Kalaeloa Barbers Point Harbor

Honouliuli, ʻEwa District, Oʻahu

FINAL
FUEL PIER DEVELOPMENT PLAN



Hawaiʻi Department of Transportation

Harbors Division

December 2016

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ABBREVIATIONS AND ACRONYMS

AASHTO	American Association of State Highway and Transportation Officials
ACI	American Concrete Institute
AISC	American Institute of Steel Construction
ASCE	American Society of Civil Engineers
ASME	American Society of Mechanical Engineers
ATB	Articulated Tug Barge
BAU	Business as Usual
BBL	Barrel
BMP	Best Management Practices
BPH	Barbers Point Harbor
BWS	Board of Water Supply, City and County of Honolulu
CFR	Code of Federal Regulations
CWB	Clean Water Branch
DA	Department of the Army, United States
DAR	Division of Aquatic Resource, Department of Land and Natural Resources
DBEDT	Department of Business, Economic Development and Tourism, State of Hawai‘i
DLNR	Department of Land and Natural Resources, State of Hawai‘i
DoD	Department of Defense, United States
DOH	Department of Health, State of Hawai‘i
DOT	Department of Transportation, State of Hawai‘i
DOT-H	Department of Transportation, Harbors Division, State of Hawai‘i
DWT	Deadweight Tonnage
EDP	‘Ewa Development Plan
EEPS	Energy Efficiency Portfolio Standard
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FGE	Facts Global Energy
FPDP	Fuel Pier Development Plan
FSP	Facilities Security Plan
FY	Fiscal Year
GDP	Gross Domestic Product

GIS	Geographic Information Systems
GPS	Global Positioning System
HAR	Hawai'i Administrative Rules
HCEI	Hawai'i Clean Energy Initiative
HECO	Hawaiian Electric Company
HNEI	Hawai'i Natural Energy Institute
HIE	Hawaii Independent Energy
HRTF	Hawai'i Refinery Task Force
ISO	International Standard Organization
IWS	Individual Wastewater Systems
kb/d	Kilo Barrels Per Day
KBPH	Kalaeloa Barbers Point Harbor
kV	Kilovolt
LHG	Liquefied Hazardous Gas
LNG	Liquefied Natural Gas
LOA	Length Overall
LPG	Liquefied Petroleum Gas or Propane
LSFO	Low Sulfur Fuel Oil
MARSEC	Maritime Security
MATS	Mercury and Air Toxics Standard
MIL-HDBK	Military Handbook
MLLW	Mean Low Lower Water
MRC	Marine Research Consultants, Inc.
MSL	Mean Sea Level
NAAQS	National Ambient Air Quality Standards
NFPA	National Fire Protection Association
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Association
NOS	National Ocean Service
NPDES	National Pollutant Discharge Elimination System
PENCO	Pacific Environmental Corporation
PIC	Person-in-Charge
RO/RO	Roll-On/Roll-Off

RPS	Renewable Portfolio Standards
SWL	Still Water Level
TWIC	Transportation Worker Identification Credential
UFC	Unified Facilities Criteria
ULSD	Ultra-low Sulfur Diesel
USACE	United States Army Corps of Engineers
USCG	United States Coast Guard
USFWS	United States Fish and Wildlife Services
WWB	Wastewater Branch, Department of Health, State of Hawai'i

GLOSSARY

Aft: Toward the stern of the boat.

Amidships: In or toward the center of the boat.

Anchor: (noun) Device usually of metal attached to a ship or boat by a cable and cast overboard to hold it in a particular place by means of fluke that digs into the bottom. (verb) To keep hold or be firmly fixed.

Apron: That portion of a wharf or pier between the waterfront edge and the (transit) shed. Strictly speaking, from the view point of construction, that portion of the wharf carried on piles beyond the solid fill.

Barge: A towed or self-propelled flat-bottomed boat, built mainly for river, canal, and coastal transport of heavy goods.

Beam: The greatest width of the boat.

Berth: A location in a port or harbor used specifically for mooring vessels while not at sea.

Bitt: A post or pair mounted on the ship's bow, for fastening ropes or cables.

Boat: A fairly indefinite term - A waterborne vehicle smaller than a ship.

Bollard: A substantial vertical pillar to which lines may be made fast.

Boom (containment): A temporary floating barrier used to contain an oil spill.

Bow: The forward part of a boat.

Break-bulk cargo: Goods that must be loaded aboard a ship individually, and not in intermodal containers or in bulk, carried by a general cargo ship.

Bulkhead: A vertical partition separating compartments; wall built parallel to the shoreline, usually near or at the high-water mark, to mitigate wave and current erosion of the uplands, and often used as a retaining wall to keep uplands from becoming submerged lands.

Bulk cargo: Cargo stored without benefit of package or container, i.e., shipped loose, as in grains or liquid.

Bulk carrier: A merchant ship specially designed to transport unpackaged bulk cargo in its cargo holds.

Bull rail: A guard, wooden, concrete or metal, placed along the outer edge of a pier wharf to prevent operating equipment from sliding.

Bunkering: Replenishment of a ship's fuel.

Call: Planned visit by a ship, especially to load or unload passengers or cargo, to obtain supplies, or to undergo repairs.

Catwalk: Narrow walkway (as long as a bridge).

Channel: The buoyed, dredged and policed fairway through which ships proceed from the sea to their berth.

Container (Types): A single rigid, non-disposable cargo box and as the case may be: ventilated, insulated, reefer (i.e. refrigerated), flat rack, vehicle rack or open top container with/without wheels or bogies attached not less than 20 feet in length, having a closure or permanently-hinged door, that allow ready access to the cargo. All types of containers will have construction, fittings and fastenings able to withstand, without permanent distortion, all the stresses that may be applied in normal service use of continuous transportation.

Container ship: A cargo ship that carries all of its cargo in truck-size intermodal containers.

Containerized cargo: Cargo that can fit physically, conveniently, and economically into a container.

Conveyor: A transfer of handling mechanism that affords continuous movement through application of power or by gravity.

Crane: A machine for hoisting weights or cargo moving them vertically/horizontally for limited distances and lowering them to new locations.

Current: The horizontal movement of water; tidal or non-tidal movement of lake or ocean water.

Deadman: An object buried in or secured to the ground for the purpose of providing anchorage or leverage.

Deadweight Tonnage (DWT): a measure of how much weight a ship is carrying or can safely carry; it does not include the weight of the ship.

Deck: The working surface of a pier or wharf or a loading surface on board a ship.

Delivery: Transfer of care and custody of containers (full or empty) and/or cargo from carrier to shipper/consignee and/or their legal representative.

Demurrage: Penalty charged shippers or receivers of freight, usually at a stated sum per day for detention beyond the free time provided for loading or unloading.

Discharge: To remove or unload cargo from a vessel.

Dock: A fixed structure attached to shore to which a vessel is secured when in port, generally synonymous with *pier* and *wharf*, except that *pier* tends to refer to structures used for tying up commercial ships and to structures extending from shore for use in fishing, while *dock* refers more generally to facilities used for tying up ships or boats, including recreational craft.

Dock, dry: A narrow basin or vessel used for the construction, maintenance, and repair of ships, boats, and other watercraft that can be flooded to allow a load to be floated in, then drained to allow that load to come to rest on a dry platform.

Dolphin: An isolated cluster of piles used as a support of mooring devices or marker lights.

Draft: The depth of a vessel below the waterline, measured to the lowest point of the hull, the bottom of the propeller, or other reference point.

Dredge: To excavate material from the bottom of a body of water.

Dry-bulk: A category of cargo stowed in large, unpackaged amounts, consisting of grain, cotton, coal, etc.

Fender: A cushion, placed between boats, or between a boat and a pier, to prevent damage.

Gangway: The opening by which a ship is boarded.

Global Positioning System (GPS): A satellite based radionavigation system providing continuous worldwide coverage. It provides navigation, position, and timing information to air, marine, and land users.

Harbor: An area of water affording a natural or artificial haven for ships.

Hatch, fuel: An opening in a pier to a fuel pipeline fitted with a watertight cover.

Head: The forwardmost or uppermost portion of the ship.

Hull: The frame or body of a ship or boat.

ISO-container: ISO or intermodal containers are used for the intermodal transport of freight. They are manufactured according to specifications from the International Organization for Standardization (ISO) and are suitable for multiple transportation methods such as truck, rail, or ship.

Jetty: An engineering structure at the mouth of a river or harbor or elsewhere to control the water flow and currents, to maintain depth of channel, to protect harbor or beach.

Layberth: A berth used for idle vessels where no loading or unloading takes place.

Length Overall (LOA): The maximum length of a vessel's hull measured parallel to the waterline, usually measured on the hull alone, and including overhanging ends that extend beyond the main bow and main stern perpendicular members.

Liquid-bulk: Liquid cargo that is transported or stored unpackaged in large volumes.

Makai: Hawaiian term for "towards the ocean."

Maritime: Of or related to the sea; i.e. maritime dependent use is a use that is dependent on the sea.

Mauka: Hawaiian term for "towards the mountains."

Midship: Approximately in the location equally distant from the bow and stern.

Mole: A massive structure, usually of stone or concrete, used as a pier, a breakwater, or a causeway between places separated by water.

Mooring: A place at which or an object to which a craft can be moored, or made fast.

Navigation: The art and science of conducting a boat safely from one point to another.

Neo-bulk: Cargo or commodities that move in large unitized loads such as newsprint, lumber, steel, construction components, etc.

Offshore: At some distance from the shore; located in the sea away from the coast.

Pier: A dock for loading or unloading ships or vessels.

Pile: Long slender column usually of timber, steel, or reinforced concrete driven into the ground to carry a vertical load.

Piling: Support, protection for wharves, piers, etc.; constructed of piles (see Pile).

Port: The left side of a boat looking forward; a harbor.

Rigging: The system of masts and lines on ships and other sailing vessels.

Roll-On/Roll-Off (RO/RO): Cargo which is rolled or driven on and off the ships, as opposed to lift on/lift off (LO/LO) or bulk loading methods.

Scow: A type of clinker dinghy, characteristically beamy and slow.

Sheet pile: A pile that is pressed or molded from sheet metal or vinyl so as to interlock with other such piles to form a retaining wall or other piling installation.

Ship: A larger vessel usually thought of as being used for ocean travel.

Spring line: A pivot line used in docking, undocking, or to prevent the boat from moving forward or astern when moored or docked.

Starboard: The right side of a boat when looking forward.

Stern: The rear end of a ship/boat.

Superstructure: The parts of the ship or a boat, including sailboats, fishing boats, passenger ships, and submarines, that project above her main deck. This does not usually include its masts or any armament turrets.

Surge: A sudden swelling, rolling or sweeping forward like that of a wave or series of waves.

Tanker (*also tank ship or tankship):* A ship designed to transport liquids in bulk.

Terminal: A berthside area where cargo is loaded to and discharged from vessels.

Tide: The periodic rising and falling of the surface of the ocean and of water bodies.

Ton: A unit of measure, may be short ton (St) (2,000 pounds), long ton (Lt) (2,240 pounds); metric ton (Met.ton) (2,204.6 pounds); measurement ton (Mt) (40 cubic feet of space); revenue ton (Rt) (any combination above, as manifested or producing the greatest revenue).

Transit shed: Wharf structure for the short-time storage of merchandise in transit.

Tug boat: A boat that maneuvers other vessels by pushing or towing them. Tugs are powerful for their size and strongly built, and some are ocean-going.

Vessel: Any craft designed for transportation on water, such as a ship or boat.

Waypoint: A location defined by navigational coordinates, especially as part of a planned route.

Wharf: A structure on the shore of a harbor or on the bank of a river or canal where ships may dock to load and unload cargo or passengers.

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1.0
Introduction

1.0 INTRODUCTION

1.1 Overview

The Hawai'i Department of Transportation (DOT) was established in 1959 to provide efficient transportation facilities and systems that support the State's commerce and economy. It is comprised of three modal divisions: Airports, Harbors and Highways. DOT, Harbors Division (DOT-H) is responsible for administering the commercial harbors system used by the cargo, passenger and fishing industries. Hawai'i Revised Statutes, Chapter 266 delineates this responsibility as the control, management, use, and regulation of commercial harbors and their improvements.

DOT-H operates and manages the State of Hawai'i's 10 commercial harbors that are situated on six separate islands, as a single integrated system. As a self-sufficient enterprise, DOT-H derives its revenues for the operation, maintenance, and capital improvements program from wharfage, rentals, dockage, port entry fees, mooring charges, demurrage, cleaning and other harbor fees.

Honolulu Harbor and Kalaeloa Barbers Point Harbor (KBPH), both on the Island of O'ahu, serve as the hub of the commercial harbors system where most cargo destined to the Neighbor Islands are transshipped from. These two harbors generate the majority of revenues that help sustain the management, operations, maintenance, and capital improvement program for the commercial harbors system. *Figure 1.1* shows the location of KBPH at the southwest corner of O'ahu. KBPH is the second busiest harbor in the state (second to Honolulu Harbor) and serves as the primary 'bulk' harbor where much of the liquid-bulk (i.e., petroleum products, chemical products, ethanol and asphalt) and dry-bulk (i.e., coal, cement, sand, aggregates and scrap metal) cargo are handled.

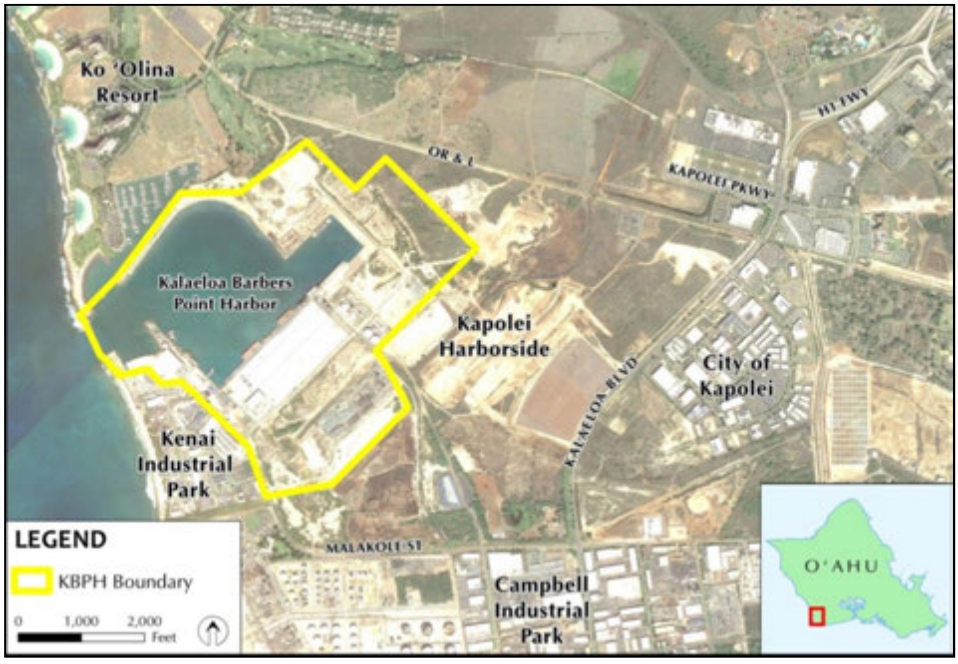

Figure 1.1 – KBPH Regional Map

In recent years, KBPH berths have become increasingly congested, causing berthing conflicts between liquid- and dry-bulk operations. It is also anticipated that imports of liquid- and dry-bulk products in Hawai'i will continue to increase. To address these issues, previous harbor plans and the *Statewide Fuel Facilities Development Plan* (2009) recommend the construction of a dedicated Fuel Pier at the Piers 3 and 4 area. This area is currently being used to moor ships under repair by Marisco, Ltd. (Marisco) in the Pier 3 area, and is unimproved except for the presence of a Finger Pier at the Pier 4 area (*Figure 1.2*). A Fuel Pier of approximately 1,325 linear feet will be constructed to accommodate various types of fuel vessels and associated products to serve the state's energy needs. In addition, a Fuel Terminal encompassing approximately 9 acres will provide product quality assurance and security-related facilities required to support the fuel transfer operations.

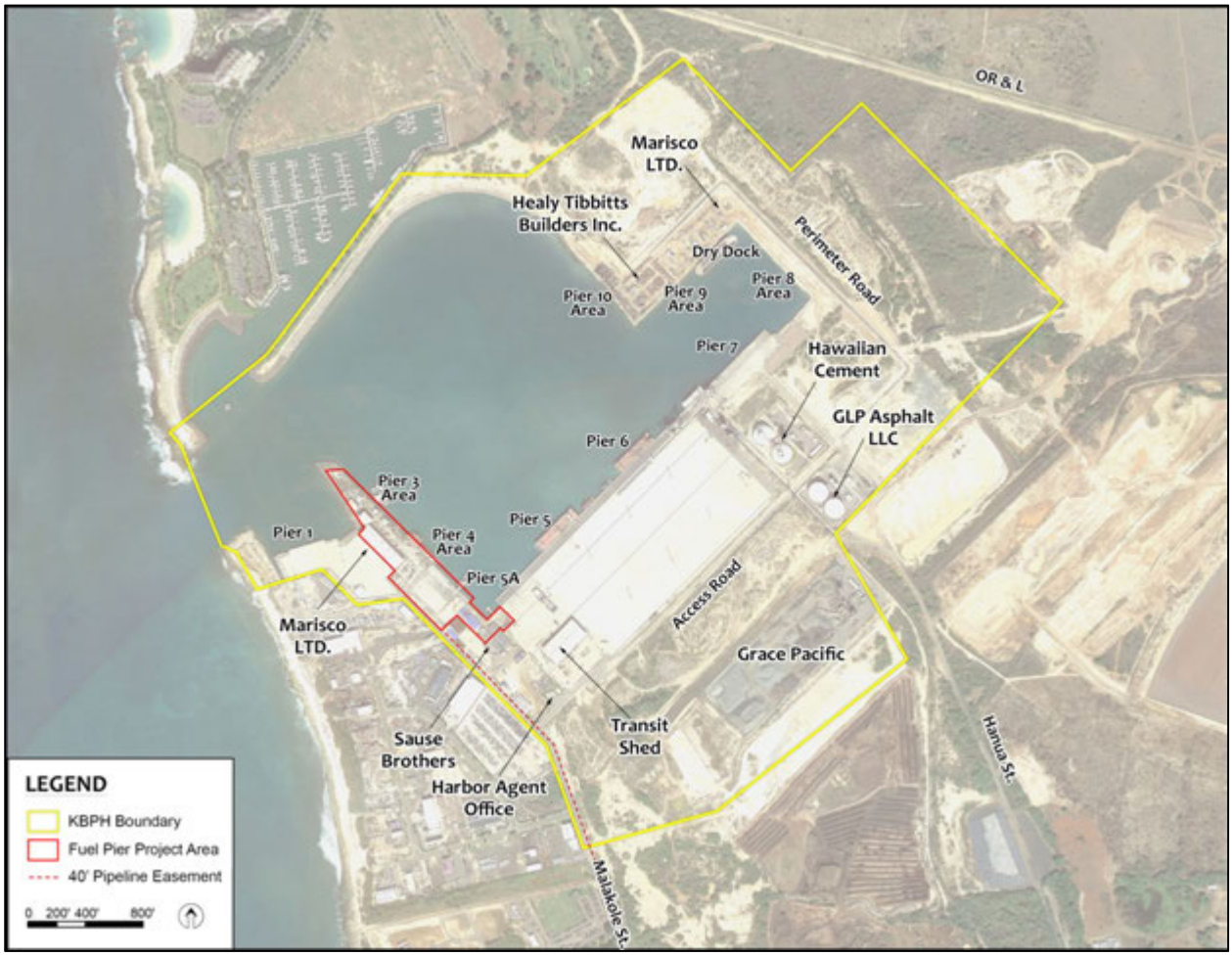

Figure 1.2 – Proposed Fuel Pier and Terminal Location at KBPH

1.2 Purpose and Need

Launched in 2008, the Hawai'i Clean Energy Initiative (HCEI) is a partnership between the State of Hawai'i and the United States (US) Department of Energy, focused on mitigating Hawai'i's energy security concerns. HCEI sets forth a plan to fulfill 70 percent of Hawai'i's energy demand using renewable sources and energy efficiency measures by 2030. These aggressive goals were increased in 2015 by Governor Ige to 100 percent 'clean' sources for power generation by 2045.

These efforts may decrease Hawai'i's demand for refined fuel products (e.g., fuel oils) used for electricity production. Subsequent to these efforts, Hawai'i's refineries may find it increasingly challenging to operate under a reduced petroleum demand scenario, and may need to export those refined fuels when they are no longer in demand. This could cause increased exports out of KBPH. Exporting product reflects poor economics of refinery operations and increases the risk that they will eventually cease operations. In the event that the refineries are forced to shut down, all or a significant portion of refined petroleum products for Hawai'i would need to be imported through the offshore moorings and/or commercial harbors system, which would also significantly increase fuel transfer activity at KBPH.

Regardless of how the refineries function, Hawai'i's utilities and transportation sector will still depend on imported petroleum products. Hawai'i's conventional petroleum-based power generating and distribution infrastructure must be upgraded to ensure a dependable fuel supply chain. In order to meet the demands of HCEI, new fuel types may also be introduced to the Hawai'i energy market. New infrastructure will be needed to accommodate these new fuels. The development of a new Fuel Pier is vital to meeting the uncertain demands for fulfilling HCEI requirements.

The Fuel Pier will also relieve berthing conflicts that occur at KBPH. Piers 5 and 6 are multi-use piers, handling container, neo-bulk, dry- and liquid-bulk cargos. This creates conflicts between interisland fuel barge operations (scheduled) and overseas dry-bulk cargo operations (chartered). Chartered ships can run into delays such as storm-related events. They may arrive one or two days before or after the planned arrival date. If a scheduled vessel is already at berth once the unscheduled vessel arrives, the unscheduled vessel has to wait for an available berth. This can incur vessel demurrage charges at costs ranging from $20,000 to $50,000 per day. It is also not unusual for a bulk carrier to be forced out and back from the berth by an advanced fuel vessel booking.

To better understand cargo trends at the harbor, a computer-generated linear trend of both dry- and liquid-bulk cargo was calculated using historic KBPH cargo data between the State's fiscal years (FY) 1995 and 2014. Because past trends may not indicate future cargo volumes, the trend line was only one of many tools used to estimate future demand (see *Chapter 3.0, Hawaii's Market Forecast and Implications).* The linear trend shows that dry-bulk cargo increased by about 34,100 short tons per year, while liquid-bulk demand was about level *(Figure 1.3).* Projected volumes of dry- and liquid-bulk products for the years 2015 to 2040 shared in questionnaire responses by harbor users *(Appendix A)* show dry-bulk is expected to climb 48 percent by 2040, and that liquid-bulk is expected to nearly flatten out at a growth rate of one percent.

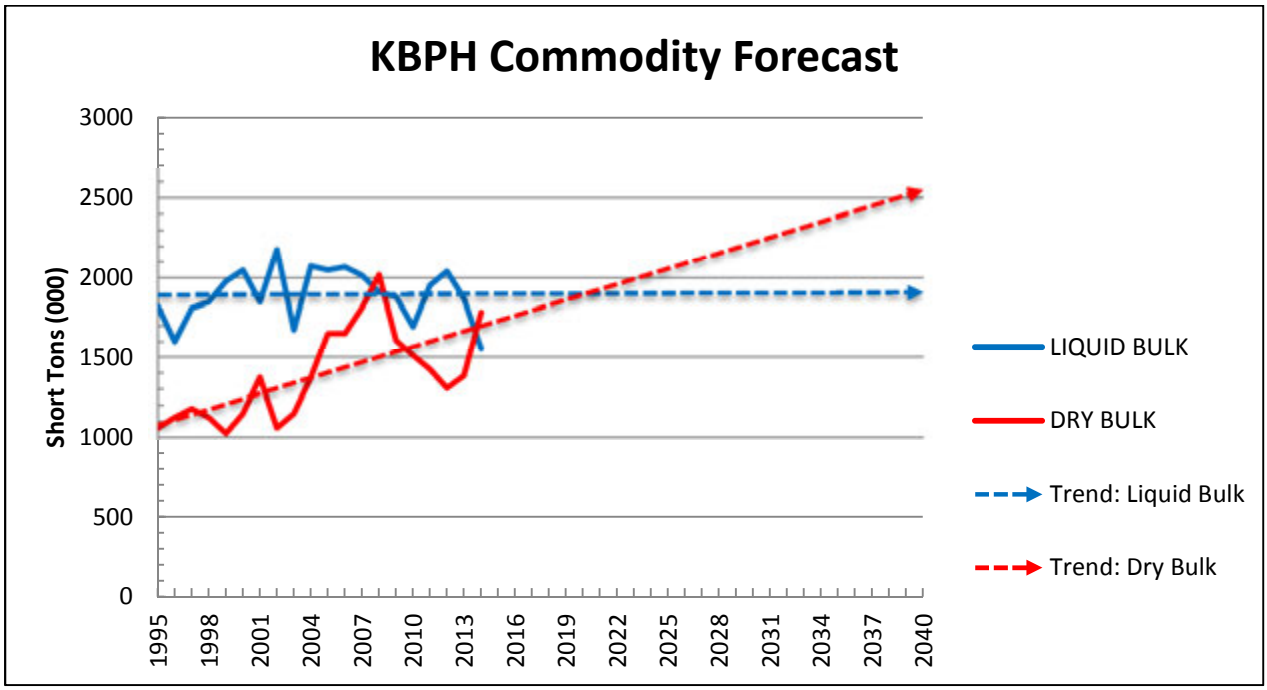

Figure 1.3 – KBPH Commodity Forecast
(Source: DOT-H Cargo Data FY 1995-2014)

Figure 1.4 shows the calculated berth utilization rates for the piers at KBPH. This takes into account unscheduled berthing and berthing limited to daylight hours. Industry standards indicate that a berth is considered fully utilized when it reaches an occupancy rate of 50 percent. This assumes that the pier cannot be occupied 'back-to-back', and that there will need to be some buffer time between calls for ships to maneuver in and out of the harbor. A berth utilization rate of 40 percent occupancy or lower is considered to be operationally acceptable, reflecting minimal operational delays. Berth utilization rates between 40 percent and 60 percent occupancy indicates periodic conflicts that may limit berthing availability and vessel utilization, due to operational inefficiencies. Berth occupancy rates between 60 and 80 percent customarily results in frequent berthing conflicts and delays, reflecting subpar optimization. Berth occupancy rates of 80 percent or higher result in regular conflicts and consistent delays.

In FY 2012, Piers 5, 6 and 7 experienced periodic conflicts, and the Finger Pier (a layberth pier) experienced frequent conflicts. Often, vessels moored at Pier 5A infringe on the Pier 5 fuel berth, and vice versa. In addition, a cement barge that berths between Piers 6 and 7 can make it difficult for a fuel tanker to offload at Pier 6, although it does allow a dry-bulk vessel to berth. The Finger Pier is the only location for non-working tugs to layberth, other than Honolulu Harbor.

The Department of Business, Economic Development & Tourism (DBEDT) real Gross Domestic Product (GDP), formerly known as the gross state product, for the State of Hawai'i forecasted growth rate (currently at 1.7 percent per year) was used in calculations to forecast berthing utilization in the year 2040, assuming a Business-As-Usual Scenario *(Figure 1.4).* The demand for this finite linear berth space exceeds capacity in 2040. Piers 5 and 6 show the potential for frequent conflicts (60 to 80 percent berth utilization), and the Finger Pier and Pier 7 reach regular conflicts (80 to 100 percent berth utilization).

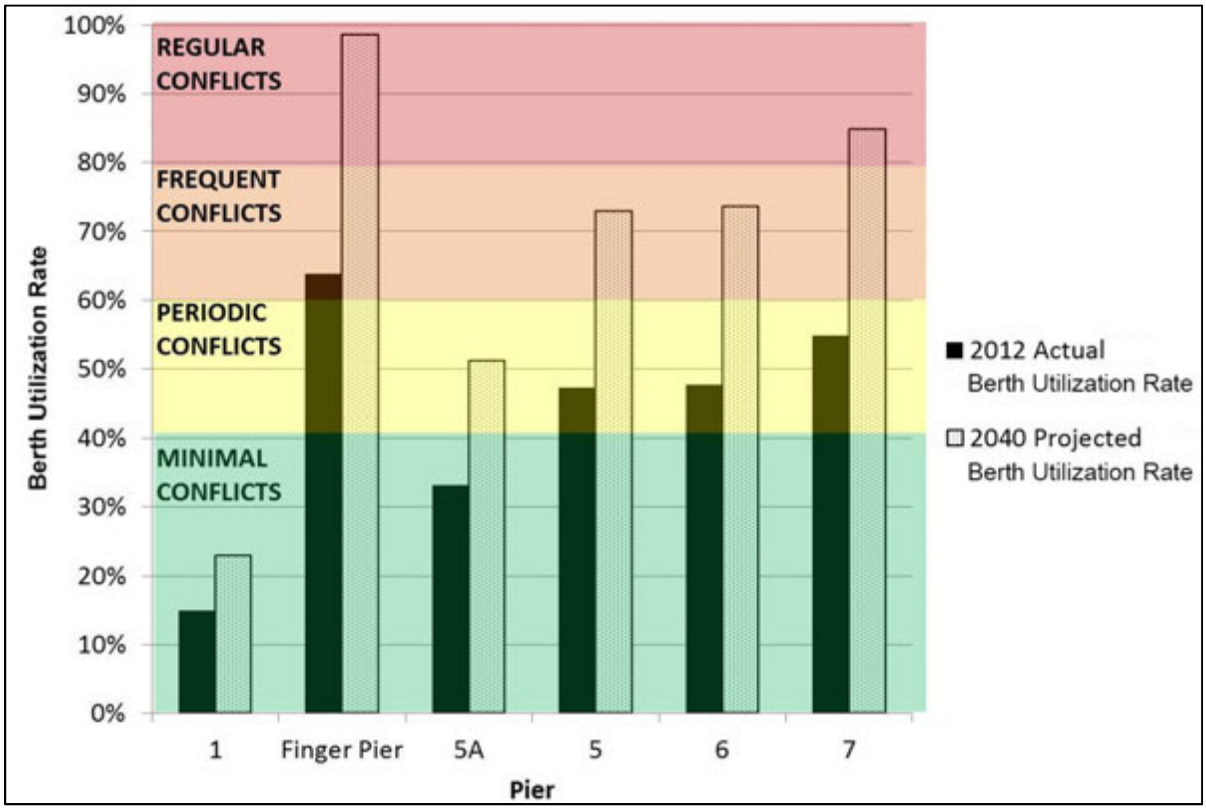

Figure 1.4 – Berthing Utilization Rates at KBPH (2012 and 2040)
(Source: DOT-H Cargo Data FY 2012)

The GDP was used for this forecast due to its correlation with personal income, which has historically shown a stable relationship with personal consumption. Hawai'i's total personal income is forecast to also grow at an annual rate of 1.7 percent in real terms over the projection period to 2040. The change in GDP depends on demand from local consumption and investment as well as from outside the region. This projection also takes into account the large government construction plans that have already been approved and scheduled for the projection period. These demands will influence bulk construction materials and vessel calls at KBPH, impacting berth utilization rates.

Fuel barges and tank ships utilize Pier 5 33.6 percent of the time, and Pier 6 9.3 percent of the time (See *Appendix B* for detailed information). By removing the liquid-bulk traffic from these piers and directing it to Piers 3 and 4, overall utilization rates at Piers 5 and 6 will fall below 40 percent and decrease conflicts. Plans for reducing berth utilization rates at the Finger Pier and Pier 7 are discussed in the *Kalaeloa Barbers Point Harbor 2040 Master Plan*.

To meet the changing and increasing fuel shipment demands at KBPH, construction of a Fuel Pier is a critical initiative. The new Fuel Pier will:

- Be designed with an understanding of the anticipated energy and fuel markets
- Have sufficient flexibility to serve an evolving fuels market
- Help to reduce the existing berthing conflicts at Piers 5 and 6
- Add overall cargo handling capacity to the harbor, providing more efficient operations

1.3 Description of the New Fuel Pier

The *KBPH Fuel Pier Development Plan (FPDP)* calls for the development of two new dedicated fuel berths at the Piers 3 and 4 area *(Figure 1.2).* At present, the Pier 3 area is being used for ship repair and dry dock operations and the Pier 4 area has a Finger Pier used for layberth and parking, both of which will be relocated to the northern end of the harbor. At full build-out, the Fuel Pier will be 1,325 feet long, capable of concurrently accommodating a Panamax tanker up to 751 feet length overall (LOA) (420,000 barrel [bbl] capacity) and a 400-foot LOA fuel tank barge (80,000 bbl capacity). An alternative berth configuration will accommodate two 600-foot LOA Handymax/articulated tug barge (ATB) tank vessels (250,000 bbl capacity) at the same time.

This vessel berthing configuration accommodates the largest LOA vessels that are currently permitted into the port (751 feet). In addition, this configuration will accommodate the anticipated future tank barges that are of service to the port (which are industry standard for the size of fuel tank barges currently being built). These fuel tank barges are anticipated to be similar to the configuration of the current interisland fuel tank barges which range from a LOA of 289 feet to 375 feet. These fuel tank barges are slightly larger and capable of increased carrying capacity compared to the current fuel tank barges in Hawai‘i service.

Three alternative Fuel Pier designs were considered in the planning process (full size figures available in Chapter 5):

- Alternative A is a protruding segmented partial pier configuration, as recommended in the *Statewide Fuel Facilities Development Plan* (2009). The protruding pier structures in this option are located up to 60 feet offshore, composed of a series of pile-supported fuel transfer platforms and breasting dolphins.

- Alternative B is a full-length continuous platform open wharf on pilings, consisting of concrete slabs spanning between concrete (cap) beams that are supported by precast, pre-stressed concrete piles driven into the harbor floor.

- Alternative C is a continuous tied-back bulkhead wharf, where interconnected steel sheet piling is used to provide a solid, vertical bulkhead behind which backfill is placed to form a contiguous yard area.

Stakeholder requirements, performance and flexibility, environmental factors, and order of magnitude construction cost estimates were considered in the selection of the preferred Fuel Pier design alternative.

Supporting the Fuel Pier will be a landside terminal encompassing approximately nine acres. A new fuel control and administration building with a second-story observation deck, maintenance building, security guard shack and parking area is recommended for development. Additional detailed information is located in *Chapter 5.*

Aboveground pipeline racks are recommended for the Fuel Terminal to facilitate changes or future expansion in pipe configurations, as well as to allow for routine visual inspection and maintenance. The pipelines will be located shoreside of an access route to accommodate line handling requirements for a standard forklift, and eliminate overhead crossing of mooring lines over an aboveground pipeline rack system. The pipeline racks and pipelines will go belowground near the boundary of the Fuel Terminal so that they can be connected to the existing pipes near the junction with Pier 5A and along Malakole Street, conveying fuel to the off-site storage facilities. Additional infrastructure, including spill response, fire suppression, additional safety measures and utilities are recommended to facilitate a safe and operational Fuel Pier.

1.4 Development Plan Process

The planning process for the *FPDP* included five elements, as outlined below:

1. **Research and Data Collection**
   The first phase of planning identified the potential opportunities and constraints for Fuel Pier design alternatives. Reconnaissance included site visits, workshops and interviews with stakeholders, and engagement of the community through public information meetings. These actions helped to identify needs and concerns regarding the project plan and scope.

2. **Demand Assessment**
   The Hawai'i fuels market was analyzed and various future fuel scenarios were forecasted in order to determine petroleum product demand, imports, transshipments and exports. These fuel quantities projected demand for berthing and storage space needed at KBPH.

3. **Alternatives Formulation and Evaluation**
   A range of Fuel Pier design alternatives were formulated to address the anticipated future needs and functions of the facilities. Several different mooring and berthing options were considered with regard to operational performance and environmental impacts. Input from stakeholders also helped to guide and evaluate the alternatives.

4. **Conceptual Design and Cost Projections**
   A cost estimate for the selected range of alternatives was developed for further evaluation. Rough order-of-magnitude construction costs for each alternative were prepared to guide Capital Improvement Programming.

5. **Plan Preparation**
   The *FPDP* summarizes each phase of study that lead to decision-making and justification of a preferred Fuel Pier design alternative.

1.5 Literature Review

Earlier studies and reports listed below were reviewed as part of the *FPDP* planning effort.

- ***Plan for Barbers Point Harbor Facilities and Expansion of James Campbell Industrial Park* (1977).** This plan estimated the types and volumes of commodities expected to be handled at the proposed Barbers Point Harbor, reviewed and commented on alternative harbor configurations prepared by the Unites States Army Corps of Engineers (USACE), and presented a series of plans that illustrate the phased development of four types of marine terminals through the year 2030: container; interisland; bulk- and break-bulk cargo; and petroleum. The initial port development was estimated to require 246 acres of land and expected to be operational in the early 1980s. Dredging of the harbor was estimated to produce approximately 12.8 million cubic yards of coral that would be stockpiled, requiring about 250 acres of land for a 30 to 35 foot high pile. Actual dredging produced approximately 3 million cubic yards of coral on 100 acres. The report included plans for vehicular circulation, land use, site subdivision, grading, utilities and staging of industrial development. Finally, a schedule was included that related the various phases of development activities at both the port and neighboring industrial park.

- ***Development Plan for Barbers Point Harbor* (1983).** In anticipation of O'ahu's increase in ocean shipping to the year 2030, a Barbers Point Harbor Task Force was convened to guide the development of the harbor. This development plan recommended the following improvements/uses for each pier:

    - Pier 1 - An off-loading pier for commercial Class A high explosives;
    - Pier 2 - A small petroleum pier for loading interisland barges;
    - Pier 3 - The main petroleum pier for loading petroleum products from nearby refineries as well as general cargo unloading as needed;
    - Pier 4 - The designated dry-bulk cargo pier; and
    - Piers 5 through 9 – Capable of handling general cargo and roll-on/roll-off (RO/RO) shipments.

    Additional construction included a control tower/pilot house, two personnel shelters, a new Harbor Office Building, and a prefabricated open cargo shed for general cargo area to the rear of Piers 5 and 6.

- ***2010 Master Plan for Barbers Point Harbor* (1991).** This report provided a long-range development planning guide for the improvement of Barbers Point Harbor due to increased economic growth and expansion related to the harbor and surrounding area. Recommendations from the plan included:

    - Deepening the harbor and channel to accept more fully laden Panamax vessels;
    - Dredging a 90-degree angle at Piers 4 and 5;
    - Providing a dedicated Fuel Pier at Piers 3 and 4;
    - Construction of a control tower at the end of Pier 3 for local traffic control;
    - Provision of facilities to accommodate smaller support vessels, even if temporary;
    - Construction of transit sheds; comfort stations at Piers 6 and 9;
    - Immediate depletion of stockpiles No. 2 and 3;

- Relocation of the access road;
- Provision of perimeter lighting to allow for vessel movement after dark;
- Provisions for measuring real-time current conditions for pilot use; and
- Purchase of additional lands.

- ***O'ahu Commercial Harbors 2020 Master Plan* (1997).** This plan served as a planning guide for the O'ahu commercial port and harbor facilities of Honolulu, Kewalo Basin, and Barbers Point Deep Draft harbors. At Barbers Point it recommended a new access road, dredging additional berths, deepening the basin to accommodate future demand for cargo, dredging and flaring of the harbor's entrance channel, and construction of a jetty to attenuate cross-currents. Development of a dedicated Fuel Pier and control tower with perimeter lighting was recommended to accommodate liquid-bulk carriers and future bunkering operations at Pier 4. This was in addition to the private pipelines at Piers 5 and 6. It recommended moving the dry dock operation at Pier 4 to the northwest area of Barbers Point.

- ***Study of Fuel Prices and Legislative Initiatives for the State of Hawai'i* (2003).** This report, also known as the *Hawai'i Fuels Study*, was prepared by the DBEDT and described Hawai'i's supply and demand for fuels as well as the petroleum infrastructure on O'ahu and Neighbor Islands. Interisland barging operations for petroleum products were also outlined, describing the adequacy of Hawai'i petroleum infrastructure. The report also addressed the potential role of a public terminal, cost and revenue structure of the petroleum industry, fuel markets, supply barriers and price controls. The process included stakeholders' input and evaluation of options available to the legislature.

- ***Hawai'i Harbor Users Group Report on Port Facilities and Development Priorities* (2005).** This report described Hawai'i commercial harbors deficiencies due to limitations on the availability of berth and terminal resources. The shortage of port facilities on many Neighbor Islands was brought about by the continued growth in intra and interstate cargo, the cruise ship industry, and interisland ferry. The report also listed development priorities for KBPH. These included improving channel width/depth and breakwater arrangement (as noted in previous plans), and expanding berth capacity to accommodate increasing demand. The report also recommended extending the pipeline system at KBPH to create more locations, and possibly a dedicated location, where fuel barges can load to increase flexibility and capacity. This action would have freed up the main KBPH berths (i.e., Piers 5A, 5 and 6) to serve increasing general cargo operations.

- ***Hawai'i Biofuels Summit Briefing Book* (2006).** DBEDT held a Biofuels Summit to bring together a broad range of biofuels stakeholders to identify existing barriers and propose possible solutions. One point of discussion was the need for additional information from DOT-H regarding cost, logistics, and harbor land use and siting capacity to handle bulk biodiesel cargo. The Briefing Book provided a snapshot of policies and resource conditions at the time of the summit.

- ***Hawai'i 2050 Sustainability Plan* (2008).** The 2050 Sustainability Task Force was created by the Hawai'i State Legislature to review the *Hawai'i State Plan* and the state's comprehensive planning system, and to create the *Hawai'i 2050 Sustainability Plan*, known as "Hawai'i 2050". The Task Force was placed under the Office of the Auditor, and was comprised of a mix of public and private sector representatives. The first statewide planning initiative in more than 30 years, "Hawai'i 2050" created a long-term action agenda to achieve sustainability for the State, and consolidated into one document key goals and initiatives from a variety of long-term strategic efforts. These key goals relate to: A Way of Life, The Economy, Environment and Natural Resources, Community and Social Well-Being, and Kanaka Maoli Culture and Island Values. An objective of the Economy goal was to plan ahead for the financing of infrastructure (including harbors) so that transportation and other vital economic systems are prepared to manage and accommodate planned growth. An objective of the Environment and Natural Resources goal was to aggressively address the impacts of global warming and rising sea levels on harbors and waterfront properties. This plan does not replace the *Hawai'i State Plan* or take precedence over other governmental plans. Each county had representatives participate on the Task Force, and "Hawai'i 2050" was a guide for each county to further their sustainability efforts.

- ***Hawai'i Bioenergy Master Plan* (2009).** The *Bioenergy Master Plan* was developed in accordance with Act 253, Session Laws of Hawai'i (SLH) 2007, which called for a bioenergy master plan to "set the course for the coordination and implementation of policies and procedures to develop a bioenergy industry in Hawai'i." The *Bioenergy Master Plan's* primary objective identified in the legislation was to "develop a Hawai'i renewable biofuels program to manage the State's transition to energy self-sufficiency based in part on biofuels for power generation and transportation." The *Bioenergy Master Plan* studied the primary value chain components necessary for a successful bioenergy industry – feedstock production and logistics, conversion, distribution, and end use. The 'Potential and Actions' section addressed the five outcomes mandated in Act 253 as well as Hawai'i's potential to rely on biofuels as a significant renewable energy resource. It also provided a bioenergy industry roadmap, identified strategic partnerships, addressed biofuels demonstration projects, and considered methods for promoting biofuels resources for use in Hawai'i as well as an export.

- ***Statewide Fuel Facilities Development Plan* (2009).** This development plan focused on needed facility improvements in Hawai'i's commercial harbors to allow for a continued safe and secure fuel supply chain. The development plan presented the design approach for fuel piers and components of fuel facilities. It also explored fuel facility alternatives in the existing commercial harbors. The development plan recommended that flexibility in design and construction are a key consideration for future fuel facilities in the commercial harbors to accommodate Hawai'i's changing fuel and energy needs. For KBPH, the development plan provided recommendations for facility improvements to Piers 3 and 4, with the anticipation that KBPH will become the hub for Hawai'i's fuel system. Both fuel berths were planned as protruding pier structures, composed of fuel transfer platforms and breasting dolphins. Main pier components of the two fuel berths included fixed fire-fighting systems and a vapor control system. Three options for ancillary facilities are also proposed, which would provide support functions to the two new fuel berths.

- ***Roundtable on Sustainable Biofuels Certification Readiness Study: Hawai'i Biofuel Projects* (2012).** Initiated by a recommendation in the *Hawai'i Bioenergy Master Plan* (HNEI, 2009), the Hawai'i Natural Energy Institute commissioned the Hawai'i Biofuels Foundation to develop a roadmap to certification of a biofuel entity in Hawai'i. Existing standards developed by the Roundtable on Sustainable Biofuels (RSB), a multi-stakeholder organization hosted by the Swiss Federal Institute of Technology in Lausanne, were recognized as suited to the Hawai'i situation. The voluntary standards were applicable to every feedstock and were not limited to specific processing or final product. The Readiness Study summarized findings from a literature review, and seminar and community stakeholder meetings. Highlights included an overview of "readiness" of current biofuels projects for certification to RSB Standards; a roadmap for Hawai'i projects to achieve RSB Certification; and a proposed framework for stakeholder engagement. Recommendations for both potential participating operators and RSB concluded the report.

- ***'Ewa Development Plan* (2013).** The 'Ewa region has been identified as one of two main regions on O'ahu which has expected population growth and development activity over the next 25 years. The *'Ewa Development Plan* (EDP) was prepared in accordance with Charter-prescribed requirements and utilized a community-based planning approach led by the City and County of Honolulu's Department of Planning and Permitting. The EDP summarized a vision for the region, and listed the land use and infrastructure policies of the plan and the means of implementation. Elements of the vision included:

    - Protect Agricultural Land and Open Space
    - Develop the Secondary Urban Center
    - Build Master Planned Residential Communities
    - Protect Natural, Historic, and Cultural Resources
    - Provide Adequate Infrastructure

  KBPH plays a role in the development of a secondary urban center on O'ahu by supporting the region's commercial and industrial centers. General policies in the EDP addressed resort development to the north and industrial park development to the south of KBPH.

- ***Hawai'i Refinery Task Force Closure Report* (2013).** According to the Governor of Hawai'i Executive Order 13-01, the purpose of the Hawai'i Refinery Task Force (HRTF) was to assess the impacts to changes in Hawai'i's refinery capacity and to provide advice and recommendations on matters involving a future fuels ecosystem. This initial report identified the following:

    - Key issues associated with the closure of the Tesoro refinery;
    - Current status of the transition process to convert the refinery to a 'terminal' operation, as well as Tesoro's role from a refiner, supplier and marketer to a supplier and marketer in Hawai'i; and
    - Overview of the Hawai'i Fuel Market and impact of the transition to date.

  One key issue with the closure of a refinery is that the increased importing of products may likely create added congestion at KBPH and Honolulu Harbor. Congestion and delays in offloading imports and loading barges to Neighbor Islands can be very disruptive to the stable supply of products, as there are already delays at KBPH.

- ***Hawai'i Statewide Transportation Plan* (2013).** The seventh edition of the *Hawai'i Statewide Transportation Plan* was released in 2013. A policy document, its chief focus was development of an updated set of goals and objectives that can guide system-level plans and master plans for air, water and land modes of transportation. Research and review of important issues facing the transportation system led revisions in goals and objectives to reflect:

    - Emphasis on security requirements as separate from safety needs;
    - Adaptation of the transportation system to the effects of climate change and sea level rise; and
    - Inclusion of a goal for clean energy, less dependence on imported oil, more use of renewable sources, and greater energy efficiency

- ***Hawai'i Refinery Task Force Interim Report* (2013).** Following the sale of the Tesoro refinery to Par Petroleum, HRTF issued its second report (referred to as the Interim Report) in November 2013. This report focused on several challenges to the sustainability of ongoing refinery operations in Hawai'i and explored options to mitigate the impacts of potential refinery closures. The Interim Report concluded that one or both of the state's refineries are likely to close by 2020 and, since Hawai'i will still be heavily dependent on petroleum fuels over the coming decades, emphasized two sets of actions needed to help ensure a smooth transition toward the state's future energy ecosystem:

    - Work to resolve several specific regulatory challenges that are having significant impacts on the refineries; and
    - Maintain access and make improvements to critical fuels infrastructure, particularly the import infrastructure needed to sustain supply should one or both refineries close.

    The urgency for Hawai'i to fully understand and prepare for the potential refinery closure reflects a range of factors, including the long lead time and consensus of approach that are necessary to enable critical fuel-related infrastructure initiatives such as the Kalaeloa Barge Harbor master plan development, and separate efforts to evaluate the facilities necessary to import liquefied natural gas.

- ***State of Hawai'i Energy Resources Coordinator's Annual Report* (2013).** This report describes many activities of DBEDT, Energy Office during the 2013 calendar year. Statutory responsibility of the Director of DBEDT includes review of proposed state actions found to have significant effects on the state's energy objectives and to report to the Governor of Hawai'i their effects on the energy program. The state's energy objectives stem largely from the landmark HCEI, establishing a goal of 70 percent clean energy by 2030. This annual report provided a snapshot of Hawai'i's current energy landscape in four key areas: renewable portfolio standard, energy efficiency portfolio standard, economic growth and entrepreneurship and innovation. The report also summarized progress towards high-impact solutions expected to translate into technical, economical, policy and cultural clean energy resolutions for Hawai'i. A summary of program funding was provided. Finally, the report identified areas the Energy Office will examine or participate in for possible future action.

- ***Hawai'i Refinery Task Force Final Report* (2014).** This was the third and final report of the Hawai'i Refinery Task Force (HRTF). It built on the findings contained within the first two volumes and provided recommendations for specific transitional measures needed through 2020. In the event of both refineries closing, the refineries should be modified to manage most product imports through the single point moorings. KBPH imports would be primarily for specific products such as naphtha, propane, and asphalt, and on occasion gasoline or diesel. Ethanol movements were not expected to change if the refineries close. Instead, ethanol movements will be dictated by future gasoline consumption, which was expected to decline steadily over the coming decade. Lastly, asphalt imports would shift exclusively to KBPH, though asphalt was largely sourced through KBPH imports even when the refineries are operating.

- ***Hawai'i Clean Energy Draft Programmatic Environmental Impact Statement* (2014).** Section 355 of the Energy Policy Act of 2005 (EPAct 2005) directed the US Department of Energy (DOE) to assess the economic implications of Hawai'i's dependence on imported oil as the principal source of energy and to explore the technical and economic feasibility of increasing the contribution of renewable energy resources for both electricity generation and fuel for various modes of transportation. In furtherance of the provisions of Section 355 of EPAct 2005, DOE and the State of Hawai'i entered into a Memorandum of Understanding (MOU) in January 2008. This MOU established a long-term partnership known as HCEI to transform the way in which energy efficiency and renewable energy resources are planned and used in the state. DOE's primary purpose in preparing this Programmatic Environmental Impact Statement (PEIS) is to provide information to the public, Federal and State agencies, Native Hawaiian and other organizations, and future energy developers on the potential environmental impacts of a wide range of energy efficiency activities and renewable energy technologies that could be used to support the HCEI. For this PEIS, DOE and the State of Hawai'i identified 31 clean energy technologies and activities associated with potential future actions and grouped them into five clean energy categories:

    - Energy Efficiency;
    - Distributed Renewable Energy Technologies;
    - Utility-Scale Renewable Energy Technologies;
    - Alternative Transportation Fuels and Modes; and
    - Electrical Transmission and Distribution

    DOE is not proposing to develop any specific project, activity, or technology at this time and, therefore, cannot and does not analyze impacts of specific projects.

- ***Hawaiian Electric Companies Fuels Master Plan* (January 2015).** Hawaiian Electric Company's (HECO) *Fuels Master Plan* recommended ways to reduce fuel costs for the benefit of its customers. HECO recently lowered low sulfur fuel oil (LSFO) pricing by sourcing all of its LSFO volumes through 2016 with Chevron. Biofuel costs were also lowered by negotiating a new biodiesel contract with Pacific Biodiesel Technologies. In addition, HECO is now operating and maintaining the Kahe and Waiau Pipelines and Barbers Point Tank Farm, previously operated and maintained by Chevron. The realized cost reduction is expected to be approximately $1.2 million per year. To ensure Environmental Protection Agency (EPA)-mandated Mercury and Air Toxic Standards (MATS) compliance by April 2106, HECO has revised their operating and maintenance procedures while still using 100 percent LSFO. By the end of 2024, if they are not using liquefied natural gas (LNG) as a fuel, it is anticipated that HECO will need to use a LSFO/diesel blend as a replacement for LSFO to comply with National Ambient Air Quality Standards (NAAQS). Should this occur, a LSFO/diesel blend could remain as a secondary or contingency fuel source even after the transition of HECO's generating units to natural gas. Having both LSFO/diesel blend and natural gas options will minimize HECO's risks that come from reliance on a remotely-located single fuel type or contract source. As Hawai'i's renewable energy sources expand, the projected future demand for fuel oil to serve power generation will decline substantially.

Summary of Literature Review Findings

These plans and studies have helped guide the evolution of harbor development at KBPH and the recommendation to develop the Fuel Pier. For example, it was proposed from the early stages to separate marine terminals by cargo type *(Plan for Barbers Point Harbor Facilities and Expansion of James Campbell Industrial Park*, 1977). In 1983, the *Development Plan for Barbers Point Harbor* recommended Pier 2 for development as an interisland petroleum barge terminal, and Pier 3 as the main petroleum pier. Development of Piers 3 and 4 as a dedicated Fuel Pier was suggested in the *2010 Master Plan for Barbers Point Harbor* (1991) as well as the *O'ahu Commercial Harbors 2020 Master Plan* (1997). Hawai'i's petroleum infrastructure, including interisland barge operations, was analyzed in the 2003 *Hawai'i's Fuels Study.* The *Hawai'i Harbor Users Group Report on Port Facilities and Development Priorities* (2005) recommended additional fueling berths at KBPH, and possibly a dedicated location, to free up the main piers for increasing general cargo operations.

The 'Ewa Development Plan (2013) recognizes that KBPH plays a role in the development of a secondary urban center on O'ahu by supporting the region's commercial and industrial centers. The *Hawai'i 2050 Sustainability Plan* (2008) lists as an objective to plan ahead for the financing of infrastructure (including harbors) so that transportation and other vital economic systems are prepared to manage and accommodate planned growth, while the *Statewide Fuel Facilities Development Plan* (2009) focuses on Hawai'i's commercial harbors and their ability to allow for a continued safe and secure fuel supply chain. This plan recommends development of a dedicated Fuel Pier at Piers 3 and 4 as the state priority harbor facility improvement. Updated goals and objectives of the 2013 *Hawai'i Statewide Transportation Plan* reflect the emphasis on security requirements as separate from safety needs, and adaptation of the transportation system to the effects of climate change and sea level rise.

The Hawai'i Refinery Task Force Closure Report (2013), Interim Report (2013), and Final Report (2014) assess the impacts to changes in Hawai'i's refinery capacity and to provide advice and recommendations on matters involving a future fuels ecosystem. One key issue with the closure of a refinery is that the increased importing of products may likely create added congestion at KBPH and Honolulu Harbor. Congestion and delays in offloading imports and loading barges to Neighbor Islands can be very disruptive to the stable supply of products, as there are already delays at KBPH. To ensure a smooth transition toward the state's future energy ecosystem, it was recommended to work on regulatory challenges faced by the refineries as well as make improvements to critical fuels infrastructure.

Fuel studies reviewed biofuels as a significant renewable energy source and identified the need for logistics with DOT-H and other partners (*Hawai'i Biofuels Summit Briefing Book,* 2006; *Hawai'i Bioenergy Master Plan,* 2009; *Roundtable on Sustainable Biofuels Certification Readiness Study,* 2012). HECO reviewed ways to reduce fuel costs for the benefit of its customers by looking at biofuels and other alternative fuel sources in their January 2015 *Fuels Master Plan.* On the renewable energy pathway, the *Hawai'i Clean Energy Draft Programmatic Environmental Impact Statement* (2014) reviews the potential environmental impacts of a wide range of energy efficiency activities and renewable energy technologies that could be used to support the HCEI. *State of Hawai'i Energy Resources Coordinator's Annual Report* (2013) summarized Hawai'i's progress towards high-impact energy solutions expected to translate into technical, economical, policy and cultural clean energy resolutions for Hawai'i.

These and additional technical studies gave a general understanding of Hawai'i's energy future and how this will affect operations at KBPH. This information underscores the need for a dedicated Fuel Pier to service this evolving industry.

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2.0
Existing Conditions

2.0 EXISTING CONDITIONS

2.1 Regional Overview

Kalaeloa Barbers Point Harbor (KBPH) is located at the southwestern tip of O'ahu (*Figure 1.1*). It is adjacent to the island's major industrial center at James Campbell Industrial Park. The area includes two refineries, a gas production plant, and several large fuel storage tank facilities. KBPH and fuel storage terminals connect to a regional fuel pipeline system between Barbers Point and Honolulu known as the Energy Corridor.

2.2 Historical Development of KBPH Fuel Piers

In 1961, a small barge harbor was excavated from nine acres of Campbell Estate lands at Barbers Point. Some twenty years later in 1982, the United States Army Corps of Engineers (USACE) dredged an additional portion of the harbor which became Barbers Point Deep Draft Harbor. USACE turned over control of the 387-acre harbor to the Department of Transportation, Harbors Division (DOT-H) in May 1986, including the entrance channel, harbor basin, upland area, and a 4,700-foot long wave energy absorbing revetment system along the northern and western periphery of the main basin.

Barbers Point Harbor (BPH) officially opened on May 31, 1990, with the completion of a 1,600-foot long pier and 30-acre cargo yard. In conjunction with the construction of the new pier, a total of 16 petroleum product pipelines were installed by the fuel industry. Pacific Resources, Inc. installed a total of 11 pipelines serving Pier 5, nine of which also serve Pier 6. These fuel pipelines were designed to handle a variety of petroleum products ranging from black oil to liquefied petroleum gas (LPG, also known as propane). Chevron and Texaco installed another three pipelines and Hawaiian Electric Company installed two more as contingency, which were never placed into service. These lines were installed with the intent of bunkering (i.e., fueling vessels while at berth) as well as distributing petroleum products.

In 1997, Aloha and Texaco created a partnership and expanded the off-site storage at Barbers Point to 0.5 million barrels, so that it could receive full size cargo shipments (often combinations of gasoline and diesel). They started importing fuel in 1997 and 1998. During this time, DOT-H enlarged the harbor basin along the northeast portion of the harbor with a rectangular expansion area measuring 600 feet by 1,100 feet and 38 feet deep. In 1999, at the time Barbers Point Naval Air Station was turned over to the State and renamed Kalaeloa (meaning long cape or headland in Hawaiian), DOT-H renamed BPH to Kalaeloa Barbers Point Harbor.

2.3 Fuel Piers and Statewide Fuel Distribution System

2.3.1 Existing KBPH Fuel Piers

KBPH is one of two commercial harbors on O'ahu and the second busiest port in the state (second to Honolulu Harbor). Due to its close proximity to the island's two refineries and associated fuel infrastructure, KBPH serves as the hub for Hawai'i's fuel supply system as well as for the interisland distribution of finished petroleum and non-petroleum products. KBPH is capable of handling liquid- (i.e., petroleum products, ethanol and asphalt) and dry-bulk (i.e., coal, cement, sand, aggregates and scrap metal) cargos and provides space for ship maintenance and repair activities. It surpasses Honolulu Harbor in liquid-bulk cargo volume and offers a number of specialized bulk cargo handling facilities not found in Honolulu Harbor (i.e., a coal bulk unloader system and a pneumatic cement pump system).

The existing facilities at KBPH are shown in *Figure 1.2* and listed below. Several piers currently serve various bulk transfer functions:

- **Pier 1:** A barge basin (also known as barge harbor) that provides berthing of barges for Neighbor Island delivery of liquefied petroleum gas (LPG, also known as propane).
- **Pier 2:** Currently unimproved.
- **Pier 3:** Unimproved area with mooring for a dry dock and ship repair operations.
- **Pier 4:** A Finger Pier that serves as a layberth for tug boats and other small vessels.
- **T-Pier:** Located at the intersection of Piers 4 and 5A, this pier serves oil spill response vessels.
- **Pier 5A:** Mooring for sand, aggregate, neo-bulk, and container vessels. Many vessels use this pier for layberth. Pier 5A has an integrated barge ramp, with a 45,000-square foot transit storage shed located to the east of the pier.
- **Pier 5:** Mooring for sand, aggregate, neo-bulk, container and petroleum vessels. It is considered a bulk-unloader berth, and an alternative roll-on/roll-off (RO/RO) auto carrier berth.
- **Pier 6:** Mooring for dry-bulk, neo-bulk, general cargo, liquid asphalt, scrap metal, coal and petroleum vessels. A temporary pipeline is constructed for each liquid asphalt shipment. This pier contains a coal bulk unloader/trenched conveyor system to affect the offloading transfer of bulk coal.
- **Pier 7:** Mooring for dry-bulk, neo-bulk, general cargo, liquid asphalt, scrap metal, and cement vessels. A pneumatic pump unloader and silos transfer and store cement.
- **Pier 8:** Currently unimproved.
- **Pier 9:** Berthing for a dry dock.
- **Pier 10:** Currently unimproved.

An interconnecting pipeline system known as the Energy Corridor connects KBPH to the refineries and their associated storage facilities located in James Campbell Industrial Park. Currently, there is no fuel storage within DOT-H's boundaries. Fuel products are held in off-site storage facilities until the fuel is ready to be loaded on barges for distribution to the Neighbor Islands. Piers 1, 5, and 6 handle fuel products *(Figure 2.2).*

Hawai'iGAS primarily uses the pipeline at Pier 1 for transfer of bulk LPG *(Table 2.1).* Aloha Petroleum also has two backup petroleum pipelines at Pier 1 that have not been used since 2008. Additional pipelines at Piers 5 and 6 are owned and/or operated by Hawaii Independent Energy (HIE) or Aloha Petroleum. These lines include fuel oil, ethanol, diesel, gasoline (regular and premium), black oil, clean product, and ultra-low sulfur diesel (ULSD). HIE pipelines are single lines with service capabilities (raiser connections) to Piers 5 and 6. Many pipelines were laid at the time of pier construction, but were never put into service and terminate near Pier 5A.

Table 2.1 - KBPH Pipeline Summary

PIPELINE TYPE	LOCATION		
	PIER 1	PIER 5	PIER 6
HAWAI'IGAS LPG	1 x 4″, 1 x 8″		
ALOHA FUEL OIL	2 x 8″		
ALOHA ETHANOL		1 x 8″	
ALOHA DIESEL		1 x 8″	
ALOHA REGULAR GAS		1 x 8″	
ALOHA PREMIUM GAS		1 x 8″	
HIE BLACK OIL		1 x 20″	
HIE CLEAN PRODUCT		1 x 12″	
HIE GASOLINE		1 x 10″	
HIE ULSD		1 x 10″	
NOT IN SERVICE	2 x 8″ (Aloha)	2 (HECO: 1 x 12″, 1 x 20″) 1 (Cutter) 3 (Aromatics: 2 x 8″, 1 x 10″)	4 (HIRI: 4 x 10″) 3 (Chevron) 1 (Cutter)

KBPH also has a major refined product import terminal apart from those of the refiners. The Aloha Petroleum, Ltd. (Aloha) storage terminal, jointly owned with US Restaurants Properties and located in James Campbell Industrial Park, has a total capacity of 460,000 barrels. It is linked to the barge docks and the deep water berths in KBPH. Aloha is an independently owned gasoline, diesel, biodiesel, ethanol, and CITGO Lubricants distributor, which supplies about 30 percent of the Hawai'i retail gasoline market. Aloha is the only non-refiner wholesaler in Hawai'i capable of directly receiving full-sized cargo vessels.

2.3.2 KBPH's Role in the Hawai'i Fuel Distribution System

O'ahu is served by two fuel ports: Honolulu Harbor and KBPH, which import refined petroleum products that are held in storage tanks offsite. Both harbors handle gasoline, diesel and ethanol. In addition, Honolulu Harbor handles jet fuel, and KBPH handles fuel oil and propane (liquid petroleum gas [LPG]). In addition, crude oil is imported at one of two offshore moorings where it is transferred via undersea pipelines to onshore storage tanks at the refineries. After the crude oil is refined, the refined products are held in off-site storage facilities before they are distributed on O'ahu or to the Neighbor Islands. Both Honolulu Harbor and KBPH have fuel pipelines that allow for the exporting of refined products on O'ahu to the Neighbor Islands (*Figure 2.1*). Fuel products exported to the Neighbor Islands are mostly transported in towed multi-compartment bulk product barges.

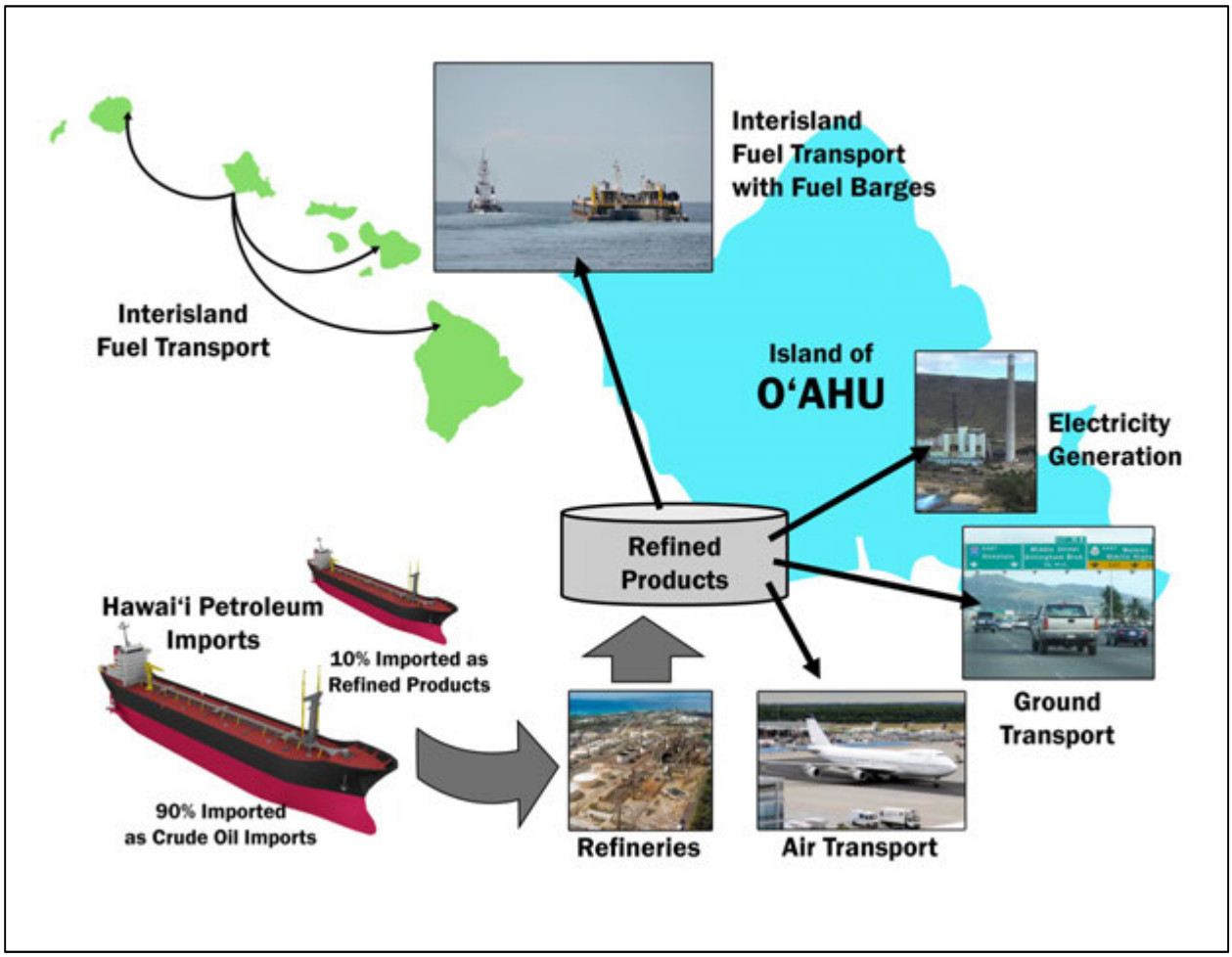

Figure 2.1 – Hawai'i Fuel Supply and Distribution System
(Source: Statewide Fuel Facilities Development Plan 2009)

2.4 KBPH Fuel Pier Site Description

Honolulu Harbor does not have the space necessary to accommodate a new Fuel Pier or the requisite landside space for related fuel storage. In comparison, KBPH contains several large undeveloped sites which provide opportunities for a new Fuel Pier, as well as potential fuel storage. The Piers 3 and 4 area is ideally situated as it is isolated from cargo handling operations at Piers 5A to 7 (*Figure 2.2*).



Figure 2.2 – KBPH Fuel Pier Facilities

Piers dedicated to liquid-bulk and gas products do not require extensive landside facilities like dry-bulk or containerized cargo because the cargo moves in fixed pipelines rather than on transitory cranes, forklifts and trucks. The Piers 3 and 4 area has a constrained landside area which makes it ideally suited for fueling operations. The Piers 3 and 4 area is also close to an existing fuel pipelines network ("Energy Corridor") that enters KBPH along Malakole Street. This would minimize construction costs to extend the pipelines. Potential fuel storage areas are available at Aloha and HECO tank facilities located in James Campbell Industrial Park to the southeast *(Figure 1.1).* Other potential locations include the refineries or new sites. Should the need arise, open areas are also available in the recently acquired areas of KBPH southeast of Piers 5 and 6. The Piers 3 and 4 area also provides flexibility for necessary site support facilities as the infrastructure is less developed there.

With prevailing northeast trade winds, the Piers 3 and 4 area provide the ability to confine accidental fuel spills at this location. The oil spill response team can be staged at the Fuel Pier to contain spills within the harbor by deploying booms across the harbor entrance to prevent escape to the ocean *(Figure 2.3).* Spilled fuel would likely not drift into the inner harbor under typical trade wind conditions, thereby minimizing the environmental and operational risk.

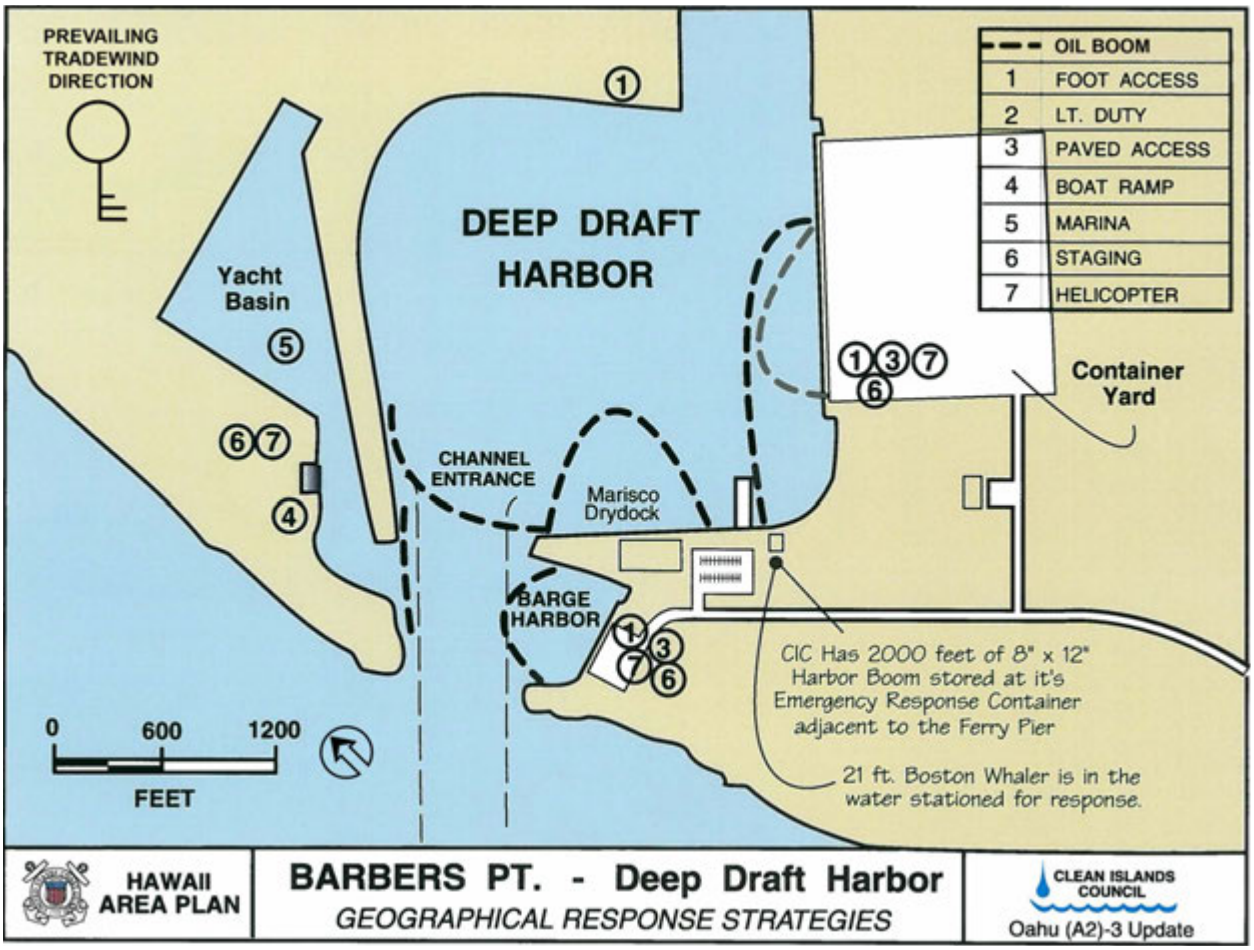

Figure 2.3 – Clean Islands Council Response Strategy
(Source: http://www.cleanislands.com/files/BPDeepDraftHarbor2012GRS.pdf)

An existing tenant, Marisco, Limited (Marisco), currently utilizes the Pier 3 area for ship maintenance and repair activities. According to Land Court Document No. 1887770, this location includes 15,000 square feet of office space, and warehouse, machine shop and painting structures totaling 34,800 square feet on 131,477 square feet of land. Moorings in the adjacent berthing area of 67,332 square feet of submerged land accommodate vessels for top-side repair operations. Measurements using Geographic Information Systems (GIS) show landside of the Pier 4 area consists of 26,468 square feet of asphalt concrete paved parking area and an unpaved open service area of 21,972 square feet. The Finger Pier provides berthing for support vessels including tug boats and workboats. In the past, this pier was used for excursion vessels and an intra-island passenger ferry operation. Oil spill response vessels dock at the nearby T-pier, located at the apex corner of Pier 4 and Pier 5A.

2.4.1 Natural and Physical Characteristics

The *Kalaeloa Barbers Point Harbor Fuel Pier and Harbor Improvements Environmental Impact Statement* (EIS) will be prepared to evaluate and disclose the potential environmental impacts of the proposed improvements. Details of the existing environment, potential impacts and mitigation will be presented in the EIS. The following section presents an overview of existing conditions.

Topography

The natural topography of the project site is generally level *(Figure 2.4).* Elevations range from five feet above mean sea level (MSL) at the north end of the site to approximately ten feet above MSL near the southern corner of the site. In general, the project site slopes from north to south with an average slope of approximately one percent. Vegetation is sparse, consisting of weeds and scrub vegetation.

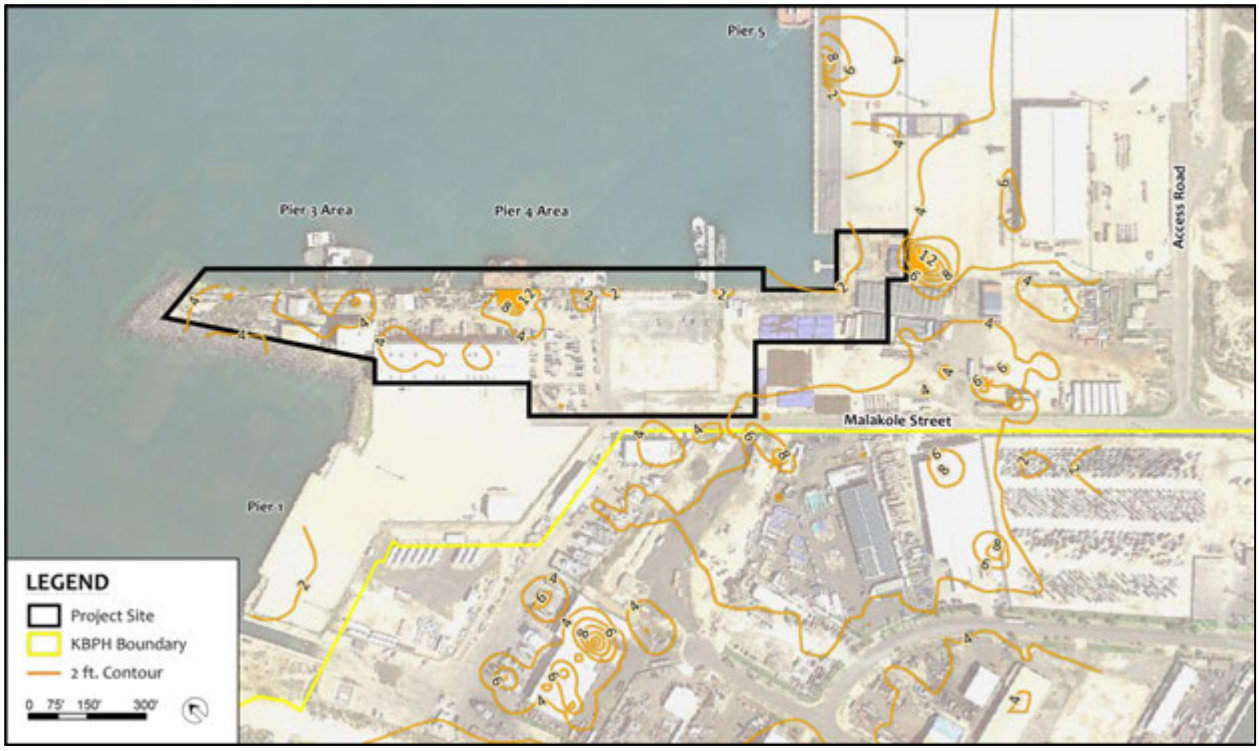

Figure 2.4 – KBPH Topography at Piers 3 and 4 Area

Geology

Four borings were drilled in October 2014 by Geolabs, Inc. *(Figure 2.5).* Two borings were drilled on land to support the preliminary design of the parking and/or container yard, while other two borings were drilled over water for preliminary design of the new piers. The land borings were extended to a depth of about 26.5 feet below the existing ground surface and the water borings were extended to a depth of approximately 90 feet below the sea level. Approximate boring locations are shown in *Figure 2.5.*

The subsurface conditions at the land side comprise a dense fill layer about two to eight feet thick and coralline reef formation extending to a depth of 26.5 feet below the existing ground surface. Groundwater was encountered at depths of about 9.5 to 11 feet below the ground surface. Groundwater levels at the site are subject to change due to tidal fluctuations, seasonal precipitation, storm surge conditions, and other factors.

In general, the mudline was encountered at about 36 feet below the sea level in the water borings. The subsurface conditions below the mudline consist of about six feet of soft harbor deposits overlying coralline reef formation with intermittent layers of alluvium deposits, extending to the maximum depth of about 90 feet below the sea level.

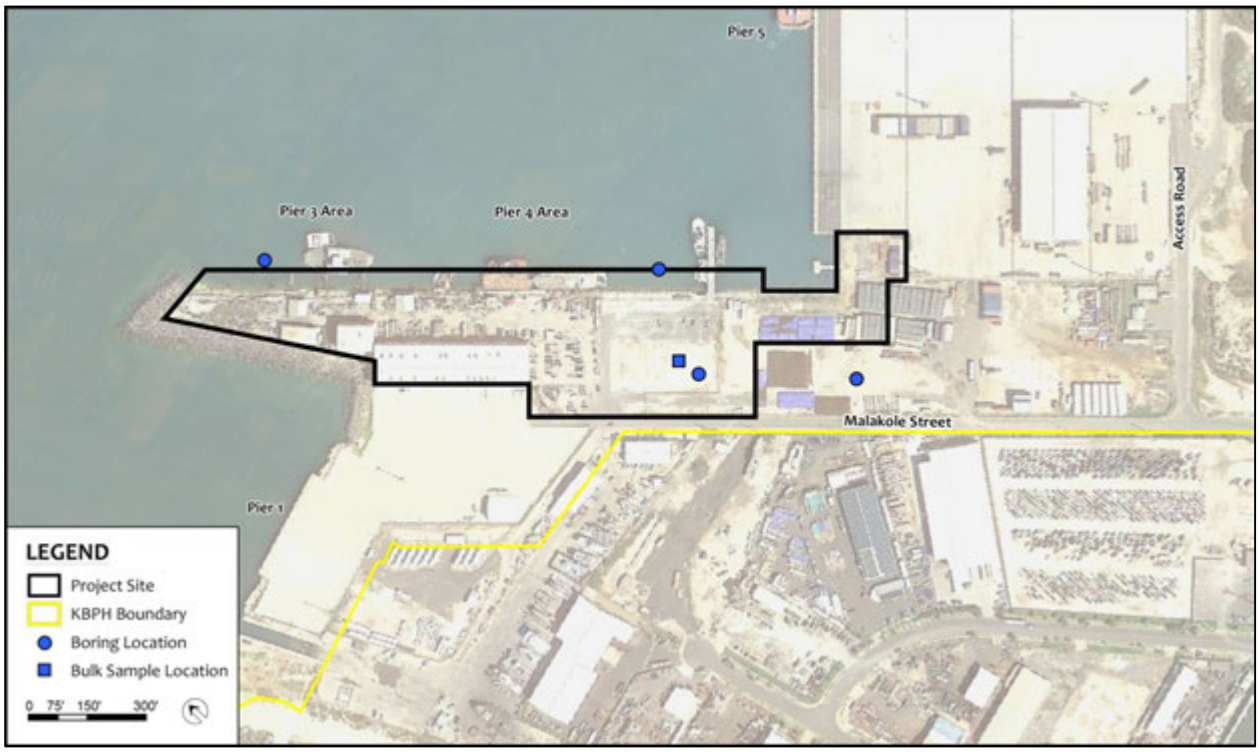

Figure 2.5 – Approximate Boring Locations
(Source: Geolabs, Inc., 2014)

Bathymetry

Bathymetric studies at the Piers 3 and 4 area indicate a steeply sloped limestone shelf extending to an average depth of approximately 38 feet. This bathymetry was created at the time of harbor dredging. There are some areas of shoaling near the harbor entrance off the Pier 3 area, with depths of approximately 36 feet *(Figure 2.6).*

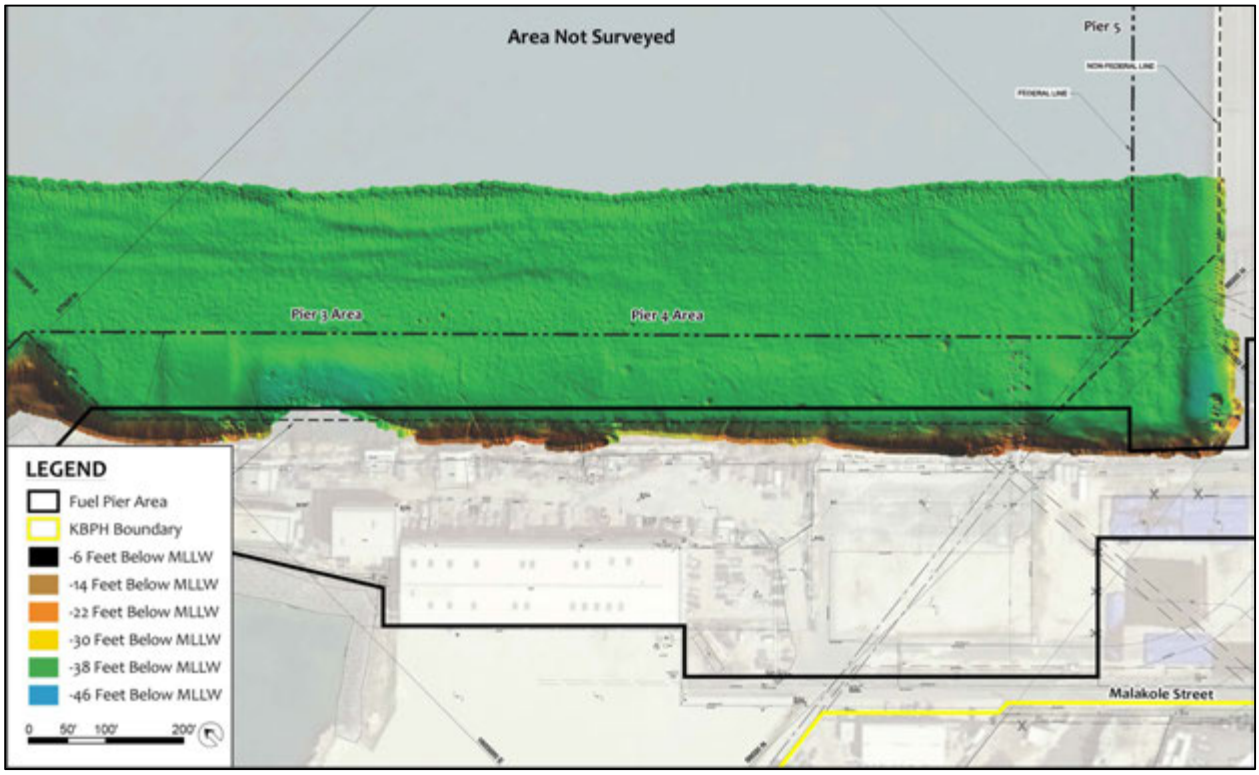

Figure 2.6 – KBPH Bathymetry at Piers 3 and 4 Area

Marine Water Quality

Waters of KBPH are designated as a Class A Marine Embayment by the State Department of Health (DOH). A water reconnaissance survey was conducted by Marine Research Consultants, Inc. (MRC) in January 2014 (*Appendix C*). Samples for water chemistry analysis were taken at 12 stations in the basin and entrance channel. The overall results of the analysis indicate several themes. First, there is a definite input of fresh water, likely as groundwater discharge through the sides of the harbor walls. The lack of distinct vertical or horizontal gradients, however, indicates that freshwater input is relatively small and well mixed due to the residence time of water within the harbor.

Water clarity around the Piers 3 and 4 area was the lowest in the harbor, likely as a result of the limited circulation in the corner of the harbor. Nearly all of the values of ammonium (NH4+) and *chlorophyll a* exceed some of the DOH standards. These results indicate that there is a relatively long residence time of water within the harbor basin, sufficient to allow uptake of inorganic nutrients by plankton populations. As a result, the elevated populations of phytoplankton, as well as input of inorganic particulates (such as dust deposited from wind transport and soil from storm drainage) result in high turbidity of waters in KBPH.

Visual observations of the harbor floor revealed a ubiquitous thick layer coating of gelatinous, fine-grained, silty sediment. Analyses of sediment particle size composition indicated that the predominant materials tested were silt and clays with a mean grain size of 0.019 millimeters, accounting for approximately 93 percent of the total sediment.

Preliminary analyses of sediment from the floor of KBPH within the Fuel Pier berthing area revealed detectable concentrations of oil, grease, and metals (particularly chromium, copper, lead, nickel and zinc). While several semi-volatile organic compounds were detected, only a single one (Dimethyl phthalate) occurred in relatively high concentrations. No organotins, organochlorine pesticides, or PCB's were detected.

Marine Biological Resources

The marine survey of the Piers 3 and 4 area (MRC, October 2016) shows a low coral count. There are isolated corals of *Porites lobata* and *Montipora capitata* of small size (< 40 cm and <5 cm, respectively), with no multi-colony growth forms. The coral colonies exhibit sediment on the surfaces, attributed to the highly turbid conditions of the inner harbor. A single colony of *Pocillopora meandrina* was observed near the northern area of Pier 3, and a single colony of *Pocillopora damicornis* was observed in the central area. Twenty-nine coral colonies were counted in the proposed Fuel Pier (Piers 3 and 4) area. *Porites lobata* and *Montipora capitata* account for 94 percent of all corals identified. Of the observed colonies, 79 percent had long diameters smaller than 40 cm. Compared to a study conducted in January 2014, substantial coral bleaching and subsequent mortality of corals occurred, likely a result of stress associated with elevated water temperature caused by the El Nino event of 2014-2015. No corals were observed growing on existing piers or pilings.

A waypoint was recorded at each site where corals occurred using a hand-held Global Positioning System (GPS) device, and then displayed in a GIS map *(Figure 2.7).* The density of the coral at each waypoint is visually represented in square centimeters with corresponding sized and colored circles.

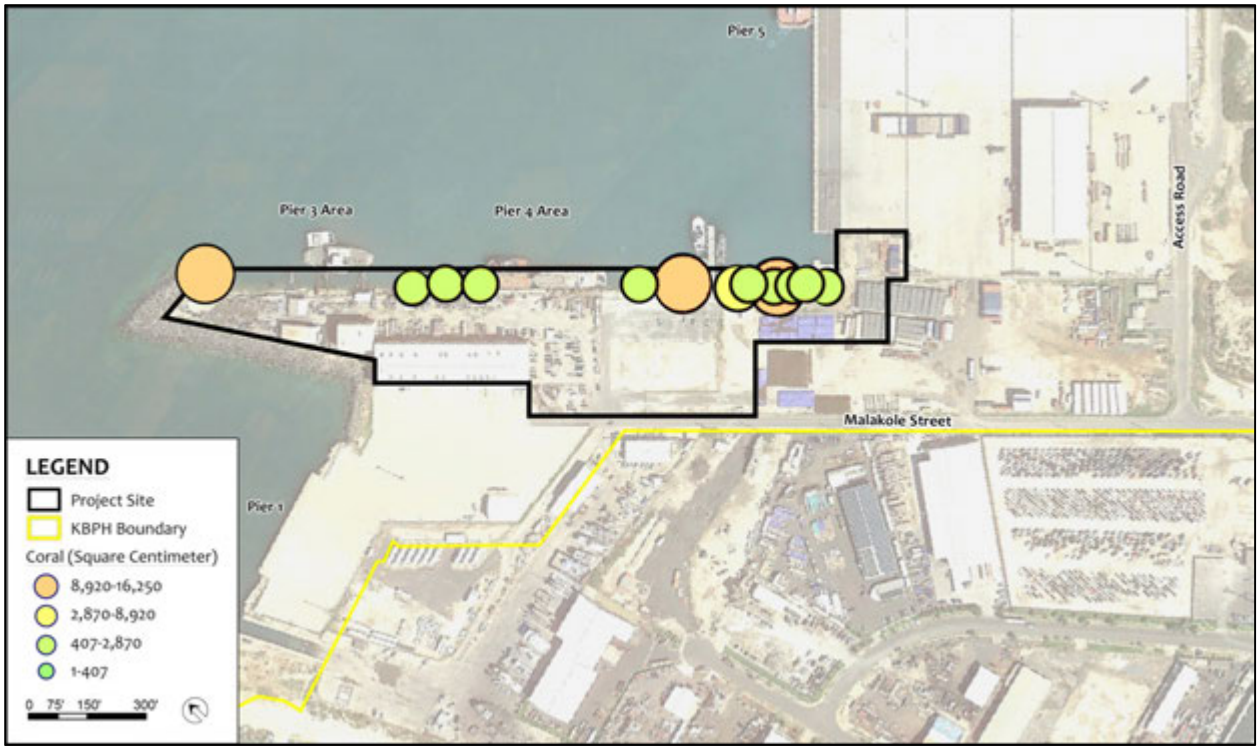

Figure 2.7 – GIS Locations of Corals at Piers 3 and 4 Area

The vertical surfaces comprising the inner walls and piers of KBPH are characterized by typical fouling communities consisting of sponges, tunicates, bivalves and bryozoans. During the January 2014 marine survey, "A total of 935 fish were counted, comprised of 42 species. Overall, numbers of fish observed were highest in areas nearest to the entrance channel. Regulated species (as listed by Hawai'i Department of Land and Natural Resources [DLNR], Division of Aquatic Resources [DAR]) observed during the KBPH surveys consisted of several fish, including a school of aholehole (*Kuhlia xenura*), and parrotfish (*Scarus psittacus*). With regard to invertebrates, the only DLNR DAR regulated species observed was a single octopus (*Octopus cyanea*)" (MRC, 2015).

No endangered or protected species as recognized by the Federal and State of Hawai'i agencies were observed during surveys. Data on turtle strandings collected by National Oceanic and Atmospheric Administration (NOAA), Pacific Islands Fisheries Science Center (PIFSC) from 1982-2014 list thirteen strandings of turtles in KBPH as a result of line entanglement, boat impacts or other unknown sources. While turtles do occur in harbor waters, it does not appear to be a preferred habitat.

No monk seals were observed in the harbor during three aerial surveys of the Island of O'ahu conducted by NOAA PIFSC in 2000, 2001 and 2008. A single seal was reported in the harbor in 2013, which was likely recovering from an injury. As with sea turtles, while seals have been observed in the harbor, it does not appear that the area is a preferred habitat.

Waves, Currents, Tides and Storm Surges

KBPH is exposed to waves from the northwest to southwest directions. Northern swells during the winter months bring the largest waves. Waves from the west occur during Kona storm conditions. The harbor is sheltered from waves from the east. Currents are a significant concern for KBPH, which has a history of navigability issues and mishaps related to problematic currents which crisscross the entrance channel. These currents have the potential to cause adverse vessel motions during approach to the harbor entrance; and the issue was considered important enough that in 1994 the USACE commissioned a physical model study to investigate the effects of a proposed new jetty designed to cut off the currents.

A 1988 field study by Sea Engineering showed that the predominantly tidal currents flow parallel to the shoreline (perpendicular to the centerline of the entrance channel) with reversing directionality, as shown in *Figure 2.8*. Currents during a flood tide generally flow to the southeast, while during an ebb tide they typically flow to the northwest.

In a 1991 investigation by Sea Engineering, it was confirmed that currents in the vicinity of the entrance channel to KBPH were primarily tidal. However, they tended to be unpredictable, sometimes not reversing with the change in tide. This condition is problematic for mariners wishing to transit large vessels into the harbor's relatively narrow approach.

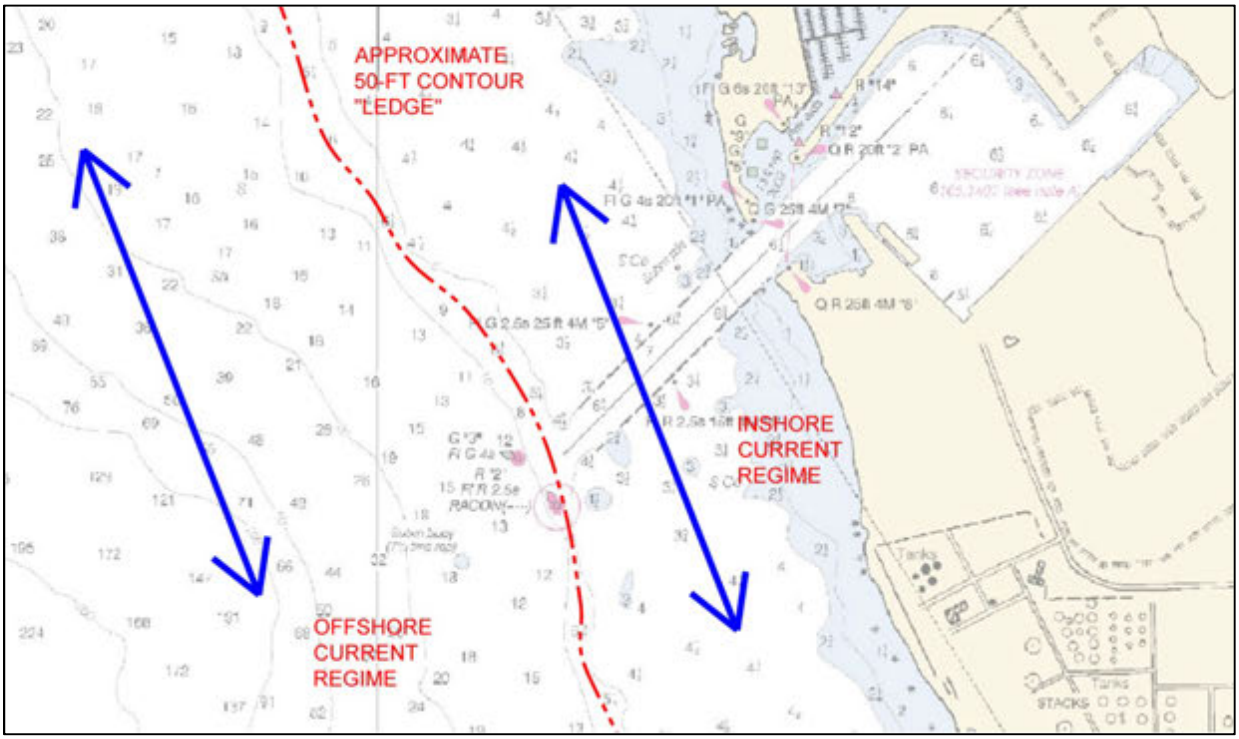

Figure 2.8 - Current Pattern for Nearshore Waters, in the Vicinity of the KBPH Entrance Channel
(Source: Sea Engineering, 2013)

Water levels in KBPH are influenced by tides and storm surges. Statistics of historical tidal elevation data at Honolulu are published by NOAA, National Ocean Service (NOS). Tides in Hawai'i are a combination of both diurnal and semi-diurnal regimes, which is referred to as a mixed semi-diurnal tide. The diurnal range recorded at Honolulu Harbor (the closest tide station to the project location) has been calculated to be 1.9 feet *(Table 2.2),* which is a measure of the vertical distance between mean lower low water (MLLW) and mean higher high water (MHHW). Measured from mean sea level (MSL), MLLW is minus 0.82 feet and MHHW is plus 1.08 feet, based on the latest Epoch of 1983-2001. Additional information can be found in the *KBPH Oceanographic Conditions Assessment* (Sea Engineering, 2013) in *Appendix E.*

Table 2.2 - Tide Data at Honolulu Harbor (NOAA Station 1612340)

TIDAL DATA	ELEVATION	
	MLLW DATUM (FEET)	MSL DATUM (FEET)
MHHW	1.90	1.08
Mean High Water (MHW)	1.44	0.62
Mean Sea Level (MSL)	0.82	0.00
Mean Tide Level (MTL)	0.80	-0.02
Mean Low Water (MLW)	0.16	-0.66
MLLW	0.00	-0.82

Longer period oscillations (also referred to as harbor resonance, surging, seiching, and resonant oscillations) are long period standing waves which are sometimes present in closed or semi-enclosed basins such as embayments, harbors, and lakes. KBPH could be considered a closed basin due to the relatively narrow entrance channel. Seiches can pose a significant threat to inner harbor operations, moored vessels, and other waterfront facilities by parting mooring lines, damaging fender systems, creating vessel collisions, and delaying transfer operations.

Wave data within the harbor is available from a variety of sources including physical scale models, numerical models, and wave monitoring. The *Physical and Numerical Model Studies of Barbers Point Harbor* (USACE, 1994) simulated wave oscillations by use of a numerical computer model, HARBD, and correlated with a physical model and wave measurements from the existing harbor. These studies documented that the harbor experiences natural resonance modes which cause standing waves to occur under certain long period ocean wave conditions along the southeastern side of the basin. As part of the 1994 monitoring study by USACE, a number of wave and surge gages were deployed in and around the harbor from 1985 to 1990. A review of the data found that the maximum surge recorded at the north end of the Pier 3 area was 1.84 feet (0.56 m) with a period of 1,024 seconds, which occurred late on August 29, 1987. The maximum recorded surge at the south end of the pier, south of the Pier 4 area was found to be slightly smaller at 1.35 feet (0.41 m) with a period of 120 seconds, which occurred early morning on January 22, 1988.

Maximum Water Level

The maximum water level at the project site can be estimated by including tide, storm surge, and wave effects. A tide level of MHW is used in the maximum water level calculation, which is 1.44 feet referenced to MLLW. The crest of the wave above still water level (SWL) is estimated to be 65 percent of the total wave height. According to the Coastal Engineering Manual published by USACE (2003), the maximum wave height can be estimated as 1.86 times of significant wave height assuming a Rayleigh distribution of wave heights. The resulting 50-year water level at the project site is 7.3 feet, with a 2.0-feet storm surge and a 0.68-feet sea level rise assumed.

Sea Level Rise

Sea level rise is primarily caused by global climate change (IPCC, 2007). It varies locally and regionally based on ocean and atmospheric circulation patterns and geologic factors such as land subsidence or uplift, compaction of sediment, crustal rebound in formerly glaciated areas, and withdrawal of subsurface fluids (USACE, 2011; NRC, 2012). Due to these uncertainties, the predictions of sea level rise are dramatically different among researchers. Therefore, it is recommended that a range of possible sea level rise scenarios be considered in the design of any project (USACE, 2011; Harris, et al. 2012). The newly published NOAA guidance (Harris, et al. 2012) for estimating future sea level change is followed herein. NOAA recommends that the following contributing variables be determined independently and then combined afterwards to predict the future local sea level change:

- Vertical Land Movement (VLM)
- Regional Trend in Ocean Basin
- Global MSL Rise

The plot in *Figure 2.9* shows the recorded monthly MSL at Honolulu Harbor without the regular seasonal fluctuations due to coastal ocean temperatures, salinity, winds, atmospheric pressures, and ocean currents. The long-term linear trend is also shown, including its 95 percent confidence level relative to the most recent MSL Datum as established by the NOAA. The rise in MSL trend is +1.50 millimeters per year (mm/yr) with a 95 percent confidence interval of +/- 0.25 mm/yr based on monthly MSL data from 1905 to 2006, which is equivalent to a change of 0.49 ft in 100 years. The results are expected to be similar for KBPH.

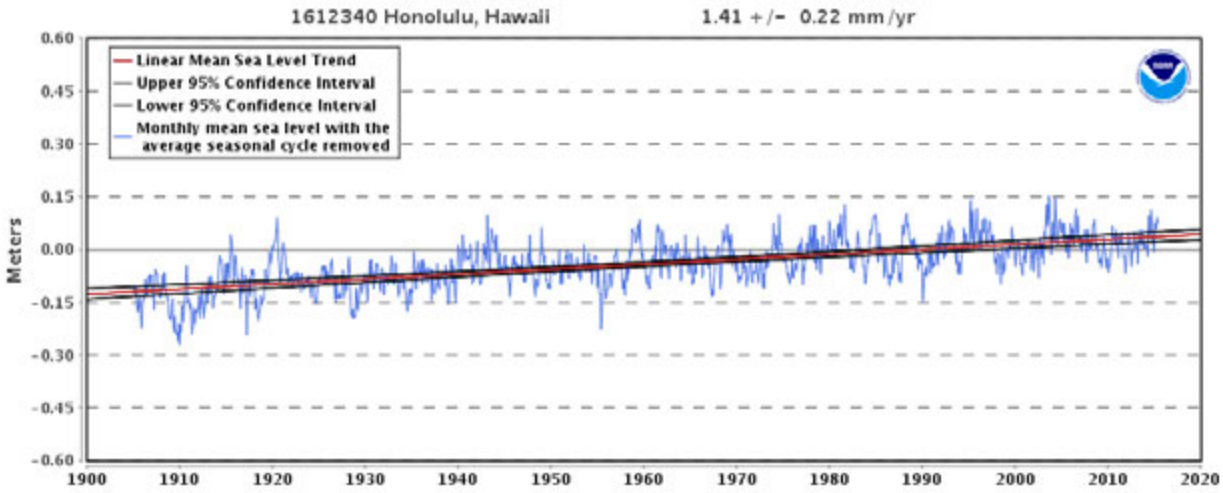

Figure 2.9 - Mean Sea Level Rise at Tide Station 1612340 Honolulu Harbor

The resultant scenarios of future sea level changes at Honolulu Harbor following the NOAA guidance are tabulated in *Table 2.3* and plotted in *Figure 2.10* (baseline year 2010).

Table 2.3 - Sea Level Rise Estimations at Honolulu Harbor

YEAR	SCENARIOS (IN FEET)			
	LOWEST	INTERMEDIATE-LOW	INTERMEDIATE-HIGH	HIGHEST
2010	**0.00**	**0.00**	**0.00**	**0.00**
2050	**0.20**	**0.47**	**1.07**	**1.75**
2100	**0.44**	**1.45**	**3.68**	**6.25**

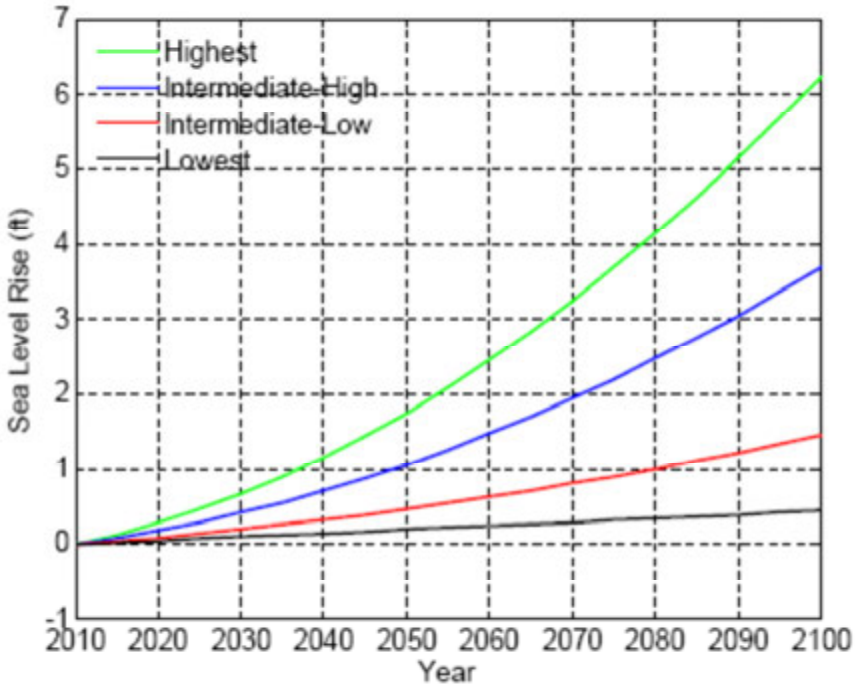

Figure 2.10 - Sea Level Rise Scenarios at Honolulu Harbor

Flood and Tsunami

According to the Flood Insurance Rate Map prepared by the Federal Emergency Management Agency, the project site is located in Zone "D", an area of undetermined flood hazard *(Figure 2.11)*. According to the City and County of Honolulu, Department of Emergency Management 2010 tsunami evacuation zone maps, the project site is located within a tsunami evacuation zone.

Tsunami records cover the period from 1819 to the present. The results include eyewitness observations of water levels above SWL of over 8 feet high during the Chile tsunami event in 1837. The maximum measured water level above SWL of over 4 feet, which is a more quantitative and reliable determination, occurred during the Kamchatka tsunami in 1952. These data suggest tsunamis occur relatively frequently in the vicinity of KBPH. These tsunami-generated increased water levels should be incorporated in developing the pier deck elevation as well as developing personnel safety plans. While it is impossible to say whether or not there will ever be larger tsunamis than those that have already occurred, virtually all the main seismic sources have occurred at magnitudes that are near maximum possible magnitudes. Therefore, a reasonable expectation for tsunami-related water level impacts would be 8.0 feet above SWL.

The tsunami source data associated with these tsunamis also suggests that the largest tsunami events in the harbor area are related to distant seismic sources such as Alaska, Chile, and Japan and not local sources such as local volcanoes or landslides. The travel time for these tsunamis is several hours.

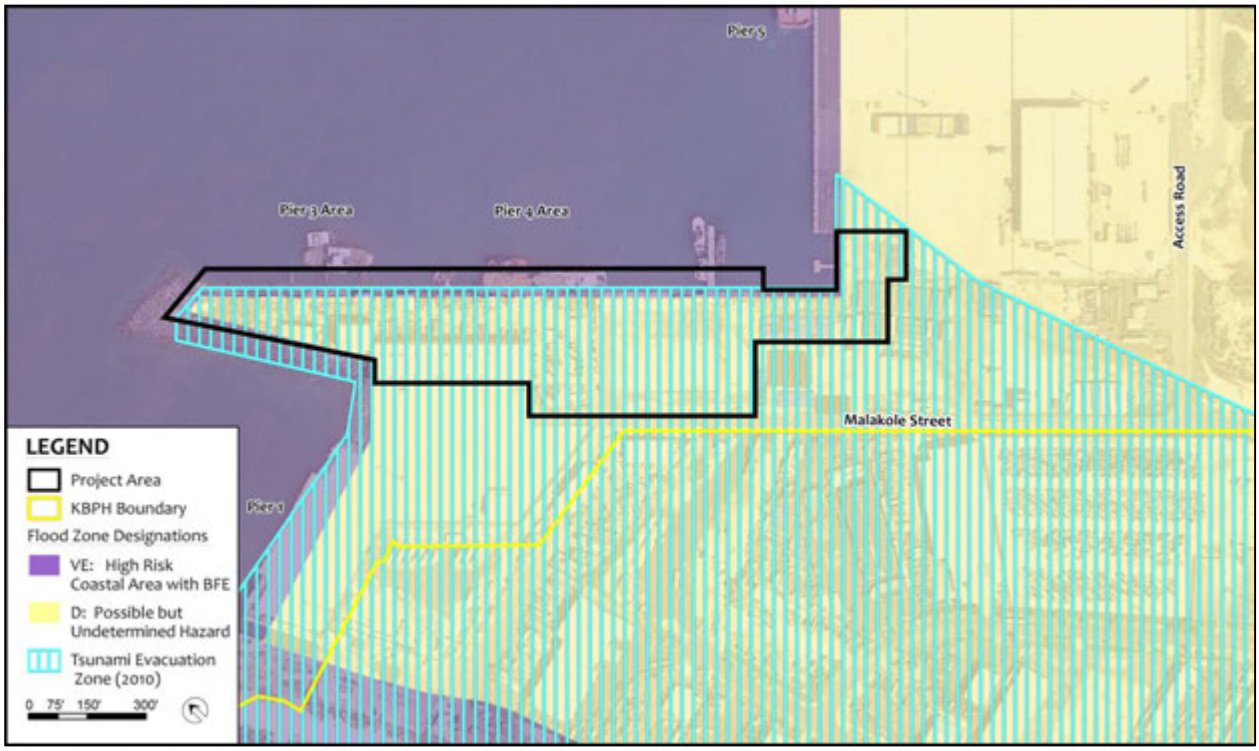

Figure 2.11 – Flood and Tsunami Evacuation Zones at Piers 3 and 4 Area

Seismic Hazard

In general, earthquakes that occur throughout the world are caused primarily by shifts in the tectonic plates. In contrast, earthquake activity in Hawai'i is primarily linked to volcanic activity. Therefore, earthquake activity locally occurs before or during volcanic eruptions. In addition, earthquakes may result from the underground movement of magma that comes close to the surface but does not erupt. Hawai'i Island experiences thousands of earthquakes each year, but most of the earthquakes are so small that only sensitive instruments are able to detect them. However, some of the earthquakes are strong enough to be felt, and a few cause minor to moderate damage. In general, earthquakes associated with volcanic activity are most common on Hawai'i Island.

Earthquakes that are directly associated with the movement of magma are concentrated beneath the active Kīlauea and Mauna Loa Volcanoes on Hawai'i Island. Because the majority of the earthquakes in Hawai'i (over 90 percent) are related to volcanic activity, the risk of high seismic activity and degree of ground shaking diminishes with increased distance from Hawai'i Island. It has experienced numerous earthquakes greater than Magnitude 5 (M5+); however, earthquakes are not confined only to Hawai'i Island.

To a lesser degree, Maui has experienced numerous earthquakes greater than M5. The effects of earthquakes occurring on Hawai'i Island and Maui may be felt as far away as O'ahu. For example, several small landslides occurred on O'ahu as a result of the Maui Earthquake of 1938 (M6.8). In addition, some houses on O'ahu were reportedly damaged as a result of the Lāna'i Earthquake of 1871 (M7+).

Over the last 150 years of recorded history, no earthquakes greater than M6 have been reported on O'ahu. A M4.8 to 5.0 occurred along the Diamond Head Fault in 1948 on O'ahu. The moderate tremor resulted in broken store windows, ruptured building walls, and broken underground water mains.

The 2012 International Building Code (IBC) Seismic Design Map of a 0.2 second spectral response acceleration *(Figure 2.12)* indicates that the West O'ahu area could experience seismic activity between 50 to 60 percent of the earth's gravitational acceleration (g-force). This represents the lower limits of probable force experienced by the region during a probable seismic event, with the epicenter located on Hawai'i Island. West O'ahu is at low risk from earthquake damage, but a seismic event could affect poorly designed and/or built structures.

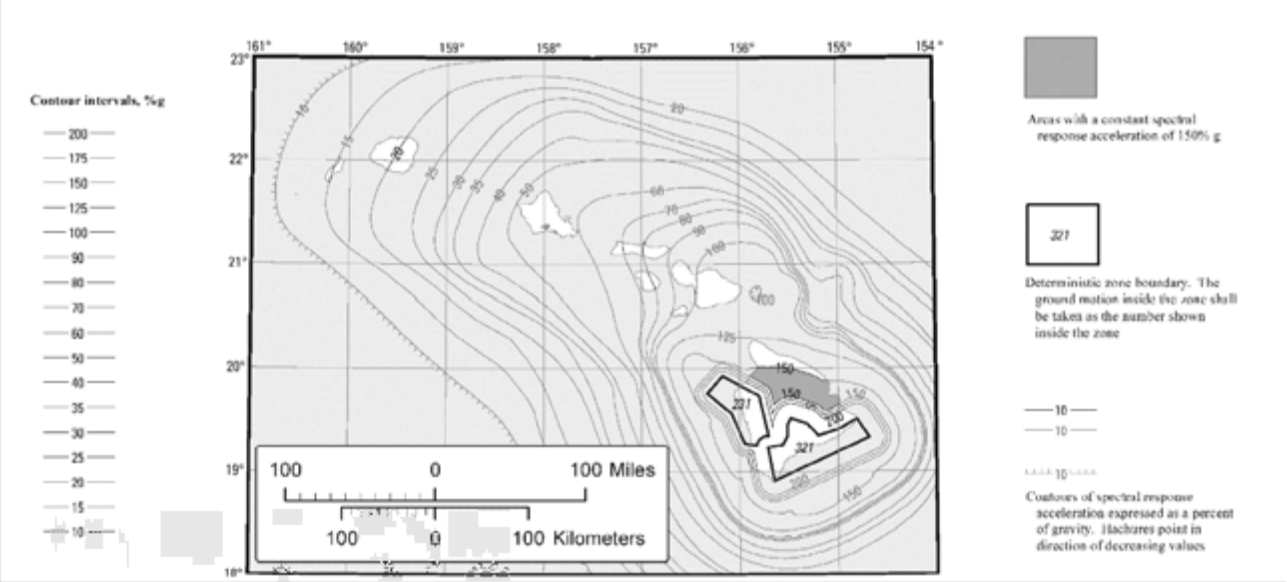

Figure 2.12 – Maximum Considered Earthquake Ground Motion for Hawai'i of 0.2 Spectral Response Acceleration
(Source: 2012 International Building Code)

Wind Load

Northeasterly trade winds predominate and occur about 75 percent of the time and range from 10 to 20 knots. The harbor is sheltered from the direct northeasterly trade winds, which are strongest during winter storms. Wind data was obtained from the NOAA weather station at Kalaeloa Airport, which is approximately three miles from KBPH. Hourly average wind data was available for the years 1996 through 2013. A wind rose diagram developed from wind for the entire 17 year data set is presented in *Figure 2.13,* which illustrates the percent occurrence of wind speed and direction for that period of time. Calm winds conditions (e.g., no wind) data were removed prior to plotting, and occurred 13.4 percent of the time.

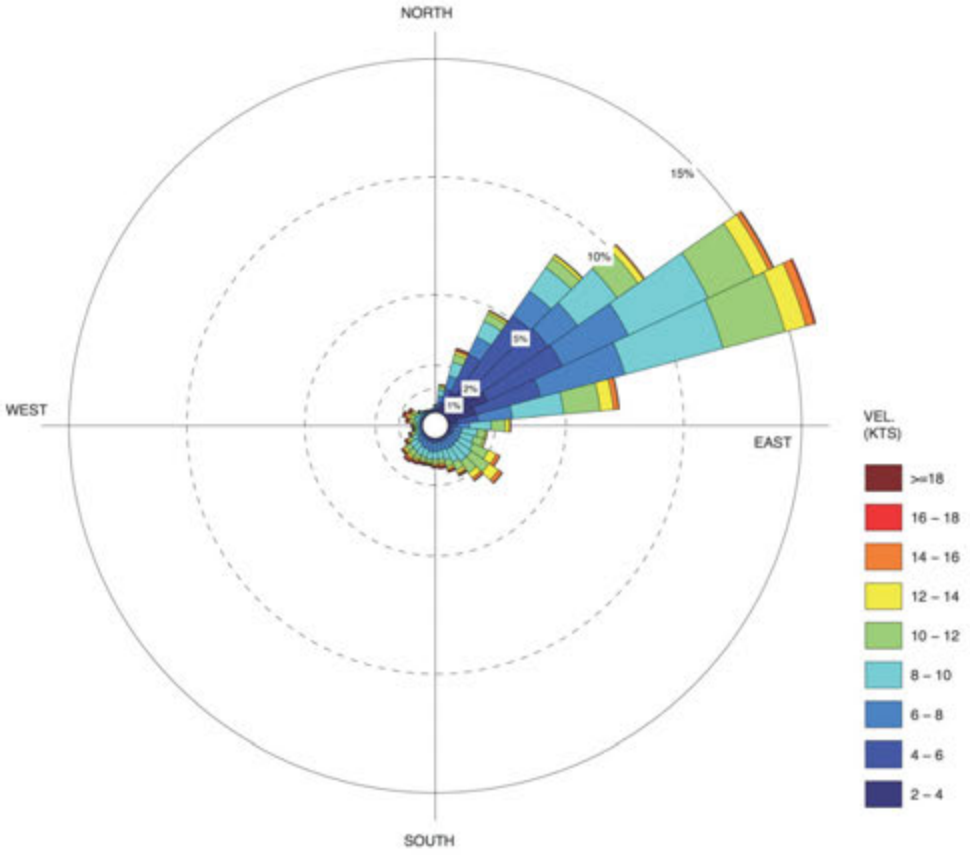

Figure 2.13 - Wind Rose for Kalaeloa Airport (1996 to 2013)
(Source: Sea Engineering, 2013)

Hurricanes

The Hawaiian Islands are seasonally affected by Pacific hurricanes during the late summer to early winter months. Tropical storms generally form in the warm waters off the southwest coast of Mexico and move westward across the central Pacific Ocean. Typically, normal atmospheric conditions steer these storms well south of the Hawaiian Islands, with occasional tracks hooking northward to the east or west of the islands. The storms generally transit far enough offshore to cause at most high surf and heavy rainfall as they pass; however, the tendency to bend northwestward makes O'ahu vulnerable to being struck by northward or westward moving storms. West O'ahu is infrequently hit by severe storm events *(Figure 2.14)*. The primary impacts of hurricanes at the Piers 3 and 4 area will be possible inundation from storm surge and high waves.

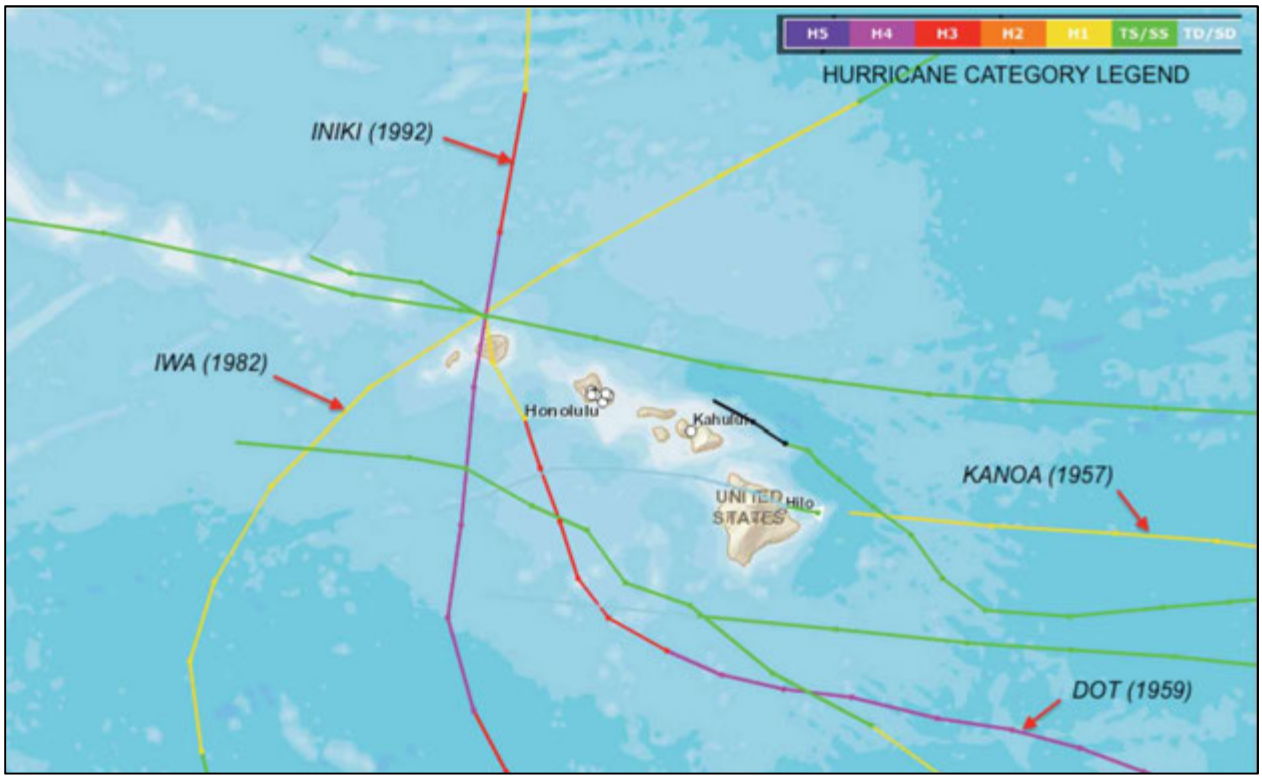

Figure 2.14 - Map of Hawai'i Hurricane Tracks
(Source: http://oceanservice.noaa.gov/news/weeklynews/aug13/historical-hurricanes.html)

Hazardous Materials

A Phase I Environmental Site Assessment was performed by Enpro Environmental (June 2013). The assessment found a history of documented releases as well as "recognized environmental conditions" at the site in connection with vessel maintenance and repair activities, including the presence of aboveground petroleum storage tanks, containers, and electrical equipment with possible polychlorinated biphenyls (PCB). Six aboveground storage tanks were observed at the Pier 3 area, in the vicinity of the Marisco lease area. Without proper management, these containers could represent a material threat of a release of petroleum products into the environment. See *Appendix F* for more information.

Socio-Economic Conditions

Hawai'i's resident population is expected to increase from 1,363,621 to 1,708,900 between 2010 and 2040, an increase of 25 percent (DBEDT, 2012). The corresponding increase in shipments of construction and energy materials will exert pressure on the State's commercial harbors. KBPH will need to be prepared to accommodate this growth, as delayed delivery of cargo increases shipping costs, which are ultimately passed on to the consumer.

Zoning, Land Use and Ownership

The State Land Use Classification for KBPH is State Urban District *(Figure 2.15).* The City and County of Honolulu zoning designation is I-3, or Waterfront Industrial. Although DOT-H is responsible for administering and controlling the commercial harbors system in Hawai'i, KBPH is owned by DLNR.

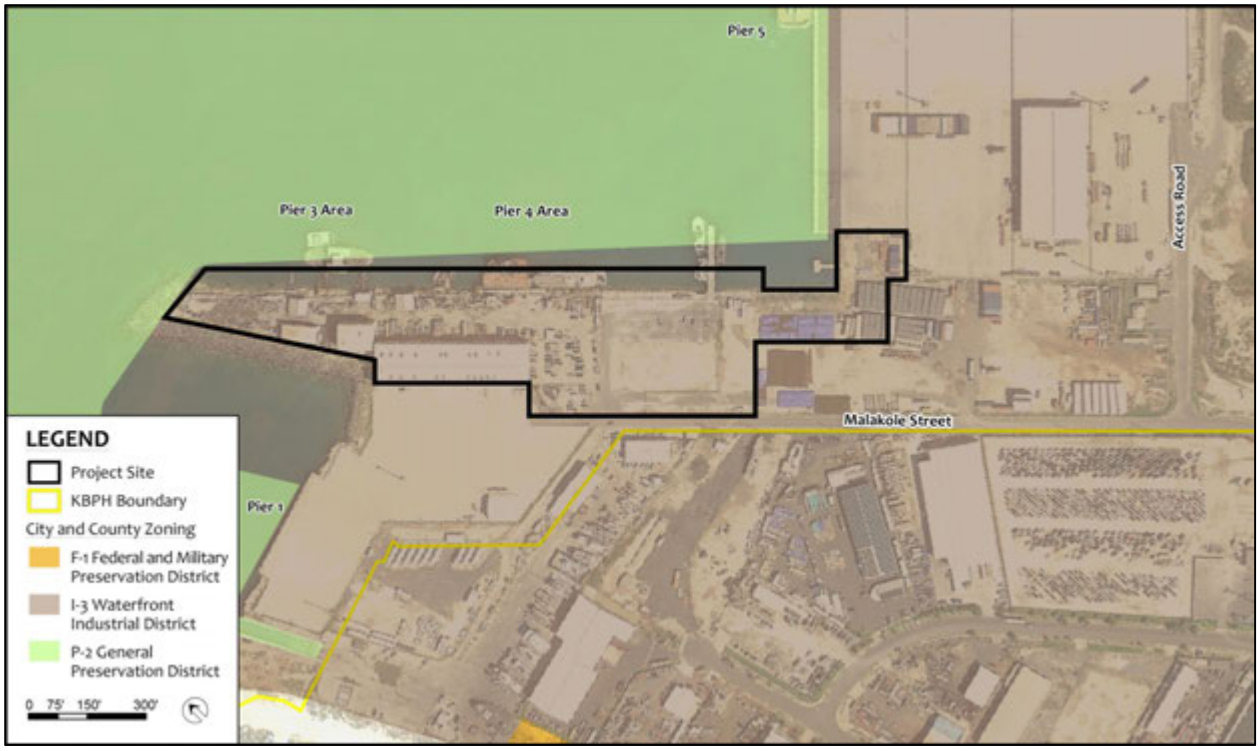

Figure 2.15 – Land Use at Piers 3 and 4 Area

2.4.2 Infrastructure and Utilities

Power and Communications

Electricity service to KBPH is provided by Hawaiian Electric Company (HECO) through underground electrical lines located along Malakole Street *(Figure 2.16).* A 12 kilovolt (kV) overhead line originating from the Malakole Substation runs along Malakole Street and terminates near the Marisco property. This supplies power to the southern and eastern portions of KBPH. Underground cables distribute this power via two separate underground ductline/handhole systems which run throughout the harbor vicinity and form two main branches along the southern (Branch #1) and eastern margins (Branch #2) of the harbor property. Branch #1 runs along Malakole Street and provides power to Pier 1, Marisco's ship repair facility at Pier 3, and Storage Yards at Piers 1 and 4. Branch #2 runs along Access Road and provides power to the coal unloader and conveyor system, Piers 5 and 6 and their adjoining storage yards, the Pier 5A Transit Shed, the Harbors Office and associated structures. Hawaiian Telcom provides telephone and internet communications service to the existing harbor facilities.

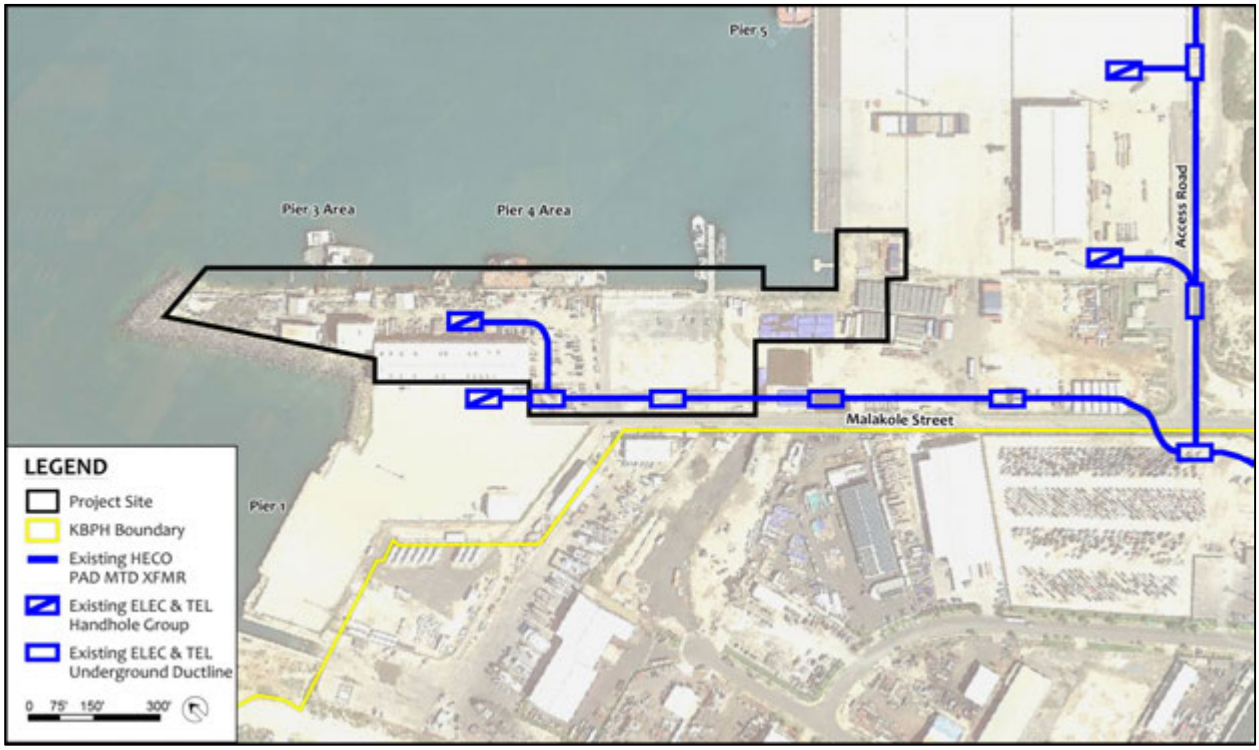

Figure 2.16 – Existing Electrical System

Potable Water

The potable water system servicing the Piers 3 and 4 area is owned and managed by DOT-H. Honolulu Board of Water Supply (BWS) provides water service to the various properties. The BWS service is monitored by a meter located on the makai side of Malakole Street, approximately 150 feet east of the corner of Malakole Street and the Access Road. The water system consists of a 4-inch water main that connects near the entrance to Access Road. A 6-inch water main connects from the reducer to the BWS 2-inch water meter. See *Figure 2.17* for water system layout.

Marisco's lease area is serviced by a 4-inch lateral water line that reduces to a 1.5-inch water line at an irrigation control box. A 1.25-inch water line teed from the 4-inch main serves a spigot at the Finger Pier for general use. The entire harbor property is metered by BWS, but the laterals for both users in the project site (the Finger Pier and the Marisco lease area) are sub-metered by DOT-H.

Fire Protection

The fire protection system servicing the Piers 3 and 4 area is owned and managed by DOT-H, and serviced by BWS. BWS provides fire protection service up to the harbor property through a 20-inch water main. The BWS fire protection service is monitored by meters located mauka of Malakole Street. The 20-inch water main is reduced to a 16-inch water main near the entrance to Access Road, and provides service to the Marisco lease area only *(Figure 2.17)*. There is no fire protection servicing the Finger Pier. The Marisco lease area is provided fire protection via a 6-inch water line that currently services the fire sprinkler system for the office building. Flow and pressure data at the BWS meter location indicates a static pressure of 90 pounds per square inch (psi), residual pressure of 60 psi, and flow rate of 4,000 gallons per minute.

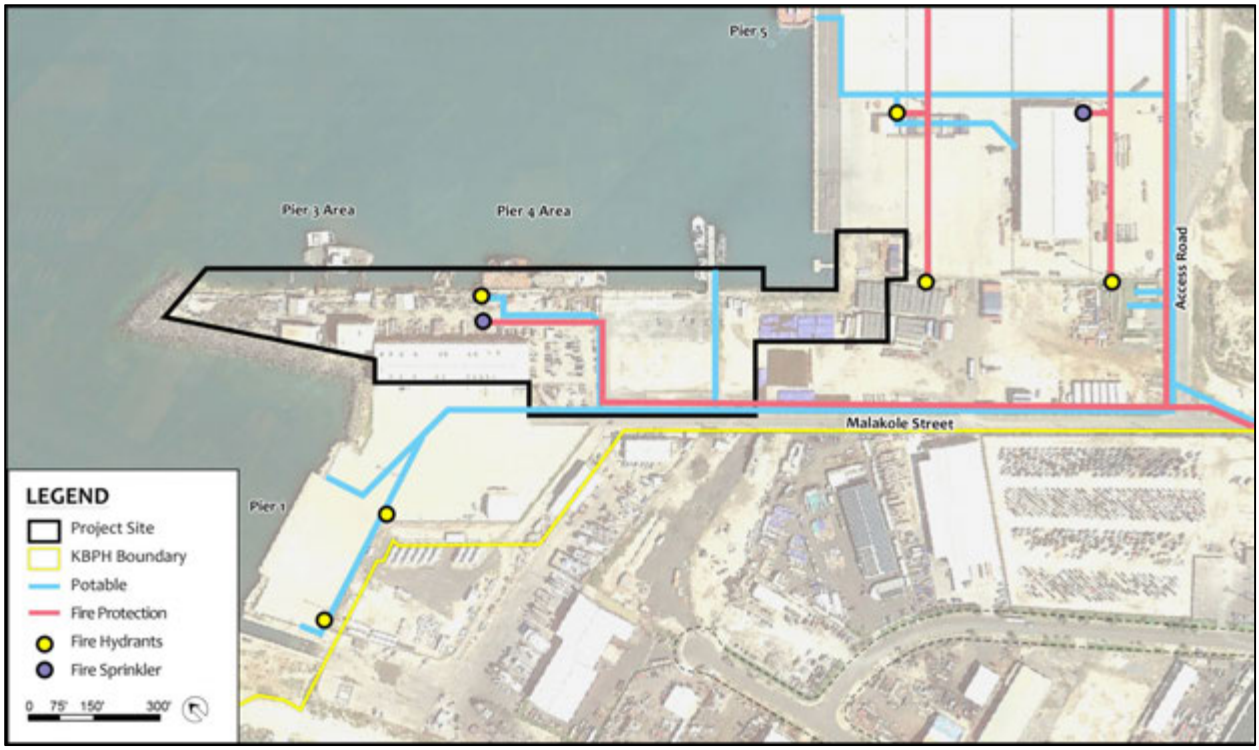

Figure 2.17 – Existing Potable Water and Fire Protection

Drainage

Stormwater at the Piers 3 and 4 area drain via surface sheet flow and ground infiltration, with no known areas of flooding. The existing drainage system consists of dry wells and surface flow outfalls (*Figure 2.18*). The drainage pattern does not direct stormwater runoff to flow into other properties, instead capturing and directing runoff to dry wells located near the center of the site. These properties collect runoff which flows toward Malakole Street into drain inlets, and is conveyed through an 18-inch pipe that discharges at the Finger Pier. Runoff from Malakole Street sheet flows into drain inlets located along the property line and fence line. Flow collected from the drain inlets along the fence line are conveyed to a 5-foot by 3.5-foot concrete box drain that also discharges at the Finger Pier. This concrete box drain also collects runoff from the Kenai Industrial Park. There is a 16-foot wide drainage easement for the concrete box that is maintained by Kenai Industrial Park.

Runoff captured from the Finger Pier parking lot sheet flows towards the harbor basin through four concrete surface outfalls, discharging into the harbor basin. Filter socks to prevent sediment from flowing into harbor waters are placed across the outfalls. There is a known issue of ponding in the Finger Pier parking lot during heavy storm events. The Marisco office site has a relatively flat terrain. The site has a 6-inch high concrete berm on the property perimeter, with breaks for surface outfalls at three locations. All stormwater runoff from the perimeter is directed toward dry wells located near the center of the site. In the case of a storm event where the drywells overflow, the overflow discharges to on-site surface outlets directed into the harbor. Filter socks are deployed at the entrance of each outfall as a best management practice.

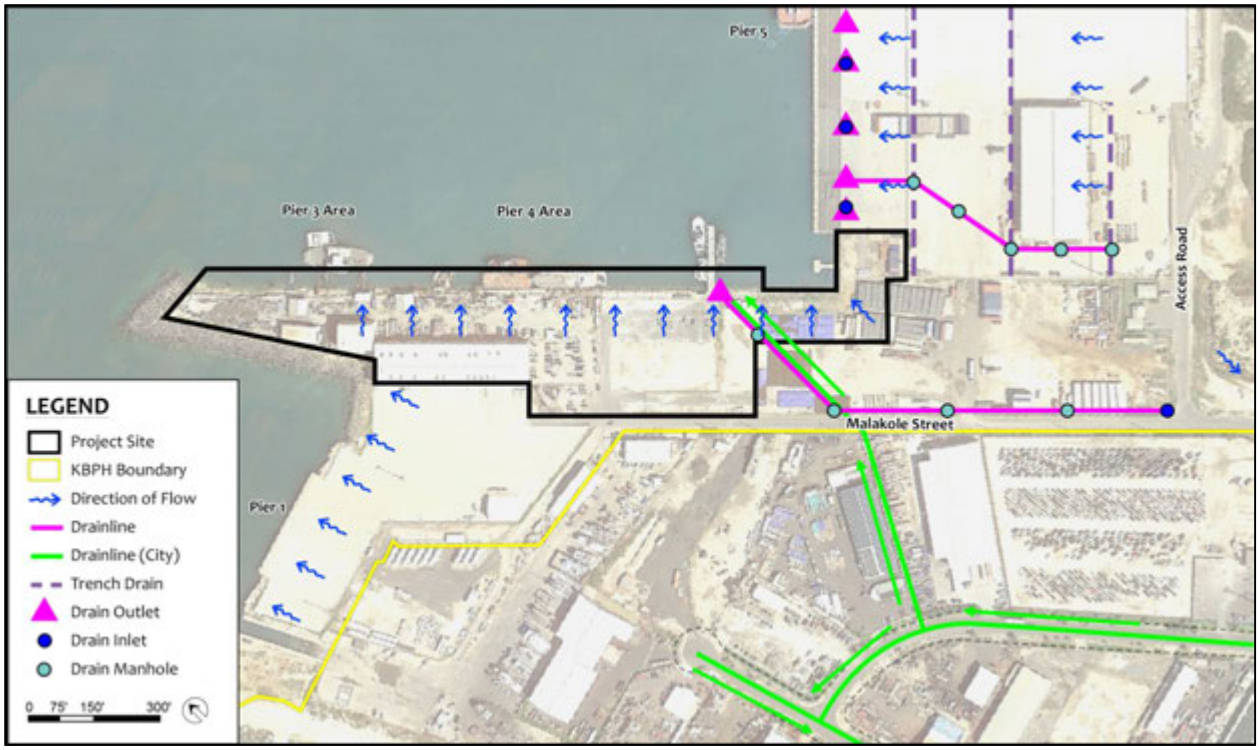

Figure 2.18 – Existing Drainage

Wastewater System and Solid Waste

The City and County of Honolulu municipal sewer system does not currently serve KBPH. The existing wastewater system consists of an individual wastewater system (IWS) servicing the three-story office building at the Marisco lease area *(Figure 2.19).* There is no wastewater service at the Finger Pier.

General municipal refuse is collected in dumpsters and hauled away by a private contractor. DOT-H Grounds Maintenance picks up and disposes potential pollutants left in drop off areas or discarded illegally by the public to minimize pollution impacts on the environment. This includes abandoned vehicles, discarded vehicle lead acid batteries, scrap steel, discarded used tires, and construction debris. Where possible materials are recycled, such as used batteries, scrap steel, and green waste. A regular sweeping schedule is maintained by DOT-H to prevent pollutants from reaching the storm drain system, and sweeper debris is removed from KBPH grounds for proper disposal.

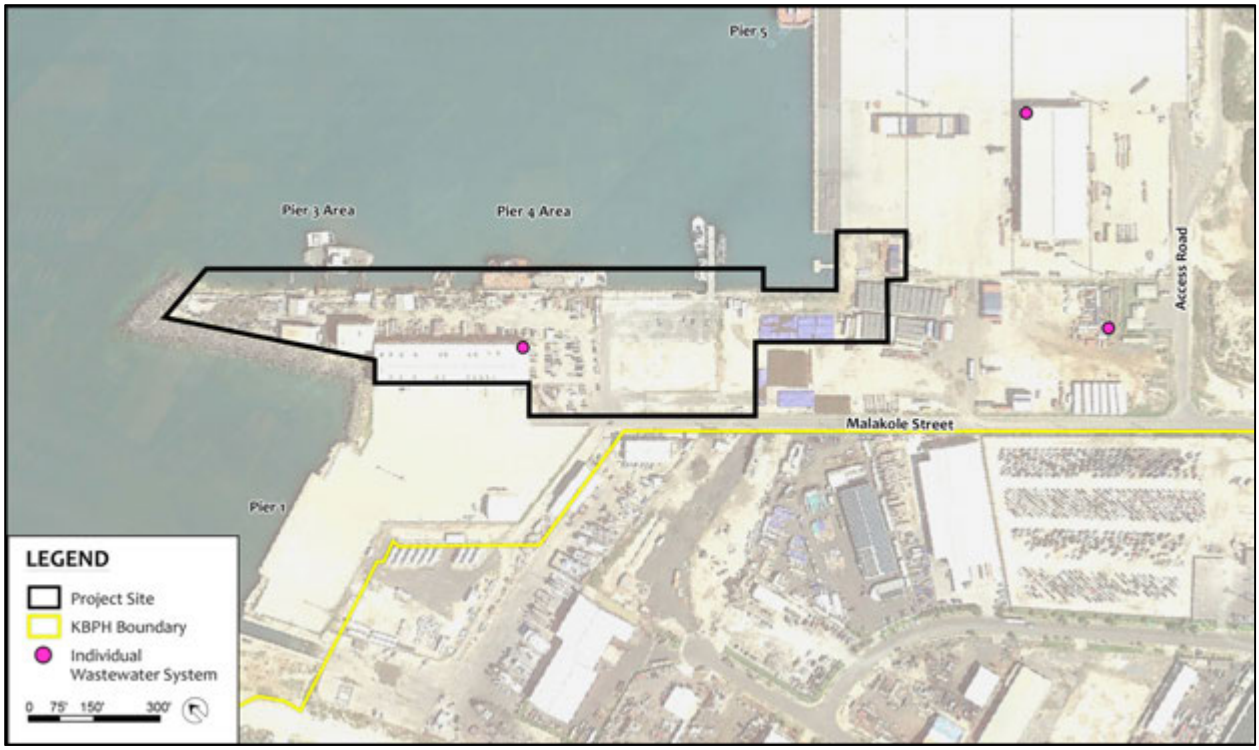

Figure 2.19 – Existing Individual Wastewater System

Circulation

The Piers 3 and 4 area is accessed through Malakole Street, primarily via Kalaeloa Boulevard as well as roads from James Campbell Industrial Park. Both Malakole Street and Kalaeloa Boulevard are privately owned by the region's major developers (Kapolei Property LLC and its affiliates) and the primary neighboring landowner (James Campbell Company and its affiliates). Easements have been established for access along Malakole Street to the harbor and Kenai Industrial Area. As visitors approach KBPH, they have the option to turn right onto Access Road or continue straight on Malakole Street. Access Road runs northeast to a security gate for passage to Piers 5A, 5 and 6. Access Road continues northeast to additional piers and terminals.

Malakole Street allows access to the Piers 3 and 4 area, and continues through a gated access to Pier 1 where it dead ends. Internal roadways from Malakole Street lead vehicles to parking areas in the Piers 3 and 4 area *(Figure 2.20).* The Pier 4 landside area consists of 26,468 square feet (as calculated using GIS software) of asphalt concrete paved parking area that was previously used more extensively when the intraisland commuter ferry service was in operation. Marisco also has a parking lot for employees and visitors. A third gated road gives access to the Sause Bros. cargo yard.

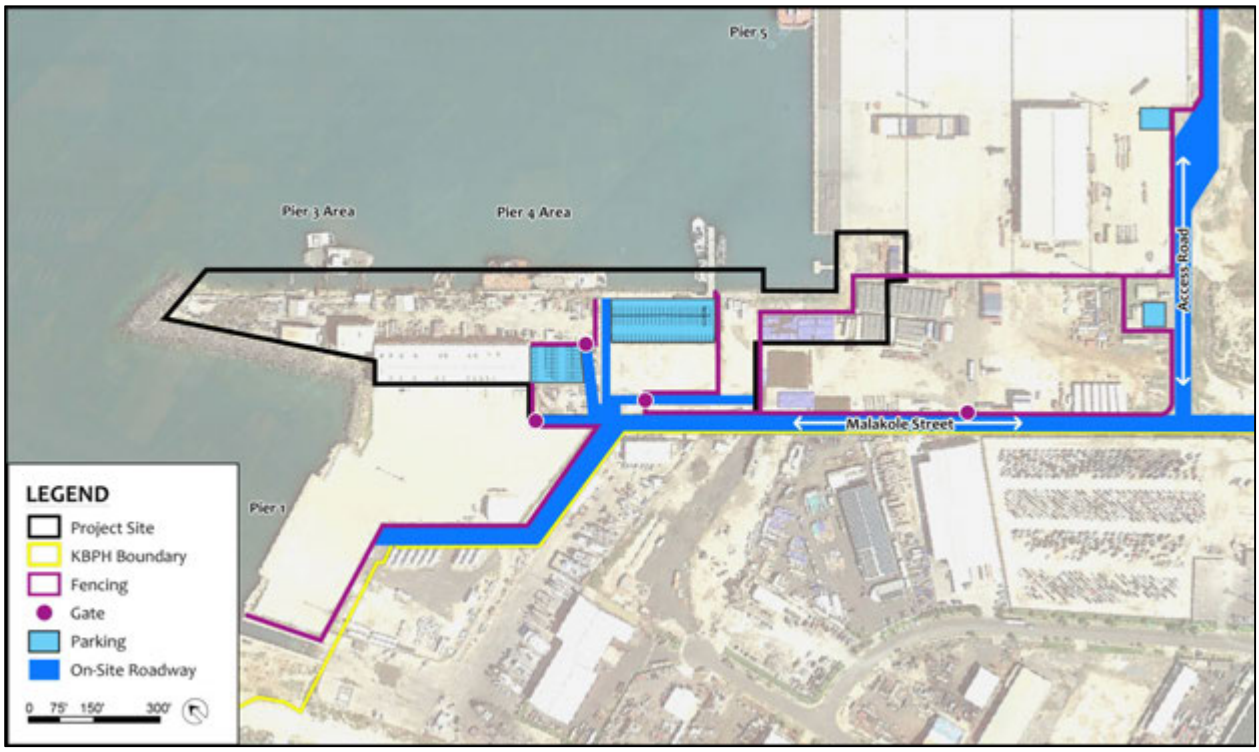

Figure 2.20 – Existing Circulation

Security

Marisco operations are secured within a fenced-security perimeter *(Figure 2.20),* and private 24-hour security guards contracted by Marisco patrol this area. The parking area landside of the Pier 4 area is not enclosed. An additional fence is located east of the Finger Pier and encloses the cargo yard for Sause Bros. This area is managed by DOT-H contracted security.

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3.0
Hawai‘i’s Fuels Market Forecast and Implications

3.0 HAWAI'I'S FUELS MARKET FORECAST AND IMPLICATIONS

The Fuel Pier at Kalaeloa Barbers Point Harbor (KBPH) will be designed to appropriately respond to the future fuels market, including demand projections for O'ahu and the Neighbor Islands. In March 2014, Facts Global Energy (FGE) completed a study entitled *Fuels Market in Hawai'i: Current Situation and Future Prospects (Appendix G).* Specifically, this study details the current Hawai'i fuels market and projects the potential future demand for the wide range of fuels products used in the state. The overview of the fuels market includes the increased demand for jet fuel and liquefied petroleum gas (LPG, also known as propane), and the potential for growing markets for natural gas and renewable fuels.

Fuels shipments to and from KBPH are closely tied to the state's demand for various fuels to support power generation and transportation. The critical infrastructure for the Fuel Pier, fuel pipelines and off-site storage facilities must be adequate to properly serve future fuels demand. This section summarizes the current fuels market in Hawai'i and provides a generalized forecast of demand for various fuel types and fuels industry requirements for support facilities at KBPH.

3.1 Fuels Market for Hawai'i

Due to its geographic isolation and a lack of available petroleum resources, Hawai'i is heavily dependent upon fossil fuel imports. In 2011, imported oil provided approximately 88 percent of Hawai'i's primary energy supply (FGE, 2014). Roughly 93 percent of Hawai'i's energy demand is served through imported energy products. Hawai'i's energy demand is equally divided between power generation, ground transportation and air transportation.

Hawai'i is served by two oil refineries located in the James Campbell Industrial Park in Kapolei, O'ahu. The Chevron Corporation refinery produces gasoline, jet fuel, diesel, fuel oil and other miscellaneous products (i.e., naphtha, unfinished oils and refinery fuel). In 2013, Hawaii Independent Energy, LLC (a subsidiary of Par Petroleum Corporation), acquired the Tesoro Hawai'i refinery, which produces gasoline, jet fuel, high sulfur diesel, high sulfur fuel oil, low sulfur fuel oil (LSFO), asphalt and naphtha. These companies refine crude oil which is delivered via ocean tankers to the two O'ahu terminals through offshore moorings and undersea pipelines to landside storage facilities. Also based in James Campbell Industrial Park are Aloha Petroleum and Mid Pac Petroleum (also a subsidiary of Par Petroleum) companies which are state-wide distributors of gasoline, diesel, biodiesel, ethanol, and lubricants. Hawai'i's demand of these petroleum products is shown in *Figure 3.1*.

3.1.1 Power Generation Fuels

Light fuel oil imported from Indonesia has historically served as the primary fuel burned by Hawaiian Electric Company (HECO) for electrical power generation across the state. Currently, crude oil is imported via offshore moorings to the refineries which produce the bulk of HECO's power generation fuels. The Neighbor Island HECO subsidiaries are supplied by fuel products delivered by interisland fuel barges which berth and load at Piers 5 and 6 at KBPH.

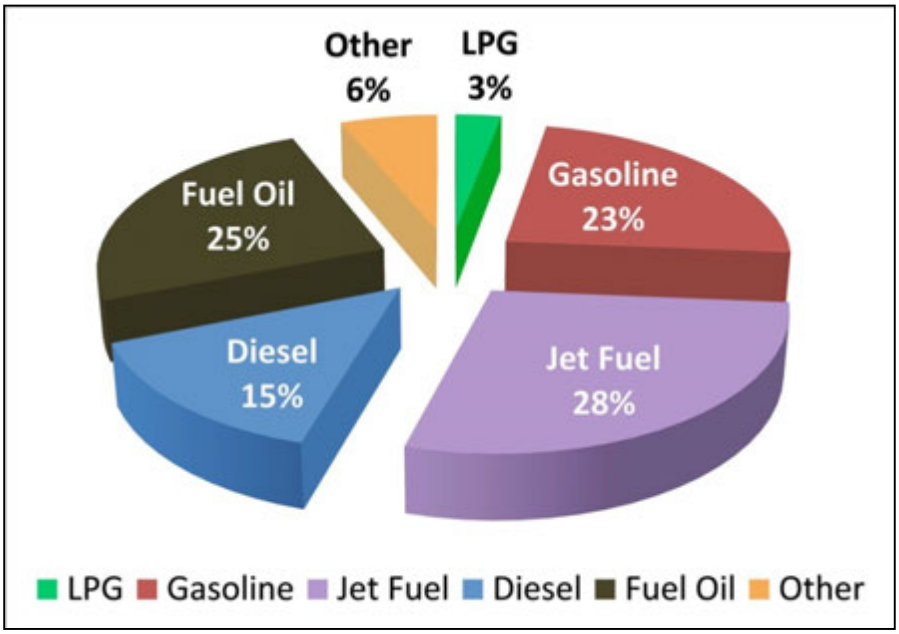

Figure 3.1 – Hawai'i Oil-Product Demand Shares, 2011 (vol %)

Under the Hawai'i Clean Energy Initiative (HCEI), a significant portion of electrical power generated through fuel oil combustion is being replaced by renewable sources, including commercial wind and solar energy. As Hawai'i's renewable energy sources expand, the projected future demand for fuel oil to serve power generation will decline substantially.

A major development in the energy supply scenario for electrical power generation is the desired introduction of liquefied natural gas (LNG) as the primary fuel source. There are proposals for LNG to largely replace the use of fuel oil and diesel over the next two decades. Scenarios for the development of an O'ahu LNG terminal and support infrastructure are currently being studied intensively by HECO and Hawai'iGAS. A majority of the LNG imports could be handled through an offshore floating terminal, with a land-based terminal at KBPH for storage and Neighbor Island distribution.

The timing of the HECO conversion to LNG was targeted to begin implementation in O'ahu power plants by 2017; however, it does not appear technically feasible to meet this deadline for development of bulk LNG infrastructure. In the interim, HECO expects to be shipping LNG in International Standard Organization (ISO)-containers for O'ahu, Hawai'i, Maui, Molokai and Lāna'i starting in 2019, prior to the completion of the bulk LNG terminal. Once the infrastructure is in place, some estimates show LNG could represent up to 60 percent of the HECO fuel consumption by 2024, substantially reducing crude oil imports to Hawai'i. However, LNG will remain a short to medium term fuel until the conversion to 100 percent renewables in 2045.

In the near-term, in order to meet new Mercury and Air Toxics Standard (MATS) environmental regulations required by April 2016, HECO has revised their operating and maintenance procedures while still using 100 percent LSFO. By the end of 2024, if they are not using liquefied natural gas (LNG) as a fuel, it is anticipated that HECO will need to use a LSFO/diesel blend as a replacement for LSFO to comply with National Ambient Air Quality Standards (NAAQS). Should

this occur, a LSFO/diesel blend could remain as a secondary or contingency fuel source even after the transition of HECO's generating units to natural gas. Having both LSFO/diesel blend and natural gas options will minimize HECO's risks that come from reliance on a remotely-located single fuel type or contract source.

3.1.2 Transportation Fuels

Transportation energy use (air, road and marine transport) is largely provided by refined petroleum products, including gasoline, diesel and jet fuels. O'ahu's two refineries can create these refined products for Hawai'i's market; however, poor economics of refinery operations present a risk that they will eventually cease operations. A potential future closure of both O'ahu refineries would necessitate the 100 percent importation of Hawai'i's transportation fuels. Transportation fuel demand would primarily be served through fuel tanker shipments that offload to the O'ahu terminals via the offshore moorings and underwater pipelines, with remaining petroleum products unloading at KBPH. In this scenario, the two refinery operations on O'ahu would convert to fuel terminals to store and transmit refined fuel products for transportation and energy generation.

Local refineries produce jet fuel used locally at a varying amount – typically between 45 and 55 percent, though it can be as high as 70 percent, with the rest imported from offshore. Unlike other products whose demands are expected to remain steady or decrease, jet fuel demand is predicted to increase, due in part to continued growth in the state's tourism industry. There will be a continued demand in jet fuel that cannot be fulfilled by the local refineries, whether they continue operations or not. Although the current infrastructure does not allow for imported jet fuel at KBPH (which could then be utilized by aircraft at Honolulu International Airport), transshipment of jet fuel at KBPH could relieve pressure on Honolulu Harbor. Direct imports of jet fuel into KBPH or through the offshore moorings could be stored at off-site storage facilities, and then loaded for Neighbor Island deliveries.

Transportation fuels are supplied to most Neighbor Islands through interisland fuel barge deliveries which originate from KBPH. Hilo is the only Neighbor Island port receiving some supply from direct ocean tanker deliveries. Neighbor Island transportation fuel demand is low relative to fuel demand on O'ahu, but as the demand for transportation fuel grows going forward, there will be a commensurate increase in fuel shipments from KBPH. As the Neighbor Island harbors are not currently programmed for expansion to serve ocean tanker vessels and provide fuel infrastructure facilities, the pattern of interisland transportation fuel shipments based from KBPH will continue over coming decades.

3.1.3 Renewable Fuels

In addition to the current importation of ethanol, biofuels are another potential future source of power generation and transportation fuels for Hawai'i. Biodiesel has been produced in Hawai'i for commercial applications through conversion of recycled cooking oil. Hawai'i possesses great potential for the development of biofuels due to its year-round growing season for various biomass feedstock crops. Wood chips and wood pellets are also being developed for direct combustion through operations in Hawai'i and outside the state.

However, there are significant logistical challenges to biofuel production, which include biomass crop production, processing of biomass material, biomass conversion to biofuels, and transport to markets. Commercial biofuel operations are being developed to meet a portion of Hawai'i Electric

Light Company's (HELCO) demand on Hawai'i Island, with others planned on Maui and Kaua'i. Due to the large land area requirements and high land costs, it is less likely that large-scale biomass crop production will occur on O'ahu. Because the logistics and costs of handling and processing biomass require the conversion operations to be conducted near the crop sources, it is unlikely that large quantities of unprocessed biomass feedstock will be delivered to KBPH.

Although renewable fuel options pose the potential to replace oil products in power generation and transportation fuels, the emergence of renewable fuels will not completely replace oil and oil products from the transportation energy demand. For the foreseeable future, renewable fuels could replace a growing portion of transportation fuel through blending with oil-based transportation fuels. Ethanol blending in gasoline is assumed to continue at 10 percent volume, and the small share of biodiesel (B20) maintains its share of road diesel.

3.2 Fuels Industry Stakeholders

The following is a summary of the fuel stakeholders at KBPH.

3.2.1 Petroleum Products, Fuel Oil and Refined Petroleum Products

Stakeholders: Chevron, Hawaii Independent Energy (HIE), Aloha Petroleum, Mid Pac Petroleum

The Chevron and HIE refineries and product terminals at James Campbell Industrial Park are essential elements of Hawai'i's fuel supply system. Aloha Petroleum and Mid Pac Petroleum import and also deliver refined product (finished petroleum and non-petroleum products) to customers on O'ahu and the Neighbor Islands. Existing fuel pipeline systems connect the refinery storage terminals with Piers 5 and 6 at KBPH, primarily for outgoing shipments via fuel barge to the Neighbor Islands. Power generating facilities on the Neighbor Islands receive the majority of the interisland fuel shipments, with transportation fuels representing the other large component of Neighbor Island fuel shipments.

Given an evolving world market for liquid petroleum products, and the resulting changes underway in Hawai'i's fuel industry, future shipments of liquid fuel products through KBPH will change over time. For the foreseeable future, liquid petroleum products will remain the primary fuel for energy production and transportation fuels in Hawai'i. The liquid fuels shipped through KBPH will likely transition to a higher percentage of refined petroleum transportation fuels.

3.2.2 Natural Gas and Gas Products

Stakeholders: Hawai'iGAS, AmeriGas, HECO

The liquefied petroleum gas (LPG) terminal at KBPH is operated by Hawai'iGAS on private land adjacent to the Pier 1. It plans to serve the future LPG demand through the improvement of its existing facilities adjacent to Pier 1 by increasing storage capacity. Hawai'iGAS is also interested in an LPG pipeline at Pier 3 to connect with existing storage facilities, as seasonal surge conditions at Pier 1 prohibit pier usage. AmeriGas has also expressed interest in locating an LPG terminal at Kalaeloa, with a potential location known as Bulk B in the *KBPH 2040 Master Plan*.

Liquefied natural gas (LNG) is being actively pursued as a supplement and replacement fuel for oil-burning HECO power generating facilities in Hawai'i. HECO and the US Navy are currently in negotiations to develop a nearshore floating terminal at Joint Base Pearl Harbor-Hickam where LNG

could be unloaded from ships and piped to the utility's power plants. This floating terminal would be the large-scale source of LNG for utility consumption on O'ahu. Due to the extended permitting process for such a facility, HECO is pursuing the integration of LNG via ISO-container shipments during the interim.

The utility is planning for the eventual conversion of the Neighbor Island power generating facilities to integrate LNG. This potential change in the Neighbor Island power generating fuel requirements may affect the number of Neighbor Island fuel oil barge shipments via KBPH.

Hawai'iGAS has already received approval by the Public Utilities Commission to begin shipment of LNG using ISO-containers via Honolulu Harbor. The LNG is being integrated into the current O'ahu utility pipeline at Pier 38. This allows Hawai'iGAS to replace up to 30 percent of the current production of synthetic natural gas (SNG) at its SNG plant in Kapolei. LNG is also being actively pursued as a transportation fuel for ocean vessels and ground transportation. Hawai'iGAS has expressed interest in developing a secondary O'ahu LNG terminal at KBPH, and has studied potential siting options. The future development of an LNG terminal is considered among the alternative scenarios in the *Kalaeloa Barbers Point Harbor 2040 Master Plan* (*2040 Master Plan*).

3.2.3 Renewable Fuels

Stakeholders: Hawai'i BioEnergy, Zilkha Biomass, and other potential biomass companies.

Hawai'i BioEnergy entered into a 20-year contract with HECO (2013) to supply 10 million gallons per year of liquid biofuel for combustion in HECO power generation facilities. Liquid biofuel production at this scale involves Neighbor Island biomass crop production and conversion to liquid fuel product (e.g., pyrolysis oil). Large-scale liquid biofuel operations, such as Hawai'i BioEnergy, will serve the HECO power generating facilities on O'ahu, which will necessitate integration with KBPH. Liquid biofuel deliveries to O'ahu will be initiated using ISO-container shipments via KBPH. There is potential for larger volume shipments from the Neighbor Islands to KBPH, which will require logistics facilities at the harbor and storage on or off-site.

Renewable fuels also being considered for shipments through KBPH include biomass products (e.g., wood pellets) that would be utilized for direct combustion in energy production. The Fuel Pier will not be used for bulk biomass shipments, due to the specific design intent for direct pipeline transfers of liquid fuels and gas fuels. There is no large lay-down space or container storage area which would enable bulk biomass shipments at Piers 3 and 4. Potential biomass product shipments are addressed in the *2040 Master Plan*.

3.3 Statewide Fuels Demand Forecast

Hawai'i's historical fuels demand has largely focused on oil products, but future demand will differ greatly from the past. The Hawai'i Clean Energy Initiative (HCEI) requires that 70 percent of Hawai'i's energy comes from 'clean' sources by 2030, either by implementing conservation measures or using renewable sources. These aggressive goals were increased in 2015 by Governor Ige to 100 percent 'clean' sources for power generation by 2045. This level of renewables in power generation, with milestones along the way, has been agreed to by the electric utilities as a binding plan, and is referred to as the Renewable Portfolio Standard (RPS). In addition to the RPS, Hawai'i's Energy Efficiency Portfolio Standard (EEPS) has helped reduce Hawai'i's oil demand by decreasing the amount of energy used in Hawai'i.

The following factors make it probable that the fundamentals of fuel demand are being transformed:

- Hawai'i is facing a volatile environment for crude oil, with frequent fluctuations
- The HCEI, RPS and EEPS will continue to reduce oil demand
- US Environmental Protection Agency (EPA) MATS aims to reduce air pollution by 2016 from coal and oil-fired power plants, causing HECO to choose between adding expensive scrubbers to their power plants, and altering or displacing their consumption of the current grade of LSFO
- By 2022 or 2025 (depending on the utilities' plan of action), it will be difficult for electric utilities to burn LSFO given the EPA's National Ambient Air Quality Standards (NAAQS) mandate
- LNG imports offer a potentially cheaper alternative, especially in the power sector
- Hawai'i refiners face a challenging business environment, threatening long-term viability

The *Fuels Market in Hawai'i: Current Situation and Future* (FGE, 2014) study presents eight fuel scenarios: Business as Usual (BAU), Renewable Portfolio Standard (RPS) falls short, RPS succeeds and Hawai'i Clean Energy Initiative (HCEI) mostly succeeds, each with and without LNG. Future demand scenarios for Hawai'i power generation and transportation fuels are shown in *Figure 3.2*.

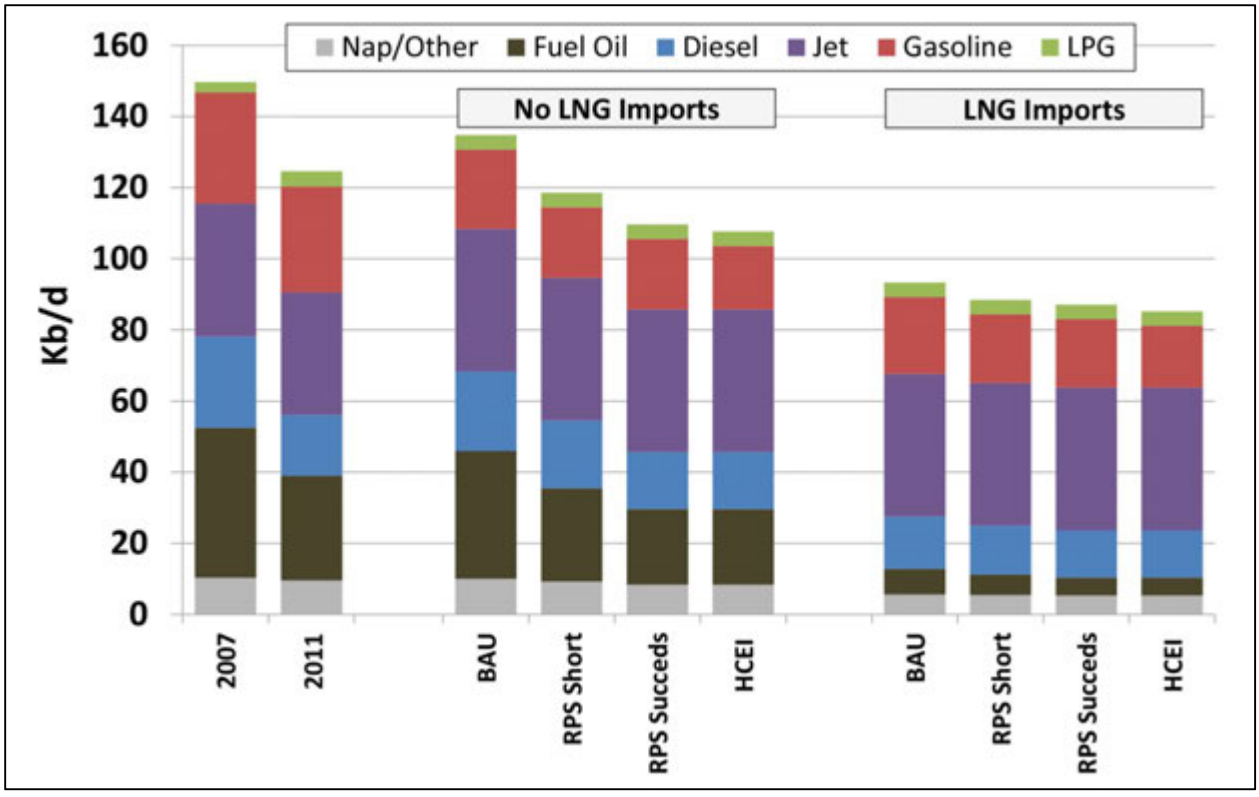

Figure 3.2 - Oil Product Demand in 2030 Under the Eight Scenarios (kb/d)
(Source: FGE, 2014)

Although this figure portrays a reduced demand for oil products in the year 2030 compared to a peak year in 2007 and a low in 2011, the range of product demand is within the 80 to 100 kilo barrels per day (kb/d) even with integration of LNG. Importantly, KBPH needs to serve Neighbor Island fuel demand in the face of growing dry-bulk deliveries at Piers 5 and 6. The development of a dedicated Fuel Pier at KBPH is critical to enable the harbor to manage growing conflicts among dry-bulk and liquid-bulk users.

3.4 KBPH Fuels Shipments

Although the future demand for liquid-bulk petroleum products in Hawai'i is forecasted to decline by 2030, the demand for waterborne movements of liquid-bulk petroleum products between 2015 and 2040 is forecasted to increase, resulting in an increase in the number of ships calling at KBPH. The primary reason for the increase in ship activity at the Fuel Pier over the forecast period is that any decreases in fuel oil demand from the power generation sector, whether from conservation or replacement fuels, ultimately results in excess local fuel oil supply by the refineries. With no local market, this excess fuel oil needs to be exported by ship or barge to other markets through KBPH facilities. In other cases, such as one or both of Hawai'i's refineries closing, it may be necessary to bring in large volumes of liquid-bulk commodities such as jet fuel, diesel and gasoline through either the offshore moorings or waterfront facilities at KBPH.

Based on the four cases outlined in the FGE report, *Fuels Market in Hawai'i: Current Situation and Future Prospects* (both refineries operating, no refineries operating, Chevron only and Hawaii Independent Energy only) and the two scenarios within each case (with or without LNG), the kb/d impact on KBPH and the associated ship activity have been calculated. Additional forecasted ship counts per month at a current harbor basin draft of 36 feet are presented in *Table 3.1*. Ship counts have also been calculated in the event the harbor is dredged to minus 42 feet (allowing for a more fully-laden ship), and are presented in *Appendix H*.

Each of the future O'ahu refinery operation scenarios results in a different forecast for the number of vessel calls to KBPH. In the cases with both or one of the refineries operating, the resulting increase in the number of ships calling at KBPH varies from one to 10 per month, with refined product surplus being exported. In the case where no refineries are operating and all product demand is met through imports, the number of additional monthly ship calls increases dramatically to between 8 and 17 per month (this assumes there would be no crude oil coming in through the offshore mooring system). In all scenarios, it is reasonable to consider the offshore mooring system will be retained for product imports, thereby decreasing the number of ships in the harbor. However, many fuel ships will contain multiple fuels, which will off-load a portion of the fuels at the moorings, and berth at KBPH to offload the remaining refined fuels.

To simplify the vessel forecast calculation, shipments are assumed to utilize 650-foot length overall (LOA) Panamax Tankships of 50,000 DWT, loaded to a 36-foot draft with 225,000 oil barrels (bbl) of liquid-bulk product.

Table 3.1 - Incremental Additional Monthly Fuel Vessel Calls to KBPH

		CY 2015	CY2020	CY2025	CY2030	CY2035	CY2040
BOTH REFINERIES IN OPERATION	W/O LNG	1-2	1-2	1-3	2-4	1-4	1-5
	With LNG	1-2	1-3	6-7	6-8	6-8	6-8
HAWAII INDEPENDENT ENERGY REFINERY ONLY	W/O LNG	4	4	4-5	3-5	3-5	3-6
	With LNG	4	4-5	5	5	5	5
CHEVRON REFINERY ONLY	W/O LNG	9	8-9	8-9	7-9	7-10	8-10
	With LNG	9	8-9	6	6	6	6
NO REFINERIES IN OPERATION	W/O LNG	14-15	14-15	13-15	12-15	12-16	12-17
	With LNG	14-15	13-15	9-10	9-10	8-10	8-10

Periodic Conflicts (40-60% occupancy)
Frequent Conflicts (60-80% occupancy)
Regular Conflicts (80-100% occupancy)

Current tank ship calls to KBPH average two per month, while current fuel tank barges average nine per month. With the addition of 3 tank ships to the current vessel calls, the fuel pier would begin to see 50 percent utilization. The blue font in *Table 3.1* represents this higher utilization, and is outlined in black. At this point, Phase 2 of the fuel pier would need to be constructed (see *Section 5.3*). However, this will not completely reduce the berthing conflicts if the numbers of ships continue to increase. One hundred percent utilization is reached with the addition of 10 Panamax-sized tank ships per month with an average port call of 60 to 72 hours and daylight vessel movement limitations.

All scenarios show an increase in berthing utilizations with current and future conflicts. It is clear that a dedicated Fuel Pier is needed, with Piers 5 and 6 in continued use as secondary fuel piers.

4.0
Summary of Business, Agency, and Community Consultations

4.0 SUMMARY OF BUSINESS, AGENCY, AND COMMUNITY CONSULTATIONS

The pre-assessment phase for this *Fuel Pier Development Plan* commenced in April 2013 and included developing a working relationship with the current and potential KBPH maritime users to determine their needs and concerns for the dedicated Fuel Pier. Small group meetings and phone conversations with users were held to understand the range of issues existing in the fuels community. Meetings with governmental agencies were also conducted to identify areas of authority, necessary permits and approvals that would be required upon future action. A questionnaire was distributed to stakeholders in the industry to gather their feedback. In addition, public meetings for the community and stakeholders were conducted to assess existing needs, capabilities, and consideration for future operational activities at the Fuel Pier that will affect the surrounding community and the state *(Appendix I).*

4.1 Site Visits and Meetings

The Project Team, consisting of the Department of Transportation, Harbors Division (DOT-H), their consultant Group 70 and various sub-consultants first visited the Fuel Pier site on May 16, 2013. Subsequent visits were conducted by Group 70 and Enpro Environmental on June 12, 2013 and Group 70 and Amergent Techs on October 1, 2013.

Early consultation on the project was carried out with stakeholders and various agencies. Planning workshops were held on July 18, 2013 and April 3, 2014 to provide opportunities for harbor stakeholders to provide input to the planning of the Fuel Pier. Public meetings were held September 3, 2013 and October 13, 2014 to provide opportunities for the community to obtain information on the *Kalaeloa Barbers Point Harbor Fuel Pier Development Plan* (*FPDP*). Maritime users that have been contacted and involved in this portion of the project are listed in *Table 4.1*. Key stakeholders in government and the community are shown in *Table 4.2*.

Table 4.1 - Harbor Stakeholders

HARBOR STAKEHOLDERS	
Aloha Petroleum, Ltd.	Hawaiian Electric Company, Inc. (HECO)
BAE Systems	Healy Tibbitts Builders, Inc.
Chevron	Hidden Villa Ranch
Clean Islands Council	Kirby Offshore Marine
Foss Maritime Company	Marisco, Ltd.
GLP Asphalt LLC	Mid Pac Petroleum
Grace Pacific Corp.	P&M/P&R Water Taxi
Hawai'iGAS	Pacific Environmental Corporation (PENCO)
Hawai'i Bioenergy, LLC	Pacific Shipyards
Hawai'i Fueling Facilities Corporation/ASIG	Petrospect
Hawaii Independent Energy, LLC	Sause Bros., Inc.
Hawai'i Port Pilots Association	Transmarine Navigation Corporation

Table 4.2 - Government Agencies and Community Members

FEDERAL AGENCIES
US Department of the Army, Corps of Engineers, Honolulu District
US Department of Homeland Security, 14th Coast Guard District
US Fish and Wildlife Service
Environmental Protection Agency (EPA), Region IX, Pacific Islands Contact Office
EPA, Region IX, San Francisco Contact Office
National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Pacific Islands Regional Office (PIRO)
STATE AGENCIES
Department of Land and Natural Resources (DBEDT), Hawai'i State Energy Office
DBEDT, Office of Planning, Coastal Zone Management
Division of Consumer Advocacy (DCA)
Department of Land and Natural Resources (DLNR), Division of Aquatic Resources
Representative Karen Awana, District 44
Senator Mike Gabbard, District 20
CITY AND COUNTY OF HONOLULU
Honolulu Councilmember Kymberly Marcos Pine, District 1
COMMUNITY
A. Arnaho, T. Arnaho
Alston, Hunt, Floyd and Ing
Hawai'i Public Policy Advocates
Kalaeloa Properties, LLC

4.2 Fuel Pier Development Issues

Comments and issues raised by stakeholders including harbor users, government agencies, and community members are summarized in the sections below. Notes from stakeholder meetings are in *Appendix I*.

4.2.1 Harbor Stakeholders' Concerns and Considerations

Information from stakeholders was gathered through questionnaires, correspondence, phone calls, and small group meetings. In addition, planning workshops were held to provide opportunities for harbor stakeholders to provide input to the planning of the Fuel Pier. The statements below outline the primary concerns raised by harbor stakeholders during these meetings.

- *Address Berthing Conflicts*
  There are concerns about building pipelines at the Piers 3 and 4 area when there are already fuel-related uses at Piers 5 and 6. A suggestion for a less expensive alternative was to make dry-bulk cargo landings at Piers 3 and 4 to free up berthing space.

- *Allow Flexibility to Meet Future Needs*
  It was recommended to remain flexible when calculating the fuel demand forecast and consider the various changing trends that may occur, which will affect the volume of products coming into KBPH. It was also asked whether or not this pier will handle the full suite of potential fuels.

- *Address New Pipelines*
  Depending on the future of the refineries, there may be more imported refined product. The scenarios will need to be evaluated with a wide range of options. Different vessels, fuels, storage, and use will have to be studied.

  Harbor users pointed out that the Fuel Pier may be able to load two vessels, but not necessarily the same fuels. If the intent is to connect the existing pipelines, then the pipeline capacity has not doubled, only the number of moorings. This could potentially cause a problem with handling different products and scheduling.

  It was suggested that the pros and cons of using a consortium to manage the pipelines should be considered. The maintenance of the fuel pipelines and Fuel Pier structures will be considerable and will need to be delegated to a party prepared to commit to maintenance and operation with each transfer operation.

  Additional comments and questions concerned the number of pipelines, whether the fuel pipeline system would be above- or belowground, and system expense.

- *Consider Safety and Security*
  Pre-staged oil spill boom equipment can save time and effort in day-to-day activities. The design should consider response, maintenance, and vessel water access. In responding to oil spills, a three-stage containment boom for the fuel berth should be considered, similar to that used at Piers 5 and 6. Vapor control measures are anticipated to be required for the Fuel Pier.

- *Evaluate Fuel Pier Design Alternatives*
  The design should take into consideration berthing scenarios for Piers 3, 4, and 5A. It is important to avoid conflicts while providing maximum utilization. The engineers need to take into consideration ship sizes and berthing techniques when determining dolphins and mooring points. A harbor user asked if there will be bunkering facilities at the Fuel Pier, as it is currently only provided via barge.

- *Funding the Fuel Pier*
  One of the primary concerns of the stakeholders was how construction of the Fuel Pier would be financed. In addition, the existing, privately-owned pipeline infrastructure (e.g. pipelines, valve boxes, hatches, etc.) that conveys fuel from the pier-side to users will have to be extended and modified. The expense of designing, building and maintaining a dedicated fueling facility at the Piers 3 and 4 area is anticipated to be passed on to users of the facility via increased tariffs and throughput fees.

  Increased costs could impose burdens on HIE's operations, with little or no corresponding benefit. HIE had previously noted that they do not intend to use the Fuel Pier and they would continue to transfer fuels via Piers 5 and 6. The financial burden associated with building a dedicated fueling facility could add to financial challenges of maintaining and operating a

refinery in Hawai'i. It is in the interest of the State and potential users to consider the future financing of the Fuel Pier facilities.

Below are comments provided by specific harbor users.

Aloha Petroleum

Aloha has experienced congestion at Pier 5, and expects that it will continue as dry-bulk increases. Aloha is in support of the Fuel Pier, as additional pier docking space is needed to accommodate increased vessel traffic. The preference is for a continuous wharf, as there can be problems with landing a ship at breasting dolphins if the ship is the wrong size. There is no preference between fuel loading arms and hoses. Loading arms are clean, but Aloha has seen many foreign vessels with centerlines more than 50 feet, and the hoses would be more flexible in this situation. Fuel storage would be available in James Campbell Industrial Park if it is needed.

Chevron

Chevron supports development of a Fuel Pier at the Piers 3 and 4 area. Loading arms would be economical if there were three to four loads a week and they would simplify a lot of things, but hoses may be more economical.

GLP Asphalt, Grace Pacific Corp., Hidden Villa Ranch

The Fuel Pier is a top priority issue for these stakeholders to relieve congestion at Piers 5 and 6. They support the development of a dedicated Fuel Pier at the Piers 3 and 4 area, consistent with prior master plan recommendations.

Hawai'iGAS (HG)

Hawai'iGAS currently has liquefied petroleum gas (LPG, also known as propane) operations at Pier 1. HG has requested access to the new Fuel Pier to avoid seasonal surge conditions at Pier 1 and provide expansion capability for their LPG terminal.

Hawai'i Fueling Facilities Corporation (HFFC)

HFFC is interested in the possibility of obtaining and/or constructing a jet fuel off-loading and terminal storage facility at KBPH. Although there is no current pipeline system to move jet fuel imports from Kalaeloa to Honolulu International Airport, KBPH may be a possible site for storing and dispersing jet fuel imports to the Neighbor Islands.

Hawaii Independent Energy, LLC (HIE) (Formerly Tesoro)

HIE believes that the current fuel facilities are adequate, but recognizes that space is limited for petroleum transfers, and the existing pipeline infrastructure on the piers is limited. However, given the high priority of distributing fuel to the Neighbor Islands in just-in-time fashion, coupled with the fact that building and connecting new fueling facilities would be cost-prohibitive, HIE prefers to continue to use Piers 5 and 6. HIE invests its own money to maintain the existing petroleum pipelines that extend from KBPH to the company's Kapolei storage terminal. HIE does not believe the expense of relocating the pipelines would be justified.

Hawai'i Port Pilots Association (HPPA)

For the new Fuel Pier, HPPA highly recommends the use of a segmented partial pier design *(Section 5.2.1).* This design is accepted and used in ports throughout the world, is readily accepted by ships and barges everywhere, and is a well-suited design for KBPH. More traditional pier designs (e.g., continuous platform wharf or sheet pile bulkhead) are more costly due to large sections of poured concrete and supporting structure. In addition, the HPPA does not endorse the installation of new marine loading arms, as recommended in the *Statewide Fuel Facilities Development Plan*. Fuel vapor containment regulations may require such loading arms to capture those vapors. Currently, all fuel transfers are done through inspected rubber hoses situated on the dock between risers.

Hawaiian Tug and Barge/Young Brothers (HTBYB) (now Foss Maritime Company)

HTBYB supports the addition of fueling facilities in general.

Hawaiian Electric Company (HECO)

HECO believes that the dedicated Fuel Pier will be an important future improvement, more so with refinery status uncertainty. Vessel traffic within the harbor may increase as the proportion of fuel imports that pass through the harbor increases compared to the offshore moorings. The Fuel Pier will be essential to serve regular calls of interisland fuel barges, and possible growth in biofuel production from Neighbor Islands. Due to these factors, HECO has requested analysis of the potential for increased vessel traffic to cause ship-to-ship and ship-to-shore collisions and resulting oil-spill risk. HECO's updated priorities for various fuels may affect the future program/design for the KBPH Fuel Pier.

HECO also expressed concerns regarding the fuel pipelines. In order for the Fuel Pier to service potential users, the existing, privately-owned pipeline infrastructure (e.g., pipelines, valve boxes, hatches, etc.) will have to be extended and modified. HECO understands that it will be required to pay its proportional share of the cost to extend these facilities, but believes that sharing the cost is in the interest of the State and potential users.

Kirby Offshore Marine

Kirby Offshore Marine is a fuel service provider, loading and discharging fuel barges at KBPH. They are concerned with not enough berths available, and cited the need for more fueling positions.

Marisco, Ltd.

Marisco is not confident that a partial pier is the most appropriate design for the Fuel Pier. They believe a full pier is needed, with sheet pile, concrete pad, and a solid foundation *(Section 5.2.3).* Due to the surge, ships may need anchors to assist berthing at a dolphin-type pier. Marisco is also concerned about phased development of the project in relation to their relocation.

Pacific Environmental Corporation (PENCO)

PENCO supports the development of a Fuel Pier, but recommends that the *FPDP* addresses the PENCO operational functions at the site of the Fuel Pier. Prevailing trade winds allow for effective fuel spill capture. With the segmented partial pier design, PENCO would need the ability to string

booms with staged boom reels, similar to Piers 5 and 6. This is important as there are strict spill response times within 60 minutes or 120 minutes. PENCO also recommends that the Fuel Pier needs to accommodate design flexibility, with the ability to locate different sized vessels where the manifold set varies by vessel.

4.2.2 Government Agencies

Information gathered from agencies occurred through public meetings and workshops, small group meetings, phone conversations, email and written letters.

Dept. of Business, Economic Development and Tourism (DBEDT) Hawai'i State Energy Office

DBEDT is concerned about harbor congestion with the additional two new piers at the same entry point. DBEDT also questions how the fuel pipelines will cross the future regional drainage channel at Malakole Street.

It was noted that jet fuel companies are interested in having an additional berth at KBPH, with off-site storage. Currently, jet fuel is only transferred through Honolulu Harbor. While the Tesoro refinery was closed in 2012, there was difficulty with importing adequate quantities of jet fuel.

If both refineries are closed (for instance by 2040), there will be increased imports of refined fuel products. In addition, the moorings and terminals owned by HIE may also become unavailable. These assets should be used as a fuel hub. The *FPDP* needs to account for the bottlenecks.

United States Coast Guard (USCG)

The design and operations of the Fuel Pier must satisfy USCG regulations. Construction of the Fuel Pier will allow other piers more space to work with dry-bulk cargo. Users of the current fuel terminals already have storage and risers. A new Fuel Pier will open up business to other users.

It is important to look at various scenarios and their impacts to KBPH, such as the possibility of one or both refineries being closed. Honolulu Harbor will continue to bring in fuels as well. It is important that the vital energy interests of the State are protected. The correlation between the state economic growth factor and harbor growth should be analyzed to substantiate the need for the Fuel Pier facility.

United States Army Corps of Engineers (USACE)

USACE recommends consulting early with other federal agencies regarding the project. Questions arose as to whether the corals are located on man-made structures or a natural substrate. Agreement on the methodology for a marine assessment should be discussed with resource agencies prior to the field studies.

Justification will be needed for the preferred alternative as the Least Environmentally Damaging Practicable Alternative (LEDPA). The design alternative and location must meet Section 404 Clean Water Act guidelines regulating the discharge of dredged or fill material. If the project requires ocean disposal of dredge material, then a Section 103 Department of the Army (DA) Permit will be required.

Liquid fuel safety zones may restrict navigability of KBPH. The USCG has jurisdiction on this issue, not USACE. However, restricted areas or danger zones may be an issue for USACE if the navigable waters of the United States are restricted.

National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS), United States Fish and Wildlife Service (USFWS), Environmental Protection Agency (EPA)

The NMFS Pacific Islands Region's Protected Resources Division is responsible for the conservation and management of marine species protected under the Endangered Species Act (ESA). Ocean waters in the general project area may include the endangered humpback whale *(Megaptera novaeangliae),* the threatened green sea turtle *(Chelonia mydas),* and the endangered Hawaiian monk seal *(Monachus schauinslandi).* The Project Team consulted with NMFS, USFWS and EPA to discuss the potential impacts to coral and other endangered species. Mitigating Best Management Practices during construction of harbor improvements were recommended to further reduce potential impacts to protected marine species.

State of Hawai'i Office of Planning, Coastal Zone Management (CZM)

CZM federal consistency review by the Hawai'i CZM Program may be required if a DA Permit from USACE or other federal permits are required for the project.

Department of Health (DOH), Clean Water Branch (CWB)

DOH CWB advised that the construction of the Fuel Pier must meet the following criteria: a) Antidegradation policy (Hawai'i Administrative Rules [HAR], Section 11-54-1.1), which requires that the existing uses and the level of water quality necessary to protect the existing uses of the receiving state water be maintained and protected; b) Designated uses (HAR, Section 11-54-3), as determined by the classification of the receiving state waters; and c) Water quality criteria (HAR, Sections 11-54-4 through 11-54-8). The project may require a National Pollutant Discharge Elimination System (NPDES) permit for discharges of wastewater, including storm water runoff, into state surface waters (HAR, Chapter 11-55). It was also advised that discharges related to the project construction or operation activities must comply with the state's Water Quality Standards. DOH CWB recommends contacting USACE, Regulatory Branch regarding permit requirements, as the project involves work in, over, and under waters of the United States.

Honolulu Board of Water Supply (BWS)

BWS confirmed that the existing water system is adequate to accommodate the Fuel Pier based upon current data. Nonpotable water requirements of the Fuel Pier should be addressed. The on-site water system should be designed to facilitate the conversion to R-1 nonpotable water when it is made available to this area, in accordance with the *Kapolei Regional Nonpotable Water Master Plan*. BWS also recommended that the on-site fire protection requirements should be coordinated with the Fire Prevention Bureau of the Honolulu Fire Department.

Kymberly Marcos Pine, District 1 Honolulu City Councilmember

Councilmember Pine has concerns about containment issues should there be a significant fuel spill at KBPH. She also questioned harbor security considerations regarding Fuel Pier location and potential for higher risk exposure to terrorist activities.

4.2.3 Community

Public meetings were held in East Kapolei on September 3, 2013 and October 13, 2014 to provide the community with information on the Fuel Pier and to receive input on the project.

A community member raised concern about dredging and the potential to destroy limu and fish habitat. With construction of the proposed Fuel Pier near the ocean, there were questions regarding protection of the ocean during an oil spill. The State was encouraged to work with the current *hui* of oil response teams. If the facilities and people are in place, the spills will be reduced. It was suggested that these safety costs be incorporated into the project, before a catastrophic event happens. If the State and USCG were to force this cost on all users, it would reduce the cost to individual stakeholders.

In general, the community expressed that the Fuel Pier is vital for keeping KBPH efficient and moving cargo and supplies for the island community.

Kapolei Properties

As an adjacent landowner, Kapolei Properties is interested in participating in the planning of future harbor uses, and developing adjacent lands with compatible industrial uses. Kapolei Properties has developed a roadway master plan that will tie into a new entrance as contemplated in the *KBPH 2040 Master Plan*.

5.0
Design Requirements and Alternatives

5.0 DESIGN REQUIREMENTS AND ALTERNATIVES

The development of a dedicated Fuel Pier at Kalaeloa Barbers Point Harbor (KBPH) will be balanced by both design considerations and input by stakeholders. This chapter presents design parameters to develop a safe and functional Fuel Pier. Three pier design alternatives were developed for analysis, and then evaluated based on stakeholder requirements, operational flexibility, environmental factors and construction cost. Each design alternative will then be taken through the Hawai'i Revised Statutes, Chapter 343 environmental process for further evaluation. In addition, a Fuel Terminal concept plan was developed to identify landside support needs for the Fuel Pier.

5.1 Design Considerations

5.1.1 Federal Project Line

Previous planning studies and the *Kalaeloa Barbers Point Harbor 2040 Master Plan* (*2040 Master Plan*) recommend the appropriate location for the Fuel Pier at the Piers 3 and 4 area. A critical design consideration is the proper placement of the pier face within the Piers 3 and 4 area. The United States Army Corps of Engineers (USACE) is responsible for developing and maintaining navigational features in the nation's harbors. In addition, it has jurisdictional authority over navigable waters of the US. Within each harbor, USACE establishes jurisdictional lines delineating areas where no obstructions to navigation are allowed (33 USC 403). The Federal Project Line demarcates the boundary of the federal project area, and delineates the limit of certain federal responsibilities. The non-Federal Project Line demarcates areas beyond which transient vessel berthing can occur. Construction or placement of structures can be built up to the non-Federal Project Line. At KBPH, a 108-foot wide berthing area is available between the non-Federal Project Line and the Federal Project Line. The three Fuel Pier design alternatives will locate the outer edge of the pier face up to the non-Federal Project Line (*Figure 5.1*) for maximum use of the 108-foot wide berthing area.

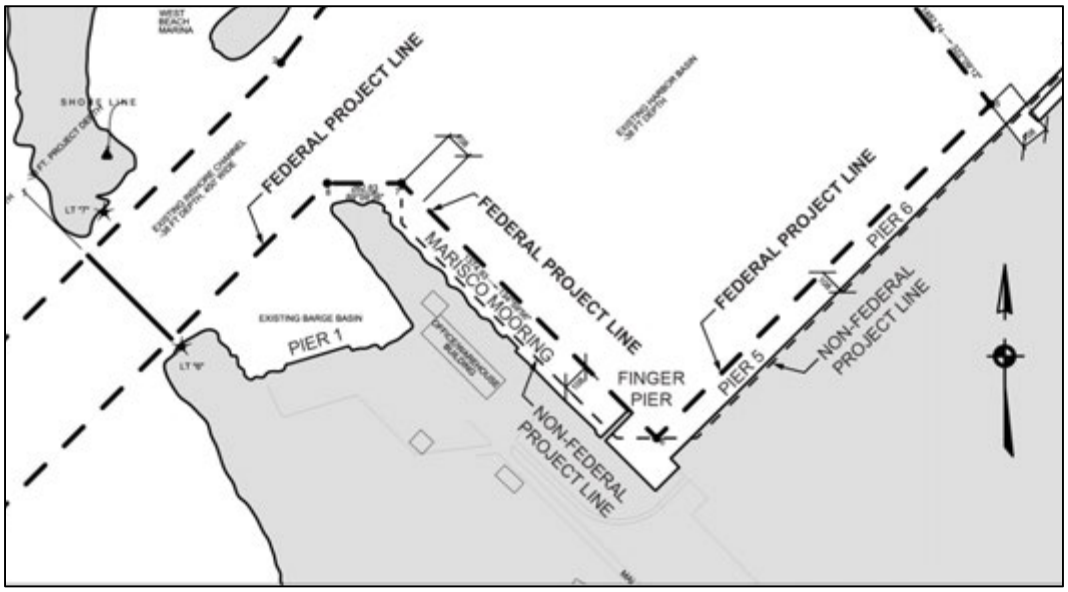

Figure 5.1 - Federal and Non-Federal Project Lines at KBPH

5.1.2 Physical Constraints

The physical constraints of KBPH will be considered when developing the Fuel Pier design alternatives. For example, the design cannot modify the rock revetment at the western end of the jetty near the Pier 3 area. Access by land and water to this revetment is also required for periodic maintenance by USACE. The Fuel Pier berths must also consider surge and wave action that occur within the harbor basin. The bow of berthed ships should be facing west to minimize the impacts from ocean wave surge at the entrance channel, particularly during the winter season.

Current harbor depth of 38 feet requires large vessels to limit cargo loads to safely navigate through KBPH. A USACE feasibility study to deepen KBPH harbor basin is underway. The Fuel Pier will be designed with piling to meet possible future harbor dredging up to a depth of 45 feet. In addition, fuel vessels berthed at Pier 4 cannot conflict with vessel water access at Pier 5A or the T-Pier located at the junction of Piers 4 and 5A.

The design water level condition for the proposed pier location within KBPH is based on the design hurricane condition. This is the most conservative approach because of the much higher expected wave heights, when compared to those of return period Kona storm, north, or south swell waves. The final design water level is composed of two main components: the maximum rise in still water level (SWL), along with the crest height of the maximum transmitted wave and harbor oscillation (surge) which propagate in on the SWL rise. The design water level excursion inside the harbor from a hurricane condition is therefore estimated by adding the total SWL rise to any transmitted wave height and long period oscillation that may enter the basin. Detailed calculations can be found in *Appendix E.*

According to USACE Circular No. 1165-2-212, which currently applies to all USACE Civil Works responsibilities, potential relative sea level change must be considered in every USACE coastal activity as far inland as the extent of estimated tidal influence. All planning, engineering, design, operation, and maintenance for sea level change must consider the sensitivity and adaptability of: 1) natural and managed ecosystems, and 2) human and engineered systems to climate change and other related global changes. Guidance provided in EC 1165-2-212 gives the planner or engineer specific instructions to account for changes in mean sea level (MSL) for USACE civil works projects in order to satisfy Federal requirements.

The O'ahu Metropolitan Planning Organization published a report in 2011 entitled *Transportation Asset Climate Change Risk Assessment Project,* which performed and evaluated a risk assessment of climate change on important transportation assets. Analysis of the Piers 3 and 4 area measured the ground surface elevations ranging between +8.0 and +11.0 feet MSL, fronting or in close proximity to the ocean. The sea level rise model for 2050 depicting one foot of sea level rise showed low structural impact and vulnerability to the entire harbor.

The sea level rise model depicting three feet for the year 2100 showed a moderate impact. By the year 2100, if constructed by the year 2020, the Fuel Pier will be 80 years old, at the end of the 50 to 80 year life expectancy of a commercial pier. Accordingly, the Fuel Pier will be designed at a minimum +11.0 feet MSL to take into consideration this rise in sea level, with transition down from the pier elevation to the existing yard elevation. Existing access roads to the area appear to remain passable with the predicted three feet of sea level rise.

5.1.3 Operational Flexibility

To meet the increasing demands of the fuel industry using KBPH, the Fuel Pier will be designed with flexibility to accommodate a wide range of vessel types *(Table 5.1)* and fuels that will be transferred through the harbor. Long-term maintenance considerations for the pier and fuel pipelines will be considered in the design. Some fuel types may require on-site storage facilities (as space permits) or incorporate safety zones, both of which will have to be developed and permitted as users respond to market demand. However, off-site storage is recommended and encouraged.

Table 5.1 – Fuel Vessel Types

VESSEL	LENGTH OVERALL (FT)	BEAM (FT)	DRAFT (FT)	DEAD WEIGHT TONNAGE (TONS)	CARGO CAPACITY (BBL)
Panamax Tankship	650 - 751	106	38 - 42	75,000	420,000
Handymax/ ATB Tank Vessel	600 - 700	95 - 106	34 - 40	50,000	225,000 -250,000
Double Hulled Fuel Tank Barge	300 - 400	80	28	30,000	80,000
LHG Tank Barge	230 - 246	46 - 48	12 - 18	3,300	15,600 – 16,000

The total pier face length available along the proposed Piers 3 and 4 area is approximately 1,425 feet. To allow vessel access to Pier 5A, a minimum 100-foot vessel clearance is needed, leaving 1,325 feet available for up to three fuel vessel berths.

The proper placement of mooring bollards/bitts is important to protect the ships from surge and hydrodynamics of passing vessels. Single post mooring bollards and double bitt moorings located along the edge of the piers need to be properly sized with appropriate safe working loads that will ensure that the vessel is secured to the jetty by providing solid, reliable anchor points for mooring lines.

Bollards and mooring bitts are typically spaced at approximately 75-foot intervals to serve Panamax-sized vessels and barges to 400 feet. Bollard spacing in multi-purpose piers can range from 50 to 64 feet, but should not exceed 100 feet if possible, depending on the pier design and usage.

The bollard and mooring bitts should be adequately designed for mooring loads. The typical safe working load for mooring bollards at KBPH is 100 tons or greater, however the mooring loads for the Fuel Pier should be determined by a qualified engineer that has performed a detailed mooring analysis. The line loads can be influenced by numerous factors including vessel size and type, wind conditions, current conditions, passing vessels, elasticity of the mooring lines, vessel deck equipment, tidal levels, bollard spacing, and numerous other factors.

A 45-degree angle from the vessel's mooring points to the bollard maximizes functionality of the head/aft and spring lines. Easy access to all mooring bollards is required for forklift accessibility when setting and removing mooring lines.

Discharge fuel manifolds for a typical Panamax/Handymax tank ship and articulated tug barges (ATB) are located amidships, with the vessel's superstructure aft. Therefore, the design will incorporate fueling infrastructure that reaches midship, while allowing for a minimum of 100-foot vessel clearance between berthed ships. Gangway platform placement will be needed for shore access and evacuation. The gangway placement for fuel barges is close to the manifold, while tank ships locate the gangway near the stern. The Fuel Pier design must accommodate vessel berthing options for the stern to face east or west, to allow for gangway placement by different vessel types.

The construction of the Fuel Pier will be phased to allow for flexibility in the Department of Transportation, Harbors Division (DOT-H) Capital Improvement Program, accommodate pier operations and meet fuel market demand (further detailed in *Section 5.3, Phased Development*). Both phases will support various vessel configurations.

5.1.4 Security, Safety and Environment

Another important consideration in the development of the Fuel Pier design is the security, safety and environmental requirements to satisfy current mandates and standards.

Security

Fuel facilities require higher levels of security than other forms of cargo, due to the potential danger of a malicious attack. Hawai'i's fuel assets (i.e., vessels, property and waterfront facilities) must be safeguarded following post-9/11 security requirements from destruction, loss or injury by sabotage or other subversive acts. The focus of security will be:

1. Strict access control
2. Capable responses to the high fire and explosion risks
3. Containment and recovery of released agents
4. Segregation of threat potential from other harbor operations.

The Fuel Pier will be a secure facility equipped with perimeter security fencing and a video monitoring system. Primary access from Malakole Street to the facility will be restricted through a secured gate with a guard verifying Transportation Worker Identification Credential (TWIC) and Maritime Security (MARSEC) security clearances as well as a specific reason for accessing the facility. A secondary restricted access connecting to Pier 5A will be a locked gate and require the same clearances.

Safety

Standards from the *Unified Facilities Criteria* (UFC) *4-152-01* related to *Design: Piers and Wharves* will guide the Fuel Pier design. The *UFC* system provides planning, design, construction, sustainment, restoration, and modernization criteria, and applies to the military departments, the defense agencies, and the US Department of Defense (DoD) field activities. The American Association of State Highway and Transportation Officials (AASHTO) standards are also used. These specifications, test protocols and guidelines are used in design and construction throughout the US. DOT-H has design criteria to supplement AASHTO guidelines. In addition, American Concrete Institute (ACI) code requirements and American Society of Engineers (ASCE) *Seismic Guidelines for Ports* are used in the design process.

Once the pier is constructed, US Coast Guard (USCG) requirements for fuel transfers and operational needs will be met, and fuel safety zones and operational impacts on other users in the harbor will be considered. Each terminal operator will need to develop a Facilities Security Plan (FSP) and submit to USCG for approval. Hazardous materials handling and emergency response support will be integrated into the pier design and harbor facilities, and will follow regulatory signage, safety and emergency response preparedness. To minimize threat of fire and explosion risk, and incorporate appropriate emergency response, the entire area may be designated a hazardous area. Required signage, site specific area classification, isolation of energized electrical systems, and other measures will be located near the fuel transfer point. *Section 5.5.2* describes safety infrastructure to be incorporated into the Fuel Pier design.

Environment

Marine waters in and around KBPH must be protected from oil and chemical pollutants. Current operations and support for fuel spill response vessels within the harbor will be maintained (for further information see *Chapter 2.4 KBPH Fuel Pier Site Description).* Impacts to the marine environment due to Fuel Pier construction are anticipated to be minimal, as sub-optimal habitat exists in the Piers 3 and 4 area, which is not conducive to development of large coral reef communities.

Construction of the Fuel Pier will require dredging in the 108-foot berthing area (between the harbor edge and the Federal Project Line) to accommodate vessels. The former harbor depth of 38 feet will be re-established utilizing hydraulic suction dredging to remove accumulated soft sediments. The accumulated sediment volume within the berthing area is estimated to be 580 cubic yards *(Figure 5.2).*

The sediment will require proper disposal, either offshore or upland, in accordance with EPA guidelines and in consultation with USACE, the permitting authority. For ocean disposal, the material has to be clean and the spoils need to meet certain sizes (e.g., cannot be rocky). Land fill is the second disposal choice. However, if the spoils are too contaminated, it will need to be exported out of state. Reuse is not considered an option in this case because there is already excess material at KBPH that needs to be removed.

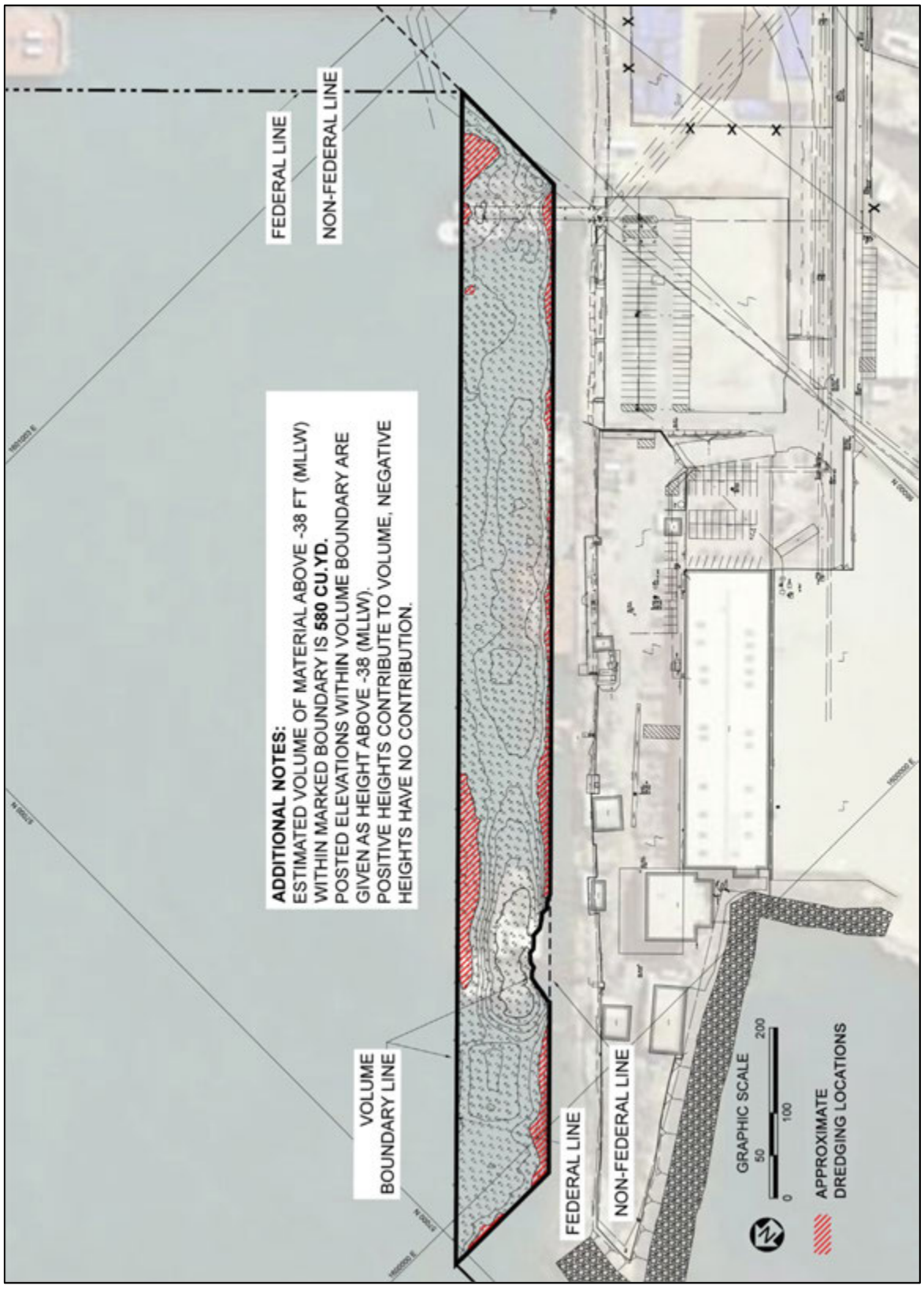

Figure 5.2 –Suction Dredge Location to Accommodate Vessels at the Fuel Pier

Sediment disposal cannot be determined only on the initial chemistry tests (completed in January 2014, see *Section 2.4.1 Water Quality),* but the preliminary sediment testing results can serve as a baseline for preparation of a more detailed and comprehensive sediment assessment program as part of the fuel pier design phase. For ocean disposal, a bioassay is required, and for land disposal, a leachate test is done.

Initial consultation with EPA recommends that due to the small amount (580 cubic yards) of sediment, additional testing could be waived and landside disposal would be acceptable. Ocean disposal is costly, due to the type of equipment needed for the accurate placement of sediment, such as a rigging scow and global positioning system (GPS). Should additional testing be warranted, it would occur during the Sampling and Analysis Plan.

Additional dredging may be necessary at the Pier 3 area near the protective revetment. Initial recommendation from the Hawaii Pilots Association is that the small shoal at the western end of the Pier 3 jetty site (yellow triangle in *Figure 5.3)* should be dredged as much as possible to provide the necessary safety margin when berthing larger (over 600 feet long) tank vessels. There would not be a Section 404 permit associated with this activity because the small amount of material produced would be "de minimis discharge." However, it is not clear whether new dredging in the shoal area would trigger a Section 408 permit at this time.

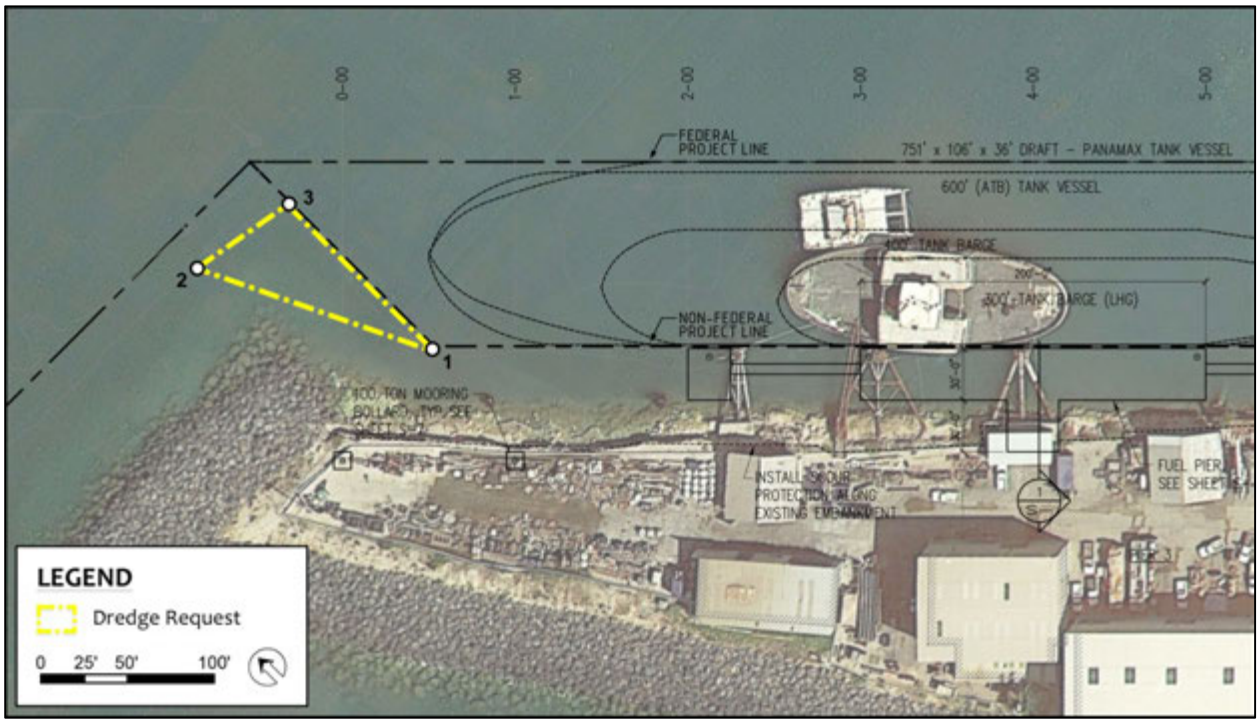

Figure 5.3 – Additional Dredge Request

State plane coordinates for the additional dredge request in *Figure 5.3* are NAD83 HARN State Plane Zone 3 (US Feet), and listed in *Table 5.2,* below.

Table 5.2 - Coordinates of Additional Dredge Request

POINT	X COORDINATE	Y COORDINATE
1	1599958	56873
2	1599893	57003
3	1599956	56992

Previous bathymetry data was vertically sectioned with dredge limits within the proposed dredge location to portray existing revetment and slope. Based on the sections, the existing cut slope supporting the revetment was constructed on a two horizontal to one vertical (2H:1V) inclination. If the dredging limits encroaching the slope are within the virgin coral ground, it is possible to steepen the slope to 1.5H:1V to 1H:1V. Initial analysis of dredging in the proposed area *(Figure 5.3)* indicates that the cut would approach the toe of the existing revetment. Dredging this area to the project depth of minus 38 feet could potentially affect the revetment toe. Evaluation by a geotechnical engineer and structural engineer will be required during the design process.

5.2 Pier Construction Alternatives

Three Fuel Pier design alternatives have been identified, each with various benefits, limitations, and construction costs (further discussed in *Section 5.4, Fuel Pier Alternative Evaluation).*

5.2.1 Alternative A: Segmented Partial Piers

The Alternative A Fuel Pier design uses a segmented pier configuration *(Figure 5.4)*. The *Statewide Fuel Facilities Development Plan* (2009) included a preliminary version of this layout, but has since been modified to reflect new information and additional input from stakeholders. Phased construction of the segmented partial pier design enables retention of the Finger Pier pending full build-out of the Fuel Pier facilities *(Figures 5.4 and 5.5).* The segmented pier structures would be located up to 60 feet offshore, composed of a series of pile-supported fuel transfer platforms and breasting dolphins. The piers would consist of six-inch thick reinforced concrete over 18-inch thick precast planks supported by 20-inch square reinforced concrete piles (approximately 285 pre-drilled). The larger fuel vessels rest against two breasting dolphins while fuel transfer operations are carried out. Several mooring bollards would be positioned on the pier deck and the shore area, and breasting dolphins support the secured berthing of vessels. Catwalks would be located between breasting dolphins and shoreside for access, with the gangway landing suspended between dolphins. The pier deck would be constructed with a bull rail system surrounding the perimeter of the platform fulfilling Occupational Safety and Health Administration (OSHA) requirements for forklift access. The fuel transfer platform would support fueling hoses (harbor user preference), with shoreside access for a maintenance truck. Fueling arms may be considered if user demand justifies. Fuel barges or Panamax/Handymax tank ships would position onboard fuel pipelines (located amidships) in range of the pipeline risers and valves for fuel transfer operations. The incongruent, segmented pier system is limited in its capacity solely for fuel transfer, and will not be planned and designed to support free movement of other cargo activities.

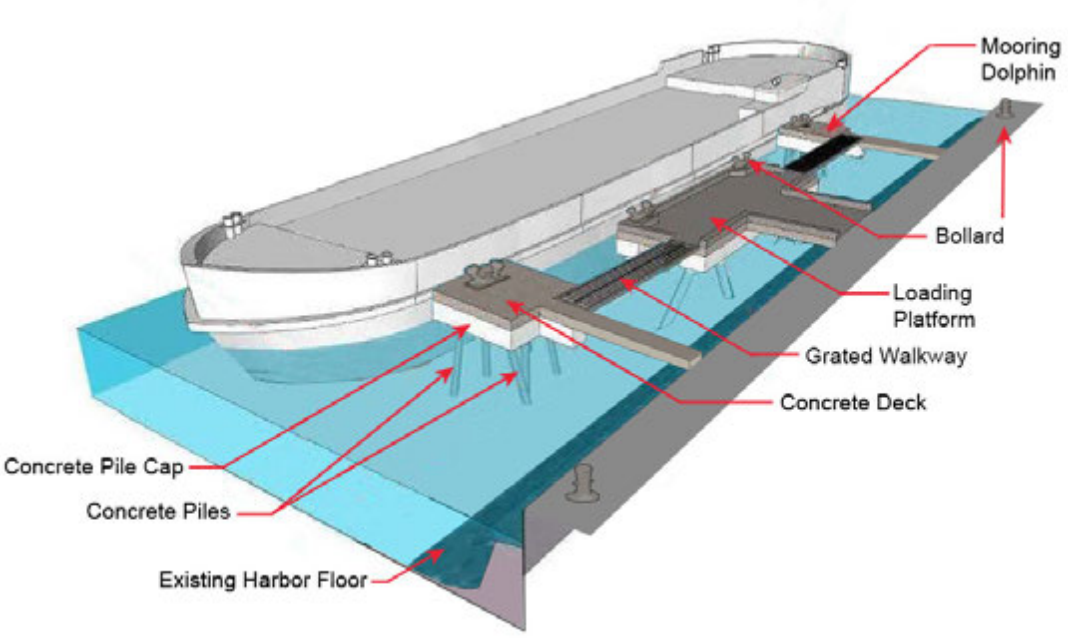

Figure 5.4 – Alternative A: Segmented Partial Piers Concept

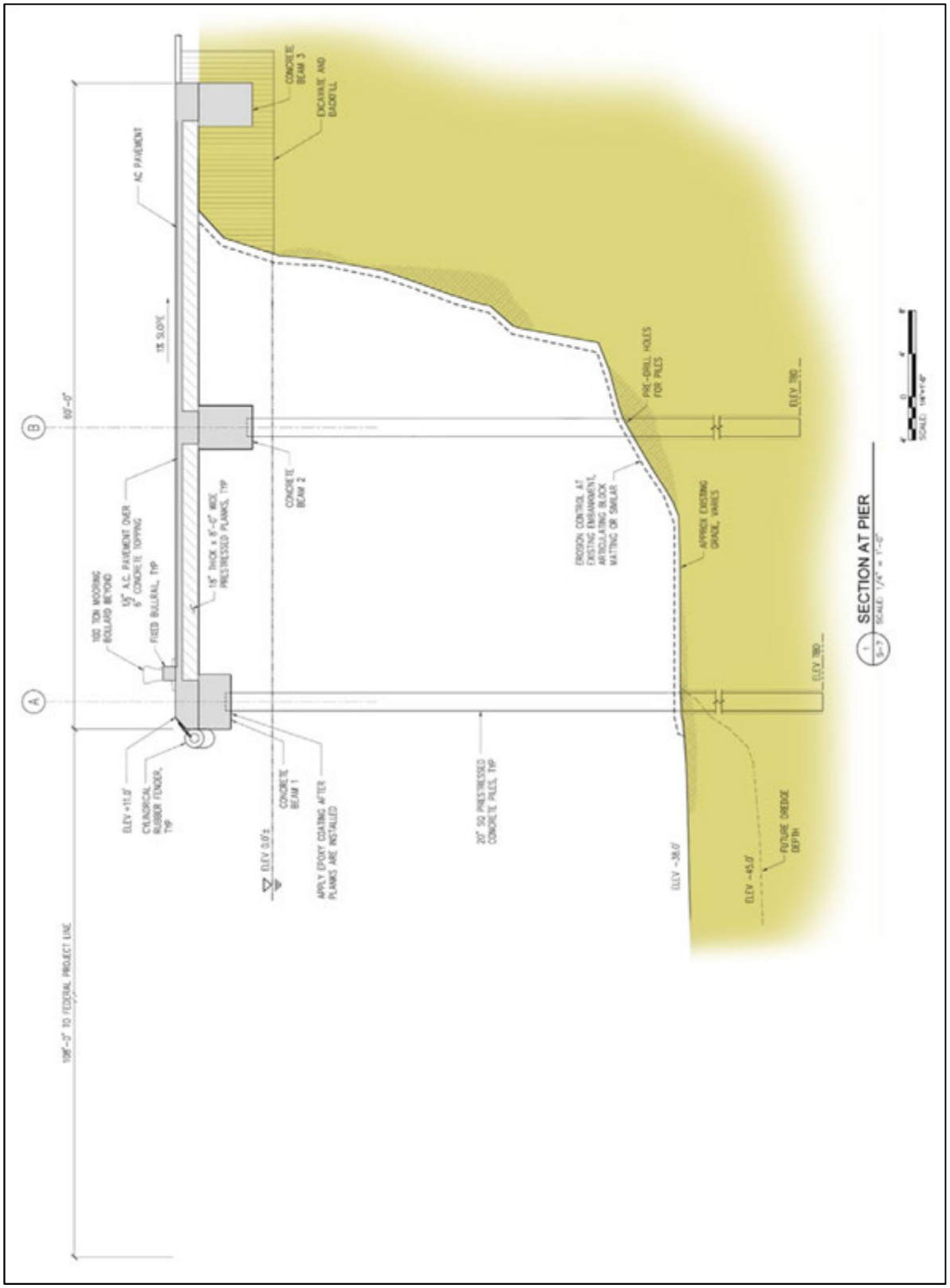

Figure 5.5 - Alternative A: Segmented Partial Piers Cross Section

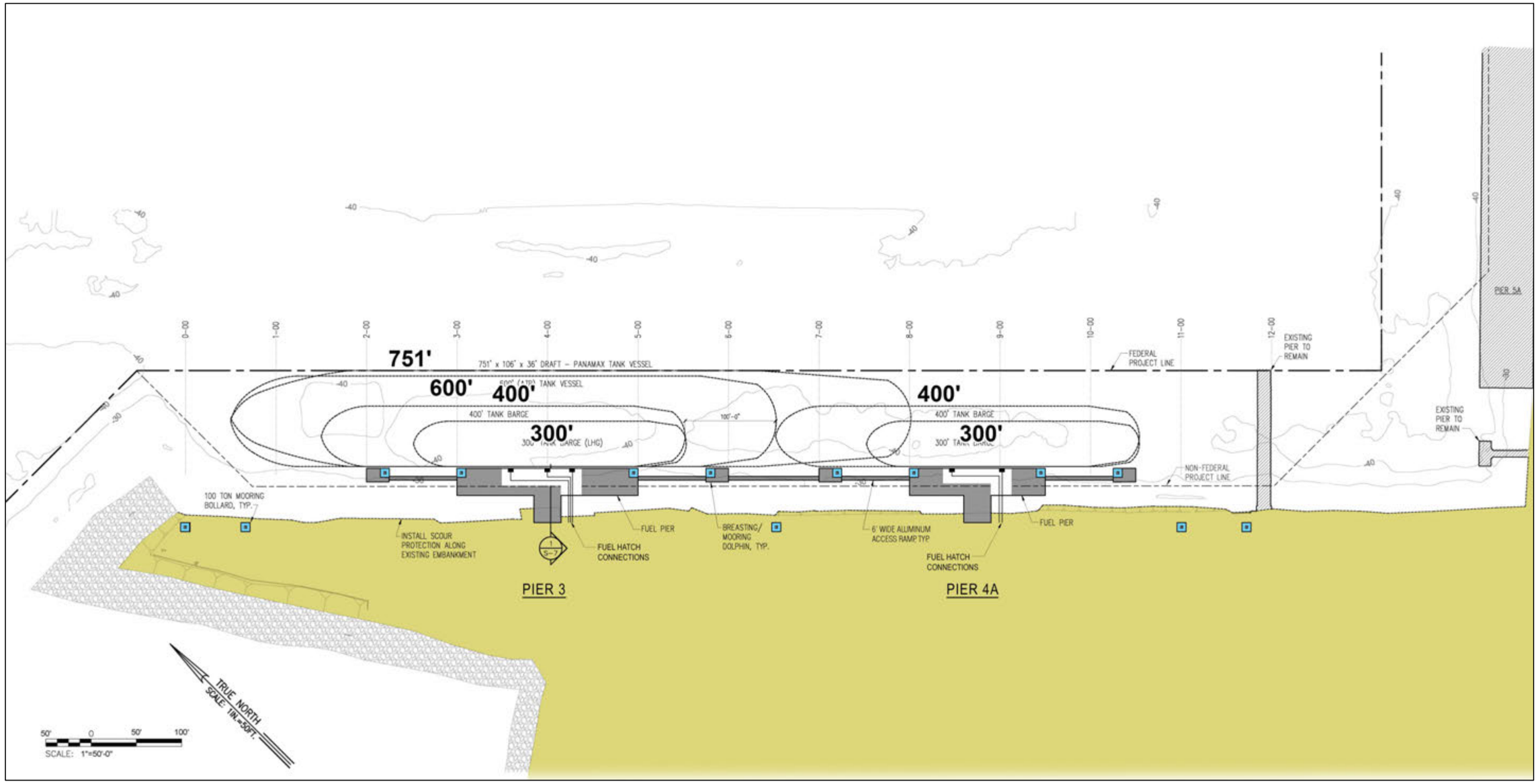

Figure 5.6 - Alternative A: Segmented Partial Piers Layout Plan (Phase 1)

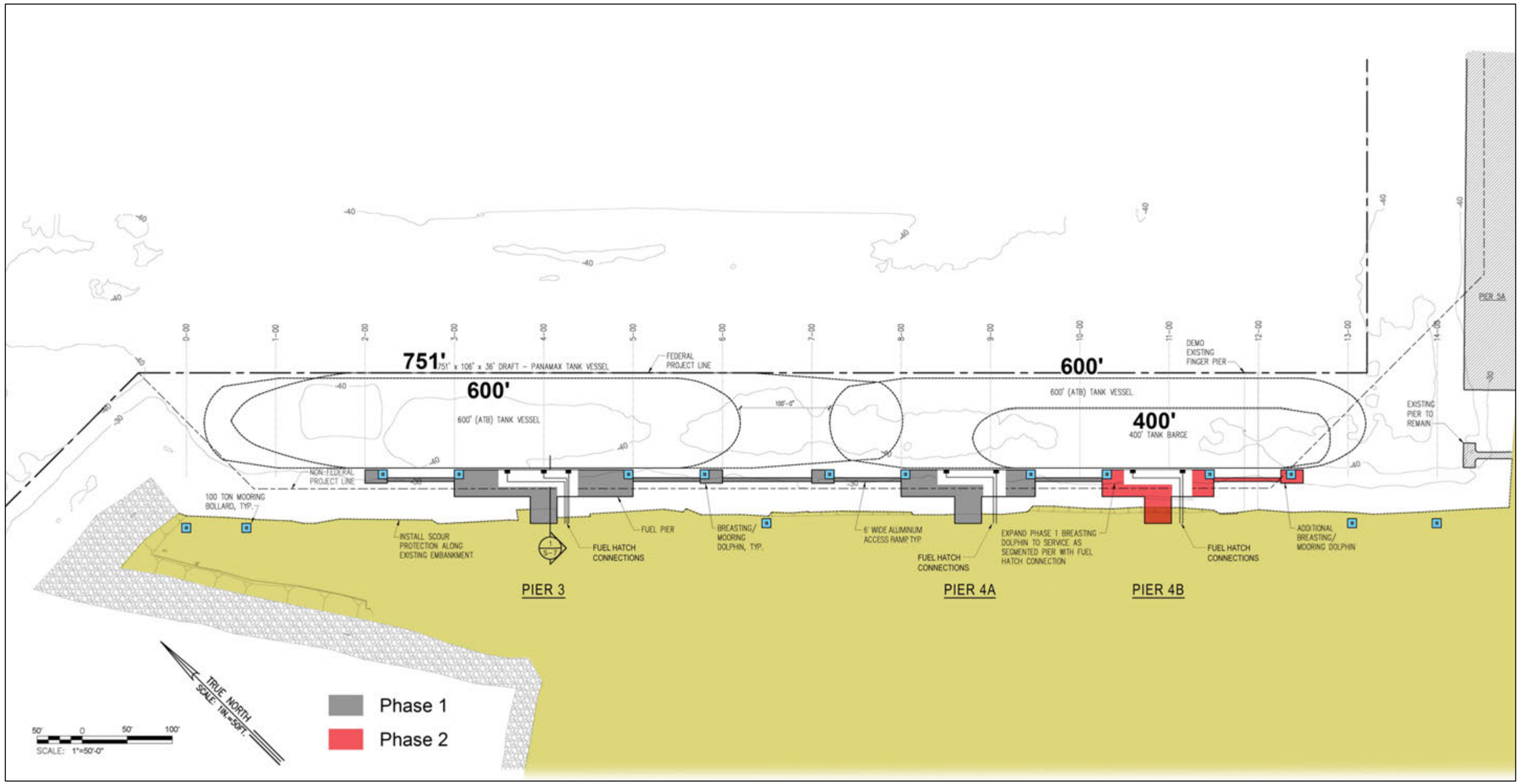

Figure 5.7 - Alternative A: Segmented Partial Piers Layout Plan (Phase 2)

5.2.2 Alternative B: Continuous Pile-Supported Platform Wharf

The Alternative B Fuel Pier is designed as a 65-foot wide by 1,050-foot long full length pile-supported wharf structure. A typical wharf structure consists of concrete slabs spanning between concrete (cap) beams that are supported by precast, pre-stressed concrete piles driven into the harbor floor *(Figure 5.8).* The pier would consist of six-inch thick reinforced concrete over 18-inch thick precast planks supported by 20-inch square reinforced concrete piles (approximately 492 pre-drilled). This alternative provides for a continuous operational platform equipped with mooring bollards, berthing fenders and other features required to service and support the berthed vessels. Fuel offloading facilities, including pipeline risers and valves, would be positioned at appropriate locations at each pier to optimize berthing flexibility *(see Section 5.5.1, Fuel Systems).* Phased construction is also possible with this option.

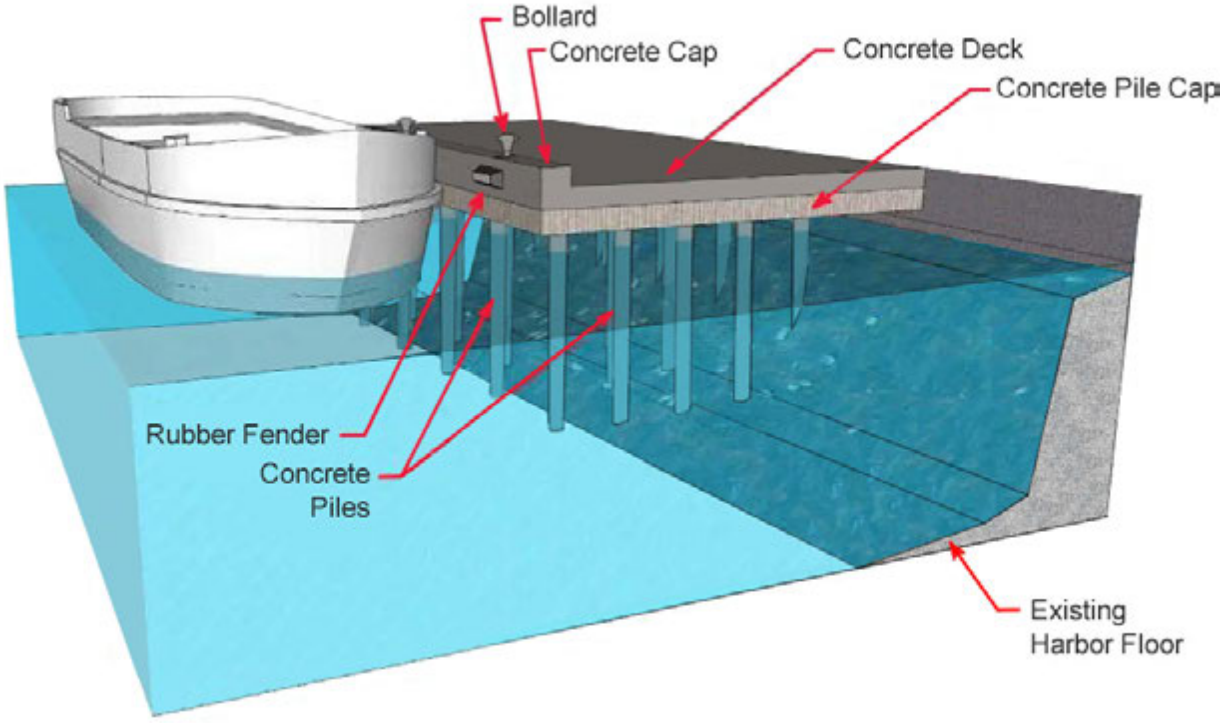

Figure 5.8 – Alternative B: Continuous Pile-Supported Platform Wharf Concept

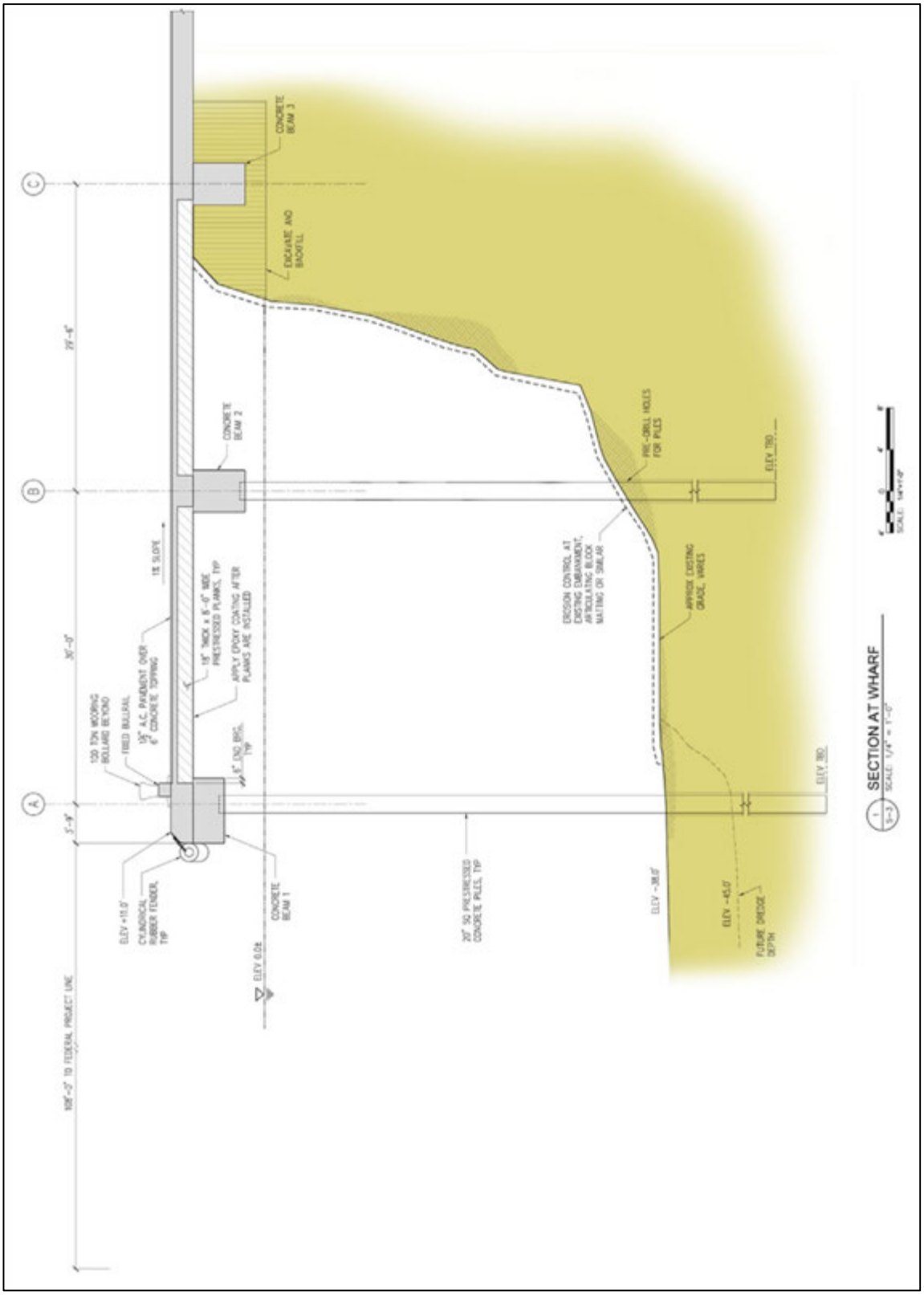

Figure 5.9 – Alternative B: Continuous Pile-Supported Platform Wharf Cross Section

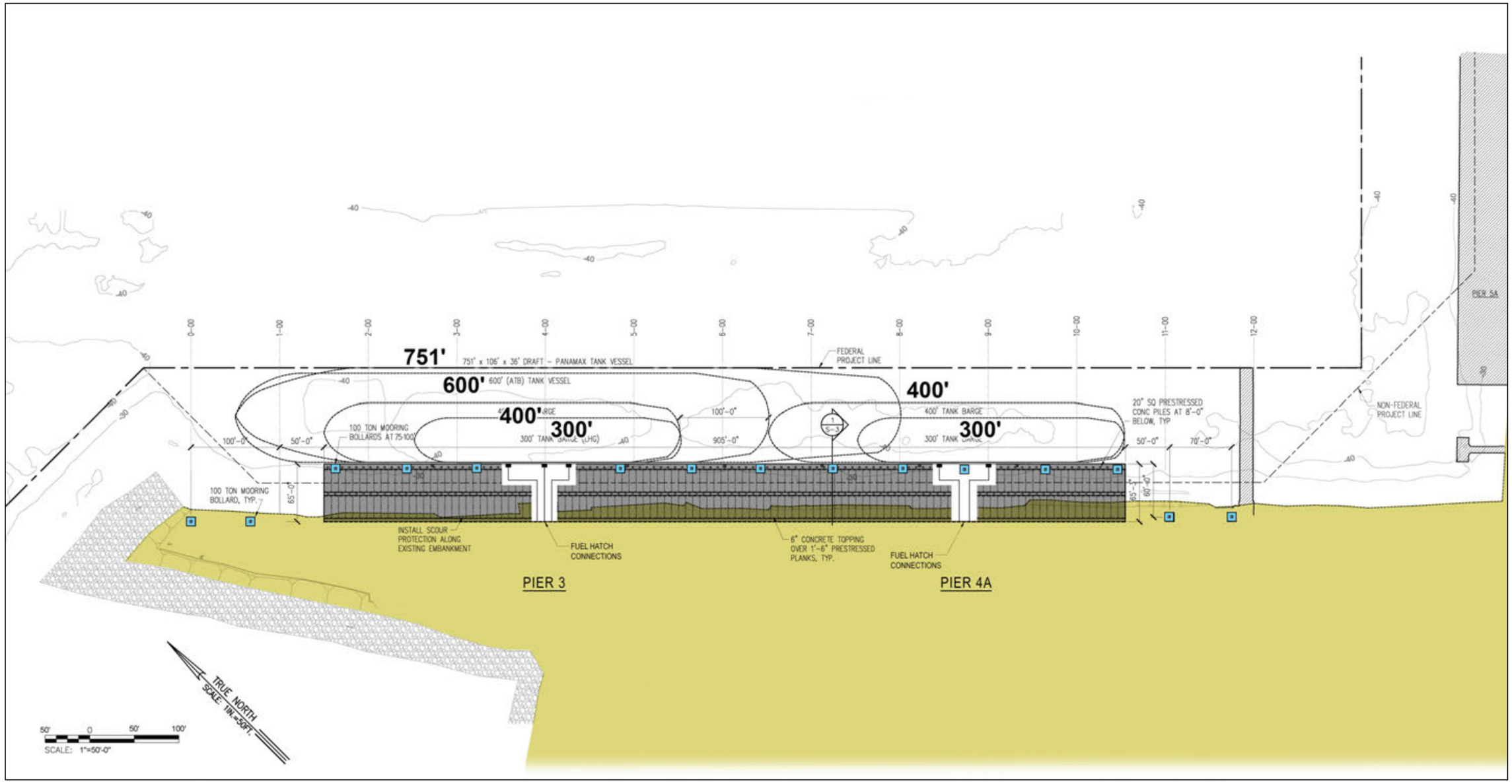

Figure 5.10 – Alternative B: Continuous Pile-Supported Platform Wharf Layout Plan (Phase 1)

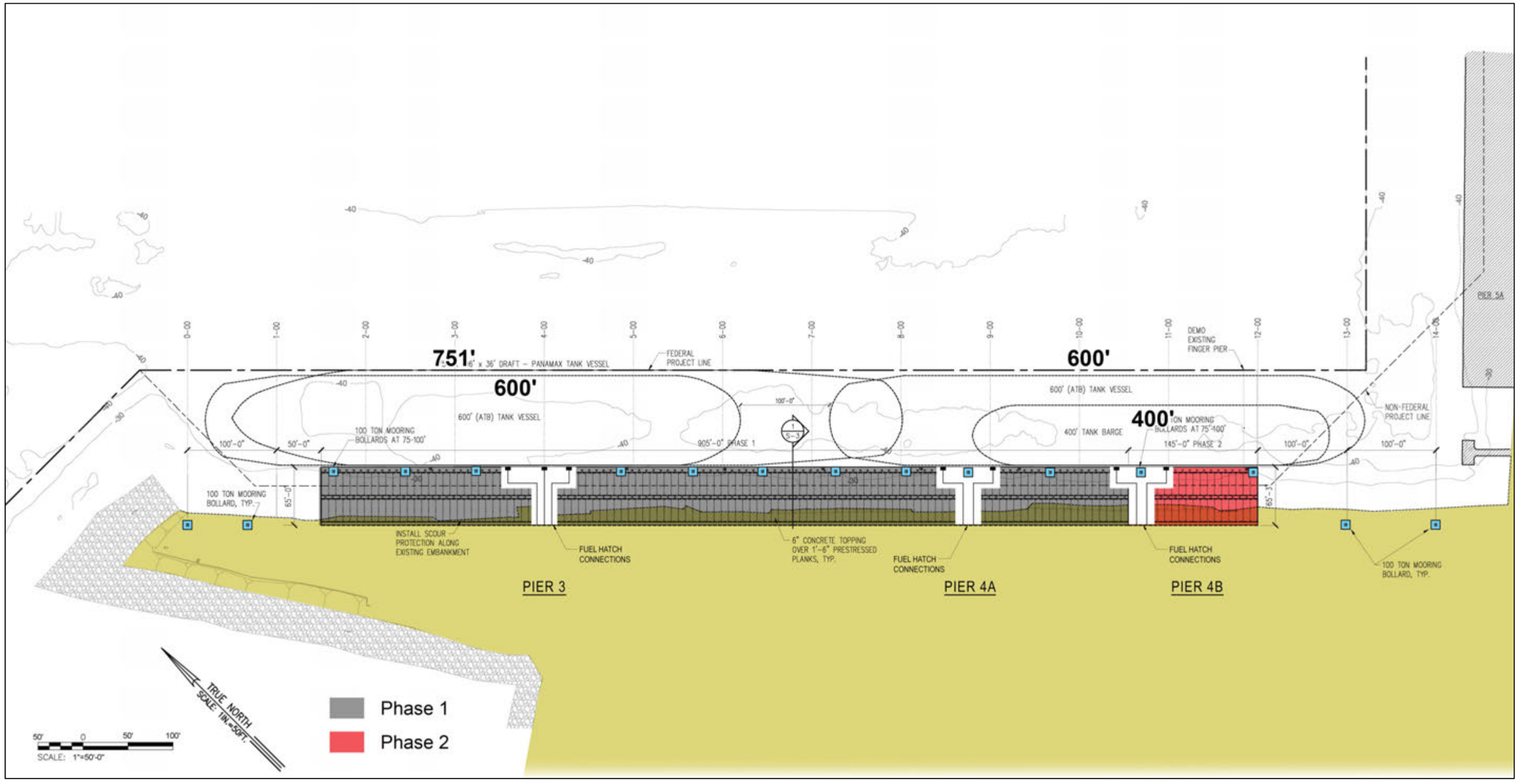

Figure 5.11 – Alternative B: Continuous Pile-Supported Platform Wharf Layout Plan (Phase 2)

5.2.3 Alternative C: Continuous Sheet Pile Bulkhead

The Alternative C Fuel Pier design is a 55-foot wide by 1,050-foot long solid-type berthing structure, consisting of a tied-back bulkhead wharf design *(Figure 5.12)*. For this type of structure, interconnected steel sheet piling is used to create a solid vertical bulkhead behind which backfill is placed to form a contiguous yard area. The sheet pile bulkhead consists of steel or concrete sheet piling, with interlocking joints and a 'cap' of steel and concrete, measuring approximately four feet wide by seven feet thick. The deck slab is six-inch thick reinforced concrete. The sheet pile bulkhead is restrained from outward movement (i.e., lateral earth pressures) by installing an anchoring system of steel rods and concrete 'deadman' anchors, five and one-half by three feet wide. A large space between the shoreline and the bulkhead is backfilled with coarse aggregate material, covering the sea floor and displacing the water column above. Fuel offloading facilities, including pipeline risers and valves, may be located under the concrete pier if required by the operator to optimize berthing flexibility. Phased construction is also possible with this option.

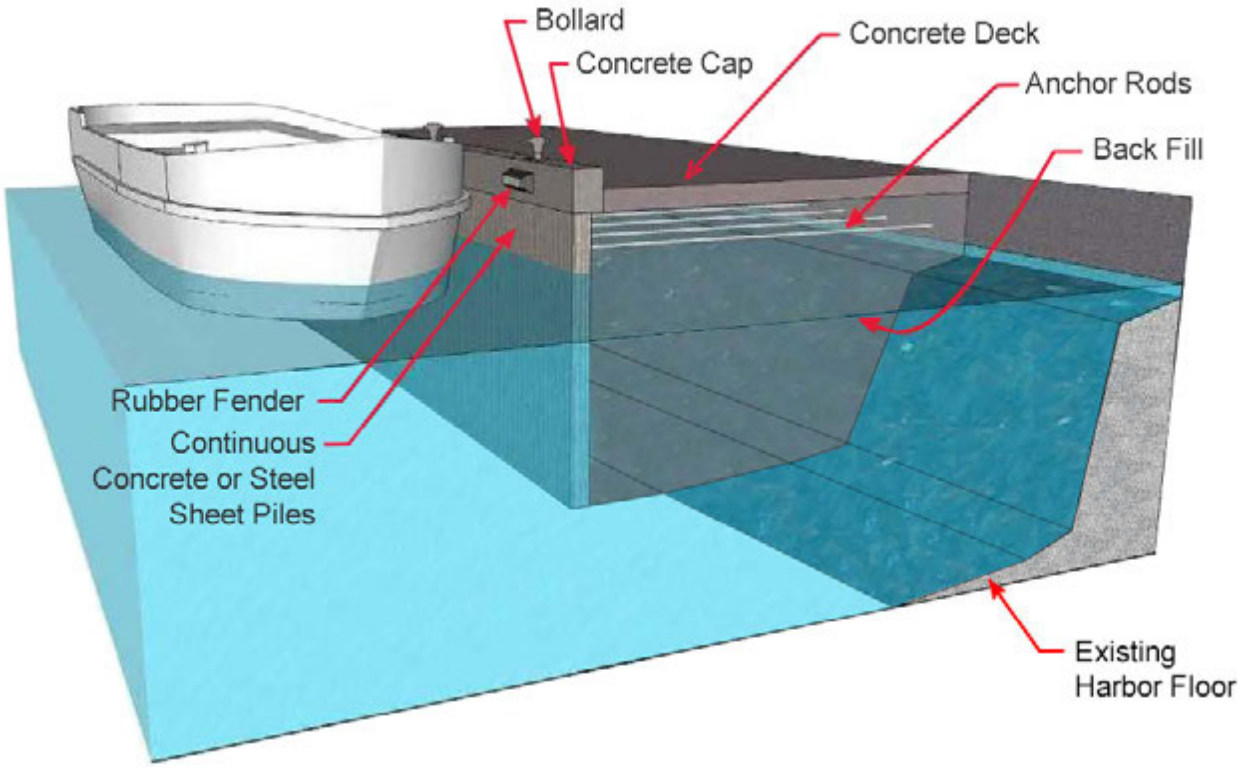

Figure 5.12 – Alternative C: Continuous Sheet Pile Bulkhead Concept

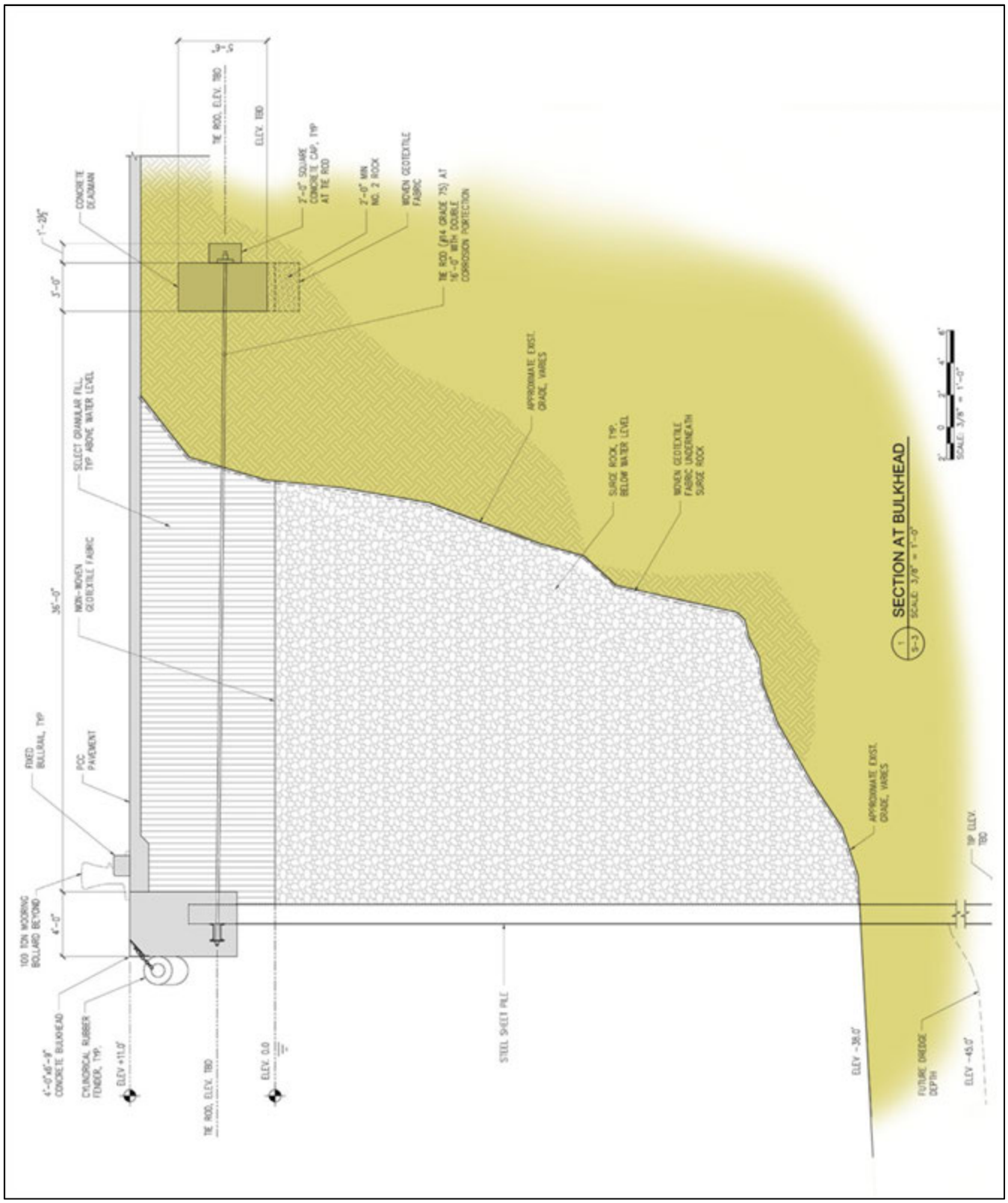

Figure 5.13 – Alternative C: Continuous Sheet Pile Bulkhead Cross Section

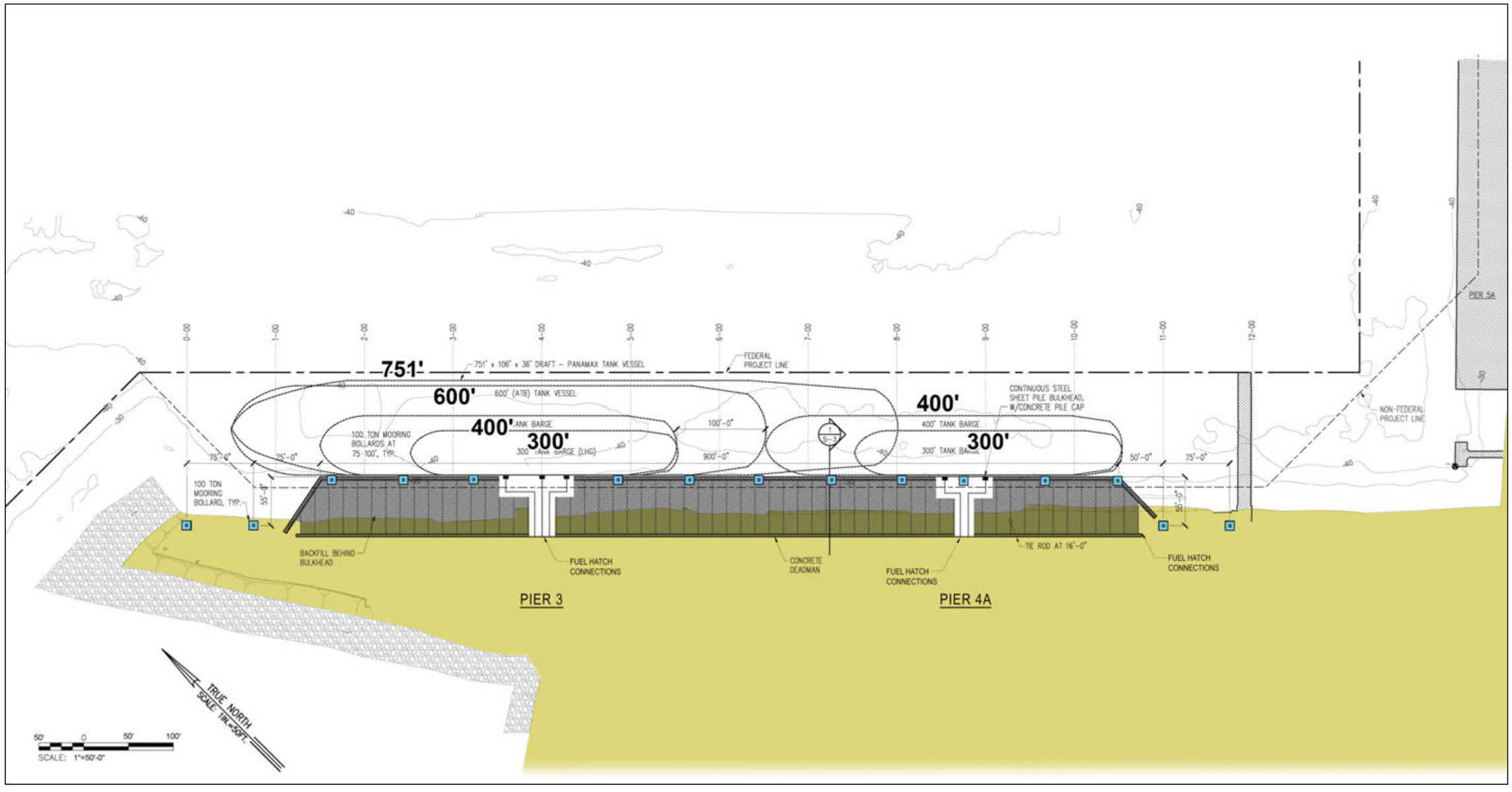

Figure 5.14 – Alternative C: Continuous Sheet Pile Bulkhead Layout Plan (Phase 1)

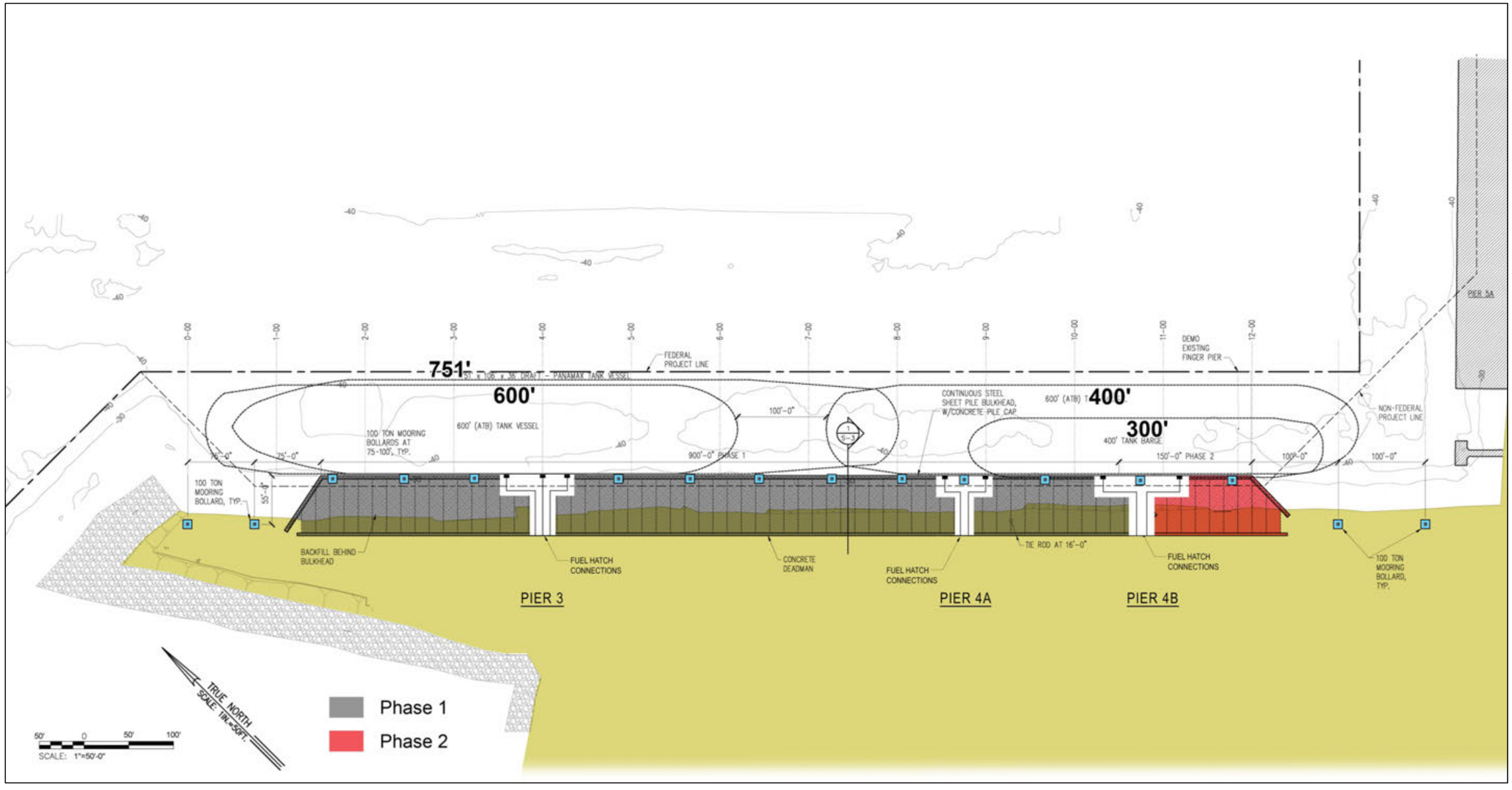

Figure 5.15 – Alternative C: Continuous Sheet Pile Bulkhead Layout Plan (Phase 2)

5.3 Phased Development

There is flexibility in each Fuel Pier design alternative to allow for phased construction. Pending DOT-H financial capabilities and demand for facilities, phasing will allow the project to accommodate budget constraints and adjust to the future growth of fuel markets. All three alternatives incorporate a series of optimal operational configurations that will permit the retention of the existing Finger Pier during Phase 1 development. The Finger Pier provides critical mooring support for on-station service tugs, workboats and spill response vessels at KBPH.

Recent (i.e., fiscal year 2012) liquid-bulk traffic shows inbound tank vessels arriving and discharging one to three times per month, with outbound barges loading and departing semi-weekly. Future fuel demand analysis forecasts an increased need to accommodate additional tank barge traffic, frequently requiring two interisland tank barges to be berthed simultaneously at the new fuel piers.

Phase 1 Fuel Pier Development

Phase 1 development of the Fuel Pier will provide vessel berthing for either one large tank vessel (Panamax or Handymax/ATB), a tank vessel and a tank barge, or two tank barges *(Table 5.3).* The following vessel configurations are possible:

- Configuration 1: One 751-foot length overall (LOA) or less Panamax Tankship (420,000 barrel capacity), or
- Configuration 2: One 650- to 700-foot LOA Handymax or ATB tank vessel (225,000 barrel capacity), or
- Configuration 3: One 600-foot LOA Handymax or ATB tank vessel (225,000 barrel capacity) *and* a 300-foot (LOA) tank barge (80,000 barrel capacity), or
- Configuration 4: Two 300- to 400-foot LOA tank barges (80,000 barrel capacity each) to serve the vast majority of interisland barge transfer activity.

Table 5.3 – Phase 1 Vessel Berthing Configurations

PHASE 1 PIERS 3 AND 4A - 1,050 FEET	CONFIG. 1	CONFIG. 2	CONFIG. 3	CONFIG. 4
Panamax - Up to 751 feet LOA (420,000 barrel capacity)	**1**			
Handymax/ATB - 600 to 700 feet LOA (225,000 barrel capacity)		**1**	**1**	
Tank Barge – 300 to 400 feet LOA (80,000 barrel capacity)			**1**	**2**

The Fuel Pier will be flexible so that vessels can berth on either portside or starboard side to the pier. The preferred berthing configuration, however, will be to berth vessels portside to the pier, facing head-out/west. During occasional periods when berthing conflicts occur at Piers 3 and 4A, the overflow fuel vessels can also be accommodated at Piers 5 or 6 on a space availability basis and as secondary priority to dry- and neo-bulk cargo operations. Berthing configuration details are discussed in *Appendix J*.

Phase 2 Fuel Pier Development

At the appropriate time in the future, DOT-H may implement the Phase 2 development of the Fuel Pier. This development phase will require the removal of the Finger Pier and replacement of that berthing at Pier 8 to support on-station commercial support service vessels.

For Alternative A, the Phase 2 development will expand the Pier 4A breasting dolphin to service as a segmented pier with a fuel hatch connection, with one additional breasting dolphin added (i.e., Pier 4B). Phase 2 for both Alternative B and C designs will have the same fuel hatch configurations as Alternative A above. To accomplish Phase 2, Alternative B and C designs would continue with their respective pier configuration and extend Pier 4A between 150 to 200 feet eastward to create Pier 4B. Once the Phase 2 development is completed, the following additional vessel berthing configurations are possible *(Table 5.4):*

- Configuration 5: One 751-foot LOA or less Panamax Tankship (420,000 barrel capacity) *and* a 300- to 400-foot LOA tank barge (80,000 barrel capacity), or
- Configuration 6: Two 600-foot LOA Handymax or ATB tank vessels (225,000 barrel capacity each).

Table 5.4 – Phase 2 Additional Vessel Berthing Configurations

PHASE 2 PIERS 3, 4A AND 4B - 1,325 FEET	CONFIG. 5	CONFIG. 6
Panamax - Up to 751 feet LOA (420,000 barrel capacity)	**1**	
Handymax/ATB - 600 to 700 feet LOA (225,000 barrel capacity)		**2**
Tank Barge – 300 to 400 feet LOA (80,000 barrel capacity)	**1**	

5.4 Fuel Pier Alternatives Evaluation

Methodology

In order to determine the preferred Fuel Pier design alternative, a set of evaluation criteria was developed to compare and rate each of the three alternatives. 'Good', 'Fair' or 'Poor' ratings are attached to each criterion to provide a qualitative basis for outcome comparisons. The evaluative criteria and discussion are briefly summarized below.

Evaluation Criteria

A comparative evaluation of the three Fuel Pier alternative designs was conducted using criteria defined under four general categories. To allow for differentiation among the alternatives, the evaluation criteria were grouped under:

1. Stakeholder Requirements,
2. Operational Flexibility,
3. Environmental Factors, and
4. Construction Cost.

It was determined that the security and phasing of the three alternatives would be equal among the alternatives, and therefore not included.

Stakeholder Requirements
The primary objective of building a new Fuel Pier at KBPH is to optimize harbor operational efficiencies by relieving congestion at Piers 5 and 6, providing the fuel industry with modern facilities for liquid-bulk fuel handling operations. The design alternatives are evaluated for responsiveness to the needs of the stakeholders as expressed in *Chapter 4*.

Operational Flexibility
The preferred Fuel Pier design alternative should accommodate a range of fuel vessel types and fuel products. The common element fuel pipeline rack system will also need to reasonably accommodate future modifications and/or expansion, in the event of new users or additional fuel products. The operational performance as well as the safety, accessibility, and efficiency of the three design alternatives will also affect the preferred alternative.

Environmental Factors
The potential for detrimental environmental impacts was considered in evaluating each design option. The primary impact category relates to the potential impacts to the existing benthic marine environment. Marine surveys at KBPH indicate a relatively small number of coral colonies at the Piers 3 and 4 area, and the impacts of construction may differ for the alternative pier designs. The *KBPH Fuel Pier and Harbor Improvements Environmental Impact Statement* (EIS) will have more information on possible impacts.

Construction Cost
Detailed order of magnitude construction cost estimates for the Fuel Pier are presented in *Appendix K, L and M*. The cost projections include mobilization, demolition, construction and utilities, as well as margins and adjustments.

Alternatives Evaluation Matrix

Table 5.5 is a summary matrix of the above criteria and the rating given to each alternative design. Further discussion of the matrix follows. The *KBPH Fuel Pier and Harbor Improvements EIS* will evaluate the potential environmental impacts of all three alternatives as part of the development process.

Table 5.5 - Summary Evaluation Matrix of Alternative Design Options (2014 Dollars)

CRITERIA CATEGORY	STAKEHOLDER REQUIREMENTS	OPERATIONAL FLEXIBILITY	ENVIRONMENTAL IMPACT	CONSTRUCTION COST (MILLIONS)
ALTERNATIVE A SEGMENTED PARTIAL PIER	**FAIR**	**FAIR**	**GOOD**	Phase 1: $35.3 Phase 2: $8.3 **Total: $43.6**
	Used in ports throughout the world.	Ability to berth different-sized vessels. Access to berths via catwalk.	Partial pier design reduces the number of piles needed.	
ALTERNATIVE B CONTINUOUS PILE-SUPPORTED WHARF	**GOOD**	**GOOD**	**FAIR**	Phase 1: $52.4 Phase 2: $8.7 **Total: $61.1**
	The full pier can accommodate a vessel during surge conditions better than a segmented pier.	Less restrictive berthing. Provides for greater access and safety, increasing efficient access to various points of a vessel or multiple vessels.	Existing benthic life relocated prior to construction. Corals less than 15 cm will not survive.	
ALTERNATIVE C CONTINUOUS SHEET PILE BULKHEAD	**GOOD**	**GOOD**	**POOR**	Phase 1: $44.3 Phase 2: $7.4 **Total: $51.7**
	The full pier can accommodate a vessel during surge conditions better than a segmented pier.	Less restrictive berthing. Provides for greater access and safety, increasing efficient access to various points of a vessel or multiple vessels.	Coral colonies relocated or lost entirely. Approx. 15,000 cubic yards of infill. May negatively influence harbor surges.	

Stakeholder Requirements Comparison
Some stakeholders are in favor of Alternative A (i.e., segmented partial piers). The segmented partial pier design is used in ports throughout the world and commonly accepted by vessel operators. With Alternative A, it was noted that oil spill response teams could string booms with pre-staged boom reels, similar to the setup at Piers 5 and 6. Other stakeholders raised concern, however, that Alternative A would be less desirable to accommodate a vessel during surge conditions, as they feel it doesn't provide the best mooring or berthing configuration as a full pier. These stakeholders felt a full length continuous pier would be better, with sheet pile, concrete pad, and a solid foundation (Alternative C). A preference for the continuous pier design (Alternative B or C) is preferred by some handlers and operators for reasons described below. *Appendix I, Stakeholder Meeting Notes,* documents these stakeholder concerns.

Operational Flexibility Comparison
The Fuel Pier must be operationally flexible and have the ability to berth different-sized vessels with differing manifold set locations. The Alternative A segmented partial piers can accommodate this need, but Alternatives B and C provide less restrictive berthing accommodations, particularly if fuel hoses are used for fuel transfer. The contiguous designs of Alternatives B and C also allow for greater access along the apron and safety without the need for using catwalk access. This also increases efficiency for those that may need access to various points of a vessel or multiple vessels at the Fuel Pier.

Environmental Factors Comparison
Alternative A generates the least environmental impacts due to the partial pier designs which reduce the number of piles needed. For Alternative B, continuous platform wharf on piles, some existing benthic life would have to be relocated and addressed prior to construction. Many small corals less than 15 centimeters in diameter will not survive relocation and are not considered candidates for transplanting. The solid wharf development with backfill (Alternative C) would pose the greatest environmental impact. Coral colonies in the fill area would have to be relocated or lost entirely, as the benthic environment below the wharf would be infilled and compacted with approximately 15,000 cubic yards of material. The sheet pile design may also contribute to an increase in surge reflection conditions within the harbor basin.

Construction Cost Comparison
Alternative A is the least expensive of the three design alternatives. Order of magnitude construction cost estimates show the cost of Alternative A to be approximately $43.6 million in 2014 dollars. Alternative C is the second most expensive design to construct at a projected cost of approximately $51.7 million. Alternative B is estimated to be the most costly alternative at approximately $61.1 million.

These cost projections include mobilization, installation of best management practices (BMPs), demolition of existing structures, BMP adjustment, form new pilecap(s), place rebar for new pilecap(s), concrete for new pilecaps, strip formwork and repair bugholes, rebor and concrete for deck, finish concrete deck, install new mooring bollards, install new rubber fenders, utilities (water, electric, fuel system), and demolition of the Finger Pier.

In addition, this includes walkways (for Alternative A); prestressed concrete piles, pile testing, pre-drilling and driving of piles, installation of precast deck planks, and embankment erosion protection (for Alternatives A and B); and installation of sheet pile, backfill, and trenching/placement of rebar/concrete for deadman (for Alternative C). These costs don't include potential mitigation for the loss of functions and services to the marine environment due to the Fuel Pier construction.

5.5 Fuel Terminal Concept Plan

The *Kalaeloa Barbers Point Harbor Fuel Pier Development Plan* (*FPDP)* recommends a layout for the landside terminal encompassing approximately nine acres *(Figure 5.17)*. The terminal itself will not cover nine acres or even a large portion of it; however the acreage will provide a secure area with controlled access to ensure safety/security zones are in place around fuel transfer activities. This terminal facility and pipelines could be developed, installed, operated and maintained by the tenants, a designated Fuel Terminal Operator or Consortium. It is recommended that this facility be open-access and managed by an industry consortium that serves all of the port's fuel handling harbor users.

The common user license agreement, partnering various harbor users to handle operation and maintenance of the petroleum unloading facilities, brings together customers that in the past have each operated independently at KBPH. Sharing of central risers will allow for higher efficiency, larger capacity and greater cost effectiveness at the new Fuel Pier, and will further solidify the port as the energy products gateway for the state. These types of agreements will not only result in additional revenue for the port, but will also allow oil and gas terminal users to realize increased efficiency and flexibility.

A competitive tendering bid and selection process by DOT-H should be developed in consultation with the fuel industry and harbor users to plan, build and operate the common use fuel terminal facility. An alternative would be for DOT-H to build the Fuel Pier and the pipelines within KBPH boundaries, and then have a Fuel Terminal Operator take over the operation. DOT-H could also opt to lease the parcel to a private entity to develop the Fuel Pier. While developed in consultation with stakeholders, the Fuel Terminal concept plan will likely be refined in response to future tenant needs and their budgetary considerations.

While the landside area may be developed by a fuel terminal operator, the Fuel Pier and common elements such as pipeline racks, and power/water main feeder lines will be established in road corridors by DOT-H, and the pipelines will be fitted and connected by the fuel industry as demand dictates. Based on current use, it is estimated that one 20-inch, two 12-inch, two 10-inch, and four 8-inch fuel pipelines will be installed. Water and electric meters will be sub-metered for each user. Potential fuel industry users include Aloha Petroleum, Mid Pac Petroleum, Chevron, Hawaii Independent Energy, LLC (HIE), Hawai'iGAS, Hawai'i Fueling Facilities Corporation (HFFC), and Hawaiian Electric Company (HECO).

The *FPDP* does not recommend retaining any of the existing warehouses and office structure landside of the Pier 3 area. Instead, a new fuel control and administration building with a second-story observation deck, maintenance building, security guard shack and parking area for up to 30 personnel are recommended for development. Parking stalls for the terminal staff/operators may be eight to 10 persons (depending if a terminal operator/consortium is housing their staff at the Fuel Terminal). Four to six fuel transfer personnel will be needed on the vessel/dock, and with two vessels on berth could be eight to 12 personnel. If ships agents, service providers and other visitor are to be accommodated at the fuel terminal, this could equate to an additional six to 10 personnel for two vessels on berth.

The observation deck will be open to employees only, and can serve as a viewing vantage point for harbor control and security monitoring of the port's activities. The location of the control building has been placed in the Pier 4 area outside of a potential fuel safety zone, should an LNG Terminal be constructed in the Pier 1/Pier 3 area.

Fuel Terminal support facilities will be designed according to *UFC 3-460-01 Design: Petroleum Fuel Facilities, UFC 2-000-05N Operational and Training Facilities,* and *UFC 1-200-01 General Building Requirements*. The new fuel control and administration building (1,530 square feet [sq. ft.]) will contain product quality assurance and security-related facilities required to support the Fuel Terminal transfer operations *(Figure 5.16)*. The space for the office proper is based on eight to 12 staff/operators, with a duty crew space of 85 sq. ft. per person, and office and shop space of 85 sq. ft. per person (including toilet and custodial space). These parameters are noted within the US Navy's *UFC 2-000-05N* under 155 21 Small Craft Boathouse. Other references do not specify parameters and instead recommend space determination based on an industrial analysis for the specific functions at each location. This building will have maximum views of outside activities and contain fuel pump controls, storage, offices, conference room and restrooms. Spill response and other fuel-related equipment can be stored within the maintenance building (510 sq. ft.) or in smaller containers closer to the pier face for ease of access. The maintenance building can also contain a fuel maintenance workshop with emergency shower/eye wash and adequate tool storage space. The complex will be surrounded by a roadway network (see *Figure 5.17)* allowing for emergency access to fire hydrants and all areas of the Fuel Pier.



Figure 5.16 – Example of a Fuel Control Room

The Fuel Terminal will be a secure facility equipped with perimeter security fencing and a video monitoring system (subject to Facility Security Plan requirements). Access to the facility will be controlled by a security gate. In addition, adequate lighting with full cutoff fixtures that minimize light pollution will be installed around the perimeter of the Fuel Terminal. The location of the Fuel Pier near the entrance of the harbor channel provides the advantage of installation of a real-time, visual and infrared camera(s) installed on a cargo light pole to allow the Aloha Tower Marine Traffic Controller and DOT-H's Central Control Center at Honolulu Harbor to view harbor operations. This camera would be in addition to the current camera at the end of the Ko 'Olina mole. At this time, the vessel traffic does not warrant siting a Marine Traffic Controller at KBPH in addition to Aloha Tower.

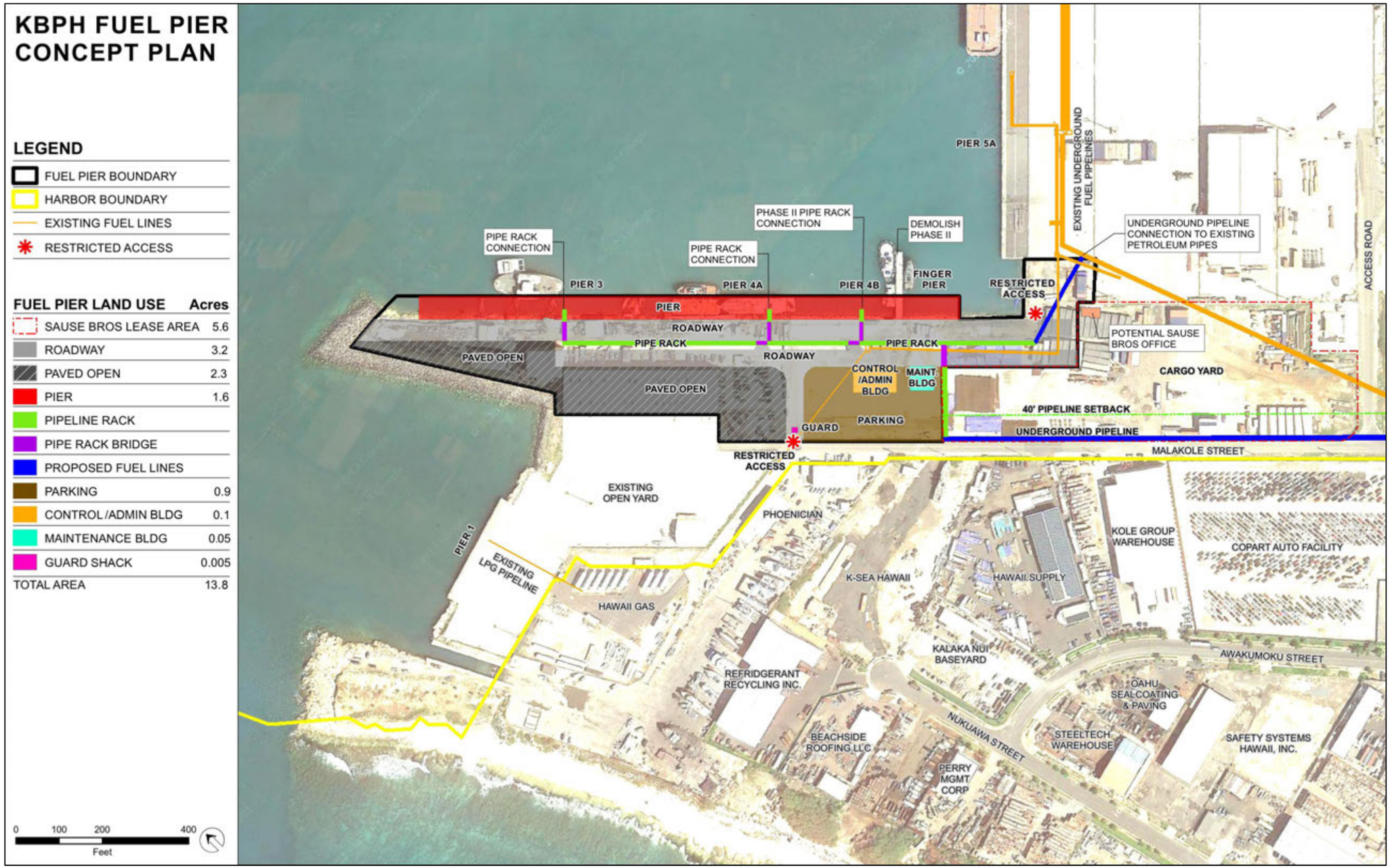

Figure 5.17 – Fuel Terminal Concept Plan

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Up to three small eight feet by eight feet covered individual shelters, either fixed or portable on a trailer, will be stationed at the Fuel Pier near the transfer riser *(Figure 5.18).* These are standard industry-sized structures used to accommodate personnel engaged in fuel transfer operations on the pier/ship-side. Some ports/fuel terminals have more substantial structures, utilizing fixed or portable trailers. These structures will provide shelter with a desk and chair for each tankerman person-in-charge (PIC) per vessel. The PIC monitors the fuel transfer process, and performs emergency shut downs when/if necessary in the most expeditious and safe manner possible.



Figure 5.18 – Portable Tankerman PIC Shelter

Table 5.6 presents the spatial requirements and cost estimates for development of the Fuel Terminal. A new fuel control building is estimated to cost approximately $1.5 million. The maintenance building and guard shack total approximately $900,000. The installation of pipeline racks and pipelines is estimated at almost $5.4 million. The total estimated cost for other non-building elements (demolition, grading, paving, fencing, security features, water, new IWS, electric) has an estimated cost of approximately $8.5 million.

Table 5.6 – Fuel Terminal Development Cost Estimate (2014 Dollars)

DESCRIPTION	QUANTITIY	COST ESTIMATE
Miscellaneous Demolition	518,364 sq. ft.	$1,555,092
Mass Grading	518,364 sq. ft.	$259,182
Water/Fire Protection Lines and Fire Hydrants to Piers	2,000 linear ft.	$400,000
Potable Water for Vessels	Lump Sum	$100,000
Upgrade Fire Suppression System	Lump Sum	$250,000
New Individual Wastewater System	Lump Sum	$500,000
Shore Based Electrical Power	Lump Sum	$80,000
Pipeline Mobilization, Excavation, Foundation/Containment, and Racks	Lump Sum	$1,527,800
Pipelines (1-20in., 2-12in., 2-10 in., 4-8in.)	Lump Sum	$3,852,909
AC Paving (Roadway, Paved Open, Parking)	517,300 sq. ft.	$5,173,000
Control/Admin Building	1,530 sq. ft.	$459,000
Maintenance Building	510 sq. ft.	$127,500
Guard Shack	205	$50,000
Vehicle Gates	1 each	$5,000
Fencing	2,300 linear ft.	$241,500
Security Fencing and Video Monitoring at Secondary Containment	1 linear ft.	$300
Gates	1 Pair	$1,500
Navigation (Signage)	Lump Sum	$50,000
	SUBTOTAL	**$14,632,783**
	MARGINS AND ADJUSTMENTS	**$4,682,344**
	GRAND TOTAL	**$19,315,127**

5.5.1 Fuel Systems

Prospective Fuel Pier tenants, a designated Fuel Terminal Operator or Consortium will install, own and operate their own fuel pipelines between the Fuel Pier and their storage facilities (See *Section 5.5).* The pipelines will initially transit DOT-H property until they reach the KBPH property line. When constructed, the pipelines will be capable of handling a range of fuel types including, but not limited to: gasoline, jet fuel, fuel oil, naphtha, diesel, biodiesel, ethanol, and liquefied hazardous gas (LHG). Some fuels (e.g., diesel and biodiesel) are allowed to operate in common pipelines using transfer procedures which reduce contamination. Some products (e.g., LHG, gasoline) could potentially require segregated pipelines to prevent contamination and eliminate safety hazards.

As Hawai'i appears to be moving into greater use of liquefied gases, these products have characteristics which require special handling and materials for liquid-bulk transfer. All liquid gases are considered LHG. LHG at KBPH includes LPG, or propane. LPG will require separate pipelines from other petroleum products. Care will need to be taken when locating liquid petroleum pipelines adjacent to liquefied gas pipelines. LHG pipelines, like other pipelines, are run in catchment basins to prevent spillage into the open. The catchment basins provide a level of safety required by regulatory requirements. Special accommodations will be required in placement of piping systems.

Some pipelines for heavier products need to be insulated for keeping petroleum products warm or cold. This is the case with heavy fuel oil which is a heated product. In moving LHG, pipelines are typically insulated to maintain the cold temperatures. Flexible and temporary pipelines are typically deployed as needed during vessel fuel transfers and dock to ship petroleum product transfers.

Pipeline risers and valves will be placed at key points along the pier to coincide with typical fuel vessel offload points. Multiple fuel connection points from each of the piers will allow for the increased berthing flexibility of various-sized vessels (See *Figures 5.4, 5.5, 5.8, 5.9, 5.12 and 5.13*). Flexible hoses (the preferred connection of harbor users) will couple to the vessel's valves for fuel transfer. The following fuel hatch boxes with industry installed connection points can be aligned within all three pier design alternatives.

- **Pier 3**
  - 350-foot mark: interisland tank barges
  - 400-foot mark: fuel/LHG tank ships
  - 425-foot mark: fuel/LHG tank ships

- **Pier 4A**
  - 850-foot mark: interisland tank barges
  - 900-foot mark: interisland tank barges

- **Pier 4B**
  - 1,020-foot mark: fuel/LHG tank ships
  - 1,120-foot mark: interisland tank barges

A fuel pumping station will provide hydraulic head (i.e., additional transfer pressures) for more efficient fuel discharge operations. Electrically-powered shoreside pumps will reduce tanker energy requirements to offload cargos, resulting in reduced fuel usage and lower emissions from the fuel vessels during the offloading operations.

The *Statewide Fuel Facilities Development Plan* (2009) noted that the closely-regulated chemical and petrochemical industries employ pipeline racks and galleries aboveground, rather than belowground. These systems are safer and less expensive for accommodating multiple pipeline runs, and retain flexibility in the operation and maintenance of pipeline systems.

Aboveground pipeline racks *(Figure 5.19)* are recommended for the Fuel Terminal to facilitate changes or future expansion in pipe configurations, as well as to allow for routine visual inspection and maintenance. Should additional racks be needed to accommodate additional pipelines, the system can be added to vertically. The *FPDP* recommends that DOT-H install these racks as a common element improvement, including the Fuel Pier and its associated utilities such as common power and water (see *Section 5.5.2, Support Infrastructure).* This system utilizes a secondary containment berm under the pipelines, allowing fuel product runoff that collects in the containment to be captured and retained within the berm, and later pumped and hauled away for treatment and disposal. An aboveground system will protect the pipelines from the corrosive environment under the pier or in the ground. This configuration is unlike the underground hatch configuration of Piers 5 and 6, which is necessary to support the multi-use function of the piers.

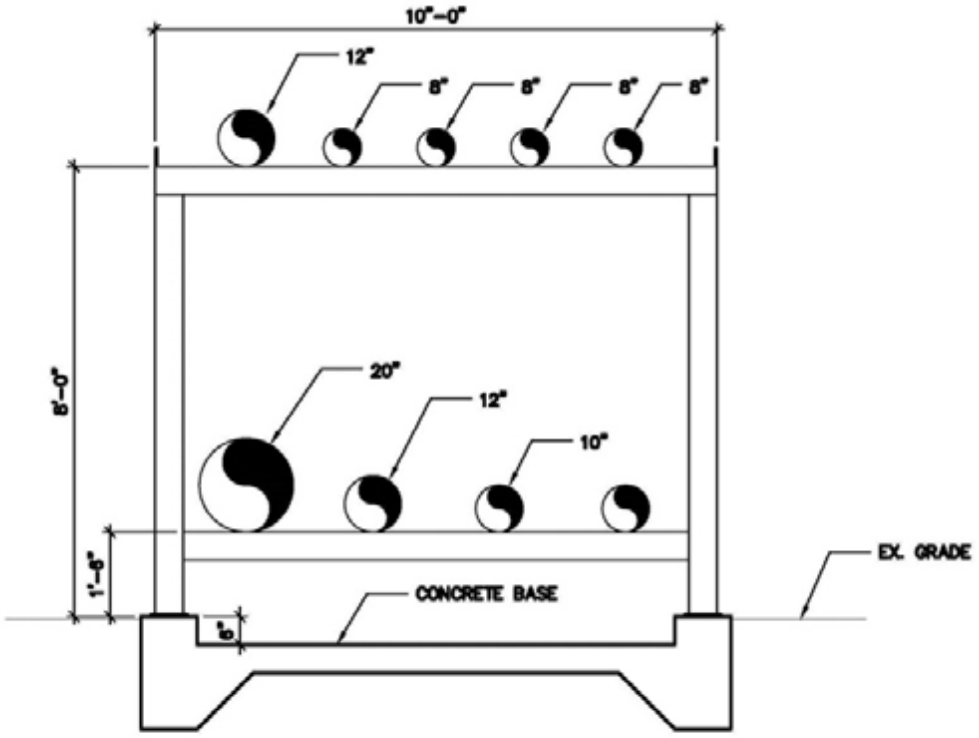

Figure 5.19 – Proposed Pipeline Rack Installation Section

Pipe racks are not only non-building structures that have similarities to structural steel buildings but also have additional loads and design considerations. The requirements found in the building codes apply and dictate some of the design requirements for pipe racks. Some code requirements are not clear on how they are to be applied to pipe racks, because most are written for buildings. Several industry references exist to help the designer apply the intent of the code and follow expected engineering practices. These include the following:

- American Institute of Steel Construction (AISC) (2005), AISC 341-05, *Seismic Provisions for Structural Steel Buildings*, Including Supplement No. 1
- AISC (2005), AISC 360-05, *Specification for Structural Steel Buildings*
- AISC (2006), AISC 358-05, *Prequalified Connections for Special and Intermediate Steel Moment Frames for Seismic Applications*
- AISC (2009), AISC 358-05s1, Supplement No. 1 to *Prequalified Connections for Special and Intermediate Steel Moment Frames for Seismic Applications*
- American Society of Civil Engineers (ASCE) (1997), *Guidelines for Seismic Evaluation and Design of Petrochemical Facilities*
- ASCE (1997), *Wind Loads on Petrochemical Facilities*
- ASCE (2006), ASCE 7-05, *Minimum Design Loads for Buildings and Other Structures*, Including Supplement No. 1
- International Conference of Building Officials (ICBO) (1994), *Uniform Building Code*
- International Code Council (ICC) (2009), *International Building Code*
- Murray, T.M. and Sumner, E.A. (2003), *Steel Design Guide No. 4,* Extended End-Plate Moment Connections—Seismic and Wind Applications, 2nd ed.
- Process Industry Practices (PIP) (2007), PIP STC01015, *Structural Design Criteria*
- Seaburg, P.A. and Carter, C.J. (1997), *Steel Design Guide No. 9, Torsional Analysis of Structural Steel Members*

The foundation type to be used will be dictated by site soil conditions. Foundation design parameters are normally stated in the project design specifications based on a site geotechnical investigation report. Typically, independent spread footings or pile caps are used at each column. Combined foundation or grade beams could be used for the columns of transverse frames and/or braced frames if the column spacing is not too large. Building codes may require that pile caps be connected with grade beams *(Figure 5.20).*

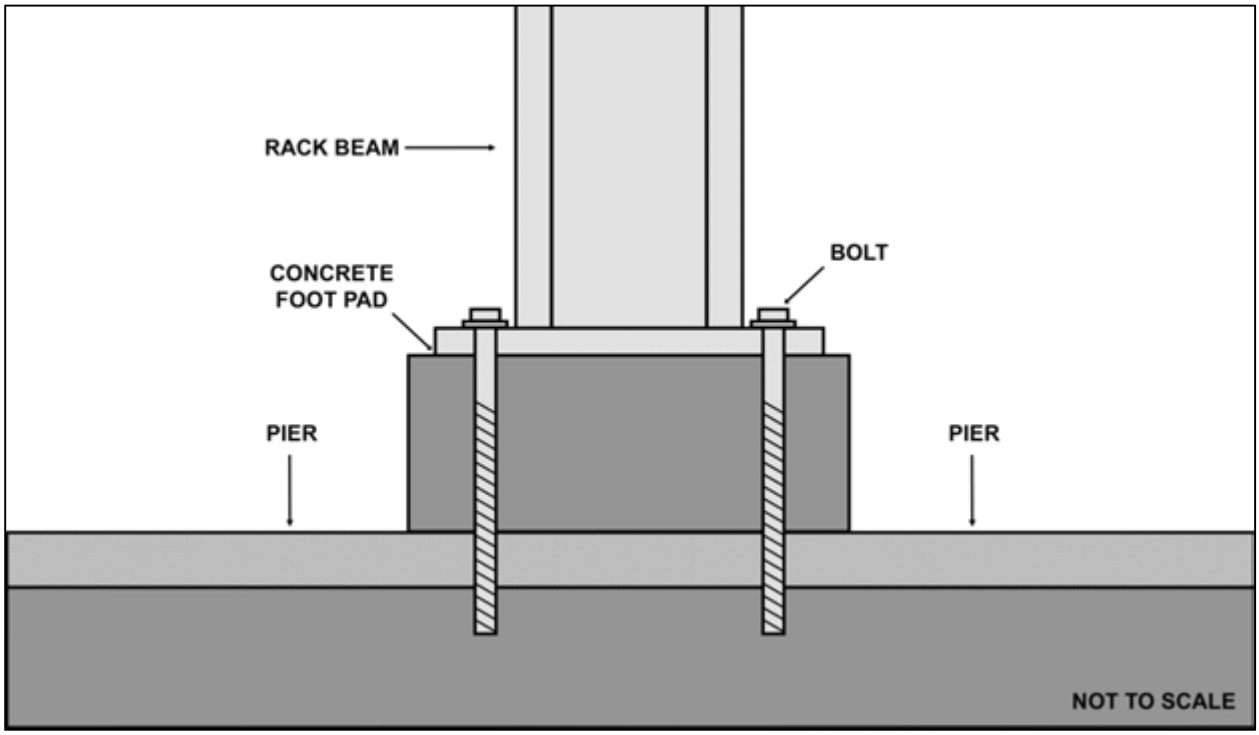

Figure 5.20 – Example of Pipeline Rack Footing

The fuel pipelines design represents a significant cost category associated with the Fuel Pier development. An aboveground pipeline rack is typically less expensive to construct, in comparison to belowground pipeline gallery. An aboveground rack would include some excavation, a concrete foundation, containment curb, and racks. A belowground pipeline gallery would require more extensive excavation and bedding material. Preliminary costs are approximately $2 million for the rack, versus approximately $10 million for the gallery *(Appendix N).* Shoreside fuel pumps and other specialized fuel support systems would be installed by the fuel industry, and are not included in this cost projection.

The pipelines will be located shoreside of an access route to accommodate line handling requirements for a standard forklift, and eliminate overhead crossing of mooring lines over an aboveground pipeline rack system *(Figure 5.17 and 5.21).* The minimum industry standard is 11 to 12 feet wide, which provides for the allowance of a safe turning radius for a forklift. The pipeline racks will be raised for passage underneath in select areas to accommodate the circulation of vehicles and equipment on the access road *(Figure 5.21).* Otherwise, there will be minimal points of interference. Protective stanchions will prevent damage from vehicles to the aboveground pipelines in the terminal area and on the piers.

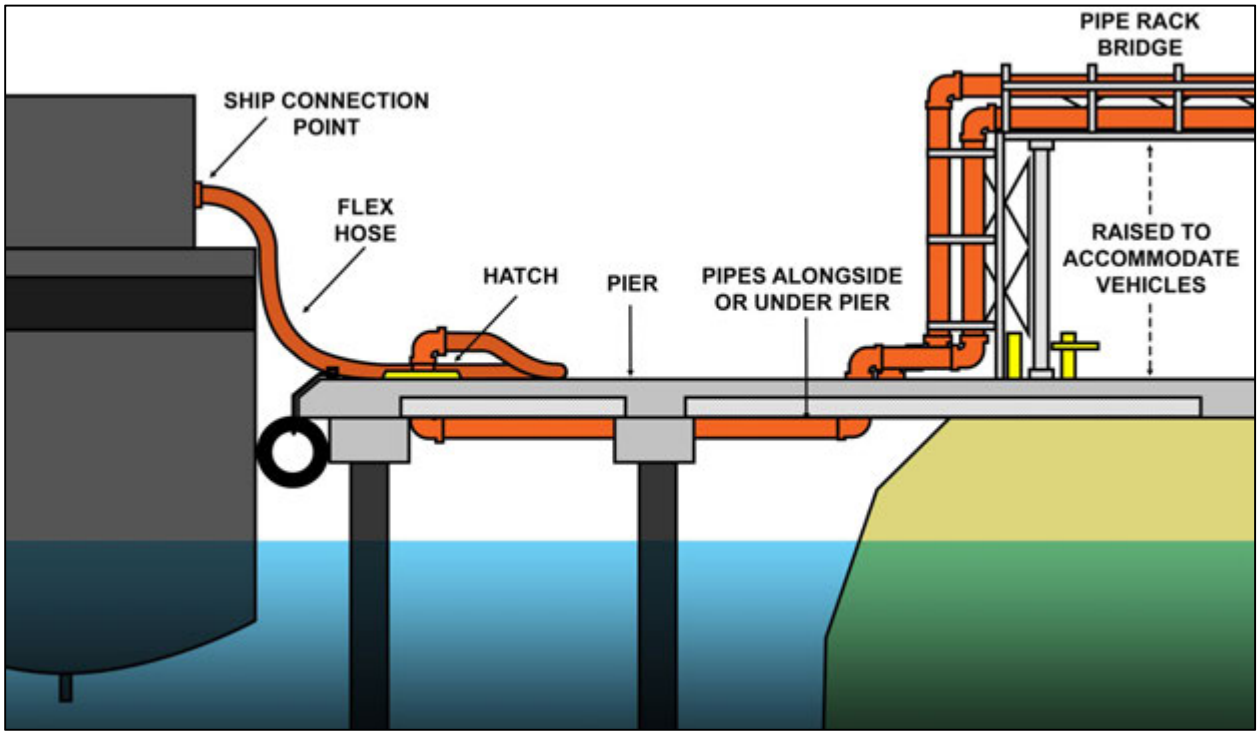

Figure 5.21 – Cross-section Diagram of Fuel Pier

The pipelines will go belowground near the boundary of the Fuel Terminal so that they can be connected to the existing underground pipes near the junction with Pier 5A and along Malakole Street, conveying fuel to the off-site storage facilities. Placement of this pipeline connection near Pier 5A will need to take into account other infrastructure and the possible siting of a new Sause Bros. office. Additional pipelines will need to be routed separately in the Energy Corridor along Malakole Street, as it has been documented that there is no room available in the current easement. The new easement will follow immediately southwest of the Pier 4A to Malakole Street, running parallel to the road at a 40-foot setback and then joining a wider energy corridor outside of KBPH property. Ultimately, industry tenants responsible for installing the pipelines will determine pipeline configuration within the parameters of available easement routes on DOT-H property, and tie-in to the existing pipelines conveying fuel to off-site refineries and storage. In addition, while the *FPDP* recommends aboveground pipeline racks due to their increased safety and reduced cost associated with multiple pipeline runs, and because they retain flexibility in the operation and maintenance of the pipeline systems, it may ultimately be up to the fuel industry to make that determination.

5.5.2 Support Infrastructure

Additional infrastructure is recommended to facilitate a safe and operational Fuel Pier. This includes spill response, fire suppression, additional safety measures and utilities. These should be in compliance with:

- *Code of Federal Regulations (CFR) 40 Part 112 Oil Pollution Prevention*
- *UFC 3-460-01 Design: Petroleum Fuel Facilities*
- *UFC 3-600-01 Fire Protection Engineering for Facilities*
- *UFC 4-152-01 Design: Piers and Wharves*
- *UFC 4-150-02 Dockside Utilities for Ship Service*
- *National Fire Protection Association (NFPA) 30 Flammable and Combustible Liquids Code*
- *NFPA 58 Liquefied Petroleum Gas Code*
- *NFPA 307 Standard for the Construction and Fire Protection of Marine Terminals, Piers, and Wharves*

Spill response and protection equipment includes:

- A central fuel monitoring system equipped with a two-stage alarm
- An emergency shutdown system to immediately stop the flow of fuels in the event of an accidental release
- An emergency release coupling with spill preventer
- Spill protection equipment including oil spill booms, utility boats, and other equipment

The fire suppression system will have to mitigate a wide range of hazardous fuel products. This system will contain the following components:

- Fire alarms and sirens located throughout the terminal
- Emergency fire pump (diesel powered) in the event of an electrical outage
- Central remote control fire suppression monitors and water-foam generators
- Fire hydrants at the fuel berths for fire-suppression water or to cool equipment
- Large, dry chemical wheeled extinguishers
- Specialized training such as fire drills and exercises
- Fire sprinklers within the fuel control building
- Mutual support agreements for fire-fighting equipment and materials
- Cooperation with the Honolulu Fire Department of inspection procedures and fire drills
- A public education program

The *Statewide Fuel Facilities Development Plan* (2009) recommended vapor controls for the fuel pier. Vapor controls are required by *40 CFR 63 Subpart Y National Emissions Standards for Marine Tank Vessel Loading Operations*. Maximum achievable control technologies (MACT) are required if the fuel piers are considered a major source of hazardous air pollutants. However, the direct emissions from the proposed Fuel Pier are below the "major source" threshold *(Appendix O, Air Quality Impact Assessment).* Therefore, the *FPDP* is not recommending vapor controls at this time.

Additional safety measures installed and maintained by the operator will include:

- Real-time environmental monitoring system to provide live wind, current, waves and seismic conditions
- Bull rails around the perimeter of the pier platform to prevent equipment and personnel from falling into the waters
- Safety ring stations in the event that someone falls into the waters
- Portable ladders for easy access to the waters

Other infrastructure to be incorporated into the Fuel Terminal includes lighting, shore-based electrical power, potable water, stormwater management and a wastewater system. Shore-based power, also known as cold iron, allows vessels to shut off onboard generators when berthed. The power needs for the Fuel Pier may be met with the current power infrastructure of 12.47 kilovolt (kV) (Douglas Engineering Inc., 2014). The power needs for other current and future facilities as proposed in the *2040 Kalaeloa Barbers Point Harbor Master Plan* (2015) may also be met with the current power infrastructure of 12.47 kV. These include electrical service needs at the Sause Bros. office, Personnel Shelter at Piers 5/6, and future users of the Bulk A and B areas. Electrical system upgrades and extension to service the Fuel Pier are estimated at approximately $80,000, and will supply electricity to the berths, fuel systems, yards, perimeter lighting and Fuel Control facilities. Electric and water will be sub-metered for each user.

An existing and future infrastructure and utilities assessment was completed by Group 70 in 2014. The potable water system main trunk line in the Fuel Pier area will be improved by DOT-H to include a looped system *(Figure 5.22).* As the water demands of all future tenants and other users are currently unknown, the users of the potable water system should be further analyzed in the design stage and the system appropriately upsized to accommodate potential future demand. If water demand increases substantially at the harbor over time, additional capacity could be obtained by upsizing the 2-inch Honolulu Board of Water Supply (BWS) water meter or by adding a second connection to the public water system once the Kapolei Harborside project is developed.

The Fuel Terminal developer will be responsible for extending the potable water service lateral that will service the Fuel Control building, and will also be available for vessel uses at the pier, fitted with international shore connections. Fire suppression infrastructure designed to comply with regulations for fire protection of marine terminals and piers will be installed to provide a reasonable level of protection against loss of life and property. Estimated costs for potable water to vessels, water/fire protection lines and fire hydrants to piers, and an upgraded fire suppression system are approximately $750,000.

Stormwater runoff generated on-site will sheet flow away from the Fuel Pier, toward the center of the site *(Figure 5.23).* The collected runoff will be treated through permanent best management practices (BMPs) before discharging into the harbor basin through a proposed outlet, located between Pier 3 and Pier 4. Permanent BMPs shall be in accordance with the *Storm Water Management Plan, Kalaeloa Barbers Point Harbor.*

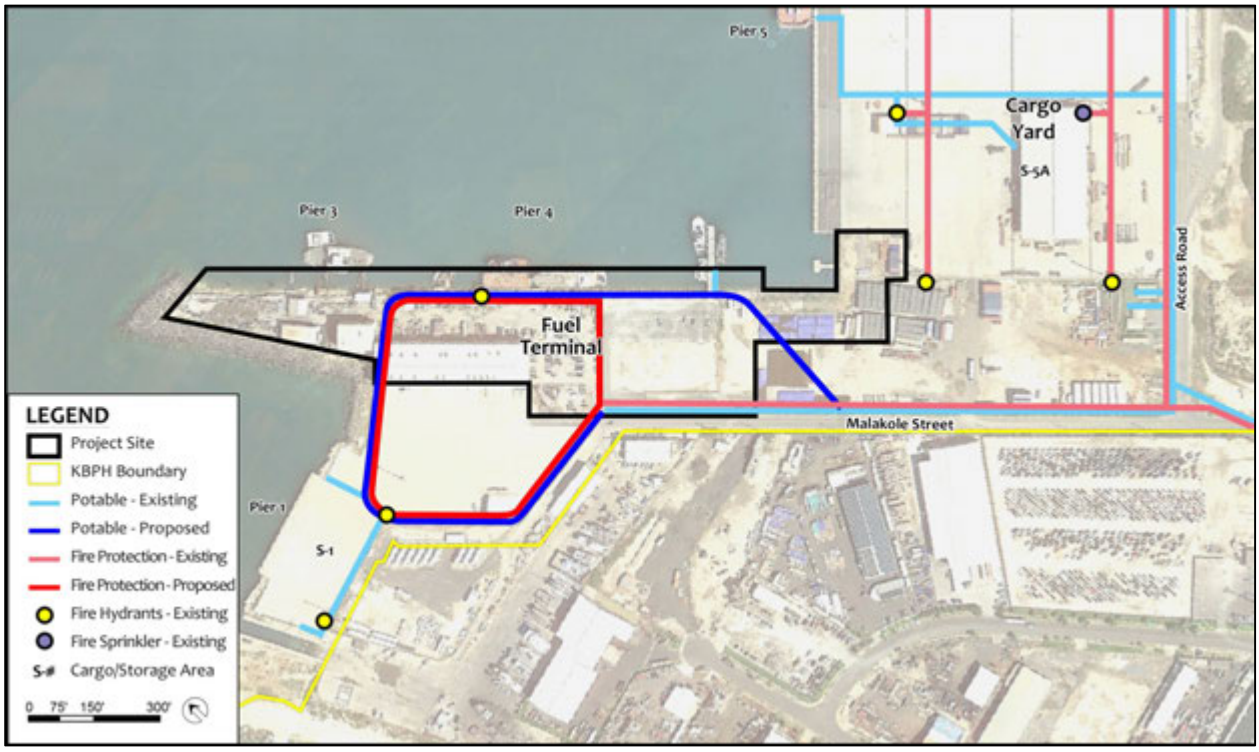

Figure 5.22 – Proposed Potable Water and Fire Protection Plan

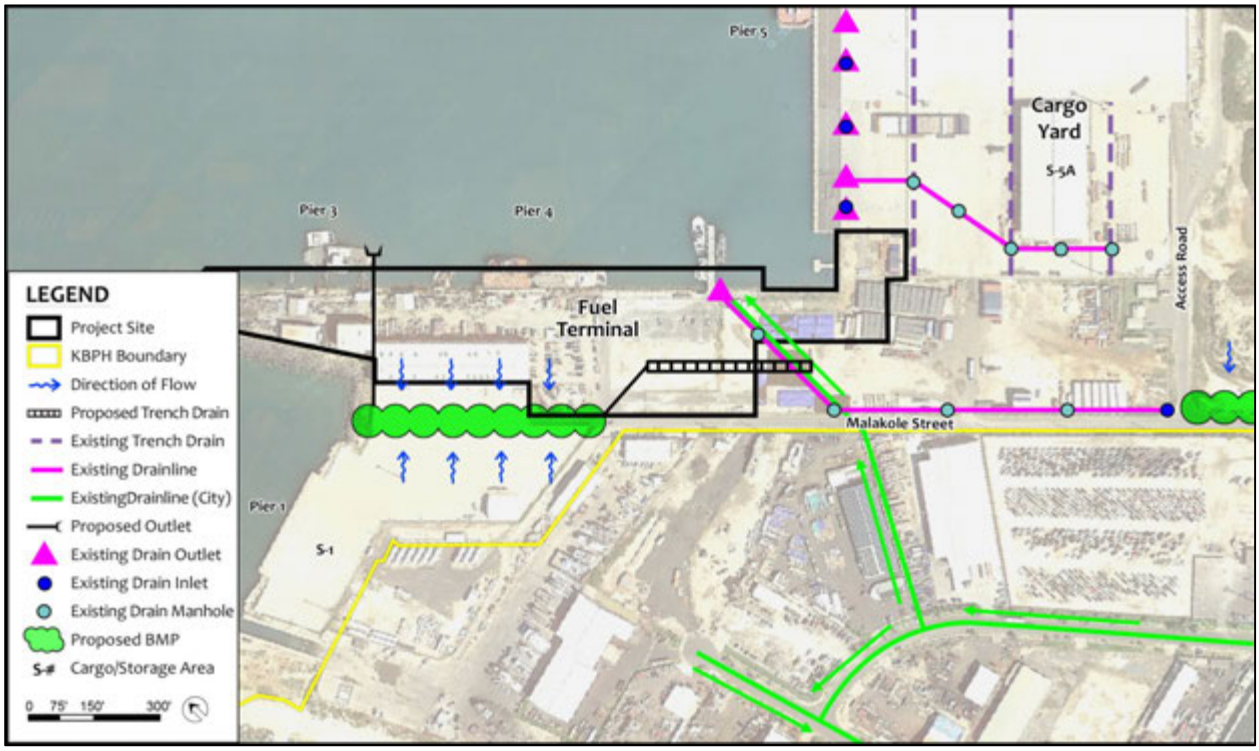

Figure 5.23 – Proposed Drainage Plan

The City and County of Honolulu municipal sewer system does not extend to KBPH. The municipal sewer system near James Campbell Industrial Park is located approximately a half mile away from KBPH, but this system may be expanded with development of the neighboring proposed Kapolei Harborside project. Sewer construction will be phased in conjunction with road development. Municipal sewer service will likely be installed along the proposed Kalaeloa Harbor Access Road and up to the northern portion of the harbor. Once this sewer system has been installed, Department of Health (DOH) Wastewater Branch (WWB) could require new buildings within KBPH to connect to these public sewer mains. Until such time that a municipal sewer system is extended to KBPH with sufficient capacity, the Fuel Control building will install a new individual wastewater system (IWS) *(Figure 5.24).*

No oil/water separator will be located on site. Wastewater collected from tankers and barges during loading and maintenance activities will be removed by an approved pumping truck company and hauled away to an approved discharge site.

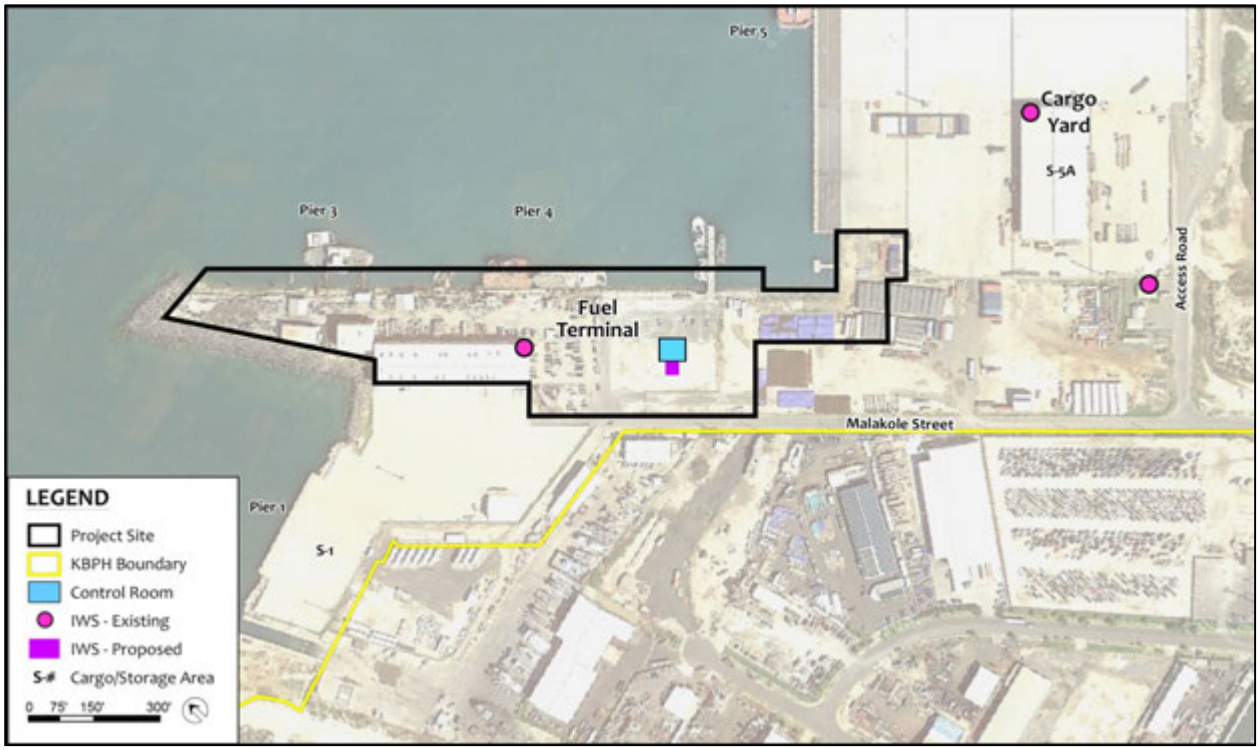

Figure 5.24 – Proposed Wastewater Plan

The Fuel Pier Terminal will have a roadway network (see *Figure 5.25)* allowing for emergency access to fire hydrants and all areas of the Fuel Pier. The roads are wide enough for standard forklifts and emergency vehicles to have adequate access to the piers. A primary roadway will be parallel to the pier face for access along the length of the pier. A secondary road will run parallel mauka to the pipeline rack to allow for maintenance of the pipelines. Parking will be available for up to 30 Fuel Terminal personnel and visitors.

The Fuel Pier will be a secure facility equipped with perimeter security fencing and a video monitoring system *(Figure 5.25).* Primary access from Malakole Street to the facility will be restricted through a secured gate with a guard verifying Transportation Worker Identification Credential (TWIC) and Maritime Security (MARSEC) security clearances as well as a specific reason for accessing the facility. A secondary restricted access connecting to Pier 5A will be a locked gate and require the same clearances. Fencing, gates, and associated clearance requirements should be in accordance with *UFC 4-022-03 Security Fences and Gates or UFC 4-020-03FA Security Engineering: Final Design.*

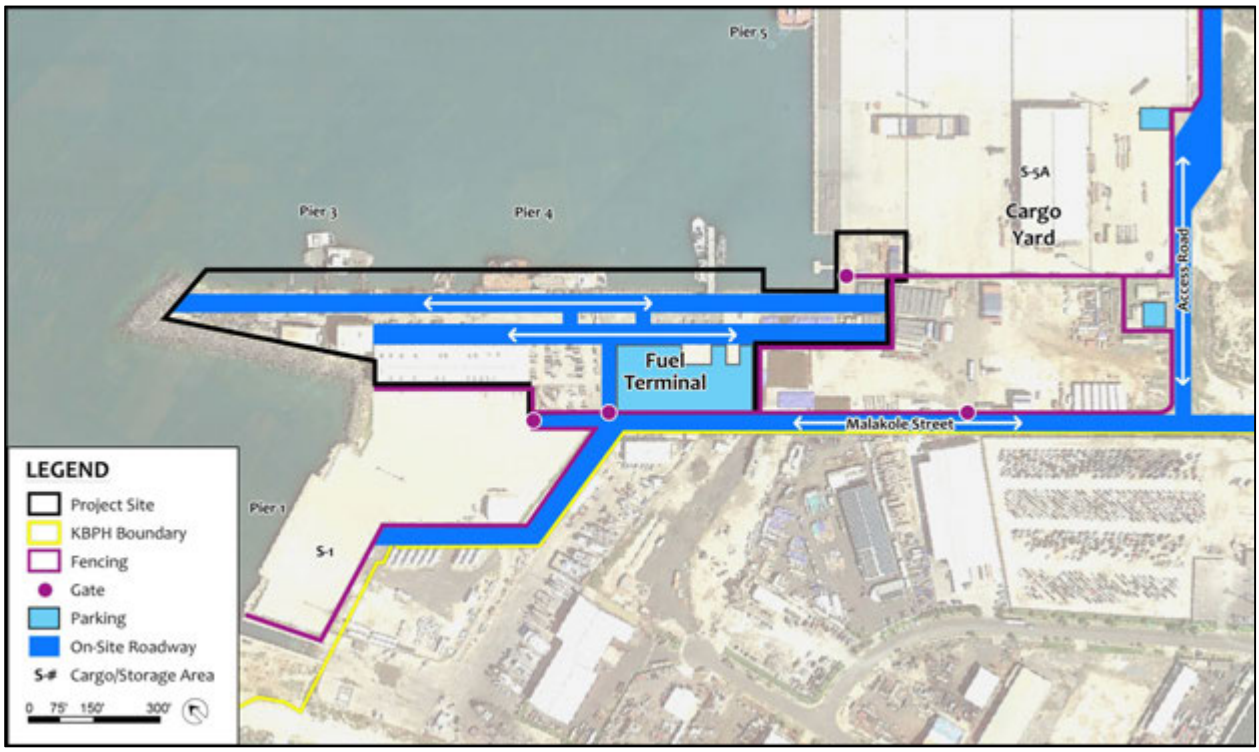

Figure 5.25 – Proposed Circulation Plan

5.6 Applicable Codes, Standards and Guidelines

The following is a compilation of codes, standards and guidelines for design of the Fuel Pier and Terminal that may or may not have been previously mentioned.

1. American Association of State Highway and Transportation Officials (AASHTO).
2. American Concrete Institute (ACI), *Building Code Requirements for Structural Concrete* (ACI 318-11).
3. American Institute of Steel Construction (AISC), *Prequalified Connections for Special and Intermediate Steel Moment Frames for Seismic Applications* (AISC 358-05).
4. AISC, *Seismic Provisions for Structural Steel Buildings*, Including Supplement No. 1 (AISC 341-05).
5. AISC, *Specification for Structural Steel Buildings* (AISC 360-05).
6. AISC, *Manual of Steel Construction, Load and Resistance Factor Design* (LRFD).
7. American National Standards Institute (ANSI)/American Welding Society (AWS) D1.1, *Structural Welding Code – Steel*.
8. American Society of Civil Engineers (ASCE), *Guidelines for Seismic Evaluation and Design of Petrochemical Facilities*.
9. ASCE, *Minimum Design Loads for Buildings and Other Structures*, Including Supplement No. 1 (ASCE 7-05).
10. ASCE, *Standard, Minimum Design Loads for Buildings and Other Structures* (ASCE 7-10).
11. ASCE, *Standard for Seismic Design of Piers and Wharves* (ASCE 61-14).
12. ASCE, *Wind Loads on Petrochemical Facilities*
13. American Petroleum Institute (API), *Specifications for Pipeline Valves* (API 6D).
14. American Public Works Association (APWA).
15. American Society of Mechanical Engineers (ASME), *Pressure Vessels Division I and II* (Section VIII).
16. ASME, *Steel Pipe Flanges and Flanged Fittings* (B16.5).
17. ASME, *Petroleum Refinery Piping* (B31.3).
18. ASME, *Welding Qualifications* (Section IX).
19. Americans with Disabilities Act Accessibility Guidelines (ADAAG).
20. American Society for Testing and Materials (ASTM).
21. Code of Federal Regulations (CFR), *Maritime Security, General* (33 CFR 101).
22. CFR, *Transportation Worker Identification Credential (TWIC) Requirements* (33 CFR 101.514).
23. CFR, *Maritime Security, Facilities (*33 CFR 105).
24. CFR, *TWIC Requirements (*33 CFR 105.255).
25. CFR, *National Emission Standards for maritime Tank Vessel Loading Operations* (40 CFR 163, Subpart Y).
26. CFR, *Discharge of Oil* (40 CFR 110).
27. CFR, *Oil Pollution Prevention* (40 CFR 112).
28. CFR, *Determination of Reportable Quantities for Hazardous Substances* (40 CFR 117).
29. CFR, *Identification and Listing of Hazardous Waste* (40 CFR 261).
30. Clean Water Act (CWA), Sections 307, 401 and 404.
31. Construction Specifications Institute (CSI).
32. Hawai'i Administrative Rules (HAR), *Water Quality Standards* (HAR Title 11-54).
33. HAR, *Water Pollution Control* (Chapter 11-55).
34. Hawai'i Department of Transportation, Harbors Division, *Stormwater Management Plan* (SWMP).
35. Illuminating Engineering Society of North America (IESNA).
36. Institute of Electrical and Electronic Engineers (IEEE).
37. International Code Council, *International Building Code* (IBC).
38. International Conference of Building Officials, *Uniform Building Code* (UBC).

39. International Electrical Testing Association (NETA).
40. International Standards Organization (ISO), *Testing of Valves, Fire Type Testing Requirements*.
41. ISO R773/4, *Recommendations for Keys and Key Seats* (ISO R773/4).
42. Leadership in Energy and Environmental Design (LEED), *Reference Guide* (LEED-NC, Version 2.2, 1st Edition).
43. Marine Oil Terminal Engineering, and Maintenance Standards; California State Lands Commission, Marine Facilities Division (MOTEMS).
44. Military Handbook (MIL-HDBK), *Foundations & Earth Structures* (MIL-HDBK 7.02).
45. MIL-HDBK, *Mooring Design* (MIL-HDBK1026/4).
46. MIL-HDBK, *Piers and Wharves* (MIL-HDBK1025/1).
47. MIL-HDBK, *Seawalls, Bulkheads and Quaywalls* (MIL-HDBK1025/4).
48. Mechanical Power Transmission Association (MPTA).
49. National Electrical Code (NEC).
50. National Electrical Contractors Association (NECA).
51. National Association for Corrosion Engineers (NACE).
52. National Electrical Manufacturers Association (NEMA).
53. National Electrical Safety Code (NESC).
54. National Fire Protection Association (NFPA), *Flammable and Combustible Liquids Code* (NFPA 30).
55. NFPA, *Liquefied Petroleum Gas Code* (NFPA 58).
56. NFPA, *Life Safety Code* (NFPA 101).
57. NFPA, *Standard for the Construction and Fire Protection of Marine Terminals, Piers and Wharves* (NFPA 307).
58. Occupational Safety and Health Act (OSHA).
59. Oil Companies International Marine Forum (OCIMF), *Design and Construction Specification for Marine Loading Arms*.
60. OCIMF, *Recommendations for Oil Tanker Manifolds and Associated Equipment*.
61. Permanent International Association of Navigation Congresses (PIANC), *Guidelines for the Design of Fender Systems*.
62. PIANC, *Seismic Design Guidelines for Port Structures* (Working Group No. 34 of the Maritime Navigation Commission, International Navigation Association).
63. Precast/Prestressed Concrete Institute (PCI) Design Handbook, *Precast/Prestressed Concrete Institute* (PCI 5th Edition).
64. Process Industry Practices (PIP), *Structural Design Criteria* (PIP STC01015).
65. *Unified Facilities Criteria* (UFC) *1-200-01 General Building Requirements*
66. *UFC 2-000-05N Operational and Training Facilities,* and
67. *UFC 3-460-01 Design: Petroleum Fuel Facilities,*
68. UFC *4-152-01* related to *Design: Piers and Wharves*
69. Underwriters Laboratories (UL).
70. United States Army Corps of Engineers (USACE), *Dredging and Dredged Material Disposal* (COE EM 1110-2-5025).
71. USACE, *Confined Disposal of Dredged Material* (COE EM 1110-2-5027).
72. United States Green Building Council (USGBC).

6.0
Recommendations and Implementation

6.0 RECOMMENDATIONS AND IMPLEMENTATION

6.1 Recommended Fuel Pier Design

The preferred alternative was selected by making a balanced evaluation of cost, input from stakeholders on operational needs and potential impacts on the environment.

Based on the comparative evaluation of the three conceptual Fuel Pier design alternatives, the Alternative A design (i.e., the segmented partial pier design), emerges as the preferred alternative. It will enhance and maximize the service capabilities of the Fuel Pier, in addition to reducing construction costs and construction service disruptions to the port's activities. It will provide DOT-H with overall advantages in comparison to other design options. Alternative A provides adequate flexibility in pier and fuel systems, construction phasing and operations, minimizes the environmental impacts due to construction and operations, and minimizes the cost of development compared to the other alternative designs (estimated at $43.6 million, 2014).

Preliminary details for the Alternative A design and projected order of magnitude construction costs (2014 dollars) are included in *Appendices J through M*. A 20 percent design is included as *Appendix P.*

6.2 Tenant Relocation Scheduling and Projected Berthing Improvements

The development of the Fuel Pier will require the relocation of the Marisco ship repair operation to another location in KBPH. Pier 9 landside is the preliminary location planned for future development of marine support services. The *KBPH 2040 Master Plan* provides specifics on the planned improvements to the Pier 9 area, which may include development of berthing improvements and support infrastructure.

The Pier 3 area will be developed in the first phase of the Fuel Pier. Per their lease agreement, notification of relocation to Marisco by DOT-H is required at least six months prior to relocation. An extended timeline will be required to accomplish the permitting, design and construction of facilities by the relocated tenant. Consequently, DOT-H should commence negotiations with Marisco regarding a long-term lease of the new premises once funding for construction of the Fuel Pier is released. Marisco has suggested closing their warehouse activities on the northern portion of the warehouse building and relocating to the southern portion of the building during initial construction, if needed.

The Pier 4 Finger Pier will be retained until additional Fuel Pier berthing is required. The Finger Pier is an actively utilized berthing facility for tugs and other small vessels operating at KBPH. Ultimate build-out of the Fuel Pier to encompass Piers 3 and 4 will eliminate the Finger Pier. Those berths will be relocated to Pier 8. Projected costs for the expanded berthing at Pier 8 are presented in the *KBPH 2040 Master Plan*.

6.3 Development Timetable

There are growing pressures faced by the competing uses of KBPH. It is of vital importance to DOT-H to provide functional harbor berthing spaces and industry-specific support facilities for ongoing operation of essential energy and cargo industries. Implementation of the *KBPH Fuel Pier Development Plan (FPDP)* depends upon capital improvement project funding allocations, as approved by the Hawai'i State Legislature, and priority of DOT-H. Currently, the Fuel Pier is considered the second highest priority project for DOT-H behind the Kapalama Container Terminal. If special funds are to be used, funding for this project may not be available until the third bond financing. If for some reason construction of the Fuel Pier would be needed sooner than the availability of the third bond, an option for DOT-H would be to appeal to the Hawai'i Legislature for general funds to expedite the financing and construction schedule. In addition, DOT-H could opt to lease the parcel to a private entity to develop the Fuel Pier.

With the completion of the *KBPH FPDP* and the *KBPH 2040 Master Plan*, DOT-H can proceed with design, permitting and implementation of the high priority projects for modernization of KBPH. Project site preparation would occur soon after land use permits and other approvals are obtained and the existing tenant vacates the site.

6.4 Development Options

The *FPDP* and the construction of the dedicated Fuel Pier at the Piers 3 and 4 area has received interest from several private sector entities. These groups have expressed an interest in participating in a public private partnership and/or other potential development and/or operating agreement that may be under consideration by DOT-H for the planned fuel piers.

As an initial first step, DOT-H will need to determine their desired interest, possible options and the proper course of action for any potential development and/or operating agreement. Any private sector group selected to undertake any of these options should have appropriate expertise, experience and the financial standing with similar fuel terminal projects that have been successfully executed. These entities should be well suited and positioned to assist DOT-H in the final design, construction, and operation of the planned fuel terminal. There are a myriad of ways and levels of participation for this undertaking; as such a prudent evaluation should be pursued to determine the most appropriate options that will best meet the long-term fuel distribution needs of the state.

This concept would provide an innovative new approach and methodology for DOT-H , which would permit the various liquid bulk oil and gas importers which service the needs of the state's oil and gas customers, to share the operations, maintenance and repair of the new planned unloading/transfer facilities at the port's dedicated Fuel Pier at Piers 3 and 4. In a public private partnership and/or other potential development, this could be achieved with a long-term agreement (30 to 50 years) and/or with a 25-year operating agreement. These types of agreements would serve as the culmination of a high level of vision and collaboration by key harbor users and the port.

7.0
References

7.0 REFERENCES

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APPENDIX A
HARBOR USER QUESTIONNAIRE AND SUMMARY OF RESULTS

Respondent

Name _____ Position: _____

Company: _____ Address: _____

E-mail:_____ Phone: _____

Project Contact (if different from Respondent)

Name _____ Position: _____

E-mail: _____ Phone: _____

Business Overview
Please describe the services your company provides and the kinds of operations they require at Kalaeloa Barbers Point Harbor.

In planning for the future of the Kalaeloa Barbers Point Harbor, the current and future needs of harbor users need to be considered. Please answer the questions that follow as completely as possible. Thank you for your participation.

1. Harbor / Water Area:	Adequate? (*Check response*) Yes	No	Improvements Necessary (*Please explain*)
a. Size of harbor			
b. Draft in harbor			
c. Navigation in harbor			
d. Configuration of harbor			
e. Accommodation of different ship types			
f. Night time operations			

2. Which vessels are typically used in operations? *(Check all that apply)*

☐	Freight Barges	☐	Neobulk Ships	☐	Tank Barges	☐	Tugs
☐	Dry Bulk Ships	☐	Passenger Vessels	☐	Tank Ships	☐	Other *(Describe)*:

Vessel Dimensions (*Please list values.*)	Current Size (Maximum)	Preferred Size (Maximum)
Length Overall:		
Beam:		
Draft:		

Comments:

What is your current vessel schedule and port call frequency?
(*Select one time frame for your response.*)

_____ times per week **OR**	_____ times per month **OR**	_____ times per year.

What is your average port call duration (in hours) for various types of vessels (listed above) and cargo handling operations (i.e., crane grab, bulk unloader, RO/RO, LO/LO, cargo hose)?
(*Example: Dry Bulk / bulk unloader = 30 hours.)*

3. Docks:	Adequate? (*Check response*) Yes	No	Improvements Necessary (*Please explain*)
a. Height			
b. Construction			
c. Regulatory requirements			
d. Fendering			
e. Mooring arrangements			
f. Pollution control			
g. Certification			
h. Fire protection			
i. Safety features			
j. Lighting			

Comments:

Which piers do you currently utilize? *(Please circle, or highlight, your choice(s).)*	Which piers would you prefer to utilize? *(Please circle, or highlight, your choice(s).)*
1. P-1	1. P-1
2. Marisco	2. Marisco
3. "Finger Pier "	3. "Finger Pier "
4. P-5A	4. P-5A
5. P-5 (aka "Pier 5 Bravo")	5. P-5 (aka "Pier 5 Bravo")
6. P-6	6. P-6
7. P-7	7. P-7
8. P-9 (Floating Dry Dock)	8. P-9 (Floating Dry Dock)
What are their limitations?	What are their limitations?

4. Marine Terminal Area (square footage):	Current	Future Needs
a. Dock Area Utilized:		
b. Storage Area Utilized:		
c. Other Area Utilized:		
Total Area:	0	0
Alternate Operational Area:		
Alternate Storage Area:		

5. Marine Terminal:	Adequate? (*Check response*) Yes	No	Improvements Necessary (*Please explain*)
a. Area			
b. Berth scheduling			
c. Availability			
d. Suitability			
e. Cargo handling features			
f. Storage			
g. Operational office space			
h. Fuel piping / Fuels			
i. Tank cleaning			
j. Passenger / Ferry operations			

Comments:

Are facility improvements needed to increase the efficiency of current operations? If so, which types would you recommend?

6. Support Services / Utilities:	Adequate? (*Check response*) Yes	No	Improvements Necessary *(Please explain)*
a. Water			
b. Electrical			
c. Ramps			
d. Navigation capabilities (dGPS, navigation lights)			
e. Fencing			
f. Security guards			
g. Office space			
h. Person in Charge (PIC) accommodations			
i. Hazardous waste handling			
j. Garbage handling			
k. Pilotage			
l. Tugs			
m. Telephone service			
n. Wireless service			
o. Internet service			
p. Sewage pump out			
q. Bunkering			
r. Vessel repairs			
s. Tank cleaning			

Comments:

7. Company Operations: Cargo Volume Throughput by Year

Year (*CY*)	Cargo / Neobulk *Circle Unit of Measure:* (*S/Tons M/Tons*)	Fuel / Liquid Bulk (No. of Barrels)	Dry Bulk *Circle Unit of Measure:* (*S/Tons M/Tons*)
2002			
2003			
2004			
2005			
2006			
2007			
2008			
2009			
2010			
2011			
2012			
2013			
Information for Planning:			
How much of the cargo (%) is currently trans-shipped inter-island?			
What is the estimated throughput capacity?			
When (i.e., year) will this throughput capacity be reached?			
Volume Forecast:			
2015			
2020			
2025			
2030			
2035			
2040			

8. Company Operations: Passenger Traffic (Passenger Cruise, Ferry, or Excursion) by Year

Year (*CY*)	Passenger Cruise		Ferry		Excursion Vessel	
	# Passengers	# Vessels	# Passengers	# Vessels	# Passengers	# Vessels
Passenger Traffic Forecast:						
2015						
2020						
2025						
2030						
2035						
2040						

9. Ship Repair / Dry Docking

Year *(CY)*	Barge		Tug / Workboat		Govt.-Owned Vessel		Other Vessels	
	# Vessels Repaired	Total Days Under Repair	# Vessels Repaired	Total Days Under Repair	# Vessels Repaired	Total Days Under Repair	# Vessels Repaired	Total Days Under Repair
2002								
2003								
2004								
2005								
2006								
2007								
2008								
2009								
2010								
2011								
2012								
2013								
Forecast of Vessels for Repair:								
2015								
2020								
2025								
2030								
2035								
2040								
Information for Planning:								

Are ship construction facilities needed at Kalaeloa? *(Circle, or highlight, your response.)*

Yes **No**

Does your company have any plans for ship construction? *(Circle, or highlight, your response.)*

Yes **No**

What is required for this operation? *(Please comment.)*

10. Other Data / Regulatory Compliance:

Of which of the following has your company had to meet regulatory compliance requirements?

	Check box if applicable
a. U.S. Coast Guard (USCG)	
b. Environmental Protection Agency (EPA)	
c. National Pollutant Discharge Elimination System (NPDES) Permit	
d. Public Utilities Commission (PUC)	
e. Americans with Disabilities Act of 1990 (ADA)	
f. Oil Companies International Marine Forum (OCIMF)	
g. Ship Inspection Report Programme (SIRE)	
h. Occupational Safety and Health Administration (OSHA)	
i. Hawaii Dept of Health environmental permits (e.g., clean water, air emissions)	
j. International Maritime Organization (IMO)	
k. Ship / Terminal Vetting	
l. Passenger Vessel Association (PVA)	

Comments:

11. Other issues:

a. **Please tell us your Top 5 priority issues and / or areas of concern.** *(List them in order of importance to you.)*

1	
2	
3	
4	
5	

b. **How would you rate the harbor facilities and services?** *(Circle, or highlight, one score)*

5	4	3	2	1
Excellent	Good	Average / Adequate	Fair	Poor

c. **New development or use: Which types would you <u>like</u> to see?**

d. **New development or use: Which types would you <u>not like</u> to see?**

e. **Are there any other issues that the Master Plan should consider? Please feel free to comment.**

Thank you for your participation. The information you provide will assist in the development of the Kalaeloa Barbers Point Harbor Master Plan.

Please return completed questionnaire to:
Group 70 International
925 Bethel Street, 5th Floor
Honolulu, HI 96813

If you have any questions, please call
(808) 523-5866 or e-mail:
kbph@group70int.com

Kalaeloa Barbers Point Harbor - 2040 Master Plan
User Survey Summary

Introduction:

The following report is a summary of the information and responses recorded through the Kalaeloa Barbers Point Harbor user survey. Through this survey, Group 70 recorded the current and future needs of Kalaeloa Harbor users in preparation for the 2040 Master Plan. 35%, or 28 of the 80 companies receiving the survey, participated. The percentages in the information tables below represent the percentage of harbor users participating in the survey that responded "yes, this harbor feature is adequate." The categories are color-coded for convenience: red (<60%), yellow (60%-80%), and green (80%-100%).

Participating Companies:

Aloha Consulting
Aloha Petroleum
Amerigas
Ameron Hawaii
BAE Systems
Chevron
Clean Islands Council
Daehan Shipping Agency
GLP Asphalt LLC
Grace Pacific Corp.
Hawaii Gas (LNG/Propane)
Hawaii Pilots Assoc.
Hawaii Stevedores, Inc.
HECO
Hidden Villa Ranch
HTB/YB (Young Brothers)
ILWU
Inchcape
Kirby Offshore Marine
Marine Cargo Surveys
Maritime Licensing Ctr.
McCabe, et al. Co.
P&M Marine Svcs and P&R Water Taxi
Pasha Hawaii
PENCO
Star of Honolulu
Tesoro Hawaii, LCC
Zilkha Biomass Fuels

Summary:

On average, the Kalaeloa harbor facilities and services are rated at 3.48 on a scale of 1 to 5. This rating is slightly above average or adequate, as the majority of users ranked the harbor with a 3 or a 4. Harbor users expressed that the harbor/water areas and marine terminal are the main issues that should be addressed.

Harbor/Water Areas:

The Kalaeloa harbor and water areas are 62.47% satisfactory. The main issues that need to be addressed are the harbor size, draft, night time operations, and ship accommodation. Harbor navigation and configuration are rated at 66.7% and 72.0% respectively. Some users suggested the need for more pier docking space and deeper drafts to allow for fully loaded vessels. Users also indicated that ship accommodation should be improved to support large Navy and commercial vessels. Improvements should be made to the shore side of the harbor in order to better accommodate several vessels at once. Additionally, the channel should be widened and a current meter should be installed.

Harbor/Water Areas			
Size of Harbor	68.0%	Configuration of Harbor	72.0%
Draft in Harbor	54.2%	Ship Accommodation	64.0%
Navigation in Harbor	66.7%	Night Time Operations	50.0%

Vessels/Cargo:

The majority of harbor users utilize tank ships, tank barges, tugs, and dry bulk ships. The companies' respective vessel schedules, port call frequencies, port call durations, and cargo volume throughputs vary.

No. Companies Utilizing Vessels			
Freight Barges	8	Dry Bulk	9
Neobulk Ships	2	Passenger Vessels	3
Tank Barges	10	Tank Ships	11
Tugs	8	Other	4

Ship Repair/Dry Docking:

92.86% of all companies surveyed agree that ship construction facilities are not needed at Kalaeloa. Only one of the surveyed companies has plans for ship construction at this point.

Docks:

Pier 6 is utilized most frequently by harbor users, closely followed by Pier 5, Pier 5A, and Pier 7. Harbor users expressed concern that cargo operations can only happen at Piers 5 and 6, and that Pier 7 does not have a cargo pipeline. Additionally, the vessel at Pier 5A often infringes on the berth at Pier 5. Pier 7 lacks sufficient bollards and winches to pull lines. Users also requested the construction of a permanent structure at Pier 7.

Docks			
Height	100%	Pollution Control	93.7%
Construction	90.0%	Certification	94.1%
Regulatory Requirements	94.7%	Fire Protection	100%
Fendering	90.0%	Safety Features	84.2%
Mooring Arrangements	80.0%	Lighting	85.0%

The dock facilities were deemed to be 91.2% adequate by harbor users. Mainly, improvements to the safety features of the docks are necessary. More life-rings need to be added, as the only ones apparent are on the off-loader machines. The height and fire protection of the docks received a 100% satisfaction rating. The harbor fendering should be improved to allow for larger ships and side-by-side berthing. In regards to construction, a larger pier pad is needed to accommodate heavier lift items. Users suggested the addition of restroom facilities at Piers 6 and 7 as well as more covered pavement at Pier 7. The limited access and storm and wave surges at Pier 1 should be addressed as well. Users also suggested improving the run-off containment system and implementing a wash-off station for workers exposed to hazardous spills. Lighting should be improved in the dry-dock areas. Fire protection, First-Aid life saving stations, and emergency communication should be incorporated into the dock improvements as well.

Marine Terminal:

The marine terminal is 69.61% satisfactory. Users' main concerns include availability, berth scheduling, passenger/ferry operations, and fuel piping. The companies unanimously agreed that the harbor's tank cleaning was satisfactory. Users expressed concern that Pier 6 is frequently congested and not enough berths are available throughout the harbor as a whole. More pier space and pipelines at all berths are needed to improve efficiency. It will be important not to disrupt the utilization of the supply chain during berth scheduling improvements. Space needs to be added for handling and storing large cargo; more covered storage area is needed as well. Additionally, more fueling positions are required and the equipment holding area should be improved to have better pier access. Users also suggested constructing a permanent receiving hopper and conveyance system at Pier 7.

Marine Terminal			
Area	71.4%	Storage	75%
Berth Scheduling	50%	Operational Office Space	72.7%
Availability	40.0%	Fuel Piping/Fuels	66.7%
Suitability	91.7%	Tank Cleaning	100%
Cargo Handling Features	71.4%	Passenger/Ferry Operations	57.1%

Support Services/Utilities:

The Kalaeloa support services and utilities were rated with 75.3% satisfaction. The main issues that need to be addressed are water utilities, office space, navigation capabilities, and internet and telephone service. The facility's bunkering, vessel repairs, and tank cleaning services were 100% satisfactory. With respect to hazardous waste handling, emergency and response systems should be built in. Users requested sewage pump out systems to be installed at every pier. The office space should be in a position that allows users to monitor harbor activity. Additionally, water and electrical services should be expanded at Pier 7.

Support Services/Utilities			
Water	60.0%	Electrical	63.6%
Ramps	75.0%	Navigation Capabilities	55.6%
Fencing	85.7%	Security Guards	80.0%
Office Space	62.5%	PIC Accommodations	70.0%
Haz. Waste Handling	90.0%	Garbage Handling	75.0%
Pilotage	92.3%	Tugs	85.7%
Telephone Service	57.1%	Wireless Service	57.1%
Internet Service	42.9%	Sewage Pump Out	77.8%
Bunkering	100%	Vessel Repairs	100%
Tank Cleaning	100%		

Regulatory Compliance:

The majority of companies utilizing Kalaeloa Harbor reported having to meet the regulatory compliance requirements of the U.S. Coast Guard (USCG), Environmental Protection Agency (EPA), Occupational Safety and Health Administration (OSHA), Hawaii Department of Health Environmental Permits, and National Pollutant Discharge Elimination System (NPDES). A select few also had to meet the regulatory compliance requirements of the Public Utilities Commission (PUC), Americans with Disabilities Act of 1990 (ADA), Oil Companies International Marine Forum (OCIMF), Ship Inspection Report Programme (SIRE), International Maritime Organization (IMO), Ship/Terminal Vetting, and Passenger Vessel Association (PVA).

No. Companies Meeting Req.			
USCG	21	EPA	18
NPDES	15	PUC	5
ADA	10	OCIMF	4
SIRE	4	OSHA	18
Dept. Health	15	IMO	8
Ship Vetting	5	PVA	2

Additional Comments:

Kalaeloa Harbor users' main areas of concern include nighttime operations, pier availability and access, harbor congestion, security, and the implementation of a fuel pier. Users also expressed concern over water, air, and electrical utilities, office facilities, scheduling, dock space, and berthing conflicts. Users suggested the addition of cameras, so that those at Aloha Tower can see the piers. It was also suggested to provide vessel crews with affordable transportation or escorts off the terminal. Another option would be to create a vessel crew recreational facility for the use of phones, internet, etc. Access to and egress from the pier should be allowed via highway. Users requested that all unused vessels be removed from DOT harbors. Additionally, an offshore current meter should be installed and a permanent structure should be constructed at Pier 7. The suggestions and comments listed above should be taken into consideration in the planning and implementation of a new master plan at Kalaeloa Harbor.

Appendix B
Fiscal Year 2012 Berthing Analysis
(Amergent Techs)

BERTH OCCUPANCY - BERTHING UTILIZATION

For the purposes of this evaluation, the berthing utilization was measured in berth foot days (BFD) which is tabulated to determine a vessel's linear berthing used with corresponding mooring allowances and the vessel 's port call duration, in relation to the maximum linear berth that is available for the specific berth. Calculations derived from State of Hawaii DOT-Harbors Divisions' vessel movement data base, covering a period from July 1, 2011 to June 30, 2012 (FY-2012).

Berth Occupancy Considerations

40% occupancy and lower are considered to be operationally acceptable and creates minimal delays.
40%-60% occupancy creates conflicts that may sub-optimize berthing availability and vessel utilization, creating operational inefficiencies.
60%-80% occupancy customary results in periodic conflicts and delays, reflecting subpar optimization
80% and higher occupancy results in regular conflicts and consistent delays.

PIER 1 (Barge Basin) Length 255 ft.	Port Calls		Berth Days	Average Port Call (hours)	Available Berth Foot Days (BFD) 93,075	Percentage Berth Utilization (BFD)	Percentage of Vessel Port Call by Used BFD
Vessel Type	Inter-Island	Overseas			Used BFD		
Fuel Barges (LPG)	50	0	32.5	15.6 hrs.	10,628.7	11.42 %	76.87 %
Tugs/Workboats	123	0	21.1	4.1 hrs.	3,150.1	3.38 %	22.78 %
Other Vessels	1	0	0.2	3.7 hrs.	47.9	0.05 %	0.35 %
TOTAL	174	0	53.8		13,826.7	14.85 %	100 %

Finger Pier (Tug/Ferry) Length 300 ft.	Port Calls		Berth Days	Average Port Call (hours)	Available Berth Foot Days (BFD) 109,500	Percentage Berth Utilization (BFD)	Percentage of Vessel Port Call by Used BFD
Vessel Type	Inter-Island	Overseas			Used BFD		
Tugs/Workboats	166	0	246.4	35.6 hrs.	34,988.6	32.0 %	50.13 %
Excursion Vessels#	1,332	0	339.4	6.1 hrs.	33,365.1	30.5 %	47.81 %
Launch Vessels	15	0	14.5	23.2 hrs.	1,406.7	1.3%	2.02 %
Fishing Vessels	2	0	0.2	2.8 hrs.	30.9	0.0 %	0.04 %
Gov't Vessels	1	0	0.0	0.3 hrs.	2.1	0.0 %	0.0 %
TOTAL	1,516	0	600.5		69,793.4	63.74 %	100 %

(#) Excursion Vessels engaged in Intra-Island activity)

PIER 5A Length 300 ft.	Port Calls		Berth Days	Average Port Call (hours)	Available Berth Foot Days (BFD) 109,500	Percentage Berth Utilization (BFD)	Percentage of Vessel Port Call by Used BFD
Vessel Type	Inter-Island	Overseas			Used BFD		
Freight Barges	0	18	27.1	36.1 hrs.	12,937.7	11.8 %	35.71 %
Fuel Tank Ships *	0	10	30.1	72.2 hrs.	12,866.9	11.8 %	35.52 %
Fuel Barges *	10	0	14.8	35.5 hrs.	5,430.0	5.0 %	14.99 %
Tugs/Workboats	197	36	43.3	4.5 hrs.	4,641.5	4.2 %	12.81 %
Dry Barges *	3	0	1.9	15.2 hrs.	307.6	0.3 %	0.85 %
Other Vessels	6	0	0.2	0.8 hrs.	42.5	0.0 %	0.12 %
TOTAL	216	64	117.4		36,226.2	33.08 %	100 %

(*) Fleeting-nesting of Vessels idle, lay-berth status)

PIER 5 Length 800 ft.	Port Calls		Berth Days	Average Port Call (hours)	Available Berth Foot Days (BFD) 292,000	Percentage Berth Utilization (BFD)	Percentage of Vessel Port Call by Used BFD
Vessel Type	Inter-Island	Overseas			Used BFD		
Fuel Barges	149	2	132.1	21.1 hrs.	57,632.2	19.8 %	41.86 %
Fuel Tank Ships	0	36	63.7	42.5 hrs.	40,384.6	13.8 %	29.33 %
Tugs/Workboats	397	2	239.9	14.4 hrs.	37,101.0	12.7 %	26.95 %
Dry Bulk Ships	0	2	1.9	22.2 hrs.	1,721.1	0.6 %	1.25 %
Ro/Ro Ships	0	1	0.4	10.5 hrs.	374.5	0.1 %	0.27 %
Dry Barges	1	0	1.6	38.4 hrs.	211.1	0.1 %	0.15 %
Other Vessels	26	0	2.6	2.4 hrs.	253.4	0.1 %	0.18 %
TOTAL	573	43	442.2		137,677.9	47.15 %	100 %

PIER 6 Length 800 ft.	Port Calls		Berth Days	Average Port Call (hours)	Available Berth Foot Days (BFD) 292,000	Percentage Berth Utilization (BFD)	Percentage of Vessel Port Call by Used BFD
Vessel Type	Inter-Island	Overseas			Used BFD		
Dry Bulk Ships	0	17	94.5	133.4 hrs.	88,342.7	30.3 %	**63.65 %**
Fuel Barges	56	1	45	19.2 hrs.	19,385.3	6.6 %	**13.97 %**
Tugs/Workboats	220	1	93.4	10.1 hrs.	14,260.3	4.9 %	**10.27 %**
Fuel Tank Ships	0	9	18.7	49.87 hrs.	7,984.9	2.7 %	**5.75 %**
General Cargo Ships	0	2	6.8	81.8 hrs.	5,050.0	1.7 %	**3.64 %**
Ro/Ro Ships	0	2	3.7	44.0 hrs.	3,129.2	1.1 %	**2.25 %**
Non-Fuel Tank Ships	0	1	1.1	26.4 hrs.	479.2	0.0 %	**0.35 %**
Dry Barges	2	0	0.4	5.0 hrs.	159.1	0.1 %	**0.11 %**
TOTAL	**278**	**33**	**263.6**		**138,790.7**	**47.53 %**	**100 %**

PIER 7 Length 800 ft.	Port Calls		Berth Days	Average Port Call (hours)	Available Berth Foot Days (BFD) 292,000	Percentage Berth Utilization (BFD)	Percentage of Vessel Port Call by Used BFD
Vessel Type	Inter-Island	Overseas			Used BFD		
Cement Barge #	65	0	248.7	91.8 hrs.	70,623.9	24.2 %	**44.14 %**
Dry Bulk Ships	0	11	74.7	162.9 hrs.	59,588.5	20.4 %	**37.24 %**
Fuel Tank Ships	0	4	24.7	147.8 hrs.	16,786.7	5.7 %	**10.49 %**
Tugs/Workboats	194	1	49.9	6.1 hrs.	7,288.4	2.5 %	**4.56 %**
Non-Fuel Tank Ships	0	1	3.1	74.4 hrs.	2,513.5	0.9 %	**1.57 %**
Fuel Barges *	5	0	4.5	21.98 hrs.	1,793.0	0.6 %	**1.12 %**
Gov't Vessels	0	1	2.8	166.6 hrs.	888.9	0.3 %	**0.56 %**
Other Barges *	3	0	5.0	39.9 hrs.	518.0	0.2 %	**0.32 %**
TOTAL	**267**	**18**	**413.4**		**160,000.9**	**54.79 %**	**100 %**

(*) Fleeting-nesting of Vessels, idle lay-berth status

(#) Dedicated Inter-Island Cement Barge

PIER 8 (Area) Length – n/a	Port Calls		Berth Days	Average Port Call (hours)	Available Berth Foot Days (BFD) n/a	Percentage Berth Utilization (Year)	Percentage of Vessel Port Call by Used BFD
Vessel Type	Inter-Island	Overseas			Used BFD		
Tugs/Workboats	13	0	80.2	148.1 hrs.	7,784.4	21.97 %	**52.63 %**
Other Barges	1	0	40.0	961.0 hrs.	7,007.8	10.96 %	**47.37 %**
TOTAL	**14**	**0**	**120.2**		**14,792.2**	**32.93 %**	**100 %**

PIER 9 (Area) (Floating Dry-Dock) Length 380 ft. (Marisco Area)	Port Calls		Berth Days	Average Port Call (hours)	Available Berth Foot Days (BFD) 138,700	Percentage Berth Utilization (BFD)	Percentage of Vessel Port Call by Used BFD
Vessel Type	Inter-Island	Overseas			Used BFD		
Barges	3	0	6.2	529.5 hrs.	19,398.5	14.0 %	**65.03 %**
Excursion Vessels	32	0	36.0	27.0 hrs.	6,574.2	4.7 %	**22.04 %**
Tugs/Workboats	13	0	15.5	28.6 hrs.	2,016.4	1.5 %	**6.76 %**
Other Vessels	1	0	7.7	183.7 hrs.	1,545.9	1.1 %	**5.15 %**
Gov't Vessels	1	0	2.1	49.4 hrs.	277.6	0.2 %	**0.93 %**
Fishing Vessels	1	0	0.1	3.0 hrs.	16.6	0.0 %	**0.06 %**
TOTAL	**51**	**0**	**67.6**		**29,829.2**	**21.51 %**	**100 %**

Appendix C
Marine Reconnaissance Survey
(Marine Research Consultants, Inc.)

FINAL REPORT

AN ASSESSMENT OF MARINE BIOLOGICAL COMMUNITY STRUCTURE AND WATER CHEMISTRY IN THE VICINITY OF THE PROPOSED FUEL PIER, DOT KALAELOA BARBERS POINT COMMERCIAL HARBOR, HONOULIULI, EWA DISTRICT, OAHU, HAWAI'I

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Revised

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EXECUTIVE SUMMARY

As part of the *Statewide Fuel Facilities Development Plan* (FFDP), the State of Hawaii, Department of Transportation (DOT), Harbors Division (DOT-H) is proposing to build new fueling facilities at Kalaeloa Barbers Point Harbor on the southwestern corner of the Island of Oahu (Figure 1). The FFDP recommends development of a dedicated fuel pier at Piers 3 and 4 to accommodate various types of fuel anticipated to serve the island's utilities into the future. The proposed improvements will require permitting from the United States Army Corps of Engineers (USACE). An environmental document will be prepared to fulfill compliance with State of Hawaii environmental law (Chapter 343).

Several alternative plans for the fuel pier are under consideration. Alternative A consists of a protruding segmented pier configuration, with pier structures located approximately 60-65 feet off the pier face. Alternative B is a pile-supported full length platform open wharf structure that would have less impact on marine resources (i.e., coral) and water quality than construction of a solid wharf structure. Alternative Design C is a solid-type berthing structure, consisting of a tied-back bulkhead wharf design. All three of these alternatives may require some dredging, pile-driving and back-filling in the area that presently consists of the Harbor edge of Piers 3 and 4. Hence, it is likely that all three choices will result in the elimination of at least some if not all of the existing marine habitats of the area, either through direct removal or shading by overhead structures.

This report presents a detailed qualitative and quantitative assessment of the existing conditions within the areas proposed for re-development that provide the requisite data for the HRS Chapter 343 EIS requirement for the project. The ultimate use of this information is for the Clean Water Act (CWA) Section 404 Permit. While all biota were evaluated, particular attention was given to quantitatively assessing the composition of reef corals owing to the protected status as dictated in Executive Order 13089. As corals and coral reefs will require the most rigorous mitigative strategies of all taxonomic groups, a thorough understanding of the composition of coral resources provides important information that will be required for further phases of the planning process.

Methods employed in the assessment follow to the extent possible the techniques set out in the "Draft Planning Aid Report-Marine Biological Survey Protocols" (DPAR) prepared for the USACE by the US Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS). To minimize uncertainty of extrapolating partial coverage data to the entire area of concern, the field effort included examination of the entirety of the vertical surfaces within survey boundaries. To execute the field program, the area of Kalaeloa Barbers Point Harbor under study was divided into five sectors, designated by letters A-E. These divisions were based primarily on boundaries of shoreline structures. The area of Piers 3 and 4 where the proposed fuel facility will be located was further divided into five sub-sectors. In-water surveys were carried out during the period of January 14-21, 2014.

Quantitative *in-situ* evaluation of stony corals was accomplished by measuring the length of the longest axis in centimeters of every coral colony resulting in a complete census of the coral community. This method was carried out using a PVC rod marked to designate the boundaries of eight size-classes (<2 centimeters (cm), >2≤5 cm, >5≤10 cm, >10≤20 cm,

>20≤40 cm, >40≤80 cm, >80≤160 cm, and >160 cm). At each location where corals were observed, a global positioning system waypoint was recorded using a waterproofed device. The resulting data allowed for the production of maps showing the exact locations of corals.

During survey swims along the length of survey sector, all observed non-cryptic invertebrates and algae were identified to the lowest taxonomic level, and estimates of abundance were recorded. Numerical abundance of fish by species (or lowest possible taxonomic level) as well as body length were recorded during swims spanning the length of each survey sector.

All of the physical structures within the survey area can be considered "non-natural" in that they were created during the excavation of the Harbor from solid lands. Surfaces that are potentially settleable by marine species include dredged shorelines and channel slopes, and the structural composition of piers and pilings. The survey area is composed of three distinct forms; 1) banks of large basaltic boulders that shore up the banks of the makai sides of the peninsula that was created during the excavation of the Harbor basin; 2) excavated shorelines along the inner, mauka side of the Peninsula that form Piers 3 and 4, and 3) steeply sloping channel wall surfaces that extends to the mud/silt channel floor. A characteristic of all of these areas is a ubiquitous coating of fine-grained silty sediment over all non-living surfaces.

Quantitative evaluation of the coral community yielded a total count of 505 coral colonies with Sector counts ranging from a low of 10 to a high of 227. One hundred and nine (109) corals were counted in the Sector which comprises the area within the footprint of the proposed fuel pier. Total counts in individual size-classes ranged from a low of 1 (>160 cm) to a high of 173 (>20≤40 cm). Within the project footprint 86% of the observed colonies had long diameters smaller than 20 cm.

Seven species of coral were encountered over the course of the survey. The number of coral species encountered within sectors ranged from 3 to 5 (Sectors B and D). When all sectors are pooled, *Porites lobata* accounted for the most colonies (240), followed by *Pocillopora meandrina* (137). These two species account for about 75% of the total observed colonies, and were the only coral species to occur in every survey sector. The third and fourth most abundant corals were *Montipora capitata* and *M. patula*. These two species are somewhat unique in that they occupy many harbor environments in Hawaii as growth forms of thin overlapping plates growing on vertical pilings. No such large overlapping coral colonies were observed anywhere in Kalaeloa Barbers Point Harbor although vertical surfaces were abundant. The lack of such typical growth forms of *Montipora* suggests that water quality conditions in Kalaeloa Barbers Point Harbor are degraded even relative to most other Harbors in Hawaii. Quantification of size-classes of all individual colonies provide a comprehensive depiction of coral community structure within the hard substratum areas of Kalaeloa Barbers Point Harbor Basin where re-development activities are planned. No coral bleaching or diseases were noted during the course of the survey.

The vertical surfaces comprising the inner walls and piers of Kalaeloa Barbers Point Harbor are characterized by typical Harbor fouling communities consisting of sponges, tunicates, bivalves and bryozoans. Twenty-six species of invertebrates were identified in surveys, including 10 sponges, 2 tunicates, 2 bryozoans, 4 annelids, 2 mollusks, 3 echinoderms, and 2 arthropods. Of these species, 8 are identified as Introduced species. The most abundant invertebrate community consisted of expansive mats of *Chaetopterus* sp., a worm which is often found in harbor settings. In contrast to invertebrates, which occurred throughout the area of study, frondose algae were nearly absent at all survey locations. Surveys of other large harbors in Hawaii (e.g., Honolulu Harbor) also reveal that these areas do not contain abundant algal communities.

A total of 935 fish were counted, comprised of 42 species. Overall, numbers of fish observed were highest in sectors nearest to the entrance channel. Regulated species (as listed by State of Hawaii Division of Aquatic Resources [DAR]) observed during the Kalaeloa Barbers Point Harbor surveys consisted of several fish, including a school of aholehole (*Kuhlia xenura*), and parrotfish (*Scarus psittacus*). With regard to invertebrates, the only DAR regulated species observed were a single octopus (*Octopus cyanea*). It is possible that burrows noted within the sediment floor of the basin may be from shrimp (`opae); however, no individuals were observed.

No endangered or protected species as recognized by the Federal and State of Hawaii Agencies were observed during surveys. Data on turtle strandings collected by NOAA PIFSC from 1982-2014 list thirteen strandings of turtles in Kalaeloa Barbers Point Harbor as a result of line entanglement, boat impacts or other unknown sources. These standings within the Harbor account for 13% of strandings in the entire Kalaeloa and surrounding area, and 2.7% of 6,829 strandings in the Hawaiian Islands. Hence, while turtles do occur in Harbor waters, it does not appear to be a preferred habitat.

No monk seals were observed in the Harbor during three aerial surveys of the Island of Oahu conducted by NOAA-PIFSC in 2000, 2001 and 2008. A single seal was reported multiple times in the Harbor in 2013 that was likely recovering from an injury. As with sea turtles, while seals have been observed in the Harbor, it does not appear that the area is a preferred habitat.

An assessment of water chemistry in Kalaeloa Barbers Point Harbor revealed several patterns. First, there is a definite input of fresh water, likely as groundwater discharge through the sides of the Harbor walls that results in slight depression of salinity throughout the Harbor Basin. The lack of distinct vertical or horizontal gradients, however, indicates that freshwater input is relatively small and well mixed with respect to the residence time of water within the Harbor basin. While groundwater generally contains higher concentrations of inorganic plant nutrients (particularly nitrate nitrogen [NO_3^-] and phosphate phosphorus [PO_4^{3-}]), the concentrations of these constituents is not substantially elevated in Harbor waters. However, the concentrations of ammonium nitrogen (NH_4^+), which is the form of nitrogen that is not generally elevated in groundwater, but is a by-product of biotic metabolism is elevated throughout the Harbor, as are the concentrations of Chlorophyll *a*. These results indicate that there is a relatively long residence time of water within the Harbor basin which is sufficient to allow uptake of inorganic nutrients by plankton

populations. As a result, the elevated populations of phytoplankton, as well as input of inorganic particulates, such as dust deposited from wind transport and soil from storm drainage, result in high turbidity of Harbor waters.

Preliminary analyses of sediments within the project footprint revealed the presence of oil and grease, Total Recoverable Petroleum Hydrocarbons (TRPH) and a variety of metals, particularly copper, chromium, lead, nickel and zinc. Mercury was present at all three sites at concentrations of 0.029 to 0.036 mg/kg, close to the reporting limits of 0.030 to 0.0397 mg/kg (Table 14). No organotin compounds or organochloride pesticides were detected.

Of the semivolative organic compounds, of the eleven that were detected above the reporting limit, the highest values occurred for dimethyl phthalate which was present at all three sites at concentrations ranging from 110 to 210 µg/kg. Dimethyl phthalate has many uses, including solid rocket propellants, plastics and insect repellants but the source in the sediments of Barbers Point in not readily apparent. Analyses of sediment particle size composition indicated that the predominant materials at all three sites were silt and clays which accounted for between 85% and 100% of sediment.

In conclusion, results of the assessment of the marine environment at the site of the proposed fueling facility at Piers 3 and 4 reveal a biotic community of relatively limited extent both in terms of numbers and diversity of organisms compared to other Harbor settings in Hawaii. Such limitation is likely the result of high levels of suspended and settled sediment which covers most surfaces. While not documented in this study, it is likely that repeated resuspension and subsequent resettlement of fine-grained sediment caused by prop-wash of large ships entering and exiting the Harbor results in conditions that are not suitable for development of extensive coral communities. Owing to the limited size of the coral community, these individuals do not likely provide a significant functional service to reef integrity of areas outside the Harbor where coral resources are far more abundant and diverse. While protected marine species have been observed occasionally within the Harbor, there are no indications that the area is a preferred habitat. As such, the area does not likely contain the potential for impacts to protected marine species or regulated species as long as best management practices are followed. Mitigation plans could also provide for minimal net loss of coral reef resources.

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I. BACKGROUND and PROPOSED ACTION

As part of the *Statewide Fuel Facilities Development Plan* (FFDP), the State of Hawai'i, Department of Transportation (DOT), Harbors Division (DOT-H) is proposing to build new fueling facilities at Kalaeloa Barbers Point Harbor on the southwestern corner of the Island of Hawaii (Figure 1). The FFDP recommends development of a dedicated fuel pier at Piers 3 and 4 to accommodate various types of fuel and feedstock anticipated to serve the island's utilities into the future. The proposed improvements will require permitting from the United States Army Corps of Engineers (USACE). An environmental document will be prepared to fulfill compliance with both State of Hawaii environmental law (Chapter 343).



FIGURE 1. Aerial view of Kalaeloa Barbers Point Deep Draft Harbor showing location of proposed fuel pier (in red rectangle) at Piers 3 and 4.

Several alternative plans for the fuel pier are under consideration. Alternative A consists of a protruding segmented pier configuration, with pier structures located approximately 60-65 feet of the existing pier face. The segmented piers are composed of a series of pile-supported fuel transfer platforms and breasting dolphins. The fuel vessels will rest against breasting dolphins while fuel transfer is carried out. The forward side of the fuel transfer platform is placed back from the breasting line so that fuel barges or the tanker actually do not touch the fuel transfer platform. Several bollards will be located on land and on the breasting dolphins for secured berthing. Catwalks will be located between each breasting dolphin and shore-side for access, with a gangway landing suspended between two breasting dolphins at Berth 1 (Pier 3). The fuel transfer platform will provide shore-side access for a maintenance truck. Positioning of fuel barges or tankers will occur so that onboard fuel pipelines located amidships would be within reach of the fuel hoses for fuel transfer operations.

Alternative B is a pile-supported full length platform open wharf structure that would have less impact on marine resources (coral) and water quality than construction of a solid wharf structure. A common type of platform wharf structure consists of concrete slabs spanning between concrete (cap) beams that are supported by precast, pre-stressed concrete piles driven into the harbor floor. This alternative provides for a continuous, full length concrete platform, equipped with mooring bollards and berthing fenders and other appurtenances and features required to service and support the berthed vessels.

Alternative Design C is a solid-type berthing structure, consisting of a tied-back bulkhead wharf design. For this type of design, interconnected steel sheet piling is used to provide a solid, vertical bulkhead behind which backfill is placed to form a contiguous yard area. The sheet pile bulkhead consists of steel or concrete sheet piling with interlocking tongue and groove joints and a "cap" of steel or concrete construction. The sheet pile bulkhead is restrained from outward movement (due to lateral earth pressures) by installing below the top of the bulkhead an anchorage system usually consisting of steel anchor rods and concrete deadman anchors. A continuous bulkhead may require more significant dredging. In addition, the substrate is hard coral and driving sheet piling may be prohibitive.

All three of these alternatives may require some dredging, pile-driving or back-filling in the area that presently consists of the Harbor edge of Piers 3 and 4. Hence, it is likely that all three choices will result in the elimination of at least some if not all of the existing marine habitats, either through direct removal or shading by overhead structures.

The Environmental Impact Statement will evaluate direct impacts associated with the proposed action and its alternative actions, as well as indirect and cumulative impacts associated with the construction and long-term operation of the project. One aspect of the EIS will be a description of the marine environmental setting of the existing area. This document presents the results of field surveys of the areas of the Kalaeloa Barbers Point Harbor that may be affected by construction of the new fuel pier. The purpose of the surveys is to gain an initial overall qualitative and quantitative understanding of the biotic communities inhabiting the areas of concern. Two overall aspects of the marine environment were investigated: 1) composition of biotic community structure within the

submerged areas that are likely to be affected by construction of the fueling facility, and 2) water and sediment chemistry within the Harbor Basin and entrance channel. While all biota were evaluated, particular attention was given to quantitatively assessing the composition of reef corals owing to the protected status as dictated in Executive Order 13089. As corals and coral reefs will require the most rigorous mitigative strategies of all taxonomic groups, a thorough understanding of the composition of coral resources provides important information that will be required for further phases of the planning process.

This report presents a detailed qualitative and quantitative assessment of the existing conditions within the areas proposed for re-development that provide the requisite data for the HRS Chapter 343 EIS requirement for the project. The ultimate use of this information is for the Clean Water Act (CWA) Section 404 Permit from the USACE.

II. METHODS

A. ASSESSMENT PLAN

Methods employed in the present assessment follow to the extent possible the techniques set out in the "Draft Planning Aid Report-Marine Biological Survey Protocols" (DPAR) prepared for the USACE by the US Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS). A document entitled "Marine Environmental Assessment Plan, Kalaeloa Barbers Point Harbor Fuel Pier, Hawaii" was prepared in December 2013 and submitted to all relevant Agencies for review. All Reviewer comments were incorporated into the methods described below which are replicated from the Assessment Plan.

B. ASSESSMENT OF MARINE BIOTA

1. Sampling Site Selection

Preliminary assessment of benthic (bottom dwelling) and fish community structure was evaluated by diver-investigators swimming the entire length of the piers and jetties within the survey scope area during a reconnaissance survey conducted on June 6, 2013. From these preliminary surveys, the area of Kalaeloa Barbers Point Harbor under investigation for the fuel pier project was divided into five sectors (A-E) (Figure 2). Sector A consists of the inner, or southern wall of the Barge Basin (Pier 1); Sector B consists of the makai western face of the boulder jetty enclosing the Barge Basin; Sector C includes the outer face of the boulder jetty; Sector D includes the mauka eastern face of the pier extending through the Marisco Facility and terminating at the southern corner of the Harbor (Piers 3, 4 and Tug Pier); and Sector E consists of the innermost section of the main pier area of the Harbor (Pier 5). As Sector D is the main area of concern regarding impacts associated with the proposed fuel pier, it is further divided into five sub-sectors (D-1 – D-5). Sector B was also subdivided into three sub-sectors (Figure 2). The central area of sector D was inaccessible owing to berthed ships that prevented safe access to the area.

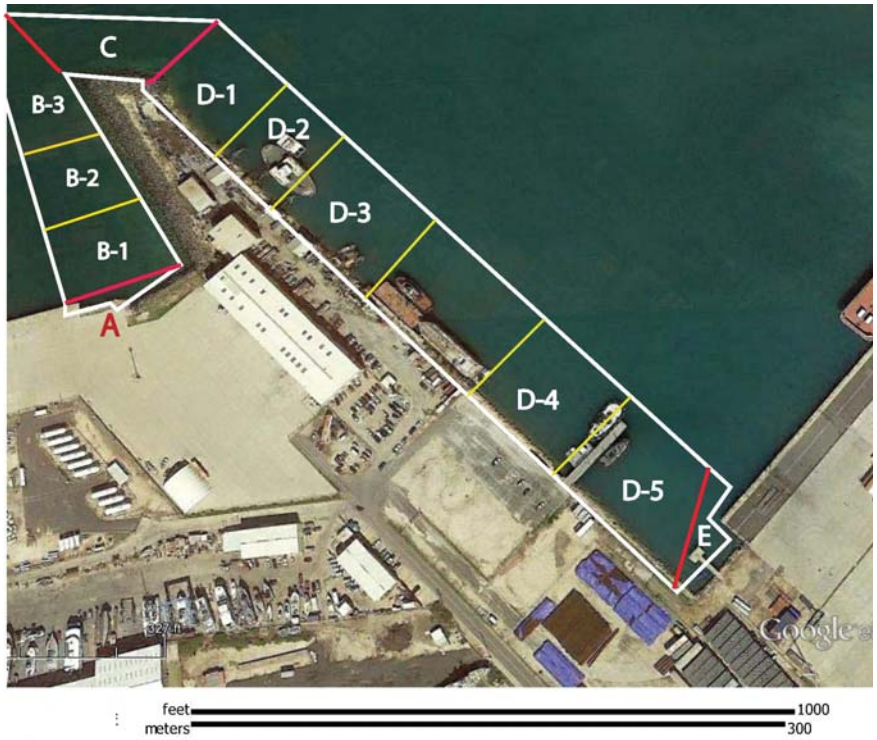

FIGURE 2. Aerial photograph showing section of Kalaeloa Barbers Point Harbor where a new fuel pier is proposed for construction. White line depicts boundaries of marine biota surveys, which includes all area within the Federal Project line. Survey area is divided into four sectors (A-E) based on geographic setting. Sector D is further divided into 5 sub-sectors.

Results of the reconnaissance survey indicated that benthic community structure is relatively sparse within the area of the project boundaries. Thus, it is considered feasible to quantitatively evaluate biotic composition of the entirety of the survey area within each of the sectors described above rather than survey only randomized or stratified sub-sets of the community. Evaluating the entire community provides a significant advantage by eliminating the inevitable uncertainty associated with relying on statistical extrapolation of sub-sets to estimate total community structure. By eliminating the need to rely on statistical extrapolation, the degree of uncertainty with respect to entire community attributes is decreased substantially, thus allowing for far higher precision in estimating environmental impact and/or mitigation obligations.

2. In-situ Survey Methods

In-water surveys were carried out during the period of January 14-16, 2014 by a team of four people diving from a 21-foot boat using SCUBA gear. Dr. Steven Dollar supervised all field operations, assisted by Laura Birse, Andrea Messer and Stephen Matadobra. Weather conditions throughout the survey interval consisted of strong tradewinds and large north swells.

For evaluation of each sector, the boat was positioned at one end of the sector, and the investigator tasked with enumerating fish entered the water and swam along the pier face or reef shelf toward the distal end of the sector, recording number of individuals and body length. Substantial suspended particulate material throughout much of the survey area limited visibility to a distance of approximately 2-4 meters. Such limited sight paths likely resulted in an unavoidable underestimate of fish. After allowing a sufficient time to prevent scattering of fish, one investigator entered the water to conduct evaluation of non-coral invertebrates. Directly after, two other investigators entered to conduct quantitative surveys of coral colony abundance. One of the investigators conducting the coral surveys carried a rod marked at intervals with each of the size-class boundaries. The other coral investigator carried an underwater writing slate and camera. At each site where corals occurred a waypoint was recorded using a hand-held Global Positioning System (GPS) device. The resulting data set includes all coral colonies at each GPS waypoint.

3. Coral Community Survey Metrics

a. Coral Colony Abundance and Size

Enumeration (censusing) of all coral colonies by species (or lowest possible taxonomic level) was measured *in-situ*. All areas within designated survey boundaries were visually assessed, and all corals within the area were evaluated, resulting in a complete census of the survey region. The planned exception to this method was to take place in Sector B, where the identified extensive coral community inhabiting the boulder jetties was to be assessed using random belt transects. However, during the period of fieldwork in January 2014 large north swells were impacting the north and west facing shorelines. As a result extreme surge occurred at the wave exposed area of Sector B, making placement of transect lines and quadrats impossible. Owing to the extreme surge, an alternate belt transect method was used that did not require the placement of transect equipment on the bottom. Rather, the "transect" was defined as the area approximately 2-3 m wide that extended the length of the sector. The width of the belt extended from the upper exposed surface of the boulders to the deepest extension of boulders terminating at the sand floor of the harbor. This area included the region of highest coral cover, but did not constitute a complete census, as many corals occurred in interstitial spaces between boulders. Owing to the extreme surge, accessing these coral between boulders would have presented a difficult and dangerous procedure.

Quantitative *in-situ* evaluation of stony corals was accomplished by measuring the length of the longest axis in centimeters of each coral colony. This method involved using a PVC rod marked with colored tape to designate the boundaries of eight size-classes (<2 cm, >2≤5 cm, >5≤10 cm, >10≤20 cm, >20≤40 cm, >40≤80 cm, >80 ≤ 160 cm and >160 cm). Measurements were made by one diver holding the rod over the longest axis of each colony, while another diver recorded the species and size-class. In cases where the colony boundary fell on the boundary line between classes, the larger class was recorded. In cases where multiple colonies appeared to have coalesced into a single amalgamated colony with no distinct margin, the amalgamated structure was considered a single colony. In cases where large colonies had experienced partial mortality creating bare areas between living tissue, the investigator determined by best judgment if the remaining living tissue was the remnants of the single older colony, or from recent settlement of multiple new colonies on the bared limestone substratum. Working in a team fashion to record size-class data proved to be an efficient method for rapid, yet thorough documentation of the whole survey area.

b. Morphological Growth Form and Evidence of Stress

Colonies were classed into growth form categories (e.g., branching, encrusting, lobate and plating). Also noted were visible signs of disease, sediment stress, bleaching, or necrotic tissue. Fragmentation was not notable owing to growth primarily on vertical or sloping surfaces which did not retain fragments.

c. Photographic Characterization and Location of Coral Colonies.

Most coral colonies observed in Sector D were photographically documented, and located using hand-held GPS. Such a photographic data base provides a permanent visual record of the individual coral colonies and habitats that can be re-visited for subsequent analyses, and is particularly useful for evaluating changes in specific areas over time. The photographic record will also be of value for characterizing practicality of relocating corals that are deemed to be within the project footprint.

d. Data Analysis

Following tabulation of all colonies by size-class per sector, biodiversity indices of community structure were calculated. These include Species Richness, which is the number of species, and the Shannon-Weiner Diversity Index (H') which takes into account relative abundance of species and includes both species richness and evenness. Communities with a large number of species that are evenly distributed are the most diverse and communities with few species that are dominated by one species are the least diverse. The Shannon-Weiner index is defined as:

$$H' = -\sum[(n_i/N) \times \ln(n_i/N)]$$

where n_i=number of colonies of species I, N = total number of colonies, and ln = natural log.

e. Rugosity

Rugosity is a measure of 3-dimensional structure defined as the ratio of chord length to surface contour length. Three replicate measurements of rugosity were acquired within each survey sector in the area of maximum coral abundance that did not consist of vertical surfaces. Rugosity measurement was conducted by pulling a 10-meter measuring tape taught across the harbor bottom. A brass chain of the same length was then laid over the bottom following bottom contours. The distance along the tape where the draped chain ended was recorded. The ratio of taut tape (10 m) to draped chain served as the index of rugosity (for example, if the draped chain extended to the 5 m mark, the index of rugosity was 2; if the chain extended to the 8 m mark, rugosity was 1.25)

4. Macro-invertebrate Community Metrics

As is typical in most Harbors in Hawaii, sessile macro-benthos such as sponges, mollusks, bryozoans and hydroids occurred on virtually all submerged surfaces. During survey swims, all observed invertebrates inhabiting the area were identified to the lowest taxonomic level, and estimates of abundance were recorded. Following investigation of each sector each observed species was assigned an abundance class of RARE (less than 10 individuals or colonies observed), COMMON (~10-50 individuals or colonies observed) and ABUNDANT (greater than 50 individuals or colonies observed). As many of the common fouling community invertebrates exist in very high abundance throughout the Harbor, and many do not have discrete individual or colonial growth forms, the classification into abundance classes rather than exact numerical estimates provides an adequate database for evaluation of community structure.

5. Algae Community Metrics

In contrast to benthic invertebrates, the results of the preliminary baseline survey indicated that algae are not an abundant colonizer of the vertical structures comprising the subject area. As a result, algal transect-quadrat surveys were not deemed necessary. In the few instances where algae was observed, species were noted as part of the coral and invertebrate assessments.

6. Fish Community Metrics

a. Fish abundance

Numerical abundance of individuals and diversity by species (or lowest possible taxonomic level) was evaluated by conducting modified transect counts at each sub-sector. Divers swam slowly in a zig-zag pattern throughout each sub-sector for a known period of time (time depending on length of sector) and enumerated all fish within the range of visibility. Fish enumeration took place prior to any other diving activity in order to minimize

scattering. No effort was made to enumerate fish under submerged areas of pier structures that are not visible from outside the piers.

b. Fish Length

Estimates of overall length of fish were also recorded during transect swims. Based on fish abundance and size, regression statistics can be applied to estimate fish biomass (Schneider, et al. 2000). These data provide qualitative (species lists) and quantitative (abundance and biomass) data on the primary vertebrate organisms in the area.

7. Incidental Sightings of Threatened and Endangered Species (Marine Mammals and Reptiles)

Incidental sightings of protected and endangered marine mammals and reptiles would have been recorded, along with estimates of species, size, tumors, obvious injuries and any other distinguishing markings. The location of the observation would have been taken using a GPS unit. However, during the course of fieldwork, no marine mammals or turtles were observed.

8. Invasive Regulated and Invasive Species

Data collection included notation of regulated and introduced species (as delineated on DLNR DAR regulated species list), as well as candidate coral species for endangered species act (ESA) status.

C. PHYSICAL CHARACTERISTICS

At each survey site, physical characteristics were recorded including:

1. physical composition of substratum (e.g., sand, rubble, basalt, limestone)
2. thickness of depositional layers of sediment
3. water clarity (visibility)
4. presence of man-made debris, particularly hazardous materials
5. any other unusual or notable physical characteristics, particularly those relating to vessels or other harbor uses.

D. ASSESSMENT OF WATER CHEMISTRY

Assessment of water chemistry within the Kalaeloa Barbers Point Harbor and entrance channel was conducted on January 21, 2014. Water samples were collected at 12 stations located throughout the survey area, entrance channel, and interior of the Harbor in order to evaluate effects from discharge from the deep draft Harbor basin as it mixes with marine

waters (Figure 3). At each station, two samples were collected, one from within 10 cm of the air-water interface, and one within 50 cm of the harbor floor.



FIGURE 3. Locations of 12 water chemistry sampling stations in Kalaeloa Barbers Point Harbor and entrance channel. At each station, discrete samples were collected at the surface and near the harbor floor. Continuous profiles of salinity, temperature and dissolved oxygen through the water

Chemical composition of Harbor waters was evaluated by analysis of constituents specified by State of Hawaii, Department of Health water quality standards (Chapter 11-54 S11-54-06 (3)). Specific constituents that were evaluated include total nitrogen (TN), nitrate + nitrite nitrogen (NO_3^- + NO_2^-), ammonium (NH_4^+), total phosphorus (TP), dissolved silica (Si) and salinity. While not included in the DOH standards, several other constituents were assessed that provide important information. These constituents include dissolved silica (Si), orthophosphate phosphorus (PO_4^{3-}), dissolved inorganic nitrogen (DON), and dissolved inorganic phosphorus (DOP).

Water samples were collected from a small boat using a Niskin oceanographic sampling bottle. The bottle is lowered to the desired sampling depth with spring-loaded endcaps

held open so water can pass freely through the bottle. At the desired sampling depth, a weighted messenger released from the surface triggers closure of the endcaps, isolating a volume of water. Upon retrieval, water from the Niskin bottle was poured into 1-liter triple-rinsed polyethylene bottles.

Following collection, subsamples for nutrient analyses were immediately placed in 125-milliliter (ml) acid washed, triple rinsed, polyethylene bottles and stored on ice. Analyses for NH_4^+, PO_4^{3-}, and NO_3^- were performed with a Technicon autoanalyzer using standard methods for seawater analysis (Strickland and Parsons 1968, Grasshoff 1983). TN and TP were analyzed in a similar fashion following oxidative digestion. Total organic nitrogen (TON) and total organic phosphorus (TOP) were calculated as the difference between TN and dissolved inorganic N and TP and dissolved inorganic P, respectively.

Water for other analyses was subsampled from 1-liter polyethylene bottles and kept chilled until analysis. Chlorophyll *a* was measured by filtering enough water through glass fiber filters for color to be visible; pigments on filters were extracted in 90% acetone in the dark at 20° C for 12-24 hours. Fluorescence before and after acidification of the extract was measured with a Turner Designs fluorometer. Salinity was determined using an AGE Model 2100 laboratory salinometer with a readability of 0.0001‰ (ppt). TSS was measured gravimetrically on dried filtrate using a Cahn electrobalance. Turbidity was determined on 60 ml subsamples using a Monitek Model 21 nephelometer, and reported in nephelometric turbidity units (NTU).

In situ field measurements of water temperature, pH, dissolved oxygen and salinity were acquired using an RBR Model XR-620 CTD calibrated to factory specifications. The CTD has a readability of 0.001°C, 0.001pH units, 0.001% saturation, and 0.001 parts per thousand (salinity). All laboratory analyses were conducted by Marine Analytical Specialists in Honolulu, Hawaii. Marine Analytical Specialists possesses the acceptable rating from EPA-compliant proficiency and quality control testing.

EPA and Standard Methods (SM) methods that were employed for chemical analyses, as well as detection limits, are listed in the Code of Federal Regulations (CRF) Title 40, Chapter 1, Part 136, are as follows:

- NH_4^+ EPA 350.1, Rev. 2.0 or SM4500-NH3 G, detection limit 0.42 µg/L,
- $NO_3^- + NO_2^-$, EPA 353.2, Rev. 2.0 or SMSM4500-NO3, detection limit 0.56 µg/L,
- PO_4^{-3} EPA 365.1, Rev, 2.0 or SM4500-P F, detection limit 0.62 µg/L,
- TP EPA 365.1, Rev. 2.0 or SM4500-P E, detection limit 0.93 µg/L,
- TN SM 4500-N C., detection limit 1.4 µg/L,
- Si, SM 4500 SiO2 C, detection limit 7.0 µg/L.
- Chlorophyll *a*, SM 10200, detection limit 0.001 µg/L
- pH, EPA SM4500H+B, detection limit 0.001 pH units
- Turbidity, EPA 180.1, Rev. 2.0 or SM2130 B, detection limit 0.01 ntu
- Temperature, SM 2550 B, detection limit 0.01 degrees centigrade
- Salinity, SM 2520, detection limit 0.00 3ppt
- Dissolved Oxygen, SM4500 O G, detection limit 0.01% sat.

E. SEDIMENT CHEMISTRY SCREENING

In order to identify the presence of potentially toxic or constituents of concern in surface sediments off the proposed project site that would be of concern for planning of dredging and disposal of dredged material, a preliminary screening of sediment composition was conducted. The screening involved hand coring of sediments at three locations off of Sector C at sites identified by planners where dredging may be required (Figure 4). Sediment samples were shipped to Calsciences Environmental Laboratory in Los Angeles CA for analyses of constituents shown in Table 1. This list of constituents includes physical characteristics (e.g., Grain size distribution, specific gravity, percent total solids), metals, petroleum products, and a variety of pesticides and organic compounds. The list is taken from a report prepared in preparation for maintenance dredging of the Port of Long Beach, and contains all constituents required by the US EPA.



FIGURE 4. Locations of three sediment sampling sites in Kalaeloa Barbers Point Harbor off the proposed location of fuel pier.

Chemical Analyses of Sediment, Site Water, and Elutriate Samples

Analyte	Analysis Method	Sediment Target Detection Limits[a, b]	Site Water and Elutriate Target Detection Limits[b]
Percent/Total Solids	SM 2540B[c]	0.1%	N/A
Grain Size	ASTM D4464	0.1%	N/A
TSS	SM 2540D[c]	N/A	1.0 mg/L
Specific Gravity	ASTM D854	N/A	N/A
Atterberg Limits	ASTM D4318	N/A	N/A
Ammonia	SM 4500-NH3 B/C (M)[c] / USEPA 350.1	0.2 mg/kg	0.05 mg/L
Total and Soluble Sulfides	376.2M[c] / SM 4500 S2[c]	0.1 mg/kg	0.05 mg/L
TOC	9060A	0.05%	N/A
Oil and Grease	USEPA 413.2M	10 mg/kg	1.0 mg/L
Arsenic	6020[d] /1640	0.1 mg/kg	0.03 µg/L
Barium	6020[d] /1640	N/A	0.05 µg/L
Cadmium	6020[d] /1640	0.1 mg/kg	0.03 µg/L
Chromium	6020[d] /1640	0.1 mg/kg	0.20 µg/L
Copper	6020[d] /1640	0.1 mg/kg	0.03 µg/L
Lead	6020[d] /1640	0.1 mg/kg	0.03 µg/L
Mercury	7471A[d] / 1631E	0.02 mg/kg	0.50 ng/L
Nickel	6020[d] /1640	0.1 mg/kg	0.05 µg/L
Selenium	6020[d] /1640	0.1 mg/kg	0.05 µg/L
Silver	6020[d] /1640	0.1 mg/kg	0.05 µg/L
Zinc	6020[d] /1640	1.0 mg/kg	1.0 µg/L
TRPH	418.1M[e]	10 mg/kg	N/A
TPH Carbon Breakdown (C6–C44)	USEPA 8015B(M)	5.0 mg/kg	N/A
PAHs[g]	8270C SIM[d]	10 µg/kg	1.0 µg/L
Chlorinated Pesticides[f]	8081A[d]	1.0 – 20 µg/kg[d]	0.050 µg/L
PCB Congeners[h]	8270C SIM[d]	0.5 µg/kg	0.50 µg/L
Phenols	8270C SIM[d]	10 – 500 µg/kg	1.0 – 20 µg/L
Phthalates	8270C SIM[d]	10 µg/kg	5.0 µg/L
Organotins	Krone *et al.*[i]	3.0 µg/kg	3.0 ng/L

Notes:

a Sediment minimum detection limits are on a dry-weight basis.

b Reporting limits provided by Calscience.

c *Standard Methods for the Examination of Water and Wastewater*, 19th Edition American Public Health Association et al., 1995.

d USEPA, 1986–1996. SW-846. *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, 3rd Edition.

e Includes naphthalene, acenaphthylene, acenaphthene, fluorene, phenanthrene), fluoranthene, pyrene, benzo(a)anthracene, chrysene, benzo(b,k)fluoranthene, benzo(a)pyrene, indeno(1,2,3-c,d)pyrene, dibenzo(a,h)anthracene, benzo(g,h,i)perylene.

f Includes aldrin, □-BHC, □-BHC, □-BHC (lindane), □-BHC, chlordane, 2,4- and 4,4-DDD, 2,4- and 4,4-DDE, 2,4- and 4,4-DDT, dieldrin, endosulfan I and II, endosulfan sulfate, endrin, endrin aldehyde, heptachlor, heptachlor epoxide, and toxaphene.

g Except toxaphene, which is 1,000 µg/kg

h Polychlorinated biphenyls, sum of 41 congeners: 18, 28, 37, 44, 49, 52, 66, 70, 74, 77, 81, 87, 99, 101, 105, 110, 114, 118, 119, 123, 126, 128, 138, 149, 151, 153, 156, 157, 158, 167, 168, 169, 170, 177, 180, 183, 187, 189, 194, 201, and 206.

i Rice, C.D. et al., 1987, or similar (e.g. Krone et al., 1989)

µg/kg - micrograms per kilogram (parts per billion)
µg/L - micrograms per liter (parts per billion)
ASTM - American Society for Testing and Materials
mg/kg - milligrams per kilogram (parts per million)
mg/L - milligrams per liter (parts per million)
N/A - not applicable
ng/L - nanograms per liter (parts per trillion)

PAH - polycyclic aromatic hydrocarbon
PCB - polychlorinated biphenyl
TOC - total organic carbon
TPH - total petroleum hydrocarbon
TRPH - total recoverable petroleum hydrocarbon
TSS - Total Suspended Solids
USEPA - United States Environmental Protection Agency

TABLE 1. List of constituents for evaluation in representative samples of surface sediment collected off site of proposed fuel pier in Kalaeloa Barbers Point Deep Draft Harbor during water chemistry testing phase of marine assessments. List of constituents taken from "Sampling and Analysis Report, Port of Long Beach Phase I Maintenance Dredging" prepared by Anchor QEA, Mission Viejo California.

A. Physical Composition of Survey Sectors

1. Sector A.

As Kalaeloa Barbers Point Harbor was created by excavation of dry lands with a connection to the ocean, all of the physical structures within the survey area consist of either man-made materials (e.g., structural composition of piers and pilings), or natural resources that have been altered by human activity (e.g., dredged channel walls and shoreline shelves). Sector A consists of the eastern end of the Barge Basin Pier. The physical structure of the area consists of metal sheet piling along the pier face (Figure 5) and large boulders laid against the dredged shoreline from the edge of the Pier to the corner where the Barge Basin Pier intersects the corner of the jetty (Figure 6).

Coral abundance on the sheet piles is sparse and consists of isolated colonies of *Porites* spp., *Pocillopora* spp. and *Montipora* spp. None of these corals was larger than approximately 40 cm, with most being in the 20-30 cm range (Figure 5). On the boulders off the east terminus of the pier, coral colonies remain relatively sparse, although the size of colonies is larger, consisting primarily of flat or platy colonies of *Montipora* spp. (Figure 6). Of note is that colonies of *Montipora patula* occur in this area. *M. patula* is one of the species that was one of the 86 candidate species listed for possible regulation under the Endangered Species Act. The final listing issued in 2014, however, did not include any species that occur in Hawaii. *Montipora patula* has been observed as one of the most common coral colonizers in many harbors in Hawaii, as it appears to have ability to grow well on vertical surfaces such as pilings, and is able to tolerate the high levels of turbidity that prevail in most inland harbors throughout the State. In total, there were on the order of 50-75 coral colonies in Sector A, with less than 10 consisting of *M. patula*.

Non-coral invertebrates in this sector included several species of sea urchins (*Echinothrix diadema, Tripneustes gratilla*), primarily along the base of the boulder rampart. Reef fish were scarce in the area, and no stands of benthic algae were observed.



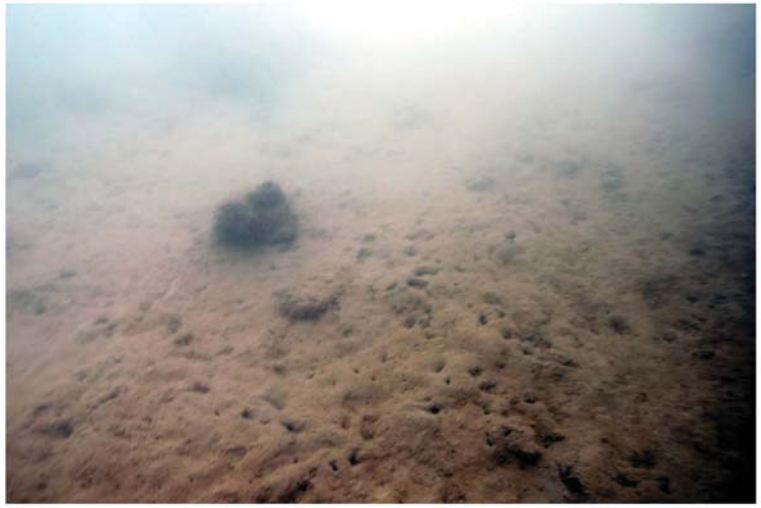

FIGURE 5. Sheet-piling forming side of Barge Basin in Sector A of Kalealoa Barbers Point Harbor. Small corals growing of sheet-piling are *Porites lobata* (upper right), *Pocillopora meandrina* (lower left), and *Montipora capitata* (lower center). Lower photo shows floor of Barge Basin consisting of fine-grained mud with numerous bore-hole openings. See Figure 2 for location of Sector A.





FIGURE 6. Excavated shoreline and boulder base forming side of Barge Basin in Sector A of Kalealoa Barbers Point Harbor. Encrusting corals growing of boulders in upper photo are *Montipora capitata* (left) and *Montipora patula* (right); while large colony of overlapping plates in bottom photo is *M. capitata*. *Montipora patula* is one of the candidate species for regulation under the Endangered Species Act. See Figure 2 for location of Sector A.

2. Sector B.

Sector B extends along the western side of the jetty/peninsula that separates the Barge Basin from the main basin of Kalaeloa Barbers Point Harbor. Owing to the length of the area of approximately 100 m, the sector was divided into three sub-sectors (B-1, B-2, B-3) (Figure 2). The submerged area of Sector B consists of large basalt boulders that have been placed in position to form a sloping jetty face.

The coral communities inhabiting the submerged boulders are the most abundant in the survey area. The proliferation of corals in this area is the result of very favorable settlement surfaces in the form of the boulders, as well as better water quality in terms of suspended and deposited sediment compared to the interior of the Kalaeloa Barbers Point main basin. However, with an orientation directly toward the mouth of the harbor leading to the open ocean, water motion in the area can be extremely high, particularly in the winter months. The present survey was conducted during such a period when a large north swell was impinging on the north and west facing shorelines. While waves were not breaking on the jetty face, there was a significant amount of surge. As a result, coral communities inhabiting the jetty consist of well-developed assemblages consisting of a relatively low diversity of species, primarily of the genera *Porites, Pocillopora* and *Montipora* that are able to settle and grow in areas of extreme water motion (Figures 7 and 8). Only several corals occurring on the boulders of Sector B contained patches of deposited sediment.

Non-coral invertebrates in this sector included numerous individuals of several species of sea urchins (*Echinothrix diadema, Tripneustes gratilla, Heterocentrotus mammilatus, Echinometra mathaei*), primarily within the interstitial spaces between the boulders. Reef fish were scarce in the area, and no stands of benthic algae were observed.

3. Sector C.

Sector C consists of the end of the boulder jetty facing the main entrance channel of Kalaeloa Barbers Point Harbor. Composition of the submerged area consists of boulders similar to Sector B. However, while the same coral species occurred on the boulders of Sector C as in Sector B, colonies were generally less abundant and of smaller size in Sector C.

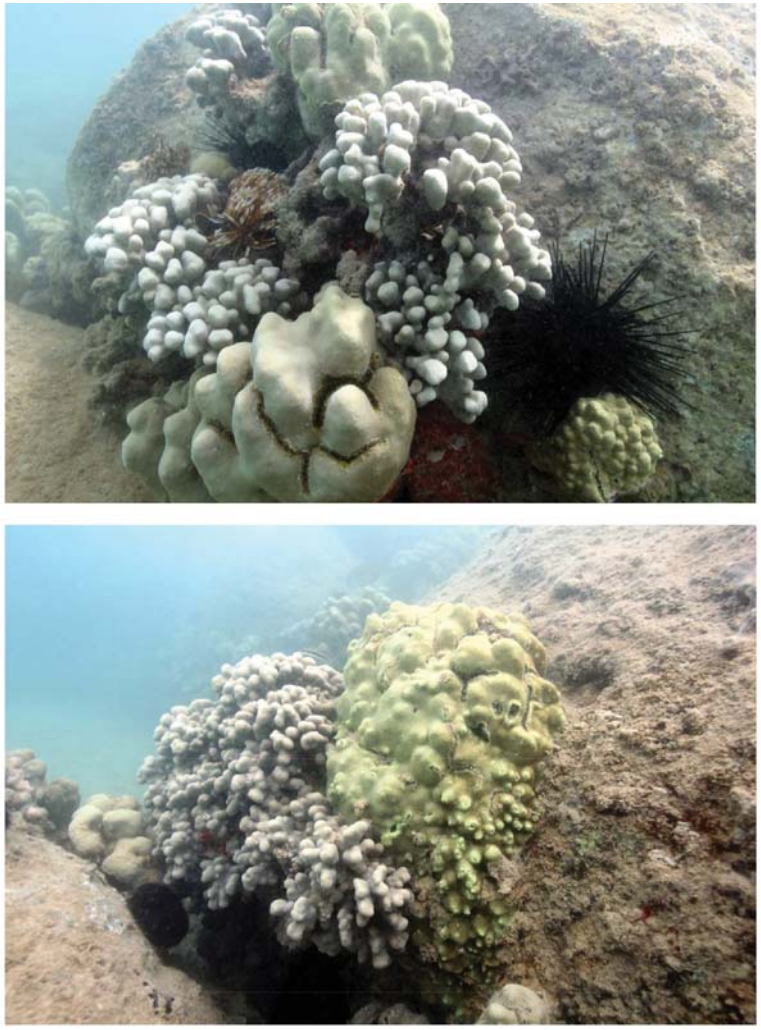

FIGURE 7. Surfaces of boulders forming submerged western margin of jetty enclosing Barge Basin designated as Sector B of Kalaeloa Barbers Point Harbor. Large corals in both photos are various species of *Porites*. See Figure 2 for location of Sector B.



FIGURE 8. Surfaces of boulders adjacent to Harbor floor forming submerged western margin of jetty enclosing Barge Basin designated as Sector B of Kalaeloa Barbers Point Harbor. Corals in upper photo are various species of *Porites*. Rust-colored encrusting coral on right side of lower photo is *Montipora patula*. See Figure 2 for location of Sector B.

4. Sector D.

Sector D consists of the northeastern side of the jetty separating the Barge Basin from the main harbor basin, and extends to the southern corner of the harbor. Sector D includes all of the berthing piers for the Marisco shipyard (Piers 3 and 4) as well as the Tug piers located south of Marisco (Figure 2). This area constitutes the main region of concern as it is the location of the proposed fuel pier. The entire 480 m-long sector is sub-divided into five sub-sectors (Figure 2). The underwater physical composition of the area consists of a near-vertical shoreline face dredged from solid limestone reefal material (Figure 9). The submerged harbor walls consist of a pocked surface with all horizontal surfaces covered with a layer of deposited sediment. Water clarity in this area was characterized by high turbidity with visibility limited to a maximum of several feet.

The base of the dredged face terminates in a narrow shelf at a depth of approximately 4-5 meters, which extends to a steep dredged slope that extends to the harbor floor (Figures 10 and 11). Of note is that the sector of the shelf closest to the harbor channel is covered with a solid mass of colonial tube worms, identified as the parchment tubeworm (*Chaetopterus* sp.). *Chaetopterus* are considered an invasive species that commonly occurs in Harbors (Figure 11). The harbor floor at the base of the sloping sides consists of a bed of deposited gelatinous sediment with no exposed hard surfaces (Figure 10).

Coral community structure in this Sector consists of sparsely distributed isolated colonies of the same species as observed in Sectors A-C (primarily *Pocillopora*, *Porites, and Montipora*). However, most of the colonies in this sector were smaller, and solitary (in terms of amalgamated coral groupings) than were evident on the boulders of Sector B. Many of these colonies exhibited areas of sediment on their surfaces. The relative paucity of corals, as well as the generally small colony size indicates that the inner area of the Harbor along Piers 3 and 4 is a suboptimal region for coral growth, likely as a result of extreme sedimentation and poor water quality.

Non-coral invertebrates in this sector were very scarce, with only several individuals of sea urchins observed (*Echinothrix diadema, Tripneustes gratilla)*. Pilings were colonized by a variety of sponges, hydroids and tunicates that typically make up fouling communities in Hawaiian Harbors. Reef fish were scarce in the area, although a large school (several hundred individuals) of *Kuhlia xenura* (aholehole) was observed transiting the area near the harbor wall. Tires used for bumpers on the piers and pilings were colonized by large stands of benthic algae, with *Padina* the dominant genus.



FIGURE 9. Two views of dredged vertical face of Kalaeloa Barbers Point Harbor at site of proposed fuel dock. Both photos are in Sector D-2 (Figure 2). See Figure 2 for location of Sector D-2. Water depth in upper photo is approximately 3 m.



FIGURE 10. Upper photo shows sloping ledge at base of dredged shoreline; bottom photo shows gelatinous mud that covers the Harbor floor. Water depth in upper photo is approximately 4 m; water depth in lower photo is approximately 12 m.



FIGURE 11. Dredged ledge at outer edge of Sector D-1 covered with mats of Chaetopterus worms. Water depth is approximately 6 m in top photo and 8 m in bottom photo. See Figure 2 for location of Sector D-1.

5. Sector E.

Sector E consists of the southernmost corner of the Harbor and consists of a dredged wall similar in structure to Sector D. While not included as part of the area of concern for the fuel pier, the submerged pilings of the main berthing piers (Piers 5-7, 5A) were inspected as part of the reconnaissance survey. The structure of the main piers consists of a concrete deck cantilevered over the supporting submerged concrete pilings. As a result, no direct sunlight penetrates the water column to reach the submerged faces of the piers. While the submerged pilings are colonized by a variety of sponges, hydroids and other typical members of harbor fouling communities, no stony corals are present on any of the pilings along the entire length of Piers 5-7. Because this area is not included within the footprint of the proposed new fuel pier, and because there are no corals present that could be affected by construction activities associated with the fuel pier, it was not surveyed further for the present report.

B. Quantitative Biotic Community Structure

1. Coral Communities

It is generally assumed that reef-building corals require water conditions characterized by low suspended particulate loads and sediment deposition. While effects of high sedimentation are one of the most important physical stresses considered detrimental to corals, it is clear from the communities that exist within Kalaeloa Barbers Point Harbor that several species of coral are able to successfully colonize non-natural environments where high levels of suspended and settling solids are typical conditions.

Corals were generally limited to a vertical zone extending from about 0.5 m from the surface of the water to depth no greater than 5 m. Below this depth, pilings and excavated hard bottom were devoid of coral colonization. Piers and pilings where ships or other floating objects were moored on a long-term basis contained little or no live coral growth.

The locations of all corals identified in Sectors C, D and E were recorded *in-situ* using hand-held GPS. Each location was assigned a numerical waypoint; all waypoints are shown in Table 2. The locations of each waypoint are shown for Sectors C (Figure 12), Sector D-1 (Figure 13), Sector D-2 (Figure 14), Sector D-3 (Figure 15), Sector D-4 (Figure 16) and Sectors D-5 and E (Figure 17). Photographs of corals at most waypoints are shown in Appendix A. Note that more than one coral colony may occur at each waypoint.

Table 3 shows results of all size-class measurements of each coral species measured in Sectors A and B. Censusing of Sector A included all corals, while counts in Sector B included corals that were accessible within a belt transect on the outer surface of boulders. A total of 227 corals were encountered in these sectors, with the largest number of corals (98) occurring in the >20≤40 cm size class.

TABLE 2. GPS latitude and longitude of waypoints (degrees, decimal minutes) identifying locations of coral colonies in survey sectors of Kalaeloa Barbers Point Deep Draft Harbor. See Figure 2 for location of sectors, and Figures12-17 for locations of waypoints. Photographs of corals at each

SECTOR	WAYPOINT	LATITUDE	LONGITUDE
C	328	N21 19.407	W158 07.182
	329	N21 19.404	W158 07.184
	332	N21 19.406	W158 07.178
	334	N21 19.408	W158 07.176
	336	N21 19.407	W158 07.175
	338	N21 19.408	W158 07.174
	339	N21 19.408	W158 07.174
	340	N21 19.410	W158 07.174
	343	N21 19.407	W158 07.172
	344	N21 19.407	W158 07.171
	345	N21 19.408	W158 07.169
	349	N21 19.409	W158 07.169
	350	N21 19.408	W158 07.166
	351	N21 19.408	W158 07.165
	352	N21 19.408	W158 07.163
	353	N21 19.410	W158 07.161
	354	N21 19.409	W158 07.159
	355	N21 19.409	W158 07.158
	356	N21 19.408	W158 07.156
	357	N21 19.407	W158 07.156
	358	N21 19.407	W158 07.153
	359	N21 19.407	W158 07.152
	360	N21 19.408	W158 07.151
	361	N21 19.406	W158 07.148
	362	N21 19.408	W158 07.146
	363	N21 19.404	W158 07.144
	364	N21 19.402	W158 07.144
	365	N21 19.401	W158 07.143
D-1	366	N21 19.402	W158 07.156
	367	N21 19.398	W158 07.142
	368	N21 19.396	W158 07.139
	376	N21 19.392	W158 07.140
	370	N21 19.391	W158 07.137
	371	N21 19.388	W158 07.137
	372	N21 19.375	W158 07.120
	373	N21 19.374	W158 07.119
	374	N21 19.373	W158 07.119
	375	N21 19.372	W158 07.114
D-2	376	N21 19.368	W158 07.113
	377	N21 19.366	W158 07.113
	378	N21 19.366	W158 07.113
	379	N21 19.363	W158 07.110
	380	N21 19.358	W158 07.105
	381	N21 19.352	W158 07.096
D-3	382	N21 19.351	W158 07.096
	383	N21 19.344	W158 07.088
	384	N21 19.341	W158 07.084
	385	N21 19.341	W158 07.084
	386	N21 19.340	W158 07.082
	387	N21 19.336	W158 07.080
	388	N21 19.332	W158 07.076
	389	N21 19.330	W158 07.073
	390	N21 19.328	W158 07.070
	391	N21 19.324	W158 07.068
	392	N21 19.319	W158 07.063
	393	N21 19.318	W158 07.061
D4	394	N21 19.285	W158 07.025
	395	N21 19.284	W158 07.024
	396	N21 19.281	W158 07.021
	397	N21 19.279	W158 07.019
	398	N21 19.279	W158 07.019
	399	N21 19.278	W158 07.018
	400	N21 19.275	W158 07.013
	401	N21 19.274	W158 07.013
	402	N21 19.269	W158 07.008
	403	N21 19.268	W158 07.006
	404	N21 19.266	W158 07.005
	405	N21 19.264	W158 07.003
	406	N21 19.264	W158 07.002
	407	N21 19.263	W158 07.002
	408	N21 19.263	W158 07.002
	409	N21 19.260	W158 06.998
	410	N21 19.260	W158 06.998
D-5	411	N21 19.255	W158 06.992
	412	N21 19.246	W158 06.984
	413	N21 19.242	W158 06.979
	414	N21 19.241	W158 06.977
	415	N21 19.239	W158 06.975
	416	N21 19.236	W158 06.973
	417	N21 19.233	W158 06.969
	418	N21 19.231	W158 06.967
	419	N21 19.226	W158 06.960
E	420	N21 19.226	W158 06.960
	421	N21 19.228	W158 06.957
	422	N21 19.234	W158 06.952
	423	N21 19.237	W158 06.948
	424	N21 19.238	W158 06.948
	425	N21 19.239	W158 06.946
	426	N21 19.259	W158 06.969
	427	N21 19.299	W158 07.008

TABLE 3. Counts of coral colonies by species and size class in Sectors A and B on outer breakwater of Kalaeloa Barbers Point Harbor. Also shown are values of Shannon Wiener diversity (H'c). For locations of Sectors A and B, see Figure 2.

SECTOR	SPECIES	SIZE CLASS - WAYPOINT									
		<2	>2≤5	>5≤10	>10≤20	>20≤40	>40≤80	>80≤160	>160	TOTAL	H'c
A	*Porites lobata*				2	5				7	
	Pocillopora meandrina	1		1	5	7	1			15	
	Monitpora capitata		1		1	10	9	8		29	
	Montipora patula					1	6	1		8	
TOTAL SECTOR A		1	1	1	8	23	16	9	0	59	1.22
B-1	*Porites lobata*				6	16	17	3		42	
	Pocillopora meandrina	1	2			3	5			11	
	Monitpora capitata					2	2	1		5	
	Montipora patula					1	2	1		4	
	Porites compressa					6	2			8	
SUB-SECTOR TOTAL		1	2	0	6	28	28	5	0	70	1.20
B-2	*Porites lobata*			3	6	32	25			66	
	Pocillopora meandrina	5	2	2	5	6	3			23	
	Monitpora capitata					6	5	2		13	
	Montipora patula					5	5			10	
	Porites compressa						1			1	
SUB-SECTOR TOTAL		5	2	5	11	49	39	2	0	113	1.14
B-3	*Porites lobata*					16	5	1		22	
	Pocillopora meandrina	1		5	5	3				14	
	Monitpora capitata				1	2				3	
	Montipora patula				4					4	
	Porites compressa				1					1	
SUB-SECTOR TOTAL		1	0	5	11	21	5	1	0	44	1.20
TOTAL SECTOR B		7	4	10	28	98	72	8	0	227	1.21



FIGURE 12. Aerial view of Sector C on end of boulder jetty showing locations of waypoints identifying locations of living coral colonies. Latitude and longitude of waypoints are shown in Table 1. Photographs of corals located at each waypoint are shown in Appendix A. Location of Sector C is shown in Figure 2.



FIGURE 13. Aerial view of Sector D-1 along dredged shoreline of northwestern end of jetty showing locations of waypoints identifying locations of living coral colonies. Latitude and longitude of waypoints are shown in Table 1. Photographs of corals located at each waypoint are shown in Appendix A. Location of Sector D-1 is shown in Figure 2.



FIGURE 14. Aerial view of Sector D-2 along dredged shoreline northwest of Pier 3 in Kalaeloa Barbers Point Harbor showing locations of waypoints identifying locations of living coral colonies. Latitude and longitude of waypoints are shown in Table 1. Photographs of corals located at each waypoint are shown in Appendix A. Location of Sector D-2 is shown in Figure 2.



FIGURE 15. Aerial view of Sector D-3 along dredged shoreline of northwestern end Pier 3 inside Kalaeloa Barbers Point Harbor showing locations of waypoints identifying locations of living coral colonies. Latitude and longitude of waypoints are shown in Table 1. Photographs of corals located at each waypoint are shown in Appendix A. Location of Sector D-3 is shown in Figure 2.



FIGURE 16. Aerial view of Sector D-4 along dredged shoreline at Pier 4 in Kalaeloa Barbers Point Harbor showing locations of waypoints identifying locations of living coral colonies. Latitude and longitude of waypoints are shown in Table 1. Photographs of corals located at each waypoint are shown in Appendix A. Location of Sector D-4 is shown in Figure 2.

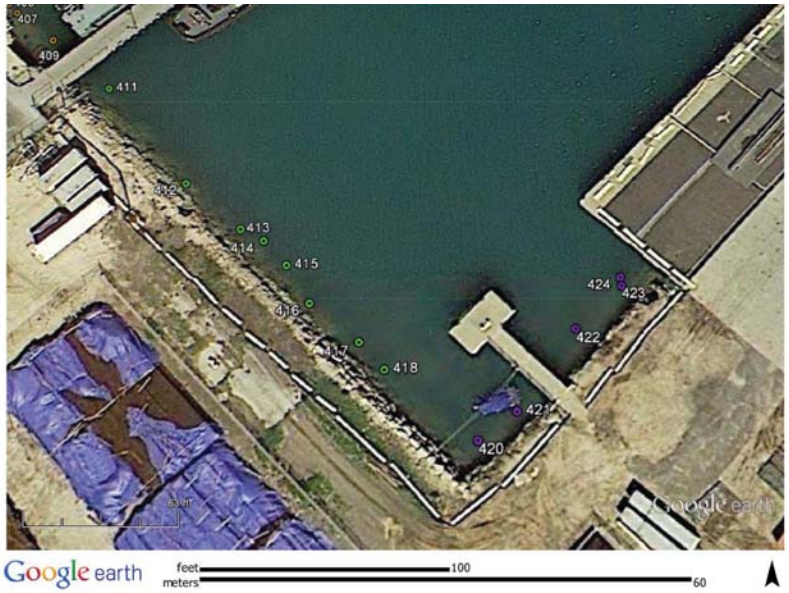

FIGURE 17. Aerial view of Sectors D-5 (green symbols) and E (purple symbols) along dredged shoreline at Pier 4 in Kalaeloa Barbers Point Harbor showing locations of waypoints identifying locations of living coral colonies. Latitude and longitude of waypoints are shown in Table 1. Photographs of corals located at each waypoint are shown in Appendix A. Location of Sectors D-5 and E are shown in Figure 2.

Tables 4, 5 and 6 list coral colonies for Sectors C, D, and E, respectively, by size class of each species according to the waypoint location (See Figures 12-17 for location of each waypoint). Total coral colony counts are summarized for each sector in Table 7, and by each species in Table 8. With respect to the summarized data by sector, of the total of 505 colonies, the largest number of corals (227) occur in Sector B, followed by 109 in Sector D. The total number of colonies in Sectors D and E which likely occur in the footprint of the fuel pier is 119. Of the total data set, the dominant size classes of coral colonies are >20≤40 cm (171 or 32%) followed by the >40≤80 (110 or 22%). When considering the 119 colonies in Sectors D and E, the dominant size classes are smaller than for the overall census. The three size classes from >2≤20 cm comprise 70% of the colonies. Only a single colony was observed to be larger than 40 cm in Sectors D and E, and no corals were recorded with a long diameter greater than 80 cm (Table 7).

With respect to distribution of coral species, only seven species were encountered. When small colonies (<2 cm) were not readily distinguishable to the species level, they were assigned to the species that was most similar in appearance. Of the seven species, 240 colonies (48%) consisted of *Porites lobata*, 137 colonies (27%) were *Pocillopora meandrina*, and 112 colonies (22%) consisted of *Montipora* spp. Thus, 97% of the coral were comprised of three genera. *Montipora patula*, which was listed as a candidate for Endangered Species Status was relatively common in Sectors A, B and C, only a single colony was encountered in Sector D (Table 8).

The most abundant coral species in the survey area, *Porites lobata*, is the overall most abundant coral on Hawaiian reefs. *Porites lobata* occurred in every sector and sub-sector within the Kalaeloa Barbers Point Harbor survey. Colonies of *P. lobata* were most common on the boulder surfaces comprising Sectors B and C. The most common size class of this species was the >20≤40 cm category.

The next most abundant species, *Pocillopora meandrina* also occurred in every sector and sub-sector. *Pocillopora meandrina* generally occurs as sturdy hemispherical colonies consisting of short compact branches. This species is recognized as a "pioneer species" in that it is often the first coral to colonize newly created substratum and can survive in conditions that are too harsh for other coral species. *Pocillopora meandrina* was the most common coral occurring in Sector D where the fuel pier will be located. Distribution of this species was nearly equal (28-29 colonies) in the four size classes between 5 and 40 cm. *Pocillopora meandrina* was the only coral that commonly occurred as small colonies (<5 cm) throughout the survey area (Table 8). The largest number of individuals in single size class (28) occurred in the >2≤5 class, indicating the predominance of small colonies in the area where the fuel pier will be located. *P. meandrina* typically assumes a determinate growth form, in that colonies reach a certain size or age, and then die. The lack of larger colonies of *P. meandrina* within the harbor suggests that environmental conditions are such that planulae can settle, but not reach maximum colony size.

TABLE 4. Coral Colony counts by size classes located by GPS waypoints for coral colonies observed in Sector C, Kalaeloa Barbers Point Harbor. For location of Sector C, see Figure 2. For locations of waypoints, see Table 1 and Figure 12. For photographs of corals at each waypoint, see Appendix A.

SPECIES	SIZE CLASS - WAYPOINT								
	<2	>2≤5	>5≤10	>10≤20	>20≤40	>40≤80	>80≤160	>160	TOTAL
Porites		364	351	344	344 (40)	333	354		
lobata		364	352	355	345	343 (25)			
			355	355	352	344 (40)			
			360	355	352	344			
			361	359	354	345			
			361	359	355	349			
			362	359	355	350			
			364	359	357	351(60)			
			365	361	358	351			
				361	359	352			
				361	361	353			
				361	361				
				361	361				
				363	364				
					365				
SPECIES TOTAL	0	2	9	14	14	8	1	0	48
Porites				361	361				
lutea					361				
SPECIES TOTAL	0	0	0	1	2	0	0	0	3
Pocillopora		355	359	332	329	328			
meandrina			360	345	344				
			364	350	345				
					349				
					328				
					334				
					340				
SPECIES TOTAL	0	1	3	3	7	1	0	0	15
Montipora				355	345	354			
capitata				356	354	361			
					359				
					361				
SPECIES TOTAL	0	0	0	2	4	2	0	0	8
Montipora	344		351(15)	355	350	344	345	344	
patula			355		351	345			
			355		351	345			
			344		351	345			
					353	349			
					354	350			
					359	355			
					361				
SPECIES TOTAL	1	0	3	1	8	7	1	1	22
TOTAL SECTOR C	**1**	**3**	**15**	**20**	**33**	**18**	**2**	**1**	**93**

TABLE 5. Coral Colony counts by size classes located by GPS waypoints for coral colonies observed in Sector D, Kalaeloa Barbers Point Harbor. For location of Sector D, see Figure 2. For locations of waypoints, see Table 1 and Figures 13-16.

SUB SECTOR	SPECIES	SIZE CLASS - WAYPOINT								
		<2	>2≤5	>5≤10	>10≤20	>20≤40	>40≤80	>80≤160	>160	TOTAL
D-1	***Porites***		374	368	368	367				
	lobata			369	368	369				
				371						
				371						
				372						
	SPECIES TOTAL	0	1	5	2	2	0	0	0	10
	Pocillopora	368	366	366	366					
	meandrina		370		366					
		373			367					
					368					
					368					
	SPECIES TOTAL	2	2	1	5	0	0	0	0	10
	Montipora			374						
	capitata									
	SPECIES TOTAL	0	0	1	0	0	0	0	0	1
Sub-Sector Total		2	3	7	7	2	0	0	0	21
D-2	***Porites***		380	377	375	378				
	lobata			377	376	379				
				379						
	SPECIES TOTAL	0	1	3	2	2	0	0	0	8
	Porites		377							
	brighami									
	SPECIES TOTAL	0	1	0	0	0	0	0	0	1
	Pocillopora	377	379	377	378					
	meandrina	380								
	SPECIES TOTAL	2	1	1	1	0	0	0	0	5
Sub-Sector Total		2	3	4	3	2	0	0	0	14
D-3	***Porites***		382	383	381	384				
	lobata		388	383	384					
			389	385	384					
				388	386					
				388						
				390						
				390						
				390						
	SPECIES TOTAL	0	3	8	4	1	0	0	0	16
	Pocillopora		387	392						
	meandrina		391							
	SPECIES TOTAL	0	2	1	0	0	0	0	0	3
Sub-Sector Total		0	5	9	4	1	0	0	0	19
D-4	***Porites***			402	397	396				
	lobata				402	397				
					404	398				
					406	403				
	SPECIES TOTAL	0	0	1	4	4	0	0	0	9
	Pocillopora	397	394	394	396	405				
	meandrina	402	395	395	396	407				
			395	395	401					
			395	396	407					
			396	397						
			397	398						
			398	399						
			399	400						
			399	401						
			401	407						
			401	409						
			401							
			402							
			407							
	SPECIES TOTAL	2	14	11	4	2	0	0	0	33
	Montipora	401								
	capitata									
	SPECIES TOTAL	1	0	0	0	0	0	0	0	1
Sub-Sector Total		3	14	12	8	6	0	0	0	43
D-5	***Porites***			411	418	413	414			
	lobata			414		415				
	SPECIES TOTAL	0	0	2	1	2	1	0	0	6
	Pocillopora		418							
	meandrina		412	411						
	SPECIES TOTAL	0	2	1	0	0	0	0	0	3
	Montipora				417	416				
	capitata									
	SPECIES TOTAL	0	0	0	1	1	0	0	0	2
	Montipora		418							
	patula									
	SPECIES TOTAL	0	1	0	0	0	0	0	0	1
Sub-Sector Total		0	3	3	2	3	1	0	0	12
TOTAL SECTOR D		**7**	**28**	**35**	**24**	**14**	**1**	**0**	**0**	**109**

TABLE 6. Coral Colony counts by size classes located by GPS waypoints for coral colonies observed in Sector E, Kalaeloa Barbers Point Harbor. For location of Sector E, see Figure 2. For locations of waypoints, see Table 1 and Figure 17.

SECTOR	SPECIES	SIZE CLASS - WAYPOINT								
		<2	>2≤5	>5≤10	>10≤20	>20≤40	>40≤80	>80≤160	>160	TOTAL
E	*Porites lobata*			419	424	422				
	SPECIES TOTAL	0	0	1	1	1	0	0	0	3
	Pocillopora meandrina		422	419	419					
			423	420						
	SPECIES TOTAL	0	2	2	1	0	0	0	0	5
	Montipora capitata				421	419				
	SPECIES TOTAL	0	0	0	1	1	0	0	0	2
	Montipora patula									
	SPECIES TOTAL	0	0	0	0	0	0	0	0	0
TOTAL SECTOR E		0	2	3	3	2	0	0	0	10

TABLE 7. Total counts of coral colonies by survey sector in Sectors A - E of Kalaeloa Barbers Point Harbor. Shaded area (Sector D) indicates corals that are in area where fuel pier will be located. For locations of Sectors, see Figure 2.

SECTOR	SIZE CLASS								
	<2	>2≤5	>5≤10	>10≤20	>20≤40	>40≤80	>80≤160	>160	TOTAL
A	1	1	1	8	23	16	9	0	59
B-1	1	2	0	6	28	28	5	0	70
B-2	5	2	5	11	49	39	2	0	113
B-3	1	0	5	11	21	5	1	0	44
TOTAL B	7	4	10	28	98	72	8	0	227
C	1	3	16	20	36	21	2	1	100
D-1	2	3	7	7	2	0	0	0	21
D-2	2	3	4	3	2	0	0	0	14
D-3	0	5	9	4	1	0	0	0	19
D-4	3	14	12	8	6	0	0	0	43
D-5	0	3	3	2	3	1	0	0	12
TOTAL D	7	28	35	24	14	1	0	0	109
E	0	2	3	3	2	0	0	0	10
TOTAL	16	38	65	83	173	110	19	1	505

The third and fourth most abundant corals were *Montipora capitata* and *M. patula*. While these two species were relatively common in occurrence in sectors B and C, they were both rare in Sectors D and E. Only five colonies of *M. capitata* and one colony of *M. patula* were observed in Sectors D and E, presumably as a result of poor water quality compared to areas with more exposure to the open ocean (Sectors A-C). Of particular note is that there were no observations of large overlapping plating colonies of *Montipora* spp. growing on vertical pilings within the Harbor. Such large colonies have been documented in other Harbor environments in Hawaii, particularly Honolulu Harbor, as well as Kahului and Hana Harbors on Maui. The overlapping plating growth form is an adaptation to take advantage of vertical surfaces that often occur in man-made environments, but are relatively rare in natural environments.

Other corals observed in the study areas included several mats of branching finger coral (*Porites compressa*) in protected spaces between boulders in Sector B. No colonies of *P. compressa* were observed in Sector D. Also observed were several colonies of *Porites lutea* and *Porites brighami*, which occurred in similar growth forms as the far more common *P. lobata*.

In addition to measuring the long axis of each coral colony, qualitative notation of growth form was also a component of the survey. After noting growth forms during the initial surveys, it quickly became apparent that each species assumed a specific growth form that remained consistent throughout the survey. To this effect, it can be stated that *Porites lobata* occurred as rounded lumpy mounds, while *P. compressa* always occurred as amalgamated branching masses. Larger colonies of *Pocillopora meandrina* consistently occur as rounded hemispheres, while small colonies were often nearly flat with little vertical extension. Most colonies of *Montipora* spp. occurred as flat encrustations, although a single larger colony assumed a mounded shape (See Appendix A, waypoint 417).

Many of the colonies within the Harbor in the area of the projected fuel pier contained dead portions covered with sediment.

In summary, measures of size-classes of species abundance provides a comprehensive depiction of the coral community structure within the hard substratum areas of the southwestern sector of Kalaeloa Barbers Point Harbor in the area proposed to contain the fuel pier. Overall coral occurrence in the area is low, with relatively few colonies of generally small size inhabiting a narrow zone adjacent to the harbor walls. High sediment loads covering other available hard substratum, as well as poor water quality, likely restrict both the species composition and abundance of corals in the area

Survey results also indicated that there were little recognizable skeletal remains of dead colonies anywhere in the survey area. The lack of such remains suggest that the Harbor has never been a more suitable area for coral colonization than at present.

The Center for Biological Diversity petitioned the National Oceanographic and Atmospheric Administration (NOAA) to list 82 species of reef building corals as endangered species. Although *Montipora patula* is one of the most common corals observed throughout Hawaii on naturally occurring reefs it was one of the 82 candidate species. In

August 2014 the final rule of the petition was released stating that a total of 22 species were now protected under the Endangered Species Act. None of these 22 species are found in Hawaii. *Montipora patula* is the only species on the original list that was observed during the Kalaeloa Barbers Point Harbor survey. A total of 50 colonies of *Montipora patula* were counted, comprising about 10% of the total number of colonies. However, only a single colony was observed in Sector D, which is the site of the fuel pier.

2. Macro-Invertebrate Communities

Of Hawaii's invertebrates, 301 species are introduced (non-native) while 117 are cryptogenic (unknown origin) (Carlton and Eldredge 2009). Of these 490 species approximately 418 have established communities within marine and brackish waters. This is particularly relevant to Hawaiian harbors, where shipping and fouling are the penultimate cause of invasive species growth on pilings and hull bottoms. Other sources of fouling are from ballast water and solid ballast taken on by ships. These species originated largely from the Indo-Pacific region, but also from the tropical western Atlantic and Caribbean regions (R. DeFelice, L. Eldredge and J. Carlton 2001).

As with virtually all Harbors in Hawaii, Kalaeloa Harbor is colonized by a variety of sponges, tunicates, bivalves and bryozoans. Forty-five species of non-coral macro-invertebrates were identified in the Harbor surveys, including 10 sponges, 2 tunicates, 2 bryozoans, 4 annelids, 2 mollusks, 3 echinoderms and 2 arthropods (Table 9). In terms of distribution, most of the sponges, tunicates and annelids were observed in the inner harbor sites (Sectors D and E) as typical harbor fouling communities, while the echinoderms (e.g., sea urchins) were observed on the boulder walls of Sectors B and C. Of the species observed, 8 are identified as Introduced species (Table 9) (Staples and Cowie 2001).

Abundance and diversity of sponges was highest with 10 species classed as "Abundant" in at least one survey sector. The red encrusting sponge *Porbus amaranthus* was present throughout the inner harbor, where it occurred in larger colonies on pilings and smaller colonies on rock outcroppings (Figure 18). As mentioned above, the most abundant invertebrate in terms of bottom cover was the annelid worm *Chaetopterus*, which formed dense mats at the outer sections of Sector D. *Sabellastarte spectabilis* (Featherduster worms) were present in nearly every sub-sector of the inner Harbor, occurring most prominently on rock outcroppings.

TABLE 9. Estimates of invertebrate abundance by class: R=rare (less than 10 individuals or colonies observed per sector; C=common (10-50 individuals or colonies per sector), and A=abundant (greater than 50 individuals or colonies per sector). "I" indicates introduced species. For locations of survey sectors, see Figure 2.

	Sector	A	B			C	D					E
	Sector Number		1	2	3		1	2	3	4	5	
SPONGES	*Callyspongia diffusa*						A	A	C	A	A	
	Clathria sp.						R	R	R	R		
	Dysidea herbacea						R	R	R	R		R
	Gelloides fibrosa (I)						A	A	A	R		A
	Halichondria coerulea						R	R	R	R	R	
	Haliclona caerulea (I)						R	R	C	R	R	C
	Mycale armata (I)						A	A	A	A	A	A
	Phorbas amaranthus						A	A	C	A	A	A
	Spirastrealla vagabunda						R	R	R	A	A	C
	Zygomycale parishii (I)	R					A	A	A	A	A	
TUN	*Ascidia sydneiensis* (I)						R			R		R
	Didemnum sp.						R	R	R	R	R	
BRY	*Bugula stolonifera* (I)					A	A	A	A	A		A
	Disporella violacea							R		A		R
ANNELIDS	*Chaetopterus sp.*						A	A				R
	Sabellastarte spectabilis (I)	R	R	R	C	R	C	C	C	C	C	R
	Salmacina dysteri (I)						R	R	R	R		R
	Spirobranchus	R					R	R		R		R
URCHINS	*Echinothrix diadema*	R	C	R	R	T	R	R	R	R	R	
	Heterocentrotus mammilatus		A	A	A	A	R	R		R		
	Echinometra mathaei							R	R	R		
	Tripneutes gratilla	R	C	R	R	R		R	R		R	R
MOL	*Octopus cyanea*		R									
	Pinctada margaritifera					R	R	R	R	R		R
ARTH	*Grapsus grapsus*		R	R	R	R						R
	Stenopis hispidus			R		R		R		R		

3. Algal Communities

Marine macroalgae, or seaweeds, are plant-like organisms without roots or leaves that generally live attached to rock or other hard substrata in coastal areas. While macroalgae are typically a component of healthy coral reefs in Hawaii, they were scarce at all survey locations within Kalaeloa Harbor. Only three species of algae were observed, the most common of which was *Caulerpa sertularoides* growing on the rocky bottom of the inner harbor dredge walls, and *Padina* sp. which was abundant only on vertical surfaces such as mooring lines. Macroalgae were essentially absent from the outer boulder habitats of Sectors A, B and C, likely as a result of severe wave stress that routinely impacts the area. It is apparent that physical conditions within Kalaeloa Harbor are not conducive to extensive algal growth.

4. Fish Communities

While the fish assemblages found in Kalaeloa Harbor include species that are typical of Hawaiian reef ecosystems, there was substantial variability in both the number of species and individuals observed within different sectors of the survey area. A total of 935 fish were observed in the survey area. These 935 individuals were comprised of 42 species (Table 10). Overall, higher numbers of fish observed in the outer sectors of the Harbor closest to the entrance channel (C, D-1, D-2). These peak numbers were a result of schooling aggregations of several species, including the brown surgeonfish (*Acanthurus nigrofuscus*), yellowfin goatfish (*Mulloidichthys vanicolensis*), aholehole (*Kuhlia xenura*) and the moorish idol (*Zanclus cornutus*). Fish were least abundant in the innermost areas of the Harbor (Sectors D-4, D-5 and E).

The most frequently observed fish within Kalaeloa Harbor was *Acanthurus nigrofuscus*, which occurred in all but one sub-sector (D-4) (Table 10). Other common surgeonfish included the convict surgeonfish (*Acanthurus triostegus*) and the yellow tang (*Zebrasoma flavescens*). The Hawaiian damselfish (*Dasyllus ablisella)* and banded damselfish *(Abudefduf abdominalis)* were also common at sites near the entrance channel. Of the butterflyfish, the threadfin butterflyfish (*Chaetodon auriga*) was the most frequently observed. Several barracuda (*Sphyraena barracuda*) were observed among the pilings of Sector D.

Application of these size estimates to regression curves of fish length to weight for individual species can provide estimates of biomass. Estimates of total fish biomass and biomass of individual trophic groups in each survey sector are shown in Table 11. Of the total estimated biomass of all fish (71.3 kg), approximately 62% occurred in the three subsectors nearest the Harbor entrance channel (B-3, C, D-1). In terms of trophic groups, the highest biomasses occurred for the zooplanktivores (21.75 kg) and the Herbivores (21.16 kg). The lowest biomasses occurred for the corallivores (0.24 kg) and the detritovores (0.27 kg) (Table 11).

TABLE 10. Counts of fish by survey sector in Kalaeloa Barbers Point Harbor. For locations of sectors, see Figure 2.

	SURVEY SECTOR											
FAMILY/SPECIES	**A**	**B1**	**B2**	**B3**	**C**	**D1**	**D2**	**D3**	**D4**	**D5**	**E**	**Total**
Snappers												
Lutjanus fulvus				1	2		1					4
Lutjanus kasmira											4	4
Goatfish												
Mulloidichthys flavolineatus					12	12	4	14			4	46
Parupeneus multifasciatus	1				3	1						5
Mulloidichthys vanicolensis	1		4	35	48	8	8	10				114
Butterflyfishes												
Chaetodon auriga	7				2	11	7	2		1		30
Chaetodon lunula	1			1								2
Chaetodon miliaris						4	1	1				6
Chaetodon ornatissimus			4									4
Chaetodon unimaculatus								1				1
Forcipiger longirostris							1	2				3
Damselfishes												
Abudefduf abdominalis	5		1		2	21			1		1	31
Abudefduf vaigiensis						2						2
Dascyllus albisella		2			15		22	28		8		75
Stegastes marginatus			1									1
Wrasses												
Coris gaimard						1						1
Coris venusta						1						1
Thalassoma duperrey	2	3	3	5	5	2	1	1		1		23
Stethojulis balteata			1	1	1							3
Parrotfishes												
Chlorurus spilurus						1						1
Halichoeres ornatissimus									4			4
Scarus psittacus	2		1	1								4
Surgeonfishes												
Acanthurus blochii		1	3	1							1	6
Acanthurus nigrofuscus	17	5	44	24	59	50	10	32		10	20	271
Acanthurus triostegus						15		1	3	6	1	26
Ctenochaetus strigosus		1										1
Naso lituratus			1									1
Naso unicornis						2	1	6				9
Zebrasoma flavescens			2	1	1	14						18
Puffers												
Canthigaster amboinensis	1											1
Canthigaster jactator	1		1	1	2	3	1			1		10
Diodon hystrix					1							1
Ostracion meleagris	3		2	1	8	2	1			1	1	19
Other												
Aulostomus chinensis								1		1		2
Kuhlia xenura	4			10	20		50					84
Kyphosus vaigiensis	1			10		1						12
Neoniphon sammara					1							1
Rhinecanthus aculeatus								1				1
Rhinecanthus rectangulus		1		1	1							3
Synodus dermatogenys					1		1					2
Zanclus cornutus	3	1		7	9	38	25	15		2		100
Sphyraena barracuda						1		1				2
TOTAL INDIVIDUALS	**49**	**14**	**68**	**100**	**193**	**190**	**134**	**116**	**8**	**31**	**32**	**935**
TOTAL SPECIES	**14**	**7**	**13**	**15**	**19**	**20**	**15**	**15**	**3**	**9**	**7**	**42**

TABLE 11. Biomass of fish according to trophic group calculated for each survey sector in Kalaeloa Barbers Point Harbor. For locations of survey sectors, see Figure 2.

	SECTOR											
BIOMASS (kg)	A	B1	B2	B3	C	D1	D2	D3	D4	D5	E	TOTAL
Corallivore	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.21	0.00	0.00	0.00	**0.24**
Detritivore	0.00	0.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.27**
Herbivore	0.91	0.21	3.53	5.92	3.38	4.45	0.37	1.24	0.03	0.63	0.48	**21.16**
Mobile Invertebrates	0.24	0.22	0.26	3.59	4.58	1.43	0.74	3.27	0.01	0.01	0.52	**14.86**
Piscivores	0.02	0.00	0.00	0.00	0.16	0.55	0.22	1.10	0.00	0.00	0.00	**2.05**
Sessile Invertebrates	0.53	0.09	0.03	0.82	0.77	6.74	1.01	0.84	0.00	0.18	0.02	**11.02**
Zooplanktivores	0.61	0.04	0.05	6.40	4.87	0.91	4.86	3.68	0.03	0.27	0.03	**21.75**
Total Biomass	**2.30**	**0.82**	**3.90**	**16.73**	**13.75**	**14.08**	**7.20**	**10.34**	**0.07**	**1.10**	**1.05**	**71.35**

It is important to note that the entire survey area is a restricted access zone and likely experiences little or no fishing pressure, although fishing does occur in neighboring areas (primarily near the boat ramp adjacent to Sector A). Hence the fish communities observed are not substantially affected by direct fishing pressure at the site of the proposed fuel pier. As a result, community structure in the area of the proposed redevelopment is largely in response to physical conditions. The areas observed that can be considered the most preferable habitats with relatively high densities of reef fish (off the end of Sectors C and D-1) are not likely to be directly affected by construction of the fuel pier. The inner sections of the Harbor, where the fuel pier will be located cannot be considered preferred habitats for reef fish.

5. Rugosity

Table 12 shows values of measured rugosity indices in each survey sector. In general, rugosity was greater in Sectors A, B and C where bottom cover consisted of irregularly shaped boulders. In comparison, rugosity was lower in the inner harbor on the dredged platforms lining the Harbor boundaries.

6. Incidental Sightings of Threatened and Endangered Species

Several species of marine animals that occur in Hawaiian waters have been declared threatened or endangered by Federal jurisdiction. The threatened green sea turtle (*Chelonia mydas*) occurs commonly throughout the Hawaiian Islands, and are frequently observed throughout the south and west shores of Oahu. The endangered hawksbill turtle (*Eretmochelys imbricata*) is known infrequently from Hawaiian waters. No green sea or hawksbill turtles were observed during the course of underwater surveys within Kalaeloa Barbers Point Harbor.

The Turtle Research Program of NOAA Fisheries, Pacific Islands Fisheries Science Center has kept records of sea turtle strandings from 1982 to the present. From 1982 to April 21, 2014 a

total of 100 strandings have been recorded for the Kalaeloa region. These strandings account for 2.7% of all strandings in the Hawaiian Islands. Of the 100 strandings in the Kalaeloa region, thirteen have occurred within Kalaeloa Barbers Point Harbor (Appendix C). Two of the strandings were caused by boat impact, two by line entanglement, one by trauma, and the remainder by unknown causes. These data indicate that while turtles are observed occasionally within Harbor waters, it does not appear to be a preferred habitat for any turtle activities.

Populations of the endangered humpback whale (*Megaptera novaeangliae*) winter in the Hawaiian Islands from December to April. The present survey was conducted in January when whales are present in Hawaiian waters. While Humpback whales, as well as other cetaceans may occasionally enter the Harbor, none were observed during the course of the present survey.

TABLE 12. Indices of rugosity measured in sectors and sub-sectors of survey area of Kalaeloa Barbers Point Harbor. Rugosity is defined as the ratio of chord length to contour length of a sector of reef. As a example, if a flexible line 10 m long follows the contours of the reef and reaches to the 5 m mark on a 10 m line stretched across the reef surface, the rugosity value will be 2. If the reef is perfectly flat, the rugosity will be one (1). Thus, higher values of rugosity indicate higher vertical relief of the reef surface. Sectors A and E consisted of vertical sheetpile which does not allow for rugosity measuremnts. See Figure 2 for locations of sectors.

Sector	Rugosity			
	Rep 1	Rep 2	Rep 3	Average
A	-	-	-	-
B-1	1.42	1.53	1.75	1.57
B-2	1.25	1.56	1.31	1.37
B-3	1.66	1.57	1.54	1.59
C	1.57	1.44	1.69	1.57
D-1	1.19	1.16	1.32	1.22
D-2	1.18	1.11	1.17	1.15
D-3	1.25	1.23	1.38	1.29
D-4	1.06	1.11	1.23	1.13
D-5	1.34	1.43	1.34	1.37
E	1.17	1.09	1.15	1.14

The Hawaiian monk seal, (*Monachus schauinslandi*) is an endangered earless seal that is endemic to the waters off the Hawaiian Islands. Monk seals commonly haul out of the water onto sandy beaches to rest. No seals were observed during survey work, and there are no beaches within the survey area that could serve as haul-out sites. A summary of all documented sightings of Hawaiian monk seals in Kalaeloa Harbor over the past ten years (2005-2014) shows that no seals were sighted in Kalaeloa Harbor during three aerial surveys conducted by NMFS Pacific Island Fisheries Science Center personnel in 2000, 2001 and 2008 (Appendix D).

Reports from the general public document a total of thirteen sightings in the Harbor, although twelve of the sightings were of the same individual during the month of September 2013. The seal was observed with a large wound on her dorsum and may been using the harbor to recuperate. The other single sighting of a seal in the Harbor occurred in January 2014 (Appendix D). These data indicate that while monk seals occasionally enter Harbor waters, and particularly as a sheltered site to recover from injury, it is not a normally preferred habitat for seal activities.

7. Regulated and Invasive Species

The State of Hawaii Department of Land and Natural Resources (DLNR) Division of Aquatic Resources fisheries rules lists a variety of "regulated" marine life. Marine invertebrates include primarily species valued as food sources, including abalone, various clams and oysters, crabs, shrimp, lobsters, and sea urchins (for complete list and scientific names of regulated species, see http://dlnr.hawaii.gov/dar/fishing/fishing-regulations/scientific-names-of-regulated-species/. No commercial or recreational fishing operations are conducted in the survey area.

The only regulated species within the Kalaeloa Harbor Basin observed during surveys were several fish, including a school of aholehole (*Kuhlia xenura*), and several parrotfish (*Scarus psittacus*). With regard to invertebrates, the only regulated species observed was a single octopus (*Octopus cyanea*). It is possible that burrows noted within the sediment floor of the basin may be from shrimp (`opae); however, no individuals were observed. As noted above, of the introduced and cryptogenic species, 13 introduced species were identified during the surveys in Kalaeloa Harbor as part of the fouling communities on piers and pilings.

C. Water Quality

Table 13 shows results of water quality sampling at the twelve stations shown in Figure 3. Histograms of the concentrations of twelve water quality constituents in surface and bottom waters at each sampling station are shown in Figures 18-23. Inspection of these histograms reveals several trends with respect to gradients of distribution within the Harbor. With respect to salinity, there is little vertical stratification between surface and bottom water, although there is a slight horizontal gradient of increasing salinity with proximity to the outer areas of the Harbor and entrance channel (Stations 1-2)(Figure 18). Dissolved

Silica (Si) shows a mirror image of the pattern of salinity, with lower values in the outer Harbor and entrance channel relative to the inner Harbor (Figure 20). The lack of vertical stratification of salinity through the water column is also clearly evident in the continuous profiles shown in Figure 24. It can also be seen in Figure 24 that the salinity through the water column is distinctly different at Stations 1-2 located at the mouth of the Harbor and entrance channel than at the other ten stations located within the Harbor basin. The combined patterns of Si and salinity reveal that there is a small component of fresh water (most likely groundwater) entering the Harbor from sources on land that mixes with the ocean water that makes up the majority of Harbor waters.

Temperature shows a consistent pattern of slight elevation at the surface at all stations relative to deep waters (Figure 18). There is also a slight gradient of increasing temperature moving from the outer Harbor to the inner Harbor.

Concentrations of dissolved nutrients show variable patterns. Nitrate nitrogen (NO_3^-) is low in the entrance channel (Station 1), peak in the area directly off the proposed fuel pier site and inner entrance channel (Stations 2-8) and fall to low levels in the inner Harbor basin (Stations 9-12)(Figure 19). Dissolved orthophosphate phosphorus (PO_4^{3-}) display the opposite pattern with generally elevated levels in the back basin relative to the area fronting the fuel pier site, although the pattern is not strong. Ammonium nitrogen (NH_4^+) peaks in concentration in the surface sample in the Harbor channel (Station 1) and is variable throughout the rest of the sampling regime in terms of both horizontal and vertical gradients (Figure 20). Total nitrogen (TN) and Total organic nitrogen (TON) show little variation throughout the sampling range (Figures 21 and 22). With the exception of a peak value in the surface water at Station 1, concentrations of Total phosphorus (TP) and Total Organic Phosphorus (TOP) also show no apparent gradients throughout the Harbor (Figures 21 and 22).

Values of turbidity and Chlorophyll *a* prescribe nearly identical patterns of distribution (Figure 23). Values are lowest in the entrance channel and increase progressively with distance into the Harbor. These results reflect observations during dive operations with indicated that turbidity (in terms of visibility) was substantially greater within the Harbor basin than in the outer Harbor. Continuous profiles of dissolved oxygen indicate peak values at the surface at all stations with consistently decreasing values at a depth of 3-4 meters of the water column, followed by essentially constant values to the Harbor floor (Figure 24).

TABLE 13. Results of water chemistry analyses from ocean sampling stations in Kalaeloa Barbers Point Harbor and entrance channel. Samples were collected on January 21, 2014. See Figure 3 for locations of sampling stations. Also shown are DOH WQS for "embayments" and "open coastal waters" under "wet" and "dry" conditions, "not to exceed more than 10% and 2% of the time" criteria. Green shaded values exceeded DOH dry water quality standards; yellow shaded values exceeded DOH wet water quality standards.

SAMPLE STATION	DEPTH (feet)	PO_4^{3-} (µg/L)	NO_3+NO_2 (µg/L)	NH_4^+ (µg/L)	Si (µg/L)	TN (µg/L)	TON (µg/L)	TP (µg/L)	TOP (µg/L)	TURB (ntu)	SALT (o/oo)	pH (std. units)	Chl-a (µg/L)	TEMP deg. C	Diss. O_2 % sat.
1-S	1	13.02	4.06	22.82	76.16	121.80	94.92	24.80	11.78	0.20	35.38	8.00	0.53	25.07	100.73
1-B	46	3.41	4.06	3.22	99.40	93.80	86.52	13.02	9.61	0.28	35.33	8.00	0.76	24.94	99.62
2-S	1	2.17	6.58	12.74	98.28	101.08	81.76	14.57	12.40	0.32	35.33	8.00	0.99	25.06	94.35
2-B	44	3.10	11.06	5.88	79.24	99.96	83.02	14.88	11.78	0.28	35.34	8.00	0.74	25.04	76.63
3-S	1	3.72	4.76	13.72	146.16	110.46	91.98	14.26	10.54	0.75	35.25	8.00	2.68	25.11	95.52
3-B	40	1.24	6.58	13.30	138.04	107.80	87.92	15.19	13.95	0.50	35.28	8.00	1.61	25.04	89.34
4-S	1	3.41	7.56	10.92	174.72	105.42	86.94	13.02	9.61	0.77	35.24	8.00	3.05	25.11	96.58
4-B	41	1.55	5.04	13.86	150.08	104.72	85.82	13.02	11.47	0.49	35.27	8.00	1.66	25.05	87.61
5-S	1	1.86	5.88	14.00	157.92	104.44	84.56	13.02	11.16	0.89	35.22	8.00	3.11	25.14	96.94
5-B	40	4.96	3.50	11.06	145.60	108.50	93.94	13.95	8.99	0.80	35.25	8.00	2.46	25.04	90.56
6-S	1	2.48	5.74	17.22	176.12	109.62	86.66	14.26	11.78	1.28	35.22	7.99	2.34	25.18	98.24
6-B	38	1.86	4.20	10.92	164.64	105.14	90.02	14.26	12.40	0.89	35.25	8.00	2.15	25.06	88.32
7-S	1	2.17	3.22	18.20	164.92	100.10	78.68	13.33	11.16	0.89	35.22	8.00	3.03	25.17	97.72
7-B	39	3.41	3.50	21.00	166.88	108.50	84.00	14.26	10.85	1.29	35.22	8.00	3.17	25.08	89.43
8-S	1	3.41	8.96	18.90	171.92	108.78	80.92	12.40	8.99	0.80	35.22	8.00	2.36	25.16	97.90
8-B	38	8.37	6.30	11.76	183.68	106.96	88.90	13.02	4.65	1.45	35.22	7.99	2.49	25.09	90.65
9-S	1	4.65	1.54	8.96	172.20	109.62	99.12	12.09	7.44	1.22	35.23	8.00	3.21	25.20	95.27
9-B	38	2.17	3.78	16.52	169.12	110.46	90.16	14.26	12.09	1.64	35.22	8.00	2.76	25.06	86.50
10-S	1	0.31	2.24	10.22	158.48	112.00	99.54	14.26	13.95	1.26	35.23	8.00	3.27	25.18	96.36
10-B	41	4.96	4.06	11.62	156.52	105.14	89.46	13.64	8.68	1.18	35.23	8.00	2.54	25.04	89.86
11-S	1	4.96	2.52	7.28	166.88	105.98	96.18	12.09	7.13	1.03	35.23	8.00	2.84	25.22	93.14
11-B	38	1.86	1.68	19.04	183.68	110.74	90.02	8.99	7.13	1.07	35.23	8.01	2.75	25.09	85.14
12-S	1	4.34	3.50	11.34	174.72	105.42	90.58	13.95	9.61	0.60	35.20	8.01	2.85	25.20	93.86
12-B	39	4.96	2.94	5.32	159.88	99.68	91.42	13.64	8.68	1.04	35.22	8.01	3.41	25.06	83.62
EMBAYMENTS	DRY	10%	14.00	8.50	-	250.00		40.00		1.00	*	**	1.50	***	****
		2%	25.00	15.00	-	350.00		60.00		1.50	*	**	3.00	***	****
	WET	10%	20.00	13.00	-	350.00		50.00		3.00	*	**	4.50	***	****
		2%	35.00	20.00	-	500.00		75.00		5.00	*	**	8.50	***	****
OPEN COASTAL WATERS	DRY	10%	10.00	5.00	-	180.00		30.00		0.50	*	**	0.50	***	****
		2%	20.00	9.00	-	250.00		45.00		1.00	*	**	1.00	***	****
	WET	10%	14.00	8.50	-	250.00		40.00		1.25	*	**	0.90	***	****
		2%	25.00	15.00	-	350.00		60.00		2.00	*	**	1.75	***	****

*= Salinity shall not vary more than 10% from natural or seasonal changes considering hydrologic input and oceanog
**= pH shall not deviate more than 0.5 units from a value of 8.1.
***= Temperature shall not vary more than one degree C. from ambient conditions.
****= Dissolved Oxygen not less than 75% saturation

µg/L = micrograms per liter
ntu = nephelometric turbidity units
DOH = Department of Health
WQS = water quality standards

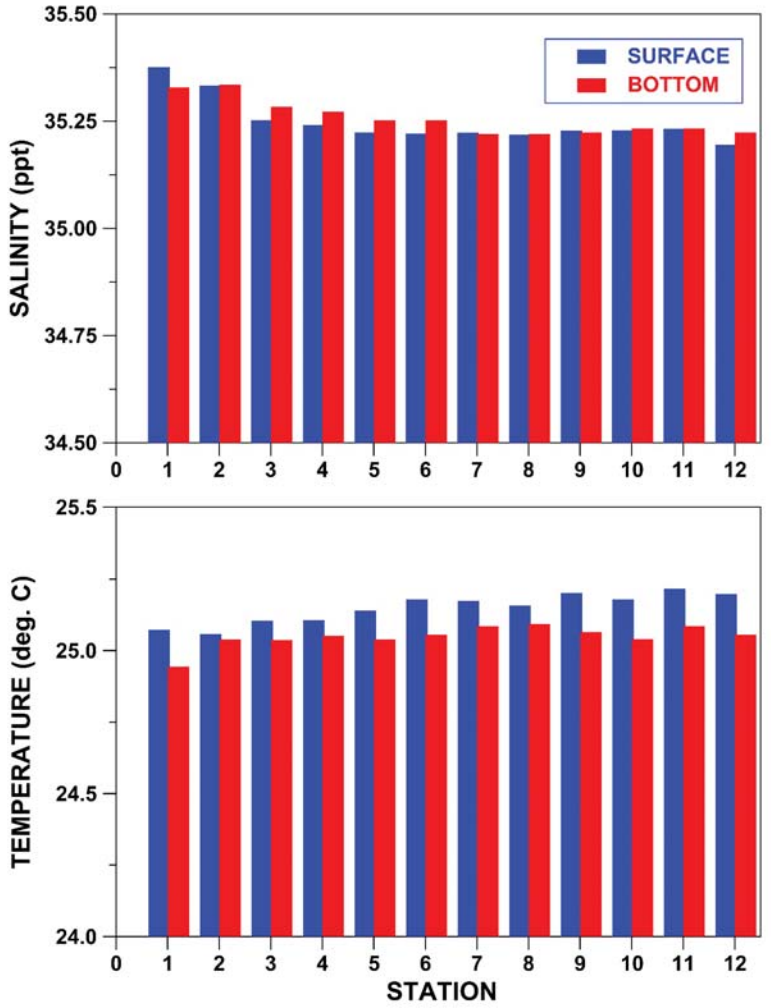

FIGURE 18. Bar graphs showing salinity (top) and temperature (bottom) in Kalaeloa Barbers Point Harbor sampled on January 21, 2014. For locations of sampling stations, see Figure 3.

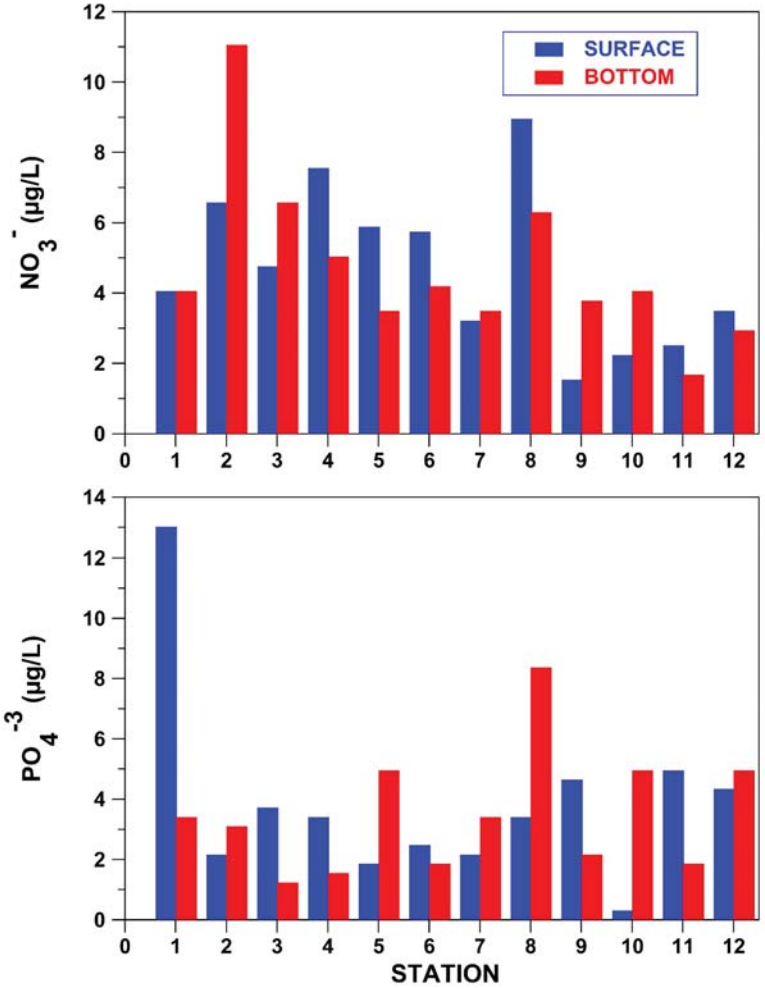

FIGURE 19. Bar graphs showing concentrations of nitrate nitrogen (top) and phosphate phosphorus (bottom) in Kalaealoa Barbers Point Harbor sampled on January 21, 2014. For locations of sampling stations, see Figure 3.

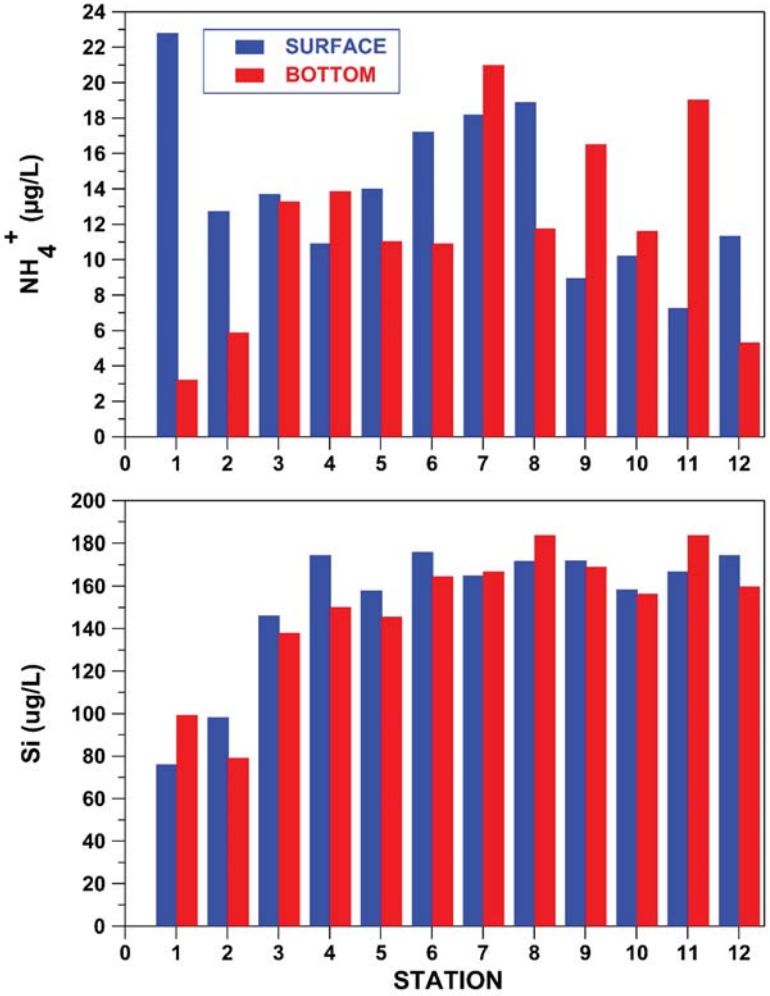

FIGURE 20. Bar graphs showing concentrations of ammonium nitrogen (top) and silica (bottom) in Kalaeloa Barbers Point Deep Draft Harbor sampled on January 21, 2014. For locations of sampling stations, see Figure 3.

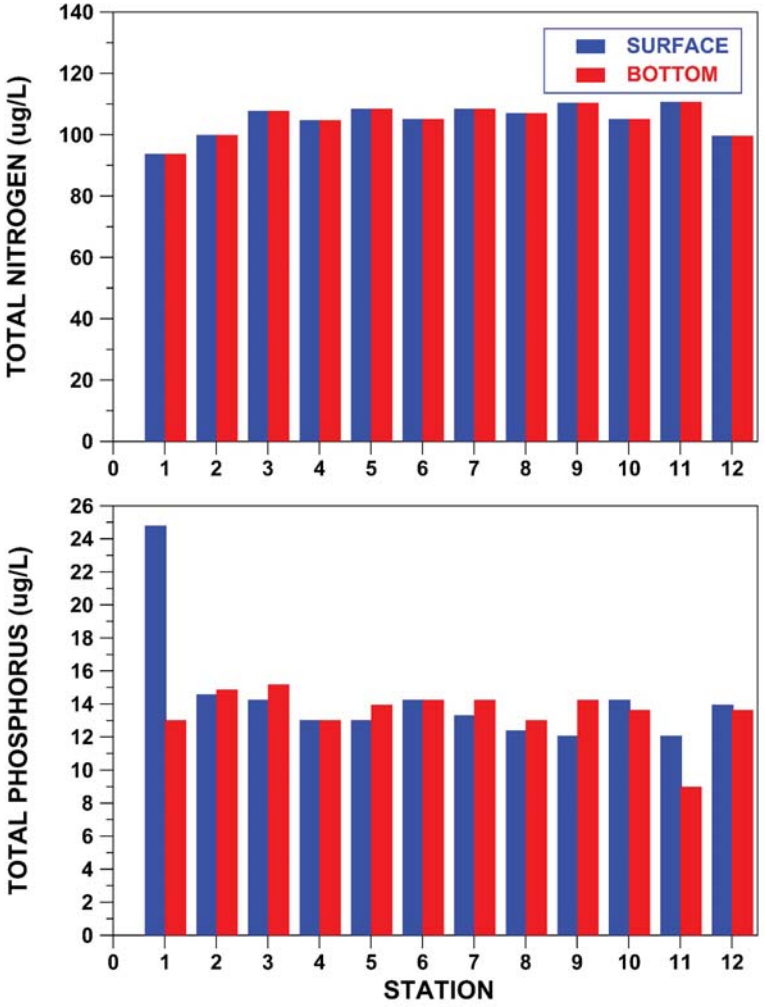

FIGURE 21. Bar graphs showing concentrations of total nitrogen (top) and total phosphorus (bottom) in Kalaeloa Barbers Point Harbor sampled on January 21, 2014. For locations of sampling stations, see Figure 3.

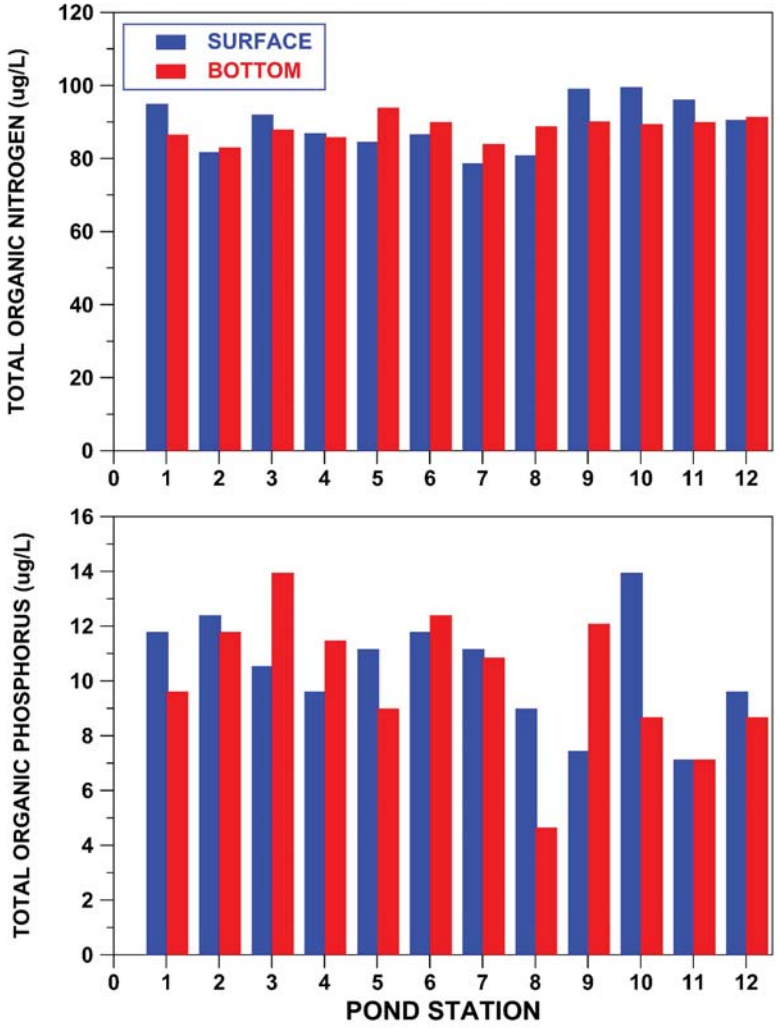

FIGURE 22. Bar graphs showing concentrations of total organic nitrogen (top) and total organic phosphorus (bottom) in Kalaeloa Barbers Point Harbor sampled on January 21, 2014. For locations of sampling stations, see Figure 3.

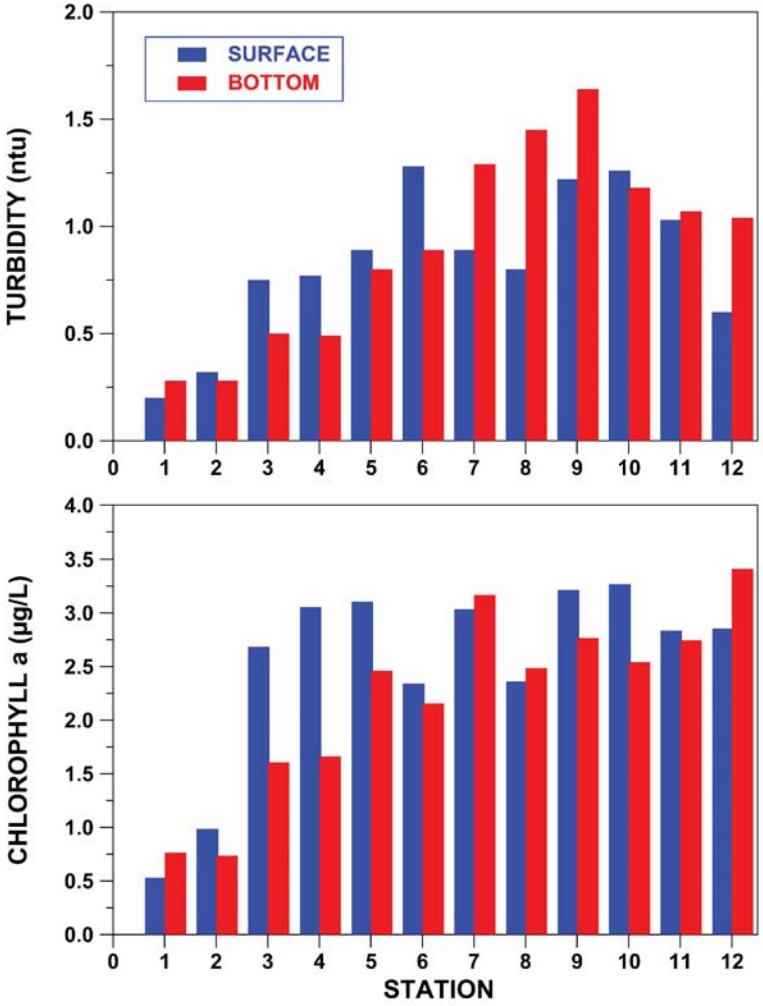

FIGURE 23. Bar graphs showing turbidity (top) and Chlorophyll a (bottom) in Kalaeloa Barbers Point Harbor sampled on January 21, 2014. For locations of sampling stations, see Figure 3.

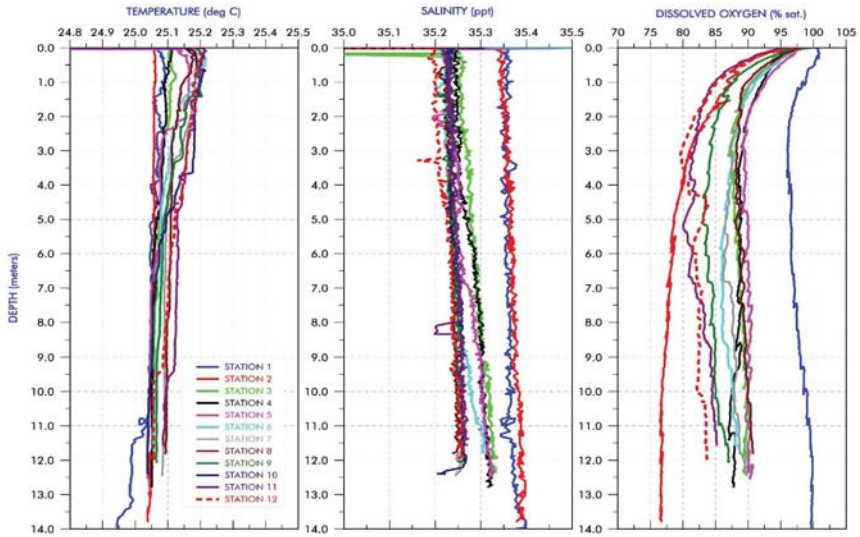

FIGURE 24. Vertical profiles of temperature, salinity and dissolved oxygen at 12 sampling stations within Kalaeloa Barbers Point Harbor acquired on January 21, 2014. For locations of sampling stations, see Figure 3.

The overall results of the water chemistry assessment indicate several themes. First, there is a definite input of fresh water, likely as groundwater discharge through the sides of the Harbor walls that results in slight depression of salinity throughout the Harbor Basin. The lack of distinct vertical or horizontal gradients, however, indicates that freshwater input is relatively small and well mixed with respect to the residence time of water within the Harbor basin. While groundwater generally contains higher concentrations of inorganic plant nutrients (particularly NO_3^- and PO_4^{3-}), the concentrations of these constituents is not substantially elevated in Harbor waters, likely as a result of uptake by resident plankton populations. It can be seen in Table 13 that no values of NO_3^- exceed any of the State of Hawaii water quality standards. However, the concentrations of ammonium nitrogen (NH_4^+), which is the form of nitrogen that is not generally elevated in groundwater, but is a by-product of biotic metabolism is elevated throughout the Harbor, as are the concentrations of Chlorophyll ***a***. Inspection of Table 13 reveals that nearly all of the values of NH_4^+ and Chlorophyll ***a*** exceed some of the DOH standards. These results suggest that there is a relatively long residence time of water within the Harbor basin which is sufficient to allow uptake of inorganic nutrients by plankton populations. As a result, the elevated populations of phytoplankton, as well as input of inorganic particulates, such as dust deposited from wind transport and soil from storm drainage, result in high turbidity of Harbor waters.

D. Sediment Analyses

Harbor sediments were collected and analyzed at three sites off the proposed site of the fuel pier. Such preliminary sediment testing results can serve as a baseline for a more detailed sediment assessment program during later stages of planning. Appendix B consists of the entire laboratory report detailing the results of analyses of sediment materials collected at the three stations off the proposed fuel pier (Figure 4). Table 14 shows the constituents of the sediment analysis with values greater than the detection limits along with the reporting limit and minimum detection limit for the analysis of each noted constituent. Of the materials that were present in sediments, oil and grease occurred at all three sites in quantities between 36 and 60 mg/kg. Total Recoverable Petroleum Hydrocarbons (TRPH) were present at Sites 1 and 2 (21, 31 mg/kg, respectively).

Analysis by inductively coupled plasma-mass spectrometry (IPC-MS) revealed the presence of most metals with the exception of selenium. The highest concentrations were of copper, chromium, lead, nickel and zinc. Mercury was present at all three sites at concentrations of 0.029 to 0.036 mg/kg, close to the reporting limits of 0.030 to 0.0397 mg/kg (Table 14). No organotin compounds or organochloride pesticides were detected.

Of the semivolative organic compounds, of the eleven that were detected about the reporting limit, the highest values occurred for dimethyl phthalate which occurred at all three sites at concentrations ranging from 110 to 210 µg/kg. Dimethyl phthalate has many uses, including solid rocket propellants, plastics and insect repellants. However, the source in the sediments of Barbers Point is not readily apparent.

Analyses of sediment particle size composition indicated that the predominant materials at all three sites were silt and clays which accounted for between 85% (Site 1) and 100% (Site 2) of sediment.

TABLE 14. Summary of analyses of sediment from three locations off proposed fuel pier site in Kalaeloa Barbers Point Harbor showing only constituents with results with numerical values above detection limits. For locations of sediment sampling sites, see Figure 4.

Constituent	Site 1	Site 2	Site 3
Sulfide (total) (mg/kg)	0.32	0.18	0.2
Total Organic Carbon (%)	1.3	1.6	1.6
Solids (total) (%)	62.3	56.0	50.5
Ammonia (N) (mg/kg)	3.4	3.0	3.0
Oil & Grease (mg/kg)	47	60	36
TRPH (mg/kg)	21	31	nd
EPA 6020 (mg/kg)			
Arsenic	5.17	5.88	6.3
Barium	9.38	11	12.8
Cadmium	0.312	0.34	0.346
Chromium	35	39.6	41.4
Copper	30.8	40.5	45
Lead	6.73	8.48	9.11
Nickel	24.9	29	30.5
Selenium	nd	nd	nd
Silver	nd	0.0567	nd
Zinc	62.2	71.9	78.8
Mercury	0.031	0.0293	0.036
EPA 8081A (µg/kg) (organochlorine pesticides)	nd	nd	nd
EPA 8270D (µg/kg) (semivolatile organics)			
Permethrin (cis/trans)	1.1	1.4	1.4
EPA 8270C (µg/kg) (semivolatile organics)			
Benzo (g,h,i) Perylene	6.8		
Bis(2-Ethylhexyl) Phthalate	53		
Dimethyl Phthalate	210	140	110
Naphthalene	7.4		
Pentachlorophenol	2.1		
Pyrene	10	11	
Bis(2-Ethylhexyl) Phthalate		66	66
Butyl Benzyl Phthalate		32	28
Fluoranthene		11	
Benzo (e) Pyrene		4.8	
Organotins(µg/kg)	nd	nd	nd
Total Silt & Clay (%)	85.29	100	93.05

IV. SUMMARY and CONCLUSIONS

Quantitative and qualitative results of field investigations were conducted in the areas of Kalaeloa Barbers Point Harbor that are the site of the proposed fuel pier. While several construction alternatives for the fuel piers are under consideration, all will result in significant alteration of the existing habitats at the site (Piers 3 and 4). Survey results of this area reveal a marine habitat that is not conducive to the development of coral reef communities, primarily as a result of sub-optimal physical conditions, particularly in terms of suspended and deposited sediment and restricted light availability. While the shorelines of the Harbor that were created by excavation of fossil reef material provide substantial hard bottom, the substratum is primarily barren rock. The excavated sloping edges of the Harbor basin are covered with a layer of sediment, restricting coral settlement. The floor of the harbor consists of a thick layer of sediment perforated by burrow holes.

While 109 coral colonies were documented to presently occur off Piers 3 and 4, all were essentially small isolated colonies located in a narrow band at the base of the excavated shoreline. No large colonies greater than 80 cm in diameter were noted, and no multi-colony aggregates that typify reefs in more areas of more optimal physical conditions were observed.

As the number of corals within the project footprint is relatively small, and the growth form of most of the corals allows for easy removal from their points of attachment, a potential mitigative measure could be transplanting to a nearby suitable habitat.

Coral communities on the outside of the structure that forms Piers 3 and 4 are far more well developed than on the inside of the Harbor, although these communities are limited in composition by impacts of seasonal large waves. Based on project planning, however, these areas of the Harbor will not be directly affected by the proposed fuel pier.

Other biotic components of the area are also limited in distribution. Few motile macrobenthos were observed, nor was frondose algae abundant. Of the populations of reef fish observed, the numbers and biomass were relatively low, with no community components representing a substantial recreational or valued resource. While protected species, particularly turtles and monk seals have been observed on rare occasions within the Harbor, it cannot be considered a preferred habitat.

Results of analyses of water in the Harbor and entrance channel indicate that there is some mixing of groundwater emanating from discharge from land with marine waters within the Harbor Basin. Relatively slow flushing resulting in extended residence time of water in the Harbor results in high standing stocks of phytoplankton. The combination of particulate material input from land and elevated phytoplankton result in highly turbid conditions in the Harbor Basin.

Preliminary analyses of sediment from the floor of the Harbor within the footprint of the project reveal detectable concentrations of oil and grease, and metals (particularly chromium, copper, lead, nickel and zinc). While several semi-volatile organic compounds were detected, only a single one (Dimethyl phthalate) occurred in relatively high

concentrations. No organotins, organochlorine pesticides, or PCB's were detected. These preliminary sediment testing results can serve as a baseline for preparation of a more detailed and comprehensive sediment assessment program.

In conclusion, results of the assessment of the marine environment fronting the proposed site of the fueling facility at Piers 3 and 4 reveal a biotic community of very limited extent, both in terms of numbers and diversity of organisms. Owing to the limited size of the coral community, these individuals do not likely provide a significant component to reef integrity of areas outside the Harbor, where coral resources are far more abundant and diverse. The area does not likely contain the potential for impacts to protected marine species, or regulated species. Mitigation plans could provide for minimal net loss of coral reef resources.

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APPENDIX A.

Coral Photos at GPS Waypoints
Sectors C, D, and E
Kalaeloa Barbers Point Harbor
January 2014


WP 328


WP 329


WP 332


WP 333



WP 340



WP 343



WP 344



WP 344



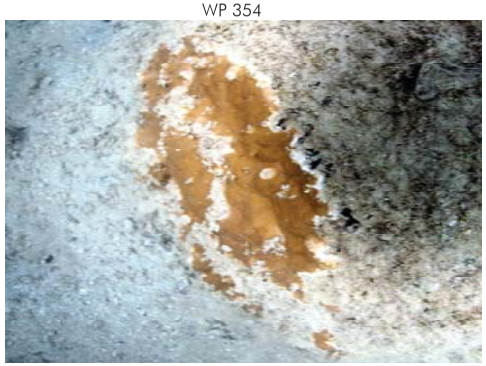
WP 353



WP 354



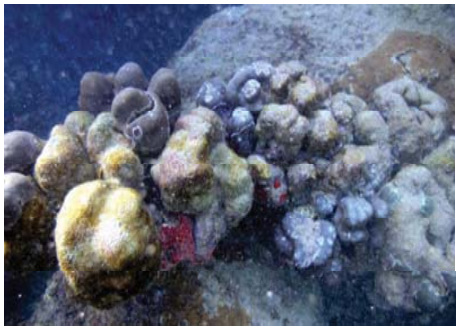
WP 351



WP 351



WP 348



WP 350



WP 350



WP 354



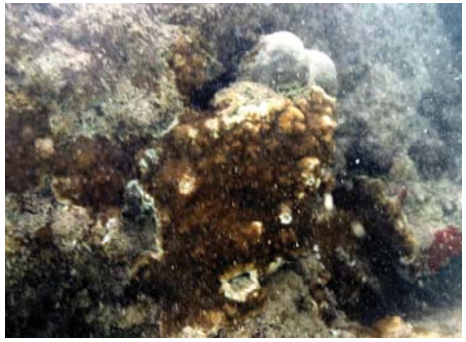
WP 355



WP 355



WP 355



WP 355



WP 357



WP 359



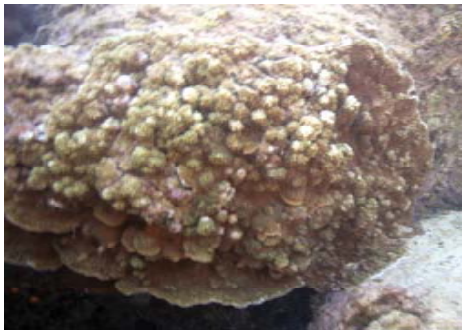
WP 360



WP 360



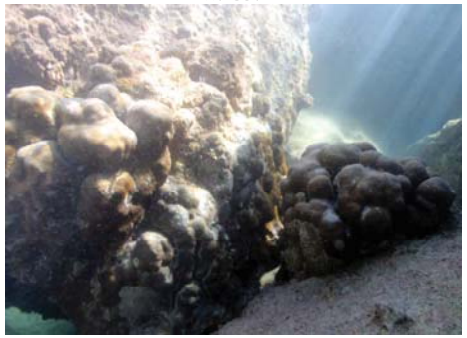
WP 361



WP 361



WP 361



WP 361



WP 361



WP 361



WP 363



WP 364



WP 364



WP 365



WP 367



WP 368



WP 368



WP 368



WP 370



WP 371



WP 372



WP 373



WP 374



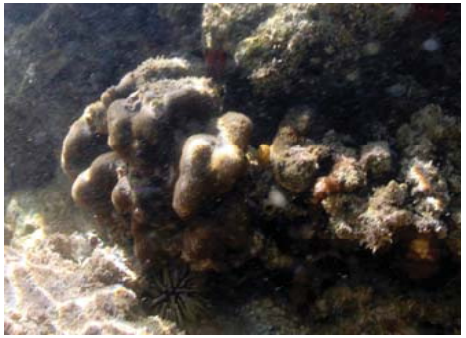
WP 375



WP 376



WP 377



WP 377



WP 377



WP 377



WP 378



WP 378



WP 378



WP 377



WP 378



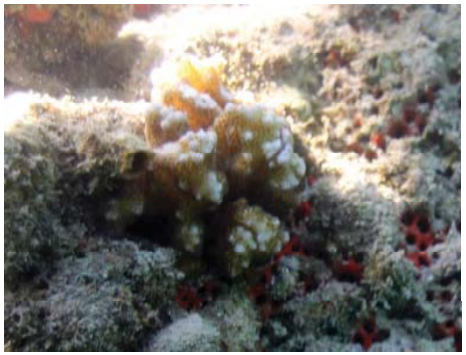
WP 378



WP 379



WP 379



WP 380



WP 380



WP 381



WP 382



WP 383



WP 384



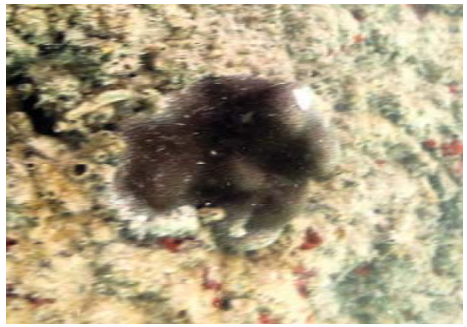
WP 386



WP 387



WP 388



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WP 391



WP 392



WP 394



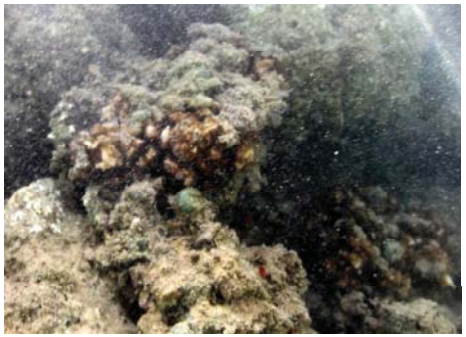
WP 395



WP 395



WP 395



WP 396



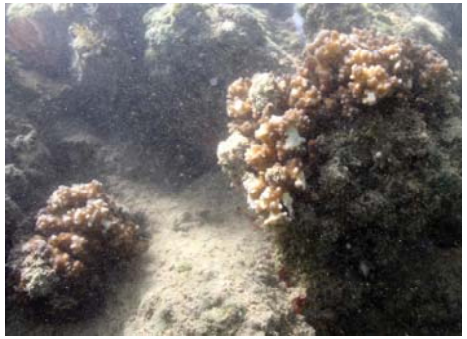
WP 396



WP 397



WP 397



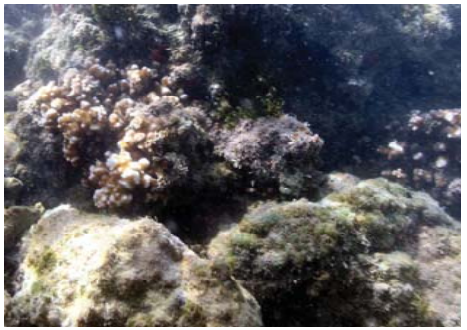
WP 398



WP 398



WP 400



WP 401



WP 401



WP 401



WP 402



WP 402



WP 403



WP 404



WP 405



WP 407



WP 407



WP 408



WP 411



WP 412



WP 413



WP 414



WP 414



WP 415



WP 415



WP 416



WP 417



WP 418



WP 419



WP 420



WP 421



WP 422



WP 423



WP 424

APPENDIX B.

Sediment Chemistry Report

Calsciences Environmental Lab

Kalaeloa Barbers Point Harbor

January 2014

Calscience Environmental Laboratories, Inc.

CALSCIENCE

WORK ORDER NUMBER: 14-01-1047

The difference is service



AIR | SOIL | WATER | MARINE CHEMISTRY

Analytical Report For

Client: Marine Research Consultants, Inc.

Client Project Name: BP HARBOR

Attention: Steve Dollar
1039 Waakaua Pl.
Honolulu, HI 96822-1173

Approved for release on 02/06/2014 by:
Danielle Gonsman
Project Manager

ResultLink

Email your PM

nelac

Calscience Environmental Laboratories, Inc. (Calscience) certifies that the test results provided in this report meet all NELAC requirements for parameters for which accreditation is required or available. Any exceptions to NELAC requirements are noted in the case narrative. The original report of subcontracted analyses, if any, is attached to this report. The results in this report are limited to the sample(s) tested and any reproduction thereof must be made in its entirety. The client or recipient of this report is specifically prohibited from making material changes to said report and, to the extent that such changes are made, Calscience is not responsible, legally or otherwise. The client or recipient agrees to indemnify Calscience for any defense to any litigation which may arise.

Calscience Environmental Laboratories, Inc.

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Work Order Number: 14-01-1047

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Calscience Environmental Laboratories, Inc.

CASE NARRATIVE

Calscience Work Order No.: 14-01-1047
Project ID: BP Harbor

Provided below is a narrative of our analytical effort, including any unique features or anomalies encountered as part of the analysis of the sediment samples.

Sample Condition on Receipt

Three sediment samples were received for this project on January 18, 2014. The samples were transferred to the laboratory in an ice-chest with wet ice, following strict chain-of-custody (COC) procedures. The temperature of the samples upon receipt at the laboratory was 1.6°C. All samples were given laboratory identification numbers, logged into the Laboratory Information Management System (LIMS) and then stored under refrigeration pending chemistry testing.

Tests Performed

Total Solids by SM 2540B (M)
Dissolved Sulfide by EPA 376.2M
Total Sulfide by EPA 9030B/9034
Ammonia by SM 4500-NH3 B/C (M)
Oil and Grease by EPA 413.2M
TRPH by EPA 418.1M
Trace Metals by EPA 6020/7471A
Chlorinated Pesticides by EPA 8081A
PCB Congeners by EPA 8270C SIM
C6-C44 Carbon Chain by EPA 8015B (M)
PAHs, Phenols and Phthalates by EPA 8270C SIM
Total Organic Carbon by EPA 9060A
Organotins by Krone et al.
Particle size by ASTM D4464 (M)
Pyrethroids by EPA 8270D (M)/TQ/EI

Data Summary

The sediment sample results and reporting limits were dry weight corrected.

All samples were homogenized prior to preparation and analysis.

Holding times

All holding times were met with the following exceptions.

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Calscience Environmental Laboratories, Inc.

Calibration

Frequency and control criteria for initial and continuing calibration verifications were met.

Reporting Limits

All Method Detection Limits were met. The results were evaluated to the MDL, and where applicable, "J" flags were reported.

Blanks

Concentrations of target analytes in the method blank were found to be below reporting limits for all testing with the following exceptions. A trace amount of bis(2-Ethylhexyl)phthalate and Dimethylphthalate were found in the EPA 8270C Method Blank. The sample results have been flagged with a "B".

Laboratory Control Samples

A Laboratory Control Sample (LCS) analysis was performed at the required frequencies, and unless otherwise noted, all parameters were within the established control limits.

The Phenol recovery was in the ME range, as was the PCB118 recovery. Since one ME is allowed for each of these analyses the data is released as is.

Matrix Spikes

Matrix spike analyses were performed for each applicable analysis on project samples. All parameters for the project sample matrix spikes were within the established control limits with the following exceptions.

The TOC MS recovery was low outside of established control limits for the Pyrethroids. The results have been flagged with the appropriate qualifiers and are released with no further action since the associated LCS recovery was in control.

Surrogates

Surrogate recoveries for all applicable tests and samples were within the established control limits.

Acronyms

LCS - Laboratory Control Sample
PDS - Post Digestion Spike
MS/MSD- Matrix Spike/Matrix Spike Duplicate
RPD- Relative Percent Difference

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Calscience Environmental Laboratories, Inc.

Work Order Narrative

Work Order: 14-01-1047 Page 1 of 1

Condition Upon Receipt:

Samples were received under Chain of Custody (COC) on 01/18/14. They were assigned to Work Order 14-01-1047.

Unless otherwise noted on the Sample Receiving forms all samples were received in good condition and within the recommended EPA temperature criteria for the methods noted on the COC. The COC and Sample Receiving Documents are integral elements of the analytical report and are presented at the back of the report.

Holding Times:

All samples were analyzed within prescribed holding times (HT) and/or in accordance with the Calscience Sample Acceptance Policy unless otherwise noted in the analytical report and/or comprehensive case narrative, if required.

Any parameter identified in 40CFR Part 136.3 Table II that is designated as "analyze immediately" with a holding time of <= 15 minutes (40CFR-136.3 Table II, footnote 4), is considered a "field" test and the reported results will be qualified as being received outside of the stated holding time unless received at the laboratory within 15 minutes of the collection time.

Quality Control:

All quality control parameters (QC) were within established control limits except where noted in the QC summary forms or described further within this report.

Additional Comments:

Air - Sorbent-extracted air methods (EPA TO-4A, EPA TO-10, EPA TO-13A, EPA TO-17): Analytical results are converted from mass/sample basis to mass/volume basis using client-supplied air volumes.

New York NELAP air certification does not certify for all reported methods and analytes, reference the accredited items here: http://www.calscience.com/PDF/New_York.pdf

Solid - Unless otherwise indicated, solid sample data is reported on a wet weight basis, not corrected for % moisture. All QC results are always reported on a wet weight basis.

Subcontractor Information:

Unless otherwise noted below (or on the subcontract form), no samples were subcontracted.

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Calscience Environmental Laboratories, Inc.

Sample Summary

Client: Marine Research Consultants, Inc.
1039 Waakaua Pl.
Honolulu, HI 96822-1173

Work Order: 14-01-1047
Project Name: BP HARBOR
PO Number:
Date/Time Received: 01/18/14 11:50
Number of Containers: 6

Attn: Steve Dollar

Sample Identification	Lab Number	Collection Date and Time	Number of Containers	Matrix
BP-1	14-01-1047-1	01/17/14 08:15	2	Sediment
BP-2	14-01-1047-2	01/17/14 08:22	2	Sediment
BP-3	14-01-1047-3	01/17/14 08:30	2	Sediment

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Calscience Environmental Laboratories, Inc.

Analytical Report

Marine Research Consultants, Inc.
1039 Waakaua Pl.
Honolulu, HI 96822-1173

Date Received: 01/18/14
Work Order: 14-01-1047
Preparation: N/A
Method: EPA 376.2M
Units: mg/kg

Project: BP HARBOR

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
BP-1	**14-01-1047-1-A**	**01/17/14 08:15**	**Sediment**	**N/A**	**01/23/14**	**01/23/14 16:42**	**E0123SL2**

Comment(s): - Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qualifiers
Sulfide, Total	0.32	0.16	1	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
BP-2	**14-01-1047-2-A**	**01/17/14 08:22**	**Sediment**	**N/A**	**01/23/14**	**01/23/14 16:42**	**E0123SL2**

Comment(s): - Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qualifiers
Sulfide, Total	0.18	0.18	1	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
BP-3	**14-01-1047-3-A**	**01/17/14 08:30**	**Sediment**	**N/A**	**01/23/14**	**01/23/14 16:42**	**E0123SL2**

Comment(s): - Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qualifiers
Sulfide, Total	0.20	0.20	1	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	**099-10-035-70**	**N/A**	**Solid**	**N/A**	**01/23/14**	**01/23/14 16:42**	**E0123SL2**

Parameter	Result	RL	DF	Qualifiers
Sulfide, Total	ND	0.10	1	

Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Calscience Environmental Laboratories, Inc.

Analytical Report

Marine Research Consultants, Inc.
1039 Waakaua Pl.
Honolulu, HI 96822-1173

Date Received: 01/18/14
Work Order: 14-01-1047
Preparation: N/A
Method: EPA 376.2M
Units: mg/kg

Project: BP HARBOR

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
BP-1	**14-01-1047-1-A**	**01/17/14 08:15**	**Sediment**	**N/A**	**01/18/14**	**01/18/14 15:30**	**E0118DSL1**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Sulfide, Dissolved	ND	0.10	0.017	1	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
BP-2	**14-01-1047-2-A**	**01/17/14 08:22**	**Sediment**	**N/A**	**01/18/14**	**01/18/14 15:30**	**E0118DSL1**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Sulfide, Dissolved	ND	0.10	0.017	1	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
BP-3	**14-01-1047-3-A**	**01/17/14 08:30**	**Sediment**	**N/A**	**01/18/14**	**01/18/14 15:30**	**E0118DSL1**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Sulfide, Dissolved	ND	0.10	0.017	1	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	**099-14-095-73**	**N/A**	**Solid**	**N/A**	**01/18/14**	**01/18/14 15:30**	**E0118DSL1**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Sulfide, Dissolved	ND	0.10	0.017	1	

Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Calscience Environmental Laboratories, Inc.

Analytical Report

Marine Research Consultants, Inc.
1039 Waakaua Pl.
Honolulu, HI 96822-1173

Date Received: 01/18/14
Work Order: 14-01-1047
Preparation: N/A
Method: EPA 9060A
Units: %

Project: BP HARBOR

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
BP-1	**14-01-1047-1-A**	**01/17/14 08:15**	**Sediment**	**TOC 4**	**01/22/14**	**01/22/14 17:59**	**E0122TOCL1**

Comment(s): - Results are reported on a dry weight basis.
- Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Carbon, Total Organic	1.3	0.080	0.019	1	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
BP-2	**14-01-1047-2-A**	**01/17/14 08:22**	**Sediment**	**TOC 4**	**01/22/14**	**01/22/14 17:59**	**E0122TOCL1**

Comment(s): - Results are reported on a dry weight basis.
- Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Carbon, Total Organic	1.6	0.089	0.022	1	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
BP-3	**14-01-1047-3-A**	**01/17/14 08:30**	**Sediment**	**TOC 4**	**01/22/14**	**01/22/14 17:59**	**E0122TOCL1**

Comment(s): - Results are reported on a dry weight basis.
- Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Carbon, Total Organic	1.6	0.099	0.024	1	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	**099-06-013-958**	**N/A**	**Solid**	**TOC 4**	**01/22/14**	**01/22/14 17:59**	**E0122TOCL1**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Carbon, Total Organic	ND	0.050	0.012	1	

Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Calscience Environmental Laboratories, Inc.

Analytical Report

Marine Research Consultants, Inc.
1039 Waakaua Pl.
Honolulu, HI 96822-1173

Date Received: 01/18/14
Work Order: 14-01-1047
Preparation: N/A
Method: SM 2540 B (M)
Units: %

Project: BP HARBOR

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
BP-1	**14-01-1047-1-B**	**01/17/14 08:15**	**Sediment**	**N/A**	**01/21/14**	**01/21/14 17:30**	**E0121TSB1**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Solids, Total	62.3	0.100	0.100	1	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
BP-2	**14-01-1047-2-B**	**01/17/14 08:22**	**Sediment**	**N/A**	**01/21/14**	**01/21/14 17:30**	**E0121TSB1**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Solids, Total	56.0	0.100	0.100	1	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
BP-3	**14-01-1047-3-B**	**01/17/14 08:30**	**Sediment**	**N/A**	**01/21/14**	**01/21/14 17:30**	**E0121TSB1**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Solids, Total	50.5	0.100	0.100	1	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	**099-05-019-2467**	**N/A**	**Solid**	**N/A**	**01/21/14**	**01/21/14 17:30**	**E0121TSB1**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Solids, Total	ND	0.100	0.100	1	

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Calscience Environmental Laboratories, Inc.

Analytical Report

Marine Research Consultants, Inc.
1039 Waakaua Pl.
Honolulu, HI 96822-1173

Date Received: 01/18/14
Work Order: 14-01-1047
Preparation: N/A
Method: SM 4500-NH3 B/C (M)
Units: mg/kg

Project: BP HARBOR

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
BP-1	**14-01-1047-1-A**	**01/17/14 08:15**	**Sediment**	**BUR05**	**01/29/14**	**01/29/14 11:21**	**E0129NH3L1**

Comment(s): - Results are reported on a dry weight basis.
- Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Ammonia (as N)	3.4	0.32	0.18	1	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
BP-2	**14-01-1047-2-A**	**01/17/14 08:22**	**Sediment**	**BUR05**	**01/29/14**	**01/29/14 11:21**	**E0129NH3L1**

Comment(s): - Results are reported on a dry weight basis.
- Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Ammonia (as N)	3.0	0.36	0.20	1	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
BP-3	**14-01-1047-3-A**	**01/17/14 08:30**	**Sediment**	**BUR05**	**01/29/14**	**01/29/14 11:21**	**E0129NH3L1**

Comment(s): - Results are reported on a dry weight basis.
- Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Ammonia (as N)	3.0	0.40	0.22	1	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	**099-12-816-80**	**N/A**	**Solid**	**BUR05**	**01/29/14**	**01/29/14 11:21**	**E0129NH3L1**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Ammonia (as N)	ND	0.20	0.11	1	

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

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Calscience Environmental Laboratories, Inc.

Analytical Report

Marine Research Consultants, Inc.
1039 Waakaua Pl.
Honolulu, HI 96822-1173

Date Received: 01/18/14
Work Order: 14-01-1047
Preparation: Extraction
Method: EPA 413.2M
Units: mg/kg

Project: BP HARBOR

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
BP-1	**14-01-1047-1-A**	**01/17/14 08:15**	**Sediment**	**IR 2**	**01/22/14**	**01/23/14 17:20**	**140122L02**

Comment(s): - Results are reported on a dry weight basis.
- Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Oil and Grease	47	16	15	1	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
BP-2	**14-01-1047-2-A**	**01/17/14 08:22**	**Sediment**	**IR 2**	**01/22/14**	**01/23/14 17:20**	**140122L02**

Comment(s): - Results are reported on a dry weight basis.
- Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Oil and Grease	60	18	16	1	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
BP-3	**14-01-1047-3-A**	**01/17/14 08:30**	**Sediment**	**IR 2**	**01/22/14**	**01/23/14 17:20**	**140122L02**

Comment(s): - Results are reported on a dry weight basis.
- Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Oil and Grease	36	20	18	1	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	**099-07-019-151**	**N/A**	**Solid**	**IR 2**	**01/22/14**	**01/23/14 17:20**	**140122L02**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Oil and Grease	ND	10	9.2	1	

Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Calscience Environmental Laboratories, Inc.

Analytical Report

Marine Research Consultants, Inc.
1039 Waakaua Pl.
Honolulu, HI 96822-1173

Date Received: 01/18/14
Work Order: 14-01-1047
Preparation: Extraction
Method: EPA 418.1M
Units: mg/kg

Project: BP HARBOR

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
BP-1	**14-01-1047-1-A**	**01/17/14 08:15**	**Sediment**	**IR 2**	**01/22/14**	**01/23/14 17:20**	**140122L01**

Comment(s): - Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qualifiers
TRPH	21	16	1	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
BP-2	**14-01-1047-2-A**	**01/17/14 08:22**	**Sediment**	**IR 2**	**01/22/14**	**01/23/14 17:20**	**140122L01**

Comment(s): - Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qualifiers
TRPH	31	18	1	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
BP-3	**14-01-1047-3-A**	**01/17/14 08:30**	**Sediment**	**IR 2**	**01/22/14**	**01/23/14 17:20**	**140122L01**

Comment(s): - Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qualifiers
TRPH	ND	20	1	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	**099-07-015-1974**	**N/A**	**Solid**	**IR 2**	**01/22/14**	**01/23/14 17:20**	**140122L01**

Parameter	Result	RL	DF	Qualifiers
TRPH	ND	10	1	

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Calscience Environmental Laboratories, Inc.

Analytical Report

Marine Research Consultants, Inc.
1039 Waakaua Pl.
Honolulu, HI 96822-1173

Date Received: 01/18/14
Work Order: 14-01-1047
Preparation: EPA 3550B
Method: EPA 8015B (M)
Units: mg/kg

Project: BP HARBOR

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
BP-1	**14-01-1047-1-AA**	**01/17/14 08:15**	**Sediment**	**GC 48**	**01/21/14**	**01/22/14 05:08**	**140121B08**

Comment(s): - Results are reported on a dry weight basis.
- Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
C6	ND	8.0	0.33	1	
C7	ND	8.0	3.7	1	
C8	ND	8.0	3.9	1	
C9-C10	ND	8.0	4.9	1	
C11-C12	ND	8.0	2.8	1	
C13-C14	ND	8.0	2.8	1	
C15-C16	ND	8.0	2.9	1	
C17-C18	ND	8.0	2.9	1	
C19-C20	ND	8.0	2.9	1	
C21-C22	ND	8.0	2.8	1	
C23-C24	ND	8.0	2.7	1	
C25-C28	ND	8.0	3.9	1	
C29-C32	ND	8.0	3.9	1	
C33-C36	ND	8.0	4.1	1	
C37-C40	ND	8.0	2.6	1	
C41-C44	ND	8.0	2.4	1	
C6-C44 Total	ND	8.0	7.7	1	

Surrogate	Rec. (%)	Control Limits	Qualifiers
n-Octacosane	117	61-145	

Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Calscience Environmental Laboratories, Inc.

Analytical Report

Marine Research Consultants, Inc.
1039 Waakaua Pl.
Honolulu, HI 96822-1173

Date Received: 01/18/14
Work Order: 14-01-1047
Preparation: EPA 3550B
Method: EPA 8015B (M)
Units: mg/kg

Project: BP HARBOR

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
BP-2	**14-01-1047-2-AA**	**01/17/14 08:22**	**Sediment**	**GC 48**	**01/21/14**	**01/22/14 05:24**	**140121B08**

Comment(s): - Results are reported on a dry weight basis.
- Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
C6	ND	8.9	0.37	1	
C7	ND	8.9	4.1	1	
C8	ND	8.9	4.3	1	
C9-C10	ND	8.9	5.5	1	
C11-C12	ND	8.9	3.1	1	
C13-C14	ND	8.9	3.1	1	
C15-C16	ND	8.9	3.2	1	
C17-C18	ND	8.9	3.2	1	
C19-C20	ND	8.9	3.3	1	
C21-C22	ND	8.9	3.1	1	
C23-C24	ND	8.9	3.0	1	
C25-C28	ND	8.9	4.3	1	
C29-C32	ND	8.9	4.3	1	
C33-C36	ND	8.9	4.6	1	
C37-C40	ND	8.9	2.8	1	
C41-C44	ND	8.9	2.7	1	
C6-C44 Total	ND	8.9	8.6	1	

Surrogate	Rec. (%)	Control Limits	Qualifiers
n-Octacosane	112	61-145	

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

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Analytical Report

Marine Research Consultants, Inc.
1039 Waakaua Pl.
Honolulu, HI 96822-1173

Date Received: 01/18/14
Work Order: 14-01-1047
Preparation: EPA 3550B
Method: EPA 8015B (M)
Units: mg/kg

Project: BP HARBOR

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
BP-3	**14-01-1047-3-AA**	**01/17/14 08:30**	**Sediment**	**GC 48**	**01/21/14**	**01/22/14 05:40**	**140121B08**

Comment(s): - Results are reported on a dry weight basis.
- Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
C6	ND	9.9	0.41	1	
C7	ND	9.9	4.5	1	
C8	ND	9.9	4.8	1	
C9-C10	ND	9.9	6.1	1	
C11-C12	ND	9.9	3.5	1	
C13-C14	ND	9.9	3.5	1	
C15-C16	ND	9.9	3.6	1	
C17-C18	ND	9.9	3.6	1	
C19-C20	ND	9.9	3.6	1	
C21-C22	ND	9.9	3.5	1	
C23-C24	ND	9.9	3.3	1	
C25-C28	ND	9.9	4.8	1	
C29-C32	ND	9.9	4.8	1	
C33-C36	ND	9.9	5.1	1	
C37-C40	ND	9.9	3.2	1	
C41-C44	ND	9.9	3.0	1	
C6-C44 Total	ND	9.9	9.5	1	

Surrogate	Rec. (%)	Control Limits	Qualifiers
n-Octacosane	118	61-145	

Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Calscience Environmental Laboratories, Inc.

Analytical Report

Marine Research Consultants, Inc.
1039 Waakaua Pl.
Honolulu, HI 96822-1173

Date Received: 01/18/14
Work Order: 14-01-1047
Preparation: EPA 3550B
Method: EPA 8015B (M)
Units: mg/kg

Project: BP HARBOR

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	**099-15-490-735**	**N/A**	**Solid**	**GC 48**	**01/21/14**	**01/22/14 04:05**	**140121B08**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
C6	ND	5.0	0.21	1	
C7	ND	5.0	2.3	1	
C8	ND	5.0	2.4	1	
C9-C10	ND	5.0	3.1	1	
C11-C12	ND	5.0	1.7	1	
C13-C14	ND	5.0	1.8	1	
C15-C16	ND	5.0	1.8	1	
C17-C18	ND	5.0	1.8	1	
C19-C20	ND	5.0	1.8	1	
C21-C22	ND	5.0	1.8	1	
C23-C24	ND	5.0	1.7	1	
C25-C28	ND	5.0	2.4	1	
C29-C32	ND	5.0	2.4	1	
C33-C36	ND	5.0	2.6	1	
C37-C40	ND	5.0	1.6	1	
C41-C44	ND	5.0	1.5	1	
C6-C44 Total	ND	5.0	4.8	1	

Surrogate	Rec. (%)	Control Limits	Qualifiers
n-Octacosane	113	61-145	

Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Calscience Environmental Laboratories, Inc.

Analytical Report

Marine Research Consultants, Inc.
1039 Waakaua Pl.
Honolulu, HI 96822-1173

Date Received: 01/18/14
Work Order: 14-01-1047
Preparation: EPA 3540C
Method: EPA 8270D (M)/TQ/EI
Units: ug/kg

Project: BP HARBOR

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
BP-1	**14-01-1047-1-AA**	**01/17/14 08:15**	**Sediment**	**GCTQ 1**	**01/27/14**	**01/28/14 19:34**	**140128L01**

Comment(s): - Results are reported on a dry weight basis.
- Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Allethrin	ND	0.80	0.41	1	
Bifenthrin	ND	0.80	0.15	1	
Cyfluthrin	ND	0.80	0.14	1	
Cypermethrin	ND	0.80	0.11	1	
Deltamethrin/Tralomethrin	ND	0.80	0.34	1	
Fenpropathrin	ND	0.80	0.058	1	
Fenvalerate/Esfenvalerate	ND	0.80	0.057	1	
Fluvalinate	ND	0.80	0.092	1	
Permethrin (cis/trans)	1.1	1.6	0.18	1	J
Phenothrin	ND	0.80	0.11	1	
Resmethrin/Bioresmethrin	ND	0.80	0.15	1	
Tetramethrin	ND	0.80	0.061	1	
lambda-Cyhalothrin	ND	0.80	0.070	1	

Surrogate	Rec. (%)	Control Limits	Qualifiers
trans-Permethrin(C13)	84	25-200	

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Calscience Environmental Laboratories, Inc.

Analytical Report

Marine Research Consultants, Inc.
1039 Waakaua Pl.
Honolulu, HI 96822-1173

Date Received: 01/18/14
Work Order: 14-01-1047
Preparation: EPA 3540C
Method: EPA 8270D (M)/TQ/EI
Units: ug/kg

Project: BP HARBOR

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
BP-2	**14-01-1047-2-AA**	**01/17/14 08:22**	**Sediment**	**GCTQ 1**	**01/27/14**	**01/28/14 20:11**	**140128L01**

Comment(s): - Results are reported on a dry weight basis.
- Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Allethrin	ND	0.89	0.46	1	
Bifenthrin	ND	0.89	0.17	1	
Cyfluthrin	ND	0.89	0.15	1	
Cypermethrin	ND	0.89	0.12	1	
Deltamethrin/Tralomethrin	ND	0.89	0.37	1	
Fenpropathrin	ND	0.89	0.065	1	
Fenvalerate/Esfenvalerate	ND	0.89	0.063	1	
Fluvalinate	ND	0.89	0.10	1	
Permethrin (cis/trans)	1.4	1.8	0.20	1	J
Phenothrin	ND	0.89	0.12	1	
Resmethrin/Bioresmethrin	ND	0.89	0.16	1	
Tetramethrin	ND	0.89	0.067	1	
lambda-Cyhalothrin	ND	0.89	0.078	1	

Surrogate	Rec. (%)	Control Limits	Qualifiers
trans-Permethrin(C13)	81	25-200	

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

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Calscience Environmental Laboratories, Inc.

Analytical Report

Marine Research Consultants, Inc.
1039 Waakaua Pl.
Honolulu, HI 96822-1173

Date Received: 01/18/14
Work Order: 14-01-1047
Preparation: EPA 3540C
Method: EPA 8270D (M)/TQ/EI
Units: ug/kg

Project: BP HARBOR

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
BP-3	**14-01-1047-3-AA**	**01/17/14 08:30**	**Sediment**	**GCTQ 1**	**01/27/14**	**01/28/14 20:47**	**140128L01**

Comment(s): - Results are reported on a dry weight basis.
- Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Allethrin	ND	0.99	0.51	1	
Bifenthrin	ND	0.99	0.19	1	
Cyfluthrin	ND	0.99	0.17	1	
Cypermethrin	ND	0.99	0.14	1	
Deltamethrin/Tralomethrin	ND	0.99	0.41	1	
Fenpropathrin	ND	0.99	0.072	1	
Fenvalerate/Esfenvalerate	ND	0.99	0.071	1	
Fluvalinate	ND	0.99	0.11	1	
Permethrin (cis/trans)	1.4	2.0	0.22	1	J
Phenothrin	ND	0.99	0.14	1	
Resmethrin/Bioresmethrin	ND	0.99	0.18	1	
Tetramethrin	ND	0.99	0.075	1	
lambda-Cyhalothrin	ND	0.99	0.086	1	

Surrogate	Rec. (%)	Control Limits	Qualifiers
trans-Permethrin(C13)	86	25-200	

Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Calscience Environmental Laboratories, Inc.

Analytical Report

Marine Research Consultants, Inc.
1039 Waakaua Pl.
Honolulu, HI 96822-1173

Date Received: 01/18/14
Work Order: 14-01-1047
Preparation: EPA 3540C
Method: EPA 8270D (M)/TQ/EI
Units: ug/kg

Project: BP HARBOR

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	**099-14-403-53**	**N/A**	**Sediment**	**GCTQ 1**	**01/27/14**	**01/28/14 18:58**	**140128L01**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Allethrin	ND	0.50	0.26	1	
Bifenthrin	ND	0.50	0.094	1	
Cyfluthrin	ND	0.50	0.085	1	
Cypermethrin	ND	0.50	0.069	1	
Deltamethrin/Tralomethrin	ND	0.50	0.21	1	
Fenpropathrin	ND	0.50	0.036	1	
Fenvalerate/Esfenvalerate	ND	0.50	0.036	1	
Fluvalinate	ND	0.50	0.057	1	
Permethrin (cis/trans)	ND	1.0	0.11	1	
Phenothrin	ND	0.50	0.069	1	
Resmethrin/Bioresmethrin	ND	0.50	0.092	1	
Tetramethrin	ND	0.50	0.038	1	
lambda-Cyhalothrin	ND	0.50	0.044	1	

Surrogate	Rec. (%)	Control Limits	Qualifiers
trans-Permethrin(C13)	82	25-200	

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

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Calscience Environmental Laboratories, Inc.

Analytical Report

Marine Research Consultants, Inc.
1039 Waakaua Pl.
Honolulu, HI 96822-1173

Date Received: 01/18/14
Work Order: 14-01-1047
Preparation: EPA 3050B
Method: EPA 6020
Units: mg/kg

Project: BP HARBOR

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
BP-1	**14-01-1047-1-AA**	**01/17/14 08:15**	**Sediment**	**ICP/MS 03**	**01/21/14**	**01/21/14 18:47**	**140121L04**

Comment(s): - Results are reported on a dry weight basis.
- Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Arsenic	5.17	0.161	0.140	1	
Barium	9.38	0.161	0.0677	1	
Cadmium	0.312	0.161	0.0919	1	
Chromium	35.0	0.161	0.0996	1	
Copper	30.8	0.161	0.0673	1	
Lead	6.73	0.161	0.106	1	
Nickel	24.9	0.161	0.0813	1	
Selenium	ND	0.161	0.117	1	
Silver	ND	0.161	0.0502	1	
Zinc	62.2	1.61	1.28	1	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
BP-2	**14-01-1047-2-AA**	**01/17/14 08:22**	**Sediment**	**ICP/MS 03**	**01/21/14**	**01/21/14 18:50**	**140121L04**

Comment(s): - Results are reported on a dry weight basis.
- Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Arsenic	5.88	0.179	0.156	1	
Barium	11.0	0.179	0.0753	1	
Cadmium	0.340	0.179	0.102	1	
Chromium	39.6	0.179	0.111	1	
Copper	40.5	0.179	0.0748	1	
Lead	8.48	0.179	0.118	1	
Nickel	29.0	0.179	0.0904	1	
Selenium	ND	0.179	0.130	1	
Silver	0.0567	0.179	0.0559	1	J
Zinc	71.9	1.79	1.42	1	

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Calscience Environmental Laboratories, Inc.

Analytical Report

Marine Research Consultants, Inc.
1039 Waakaua Pl.
Honolulu, HI 96822-1173

Date Received: 01/18/14
Work Order: 14-01-1047
Preparation: EPA 3050B
Method: EPA 6020
Units: mg/kg

Project: BP HARBOR

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
BP-3	**14-01-1047-3-AA**	**01/17/14 08:30**	**Sediment**	**ICP/MS 03**	**01/21/14**	**01/21/14 18:44**	**140121L04**

Comment(s): - Results are reported on a dry weight basis.
- Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Arsenic	6.30	0.198	0.173	1	
Barium	12.8	0.198	0.0835	1	
Cadmium	0.346	0.198	0.113	1	
Chromium	41.4	0.198	0.123	1	
Copper	45.0	0.198	0.0830	1	
Lead	9.11	0.198	0.130	1	
Nickel	30.5	0.198	0.100	1	
Selenium	ND	0.198	0.145	1	
Silver	ND	0.198	0.0620	1	
Zinc	78.8	1.98	1.57	1	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	**099-15-254-183**	**N/A**	**Solid**	**ICP/MS 03**	**01/21/14**	**01/21/14 18:12**	**140121L04**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Arsenic	ND	0.100	0.0873	1	
Barium	ND	0.100	0.0422	1	
Cadmium	ND	0.100	0.0572	1	
Chromium	ND	0.100	0.0621	1	
Copper	ND	0.100	0.0419	1	
Lead	ND	0.100	0.0659	1	
Nickel	ND	0.100	0.0506	1	
Selenium	ND	0.100	0.0731	1	
Silver	ND	0.100	0.0313	1	
Zinc	ND	1.00	0.795	1	

Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

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Calscience Environmental Laboratories, Inc.

Analytical Report

Marine Research Consultants, Inc.
1039 Waakaua Pl.
Honolulu, HI 96822-1173

Date Received: 01/18/14
Work Order: 14-01-1047
Preparation: EPA 7471A Total
Method: EPA 7471A
Units: mg/kg

Project: BP HARBOR

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
BP-1	**14-01-1047-1-AA**	**01/17/14 08:15**	**Sediment**	**Mercury**	**01/20/14**	**01/21/14 15:19**	**140120L03A**

Comment(s): - Results are reported on a dry weight basis.
- Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Mercury	0.0310	0.0300	0.00882	0.934	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
BP-2	**14-01-1047-2-AA**	**01/17/14 08:22**	**Sediment**	**Mercury**	**01/20/14**	**01/21/14 15:22**	**140120L03A**

Comment(s): - Results are reported on a dry weight basis.
- Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Mercury	0.0293	0.0326	0.00956	0.91	J

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
BP-3	**14-01-1047-3-AA**	**01/17/14 08:30**	**Sediment**	**Mercury**	**01/20/14**	**01/21/14 15:24**	**140120L03A**

Comment(s): - Results are reported on a dry weight basis.
- Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Mercury	0.0360	0.0397	0.0116	1	J

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	**099-12-452-447**	**N/A**	**Solid**	**Mercury**	**01/20/14**	**01/20/14 15:37**	**140120L03A**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Mercury	ND	0.0200	0.00588	1	

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Calscience Environmental Laboratories, Inc.

Analytical Report

Marine Research Consultants, Inc.
1039 Waakaua Pl.
Honolulu, HI 96822-1173

Date Received: 01/18/14
Work Order: 14-01-1047
Preparation: EPA 3545
Method: EPA 8081A
Units: ug/kg

Project: BP HARBOR

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
BP-1	**14-01-1047-1-AA**	**01/17/14 08:15**	**Sediment**	**GC 44**	**01/22/14**	**01/24/14 13:21**	**140122L08**

Comment(s): - Results are reported on a dry weight basis.
- Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
4,4'-Dichlorobenzophenone	ND	40	3.3	1	
Aldrin	ND	1.6	0.51	1	
Alpha-BHC	ND	1.6	0.52	1	
Beta-BHC	ND	1.6	0.42	1	
Delta-BHC	ND	1.6	0.41	1	
Gamma-BHC	ND	1.6	0.56	1	
Chlordane	ND	16	5.2	1	
Dieldrin	ND	1.6	0.53	1	
Trans-nonachlor	ND	1.6	0.46	1	
2,4'-DDD	ND	1.6	0.54	1	
2,4'-DDE	ND	1.6	0.49	1	
2,4'-DDT	ND	1.6	0.48	1	
4,4'-DDD	ND	1.6	0.51	1	
4,4'-DDE	ND	1.6	0.48	1	
4,4'-DDT	ND	1.6	0.54	1	
Endosulfan I	ND	1.6	0.42	1	
Endosulfan II	ND	1.6	0.45	1	
Endosulfan Sulfate	ND	1.6	0.54	1	
Endrin	ND	1.6	0.58	1	
Endrin Aldehyde	ND	1.6	0.39	1	
Endrin Ketone	ND	1.6	0.56	1	
Heptachlor	ND	1.6	0.52	1	
Heptachlor Epoxide	ND	1.6	0.57	1	
Methoxychlor	ND	1.6	0.52	1	
Toxaphene	ND	32	10	1	
Alpha Chlordane	ND	1.6	0.51	1	
Gamma Chlordane	ND	1.6	0.51	1	
Cis-nonachlor	ND	1.6	0.47	1	
Mirex	ND	8.0	0.49	1	
Oxychlordane	ND	1.6	0.45	1	

Surrogate	Rec. (%)	Control Limits	Qualifiers
2,4,5,6-Tetrachloro-m-Xylene	52	25-145	
Decachlorobiphenyl	65	24-168	

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Calscience Environmental Laboratories, Inc.

Analytical Report

Marine Research Consultants, Inc.
1039 Waakaua Pl.
Honolulu, HI 96822-1173

Date Received: 01/18/14
Work Order: 14-01-1047
Preparation: EPA 3545
Method: EPA 8081A
Units: ug/kg

Project: BP HARBOR

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
BP-2	**14-01-1047-2-AA**	**01/17/14 08:22**	**Sediment**	**GC 44**	**01/22/14**	**01/24/14 13:35**	**140122L08**

Comment(s): - Results are reported on a dry weight basis.
- Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
4,4'-Dichlorobenzophenone	ND	45	3.6	1	
Aldrin	ND	1.8	0.56	1	
Alpha-BHC	ND	1.8	0.58	1	
Beta-BHC	ND	1.8	0.47	1	
Delta-BHC	ND	1.8	0.46	1	
Gamma-BHC	ND	1.8	0.62	1	
Chlordane	ND	18	5.8	1	
Dieldrin	ND	1.8	0.59	1	
Trans-nonachlor	ND	1.8	0.51	1	
2,4'-DDD	ND	1.8	0.60	1	
2,4'-DDE	ND	1.8	0.55	1	
2,4'-DDT	ND	1.8	0.54	1	
4,4'-DDD	ND	1.8	0.56	1	
4,4'-DDE	ND	1.8	0.53	1	
4,4'-DDT	ND	1.8	0.60	1	
Endosulfan I	ND	1.8	0.47	1	
Endosulfan II	ND	1.8	0.50	1	
Endosulfan Sulfate	ND	1.8	0.60	1	
Endrin	ND	1.8	0.64	1	
Endrin Aldehyde	ND	1.8	0.44	1	
Endrin Ketone	ND	1.8	0.62	1	
Heptachlor	ND	1.8	0.57	1	
Heptachlor Epoxide	ND	1.8	0.63	1	
Methoxychlor	ND	1.8	0.58	1	
Toxaphene	ND	36	11	1	
Alpha Chlordane	ND	1.8	0.57	1	
Gamma Chlordane	ND	1.8	0.57	1	
Cis-nonachlor	ND	1.8	0.52	1	
Mirex	ND	8.9	0.55	1	
Oxychlordane	ND	1.8	0.50	1	

Surrogate	Rec. (%)	Control Limits	Qualifiers
2,4,5,6-Tetrachloro-m-Xylene	57	25-145	
Decachlorobiphenyl	68	24-168	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

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Calscience Environmental Laboratories, Inc.

Analytical Report

Marine Research Consultants, Inc.
1039 Waakaua Pl.
Honolulu, HI 96822-1173

Date Received: 01/18/14
Work Order: 14-01-1047
Preparation: EPA 3545
Method: EPA 8081A
Units: ug/kg

Project: BP HARBOR

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
BP-3	**14-01-1047-3-AA**	**01/17/14 08:30**	**Sediment**	**GC 44**	**01/22/14**	**01/24/14 13:49**	**140122L08**

Comment(s): - Results are reported on a dry weight basis.
- Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
4,4'-Dichlorobenzophenone	ND	50	4.0	1	
Aldrin	ND	2.0	0.62	1	
Alpha-BHC	ND	2.0	0.64	1	
Beta-BHC	ND	2.0	0.52	1	
Delta-BHC	ND	2.0	0.51	1	
Gamma-BHC	ND	2.0	0.69	1	
Chlordane	ND	20	6.5	1	
Dieldrin	ND	2.0	0.65	1	
Trans-nonachlor	ND	2.0	0.57	1	
2,4'-DDD	ND	2.0	0.67	1	
2,4'-DDE	ND	2.0	0.60	1	
2,4'-DDT	ND	2.0	0.60	1	
4,4'-DDD	ND	2.0	0.63	1	
4,4'-DDE	ND	2.0	0.59	1	
4,4'-DDT	ND	2.0	0.66	1	
Endosulfan I	ND	2.0	0.52	1	
Endosulfan II	ND	2.0	0.55	1	
Endosulfan Sulfate	ND	2.0	0.67	1	
Endrin	ND	2.0	0.71	1	
Endrin Aldehyde	ND	2.0	0.48	1	
Endrin Ketone	ND	2.0	0.69	1	
Heptachlor	ND	2.0	0.64	1	
Heptachlor Epoxide	ND	2.0	0.70	1	
Methoxychlor	ND	2.0	0.64	1	
Toxaphene	ND	40	13	1	
Alpha Chlordane	ND	2.0	0.64	1	
Gamma Chlordane	ND	2.0	0.63	1	
Cis-nonachlor	ND	2.0	0.58	1	
Mirex	ND	9.9	0.61	1	
Oxychlordane	ND	2.0	0.56	1	

Surrogate	Rec. (%)	Control Limits	Qualifiers
2,4,5,6-Tetrachloro-m-Xylene	43	25-145	
Decachlorobiphenyl	58	24-168	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

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Calscience Environmental Laboratories, Inc.

Analytical Report

Marine Research Consultants, Inc.
1039 Waakaua Pl.
Honolulu, HI 96822-1173

Date Received: 01/18/14
Work Order: 14-01-1047
Preparation: EPA 3545
Method: EPA 8081A
Units: ug/kg

Project: BP HARBOR

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	**099-12-858-252**	**N/A**	**Solid**	**GC 44**	**01/22/14**	**01/24/14 12:52**	**140122L08**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
4,4'-Dichlorobenzophenone	ND	25	2.0	1	
Aldrin	ND	1.0	0.31	1	
Alpha-BHC	ND	1.0	0.32	1	
Beta-BHC	ND	1.0	0.26	1	
Delta-BHC	ND	1.0	0.26	1	
Gamma-BHC	ND	1.0	0.35	1	
Chlordane	ND	10	3.3	1	
Dieldrin	ND	1.0	0.33	1	
Trans-nonachlor	ND	1.0	0.29	1	
2,4'-DDD	ND	1.0	0.34	1	
2,4'-DDE	ND	1.0	0.31	1	
2,4'-DDT	ND	1.0	0.30	1	
4,4'-DDD	ND	1.0	0.32	1	
4,4'-DDE	ND	1.0	0.30	1	
4,4'-DDT	ND	1.0	0.33	1	
Endosulfan I	ND	1.0	0.26	1	
Endosulfan II	ND	1.0	0.28	1	
Endosulfan Sulfate	ND	1.0	0.34	1	
Endrin	ND	1.0	0.36	1	
Endrin Aldehyde	ND	1.0	0.24	1	
Endrin Ketone	ND	1.0	0.35	1	
Heptachlor	ND	1.0	0.32	1	
Heptachlor Epoxide	ND	1.0	0.36	1	
Methoxychlor	ND	1.0	0.32	1	
Toxaphene	ND	20	6.3	1	
Alpha Chlordane	ND	1.0	0.32	1	
Gamma Chlordane	ND	1.0	0.32	1	
Cis-nonachlor	ND	1.0	0.29	1	
Mirex	ND	5.0	0.31	1	
Oxychlordane	ND	1.0	0.28	1	

Surrogate	Rec. (%)	Control Limits	Qualifiers
2,4,5,6-Tetrachloro-m-Xylene	80	25-145	
Decachlorobiphenyl	81	24-168	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

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Calscience Environmental Laboratories, Inc.

Analytical Report

Marine Research Consultants, Inc.
1039 Waakaua Pl.
Honolulu, HI 96822-1173

Date Received: 01/18/14
Work Order: 14-01-1047
Preparation: EPA 3545
Method: EPA 8270C SIM
Units: ug/kg

Project: BP HARBOR

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
BP-1	**14-01-1047-1-AA**	**01/17/14 08:15**	**Sediment**	**GC/MS MM**	**01/21/14**	**01/29/14 16:35**	**140121L26**

Comment(s): - Results are reported on a dry weight basis.
- Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
1-Methylnaphthalene	ND	16	5.9	1	
2,4,5-Trichlorophenol	ND	16	5.2	1	
2,4,6-Trichlorophenol	ND	16	5.7	1	
2,4-Dichlorophenol	ND	16	4.3	1	
2,4-Dimethylphenol	ND	16	4.9	1	
2,4-Dinitrophenol	ND	790	86	1	
2-Chlorophenol	ND	16	5.4	1	
2-Methylnaphthalene	ND	16	5.7	1	
2-Methylphenol	ND	16	8.4	1	
2-Nitrophenol	ND	16	3.8	1	
3/4-Methylphenol	ND	16	4.1	1	
4,6-Dinitro-2-Methylphenol	ND	790	110	1	
4-Chloro-3-Methylphenol	ND	16	5.6	1	
4-Nitrophenol	ND	790	100	1	
Acenaphthene	ND	16	7.4	1	
Acenaphthylene	ND	16	7.2	1	
Anthracene	ND	16	8.6	1	
Benzo (a) Anthracene	ND	16	7.5	1	
Benzo (a) Pyrene	ND	16	8.0	1	
Benzo (b) Fluoranthene	ND	16	8.2	1	
Benzo (g,h,i) Perylene	6.8	16	6.7	1	J
Benzo (k) Fluoranthene	ND	16	10	1	
Bis(2-Ethylhexyl) Phthalate	53	16	6.5	1	B
Butyl Benzyl Phthalate	ND	16	7.0	1	
Chrysene	ND	16	8.1	1	
Di-n-Butyl Phthalate	ND	16	8.2	1	
Di-n-Octyl Phthalate	ND	16	7.5	1	
Dibenz (a,h) Anthracene	ND	16	5.9	1	
Diethyl Phthalate	ND	16	7.9	1	
Dimethyl Phthalate	210	16	8.5	1	B
Fluoranthene	ND	16	9.2	1	
Fluorene	ND	16	8.1	1	
Indeno (1,2,3-c,d) Pyrene	ND	16	7.2	1	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

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Calscience Environmental Laboratories, Inc.

Analytical Report

Marine Research Consultants, Inc.
1039 Waakaua Pl.
Honolulu, HI 96822-1173

Date Received: 01/18/14
Work Order: 14-01-1047
Preparation: EPA 3545
Method: EPA 8270C SIM
Units: ug/kg

Project: BP HARBOR

Parameter	Result	RL	MDL	DF	Qualifiers
Naphthalene	7.4	16	6.0	1	J
Pentachlorophenol	2.1	790	2.0	1	J
Phenanthrene	ND	16	9.1	1	
Phenol	ND	16	5.9	1	
Pyrene	10	16	8.5	1	J
1,6,7-Trimethylnaphthalene	ND	16	4.8	1	
2,3,4,6-Tetrachlorophenol	ND	16	6.2	1	
2,6-Dichlorophenol	ND	16	9.4	1	
Benzoic Acid	ND	160	20	1	
DCPA	ND	16	3.8	1	
Dibenzothiophene	ND	16	9.2	1	
Perthane	ND	16	2.1	1	
1-Methylphenanthrene	ND	16	5.7	1	
Benzo (e) Pyrene	ND	16	3.8	1	
Perylene	ND	16	5.7	1	
Biphenyl	ND	16	6.4	1	
2,6-Dimethylnaphthalene	ND	16	5.4	1	
Isophorone	ND	160	20	1	

Surrogate	Rec. (%)	Control Limits	Qualifiers
2,4,6-Tribromophenol	76	32-143	
2-Fluorobiphenyl	49	14-146	
2-Fluorophenol	59	15-138	
Nitrobenzene-d5	54	18-162	
p-Terphenyl-d14	81	34-148	
Phenol-d6	70	17-141	

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Calscience Environmental Laboratories, Inc.

Analytical Report

Marine Research Consultants, Inc.
1039 Waakaua Pl.
Honolulu, HI 96822-1173

Date Received: 01/18/14
Work Order: 14-01-1047
Preparation: EPA 3545
Method: EPA 8270C SIM
Units: ug/kg

Project: BP HARBOR

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
BP-2	**14-01-1047-2-AA**	**01/17/14 08:22**	**Sediment**	**GC/MS MM**	**01/21/14**	**01/29/14 17:01**	**140121L26**

Comment(s): - Results are reported on a dry weight basis.
- Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
1-Methylnaphthalene	ND	18	6.7	1	
2,4,5-Trichlorophenol	ND	18	5.8	1	
2,4,6-Trichlorophenol	ND	18	6.5	1	
2,4-Dichlorophenol	ND	18	4.8	1	
2,4-Dimethylphenol	ND	18	5.5	1	
2,4-Dinitrophenol	ND	890	96	1	
2-Chlorophenol	ND	18	6.0	1	
2-Methylnaphthalene	ND	18	6.4	1	
2-Methylphenol	ND	18	9.4	1	
2-Nitrophenol	ND	18	4.3	1	
3/4-Methylphenol	ND	18	4.6	1	
4,6-Dinitro-2-Methylphenol	ND	890	120	1	
4-Chloro-3-Methylphenol	ND	18	6.3	1	
4-Nitrophenol	ND	890	110	1	
Acenaphthene	ND	18	8.4	1	
Acenaphthylene	ND	18	8.1	1	
Anthracene	ND	18	9.7	1	
Benzo (a) Anthracene	ND	18	8.4	1	
Benzo (a) Pyrene	ND	18	9.0	1	
Benzo (b) Fluoranthene	ND	18	9.2	1	
Benzo (g,h,i) Perylene	ND	18	7.5	1	
Benzo (k) Fluoranthene	ND	18	12	1	
Bis(2-Ethylhexyl) Phthalate	66	18	7.2	1	B
Butyl Benzyl Phthalate	32	18	7.9	1	
Chrysene	ND	18	9.1	1	
Di-n-Butyl Phthalate	ND	18	9.2	1	
Di-n-Octyl Phthalate	ND	18	8.5	1	
Dibenz (a,h) Anthracene	ND	18	6.7	1	
Diethyl Phthalate	ND	18	8.9	1	
Dimethyl Phthalate	140	18	9.6	1	B
Fluoranthene	11	18	10	1	J
Fluorene	ND	18	9.1	1	
Indeno (1,2,3-c,d) Pyrene	ND	18	8.1	1	

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

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Calscience Environmental Laboratories, Inc.

Analytical Report

Marine Research Consultants, Inc.
1039 Waakaua Pl.
Honolulu, HI 96822-1173

Date Received: 01/18/14
Work Order: 14-01-1047
Preparation: EPA 3545
Method: EPA 8270C SIM
Units: ug/kg

Project: BP HARBOR

Parameter	Result	RL	MDL	DF	Qualifiers
Naphthalene	ND	18	6.8	1	
Pentachlorophenol	ND	890	2.3	1	
Phenanthrene	ND	18	10	1	
Phenol	ND	18	6.6	1	
Pyrene	11	18	9.6	1	J
1,6,7-Trimethylnaphthalene	ND	18	5.4	1	
2,3,4,6-Tetrachlorophenol	ND	18	7.0	1	
2,6-Dichlorophenol	ND	18	11	1	
Benzoic Acid	ND	180	22	1	
DCPA	ND	18	4.3	1	
Dibenzothiophene	ND	18	10	1	
Perthane	ND	18	2.3	1	
1-Methylphenanthrene	ND	18	6.4	1	
Benzo (e) Pyrene	4.8	18	4.3	1	J
Perylene	ND	18	6.4	1	
Biphenyl	ND	18	7.2	1	
2,6-Dimethylnaphthalene	ND	18	6.1	1	
Isophorone	ND	180	22	1	

Surrogate	Rec. (%)	Control Limits	Qualifiers
2,4,6-Tribromophenol	87	32-143	
2-Fluorobiphenyl	59	14-146	
2-Fluorophenol	67	15-138	
Nitrobenzene-d5	69	18-162	
p-Terphenyl-d14	81	34-148	
Phenol-d6	76	17-141	

Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Calscience Environmental Laboratories, Inc.

Analytical Report

Marine Research Consultants, Inc.
1039 Waakaua Pl.
Honolulu, HI 96822-1173

Date Received: 01/18/14
Work Order: 14-01-1047
Preparation: EPA 3545
Method: EPA 8270C SIM
Units: ug/kg

Project: BP HARBOR

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
BP-3	**14-01-1047-3-AA**	**01/17/14 08:30**	**Sediment**	**GC/MS MM**	**01/21/14**	**01/29/14 17:26**	**140121L26**

Comment(s): - Results are reported on a dry weight basis.
- Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
1-Methylnaphthalene	ND	20	7.5	1	
2,4,5-Trichlorophenol	ND	20	6.5	1	
2,4,6-Trichlorophenol	ND	20	7.2	1	
2,4-Dichlorophenol	ND	20	5.4	1	
2,4-Dimethylphenol	ND	20	6.1	1	
2,4-Dinitrophenol	ND	1000	110	1	
2-Chlorophenol	ND	20	6.7	1	
2-Methylnaphthalene	ND	20	7.2	1	
2-Methylphenol	ND	20	11	1	
2-Nitrophenol	ND	20	4.8	1	
3/4-Methylphenol	ND	20	5.1	1	
4,6-Dinitro-2-Methylphenol	ND	1000	140	1	
4-Chloro-3-Methylphenol	ND	20	7.1	1	
4-Nitrophenol	ND	1000	130	1	
Acenaphthene	ND	20	9.4	1	
Acenaphthylene	ND	20	9.1	1	
Anthracene	ND	20	11	1	
Benzo (a) Anthracene	ND	20	9.4	1	
Benzo (a) Pyrene	ND	20	10	1	
Benzo (b) Fluoranthene	ND	20	10	1	
Benzo (g,h,i) Perylene	ND	20	8.4	1	
Benzo (k) Fluoranthene	ND	20	13	1	
Bis(2-Ethylhexyl) Phthalate	66	20	8.1	1	B
Butyl Benzyl Phthalate	28	20	8.8	1	
Chrysene	ND	20	10	1	
Di-n-Butyl Phthalate	ND	20	10	1	
Di-n-Octyl Phthalate	ND	20	9.5	1	
Dibenz (a,h) Anthracene	ND	20	7.5	1	
Diethyl Phthalate	ND	20	10	1	
Dimethyl Phthalate	110	20	11	1	B
Fluoranthene	ND	20	12	1	
Fluorene	ND	20	10	1	
Indeno (1,2,3-c,d) Pyrene	ND	20	9.1	1	

Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

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Calscience Environmental Laboratories, Inc.

Analytical Report

Marine Research Consultants, Inc.
1039 Waakaua Pl.
Honolulu, HI 96822-1173

Date Received: 01/18/14
Work Order: 14-01-1047
Preparation: EPA 3545
Method: EPA 8270C SIM
Units: ug/kg

Project: BP HARBOR

Parameter	Result	RL	MDL	DF	Qualifiers
Naphthalene	ND	20	7.6	1	
Pentachlorophenol	ND	1000	2.6	1	
Phenanthrene	ND	20	12	1	
Phenol	ND	20	7.4	1	
Pyrene	ND	20	11	1	
1,6,7-Trimethylnaphthalene	ND	20	6.1	1	
2,3,4,6-Tetrachlorophenol	ND	20	7.8	1	
2,6-Dichlorophenol	ND	20	12	1	
Benzoic Acid	ND	200	25	1	
DCPA	ND	20	4.8	1	
Dibenzothiophene	ND	20	12	1	
Perthane	ND	20	2.6	1	
1-Methylphenanthrene	ND	20	7.2	1	
Benzo (e) Pyrene	ND	20	4.8	1	
Perylene	ND	20	7.1	1	
Biphenyl	ND	20	8.1	1	
2,6-Dimethylnaphthalene	ND	20	6.8	1	
Isophorone	ND	200	25	1	

Surrogate	Rec. (%)	Control Limits	Qualifiers
2,4,6-Tribromophenol	78	32-143	
2-Fluorobiphenyl	42	14-146	
2-Fluorophenol	53	15-138	
Nitrobenzene-d5	52	18-162	
p-Terphenyl-d14	68	34-148	
Phenol-d6	64	17-141	

Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Calscience Environmental Laboratories, Inc.

Analytical Report

Marine Research Consultants, Inc.
1039 Waakaua Pl.
Honolulu, HI 96822-1173

Date Received: 01/18/14
Work Order: 14-01-1047
Preparation: EPA 3545
Method: EPA 8270C SIM
Units: ug/kg

Project: BP HARBOR

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	**099-14-256-69**	**N/A**	**Solid**	**GC/MS MM**	**01/21/14**	**01/29/14 12:49**	**140121L26**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
1-Methylnaphthalene	ND	10	3.7	1	
2,4,5-Trichlorophenol	ND	10	3.3	1	
2,4,6-Trichlorophenol	ND	10	3.6	1	
2,4-Dichlorophenol	ND	10	2.7	1	
2,4-Dimethylphenol	ND	10	3.1	1	
2,4-Dinitrophenol	ND	500	54	1	
2-Chlorophenol	ND	10	3.4	1	
2-Methylnaphthalene	ND	10	3.6	1	
2-Methylphenol	ND	10	5.3	1	
2-Nitrophenol	ND	10	2.4	1	
3/4-Methylphenol	ND	10	2.6	1	
4,6-Dinitro-2-Methylphenol	ND	500	69	1	
4-Chloro-3-Methylphenol	ND	10	3.5	1	
4-Nitrophenol	ND	500	64	1	
Acenaphthene	ND	10	4.7	1	
Acenaphthylene	ND	10	4.5	1	
Anthracene	ND	10	5.4	1	
Benzo (a) Anthracene	ND	10	4.7	1	
Benzo (a) Pyrene	ND	10	5.1	1	
Benzo (b) Fluoranthene	ND	10	5.2	1	
Benzo (g,h,i) Perylene	ND	10	4.2	1	
Benzo (k) Fluoranthene	ND	10	6.6	1	
Bis(2-Ethylhexyl) Phthalate	15	10	4.1	1	
Butyl Benzyl Phthalate	ND	10	4.4	1	
Chrysene	ND	10	5.1	1	
Di-n-Butyl Phthalate	11	10	5.1	1	
Di-n-Octyl Phthalate	ND	10	4.7	1	
Dibenz (a,h) Anthracene	ND	10	3.7	1	
Diethyl Phthalate	ND	10	5.0	1	
Dimethyl Phthalate	33	10	5.4	1	
Fluoranthene	ND	10	5.8	1	
Fluorene	ND	10	5.1	1	
Indeno (1,2,3-c,d) Pyrene	ND	10	4.6	1	
Naphthalene	ND	10	3.8	1	

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

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Calscience Environmental Laboratories, Inc.

Analytical Report

Marine Research Consultants, Inc.
1039 Waakaua Pl.
Honolulu, HI 96822-1173

Date Received: 01/18/14
Work Order: 14-01-1047
Preparation: EPA 3545
Method: EPA 8270C SIM
Units: ug/kg

Project: BP HARBOR

Parameter	Result	RL	MDL	DF	Qualifiers
Pentachlorophenol	ND	500	1.3	1	
Phenanthrene	ND	10	5.8	1	
Phenol	ND	10	3.7	1	
Pyrene	ND	10	5.4	1	
1,6,7-Trimethylnaphthalene	ND	10	3.0	1	
2,3,4,6-Tetrachlorophenol	ND	10	3.9	1	
2,6-Dichlorophenol	ND	10	5.9	1	
Benzoic Acid	54	100	12	1	J
DCPA	ND	10	2.4	1	
Dibenzothiophene	ND	10	5.8	1	
Perthane	ND	10	1.3	1	
1-Methylphenanthrene	ND	10	3.6	1	
Benzo (e) Pyrene	ND	10	2.4	1	
Perylene	ND	10	3.6	1	
Biphenyl	ND	10	4.1	1	
2,6-Dimethylnaphthalene	ND	10	3.4	1	
Isophorone	ND	100	12	1	

Surrogate	Rec. (%)	Control Limits	Qualifiers
2,4,6-Tribromophenol	73	32-143	
2-Fluorobiphenyl	77	14-146	
2-Fluorophenol	50	15-138	
Nitrobenzene-d5	66	18-162	
p-Terphenyl-d14	77	34-148	
Phenol-d6	46	17-141	

Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Calscience Environmental Laboratories, Inc.

Analytical Report

Marine Research Consultants, Inc.
1039 Waakaua Pl.
Honolulu, HI 96822-1173

Date Received: 01/18/14
Work Order: 14-01-1047
Preparation: EPA 3545
Method: EPA 8270C SIM PCB Congeners
Units: ug/kg

Project: BP HARBOR

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
BP-1	**14-01-1047-1-AA**	**01/17/14 08:15**	**Sediment**	**GC/MS HHH**	**01/21/14**	**01/31/14 16:41**	**140121L25**

Comment(s): - Results are reported on a dry weight basis.
- Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
PCB003	ND	0.80	0.19	1	
PCB008	ND	0.80	0.14	1	
PCB018	ND	0.80	0.25	1	
PCB028	ND	0.80	0.16	1	
PCB031	ND	0.80	0.19	1	
PCB033	ND	0.80	0.17	1	
PCB037	ND	0.80	0.21	1	
PCB044	ND	0.80	0.21	1	
PCB049	ND	0.80	0.19	1	
PCB052	ND	0.80	0.15	1	
PCB056	ND	0.80	0.22	1	
PCB060	ND	0.80	0.17	1	
PCB066	ND	0.80	0.15	1	
PCB070	ND	0.80	0.13	1	
PCB074	ND	0.80	0.15	1	
PCB077	ND	0.80	0.16	1	
PCB081	ND	0.80	0.20	1	
PCB087	ND	0.80	0.16	1	
PCB095	ND	0.80	0.27	1	
PCB097	ND	0.80	0.22	1	
PCB099	ND	0.80	0.14	1	
PCB101	ND	0.80	0.13	1	
PCB105	ND	0.80	0.17	1	
PCB110	ND	0.80	0.16	1	
PCB114	ND	0.80	0.16	1	
PCB118	ND	0.80	0.21	1	
PCB119	ND	0.80	0.14	1	
PCB123	ND	0.80	0.14	1	
PCB126	ND	0.80	0.22	1	
PCB128	ND	0.80	0.16	1	
PCB132	ND	0.80	0.26	1	
PCB138/158	ND	1.6	0.32	1	
PCB141	ND	0.80	0.18	1	

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Calscience Environmental Laboratories, Inc.

Analytical Report

Marine Research Consultants, Inc.
1039 Waakaua Pl.
Honolulu, HI 96822-1173

Date Received: 01/18/14
Work Order: 14-01-1047
Preparation: EPA 3545
Method: EPA 8270C SIM PCB Congeners
Units: ug/kg

Project: BP HARBOR

Parameter	Result	RL	MDL	DF	Qualifiers
PCB149	ND	0.80	0.14	1	
PCB151	ND	0.80	0.17	1	
PCB153	ND	0.80	0.17	1	
PCB156	ND	0.80	0.16	1	
PCB157	ND	0.80	0.15	1	
PCB167	ND	0.80	0.16	1	
PCB168	ND	0.80	0.14	1	
PCB169	ND	0.80	0.13	1	
PCB170	ND	0.80	0.15	1	
PCB174	ND	0.80	0.17	1	
PCB177	ND	0.80	0.20	1	
PCB180	ND	0.80	0.098	1	
PCB183	ND	0.80	0.18	1	
PCB184	ND	0.80	0.089	1	
PCB187	ND	0.80	0.17	1	
PCB189	ND	0.80	0.14	1	
PCB194	ND	0.80	0.15	1	
PCB195	ND	0.80	0.084	1	
PCB200	ND	0.80	0.15	1	
PCB201	ND	0.80	0.091	1	
PCB203	ND	0.80	0.17	1	
PCB206	ND	0.80	0.13	1	
PCB209	ND	0.80	0.17	1	

Surrogate	Rec. (%)	Control Limits	Qualifiers
2-Fluorobiphenyl	40	19-133	
p-Terphenyl-d14	36	33-147	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

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Calscience Environmental Laboratories, Inc.

Analytical Report

Marine Research Consultants, Inc.
1039 Waakaua Pl.
Honolulu, HI 96822-1173

Date Received: 01/18/14
Work Order: 14-01-1047
Preparation: EPA 3545
Method: EPA 8270C SIM PCB Congeners
Units: ug/kg

Project: BP HARBOR

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
BP-2	**14-01-1047-2-AA**	**01/17/14 08:22**	**Sediment**	**GC/MS HHH**	**01/21/14**	**01/31/14 17:10**	**140121L25**

Comment(s): - Results are reported on a dry weight basis.
- Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
PCB003	ND	0.88	0.21	1	
PCB008	ND	0.88	0.15	1	
PCB018	ND	0.88	0.28	1	
PCB028	ND	0.88	0.18	1	
PCB031	ND	0.88	0.20	1	
PCB033	ND	0.88	0.19	1	
PCB037	ND	0.88	0.23	1	
PCB044	ND	0.88	0.23	1	
PCB049	ND	0.88	0.21	1	
PCB052	ND	0.88	0.17	1	
PCB056	ND	0.88	0.24	1	
PCB060	ND	0.88	0.19	1	
PCB066	ND	0.88	0.16	1	
PCB070	ND	0.88	0.15	1	
PCB074	ND	0.88	0.17	1	
PCB077	ND	0.88	0.17	1	
PCB081	ND	0.88	0.22	1	
PCB087	ND	0.88	0.18	1	
PCB095	ND	0.88	0.29	1	
PCB097	ND	0.88	0.24	1	
PCB099	ND	0.88	0.15	1	
PCB101	ND	0.88	0.14	1	
PCB105	ND	0.88	0.19	1	
PCB110	ND	0.88	0.18	1	
PCB114	ND	0.88	0.18	1	
PCB118	ND	0.88	0.23	1	
PCB119	ND	0.88	0.15	1	
PCB123	ND	0.88	0.15	1	
PCB126	ND	0.88	0.24	1	
PCB128	ND	0.88	0.18	1	
PCB132	ND	0.88	0.29	1	
PCB138/158	ND	1.8	0.36	1	
PCB141	ND	0.88	0.20	1	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

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Calscience Environmental Laboratories, Inc.

Analytical Report

Marine Research Consultants, Inc.
1039 Waakaua Pl.
Honolulu, HI 96822-1173

Date Received: 01/18/14
Work Order: 14-01-1047
Preparation: EPA 3545
Method: EPA 8270C SIM PCB Congeners
Units: ug/kg

Project: BP HARBOR

Parameter	Result	RL	MDL	DF	Qualifiers
PCB149	ND	0.88	0.16	1	
PCB151	ND	0.88	0.18	1	
PCB153	ND	0.88	0.18	1	
PCB156	ND	0.88	0.17	1	
PCB157	ND	0.88	0.17	1	
PCB167	ND	0.88	0.18	1	
PCB168	ND	0.88	0.15	1	
PCB169	ND	0.88	0.14	1	
PCB170	ND	0.88	0.16	1	
PCB174	ND	0.88	0.19	1	
PCB177	ND	0.88	0.22	1	
PCB180	ND	0.88	0.11	1	
PCB183	ND	0.88	0.20	1	
PCB184	ND	0.88	0.099	1	
PCB187	ND	0.88	0.19	1	
PCB189	ND	0.88	0.15	1	
PCB194	ND	0.88	0.17	1	
PCB195	ND	0.88	0.093	1	
PCB200	ND	0.88	0.17	1	
PCB201	ND	0.88	0.10	1	
PCB203	ND	0.88	0.19	1	
PCB206	ND	0.88	0.15	1	
PCB209	ND	0.88	0.19	1	

Surrogate	Rec. (%)	Control Limits	Qualifiers
2-Fluorobiphenyl	53	19-133	
p-Terphenyl-d14	43	33-147	

Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Calscience Environmental Laboratories, Inc.

Analytical Report

Marine Research Consultants, Inc.
1039 Waakaua Pl.
Honolulu, HI 96822-1173

Date Received: 01/18/14
Work Order: 14-01-1047
Preparation: EPA 3545
Method: EPA 8270C SIM PCB Congeners
Units: ug/kg

Project: BP HARBOR

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
BP-3	**14-01-1047-3-AA**	**01/17/14 08:30**	**Sediment**	**GC/MS HHH**	**01/21/14**	**01/31/14 17:39**	**140121L25**

Comment(s): - Results are reported on a dry weight basis.
- Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
PCB003	ND	1.0	0.24	0.996	
PCB008	ND	1.0	0.17	0.996	
PCB018	ND	1.0	0.31	0.996	
PCB028	ND	1.0	0.20	0.996	
PCB031	ND	1.0	0.23	0.996	
PCB033	ND	1.0	0.22	0.996	
PCB037	ND	1.0	0.26	0.996	
PCB044	ND	1.0	0.26	0.996	
PCB049	ND	1.0	0.24	0.996	
PCB052	ND	1.0	0.19	0.996	
PCB056	ND	1.0	0.27	0.996	
PCB060	ND	1.0	0.21	0.996	
PCB066	ND	1.0	0.18	0.996	
PCB070	ND	1.0	0.16	0.996	
PCB074	ND	1.0	0.19	0.996	
PCB077	ND	1.0	0.19	0.996	
PCB081	ND	1.0	0.24	0.996	
PCB087	ND	1.0	0.20	0.996	
PCB095	ND	1.0	0.33	0.996	
PCB097	ND	1.0	0.27	0.996	
PCB099	ND	1.0	0.17	0.996	
PCB101	ND	1.0	0.16	0.996	
PCB105	ND	1.0	0.21	0.996	
PCB110	ND	1.0	0.21	0.996	
PCB114	ND	1.0	0.20	0.996	
PCB118	ND	1.0	0.26	0.996	
PCB119	ND	1.0	0.17	0.996	
PCB123	ND	1.0	0.17	0.996	
PCB126	ND	1.0	0.28	0.996	
PCB128	ND	1.0	0.20	0.996	
PCB132	ND	1.0	0.33	0.996	
PCB138/158	ND	2.0	0.40	0.996	
PCB141	ND	1.0	0.22	0.996	

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

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Calscience Environmental Laboratories, Inc.

Analytical Report

Marine Research Consultants, Inc.
1039 Waakaua Pl.
Honolulu, HI 96822-1173

Date Received: 01/18/14
Work Order: 14-01-1047
Preparation: EPA 3545
Method: EPA 8270C SIM PCB Congeners
Units: ug/kg

Project: BP HARBOR

Parameter	Result	RL	MDL	DF	Qualifiers
PCB149	ND	1.0	0.18	0.996	
PCB151	ND	1.0	0.21	0.996	
PCB153	ND	1.0	0.21	0.996	
PCB156	ND	1.0	0.20	0.996	
PCB157	ND	1.0	0.19	0.996	
PCB167	ND	1.0	0.20	0.996	
PCB168	ND	1.0	0.17	0.996	
PCB169	ND	1.0	0.16	0.996	
PCB170	ND	1.0	0.18	0.996	
PCB174	ND	1.0	0.21	0.996	
PCB177	ND	1.0	0.25	0.996	
PCB180	ND	1.0	0.12	0.996	
PCB183	ND	1.0	0.22	0.996	
PCB184	ND	1.0	0.11	0.996	
PCB187	ND	1.0	0.21	0.996	
PCB189	ND	1.0	0.17	0.996	
PCB194	ND	1.0	0.19	0.996	
PCB195	ND	1.0	0.10	0.996	
PCB200	ND	1.0	0.19	0.996	
PCB201	ND	1.0	0.11	0.996	
PCB203	ND	1.0	0.21	0.996	
PCB206	ND	1.0	0.17	0.996	
PCB209	ND	1.0	0.21	0.996	

Surrogate	Rec. (%)	Control Limits	Qualifiers
2-Fluorobiphenyl	56	19-133	
p-Terphenyl-d14	44	33-147	

Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Calscience Environmental Laboratories, Inc.

Analytical Report

Marine Research Consultants, Inc.
1039 Waakaua Pl.
Honolulu, HI 96822-1173

Date Received: 01/18/14
Work Order: 14-01-1047
Preparation: EPA 3545
Method: EPA 8270C SIM PCB Congeners
Units: ug/kg

Project: BP HARBOR

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	**099-14-341-153**	**N/A**	**Solid**	**GC/MS HHH**	**01/21/14**	**01/28/14 19:47**	**140121L25**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
PCB003	ND	0.50	0.12	1	
PCB008	ND	0.50	0.085	1	
PCB018	ND	0.50	0.16	1	
PCB028	ND	0.50	0.099	1	
PCB031	ND	0.50	0.12	1	
PCB033	ND	0.50	0.11	1	
PCB037	ND	0.50	0.13	1	
PCB044	ND	0.50	0.13	1	
PCB049	ND	0.50	0.12	1	
PCB052	ND	0.50	0.097	1	
PCB056	ND	0.50	0.14	1	
PCB060	ND	0.50	0.11	1	
PCB066	ND	0.50	0.091	1	
PCB070	ND	0.50	0.082	1	
PCB074	ND	0.50	0.094	1	
PCB077	ND	0.50	0.097	1	
PCB081	ND	0.50	0.12	1	
PCB087	ND	0.50	0.10	1	
PCB095	ND	0.50	0.17	1	
PCB097	ND	0.50	0.14	1	
PCB099	ND	0.50	0.085	1	
PCB101	ND	0.50	0.081	1	
PCB105	ND	0.50	0.10	1	
PCB110	ND	0.50	0.10	1	
PCB114	ND	0.50	0.10	1	
PCB118	ND	0.50	0.13	1	
PCB119	ND	0.50	0.087	1	
PCB123	ND	0.50	0.087	1	
PCB126	ND	0.50	0.14	1	
PCB128	ND	0.50	0.10	1	
PCB132	ND	0.50	0.17	1	
PCB138/158	ND	1.0	0.20	1	
PCB141	ND	0.50	0.11	1	
PCB149	ND	0.50	0.089	1	

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

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Calscience Environmental Laboratories, Inc.

Analytical Report

Marine Research Consultants, Inc.
1039 Waakaua Pl.
Honolulu, HI 96822-1173

Date Received: 01/18/14
Work Order: 14-01-1047
Preparation: EPA 3545
Method: EPA 8270C SIM PCB Congeners
Units: ug/kg

Project: BP HARBOR

Parameter	Result	RL	MDL	DF	Qualifiers
PCB151	ND	0.50	0.10	1	
PCB153	ND	0.50	0.10	1	
PCB156	ND	0.50	0.098	1	
PCB157	ND	0.50	0.096	1	
PCB167	ND	0.50	0.10	1	
PCB168	ND	0.50	0.086	1	
PCB169	ND	0.50	0.082	1	
PCB170	ND	0.50	0.093	1	
PCB174	ND	0.50	0.11	1	
PCB177	ND	0.50	0.12	1	
PCB180	ND	0.50	0.061	1	
PCB183	ND	0.50	0.11	1	
PCB184	ND	0.50	0.056	1	
PCB187	ND	0.50	0.10	1	
PCB189	ND	0.50	0.086	1	
PCB194	ND	0.50	0.096	1	
PCB195	ND	0.50	0.053	1	
PCB200	ND	0.50	0.093	1	
PCB201	ND	0.50	0.057	1	
PCB203	ND	0.50	0.11	1	
PCB206	ND	0.50	0.083	1	
PCB209	ND	0.50	0.11	1	

Surrogate	Rec. (%)	Control Limits	Qualifiers
2-Fluorobiphenyl	70	19-133	
p-Terphenyl-d14	88	33-147	

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Calscience Environmental Laboratories, Inc.

Analytical Report

Marine Research Consultants, Inc.
1039 Waakaua Pl.
Honolulu, HI 96822-1173

Date Received: 01/18/14
Work Order: 14-01-1047
Preparation: EPA 3550B (M)
Method: Organotins by Krone et al.
Units: ug/kg

Project: BP HARBOR

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
BP-1	**14-01-1047-1-AA**	**01/17/14 08:15**	**Sediment**	**GC/MS Y**	**01/21/14**	**01/28/14 12:51**	**140121L20**

Comment(s): - Results are reported on a dry weight basis.
- Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Dibutyltin	ND	4.9	1.1	1	
Monobutyltin	ND	4.9	1.1	1	
Tetrabutyltin	ND	4.9	1.3	1	
Tributyltin	ND	4.9	0.93	1	

Surrogate	Rec. (%)	Control Limits	Qualifiers
Tripentyltin	71	27-135	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
BP-2	**14-01-1047-2-AA**	**01/17/14 08:22**	**Sediment**	**GC/MS Y**	**01/21/14**	**01/28/14 13:08**	**140121L20**

Comment(s): - Results are reported on a dry weight basis.
- Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Dibutyltin	ND	5.3	1.2	1	
Monobutyltin	ND	5.3	1.2	1	
Tetrabutyltin	ND	5.3	1.4	1	
Tributyltin	ND	5.3	1.0	1	

Surrogate	Rec. (%)	Control Limits	Qualifiers
Tripentyltin	83	27-135	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
BP-3	**14-01-1047-3-AA**	**01/17/14 08:30**	**Sediment**	**GC/MS Y**	**01/21/14**	**01/28/14 13:24**	**140121L20**

Comment(s): - Results are reported on a dry weight basis.
- Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Dibutyltin	ND	5.8	1.3	1	
Monobutyltin	ND	5.8	1.3	1	
Tetrabutyltin	ND	5.8	1.5	1	
Tributyltin	ND	5.8	1.1	1	

Surrogate	Rec. (%)	Control Limits	Qualifiers
Tripentyltin	80	27-135	

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Calscience Environmental Laboratories, Inc.

Analytical Report

Marine Research Consultants, Inc.
1039 Waakaua Pl.
Honolulu, HI 96822-1173

Date Received: 01/18/14
Work Order: 14-01-1047
Preparation: EPA 3550B (M)
Method: Organotins by Krone et al.
Units: ug/kg

Project: BP HARBOR

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	**099-07-016-1119**	**N/A**	**Solid**	**GC/MS Y**	**01/21/14**	**01/28/14 12:35**	**140121L20**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Dibutyltin	ND	3.0	0.65	1	
Monobutyltin	ND	3.0	0.65	1	
Tetrabutyltin	ND	3.0	0.77	1	
Tributyltin	ND	3.0	0.58	1	

Surrogate	Rec. (%)	Control Limits	Qualifiers
Tripentyltin	75	27-135	

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Calscience Environmental Laboratories, Inc.

PARTICLE SIZE SUMMARY

(ASTM D422 / D4464M)

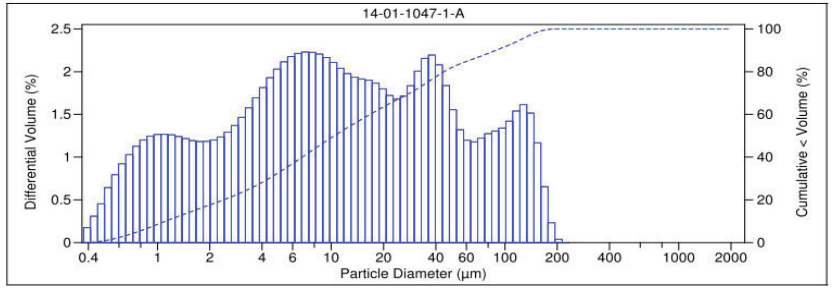
Marine Research Consultants, Inc.

Date Sampled: 1/17/2014
Date Received: 1/18/2014
Work Order No: 14-01-1047
Date Analyzed: 1/22/2014
Method: ASTM D4464M

Project: BP HARBOR

Sample ID	Depth ft	Description	Mean Grain Size mm
BP-1		Silt	0.028

Particle Size Distribution, wt by percent								Total Silt & Clay
Total Gravel	Very Coarse Sand	Coarse Sand	Medium Sand	Fine Sand	Very Fine Sand	Silt	Clay	
0.00	0.00	0.00	0.00	4.80	9.91	57.48	27.81	85.29



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Calscience Environmental Laboratories, Inc.

PARTICLE SIZE SUMMARY

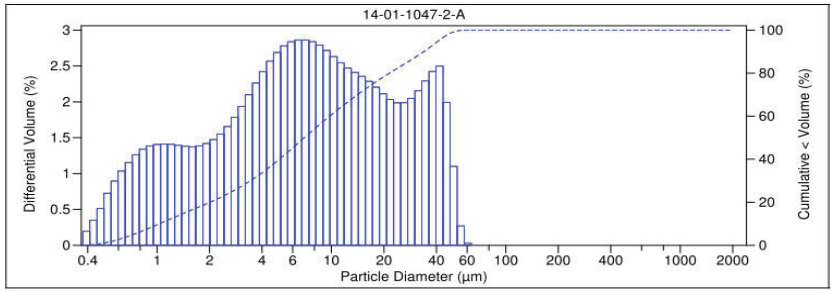
(ASTM D422 / D4464M)

Marine Research Consultants, Inc.	Date Sampled:	1/17/2014
	Date Received:	1/18/2014
	Work Order No:	14-01-1047
	Date Analyzed:	1/22/2014
	Method:	ASTM D4464M

Project: BP HARBOR

Sample ID	Depth ft	Description	Mean Grain Size mm
BP-2		Silt	0.012

Particle Size Distribution, wt by percent								
Total Gravel	Very Coarse Sand	Coarse Sand	Medium Sand	Fine Sand	Very Fine Sand	Silt	Clay	Total Silt & Clay
0.00	0.00	0.00	0.00	0.00	0.00	66.94	33.05	100.00



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Calscience Environmental Laboratories, Inc.

PARTICLE SIZE SUMMARY

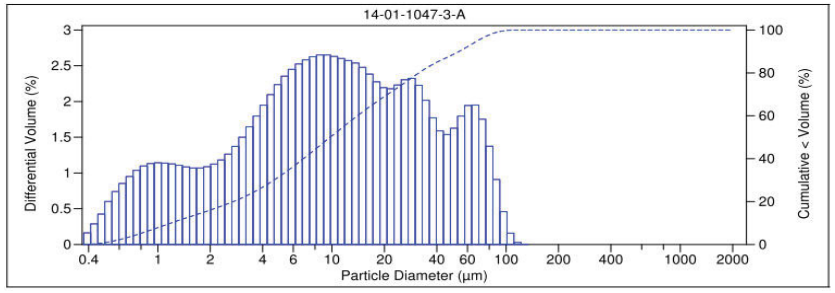
(ASTM D422 / D4464M)

Marine Research Consultants, Inc.	Date Sampled:	1/17/2014
	Date Received:	1/18/2014
	Work Order No:	14-01-1047
	Date Analyzed:	1/22/2014
	Method:	ASTM D4464M

Project: BP HARBOR

Sample ID	Depth ft	Description	Mean Grain Size mm
BP-3		Silt	0.019

Particle Size Distribution, wt by percent								
Total Gravel	Very Coarse Sand	Coarse Sand	Medium Sand	Fine Sand	Very Fine Sand	Silt	Clay	Total Silt & Clay
0.00	0.00	0.00	0.00	0.00	6.95	66.83	26.22	93.05



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Calscience Environmental Laboratories, Inc.

Quality Control - Spike/Spike Duplicate

Marine Research Consultants, Inc.
1039 Waakaua Pl.
Honolulu, HI 96822-1173

Project: BP HARBOR

Date Received: 01/18/14
Work Order: 14-01-1047
Preparation: N/A
Method: EPA 9060A

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
BP-1	**Sample**	**Sediment**	**TOC 4**	**01/22/14**	**01/22/14 17:59**	**E0122TOCS1**
BP-1	**Matrix Spike**	**Sediment**	**TOC 4**	**01/22/14**	**01/22/14 17:59**	**E0122TOCS1**
BP-1	**Matrix Spike Duplicate**	**Sediment**	**TOC 4**	**01/22/14**	**01/22/14 17:59**	**E0122TOCS1**

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Carbon, Total Organic	0.7900	3.000	2.890	70	3.400	87	75-125	16	0-25	3

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RPD: Relative Percent Difference. CL: Control Limits

Calscience Environmental Laboratories, Inc.

Quality Control - Spike/Spike Duplicate

Marine Research Consultants, Inc.
1039 Waakaua Pl.
Honolulu, HI 96822-1173

Project: BP HARBOR

Date Received: 01/18/14
Work Order: 14-01-1047
Preparation: Extraction
Method: EPA 413.2M

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
BP-2	**Sample**	**Sediment**	**IR 2**	**01/22/14**	**01/23/14 17:20**	**140122S02**
BP-2	**Matrix Spike**	**Sediment**	**IR 2**	**01/22/14**	**01/23/14 17:20**	**140122S02**
BP-2	**Matrix Spike Duplicate**	**Sediment**	**IR 2**	**01/22/14**	**01/23/14 17:20**	**140122S02**

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Oil and Grease	33.41	100.0	115.5	82	123.1	90	55-135	6	0-30	

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RPD: Relative Percent Difference. CL: Control Limits

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Calscience Environmental Laboratories, Inc.

Quality Control - Spike/Spike Duplicate

Marine Research Consultants, Inc.
1039 Waakaua Pl.
Honolulu, HI 96822-1173

Project: BP HARBOR

Date Received: 01/18/14
Work Order: 14-01-1047
Preparation: Extraction
Method: EPA 418.1M

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
BP-2	**Sample**	**Sediment**	**IR 2**	**01/22/14**	**01/23/14 17:20**	**140122S01**
BP-2	**Matrix Spike**	**Sediment**	**IR 2**	**01/22/14**	**01/23/14 17:20**	**140122S01**
BP-2	**Matrix Spike Duplicate**	**Sediment**	**IR 2**	**01/22/14**	**01/23/14 17:20**	**140122S01**

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
TRPH	17.46	100.0	106.4	89	108.4	91	55-135	2	0-30	

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RPD: Relative Percent Difference. CL: Control Limits

Calscience Environmental Laboratories, Inc.

Quality Control - Spike/Spike Duplicate

Marine Research Consultants, Inc.
1039 Waakaua Pl.
Honolulu, HI 96822-1173

Project: BP HARBOR

Date Received: 01/18/14
Work Order: 14-01-1047
Preparation: EPA 3550B
Method: EPA 8015B (M)

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
BP-2	**Sample**	**Sediment**	**GC 48**	**01/21/14**	**01/22/14 05:24**	**140121S08**
BP-2	**Matrix Spike**	**Sediment**	**GC 48**	**01/21/14**	**01/22/14 04:36**	**140121S08**
BP-2	**Matrix Spike Duplicate**	**Sediment**	**GC 48**	**01/21/14**	**01/22/14 04:52**	**140121S08**

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
TPH as Diesel	ND	400.0	435.4	109	424.2	106	64-130	3	0-15	

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RPD: Relative Percent Difference. CL: Control Limits

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Calscience Environmental Laboratories, Inc.

Quality Control - Spike/Spike Duplicate

Marine Research Consultants, Inc.
1039 Waakaua Pl.
Honolulu, HI 96822-1173

Project: BP HARBOR

Date Received: 01/18/14
Work Order: 14-01-1047
Preparation: EPA 3540C
Method: EPA 8270D (M)/TQ/EI

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
BP-2	**Sample**	**Sediment**	**GCTQ 1**	**01/27/14**	**01/28/14 20:11**	**140128S01**
BP-2	**Matrix Spike**	**Sediment**	**GCTQ 1**	**01/27/14**	**01/28/14 21:23**	**140128S01**
BP-2	**Matrix Spike Duplicate**	**Sediment**	**GCTQ 1**	**01/27/14**	**01/28/14 22:00**	**140128S01**

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Allethrin	ND	5.000	1.855	37	1.890	38	25-200	2	0-30	
Bifenthrin	ND	5.000	2.522	50	2.497	50	25-200	1	0-30	
Cyfluthrin	ND	5.000	3.314	66	4.112	82	25-200	21	0-30	
Cypermethrin	ND	5.000	3.625	73	4.217	84	25-200	15	0-30	
Deltamethrin/Tralomethrin	ND	5.000	5.266	105	6.753	135	25-200	25	0-30	
Fenpropathrin	ND	5.000	2.829	57	2.927	59	25-200	3	0-30	
Fenvalerate/Esfenvalerate	ND	10.00	10.79	108	12.74	127	25-200	17	0-30	
Fluvalinate	ND	5.000	2.108	42	2.477	50	20-200	16	0-30	
Permethrin (cis/trans)	ND	5.000	4.694	94	4.928	99	25-200	5	0-30	
Phenothrin	ND	5.000	4.040	81	4.229	85	25-200	5	0-30	
Resmethrin/Bioresmethrin	ND	5.000	4.395	88	4.691	94	25-200	6	0-30	
Tetramethrin	ND	5.000	4.027	81	4.066	81	25-200	1	0-30	
lambda-Cyhalothrin	ND	5.000	3.034	61	3.681	74	25-200	19	0-30	

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RPD: Relative Percent Difference. CL: Control Limits

Calscience Environmental Laboratories, Inc.

Quality Control - Spike/Spike Duplicate

Marine Research Consultants, Inc.
1039 Waakaua Pl.
Honolulu, HI 96822-1173

Project: BP HARBOR

Date Received: 01/18/14
Work Order: 14-01-1047
Preparation: EPA 3050B
Method: EPA 6020

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
BP-3	**Sample**	**Sediment**	**ICP/MS 03**	**01/21/14**	**01/21/14 18:44**	**140121S04**
BP-3	**Matrix Spike**	**Sediment**	**ICP/MS 03**	**01/21/14**	**01/21/14 18:18**	**140121S04**
BP-3	**Matrix Spike Duplicate**	**Sediment**	**ICP/MS 03**	**01/21/14**	**01/21/14 18:21**	**140121S04**

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Arsenic	3.180	25.00	29.54	105	28.53	101	80-120	3	0-20	
Barium	6.459	25.00	32.76	105	31.03	98	80-120	5	0-20	
Cadmium	0.1747	25.00	25.71	102	25.67	102	80-120	0	0-20	
Chromium	20.89	25.00	43.80	92	44.37	94	80-120	1	0-20	
Copper	22.72	25.00	48.29	102	46.94	97	80-120	3	0-20	
Lead	4.602	25.00	30.97	105	30.25	103	80-120	2	0-20	
Nickel	15.42	25.00	40.29	99	40.14	99	80-120	0	0-20	
Selenium	ND	25.00	24.33	97	23.16	93	80-120	5	0-20	
Silver	ND	12.50	13.00	104	12.96	104	80-120	0	0-20	
Zinc	39.77	25.00	65.72	104	65.99	105	80-120	0	0-20	

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RPD: Relative Percent Difference. CL: Control Limits

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Calscience Environmental Laboratories, Inc.

Quality Control - Spike/Spike Duplicate

Marine Research Consultants, Inc.
1039 Waakaua Pl.
Honolulu, HI 96822-1173

Project: BP HARBOR

Date Received: 01/18/14
Work Order: 14-01-1047
Preparation: EPA 7471A Total
Method: EPA 7471A

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
BP-1	**Sample**	**Sediment**	**Mercury**	**01/20/14**	**01/21/14 15:19**	**140120S03A**
BP-1	**Matrix Spike**	**Sediment**	**Mercury**	**01/20/14**	**01/21/14 15:26**	**140120S03A**
BP-1	**Matrix Spike Duplicate**	**Sediment**	**Mercury**	**01/20/14**	**01/21/14 15:28**	**140120S03A**

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Mercury	0.01933	0.8350	0.7636	89	0.7669	90	76-136	0	0-16	

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RPD: Relative Percent Difference. CL: Control Limits

Calscience Environmental Laboratories, Inc.

Quality Control - Spike/Spike Duplicate

Marine Research Consultants, Inc.
1039 Waakaua Pl.
Honolulu, HI 96822-1173

Project: BP HARBOR

Date Received: 01/18/14
Work Order: 14-01-1047
Preparation: EPA 3545
Method: EPA 8081A

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
BP-3	**Sample**	**Sediment**	**GC 44**	**01/22/14**	**01/24/14 13:49**	**140122S08**
BP-3	**Matrix Spike**	**Sediment**	**GC 44**	**01/22/14**	**01/24/14 14:04**	**140122S08**
BP-3	**Matrix Spike Duplicate**	**Sediment**	**GC 44**	**01/22/14**	**01/24/14 14:18**	**140122S08**

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Aldrin	ND	5.000	3.417	68	3.271	65	50-135	4	0-25	
Alpha-BHC	ND	5.000	3.633	73	3.653	73	50-135	1	0-25	
Beta-BHC	ND	5.000	4.028	81	3.938	79	50-135	2	0-25	
Delta-BHC	ND	5.000	3.663	73	3.422	68	50-135	7	0-25	
Gamma-BHC	ND	5.000	3.156	63	3.063	61	50-135	3	0-25	
Dieldrin	ND	5.000	3.663	73	3.492	70	50-135	5	0-25	
4,4'-DDD	ND	5.000	3.687	74	3.432	69	50-135	7	0-25	
4,4'-DDE	ND	5.000	3.704	74	3.541	71	50-135	5	0-25	
4,4'-DDT	ND	5.000	3.505	70	3.374	67	50-135	4	0-25	
Endosulfan I	ND	5.000	3.398	68	3.215	64	50-135	6	0-25	
Endosulfan II	ND	5.000	3.672	73	3.442	69	50-135	6	0-25	
Endosulfan Sulfate	ND	5.000	3.304	66	3.160	63	50-135	4	0-25	
Endrin	ND	5.000	3.622	72	3.460	69	50-135	5	0-25	
Endrin Aldehyde	ND	5.000	2.808	56	2.755	55	50-135	2	0-25	
Endrin Ketone	ND	5.000	3.468	69	3.335	67	50-135	4	0-25	
Heptachlor	ND	5.000	3.212	64	3.056	61	50-135	5	0-25	
Heptachlor Epoxide	ND	5.000	3.323	66	3.098	62	50-135	7	0-25	
Methoxychlor	ND	5.000	2.954	59	2.813	56	50-135	5	0-25	
Alpha Chlordane	ND	5.000	3.557	71	3.397	68	50-135	5	0-25	
Gamma Chlordane	ND	5.000	3.482	70	3.306	66	50-135	5	0-25	

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Calscience Environmental Laboratories, Inc.

Quality Control - Spike/Spike Duplicate

Marine Research Consultants, Inc.
1039 Waakaua Pl.
Honolulu, HI 96822-1173

Project: BP HARBOR

Date Received: 01/18/14
Work Order: 14-01-1047
Preparation: EPA 3545
Method: EPA 8270C SIM

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
BP-2	Sample	Sediment	GC/MS MM	01/21/14	01/29/14 17:01	140121S26
BP-2	Matrix Spike	Sediment	GC/MS MM	01/21/14	01/29/14 17:52	140121S26
BP-2	Matrix Spike Duplicate	Sediment	GC/MS MM	01/21/14	01/29/14 18:18	140121S26

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
2,4,6-Trichlorophenol	ND	1000	849.3	85	846.6	85	40-160	0	0-20	
2,4-Dichlorophenol	ND	1000	734.1	73	732.4	73	40-160	0	0-20	
2-Methylphenol	ND	1000	737.0	74	743.4	74	40-160	1	0-20	
2-Nitrophenol	ND	1000	646.4	65	637.5	64	40-160	1	0-20	
4-Chloro-3-Methylphenol	ND	1000	801.9	80	806.0	81	40-160	1	0-20	
Acenaphthene	ND	1000	639.9	64	650.5	65	40-106	2	0-20	
Benzo (a) Pyrene	ND	1000	921.5	92	927.8	93	17-163	1	0-20	
Chrysene	ND	1000	809.0	81	813.9	81	17-168	1	0-20	
Di-n-Butyl Phthalate	ND	1000	761.5	76	761.2	76	40-160	0	0-20	
Dimethyl Phthalate	79.64	1000	896.1	82	908.3	83	40-160	1	0-20	
Fluoranthene	ND	1000	816.9	82	812.3	81	26-137	1	0-20	
Fluorene	ND	1000	697.5	70	713.3	71	59-121	2	0-20	
Naphthalene	ND	1000	632.3	63	623.7	62	21-133	1	0-20	
Phenanthrene	ND	1000	763.4	76	761.4	76	54-120	0	0-20	
Phenol	ND	1000	792.4	79	804.6	80	40-160	2	0-20	
Pyrene	ND	1000	895.3	90	866.5	87	6-156	3	0-46	

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RPD: Relative Percent Difference. CL: Control Limits

Calscience Environmental Laboratories, Inc.

Quality Control - Spike/Spike Duplicate

Marine Research Consultants, Inc.
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Honolulu, HI 96822-1173

Project: BP HARBOR

Date Received: 01/18/14
Work Order: 14-01-1047
Preparation: EPA 3545
Method: EPA 8270C SIM PCB Congeners

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
BP-2	Sample	Sediment	GC/MS HHH	01/21/14	01/31/14 17:10	140121S25
BP-2	Matrix Spike	Sediment	GC/MS HHH	01/21/14	01/31/14 18:07	140121S25
BP-2	Matrix Spike Duplicate	Sediment	GC/MS HHH	01/21/14	01/31/14 18:35	140121S25

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
PCB008	ND	25.00	18.57	74	18.75	75	50-125	1	0-30	
PCB018	ND	25.00	19.61	78	20.00	80	50-125	2	0-30	
PCB028	ND	25.00	21.06	84	20.93	84	50-125	1	0-30	
PCB044	ND	25.00	19.92	80	19.83	79	50-125	0	0-30	
PCB052	ND	25.00	20.56	82	20.99	84	50-125	2	0-30	
PCB066	ND	25.00	20.72	83	20.94	84	50-125	1	0-30	
PCB077	ND	25.00	20.93	84	20.68	83	50-125	1	0-30	
PCB101	ND	25.00	20.24	81	20.40	82	50-125	1	0-30	
PCB105	ND	25.00	20.81	83	20.44	82	50-125	2	0-30	
PCB118	ND	25.00	22.31	89	22.37	89	50-125	0	0-30	
PCB126	ND	25.00	21.47	86	21.00	84	50-125	2	0-30	
PCB128	ND	25.00	21.43	86	21.04	84	50-125	2	0-30	
PCB153	ND	25.00	20.76	83	20.46	82	50-125	1	0-30	
PCB170	ND	25.00	19.33	77	19.55	78	50-125	1	0-30	
PCB180	ND	25.00	22.90	92	22.29	89	50-125	3	0-30	
PCB187	ND	25.00	21.04	84	20.78	83	50-125	1	0-30	
PCB195	ND	25.00	18.53	74	18.65	75	50-125	1	0-30	
PCB206	ND	25.00	26.98	108	26.62	106	50-125	1	0-30	
PCB209	ND	25.00	21.51	86	20.44	82	50-125	5	0-30	

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Calscience Environmental Laboratories, Inc.

Quality Control - Spike/Spike Duplicate

Marine Research Consultants, Inc.
1039 Waakaua Pl.
Honolulu, HI 96822-1173

Project: BP HARBOR

Date Received: 01/18/14
Work Order: 14-01-1047
Preparation: EPA 3550B (M)
Method: Organotins by Krone et al.
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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
BP-2	**Sample**	**Sediment**	**GC/MS Y**	**01/21/14**	**01/28/14 13:08**	**140121S20**
BP-2	**Matrix Spike**	**Sediment**	**GC/MS Y**	**01/21/14**	**01/28/14 13:40**	**140121S20**
BP-2	**Matrix Spike Duplicate**	**Sediment**	**GC/MS Y**	**01/21/14**	**01/28/14 13:57**	**140121S20**

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Tetrabutyltin	ND	100.0	47.08	47	52.84	53	33-129	12	0-36	
Tributyltin	ND	100.0	71.67	72	76.20	76	34-142	6	0-50	

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Calscience Environmental Laboratories, Inc.

Quality Control - PDS/PDSD

Marine Research Consultants, Inc.
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Project: BP HARBOR

Date Received: 01/18/14
Work Order: 14-01-1047
Preparation: EPA 3050B
Method: EPA 6020
Page 1 of 1

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	PDS/PDSD Batch Number
BP-3	**Sample**	**Sediment**	**ICP/MS 03**	**01/21/14 00:00**	**01/21/14 18:44**	**140121S04**
BP-3	**PDS**	**Sediment**	**ICP/MS 03**	**01/21/14 00:00**	**01/21/14 18:24**	**140121S04**

Parameter	Sample Conc.	Spike Added	PDS Conc.	PDS %Rec.	%Rec. CL	Qualifiers
Arsenic	3.180	25.00	29.38	105	75-125	
Barium	6.459	25.00	31.31	99	75-125	
Cadmium	0.1747	25.00	25.52	101	75-125	
Chromium	20.89	25.00	45.55	99	75-125	
Copper	22.72	25.00	46.38	95	75-125	
Lead	4.602	25.00	31.17	106	75-125	
Nickel	15.42	25.00	38.85	94	75-125	
Selenium	ND	25.00	25.96	104	75-125	
Silver	ND	12.50	9.313	75	75-125	
Zinc	39.77	25.00	63.87	96	75-125	

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RPD: Relative Percent Difference. CL: Control Limits

Calscience Environmental Laboratories, Inc.

Quality Control - Sample Duplicate

Marine Research Consultants, Inc.
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Honolulu, HI 96822-1173

Project: BP HARBOR

Date Received: 01/18/14
Work Order: 14-01-1047
Preparation: N/A
Method: EPA 376.2M

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	Duplicate Batch Number
BP-3	**Sample**	**Sediment**	**N/A**	**01/23/14 00:00**	**01/23/14 16:42**	**E0123SD2**
BP-3	**Sample Duplicate**	**Sediment**	**N/A**	**01/23/14 00:00**	**01/23/14 16:42**	**E0123SD2**

Parameter	Sample Conc.	DUP Conc.	RPD	RPD CL	Qualifiers
Sulfide, Total	0.1000	0.1000	0	0-25	

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RPD: Relative Percent Difference. CL: Control Limits

Calscience Environmental Laboratories, Inc.

Quality Control - Sample Duplicate

Marine Research Consultants, Inc.
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Project: BP HARBOR

Date Received: 01/18/14
Work Order: 14-01-1047
Preparation: N/A
Method: EPA 376.2M

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	Duplicate Batch Number
BP-3	**Sample**	**Sediment**	**N/A**	**01/18/14 00:00**	**01/18/14 15:30**	**E0118DSD1**
BP-3	**Sample Duplicate**	**Sediment**	**N/A**	**01/18/14 00:00**	**01/18/14 15:30**	**E0118DSD1**

Parameter	Sample Conc.	DUP Conc.	RPD	RPD CL	Qualifiers
Sulfide, Dissolved	ND	ND	N/A	0-25	

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Quality Control - Sample Duplicate

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Project: BP HARBOR

Date Received: 01/18/14
Work Order: 14-01-1047
Preparation: N/A
Method: SM 2540 B (M)
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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	Duplicate Batch Number
BP-1	**Sample**	**Sediment**	**N/A**	**01/21/14 00:00**	**01/21/14 17:30**	**E0121TSD1**
BP-1	**Sample Duplicate**	**Sediment**	**N/A**	**01/21/14 00:00**	**01/21/14 17:30**	**E0121TSD1**

Parameter	Sample Conc.	DUP Conc.	RPD	RPD CL	Qualifiers
Solids, Total	62.30	62.80	1	0-10	

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RPD: Relative Percent Difference. CL: Control Limits

Calscience Environmental Laboratories, Inc.

Quality Control - LCS/LCSD

Marine Research Consultants, Inc.
1039 Waakaua Pl.
Honolulu, HI 96822-1173

Project: BP HARBOR

Date Received: 01/18/14
Work Order: 14-01-1047
Preparation: N/A
Method: EPA 9060A
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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number
099-06-013-958	**LCS**	**Solid**	**TOC 4**	**01/22/14**	**01/22/14 17:59**	**E0122TOCL1**
099-06-013-958	**LCSD**	**Solid**	**TOC 4**	**01/22/14**	**01/22/14 17:59**	**E0122TOCL1**

Parameter	Spike Added	LCS Conc.	LCS %Rec.	LCSD Conc.	LCSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Carbon, Total Organic	0.6000	0.6334	106	0.6278	105	80-120	1	0-20	

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RPD: Relative Percent Difference. CL: Control Limits

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Calscience Environmental Laboratories, Inc.

Quality Control - LCS/LCSD

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Project: BP HARBOR

Date Received: 01/18/14
Work Order: 14-01-1047
Preparation: N/A
Method: SM 4500-NH3 B/C (M)
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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number
099-12-816-80	**LCS**	**Solid**	**BUR05**	**01/29/14**	**01/29/14 11:21**	**E0129NH3L1**
099-12-816-80	**LCSD**	**Solid**	**BUR05**	**01/29/14**	**01/29/14 11:21**	**E0129NH3L1**

Parameter	Spike Added	LCS Conc.	LCS %Rec.	LCSD Conc.	LCSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Ammonia (as N)	10.00	9.100	91	9.240	92	80-120	2	0-20	

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RPD: Relative Percent Difference. CL: Control Limits

Calscience Environmental Laboratories, Inc.

Quality Control - LCS

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Project: BP HARBOR

Date Received: 01/18/14
Work Order: 14-01-1047
Preparation: Extraction
Method: EPA 413.2M
Page 3 of 12

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS Batch Number
099-07-019-151	**LCS**	**Solid**	**IR 2**	**01/22/14**	**01/23/14 17:20**	**140122L02**

Parameter	Spike Added	Conc. Recovered	LCS %Rec.	%Rec. CL	Qualifiers
Oil and Grease	100.0	90.20	90	70-130	

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RPD: Relative Percent Difference. CL: Control Limits

Calscience Environmental Laboratories, Inc.

Quality Control - LCS

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Project: BP HARBOR

Date Received: 01/18/14
Work Order: 14-01-1047
Preparation: Extraction
Method: EPA 418.1M
Page 4 of 12

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS Batch Number
099-07-015-1974	**LCS**	**Solid**	**IR 2**	**01/22/14**	**01/23/14 17:20**	**140122L01**

Parameter	Spike Added	Conc. Recovered	LCS %Rec.	%Rec. CL	Qualifiers
TRPH	100.0	85.50	85	70-130	

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RPD: Relative Percent Difference. CL: Control Limits

Calscience Environmental Laboratories, Inc.

Quality Control - LCS

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Project: BP HARBOR

Date Received: 01/18/14
Work Order: 14-01-1047
Preparation: EPA 3550B
Method: EPA 8015B (M)
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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS Batch Number
099-15-490-735	**LCS**	**Solid**	**GC 48**	**01/21/14**	**01/22/14 04:20**	**140121B08**

Parameter	Spike Added	Conc. Recovered	LCS %Rec.	%Rec. CL	Qualifiers
TPH as Diesel	400.0	409.5	102	75-123	

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Quality Control - LCS

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Honolulu, HI 96822-1173

Project: BP HARBOR

Date Received: 01/18/14
Work Order: 14-01-1047
Preparation: EPA 3540C
Method: EPA 8270D (M)/TQ/EI

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS Batch Number
099-14-403-53	**LCS**	**Sediment**	**GCTQ 1**	**01/27/14**	**01/28/14 18:21**	**140128L01**

Parameter	Spike Added	Conc. Recovered	LCS %Rec.	%Rec. CL	ME CL	Qualifiers
Allethrin	5.000	2.478	50	25-200	0-229	
Bifenthrin	5.000	2.740	55	25-200	0-229	
Cyfluthrin	5.000	1.663	33	25-200	0-229	
Cypermethrin	5.000	2.137	43	25-200	0-229	
Deltamethrin/Tralomethrin	5.000	2.151	43	25-200	0-229	
Fenpropathrin	5.000	1.985	40	25-200	0-229	
Fenvalerate/Esfenvalerate	10.00	3.952	40	25-200	0-229	
Fluvalinate	5.000	1.049	21	20-200	0-230	
Permethrin (cis/trans)	5.000	3.871	77	25-200	0-229	
Phenothrin	5.000	3.902	78	25-200	0-229	
Resmethrin/Bioresmethrin	5.000	4.463	89	25-200	0-229	
Tetramethrin	5.000	2.639	53	25-200	0-229	
lambda-Cyhalothrin	5.000	1.943	39	25-200	0-229	

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Total number of LCS compounds: 13
Total number of ME compounds: 0
Total number of ME compounds allowed: 1
LCS ME CL validation result: Pass

RPD: Relative Percent Difference. CL: Control Limits

Calscience Environmental Laboratories, Inc.

Quality Control - LCS

Marine Research Consultants, Inc.
1039 Waakaua Pl.
Honolulu, HI 96822-1173

Project: BP HARBOR

Date Received: 01/18/14
Work Order: 14-01-1047
Preparation: EPA 3050B
Method: EPA 6020

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS Batch Number
099-15-254-183	**LCS**	**Solid**	**ICP/MS 03**	**01/21/14**	**01/22/14 17:57**	**140121L04**

Parameter	Spike Added	Conc. Recovered	LCS %Rec.	%Rec. CL	Qualifiers
Arsenic	25.00	26.35	105	80-120	
Barium	25.00	22.04	88	80-120	
Cadmium	25.00	27.02	108	80-120	
Chromium	25.00	25.66	103	80-120	
Copper	25.00	27.10	108	80-120	
Lead	25.00	25.90	104	80-120	
Nickel	25.00	25.18	101	80-120	
Selenium	25.00	24.29	97	80-120	
Silver	12.50	12.02	96	80-120	
Zinc	25.00	29.60	118	80-120	

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RPD: Relative Percent Difference. CL: Control Limits

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Quality Control - LCS

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Project: BP HARBOR

Date Received: 01/18/14
Work Order: 14-01-1047
Preparation: EPA 7471A Total
Method: EPA 7471A

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS Batch Number
099-12-452-447	**LCS**	**Solid**	**Mercury**	**01/20/14**	**01/20/14 15:39**	**140120L03A**

Parameter	Spike Added	Conc. Recovered	LCS %Rec.	%Rec. CL	Qualifiers
Mercury	0.8350	0.8371	100	82-124	

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RPD: Relative Percent Difference. CL: Control Limits

Calscience Environmental Laboratories, Inc.

Quality Control - LCS

Marine Research Consultants, Inc.
1039 Waakaua Pl.
Honolulu, HI 96822-1173

Project: BP HARBOR

Date Received: 01/18/14
Work Order: 14-01-1047
Preparation: EPA 3545
Method: EPA 8081A

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS Batch Number
099-12-858-252	**LCS**	**Solid**	**GC 44**	**01/22/14**	**01/24/14 13:06**	**140122L08**

Parameter	Spike Added	Conc. Recovered	LCS %Rec.	%Rec. CL	ME CL	Qualifiers
Aldrin	5.000	3.919	78	50-135	36-149	
Alpha-BHC	5.000	3.896	78	50-135	36-149	
Beta-BHC	5.000	3.577	72	50-135	36-149	
Delta-BHC	5.000	3.554	71	50-135	36-149	
Gamma-BHC	5.000	3.946	79	50-135	36-149	
Dieldrin	5.000	3.888	78	50-135	36-149	
4,4'-DDD	5.000	3.458	69	50-135	36-149	
4,4'-DDE	5.000	3.674	73	50-135	36-149	
4,4'-DDT	5.000	3.664	73	50-135	36-149	
Endosulfan I	5.000	4.098	82	50-135	36-149	
Endosulfan II	5.000	3.953	79	50-135	36-149	
Endosulfan Sulfate	5.000	3.746	75	50-135	36-149	
Endrin	5.000	2.672	53	50-135	36-149	
Endrin Aldehyde	5.000	4.152	83	50-135	36-149	
Endrin Ketone	5.000	4.371	87	50-135	36-149	
Heptachlor	5.000	3.829	77	50-135	36-149	
Heptachlor Epoxide	5.000	3.650	73	50-135	36-149	
Methoxychlor	5.000	3.539	71	50-135	36-149	
Alpha Chlordane	5.000	3.823	76	50-135	36-149	
Gamma Chlordane	5.000	3.988	80	50-135	36-149	

Total number of LCS compounds: 20
Total number of ME compounds: 0
Total number of ME compounds allowed: 1
LCS ME CL validation result: Pass

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RPD: Relative Percent Difference. CL: Control Limits

Calscience Environmental Laboratories, Inc.

Quality Control - LCS

Marine Research Consultants, Inc.
1039 Waakaua Pl.
Honolulu, HI 96822-1173

Project: BP HARBOR

Date Received: 01/18/14
Work Order: 14-01-1047
Preparation: EPA 3545
Method: EPA 8270C SIM

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS Batch Number
099-14-256-69	LCS	Solid	GC/MS MM	01/21/14	01/29/14 13:14	140121L26

Parameter	Spike Added	Conc. Recovered	LCS %Rec.	%Rec. CL	ME CL	Qualifiers
2,4,6-Trichlorophenol	1000	652.3	65	40-160	20-180	
2,4-Dichlorophenol	1000	565.8	57	40-160	20-180	
2-Methylphenol	1000	431.8	43	40-160	20-180	
2-Nitrophenol	1000	437.2	44	40-160	20-180	
4-Chloro-3-Methylphenol	1000	602.1	60	40-160	20-180	
Acenaphthene	1000	745.8	75	48-108	38-118	
Benzo (a) Pyrene	1000	887.1	89	17-163	0-187	
Chrysene	1000	763.0	76	17-168	0-193	
Di-n-Butyl Phthalate	1000	805.6	81	40-160	20-180	
Dimethyl Phthalate	1000	751.7	75	40-160	20-180	
Fluoranthene	1000	806.3	81	26-137	8-156	
Fluorene	1000	757.3	76	59-121	49-131	
Naphthalene	1000	679.1	68	21-133	2-152	
Phenanthrene	1000	785.1	79	54-120	43-131	
Phenol	1000	361.8	36	40-160	20-180	ME
Pyrene	1000	864.1	86	28-106	15-119	

Total number of LCS compounds: 16
Total number of ME compounds: 1
Total number of ME compounds allowed: 1
LCS ME CL validation result: Pass

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RPD: Relative Percent Difference. CL: Control Limits

Calscience Environmental Laboratories, Inc.

Quality Control - LCS

Marine Research Consultants, Inc.
1039 Waakaua Pl.
Honolulu, HI 96822-1173

Project: BP HARBOR

Date Received: 01/18/14
Work Order: 14-01-1047
Preparation: EPA 3545
Method: EPA 8270C SIM PCB Congeners

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS Batch Number
099-14-341-153	LCS	Solid	GC/MS HHH	01/21/14	01/28/14 17:58	140121L25

Parameter	Spike Added	Conc. Recovered	LCS %Rec.	%Rec. CL	ME CL	Qualifiers
PCB008	25.00	24.80	99	50-125	38-138	
PCB018	25.00	25.53	102	50-125	38-138	
PCB028	25.00	27.10	108	50-125	38-138	
PCB044	25.00	27.05	108	50-125	38-138	
PCB052	25.00	27.05	108	50-125	38-138	
PCB066	25.00	28.74	115	50-125	38-138	
PCB077	25.00	31.00	124	50-125	38-138	
PCB101	25.00	27.47	110	50-125	38-138	
PCB105	25.00	29.19	117	50-125	38-138	
PCB118	25.00	32.05	128	50-125	38-138	ME
PCB126	25.00	29.44	118	50-125	38-138	
PCB128	25.00	28.55	114	50-125	38-138	
PCB153	25.00	28.64	115	50-125	38-138	
PCB170	25.00	23.99	96	50-125	38-138	
PCB180	25.00	28.46	114	50-125	38-138	
PCB187	25.00	27.11	108	50-125	38-138	
PCB195	25.00	23.77	95	50-125	38-138	
PCB206	25.00	20.67	83	50-125	38-138	
PCB209	25.00	20.95	84	50-125	38-138	

Total number of LCS compounds: 19
Total number of ME compounds: 1
Total number of ME compounds allowed: 1
LCS ME CL validation result: Pass

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RPD: Relative Percent Difference. CL: Control Limits

7440 Lincoln Way, Garden Grove, CA 92841-1427 • TEL: (714) 895-5494 • FAX: (714) 894-7501

Calscience Environmental Laboratories, Inc.

Quality Control - LCS

Marine Research Consultants, Inc.
1039 Waakaua Pl.
Honolulu, HI 96822-1173

Project: BP HARBOR

Date Received: 01/18/14
Work Order: 14-01-1047
Preparation: EPA 3550B (M)
Method: Organotins by Krone et al.

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS Batch Number
099-07-016-1119	**LCS**	**Solid**	**GC/MS Y**	**01/21/14**	**01/28/14 12:19**	**140121L20**

Parameter	Spike Added	Conc. Recovered	LCS %Rec.	%Rec. CL	Qualifiers
Tetrabutyltin	100.0	45.37	45	40-142	
Tributyltin	100.0	64.41	64	33-147	

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RPD: Relative Percent Difference. CL: Control Limits

Calscience Environmental Laboratories, Inc.

Glossary of Terms and Qualifiers

Work Order: 14-01-1047

Qualifiers	Definition
*	See applicable analysis comment.
<	Less than the indicated value.
>	Greater than the indicated value.
1	Surrogate compound recovery was out of control due to a required sample dilution. Therefore, the sample data was reported without further clarification.
2	Surrogate compound recovery was out of control due to matrix interference. The associated method blank surrogate spike compound was in control and, therefore, the sample data was reported without further clarification.
3	Recovery of the Matrix Spike (MS) or Matrix Spike Duplicate (MSD) compound was out of control due to suspected matrix interference. The associated LCS recovery was in control.
4	The MS/MSD RPD was out of control due to suspected matrix interference.
5	The PDS/PDSD or PES/PESD associated with this batch of samples was out of control due to suspected matrix interference.
6	Surrogate recovery below the acceptance limit.
7	Surrogate recovery above the acceptance limit.
B	Analyte was present in the associated method blank.
BU	Sample analyzed after holding time expired.
BV	Sample received after holding time expired.
E	Concentration exceeds the calibration range.
ET	Sample was extracted past end of recommended max. holding time.
HD	The chromatographic pattern was inconsistent with the profile of the reference fuel standard.
HDH	The sample chromatographic pattern for TPH matches the chromatographic pattern of the specified standard but heavier hydrocarbons were also present (or detected).
HDL	The sample chromatographic pattern for TPH matches the chromatographic pattern of the specified standard but lighter hydrocarbons were also present (or detected).
J	Analyte was detected at a concentration below the reporting limit and above the laboratory method detection limit. Reported value is estimated.
JA	Analyte positively identified but quantitation is an estimate.
ME	LCS Recovery Percentage is within Marginal Exceedance (ME) Control Limit range (+/- 4 SD from the mean).
ND	Parameter not detected at the indicated reporting limit.
Q	Spike recovery and RPD control limits do not apply resulting from the parameter concentration in the sample exceeding the spike concentration by a factor of four or greater.
SG	The sample extract was subjected to Silica Gel treatment prior to analysis.
X	% Recovery and/or RPD out-of-range.
Z	Analyte presence was not confirmed by second column or GC/MS analysis.
	Solid - Unless otherwise indicated, solid sample data is reported on a wet weight basis, not corrected for % moisture. All QC results are reported on a wet weight basis.
	Any parameter identified in 40CFR Part 136.3 Table II that is designated as "analyze immediately" with a holding time of <= 15 minutes (40CFR-136.3 Table II, footnote 4), is considered a "field" test and the reported results will be qualified as being received outside of the stated holding time unless received at the laboratory within 15 minutes of the collection time.
	A calculated total result (Example: Total Pesticides) is the summation of each component concentration and/or, if "J" flags are reported, estimated concentration. Component concentrations showing not detected (ND) are summed into the calculated total result as zero concentrations.

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Chemical Analyses of Sediment, Site Water, and Elutriate Samples

Analyte	Analysis Method	Sediment Target Detection Limits[a,b]	Site Water and Elutriate Target Detection Limits[b]
Percent Total Solids	SM 2540B[c]	0.1%	N/A
Grain Size	ASTM D4464	0.1%	N/A
TSS	SM 2540D[c]	N/A	1.0 mg/L
Specific Gravity	ASTM D854	N/A	N/A
Atterberg Limits	ASTM D4318	N/A	N/A
Ammonia	SM 4500-NH3 B/C (M)[c] / USEPA 350.1	0.2 mg/kg	0.05 mg/L
Total and Soluble Sulfides	376.2M[c] / SM 4500 S2-[c]	0.1 mg/kg	0.05 mg/L
TOC	9060A	0.05%	N/A
Oil and Grease	USEPA 413.2M	10 mg/kg	1.0 mg/L
Arsenic	6020 / 7640	0.1 mg/kg	0.03 µg/L
Barium	6020 / 7640	N/A	0.05 µg/L
Cadmium	6020 / 7640	0.1 mg/kg	0.03 µg/L
Chromium	6020 / 7640	0.1 mg/kg	0.20 µg/L
Copper	6020 / 7640	0.1 mg/kg	0.03 µg/L
Lead	6020 / 7640	0.1 mg/kg	0.03 µg/L
Mercury	7471A[c] / 1631E	0.02 mg/kg	0.50 ng/L
Nickel	6020 / 7640	0.1 mg/kg	0.05 µg/L
Selenium	6020 / 7640	0.1 mg/kg	0.05 µg/L
Silver	6020 / 7640	0.1 mg/kg	0.05 µg/L
Zinc	6020 / 7640	1.0 mg/kg	1.0 µg/L
TRPH	418.1M[c]	10 mg/kg	N/A
TPH Carbon Breakdown (C6-C44)	USEPA 8015B/M	5.0 mg/kg	N/A
PAHs[d]	8270C SIM[c]	10 µg/kg	1.0 ng/L
Chlorinated Pesticides	8081A[c]	1.0 – 20 µg/kg[e]	0.050 µg/L
PCB Congeners	8270C SIM[c]	0.5 µg/kg	0.50 µg/L
Phenols	8270C SIM[c]	10 – 500 µg/kg	1.0 – 20 µg/L
Phthalates	8270C SIM[c]	10 µg/kg	5.0 µg/L
Organotins	Krone et al.[f]	3.0 µg/kg	3.0 ng/L

Notes:

a. Sediment minimum detection limits are on a dry-weight basis.

b. Reporting limits provided by Calscience.

c. Standard Methods for the Examination of Water and Wastewater, 19th Edition American Public Health Association et al., 1995
USEPA, 1996; 1996; SW 846, Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, 3rd Edition.

d. PAHs - polycyclic aromatic hydrocarbon
PCBs - polychlorinated biphenyl
TOC - total organic carbon
TPH - total petroleum hydrocarbon
TRPH - total recoverable petroleum hydrocarbon
TSS - Total Suspended Solids
USEPA - United States Environmental Protection Agency

TABLE 1. List of constituents for evaluation in representative samples of surface sediment collected off site of proposed fuel pier in Kalaeloa Barbers Point Deep Draft Harbor during water chemistry testing phase of marine assessments. List of constituents taken from "Sampling and Analysis Report, Port of Long Beach Phase I Maintenance Dredging" prepared by Anchor QEA, Mission Viejo California.

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DISTRIBUTION: White with final report, Green and Yellow to Client.
Please note that pages 1 and 2 of 2 of our T/Cs are printed on the reverse side of the Green and Yellow copies respectively.

11/01/12 Revision

Calscience Environmental Laboratories, Inc.
7440 Lincoln Way, Garden Grove, CA 92841-1427 • (714) 895-5494
Other CA Office locations: Concord and San Luis Obispo
For courier service / sample drop off information, contact sales@calscience.com or call us.

CHAIN OF CUSTODY RECORD

WO # / LAB USE ONLY: **14-01-1047**

Date _____ Page _____ of _____

LABORATORY CLIENT: MACTEC Engineering Consultants
ADDRESS: 1039 Waimanu Pl
CITY: Honolulu STATE: HI ZIP: 96822
TEL: 808 729 4009 E-MAIL: Sballard@mactec-hawaii.com

TURNAROUND TIME: ☐ SAME DAY ☐ 24 HR ☐ 48 HR ☐ 72 HR ☒ STANDARD
☐ COELT EDF GLOBAL ID LOG CODE

SPECIAL INSTRUCTIONS: See ATTACHED LIST for ANALYTES

CLIENT PROJECT NAME / NUMBER: BP Habero
PROJECT CONTACT: S. Ballard
SAMPLER(S): (PRINT) S. Ballard
P.O. NO.:

REQUESTED ANALYSES

Please check box or fill in blank as needed.

LAB USE ONLY	SAMPLE ID	SAMPLING DATE	SAMPLING TIME	MATRIX	NO. OF CONT.	Unpreserved	Preserved	Field Filtered	TPH ☐ C6-C36 ☐ C6-C44	TPH ____	BTEX / MTBE ☐ 8260 ☐ ____	VOCs (8260)	Oxygenates (8260)	Prep (5035) ☐ En Core ☐ Terra Core	SVOCs (8270)	Pesticides (808.1)	PCBs (8082)	PAHs ☐ 8270 ☐ 8270 SIM	T22 Metals ☐ 6010/747X ☐ 6020/747X	Cr(VI) ☐ 7196 ☐ 7199 ☐ 218.6
1-2	BP-1	1/17/14	0815		2	✓														
3-4	BP-2	"	0822		2	✓														
5-6	BP-3	"	0830		2	✓														

Relinquished by: (Signature) — Received by: (Signature/Affiliation) — Date: — Time:

Relinquished by: (Signature) — Received by: (Signature/Affiliation) — Date: 1/18/14 — Time: 1120

Relinquished by: (Signature) — Received by: (Signature/Affiliation) — Date: — Time:

Please CLEAN SAMPLES with TWO REPLICATE SAMPLES which CAN BE COMBINED

1047

FedEx TRK# 0215 8431 3189 3841

SATURDAY 12:00P
PRIORITY OVERNIGHT

92841
CA-US
SNA

W0 APVA

FTD 708471 17JAN14 HNLA 51AC1/D6EC/65DD

Calscience Environmental Laboratories, Inc.

WORK ORDER #: 14-01-1047

SAMPLE RECEIPT FORM

Cooler 1 of 1

CLIENT: Marine Research DATE: 01/18/14

TEMPERATURE: Thermometer ID: SC1 (Criteria: 0.0 °C – 6.0 °C, not frozen except sediment/tissue)

Temperature 1.9 °C - 0.3 °C (CF) = 1.6 °C ☑ Blank ☐ Sample

☐ Sample(s) outside temperature criteria (PM/APM contacted by: _____).

☐ Sample(s) outside temperature criteria but received on ice/chilled on same day of sampling.

☐ **Received at ambient temperature, placed on ice for transport by Courier.**

Ambient Temperature: ☐ Air ☐ Filter Checked by: SD2

CUSTODY SEALS INTACT:

☑ Cooler ☐_____ ☐ No (Not Intact) ☐ Not Present ☐ N/A Checked by: SD2

☐ Sample ☐_____ ☐ No (Not Intact) ☑ Not Present Checked by: SD2

SAMPLE CONDITION:	Yes	No	N/A
Chain-Of-Custody (COC) document(s) received with samples	☑	☐	☐
COC document(s) received complete	☐	☑	☐
* ☑ Collection date/time, matrix, and/or # of containers logged in based on sample labels. ☐ No analysis requested. ☐ Not relinquished. ☐ No date/time relinquished.			
Sampler's name indicated on COC	☑	☐	☐
Sample container label(s) consistent with COC	☑	☐	☐
Sample container(s) intact and good condition	☑	☐	☐
Proper containers and sufficient volume for analyses requested	☑	☐	☐
Analyses received within holding time	☑	☐	☐
Aqueous samples received within 15-minute holding time ☐ pH ☐ Residual Chlorine ☐ Dissolved Sulfides ☐ Dissolved Oxygen	☐	☐	☑
Proper preservation noted on COC or sample container	☐	☐	☑
☐ Unpreserved vials received for Volatiles analysis			
Volatile analysis container(s) free of headspace	☐	☐	☑
Tedlar bag(s) free of condensation	☐	☐	☑

CONTAINER TYPE:

Solid: ☐4ozCGJ ☐8ozCGJ ☑16ozCGJ ☐Sleeve (_____) ☐EnCores® ☐TerraCores® ☐_____

Aqueous: ☐VOA ☐VOA**h** ☐VOA**na$_2$** ☐125AGB ☐125AGB**h** ☐125AGB**p** ☐1AGB ☐1AGB**na$_2$** ☐1AGB**s** ☐500AGB ☐500AGJ ☐500AGJ**s** ☐250AGB ☐250CGB ☐250CGB**s** ☐1PB ☐1PB**na** ☐500PB ☐250PB ☐250PB**n** ☐125PB ☐125PB**znna** ☐100PJ ☐100PJ**na$_2$** ☐_____ ☐_____ ☐_____

Air: ☐Tedlar® ☐Canister **Other:** ☐_____ **Trip Blank Lot#:**_____ **Labeled/Checked by:** SD2

Container: **C:** Clear **A:** Amber **P:** Plastic **G:** Glass **J:** Jar **B:** Bottle **Z:** Ziploc/Resealable Bag **E:** Envelope **Reviewed by:** SSK

Preservative: **h:** HCL **n:** HNO_3 **na$_2$:**$Na_2S_2O_3$ **na:** NaOH **p:** H_3PO_4 **s:** H_2SO_4 **u:** Ultra-pure **znna:** $ZnAc_2$+NaOH **f:** Filtered **Scanned by:** SSK

* Sediment

SOP T100_090 (07/31/13)

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Appendix D
Follow-up Marine Survey
(Marine Research Consultants, Inc.)

FINAL REPORT

A FOLLOW-UP ASSESSMENT OF CORAL COMMUNITY STRUCTURE IN THE VICINITY OF THE PROPOSED FUEL PIER AND PIER 9, DOT KALAELOA BARBERS POINT COMMERCIAL HARBOR, HONOULIULI, EWA DISTRICT, OAHU, HAWAI'I

Prepared by:

Marine Research Consultants, Inc.
1039 Waakaua Pl.
Honolulu, HI 96822

Prepared for:

Group 70 International Inc.
925 Bethel St.
Honolulu, HI 96813

December 2016

EXECUTIVE SUMMARY

As part of the *Statewide Fuel Facilities Development Plan* (FFDP), the State of Hawaii, Department of Transportation (DOT), Harbors Division (DOT-H) is proposing to build new fueling facilities at Kalaeloa Barbers Point Harbor on the southwestern corner of the Island of Oahu (Figure 1). The FFDP recommends development of a dedicated fuel pier at Piers 3 and 4 to accommodate various types of fuel anticipated to serve the island's utilities into the future.

In 2014, a detailed qualitative and quantitative assessment of the existing conditions within the areas proposed for re-development was prepared that provided the requisite data for the HRS Chapter 343 EIS requirement, and to inform the Department of the Army Section 10 Permit to be obtained in the permitting phase. While all biota were evaluated, particular attention was given to quantitatively assessing the composition of reef corals owing to the protected status as dictated in Executive Order 13089. As corals and coral reefs will require the most rigorous mitigative strategies of all taxonomic groups, a thorough understanding of the composition of coral resources provides important information that will be required for further phases of the planning process.

Methods employed in the assessment follow to the extent possible the techniques set out in the "Draft Planning Aid Report-Marine Biological Survey Protocols" (DPAR) prepared for the USACE by the US Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS). To minimize uncertainty of extrapolating partial coverage data to the entire area of concern, the field effort included examination of the entirety of the benthic surfaces within survey boundaries.

Quantitative *in-situ* evaluation of stony corals was accomplished by measuring the length of the longest axis in centimeters of every coral colony resulting in a complete census of the coral community. This method was carried out using a PVC rod marked to designate the boundaries of eight size-classes (<2 centimeters (cm), >2≤5 cm, >5≤10 cm, >10≤20 cm, >20≤40 cm, >40≤80 cm, >80≤160 cm, and >160 cm). At each location where corals were observed, a global positioning system waypoint was recorded using a waterproofed device. The resulting data allowed for the production of maps showing the exact locations of corals.

In 2016, the Hawaii Department of Transportation Harbors Division requested a follow-up survey to confirm the findings of the 2014 survey. To meet this request, a complete census of coral colonies on Piers 3 and 4 was conducted in October 2016. In addition to the census of Piers 3 and 4, similar censusing was conducted at Pier 9 along the Harbor walls fronting the moored dry dock.

Quantitative evaluation of the coral community in 2014 yielded a total count of 108 corals in the Sector which comprises the area within the footprint of the proposed fuel pier (Piers 3 and 4). The follow-up survey of Piers 3 and 4 identified a total of 29 coral colonies

comprised of four species. None of the corals observed at Piers 3 and 4 were growing on existing pier or pilings.

The decrease in number of corals between 2014 and 2016 represents of decrease of approximately 73%. The most abundant coral species in 2014 (54 colonies of *Pocillopora meandrina*) was represented by only a single colony in 2016. One coral species that is often found in Harbor environments in Hawaii (*Montipora capitata*) increased in number in 2016 (7 colonies) relative to 2014 (4 colonies).

The most abundant size class of these corals was in 2016 was >20≤40 cm; corals smaller than 5 cm that could be considered recent recruits were essentially absent from the area. In 2014 the most abundant size class was smaller (>10≤20 cm), suggesting a preferential reduction in smaller colonies in 2016.

The overall decrease in number of corals and shift in species composition is likely a result of stress associated with elevated water temperature caused by the El Nino event of 2014-2015. It has been well documented that during the summer months of these two years substantial bleaching and subsequent mortality of corals occurred on many reefs throughout the Hawaiian archipelago. As the temperature of water within the semi-enclosed basin of Kalaeloa Harbor likely was elevated above temperatures on reefs occurring on open coastlines, it is not surprising that there was mortality to the corals within the Harbor. The coral showing the most extreme change in abundance (*Pocillopora meandrina*) is the species that has been observed to be one of the most susceptible to temperature related bleaching.

As noted in the original survey in 2014, the coral community occupying the substratum of Piers 3 and 4 was always relatively sparse, likely as a result of harsh conditions associated with heavy sedimentation. In 2016, the community is even sparser owing to additional temperature stress associated with an extreme El Nino event.

A small community of 10 corals comprised mostly of small colonies of *Pocillopora* spp. was censused at the area of Pier 9 fronting the moored dry dock.

In conclusion, results of the follow-up assessment of the marine environment at the site of the proposed fueling facility at Piers 3 and 4 reveal a biotic community of relatively limited extent both in terms of numbers and diversity of organisms compared to other Harbor settings in Hawaii. This limitation is primarily the result of high levels of suspended and settled sediment which covers most surfaces. The community has been recently documented to be even further reduced in number of individuals and species distribution owing to temperature stress associated with a prolonged El Nino warming event. Owing to the limited size and composition of the coral community, these individuals do not likely provide a significant functional service to reef integrity of areas outside the Harbor where coral resources are far more abundant and diverse. Mitigation plans could also provide for minimal net loss of coral reef resources.

I. BACKGROUND and PROPOSED ACTION

As part of the *Statewide Fuel Facilities Development Plan* (FFDP), the State of Hawai'i, Department of Transportation (DOT), Harbors Division (DOT-H) is proposing to build new fueling facilities at Kalaeloa Barbers Point Harbor on the southwestern corner of the Island of Hawaii. The FFDP recommends development of a dedicated fuel pier at Piers 3 and 4 to accommodate various types of fuel and feedstock anticipated to serve the island's utilities into the future. The proposed improvements will require permitting from the United States Army Corps of Engineers (USACE). As part of the planning process for the project, a detailed marine environmental assessment survey of the area was conducted in 2014. The survey including a complete census of all living coral colonies in the area, as well as a characterization of water chemistry. In 2015, another census survey was conducted of the inner areas of the Harbor (Piers 7-10) in order to assess the biotic composition of the areas where Marisco facilities would be relocated to provide space for the fuel facility at Piers 3 and 4. During this survey active work was taking place at the moored dry dock located at Pier 9. As a result of safety considerations, divers were not permitted to survey the area between the dry dock and the shoreline during the 2015 survey.

As several years have passed since the 2014-2015 surveys, it was requested by H-DOT that the area be re-examined to determine if any changes to biotic structure had occurred. The purpose of the present surveys was to re-examine the submerged area off Piers 3 and 4 to determine if composition of the coral community had changed substantially over the two-year interval between surveys, and to confirm that corals have not colonized the existing pier structures that will be removed for construction of the fuel pier. An additional objective was to census coral colonization of the area fronting the dry dock at Pier 9 (Figure 1).

As corals and coral reefs will require the most rigorous mitigative strategies of all taxonomic groups for project planning, a thorough understanding of the existing composition of coral resources provides important information that will be required for further phases of the project. This report presents a detailed qualitative and quantitative assessment of the existing conditions within the areas proposed for re-development that provide the requisite data for the HRS Chapter 343 EIS requirement for the project. The ultimate use of this information is for the Clean Water Act (CWA) Section 404 Permit from the USACE.



FIGURE 1. Aerial view of Kalaeloa Barbers Point Deep Draft Harbor showing locations of follow-up surveys in yellow at Piers 3 and 4, and inshore of the moored dry dock at Pier 9.

II. METHODS

Methods employed in the present assessment follow to the extent possible the techniques set out in the "Draft Planning Aid Report-Marine Biological Survey Protocols" (DPAR) prepared for the USACE by the US Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS). Methods employed in the 2016 survey were identical to those used in the 2014 and 2015 surveys.

The follow-up assessment of benthic (bottom dwelling) community structure was evaluated by diver-investigators swimming the entire length of the piers and jetties within the survey scope area on October 1, 2016. This included the entire area of mauka eastern face of the pier extending through the Marisco Facility and terminating at the southern corner of the Harbor (Piers 3, 4 and Tug Pier (designated as Sector D in the 2014 survey) (Figure 2).



FIGURE 2. Aerial photograph showing Piers 3 and 4 in Kalaeloa Barbers Point Harbor where a new fuel pier is proposed for construction. Orange circles indicate waypoints where corals were observed, yellow circles indicate waypoints where photographs of Pier structures were taken. Appendix B shows corals at each waypoint. Appendix C shows pier structures devoid of coral at each waypoint.



FIGURE 3. Aerial photograph showing Pier 9 in Kalaeloa Barbers Point Harbor where Marisco facilities will be relocated to provide space for a new fuel pier proposed for construction. Also shown is moored dry dock along Pier 9. Orange points indicate areas where corals were observed. Appendix B shows corals at each waypoint.

For the follow-up survey, a full census of all corals inhabiting the survey regions was conducted. Thus, a quantitative evaluation of biotic composition of the entirety of the survey area was completed rather than a survey of randomized or stratified sub-sets of the community. Evaluating the entire community provided a significant advantage by eliminating the inevitable uncertainty associated with relying on statistical extrapolation of sub-sets to estimate total community structure. By eliminating the need to rely on statistical extrapolation, the degree of uncertainty with respect to entire community attributes is decreased substantially, thus allowing for far higher precision in estimating environmental impact and/or mitigation obligations.

In-water surveys were carried out on October 1, 2016 working from a 21-foot boat using SCUBA gear. Dr. Steven Dollar supervised all field operations, assisted by Ms. Andrea Millan. Weather conditions throughout the survey interval consisted of moderate tradewinds and small south swells.

Enumeration (censusing) of all coral colonies by species (or lowest possible taxonomic level) was measured *in-situ*. Quantitative *in-situ* evaluation of stony corals was accomplished by measuring the length of the longest axis in centimeters of each coral colony. This method involved using a PVC rod marked with colored tape to designate the boundaries of eight size-classes (<2 cm, >2≤5 cm, >5≤10 cm, >10≤20 cm, >20≤40 cm,

>40≤80 cm, >80 ≤ 160 cm and >160 cm). Measurements were made by one diver holding the rod over the longest axis of each colony, while another diver recorded the species and size-class. In cases where the colony boundary fell on the boundary line between classes, the larger class was recorded. Working in a team fashion to record size-class data proved to be an efficient method for rapid, yet thorough documentation of the whole survey area.

In addition to size classification, corals were classed into growth form categories (e.g., branching, encrusting, lobate and plating). Also noted were visible signs of disease, sediment stress, bleaching, or necrotic tissue. Fragmentation was not notable owing to growth primarily on vertical or sloping surfaces which did not retain fragments.

All coral colonies observed were photographically documented, and located using hand-held GPS. In addition, GPS waypoints were taken at representative locations of submerged piers and pilings to document the lack of coral colonization (All GPS waypoint coordinaes are shown in Appendix A). Such a geolocated photographic data base provides a permanent visual record of the individual coral colonies and habitats that can be re-visited for subsequent analyses, and is particularly useful for evaluating changes in specific areas over time. The photographic record will also be of value for characterizing practicality of relocating corals that are deemed to be within the project footprint.

III. RESULTS

While the initial scope of work of the follow-up survey was to evaluate several specific areas of Piers 3 and 4, it was immediately apparent during fieldwork that coral community structure had changed considerably during the 2-year interval since the last survey. As a result, the most effective method of evaluating the existing community structure was to conduct a second complete census of the 480 m-long area of Piers 3 and 4. Comparing the results of the 2016 census with the original survey results from 2014 provides the data to quantitatively evaluate changes to community structure.

As Kalaeloa Barbers Point Harbor was created by excavation of dry lands with a connection to the ocean, all of the physical structures within the survey area consist of either man-made materials (e.g., structural composition of piers and pilings), or natural resources that have been altered by human activity (e.g., dredged channel walls and shoreline shelves). The underwater physical composition of the area consists of a near-vertical shoreline face dredged from solid limestone fossil reef material. The submerged harbor walls consist of a pocked surface with all horizontal surfaces covered with a layer of deposited sediment. Water clarity in this area was characterized by high turbidity with visibility limited to a maximum of several feet.

The base of the dredged face terminates in a narrow shelf at a depth of approximately 4-5 meters, which extends to a steep dredged slope that extends to the harbor floor. As during the 2013 survey, the follow-up 2016 survey revealed that coral community structure in this area consists of sparsely distributed isolated colonies of *Pocillopora, Porites, and Montipora*. Many of these colonies exhibited areas of sediment on their surfaces. The isolated distribution and paucity of corals, as well as the generally small colony size indicates that

the inner area of the Harbor along Piers 3 and 4 continues to be a suboptimal region for coral growth, primarily as a result of extreme sedimentation.

Corals were generally limited to a vertical zone extending from about 0.5 m below the surface of the water to depths no greater than 5 m. Below this depth, the excavated hard bottom was devoid of coral colonization. The locations of all corals identified were assigned a numerical waypoint (Appendix A). The locations of each waypoint off Piers 3 and 4 is shown in Figure 2. Photographs of all corals at each waypoint are shown in Appendix B. Note that more than one coral colony may occur at each waypoint.

Table 1 shows results of all size-class measurements of each coral species measured at Piers 3 and 4 by waypoint location. A total of 29 corals were encountered off Piers 3 and 4, with the largest number of corals (15) occurring in the >20≤40 cm size class. Table 2 shows the same corals classed by species. Nineteen of the 29 corals observed were colonies of *Porites lobata*, eight were *Montipora capitata*, and two were *Pocillopora* spp.

TABLE 1. Counts of coral colonies by species and waypoint off Piers 3 and 4 (Sector D in previous reports) during re-survey on October 1, 2016. For locations of waypoints where corals were located, see Figure 2.

WAYPOINT	SPECIES	SIZE CLASS								
		<2	>2≤5	>5≤10	>10≤20	>20≤40	>40≤80	>80≤160	>160	TOTAL
40	*Porites lobata*					2				3
	Pocillopora meandrina					1				1
47	*Porites lobata*			1		1				3
49	*Porites lobata*					1				1
52	*Porites lobata*				3					3
	Pocillopora damicornis		1							1
56	*Porites lobata*					1				1
57	*Porites lobata*					1	1			2
59	*Montipora capitata*					1	1			2
60	*Montipora capitata*					1				1
61	*Porites lobata*						1			1
62	*Porites lobata*					2	1			3
	Montipora capitata			1		1				2
63	*Montipora capitata*					1				1
64	*Montipora capitata*					1				1
65	*Porites lobata*			1			1			2
	Montipora capitata					1				1
PIER 3-4 TOTAL		0	1	3	4	15	6	0	0	29

The census of corals at Piers 3 and 4 in 2016 provided a substantially different result than the survey of the same area in 2014. During the earlier survey, a total of 108 corals were observed, over four times as many as seen in 2016 (Table 3). The most abundant size class in the 2014 survey (>10≤20 cm) was smaller than the most abundant size class in 2016 (>20≤40 cm). The species distribution between the two surveys was also distinctly different. In 2014, the most abundant coral species was *Pocillopora meandrina* (54 colonies) which comprised half of the total corals present. In 2016, only a single colony of *P. meandrina* was observed, along with a single small colony of *P. damicornis*. The distribution of other coral species in 2014 revealed that *Porites lobata* was the second most abundant species with 49 colonies present. In 2016, *P. lobata* was the most abundant species, but with only 19 colonies. Four colonies of *Montipora capitata* were observed in 2014, compared to eight colonies in 2016 (Tables 2, 3 and 4). Most of the existing colonies of *Porites lobata* in 2016 occurred as hemispherical heads in the <20≤80 cm size classes. No small or recently settled

colonies of *Porites* were observed. All colonies of *Montipora capitata* were flat encrustations (see Appendix B).

TABLE 2. Counts of coral colonies by species off Piers 3 and 4 (Sector D in previous reports) during re-survey on October 1, 2016. For locations of waypoints where corals were located, see Figure 2.

WAYPOINT	SPECIES	SIZE CLASS								
		<2	>2≤5	>5≤10	>10≤20	>20≤40	>40≤80	>80≤160	>160	TOTAL
40	*Porites lobata*					2	1			3
47	*Porites lobata*			1	1	1				3
49	*Porites lobata*					1				1
52	*Porites lobata*				3					3
56	*Porites lobata*					1				1
57	*Porites lobata*					1	1			2
61	*Porites lobata*						1			1
62	*Porites lobata*					2	1			3
65	*Porites lobata*			1			1			2
PIER 3-4 TOTAL		0	0	2	4	8	5	0	0	19
59	*Montipora capitata*					1	1			2
60	*Montipora capitata*					1				1
62	*Montipora capitata*			1		1				2
63	*Montipora capitata*					1				1
64	*Montipora capitata*					1				1
65	*Montipora capitata*					1				1
PIER 3-4 TOTAL		0	0	1	0	6	1	0	0	8
40	*Pocillopora meandrina*					1				1
52	*Pocillopora damicornis*		1							1
PIER 3-4 TOTAL		0	1	0	0	1	0	0	0	2

These comparative results, conducted in the same area using the same methods, clearly indicate that processes had occurred in the interval between surveys that altered coral community structure. A most likely cause of the changes were elevations in water temperature that occurred as a result of a prolonged world-wide El Nino event in 2014-2015. The El Nino caused abnormally rapid elevation in water temperature above "normal" ranges during the summers of 2014 and 2015 which resulted in well-documented bleaching events throughout the Hawaiian Islands. Bleaching was particularly widespread during the summer of 2015, when many open ocean reefs that are normally not prone to bleaching were affected. As water in the semi-enclosed basin of Kalaeloa Harbor would be particularly susceptible to warming, it is likely that the El Nino resulted in elevation of temperatures that were higher than open coastal reefs with no restricted circulation. As a result, it is likely that the documented decrease in corals within the Harbor was a result of temperature stress. Observed areas of bleaching on open ocean reefs indicate that one of the most sensitive species to temperature stress was *Pocillopora meandrina*. Such susceptibility is evident by the near complete lack of this species in 2016, while it was the most abundant coral in 2014.

TABLE 3. Counts of coral colonies by species and size class off Pier 9 fronting the moored dry dock during re-survey on October 1, 2016. For locations of waypoints where corals were located, see Figure 3.

WAYPOINT	SPECIES	SIZE CLASS								
		<2	>2≤5	>5≤10	>10≤20	>20≤40	>40≤80	>80≤160	>160	TOTAL
66	*Montipora capitata*				2					2
67	*Pocillopora spp.*			2						2
68	*Pocillopora spp.*			3	2					5
69	*Pocillopora spp.*			1						1
PIER 9 TOTAL		0	0	6	4	0	0	0	0	10

The only species that occurred in higher number in 2016 relative to 2014 was *Montipora capitata*. This coral has been documented to occur frequently in Harbors throughout Hawaii. As a result, this species may be more adapted to high stress environments than other corals, and was more resistant to the temperature stress than other species. However, while the number of corals in 2016 was not reduced, the overall number of corals of this species was low (7) for the entire Pier 3 and 4 area.

TABLE 4. Counts of coral colonies by species and size class in Sector D (Piers 3 and 4) in Kalaelca Barbers Point Harbor from survey in 2014.

SPECIES	SECTOR	SIZE CLASS								
		<2	>2≤5	>5≤10	>10≤20	>20≤40	>40≤80	>80≤160	>160	TOTAL
Porites lobata	D-1	0	1	5	2	2	0	0	0	10
	D-2	0	1	3	2	2	0	0	0	8
	D-3	0	3	8	4	1	0	0	0	16
	D-4	0	0	1	4	4	0	0	0	9
	D-5	0	0	2	1	2	1	0	0	6
	TOTAL	**0**	**5**	**19**	**13**	**11**	**1**	**0**	**0**	**49**
Pocillopora meandrina	D-1	2	2	1	5	0	0	0	0	10
	D-2	2	1	1	1	0	0	0	0	5
	D-3	0	2	1	0	0	0	0	0	3
	D-4	2	14	11	4	2	0	0	0	33
	D-5	0	2	1	0	0	0	0	0	3
	TOTAL	**6**	**21**	**15**	**10**	**2**	**0**	**0**	**0**	**54**
Montipora capitata	D-1	0	0	1	0	0	0	0	0	1
	D-4	1	0	0	0	0	0	0	0	1
	D-5	0	0	0	1	1	0	0	0	2
	TOTAL	**1**	**0**	**1**	**1**	**1**	**0**	**0**	**0**	**4**
Montipora patula	D-5	0	1	0	0	0	0	0	0	1
	TOTAL	0	1	0	0	0	0	0	0	1
Porites brighami	D-2	0	1	0	0	0	0	0	0	1
TOTAL		**14**	**55**	**70**	**48**	**28**	**2**	**0**	**0**	**108**

As noted above, physical conditions of the Harbor are typified by high sediment loads in the water column, and sediment deposition on all settleable surfaces. Many of the existing corals contained areas of visible sediment deposition on the upward facing surfaces (see Appendix B). These conditions of high sediment appear to have restricted settlement of new corals since the easing of El Nino related warming. Only a single small coral in the <2 or >2≤5 cm size class were observed in the 2016 survey.

A second task in the follow-up survey was to verify the lack of coral colonization on wharf and piling structures at Piers 3 and 4 that will be removed for construction of the fuel dock. Visual inspection of all structures along Piers 3 and 4 confirmed that no corals were present on any of these structures. Representative photographs of piers and pilings are shown in Appendix C at various waypoints shown in Figure 2.

The third task in the follow-up survey was to census any corals that occurred on the submerged areas inshore of the moored dry dock at Pier 9. Surveys of this area revealed a population of small corals growing on the boulder surfaces that compose the shoreline (Table 3). Overall, a total of 10 coral colonies were observed along the length of the dry dock. Eight of these corals were of the genus *Pocillopora*, but most were too small (<10 cm) to identify to species level. The remaining two corals were small encrustations of *Montipora capitata* (Appendix B). No colonies of *Porites* were observed at Pier 9, although this genus was the most abundant at Piers 3 and 4. In addition, no corals at Pier 9 were larger than 20

cm, while the most abundant size class at Piers 3 and 4 was >20≤40 cm. These comparisons indicate that the corals communities off the moored dry dock at Pier 9 were different than the coral communities at Piers 3 and 4.

IV. SUMMARY and CONCLUSIONS

A follow-up quantitative and qualitative census conducted in the areas of Kalaeloa Barbers Point Harbor that are the site of the proposed fuel pier and moored dry dock were conducted in October 2016. While the original intent of the follow-up survey was to investigate only small areas of Piers 3 and 4 to verify previous survey results, it became apparent to the investigators that community structure of the area had changed considerable in the last several years. As a result, a complete census of living corals was conducted along the entire face of Piers 3 and 4.

Survey results of this area continued to reveal a marine habitat that is not conducive to the development of coral reef communities, primarily as a result of sub-optimal physical conditions, particularly in terms of suspended and deposited sediment and restricted light availability.

While 109 coral colonies were documented off Piers 3 and 4 in 2014, the total number of corals was reduced to 25 corals in 2016. In both surveys, all corals were isolated colonies located in a narrow band at the base of the excavated shoreline. No large colonies greater than 80 cm in diameter were noted, and no multi-colony aggregates that typify reefs in areas of more optimal physical conditions were observed. In addition to a decrease of the number of corals, distribution of coral species differed substantially between surveys. In 2014, the dominant species was *Pocillopora meandrina*, which was essentially absent from the area in 2016. While *Porites lobata* was the most common species in 2016, the number of colonies dropped from 54 in 2014 to 17 in 2016.

The reduction in number of corals and change in species dominance is likely a result of selective mortality associated with elevated water temperatures that were an artifact of the El Nino event of 2014-2015. During the summer months of these years, abnormally warm water resulted in significant coral bleaching throughout the Hawaiian archipelago. As Kalaeloa Harbor is a semi-enclosed basin with a prolonged residence time of water relative to open ocean habitats, the water temperature was likely higher in the basin than in other reef areas that sustained substantial coral bleaching. On these open ocean reefs, one of the most susceptible species to bleaching is *Pocillopora meandrina*. The likelihood that the reduction in coral colonies at Piers 3 and 4 in 2016 is a result of bleaching and subsequent mortality is supported by the virtual absence of *Pocillopora meandrina* in 2016.

Censusing of the area of Pier 9 inshore of the moored dry dock revealed the presence of ten coral colonies, all of which were small. No corals were observed on any of the man-structures at Piers 3 and 4 that will be removed for construction of the planned fuel pier.

In conclusion, results of the assessment of the marine environment fronting the proposed site of the fueling facility at Piers 3 and 4 conducted in 2016 reveal a biotic community of

very limited extent, both in terms of numbers and diversity of organisms. Owing to the limited size of the coral community, these individuals do not likely provide a significant component to reef integrity to areas outside the Harbor, where coral resources are far more abundant and diverse. The area does not likely contain the potential for impacts to protected marine species, or regulated species. Mitigation plans could provide for minimal net loss of coral reef resources.

APPENDIX A. GPS latitude and longitude of waypoints (degrees, decimal minutes) identifying locations of coral colonies and submerged piers in survey sectors of Kalaeloa Barbers Point Deep Draft Harbor conducted on October 1, 2016. See Figures 1-3 for location of waypoints. Photographs of corals at each waypoint are shown in Appendix B.

WAYPOINT	LATITUDE	LONGITUDE
40	21 19.402 n	158 7.145 w
41	21 19.388 n	158 7.135 w
42	21 19.376 n	158 7.124 w
43	21 19.373 n	158 7.115 w
44	21 19.364 n	158 7.108 w
45	21 19.362 n	158 7.106 w
46	21 19.351 n	158 7.097 w
47	21 19.341 n	158 7.088 w
48	21 19.338 n	158 7.082 w
49	21 19.333 n	158 7.077 w
50	21 19.332 n	158 7.074 w
51	21 19.334 n	158 7.069 w
52	21 19.323 n	158 7.067 w
53	21 19.319 n	158 7.064 w
54	21 19.321 n	158 7.061 w
55	21 19.293 n	158 7.022 w
56	21 19.279 n	158 7.020 w
57	21 19.267 n	158 7.007 w
58	21 19.258 n	158 6.998 w
59	21 19.251 n	158 6.992 w
60	21 19.249 n	158 6.988 w
61	21 19.241 n	158 6.981 w
62	21 19.240 n	158 6.980 w
63	21 19.236 n	158 6.975 w
64	21 19.233 n	158 6.971 w
65	21 19.227 n	158 6.966 w
66	21 19.671 n	158 6.660 w
67	21 19.664 n	158 6.668 w
68	21 19.657 n	158 6.674 w
69	21 19.650 n	158 6.680 w

APPENDIX B.

CORAL COLONIES OCCURRING AT PIERS 3, 4 AND 9

KALAELOA BARBERS POINT HARBOR

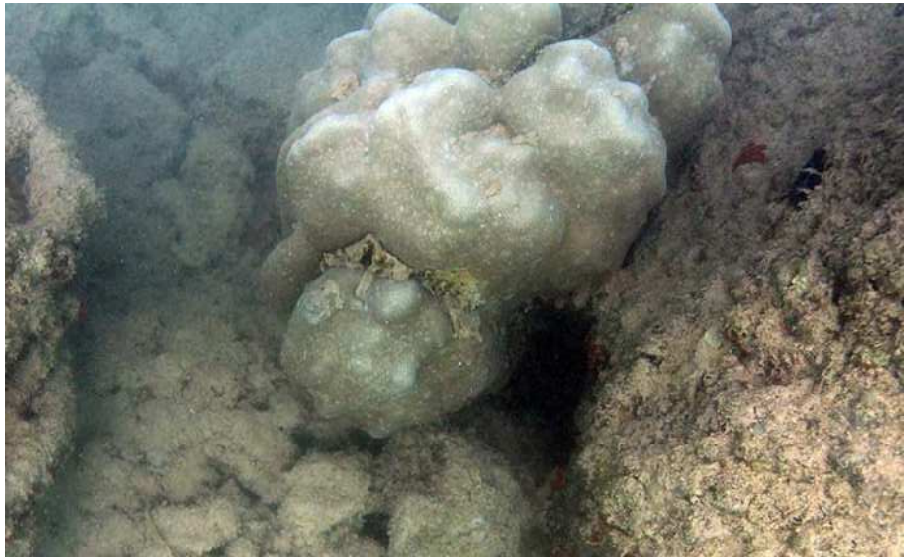
OCTOBER 1, 2016

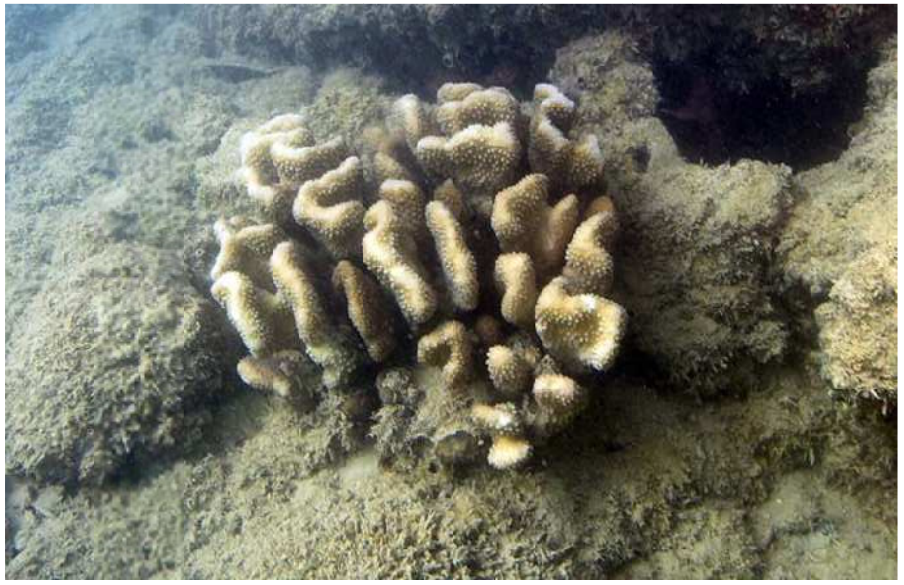
WAYPOINT 40





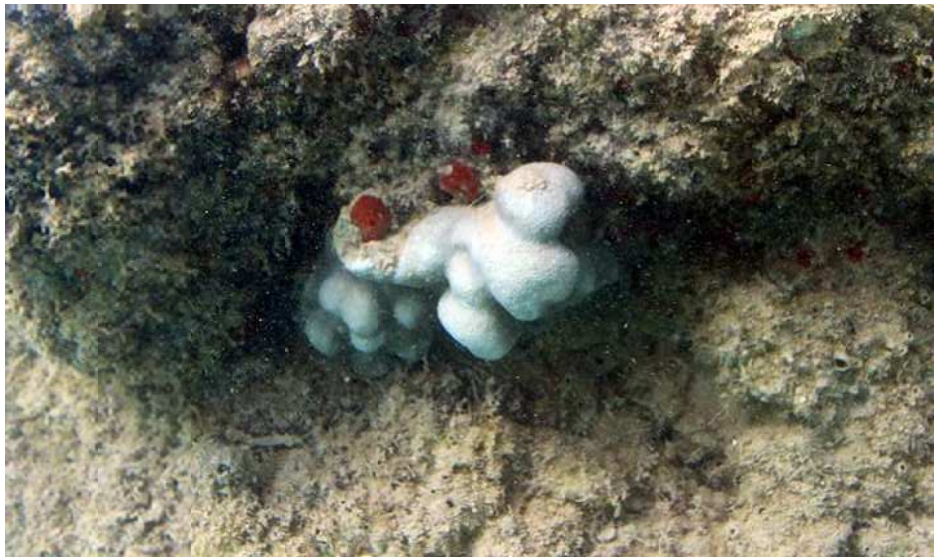
WAYPOINT 40





WAYPOINT 47





WAYPOINT 47



WAYPOINT 49



WAYPOINT 52





WAYPOINT 56



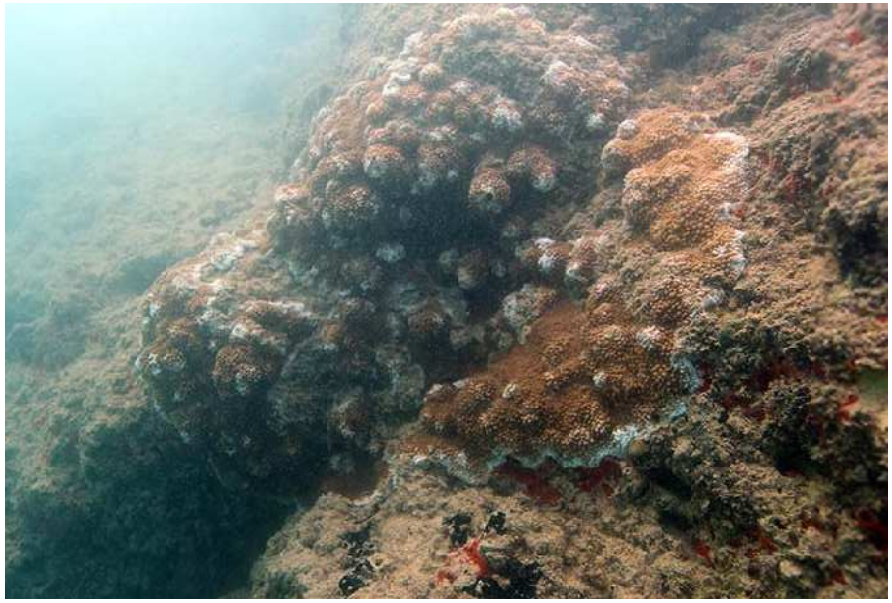
WAYPOINT 57



WAYPOINT 57



WAYPOINT 59



WAYPOINT 60



WAYPOINT 61



WAYPOINT 62





WAYPOINT 62





WAYPOINT 62



WAYPOINT 63



WAYPOINT 64



WAYPOINT 65





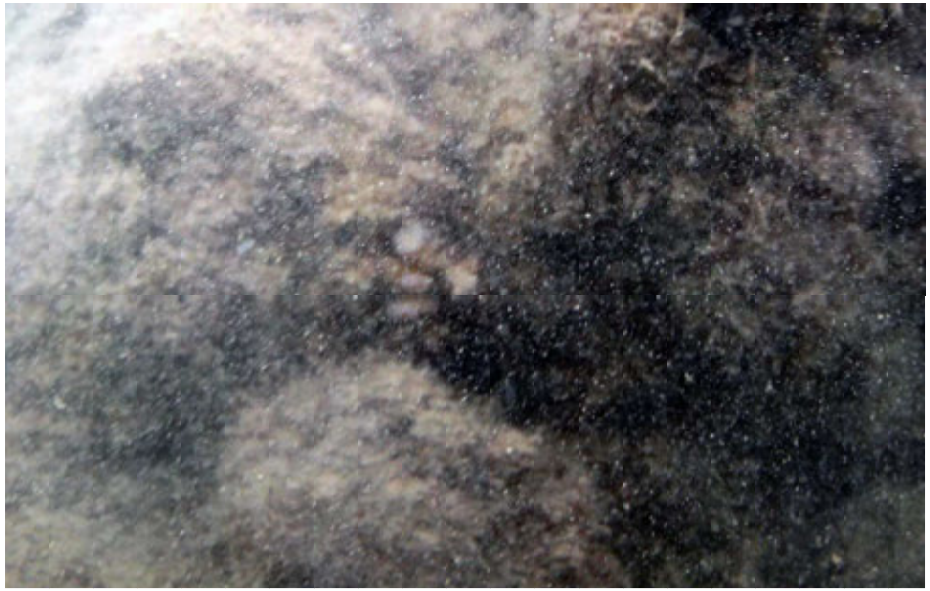
WAYPOINT 65



WAYPOINT 66



WAYPOINT 67





WAYPOINT 68





WAYPOINT 69



APPENDIX C.

UNDERWATER PIER STRUCTURES OCCURRING AT PIERS 3 AND 4

KALAELOA BARBERS POINT HARBOR

OCTOBER 1, 2016

WAYPOINT 40



WAYPOINT 41





WAYPOINT 42





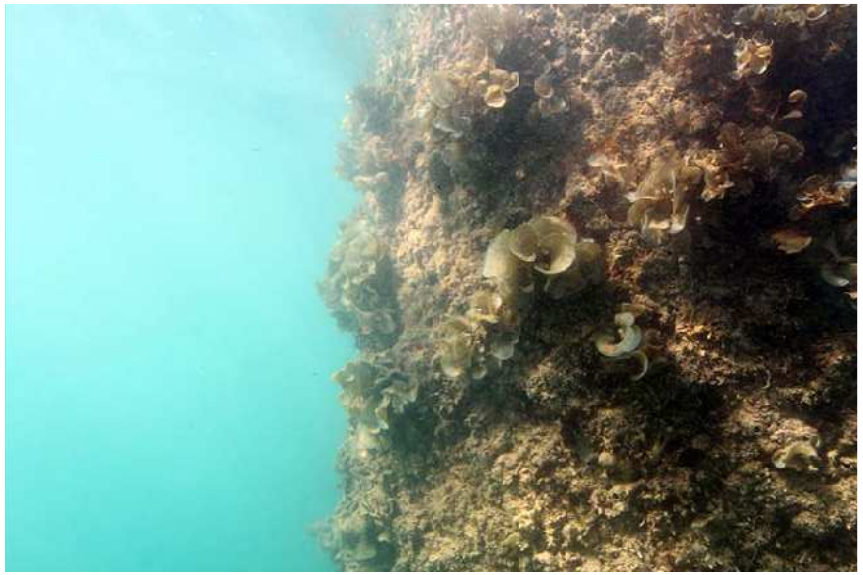
WAYPOINT 42



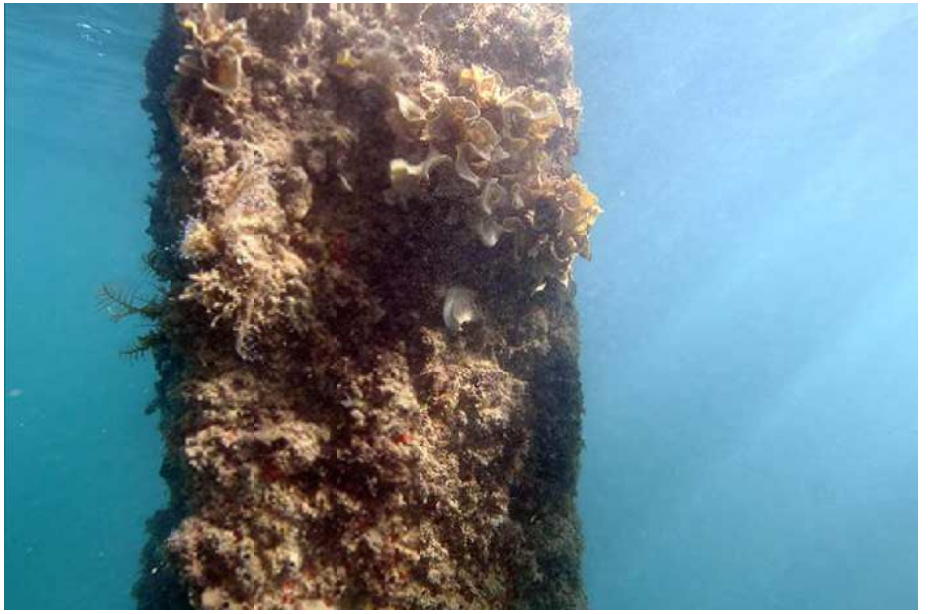


WAYPOINT 43





WAYPOINT 44



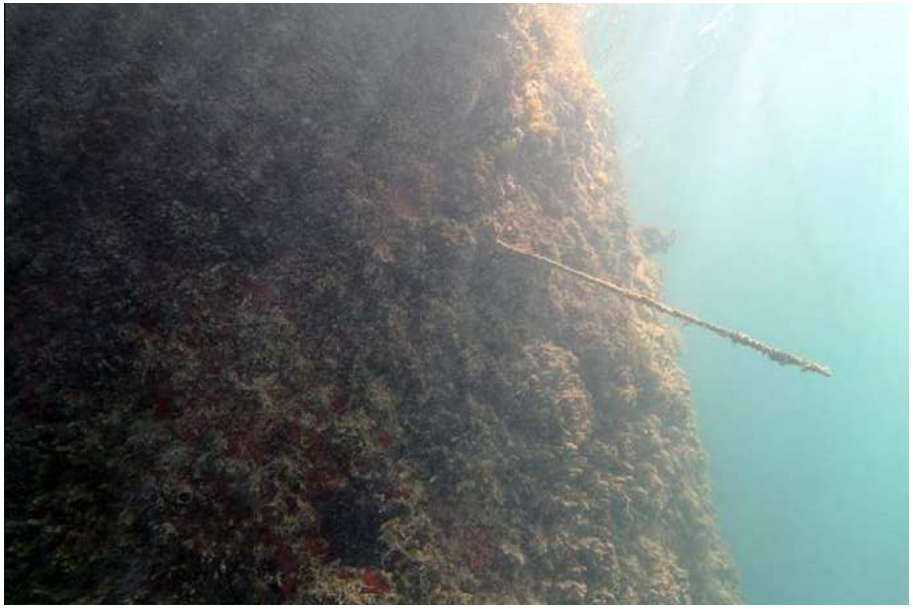


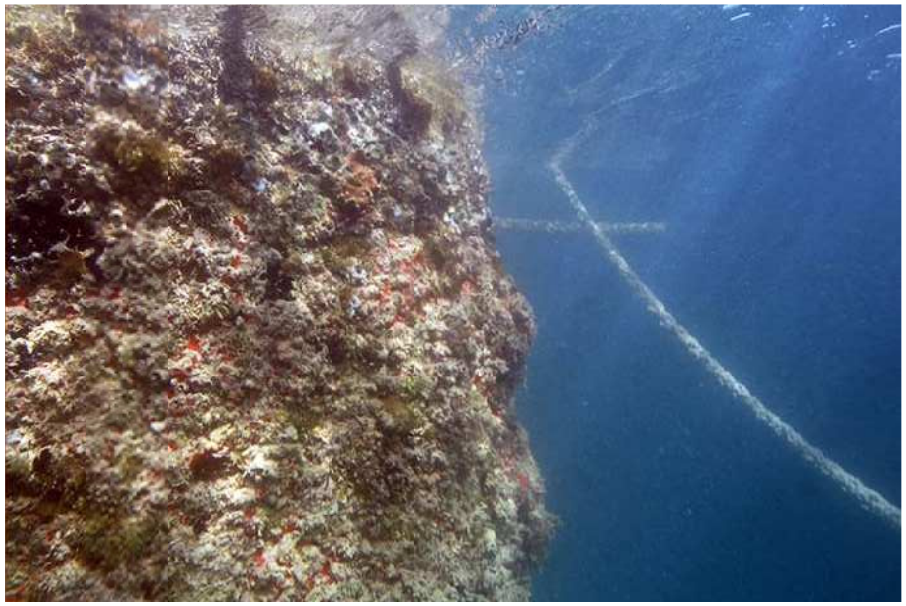
WAYPOINT 45





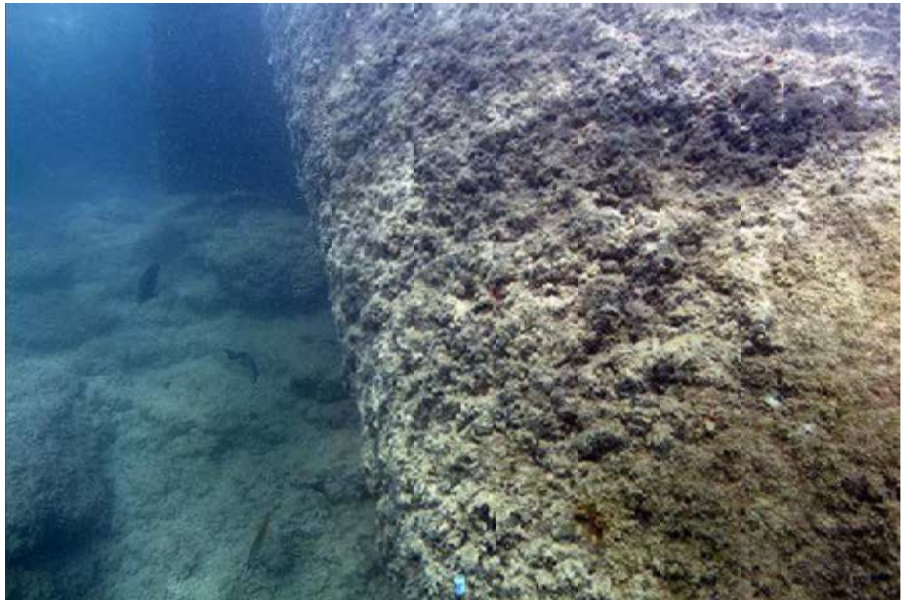
WAYPOINT 46





WAYPOINT 48





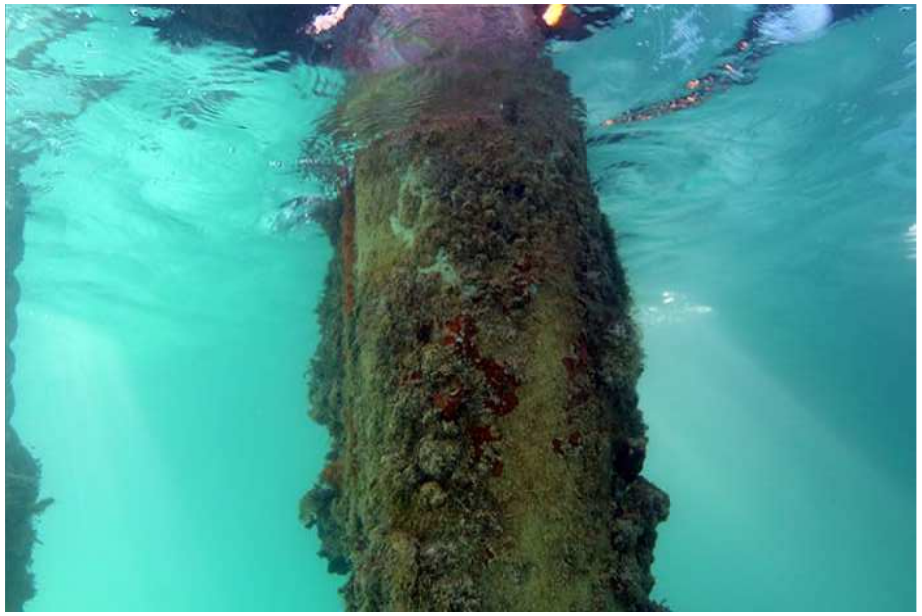
WAYPOINT 50





WAYPOINT 50





WAYPOINT 51





WAYPOINT 51

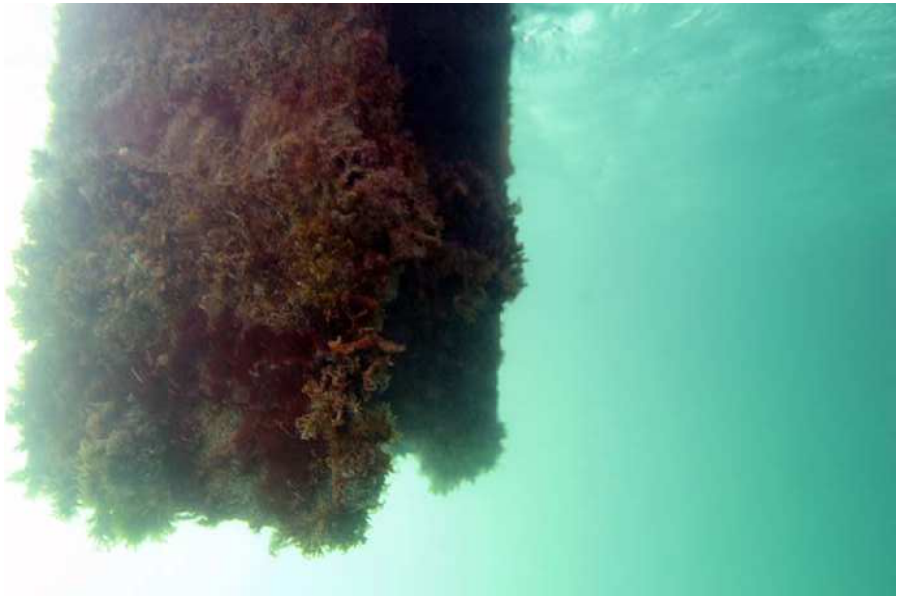


WAYPOINT 53



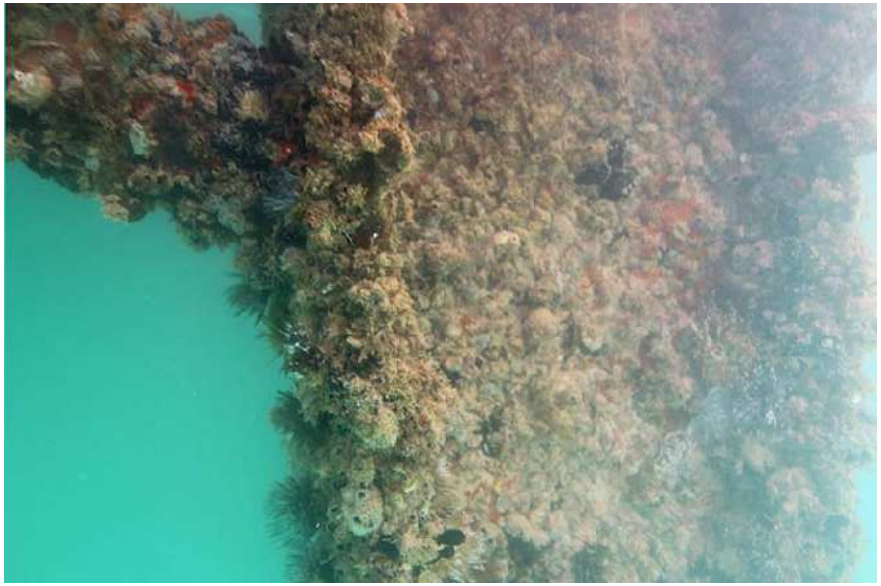


WAYPOINT 54





WAYPOINT 55





WAYPOINT 55



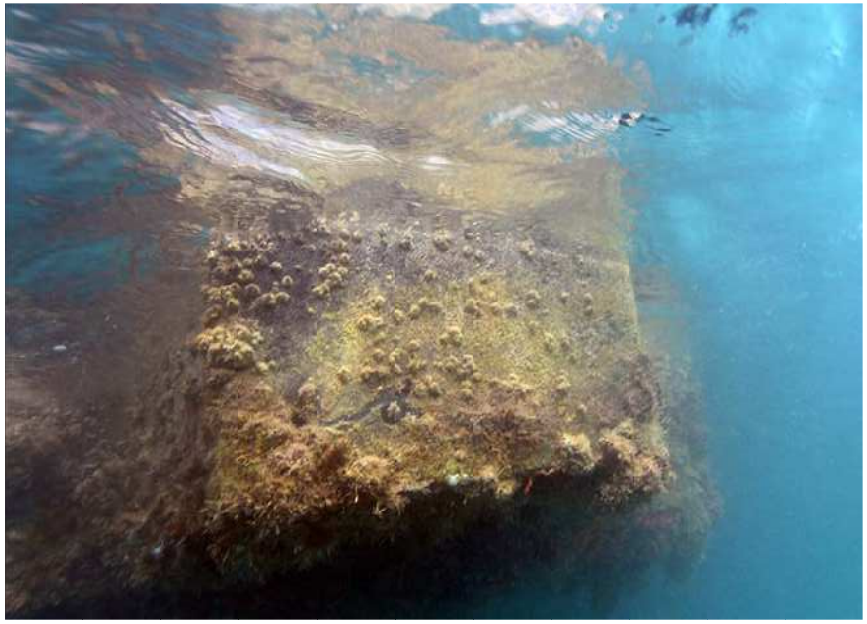
WAYPOINT 58





WAYPOINT 58





Appendix E
Oceanographic Conditions
(Sea Engineering)

KALAELOA BARBERS POINT HARBOR OCEANOGRAPHIC CONDITIONS ASSESSMENT

Kapolei, Oahu, Hawaii

October 2013

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Prepared by: *Sea Engineering, Inc.*

1. INTRODUCTION

The Hawaii Department of Transportation (HDOT) is planning to expand the capabilities and services available at the Kalaeloa Barbers Point Harbor, located on the southwest corner of Oahu. As a part of this project, the DOT is planning the construction of a dedicated fuel pier within the harbor. In support of this effort, Sea Engineering, Inc. (SEI) has been contracted by Group 70 International (Prime Contractor) to conduct an assessment of general oceanographic conditions in the vicinity of, and within, Kalaeloa Barbers Point Harbor, applicable for use within the Development Plan and EIS components of the project.

This effort also includes a summary assessment of sea level rise, based on the latest peer reviewed research and forecasts. The assessment discusses potential impacts as they relate to harbor infrastructure and operations in Hawaii, as well as identifying the latest design guidelines and recommendations for mitigating the effects of sea level rise.

The project area is Kalaeloa Barbers Point Harbor (KBPH), located west of Ewa Beach on Oahu, in the State of Hawaii. A project location map and project vicinity map are presented in Figure 1-1 and Figure 1-2, respectively. A diagram of proposed improvements to KBPH is presented in Figure 1-3.

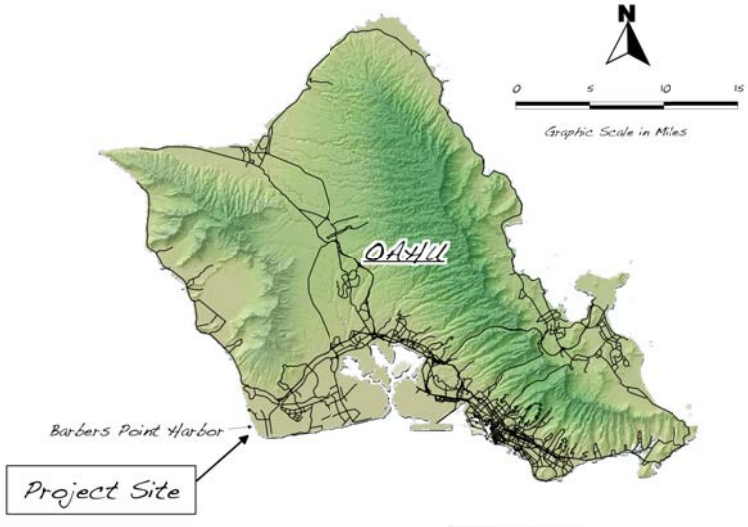

Figure 1-1. Project location map.

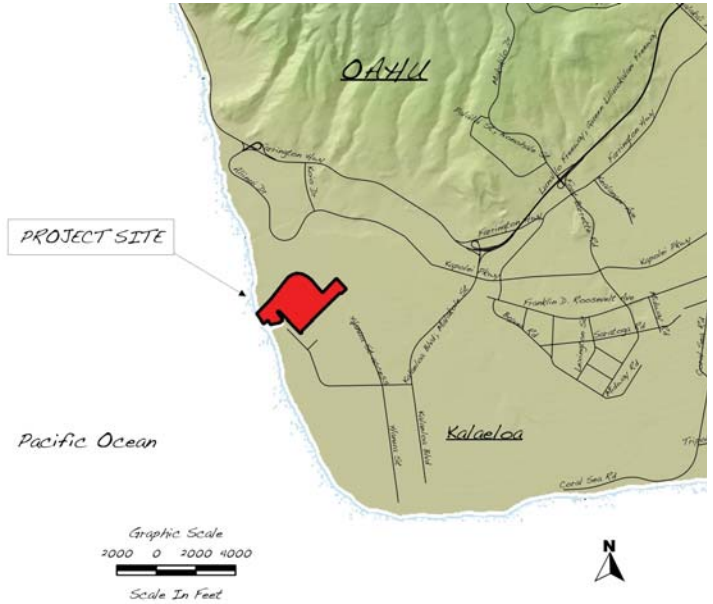

Figure 1-2. Project vicinity map.

The oceanographic conditions assessment will characterize site-specific conditions which could affect operations at the harbor, including wind, waves, surge, and tides. Existing available data from nearby wave buoys, surge gages or other relevant instrumentation will be utilized in this study.

This assessment will discuss the general oceanographic and meteorological conditions that are prevalent for the Hawaii region, and will then focus on site-specific conditions and oceanographic processes which affect the harbor and surrounding vicinity. Any specific conditions of interest found to exist within the Harbor, particularly in the vicinity of the proposed Fuel Pier (see Figure 1-3), will be examined in detail.



Figure 1-3. Areas of proposed improvements at Kalaeloa Barbers Point Harbor.

Kalaeloa Barbers Point Harbor
Oceanographic Assessment

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2. OCEANOGRAPHIC ANALYSIS

Existing available wind, wave, and water level data sets, along with previously completed studies and analyses were acquired by SEI and used to develop a comprehensive basic climatological analysis of the Barbers Point vicinity. The following sections present the findings organized by oceanographic parameter.

2.1 Wind Climate

2.1.1 General Wind Climate in the State of Hawaii

The prevailing wind regime in Hawaii is dominated by the northeasterly Trade winds, spawned by the outflow of air from the Pacific Anticyclone (also known as the Pacific High), which is a vast area of high pressure that typically resides over the northeast Pacific Ocean. The center of this system is located well northeast of the Hawaiian Islands, and shifts northward and southward with the seasons. The summer months from May through September are when the Trades are typically strongest. In the winter months from October through April, the Trades become less frequent. Trade wind frequency varies from approximately 90% in the summer to 50% during the winter, with a yearly average of around 70%.

Winds from the south and west (colloquially referred to as kona winds) occur primarily during the winter months, and are generated by cold fronts or cut-off low pressure systems that migrate eastward across the Pacific. Winds from cut-off lows or extra-tropical storms can be strong and may blow from any direction, depending on the strength and position of the storm relative to the Islands. Wind speeds exceeding 60 miles per hour have been known to occur. Southerly winds from these storms are often stronger on the north and east (windward) sides of the Islands due to downslope acceleration and the funneling effects of the steeper valleys and ridges typical of windward slopes. Generally, winds from these storms range from gentle to severe, and are often associated with heavy rainfall.

The Hawaiian Islands lie within a zone of the Earth's climate that is susceptible to tropical storms and hurricanes; however, typical sea surface temperatures around Hawaii are generally not warm enough to encourage or sustain hurricane formation and growth. Although very infrequent events in Hawaii, two hurricanes did strike the Island of Oahu within an approximate ten year period – Hurricane Iwa (1982) and Hurricane Iniki (1992). Hurricane Iwa was dimensionally a large storm, and possessed wind speeds at the low end of hurricane strength (74 miles per hour), while Hurricane Iniki was a smaller, much more powerful storm, with peak wind speeds of approximately 130 miles per hour at the time of landfall. Hurricane Iniki passed directly over the island of Kauai . In general, scenario hurricanes reaching Hawaii are predicted to have relatively low wind speeds, between 75 and 115 miles per hour (Haraguchi, 1984).

2.1.2 Wind Data for Oahu

Wind data was obtained from the NOAA weather station at Kalaeloa Airport, which is approximately three miles from KBPH. Hourly average wind data was available for the years 1996 through 2013. A basic statistical analysis was performed on the data.

A wind rose diagram developed from wind for the entire 17 year data set is presented in Figure 2-1, which illustrates the percent occurrence of wind speed and direction for that period of time. Calm winds conditions (e.g., no wind) data were remove prior to plotting, and occurred 13.4% of the time.

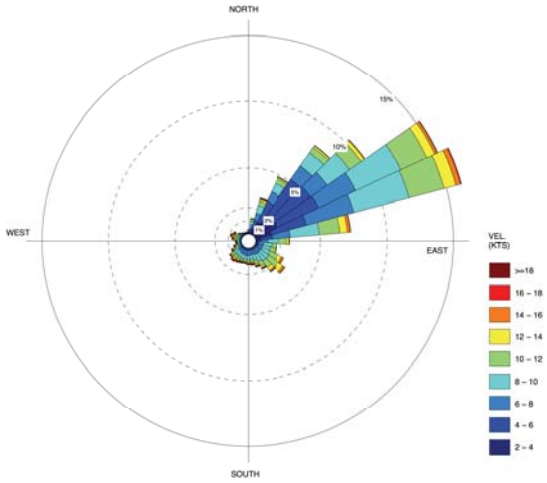

Figure 2-1. Wind rose for Kalaeloa Airport (1996 to 2013). Hourly wind speed in knots.

The annual maximum 2-minute averaged wind speeds were available for the NOAA weather station at Honolulu International Airport (approximately 12 miles from Kalaeloa) for the 44-year period from 1969 to 2012. Results are presented in Table 2-1, sorted by descending wind speed. Some of the annual maxima shown are associated with specific storm events, most notably, the highest value of 46 miles per hour in November of 1982 which was the result of the passage of Hurricane Iwa. Other events include Hurricane Iniki in 1992 at 38 miles per hour, and several severe Kona storms with wind speeds up to 40 miles per hour.

For this oceanographic analysis, it is assumed that the annual maximum wind velocities at Kalaeloa Barbers Point Harbor are comparable to those at Honolulu International Airport. For design purposes, the direction can be assumed to be that which would cause the greatest force on any proposed dock, pier, vessel or other design element, resulting in a reasonably likely conservative value based on the existing wind data.

Table 2-1. Annual Maximum 2-minute Wind Speeds at Honolulu International Airport.

Year	Wind Speed (MPH)	Year	Wind Speed (MPH)
1982	46	1972	33
1969	40	1973	33
1970	40	1993	33
2004	40	1999	33
2007	39	2010	33
2011	39	1997	32
1976	38	2003	32
1992	38	2005	32
1977	37	1994	31
2008	37	2006	31
1975	36	1981	30
2002	36	1985	30
1980	35	1986	30
1990	35	1989	30
2000	35	2012	30
2001	35	1987	29
2009	35	1988	29
1971	34	1984	28
1974	34	1991	28
1978	34	1995	28
1979	34	1996	28
1998	34	1983	23

A Gumbel's extreme value distribution was applied to the 44 annual maximum 2-minute averaged wind speed records to develop expected extreme wind speeds for various return periods ranging from 1 to 100 years. The corresponding wind speeds are presented in Table 2-2.

2.1.3 Hurricane Wind

The report *Hurricanes in Hawaii* (Haraguchi, 1984), prepared for the U. S. Army Corps of Engineers, Honolulu Engineer District, presents a hypothetical hurricane model and a series of worst-case scenarios for the Hawaiian Islands. The model hurricane is defined as the probable hurricane that will strike Hawaii in the future, based on the characteristics of storms that have previously approached or struck the islands. The worst-case hurricane characteristics are derived from a subjective analysis of the data from 20 significant hurricanes in the Central Pacific and an understanding of the basic atmospheric and oceanic conditions surrounding the Hawaiian Islands.

Haraguchi estimated the model hurricane wind speed in the vicinity of the Hawaiian Islands to be 75 miles per hour. This value falls beyond the 100 year return period wind predicted by the Gumbel Distribution for Honolulu, shown in Table 2-2. By comparison, the maximum 2-minute averaged wind recorded at Honolulu International Airport in the last 44 years (1969 to 2012) was

46 miles per hour, which is equivalent to the 50-year wind speed from Table 2-2. For the most conservative calculations, the Haraguchi hurricane wind speed of 75 miles per hour is recommended.

Table 2-2. Gumbel's Distribution Return Periods for 2-Minute Averaged Wind Speeds at Honolulu International Airport (1969 to 2012)

Return Period (years)	Wind Speed (MPH)
1	33.3
2	35.6
5	38.7
7	39.8
10	41.0
15	42.3
20	43.3
25	44.0
30	44.6
40	45.6
50	46.3
75	47.7
100	48.6

2.2 Wave Climate

2.2.1 General Wave Climate for Hawaiian Waters

The wave climate in Hawaii is typically characterized by four general swell sources, which include northeast trade wind waves, North Pacific swell, South Pacific swell, and kona storm wind waves. Additionally, tropical storms and hurricanes may generate waves that can approach the islands from virtually any direction. Unlike winds, any combination of these wave conditions may occur at the same time. Kalaeloa Barbers Point Harbor is sheltered from the direct approach of northeast trade wind swell; however, the site is directly exposed to west, southwest, and northwest swells, and kona storm wind waves.

Trade wind waves may occur throughout the year, but generally are most persistent from April through September when they often dominate the Hawaiian wave climate. These conditions result from the strong and steady trade winds blowing from the northeast quadrant over long fetches of open ocean. Trade wind deepwater wave heights are typically between 3 and 8 feet (1 to 2.5 m) with periods of 5 to 10 seconds, depending upon the strength of the trade winds and how far the fetch extends eastward of the Hawaiian Islands. The direction of approach, like the trade winds themselves, varies between north-northeast and east-southeast, and is generally centered on the east-northeast direction. The project site is sheltered from direct approach of trade wind waves by the landmass of Oahu; however, a portion of the trade wind wave energy does diffract around the island and reaches Kalaeloa. This energy registers as short period waves from the southeast at Kalaeloa.

During the winter months in the northern hemisphere, strong storms formed by intense low pressure systems are frequent in the North Pacific at mid-latitudes, such as near the Aleutian Islands. These storms generate the large North Pacific swells that range in direction from west-northwest to north-northeast, and arrive at north-facing Hawaiian shorelines with minimal attenuation of energy. Deepwater wave heights often reach 15 feet (4.6 m) and in extreme cases can exceed 30 feet (9 m). Periods vary between 12 and 22 seconds, depending on the location of the storm. The shoreline between Barbers Point and Ko Olina is partially exposed to these swells approaching from the north to northwest, while it is directly exposed to more westerly directions of wave approach.

Southern swell is generated by large storms in the mid latitudes of the southern hemisphere and is most prevalent during the summer months of May through September (winter in the southern hemisphere). Propagating over distances of greater than 5,000 miles, these waves typically arrive with relatively low deep water wave heights of 1 to 4 feet and periods of 14 to 22 seconds. Depending on the positions and tracks of the southern hemisphere storms creating these waves, southern swells approach mainly from the southwesterly direction but occasionally track to more southeasterly directions.

Kona storm waves also directly approach the project site; however, this wave condition is fairly infrequent, occurring up to roughly ten percent of the time during a typical year. Kona storm wave conditions typically have periods ranging from 6 to 10 seconds with heights of 5 to 10 feet (1.5 to 3 m), and approach from the southwest. Deepwater wave heights during the severe Kona storm of January 1980 were approximately 17 feet. These waves had a significant impact on the south and west shores of Oahu.

Severe tropical storms and the unlikely, but possible, hurricane event have the potential to generate large waves, which in turn could potentially result in large waves at the project site. SEI (2010) estimated model deepwater hurricane wave heights applicable to the project site of 31 to 54 feet (9 to 16 m) arriving from 169 to 221 degrees.

2.2.2 Southwest Oahu Wave Climate

Wave conditions for this area have been measured by the Coastal Data Information Program (CDIP), at two nearby locations, designated as Station 159 ("Barbers Point Offshore") and Station 165 ("Barbers Point"). Station 159 was deployed between 1986 and 1990 at a location approximately 2 ½ miles northwest of the harbor entrance. Station 165 is located approximately 1½ miles southwest of Barbers Point, in a water depth of roughly 990 feet (300 m) and has recorded data since 2010. The buoy measures and records spectral wave energy and direction at ½-hour increments, and derives important wave parameters such as significant wave height[†], peak direction, and peak period.

[†] Significant Wave Height refers to the average wave height of the highest one-third of waves in the record.

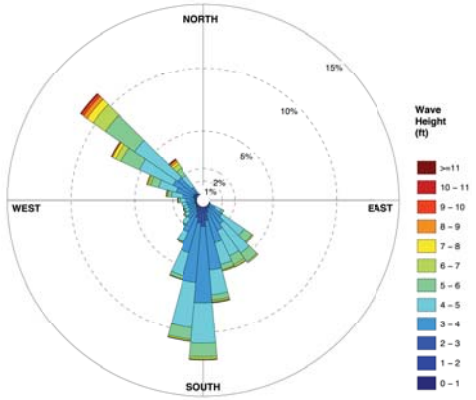

Figure 2-2. Barbers Point deep water wave height rose diagram, based on approximately three years of data from CDIP Station 165.

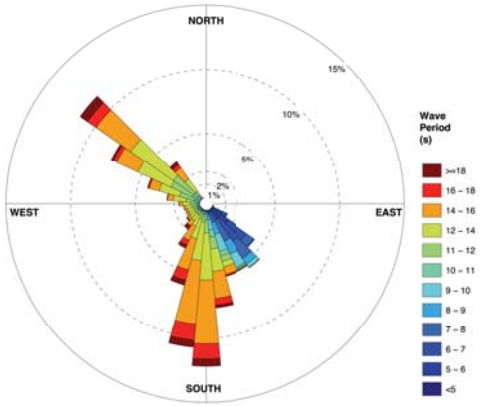

Figure 2-3. Barbers Point deep water wave period rose diagram, based on approximately three years of data from CDIP Station 165.

The entire dataset was utilized to generate wave height and wave period rose plots, which are a form of histogram which convey a parameter's directional dependence, and are presented in Figure 2-2 and Figure 2-3. In general, the plots show peak values centered on two primary directions; northwest swell from 315°, and south swell from 180°. This indicates that Barbers Point is susceptible to elevated surf throughout the year due to its exposure to both north (winter) and south (summer) swells. However, the wave height rose plot (Figure 2-2) reveals that a significant majority of the wave heights over 6 feet (2 m) arrive from the northerly winter swells.

The wave period rose plot (Figure 2-3) shows that the north and south swell peaks are primarily composed of longer period (>16 seconds) swell, as would be expected, but additionally shows a component of wrapping trade wind waves which register as periods less than 10 seconds from the southeast. Based on the wave climate and exposure at KBPH, design wave conditions should consider the following events: [1] an extreme south swell; [2] an extreme north swell; and, [3] waves from a near direct hurricane impact at this location.

2.2.3 Return Period Wave Heights for Barbers Point

Return period wave heights were calculated for Barbers Point using nine years of data collected near the site (CDIP Stations 159 and 165), with the measured annual maximum wave heights shown in Table 2-3. All maximum wave heights were found to be from the Northwest, which is swell characterized by waves with periods greater than 10 seconds (typically 15 to 20 seconds) and directions between 270° and 360°. The maximum measured wave height in the nine-year data set was 19.1 feet in 2011. A Gumbel's extreme distribution was applied to the available annual maximum wave heights to calculate design return periods from the data. The resulting return period wave heights are presented in Table 2-4. Although extrapolation is typically limited to around three times the dataset length (a prediction of approximately 30 years in our case), the longer period results were found to be consistent with analyses performed by the US Army Corps of Engineers for WIS (Wave Information Studies) hindcast station number 82553, located roughly 40 miles (64 km) southwest of Barbers Point (see Figure 2-4).

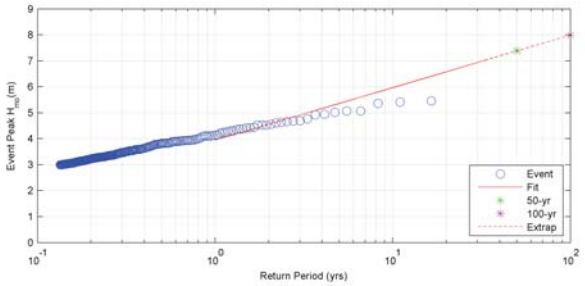

Figure 2-4. Return Period Wave Heights for WIS Station 82553.

The WIS data from Station 82553 result in a 50-year wave height calculation of 24.3 feet (7.4 m), which is virtually equivalent to that calculated for Barbers Point from the buoy data (see Table 2-4). The 100-year return period wave height from the WIS dataset is found to be 26.2 feet (8.0 m), which is also comparable to the Barbers Point data which result in a return period wave height of 25.5 feet (7.8 m).

Table 2-3. Annual Maximum Wave Heights Offshore of KBPH

Year	H_{max} (feet)	H_{max} (meters)
2013	18.5	5.65
2012	17.7	5.38
2011	19.1	5.83
2010	13.6	4.16
1990	16.4	5.00
1989	16.7	5.08
1988	16.6	5.06
1987	18.8	5.74
1986	17.7	5.38

Table 2-4. Gumbel Return Period Wave Heights Offshore of KBPH

Return Period (years)	Height (ft)	Height (m)
1	17.2	5.2
2	18.5	5.6
5	20.1	6.1
7	20.7	6.3
10	21.4	6.5
15	22.1	6.7
20	22.6	6.9
25	23.0	7.0
30	23.4	7.1
40	23.9	7.3
50	24.3	7.4
75	25.0	7.6
100	25.5	7.8

2.2.4 Hurricane Wave Heights

During the primary hurricane season of July through September, tropical storms generally form in the warm waters off the southwest coast of Mexico and move westward across the central Pacific Ocean. Typically, normal atmospheric conditions steer these storms well south of the Hawaiian Islands, with occasional tracks hooking northward to the east or west of the islands. The storms generally transit far enough offshore to cause at most high surf and heavy rainfall as they pass; however, the tendency to bend northwestward makes Oahu vulnerable to being struck by northward or westward moving storms. Hurricane Iniki in September 1992, which passed within approximately 100 miles of the project site, is an example of a mid-season hurricane track. Late season hurricanes follow a somewhat different track, forming south of Hawaii and moving north toward the islands. Hurricane Iwa, which was a late season hurricane, formed near 6° N and 162° W in November 1982 and moved northward in the direction of Hawaii. The easterly trade winds were absent at the time of the storm; thus, it was not forced to turn westward away from Hawaii. Instead, it turned slightly northeast to pass just to the west of Kauai. A map

of near-approach hurricane tracks for the Hawaiian Islands was compiled from historic data obtained from NOAA's Central Pacific hurricane database, and is presented in Figure 2-5.

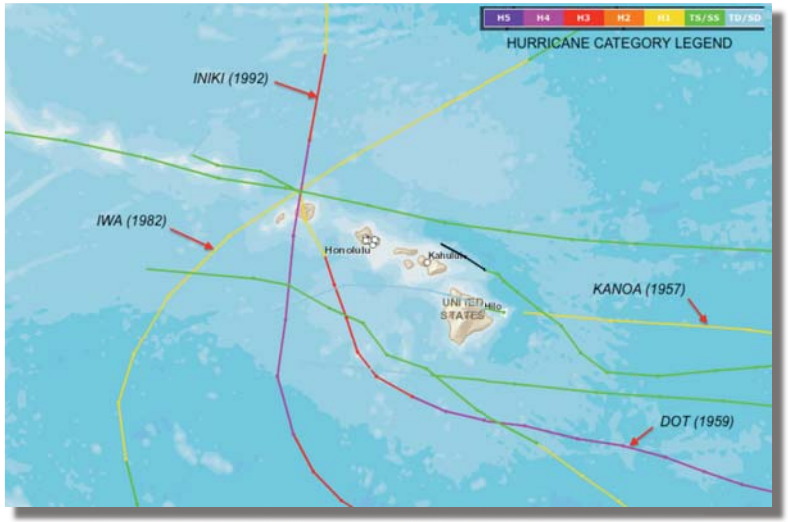

Figure 2-5. Map of near Hawaii hurricane tracks (1900 – 2012). Image courtesy NOAA.

Hurricane Iniki was a compact but intense hurricane when it moved northward across the Island of Kauai, and was the strongest and most destructive hurricane to hit the Hawaiian Islands in this century. The center of Iniki crossed the south coast of Kauai just west of Port Allen near Kaumakani. The hourly pressure readings at the NOS tide station at Port Allen indicated a low reading of about 960 millibars (mb) at 1500 hrs local time and a reading of 968 mb at 1600 hrs. The wind shift indicated the time of the hurricane center passing the station as being between 1500 and 1600 hrs, and the lowest pressure would thus be lower than the recorded hourly readings. Additionally, an off-duty weather observer in Kekaha recorded a reading of 948.2 mb with a hand held barometer. It therefore appears that a central pressure of 945 mb would be a reasonable value for Hurricane Iniki.

Hurricane Iwa was not as intense as Hurricane Iniki near the Hawaiian Islands, but it was a much larger hurricane than Iniki, with an estimated radius of maximum winds at 51 nautical miles (n.m.), compared to 16 n.m. for Iniki. The center of Iwa passed within 25 n.m. of the Barking Sands Missile Range weather station, and this station's pressure data represents Iwa's lowest sea level pressure drop over Kauai. The air pressure at the Barking Sands weather station bottomed

out at 971.5 mb when the storm center passed. The maximum sustained surface wind speed was 63 knots at the station. General characteristics of Hurricanes Iwa and Iniki are presented in Table 2-5.

Table 2-5. Characteristics of Hurricanes Iwa and Iniki

Hurricane Characteristic	Iwa	Iniki
Forward Direction (°TN)	55	10
Max. Sustained Surface Wind Speed (knots)	64	84
Min. Sea Level Pressure (mbs)	972	945
Forward Speed (knots)	21	20
Radius of Max. Wind Speed (n.m.)	51	16

Table 2-6. Modeled Deep Water Wave Conditions for Hurricanes Iwa and Iniki

Storm Name	Wave Height (ft)	Wave Period (sec)	Wave Direction (deg N)
Hurricane Iwa	45.4	14.9	260
	44.7	14.8	242
	41.0	14.1	220
	35.9	13.2	199
Hurricane Iniki	44.5	14.6	222
	43.5	14.4	205
	40.7	13.9	179
	36.8	13.2	160

In a 1993 study by Sea Engineering for the USACE, a numerical model known as HURWIND was employed to predict a set of extreme wave conditions for the two storms, shown in Table 2-6, based on the parameters listed in Table 2-5. The two hurricanes had similar deepwater wave heights and periods, with the higher wind speed during Iniki being somewhat balanced by Iwa's larger diameter. The two storms did, however, have slight differences in wave approach direction.

2.2.5 Wave Transmission

A transmitted wave is created when an incident wave propagates through, over, or around a structure or other restriction such as an embayment or inlet, and is often a fraction of the original wave height offshore. In 1967, the US Army Corps of Engineers conducted a hydraulic model study of Barbers Point, including both model and prototype results. In the study, it was found that transmitted waves never surpassed the 'desired maximum criteria' of 2.5 feet (0.76 m) or the 'maximum tolerable criteria' of 4.5 feet (1.37 m) for all modeled conditions, which utilized incident wave heights up to 24 feet and periods from 4 to 20 seconds. By comparison, hurricane conditions from Table 2-6 are up to twice the size of the maximum incident wave used in the 1967 study, suggesting that waves inside the harbor may approach the maximum tolerable criteria during such an event. For the purposes of this oceanographic assessment, a conservative

estimate of transmitted wave height within the harbor may be found by doubling the desired maximum criteria, yielding a wave height of 5.0 feet (1.6 m). This estimate is a valid approximation because the maximum incident wave heights from the 1967 study were nearly doubled by the calculated hurricane condition, assuming that transmitted wave height rises linearly with incident wave height.

Since the time of the original study over four decades ago, many advances have been made in the numerical modeling of waves and wave-structure interactions. If further resolution is necessary, these methods could be used effectively to estimate a site-specific transmitted wave height distribution within the harbor through a quantitative approach.

2.2.6 Harbor Oscillations (Seiches)

Longer period oscillations (also referred to as harbor resonance, surging, seiching, and resonant oscillations) are long period standing waves which are sometimes present in closed or semi-enclosed basins such as embayments, harbors, and lakes. KBPH could be considered a closed basin due to the relatively narrow entrance channel. The two forms of seiches, enclosed basin and open basin, are schematically depicted in Figure 2-6, which also illustrates the locations of the nodes and antinodes for the various harmonics.

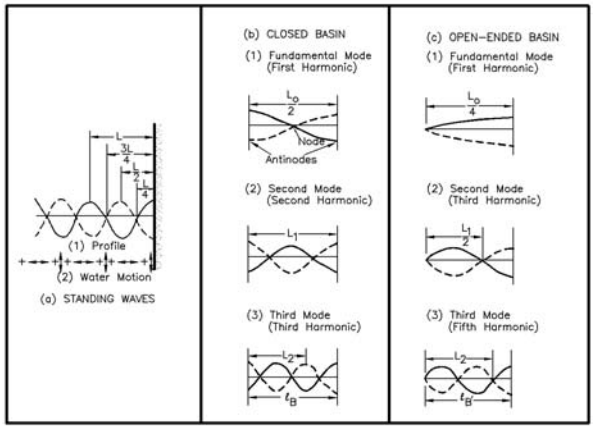

Figure 2-6. Schematic surface profiles for seiching modes (excerpted from USACE EM 1110-2-110).

The oscillation characteristics are mainly driven by the basin size, shape and water depth, and become most damaging as the oscillation period matches that of the natural resonant period of the basin. Seiches are typically characterized as having periods between 30 seconds and 10

minutes, in contrast to wind waves and swell which exhibit periods in the range of 4 to 25 seconds.

Seiches can pose a significant threat to inner harbor operations, moored vessels, and other waterfront facilities by parting mooring lines, damaging fender systems, creating vessel collisions, and delaying transfer operations. Because of the potential for damage, seiching has been studied extensively in areas where it is present, including KBPH.

A numerical and physical model study of Kalaeloa Barbers Point Harbor produced by the US Army Corps of Engineers in 1994 found that the modeled geometry, which is equivalent to the current configuration of the harbor, shows the harbor to be susceptible to seiching during large swell events which spawn infragravity waves with periods close to its fundamental or Helmholtz mode of 1,024 seconds (0.00098 Hz). Research conducted by Okihiro and Guza (1997) suggests that both bound and free infragravity waves are the driving force for seiching at KBPH, where infragravity waves are defined as long period waves with periods falling in the range of 25 to 200 seconds. Infragravity wave heights are typically much lower than wind wave and swell heights, generally on the order of one-tenth the size. Bound infragravity waves are driven by, and coupled to wave groups, which are in turn forced by wind waves and swell.

As part of the 1993 monitoring study by the USACE, a number of wave and surge gages were deployed in and around the harbor from 1985 to 1990, and the data collected from them are currently available online from the Coastal Data Information Program (CDIP) website[‡], where the specific deployment locations are as shown in Figure 2-7. A review of the data found that the maximum surge recorded at the north end of the proposed Fuel Pier/Pier 3 (060-p2) was 1.84 feet (0.56 m) with a period of 1,024 seconds, which occurred late on 29 August 1987. At the same time, the offshore array (059-p1) measured a significant wave height of 1.54 feet (0.47 m) with a period of 14.22 seconds. The maximum recorded surge at the south end of the pier, south of the Ferry/Tug Pier (060-p3) was found to be slightly smaller at 1.35 feet (0.41 m) with a period of 120 seconds, which occurred early morning on 22 January 1988. At the same time, the offshore array measured a significant wave height of 7.94 feet (2.42 m) with a period of 16 seconds.

The data are consistent with the USACE model study, which predicted that the fundamental mode of harbor oscillations is 1,024 seconds (as observed at 060-p2), and that the fundamental north-south mode from the southwest corner (060-p3) to the northeast corner is 124 seconds (compared to the 120 seconds measured). Three out of the five largest surge heights at both locations p2 and p3 occurred when the offshore array p1 was measuring a wave period of 16 seconds. A review of the spectral data from the offshore buoy (Station 159) reveals that there were varying amounts of energy in the 16 second band coinciding with all of the top five surge heights on record for each location. This implies that certain wave conditions with energy in the 16 second (0.0625 Hz) band are particularly able to excite long period oscillations in Kalaeloa Barbers Point Harbor, as suggested in the existing research and literature.

[‡] The CDIP website is available at the following link: http://cdip.ucsd.edu/. The site is maintained by the Scripps Institute of Oceanography, with funding from the US Army Corps of Engineers.

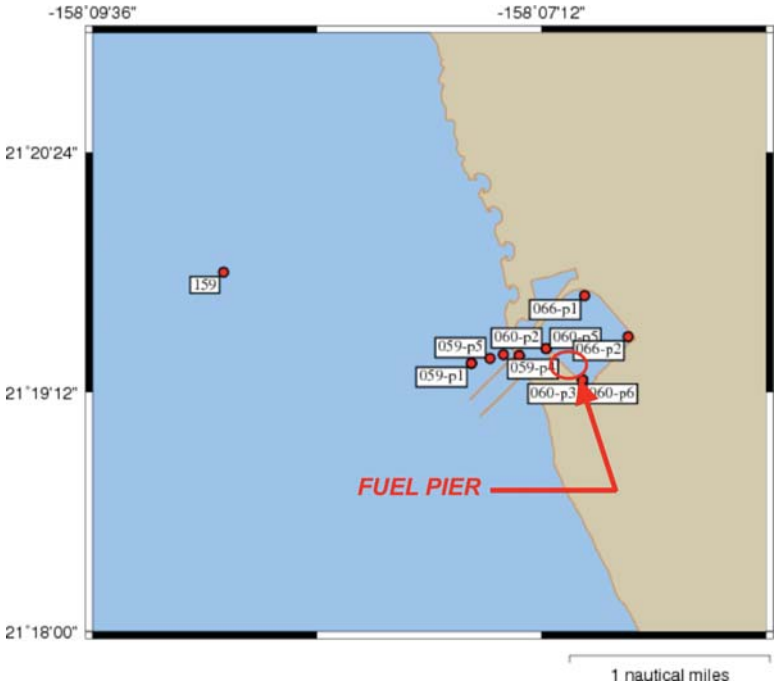

Figure 2-7. □ ave and surge gage locations at □□P□ □image courtesy of CDIP/USACE□

2.3 Tides and Other Long Period Waves

2.3.1 Astronomical Tide

Tides in Hawaii are a combination of both diurnal and semi-diurnal regimes, which is referred to as a mixed semi-diurnal tide. Water level data has been recorded continuously at Honolulu Harbor by a tide station (now operated by NOAA's Center for Operational Oceanographic Products and Services) since it was first established in 1905. This is the closest tide station to the project location. The diurnal range at Honolulu has been calculated to be 1.9 feet, which is a measure of the vertical distance between mean lower low water (MLLW) and mean higher high water (MHHW). Measured from mean sea level (MSL), MLLW is -0.82 feet, and MHHW is +1.08 feet, based on the latest Epoch of 1983-2001.

2.3.2 Mesoscale Eddies

Hawaii is subject to periodic tidal excursions due to large scale oceanic eddies that have recently been identified by researchers. These eddies, which occasionally propagate through the islands, are termed *mesoscale eddies* (Merrifield, 2004), and produce elevated tide levels that can be on the order of 0.5 feet higher than normal for periods up to several weeks. In a recent example of the potential effects of this phenomenon, it is now widely accepted among Hawaii coastal scientists and engineers that a 2003 erosion event that damaged the shoreline along Kaanapali Beach, Maui, was caused by the vigorous and sustained occurrence of southern swell in combination with pronounced short-term increases in sea level due to the presence of mesoscale eddies (SEI 2003, Vitousek 2007). Comparison and analysis of tide level, satellite altimetry, and hydrographic measurements around the Hawaiian Islands suggest that the 2003 extreme water levels were largely due to an anti-cyclonic eddy with an offshore water level rise of about 0.5 feet and a diameter of roughly 186 miles.

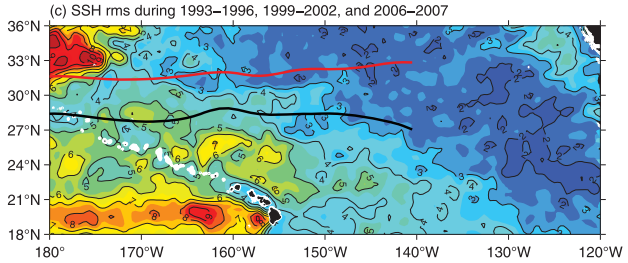

Figure 2-8. □ap of satellite altimetry SS□ near □awaii □Chen and □iu □□□□□

A recent study of mesoscale eddies using satellite altimetry of sea surface heights (SSH) discovered that an area of strong eddy activity exists in the lee of the main Hawaiian Islands due to surface wind forcing and the unstable Hawaiian Lee Countercurrent (Chen and Qiu 2010). They found that the root mean square of eddy surface elevations near the main Hawaiian Islands ranged up to 0.3 feet (9 cm), which is equivalent to a significant elevation (average of the highest one-third) of 0.42 feet (12 cm), as depicted in Figure 2-8.

2.4 Currents and Harbor Circulation

2.4.1 Nearshore Currents

Currents are a significant concern for Kalaeloa Barbers Point Harbor, which has a history of navigability issues and mishaps related to problematic currents which crisscross the entrance channel. These currents have the potential to cause adverse vessel motions during approach to the harbor entrance; and the issue was considered important enough that in 1994 the USACE

commissioned a physical model study to investigate the effects of a proposed new jetty designed to cut off the currents.

In a 1991 investigation by Sea Engineering, it was found that currents in the vicinity of the entrance channel to KBPH were primarily tidal. However, they tended to be unpredictable, sometimes not reversing with the change in tide. This condition is problematic for mariners wishing to transit large vessels into the harbor's relatively narrow approach.

A 1988 field study by Sea Engineering showed that the predominantly tidal currents flow parallel to the shoreline (perpendicular to the centerline of the entrance channel) with reversing directionality, as shown in Figure 2-9. Currents during a flood tide generally flow to the southeast, while during an ebb tide they typically flow to the northwest.

The same study also found that inshore currents differ significantly from the offshore currents, where the division between them is roughly the 50 foot depth contour, where there is a notable ledge which drops to roughly 80 feet. The currents offshore are greater than or equal to 1 knot (50 cm/s) for approximately five percent of the time, with an average velocity of 0.5 knots (24 cm/s), and a predicted annual maximum velocity of 2 knots (100 cm/s). Currents inshore of the 50 foot isobath average up to 0.3 knots (15 cm/s).

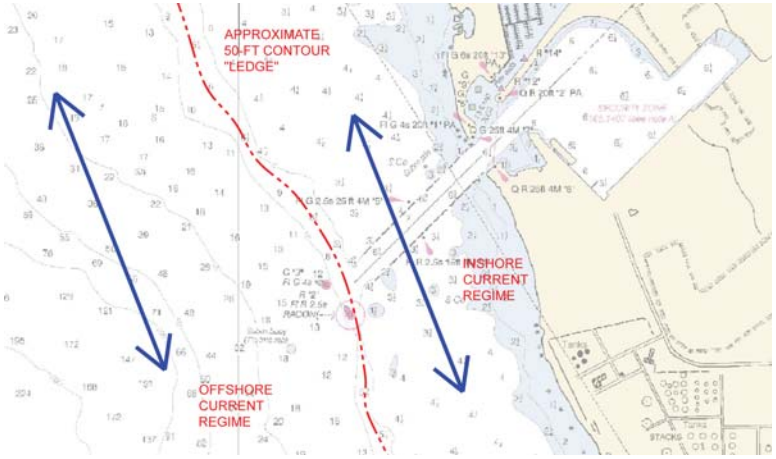

Figure 2-9. Current pattern for nearshore waters, in the vicinity of the □□P□ entrance channel.

2.4.2 Harbor Circulation

The circulation (current patterns) within Kalaeloa Barbers Point Harbor were investigated by Sea Engineering during a number of separate investigations, including two, in 1993 and 1999 respectively (Sea Engineering, Inc., 2000). These studies employed drogues[§] to map out the circulation within the harbor basin during various tides. The drogue data indicated that current speeds within the basin vary from 0.01 knots (0.6 cm/s) to 0.15 knots (7.6 cm/s) with an average speed of 0.08 knots (4.3 cm/s). Current direction showed a significant degree of variation, however, in general it showed currents near the harbor mouth typically more aligned with the north-south boundaries, and currents in the back basin generally more indiscriminate.

2.5 Turbidity and Total Suspended Solids

A significant amount of turbidity monitoring has been conducted in the vicinity of Kalaeloa Barbers Point Harbor, in an attempt to quantify baseline and elevated turbidity levels. In a 1999 study for proposed modifications to KBPH (Sea Engineering, Inc., 2000), it was found that the data generally indicate that high turbidity is a naturally occurring phenomenon along this shoreline. Pre-construction measurements conducted in 1982 support this assertion, with an average value of 1.3 NTU (nephelometric turbidity units) in nearshore waters 1,500 feet to the north and 1,500 feet to the south of the harbor entrance, and an average of 3.3 NTU at the entrance to the preexisting barge harbor. Both of these measurements far exceed the current State water quality standard of 0.2 NTU for open coastal waters (HAR §11-54-6). During the basin expansion project, Marine Research Consultants (MRC) observed five large surf events during the project water quality monitoring effort, and recorded an average turbidity of 2.4 NTU in the middle of the entrance channel, and an average of 7 NTU at the harbor entrance.

Turbidity inside the harbor basin is generally greater than nearby open coastal waters, as seen in Figure 2-10, which is due to fine particulate matter generated by the soft limestone and unconsolidated sediments from which the harbor was excavated.

[§] Current drogues are subsurface devices which float neutrally in the water column at specific depths along with a surface float, used to trace current speed and direction over time. Drogues typically utili□e a parachute□or sail□ shaped appendage underwater to ride the current.



Figure 2-10. Turbidity plumes emanating from □o Olina □arina □upper□and □□P□ entrance channel □lower□

Average turbidity levels measured within the harbor from 1993 to 2000 ranged from 1 to 4 NTU, which significantly exceeds the State water quality standard of 0.4 NTU set forth for embayments. During the previous harbor expansion project, while active dredging was occurring on a daily basis, average turbidity increased noticeably within the harbor. Average turbidity inside the inner basin ranged up to 12 NTU, and at the harbor entrance averaged up to 3.5 NTU. Turbidities were also elevated during the maintenance dredging, which sent the average values for the basin and harbor entrance up to 16 NTU and 11 NTU, respectively. Similar increases in turbidity were not observed at the sampling locations in the middle of the entrance channel, roughly 1,600 feet offshore, suggesting that elevated turbidity levels generated by dredging inside the harbor rarely impact offshore waters. By comparison in 1997, MRC measured turbidities as high as 71 NTU inside the harbor basin following ship movements, suggesting that routine ship operations may create greater local turbidities than does active dredging operations.

3. DESIGN GUIDELINES SUMMARY

The design water level condition for the proposed pier location within Kalaeloa Barbers Point Harbor is based on the design hurricane condition. This is the most conservative approach because of the much higher expected wave heights, when compared to those of return period kona storm, north, or south swell waves (refer to Table 2-4 and Table 2-6). The final design water level is composed of two main components: the maximum rise in still water level, along with the crest height of the maximum transmitted wave and harbor oscillation (surge) which propagate in on the still water level rise. The design water level excursion inside the harbor from a hurricane condition is therefore estimated by adding the total still water level rise to any transmitted wave height and long period oscillation that may enter the basin.

3.1.1 Still Water Level Rise

In this report, the still water level rise (S_T) is defined as the following: *the rise in still water level along the shoreline during a hurricane, which is a function of: (1) the astronomical tide; (2) storm surge due to reduced atmospheric pressure and wind stress; (3) wave setup, and (4) mesoscale eddy effects.* The components of water level rise are assumed to add linearly in Hawaiian waters, as follows:

$$\boldsymbol{S_T} = S_A + S_P + S_X + S_Y + S_W \qquad \text{Equation 1.}$$

Where,

S_T = Total still water level rise above the vertical datum

S_A = Rise due to *astronomical tide*

S_P = Rise due to *reduced atmospheric pressure*, which is calculated by:

$$S_P = 1.14(P_n - P_o)(1 - e^{\left[\frac{-R}{r}\right]}) \qquad \text{Equation 2.}$$

where,

- P_n is normal atmospheric pressure (inches mercury)
- P_o is pressure at center of hurricane (inches mercury)
- R is radius of maximum wind (nautical miles)
- r is local distance from center of hurricane (nautical miles)

S_X = Rise due to wind stress perpendicular to the coast

S_Y = Rise due to the balance of wind stress and bottom stress forces parallel to the coast and the *Coriolis* force

S_W = Rise due to wave setup

S_{ME} = Rise due to mesoscale eddy effects

The wind stress effects are very significant on the Eastern and Gulf Coasts of the mainland United States, where hurricane winds blow over long reaches of relatively shallow water. The computation for our case, however, does not include S_X and S_Y because the wind stress

components of the water level rise are very small in Hawaii. This is due to the fact that there is no continental shelf around Hawaii, and deep water extends for all practical purposes up to the shoreline. The resulting equation reduces to the following:

$$\boldsymbol{S_T} = S_A + S_P + S_W + S_{ME} \qquad \text{Equation 3.}$$

The values were determined as follows:

S_A = + 1.1 feet MSL For this study, it is assumed that a scenario hurricane would occur simultaneously with a mean higher high water tide (MHHW, refer to Section 2.3).

S_P = 1.5 feet The rise in water level associated with a reduction in atmospheric pressure (storm surge) is calculated by using the values from Table 2-5 and inserting them into Equation 2.

S_W = 3.4 feet Wave setup is defined as the superelevation of the still water level due only to onshore mass transport of water by wave action (i.e., breaking waves). Wave setup was estimated using the Longuet-Higgins and Stewart method described in the Shore Protection Manual (SPM), published by the USACE. By comparison, the storm surge measured at Port Allen, Kauai during the passage of Hurricane Iniki was found to be 2.9 feet (0.88 m), which was calculated by subtracting the astronomical tide and storm surge components from the record at the time of maximum water surface elevation at the Port Allen tide gage.

S_{ME} = 0.5 feet Still water level rise due to the presence of a mesoscale eddy is taken to be the more conservative value, observed from the Kaanapali erosion event. Water level rise values from the remote sensing study of SSH (Chen and Qiu 2010) are similar at roughly 0.4 feet.

The total still water rise is therefore found as the following vertical distance above MSL:

$$\boldsymbol{S_T} = 1.1 + 1.5 + 3.4 + 0.5 = \text{6.5 feet (1.98 m)}$$

3.1.2 Total Water Level Excursion (Hurricane Condition)

The maximum transmitted wave which rides in on the still water level rise was estimated to be 5.0 feet (refer to Section 2.2.5). The final hurricane design water level excursion inside the harbor is found by adding the following quantities: still water level rise (S_T); one-half the maximum transmitted wave height (wave crest elevation above still water line); and, one-half the maximum oscillation amplitude (oscillation/surge elevation above still water line). Note that only the positive (crest) portion of transmitted wave height is added (e.g., ½ *H*).

The total water level (WL) excursion equation for hurricane conditions is as follows:

$$\mathbf{WL_{hur}} = S_T + \tfrac{1}{2} \cdot \{(H_t) + (H_{surge})\} \qquad \text{Equation 4.}$$

Where,

S_T = Total still water level rise above the vertical datum (6.5 feet)

H_t = Maximum transmitted wave height inside the harbor (5.0 feet, see Section 2.2.5)

H_{surge} = Maximum surge inside harbor (1.4 feet, see Section 2.2.6)

$$= 6.5' + \frac{1}{2} \cdot \{(5.0') + (1.4')\}$$

$\mathbf{WL_{hur}} = \mathbf{+ 9.7\ feet\ (+3.0\ m)\ above\ MSL}$

4. SEA LEVEL RISE ASSESSMENT

Due to the heat-trapping effects of greenhouses gases (GHG), climate scientists project that if GHG emissions continue to accelerate at current output trends, then the average global temperature will likely increase by three to seven degrees Fahrenheit (1.7 to 3.9 degrees Celsius) by the year 2100. These figures were derived from a number of global climate models, which were based on various scenarios of changes in the concentrations of greenhouse gases in the Earth's atmosphere. As the Earth's atmosphere warms, so do the oceans, and as seawater warms up it expands, increasing the total volume of the oceans and producing thermosteric sea level rise. Global average thermal expansion can be calculated directly from simulated changes in ocean temperature. Other major components to sea level rise which have been identified by scientists are: glacier and ice cap melting; Greenland Ice Sheet; Antarctic Ice Sheet; Land Ice Sum; and, Scaled-up Ice Sheet Discharge. All components are additive and are directly related to global warming. Latest study results from the Intergovernmental Panel on Climate Change (IPCC) given in their 2007 report on sea levels titled, *Fourth Assessment Report*, or AR4, predicts a range of sea level rise of 0.6 to 2.0 feet by the year 2100.

Future sea level rise primarily depends on future GHG production, and depending on the emissions scenarios, which have recently been updated and scaled up to reflect measured increases in GHG production rates, new semi-empirical estimates of sea level rise (central estimates published 2009) range between approximately 3.3 and 4.6 feet (1.0 to 1.4 m) for the period 1990-2100. This is significantly more than corresponding estimates of the 2007 study AR4 released by the IPCC. Figure 4-1 graphically compares 2007 projections with those updated by the new scenarios presented by Vermeer and Rahmstorf (2009). The AR4 estimates are shown along the lower right hand axis, with predictions ranging from 20 to 60 cm, which is equivalent to 0.7 to 2.0 feet; whereas the updated scenarios of GHG production, labeled as A1F1, A2, and B3, yield much higher estimates of sea level rise ranging from over 60 cm up to 160 cm, equivalent to 2.0 to 5.2 feet by the year 2100. The individual scenario components of sea level rise used in this study are shown Table 4-1.

Global warming has the potential to set in motion a cascade of effects which will further accelerate sea level rise. Recently, scientists have had concerns about the impact of rising temperatures on permafrost over many years. Large amounts of methane are concentrated in the frozen Arctic tundra but are also found as semi-solid gas hydrates under the sea. Warming of global average temperatures will accelerate release of these previously trapped green house gasses, resulting in a feedback loop further increasing temperatures and accelerating release. Studies suggest a release of methane on this scale could bring forward the date when global temperatures increase by 2 degrees C by between 15 and 35 years.

Currently, governmental policy for civil works is limited and still evolving with respect to specific planning for future sea level rise, with only a handful of local and international bodies with any policies in effect. In Canada, draft British Columbia policy is planning for a rise in global sea level of 20 inches (50 cm) by 2050, and 3.3 feet (1 m) by the end of the century.

Locally, the University of Hawaii's School of Ocean and Earth Sciences and Technology (SOEST) has developed an unofficial policy that proposes three major actions that state and local governments should consider to successfully adapt to sea level rise, including the following: the Governor or State Legislature should direct State agencies to incorporate a sea level rise

benchmark of 1-foot-by-2050 and 3-feet-by-2100 in planning and permitting processes and decision-making, similar to the approach taken by the U.S. Army Corps of Engineers (USACE) and to an executive order issued in California.

According to USACE Circular No. 1165-2-212, which currently applies to all USACE Civil Works responsibilities, potential relative sea level change must be considered in every USACE coastal activity as far inland as the extent of estimated tidal influence. All planning, engineering, designing, operating, and maintaining for sea level change must consider how sensitive and adaptable: 1) natural and managed ecosystems; and, 2) human and engineered systems are to climate change and other related global changes. Guidance provided in EC 1165-2-212 gives the planner or engineer specific instructions to account for changes in mean sea level for USACE civil works projects in order to satisfy Federal requirements.

Table 4-1. Sea □evel □ise Component Pro□ections by Climate Change Scenario □IPCC, A□□ □□□□□

Scenario		B1		B2		A1B		A1T		A2		A1FI	
upper/lower limit		U	L	U	L	U	L	U	L	U	L	U	L
Thermal Expansion	m	0.1	0.2	0.1	0.3	0.1	0.3	0.1	0.3	0.1	0.4	0.2	0.4
	mm/yr	*1.1*	*2.6*	*1.6*	*4.0*	*1.7*	*4.2*	*1.3*	*3.2*	*2.6*	*6.3*	*2.8*	*6.8*
Glaciers & Ice Caps	m	0.1	0.1	0.1	0.2	0.1	0.2	0.1	0.2	0.1	0.2	0.1	0.2
	mm/yr	*0.5*	*1.3*	*0.5*	*1.5*	*0.6*	*1.6*	*0.5*	*1.4*	*0.6*	*1.9*	*0.7*	*2.0*
Greenland Ice Sheet SMB	m	0.0	0.1	0.0	0.1	0.0	0.1	0.0	0.1	0.0	0.1	0.0	0.1
	mm/yr	*0.2*	*1.0*	*0.2*	*1.5*	*0.3*	*1.9*	*0.2*	*1.5*	*0.3*	*2.8*	*0.4*	*3.9*
Antarctic Ice Sheet SMB	m	-0.1	0.0	-0.1	0.0	-0.1	0.0	-0.1	0.0	-0.1	0.0	-0.1	0.0
	mm/yr	*-1.4*	*-0.3*	*-1.7*	*-0.3*	*-1.9*	*-0.4*	*-1.7*	*-0.3*	*-2.3*	*-0.4*	*-2.7*	*-0.5*
Land Ice Sum	m	0.0	0.2	0.0	0.2	0.0	0.2	0.0	0.2	0.0	0.2	0.0	0.2
	mm/yr	*0.0*	*1.8*	*-0.1*	*2.2*	*-0.2*	*2.5*	*-0.1*	*2.1*	*-0.4*	*3.2*	*-0.8*	*4.0*
Scaled-up Ice Sheet Discharge	m	0.0	0.1	0.0	0.1	0.0	0.1	0.0	0.1	0.0	0.1	0.0	0.2
	mm/yr	*0.0*	*1.7*	*0.0*	*2.3*	*0.0*	*2.6*	*0.0*	*2.3*	*-0.1*	*3.2*	*-0.1*	*3.9*
Total Sea Level Rise	m	**0.2**	**0.4**	**0.2**	**0.4**	**0.2**	**0.5**	**0.2**	**0.5**	**0.2**	**0.5**	**0.3**	**0.6**
	mm/yr	*1.5*	*3.9*	*2.1*	*5.6*	*2.1*	*6.0*	*1.7*	*4.7*	*3.0*	*8.5*	*3.0*	*9.7*

5. SUMMARY OF RELEVANT OCEANOGRAPHIC PARAMETERS

A summary of pertinent oceanographic design parameters for Kalaeloa Barbers Point Harbor is presented in Table 5-1 below. Mean sea level (MSL) is used as the vertical datum. Additionally, a summary including the predicted effects to water levels within KBPH due to global warming and sea level rise is presented in Table 5-2.

Table 5-1. Summary of Oceanographic Parameters

Parameter	Recommended Value		Comment
Wind Speed:	49 mi/hr	79 km/hr	100 year, 2-minute averaged wind speed at HNL
	75 mi/hr	121 km/hr	Haraguchi (1984) design hurricane wind speed
Trans. Wave Ht.:	2.5 feet	0.8 m	Desired maximum condition (TR CERC-93-18)
	5.0 feet	1.4 m	Hurricane condition
Harbor Oscillation (Surge):	1.4 feet	0.4 m	Maximum recorded surge from monitoring program, recorded at gages 060-p2 and -p3
Mesoscale Eddies:	0.5 feet	0.2 m	From measured study of mesoscale effects at Kaanapali, and (Chen and Qiu, 2010)
Still Water Levels:			
Tide (ref. MSL):	+ 1.1 feet	+ 0.3 m	Equivalent to mean higher high water
Storm Surge:	+ 1.5 feet	+ 0.5 m	Due to hurricane pressure drop
Mesoscale Eddy:	+ 0.5 feet	+ 0.2 m	
Wave Setup:	+ 3.4 feet	+ 1.0 m	Calculated from Longuet-Higgins & Steward (USACE SPM)
Total SWL Rise:	+ 6.5 feet	+ 2.0 m	Referenced to MSL
Dynamic Water Levels:			
Transmitted Wave:	+ 2.5 feet	+ 0.8 m	Based on hurricane condition (half amplitude)
Harbor Oscillation:	+ 0.7 feet	+ 0.2 m	Based on maximum surge (half amplitude)
Total Dynamic Ht.:	+ 3.2 feet	+ 1.0 m	
Total Water Level Excursion:	**+ 9.7 feet MSL**	**+ 3.0 m MSL**	Total max excursion above mean sea level (TWLE)

Table 5-2. Sea Level Rise Estimations and Future Minimum Design Water Levels

Parameter	Recommended Minimum Value		Comment
SLR_{2050}	1.0 feet	0.3 m	Estimated increase in mean sea level due to climate change by 2050 (SOEST Guidance)
SLR_{2100}	3.0 feet	0.9 m	Estimated increase in mean sea level due to climate change by 2100 (SOEST Guidance)
TWLE (2050)	**+ 10.7 feet MSL**	**+ 3.3 m MSL**	Estimated total max. excursion in the year 2050 above current mean sea level
TWLE (2100)	**+ 12.7 feet MSL**	**+ 3.9 m MSL**	Estimated total max. excursion in the year 2100 above current mean sea level

It is worth noting that global temperatures and sea levels may rise significantly faster than currently estimated based on projected increases in GHG emissions. Global warming alone will have the additional effect of increasing storm severity and probability of occurrence, and furthermore will likely increase the expected maximum wave heights in the future. This will directly affect the dynamic water level within the harbor and thus further increase the expected total water level excursion (TWLE) by an unknown amount.

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Appendix F
Phase 1 Environmental Site Assessment
(Enpro Environmental)

Prepared for:

Group 70 International, Inc. and Its Client State of Hawaii
Department of Transportation, Harbors Division
925 Bethel Street, 5th Floor
Honolulu, Hawaii 96813

Phase I Environmental Site Assessment



Kalaeloa Barbers Point Harbor

Malakole Street

Kapolei, Hawaii

Project Number:	1304-00152-PH1
Date of Report:	June 28, 2013, Revised on March 17, 2014
On-Site Investigation:	May 16 and June 12, 2013

PROJECT AT A GLANCE™

Assessment Component	Not Requested	Acceptable (†)	Routine Solution	Phase II ESA	Estimated Cost (‡)	Report Reference Section	
						Project Site	Adjoining Property
Historical Review		X					
Regulatory Review				**(3)* (6)***	**$300,000 to $350,000**	**7.2.1, 7.2.2**	
Operations			**(5)***	**(1)***	**$6,000**	**5.1, 3.3**	
Hazardous Materials		**X**	**(4)***			**5.1, 5.2.2**	
Underground Storage Tanks		X					
Aboveground Storage Tanks			**(4)***			**5.2.2**	
Solid Waste		X					
Surface Areas		X					
Wells		(N/A)					
PCBs				**(2)***	**$1,000**	**5.4.1**	
Asbestos	X						
Lead Based Paint	X						
Lead in Drinking Water	X						
Radon	X						
Mold							
Significant Data Gaps						**1.5**	

***BOLD** = Identified issues. **Numbers [(1) (2) (3) (4) (5) (6)] reference Action Items listed on the following page.**

(†) = Based on this preliminary study, it appears that further investigation in this area is not a priority concern for this site at the present time.

(‡) = Costs depicted are for investigation/program development activities. Remediation costs, if required, will be identified as a result of investigation/program development activities

Conditions noted in the Project at a Glance™ table represent the overall conditions of the property. More specific details on assessment components may be included in the text of this report; therefore the Project at a Glance™ should not be used as a stand-alone document.

ACTION ITEMS

Based on our investigation, ENPRO has concluded that there is sufficient risk to warrant additional investigation. ENPRO has identified the following action items and makes the following recommendations:

(1) Vessel maintenance and repair activities onsite (Pier 9, adjacent to the drydock). ENPRO recommends conducting Phase II soil sampling at Pier 9, adjacent to the drydock to determine if heavy metals-contaminated soil is present.

(2) The presence of one privately-owned transformer (vault number V6574) located at 91-601 Malakole Road, occupied by Marisco, Ltd. ENPRO recommends sampling and testing the dielectric fluid of this transformer to determine whether or not it contains PCBs. In the event that the transformer contains PCBs, it may be "retrofitted" so it is classified as "non-PCB" or "PCB-free."

(3) Underground petroleum pipelines onsite. ENPRO recommends conducting Phase II soil and groundwater sampling in the areas around the petroleum underground pipelines to assess for petroleum-impacted soil and groundwater.

(4) Numerous drums and containers with petroleum products and aboveground fuel storage tanks at the project site. ENPRO recommends continued management of the existing drums and containers with petroleum products and aboveground fuel storage tanks in accordance with applicable state and federal regulation.

(5) Fuel loading, unloading and transfer operations at the project site (Pier P5 and Pier P6). ENPRO recommends continued management of these operations in accordance with applicable state and federal regulation.

(6) Chevron Refinery in the vicinity of the project site. ENPRO recommends contacting Chevron Refinery to obtain records of the most recent data regarding the petroleum hydrocarbon plume to determine which areas of the project site may be within the plume, and ensuring proper management of the existing plume.

CERTIFICATION

ENPRO Environmental (ENPRO) has completed a Phase I Environmental Site Assessment (ESA) in conformance with the scope and limitations of ASTM Practice E 1527 of the Kalaeloa Barbers Point Harbor in Kapolei, Hawaii, described by the City and County of Honolulu Real Property Tax Office as Tax Map Keys: (1) 9-1-014: 008, 024, 025, 026, 028, 030, 031, 036, 037, 039, 040, 043, and (1) 9-1-074: 037, 038 (the "project site").

This assessment was performed at the request of Group 70 International, Inc. (the Client), on behalf of their client, State of Hawaii Department of Transportation, Harbors Division, using the methods and procedures consistent with good commercial and customary practices designed to conform to acceptable industry standards.

The information and opinions rendered in this report are intended for the Client and their client, State of Hawaii Department of Transportation, Harbors Division, for the purposes stated herein (see Sections 1.1 and 2.5). This report is not for the use or benefit of, nor may it be relied upon by any other person or entity, for any purpose except as described below without the advance written consent of ENPRO. ENPRO shall not distribute nor publish this report without the consent of the Client except as required by law or court order. The information and opinions expressed in this report are given in response to a limited assignment and should be considered and implemented in light of that assignment.

The Client and their client, State of Hawaii Department of Transportation, Harbors Division, may rely upon this report in evaluating a request for one or more extensions of credit to be secured directly or indirectly by the subject property (including mortgage and mezzanine loans) and the acquisition of the direct or indirect interest in the subject property as applicable.

This report is not for the use or benefit of, nor may it be relied upon by any other person or entity, for any purpose without the advance written consent of ENPRO. In expressing the opinions stated in this report, ENPRO has exercised a degree of skill and care ordinarily exercised by a reasonable prudent environmental professional in the same community and in the same time frame given the same or similar facts and circumstances. Documentation and data provided by the Client, designated representatives of the Client or other interested third parties, or from the public domain, and referred to in the preparation of this assessment, have been used and referenced with the understanding that ENPRO assumes no responsibility or liability for their accuracy.

The independent conclusions represent our professional judgment based on information and data available to us during the course of this assignment. Factual information regarding operations, conditions, and test data provided by the Client or their representatives has been assumed to be correct and complete. The conclusions presented are based on the data provided, observations, and conditions that existed on the date of the site visit.

If you have any questions regarding this report, please contact the ENPRO contact listed on the cover of this report at (808) 748-2111.

Researched by: Roberta Bitzer, Project Manager

Surveyed by: Roberta Bitzer, Project Manager

Written by: Roberta Bitzer, Project Manager

Supervised by: Kenton Beal, Executive Vice President

I declare that to the best of my professional knowledge and belief, I meet the definition of Environmental Professional as defined in §312.10 of 40 CFR Part 312.

I have the specific qualifications based on education, training, and experience to assess a property of the nature, history, and setting of the subject *property* [project site]. I have developed and performed the all appropriate inquiries in conformance with the standards and practices set forth in 40 CFR Part 312.

Reviewed by: 

Kenton Beal
Executive Vice President, ENPRO Environmental

EXECUTIVE SUMMARY

Group 70 International, Inc. (the Client), on behalf of its client, State of Hawaii Department of Transportation, Harbors Division, retained ENPRO Environmental (ENPRO) to conduct a Phase I Environmental Site Assessment of the Kalaeloa Barbers Point Harbor in Kapolei, Hawaii, described by the City and County of Honolulu Real Property Tax Office as Tax Map Keys: (1) 9-1-014: 008, 024, 025, 026, 028, 030, 031, 036, 037, 039, 040, 043, and (1) 9-1-074: 037, 038 (the "project site").

The objective of this assessment was to provide an independent, professional opinion regarding *recognized environmental conditions* (RECs), as defined by the American Society for Testing and Materials (ASTM), associated with the project site.

This assessment was performed under the conditions of, and in accordance with ENPRO's Proposal Number 13D-0365-HNL dated April 16, 2013, the *ASTM E 1527-05, Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process,* and *All Appropriate Inquiries* (AAI) which includes 40 CFR Part 312, §312.21 and §312.31. Any exceptions, additions to, or deletions from the ASTM or AAI practice, details of the work performed, sources of information, and findings are presented in the report. Limitations of the assessment are described in Sections 1.4 and 1.5.

The project site, currently owned by the State of Hawaii, is approximately 522 acres.

As part of this assessment, ENPRO reviewed several historical sources of information, including aerial photographs, USGS topographic maps, building department records, chain of title documents, property tax records and zoning/land use records. On the earliest reference depicting the project site, the 1928 topographic map, the project site was coded in green omission tint indicating vegetated land. Kalaeloa Barbers Point Harbor had not been excavated yet and a road bisected the project site. According to the topographic maps available, coral was mined from the site from the early 1960s to the mid-1990s; a small portion of Kalaeloa Barbers Point Harbor (western portion) was excavated prior to 1968 and the harbor took its current shape sometime between 1983 and 1998.

According to the ownership records reviewed, the project site was leased to Ewa Sugar, Inc./Oahu Sugar Co., Ltd. in 1970; leased to Marisco, Ltd since 1992 for the operation of a ship repair facility; and leased to GLP Asphalt, LLC since 2009 to operate an asphalt facility. Furthermore, the records indicate granting of pipeline easements to Standard Oil of California in 1963, lease of an easement to Tesoro Hawaii Corporation in 2005, and the designation of a gasoline easement in 2006.

The project site, Kalaeloa Barbers Point Harbor, is currently Oahu's second deep-draft commercial harbor and the second busiest port in the state. It is located only a short distance away from two refineries, a gas production plant, and a number of large fuel storage tank facilities in Campbell Industrial Park. An interconnecting pipeline system connects the

harbor to the refineries and tank farms. The project site is used by cargo ships transporting petroleum, coal, cement, and other liquid and dry bulk materials to and from neighbor islands, mainland U.S., and international ports. Furthermore, fuel loading, unloading and transfer operations are conducted at the project site (Pier P5 and Pier P6).

The project site also includes a transit shed, a ship maintenance and repair facility, a construction yard, a cement transfer, storage and processing facility, an asphalt transfer, storage and processing facility, and offices.

FINDINGS AND CONCLUSIONS

We have performed a *Phase I Environmental Site Assessment* in conformance with the scope and limitations of ASTM Practice E 1527 of the Kalaeloa Barbers Point Harbor located in Kapolei, Hawaii, described by the City and County of Honolulu Real Property Tax Office as Tax Map Keys: (1) 9-1-014: 008, 024, 025, 026, 028, 030, 031, 036, 037, 039, 040, 043, and (1) 9-1-074: 037, 038, the *property*. Any exceptions to, or deletions from, this practice are described in Section 1.4 of this *report*. This assessment has revealed no evidence of *recognized environmental conditions [RECs]* in connection with the *property* except for the following:

- Vessel maintenance and repair activities onsite (Pier 9, adjacent to the drydock). This finding is considered a *recognized environmental condition* because of the potential for a release of heavy metals-containing sandblast grit generated by sandblasting vessels onsite.
- One privately-owned transformer (vault number V6574) located at 91-601 Malakole Road, occupied by Marisco, Ltd. This finding is considered a *recognized environmental condition* because the dielectric fluid of this transformer could contain PCBs, therefore, representing a material threat of a release of PCBs onto the soil at the project site.
- Petroleum underground pipelines onsite. This finding is considered a *recognized environmental condition* because of the potential for a release of petroleum products into the soil and groundwater beneath the project site.
- Numerous drums and containers with petroleum products and aboveground fuel storage tanks at the project site. This finding is considered a *recognized environmental condition* because the containers, drums and aboveground storage tanks containing petroleum products represent a material threat of a release of petroleum products onto the soil at the project site.
- Fuel loading, unloading and transfer operations at the project site (Pier P5 and Pier P6). This finding is considered a *recognized environmental condition* because the fuel operations onsite represent a material threat of a release of petroleum products onto the soil and water at the project site.
- Chevron Refinery in the vicinity of the project site. This finding is considered a *recognized environmental condition* because several historical releases of petroleum products at the Chevron Hawaii Refinery may have impacted the soil and groundwater beneath the project site. The inferred extent of the groundwater and soil petroleum hydrocarbon plume may extend onto the south portion of the project site.

The following environmental conditions, which are not considered *recognized environmental conditions,* as defined by ASTM, were observed during the assessment:

- Suspect asbestos containing building materials
- Suspect lead containing paint
- Ecologically sensitive areas

RECOMMENDATIONS

Based on the *recognized environmental conditions* identified above ENPRO recommends the following additional actions and/or investigations:

- Vessel maintenance and repair activities onsite (Pier 9, adjacent to the drydock). Conduct Phase II soil sampling at Pier 9, adjacent to the drydock to determine if heavy metals-contaminated soil is present. If contaminants are identified, additional sampling may be required to delineate the extent of the contamination.

  Associated cost estimate for Phase II ESA……$6,000

- The presence of one privately-owned transformer (vault number V6574) located at 91-601 Malakole Road, occupied by Marisco, Ltd. Sample and test the dielectric fluid of this transformer to determine whether or not it contains PCBs. In the event that the transformer contains PCBs, it may be "retrofitted" so it is classified as "non-PCB" or "PCB-free." In the event that evidence of leakage is observed during the sampling, soil sampling may be warranted.

  Associated cost estimate for Phase II ESA……$1,000

- Underground petroleum pipelines onsite. Conduct Phase II soil and groundwater sampling in the areas around the petroleum underground pipelines to determine if petroleum-impacted soil and groundwater are present. If contaminants are identified, additional sampling may be required to delineate the extent of the contamination.

  Associated cost estimate for Phase II ESA……$300,000 to $350,000

- Presence of numerous drums and containers with petroleum products and aboveground fuel storage tanks at the project site. Continue proper management of the existing drums and containers with petroleum products

and aboveground fuel storage tanks in accordance with applicable state and federal regulation.

- Fuel loading, unloading and transfer operations at the project site (Pier P5 and Pier P6). Continue proper management of the fuel loading, unloading and transfer operations in accordance with applicable state and federal regulation.
- Presence of the Chevron Refinery in the vicinity of the project site. Contact Chevron Refinery to obtain records of the most recent data regarding the petroleum hydrocarbon plume to determine which areas of the project site may be within the plume. Ensure proper management of the existing plume.

  Associated cost estimate for records review and management……$5,000

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Prepared by ENPRO Environmental

1.0 INTRODUCTION

Group 70 International, Inc. (the Client), on behalf of its client, State of Hawaii Department of Transportation, Harbors Division, retained ENPRO Environmental (ENPRO) to conduct a Phase I Environmental Site Assessment of the Kalaeloa Barbers Point Harbor in Kapolei, Hawaii, described by the City and County of Honolulu Real Property Tax Office as Tax Map Keys: (1) 9-1-014: 008, 024, 025, 026, 028, 030, 031, 036, 037, 039, 040, 043, and (1) 9-1-074: 037, 038 (the "project site").

1.1 PURPOSE

The objective of this environmental site assessment is to provide an independent, professional opinion regarding recognized environmental conditions, as defined by the American Society for Testing and Materials (ASTM, Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process, Designation: E 1527-05), associated with the project site. The term *recognized environmental condition* is defined as the presence or likely presence of any hazardous substances or petroleum products on a property under conditions that indicate an existing release, a past release, or a material threat of a release of any hazardous substances or petroleum products into structures on the property, or into the ground, groundwater, or surface water of the property. The term includes hazardous substances or petroleum products even under conditions in compliance with laws. The term is not intended to include *de minimis* conditions that generally do not present a material risk of harm to public health or the environment and that generally would not be the subject of an enforcement action if brought to the attention of appropriate governmental agencies. A condition determined to be *de minimis* is not a *recognized environmental condition*.

1.2 DETAILED SCOPE OF SERVICES

This assessment was performed under the conditions of, and in accordance with ENPRO's Proposal Number 13D-0365-HNL dated April 16, 2013, and in accordance with the *ASTM E 1527-05, Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process,* and *All Appropriate Inquiries* (AAI) which includes 40 CFR Part 312, §312.21 and §312.31. The scope of services in conducting this assessment included:

Records Review

- A review of environmental records, including regulatory agency reports, permits, registrations, and consultant's reports for evidence of *recognized environmental conditions* available from the property owner or site contact.
- An investigation of historical use of the project site by examining locally available aerial photographs, fire insurance maps, property tax files, recorded land title records, USGS topographical maps, building department records, zoning/land use records and/or other readily available historical information for evidence of prior land use that could have led to *recognized environmental conditions*.
- A review of an environmental database search report of federal and state regulatory agency records pertinent to the project site and offsite facilities located within ASTM-specified search distances from the project site.
- A review of readily available information describing the general geology and topography of the project site, local groundwater characteristics, sources of water, power and sewer, and proximity to ecologically sensitive receptors that may be impacted by *recognized environmental conditions.*

Site Reconnaissance

- A site walkthrough inspection of the property for visible evidence of *recognized environmental conditions* including existing or potential soil and groundwater contamination, as evidenced by staining or discoloration; stressed vegetation; indications of waste dumping or burial; pits, ponds or lagoons; containers of hazardous substances or petroleum products; electrical and hydraulic equipment that may contain polychlorinated biphenyls (PCBs), such as transformers or lifts; and underground and aboveground storage tanks.
- A site property line visual assessment of adjacent properties for evidence of potential offsite *recognized environmental conditions* that may affect the project site.

Interviews

- Interviews with available key site personnel regarding current and previous site activities on the property, especially those involving the use of hazardous substances and petroleum products. Interviews are summarized in Section 6 of this report. Completed property questionnaires are presented in the Appendix.

1.3 SIGNIFICANT ASSUMPTIONS

ENPRO, in part, has relied on information supplied by the Client or the Client's agent(s), listed in Section 6.0, and assumes such information to be factual.

The commercial regulatory database search report, summarizing federal and state regulatory agency records, is provided by a contracted data research firm. The information provided is assumed to be correct unless otherwise noted.

Unless otherwise discovered during review, all other sources of information, whether verbal or written, are assumed to be factual.

1.4 LIMITATIONS AND EXCEPTIONS

Access was not provided to the following areas of the project site:

- Storage containers
- Interior of onsite buildings and most of the tenants' yards

No opinion regarding environmental conditions in areas that were not inspected can be formed.

As a matter of necessity, ENPRO relies largely on readily available sources of information such as the Client, public records, interviews, and contracted research firms for recognizing potential environmental liabilities at a project site/facility. Requests for information resources are made to collect relevant data on current and past practices conducted at the project site/facility. ENPRO may not receive all information requested or be able to confirm received information during the course of the environmental site assessment. Therefore, ENPRO shall not be held responsible for errors, omissions, or misrepresentations resulting from missing documentation or from inaccurate information provided by such sources.

Additionally, the following limitation regarding the AAI standard applies to this assessment:

ASTM allows the prospective owner or grantee to provide information regarding recorded environmental liens on the property. ENPRO's Phase I Environmental Site Assessment service does not include a search for environmental liens that may have been placed on the title of the subject property.

1.5 DATA GAPS

Data gaps are not uncommon in environmental site assessments. A data gap by itself is not inherently significant. The significance is determined by other information and professional experience as to whether the data gap raises reasonable concerns about activities that may present a *recognized environmental condition*. According to *ASTM E 1527-05, Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process,* and *All Appropriate Inquiries* (AAI) which includes 40 CFR Part 312, §312.21 and §312.31, the Phase I Environmental Site Assessment report shall identify and comment on significant data gaps that affect the ability of the environmental professional to identify *recognized environmental conditions* and identify the sources of information that were consulted to address the data gap.

ENPRO did not encounter any significant data gaps during the performance of this Phase 1 Environmental Site Assessment, although the User did not provide any information regarding environmental liens that may be relevant to the subject property.

1.6 SPECIAL TERMS AND CONDITIONS

This Phase 1 Environmental Site Assessment did not include any special terms or conditions.

2.0 USER PROVIDED INFORMATION

Per ASTM, the "User" is the party seeking to use Practice E 1527-05 to perform an environmental site assessment of the property. A user may include a purchaser, a potential tenant, an owner, a lender or a property manager, all associated with the property. According to ASTM, "the user has specific obligations for completing a successful application of this practice." A Property Questionnaire was completed by Mr. Dean Watase and Mr. Randal Leong, harbors staff, on behalf of the User (State of Hawaii Department of Transportation, Harbors Division). A copy of the completed Property Questionnaire is included in the appendix section of this report. Additional User provided information is detailed in Section 6.1.

2.1 ENVIRONMENTAL CLEANUP LIENS AND ACTIVITY AND USE LIMITATIONS (AUL) REVIEW

The user did not engage ENPRO Environmental to review title and judicial records for environmental liens or Activity and Use Limitations (AULs) recorded against the project site. Furthermore, these documents were not provided to ENPRO for review. The lack of or inability to obtain this information represents a data gap. Refer to Section 1.5 for additional information about the identification of *significant* data gaps.

ASTM allows the prospective owner or grantee to provide information regarding recorded environmental liens on the property. The User did not provide information regarding recorded environmental liens on the property.

2.2 SPECIALIZED KNOWLEDGE

Mr. Watase and Mr. Leong reported the following specialized knowledge of *recognized environmental conditions* in connection with the property:

- Past fuel spills and pipeline leaks on site have been contained/mitigated by the pipelines users.
- Former lead contaminated soil on site. See Section 4.4 for further details.
- Fuel ASTs at GLP Asphalt, LLC. See Section 4.4 for further details.

2.3 COMMONLY KNOWN OR REASONABLY ASCERTAINABLE INFORMATION

The representatives of the User reported that the project site is located in an industrial setting and the harbor area has been subjected to past fuel spills and pipeline leaks which have been contained. Additionally, the representative of the User indicated the former presence of lead contaminated soil onsite. Further information regarding the reported former lead contaminated soil onsite is provided in Section 4.4.

2.4 VALUATION REDUCTION FOR ENVIRONMENTAL IMPAIRMENT

Mr. Watase and Mr. Leong did not provide information on any reduction of valuation due to environmental impairment.

2.5 REASONS FOR PERFORMING PHASE I ENVIRONMENTAL SITE ASSESSMENT

Mr. Watase and Mr. Leong stated that the purpose for conducting the Phase I Environmental Site Assessment was to support the planning and environmental work to be conducted at the property.

3.0 PROJECT SITE DESCRIPTION

3.1 LOCATION AND LEGAL DESCRIPTION

The project site, located at Malakole Street in Kapolei, Hawaii, is in a commercial/industrial setting (Figures 1 and 2). The longitude and latitude for the project site address are in Table 1.

The project site is further described by the City and County of Honolulu Real Property Tax Office as Tax Map Keys (1) 9-1-014: 008, 024, 025, 026, 028, 030, 031, 036, 037, 039, 040, 043, and (1) 9-1-074: 037, 038. It is located in an area zoned "I-3 Waterfront Industrial / P-2 General Preservation."

Table 1

Location and Legal Description of Project Site

Location Description	Project Site
Address	Malakole Street, Kapolei, Hawaii
TMKs	(1) 9-1-014: 008, 024, 025, 026, 028, 030, 031, 036, 037, 039, 040, 043, and (1) 9-1-074: 037, 038
Latitude (North)	21.3247000 - 21° 19' 28.92''
Longitude (West)	158.1161000 - 158° 6' 57.96''
Elevation	10 feet above sea level
Distance and Direction to Surface Waters	Pacific Ocean/Kalaeloa Barbers Point Harbor, along the west boundary of the project site and within the project site.

3.2 SITE AND VICINITY GENERAL CHARACTERISTICS

The project site is located on the west shore of the island of Oahu, near two refineries, a gas production plant, a number of large fuel storage tank facilities and is the terminus of the regional pipeline between Barbers Point and Honolulu. The project site included fourteen irregular-shaped parcels totaling approximately 522 acres. On site structures were constructed over approximately ten percent of the project site. Primary access to the site was from Malakole Street, south of the project site.

3.3 CURRENT USE OF THE PROPERTY

The project site, Kalaeloa Barbers Point Harbor, is currently Oahu's second deep-draft commercial harbor and the second busiest port in the state. It is located only a short distance away from two refineries, a gas production plant, and a number of large fuel storage tank facilities in Campbell Industrial Park. An interconnecting pipeline system connects the harbor to the refineries and tank farms. The project site is used by cargo ships transporting petroleum, coal, cement, and other liquid and dry bulk materials to and from neighbor islands, mainland U.S., and international ports. Furthermore, fuel loading, unloading and transfer operations are conducted at the project site (Pier P5 and Pier P6).

The project site also includes a transit shed, a ship maintenance and repair facility, a construction yard, a cement transfer, storage and processing facility, an asphalt transfer, storage and processing facility, and offices.

Tenant usage and/or businesses at the project site at the time of our site reconnaissance are listed in Table 2.

Table 2

Tenant Usage and/or Businesses at the Project Site

Tenant or Business Name	Use of Project Site
Marisco, Ltd.	Ship maintenance and repair facility
Sause Brothers	Transit of Cargo (Transit Shed)
Matson	Transit of Cargo (Transit Shed)
AES Hawaii	Receives and transfers coal to parent facility offsite
Hawaiian Cement	Cement transfer, storage and processing facility
GLP Asphalt, LLC	Asphalt plant
Grace Pacific	Asphalt plant
Healy Tibbitts Builders	Construction yard
Hawaii Gas	Receives and transfers propane gas (underground pipelines)
Aloha Petroleum, Ltd.	Receives and transfers petroleum fuel (underground pipelines)
Tesoro Hawaii Corporation	Receives and transfers petroleum fuel (underground pipelines)

3.4 DESCRIPTIONS OF STRUCTURES, ROADS & OTHER IMPROVEMENTS

The following buildings were observed at the project site:

- One, three-story building occupied by Marisco, Ltd.
- One transit shed used by Sause Brothers and Matson
- One, one-story building used as the harbor's agent office
- One, two-story building occupied by AES Hawaii
- One, one-story building occupied by GLP Asphalt, LLC
- Several warehouses and portable trailers throughout the property

An interconnecting pipeline system connects the harbor to two refineries and tank farms located in Campbell Industrial Park and Kenai Industrial Park (Hawaii Gas). Other improvements included several piers, one asphalt road (Access Road) and several dirt roads.

The following companies/agencies provide project site utilities and service:

Electricity: Hawaiian Electric Company and private generators

Water: Board of Water Supply

Refuse: Rolloffs Hawaii and Honolulu Disposal Services

Storm water runoff from the project site flows to the west/southwest via sheet flow and engineered drainage to storm drains on the project site and eventually discharges to the Pacific Ocean. A significant amount of storm water is also expected to percolate into the exposed land throughout the property.

Wastewater from the project site originates from sinks and toilets, and discharges to individual wastewater systems (septic tank and leach field).

Evidence of additional wastewater discharge sources was not observed at the project site.

3.5 CURRENT USES OF ADJACENT AND NEARBY PROPERTIES

The area surrounding the project site consisted of commercial and industrial properties. Adjoining properties were observed from the project site and from public access lands for signs of *recognized environmental conditions* and their potential to pose an environmental concern to the project site. These properties are listed in the following table:

Table 3

Summary of Adjacent and Nearby Property Use

Direction	Name	Use
North	Koolina Marina	Harbor with moorings for pleasure craft and small boats
South	Kenai Industrial Park Hawaiian Earth Products Chevron Kapolei Refinery	Multi-tenant Industrial Park Compost producer Oil refinery
East	Vacant Land	None
West	Pacific Ocean	Recreation and transportation

3.6 PHYSICAL SETTING SOURCES

3.6.1 TOPOGRAPHY

Review of the topographic map published by the U.S. Geological Survey (1998) indicated the following:

The project site was located at Barbers Point Harbor, on the west shore of the island of Oahu. The project site elevation was approximately ten feet above mean sea level.

A coral pit was depicted on the east portion of the project site. Five structures were depicted on the project site, to the south of Barbers Point Harbor. The project site region was coded in white omission tint indicating sandy surface features.

The project site region was slightly sloping to the west-southwest. The nearest body of water was Barbers Point Harbor to the west portion of the project site.

3.6.2 SOILS

A review of the soil type of the area was performed. The soil survey of the island of Oahu is published by the USDA Natural Resources Conservation Service in cooperation with the United States Department of Agriculture (USDA) Soil Conservation Service and University of Hawaii Agricultural Experiment Station. USDA soil survey data is available at http://websoilsurvey.nrcs.usda.gov/app/ and was accessed on May 15, 2013. The following information is pertinent to the project site:

The project site was situated on soil classified as coral outcrop (CR). Coral outcrop consists of coral or cemented calcareous sand on the island of Oahu. The coral reefs formed in shallow ocean water during the time the ocean stand was at a higher level. This land type is used for military installations, quarries, and urban development. Vegetation is sparse, consisting of kiawe, koa haole and fingergrass.

3.6.3 GEOLOGY/HYDROGEOLOGY

Groundwater beneath the project site occurs in two distinct aquifers within the Ewa Aquifer System of the Pearl Harbor Aquifer Sector. The shallow aquifer is classified as a basal, unconfined, sedimentary aquifer, occurring in non-volcanic lithology. The groundwater status is reported as currently in use, but not for drinking water, nor is it considered to be ecologically important. The salinity of the groundwater within this aquifer is described as moderate (1000-5000 milligrams per liter Cl^-). The groundwater is further described as replaceable, with a high vulnerability to contamination (Mink and Lau, 1990).

The deeper aquifer is classified as a basal, confined, flank aquifer, occurring in horizontally extensive lavas. The groundwater status is reported as being currently in use but not for drinking water, nor is it considered to be ecologically important. The salinity of the groundwater within this aquifer is described as low (250-1000 milligrams per liter Cl^-). The groundwater is further described as irreplaceable, with a low vulnerability to contamination (Mink and Lau, 1990).

The hydrogeologic gradient in the vicinity of the project site is anticipated to be slight, with a general trend to the west-southwest. Groundwater levels may be influenced by leaking infrastructure and tidal fluctuations, and human activity. The direction and rate of groundwater flow across the project site is expected to be to the west-southwest and relatively slow.

4.0 HISTORICAL RECORDS REVIEW

According to *ASTM E 1527-05, Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process,* the historical search of the property must cover a period of time back to the property's first developed use, or back to 1940, whichever is earlier.

As part of this assessment, ENPRO reviewed several historical sources of information, including aerial photographs, USGS topographic maps, building department records, chain of title documents, property tax records and zoning/land use records. On the earliest reference depicting the project site, the 1928 Topographic map, the project site was coded in green omission tint indicating vegetated land. Kalaeloa Barbers Point Harbor had not been excavated yet and a road bisected the project site. According to the topographic maps available, coral was mined from the site from the early 1960s to the mid-1990s; a small portion of Kalaeloa Barbers Point Harbor (western portion) was excavated prior to 1968 and the harbor took its current shape sometime between 1983 and 1998.

According to the ownership records reviewed, the project site was leased to Ewa Sugar, Inc./Oahu Sugar Co., Ltd. in 1970; leased to Marisco, Ltd. since 1992 for the operation of a ship repair facility; and leased to GLP Asphalt, LLC since 2009 to operate an asphalt facility. Furthermore, the records indicate granting of pipeline easements to Standard Oil of California in 1963, lease of an easement to Tesoro Hawaii Corporation in 2005, and the designation of a gasoline easement in 2006.

4.1 TITLE RECORDS

Readily available records at the City and County of Honolulu Tax Assessor's Office were reviewed to assess past ownership of the project site. Significant ownership transactions are summarized in the table on the following page.

Table 4

Summary of Title Information

Tax Map Key	Date	Property Transaction
(1) 9-1-014: 008		
(1) 9-1-014: 008	1940	Owned by James Campbell Trust Estate (leased to Ewa Plantation Co.)
(1) 9-1-014: 008	8/24/81	Owned by the State of Hawaii (*Final Order of Condemnation*)
(1) 9-1-014: 008	1988	Parcel is set aside for piers and shore side facilities purposes, to be under the control and management of the Department of Transportation.
(1) 9-1-014: 008	1990	Conveyor easement
(1) 9-1-014: 008	1990	Leased to Hawaii Pacific Industries, Inc., subleased to AES Barbers Point, Inc.
(1) 9-1-014: 024		
(1) 9-1-014: 024	5/24/88	From (1) 9-1-014: 008, owned by the State of Hawaii, Department of Transportation, Harbors Division, Leased to Kiewit Pacific Co. for storage of construction equipment
(1) 9-1-014: 024	9/30/94	Pier 6 Barbers Point Harbor leased to Briggs Pacific Industries, Inc.
(1) 9-1-014: 024	11/2/06	Designation of gasoline easement "8320"
(1) 9-1-014: 025		
(1) 9-1-014: 025	12/31/92	From (1) 9-1-014: 024, Owned by the State of Hawaii, Department of Transportation, Harbors Division, leased to Marisco, Ltd. for construction and maintenance.
(1) 9-1-014: 025	9/25/08	New lease from the State of Hawaii, Department of Transportation, Harbors Division, leased to Marisco, Ltd. for operation of a ship repair facility
(1) 9-1-014: 026		
(1) 9-1-014: 026	9/13/94	From (1) 9-1-014: 002, Owned by James Campbell Trust Estate
(1) 9-1-014: 026	1/2/02	Deeded to Campbell Hawaii Investor, LLC
(1) 9-1-014: 026	1/28/05	Leased a non-exclusive right-of-way in the nature of an easement to Tesoro Hawaii Corporation
(1) 9-1-014: 026	5/14/12	Granted right and easement to Hawaiian Electric Company, Inc.
(1) 9-1-014: 028		
(1) 9-1-014: 028	4/2/97	From (1) 9-1-014: 024, Owned by the State of Hawaii, Department of Transportation, Harbors Division.

Table 4 (Continued)

Summary of Title Information

Tax Map Key	Date	Property Transaction
(1) 9-1-014: 030		
(1) 9-1-014: 030	3/22/01	From (1) 9-1-014: 024, Owned by the State of Hawaii, Department of Transportation, Harbors Division, leased to Marisco, Ltd. for dry-dock.
(1) 9-1-014: 031		
(1) 9-1-014: 031	3/22/01	From (1) 9-1-014: 024, Owned by the State of Hawaii, Department of Transportation, Harbors Division, leased to Marisco, Ltd. for mooring bits.
(1) 9-1-014: 036		
(1) 9-1-014: 036	10/1/01	From (1) 9-1-014: 024, Owned by the State of Hawaii, Department of Transportation, Harbors Division, leased to Maritime License Center for training mariners for standards training, certification, etc. requirements.
(1) 9-1-014: 037		
(1) 9-1-014: 037	10/1/07	From (1) 9-1-014: 024, Owned by the State of Hawaii, Department of Transportation, Harbors Division, leased to Healy Tibbitts Builders, Inc. as storage yard for (a) marine construction equipment, materials and supplies; (b) trade fixtures; (c) other items that are accessory to a marine construction business.
(1) 9-1-014: 039		
(1) 9-1-014: 039	9/30/09	From (1) 9-1-014: 024, Owned by the State of Hawaii, Department of Transportation, Harbors Division, leased to Imperium Renewables Hawaii, LLC. as manufacturing facility. Lease terminated on 12/31/09.
(1) 9-1-014: 040		
(1) 9-1-014: 040	7/31/09	From (1) 9-1-014: 024, Owned by the State of Hawaii, Department of Transportation, Harbors Division, leased to Marisco, Ltd. for parking and storage of equipment.
(1) 9-1-014: 043		
(1) 9-1-014: 043	9/30/10	From (1) 9-1-014: 024, Owned by the State of Hawaii, Department of Transportation, Harbors Division, leased to GLP Asphalt, LLC, an asphalt facility.

Table 4 (Continued)

Summary of Title Information

Tax Map Key	Date	Property Transaction
(1) 9-1-014: 002		
(1) 9-1-014: 002	1937	Owned by James Campbell Trust Estate
(1) 9-1-014: 002	4/24/37	Deeded to USA
(1) 9-1-014: 002	1963	Granted to Standard Oil of California for pipelines easements
(1) 9-1-014: 002	1970	Leased to Ewa Sugar, Inc./Oahu Sugar Co., Ltd.
(1) 9-1-74: 37		
(1) 9-1-074: 037	9/24/93	Deeded from Ciri Land Dev. Co. to James Campbell Trust Estate
(1) 9-1-074: 037	9/24/93	Deeded to the State of Hawaii
(1) 9-1-74: 38		
(1) 9-1-074: 038	9/24/93	Deeded from Ciri Land Dev. Co. to James Campbell Trust Estate
(1) 9-1-074: 038	9/24/93	Deeded to the State of Hawaii

No readily apparent evidence of *recognized environmental conditions* that are expected to impact the project site was noted in the ownership records reviewed, except that the project site was leased to Ewa Sugar, Inc./Oahu Sugar Co., Ltd. in 1970; leased to Marisco, Ltd since 1992 for the operation of a ship repair facility; and leased to GLP Asphalt LLC since 2009 to operate an asphalt facility. Furthermore, the records indicate granting of pipeline easements to Standard Oil of California in 1963, lease of an easement to Tesoro Hawaii Corporation in 2005 and the designation of a gasoline easement in 2006.

Copies of the title records reviewed for this project are provided in the appendix.

4.2 HISTORICAL USE INFORMATION ON THE PROPERTY

4.2.1 HISTORICAL SANBORN MAPS

A copy of the correspondence from EDR/Sanborn, indicating no coverage was available for the project site, is included in the appendix section of this report.

4.2.2 HISTORICAL TOPOGRAPHIC MAPS

The following topographic maps were reviewed as part of this assessment:

- EDR/USGS, dated 1928. The scale of this map was approximately one inch equals 1,667 feet. A dirt road was depicted along the west boundary of the project site and a road bisected the project site. The project site was coded in green omission tint indicating vegetated land. Kalaeloa Barbers Point Harbor had not been excavated yet.
- EDR/USGS, dated 1968. The scale of this map was approximately one inch equals 2,000 feet. The western portion of Kalaeloa Barbers Point Harbor had been developed. A dirt road was depicted adjacent to the east and south of the harbor, and connecting to a road across the south portion of the project site, which was connected to Malakole Road, which bisected the project site. Two structures were depicted between the dirt road and the road across the south portion of the project site. The eastern portion of the project site was depicted as U.S. Government Reservation and coral pit. A dirt road connecting the coral pit to Malakole Road was indicated. Most of the project site was coded in white omission tint indicating sandy surface features, except for the south portion of the project site and the U.S. Government Reservation, which were coded in green omission tint, indicative of vegetated land.
- EDR/USGS, dated 1970. The scale of this map was approximately one inch equals 5, 208 feet. This map was very similar to the 1968 map except that most of the project site was coded in green omission tint, indicative of vegetated land, except for the U.S. Government Reservation, which was coded in white omission tint indicating sandy surface features.
- EDR/USGS, dated 1983. The scale of this map was approximately one inch equals 2,000 feet. This map was very similar to the 1970 map except that the two structures previously depicted between the dirt road and the road across the south portion of the project site were no longer depicted. Moreover, most of project site was coded in white omission tint indicating sandy surface features.
- EDR/USGS, dated 1998. The scale of this map was approximately one inch equals 2,000 feet. Kalaeloa Barbers Point Harbor had been expanded to the east, taking over the U.S. Government Reservation. The coral pit was still present on the east portion of the project site. One road adjacent to the south boundary of the project site was connected to a road at the south portion of the project site. Two structures adjacent to the south of the harbor and three structures adjacent to the road at the south portion of the project site were indicated. The project site region was coded in white omission tint indicating sandy surface features.

Copies of the maps reviewed for this project are provided in the appendix.

4.2.3 HISTORICAL AERIAL PHOTOGRAPHS

The following aerial photographs were reviewed as part of this assessment:

- EDR, dated 1951. The scale of this photograph was approximately one inch equals 750 feet. A road was illustrated along the west shore of the project site and another road bisected the project site. The project site appeared to be overgrown by brush and/or trees, except for a cleared area east of the road bisecting the project site. Kalaeloa Barbers Point Harbor had not been excavated yet.
- EDR, dated 1968. The scale of this photograph was approximately one inch equals 500 feet. The western portion of Kalaeloa Barbers Point Harbor had been developed. A road adjacent to the east and south of the harbor was connected to a road across the south portion of the project site, leading to the road that bisected the project site. Two circular structures appeared on the south portion of the project site, near the road across the south portion of the project site. About fifty percent of the project site had been cleared of vegetation. Details of the project site were obscured by poor photographic resolution.
- EDR, dated 1975 and 1978. The scale of these photographs was approximately one inch equals 1,000 feet. The project site appeared to be developed similar to what was indicated in the 1968 photograph with two additional circular structures to the east of the two circular structures on the south portion of the project site. Details of the project site were obscured by poor photographic resolution.

- EDR, dated 1985. The scale of this photograph was approximately one inch equals 500 feet. Kalaeloa Barbers Point Harbor had been expanded to the east, beyond the road that bisected the project site. A few structures appeared to be developed to the south of the harbor; however, details of the project site were obscured by poor photographic resolution.
- EDR, dated 1992. The scale of this photograph was approximately one inch equals 750 feet. The project site appeared to be developed similar to what was indicated in the 1985 photograph. Although details of the project site were obscured by clouds and poor photographic resolution, two ships appeared to be in transit and two ships appeared to be docked at the harbor.
- EDR, dated 2001. The scale of this photograph was approximately one inch equals 500 feet. The project site appeared to be developed similar to what was observed during the site reconnaissance. Two ships appeared to be docked at the harbor. Four structures, several container-like structures and two large tanks appeared south of the harbor. Details of the project site were obscured by poor photographic resolution.

Copies of the aerial photographs reviewed for this project are provided in the appendix.

4.3 HISTORICAL USE INFORMATION ON ADJOINING PROPERTIES

4.3.1 HISTORICAL SANBORN MAPS

A copy of the correspondence from EDR/Sanborn, indicating no coverage was available for the project site region, is included in the appendix section of this report.

4.3.2 HISTORICAL TOPOGRAPHIC MAPS

The following topographic maps were reviewed as part of this assessment:

- EDR/USGS, dated 1928. The scale of this map was approximately one inch equals 1,667 feet. The Pacific Ocean was depicted to the west of the project site. The project site region was coded in green omission tint indicating vegetated land.
- EDR/USGS, dated 1968, 1970 and 1983. The scale of these maps varied. The Pacific Ocean was depicted to the west of the project site. Three dirt roads were depicted to the north of the project site, which was coded in white omission tint indicating sandy surface features. The adjacent area to the south of the project site was labeled as Camp Malakole Military Reservation. An oil refinery was depicted to the south of the military reservation. The area to the east of the project site was coded in green omission tint indicating vegetated land.
- EDR/USGS, dated 1998. The scale of this map was approximately one inch equals 2,000 feet. The Pacific Ocean was depicted to the west of the project site. The Koolina Beach Park and Koolina Marina were depicted to the north of the project site. A park and the oil refinery were depicted to the south, and a coral pit was depicted to the east of the project site.

Copies of the maps reviewed for this project are provided in the appendix.

4.3.3 AERIAL PHOTOGRAPHS

The following aerial photographs were reviewed as part of this assessment:

- EDR, dated 1951. The scale of this photograph was approximately one inch equals 750 feet. The project site was surrounded by vegetated land to the north, east and southeast. The Pacific Ocean was adjacent to the west of the project site. The area to the south/southwest was mostly cleared of vegetation and a few roads had been developed. Details of the project site region were obscured by poor photographic resolution.
- EDR, dated 1968. The scale of this photograph was approximately one inch equals 500 feet. The areas to the northeast, east and southeast of the project site were vegetated land. The area to the south/southwest was covered with vegetation although several roads appeared to be developed in the area, and structures associated with the oil refinery were visible to the south of the vegetated area. The Pacific Ocean was adjacent to the west of the project site and the area to the northwest was mostly cleared of vegetation. Details of the project site region were obscured by poor photographic resolution.
- EDR, dated 1975 and 1978. The scale of these photographs was approximately one inch equals 1,000 feet. The project site region appeared to be developed similar to what was indicated in the 1968 photograph. Details of the project site region were obscured by poor photographic resolution and clouds.
- EDR, dated 1985 and 1992. The scales of these photographs were approximately one inch equals 500 feet and 750 feet, respectively. These photographs were similar to the 1968, 1975 and 1978 except for the development of Koolina Marina to the north, and the area to the southwest

was cleared of vegetation and developed with roads. Details of the project site region were obscured by poor photographic resolution and clouds.

- EDR, dated 2001. The scale of this photograph was approximately one inch equals 500 feet. This photograph was similar to the 1985 and 1992 photographs, except that the area adjacent to the south of the project site which was cleared of vegetation. Details of the project site region were obscured by poor photographic resolution.

Copies of the aerial photographs reviewed for this project are provided in the appendix.

4.4 PREVIOUS ENVIRONMENTAL REPORTS

During this assessment ENPRO reviewed the following environmental reports:

Phase 1 Environmental Site Assessment of 91-500 Malakole Street, prepared by Tetra Tech EM, Inc., dated May 2011

This Phase 1 ESA was prepared for the portion of the project site identified as TMK (1) 9-1-014: 026, occupied by Grace Pacific Corporation (GPC), the operator of a hot mix asphalt plant at the project site.

According to the report, coral (limestone) was mined from the site from the early 1960s to the mid-1990s. The hot mix asphalt plant began operations at the site in March 2009.

The report indicated the following concerns in connection with the site:

- Fuel and oil pipelines observed along the southern and western borders of the site.
- The presence of nine aboveground storage tanks (ASTs) at the site:
  - Two, 10,000-gallon diesel ASTs;
  - One, 2,000-gallon diesel AST;
  - Four, 2,000-gallon propane ASTs; and
  - Two, 30,000-gallon liquid asphalt ASTs.
- The presence of a transformer and fluorescent light ballasts on the site.
- The presence of fluorescent light bulbs at the site.
- The presence of potential CFC-containing equipment at the site.

- The GPC hot mix asphalt plant operations and air permit requirements.
- The former presence of dredged sediment stockpiles at the site.

The report indicated the following REC in connection with the site:

- Several historical releases of petroleum products at the Chevron Hawaii Refinery impacted the groundwater beneath and surrounding the site. The inferred extent of the impacted groundwater plume extends onto the site and along the southwestern corner of the site.

Tenant Inspection Report, GLP Asphalt, LLC, prepared by Weston Solutions, Inc., dated October 23, 2012

This inspection was conducted as part of the Hawaii Department of Transportation (HDOT) Stormwater Management Plan (SWMP) to address activities conducted at the GLP Asphalt, LLC facility that may generate pollutants which may degrade stormwater runoff quality. Proper management, housekeeping and training was reported and no history of oil/chemical spills was indicated in the report.

The following hazardous materials and storage conditions were identified in the report:

- Two (2), 10,000-gallon above ground storage tanks (AST) of diesel. The ASTs were covered and contained.
- One (1), 3,800-gallon additive tank of phosphoric acid, which was contained.
- Two (2), 148,000-barrel asphalt storage tanks, which were covered and contained.
- Two (2), 5,000-barrel ASTs for asphalt storage, which were contained.
- One (1), 1,500-gallon AST of heating oil, which was contained.
- One (1), 55-gallon drum of solvent, which was covered.

The following operations were indicated to be conducted at the site:

- Vehicle/Equipment Maintenance
- Vehicle/Equipment Fueling

- Petroleum-Based Product Storage
- Material Storage
- Hazardous Material Storage
- Material Handling
- Waste Handling
- Building Maintenance

Excavation and Disposal of Lead Contaminated Soil at Kalaeloa Barbers Point Harbor Pier P-7 and Storage Yard S-6, prepared by Professional Service Industries, Inc. (PSI), dated June 2, 2003

According to this report, approximately 3,900 cubic yards of soil was stockpiled at Pier P-7 and Storage Yard S-6 at the project site. The soil was transported from a scrap metal yard to the project site for storage. The stockpile covered an area of approximately 13,500 square feet. The report documented the removal of contaminated soil for disposal at PVT landfill, air monitoring and confirmation soil sampling from under the polyethylene liner at the footprint of the soil stockpile. The analytical data of the air samples indicated that worker exposer to lead dust concentrations were below the Occupational Safety and Health Administration (OSHA) Permissible Exposure Limit (PEL). The results of the analytical data of soil confirmation sampling indicated concentrations of lead less than the cleanup level of 400 mg/kg, which is greater than the current DOH Tier 1 Environmental Action Level (EAL) for lead of 200 mg/kg for unrestricted land use. However, the current site-specific DOH Tier 1 Environmental Action Level (EAL) for lead in commercial/industrial properties is 800 mg/kg. According to Mr. Randal Leong (representative of the User/Owner), this area has been capped with clean soil.

5.0 SITE RECONNAISSANCE

Site reconnaissance was performed by Ms. Roberta Bitzer on May 16, 2013. The site reconnaissance was conducted on foot and using a vehicle.

Access was not provided to the following areas of the project site:

- Storage containers at Grace Pacific
- Storage containers at GLP Asphalt, LLC

No opinion is provided regarding environmental conditions in areas that were not inspected.

Table 5 summarizes the site inspection and findings. All features that were observed during the site reconnaissance, or that were discovered to have been historically present at the project site, are noted in the table. Also indicated in the table are items that may present concerns to the project site. Additional information about items noted in the table can be found in the referenced section of this report.

Table 5

Site Inspection Findings

Onsite Environmental Features	Currently / Historically Present	Possible Environmental Concern	Report Section
Hazardous Substances or Petroleum Products	**Yes**	**Yes**	**5.1**
Underground Storage Tank (UST)	No	No	5.2.1
Aboveground Storage Tank (AST)	**Yes**	**Yes**	**5.2.2**
Odors	No	No	5.6
Air Emissions *(stacks, hoods, other point sources)*	No	No	5.6
Pools of Liquid	No	No	5.6
Drums	No	No	5.6
Unidentified Substance Containers	No	No	5.1
Electrical Equipment/Possible PCBs	**Yes**	**Yes**	**5.4.1**, 5.4.3
Hydraulic Equipment/Possible PCBs	No	No	5.4.2

Table 5 (continued)

Site Inspection Findings

Onsite Environmental Features	Currently / Historically Present	Possible Environmental Concern	Report Section
Stains or Corrosion	No	No	5.6
Drains	Yes	No	5.6
Sumps	No	No	5.6
Pits, Ponds, or Lagoons	No	No	5.6
Stained Soil or Pavement	No	No	5.6
Stressed Vegetation	No	No	5.6
Evidence of Spills or Releases	No	No	-
Artificially Filled Areas *(Solid Waste Disposal)*	No	No	-
Waste Water	No	No	5.6
Wells	No	No	5.5
Septic Systems *(cisterns, cess pools, dry wells)*	**Yes**	**No**	**3.4**
Dry Cleaning Operations	No	No	-
Agricultural Use *(pesticides/herbicides/fungicides)*	No	No	-
Oil/Gas Pipelines, Production, or Exploration	**Yes**	**Yes**	**5.1**
Remedial Activities	No	No	-

5.1 HAZARDOUS SUBSTANCES AND PETROLEUM PRODUCTS

Project Site

Visual observation for the use and/or storage of hazardous substances and petroleum products was performed.

The following activities were observed that would indicate that hazardous substances and/or petroleum products are likely to be used, generated, stored, accumulated, transported, or disposed on site:

- Bunker stations (Pier P-1, Pier P-5, Pier P-6) used by Tesoro Hawaii Corporation, Aloha Petroleum, Ltd., Chevron and others

- Mooring for propane, petroleum and coal vessels
- Indication of fuel and propane underground pipelines connected to Hawaii Gas and nearby refineries

The following hazardous substances and/or petroleum products were observed on site:

Marisco, Ltd.- Ship maintenance and repair facility

- Sandblast grit stored in drums for disposal
- Diesel fuel, approximately 6,000 gallons
- Solvent based paint, approximately 1,000 gallons
- Motor oil, approximately 500 gallons
- Gasoline, approximately 500 gallons
- Paint thinners, approximately 500 gallons
- Acetone, approximately 500 gallons
- Aerosol spray paints, approximately 50 cases
- Acids, approximately 100 gallons
- Used oil, approximately 500 gallons
- Small quantities of cleaning supplies

Transit Shed - Sause Brothers and Matson

- Two batteries
- Paint, approximately 125 gallons

AES - Coal Facility

- Small quantities of cleaning supplies
- Solvent, approximately 10 gallons

- Gear oil, approximately 100 gallons
- Acetone, approximately 10 gallons
- Used oil, approximately 55 gallons
- Hydraulic oil, approximately 170 gallons

Hawaiian Cement - Cement Transfer, Storage and Processing Facility

- Small quantities of cleaning supplies
- Diesel, approximately 150 gallons
- Used oil, approximately 220 gallons
- Luma Brite (aluminum cleaner and brightner), approximately 110 gallons
- Coolant/antifreeze, approximately 110 gallons
- Motor oil, approximately 150 gallons
- Paint, approximately 50 gallons

GLP Asphalt - Asphalt Plant

- Diesel, approximately 20,000 gallons

Grace Pacific - Asphalt Plant

- Diesel, approximately 20,000 gallons
- Paint, approximately 50 gallons
- Propane, approximately 8,000 gallons
- Liquid asphalt, over 30,000 gallons

Healy Tibbitts Builders - Construction Yard

- Paint, approximately 3,000 gallons

None of the hazardous substances and/or petroleum products onsite and activities associated with hazardous substances and/or petroleum products observed on the project site

during the site reconnaissance appeared to be causing or contributing to any site contamination. However, the presence of large quantities of petroleum products onsite represents a material threat of a release with the potential to negatively impact the project site.

Adjoining or Nearby Sites

The following activities related to hazardous substances and/or petroleum products on adjoining or nearby sites were observed at the time of the project site reconnaissance:

- Hawaii Gas and other industrial facilities at Kenai Industrial Park, adjacent to the south/southwest of the project site.
- Refineries and other industrial facilities at Campbell Industrial Park to the south of the project site.

5.2 STORAGE TANKS

5.2.1 UNDERGROUND STORAGE TANKS

Project Site

Visual observations for manways, vent pipes, fill connections, concrete pressure dispersion pads, and dispenser pumps were conducted throughout the project site. Evidence indicating historical or current existence of USTs was not observed.

Adjoining or Nearby Sites

Visual observations for manways, vent pipes, fill connections, concrete pressure dispersion pads, and dispenser pumps were conducted throughout the accessible areas of adjacent properties. Evidence indicating historical or current existence of USTs was not observed.

5.2.2 ABOVEGROUND STORAGE TANKS

Project Site

Visual observations for vent pipes, secondary containment walls, or other evidence of above ground storage tanks (ASTs) were conducted throughout the project site. ASTs were observed in the following areas:

Marisco, Ltd. - Ship maintenance and repair facility

- One, 5,000-gallon diesel AST
- One, 15,000-gallon fuel AST closed in 2009.
- One, 500-gallon oxygen AST
- Six, 500-gallon diesel ASTs
- Six large water ASTs

AES - Coal Facility

- Two, 400-gallon foam dust control agent ASTs
- One, 10,000-gallon cement AST closed in 2005

Hawaiian Cement - Cement Transfer, Storage and Processing Facility

- One, 150-gallon diesel AST
- One, 300-gallon diesel AST
- Two, 30,000 metric ton domes of cement

GLP Asphalt - Asphalt Plant

- Two, 10,000-gallon diesel ASTs
- Several hot asphalt ASTs

Grace Pacific - Asphalt Plant

- Two, 10,000-gallon diesel ASTs
- Four, 2,000-gallon propane ASTs
- Two, 30,000-gallon liquid asphalt ASTs
- One, 10,000-gallon non-potable water AST

None of the fuel ASTs observed on the project site during the site reconnaissance appeared to be causing or contributing to any site contamination. However, the presence of

large quantities of petroleum products onsite represents a material threat of a release with the potential to negatively impact the project site.

Adjoining or Nearby Sites

Visual observations for vent pipes, secondary containment walls, or other evidence of aboveground storage tanks were conducted throughout the accessible areas of adjacent properties. Several propane ASTs were observed at the Hawaii Gas facility, adjacent to the south/southwest of Pier P-1 and Yard S-1. ASTs were also observed at the refineries at Campbell Industrial Park, to the south.

5.3 SOLID WASTE

Project Site

At the time of our investigation, non-hazardous solid waste was generated onsite. Waste was in the form of general municipal refuse. General municipal refuse was placed into dumpsters located on the project site. The waste was accumulated and transported to an offsite facility for recycling and/or disposal on a regular interval basis.

Adjoining or Nearby Sites

At the time of our investigation, non-hazardous solid waste was observed to be generated on adjoining or nearby sites. Waste was in the form of general municipal refuse. General municipal refuse was placed into dumpsters located on adjoining sites. The waste was accumulated and transported to an offsite facility for recycling and/or disposal on a regular interval basis.

5.4 POLYCHLORINATED BIPHENYLS (PCBS)

Visual observation for electrical equipment or electrical components that use dielectric fluid, hydraulic lift equipment and fluorescent light ballasts that potentially include PCB-containing fluids was conducted. PCBs (polychlorinated biphenyl) are heavily regulated under the Toxic Substances Control Act (TSCA), which obligates a property owner to clean up any spills occurring on their property.

5.4.1 ELECTRICAL TRANSFORMERS/CAPACITORS

Several transformers were observed on and adjacent to the project site. An inquiry was sent to HECO regarding the PCB content of the transformers on and adjacent to the project site.

HECO responded to the inquiry and indicated that all the transformers were "non-PCB" or "PCB-free" except for one privately-owned transformer (vault number V6574) located at 91-601 Malakole Road, occupied by Marisco, Ltd. HECO indicated that since the transformer located in vault V6574 is privately-owned, HECO had no information regarding the PCBs content of this unit.

ENPRO recommends sampling and testing the dielectric fluid from this privately owned transformer to determine whether or not it contains PCBs. In the event that the transformer contains PCBs, we recommend it be "retrofitted" so it is classified as "non-PCB" or "PCB-free." In the event that evidence of leakage is observed during the sampling, soil sampling may be warranted.

Details regarding correspondence with HECO can be found in the appendix section of this report.

5.4.2 HYDRAULIC LIFT EQUIPMENT

Visual observation for hydraulic lift equipment or components containing hydraulic fluid that potentially contains PCBs was conducted.

No in-ground hydraulic lift equipment was observed on site at the time of our reconnaissance.

5.4.3 FLUORESCENT LIGHT BALLASTS

Fluorescent light fixtures are present at the project site. Many fluorescent light fixtures manufactured prior to 1980 may have contained ballasts with PCBs. Since the project site was constructed before 1980, the potential that the ballasts of these fluorescent lights contain PCBs may be a concern.

5.5 WELLS

The EDR report indicated a total of nine wells on the project site. Three of the wells were either sealed or lost. The EDR report including the wells map is provided in the appendix.

5.6 OTHER OBSERVATIONS

The following describes additional observations of the project site:

Odors:	Not observed
Pools of liquid:	Not observed
Drums:	Several drums of oil, scrap metal and used oil were observed at the Marisco, Ltd. Sites. Three, 55-gallon drums of solid waste were observed at Healy Tibbitts Builders yard. One, 55-gallon drum of parts washer fluid was observed at the Grace Pacific site; several drums of oil, Luma Brite, coolant, and used oil were observed at the Hawaiian Cement site.
Drains and Sumps:	Observed throughout the paved yards
Pits, ponds, lagoons:	Not observed
Stained soil or pavement:	Not observed
Stressed vegetation:	Not observed
Waste water features:	Not observed
Septic systems:	Observed adjacent to onsite buildings

5.7 ADDITIONAL ENVIRONMENTAL ISSUES OF CONCERN, NON-ASTM

The following environmental conditions were evaluated for the potential to impact the property though they are not considered *recognized environmental conditions* as defined by ASTM.

Asbestos-Containing Materials

In July 1989, under the Toxic Substances Control Act (TSCA), the United States Environmental Protection Agency (USEPA) promulgated an Asbestos Ban Phaseout Rule. Beginning in 1990 and taking effect in three stages, the rule prohibits the importation, manufacture, and processing of ninety-four percent of all remaining asbestos products in the United States over a period of seven years. Presently, asbestos has not been prohibited from all construction building materials.

No sampling for asbestos containing materials was conducted as part of this investigation.

Suspect asbestos containing materials should be sampled and analyzed for possible asbestos content prior to activities (e.g., renovation, demolition) that may damage or disturb

the material. If the materials are asbestos-containing, the building owner must comply with applicable USEPA National Emissions Standards for Hazardous Air Pollutants (NESHAPS), OSHA, state and local regulations.

Radon

Radon is a naturally occurring radioactive gas formed by the decay of uranium in bedrock and soil. The potential adverse health effects associated with radon gas depend on several factors including concentration of the gas and duration of exposure. The concentration of radon gas in a building depends on subsurface soil conditions, the integrity of the building's foundation, and the building's ventilation system.

Due to the geologic composition of basalt bedrock and the soils that derive from them, as well as the composition of marine-related sediments found in Hawaii, the State of Hawaii has been determined to have a low radon potential (G.M. Reimer, U.S. Geological Survey). Therefore, investigation of radon is not recommended for this property.

Lead-Based Paint

There is no commercial property definition of what is a lead-based paint. Regulations specifically addressing lead-based paint include Housing and Urban Development (HUD) (1995) guidelines and the Consumer Product Safety Act (1977). These regulations are for housing and consumer products.

OSHA regulations apply to worker protection during renovation and demolition activities.

Sensitive Ecological Areas

According to the EDR report, the following areas were depicted as sensitive ecological areas or federal wetlands:

- The shores of Kapolei

6.0 INTERVIEWS

Interviews with individuals having past or present knowledge of the project site, such as owners, key site managers, occupants, and neighbors are routinely conducted to obtain information indicating *recognized environmental conditions* in connection with the property. The following individuals were available to interview:

Table 6

Key Site Interviews

Interviewee Name	Relationship to Property	Length of Time Familiar with Property	Date of Interview
Mr. Dean Watase	Staff and Representative of the State of Hawaii Department of Transportation, Harbors Division	Approximately 10 years	5/7/13
Mr. Randal Leong	Staff and Representative of the State of Hawaii Department of Transportation, Harbors Division	Approximately 20 years	5/7/13

6.1 OWNER/USER

Mr. Dean Watase and Mr. Randal Leong, staff and representative of the State of Hawaii Department of Transportation, Harbors Division harbors (the User) completed a Property Questionnaire supplied by ENPRO Environmental regarding the project site. A copy of the completed Property Questionnaire is included in the appendix section of this report.

Project Site

Mr. Watase and Mr. Leong have been familiar with the project site for several years and reported the following significant environmental issues regarding the project site:

- Past fuel spills and pipeline leaks which have been mitigated by the pipeline users. Mr. Watase and Mr. Leong were not able to provide further details regarding the releases.

- Former lead contaminated soil. Details regarding the former lead contaminated soil are provided in Section 4.4.

- Fuel ASTs at GLP Asphalt, LLC. Details regarding the ASTs are provided in Section 4.4.

Adjoining and Adjacent Properties

Mr. Watase and Mr. Leong reported no information regarding past or present contamination and/or activities on adjacent properties that may have resulted in contamination of the project site, except for the industrial use of the adjoining properties, including, but not limited to refineries and a former encapsulated/capped steel site at the corner of Honua Street (mauka extension) and Malakole Road, currently a solar panel site.

7.0 REGULATORY DATABASE REVIEW

7.1 STANDARD ENVIRONMENTAL RECORD RESOURCES: FEDERAL, STATE AND LOCAL DATABASE SEARCH

The regulatory database search report prepared by Environmental Data Resources, Inc. (EDR) was reviewed to evaluate the project site and listed properties within ASTM-recommended search distances. Federal, state and local databases reviewed are included in the Appendix section of this report.

Project site

The project site was listed in the following databases as identified in the EDR regulatory database search report:

- Barbers Point Harbor Pier 5, SHWS

Adjacent and Nearby Properties

The EDR regulatory database search report identified a total of thirty-two sites within the ASTM minimum search distances from the project site.

Most of the listed sites are not expected to present an environmental concern to the project site because, based upon ENPRO's review:

1. They only hold an operating permit (which does not imply a problem) or,
2. They were identified for past regulatory requirements that require no future action or,
3. They are too distant and/or hydrogeologically down gradient or cross gradient relative to the project site.

The EDR regulatory database search report identified twenty "orphan" sites within the ASTM minimum search distances from the project site.

Based on our review of the orphan sites listed, ENPRO requested the following regulatory file from the State of Hawaii Department of Health (DOH):

- Texaco Malakole Street, Pipeline Excavation at Malakole Street, HWS, SPILLS

7.2 ADDITIONAL ENVIRONMENTAL RECORD RESOURCES: STATE AND LOCAL AGENCY ENVIRONMENTAL RECORD SOURCES

Based on ENPRO's review of the EDR regulatory database search report, regulatory files from the State of Hawaii Department of Health (DOH) were requested and reviewed. Our review considers both proximity to the project site and local hydrogeologic conditions to identify which sites and which environmental violations may be interpreted to have a potential impact to the project site's environmental conditions.

ENPRO additionally requested information on the project site from the City and County of Honolulu Fire Department and reviewed documents from the Honolulu Department of Planning and Permitting.

7.2.1 DEPARTMENT OF HEALTH, SOLID AND HAZARDOUS WASTE BRANCH

Based on our review of the EDR regulatory database search report, we requested the following regulatory files from the State of Hawaii Department of Health (DOH), Solid and Hazardous Waste Branch (SHWB):

- Kalaeloa Barbers Point Harbor, Kapolei
- Texaco Malakole Street, Pipeline Excavation at Malakole Street
- Barbers Point Harbor Pier 5
- Honsador, 91-151 Malakole Street
- 91-063 Malakole Street
- 91-127 Malakole Street
- 91-505 Awakumoku Street
- 91-567 Nukuawa Street
- 91-325 Komohana Street
- 91-543 Nukuawa Street
- 91-522 Nukuawa Street
- 91-343 Kaiholo Street
- 91-515 Nukuawa Street
- Hawaiian Western Steel Dump, Hanua Street and Malakole Street

- 91-480 Malakole Street
- 91-201 Malakole Street
- 91-310 Hanua Street

The Underground Storage Tank (UST) Section provided the following:

1) **Chevron Hawaii Refinery, 91-480 Malakole Street**

- An October 6, 1989 letter from Chevron USA Inc. to the DOH regarding the discovery of petroleum underlying the Campbell Industrial Park, adjacent to the west of the Chevron refinery. The petroleum was discovered and delineated during an environmental assessment of the property performed by Harding Lawson Associates. Approximately 2.8 acres of the southwest corner of the property appeared to be affected. The oil thickness varied from 18 inches to 2 feet on the groundwater. The letter stated that Chevron was going to be drilling several wells on the affected property to evaluate the oil thickness and recoverability of free oil trapped on the water table.
- A November 2, 2005 Notice of Intent to Close USTs indicating the intent to close two, 5,000-gallon USTs on November 9, 2005.
- A November 3, 2005 letter from ChevronTexaco to the DOH notifying the discovery of two abandoned USTs at the refinery during grading activities in preparation for the construction of a storage area. The letter indicated that the USTs were located within a stable, non-migrating hydrocarbon plume located on the groundwater beneath the Hawaii Refinery. This plume was reported to have been thoroughly characterized and delineated. A plume-wide groundwater monitoring program was ongoing. Since the USTs were located within the plume, petroleum impacted samples were expected to be detected during removal of the USTs.

Although the DOH SHWB UST records indicated the presence of a stable, non-migrating hydrocarbon plume confined to the groundwater beneath the Chevron Refinery, the HEER Office documentation (Section 7.2.2) indicated numerous oil releases from the facility, and evidence that the existing Chevron Refinery free product plume of petroleum hydrocarbon extends through Malakole Street, southeast of Kaiholo Street, which is adjacent to the south border of the project site. Therefore, it is ENPRO's opinion that the existing Chevron Refinery free product plume of petroleum hydrocarbon indicates evidence of a *recognized environmental condition* with the potential to have negatively impacted the project site.

2) Hawaiian Independent Refinery, 91-325 Komohana Street

- An April 9, 1986 Notification for UST form indicating the presence of one, 1,000-gallon gasoline UST, installed in 1972.
- A September 27, 1991 Notification for UST form indicating the removal of one, 1,000-gallon gasoline UST in December 1988. No site assessment was completed at the time of the removal of the UST.

Based on the distance from the property and our interpretation that it is located hydrogeologically cross-gradient, it is ENPRO's opinion that any *recognized environmental conditions* are not expected to impact the project site.

3) Hawaiian Western Steel Limited, 91-150 Hanua Street

- A June 30, 1986 Notification for UST form indicating the presence of one, 500-gallon gasoline UST installed in 1961, and the closure in-place of one, 500-gallon Fuel Oil #5 in 1975. This UST had been installed in 1962.
- Several letters and reports regarding a removed or closed in-place 500-gallon gasoline UST. It was suspected that the UST had been removed prior to 1980; however, no documentation of the removal was available. Because of the uncertain status of the UST, Levine Fricke conducted a subsurface investigation on March 11, 1996. The investigation confirmed that the UST had been removed. No indications of gross contamination were observed. Analysis of confirmation soil samples did not indicate evidence of a release.
- An October 20, 1995 UST Closure Report prepared by Levine Fricke documenting the removal of a 1,000-gallon fuel-oil UST, which had previously been abandoned in-place and filled with inert material. The tank was removed on August 31, 1995. No indications of gross contamination were observed. Analysis of confirmation soil samples did not indicate evidence of petroleum impact in the UST excavation. The DOH issued a NFA letter for the UST on December 28, 1995.

Based on the distance from the property and our interpretation that it is located hydrogeologically cross-gradient, it is ENPRO's opinion that any *recognized environmental conditions* are not expected to impact the project site. Furthermore, the documentation states that the identified contamination was properly addressed and a *NFA* status was issued for the site.

4) Waste Management of Hawaii, Inc., 91-310 Hanua Street

- A 1993 and a 1994 Notification for UST form indicating the presence of one, 10,000-gallon diesel UST and one, 8,000-gallon gasoline UST, both installed in 1986.
- A May 6, 2001 Closure Report prepared by Dawson Group, Inc. The report documented investigations and remedial actions taken to address a release from the piping beneath a diesel dispenser in 1998. At the time of the discovery of the release, the leaking pipes were replaced and the system was upgraded. Approximately 175 tons of impacted soil was over-excavated and removed for off-site disposal. A series of samples were collected and analyzed; however, the contractors did not file a UST closure and release response report with the DOH and subsequently misplaced all records of this action. Dawson Group, Inc. performed additional soil and groundwater monitoring in May and June of 2000 and found no evidence of TPH, BTEX or metals contamination in either soil or groundwater.
- The DOH issued a NFA letter on August 30, 2001 for the release identified in the May 6, 2001 Closure Report prepared by Dawson Group, Inc.
- A July 11, 2005 Notification for UST form indicating the temporary closure of one, 10,000-gallon diesel UST and one, 8,000-gallon gasoline UST, both installed in 1986. The tanks were temporarily closed on July 7, 2005.
- Several Notice of Inspection forms on file. The most recent was dated September 19, 2012 and it requested an updated copy of the "Certification of Financial Responsibility".
- A November 21, 2012 letter from the DOH to Oahu Waste Services, Inc. acknowledging the receipt of the "Certification of Financial Responsibility".

Based on the distance from the project site to this property and ENPRO's interpretation that this property is located hydrogeologically cross-gradient, it is our opinion that this site does not represent a *recognized environmental condition* expected to negatively impact the project site. Furthermore, the documentation states that the identified contamination was properly addressed and a *NFA* status was issued by DOH.

5) Honsador Lumber, 91-151 Malakole Street

- A March 21, 1986 Notification for UST form indicating the presence of one, 2,000-gallon gasoline UST and one, 4,000-gallon gasoline UST, both installed in 1974, and one, 10,000-gallon diesel UST installed in 1979.

- A December 10, 1992 Notification for UST form indicating the removal of one, 2,000-gallon gasoline UST and one, 4,000-gallon gasoline UST, both installed in 1974. The gasoline tanks were removed on March 2, 1992. The form indicated that an assessment was completed and no evidence of a leak was detected.

- An August 10, 1995 EPA Notice of Inspection form requesting documentation of compliance with financial responsibility by November 10, 1995.

- A November 2, 1995 letter from the EPA to Honsador, Inc. stating that the facility had returned to compliance.

- An October 21, 1998 UST Closure Report prepared by Environmental Contracting-Pacific, Inc. The report documented the closure of one, 10,000-gallon diesel UST on August 25, 1998 (the field activities took place between August 24 and 28, 1998). No indications of gross contamination were observed. Analysis of confirmation soil samples indicated detectable concentrations of TPH-diesel at concentrations less than the DOH Tier 1 Soil Action Levels.

- An October 26, 1998 Notification for UST form indicating the removal of one, 10,000-gallon diesel UST installed in 1979. The form indicated that the estimated tank removal date was August 22, 1998. A Confirmed Release Notification Form dated September 2, 1998 indicated that analyses of soil confirmation sample collected beneath the UST had detected 31 ppm of TPH-diesel.

- The DOH issued a NFA letter on April 4, 2001 for the release identified in the October 21, 1998 UST Closure Report prepared by Environmental Contracting-Pacific, Inc.

Based on the distance from the project site to this property and ENPRO's interpretation that this property is located hydrogeologically cross-gradient, it is our opinion that this site does not represent a *recognized environmental condition* expected to negatively impact the project site.

6) Hawaiian Dredging and Construction, 91-063 Malakole Street

- An August 1, 1989 Preliminary Site Survey for UST Closure report prepared by Unitek Environmental Consultants, Inc. documenting the removal of one, 1,000-gallon waste oil UST. The analytical results of confirmation soil samples indicated diesel fuel contamination of the soil surrounding the UST.

- An October 25, 1989 Environmental Assessment report prepared by Muranaka Environmental Consultants, Inc. documenting soil and groundwater sampling conducted on October 13, 1989 to determine the extent of contamination associated with a former UST. The analytical results indicated contamination of backfill soil with diesel fuel. No contaminants of concern were detected in the groundwater samples.

- An October 25, 1991 Notification for UST form indicating the closure of one, 8,000-gallon fuel oil UST, installed in 1974. The tank was removed from the ground on June 30, 1991. The form indicated that a site assessment was in progress.

- An April 26, 1993 Notification for UST form indicating the closure of one, 10,000-gallon gasoline UST; one, 12,000-gallon diesel UST; one, 2,000-gallon solvent UST; and one, 1,000-gallon used oil UST, all installed in 1974. The form did not indicate the date the tanks were closed, but it indicated that they were last used on December 15, 1992 and were removed from the ground. Evidence of a leak was indicated for the 1,000-gallon used oil UST.

- A June 22, 1993 UST Closure Report prepared by Brewer Environmental Services documenting the removal of four USTs at the site. The tanks consisted of one, 10,000-gallon gasoline UST; one, 12,000-gallon diesel UST; one, 2,000-gallon solvent UST; and one, 1,000-gallon waste oil UST. The analytical results of confirmation soil samples indicated diesel contamination of the soils at the 2,000-gallon solvent UST location and at the southern dispenser.

- A January 19, 1994 Site Characterization Report prepared by Brewer Environmental Services documenting the over-excavation of soils at former UST and dispenser locations, and confirmation soil sampling and analyses. The analytical results of confirmation soil samples indicated contaminants of concern at concentrations less than the DOH's recommended clean-up criteria.

- The DOH issued a NFA letter on November 2, 1999 for the releases identified in the August 1, 1989 Preliminary Site Survey for UST Closure report prepared by Unitek Environmental Consultants, Inc. and in the January 19, 1994 Site Characterization Report prepared by Brewer Environmental Services.

- A June 30, 2008 DOH Letter of Completion pursuant to the Voluntary Response Program (VRP) agreement dated December 20, 2001 and revised

June 11, 2007 between Bank of Hawaii and the DOH for Komohana Park. Details regarding this VRP agreement are summarized in Section 7.2.2.

Based on the distance from the project site to this property and ENPRO's interpretation that this property is located hydrogeologically cross-gradient, it is our opinion that this site does not represent a *recognized environmental condition* expected to negatively impact the project site.

7) Texaco Barbers Point Sales Terminal, 91-119 Hanua Street

- An April 29, 1997 Notification for UST form indicating the removal of one, 10,000-gallon diesel UST installed in 1981 and removed in 1997. The form indicated that an assessment was completed and no evidence of a leak was detected.

- A June 13, 1997 Notification for UST form indicating the removal of one, 2,000-gallon gasoline/diesel UST installed in 1960; and the removal of one, 6,000-gallon diesel UST installed in 1971. Both tanks were removed in 1997. The form indicated that an assessment was completed and no evidence of a leak was detected.

- A September 2001 Quarterly Release Response Report prepared by Walker Consultants, Ltd. summarizing release response conducted from 1997 to 2001 in response to a diesel release to soil discovered in May 1997 during removal of diesel and commingled oil USTs, and an exempt oil/water separator onsite. The release was attributed to overfill and overflows during UST and oil/water separator operation. The contaminant of concern was determined to be benzo(a)pyrene which was limited to the soil beneath the diesel product lines near the former loading rack. According to the report, the benzo(a)pyrene concentration (2.69 mg/kg) exceeded the DOH Tier 1 SAL (1.0 mg/kg); however, it was less than the site-specific DOH Tier 2 SAL (3.1). The site-specific DOH Tier 2 SAL was indicated to be appropriate because the area surrounding the impacted soil was covered by a concrete load rack island and drive-through slab, serving as engineered controls to prevent direct exposure. The report recommended no further action.

- A December 5, 2001 letter from the DOH to Equiva Services, LLC indicating that the DOH had reviewed the September 2001 Quarterly Release Response Report prepared by Walker Consultants, Ltd. and concluding that *no further action* was necessary in response to the release at the site.

Based on the distance from the project site to this facility and ENPRO's interpretation that this property is located hydrogeologically cross-gradient, it is our opinion

that this site does not represent a *recognized environmental condition* expected to negatively impact the project site.

The Hazardous Waste Section provided the following:

1) AAA Environmental, 91-503 Nukuawa Street

- Several letters and reports were identified in the regulatory files. According to the documents reviewed, AAA Environmental was in the business of heavy duty industrial and marine cleaning, tank cleaning, heavy equipment cleaning and waste disposal. The southeastern unit of the facility was used to accumulate containers of paint, cleaners and paint-related materials (paint unit). An oily waste management unit was also operated to the northwest of the paint unit. The DOH inspected the facility in 1997 and 1999. During the inspections, violations were noted and Notice of Violation Orders (NOVO) were issued by the DOH in 1997, 1998 and 1999. AAA Environmental removed the hazardous wastes on May 23, 1997 as cited in the first NOVO. Settlement negotiations were initiated between the DOH and AAA Environmental, but stalled during a pending voluntary petition for bankruptcy filed by AAA Environmental. AAA Environmental abandoned the property in 1998 leaving hazardous materials at the site. All abandoned hazardous materials and residues were removed from the site and followed up with confirmation sampling in 2000. The sampling indicated that residual contaminants were present at the site at concentrations less than the EPA and State action levels. The DOH approved the clean-up efforts and closed the site on June 5, 2000.

Based on the distance from the project site to this property and ENPRO's interpretation that this property is located hydrogeologically down-gradient, it is our opinion that this site does not represent a *recognized environmental condition* expected to negatively impact the project site. Furthermore, the documentation states that the identified contamination was properly addressed and approved by the DOH.

2) Hawaii International Racing School, 91-201 Malakole Street

- A February 15, 2005 State Hazardous Waste and Used Oil Compliance Evaluation Inspection report noting several violations associated with the facility's operation.

- A May 24, 2005 letter from the Vice President of the racing school stating that the facility was in the process of addressing all violations noted in the February 15, 2005 inspection report.

Based on the distance from the project site to this property and ENPRO's interpretation that this property is located hydrogeologically cross-gradient, it is our opinion that this site does not represent a *recognized environmental condition* expected to negatively impact the project site.

3) South Bay Blasting & Tank Cleaning, 91-522 Nukuawa Street

- Several letters and inspection reports were available for review. According to the files, on October 9, 1997, the facility applied for a "Used Oil Transporter" permit in which the facility would only be used for staging equipment and parking vehicles. On October 8 and 20, 1998 the DOH attempted to inspected the property; however, the property was locked. The DOH inspectors observed the property from the fence line and noted several drums, paint containers and thinner containers stored at the property. The facility was in the process of moving tankers from the property to a new property at Komohana Street. The DOH recommended that the facility cease all movement, transportation and/or disposal of any items at the facility. On December 18, 1998, the DOH inspected the facility, sampled five tankers, one sandblast grit tank and a 55-gallon drum. The analytical results for all samples indicated that the materials were non-hazardous. The DOH authorized the facility to move the tankers and the sandblast grit from the facility to the new location at Komohana Street in January 13, 1999.

Based on the distance from the project site to this property and ENPRO's interpretation that this property is located hydrogeologically down-gradient, it is our opinion that this site does not represent a *recognized environmental condition* expected to negatively impact the project site. Moreover, no records of a release of hazardous materials and/or petroleum products were identified in the regulatory files.

4) JD Trucking, Inc., 91-567 Nukuawa Street

- A Hazardous Waste Management Site Visit form regarding an April 22, 2003 inspection of the facility stating that the inspector observed four, 55-gallon used oil drums which were not labeled with the words "Used Oil" and stains on the ground. The inspector recommended labeling the drums with the words "Used Oil".

Based on the distance from the project site to this property and ENPRO's interpretation that this property is located hydrogeologically down-gradient, it is our opinion that this site does not represent a *recognized environmental condition* expected to negatively impact the project site.

5) Sun Home Metal, Inc., 91-567 Nukuawa Street

- A Hazardous Waste Management Site Visit form regarding a September 11, 2003 inspection of the facility stating that the inspector observed an unlabeled 55-gallon drum of used oil. The inspector recommended labeling all containers of used oil drums with the words "Used Oil".

Based on the distance from the project site to this property and ENPRO's interpretation that this property is located hydrogeologically down-gradient, it is our opinion that this site does not represent a *recognized environmental condition* expected to negatively impact the project site. Moreover, no records of a release of hazardous materials and/or petroleum products were identified in the regulatory files.

6) American Industrial Insulation, LLC., 91-505 Awakumoku Street

- A March 24, 2000 memo from Beryl Ekimoto (DOH) to Grace Simons (DOH) describing soil sampling activities conducted by Ogden Environmental and Energy Services on March 23, 2000, and observed by the DOH staff.
- A September 28, 2007 letter from the EPA to American Industrial Insulation LLC indicating that the facility's status was listed as "Not a Generator" and "Used Oil Transporter".
- An Inspection Report regarding a September 29, 2011 State Hazardous Waste Compliance Evaluation Inspection indicating that the generator failed to: determine if the solid waste generated was a hazardous waste, label the ASTs and containers with the words "Used Oil", transport hazardous waste lead paint chips with a manifest, obtain a used oil transporter permit from the DOH to transport used oil, obtain an EPA identification number as a transporter of used oil, provide secondary containment to containers used to store used oil at transfer facilities. The facility returned to compliance on July 9, 2012.

Based on the distance from the project site to this property and ENPRO's interpretation that this property is located hydrogeologically down-gradient, it is our opinion that this site does not represent a *recognized environmental condition* expected to negatively impact the project site.

7) Beachside Roofing, LLC., 91-522 Nukuawa Street

- A December 16, 2008 letter from the EPA to American Industrial Insulation LLC indicating that the facility's status was listed as "Small Quantity Generator".

- Several letters and inspection reports dated from 2002 to 2008 indicating violations and return to compliance.

Based on the distance from the project site to this property and ENPRO's interpretation that this property is located hydrogeologically down-gradient, it is our opinion that this site does not represent a *recognized environmental condition* expected to negatively impact the project site.

8) Philip Services Hawaii, LTD., 91-127 Malakole Street

- Several letters and inspection reports dated from 1998 to 2007 indicating hazardous wastes violations and return to compliance.

Based on the distance from the project site to this property and ENPRO's interpretation that this property is located hydrogeologically cross-gradient, it is our opinion that this site does not represent a *recognized environmental condition* expected to negatively impact the project site.

The Solid Waste Section provided the following:

1) Reynolds Recycling, 91-310 Hanua Street

- A Solid Waste Management Permit issued on October 17, 2006 to operate a recycling drop-off facility at the site. The permit was terminated on January 28, 2009 as requested by the permittee.

Based on the distance from the project site to this property and ENPRO's interpretation that this property is located hydrogeologically cross-gradient, it is our opinion that this site does not represent a *recognized environmental condition* expected to negatively impact the project site. Moreover, no records of a release of hazardous materials and/or petroleum products were identified in the regulatory files for this facility.

2) Pacific Rim Environmental Resources, LLC, 91-310 Hanua Street

- A Solid Waste Management Permit issued on June 6, 2008 for a commercial and household waste transfer station. The permit was terminated on September 1, 2010 as requested by the permittee. Apparently, the facility was never constructed and/or operated at the site.

Based on the distance from the project site to this property and ENPRO's interpretation that this property is located hydrogeologically cross-gradient, it is our opinion that this site does not represent a *recognized environmental condition* expected to negatively impact the project site. Moreover, no records of a release of hazardous materials and/or petroleum products were identified in the regulatory files for this facility.

3) Eco-Feeds, 91-310 Hanua Street

- A Solid Waste Management Permit issued on April 25, 2011 and scheduled to expire on April 24, 2016. It is currently in operation to consolidate and transfer food waste.

Based on the distance from the project site to this property and ENPRO's interpretation that this property is located hydrogeologically cross-gradient, it is our opinion that this site does not represent a *recognized environmental condition* expected to negatively impact the project site. Moreover, no records of a release of hazardous materials and/or petroleum products were identified in the regulatory files for this facility.

4) Storage Services, 91-567 Nukuawa Street

- A Solid Waste Management Permit issued on July 17, 1995 for disposal of derelict and damaged cars, including processing of vehicles at the facility.
- The DOH revoked the permit on August 14, 2000 due to violations issued in 1998 and not addressed by the permittee.
- The Storage Services facility was closed on December 6, 2002 after removal of materials and petroleum contaminated soil from the site.

Based on the distance from the project site to this property and ENPRO's interpretation that this property is located hydrogeologically down-gradient, it is our opinion that this site does not represent a *recognized environmental condition* expected to negatively impact the project site.

5) Sun Home Metal, 91-567 Nukuawa Street

- Several letters and reports were identified in the regulatory files. According to the documents reviewed, Sun Home Metal operated a metal processing and recycling facility at the site from 1996 to 2005. Their operations consisted of sorting, separating, packaging and transportation of scrap metal. Several surface soil sampling events were conducted from 1996 to 2008 by various consultants. The results of these sampling events indicated elevated concentrations of arsenic, chromium, lead PCBs, TPH-oil and benzo(a)pyrene in the surface soil at the site. The most recent environmental sampling activities at the site were conducted in 2008 by Environet, Inc. The results of the soil sampling activities indicated elevated concentrations of benzo(a)pyrene, lead and PCBs in the top layer soil (0 to 12 inches bgs). The results of the groundwater sampling did not indicate contaminants of concern above the site screening levels. The contaminated soil was over excavated and removed from the site for proper disposal in 2008. The DOH reviewed

the Removal Action Report prepared by Environet, Inc, dated October 2008 and closed the site on January 8, 2009.

Based on the distance from the project site to this property and ENPRO's interpretation that this property is located hydrogeologically down-gradient, it is our opinion that this site does not represent a *recognized environmental condition* expected to negatively impact the project site. Moreover, the contaminated soil was over excavated and removed from the site and the clean-up was approved by the DOH.

6) Perry Management Corporation, 91-567 and 91-599 Nukuawa Street

- A Solid Waste Inspection Report dated April 5, 2011 documented the findings of an April 4, 2011 inspection. The inspection was performed in response to a complaint of an unpermitted transfer station at the facility. The report indicated that DOH-SWS inspectors observed stockpiles of construction and demolition waste, mattresses, discarded white goods, appliances and used lead acid batteries. The report indicated the following potential violation:
    - "Solid waste brought back to facility, unloaded onto ground and consolidated into larger bins- operation of an unpermitted transfer station."
- An April 13, 2011 warning letter from the DOH to Perry Management Corporation stating that a permit with the DOH-SWS was required to operate a solid waste management system; however, during the April 4, 2011, DOH-SWS inspectors observed solid waste management activities onsite without a permit. The letter required the removal of all accumulated solid waste and that the facility cease acceptance of additional solid waste.
- A May 20, 2011 letter from Perry Management Corporation to the DOH stating that the construction and demolition waste, mattresses, white goods, appliances and used lead acid batteries had been removed from the property.
- A Solid Waste Inspection Report dated June 3, 2011 documenting the findings of a May 26, 2011 inspection. The inspection was performed as a follow-up to the April 4, 2011 inspection. The report stated that no waste was observed at the property and no violations were indicated.

Based on the distance from the project site to this property and ENPRO's interpretation that this property is located hydrogeologically down-gradient, it is our opinion that this site does not represent a *recognized environmental condition* expected to negatively impact the project site. Moreover, the solid wastes were removed from the site as confirmed by a follow-up DOH-SWS inspection.

7) Hawaii Raceway Park, 91-201 Malakole Street

- Several documents dated from 2005 to 2009 expressing DOH-SWS's concern regarding the facility due to complaints that house demolition, construction debris, electrical transformers, tires and batteries had been buried at the site causing soil contamination at the facility. The documents indicated that although several investigations were conducted at the site since 2005, test pits and exploratory trenching were going to be conducted sometime in 2009 in response to the complaint.

Based on the distance from the property and our interpretation that it is located hydrogeologically cross-gradient, it is ENPRO's opinion that any *recognized environmental conditions* are not expected to impact the project site.

7.2.2 DEPARTMENT OF HEALTH, HAZARD EVALUATION AND EMERGENCY RESPONSE (HEER) OFFICE

Based on our review of the EDR regulatory database search report, we requested the following regulatory files from the State of Hawaii Department of Health (DOH), Hazard Evaluation and Emergency Response (HEER) Office:

- Kalaeloa Barbers Point Harbor, Kapolei
- Texaco Malakole Street, Pipeline Excavation at Malakole Street
- Barbers Point Harbor Pier 5
- Honsador, 91-151 Malakole Street
- 91-063 Malakole Street
- 91-127 Malakole Street
- 91-505 Awakumoku Street
- 91-567 Nukuawa Street
- 91-325 Komohana Street
- 91-543 Nukuawa Street
- 91-522 Nukuawa Street
- 91-343 Kaiholo Street
- 91-515 Nukuawa Street
- Hawaiian Western Steel Dump, Hanua Street and Malakole Street

- 91-480 Malakole Street
- 91-201 Malakole Street
- 91-310 Hanua Street

The HEER Office provided the following:

1) **Marisco Shipyard, 91-607 Malakole Street**

- An October 16, 1995 release notification report stating the following: "Sandblasting boat bottoms, accumulation of old paint and thinner cans rusting out on ocean site, TBT bottom paint from sandblasting and lead entering ocean". The document indicated that *no further action* was required by the HEER Office.
- An August 4, 1997 release notification report stating the following: "Copper piping, which had been cut from a ship under repair and placed aside, was stolen. The pipe was covered with asbestos insulation and contained PCBs". The document indicated that *no further action* was required by the HEER Office.
- A September 14, 1997 release notification report stating the following: "US Coast Guard issued a $2,000 Notice of Violation for discharging oil into the water and failing to bolt the connection of the transfer hose. Coast Guard is responding to an 8pm spill 9/13. At scene 9 pm". The document indicated that *no further action* was required by the HEER Office.
- An August 20, 1999 release notification report stating the following: "Forklift fell into water on 8/20/99 at 11:15 am". The document indicated that *no further action* was required by the HEER Office.
- A May 21, 2003 release notification report stating the following: "Vessel releasing bilges into water all morning into harbor. Appear to be deballasting some type of tank. Oily material gold color". The document indicated that *no further action* was required by the HEER Office.
- An August 24, 2004 release notification report stating the following: "Diesel fuel spill less than five gallons, due to valve alignment. Clean-up completed using absorbent pads and boom. Coast Guard will visit area". The document indicated that *no further action* was required by the HEER Office.

It is our opinion that the vessel maintenance and repair activities conducted by Marisco LTD at the project site combined with the history of documented releases indicate evidence of a *recognized environmental condition* in connection with the project site.

2) **Kalaeloa Barbers Point Harbor, Pier 5**

- A Release Notification form indicating that an oil sheen was observed at Pier 5 on March 12, 1996. The source was unknown and the sheen dissipated with on-scene weather conditions.
- A Release Notification form indicating that an oil film in a water box leaked out from the seal in the valve box and onto the water under Pier 5 on March 3, 1996, due to a missing plug on the bottom of the valve box. The sheen was removed from the surface water the same day.
- A July 22, 1997 "Written Follow-Up Notification" letter from Aloha Petroleum to the DOH HEER Office indicating the release of product discovered during excavation for a new pipeline constructed for Aloha Petroleum and Texaco Refining and Marketing Inc. at Barbers Point Harbor Pier 5. The stained soil was over excavated for off-site disposal. A discontinuous, thin layer of free product was reported on groundwater. The source(s) of the release were interpreted to be oil pipeline(s) not associated with the Texaco/Aloha pipeline under construction or other Texaco/Aloha pipelines.
- An October 1998 Release Response and Baseline Soil Sampling Report at Pier 5, Barbers Point Deep Draft Harbor, prepared by Walker Consultants, Ltd. This report documented petroleum hydrocarbon impacts encountered within the valve box excavation in June 1997 during the installation of underground pipelines in the vicinity of Pier 5 of Barbers Point Deep Draft Harbor. The petroleum seeping into the valve box excavation was identified in the field as a heavy, tarry oil, similar to Bunker-C oil. Since Texaco had only used gasoline and middle distillates in its pipelines at the harbor, and Aloha had never used pipelines in the harbor, the suspect Bunker-C oil was determined to be unrelated to Texaco's and Aloha's pipelines, and its presence was indicated to be a pre-existing condition at the valve box. The report indicated that the valve box excavation was not enlarged more than was necessary to construct the concrete valve box, because the Bunker-C oil was not related to a release from Texaco's or Aloha's pipelines, and Texaco and Aloha were not responsible for its remediation. The suspect Bunker-C oil continued to seep into the valve box excavation until it was backfilled. The TPH-oil and TPH-diesel concentrations in the impacted stockpile soil samples were greater than the DOH Tier 1 soil action levels (SALs), but the PAHs were less than the Tier 1 SALs. The excavation surrounding the new valve box was backfilled with the impacted soil, based on the rationale that, if imported clean backfill soil had been used it would have been contaminated subsequently by subsurface free product seepage. No oil seeps, soil discoloration, or hydrocarbon odors were observed in the Aloha or Texaco

pipeline excavations. Twenty-one soil samples were collected within the pipeline excavations and the TPH-diesel concentrations in ten samples ranged from 10.9 to 63.2 mg/kg. The encountered concentrations of TPH-diesel within the pipeline excavations were determined to be indicative of baseline conditions in the new Aloha and Texaco pipeline areas.

- A Release Notification form indicating that an unknown sheen was observed in Barbers Point Harbor on October 9, 2001.
- A Release Notification form indicating that a hydraulic cylinder exploded on January 15, 2002, due to high pressure. Less than one gallon of hydraulic fluid spilled into the water.
- A January 24, 2003 from Smith Maritime to the DOH HEER Office reporting that on January 15, 2003 approximately one gallon of JET A fuel overflowed into the harbor water from barge NOEAU while loading fuel in Barbers Point Harbor from the Tesoro refinery. Most of the spilled fuel was recovered from the harbor.
- A January 6, 2004 letter from Tesoro to the DOH reporting "minor patches of sheening were discovered between the pier and Huimana" on December 28, 2003. The source was unknown but suspected to be related to heavy rain showers, which could have washed residual oil from the pier deck into the water. Sorbent pads were used to clean up the sheen and the valve box was vacuumed out.
- Interim Release Response Report prepared by Clayton Group Services, Inc., dated August 8, 2005 documenting the release response activities for removal and mitigation of an Industrial Fuel Oil 380 (IFO) release at Pier 5. The release was discovered on January 21, 2005, when an oily sheen was observed at the Pier 5 and was classified as a mystery spill by the US Coast Guard. On January 24, 2005, during a barge loading operation, a sheen was observed and a series of subsequent testing of the IFO supply pipeline confirmed that a release had occurred. The source of the release was repaired. Approximately 30 barrels of IFO were released from the IFO supply line. Release recovery activities included the use of booms to capture IFO released from the storm drain to the harbor, pressure washing the pier columns, excavating IFO-impacted soil from the recovery pits, and using a vacuum truck to remove free product from the surface of the groundwater in Pits 3 and 4 for transport and recycling at the Tesoro refinery. Impacted soil was excavated for off-site disposal. However, IFO remained in the subsurface as a thin coating on the lower walls of Pits 3 and 4, as free product on the groundwater surface near Pits 3 and 4, and as free product near the 36-inch diameter RCP storm drain. The report recommended further characterization/delineation of the IFO in soil and groundwater, and

development of alternatives to mitigate the IFO and prevent migration to the storm drain and harbor.

- A September 29, 2005 incident report indicating a release of approximately 1,000 liters of diesel into the harbor on September 29, 2005 from a vessel due to equipment failure. The document stated that the release was contained.

It is our opinion that the presence of petroleum underground pipelines at the project site (Pier 1) represents a material threat of a release with the potential to negatively impact the project site. Furthermore, the documented history of petroleum releases onto the ground and water at the project site indicates evidence of a *recognized environmental condition* in connection with the project site.

3) Texaco, Inc., Malakole Street Pipeline Excavation

- A July 10, 1996 release notification report stating that CorePro, Texaco's contractor, discovered soil contamination while taking core samples along the pipeline. The cause was indicated to be an existing Chevron Refinery free product plume of petroleum hydrocarbon. The document indicated that a *no further action* status was issued by the HEER Office on November 8, 1996.
- A DOH Site Screening Checklist dated October 6, 1998 ranked the site as a "Low Priority Site" and recommended *no further action* for the "Malakole Street Pipeline Excavation". The "Malakole Street Pipeline Excavation" was located on the north side of Malakole Street, southeast of Kaiholo Street. The following justification for the ranking was reported: "Free product was discovered during pipeline maintenance/restoration activities. The free product consisted of gasoline and diesel. The pipeline was covered with a tar/asbestos coating which deteriorated with contact with the free product. Free product, impacted soil and groundwater, and the asbestos containing pipeline coating were removed from the pipeline excavation and disposed of properly. The pipeline was tested tight. The free product encountered in the excavation is probably part of the free product plume originating from the Chevron refinery. The free product plume from the Chevron refinery has been delineated and extends through Malakole Street and the Texaco pipeline excavation. Consequently, soil and groundwater contamination was not delineated beyond the pipeline excavation by Texaco".
- A December 18, 2009 letter from Tesoro Hawaii Corporation to the DOH notifying the DOH of an oily groundwater observed at Malakole and Hanua Streets on November 20, 2009. According to the letter, Tesoro pipeline personnel observed some oily groundwater while conducting routine preventive maintenance and excavation work at Malakole and Hanua Streets.

The underground fuel oil pipeline was inspected and no indication of a confirmed release from this pipeline segment was indicated.

It is our opinion that the existing Chevron Refinery free product plume of petroleum hydrocarbon extending through Malakole Street, southeast of Kaiholo Street, indicates evidence of a *recognized environmental condition* with the potential to have negatively impacted the project site.

4) Chevron, 91-480 Malakole Street

- A Federal On-Scene Coordinator's Report for a Chevron Pipeline Failure impacting the Middle Loch Pearl Harbor summarized the events that took place between May 13, 1987 and June 29, 1987. According to the report, over 104,000-gallons of JET A fuel oil impacted Pearl Harbor due to a pipeline leak at Chevron Refinery in Barbers Point.
- A December 8, 1995 DOH News Release indicating that the DOH completed air monitoring to investigate a "bad odor" reported by Barbers Point neighbors and no evidence of public health hazard was encountered.
- A December 29, 1995 letter from Chevron to the DOH, Clean Air Branch reporting that the Chevron Refinery had visible emissions on December 6 and 7, 1995 which exceeded certain opacity requirements. The staff took corrective measures to secure the operations, notify agencies, obtain monitoring data, inform and visit the neighbors, and assist in response actions at Barbers Point Elementary as requested by the school. The monitoring and analysis concluded that the smoke from the refinery did not adversely impact the Barbers Point Elementary School.
- An October 21, 1998 letter from Sierra Club, Hawaii Chapter to the DOH requesting that the DOH consult the environmental community regarding the environmental restoration efforts on the 1998 Chevron acid spill.
- Several notifications of hazardous substances emissions and oil releases, dating from 1998 to 2011 were observed on file.

It is our opinion that the presence of the Chevron Refinery in the vicinity of the project site and numerous reported oil releases from the facility represent a *recognized environmental condition* with the potential to have negatively impacted the project site.

5) Tesoro Hawaii Corporation, 91-325 Komohana Street

- A January 8, 1985 EPA Preliminary Report of Hawaiian Independent Refinery Inc. at 91-352 Komohana Street stated that the facility was actively operating since about 1970 as a petroleum refinery and generating API separator sludges, some leaded tank waste, liquids containing antimony from bottom sludges, process waste containing monoethanolamine and other tank bottom sludges. No incidents directly related to hazardous wastes were indicated.
- A January 8, 1985 Contact Report from the DOH to Pacific Resources Inc. The report indicated that the facility, owned and operated by the Hawaiian Independent Refinery Inc. was a subsidiary of Pacific Resources Inc. The primary function of the facility was the refining of crude oil into petroleum products. The facility also collected waste oil which was recycled and reprocessed at the refinery until about December 1984. The report stated that no known enforcement action had ever been taken against the facility.
- An EPA Case Development Notes on an EPCRA Section 313 records inspection conducted on April 20, 1989 stated that the facility did not report on the formation of byproduct sodium sulfate, a Section 313 listed chemical, produced from neutralization of sulfuric acid. On May 31, 1989, the facility submitted the required Form R to EPA and to the State showing the release of 2,048,700 pounds of sodium sulfate to underground injection.
- A November 23, 1995 fax sent from BHP Hawaii Inc. to the DOH Clean Air Branch notifying excess sulfur dioxide emissions at BHP Petroleum Americas Refining Inc. on November 21, 1995.
- An Incident Investigation Report prepared by BHP Hawaii, dated December 1, 1995 describing the shutdown of sulfur units by BHP Hawaii on November 21, 1995. The cause of the incident was found to be liquid carryover from the SCOT stripper tower T-1393, coupled with a malfunctioning pump P-1382A.
- A November 30, 1995 memorandum prepared by Terence Corpus (On-Scene Coordinator) regarding a field trip report for air monitoring around BHP refinery conducted on November 22, 1995. The results of the air monitoring indicated concentrations of sulfur dioxide well below action levels. Mr. Corpus recommended a long term air monitoring program be established by the Clean Air Branch.

- A December 6, 1995 from Bruce Anderson to George Bates, BHP Hawaii stated that, as a result of the Chevron incident, numerous inquiries from the press had been received.
- A Corrective Measures Study Report for the Tesoro Hawaii Refinery prepared by QST Environmental Inc. dated February 1999 indicated that corrective measures had been taken for arsenic-impacted soil at the site. Contaminated soil was excavated and disposed off-site in July 1997. The report also indicated the presence of free product on the surface of underlying groundwater, which was being addressed by Tesoro for several years. Free product was reported to be confined within the facility boundaries and the plume was stable.
- A Corrective Measures Implementation Report for the Free Floating Product Plume at Tesoro Hawaii Corporation Refinery prepared by Theodore Metrose dated January 2003. The report stated that on June 21, 1993, EPA Region 9 and BHP Petroleum Americas Refining Inc. entered into a Corrective Action Consent Agreement and Final Order, which required that the following three corrective actions be executed:
    - RCRA Facility Investigation
    - Corrective Measures Study
    - Corrective Measures Implementation

  The corrective actions were originally triggered because the refinery had previously operated three waste water treatment ponds under RCRA interim status which had to be closed. The ponds were closed and capped with asphalt. Post closure monitoring of the groundwater surrounding the surface impoundments was ongoing. The facility investigation indicated that further investigation was needed for:
    - Ten solid waste management units
    - Six areas of concern (AOCs)
    - A plume of free floating product (weathered diesel) beneath the refinery

  The contaminants identified were not similar to nor attributed to the operation of the surface impoundments, however, cleanup of the entire facility was required. Two of the areas of concern (Fire Training Area and a portion of the miscellaneous materials staging area) had arsenic contaminated soil which had been excavated and disposed off-site. The following corrective measures had been implemented to address the free product plume:

    - In September of 1996 Dames and Moore prepared a report summarizing the free product management program. Well data was reviewed and recovery test were conducted. The free floating hydrocarbon was characterized as weathered diesel containing comparatively little residual VOCs.
    - A short-term remediation test involving a number of different technologies was completed in June 1997.
    - A free product/tidal study was conducted to determine the influence of the tide on the flow of groundwater and the impact on the free product plume. In addition to reviewing historical data, an intensive sampling effort was conducted during a three day period in December of 1998.
    - Six additional groundwater monitoring wells were drilled and installed in January 1999, within the refinery's central processing area.
    - The extent and the size of the plume were further delineated by level sampling the new and previously installed wells. The plume did not appear to extend beyond the refinery property lines and its maximum thickness appeared to be 1.2 feet.
    - Models estimated the amount of the free product as between 240,000 and 340,000 gallons.
    - As of March 2001, nearly 5,700 gallons of oil was recovered from monitoring well BHP-MW8.
    - Fifteen additional wells were drilled in June of 2001 to further delineate the plume. Ten of the wells were equipped with a recovery system.
    - As of December 31, 2002, 50,275 gallons of oil and water had been recovered.

  No other documents regarding the progress of the Corrective Measures Implementation for the free floating product plume at Tesoro Hawaii Corporation Refinery were observed on file.
- Several notifications of hazardous substances air emissions and oil releases, dating from 1995 to 2012 were observed on file.

Based on the distance from the property and our interpretation that it is located hydrogeologically cross-gradient, it is ENPRO's opinion that any *recognized environmental conditions* are not expected to impact the project site. Furthermore, the documentation

states that the petroleum plume is stable and confined within the Tesoro's property boundaries.

6) Hawaiian Dredging and Bank of Hawaii, 91-063 Malakole Street

- A February 18, 1992 Preliminary Site Investigation for Boiler Fuel Tank System Closure documenting the condition of soils in the pit following the excavation and removal of one underground storage facility. The tank had been used to store fuel oil #5 for a boiler. During excavation, field measurements using photoionization device (PID) detected organic vapors above background levels. Soils in the underground storage facility pit had a slight hydrocarbon odor but no visual evidence of staining. Soils in the excavation trench were stained and a slight hydrocarbon odor was noticeable. Laboratory analyses of soils collected from the pit revealed levels of total petroleum hydrocarbons (TPH) as diesel. Groundwater was not encountered. The report recommended further site assessment to establish the extent of contamination of soil by TPH as diesel.
- A May 6, 1997 letter from the DOH to Hawaiian Dredging & Construction Co. regarding a January 28, 1997 Hazardous Waste Compliance Evaluation Inspection conducted at the facility. The letter stated that areas of non-compliances had been identified and the facility adequately addressed the violations.
- A November 2, 1999 letter from the DOH to Hawaiian Dredging & Construction Co. stating that a *Preliminary Site Survey for UST System Closure* dated August 1, 1989 and prepared by Unitek Environmental Consultants, Inc. and an *Environmental Assessment, Hawaiian Dredging & Construction* dated October 23, 1989 and prepared by Muranaka Environmental Consultants, Inc. had been reviewed by the DOH. The letter stated that no further action was necessary in response to the release associated with the closure of the UST.
- A November 2, 1999 letter from the DOH to Hawaiian Dredging & Construction Co. stating that a *Site Characterization Report, Hawaiian Dredging & Construction* dated January 19, 1994, and prepared by Brewer Environmental Services had been reviewed by the DOH. The letter stated that no further action was necessary in response to the release associated with the closure of the UST.
- A June 16, 2000 letter from the DOH to Hawaiian Dredging & Construction Co. regarding a May 1, 2000 Hazardous Waste and Used Oil Compliance Evaluation Inspection conducted at the facility. The letter stated that no deficiencies had been noted during the inspection.

- An April 4, 2001 letter from the DOH to Hawaiian Dredging & Construction Company in response to a release of petroleum reported on March 16, 2001. The release was discovered during an investigation for real estate transaction at the facility. The letter required investigation and clean-up of the release.
- Chemical inventory Tier II forms dated from 2003 to 2007 indicated the presence of fuel oil #2 at the property.
- A March 5, 2003 letter from Hawaiian Dredging to the DOH stating that Hawaiian Dredging had merged with and into Hawaiian Construction Company, Inc.
- Several letters and reports in the regulatory files indicated that in December 20, 2001, the Bank of Hawaii (which acquired the property by a deed in lieu of foreclosure) and the DOH entered into a Voluntary Response Program (VRP) agreement for Komohana Park to conduct further site assessment work to assess soil and groundwater contamination at the site, to evaluate potential risks to human health and the environment, evaluate remedial alternatives, and to develop an appropriate response action for the site. The voluntary cleanup response actions and the agreement were limited to four areas: a former 1,000-gallon waste oil tank area, a former hydraulic shear area, an equipment repair yard area and a petroleum stained soil area. Several investigations including soil and groundwater sampling were performed at the site and after review of sampling results, the DOH indicated that no additional action was necessary for all but one of the areas of concern – the former 1,000-gallon waste oil tank area. Although the leaking UST had been removed, free product remained and appeared to be confined to a small area at groundwater monitoring well MW-2. This well was positioned at the approximate location of the former 1,000-gallon waste oil tank. The contaminants of potential concern (COPCs) associated with the free product floating in MW-2 were lead, TPH, trichloroethylene (TCE), polynuclear aromatic hydrocarbons (PAHs), and benzene, toluene, ethylbenzene and xylenes (BTEX). Results from several groundwater monitoring events conducted from 2001 to 2004 indicated the free product appeared to be stable and not migrating nor increasing in size. The proposed remedy for the site was institutional controls that limit conditions of access, conditions of building and excavation permits and of implementing an Operations and Maintenance (O&M) Plan. The DOH agreed with the proposed remedy and issued a Letter of Completion on June 30, 2008.

Based on the distance from the project site to this property and ENPRO's interpretation that this property is located hydrogeologically cross-gradient, it is our opinion

that this site does not represent a *recognized environmental condition* expected to negatively impact the project site.

7) Horizon Waste Services of Hawaii, Inc., 91-310 Hanua Street

- A November 12, 1999 release notification of a spill of hydraulic oil at Rogers Boulevard.
- A May 29, 1998 notification of a BFI truck fire.
- Chemical inventory Tier II forms dated from 1993 to 2001 indicated the presence of diesel fuel #2, gasoline, motor oil 40 WT, and Unax AW 68 hydraulic fluid at the property.
- Chemical inventory Tier II forms dated 1990 and 1991 indicated the presence of diesel fuel #2 at the property.

Based on the distance from the project site to this property and ENPRO's interpretation that this property is located hydrogeologically cross-gradient, it is our opinion that this site does not represent a *recognized environmental condition* expected to negatively impact the project site.

8) AAA Island Environmental, 91-515 Nukuawa Street

- An October 28, 1998 Release Notification form indicating the abandonment of waste onsite.
- A November 20, 1998 Memorandum regarding a release investigation at the AAA site. The document stated that the DOH SHWB Hazardous Waste Section (HWS) requested assistance from the HEER Office to address the abandonment of oil drums in a shipping container onsite by AAA. The HEER Office conducted an investigation of the site on November 2, 1998. Twenty-four 55-gallon drums and 140 five-gallon containers were removed from the shipping container and sampled by the DOH SHWB HWS. The document stated that there was no release that would deem the situation an imminent and substantial endangerment to human health and the environment, and proper removal and disposal of the drums was recommended.

Based on the distance from the project site to this property and ENPRO's interpretation that this property is located hydrogeologically down-gradient, it is our opinion that this site does not represent a *recognized environmental condition* expected to negatively impact the project site.

9) Honsador Lumber Corporation, 91-151 Malakole Road

- Chemical inventory Tier II forms dated 1993 to 2008 indicated the presence of diesel fuel and liquid propane gas at the property.
- The regulatory records indicated that in October 14, 2004, Honsador Lumber LLC, Honsador Holding LLC, Honsador Group LLC and the DOH entered into a Voluntary Response Program (VRP) agreement for the Honsador Lumber facility to address contamination at the property. The VRP Agreement established the site-specific contaminants and contaminated media for the Honsador Lumber Facility. The VRP contaminated media at the Honsador Lumber Facility were soil and groundwater. The VRP Agreement contaminants for the site were:
    - Free-phase petroleum product (gasoline, diesel, oil).
    - Total Petroleum Hydrocarbons (TPH):
        - TPH as diesel (TPH-D);
        - TPH as gasoline (TPH-G);
        - TPH as oil (TPH-O).
    - Benzene, toluene, ethylbenzene and xylenes (BTEX).
    - Polynuclear aromatic hydrocarbons (PAHs):
        - Acenapthene;
        - Benzo(a)pyrene;
        - Fluoranthene;
        - Naphthalene.
    - Chlorinated solvents.
    - Chromium.
    - Hexavalent chromium.
    - Arsenic.
    - Copper.
    - Zinc.
    - Dioxins/furan (Dioxins).
    - Pentachlorophenol.

  Five primary Areas of Interest were defined for the Honsador Lumber Facility:

- Maintenance Area – An area of former equipment storage and repair and waste oil storage, located at the northern end of the site at the west end of Warehouse A.
- Former Underground Storage Tank (UST) Area – An area formerly containing a 2,000-gallon and a 4,000-gallon gasoline UST (removed in 1992) and a 10,000-gallon diesel UST (removed in 1998), located along the western property boundary, directly across from Warehouse B.
- Chem-Wood Fence Line Area – A 10-foot-wide area at the fence line at the eastern boundary of the site running from the southern end of Warehouse B to the drainage swale at the southern boundary of the property where wood treatment chemicals spilled from the adjacent Chem-Wood property and entered the Site.
- Lumber Storage Area – Essentially the southern half of the site, excluding Warehouse C, where bulk lumber is stored. The Lumber Storage Area is further subdivided into two subareas:
  - Paved Lumber Storage Area – The entire Lumber Storage Area excluding seven, 20-foot-wide rows of unpaved open soil used to store and stack lumber.
  - Unpaved Lumber Storage Area – Seven, 20-feet-wide by 200-feet-long rows of unpaved open soil where lumber is stacked and stored.
- Warehouses – Two borehole locations, one located between Warehouses A and B and one located near Warehouse C (Figure 5). The two boreholes were drilled to allow collection of soil and groundwater samples so subsurface conditions could be evaluated in these two areas.

Several reports documenting the activities conducted to comply with the VRP program were reviewed. In summary, four of the five Areas of Interests at the Honsador Lumber Facility contained the following VRP Chemicals of Concern at concentrations exceeding their respective EALs:

- Maintenance Area.
  - *Soil*
    - TPH-O
  - *Groundwater*
    - None

- Former UST Area.
  - *Soil*
    - None
  - *Groundwater*
    - None
- Chem-Wood Fence Line Area.
  - *Soil*
    - Arsenic
    - Copper
    - Dioxin (exceeds the new [June 2010] EAL)
    - Chromium (exceeds background levels)
    - Cr^{+3} (for terrestrial ecological concerns only)
  - *Groundwater*
    - Copper
    - Cr^{+6}
    - Pentachlorophenol
- Lumber Storage Area.

  <u>*Paved Lumber Storage Area*</u>
  - *Soil*
    - Arsenic
  - *Groundwater*
    - None

  <u>*Unpaved Lumber Storage Area*</u>
  - *Soil*
    - Arsenic
    - Copper (for terrestrial ecological concerns only)
  - *Groundwater*
    - None
- Warehouses.

  <u>*Warehouse A*</u>
  - *Soil*
    - None

- *Groundwater*
  - Copper

Warehouse C

- *Soil*
  - None
- *Groundwater*
  - Copper
  - Cr^{+6}

The proposed remedy for the site was institutional controls. The DOH agreed with the proposed remedy and issued a Letter of Completion on February 27, 2012.

Based on the distance from the project site to this property and ENPRO's interpretation that this property is located hydrogeologically cross-gradient, it is our opinion that this site does not represent a *recognized environmental condition* expected to negatively impact the project site.

10) Hawaii Raceway Park, 91-201 Malakole Road

- A June 18, 1991 Release Notification form indicating an anonymous report of intentional dumping of oil and battery acid. The HEER Office investigated the property and could not find any sign of spill.
- Several documents dated 1992 expressing the HEER Office's concern regarding the facility due to historical dumping of hazardous wastes at the facility.
- An April 23, 1992 Release Notification form indicating potential dumping and storage of hazardous materials at the property. The report stated that "various suspected businesses, past and present, have either dumped or stored suspected materials on site. Materials included road surfacing materials, sandblasting material, racing fuel containing carcinogens and sold as Senoco Race Gas."
- An October 5, 1992 DOH Memorandum to the Office of State Planning (OSP), Land Use Division regarding a Preliminary Assessment for the Hawaii Raceway Park completed by the HEER Office. The document stated that no further investigation was planned for the site under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980 and the Superfund Amendments and Reauthorization Action (SARA) of 1986. However, the document recommended that OSP

obtain further characterization of the site through soil sampling and analysis before development of the site.

- A May 15, 1995 HEER Office Summary of the Preliminary Assessment conducted by the HEER Office in June 1992 indicated that the site was used by Pepper Industries, Inc. as a site for the disposal of waste water from the Navy's Defense Property Disposal Service. In 1983, Pepper Industries disposed of 85,064 gallons of bilge water which was tested and found to contain between 1 and 10 ppm of mercury. In 1984, Pepper Industries disposed of 79,326 gallons of waste water possibly contaminated with heavy metals, organic compounds and other hazardous waste. Prior to 1974, waste oil was sprayed on the site for dust control. Two wells, located 2.3 and 3.5 miles away serve as drinking water source wells. The likelihood of exposure via surface water, soil contact or air releases is low for the environment, human population and the food chain. In January of 1986, the EPA sampled soils at Campbell Industrial Park and no hazardous levels of lead or mercury were reported.
- A Phase 1 ESA, a Work Plan, a Phase II ESA (all prepared by Professional Service Industries, Inc.) and several letters dated 2006 were available for review. The Phase II ESA, dated September 25, 2006 (also prepared by Professional Service Industries, Inc.) is summarized below:

  The Phase II ESA was designed to assess soil and groundwater impacts from previous site uses and practices, including: (1) spraying of bilge water and waste oil for dust control, (2) use of the site for various motor sports, (3) operation of maintenance shops and a paint booth, (4) various materials storage, (5) a vehicle holding area, (6) reported on-site disposal of sand blast grit, and (6) complaints of improper disposal of various hazardous materials.

  A multi-increment sampling approach was utilized to address site soils. Twelve decision units were identified and soil samples from each were analyzed for TPH as gasoline, diesel, and motor oil, semi-volatile organic compounds (SVOCs), Resource Conservation and Recovery Act (RCRA) (8) metals, and polychlorinated biphenyls (PCBs). Five groundwater monitoring wells were installed and groundwater samples were analyzed for volatile organic compounds (VOCs), TPH as gasoline, diesel, and motor oil, SVOCs, RCRA 8 metals, and PCBs. Analytical results indicated that no COCs, as listed above, were identified in groundwater and no COCs were identified in soil at concentrations greater than the HDOH Environmental Action Levels (EALs) for *"Groundwater IS NOT Current or Potential Source of Drinking Water"* and *">150m to Surface Water Body."* The DOH

HEER Office issued a *No Further Action* (NFA) letter for the site on November 29, 2006.

Based on the distance from the property and our interpretation that it is located hydrogeologically cross-gradient, it is ENPRO's opinion that any *recognized environmental conditions* are not expected to impact the project site. Furthermore, the documentation states that the identified contamination was properly addressed and a NFA status was issued for the identified release.

11) Sun Home Metals, 91-567 Nukuawa Street

- The regulatory records indicated that in in September 2008 Cook Inlet Region, Inc. (CIRI) Land Development Company (CLDC) and the DOH entered into a Voluntary Response Program (VRP) agreement for the Sun Home Metals facility to address contamination at the property. The VRP Agreement established the site-specific contaminants and contaminated media for the Honsador Lumber Facility. The VRP contaminated media at the facility was soil. The VRP Agreement COCs for the site were:
    - TPH as diesel;
    - The four DOH-listed PAHs - acenaphthene, benzo(a)pyrene, fluoranthene, and naphthalene;
    - lead, chromium, and arsenic; and
    - PCBs

  According to documents on file, operations at the site date back to 1877, when it was purchased by James Campbell for ranching purposes. In 1941, the United States Government acquired the property and adjacent properties as part of a land exchange, and later developed the area as Camp Malakole Military Reservation. The military activities included troop training and support, artillery, motor support, and military administration. These activities continued until closure in 1947. The parcel remained relatively undeveloped until CLDC purchased the property in 1983. The last tenant of the property, prior to the VRP agreement, was Sun Home Metals, Inc., a metal processing and recycling operation. Their operations consisted of sorting, separating, packaging, and transportation of scrap metal. In 2004, Sun Home Metals, Inc. ceased their operation and vacated the site. Several surface soil sampling events were completed from July 1996 through July 2004 by various environmental consultants. From these events, laboratory analysis confirmed that the concentrations of several target analytes including TPH, benzo(a)pyrene, arsenic, chromium and lead were greater than the United States Environmental Protection Agency (EPA) Region 9 Preliminary

Remediation Goals (PRGs) and DOH Soil Action Levels (SALs). However due to the moving activities during the closure of Sun Home Metals, Inc. in 2004, surface soils at the site were widely disturbed. As a result, previous sampling events and locations were no longer representative of the site conditions and target analyte levels. Therefore, in 2007, Environet conducted a Phase II investigation of the site, with a follow-up groundwater investigation in 2008. The 2007 Environet Phase II investigation indicated that the primary COCs for the site were benzo(a)pyrene, lead, PCBs and TPH as diesel. The impact to the site's soil was reported to be limited to the top layer of imported fill (0 to 12 inches). The 2008 Environet follow-up groundwater investigation concluded that there were no environmental groundwater concerns at the site for TPH as diesel, PCBs, PAH, and lead. A 2008 Removal Action Report indicated that all contamination was removed to below commercial/industrial levels. The DOH approved the remedy and issued a Letter of Completion on January 7, 2009.

Based on the distance from the property and our interpretation that it is located hydrogeologically down-gradient, it is ENPRO's opinion that any *recognized environmental conditions* are not expected to impact the project site. Furthermore, the documentation states that the identified contamination was properly addressed and a Letter of Completion was issued for the site.

12) Hawaiian Western Steel Dump, Hanua Street and Malakole Street

- Several documents were available for review. According to the documents on file, from 1960 to 1991, Hawaiian Western Steel, Ltd. operated an electric arc furnace at its plant site at 91-150 Hanua Street in the Campbell Industrial Park. The plant melted scrap steel to produce reinforcement steel bars for the construction industry. Wastes generated from the plant, consisting mainly of slag and fly ash, were disposed of primarily in two dump sites in the vicinity of the plant. One of the dumps is on the beach just west of the plant, and the other is the Hawaiian Western Steel Dump Site #1 which is north of the plant at the intersection of Hanua and Malakole Streets. The EPA Region IX Emergency Response Section (ERS) and the Technical Assistance Team (TAT) investigated all three areas of concern. Sampling conducted by TAT indicated that lead and cadmium contamination had migrated from the plant site through a drainage channel to the ocean, causing high levels of lead in fish tissue samples. There was also concern for lead and cadmium contamination to become airborne. A September 3, 1992 memorandum prepared by Ecology and Environment, Inc. indicated that the plan of closure for the Hawaiian Western Steel Dump Site #1 included an extensive cover, but did not include a liner underneath the dump. The site was closed in 2005,

based on a NFA letter issued on January 11, 2005; however, the closure report was not available for review.

Based on the distance from the property and our interpretation that it is located hydrogeologically cross-gradient, it is ENPRO's opinion that any *recognized environmental conditions* are not expected to impact the project site. Furthermore, the documentation states that the identified contamination was properly addressed and a *NFA* status was issued for the site.

7.2.3 BUILDING, PLANNING, AND/OR ZONING DEPARTMENTS

The City and County of Honolulu Department of Planning and Permitting database was reviewed on May 23, 2013 to obtain historical use information for the project site. A copy of the records for the project site can be found in the appendix section of this report.

Based on our review of the planning and permitting database, the following information indicated possible evidence of *recognized environmental conditions* associated with the project site:

- A 1989 building permit issued to Hawaiian Independent Refinery to construct pipelines at the project site (TMK: 9-1-014:008)
- A 1991 building permit issued to Marisco, LTD to construct an assembly plant, repair garage/shop at the project site (TMK: 9-1-014:008)
- A 1996 building permit issued to Aloha Petroleum to extend a pipeline at the project site (TMK: 9-1-014:008)
- A 1975 building permit issued to Powerine Oil Company to build a storage tank at the project site (TMK: 9-1-014:008)
- A 1991 building permit issued to Hawaii Pacific Industries, Inc. to build a tank at the project site (TMK: 9-1-014:008)
- A 1996 building permit issued to Texaco Refining & Marketing to construct a pipeline at the project site (TMK: 9-1-014:024)

7.2.4 FIRE DEPARTMENT

The Honolulu Fire Communication Center was contacted on May 1, 2013 to obtain information regarding any fires, complaints, permits, violations involving hazardous materials use, USTs or ASTs on record for the project site and/or adjoining properties.

ENPRO has not received a response from the Honolulu Fire Communication Center as of the date of this report. Should our review of these files at a later date impact our findings, conclusions or recommendations, ENPRO shall forward an addendum letter to such effect.

8.0 REFERENCES

Publications:

Names of Publication: Aquifer Identification and Classification for Oahu: Groundwater Protection Strategy For Hawaii
Author of Publication: Mink, J.F. and L.S. Lau
Published by: Water Resources Research Center, University of Hawaii at Manoa, Honolulu, Hawaii
Date of Publication: 1990
Information Obtained: Groundwater data

Names of Publication: Groundwater Well Index
Author of Publication: State of Hawaii, Department of Natural Resources, Commission on Water Management
Date of Publication: January 2001
Information Obtained: Groundwater wells

Names of Publication: Ownership records and Tax Map Key maps
Author of Publication: City and County of Honolulu
Information Obtained: Ownership records

Names of Publication: Code of Federal Regulations, Title 40, Part 761, Rules for Controlling PCBs under the Toxic Substance Control Act,
Author of Publication: U.S. Environmental Protection Agency
Date of Publication: December 14, 1990
Information Obtained: PCB regulations

Names of Publication: Soil Survey for the Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii
Author of Publication: Foote, Donald E. et al.
Published by: U.S. Department of Agriculture, Soil Conservation Service, in cooperation with the University of Hawaii Agricultural Experiment Station. Also available at http://websoilsurvey.nrcs.usda.gov/app/ accessed on May 15, 2013.
Date of Publication: 1972
Information Obtained: Soil classification

Names of Publication: The EDR Radius Map Report
Author of Publication: Environmental Data Resources, Inc. (EDR)

Date of Publication: May 1, 2013
Information Obtained: Regulatory database records

Names of Publication: Topographic Maps, Ewa, Barbers Point and Oahu Quadrangles, Hawaii
Author of Publication: EDR/United States Geological Survey (USGS)
Date of Publication: 1928, 1968, 1970, 1983, 1998
Information Obtained: Historical use

Names of Publication: Aerial Photographs
Author of Publication: EDR
Date of Publication: 1951, 1968, 1975, 1978, 1985, 1992, 2001
Information Obtained: Historical use

Contacts:

Agency or Business: State of Hawaii Department of Transportation, Harbors Division
Name/Title of Representative: Mr. Dean Watase/Staff
Date Information was Received: May 7, 2013
Information Obtained: Historical and current property use

Agency or Business: State of Hawaii Department of Transportation, Harbors Division
Name/Title of Representative: Mr. Randal Leong /Staff
Date Information was Received: May 7, 2013
Information Obtained: Historical and current property use

Agency or Business: Solid and Hazardous Waste Branch (SHWB)
Location of Agency or Business: 919 Ala Moana Boulevard
Telephone Number: 808-586-4226
Date Information was Received: May 30 and 31, 2013 and June 6, 2013
Information Obtained: Regulatory records

Agency or Business:	Hazard Evaluation and Emergency Response (HEER)
Location of Agency or Business:	919 Ala Moana Boulevard
Telephone Number:	808-586-4249
Date Information was Received:	May 8, 2013 and June 6, 2013
Information Obtained:	Regulatory records

9.0 APPENDICES

Site Figures
Site Photographs
Historical Research
Regulatory Records Documentation
Records of Communication/Interview
Qualifications of Environmental Professionals

SITE FIGURES



Source: U.S. Geological Survey, 1998

Figure 1
TOPOGRAPHIC MAP

Scale: 1 inch = 2,000 feet

Project Number 1304-00152-PH1
Kalaeloa Barbers Point Harbor

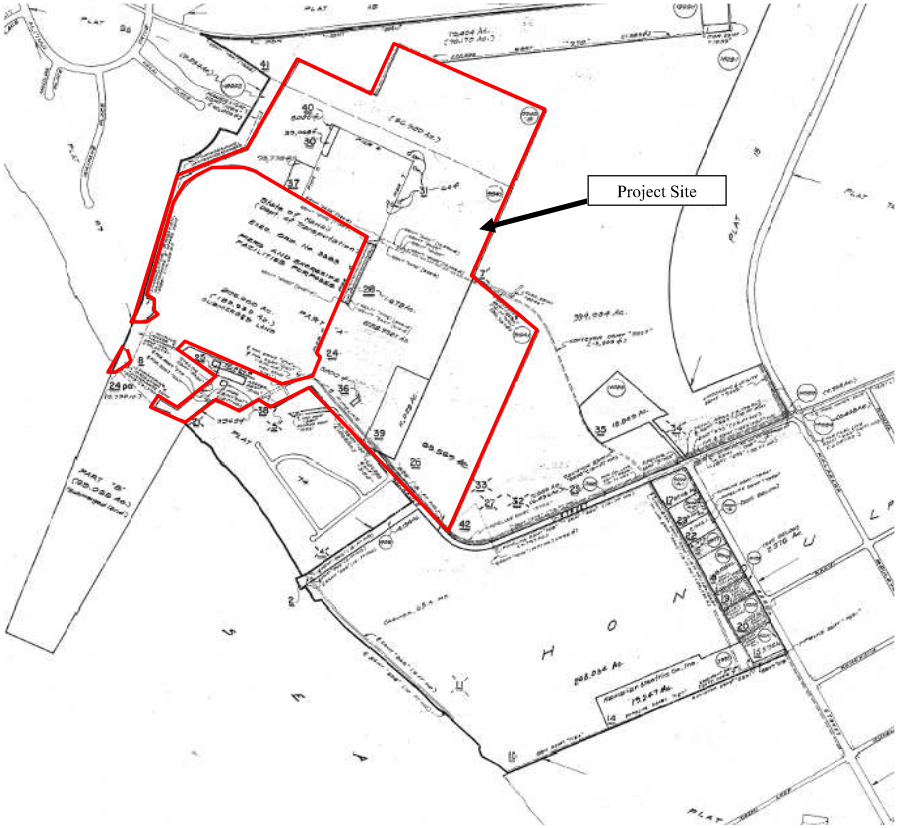


Figure 2
TAX MAP KEY (1) 9-1-014: 008, 024, 025, 026, 028, 030, 031, 036, 037, 039, 040, 043, and (1) 9-1-074: 037, 038

Scale: 1 inch = Approximately 1,800 feet



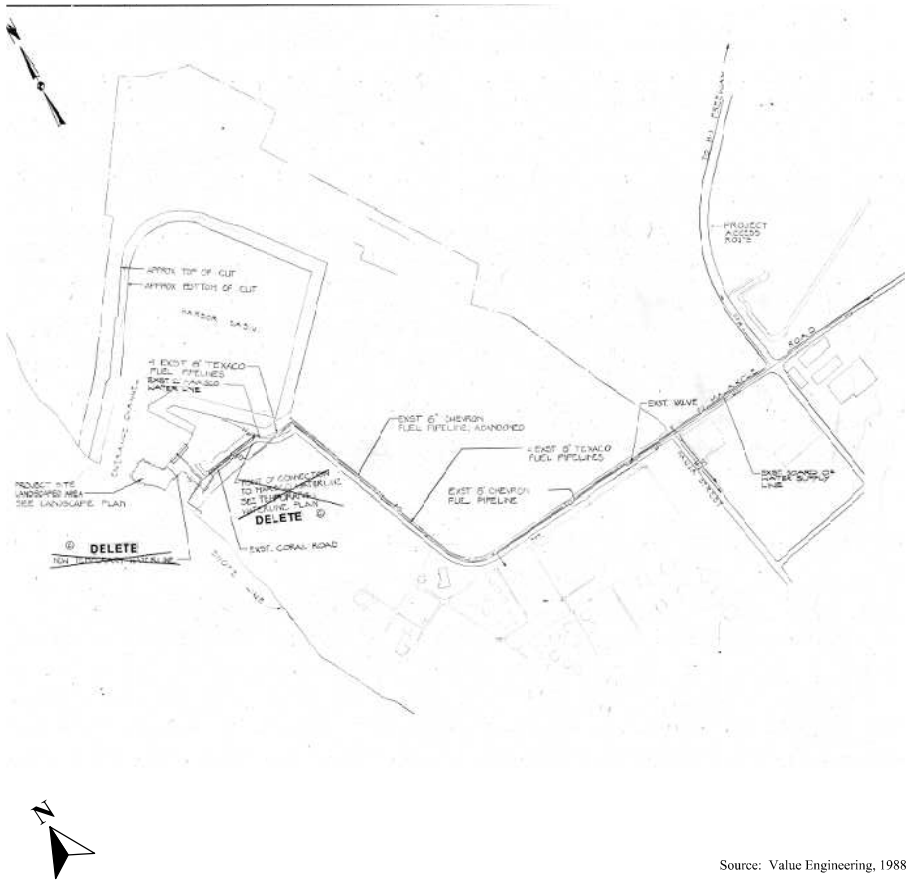
Figure 3
AERIAL PHOTOGRAPH/TMK OVERLAY



Source: Group 70 International, and ENPRO's Field Notes, 2013

Figure 4
AERIAL PHOTOGRAPH/SITE MAP

Scale: 1 inch = Approximately 1,000 feet



Source: Value Engineering, 1988

Figure 5
SITE AND UTILITY PLAN

Scale: 1 inch = Approximately 1,800 feet

Project Number 1304-00152-PH1
Kalaeloa Barbers Point Harbor



Source: Group 70 International, 2013

Figure 6
UNDERGROUND FUEL PIPELINES PLAN

Scale: 1 inch = Approximately 600 feet

PHOTOGRAPHS



Photo 1

Pier P-1, Facing West

Project Number: 1304-00152-PH1
Kalaeloa Barbers Point Harbor
Date of Photo: May 16 , 2013

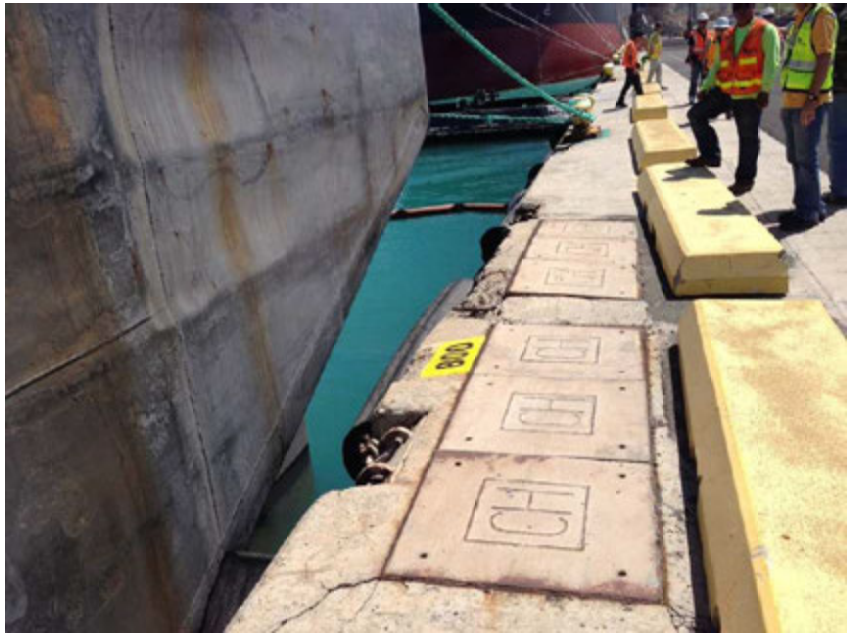


Photo 2

Pier P-5, Location of Vessels Fueling

Project Number: 1304-00152-PH1
Kalaeloa Barbers Point Harbor
Date of Photo: May 16, 2013



Photo 3

Pier P-5 and Pier -6, Facing Northeast

Project Number: 1304-00152-PH1
Kalaeloa Barbers Point Harbor
Date of Photo: May 16, 2013



Photo 4

Pier P-4, Facing Northwest

Project Number: 1304-00152-PH1
Kalaeloa Barbers Point Harbor
Date of Photo: May 16, 2013



Photo 5

Capped Lead-Containing Soil to the East of Yard S-6

Project Number: 1304-00152-PH1
Kalaeloa Barbers Point Harbor
Date of Photo: May 16, 2013



Photo 6

Pier P-4 and Marisco Site, Facing Northwest

Project Number: 1304-00152-PH1
Kalaeloa Barbers Point Harbor
Date of Photo: May 16, 2013



Photo 7

Paint Storage at Marisco Site Near Yard S-2

Project Number: 1304-00152-PH1
Kalaeloa Barbers Point Harbor
Date of Photo: June 12, 2013



Photo 8

Water Tank and Sandblast Grit Drums at Marisco Site Near Yard S-2

Project Number: 1304-00152-PH1
Kalaeloa Barbers Point Harbor
Date of Photo: June 12, 2013



Photo 9

Used Oil Drum at Marisco Site Near Yard S-2

Project Number: 1304-00152-PH1
Kalaeloa Barbers Point Harbor
Date of Photo: June 12, 2013



Photo 10

Privately Owned Transformer at Marisco Site Near Yard S-2

Project Number: 1304-00152-PH1
Kalaeloa Barbers Point Harbor
Date of Photo: June 12, 2013



Photo 11

Diesel ASTs at Marisco Site Near Yard S-2

Project Number: 1304-00152-PH1
Kalaeloa Barbers Point Harbor
Date of Photo: June 12, 2013



Photo 12

Oxygen AST at Marisco Site Near Yard S-2

Project Number: 1304-00152-PH1
Kalaeloa Barbers Point Harbor
Date of Photo: June 12, 2013



Photo 13

Hazardous Waste Storage Area at Marisco Site Near Yard S-2

Project Number: 1304-00152-PH1
Kalaeloa Barbers Point Harbor
Date of Photo: June 12, 2013



Photo 14

Marisco Yard and Drydock at Pier P-9, Facing South

Project Number: 1304-00152-PH1
Kalaeloa Barbers Point Harbor
Date of Photo: May 16, 2013



Photo 15

Diesel ASTs at Marisco Yard, Pier 9

Project Number: 1304-00152-PH1
Kalaeloa Barbers Point Harbor
Date of Photo: June 12, 2013



Photo 16

Marisco's Drydock

Project Number: 1304-00152-PH1
Kalaeloa Barbers Point Harbor
Date of Photo: June 12, 2013



Photo 17

Hawaiian Cement and GLP Asphalt LLC, Photographed from Pier P-5, Facing Northeast

Project Number: 1304-00152-PH1
Kalaeloa Barbers Point Harbor
Date of Photo: May 16, 2013



Photo 18

Hawaiian Cement, Chemical Storage

Project Number: 1304-00152-PH1
Kalaeloa Barbers Point Harbor
Date of Photo: June 12, 2013



Photo 19

Hawaiian Cement, Chemical Storage

Project Number: 1304-00152-PH1
Kalaeloa Barbers Point Harbor
Date of Photo: June 12, 2013



Photo 20

Grace Pacific Warehouse, Note: Parts Washer

Project Number: 1304-00152-PH1
Kalaeloa Barbers Point Harbor
Date of Photo: June 12, 2013



Photo 21

Hawaiian Cement, Chemicals

Project Number: 1304-00152-PH1
Kalaeloa Barbers Point Harbor
Date of Photo: June 12, 2013



Photo 22

Grace Pacific, Diesel ASTs

Project Number: 1304-00152-PH1
Kalaeloa Barbers Point Harbor
Date of Photo: June 12, 2013



Photo 23

Grace Pacific, Propane Tanks and Water Tank

Project Number: 1304-00152-PH1
Kalaeloa Barbers Point Harbor
Date of Photo: June 12, 2013



Photo 24

Hawaiian Cement, Diesel AST

Project Number: 1304-00152-PH1
Kalaeloa Barbers Point Harbor
Date of Photo: June 12, 2013



Photo 25

Hawaiian Cement, Diesel AST

Project Number: 1304-00152-PH1
Kalaeloa Barbers Point Harbor
Date of Photo: June 12, 2013



Photo 26

Transit Shed, Facing Northwest

Project Number: 1304-00152-PH1
Kalaeloa Barbers Point Harbor
Date of Photo: June 12, 2013



Photo 27

Interior of the Transit Shed

Project Number: 1304-00152-PH1
Kalaeloa Barbers Point Harbor
Date of Photo: June 12, 2013



Photo 28

Batteries in the Transit Shed

Project Number: 1304-00152-PH1
Kalaeloa Barbers Point Harbor
Date of Photo: June 12, 2013



Photo 29

Paint Stored in the Transit Shed

Project Number: 1304-00152-PH1
Kalaeloa Barbers Point Harbor
Date of Photo: June 12, 2013



Photo 30

Harbor Agent Office, Facing Northwest

Project Number: 1304-00152-PH1
Kalaeloa Barbers Point Harbor
Date of Photo: June 12, 2013



Photo 31

AES Hawaii, Chemical Storage Area

Project Number: 1304-00152-PH1
Kalaeloa Barbers Point Harbor
Date of Photo: June 12, 2013



Photo 32

AES Hawaii, Chemical Storage Area

Project Number: 1304-00152-PH1
Kalaeloa Barbers Point Harbor
Date of Photo: June 12, 2013



Photo 33

Coal Conveyor System, Facing East

Project Number: 1304-00152-PH1
Kalaeloa Barbers Point Harbor
Date of Photo: May 16, 2013

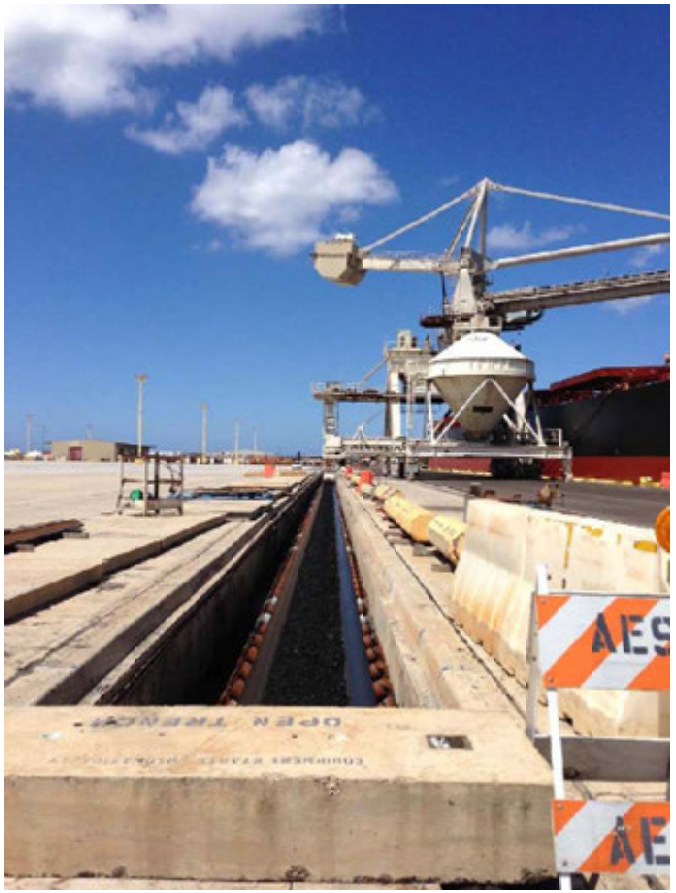


Photo 34

Coal Conveyor System, Facing Southwest

Project Number: 1304-00152-PH1
Kalaeloa Barbers Point Harbor
Date of Photo: June 12, 2013



Photo 35

GLP Asphalt LLC, Asphalt Tanks, Facing Southwest

Project Number: 1304-00152-PH1
Kalaeloa Barbers Point Harbor
Date of Photo: May 16, 2013



Photo 36

Healy Tibbitts Builders Yard, Note Containers of Paint on Pallets and Covered

Project Number: 1304-00152-PH1
Kalaeloa Barbers Point Harbor
Date of Photo: June 12, 2013



Photo 37

Northern Portion of the Project Site, Undeveloped

Project Number: 1304-00152-PH1
Kalaeloa Barbers Point Harbor
Date of Photo: June 12, 2013



Photo 38

Chevron Refinery, Photographed from Malakole Street, Facing West

Project Number: 1304-00152-PH1
Kalaeloa Barbers Point Harbor
Date of Photo: May 16, 2013



Photo 39

GasPro Propane Tanks, Photographed from Pier 1, Facing South

Project Number: 1304-00152-PH1
Kalaeloa Barbers Point Harbor
Date of Photo: May 16, 2013



Photo 40

Malakole Street, Facing Southeast

Project Number: 1304-00152-PH1
Kalaeloa Barbers Point Harbor
Date of Photo: May 16, 2013

HISTORICAL RESEARCH

Kalaeloa Harbors
John Wayne Avenue
Kapolei, HI 96707

Inquiry Number: 3593654.3
May 01, 2013

Certified Sanborn® Map Report

EDR® Environmental Data Resources Inc

440 Wheelers Farms Road
Milford, CT 06461
800.352.0050
www.edrnet.com

Certified Sanborn® Map Report

5/01/13

Site Name:
Kalaeloa Harbors
John Wayne Avenue
Kapolei, HI 96707

Client Name:
ENPRO, Env. Professionals
629 Kailua Road
Kailua, HI 96734

EDR Inquiry # 3593654.3

Contact: Roberta Bitzer

EDR® Environmental Data Resources Inc

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Certified Sanborn Results:

Site Name: Kalaeloa Harbors
Address: John Wayne Avenue
City, State, Zip: Kapolei, HI 96707
Cross Street:
P.O. # NA
Project: 1304-00152-PH1
Certification # 672D-4797-8C6F

Sanborn® Library search results
Certification # 672D-4797-8C6F

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- ✓ University Publications of America
- ✓ EDR Private Collection

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Kalaeloa Harbors
John Wayne Avenue
Kapolei, HI 96707

Inquiry Number: 3593654.4
May 01, 2013

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440 Wheelers Farms Road
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800.352.0050
www.edrnet.com

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with any questions or comments.

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Historical Topographic Map



N

TARGET QUAD
NAME: BARBERS POINT
MAP YEAR: 1928

SERIES: 7.5
SCALE: 1:20000

SITE NAME: Kalaeloa Harbors
ADDRESS: John Wayne Avenue
Kapolei, HI 96707
LAT/LONG: 21.3247 / -158.1161

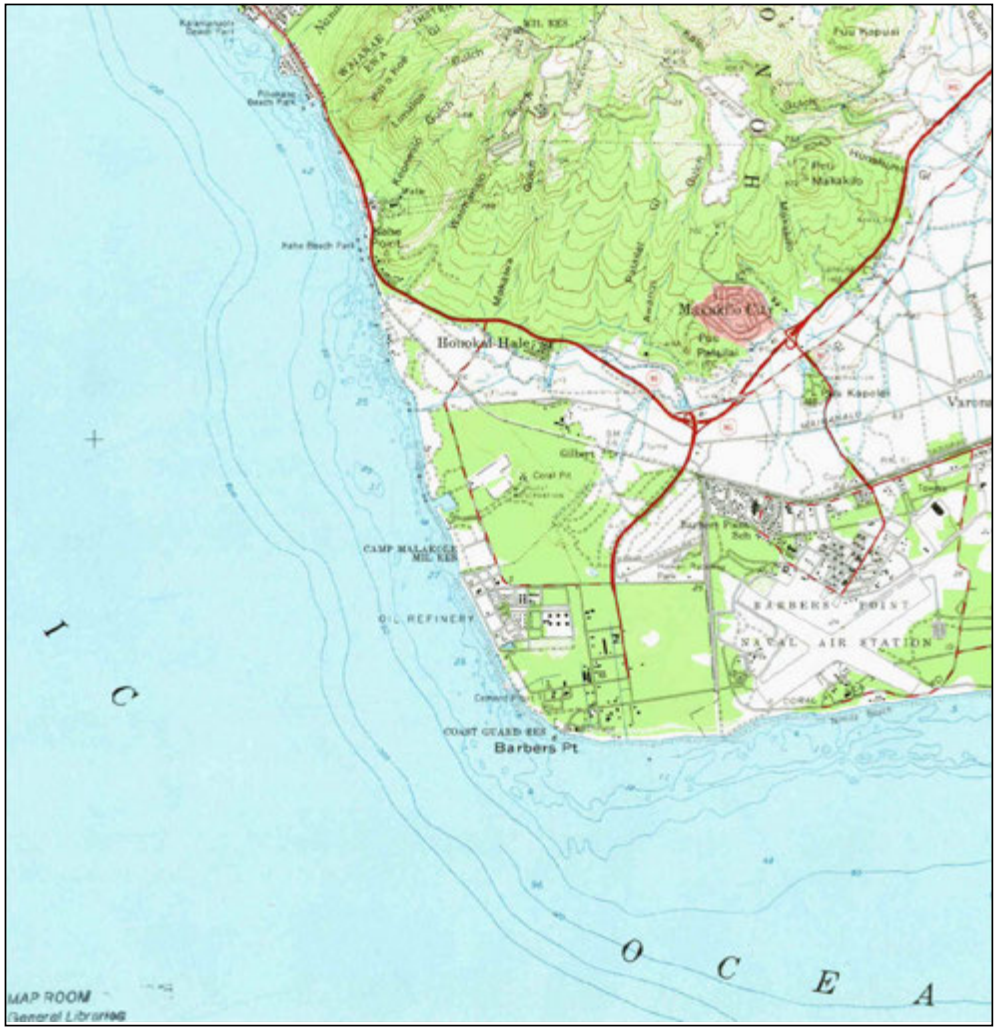
CLIENT: ENPRO, Env. Professionals
CONTACT: Roberta Bitzer
INQUIRY#: 3593654.4
RESEARCH DATE: 05/01/2013

Historical Topographic Map



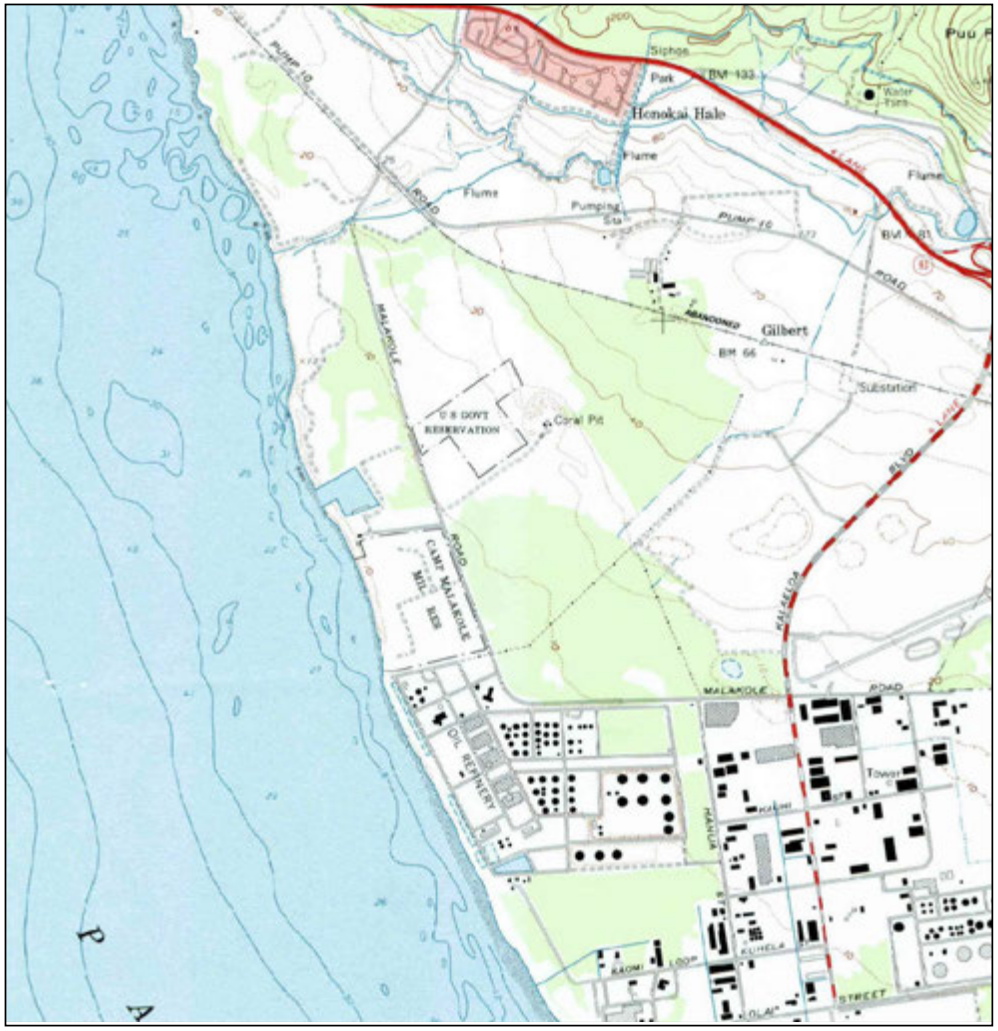
N	TARGET QUAD	SITE NAME: Kalaeloa Harbors	CLIENT: ENPRO, Env. Professionals
↑	NAME: EWA	ADDRESS: John Wayne Avenue	CONTACT: Roberta Bitzer
	MAP YEAR: 1968	Kapolei, HI 96707	INQUIRY#: 3593654.4
	SERIES: 7.5	LAT/LONG: 21.3247 / -158.1161	RESEARCH DATE: 05/01/2013
	SCALE: 1:24000		

Historical Topographic Map



N	TARGET QUAD	SITE NAME: Kalaeloa Harbors	CLIENT: ENPRO, Env. Professionals
↑	NAME: OAHU	ADDRESS: John Wayne Avenue	CONTACT: Roberta Bitzer
	MAP YEAR: 1970	Kapolei, HI 96707	INQUIRY#: 3593654.4
	REVISED FROM :1954	LAT/LONG: 21.3247 / -158.1161	RESEARCH DATE: 05/01/2013
	SERIES: 15		
	SCALE: 1:62500		

Historical Topographic Map



N	TARGET QUAD		SITE NAME:	Kalaeloa Harbors	CLIENT:	ENPRO, Env. Professionals
↑	NAME:	EWA	ADDRESS:	John Wayne Avenue	CONTACT:	Roberta Bitzer
	MAP YEAR:	1983		Kapolei, HI 96707	INQUIRY#:	3593654.4
	SERIES:	7.5	LAT/LONG:	21.3247 / -158.1161	RESEARCH DATE:	05/01/2013
	SCALE:	1:24000				

Historical Topographic Map



N	TARGET QUAD		SITE NAME:	Kalaeloa Harbors	CLIENT:	ENPRO, Env. Professionals
↑	NAME:	EWA	ADDRESS:	John Wayne Avenue	CONTACT:	Roberta Bitzer
	MAP YEAR:	1998		Kapolei, HI 96707	INQUIRY#:	3593654.4
	SERIES:	7.5	LAT/LONG:	21.3247 / -158.1161	RESEARCH DATE:	05/01/2013
	SCALE:	1:24000				

Kalaeloa Harbors
John Wayne Avenue
Kapolei, HI 96707

Inquiry Number: 3593654.5
May 02, 2013

The EDR Aerial Photo Decade Package

EDR® Environmental Data Resources Inc

440 Wheelers Farms Road
Milford, CT 06461
800.352.0050
www.edrnet.com

EDR Aerial Photo Decade Package

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with any questions or comments.

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Date EDR Searched Historical Sources:
Aerial Photography May 02, 2013

Target Property:
John Wayne Avenue
Kapolei, HI 96707

Year	Scale	Details	Source
1951	Aerial Photograph. Scale: 1"=750'	Panel #: 21158-C1, EWA, HI;/Flight Date: May 14, 1951	EDR
1968	Aerial Photograph. Scale: 1"=500'	Panel #: 21158-C1, EWA, HI;/Flight Date: February 26, 1968	EDR
1968	Aerial Photograph. Scale: 1"=500'	Panel #: 21158-C1, EWA, HI;/Flight Date: February 26, 1968	EDR
1968	Aerial Photograph. Scale: 1"=500'	Panel #: 21158-C1, EWA, HI;/Flight Date: February 26, 1968	EDR
1975	Aerial Photograph. Scale: 1"=1000'	Panel #: 21158-C1, EWA, HI;/Flight Date: July 15, 1975	EDR
1978	Aerial Photograph. Scale: 1"=1000'	Panel #: 21158-C1, EWA, HI;/Flight Date: February 12, 1978	EDR
1985	Aerial Photograph. Scale: 1"=500'	Panel #: 21158-C1, EWA, HI;/Flight Date: May 02, 1985	EDR
1985	Aerial Photograph. Scale: 1"=500'	Panel #: 21158-C1, EWA, HI;/Flight Date: May 02, 1985	EDR
1985	Aerial Photograph. Scale: 1"=500'	Panel #: 21158-C1, EWA, HI;/Flight Date: May 02, 1985	EDR
1992	Aerial Photograph. Scale: 1"=750'	Panel #: 21158-C1, EWA, HI;/Flight Date: September 25, 1992	EDR
2001	Aerial Photograph. Scale: 1"=500'	Panel #: 21158-C1, EWA, HI;/DOQQ - acquisition dates: February 22, 2001	EDR
2001	Aerial Photograph. Scale: 1"=500'	Panel #: 21158-C1, EWA, HI;/DOQQ - acquisition dates: February 22, 2001	EDR
2001	Aerial Photograph. Scale: 1"=500'	Panel #: 21158-C1, EWA, HI;/DOQQ - acquisition dates: February 22, 2001	EDR
2001	Aerial Photograph. Scale: 1"=500'	Panel #: 21158-C1, EWA, HI;/DOQQ - acquisition dates: February 22, 2001	EDR




INQUIRY #: 3593654.5
YEAR: 1968
= 500'
N


INQUIRY #: 3593654.5
YEAR: 1968
= 500'
N

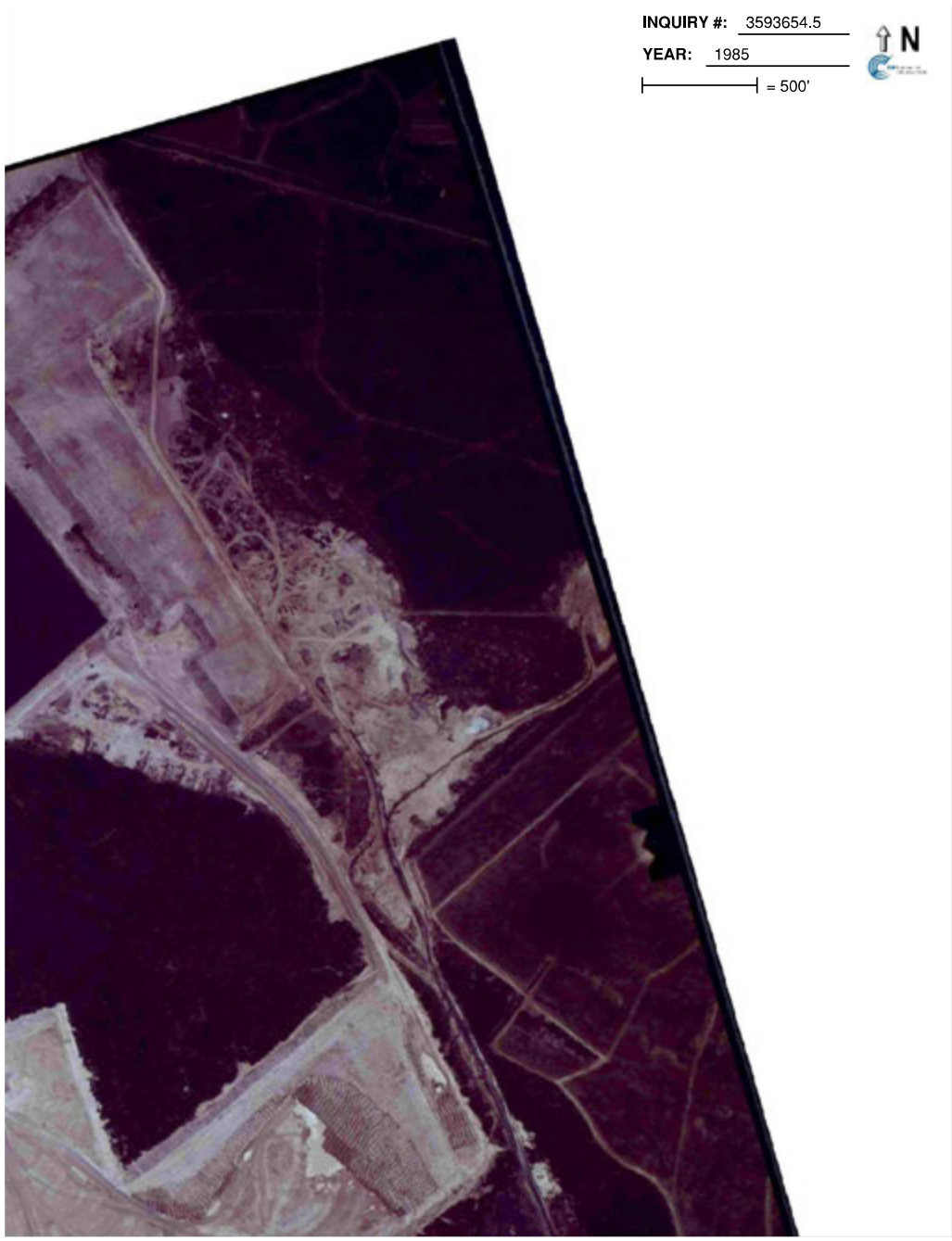

INQUIRY #: 3593654.5
YEAR: 1968
= 500'
N


INQUIRY #: 3593654.5
YEAR: 1975
= 1000'
N


INQUIRY #: 3593654.5
YEAR: 1978
= 1000'
N


INQUIRY #: 3593654.5
YEAR: 1985
= 500'
N


INQUIRY #: 3593654.5
YEAR: 1985
= 500'
N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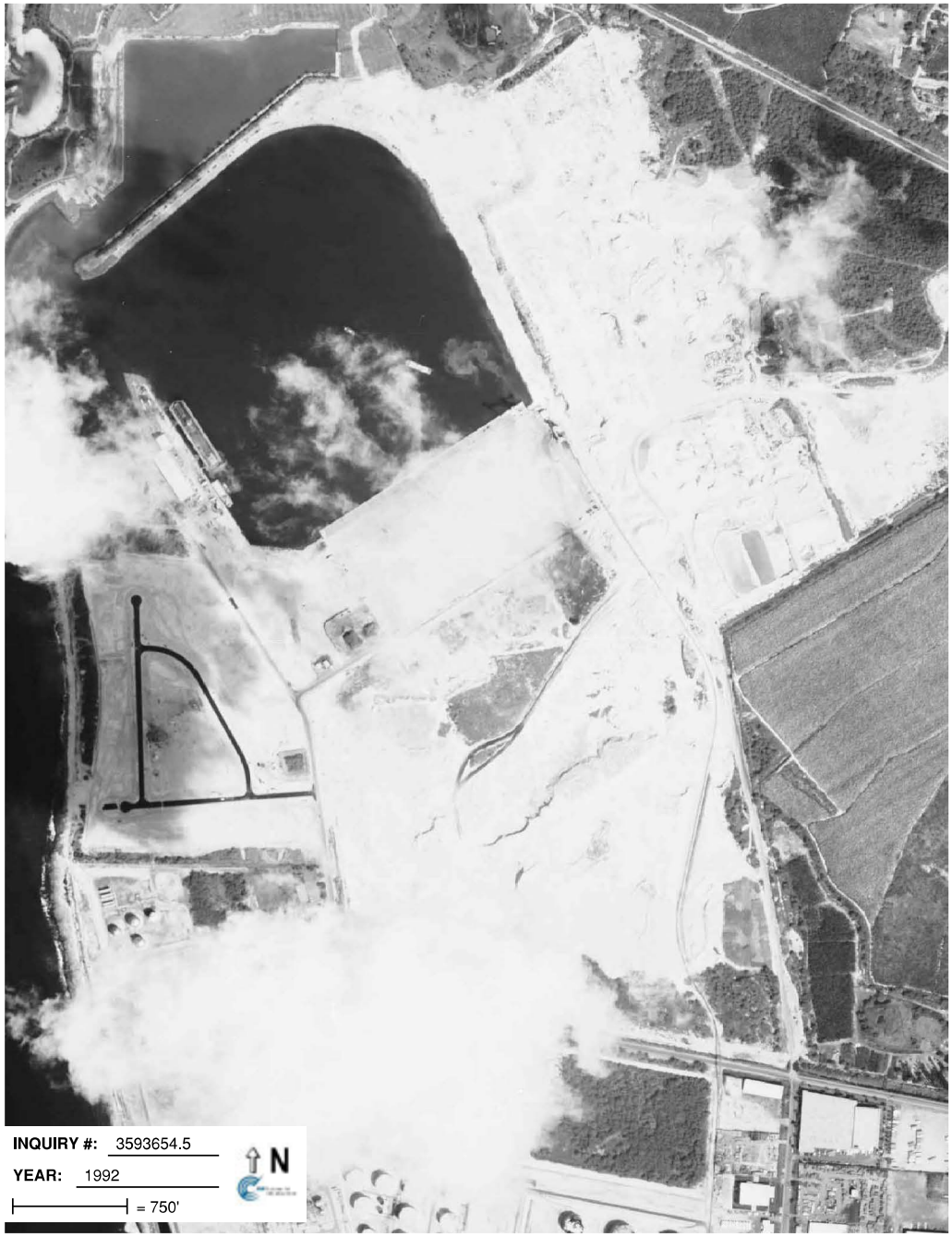
YEAR: 1985
= 500'
N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YEAR: 1992
= 750'
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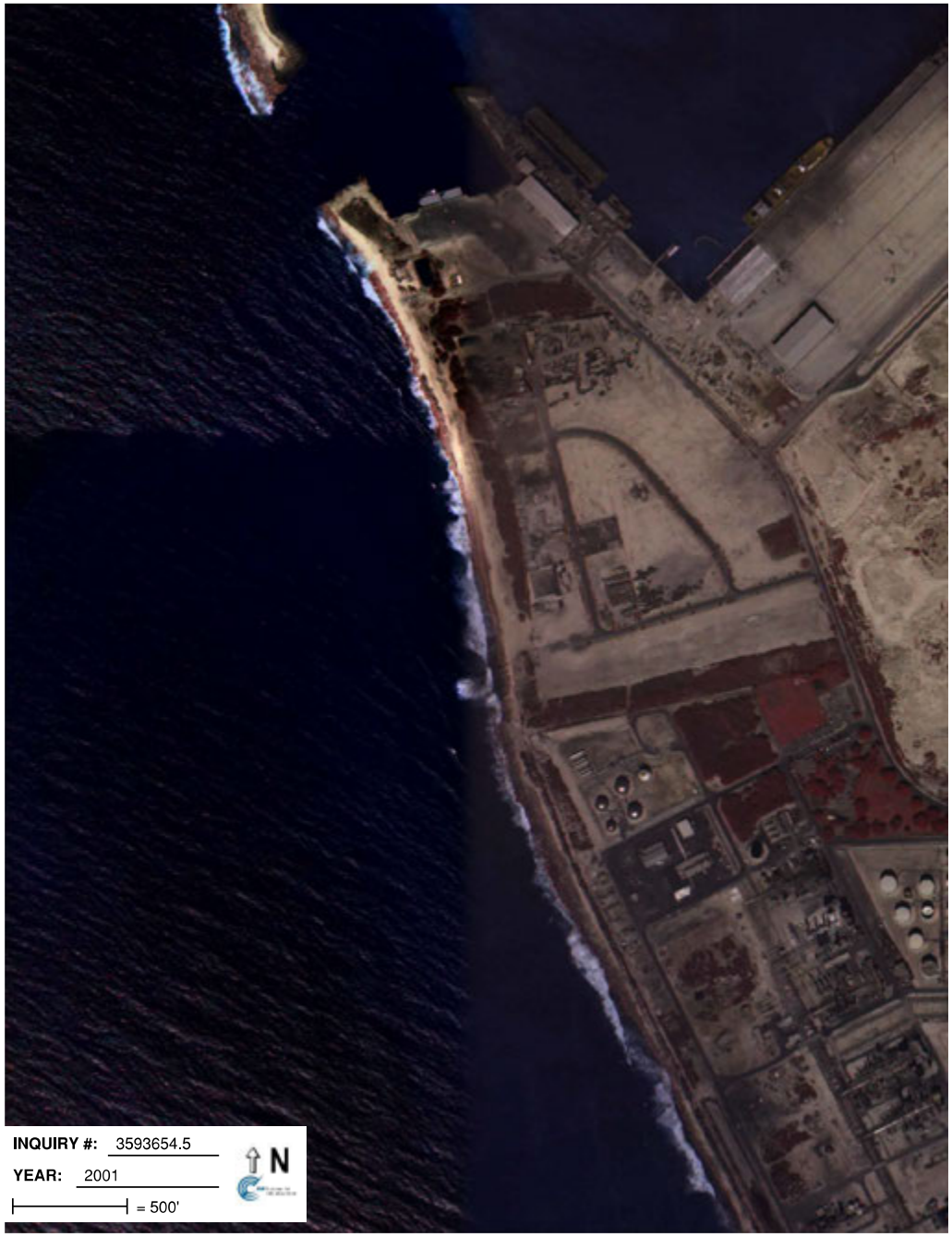
INQUIRY #: 3593654.5
YEAR: 2001
= 500'
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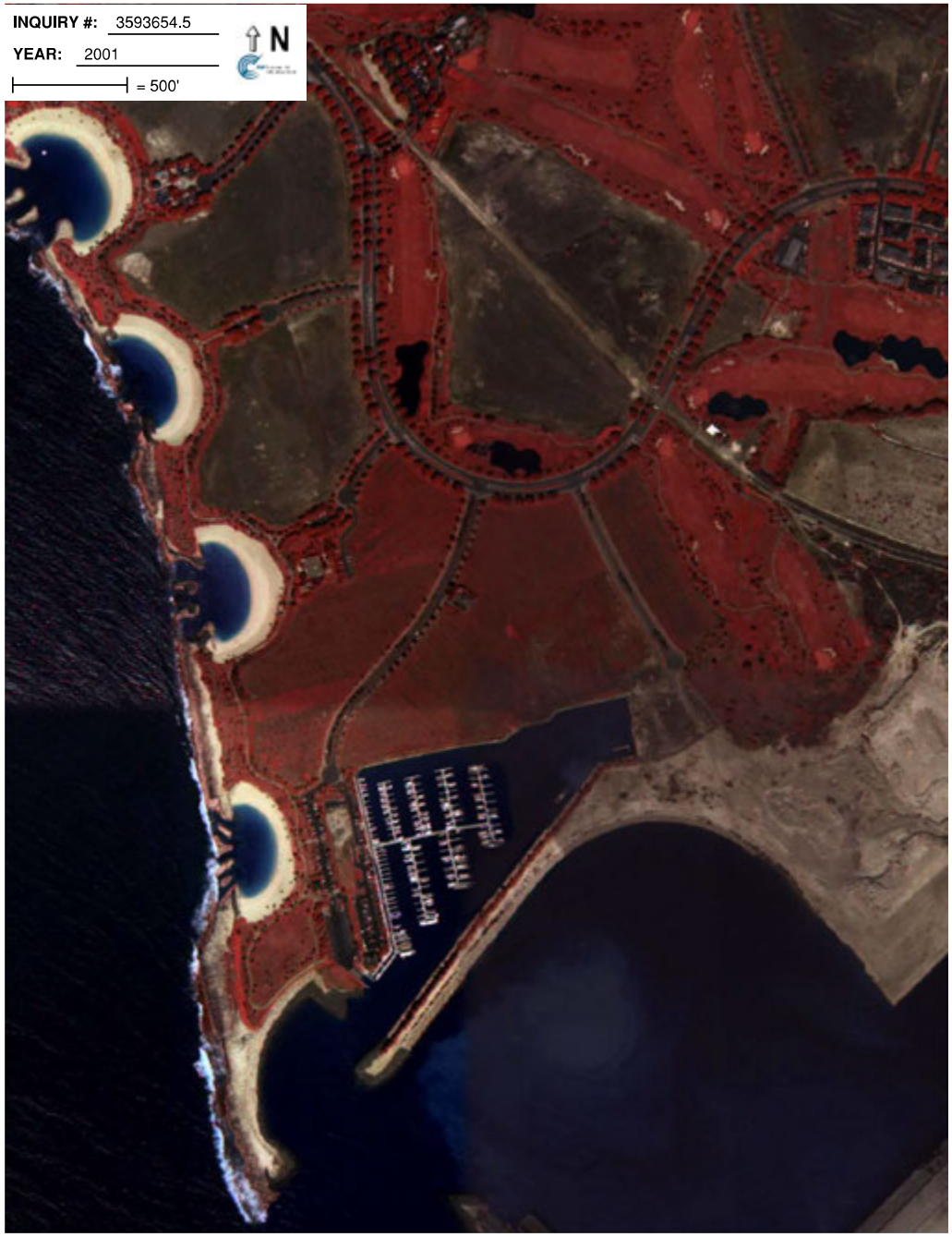
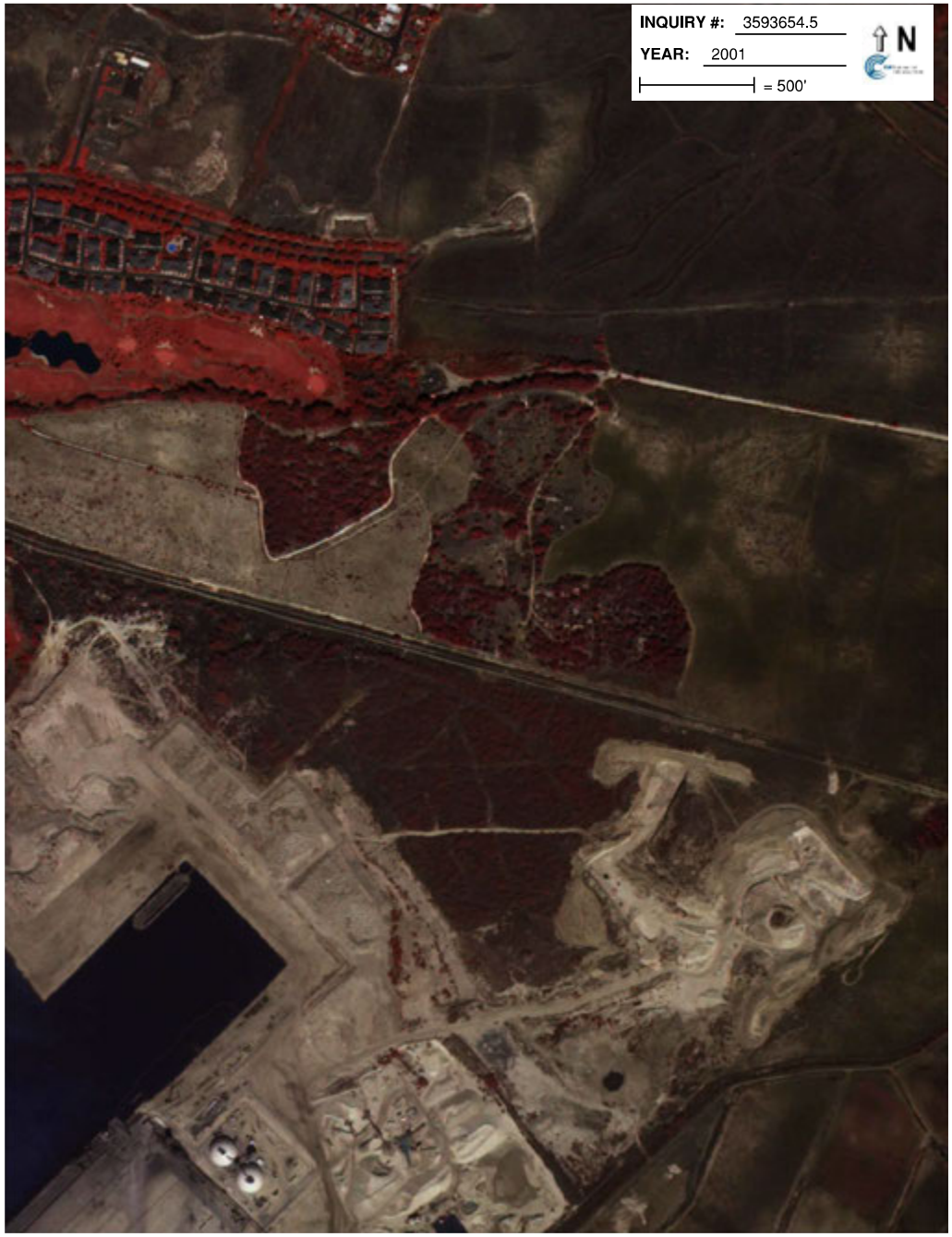

INQUIRY #: 3593654.5
YEAR: 2001
= 500'
N


INQUIRY #: 3593654.5
YEAR: 2001
= 500'
N



CITY AND COUNTY OF HONOLULU PARCEL HISTORY (TT102) FOR:

TMK: 9-1-074-038-0000 PAGE: 1

09/24/1993
INSTR-DESC: LTD WARRANTY DEED TRANS NO: 95018
INSTR-DATE: 06/18/1993
LC-DOC-NO: 2069304 CERT NO:422290 REC-DATE: 09/24/1993
AMOUNT:$1,163,525
AREA:118,246 SQ.FT. STATE-CONV-TAX: $ 1163.50
FROM: W.H. MCVAY, P.R. CASSIDAY, C.D. PRATT, JR. & C.R. CHURCHILL,
TRUSTEES UNDER THAT WILL AND OF THE ESTATE OF JAMES CAMPBELL, DECEASED
TO: STATE OF HAWAII, ITS DIRECTOR OF TRANSPORTATION
LOT 7309 LCAPP 1069 MAP 602 118,246 SF
SUBJ/DRAINAGE ESMT "3198"; ESMT "3204" FOR ACCESS PURPOSES

GROUP#	NAME	F	TC	%-OWNER	TITLE-DESC
2 0011	STATE OF HAWAII				

09/24/1993
INSTR-DESC: LTD WARRANTY DEED TRANS NO: 95019
INSTR-DATE: 06/18/1993
LC-DOC-NO: 2069303 CERT NO:422289 REC-DATE: 09/24/1993
AMOUNT:$1,163,525
AREA:118,246 SQ.FT. STATE-CONV-TAX: $ 1163.50
FROM: CIRI LAND DEVELOPMENT COMPANY
TO: W.H. MCVAY, P.R. CASSIDAY, C.D. PRATT, JR. & C.R. CHURCHILL,
TRUSTEES UNDER THE WILL AND OF THE ESTATE OF JAMES CAMPBELL, DECEASED
LOT 7309 LCAPP 1069 MAP 602 118,246 SF
SUBJ/DRAINAGE ESMT "3198"; ESMT "3204" FOR ACCESS PURPOSES

GROUP#	NAME	F	TC	%-OWNER	TITLE-DESC
2 0011	JAMES CAMPBELL TRUST ESTATE				

12/15/1992
INSTR-DESC: CONS & RESUB MAP 602 LCAPP 1069 TRANS NO: 95017
INSTR-DATE: 01/25/1993

AREA:118,246 SQ.FT.
NEW PARCEL FROM 9114-4
F/D: NEW, LOT 7309, LCO 110156 NEW C-405860

GROUP#	NAME	F	TC	%-OWNER	TITLE-DESC
2 0011	CIRI LAND DEV CO				

----------SEE HISTORY SHEET FOR MORE INFORMATION----------

CITY AND COUNTY OF HONOLULU PARCEL HISTORY (TT102) FOR:
TMK: 9-1-074-037-0000 PAGE: 1

09/24/1993
INSTR-DESC: LTD WARRANTY DEED
TRANS NO: 95015
INSTR-DATE: 06/18/1993
LC-DOC-NO: 2069304 CERT NO:422290
REC-DATE: 09/24/1993
AMOUNT:$1,163,525
AREA: 114,459 SQ.FT. STATE-CONV-TAX: $ 1163.50

FROM: W.H. MCVAY, P.R. CASSIDAY, C.D. PRATT, JR. & C.R. CHURCHILL,
TRUSTEES UNDER THAT WILL AND OF THE ESTATE OF JAMES CAMPBELL, DECEASED
TO: STATE OF HAWAII, ITS DIRECTOR OF TRANSPORTATION
LOT 7308 LCAPP 1069 MAP 602 114,459 SF
SUBJ/DRAINAGE ESMT "3202"; ESMT "3203" FOR ACCESS PURPOSES

GROUP#	NAME	F	TC	%-OWNER	TITLE-DESC
2 0011	STATE OF HAWAII				

09/24/1993
INSTR-DESC: LTD WARRANTY DEED
TRANS NO: 95016
INSTR-DATE: 06/18/1993
LC-DOC-NO: 2069303 CERT NO:422289
REC-DATE: 09/24/1993
AMOUNT:$1,163,525
AREA: 114,459 SQ.FT. STATE-CONV-TAX: $ 1163.50

FROM: CIRI LAND DEVELOPMENT COMPANY
TO: W.H. MCVAY, P.R. CASSIDAY, C.D. PRATT, JR. & C.R. CHURCHILL,
TRUSTEES UNDER THE WILL AND OF THE ESTATE OF JAMES CAMPBELL, DECEASED
LOT 7308 LCAPP 1069 MAP 602 114,459 SF
SUBJ/DRAINAGE ESMT "3202"; ESMT "3203" FOR ACCESS PURPOSES

GROUP#	NAME	F	TC	%-OWNER	TITLE-DESC
2 0011	JAMES CAMPBELL TRUST ESTATE				

12/15/1992
INSTR-DESC: CONS & RESUB MAP 602 LCAPP 1069
TRANS NO: 95014
INSTR-DATE: 01/25/1993

AREA: 114,459 SQ.FT.

NEW PARCEL FROM 5114-4
F/D: NEW, LOT 7308, LCO 110156 NEW C-405860

GROUP#	NAME	F	TC	%-OWNER	TITLE-DESC
2 0011	CIRI LAND DEV CO				

----------SEE HISTORY SHEET FOR MORE INFORMATION----------

CITY AND COUNTY OF HONOLULU PARCEL HISTORY (TY102) FOR:
TMK: 9-1-014-029-0000 PAGE: 1

08/19/2010
INSTR-DESC: ROUTE SLIP
TRANS NO: 5329153
INSTR-DATE: 08/10/2010
ACK/EFF DATE: 12/31/2069

AREA: 480,380 SQ.FT.

DOT NO - TERMINATION - LE 98-08-44
FROM: IMPERIUM RENEWABLES INC
TO: STATE OF HAWAII (DOT HO)
TERMINATED: 12/31/2009
F/D: LESSEE - CUT
LEASE PAR A FOR LOT 9540 MAP 710 LOAPP 1069
480,380 SF (11.028 AC) DES
TOG/E SUBJ/E

GROUP#	NAME	F	TC	% OWNER	TITLE-DESC
2 0011	S OF H DOT HARBORS DIV				TERM LE 98-08-44

GROUP#: 2 0011
Date & Time 08/19/2010 12:12:12

08/19/2010
INSTR-DESC: ROUTE SLIP
TRANS NO: 5329139
INSTR-DATE: 08/19/2010
ACK/EFF DATE: 02/01/2009

AREA: 480,380 SQ.FT.

DOT NO - 2ND AMDMT - LE 98-08-44
STATE OF HAWAII (DOT HO) - "LESSOR"
IMPERIUM RENEWABLES HAWAII LLC - "IRH/LESSEE"
*NOW, THEREFORE, THE STATE OF HI & IRH HAS COME TO AN AGRMT TO ADJUST THE
COMMENCEMENT DATE OF THIS LEASE FROM 02/01/2008 TO 02/01/2009 & THAT THE
EXPIRATION DATE SHALL BE ADJUSTED AS WELL FROM 01/31/2043 TO 01/31/2044.
THIS WILL ALLOW IRH WAIVER OF THE 1ST TWO LEASE RENT FOR THE 12-MONTH PERIOD
COMMENCING 02/01/2009.
**THE NOTE: TERMINATION ENTERED PRIOR TO THIS AMDMT. EXPIRES ADJUSTED TO
ACCOMODATE THIS AMDMT PER APPRAISER M.FLEENOR.
F/D: AME LEASE TERM
LEASE PAR A FOR LOT 9540 MAP 710 LOAPP 1069 480,380 SF (11.028 AC) DES TOG/E
SUBJ/E

GROUP#	NAME	F	TC	% OWNER	TITLE-DESC
2 0011	S OF H DOT HARBORS DIV				
7 0011	IMPERIUM RENEWABLES INC				AMD LE 98-08-44

GROUP#: 2 0011
Date & Time 08/19/2010 12:12:12

09/30/2009
INSTR-DESC: ROUTE SLIP
TRANS NO: 5306053
INSTR-DATE: 11/17/2009
ACK/EFF DATE: 02/01/2008

AREA: 480,369 SQ.FT.

DOT NO - LOT AGREEMENT - LE 98H-44
STATE OF HAWAII "LESSOR"
IMPERIUM RENEWABLES HAWAII LLC - "LESSEE"
HARBORS LEASE 98-08-44 - "LEASE"
*NOW, THEREFORE, PARTIES HERETO DO HEREBY AMD SAID LEASE AS FOLLOWS: APP III
RELATING TO USE OF PREMISES IS HEREBY AMDED BY ADDING THE FOLLOWING SEC C:
C. IN CONNECTION...THE LESSEE SHALL USE COMMERCIALLY REASONABLE BEST EFFOTS
AS NEW CHOSE...ETC.; ALSO ANY V RELATING TO RENTAL IS HEREBY AMDED BY ADDING

CITY AND COUNTY OF HONOLULU PARCEL HISTORY (TY102) FOR:
TMK: 9-1-014-029-0000 PAGE: 2

THE FOLLOWING SEC F: F. WHARFAGE & OTHER FEES & CHARGES...ETC.
F/D: REVED ONLY - AME LEASE TERMS
LEASE PAR A FOR LOT 9540 MAP 710 LOAPP 1069 480,369 SF (11.028 AC) DES TOG/E
SUBJ/E

GROUP#	NAME	F	TC	% OWNER	TITLE-DESC
2 0011	S OF H DOT HARBORS DIV				
7 0011	IMPERIUM RENEWABLES HAWAII LLC				AMDMT LE 98H-44

GROUP#: 2 0011
Date & Time 09/30/2009 12:12:12

09/30/2009
INSTR-DESC: ROUTE SLIP
TRANS NO: 5306052
INSTR-DATE: 11/17/2009
ACK/EFF DATE: 02/01/2008

AREA: 480,380 SQ.FT.
OTHER TMKS: 9-1-014-026-0003 ETC.

TMK: 9114-24, 9114-36 & 9114-39
DOT NO - NEW - LE 98H-44
FROM: 9114-24 - 480,380 SF (11.028 AC)
FROM: STATE OF HAWAII (DOT HO)
TO: IMPERIUM RENEWABLES HAWAII LLC
TERM: 35 YRS COMMENCING 02/01/2008 & ENDING 01/31/2043
RENTAL: $477,000.00/YR FOR THE FIRST FIVE-YR PERIOD
EFFECTIVE: 02/01/2008
PURPOSE: MANUFACTURING FACILITY
*THE NOTE: PER HARBORS, THIS HARBOR LE #98H-44 INCLUDES A ONE-YR RENT WAIVER
PERIOD WHICH EXPIRED 01/31/2009.
F/D: NEW - LEASE
LEASE PAR A FOR LOT 9540 MAP 710 LOAPP 1069 480,380 SF (11.028 AC) DES TOG/E
SUBJ/E

GROUP#	NAME	F	TC	% OWNER	TITLE-DESC
2 0011	S OF H DOT HARBORS DIV				
7 0011	IMPERIUM RENEWABLES HAWAII LLC				NEW LE #98H-44

GROUP#: 2 0011
Date & Time 09/30/2009 12:12:12

----------SEE HISTORY SHEET FOR MORE INFORMATION----------

CITY AND COUNTY OF HONOLULU PARCEL HISTORY (TY102) FOR:
TMK: 9-1-014-040-0000 PAGE: 1

07/31/2009
INSTR-DESC: ROUTE SLIP
TRANS NO: 5297299
INSTR-DATE: 07/31/2009
ACK/EFF DATE: 06/01/2008

AREA: 5,000 SQ.FT.
OTHER TMKS: 9 1 014 024 0003 ETC.

LOT AG - NEW - SF #98H-2649
FROM: 9114-24 - 5,000 SF
FROM: STATE OF HAWAII (DOT HO)
TO: HARBOR LTD
TERM: MONTH TO MONTH
RENTAL: $400.00/MO
EFFECTIVE: 06/01/2008
PURPOSE: PARKING & STORAGE OF EQUIPMENT ONLY
F/D: NEW - PERMITTEE
OPEN, UNPAVED LAND 5,000 SF
KALAELOA BARBERS POINT HARBOR

GROUP#	NAME	F	TC	% OWNER	TITLE-DESC
2 0011	S OF H DOT HARBORS DIV				
9 0011	HARBOR LTD				NEW RP 9808-5416

GROUP#: 2 0011
Date & Time 07/31/2009 12:12:12

----------SEE HISTORY SHEET FOR MORE INFORMATION----------

CITY AND COUNTY OF HONOLULU PARCEL HISTORY (TT102) FOR:
TMK: 9-1-014-033-0000 PAGE: 1

01/22/2001
INSTR-DESC: DOT HD - NEW REV PMT H-99-2186 TRANS NO: 3050304
INSTR-DATE: 12/01/1999

ACK/EFF DATE: 01/22/2001

AREA: 33.065 SQ.FT.

NEW PARCEL FROM 9114-24
FROM: STATE OF HAWAII (DOT HD) TO: MARISCO LTD
RENT: 33984/MON 91-607 MALAKOLE RD
TERM: MON/MON KAPOLEI, HI 96707
EFFECTIVE: 12/1/99
PURPOSE: SITE FOR DRYDOCK
BARBERS POINT HARBOR
- PIER 9 33.065 SF
F/D: NEW, PERMITTEE

GROUP#	NAME	F	TC	%-OWNER	TITLE-DESC
2 0011	S OF H DOT HARBORS DIV				DOT HD
7 0011	MARISCO LTD				H-99-2186

----------SEE HISTORY SHEET FOR MORE INFORMATION----------

CITY AND COUNTY OF HONOLULU PARCEL HISTORY (TT102) FOR:
TMK: 9-1-014-036-0000 PAGE: 1

05/30/2009
INSTR-DESC: ROUTE SLIP TRANS NO: 5300052
INSTR-DATE: 11/17/2005

ACK/EFF DATE: 02/01/2008

AREA: 6,000 SQ.FT.
OTHER-TMKS: 9-1-014-024-0000 ETC.

TMK: 9114-24, 9114-36 & 9114-39
DOT HD - NEW - LE #H09-44
A/S: PER PARTS DRAWBORS, PAR 36 MOVED TO A NEW LOCATION, BUT THERE IS NO MAP
OF THE NEW SITE. PAR 36 AS GIVEN ON TMB MAP.
F/D: KEYED ONLY - NEW LOCATION OF PAR ON TMB MAP
KALAELOA BARBERS POINT HARBOR
6,000 SF OF PAVED LAND

GROUP#	NAME	F	TC	%-OWNER	TITLE-DESC
2 0011	S OF H DOT HARBORS DIV				
7 0011	MARITIME LICENSE CENTER INC				AMD#1 RP#H-01-2298

GROUP#: 2 0011
Date & Time 09/30/2009 12:12:12

08/12/2003
INSTR-DESC: ROUTE SLIP TRANS NO: 5057043
INSTR-DATE: 08/12/2003

ACK/EFF DATE: 07/01/2003

AREA: 6,000 SQ.FT.
OTHER-TMKS: 9-1-014-024-0000 ETC.

DOT HD - AMENDMENT #1 - RP #H-01-2298
FROM: STATE OF HAWAII (DOT AD)
TO: MARITIME LICENSE CENTER INC
TERM: MONTH TO MONTH
RENTAL: $480.00/MO
EFFECTIVE: 07/01/2003
PURPOSE: TRAIN MARINERS TO MEET STANDARDS TRAINING,
CERTIFICATION & WATCH KEEPING (STCW) REQUIREMENTS
*ADDITIONAL 1,000 SF OF OPEN PAVED LAND WEST OF & ADJACENT
TO PERMITTE'S CURRENT PREMISES.
F/D: AREA: NEXT
KALAELOA BARBERS POINT HARBOR 6,000 SF OF PAVED LAND

GROUP#	NAME	F	TC	%-OWNER	TITLE-DESC
2 0011	S OF H DOT HARBORS DIV				
7 0011	MARITIME LICENSE CENTER INC				AMD#1 RP#H-01-2298

GROUP#: 2 0011
Date & Time 08/12/2003 12:12:12

10/01/2001
INSTR-DESC: ROUTE SLIP TRANS NO: 5039031
INSTR-DATE: 10/01/2001

ACK/EFF DATE: 02/24/2003

AREA: .1148 ACRES
OTHER-TMKS: 9-1-014-024-0000 ETC.

FROM: 9114-24 5000 SF
FROM: STATE OF HAWAII (DOT-HD)
TO: MARITIME LICENSE CENTER
PREMISES: 5000 SF PAVED LAND

CITY AND COUNTY OF HONOLULU PARCEL HISTORY (TT102) FOR:
TMK: 9-1-014-036-0000 PAGE: 9

LOCATION: KALAELOA BARBERS POINT HARBOR
PURPOSE: TRAIN MARINERS FOR STANDARDS TRAINING,
CERTIFICATION, ETC REQUIREMENTS
RENTAL: $400 MO EFFECTIVE DATE: 10/1/01
F/D: NEW, PERMITTEE

GROUP#	NAME	F	TC	%-OWNER	TITLE-DESC
2 0011	STATE OF HAWAII				

GROUP#: 2 0011
Date & Time 02/24/2003 12:12:12

----------SEE HISTORY SHEET FOR MORE INFORMATION----------

CITY AND COUNTY OF HONOLULU PARCEL HISTORY (TI102) FOR:
TMK: 9-1-014-026-0000 PAGE: 1

05/16/2012
INSTR-DESC: GRANT TRANS NO: 5389456
INSTR-DATE: 05/02/2012
LC-DOC-NO: T 8169111 CERT NO:600219 REC-DATE: 05/16/2012
ADEL CERT:612026
AREA: 63.5690 ACRES
OTHER-TMKS: 9-1-014-001-0000 ETC.

JAMES CAMPBELL COMPANY LLC & CAMPBELL HAWAII INVESTOR LLC "GRANTOR"
HAWAIIAN ELECTRIC COMPANY INC "GRANTEE"
GRANTOR CONVEYS UNTO GRANTEE A PERPETUAL RIGHT & EASMT TO
CONSTRUCT, OPERATE, MAINTAIN, ACCESS, REPAIR & REMOVE POLES, GUY
WIRES, ANCHORS, OVERHEAD &/OR UNDERGROUND WIRE LINES & OTHER
APPLIANCES...FOR THE TRANSMISSION...OF ELECTRICITY...PER LEASE, POWER &/OR
COMMUNICATIONS...OVER, UNDER, ACROSS & THROUGH...PREMISES
BEING LOT 626 MAP 79...& LOT 9541 MAP 711...EASMT BEING SHOWN ON R/W
MAPS 1003-C006-2 ATTACHED..ETC
F/D: ROAD/EASMT

GROUP#	NAME	F	TC	%-OWNER	TITLE-DESC
2 0011	CAMPBELL HAWAII INVESTOR LLC			100	

GROUP#: 2 0011
Date & Time 05/16/2012 12:12:12

01/28/2005
INSTR-DESC: AMEND LE TRANS NO: 5155116
INSTR-DATE: 01/17/2005
LC-DOC-NO: 3224610 REC-DATE: 01/28/2005

AREA: 63.5690 ACRES
OTHER-TMKS: 9-1-014-026-0000 ETC.

FROM: C R CHURCHILL, D A KENNEY, RICHARD W CUSHMAN II &
RONALD J SLATOPER, TRS UNDER THE WILL & ESTATE OF JAMES
CAMPBELL, DEC'D "TRUSTEES"
ROADS LLC "ROADS"
TO: TESORO HAWAII CORPORATION "LESSEE"
CAMPBELL HAWAII INVESTOR LLC "CHILLI"
INDENTURE OF LEASE DATED 6/28/1961, REC AS DOC 2716948. TRUSTEES
& ROADS DEMISED TO LESSEE A NON-EXCL RIGHT-OF-WAY IN THE
NATURE OF AN EASMT ALONG, THRU, UNDER & UPON ESMTS "3753"
"3753" & "3754"
F/D: ESMTS ONLY - AMENDMENT TO LEASE RE: ESMTS

GROUP#	NAME	F	TC	%-OWNER	TITLE-DESC
2 0011	CAMPBELL HAWAII INVESTOR LLC			100	

08/09/2004
INSTR-DESC: NORTH SLIP TRANS NO: 5103373
INSTR-DATE: 08/05/2004
ACK/EFF DATE: 03/26/2004

AREA: 63.5690 ACRES
OTHER-TMKS: 9-1-014-026-0000 ETC.

R/D: DESIGNATION ELECTRICAL EASMT "8246" (19,872 SF)
AFFECTING LOTS 9541 & 16382 PER MAP 1332 LCAPP 1069.
F/D: DESIGNATION ELEC EASMT "8246"

GROUP#	NAME	F	TC	%-OWNER	TITLE-DESC
2 0011	CAMPBELL HAWAII INVESTOR LLC			100	

01/02/2003
INSTR-DESC: DEED TRANS NO: 5018443

CITY AND COUNTY OF HONOLULU PARCEL HISTORY (TI102) FOR:
TMK: 9-1-014-026-0000 PAGE: 2

LC-DOC-NO: 2766586 CERT NO:600216 REC-DATE: 01/03/2002
INSTR-DATE: 01/03/2002
AREA: 63.5690 ACRES CURRENT CONDO TAX: $ 00952.7
ASSESS. LAND $: 0 BLDG $: 0 ASSESSMENT: 4230317 ACK/EFF DATE: 01/02/2002
OTHER-TMKS: 9-1-014-026-0000 ETC.

FROM: C R CHURCHILL, D A KENNEY, RICHARD W CUSHMAN II &
RONALD J SLATOPER, TRS UNDER THE WILL & ESTATE OF JAMES
CAMPBELL, DEC'D
TO: CAMPBELL HAWAII INVESTOR LLC

GROUP#	NAME	F	TC	%-OWNER	TITLE-DESC
2 0011	CAMPBELL HAWAII INVESTOR LLC			100	

GROUP#: 2 0011
Date & Time 01/02/2002 12:12:12

09/13/1994
INSTR-DESC: LCAPP 1069 MAP 711 TRANS NO: 66873
INSTR-DATE: 12/27/1994
REC-DATE: 12/27/1994

AREA: 63.5690 ACRES
NEW PARCEL FROM 9114-2
F/D: NEW; LOT 9541 MAP 711 LCAPP 1069

GROUP#	NAME	F	TC	%-OWNER	TITLE-DESC
2 0011	JAMES CAMPBELL TRUST ESTATE				

----------SEE HISTORY SHEET FOR MORE INFORMATION----------

CITY AND COUNTY OF HONOLULU PARCEL HISTORY (TI102) FOR:
TMK: 9-1-014-026-0000 PAGE: 1

04/22/1997
INSTR-DESC: DOT RD - CORRECT SHORT FORM LEASE 6-83-1 TRANS NO: 59803
INSTR-DATE: 04/22/1997

AREA: 73,095 SQ.FT.
FROM: 9114-24: 73,095 SF OR 1.678 AC
TO: 9114-26-0031(NEW), CREATED FOR ASSESSMENT PURPOSES
TO: 9114-26-0032(NEW), 71,969 SF, ESMTS "3436" (5497 SF); "3437"
(5541 SF), "3438" (8461 SF) & ESMT "C" (3693 SF)
IMP NOTE: ESMTS SHOWN ON MAP 914 LCAPP 1069, ON FILE
F/D: R&M

GROUP#	NAME	F	TC	%-OWNER	TITLE-DESC
3 0011	STATE OF HAWAII				DOT RD

----------SEE HISTORY SHEET FOR MORE INFORMATION----------

CITY AND COUNTY OF HONOLULU PARCEL HISTORY (TY102) FOR:
TMK: 9-1-014-024-0000 PAGE: 1

09/30/2010
INSTR-DESC: ROUTE SLIP TRANS NO: 6333338
INSTR-DATE: 10/14/2010
ACK/EFF DATE: 01/01/1980

AREA: 224.6191 ACRES
OTHER-TMKS: 9-1-014-024-0000 ETC.

DOT HD - NEW - LE #HD9-45
TO: 9114-43(NEW) - 4.313 AC (187,874 SF)
F/D: AREA; NEW
FOR LOT 9540 MAP 710 LCAPP 1069

GROUP#	NAME	F	TC	%-OWNER	TITLE-DESC
2 0011	S OF N DOT HARBORS DIV				

GROUP#: 2 0011
Date & Time 09/30/2010 12:12:12

09/30/2009
INSTR-DESC: ROUTE SLIP TRANS NO: 5306052
INSTR-DATE: 11/17/2009
ACK/EFF DATE: 02/01/2008

AREA: 228.9331 ACRES
OTHER-TMKS: 9-1-014-024-0000 ETC.

TMK: 9114-31, 9114-36 & 9114-39
DOT HD - NEW - LE #HD8-44
TO: 9114-39 (NEW) - 480,380 SF (11.028 AC)
*THE NOTE: PER PATTI HARBORS, PAR 26 MOVED TO A NEW LOCATION, BUT THERE IS
NO MAP OF THE NEW SITE. PAR 26 AS GIVEN ON THE MAP.
F/D: AREA; NEW
FOR LOT 9540 MAP 710 LCAPP 1069

GROUP#	NAME	F	TC	%-OWNER	TITLE-DESC
2 0011	S OF N DOT HARBORS DIV				

GROUP#: 2 0011
Date & Time 09/30/2009 12:12:12

07/31/2009
INSTR-DESC: ROUTE SLIP TRANS NO: 5297355
INSTR-DATE: 07/31/2009
ACK/EFF DATE: 05/01/2008

AREA: 239.9601 ACRES
OTHER-TMKS: 9-1-014-024-0000 ETC.

DOT HD - NEW - RP #HD8-2615
TO: 9114-40 (NEW) - 5.000 SF
F/D: AREA; NEW
FOR LOT 9540 MAP 710 LCAPP 1069

GROUP#	NAME	F	TC	%-OWNER	TITLE-DESC
2 0011	S OF N DOT HARBORS DIV				

GROUP#: 2 0011
Date & Time 07/31/2009 12:12:12

09/25/2008
INSTR-DESC: ROUTE SLIP TRANS NO: 5275046
INSTR-DATE: 09/25/2008
ACK/EFF DATE: 02/01/2006

CITY AND COUNTY OF HONOLULU PARCEL HISTORY (TY102) FOR:
TMK: 9-1-014-024-0000 PAGE: 2

AREA: 240.0749 ACRES
OTHER-TMKS: 9-1-014-024-0000 ETC.

DOT HD - NEW - LE #07-33
TO: 9114-25 104,634 SF (2.402 AC)
F/D: AREA; NEW
FOR LOT 9540 MAP 710 LCAPP 1069

GROUP#	NAME	F	TC	%-OWNER	TITLE-DESC
2 0011	S OF N DOT HARBORS DIV				

GROUP#: 2 0011
Date & Time 09/25/2008 12:12:12

07/29/2008
INSTR-DESC: ROUTE SLIP TRANS NO: 5169878
INSTR-DATE: 07/29/2008
ACK/EFF DATE: 08/01/2033

AREA: 242.4369 ACRES
OTHER-TMKS: 9-1-014-024-0000 ETC.

DOT HD - NEW - RP #HD3-2422
TO: 9114-38 (NEW) - 3,968 SF
F/D: AREA; NEW
FOR LOT 9540 MAP 710 LCAPP 1069

GROUP#	NAME	F	TC	%-OWNER	TITLE-DESC
2 0011	S OF N DOT HARBORS DIV				

GROUP#: 2 0011
Date & Time 07/29/2008 12:12:12

05/07/2008
INSTR-DESC: ROUTE SLIP TRANS NO: 5259058
INSTR-DATE: 05/07/2008
ACK/EFF DATE: 06/01/2005

AREA: 242.1680 ACRES
OTHER-TMKS: 9-1-014-024-0000 ETC.

DOT HD - NEW - RP #HD4-2464
*THE NOTE: DESIGNATED CPR 01 TO REGULATE AREA.
F/D: AREA CORRECTION
FOR LOT 9540 MAP 710 LCAPP 1069

GROUP#	NAME	F	TC	%-OWNER	TITLE-DESC
2 0011	S OF N DOT HARBORS DIV				

GROUP#: 2 0011
Date & Time 05/07/2008 12:12:12

10/01/2007
INSTR-DESC: ROUTE SLIP TRANS NO: 5247985
INSTR-DATE: 11/15/2007
ACK/EFF DATE: 04/01/2004

AREA: 239.8170 ACRES
OTHER-TMKS: 9-1-014-024-0000 ETC.

DOT HD - NEW - RP #HD4-2836
TO: 9114-37 (NEW) - 95,775 SF
F/D: AREA; NEW
FOR LOT 9540 MAP 710 LCAPP 1069

CITY AND COUNTY OF HONOLULU PARCEL HISTORY (TY102) FOR:
TMK: 9-1-014-025-0000 PAGE: 1

09/25/2008
INSTR-DESC: ROUTE SLIP TRANS NO: 5275046
INSTR-DATE: 09/25/2008
ACK/EFF DATE: 02/01/2006

AREA: 149,114 SQ.FT.
OTHER-TMKS: 9-1-014-024-0000 ETC.

DOT HD - NEW - LE #07-33
FROM: 9114-24 - 104,634 SF (2.403 AC)
FROM: STATE OF HAWAII (DOT HD)
TO: MARISCO LTD
TERM: 35YRS COMMENCING 02/01/2006 & ENDING 01/31/2041
RENTAL: $220,535.00/YR FOR THE 1ST 10-YR PERIOD
EFFECTIVE: 02/01/2006
PURPOSE: OPERATION OF A SHIP REPAIR FACILITY
*THE NOTE: THE SQUARE FOOTAGE OF LEASE CONVERTS TO 3.378 AC & NOT 3.474 AC
AS GIVEN IN DESC. PER P.PALSGROVE, CHANGE AC TO MATCH.
F/D: NEW - LEASES
LOT A POR LOT 9540 MAP 710 LCAPP 1069
KALAKAUA HARBORS POINT HARBOR 147,338 SF (3.479 AC) DSD
67,333 SF OF SUBMERGED LAND

GROUP#	NAME	F	TC	%-OWNER	TITLE-DESC
2 0011	STATE OF HAWAII				
7 0011	MARISCO LTD				NEW LE #07-33

GROUP#: 2 0011
Date & Time 01/25/2001 12:12:12

05/26/2006
INSTR-DESC: ROUTE SLIP TRANS NO: 5275023
INSTR-DATE: 09/25/2008
ACK/EFF DATE: 01/01/2006

AREA: 42,500 SQ.FT.
OTHER-TMKS: 9-1-014-068-0000 ETC.

DOT HD - TERMINATION - LE #HD0-10
FROM: 9114-25-0031 - REGULATING CPR
FROM: 9114-25-0032 - 841 SF
FROM: 9114-25-0033 - 414 SF
FROM: MARISCO LTD
TO: STATE OF HAWAII (DOT HD)
TERMINATED: 01/31/2026
*THE NOTE: 1) PER AF EMAIL FROM PATTI MIYASHIRO @HARBORS, ALTHOUGH THE LEASE
NOTING A TERMINATION DATE OF 02/14/31, MARISCO LTD WAS ON A HOLDOVER UNTIL
NEGOTIATIONS FOR THE NEW LEASE (#07-33) COULD BE WORKED OUT WHICH RESULTED
IN A LATER TERMINATION DATE. 2) LE #HD0-10 IN THIS 9114-08-0003 & 9114-35
ALONG WITH CPRS 1 THRU 3.
F/D: LE - OUT; TERMINATED
MARISCO BLDG GRND FLR 42,500 SF

GROUP#	NAME	F	TC	% OWNER	TITLE-DESC
2 0011	STATE OF HAWAII				TERM LE #HD0-10

GROUP#: 2 0011
Date & Time 05/26/2006 12:12:12

04/26/2006
INSTR-DESC: ROUTE SLIP TRANS NO: 5266323
INSTR-DATE: 04/26/2006

CITY AND COUNTY OF HONOLULU PARCEL HISTORY (TY102) FOR:
TMK: 9-1-014-025-0000 PAGE: 2

AREA: 42,500 SQ.FT.
OTHER-TMKS: 9-1-014-068-0000 ETC. ACK/EFF DATE: 02/14/1966

DOT HD - RENTAL REVISION - EP #HD0-10
FROM: STATE OF HAWAII (DOT HD)
TO: MARISCO LTD
TERM: RENEWED AT/ON 02/14/1956
RENTAL: $17,174.84/MO
EFFECTIVE: 02/16/1996
PURPOSE: CONSTRUCTION & MAINTENANCE
*THE NOTE: UNABLE TO LOCATE ORIGINAL LEASE. PER RENTAL REVISION, RENT WAS
INCREASED EFFECTIVE 02/16/94 THRU 02/14/2001.
F/D: REVISD ONLY - RENTAL REVISION
MARISCO BLDG GRND FLR 42,500 SF

GROUP#	NAME	F	TC	%-OWNER	TITLE-DESC
2 0011	STATE OF HAWAII				DOT HD
7 0011	MARISCO LTD				H-90-10

GROUP#: 2 0011
Date & Time 05/26/2006 12:12:12

12/31/1992
INSTR-DESC: DOT HD - CONSENT TO SUBLEASE H-90-10 TRANS NO: 66867
INSTR-DATE: 01/27/1993

AREA: 131,477 SQ.FT.
TO: 9114-25-0033, 414 SF
F/D: CHANGE IN FLOOR SPACE AREA

GROUP#	NAME	F	TC	%-OWNER	TITLE-DESC
2 0011	STATE OF HAWAII				DOT HD
7 0011	MARISCO LTD				H-90-10

12/31/1992
INSTR-DESC: DOT HD - CONSENT TO SUBLEASE H-90-10 TRANS NO: 66866
INSTR-DATE: 01/27/1993

AREA: 131,477 SQ.FT.
TO: 9114-25-0031, CREATED FOR ASSESSMENT PURPOSES
- 9114-25-0032, HSM, 841 SF
F/D: CHANGE IN FLOOR SPACE AREA

GROUP#	NAME	F	TC	%-OWNER	TITLE-DESC
2 0011	STATE OF HAWAII				DOT HD
7 0011	MARISCO LTD				H-90-10

12/31/1992
INSTR-DESC: DOT HD - LEASE NO H-90-10 TRANS NO: 66866
INSTR-DATE: 01/27/1993

AREA: 131,477 SQ.FT.
FROM: 9114-24, 131,477 SF OR 3.018 AC
FROM: STATE OF HAWAII (DOT HD) TO: MARISCO, LTD
RENTAL: $358.53/ANN. TO BE 677 ALA MOANA BOULEVARD
- PAID QUARTERLY AT $89.634.25 HONOLULU, HAWAII 96813
TERM: 2/16/81 TO 2/16/96
EFFECTIVE: 2/16/81
PURPOSE: CONSTRUCTION & MAINTENANCE
- OF IMPROVEMENTS, FOR THE OPERATION

CITY AND COUNTY OF HONOLULU PARCEL HISTORY (TY102) FOR:
TMK: 9-1-014-024-0000 PAGE: 5

TO: 9114-24-0003(NEW), 160 SF
F/D: CHANGE IN FLOOR SPACE AREA

GROUP#	NAME	F	TC	%-OWNER	TITLE-DESC
2 0011	STATE OF HAWAII				DOT HD

09/15/1998 — INSTR-DESC: DOT HD - NEW REV PMT NO R-97-1958 — TRANS NO: 66823, INSTR DATE: 09/15/1998

AREA: 186.0603 ACRES

TO: 9114-24-0004(NEW), 7855 SF
F/D: CHANGE IN FLOOR SPACE AREA

GROUP#	NAME	F	TC	%-OWNER	TITLE-DESC
2 0011	STATE OF HAWAII				DOT HD

09/10/1997 — INSTR-DESC: LUC MAP R/S — TRANS NO: 66835, INSTR-DATE: 11/03/1997

AREA: 187.7440 ACRES

FORMER ZONING: A & U
CHANGED TO: U
URB: 186.060 AC
TOTAL: 186.060 AC
CANCEL: THE R95-331
SOURCE OF CHANGE: LUC RULE A&O A96-719 DTD 4/29/97
TMK NOTE: AREA BY MAPPING BRANCH FOR ASSESSMENT PURPOSES ONLY.

GROUP#	NAME	F	TC	%-OWNER	TITLE-DESC
2 0011	STATE OF HAWAII				DOT HD

09/10/1997 — INSTR-DESC: DOT HD - NEW REV PMT NO R-96-1888 — TRANS NO: 66837, INSTR-DATE: 10/31/1997

AREA: 186.0680 ACRES

TO: 9114-24-0037(NEW), 500 SF
F/D: CHANGE IN FLOOR SPACE AREA

GROUP#	NAME	F	TC	%-OWNER	TITLE-DESC
2 0011	STATE OF HAWAII				DOT HD

05/07/1997 — INSTR-DESC: DOT HD - REV PMT NO R-96-1901 — TRANS NO: 66819, INSTR-DATE: 05/07/1997

AREA: 186.0680 ACRES

TO: 9114-24-0036(NEW), 13,000 SF
F/D: CHANGE IN FLOOR SPACE AREA

GROUP#	NAME	F	TC	%-OWNER	TITLE-DESC
2 0011	STATE OF HAWAII				DOT HD

04/02/1997 — INSTR-DESC: DOT HD - CORRECT SHORT FORM LEASE R-89-1 — TRANS NO: 66838, INSTR-DATE: 04/02/1997

AREA: 186.0680 ACRES

TO: 9114-20(NEW), 73,095 SF OR 1.678 AC

CITY AND COUNTY OF HONOLULU PARCEL HISTORY (TY102) FOR:
TMK: 9-1-014-024-0000 PAGE: 6

F/D: AREA, HDHY

GROUP#	NAME	F	TC	%-OWNER	TITLE-DESC
2 0011	STATE OF HAWAII				DOT HD

03/24/1995 — INSTR-DESC: DOT HD - NEW REV PMT RF R-94-1842 — TRANS NO: 66831, INSTR-DATE: 03/24/1995

AREA: 187.7440 ACRES

TO: 9114-24-0005(NEW), 100 SF
F/D: CHANGE IN FLOOR SPACE AREA

GROUP#	NAME	F	TC	%-OWNER	TITLE-DESC
2 0011	STATE OF HAWAII				DOT HD

08/16/1995 — INSTR-DESC: LUC MAP R/S — TRANS NO: 66833, INSTR-DATE: 08/16/1995

AREA: 187.7440 ACRES

FORMER ZONING: PICKUP PARCEL
CHANGED TO: A & U
AGR: 63.999 AC
URB: 123.747 AC
TOTAL: 187.746 AC
TMK NOTE: AREA BY MAPPING BRANCH FOR ASSESSMENT PURPOSES ONLY.

GROUP#	NAME	F	TC	%-OWNER	TITLE-DESC
2 0011	STATE OF HAWAII				DOT HD

09/10/1994 — INSTR-DESC: COMMISSIONER'S & RECEIVER'S ASSIGNMENT/L — INSTR NO: 9400161500, CERT NO: 255591 — TRANS NO: 66836, INSTR-DATE: 09/28/1994, REC-DATE: 09/30/1994
LC-DOC-NO: 2184746

AREA: 187.7440 ACRES — STATE-CONV-TAX: $ 1503.25

FROM: HARRO A ROBERTS, SUCCESSOR COMMISSIONER & RECEIVER
TO: DRIGGS PACIFIC INDUSTRIES, INC
HARBOR LEASE H-89-14, PIER 6 HARBORS POINT HARBOR
EXCEPTING THE FOLLOWING DESCRIBED EASEMENTS:
I EASEMENTS 2426 & 2427
II EASEMENT 2428C
III EASEMENT 2429
IV EASEMENTS 2430, 2431, & 2432
V EASEMENT 2433
VI EASEMENTS 2434 & 2435
F/D: KEYED ONLY--LE OVER ESMTS

GROUP#	NAME	F	TC	%-OWNER	TITLE-DESC
2 0011	STATE OF HAWAII				DOT HD

08/28/1994 — INSTR-DESC: LOAPP 1069 MAP 710 — TRANS NO: 66832, INSTR-DATE: 12/27/1994

AREA: 187.7410 ACRES

FROM: 9114 2 83.995 AC LOT 4021 D
CURE OF LOT 2154 & 9721-B UNDO LOT 9540 PER MAP 710 LOAPP 1069
LCD 118803: NEW C-448245 ISSUED
TMK NOTE: LOT 9540 ACCONVEYED FOR IN TMK 9114-8, 24 & 25

CITY AND COUNTY OF HONOLULU PARCEL HISTORY (TY102) FOR:
TMK: 9-1-014-024-0000 PAGE: 3

GROUP#	NAME	F	TC	%-OWNER	TITLE-DESC
2 0011	C OF H DOT HARBORS DIV				

GROUP#: 2 0011
Date & Time 10/01/2007 12:12:12

11/03/2004 — INSTR-DESC: SOUTH SLIP — TRANS NO: 6331345, INSTR-DATE: 10/18/2004

AREA: 241.6700 ACRES

R/E: DESIGNATION OF SAILING ESMT "8350" (142 SF) PER MAP
1333 LOAPP 1069.
F/D: ESMT
FOR LOT 9540 MAP 710 LOAPP 1069

GROUP#	NAME	F	TC	%-OWNER	TITLE-DESC
3 0011	STATE OF HAWAII				

08/13/2003 — INSTR-DESC: SOUTH SLIP — TRANS NO: 6017043, INSTR-DATE: 08/13/2003
ACK/EFF DATE: 07/01/2002

AREA: 241.6700 ACRES
OTHER-TMKS: 9-1-014-024-0000 ETC.

DOT HD - AMENDMENT #1 - RP 98-01-3298
TO: 9114-36 - 1,000 SF
F/D: AREA; HDHY

GROUP#	NAME	F	TC	%-OWNER	TITLE-DESC
2 0011	STATE OF HAWAII				

GROUP#: 2 0011
Date & Time 08/13/2003 10:13:13

02/26/2002 — INSTR-DESC: SOUTH SLIP — TRANS NO: 5039513, INSTR-DATE: 10/01/2001
ACK/EFF DATE: 02/26/2002

AREA: 241.6933 ACRES
OTHER-TMKS: 9-1-014-024-0000 ETC.

DOT-HD: R P 98-01-2298
TO: 9114-36 (NEW) 5000 SF
F/D: AREA, HDHY

GROUP#	NAME	F	TC	%-OWNER	TITLE-DESC
2 0011	STATE OF HAWAII			1	

GROUP#: 2 0011
Date & Time 02/26/2002 12:12:12

03/21/2001 — INSTR-DESC: LOAPP 1069, MAP 1019 — TRANS NO: 3026311, INSTR-DATE: 06/03/2030
ACK/EFF DATE: 09/28/2001

AREA: 241.8080 ACRES

FOR LOT 9542 DESIGNATED INTO 9542-B PER MAP 1019, LOAPP 1069
F/D: LOT 9542-B & FOR LOT 9540

CITY AND COUNTY OF HONOLULU PARCEL HISTORY (TY102) FOR:
TMK: 9-1-014-024-0000 PAGE: 4

GROUP#	NAME	F	TC	%-OWNER	TITLE-DESC
2 0011	STATE OF HAWAII				DOT HD

03/22/2001 — INSTR-DESC: DOT HD - NEW REV PMT R-99-2133 — TRANS NO: 3050851, INSTR-DATE: 01/15/2001
ACK/EFF DATE: 03/22/2001

AREA: 241.8080 ACRES

TO: 9114-35(NEW), 64 SF OR 0.001 AC
F/D: AREA, HDHY

GROUP#	NAME	F	TC	%-OWNER	TITLE-DESC
2 0011	STATE OF HAWAII				DOT HD

03/12/2001 — INSTR-DESC: DOT HD - NEW REV PMT R-99-2186 — TRANS NO: 3050849, INSTR-DATE: 12/01/1999
ACK/EFF DATE: 03/22/2001

AREA: 241.8080 ACRES

TO: 9114-30(NEW), 33,665 SF OR 0.750 AC
F/D: AREA, HDHY

GROUP#	NAME	F	TC	%-OWNER	TITLE-DESC
2 0011	STATE OF HAWAII				DOT HD

02/17/2000 — INSTR-DESC: DOT HD - NEW REV PMT R-99-2097 — TRANS NO: 66829, INSTR-DATE: 02/17/2000

AREA: 242.5680 ACRES

TO: 9114-24-0010(NEW), 15,003 SF OR 0.344 AC
F/D: CHANGE IN FLOOR SPACE AREA

08/30/1999 — INSTR-DESC: DOT HD - REVISE REV PMNT NO R-97-1910 — TRANS NO: 66827, INSTR-DATE: 10/27/1999

AREA: 242.5680 ACRES

TO: 9114-24-0008, 3500 SF OR 0.080 AC
F/D: CHANGE IN FLOOR SPACE AREA

GROUP#	NAME	F	TC	%-OWNER	TITLE-DESC
2 0011	STATE OF HAWAII				DOT HD

06/30/1999 — INSTR-DESC: HDHY CHANGE — TRANS NO: 66826, INSTR-DATE: 06/03/1999

AREA: 242.5680 ACRES

FROM: 9114 27 56.50 AC FOR LOT 9542
F/D: AREA, HDHY; FOR LOT 9542 ETC

GROUP#	NAME	F	TC	%-OWNER	TITLE-DESC
2 0011	STATE OF HAWAII				DOT HD

05/27/1999 — INSTR-DESC: DOT HD - NEW REV PMT NO R-98-1952 — TRANS NO: 66835, INSTR-DATE: 05/27/1999

AREA: 186.0680 ACRES

CITY AND COUNTY OF HONOLULU PARCEL HISTORY (TY102) FOR:
TMK: 9-1-014-002-0000 PAGE: 1

05/14/2012 — INSTR-DESC: GRANT — TRANS NO: 5203455 — INSTR-DATE: 05/02/2012 — REC-DATE: 05/14/2012
LC-DOC-NO: T-8169111 — CERT NO:603219 — ADDL CERT:612024
AREA: 4.1340 ACRES
OTHER-PARC: 9-1-014-002-0000 ETC.

JAMES CAMPBELL COMPANY LLC & CAMPBELL HAWAII INVESTOR LLC "GRANTOR"
HAWAIIAN ELECTRIC COMPANY INC "GRANTEE"
GRANTOR CONVEYS UNTO GRANTEE A PERPETUAL RIGHT & EASE TO
CONSTRUCT, OPERATE, MAINTAIN, ACCESS, REBUILD & REMOVE POLES, GUY
WIRES, ANCHORS, OVERHEAD &/OR UNDERGROUND WIRE LINES & OTHER
APPLIANCES...FOR THE TRANSMISSION...OF ELECTRICITY...FOR LIGHT, POWER &/OR
COMMUNICATIONS...OVER, UNDER, ACROSS & THROUGH...PREMISES
BEING LOT 424 MAP 75...& LOT 9541 MAP 731....EASE BEING SHOWN ON R/W
MAPS 1360-030B-2 ATTACHED..ETC
F/D: GRNT/EASE

GROUP#	NAME	F	TC	%-OWNER	TITLE-DESC
2 0011	JAMES CAMPBELL COMPANY LLC				

GROUP#: 2 0011
Date & Time 05/14/2012 12:12:12

07/03/2006 — INSTR-DESC: DEED — TRANS NO: 5206215 — INSTR-DATE: 07/01/2006 — REC-DATE: 07/03/2006
LC-DOC-NO: 3448328 — CERT NO:612024 — ADDL CERT:612030
AREA: 4.1340 ACRES — STATE-CONV-TAX: $ 1776
OTHER-PARC: 9-1-014-002-0000 ETC.

C H CHURCHILL, D A KEENAN, RICHARD W GUSHMAN II & RONALD J
BLAKEMAN, TRUSTEES UNDER THE WILL & ESTATE OF JAMES CAMPBELL
DEC'D "GRANTOR"
JAMES CAMPBELL COMPANY LLC "GRANTEE"

GROUP#	NAME	F	TC	%-OWNER	TITLE-DESC
2 0011	JAMES CAMPBELL COMPANY LLC				

02/10/1998 — INSTR-DESC: QUITCLAIM DEED — TRANS NO: 66739 — INSTR-DATE: 01/19/1998 — REC-DATE: 02/10/1998
LC-DOC-NO: 2437466 — CERT NO:491119
AMOUNT: $46,500
AREA: 4.1340 ACRES — STATE-CONV-TAX: $ 46.50

FROM: R P CASSIDAY, C H CHURCHILL, D A KEENAN & T C LEPPERT, TRUSTEES
UNDER THE WILL AND OF THE ESTATE OF JAMES CAMPBELL, DEC'D
TO: ROADS LLC
LOT 3159 4.436 AC MAP 332 LCAPP 1069
LOT 425-C-1 4.372 AC MAP 331 LCAPP 1069
LOT 424-C 0.927 AC MAP 330 LCAPP 1069
LOT 372-C 32.853 AC MAP 330 LCAPP 1069
LOT 70-C-1 2.822 AC MAP 329 LCAPP 1069
LOT 84-A-2-A 0.184 AC MAP 329 LCAPP 1069
LOT 2493 10.345 AC MAP 329 LCAPP 1069
TO: 9114-29 12.695 AC LOTS 424-C, 425-C-1 & 3159 NEW
F/D: AREA, NEW; LOT 424

GROUP#	NAME	F	TC	%-OWNER	TITLE-DESC
2 0011	JAMES CAMPBELL TRUST ESTATE				

05/06/1998

CITY AND COUNTY OF HONOLULU PARCEL HISTORY (TY102) FOR:
TMK: 9-1-014-002-0000 PAGE: 2

INSTR-DESC: GRANT OF EASEMENT — TRANS NO: 66733 — INSTR-DATE: 12/19/1997 — REC-DATE: 02/06/1998
LC-DOC-NO: 2420353 — CERT NO:585344
AREA: 14.3000 ACRES

FROM: F R CASSIDAY, C H PRATT JR, C H CHURCHILL & D A KEENAN TRUSTEES
UNDER THE WILL AND OF THE ESTATE OF JAMES CAMPBELL, DEC'D
TO: CAMPBELL WAIMANALO LLC
GRANTOR GRANT UNTO GRANTEE A PERPETUAL NON-EXCLUSIVE EASMT, APPURTENANT
TO LOT 2310-A OVER & ACROSS THE ROAD LOTS FOR ACCESS PURPOSES.
TMK NOTE: EASMTS NOT SHOWN; EASMTS IN EASMT
F/D: SUBJ TO EASMT IN FAVOR OF TMK 9132-96

GROUP#	NAME	F	TC	%-OWNER	TITLE-DESC
2 0011	JAMES CAMPBELL TRUST ESTATE				

06/16/1995 — INSTR-DESC: LOC MAP R/S — TRANS NO: 66726 — INSTR-DATE: 06/16/1995

AREA: 14.2000 ACRES
FORMER ZONING: A & U
CHANGED TO: A & U
AGR: 12.075 AC
CPR: 4.134 AC
TOTAL: 16.209 AC
CANCEL: M 90-106
SOURCE OF CHANGE: LOC MCBY INT 95-21 DTD 8/24/95
TMK NOTE: AREA BY MAPPING BRANCH FOR ASSESSMENT PURPOSES ONLY.

GROUP#	NAME	F	TC	%-OWNER	TITLE-DESC
2 0011	JAMES CAMPBELL TRUST ESTATE				

05/13/1994 — INSTR-DESC: LCAPP 1069 MAP 731 — TRANS NO: 66724 — INSTR-DATE: 12/27/1995

AREA: 16.2000 ACRES

CONS OF LOTS 3130 & 4021-A AND RESUBD INTO LOTS 9541 & 9542
PER MAP 731 LCAPP 1069
LOTS 9541 & 9542 TO NEW PARCELS 9114-26 & 27, RESP
F/D: AREA, NEW; LOTS 424, 424-C & 425-C-1 & 3159

GROUP#	NAME	F	TC	%-OWNER	TITLE-DESC
2 0011	JAMES CAMPBELL TRUST ESTATE				

05/05/1994 — INSTR-DESC: LCAPP 1069 MAP 730 — TRANS NO: 66730 — INSTR-DATE: 12/27/1994

AREA: 363.5430 ACRES

TO: 9114-24 83.909 AC LOT 4021-A
F/D: AREA, NEW; LOTS 4021-A ETC.

GROUP#	NAME	F	TC	%-OWNER	TITLE-DESC
2 0011	JAMES CAMPBELL TRUST ESTATE				

09/08/1994 — INSTR-DESC: LCAPP 1069 MAP 727 — TRANS NO: 66725 — INSTR-DATE: 12/27/1994

CITY AND COUNTY OF HONOLULU PARCEL HISTORY (TY102) FOR:
TMK: 9-1-014-008-0000 PAGE: 1

12/31/1992 — INSTR-DESC: DOT RD - REV EMT H-88-1693 — TRANS NO: 66756 — INSTR-DATE: 01/26/1993

AREA: 205.0000 ACRES

TO: 9114-8-0001, CHANGE FOR ASSESSMENT PURPOSES
- 9114-8-0002, NEW, 67332 SF OR 1.546 AC
F/D: CHANGE IN FLOOR SPACE AREA

GROUP#	NAME	F	TC	%-OWNER	TITLE-DESC
2 0011	STATE OF HAWAII				DOT RD

12/31/1992 — INSTR-DESC: DOT RD - REV EMT H-86-1344 — TRANS NO: 66758 — INSTR-DATE: 01/26/1993

AREA: 205.0000 ACRES
TO: 9114-34, 106.933 AC (PIECES)
F/D: AREA, NEW

GROUP#	NAME	F	TC	%-OWNER	TITLE-DESC
2 0011	STATE OF HAWAII				DOT RD

04/29/1992 — INSTR-DESC: EASMT MAP 590 LCAPP 1069 — TRANS NO: 66760 — INSTR-DATE: 06/10/1992

AREA: 309.7230 ACRES
DESIGNATION OF EASMTS 3130 TO 3134 INCL PER MAP 590 LCAPP 1069
F/D: EASMTS

GROUP#	NAME	F	TC	%-OWNER	TITLE-DESC
2 0011	STATE OF HAWAII				DOT RD

04/01/1991 — INSTR-DESC: MAP R/S: EASMTS MAP 540 LCAPP 1069 — TRANS NO: 66753 — INSTR-DATE: 04/22/1991

AREA: 309.7230 ACRES
DESIGNATION OF EASMTS 2579 TO 2581 INCL PER MAP 540 LCAPP 1069
TMK NOTE: EASMTS 33 & 329 CANCELLED BY MAP 451 LCAPP 1069.
F/D: EASMTS

GROUP#	NAME	F	TC	%-OWNER	TITLE-DESC
2 0011	STATE OF HAWAII				DOT RD

07/10/1990 — INSTR-DESC: SHORT FORM SUBLEASE — TRANS NO: 66755 — INSTR-DATE: 08/20/1990 — REC-DATE: 05/13/1990
LC-DOC-NO: 1763500 — CERT NO:235391
AREA: 309.7230 ACRES — STATE-CONV-TAX: $ 108.15

FROM: HAWAII PACIFIC INDUSTRIES INC
TO: ASS BARGERS POINT INC
LESSOR GRNS NONEXCLUSIVE LEASE EASMTS 2434 & 2435 (15-FT WIDE) WITHIN LOT
3156, MAP 526, LCAPP 1069, COMMENCING ON DATE OF THAT CERTAIN SHORT
SUBLEASE & TERMINATING 1/27/2024.....
F/D: REVISD ONLY - NON-EXCL/EASMTS

GROUP#	NAME	F	TC	%-OWNER	TITLE-DESC
2 0011	STATE OF HAWAII				DOT RD

07/10/1990

CITY AND COUNTY OF HONOLULU PARCEL HISTORY (TY102) FOR:
TMK: 9-1-014-008-0000 PAGE: 2

INSTR-DESC: 1ST RESTATED SHORT-FORM LEASE — TRANS NO: 66751 — INSTR-DATE: 07/10/1990 — REC-DATE: 07/11/1990
LC-AA-NO: 1763499 — CERT NO:235391
AREA: 309.7230 ACRES

FROM: STATE OF HAWAII, DEPT OF TRANSPORTATION
TO: HAWAII PACIFIC INDUSTRIES INC
EASTS DESIGNATED & SPECIFIED IN HARBOR LE NO. H 88 16, PIER 6, BARBERS
POINT HARBOR AS AMENDED:
LOT 3156 265.658 AC MAP 321 ACAPP 1369
SHORT FORM LEASE, DOC 1707939..IN CONSIDERATION OF THE MUTUAL COVENANTS
SET FORTH & EASMT RESERVED IN THAT CERTAIN UNREC "STATE OF HAWAII HARBOR
LEASE NO. H-88-16, PIER 6, BARBERS POINT HARBOR" DTD EFFEC 1/27/89 AS
AMENDED. ALL TERMS & CONDITIONS ARE HEREBY MADE A PART HEREOF & HEREBY
INCORPORATED.
F/D: EASES ONLY - RESTATED SHORT FORM LEASE

GROUP#	NAME	F	TC	%-OWNER	TITLE-DESC
2 0011	STATE OF HAWAII				DOT RD

07/10/1990 — INSTR-DESC: SHORT FORM LEASE — TRANS NO: 66752 — INSTR-DATE: 02/23/1990 — REC-DATE: 02/23/1990
LC-DOC-NO: 1707939 — CERT NO:235391
AREA: 309.7230 ACRES — STATE-CONV-TAX: $ 501.70

FROM: STATE OF HAWAII, DEPT OF TRANSPORTATION
TO: HAWAII PACIFIC INDUSTRIES INC
LOT 3156 MAP 399 LCAPP 1069
LESSOR HAS DEMISED & LEASED TO LESSEE & LESSEE HAS RENTED & LEASED FROM
LESSOR, CERTAIN EASEMENTS ACROSS THE LAND, WHICH ARE MORE PARTICULARLY
DESC IN THE HEREINAFTER-DESCRIBED LE OF WHICH THIS INSTRUMENT IS
INTENDED TO BE A SHORT FORM LE....."STATE OF HAWAII HARBOR LEASE H-88-16,
PIER 6, BARBERS POINT HARBOR" DTD EFFEC 1/27/89....
F/D: REVISD ONLY - NON-EXCL/EASMT

GROUP#	NAME	F	TC	%-OWNER	TITLE-DESC
2 0011	STATE OF HAWAII				DOT RD

06/13/1990 — INSTR-DESC: MAP R/S (EASMT) — TRANS NO: 66750 — INSTR-DATE: 07/18/1990

AREA: 309.7230 ACRES
DELETION EASMT "2295" & DESIGNATION EASMTS "2426" TO "2435" INCL PER
MAP 526 LCAPP 1069.
F/D: EASMTS "2426" TO "2435" INCL.

GROUP#	NAME	F	TC	%-OWNER	TITLE-DESC
2 0011	STATE OF HAWAII				DOT RD

02/01/1990 — INSTR-DESC: MAP R/S (EASMT) — TRANS NO: 66754 — INSTR-DATE: 04/13/1990

AREA: 309.7230 ACRES
DESIGNATION CONVEYOR EASMT "2295" PER MAP 501 LCAPP 1069
F/D: EASMT "2295"

GROUP#	NAME	F	TC	%-OWNER	TITLE-DESC
2 0011	STATE OF HAWAII				DOT RD

LAND APPRAISAL CARD

DESCRIPTION: 424-C, 425-B) 425-C, 426, 3155, 3158 & 3159
Lot 4021 LCApp 1069 Pms

HPR:
APP: Marten UNIT

ZONING: C&O C.U.C.

CARD 2 OF CARDS
ZONE SEC 9 1 PLAT 24 PARCEL 02

FM CODE

OWNER	TITLE HISTORY	NET AREA
	(For 1972-73 Designation of Fuel Line Easmt 667 (0.10Aac) affecting this parcel) THB M-511'71-72)	766.122ac
	(For 1982 20.002ac (Lot 702) fr 9116-08, 165.23ac (Lot 68) fr 9115-03, 36.55ac (Lot 294) fr 9115-09 & Area revised to 981.011ac due to erosion to Lots 104 & 294; Lot 425 Subd into Lots 425-A, 425-B & 425-C LCApp 1069, Cons Lots 104 & 294 less erosion & Lots 68, 102, 103, 105, 109-A, 110, 424-A, 425-A, 701 & 702 resubd into Lots 3154 thru 3159 LCApp 1069; 240.658ac (Lot 3155) to 9114-08, 8.240ac (Lot 3157) to 9114-21 (new) & 190.089ac (Lot 3154) to 9115-03 THB M-263 & 269'81)	342.024ac
	R: 11/4/81 to C&C of Bon 2.105ac (Lot 425-B) dropped into rd CF ooms 4/29/81 Doc 1114159	539.919ac 539.919ac
	(For 1983-84 Designation of Pipeline Easmt "1222" 10/13/82 THB M-212'82)	
	(For 1984 designation of Range Light Easmt "1284" (20,200@) per Map 350 5/18/83 THB M-44'83)	539.919ac
	(For 1985 Subd Lot 425 into Lots 425-C-1 (4.712ac) & 425-C-2 (0.787ac) 1/15/85 THB M-672'85) (Map Case 266962 Issued w/9115-12 etal) toa/t	539.919ac
	(For 1987 Corr.57Aac (Lot 3155) to 9115-03, Cons & Resubd; 308.988ac (Lot 4021) fr 9115-03 THB M-294 & 315'88)	448.339ac

RECEIVED AS FOLLOWS

RESIDENTIAL APPRAISAL CARD

SOURCE:	VOL. Ewa		DIV.
BY HN/wd DATE 3/24/58	DEED. ETC.	TMB NO.	9 1 14 2
BY DATE			

NO.	Cert 15770 GRANTOR ETC. PAGE 1	AREA OF PARCEL	GRANTEE ETC.
1	As shown on Tax Maps	2107.339 Ac.	James Campbell Trust Estate (Hawaii Meat Co)le
2	TMB M-617'57,1/3(2/3 8;3/3 6) HN/wd 3/24/58		
	R/S: From 9114-6 4.41 Ac.	2045.105 Ac.	James Campbell Trust Estate
	From 9114-8 35.00 Ac.		
	Total area 2146.749 Ac. revised to 2145.105 Ac.		
	Portion 9114-2 Lots 64, 107, 245-A & 246		
	cons & resubd into Lots 424 to 436 incl.		
	as per Map 79 LCApp 1069. (lease out)		
	To 9114-10(New) Lot 428 100.00 Ac.		
	F/D: 9114-2; Area,des & bdy; Lots 424 etc.;		
	LCApp 1069.		
3	TMB 3410'58 (9-1-14-11,etc) DL 10/10/58		
	D: To 9-1-14-11 (1) 800.00 ac lot 427	1835.105 ac	James Campbell Trust Estate
	To 9-1-14-12 (1) 10.00 ac. lot 434		
	1/2/58 3/31/58		
	F/D: 9-1-14-2, area, lot 67,etc, Ld Ct.		
	App 1069 1835.105 ac.		

(Contd.)

NOTE: LAST AREA & GRANTEE FINAL DATA AS SHOWN ON TAX MAPS

SOURCE:	VOL. Ewa	1959	DIV.
BY lb/wd DATE 12/7/59	DEED. ETC.	TMB NO.	9 1 14 2
BY DATE			

NO.	PAGE 2 GRANTOR ETC.	AREA OF PARCEL	GRANTEE ETC.
3.	As shown on Tax Maps	1835.105 Ac.	James Campbell Trust Estate
4.	TMB M-522'59,1/4 lb/wd 12/7/59.		
	R/S: Portion 9114-2 975.002 Ac. Lots	860.[illegible] Ac.	ditto
	429 to 433, 435 & 436 cons & resubd into	960.100 Ac.	
	Lots 591 to 624 incl. per Map 95.		
	Lots 615 & 621 cons & resubd into Lots		
	704 to 718 per Map 100.		
	Lots 601 & 602 cons into Lot 703 per		
	Map 99.		
	Lots 608, 609 & 624 cons & resubd into		
	Lots 719 & 720 per Map 101.		
	To NEW PLAT 9126-1 etc. 246.603 Ac.		
	To NEW PLAT 9131-1 etc. 201.094 Ac.		
	To NEW PLAT 9132-1 etc. 527.305 Ac.		
	F/D: 9114-2; revised area,des & bdy; Lots		
	102 etc.; LCApp 1069.		

(Contd.)

NOTE: LAST AREA & GRANTEE FINAL DATA AS SHOWN ON TAX MAPS

SOURCE:	LOC. & TITLE: Honouliuli, Ewa		1962	DIV.
BY: JT/sy DATE: 8/24/62	DEED, ETC.:	THB NO.		9 1 14 2
BY: DATE:				

NO.	PAGE 4 GRANTOR ETC.	AREA OF PARCEL	GRANTEE ETC.
1.	As shown on Tax Maps	851.464 Ac	James Campbell Trust Estate
2.	TMB M-652'62, 1/4(2/4, 9115-1) JT/sy 8/24/62		
	R/S: Subd of Lot 424 (219.940 Ac) into Lots 424-A (138.664 Ac), 424-B (80.349 Ac) and 424-C (0.927 Ac) per Map 132, Ld Ct App 1069.	851.464 Ac	do
	Other subareas - O.K.		
	F/D: 9114-2; Per Subd. Lots 424-A, etc Ld Ct App 1069.		
3.	TMB 6554'63(9114-2 etc)DL/sy 8/19/63		
	Surv/E, Gr: James Campbell Trust Est	851.464 Ac	do
	To: Standard Oil Co of Calif Doc 312815-17 C-15790, 71042 & 76329 2/19/63		
	7/30/63 Grantee, in exch for Re-W granted surrender & quitclaim unto grantors, all rts in & to those certain Re-W, etc; grantors, in exch grant & convey unto Grantee the rt in nature of a R/W, etc.		
	KEYED ONLY		
4.	TMB 7415'63 (1903-18,1909-69,9114-2) LB/pl 9/10/63		
	R/S: Est of Rosalie Stephenson, dec'd Died 7/27/62 in Hon. Prob. 23300,1st Cir. No F/O to date. Unrecorded lease for 31 yrs fr 10/1/49 to 10/1/79 over 1.033Ac.	do	do
	KEYED ONLY	NOTE: LAST AREA & GRANTEE FINAL DATA AS SHOWN ON TAX MAPS	

SOURCE:	LOC. & TITLE: Ewa		1960	DIV.
BY: MN/wd DATE: 1/12/61	DEED, ETC.:	THB NO.		9 1 14 2
BY: DATE:				

NO.	PAGE 3 GRANTOR ETC.	AREA OF PARCEL	GRANTEE ETC.
1.	TMB 2069'60 1/2 MN/wd 1/12/61		
	R/S: Portion parcel 9114-2 being Lot 702 LCApp 1069 dropped into 9114-8(Pick up). Request by AHL/Tax Off.	840.098 Ac.	James Campbell Trust Estate
	F/D: 9114-2; Area & bdy.		
5	TMB M-222'61 1/4 DL 7/6/61		
	R/S: By Map 122 of Ld Ct App 1069 an area of 0.931 ac pors of lot 617 & 618 dropped into 9-1-26-26 (2). Remaining area of 1.023 ac. being pors lots 617 & 618 is consolidated into lot 1104 as shown on map 122 of Ld Ct App 1069	839.167 ac	James Campbell Trust Estate
	F/D: 9-1-14-2, area.		
6	TMB 5136'61 (9-1-14-13) DL 8/1/61		
	L: To 9-1-14-13 (1) 32.703 ac lot 245-3 Doc: 275602 Cert: 15790 1/4/57 6/28/61	806.464 ac	James Campbell Trust Estate
	F/D: 9-1-14-2, area.		
7	TMB 6685 '62 2/2 DL 8/14/62		
	R/S: From 9-1-14-7 (2) 45.00 ac	851.464 ac	James Campbell Trust Estate
	F/D: 9-1-14-2, area		
		NOTE: LAST AREA & GRANTEE FINAL DATA AS SHOWN ON TAX MAPS	

TAX MAPS BRANCH HISTORY SHEET

DATE: 5/10/70

LOCATION:

TITLE:

DIV.	S	E	PLAT	PAR
	9	1	14	2

NO.	Page 6 GRANTOR, ETC.	AREA OF PARCEL	GRANTEE, ETC.
7	As shown on tax maps	766.128 Ac	James Campbell Trust Estate
8	TMB 36395'69-70(9110-2 etc)DL/en 6/10/70		
	A/L: Ewa Sugar Co Inc To: Oahu Sugar Co Ltd	do	do
	Doc 500009-10 C15790 SCT$00 Cons:$10		
	4/9/70 5/1/70 KEYED ONLY		
9	TMB M-51C'71-72 3/3 DL 7/5/72		
	R/S: Designation of e xemption at Kam.mat	766.128 ac	James Campbell Trust Estate
	666(0.207 ac) 10 ft wide for duct line		
	purposes over and across Lot 424-B per		
	Map 213 of Ld Ct App 1069.		
	F/Ds 9-1-14-2 for Exc nt 666		
10	TMB M-51 '71-72 LN 7/7/72		
	R/S: Designation of Fuel Line Ease't 668	766.128 Ac.	do
	[2.104 Ac.], affecting this parcel, per		
	Map 213 of L C App 1069.		
	F/D: 9114-2; Designation of Ease't.		

CONTINUED

NOTE: INFORMATION ON THIS SHEET IS SUBJECT TO CHANGE

TAX MAPS BRANCH HISTORY SHEET

DATE: 11/29/63 (5 Lots)

LOCATION:

TITLE:

1963

DIV.	S	E	PLAT	PAR
	9	1	14	2

NO.	PAGE 5 GRANTOR, ETC.	AREA OF PARCEL	GRANTEE, ETC.
5	TMB M-450'63 1/2 DL 11/29/63		
	R/Ss To 9-1-15-12 (2) 30.349 ac	771.115 ac	James Campbell Trust Estate
	Lot 424-B Ld Ct App 1069		
	F/Ds: 9-1-14-2, Area, Lot 102 etc		
	Ld Ct App 1069		
6	TMB 10068'63 (9-1-14-2,etc) DL 12/2/63		
	Ds James Campbell Trust Estate to City	760.339 ac	James Campbell Trust Estate
	& County of Honolulu 10.776 ac. [illegible]		
	KAPIO ROAD, brdg: Lots 604, 705, LDP,		
	606, & LDP4 Ld Ct App 1069 Docs 31903-79		
	Cert: 74299 (76932, 82896 & 85871)		
	Cons:GL. RDs— 12/31/62 11/7/63		
	Subj: to Re of Standard Oil Co for wire		
	lines, etc Ewa Pltn Co. does hereby		
	quitclaim.		
	F/Ds: 9-1-14-2, Area		
7	TMB 16251'64(9114-2)NT/wr 1/9/65		
	From: 9114-5(5), 5.789 Ac	766.128 Ac	do
	Q/Ds: United States of America To: James		
	Campbell Trust Estate Doc 351455		
	C-101350 10/20/64 1/7/65		
	Quitclaim all rt, title & int in.		
	F/Ds: 9114-2; Area, bdry, Lot 103, 109-A etc		

(End)

NOTE: INFORMATION ON THIS SHEET IS SUBJECT TO CHANGE

TAX MAPS BRANCH HISTORY SHEET

DATE:
LOCATION:
TITLE:

DIV. 9 | 1 | PLAT 14 | PAR 2

NO.	Page 7 GRANTOR, ETC.	AREA OF PARCEL	GRANTEE, ETC.
10	As shown on tax maps	766.128 Ac	To: James Campbell Trus: Estate
11	TMB M-263 & 269'81 UK/mm 10/1/81	542.024 Ac	do
	R/S: From 9114-8(4) 20.002 Ac, Lot 702		
	9115-3(5) 165.23 Ac, Lot 68		
	-9(4) 36.55 Ac, Lot 294		
	Area revised to 981.011 Ac due to erosion		
	to Lots 104 & 294. Lot 425 subd into Lots		
	425-A, 425-B & 425-C per Map 320, LCApp 1060.		
	Cons Lots 104 & 294 less erosion & Lots		
	68, 102, 303, 305, 309-A, 310, 424-A,		
	425-A, 701 & 702 resubd into Lots 3154 thru		
	3159 top/E per Map 322, LCApp 1069.		
	To: 9114-8(4) 240.658 Ac, Lot 3156		
	-21(new) 8.240 Ac, Lot 3157		
	9115-3(5) 190.089 Ac, Lot 3154		
	F/D: Area, bdry; Lot 424-C, Map 132; Lot 425-B		
	& 425-C, Map 320; Lot 426, Map 79;		
	Lots 3155, 3158, 3159, Map 322.		
12	TMB 13433'82 LN/cmr 5/18/82		
	D: (2.05 Ac. lot 425-2)Dropped into Dd	539.919 Ac	do
	James Campbell Trust Estate To: City And		
	County of Honolulu Doc 1114159 C-239957		
	11/4/81 4/29/82		
	F/D: Area & Bdry, lots 424-C etc		

CONTINUED

NOTE: INFORMATION ON THIS SHEET IS SUBJECT TO CHANGE

TAX MAPS BRANCH HISTORY SHEET

DATE:
LOCATION:
TITLE: Lot 424-C Map 132 etc

DIV. 9 | 1 | PLAT 14 | PAR 2

NO.	Page 8 GRANTOR, ETC.	AREA OF PARCEL	GRANTEE, ETC.
12	As shown on tax map	539.919 Ac	James Campbell Trust Estate
13	TMB M-317'82 FH/cmr 10/13/82		
	R/S: Designation of Pipeline Esmt "1222"	do	do
	per Map 326 LCApp 1069		
	F/D: Esmt		
14	TMB M-19'83 FH/ 2/23/83		
	R/S: Designation per Pipeline Esmt "1223"	do	do
	& "1224" per Map 340 LCApp 1069.		
	F/D: Esmt		
15	TMB M-94'83 FH/yc 5/18/83		
	R/S: Designation of RANGE LIGHT ESMT "128-"	do	do
	(20,260 S) per Map 350, LCApp 1069.		
	F/D: Esmt		
16	TMB M-472'84 RT/jr 1/25/83		
	R/S: Subd Lot 424-C into Lots 425-C-1	do	do
	(4.712 ac) & 425-C-2 (0.787 Ac) Top/E		
	per Map 373 LCApp 1069 Desc C-266962		
	F/D: Por Subd		
17	TMB M-294 & 315'86 RT/bm 2/12/87		
	R/S: To 9115-3(7) 400.578Ac, Lot 3155	468.329 Ac	do
	From 9115-3(7) 308.988Ac, lot 4021		
	Cons & resubd into lot 4021 per Map 406		
	LCApp 1069.		
	F/D: Area, bdry		

CONTINUED

NOTE: INFORMATION ON THIS SHEET IS SUBJECT TO CHANGE

CITY AND COUNTY OF HONOLULU
DEPARTMENT OF FINANCE • TAX MAPS SECTION

TAX MAPS BRANCH HISTORY SHEET

DIV.

DATE		Z	S	PLAT	PAR
LOCATION		9	1	14	2
TITLE					

NO	PAGE 9 GRANTOR, ETC	AREA OF PARCEL	GRANTEE, ETC
1R	TMK 9-7-1-000025 JV/Em 1/27/83		
	R/S: Designation of drainage esm't "1461" per Map 407 LCApp 1069.	848.329 Ac	James Campbell Trust Est
	F/D: Esm't		

NOTE: INFORMATION ON THIS SHEET IS SUBJECT TO CHANGE

SF 40 M A
REVISED 8/81



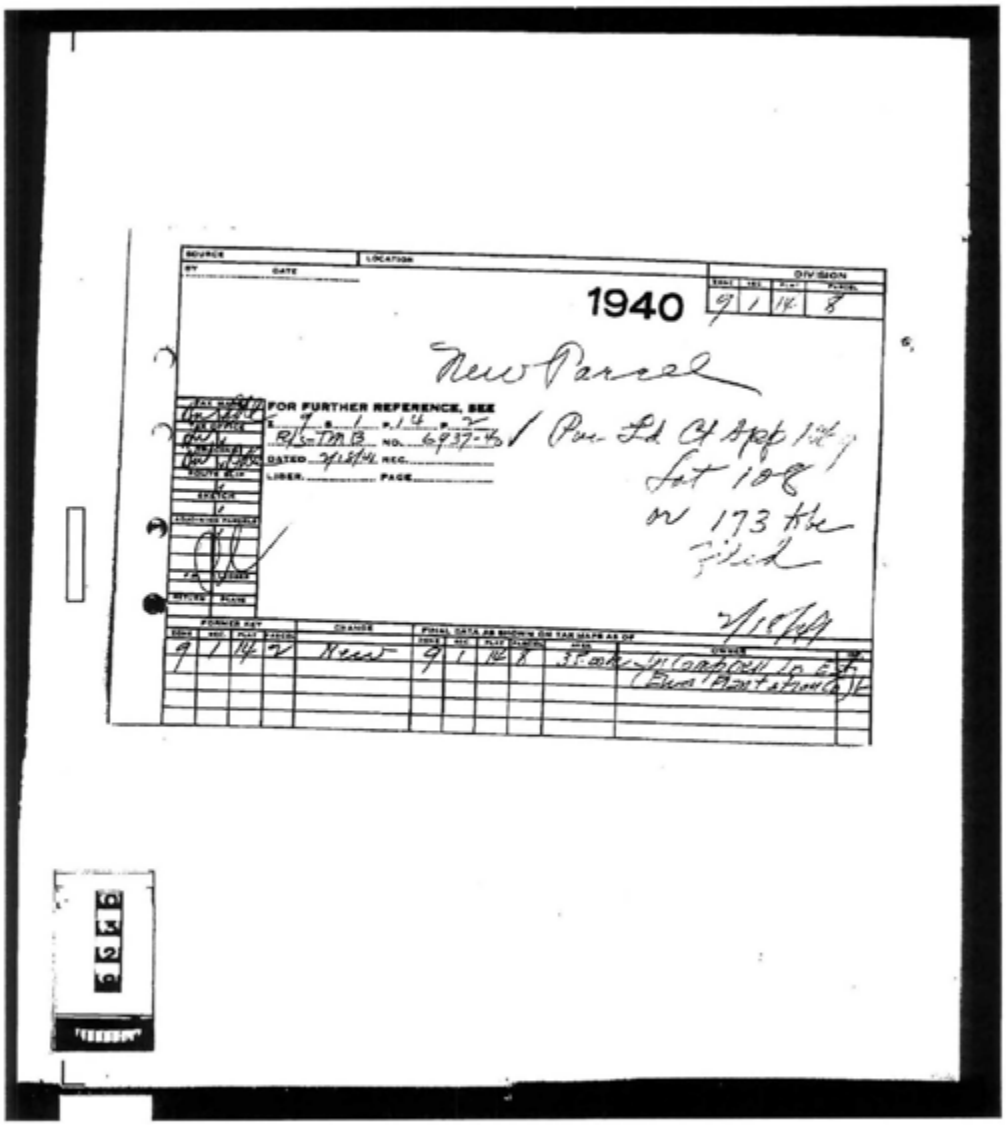


SOURCE(S): Vol. 4 Plan Exhibit 1 Lot 702

BK:	HH/wd	DATE: 3/24/58	DEED, ETC.:	TMK NO.:	DIV. 9	1	14	8
BY:		DATE:						

NO	GRANTOR, ETC	AREA OF PARCEL	GRANTEE, ETC
1	As shown on Tax Maps	35.0 Ac.	James Campbell Trust Estate (Dun Plantation Co)Ltd
2	TMK M-617'57,2/3(1/3 2; 3/3 6) HH/wd 3/24/58		
	R/3: Parcel 9114-8 35.0 Ac. dropped into	NONE	ERROR??
	9114-2(2). Lease out.		
	F/D: 9114-8; dropped.		
3.	TMK 2069'60,2/2 HH/wd 1/12/61		
	R/3: From 9114-2(5) Lot 702 20.002 Ac.	20.002 Ac.	James Campbell Trust Estate
	F/D: 9114-8; Pick up; Lot 702; LCApp 1069		
4	TMK M-263 & 269'81 WD/sm 10/1/81	240.658 Ac	do
	R/S: To 9114-2(11) 20.002 Ac. Lot 702 From 9114-2(11) 240.658 Ac. Lot 3156		
	F/D: Area, bdry; Lot 3156, Map 322.		
5	F/C/C: State of Hawaii, Civ No. 63019, 1st Cir Ct vs F E Trotter, Inc. etal Doc 1082445 L-235391 8/24/81 8/28/81	do	To: State of Hawaii
	SEE COMPUTER		

NOTE: LAST AREA & GRANTEE FINAL DATA AS SHOWN ON TAX MAPS



REGULATORY RECORDS
DOCUMENTATION

Kalaeloa Harbors
John Wayne Avenue
Kapolei, HI 96707

Inquiry Number: 3593654.2s
May 01, 2013

The EDR Radius Map™ Report with GeoCheck®

EDR® Environmental Data Resources Inc

440 Wheelers Farms Road
Milford, CT 06461
Toll Free: 800.352.0050
www.edrnet.com

FORM-STD-KKT

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Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

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EXECUTIVE SUMMARY

A search of available environmental records was conducted by Environmental Data Resources, Inc (EDR). The report was designed to assist parties seeking to meet the search requirements of EPA's Standards and Practices for All Appropriate Inquiries (40 CFR Part 312), the ASTM Standard Practice for Environmental Site Assessments (E 1527-05) or custom requirements developed for the evaluation of environmental risk associated with a parcel of real estate.

TARGET PROPERTY INFORMATION

ADDRESS

JOHN WAYNE AVENUE
KAPOLEI, HI 96707

COORDINATES

Latitude (North):	21.3247000 - 21° 19' 28.92"
Longitude (West):	158.1161000 - 158° 6' 57.96"
Universal Tranverse Mercator:	Zone 4
UTM X (Meters):	591666.7
UTM Y (Meters):	2358202.0
Elevation:	13 ft. above sea level

USGS TOPOGRAPHIC MAP ASSOCIATED WITH TARGET PROPERTY

Target Property Map:	21158-C1 EWA, HI
Most Recent Revision:	Not reported

TARGET PROPERTY SEARCH RESULTS

The target property was not listed in any of the databases searched by EDR.

DATABASES WITH NO MAPPED SITES

No mapped sites were found in EDR's search of available ("reasonably ascertainable ") government records either on the target property or within the search radius around the target property for the following databases:

STANDARD ENVIRONMENTAL RECORDS

Federal NPL site list

NPL ..... National Priority List
Proposed NPL ..... Proposed National Priority List Sites
NPL LIENS ..... Federal Superfund Liens

Federal Delisted NPL site list

Delisted NPL ..... National Priority List Deletions

EXECUTIVE SUMMARY

Federal CERCLIS list

CERCLIS ..... Comprehensive Environmental Response, Compensation, and Liability Information System
FEDERAL FACILITY ..... Federal Facility Site Information listing

Federal CERCLIS NFRAP site List

CERC-NFRAP ..... CERCLIS No Further Remedial Action Planned

Federal RCRA non-CORRACTS TSD facilities list

RCRA-TSDF ..... RCRA - Treatment, Storage and Disposal

Federal RCRA generators list

RCRA-LQG ..... RCRA - Large Quantity Generators
RCRA-CESQG ..... RCRA - Conditionally Exempt Small Quantity Generator

Federal institutional controls / engineering controls registries

US ENG CONTROLS ..... Engineering Controls Sites List
US INST CONTROL ..... Sites with Institutional Controls
LUCIS ..... Land Use Control Information System

Federal ERNS list

ERNS ..... Emergency Response Notification System

State and tribal landfill and/or solid waste disposal site lists

SWF/LF ..... Permitted Landfills in the State of Hawaii

State and tribal leaking storage tank lists

INDIAN LUST ..... Leaking Underground Storage Tanks on Indian Land

State and tribal registered storage tank lists

INDIAN UST ..... Underground Storage Tanks on Indian Land
FEMA UST ..... Underground Storage Tank Listing

State and tribal voluntary cleanup sites

INDIAN VCP ..... Voluntary Cleanup Priority Listing

State and tribal Brownfields sites

BROWNFIELDS ..... Brownfields Sites

ADDITIONAL ENVIRONMENTAL RECORDS

Local Brownfield lists

US BROWNFIELDS ..... A Listing of Brownfields Sites

Local Lists of Landfill / Solid Waste Disposal Sites

DEBRIS REGION 9 ..... Torres Martinez Reservation Illegal Dump Site Locations
ODI ..... Open Dump Inventory
INDIAN ODI ..... Report on the Status of Open Dumps on Indian Lands

Local Lists of Hazardous waste / Contaminated Sites

US CDL ..... Clandestine Drug Labs
CDL ..... Clandestine Drug Lab Listing
US HIST CDL ..... National Clandestine Laboratory Register

Local Land Records

LIENS 2 ..... CERCLA Lien Information

Records of Emergency Release Reports

HMIRS ..... Hazardous Materials Information Reporting System
SPILLS ..... Release Notifications
SPILLS 90 ..... SPILLS 90 data from FirstSearch

Other Ascertainable Records

DOT OPS ..... Incident and Accident Data
FUDS ..... Formerly Used Defense Sites
CONSENT ..... Superfund (CERCLA) Consent Decrees
ROD ..... Records Of Decision
UMTRA ..... Uranium Mill Tailings Sites
US MINES ..... Mines Master Index File
TRIS ..... Toxic Chemical Release Inventory System
TSCA ..... Toxic Substances Control Act
FTTS ..... FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
HIST FTTS ..... FIFRA/TSCA Tracking System Administrative Case Listing
SSTS ..... Section 7 Tracking Systems
ICIS ..... Integrated Compliance Information System
PADS ..... PCB Activity Database System
MLTS ..... Material Licensing Tracking System
RADINFO ..... Radiation Information Database
FINDS ..... Facility Index System/Facility Registry System
RAATS ..... RCRA Administrative Action Tracking System
RMP ..... Risk Management Plans
UIC ..... Underground Injection Wells Listing
DRYCLEANERS ..... Permitted Drycleaner Facility Listing
AIRS ..... List of Permitted Facilities
INDIAN RESERV ..... Indian Reservations
SCRD DRYCLEANERS ..... State Coalition for Remediation of Drycleaners Listing
COAL ASH EPA ..... Coal Combustion Residues Surface Impoundments List
COAL ASH DOE ..... Steam-Electric Plant Operation Data
PCB TRANSFORMER ..... PCB Transformer Registration Database
US FIN ASSUR ..... Financial Assurance Information
EPA WATCH LIST ..... EPA WATCH LIST
PRP ..... Potentially Responsible Parties

US AIRS ..... Aerometric Information Retrieval System Facility Subsystem
2020 COR ACTION ..... 2020 Corrective Action Program List
Financial Assurance ..... Financial Assurance Information Listing

EDR HIGH RISK HISTORICAL RECORDS

EDR Exclusive Records

EDR MGP ..... EDR Proprietary Manufactured Gas Plants
EDR US Hist Auto Stat ..... EDR Exclusive Historic Gas Stations
EDR US Hist Cleaners ..... EDR Exclusive Historic Dry Cleaners

SURROUNDING SITES: SEARCH RESULTS

Surrounding sites were identified in the following databases.

Elevations have been determined from the USGS Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified. Sites with an elevation equal to or higher than the target property have been differentiated below from sites with an elevation lower than the target property.
Page numbers and map identification numbers refer to the EDR Radius Map report where detailed data on individual sites can be reviewed.

Sites listed in ***bold italics*** are in multiple databases.

Unmappable (orphan) sites are not considered in the foregoing analysis.

STANDARD ENVIRONMENTAL RECORDS

Federal RCRA CORRACTS facilities list

CORRACTS: CORRACTS is a list of handlers with RCRA Corrective Action Activity. This report shows which nationally-defined corrective action core events have occurred for every handler that has had corrective action activity.

A review of the CORRACTS list, as provided by EDR, and dated 02/12/2013 has revealed that there is 1 CORRACTS site within approximately 1 mile of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
HONOLULU WOOD TREATING CO LTD	***91 921 HANUA ST***	***SE 1/2 - 1 (0.550 mi.)***	***F19***	***56***

Federal RCRA generators list

RCRA-SQG: RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Small quantity generators (SQGs) generate between 100 kg and 1,000 kg of hazardous waste per month.

A review of the RCRA-SQG list, as provided by EDR, and dated 02/12/2013 has revealed that there is 1

RCRA-SQG site within approximately 0.25 miles of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
HAWAIIAN DREDGING AND CONSTRUC	***91 063 MALAKOLE ST***	***SSE 0 - 1/8 (0.004 mi.)***	***B4***	***12***

State- and tribal - equivalent CERCLIS

SHWS: The State Hazardous Waste Sites records are the states' equivalent to CERCLIS. These sites may or may not already be listed on the federal CERCLIS list. Priority sites planned for cleanup using state funds (state equivalent of Superfund) are identified along with sites where cleanup will be paid for by potentially responsible parties. The data come from the Department of Health.

A review of the SHWS list, as provided by EDR, and dated 01/17/2013 has revealed that there are 19 SHWS sites within approximately 1 mile of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
BARBERS POINT HARBOR PIER 5	BARBERS POINT HARBOR PI	0 - 1/8 (0.000 mi.)	1	7
HECO - CAMPBELL INDUSTRIAL PAR	***91-550 KALAELOA BLVD***	***E 1/2 - 1 (0.677 mi.)***	***21***	***69***
HICKLIN VALLEY DETROIT DIESEL	***91-265 KALAELOA BLVD***	***SE 1/2 - 1 (0.790 mi.)***	***23***	***73***
CHEMWOOD TREATMENT CO, INC.	***91-476 KOMOHANA ST***	***ESE 1/2 - 1 (0.946 mi.)***	***29***	***85***
GRACE PACIFIC CORPORATION - GR	91-205 KALAELOA BLVD	SE 1/2 - 1 (0.961 mi.)	30	87

Lower Elevation	Address	Direction / Distance	Map ID	Page
HONSADOR	***91-151 MALAKOLE RD***	***0 - 1/8 (0.001 mi.)***	***A2***	***8***
SUN HOME METALS	***91-567 NUKUAWA ST***	***SSW 0 - 1/8 (0.120 mi.)***	***C9***	***35***
HAWAIIAN WESTERN STEEL DUMP	***HANUA ST & MALAKOLE ST***	***SE 1/4 - 1/2 (0.443 mi.)***	***E15***	***47***
CHEVRON - HAWAII REFINERY	***91-480 MALAKOLE ST.***	***SE 1/4 - 1/2 (0.449 mi.)***	***E16***	***48***
HAWAII RACEWAY PARK	***91-201 MALAKOLE ST***	***SE 1/4 - 1/2 (0.453 mi.)***	***E17***	***53***
HONOLULU WOOD TREATING COMPANY	***91-291 HANUA ST***	***SE 1/2 - 1 (0.550 mi.)***	***F20***	***66***
BEI (BREWER ENVIRONMENTAL INDU	***91-291 KAOMI LP***	***S 1/2 - 1 (0.708 mi.)***	***22***	***70***
COVAN WAREHOUSE	91-238 KALAELOA BLVD	SE 1/2 - 1 (0.791 mi.)	24	75
BONJON'S TUXEDOS	***91-226 KAUHI ST.***	***SE 1/2 - 1 (0.808 mi.)***	***25***	***75***
TILECO, INC	***91-209 HANUA ST***	***SE 1/2 - 1 (0.839 mi.)***	***26***	***76***
HONOLULU RESOURCE RECOVERY VEN	***91-174 HANUA STREET***	***SSE 1/2 - 1 (0.925 mi.)***	***27***	***78***
AES HAWAII, INC.	***91-086 KAOMI LOOP***	***SSE 1/2 - 1 (0.932 mi.)***	***28***	***84***
UNITEK ENVIRONMENTAL SERVICES,	***91-125 KAOMI LP***	***SSE 1/2 - 1 (0.966 mi.)***	***31***	***88***
CHEVRON PIPELINE BREAK AT HAWA	***220 KOMOHANA ST***	***SE 1/2 - 1 (0.977 mi.)***	***32***	***90***

State and tribal leaking storage tank lists

LUST: The Leaking Underground Storage Tank Incident Reports contain an inventory of reported leaking underground storage tank incidents. The data come from the Department of Health's Active Leaking Underground Storage Tank Log Listing.

A review of the LUST list, as provided by EDR, and dated 03/05/2013 has revealed that there are 2 LUST sites within approximately 0.5 miles of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
HONSADOR	***91-151 MALAKOLE RD***	***0 - 1/8 (0.001 mi.)***	***A2***	***8***
Facility Status: Site Cleanup Completed (NFA)				
OAHU WASTE SERVICES, INC	***91-310 HANUA ST***	***SE 1/4 - 1/2 (0.459 mi.)***	***E18***	***55***
Facility Status: Site Cleanup Completed (NFA)				

State and tribal registered storage tank lists

UST: The Underground Storage Tank database contains registered USTs. USTs are regulated under Subtitle I of the Resource Conservation and Recovery Act (RCRA). The data come from the Department of Health's Listing of Underground Storage Tanks.

A review of the UST list, as provided by EDR, and dated 03/05/2013 has revealed that there are 2 UST sites within approximately 0.25 miles of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
HONSADOR	***91-151 MALAKOLE RD***	***0 - 1/8 (0.001 mi.)***	***A2***	***8***
HAWAIIAN INDEPENDENT REFINERY	91-325 KOMOHANA ST	S 1/8 - 1/4 (0.126 mi.)	D10	36

State and tribal institutional control / engineering control registries

ENG CONTROLS: A listing of sites with engineering controls in place.

A review of the ENG CONTROLS list, as provided by EDR, and dated 01/17/2013 has revealed that there is 1 ENG CONTROLS site within approximately 0.5 miles of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
HONSADOR	***91-151 MALAKOLE RD***	***0 - 1/8 (0.001 mi.)***	***A2***	***8***

Voluntary Remediation Program and Brownfields sites with institutional controls in place.

A review of the INST CONTROL list, as provided by EDR, and dated 01/17/2013 has revealed that there are 3 INST CONTROL sites within approximately 0.5 miles of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
HONSADOR	***91-151 MALAKOLE RD***	***0 - 1/8 (0.001 mi.)***	***A2***	***8***
SUN HOME METALS	***91-567 NUKUAWA ST***	***SSW 0 - 1/8 (0.120 mi.)***	***C9***	***35***
HAWAIIAN WESTERN STEEL DUMP	***HANUA ST & MALAKOLE ST***	***SE 1/4 - 1/2 (0.443 mi.)***	***E15***	***47***

State and tribal voluntary cleanup sites

VCP: Voluntary Response Program Sites.

A review of the VCP list, as provided by EDR, and dated 01/17/2013 has revealed that there are 2 VCP sites within approximately 0.5 miles of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
HONSADOR	***91-151 MALAKOLE RD***	***0 - 1/8 (0.001 mi.)***	***A2***	***8***
SUN HOME METALS	***91-567 NUKUAWA ST***	***SSW 0 - 1/8 (0.120 mi.)***	***C9***	***35***

ADDITIONAL ENVIRONMENTAL RECORDS

Other Ascertainable Records

RCRA NonGen / NLR: RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Non-Generators do not presently generate hazardous waste.

A review of the RCRA NonGen / NLR list, as provided by EDR, and dated 02/12/2013 has revealed that there are 9 RCRA NonGen / NLR sites within approximately 0.25 miles of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
HONSADOR	***91-151 MALAKOLE ST***	***0 - 1/8 (0.001 mi.)***	***A3***	***10***
HAWAIIAN DREDGING CONSTRUCTION	91063 MALAKOLE STREET	SSE 0 - 1/8 (0.004 mi.)	B5	16
HAWAIIAN BITUMULS PAVING PREC	***91063 MALAKOLE STREET***	***SSE 0 - 1/8 (0.004 mi.)***	***B6***	***17***
PHILIP SERVICES HAWAII	***91 127 MALAKOLE ST***	***SSE 0 - 1/8 (0.004 mi.)***	***B7***	***19***
AMERICAN INDUSTRIAL, LLC	91-505 AWAKUMOKU ST	S 0 - 1/8 (0.093 mi.)	8	32
STORAGE SERVICES INC	***91543 NUKUAWA STREET***	***SSW 1/8 - 1/4 (0.168 mi.)***	***C11***	***36***
HAWAII DIVISION SBSB AND TC IN	91_522 NUKUAWA ST	SSW 1/8 - 1/4 (0.169 mi.)	12	38
BERING SEA ENV LLC	91 343 KAIHOLO ST	S 1/8 - 1/4 (0.180 mi.)	D13	39
AAA ISLAND ENVIRONMENTAL INC	***91 515 NUKUAWA ST***	***SSW 1/8 - 1/4 (0.233 mi.)***	***14***	***45***

DOD: Consists of federally owned or administered lands, administered by the Department of Defense, that have any area equal to or greater than 640 acres of the United States, Puerto Rico, and the U.S. Virgin Islands.

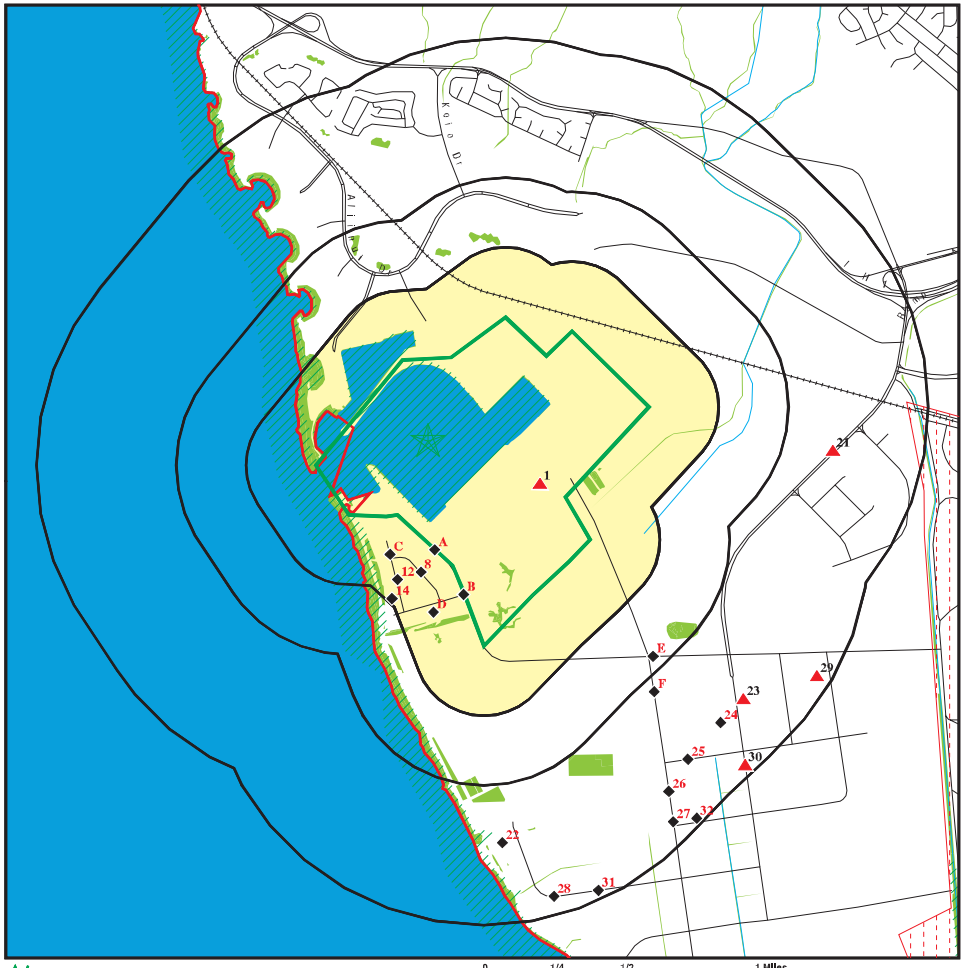
A review of the DOD list, as provided by EDR, and dated 12/31/2005 has revealed that there is 1 DOD site within approximately 1 mile of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
BARBERS POINT NAVAL AIR STATIO		E 1/2 - 1 (0.923 mi.)	0	7

Due to poor or inadequate address information, the following sites were not mapped. Count: 20 records.

Site Name	Database(s)
CHEVRON-HAWAII REFINERY	CORRACTS,CERCLIS-NFRAP,FINDS,TRIS,2020 CORRECTIVE A
KAPOLEI PIPELINE FUEL SPILL	HWS,SPILLS
HANUA STREET FUGITIVE OIL	HWS,SPILLS
TEXACO MALAKOLE STREET PIPELINE EX	HWS,SPILLS
PUMP 15 STATION, FORMER OAHU SUGAR	HWS
KALAELOA, FORMERLY NAVAL AIR STATI	RCRA-SQG
NORTH SOUTH ROAD PHASE 1C	RCRA-NLR
A AND G ENVIRONMENTAL	FINDS,RCRA-NLR
BERING SEA ECCOTECH	RCRA-NLR,HAZNET
KALAELOA HARBOR PONDS (SEE FIGURE	FINDS
KALAELOA BASEYARD	FINDS
KALAELOA HARBOR PONDS STOCKPILE (R	FINDS
KALAELOA (BARBERS POINT) HARBOR AS	FINDS
ACCESS AND ELECTRICAL IMPROVEMENTS	FINDS
WEST KALAELOA BUSINESS PARK STUDIO	FINDS
WEST KALAELOA BUSINESS PARK	FINDS
KALAELOA STORAGE AND BUILDING	FINDS
KALAELOA (JOHN RODGERS	FINDS
KALAELOA WARD (585-6330)	FINDS
CORNER OF FARRINGTON HIGHWAY AND K	SPILLS

OVERVIEW MAP - 3593654.2s



- Target Property
- Sites at elevations higher than or equal to the target property
- Sites at elevations lower than the target property
- Manufactured Gas Plants
- National Priority List Sites
- Dept. Defense Sites
- Indian Reservations BIA
- County Boundary
- Oil & Gas pipelines from USGS
- 100-year flood zone
- 500-year flood zone
- National Wetland Inventory

This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

SITE NAME: Kalaeloa Harbors ADDRESS: John Wayne Avenue Kapolei HI 96707 LAT/LONG: 21.3247 / 158.1161	CLIENT: ENPRO, Env. Professionals CONTACT: Roberta Bitzer INQUIRY #: 3593654.2s DATE: May 01, 2013 1:09 pm

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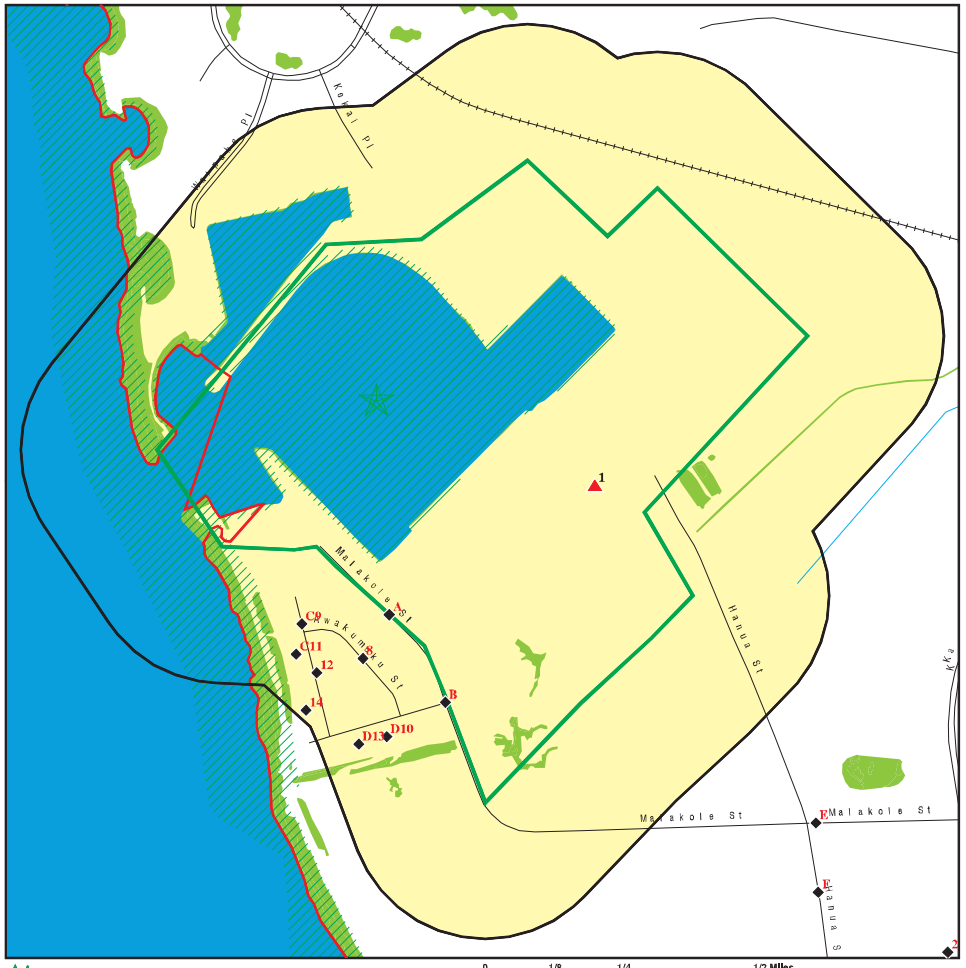
DETAIL MAP - 3593654.2s



- Target Property
- Sites at elevations higher than or equal to the target property
- Sites at elevations lower than the target property
- Manufactured Gas Plants
- Sensitive Receptors
- National Priority List Sites
- Dept. Defense Sites
- Indian Reservations BIA
- County Boundary
- Oil & Gas pipelines from USGS
- 100-year flood zone
- 500-year flood zone
- National Wetland Inventory

This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

SITE NAME: Kalaeloa Harbors ADDRESS: John Wayne Avenue Kapolei HI 96707 LAT/LONG: 21.3247 / 158.1161	CLIENT: ENPRO, Env. Professionals CONTACT: Roberta Bitzer INQUIRY #: 3593654.2s DATE: May 01, 2013 1:09 pm

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MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
STANDARD ENVIRONMENTAL RECORDS								
Federal NPL site list								
NPL	1.000		0	0	0	0	NR	0
Proposed NPL	1.000		0	0	0	0	NR	0
NPL LIENS	TP		NR	NR	NR	NR	NR	0
Federal Delisted NPL site list								
Delisted NPL	1.000		0	0	0	0	NR	0
Federal CERCLIS list								
CERCLIS	0.500		0	0	0	NR	NR	0
FEDERAL FACILITY	0.500		0	0	0	NR	NR	0
Federal CERCLIS NFRAP site List								
CERC-NFRAP	0.500		0	0	0	NR	NR	0
Federal RCRA CORRACTS facilities list								
CORRACTS	1.000		0	0	0	1	NR	1
Federal RCRA non-CORRACTS TSD facilities list								
RCRA-TSDF	0.500		0	0	0	NR	NR	0
Federal RCRA generators list								
RCRA-LQG	0.250		0	0	NR	NR	NR	0
RCRA-SQG	0.250		1	0	NR	NR	NR	1
RCRA-CESQG	0.250		0	0	NR	NR	NR	0
Federal institutional controls / engineering controls registries								
US ENG CONTROLS	0.500		0	0	0	NR	NR	0
US INST CONTROL	0.500		0	0	0	NR	NR	0
LUCIS	0.500		0	0	0	NR	NR	0
Federal ERNS list								
ERNS	TP		NR	NR	NR	NR	NR	0
State- and tribal - equivalent CERCLIS								
SHWS	1.000		3	0	3	13	NR	19
State and tribal landfill and/or solid waste disposal site lists								
SWF/LF	0.500		0	0	0	NR	NR	0
State and tribal leaking storage tank lists								
LUST	0.500		1	0	1	NR	NR	2
INDIAN LUST	0.500		0	0	0	NR	NR	0
State and tribal registered storage tank lists								
UST	0.250		1	1	NR	NR	NR	2

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
INDIAN UST	0.250		0	0	NR	NR	NR	0
FEMA UST	0.250		0	0	NR	NR	NR	0
State and tribal institutional control / engineering control registries								
ENG CONTROLS	0.500		1	0	0	NR	NR	1
INST CONTROL	0.500		2	0	1	NR	NR	3
State and tribal voluntary cleanup sites								
VCP	0.500		2	0	0	NR	NR	2
INDIAN VCP	0.500		0	0	0	NR	NR	0
State and tribal Brownfields sites								
BROWNFIELDS	0.500		0	0	0	NR	NR	0
ADDITIONAL ENVIRONMENTAL RECORDS								
Local Brownfield lists								
US BROWNFIELDS	0.500		0	0	0	NR	NR	0
Local Lists of Landfill / Solid Waste Disposal Sites								
DEBRIS REGION 9	0.500		0	0	0	NR	NR	0
ODI	0.500		0	0	0	NR	NR	0
INDIAN ODI	0.500		0	0	0	NR	NR	0
Local Lists of Hazardous waste / Contaminated Sites								
US CDL	TP		NR	NR	NR	NR	NR	0
CDL	TP		NR	NR	NR	NR	NR	0
US HIST CDL	TP		NR	NR	NR	NR	NR	0
Local Land Records								
LIENS 2	TP		NR	NR	NR	NR	NR	0
Records of Emergency Release Reports								
HMIRS	TP		NR	NR	NR	NR	NR	0
SPILLS	TP		NR	NR	NR	NR	NR	0
SPILLS 90	TP		NR	NR	NR	NR	NR	0
Other Ascertainable Records								
RCRA NonGen / NLR	0.250		5	4	NR	NR	NR	9
DOT OPS	TP		NR	NR	NR	NR	NR	0
DOD	1.000		0	0	0	1	NR	1
FUDS	1.000		0	0	0	0	NR	0
CONSENT	1.000		0	0	0	0	NR	0
ROD	1.000		0	0	0	0	NR	0
UMTRA	0.500		0	0	0	NR	NR	0
US MINES	0.250		0	0	NR	NR	NR	0
TRIS	TP		NR	NR	NR	NR	NR	0

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
TSCA	TP		NR	NR	NR	NR	NR	0
FTTS	TP		NR	NR	NR	NR	NR	0
HIST FTTS	TP		NR	NR	NR	NR	NR	0
SSTS	TP		NR	NR	NR	NR	NR	0
ICIS	TP		NR	NR	NR	NR	NR	0
PADS	TP		NR	NR	NR	NR	NR	0
MLTS	TP		NR	NR	NR	NR	NR	0
RADINFO	TP		NR	NR	NR	NR	NR	0
FINDS	TP		NR	NR	NR	NR	NR	0
RAATS	TP		NR	NR	NR	NR	NR	0
RMP	TP		NR	NR	NR	NR	NR	0
UIC	TP		NR	NR	NR	NR	NR	0
DRYCLEANERS	0.250		0	0	NR	NR	NR	0
AIRS	TP		NR	NR	NR	NR	NR	0
INDIAN RESERV	1.000		0	0	0	0	NR	0
SCRD DRYCLEANERS	0.500		0	0	0	NR	NR	0
COAL ASH EPA	0.500		0	0	0	NR	NR	0
COAL ASH DOE	TP		NR	NR	NR	NR	NR	0
PCB TRANSFORMER	TP		NR	NR	NR	NR	NR	0
US FIN ASSUR	TP		NR	NR	NR	NR	NR	0
EPA WATCH LIST	TP		NR	NR	NR	NR	NR	0
PRP	TP		NR	NR	NR	NR	NR	0
US AIRS	TP		NR	NR	NR	NR	NR	0
2020 COR ACTION	0.250		0	0	NR	NR	NR	0
Financial Assurance	TP		NR	NR	NR	NR	NR	0

EDR HIGH RISK HISTORICAL RECORDS

EDR Exclusive Records

EDR MGP	1.000		0	0	0	0	NR	0
EDR US Hist Auto Stat	0.250		0	0	NR	NR	NR	0
EDR US Hist Cleaners	0.250		0	0	NR	NR	NR	0

NOTES:

TP = Target Property

NR = Not Requested at this Search Distance

Sites may be listed in more than one database

MAP FINDINGS

Map ID / Direction / Distance / Elevation | Site | Database(s) | EDR ID Number / EPA ID Number

DOD
Region East
1/2-1
4872 ft.

BARBERS POINT NAVAL AIR STATION (CLOSED) — **DOD** — **CUSA147755**, **N/A**

BARBERS POINT NAVAL AIR S (County), HI

DOD:
- Feature 1: Navy DOD
- Feature 2: Not reported
- Feature 3: Not reported
- URL: Not reported
- Name 1: Barbers Point Naval Air Station (Closed)
- Name 2: Not reported
- Name 3: Not reported
- State: HI
- DOD Site: Yes
- Tile name: HIHONOLULU

1
< 1/8
1 ft.

Relative: Higher

Actual: 20 ft.

BARBERS POINT HARBOR PIER 5 — **SHWS** — **S108008479**
BARBERS POINT HARBOR PIER 5 — **N/A**
BARBERS POINT, HI 96707

SHWS:

Organization:	Not reported
Supplemental Location Text:	Barbers Point Harbor Pier 5
Island:	Oahu
Environmental Interest:	Deep Draft Harbor Pier 5 Crude Oil Contamination
HID Number:	Not reported
Facility Registry Identifier:	110005722236
Lead Agency:	HEER
Program:	State
Project Manager:	Unassigned
Hazard Priority:	Low
Potential Hazards And Controls:	Hazard Undetermined
Organization:	Not reported
Island:	Oahu
Location Address Line 2:	Not reported
Location Zip Suffix:	Not reported
Supplemental Location Text:	Barbers Point Harbor Pier 5
SDAR Environmental Interest Name:	Deep Draft Harbor Pier 5 Crude Oil Contamination
HID Number:	Not reported
Facility Registry Identifier:	110005722236
Lead Agency:	HEER
Progran Name:	State
Potential Hazard And Controls:	Hazard Undetermined
Priority:	Low
Assessment:	Assessment Ongoing
Response:	Not reported
Nature of Contamination:	Found: Crude oil in soil
Nature of Residual Contamination:	Not reported
Use Restrictions:	Undetermined
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported

BARBERS POINT HARBOR PIER 5 (Continued) **S108008479**

Project Manager: Unassigned
Contact Information: (808) 586-4249 919 Ala Moana Blvd, Honolulu, HI 96814

A2 **HONSADOR** **SHWS** **U003221988**
91-151 MALAKOLE RD **UIC** **N/A**
< 1/8 **KAPOLEI, HI 96707** **LUST**
0.001 mi. **UST**
4 ft. **Site 1 of 2 in cluster A** **ENG CONTROLS**
INST CONTROL
Relative: **VCP**
Lower **Financial Assurance**

Actual:
3 ft.

SHWS:
Organization: Not reported
Supplemental Location Text: Not reported
Island: Oahu
Environmental Interest: Honsador Lumber Corp
HID Number: Not reported
Facility Registry Identifier: 110013785957
Lead Agency: HEER
Program: Voluntary Response Program
Project Manager: Steve Mow
Hazard Priority: Medium
Potential Hazards And Controls: Hazard Managed With Controls
Organization: Not reported
Island: Oahu
Location Address Line 2: Not reported
Location Zip Suffix: Not reported
Supplemental Location Text: Not reported
SDAR Environmental Interest Name: Honsador Lumber Corp
HID Number: Not reported
Facility Registry Identifier: 110013785957
Lead Agency: HEER
Progran Name: Voluntary Response Program
Potential Hazard And Controls: Hazard Managed With Controls
Priority: Medium
Assessment: Response Necessary
Response: Response Complete
Nature of Contamination: Found: Arsenic
Nature of Residual Contamination: Not reported
Use Restrictions: Controls Required to Manage Contamination
Engineering Control: Engineering Control Required
Description of Restrictions: Not reported
Institutional Control: Government - Hawaii Dept. of Health Letter Issued
Within Designated Areawide Contamination: Not reported
Site Closure Type: RAM LUC
Document Date: 11/30/2010
Document Number: 2010-721-MS
Document Subject: Review of: Voluntary Response Program Draft Response Action Memorandum, Honsador Lumber Facility (Ka
Project Manager: Steve Mow
Contact Information: (808) 586-4249 919 Ala Moana Blvd, Honolulu, HI 96814

UIC:
UIC Permit Number: UO-2510
Facility Id/Lat Long Minute Coordinates: 3-1805.10.1
Central Latitude Of The Site: 21 18 58

HONSADOR (Continued) **U003221988**

Central Longitude Of The Site: 158 05 56
Flow In Gallons Per Day: 1640 gpd
Total Number Of Inj. Well(S) On Permit: 1
Island: Oahu
Location In Relation To UIC Line: Not reported
Facility Type: SEW
Subclass: B
Facility Operator, Not Contract Opr: Honsador Lumber LLC
Operator Address: 91-151 Malakole St, Kapolei, Oahu, HI 96707
Facility Owner: Honsador Lumber LLC
Owner Address: Not reported
Tax Map Key Number: 1:9-1-032:62
Owner Of Land Property On Leasehold: Not reported
Consultant Serving The Application: Clayton Group Services
Receipt Of Initial Application: 10/14/2005
Public Notice Date: Not reported
Approval-To-Construct Issuance Date: Not reported
Exemption Issuance Date: Not reported
1st Issuance Of Permit: 5/31/2007
Last Issuance Of Permit: 8/15/2012
Type: Not reported
Permit Expiration Date: 8/14/2017
Date When File Is Closed: Not reported
UIC Project Geologist: Not reported
Remarks: Not reported

LUST:
Facility ID: 9-200822
Facility Status: Site Cleanup Completed (NFA)
Facility Status Date: 04/04/2003
Release ID: 980244
Project Officer: Richard Takaba

UST:
Facility ID: 9-200822
Owner: HONSADOR
Owner Address: 91-151 MALAKOLE RD
Owner City,St,Zip: Kapolei, 96707 96707

Tank ID: R-1
Date Installed: 03/21/1974
Tank Status: **Permanently Out of Use**
Date Closed: 03/02/1992
Tank Capacity: 2000
Substance: Gasoline

Tank ID: R-2
Date Installed: 03/21/1974
Tank Status: **Permanently Out of Use**
Date Closed: 03/02/1992
Tank Capacity: 4000
Substance: Gasoline

Tank ID: R-3

HONSADOR (Continued) **U003221988**

Date Installed: 03/22/1979
Tank Status: Permanently Out of Use
Date Closed: 08/22/1998
Tank Capacity: 10000
Substance: Diesel

ENG CONTROLS:
Supplemental Location Text: Not reported
Zip Suffix: Not reported
Island: Oahu
Potential Hazards And Controls: Hazard Managed With Controls
Engineering Control: Engineering Control Required

INST CONTROL:
Potential hazards and controls: Hazard Managed With Controls
Supplemental Location: Not reported
Zip Suffix: Not reported
Island: Oahu
Institutional Control: Government - Hawaii Dept. of Health Letter Issued

VCP:
Program: Voluntary Response Program
Zip Suffix: Not reported
Supplemental Location: Not reported
Island: Oahu

HI Financial Assurance:
Alt Facility ID: 9-200822
Tank Id: R-1
Tank Status Desc: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: Not reported

Alt Facility ID: 9-200822
Tank Id: R-2
Tank Status Desc: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: Not reported

Alt Facility ID: 9-200822
Tank Id: R-3
Tank Status Desc: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: Not reported

A3 **HONSADOR** **RCRA NonGen / NLR** **1000376624**
91-151 MALAKOLE ST **FINDS** **HID981380256**
< 1/8 **EWA BEACH, HI 96706**
0.001 mi.
4 ft. **Site 2 of 2 in cluster A**

Relative:
Lower

Actual:
3 ft.

RCRA NonGen / NLR:
Date form received by agency: 11/08/2002
Facility name: HONSADOR
Facility address: 91-151 MALAKOLE ST
EWA BEACH, HI 96706

HONSADOR (Continued) **1000376624**

EPA ID: HID981380256
Contact: ENVIRONMENTAL MANAGER
Contact address: 91-151 MALAKOLE ST
EWA BEACH, HI 96707
Contact country: US
Contact telephone: Not reported
Contact email: Not reported
EPA Region: 09
Classification: Non-Generator
Description: Handler: Non-Generators do not presently generate hazardous waste

Owner/Operator Summary:
Owner/operator name: NON-NOTIFIER
Owner/operator address: NOT REQUIRED
NOT REQUIRED, ME 99999
Owner/operator country: Not reported
Owner/operator telephone: (415) 555-1212
Legal status: Private
Owner/Operator Type: Owner
Owner/Op start date: Not reported
Owner/Op end date: Not reported

Owner/operator name: NOT REQUIRED
Owner/operator address: NOT REQUIRED
NOT REQUIRED, ME 99999
Owner/operator country: Not reported
Owner/operator telephone: (415) 555-1212
Legal status: Private
Owner/Operator Type: Operator
Owner/Op start date: Not reported
Owner/Op end date: Not reported

Handler Activities Summary:
U.S. importer of hazardous waste: No
Mixed waste (haz. and radioactive): No
Recycler of hazardous waste: No
Transporter of hazardous waste: No
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: No
Furnace exemption: No
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No

Violation Status: No violations found

FINDS:

Registry ID: 110013785957

Environmental Interest/Information System
RCRAInfo is a national information system that supports the Resource

HONSADOR (Continued) **1000376624**

Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

B4 **HAWAIIAN DREDGING AND CONSTRUCTION CO** **RCRA-SQG** **1000983426**
SSE **91 063 MALAKOLE ST** **FINDS** **HID981631328**
< 1/8 **KAPOLEI, HI 96707** **HAZNET**
0.004 mi.
20 ft.

Site 1 of 4 in cluster B

Relative: Lower

Actual: 3 ft.

RCRA-SQG:
Date form received by agency: 06/28/2002
Facility name: HAWAIIAN DREDGING AND CONSTRUCTION CO
Facility address: 91 063 MALAKOLE ST
KAPOLEI, HI 96707
EPA ID: HID981631328
Contact: RUBEN VENIEGAS
Contact address: 91 063 MALAKOLE ST
KAPOLEI, HI 96707
Contact country: US
Contact telephone: (808) 673-4300
Contact email: Not reported
EPA Region: 09
Land type: Private
Classification: Small Small Quantity Generator
Description: Handler: generates more than 100 and less than 1000 kg of hazardous waste during any calendar month and accumulates less than 6000 kg of hazardous waste at any time; or generates 100 kg or less of hazardous waste during any calendar month, and accumulates more than 1000 kg of hazardous waste at any time

Owner/Operator Summary:
Owner/operator name: HAWAIIAN DREDGING CONSTRUCTION
Owner/operator address: 91 063 MALAKOLE
KAPOLEI, HI 96707
Owner/operator country: Not reported
Owner/operator telephone: (808) 673-4300
Legal status: Private
Owner/Operator Type: Owner
Owner/Op start date: Not reported
Owner/Op end date: Not reported

Owner/operator name: NOT REQUIRED
Owner/operator address: NOT REQUIRED
NOT REQUIRED, ME 99999
Owner/operator country: Not reported
Owner/operator telephone: (415) 555-1212
Legal status: Private
Owner/Operator Type: Operator
Owner/Op start date: Not reported
Owner/Op end date: Not reported

Handler Activities Summary:
U.S. importer of hazardous waste: No

HAWAIIAN DREDGING AND CONSTRUCTION CO (Continued) **1000983426**

Mixed waste (haz. and radioactive): No
Recycler of hazardous waste: No
Transporter of hazardous waste: No
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: No
Furnace exemption: No
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No

Hazardous Waste Summary:
Waste code: D001
Waste name: IGNITABLE HAZARDOUS WASTES ARE THOSE WASTES WHICH HAVE A FLASHPOINT OF LESS THAN 140 DEGREES FAHRENHEIT AS DETERMINED BY A PENSKY-MARTENS CLOSED CUP FLASH POINT TESTER. ANOTHER METHOD OF DETERMINING THE FLASH POINT OF A WASTE IS TO REVIEW THE MATERIAL SAFETY DATA SHEET, WHICH CAN BE OBTAINED FROM THE MANUFACTURER OR DISTRIBUTOR OF THE MATERIAL. LACQUER THINNER IS AN EXAMPLE OF A COMMONLY USED SOLVENT WHICH WOULD BE CONSIDERED AS IGNITABLE HAZARDOUS WASTE.

Facility Has Received Notices of Violations:
Regulation violated: F - 262.40-43.D
Area of violation: Generators - General
Date violation determined: 03/04/1997
Date achieved compliance: 05/06/1997
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 03/04/1997
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: F - 262.10-12.A
Area of violation: Generators - General
Date violation determined: 03/04/1997
Date achieved compliance: 05/06/1997
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 03/04/1997
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: F - 262.50-60
Area of violation: Generators - General

HAWAIIAN DREDGING AND CONSTRUCTION CO (Continued) **1000983426**

Date violation determined: 03/04/1997
Date achieved compliance: 05/06/1997
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 03/04/1997
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Evaluation Action Summary:
Evaluation date: 01/28/1997
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Generators - General
Date achieved compliance: 05/06/1997
Evaluation lead agency: State

Evaluation date: 12/12/1995
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

FINDS:

Registry ID: 110005724145

Environmental Interest/Information System
RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

HAZNET:
Year: 2003
Gepaid: HID981631328
Contact: OKUTANI PETER
Telephone: 8086822031
Mailing Name: Not reported
Mailing Address: 614 KAPAHULU AVE
Mailing City,St,Zip: HONOLULU, HI 96815
Gen County: Not reported
TSD EPA ID: CAD028409019
TSD County: Not reported
Waste Category: Unspecified organic liquid mixture
Disposal Method: Transfer Station
Tons: 0.22
Facility County: 99

Year: 2002
Gepaid: HID981631328
Contact: OKUTANI PETER

HAWAIIAN DREDGING AND CONSTRUCTION CO (Continued) **1000983426**

Telephone: 8086822031
Mailing Name: Not reported
Mailing Address: 614 KAPAHULU AVE
Mailing City,St,Zip: HONOLULU, HI 96815
Gen County: Not reported
TSD EPA ID: CAT000646117
TSD County: Not reported
Waste Category: Off-specification, aged or surplus inorganics
Disposal Method: Transfer Station
Tons: 0.25
Facility County: 99

Year: 2002
Gepaid: HID981631328
Contact: OKUTANI PETER
Telephone: 8086822031
Mailing Name: Not reported
Mailing Address: 614 KAPAHULU AVE
Mailing City,St,Zip: HONOLULU, HI 96815
Gen County: Not reported
TSD EPA ID: CAT000646117
TSD County: Not reported
Waste Category: Off-specification, aged or surplus inorganics
Disposal Method: Treatment, Tank
Tons: 0.25
Facility County: 99

Year: 2002
Gepaid: HID981631328
Contact: OKUTANI PETER
Telephone: 8086822031
Mailing Name: Not reported
Mailing Address: 614 KAPAHULU AVE
Mailing City,St,Zip: HONOLULU, HI 96815
Gen County: Not reported
TSD EPA ID: CAT000646117
TSD County: Not reported
Waste Category: Adhesives
Disposal Method: Disposal, Land Fill
Tons: 0.6
Facility County: 99

Year: 2002
Gepaid: HID981631328
Contact: OKUTANI PETER
Telephone: 8086822031
Mailing Name: Not reported
Mailing Address: 614 KAPAHULU AVE
Mailing City,St,Zip: HONOLULU, HI 96815
Gen County: Not reported
TSD EPA ID: CAT000646117
TSD County: Not reported
Waste Category: Other organic solids
Disposal Method: Disposal, Land Fill
Tons: 0.62
Facility County: 99

HAWAIIAN DREDGING AND CONSTRUCTION CO (Continued) **1000983426**

Click this hyperlink while viewing on your computer to access
1 additional CA_HAZNET: record(s) in the EDR Site Report.

B5 **HAWAIIAN DREDGING CONSTRUCTION CO** **RCRA NonGen / NLR** **1006806666**
SSE **91063 MALAKOLE STREET** **HIR000131979**
< 1/8 **KAPOLEI, HI 96707**
0.004 mi.
20 ft. **Site 2 of 4 in cluster B**

Relative:
Lower

Actual:
3 ft.

RCRA NonGen / NLR:
Date form received by agency: 01/24/2003
Facility name: HAWAIIAN DREDGING CONSTRUCTION CO
Facility address: 91063 MALAKOLE STREET
KAPOLEI, HI 96707
EPA ID: HIR000131979
Mailing address: MALAKOLE STREET
KAPOLEI, HI 96707
Contact: Not reported
Contact address: MALAKOLE STREET
KAPOLEI, HI 96707
Contact country: US
Contact telephone: Not reported
Contact email: Not reported
EPA Region: 09
Land type: Private
Classification: Non-Generator
Description: Handler: Non-Generators do not presently generate hazardous waste

Owner/Operator Summary:
Owner/operator name: OWNER
Owner/operator address: MALAKOLE ST
KAPOLEI, HI 96707
Owner/operator country: US
Owner/operator telephone: Not reported
Legal status: Private
Owner/Operator Type: Owner
Owner/Op start date: 01/24/2003
Owner/Op end date: Not reported

Owner/operator name: OPERATOR
Owner/operator address: MALAKOLE ST
KAPOLEI, HI 96707
Owner/operator country: US
Owner/operator telephone: Not reported
Legal status: Private
Owner/Operator Type: Operator
Owner/Op start date: 01/24/2003
Owner/Op end date: Not reported

Handler Activities Summary:
U.S. importer of hazardous waste: No
Mixed waste (haz. and radioactive): No
Recycler of hazardous waste: No
Transporter of hazardous waste: No
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: No

HAWAIIAN DREDGING CONSTRUCTION CO (Continued) **1006806666**

Furnace exemption: No
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No

Historical Generators:
Date form received by agency: 11/08/2002
Facility name: HAWAIIAN DREDGING CONSTRUCTION CO
Classification: Not a generator, verified

Violation Status: No violations found

Evaluation Action Summary:
Evaluation date: 04/23/2008
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

B6 **HAWAIIAN BITUMULS PAVING PRECAST** **RCRA NonGen / NLR** **1006806664**
SSE **91063 MALAKOLE STREET** **FINDS** **HIR000131854**
< 1/8 **KAPOLEI HI, HI 96707**
0.004 mi.
20 ft. **Site 3 of 4 in cluster B**

Relative:
Lower

Actual:
3 ft.

RCRA NonGen / NLR:
Date form received by agency: 01/24/2003
Facility name: HAWAIIAN BITUMULS PAVING PRECAST
Facility address: 91063 MALAKOLE STREET
KAPOLEI, HI 96707
EPA ID: HIR000131854
Mailing address: MALAKOLE STREET
KAPOLEI, HI 96707
Contact: Not reported
Contact address: MALAKOLE STREET
KAPOLEI, HI 96707
Contact country: US
Contact telephone: Not reported
Contact email: Not reported
EPA Region: 09
Land type: Private
Classification: Non-Generator
Description: Handler: Non-Generators do not presently generate hazardous waste

Owner/Operator Summary:
Owner/operator name: OWNER
Owner/operator address: MALAKOLE ST
KAPOLEI, HI 96707
Owner/operator country: US
Owner/operator telephone: Not reported
Legal status: Private
Owner/Operator Type: Owner
Owner/Op start date: 01/24/2003

HAWAIIAN BITUMULS PAVING PRECAST (Continued) **1006806664**

Owner/Op end date: Not reported

Owner/operator name: OPERATOR
Owner/operator address: MALAKOLE ST
KAPOLEI, HI 96707
Owner/operator country: US
Owner/operator telephone: Not reported
Legal status: Private
Owner/Operator Type: Operator
Owner/Op start date: 01/24/2003
Owner/Op end date: Not reported

Handler Activities Summary:
U.S. importer of hazardous waste: No
Mixed waste (haz. and radioactive): No
Recycler of hazardous waste: No
Transporter of hazardous waste: No
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: No
Furnace exemption: No
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No

Historical Generators:
Date form received by agency: 11/08/2002
Facility name: HAWAIIAN BITUMULS PAVING PRECAST
Classification: Not a generator, verified

Violation Status: No violations found

Evaluation Action Summary:
Evaluation date: 05/01/2000
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

FINDS:

Registry ID: 110013387502

Environmental Interest/Information System
RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

B7 **PHILIP SERVICES HAWAII** **RCRA NonGen / NLR** **1000921764**
SSE **91 127 MALAKOLE ST** **PADS** **HID980880884**
< 1/8 **KAPOLEI, HI 96707** **FINDS**
0.004 mi.
20 ft. **Site 4 of 4 in cluster B**

Relative: Lower

Actual: 3 ft.

RCRA NonGen / NLR:
Date form received by agency: 07/24/2001
Facility name: PHILIP SERVICES HAWAII
Facility address: 91 127 MALAKOLE ST
KAPOLEI, HI 96707
EPA ID: HID980880884
Mailing address: 395 W CHANNEL RD
BENICIA, CA 94510
Contact: CURTIS COLICHER
Contact address: 395 W CHANNEL RD
BENICIA, CA 94510
Contact country: US
Contact telephone: (808) 682-3033
Contact email: Not reported
EPA Region: 09
Land type: Private
Classification: Non-Generator
Description: Handler: Non-Generators do not presently generate hazardous waste

Owner/Operator Summary:
Owner/operator name: PHILIP SERVICES CORP
Owner/operator address: 12946 DAIRY ASHFORD STE 100
SUGAR LAND, TX 77478
Owner/operator country: Not reported
Owner/operator telephone: (281) 276-3000
Legal status: Private
Owner/Operator Type: Owner
Owner/Op start date: Not reported
Owner/Op end date: Not reported

Owner/operator name: NOT REQUIRED
Owner/operator address: NOT REQUIRED
NOT REQUIRED, ME 99999
Owner/operator country: Not reported
Owner/operator telephone: (415) 555-1212
Legal status: Private
Owner/Operator Type: Operator
Owner/Op start date: Not reported
Owner/Op end date: Not reported

Handler Activities Summary:
U.S. importer of hazardous waste: No
Mixed waste (haz. and radioactive): No
Recycler of hazardous waste: No
Transporter of hazardous waste: Yes
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: No
Furnace exemption: No
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No

PHILIP SERVICES HAWAII (Continued) **1000921764**

Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: Yes

Facility Has Received Notices of Violations:
Regulation violated: Not reported
Area of violation: Used Oil - Transporter and Transfer Facility
Date violation determined: 05/24/2006
Date achieved compliance: 10/24/2007
Violation lead agency: State
Enforcement action: FINAL 3008(A) COMPLIANCE ORDER
Enforcement action date: 10/24/2007
Enf. disposition status: Action Satisfied (Case Closed)
Enf. disp. status date: 03/18/2008
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: 20500
Paid penalty amount: 20500

Regulation violated: Not reported
Area of violation: Permit Condition or Requirement
Date violation determined: 05/24/2006
Date achieved compliance: 10/24/2007
Violation lead agency: State
Enforcement action: INITIAL 3008(A) COMPLIANCE
Enforcement action date: 08/14/2007
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: 22000
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: Not reported
Area of violation: Permit Condition or Requirement
Date violation determined: 05/24/2006
Date achieved compliance: 10/24/2007
Violation lead agency: State
Enforcement action: LETTER OF INTENT TO INITIATE ENFORCEMENT ACTION
Enforcement action date: 05/25/2006
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: Not reported
Area of violation: Permit Condition or Requirement
Date violation determined: 05/24/2006
Date achieved compliance: 10/24/2007
Violation lead agency: State
Enforcement action: FINAL 3008(A) COMPLIANCE ORDER
Enforcement action date: 10/24/2007
Enf. disposition status: Action Satisfied (Case Closed)
Enf. disp. status date: 03/18/2008

PHILIP SERVICES HAWAII (Continued) **1000921764**

Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: 20500
Paid penalty amount: 20500

Regulation violated: Not reported
Area of violation: Used Oil - Transporter and Transfer Facility
Date violation determined: 05/24/2006
Date achieved compliance: 10/24/2007
Violation lead agency: State
Enforcement action: INITIAL 3008(A) COMPLIANCE
Enforcement action date: 08/14/2007
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: 22000
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: Not reported
Area of violation: Used Oil - Transporter and Transfer Facility
Date violation determined: 05/24/2006
Date achieved compliance: 10/24/2007
Violation lead agency: State
Enforcement action: LETTER OF INTENT TO INITIATE ENFORCEMENT ACTION
Enforcement action date: 05/25/2006
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: Not reported
Area of violation: Generators - General
Date violation determined: 05/24/2006
Date achieved compliance: 10/24/2007
Violation lead agency: State
Enforcement action: LETTER OF INTENT TO INITIATE ENFORCEMENT ACTION
Enforcement action date: 05/25/2006
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: Not reported
Area of violation: Generators - General
Date violation determined: 05/24/2006
Date achieved compliance: 10/24/2007
Violation lead agency: State
Enforcement action: FINAL 3008(A) COMPLIANCE ORDER
Enforcement action date: 10/24/2007
Enf. disposition status: Action Satisfied (Case Closed)
Enf. disp. status date: 03/18/2008
Enforcement lead agency: State

PHILIP SERVICES HAWAII (Continued) **1000921764**

Proposed penalty amount: Not reported
Final penalty amount: 20500
Paid penalty amount: 20500

Regulation violated: Not reported
Area of violation: Generators - General
Date violation determined: 05/24/2006
Date achieved compliance: 10/24/2007
Violation lead agency: State
Enforcement action: INITIAL 3008(A) COMPLIANCE
Enforcement action date: 08/14/2007
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: 22000
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: Not reported
Area of violation: Permits - General Information
Date violation determined: 04/04/2003
Date achieved compliance: 10/17/2006
Violation lead agency: State
Enforcement action: Not reported
Enforcement action date: Not reported
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: Not reported
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: Not reported
Area of violation: State Statute or Regulation
Date violation determined: 04/04/2003
Date achieved compliance: 10/17/2006
Violation lead agency: State
Enforcement action: Not reported
Enforcement action date: Not reported
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: Not reported
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: SR - HAR : 11-263-12
Area of violation: Transporters - Manifest and Recordkeeping
Date violation determined: 12/17/2002
Date achieved compliance: 08/03/2006
Violation lead agency: State
Enforcement action: Not reported
Enforcement action date: Not reported
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: Not reported
Proposed penalty amount: Not reported

PHILIP SERVICES HAWAII (Continued) **1000921764**

Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: Not reported
Area of violation: Generators - General
Date violation determined: 12/17/2002
Date achieved compliance: 08/03/2006
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 04/04/2003
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: Not reported
Area of violation: Generators - Manifest
Date violation determined: 12/17/2002
Date achieved compliance: 08/03/2006
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 04/04/2003
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: F - 263
Area of violation: Transporters - General
Date violation determined: 06/12/2001
Date achieved compliance: 06/12/2001
Violation lead agency: EPA
Enforcement action: Not reported
Enforcement action date: 08/30/2001
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: EPA
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: F - 263
Area of violation: Transporters - General
Date violation determined: 06/12/2001
Date achieved compliance: 06/12/2001
Violation lead agency: EPA
Enforcement action: Not reported
Enforcement action date: 07/27/2001
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: EPA
Proposed penalty amount: Not reported
Final penalty amount: Not reported

PHILIP SERVICES HAWAII (Continued) **1000921764**

Paid penalty amount: Not reported

Regulation violated: F - 263
Area of violation: Transporters - General
Date violation determined: 06/12/2001
Date achieved compliance: 06/12/2001
Violation lead agency: EPA
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 07/27/2001
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: EPA
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: F - 279.50-59
Area of violation: Used Oil - Processors and Re-refiners
Date violation determined: 01/08/2001
Date achieved compliance: 07/20/2001
Violation lead agency: State
Enforcement action: Not reported
Enforcement action date: Not reported
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: Not reported
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: F - 262.10-12.A
Area of violation: Generators - General
Date violation determined: 01/08/2001
Date achieved compliance: 07/20/2001
Violation lead agency: State
Enforcement action: Not reported
Enforcement action date: Not reported
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: Not reported
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: F - 279.40-47
Area of violation: Used Oil - Transporter and Transfer Facility
Date violation determined: 01/08/2001
Date achieved compliance: 07/20/2001
Violation lead agency: State
Enforcement action: Not reported
Enforcement action date: Not reported
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: Not reported
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

PHILIP SERVICES HAWAII (Continued) **1000921764**

Regulation violated: S - 279.60-67
Area of violation: Used Oil - Burners of Off-Spec for Energy Recovery
Date violation determined: 01/08/2001
Date achieved compliance: 07/20/2001
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 01/08/2001
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: S - 279.30-32
Area of violation: Used Oil - Collection Centers AND Point
Date violation determined: 01/08/2001
Date achieved compliance: 07/20/2001
Violation lead agency: State
Enforcement action: INITIAL 3008(A) COMPLIANCE
Enforcement action date: 03/20/2001
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: 70000
Final penalty amount: 37500
Paid penalty amount: Not reported

Regulation violated: S - 279.50-59
Area of violation: Used Oil - Processors and Re-refiners
Date violation determined: 01/08/2001
Date achieved compliance: 07/20/2001
Violation lead agency: State
Enforcement action: INITIAL 3008(A) COMPLIANCE
Enforcement action date: 03/20/2001
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: 70000
Final penalty amount: 37500
Paid penalty amount: Not reported

Regulation violated: S - 279.20-24
Area of violation: Used Oil - Generators
Date violation determined: 01/08/2001
Date achieved compliance: 07/20/2001
Violation lead agency: State
Enforcement action: INITIAL 3008(A) COMPLIANCE
Enforcement action date: 03/20/2001
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: 70000
Final penalty amount: 37500
Paid penalty amount: Not reported

Regulation violated: S - 279.40-47

PHILIP SERVICES HAWAII (Continued) **1000921764**

Area of violation: Used Oil - Transporter and Transfer Facility
Date violation determined: 01/08/2001
Date achieved compliance: 07/20/2001
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 01/08/2001
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: S - 279.50-59
Area of violation: Used Oil - Processors and Re-refiners
Date violation determined: 07/06/2000
Date achieved compliance: 07/20/2001
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 08/11/2000
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: S - 263
Area of violation: Transporters - General
Date violation determined: 07/06/2000
Date achieved compliance: 07/20/2001
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 08/11/2000
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: S - 279.40-47
Area of violation: Used Oil - Transporter and Transfer Facility
Date violation determined: 07/06/2000
Date achieved compliance: 07/20/2001
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 08/11/2000
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: F - 262.20-23.B
Area of violation: Generators - General

PHILIP SERVICES HAWAII (Continued) **1000921764**

Date violation determined: 12/28/1998
Date achieved compliance: 07/20/2001
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 03/31/2000
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: F - 263
Area of violation: Transporters - General
Date violation determined: 12/28/1998
Date achieved compliance: 07/20/2001
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 03/31/2000
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: F - 262.30-34.C
Area of violation: Generators - General
Date violation determined: 12/28/1998
Date achieved compliance: 07/20/2001
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 03/31/2000
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: F - 262.10-12.A
Area of violation: Generators - General
Date violation determined: 12/28/1998
Date achieved compliance: 07/20/2001
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 03/31/2000
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: F - 279.20-24
Area of violation: Used Oil - Generators
Date violation determined: 12/28/1998

PHILIP SERVICES HAWAII (Continued) **1000921764**

Date achieved compliance: 07/20/2001
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 03/31/2000
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Evaluation Action Summary:
Evaluation date: 10/24/2007
Evaluation: NOT A SIGNIFICANT NON-COMPLIER
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 10/18/2005
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Used Oil - Transporter and Transfer Facility
Date achieved compliance: 10/24/2007
Evaluation lead agency: State

Evaluation date: 10/18/2005
Evaluation: SIGNIFICANT NON-COMPLIER
Area of violation: Permit Condition or Requirement
Date achieved compliance: 10/24/2007
Evaluation lead agency: State

Evaluation date: 10/18/2005
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Permit Condition or Requirement
Date achieved compliance: 10/24/2007
Evaluation lead agency: State

Evaluation date: 10/18/2005
Evaluation: SIGNIFICANT NON-COMPLIER
Area of violation: Generators - General
Date achieved compliance: 10/24/2007
Evaluation lead agency: State

Evaluation date: 10/18/2005
Evaluation: SIGNIFICANT NON-COMPLIER
Area of violation: Used Oil - Transporter and Transfer Facility
Date achieved compliance: 10/24/2007
Evaluation lead agency: State

Evaluation date: 10/18/2005
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Generators - General
Date achieved compliance: 10/24/2007
Evaluation lead agency: State

Evaluation date: 12/17/2002
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Generators - Manifest

PHILIP SERVICES HAWAII (Continued) **1000921764**

Date achieved compliance: 08/03/2006
Evaluation lead agency: State

Evaluation date: 12/17/2002
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Generators - General
Date achieved compliance: 08/03/2006
Evaluation lead agency: State

Evaluation date: 12/17/2002
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Transporters - Manifest and Recordkeeping
Date achieved compliance: 08/03/2006
Evaluation lead agency: State

Evaluation date: 12/17/2002
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: State Statute or Regulation
Date achieved compliance: 10/17/2006
Evaluation lead agency: State

Evaluation date: 12/17/2002
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Permits - General Information
Date achieved compliance: 10/17/2006
Evaluation lead agency: State

Evaluation date: 06/12/2001
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Transporters - General
Date achieved compliance: 06/12/2001
Evaluation lead agency: EPA

Evaluation date: 10/17/2000
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 10/09/2000
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Generators - General
Date achieved compliance: 07/20/2001
Evaluation lead agency: State

Evaluation date: 10/09/2000
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Transporters - General
Date achieved compliance: 07/20/2001
Evaluation lead agency: State

Evaluation date: 10/09/2000
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Used Oil - Generators
Date achieved compliance: 07/20/2001
Evaluation lead agency: State

PHILIP SERVICES HAWAII (Continued) **1000921764**

Evaluation date: 10/09/2000
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Used Oil - Transporter and Transfer Facility
Date achieved compliance: 07/20/2001
Evaluation lead agency: State

Evaluation date: 10/09/2000
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Used Oil - Processors and Re-refiners
Date achieved compliance: 07/20/2001
Evaluation lead agency: State

Evaluation date: 10/09/2000
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Used Oil - Collection Centers AND Point
Date achieved compliance: 07/20/2001
Evaluation lead agency: State

Evaluation date: 10/09/2000
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Used Oil - Burners of Off-Spec for Energy Recovery
Date achieved compliance: 07/20/2001
Evaluation lead agency: State

Evaluation date: 04/20/2000
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Transporters - General
Date achieved compliance: 07/20/2001
Evaluation lead agency: State

Evaluation date: 04/20/2000
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Used Oil - Processors and Re-refiners
Date achieved compliance: 07/20/2001
Evaluation lead agency: State

Evaluation date: 04/20/2000
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Used Oil - Transporter and Transfer Facility
Date achieved compliance: 07/20/2001
Evaluation lead agency: State

Evaluation date: 12/28/1998
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Generators - General
Date achieved compliance: 07/20/2001
Evaluation lead agency: State

Evaluation date: 12/28/1998
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Used Oil - Generators
Date achieved compliance: 07/20/2001
Evaluation lead agency: State

Evaluation date: 12/28/1998
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Transporters - General

PHILIP SERVICES HAWAII (Continued) **1000921764**

Date achieved compliance: 07/20/2001
Evaluation lead agency: State

Evaluation date: 09/19/1986
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 03/05/1986
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 06/13/1985
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

PADS:
EPAID: HID980880884
Facility name: Philip Services Hawaii
Facility Address: 91-127 Malokole St.
Kapolei, HI 96707
Facility country: US
Generator: No
Storer: No
Transporter: Yes
Disposer: No
Research facility: No
Smelter: No
Facility owner name: Philip Services Corporation
Contact title: Not reported
Contact name: Ken Matheson
Contact tel: (808)682-3033
Contact extension: Not reported
Mailing address: 91-127 Malokole St.
Kapolei, HI 96707
Mailing country: US
Cert. title: Not reported
Cert. name: Not reported
Cert. date: 4/28/2003
Date received: 5/29/2003

FINDS:

Registry ID: 110005723431

Environmental Interest/Information System
RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

8
South
< 1/8
0.093 mi.
489 ft.

Relative:
Lower

Actual:
3 ft.

AMERICAN INDUSTRIAL, LLC — **RCRA NonGen / NLR** — **1009398561**
91-505 AWAKUMOKU ST — **HIR000137729**
KAPOLEI, HI 96707

RCRA NonGen / NLR:
Date form received by agency: 10/21/2011
Facility name: AMERICAN INDUSTRIAL, LLC
Facility address: 91-505 AWAKUMOKU ST
KAPOLEI, HI 96707
EPA ID: HIR000137729
Contact: CLEDITH P GOODWIN, JR.
Contact address: 91-505 AWAKUMOKU ST
KAPOLEI, HI 96707
Contact country: US
Contact telephone: (808) 590-4908
Contact email: CGOODWIN@HAWAIIANTEL.NET
EPA Region: 09
Land type: Private
Classification: Non-Generator
Description: Handler: Non-Generators do not presently generate hazardous waste

Owner/Operator Summary:
Owner/operator name: CLEDITH P. GOODWIN, JR.
Owner/operator address: 91-505 AWAKUMOKU ST
KAPOLEI, HI 96707
Owner/operator country: US
Owner/operator telephone: (808) 590-4908
Legal status: Private
Owner/Operator Type: Operator
Owner/Op start date: 04/01/2010
Owner/Op end date: Not reported

Owner/operator name: AMERICAN INDUSTRIAL LLC
Owner/operator address: 91-505 AWAKUMOKU ST
KAPOLEI, HI 96707
Owner/operator country: US
Owner/operator telephone: (808) 682-5580
Legal status: Private
Owner/Operator Type: Owner
Owner/Op start date: 04/01/2010
Owner/Op end date: Not reported

Handler Activities Summary:
U.S. importer of hazardous waste: No
Mixed waste (haz. and radioactive): No
Recycler of hazardous waste: No
Transporter of hazardous waste: No
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: No
Furnace exemption: No
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No

AMERICAN INDUSTRIAL, LLC (Continued) — **1009398561**

Used oil transfer facility: No
Used oil transporter: Yes

Historical Generators:
Date form received by agency: 08/21/2007
Facility name: AMERICAN INDUSTRIAL, LLC
Site name: AMERICAN INDUSTRIAL INSULATION LLC
Classification: Not a generator, verified

Date form received by agency: 05/24/2006
Facility name: AMERICAN INDUSTRIAL, LLC
Site name: AMERICAN INDUSTRIAL INSULATION LLC
Classification: Large Quantity Generator

Facility Has Received Notices of Violations:
Regulation violated: Not reported
Area of violation: Generators - General
Date violation determined: 10/21/2011
Date achieved compliance: 07/09/2012
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 10/21/2011
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: Not reported
Area of violation: Used Oil - Generators
Date violation determined: 10/21/2011
Date achieved compliance: 07/09/2012
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 10/21/2011
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: Not reported
Area of violation: Transporters - Manifest and Recordkeeping
Date violation determined: 10/21/2011
Date achieved compliance: 07/09/2012
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 10/21/2011
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

AMERICAN INDUSTRIAL, LLC (Continued) **1009398561**

Regulation violated: Not reported
Area of violation: State Statute or Regulation
Date violation determined: 10/21/2011
Date achieved compliance: 07/09/2012
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 10/21/2011
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: Not reported
Area of violation: Used Oil - Transporter and Transfer Facility
Date violation determined: 10/21/2011
Date achieved compliance: 07/09/2012
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 10/21/2011
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Evaluation Action Summary:
Evaluation date: 09/29/2011
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Used Oil - Transporter and Transfer Facility
Date achieved compliance: 07/09/2012
Evaluation lead agency: State

Evaluation date: 09/29/2011
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Generators - General
Date achieved compliance: 07/09/2012
Evaluation lead agency: State

Evaluation date: 09/29/2011
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Transporters - Manifest and Recordkeeping
Date achieved compliance: 07/09/2012
Evaluation lead agency: State

Evaluation date: 09/29/2011
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Used Oil - Generators
Date achieved compliance: 07/09/2012
Evaluation lead agency: State

Evaluation date: 09/29/2011
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: State Statute or Regulation
Date achieved compliance: 07/09/2012

AMERICAN INDUSTRIAL, LLC (Continued) **1009398561**

Evaluation lead agency: State

Evaluation date: 08/01/2007
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

C9 **SUN HOME METALS** **SHWS S110061840**
SSW **91-567 NUKUAWA ST** **INST CONTROL N/A**
< 1/8 **KAPOLEI, HI** **VCP**
0.120 mi.
635 ft.

Site 1 of 2 in cluster C

Relative:
Lower

Actual:
3 ft.

SHWS:
Organization: Not reported
Supplemental Location Text: Not reported
Island: Oahu
Environmental Interest: Sun Home Metals
HID Number: Not reported
Facility Registry Identifier: Not reported
Lead Agency: HEER
Program: Voluntary Response Program
Project Manager: Mark Sutterfield
Hazard Priority: NFA
Potential Hazards And Controls: Hazard Managed With Controls
Organization: Not reported
Island: Oahu
Location Address Line 2: Not reported
Location Zip Suffix: Not reported
Supplemental Location Text: Not reported
SDAR Environmental Interest Name: Sun Home Metals
HID Number: Not reported
Facility Registry Identifier: Not reported
Lead Agency: HEER
Progran Name: Voluntary Response Program
Potential Hazard And Controls: Hazard Managed With Controls
Priority: NFA
Assessment: Response Necessary
Response: Response Complete
Nature of Contamination: Found: Pb & PCBs
Nature of Residual Contamination: Lead, chromium, arsenic, PCBs, PAHs, TPH as diesel
Use Restrictions: Controls Required to Manage Contamination
Engineering Control: Not reported
Description of Restrictions: Not reported
Institutional Control: Government - Hawaii Dept. of Health Letter Issued
Within Designated Areawide Contamination: Not reported
Site Closure Type: Letter of Completion - Restricted Use
Document Date: 01/07/2009
Document Number: 2008-886-MS
Document Subject: LOC Sun Home Metals
Project Manager: Mark Sutterfield
Contact Information: (808) 586-4249 919 Ala Moana Blvd, Honolulu, HI 96814

INST CONTROL:
Potential hazards and controls: Hazard Managed With Controls
Supplemental Location: Not reported
Zip Suffix: Not reported

SUN HOME METALS (Continued) **S110061840**

Island: Oahu
Institutional Control: Government - Hawaii Dept. of Health Letter Issued

VCP:
Program: Voluntary Response Program
Zip Suffix: Not reported
Supplemental Location: Not reported
Island: Oahu

D10 **HAWAIIAN INDEPENDENT REFINERY** **UST** **1000995006**
South **91-325 KOMOHANA ST** **N/A**
1/8-1/4 **KAPOLEI, HI 96707**
0.126 mi.
667 ft. **Site 1 of 2 in cluster D**

Relative:
Lower

Actual:
3 ft.

UST:
Facility ID: 9-200927
Owner: BHP HAWAII INC.
Owner Address: P.O. BOX 3379
Owner City,St,Zip: Kapolei, 96707 96707

Tank ID: R-001
Date Installed: 04/09/1972
Tank Status: Permanently Out of Use
Date Closed: 12/21/1988
Tank Capacity: 1000
Substance: Gasoline

C11 **STORAGE SERVICES INC** **RCRA NonGen / NLR** **1006806708**
SSW **91543 NUKUAWA STREET** **FINDS** **HIR000134981**
1/8-1/4 **KAPOLEI HI, HI 96707**
0.168 mi.
889 ft. **Site 2 of 2 in cluster C**

Relative:
Lower

Actual:
3 ft.

RCRA NonGen / NLR:
Date form received by agency: 01/24/2003
Facility name: STORAGE SERVICES INC
Facility address: 91543 NUKUAWA STREET
KAPOLEI, HI 96707
EPA ID: HIR000134981
Mailing address: NUKUAWA STREET
KAPOLEI, HI 96707
Contact: Not reported
Contact address: NUKUAWA STREET
KAPOLEI, HI 96707
Contact country: US
Contact telephone: Not reported
Contact email: Not reported
EPA Region: 09
Classification: Non-Generator
Description: Handler: Non-Generators do not presently generate hazardous waste

Owner/Operator Summary:
Owner/operator name: OWNER
Owner/operator address: NUKUAWA ST

STORAGE SERVICES INC (Continued) **1006806708**

KAPOLEI, HI 96707
Owner/operator country: US
Owner/operator telephone: Not reported
Legal status: Private
Owner/Operator Type: Owner
Owner/Op start date: 01/24/2003
Owner/Op end date: Not reported

Owner/operator name: OPERATOR
Owner/operator address: NUKUAWA ST
KAPOLEI, HI 96707
Owner/operator country: US
Owner/operator telephone: Not reported
Legal status: Private
Owner/Operator Type: Operator
Owner/Op start date: 01/24/2003
Owner/Op end date: Not reported

Handler Activities Summary:
U.S. importer of hazardous waste: No
Mixed waste (haz. and radioactive): No
Recycler of hazardous waste: No
Transporter of hazardous waste: No
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: No
Furnace exemption: No
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No

Historical Generators:
Date form received by agency: 11/08/2002
Facility name: STORAGE SERVICES INC
Classification: Not a generator, verified

Violation Status: No violations found

FINDS:

Registry ID: 110013363948

Environmental Interest/Information System
RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

12
SSW
1/8-1/4
0.169 mi.
891 ft.

Relative:
Lower

Actual:
3 ft.

HAWAII DIVISION SBSB AND TC INC — **RCRA NonGen / NLR** — **1010316389**
91_522 NUKUAWA ST — **HIP000031864**
KAPOLEI, HI 96707

RCRA NonGen / NLR:
Date form received by agency: 05/29/2007
Facility name: HAWAII DIVISION SBSB AND TC INC
Facility address: 91_522 NUKUAWA ST
KAPOLEI, HI 96707
EPA ID: HIP000031864
Mailing address: P O BOX 119
348 PUUHALE RD
HONOLULU, HI 96819
Contact: TONY ALBRIGHT
Contact address: P O BOX 119 348 PUUHALE RD
HONOLULU, HI 96819
Contact country: US
Contact telephone: (808) 531-7025
Contact email: Not reported
EPA Region: 09
Classification: Non-Generator
Description: Handler: Non-Generators do not presently generate hazardous waste

Owner/Operator Summary:
Owner/operator name: SOUTHBAY SANDBLASTING AND TA
Owner/operator address: 1920 UNA ST
SAN DIEGO, CA 92113
Owner/operator country: Not reported
Owner/operator telephone: (619) 238-8338
Legal status: Private
Owner/Operator Type: Owner
Owner/Op start date: Not reported
Owner/Op end date: Not reported

Handler Activities Summary:
U.S. importer of hazardous waste: No
Mixed waste (haz. and radioactive): No
Recycler of hazardous waste: No
Transporter of hazardous waste: No
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: No
Furnace exemption: No
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No

Historical Generators:
Date form received by agency: 09/26/1997
Facility name: HAWAII DIVISION SBSB AND TC INC
Classification: Large Quantity Generator

HAWAII DIVISION SBSB AND TC INC (Continued) — **1010316389**

Violation Status: No violations found

D13
South
1/8-1/4
0.180 mi.
948 ft.

Site 2 of 2 in cluster D

Relative:
Lower

Actual:
3 ft.

BERING SEA ENV LLC — **RCRA NonGen / NLR** — **1010784158**
91 343 KAIHOLO ST — **HIR000138602**
KAPOLEI, HI 96707

RCRA NonGen / NLR:
Date form received by agency: 03/18/2008
Facility name: BERING SEA ENV LLC
Facility address: 91 343 KAIHOLO ST
KAPOLEI, HI 96707
EPA ID: HIR000138602
Mailing address: 4300 B ST
STE 402
ANCHORAGE, AK 99503
Contact: JAMES DIRECTO
Contact address: 4300 B ST STE 402
ANCHORAGE, AK 99503
Contact country: US
Contact telephone: 808-330-8991
Contact email: JAMESDIRECTO@BSEAK.COM
EPA Region: 09
Land type: Private
Classification: Non-Generator
Description: Handler: Non-Generators do not presently generate hazardous waste

Owner/Operator Summary:
Owner/operator name: BERING SEA ECCOTECH INC
Owner/operator address: 4300 B ST STE 402
ANCHORAGE, AK 99503
Owner/operator country: US
Owner/operator telephone: Not reported
Legal status: Private
Owner/Operator Type: Owner
Owner/Op start date: 04/26/2005
Owner/Op end date: Not reported

Owner/operator name: BERING SEA ENV LLC
Owner/operator address: Not reported
Not reported
Owner/operator country: Not reported
Owner/operator telephone: Not reported
Legal status: Private
Owner/Operator Type: Operator
Owner/Op start date: 10/06/2003
Owner/Op end date: Not reported

Handler Activities Summary:
U.S. importer of hazardous waste: No
Mixed waste (haz. and radioactive): No
Recycler of hazardous waste: No
Transporter of hazardous waste: Yes
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: No
Furnace exemption: No

BERING SEA ENV LLC (Continued) **1010784158**

Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No

Facility Has Received Notices of Violations:
Regulation violated: Not reported
Area of violation: Universal Waste - Small Quantity Handlers
Date violation determined: 04/07/2010
Date achieved compliance: 09/14/2011
Violation lead agency: State
Enforcement action: FINAL 3008(A) COMPLIANCE ORDER
Enforcement action date: 09/14/2011
Enf. disposition status: Action Satisfied (Case Closed)
Enf. disp. status date: 09/14/2011
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: 38000
Paid penalty amount: 38000

Regulation violated: Not reported
Area of violation: Used Oil - Transporter and Transfer Facility
Date violation determined: 04/07/2010
Date achieved compliance: 09/14/2011
Violation lead agency: State
Enforcement action: FINAL 3008(A) COMPLIANCE ORDER
Enforcement action date: 09/14/2011
Enf. disposition status: Action Satisfied (Case Closed)
Enf. disp. status date: 09/14/2011
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: 38000
Paid penalty amount: 38000

Regulation violated: Not reported
Area of violation: Used Oil - Processors and Re-refiners
Date violation determined: 04/07/2010
Date achieved compliance: 09/14/2011
Violation lead agency: State
Enforcement action: INITIAL 3008(A) COMPLIANCE
Enforcement action date: 02/24/2011
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: 50000
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: Not reported
Area of violation: Used Oil - Transporter and Transfer Facility
Date violation determined: 04/07/2010
Date achieved compliance: 09/14/2011
Violation lead agency: State
Enforcement action: INITIAL 3008(A) COMPLIANCE

BERING SEA ENV LLC (Continued) **1010784158**

Enforcement action date: 02/24/2011
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: 50000
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: Not reported
Area of violation: State Statute or Regulation
Date violation determined: 04/07/2010
Date achieved compliance: 09/14/2011
Violation lead agency: State
Enforcement action: INITIAL 3008(A) COMPLIANCE
Enforcement action date: 02/24/2011
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: 50000
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: Not reported
Area of violation: Used Oil - Processors and Re-refiners
Date violation determined: 04/07/2010
Date achieved compliance: 09/14/2011
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 04/07/2010
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: Not reported
Area of violation: Universal Waste - Small Quantity Handlers
Date violation determined: 04/07/2010
Date achieved compliance: 09/14/2011
Violation lead agency: State
Enforcement action: INITIAL 3008(A) COMPLIANCE
Enforcement action date: 02/24/2011
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: 50000
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: Not reported
Area of violation: State Statute or Regulation
Date violation determined: 04/07/2010
Date achieved compliance: 09/14/2011
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 04/07/2010

BERING SEA ENV LLC (Continued) **1010784158**

Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: Not reported
Area of violation: State Statute or Regulation
Date violation determined: 04/07/2010
Date achieved compliance: 09/14/2011
Violation lead agency: State
Enforcement action: FINAL 3008(A) COMPLIANCE ORDER
Enforcement action date: 09/14/2011
Enf. disposition status: Action Satisfied (Case Closed)
Enf. disp. status date: 09/14/2011
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: 38000
Paid penalty amount: 38000

Regulation violated: Not reported
Area of violation: Used Oil - Generators
Date violation determined: 04/07/2010
Date achieved compliance: 09/14/2011
Violation lead agency: State
Enforcement action: FINAL 3008(A) COMPLIANCE ORDER
Enforcement action date: 09/14/2011
Enf. disposition status: Action Satisfied (Case Closed)
Enf. disp. status date: 09/14/2011
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: 38000
Paid penalty amount: 38000

Regulation violated: Not reported
Area of violation: Permit Condition or Requirement
Date violation determined: 04/07/2010
Date achieved compliance: 09/14/2011
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 04/07/2010
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: Not reported
Area of violation: Used Oil - Generators
Date violation determined: 04/07/2010
Date achieved compliance: 09/14/2011
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 04/07/2010
Enf. disposition status: Not reported

BERING SEA ENV LLC (Continued) **1010784158**

Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: Not reported
Area of violation: Used Oil - Generators
Date violation determined: 04/07/2010
Date achieved compliance: 09/14/2011
Violation lead agency: State
Enforcement action: INITIAL 3008(A) COMPLIANCE
Enforcement action date: 02/24/2011
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: 50000
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: Not reported
Area of violation: Permit Condition or Requirement
Date violation determined: 04/07/2010
Date achieved compliance: 09/14/2011
Violation lead agency: State
Enforcement action: FINAL 3008(A) COMPLIANCE ORDER
Enforcement action date: 09/14/2011
Enf. disposition status: Action Satisfied (Case Closed)
Enf. disp. status date: 09/14/2011
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: 38000
Paid penalty amount: 38000

Regulation violated: Not reported
Area of violation: Used Oil - Processors and Re-refiners
Date violation determined: 04/07/2010
Date achieved compliance: 09/14/2011
Violation lead agency: State
Enforcement action: FINAL 3008(A) COMPLIANCE ORDER
Enforcement action date: 09/14/2011
Enf. disposition status: Action Satisfied (Case Closed)
Enf. disp. status date: 09/14/2011
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: 38000
Paid penalty amount: 38000

Regulation violated: Not reported
Area of violation: Universal Waste - Small Quantity Handlers
Date violation determined: 04/07/2010
Date achieved compliance: 09/14/2011
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 04/07/2010
Enf. disposition status: Not reported
Enf. disp. status date: Not reported

BERING SEA ENV LLC (Continued) **1010784158**

Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: Not reported
Area of violation: Used Oil - Transporter and Transfer Facility
Date violation determined: 04/07/2010
Date achieved compliance: 09/14/2011
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 04/07/2010
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: Not reported
Area of violation: Permit Condition or Requirement
Date violation determined: 04/07/2010
Date achieved compliance: 09/14/2011
Violation lead agency: State
Enforcement action: INITIAL 3008(A) COMPLIANCE
Enforcement action date: 02/24/2011
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: 50000
Final penalty amount: Not reported
Paid penalty amount: Not reported

Evaluation Action Summary:
Evaluation date: 03/18/2010
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Used Oil - Transporter and Transfer Facility
Date achieved compliance: 09/14/2011
Evaluation lead agency: State

Evaluation date: 03/18/2010
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: State Statute or Regulation
Date achieved compliance: 09/14/2011
Evaluation lead agency: State

Evaluation date: 03/18/2010
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Used Oil - Generators
Date achieved compliance: 09/14/2011
Evaluation lead agency: State

Evaluation date: 03/18/2010
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Used Oil - Processors and Re-refiners
Date achieved compliance: 09/14/2011
Evaluation lead agency: State

BERING SEA ENV LLC (Continued) **1010784158**

Evaluation date: 03/18/2010
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Universal Waste - Small Quantity Handlers
Date achieved compliance: 09/14/2011
Evaluation lead agency: State

Evaluation date: 03/18/2010
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Permit Condition or Requirement
Date achieved compliance: 09/14/2011
Evaluation lead agency: State

14
SSW
1/8-1/4
0.233 mi.
1231 ft.

Relative:
Lower

Actual:
3 ft.

AAA ISLAND ENVIRONMENTAL INC **RCRA NonGen / NLR** **1001123256**
91 515 NUKUAWA ST **FINDS** **HIR000001073**
KAPOLEI, HI 96707

RCRA NonGen / NLR:
Date form received by agency: 12/31/2008
Facility name: AAA ISLAND ENVIRONMENTAL INC
Facility address: 91 515 NUKUAWA ST
KAPOLEI, HI 96707
EPA ID: HIR000001073
Contact: JUAN J NAVARRETE
Contact address: 619 A MAPUNAPUNA ST
HONOLULU, HI 96819
Contact country: US
Contact telephone: (808) 833-3787
Contact email: Not reported
EPA Region: 09
Land type: Private
Classification: Non-Generator
Description: Handler: Non-Generators do not presently generate hazardous waste

Owner/Operator Summary:
Owner/operator name: SERGIO NAVARRETE
Owner/operator address: 47 402 KAMEHAMENA HWY
KANEOHE, HI 96744
Owner/operator country: Not reported
Owner/operator telephone: (808) 239-2797
Legal status: Private
Owner/Operator Type: Owner
Owner/Op start date: Not reported
Owner/Op end date: Not reported

Handler Activities Summary:
U.S. importer of hazardous waste: No
Mixed waste (haz. and radioactive): No
Recycler of hazardous waste: No
Transporter of hazardous waste: No
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: No
Furnace exemption: No
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No

AAA ISLAND ENVIRONMENTAL INC (Continued) **1001123256**

Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No

Historical Generators:
Date form received by agency: 10/25/1996
Facility name: AAA ISLAND ENVIRONMENTAL INC
Classification: Small Quantity Generator

Facility Has Received Notices of Violations:
Regulation violated: F - 263
Area of violation: Transporters - General
Date violation determined: 02/05/1997
Date achieved compliance: 02/05/2002
Violation lead agency: State
Enforcement action: INITIAL 3008(A) COMPLIANCE
Enforcement action date: 03/11/1997
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: 3800
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: F - 270
Area of violation: TSD - General
Date violation determined: 02/05/1997
Date achieved compliance: 02/05/2002
Violation lead agency: State
Enforcement action: INITIAL 3008(A) COMPLIANCE
Enforcement action date: 03/11/1997
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: 3800
Final penalty amount: Not reported
Paid penalty amount: Not reported

Evaluation Action Summary:
Evaluation date: 02/05/2002
Evaluation: NOT A SIGNIFICANT NON-COMPLIER
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 05/07/1999
Evaluation: NOT A SIGNIFICANT NON-COMPLIER
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 03/11/1997
Evaluation: SIGNIFICANT NON-COMPLIER
Area of violation: Not reported
Date achieved compliance: Not reported

AAA ISLAND ENVIRONMENTAL INC (Continued) **1001123256**

Evaluation lead agency: State

Evaluation date: 02/05/1997
Evaluation: SIGNIFICANT NON-COMPLIER
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 02/05/1997
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Transporters - General
Date achieved compliance: 02/05/2002
Evaluation lead agency: State

Evaluation date: 02/05/1997
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: TSD - General
Date achieved compliance: 02/05/2002
Evaluation lead agency: State

FINDS:

Registry ID: 110005729765

Environmental Interest/Information System
RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

E15 **HAWAIIAN WESTERN STEEL DUMP** **SHWS S106817421**
SE **HANUA ST & MALAKOLE ST** **INST CONTROL N/A**
1/4-1/2 **KAPOLEI, HI 96707**
0.443 mi.
2338 ft. **Site 1 of 4 in cluster E**

Relative:
Lower

Actual:
10 ft.

SHWS:
Organization: Not reported
Supplemental Location Text: Waste Pile Area
Island: Oahu
Environmental Interest: Hawaiian Western Steel Dump
HID Number: HID982516775
Facility Registry Identifier: 110013791600
Lead Agency: HEER
Program: State
Project Manager: Steve Mow
Hazard Priority: NFA
Potential Hazards And Controls: Hazard Managed With Controls
Organization: Not reported
Island: Oahu
Location Address Line 2: Not reported
Location Zip Suffix: Not reported
Supplemental Location Text: Waste Pile Area
SDAR Environmental Interest Name: Hawaiian Western Steel Dump
HID Number: HID982516775

HAWAIIAN WESTERN STEEL DUMP (Continued) **S106817421**

Facility Registry Identifier:	110013791600
Lead Agency:	HEER
Progran Name:	State
Potential Hazard And Controls:	Hazard Managed With Controls
Priority:	NFA
Assessment:	Response Necessary
Response:	Response Complete
Nature of Contamination:	Presumed: Lead in Soil.
Nature of Residual Contamination:	Not reported
Use Restrictions:	Controls Required to Manage Contamination
Engineering Control:	Not reported
Description of Restrictions:	Limit Further Land Use - Site is restricted to industrial use only
Institutional Control:	Government - Hawaii Dept. of Health Letter Issued
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	No Further Action Letter - Restricted Use
Document Date:	01/11/2005
Document Number:	2005-020-SPM
Document Subject:	No Further Action Required at Hawaiian Western Steel Sites
Project Manager:	Steve Mow
Contact Information:	(808) 586-4249 919 Ala Moana Blvd, Honolulu, HI 96814

INST CONTROL:

Potential hazards and controls:	Hazard Managed With Controls
Supplemental Location:	Waste Pile Area
Zip Suffix:	Not reported
Island:	Oahu
Institutional Control:	Government - Hawaii Dept. of Health Letter Issued

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E16 **CHEVRON - HAWAII REFINERY** **TSCA 1001204662**
SE **91-480 MALAKOLE ST.** **SHWS N/A**
1/4-1/2 **KAPOLEI, HI 96707** **SPILLS**
0.449 mi. **AIRS**
2370 ft. **Site 2 of 4 in cluster E**

Relative:
Lower

Actual:
10 ft.

Click this hyperlink while viewing on your computer to access additional TSCA detail in the EDR Site Report.

SHWS:

Organization:	Not reported
Supplemental Location Text:	Not reported
Island:	Oahu
Environmental Interest:	Chevron USA Hawaiian Refinery
HID Number:	HIT160010005
Facility Registry Identifier:	Not reported
Lead Agency:	HEER
Program:	State
Project Manager:	Unassigned
Hazard Priority:	Medium
Potential Hazards And Controls:	Hazard Undetermined
Organization:	Not reported
Island:	Oahu
Location Address Line 2:	Not reported
Location Zip Suffix:	Not reported
Supplemental Location Text:	Not reported
SDAR Environmental Interest Name:	Chevron USA Hawaiian Refinery
HID Number:	HIT160010005
Facility Registry Identifier:	Not reported

CHEVRON - HAWAII REFINERY (Continued) **1001204662**

Lead Agency:	HEER
Progran Name:	State
Potential Hazard And Controls:	Hazard Undetermined
Priority:	Medium
Assessment:	Assessment Ongoing
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Undetermined
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Unassigned
Contact Information:	(808) 586-4249 919 Ala Moana Blvd, Honolulu, HI 96814

HI SPILLS:

Island:	Oahu
Supplemental Loc. Text:	Campbell Industrial Park
Case Number:	19940315
HID Number:	Not reported
Facility Registry Id:	110000486304
Lead and Program:	HEER EP&R
ER:	Not reported
Units:	Chevron Hawaiian Refinery
Substances:	black crude oil
Less Or Greater Than:	Not reported
Numerical Quantity:	300
Units:	Gallons
Activity Type:	Response
Activity Lead:	Not reported
Assignment End Date:	Not reported
Result:	SOSC NFA
File Under:	Chevron USA Products Company

Island:	Oahu
Supplemental Loc. Text:	Campbell Industrial Park
Case Number:	19950506
HID Number:	Not reported
Facility Registry Id:	110000486304
Lead and Program:	HEER EP&R
ER:	Not reported
Units:	Chevron Hawaii Refinery Sulfuric acid release from gasket failure
Substances:	Sulfuric Acid
Less Or Greater Than:	Not reported
Numerical Quantity:	70897
Units:	Pounds
Activity Type:	Response
Activity Lead:	Bill Perry
Assignment End Date:	Not reported
Result:	SOSC NFA
File Under:	Chevron USA Products Company

CHEVRON - HAWAII REFINERY (Continued) **1001204662**

Island:	Oahu
Supplemental Loc. Text:	Campbell Industrial Park
Case Number:	19951018-1
HID Number:	Not reported
Facility Registry Id:	110000486304
Lead and Program:	HEER EP&R
ER:	No
Units:	Shell Refinery Tank #264
Substances:	Jet Fuel A
Less Or Greater Than:	Not reported
Numerical Quantity:	90
Units:	Gallons
Activity Type:	Response
Activity Lead:	Bill Perry
Assignment End Date:	Not reported
Result:	SOSC NFA
File Under:	Chevron USA Products Company

Island:	Oahu
Supplemental Loc. Text:	Campbell Industrial Park
Case Number:	19951030
HID Number:	Not reported
Facility Registry Id:	110000486304
Lead and Program:	HEER EP&R
ER:	No
Units:	Chevron Refinery Adjacent to Tank 271
Substances:	BTEX, Olefins sulfur, gasoline component.
Less Or Greater Than:	Not reported
Numerical Quantity:	200
Units:	Gallons
Activity Type:	Response
Activity Lead:	Mike Cripps
Assignment End Date:	Not reported
Result:	SOSC NFA
File Under:	Chevron USA Products Company

Island:	Oahu
Supplemental Loc. Text:	Campbell Industrial Park
Case Number:	20020108-1037
HID Number:	Not reported
Facility Registry Id:	110000486304
Lead and Program:	HEER EP&R
ER:	Not reported
Units:	Chevron Refinery December 10, 2001 Crude Oil Spill
Substances:	Crude Oil
Less Or Greater Than:	Not reported
Numerical Quantity:	45
Units:	Barrels
Activity Type:	Response
Activity Lead:	Bill Perry
Assignment End Date:	Not reported
Result:	Not reported
File Under:	Chevron USA Products Company

Click this hyperlink while viewing on your computer to access
117 additional HI SPILLS: record(s) in the EDR Site Report.

CHEVRON - HAWAII REFINERY (Continued) **1001204662**

AIRS:

Facility ID:	0088-02-C
Island:	Oahu
Mailing Address:	91-480 Malakole Street
Locale:	Campbell Industrial Park
Mailing City,St,Zip:	Kapolei, HI 96707
Business Phone:	Not reported
Contact Name:	Helen Mary Wessel
Contact Title:	Environmental Specialist
Description:	Hybrid Energy PlantAttachment IIA:This portion of the Covered Source Permit encompasses the following equipment and associated appurtenances: One (1) Cogeneration Unit consisting of the following:a.One (1) 46 MMBtu/hr combustion turbine, Solar Centaur 40, model no. 40-4701, serial no. 5157C;b.One (1) heat recovery steam generator (HRSG) with one (1) 49 MMBtu/hr duct burner, John Zink Company; andc.For NOx control, the combustion turbine is equipped with water injection and low NOx burners.Attachment IIB:This portion of the Covered Source Permit encompasses the following equipment and associated appurtenances: Two (2) 99 MMBtu/hr boilers, Foster Wheeler, model no. AG-5060, serial nos. 7414, National Board No. 585 and 7415, National Board No. 586.'Attachment IIC:This portion of the Covered Source Permit encompasses the requirements for miscellaneous equipment associated with the cogeneration unit and boilers.

Facility ID:	0088-01-C
Island:	Oahu
Mailing Address:	91-480 Malakole Street
Locale:	Campbell Industrial Park
Mailing City,St,Zip:	Kapolei, HI 96707
Business Phone:	Not reported
Contact Name:	Chris Cavote
Contact Title:	Refinery Manager
Description:	Petroleum RefineryAttachment II(E) superseded on 11/4/09.The permit amendment issued on 11/8/07 adds NSPS Subpart J applicability to the FCC flare. The permit amendment issued on 9/11/09 (replacing Attachment II(I))incorporates sulfur dioxide and carbon monoxide emission limits from Consent Decree No. C 03-04650 (CRB), Sections B and D into the existing covered source permit. The Issuance Date of 11/8/07 and Expiration Date of 6/27/11 apply only to these amendments. The amendments (issued on 11/8/07 and 9/11/09) do not include the renewal of the remaining equipment. The remaining equipment at the facility are operating under a permit shield.The equipment listed here encompasses the entire facility and includes the last permit amendment and all other equipment that are operating under the permit shield.Attachment II(A):This portion of the Covered Source Permit encompasses the requirements for miscellaneous process units and/or source operations not included with the Special Conditions of Attachments II(B) through II(M).Attachment II(B):This portion of the Covered Source Permit encompasses the following equipment and associated appurtenances:a.Twenty-Seven (27) Gasoline Intermediates and Finished Products Storage Tanksi.One (1) - 272,000 bbl external floating roof storage tank identified as Tank 111;ii.Two (2) - 19,200 bbl external floating roof storage tanks identified as Tanks 232 and 235;iii.Two (2) - 19,000 bbl external floating roof storage tanks identified as Tanks 233 and 273;iv.Four (4) - 38,000 bbl external floating roof storage tanks identified as Tanks 236, 237, 255, and 256;v.One (1) - 9,500 bbl external floating roof

CHEVRON - HAWAII REFINERY (Continued) **1001204662**

storage tanks identified as Tank 251;vi.One (1) - 37,000 bbl external floating roof storage tank identified as Tank 252;vii.One (1) - 37,400 bbl external floating roof storage tank identified as Tank 253;viii.One (1) - 33,000 bbl external floating roof storage tank identified as Tank 254;ix.Three (3) - 29,000 bbl external floating roof storage tanks identified as Tanks 257, 258, and 262;x.Three (3) - 41,000 bbl external floating roof storage tanks identified as Tanks 264, 265, and 266;xi.One (1) - 23,000 bbl external floating roof storage tank identified as Tank 269;xii.One (1) - 36,000 bbl external floating roof storage tank identified as Tank 271;xiii.Two (2) - 4,700 bbl external floating roof storage tanks identified as Tanks 162 and 163; xiv.One (1) - 235,000 bbl external floating roof storage tank identified as Tank 109;xv.One (1) - 9,500 bbl external floating roof storage tank converted to an internal floating roof storage tank identified as Tank 249; andxvi.Two (2) - 5,000 bbl external floating roof storage tanks converted to internal floating roof storage tanks identified as Tanks 250 and 275.b.Eight (8) Crude Oil Storage Tanksi.One (1) - 149,000 bbl external floating roof storage tank identified as Tank 104;ii.Two (2) - 237,000 bbl external floating roof storage tanks identified as Tanks 105 and 107;iii.Two (2) - 235,000 bbl external floating roof storage tanks identified as Tanks 106 and 108;iv.One (1) - 272,000 bbl external floating roof storage tank identified as Tank 110;v.One (1) - 23,000 bbl external floating roof storage tank identified as Tank 113; andvi.One (1) - 81,250 bbl vertical fixed roof storage tank identified as Tank 152.c.Three (3) Jet Fuel Storage Tanksi.One (1) - 50,827 bbl vertical fixed roof storage tank identified as Tank 274;ii.One (1) - 38,000 bbl external floating roof storage tank identified as Tank 263; andiii.One (1) - 41,000 bbl external floating roof storage tank identified as Tank 267.Attachment II(C):This portion of the Covered Source Permit encompasses the following equipment and associated appurtenances:a.Petroleum Truck Loading Rack.Attachment II(D):This portion of the Covered Source Permit encompasses the following equipment and associated appurtenances:a.One Ten-cell Induced Draft Cooling Tower.Attachment II(E):This portion of the Covered Source Permit encompasses the following equipment and associated appurtenances:a.Crude Flare (steam-assisted); andb.FCC Flare (steam-assisted).Attachment II(F):This portion of the Covered Source Permit encompasses the following equipment and associated appurtenances:a.Two (2) Covered API Separators, ID. Nos. D-3617 and D-3618i.Control Devices - Two (2) Carbon Adsorption Canisters (Primary and Secondary);b.Benzene Recovery Unit (BRU) consisting of two (2) Nitrogen Gas Strippers and two(2) Carbon Adsorber Towersi.Control Devices -Two (2) Carbon Adsorption Canisters (Primary and Secondary);c.Recovered Oil Sumpi.Control Devices - Two (2) Carbon Adsorption Canisters (Primary and Secondary);d.Skim Oil Tank identified as storage tank T-3619;e.Wastewater Surge Tank identified as Storage Tank T-301;f.Recovered Oil Tank identified as Storage Tank T-302; andg.Crude Water Draw Tank identified as Storage Tank T-113.Attachment II(G):This portion of the Covered Source Permit encompasses the following equipment and associated appurtenances:a.One (1) - 151.5 MMBtu/hr Atmospheric Furnace identified as F-5103 with Low NOxburners; andb.One (1) - 62.5 MMBtu/hr Vacuum Furnace identified as F-5153 with Low NOx burnersAttachment II(H):This portion of the Covered Source Permit encompasses the following equipment and associated appurtenances: a.One (1) - 220 MMBtu/hr boiler identified as F-5201; andb.Two (2) -

CHEVRON - HAWAII REFINERY (Continued) **1001204662**

160.8 MMBtu/hr boilers identified as F-5202 and F-5203.Attachment II(I):This portion of the Covered Source Permit encompasses the following equipment and associated appurtenances: a.Catalyst transfer operations;b.One (1) - Fluid Catalytic Cracking Unit (FCCU) which includes the Regenerator and Reactor; i.Particulate Control Devices: (1)Cyclone; and (2)Electrostatic Precipitator (ESP), Manufacturer: Hamon Research Cottrell, Inc., Model no. 8883.c.One (1) - 61 MMBtu/hr furnace identified as F-5300.Attachment II(J):This portion of the Covered Source Permit encompasses the following equipment and associated appurtenances: a.One (1) - 9 MMBtu/hr Hydrogenation Unit Furnace identified as F-5600;b.One (1) - 24.3 MMBtu/hr Hydrogen Unit Furnace identified as F-5700;c.One (1) - 4 MMBtu/hr Isomerization Unit Furnace identified as F-5930; andd.One (1) - 1.6 MMBtu/hr Isomerization Unit Furnace identified as F-5950.Attachment II(K):This portion of the Covered Source Permit encompasses the following equipment and associated appurtenances:a.One (1) - 5.7 MMBtu/hr Asphalt Furnace identified as F-6003.Attachment II(L):This portion of the Covered Source Permit encompasses the following equipment and associated appurtenances:a.One (1) - 4.2 MSCFIhr Acid Plant Combustion Chamber, ID no. 6200with one (1) Acid Plant Absorbing Tower Stack; andb.One (1) - 5.1 MMBtuIhr Acid Plant Preheater, ID no. F-6262.Attachment II(M):This portion of the Covered Source Permit encompasses the following equipment andassociated appurtenances:a.Three (3) - 40 MMBtuthr Gas Turbines with Heat Recovery Steam Generators (HRSG), identified as K-6701, K-6702 and K-6703i.NOx Control(1)Gas Turbines - Water Injection; and(2)Heat Recovery Steam Generators (HRSG) - Low NOx Burners.

E17
SE
1/4-1/2
0.453 mi.
2394 ft.

Relative: Lower

Actual: 10 ft.

HAWAII RACEWAY PARK **SHWS S106817374**
91-201 MALAKOLE ST **SPILLS N/A**
KAPOLEI, HI 96707

Site 3 of 4 in cluster E

SHWS:

Organization:	Not reported
Supplemental Location Text:	Kalaeloa Blvd & Malakole St
Island:	Oahu
Environmental Interest:	Hawaii Raceway Park
HID Number:	HID984467779
Facility Registry Identifier:	110013789061
Lead Agency:	HEER
Program:	State
Project Manager:	Diane England
Hazard Priority:	NFA
Potential Hazards And Controls:	No Hazard
Organization:	Not reported
Island:	Oahu
Location Address Line 2:	Not reported
Location Zip Suffix:	Not reported
Supplemental Location Text:	Kalaeloa Blvd & Malakole St
SDAR Environmental Interest Name:	Hawaii Raceway Park
HID Number:	HID984467779
Facility Registry Identifier:	110013789061
Lead Agency:	HEER
Progran Name:	State
Potential Hazard And Controls:	No Hazard
Priority:	NFA

HAWAII RACEWAY PARK (Continued) **S106817374**

Assessment:	Response Not Necessary
Response:	Not reported
Nature of Contamination:	Found: Petroleum, metals, and PCBs in soil
Nature of Residual Contamination:	No (petroleum, metals, and PCBs in soil) contamination left on site is above EALs.
Use Restrictions:	No Hazard Present For Unrestricted Residential Use
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	No Further Action Letter - Unrestricted Residential Use
Document Date:	11/09/2006
Document Number:	2006-673-DE
Document Subject:	No Further Action Determination
Project Manager:	Diane England
Contact Information:	(808) 586-4249 919 Ala Moana Blvd, Honolulu, HI 96814

HI SPILLS:

Island:	Oahu
Supplemental Loc. Text:	Kalaeloa Blvd & Malakole St
Case Number:	19920423-2
HID Number:	HID984467779
Facility Registry Id:	110013789061
Lead and Program:	HEER EP&R
ER:	Not reported
Units:	Hawaii Raceway Park potential dumping and storage of hazardous material
Substances:	Various
Less Or Greater Than:	Not reported
Numerical Quantity:	Not reported
Units:	Not reported
Activity Type:	Response
Activity Lead:	Bryce Hataoka
Assignment End Date:	Not reported
Result:	Refer to ISST
File Under:	Hawaii Raceway Park

Island:	Oahu
Supplemental Loc. Text:	Kalaeloa Blvd & Malakole St
Case Number:	19910618-4
HID Number:	HID984467779
Facility Registry Id:	110013789061
Lead and Program:	HEER EP&R
ER:	Not reported
Units:	HAWAII RACEWAY PARK intential dumping of oil/sulfuric acid
Substances:	Oil, Sulfuric Acid
Less Or Greater Than:	Not reported
Numerical Quantity:	Not reported
Units:	Not reported
Activity Type:	Response
Activity Lead:	Not reported
Assignment End Date:	Not reported
Result:	SOSC NFA
File Under:	Hawaii Raceway Park

Island:	Oahu
Supplemental Loc. Text:	Kalaeloa Blvd & Malakole St
Case Number:	20040924-1600

HAWAII RACEWAY PARK (Continued) **S106817374**

HID Number:	HID984467779
Facility Registry Id:	110013789061
Lead and Program:	HEER EP&R
ER:	None
Units:	Hawaii Raceway Park fire
Substances:	Not reported
Less Or Greater Than:	Not reported
Numerical Quantity:	Not reported
Units:	Not reported
Activity Type:	Not reported
Activity Lead:	Not reported
Assignment End Date:	Not reported
Result:	Not reported
File Under:	Hawaii Raceway Park

E18 **OAHU WASTE SERVICES, INC** **LUST U003154965**
SE **91-310 HANUA ST** **UST N/A**
1/4-1/2 **KAPOLEI, HI 96707** **Financial Assurance**
0.459 mi.
2423 ft. **Site 4 of 4 in cluster E**

Relative:
Lower

Actual:
10 ft.

LUST:

Facility ID:	9-202210
Facility Status:	Site Cleanup Completed (NFA)
Facility Status Date:	08/30/2001
Release ID:	990095
Project Officer:	Mark Sutterfield

UST:

Facility ID:	9-202210
Owner:	Oahu Waste Services, inc
Owner Address:	1169 Mikole Street
Owner City,St,Zip:	Kapolei, 96707 96707
Tank ID:	1D
Date Installed:	12/01/1986
Tank Status:	**Temporarily Out of Use**
Date Closed:	Not reported
Tank Capacity:	10000
Substance:	Diesel
Tank ID:	87
Date Installed:	12/01/1986
Tank Status:	**Temporarily Out of Use**
Date Closed:	Not reported
Tank Capacity:	8000
Substance:	Gasoline

HI Financial Assurance:

Alt Facility ID:	9-202210
Tank Id:	1D
Tank Status Desc:	Temporarily Out of Use
FRTYPE:	Other
Expiration Date:	Not reported
Alt Facility ID:	9-202210

OAHU WASTE SERVICES, INC (Continued) **U003154965**

Tank Id: 87
Tank Status Desc: Temporarily Out of Use
FRTYPE: Other
Expiration Date: Not reported

Alt Facility ID: 9-202210
Tank Id: 1D
Tank Status Desc: Temporarily Out of Use
FRTYPE: Insurance
Expiration Date: 04/13/2013

Alt Facility ID: 9-202210
Tank Id: 87
Tank Status Desc: Temporarily Out of Use
FRTYPE: Insurance
Expiration Date: 04/13/2013

F19 **HONOLULU WOOD TREATING CO LTD** **RCRA-TSDF 1000334042**
SE **91 921 HANUA ST** **CERC-NFRAP HID009198797**
1/2-1 **KAPOLEI, HI 96707** **CORRACTS**
0.550 mi. **RCRA-CESQG**
2902 ft. **Site 1 of 2 in cluster F** **RAATS**
HAZNET
Relative: **2020 COR ACTION**
Lower

Actual:
10 ft.

RCRA-TSDF:
Date form received by agency: 09/13/2001
Facility name: HONOLULU WOOD TREATING CO LTD
Facility address: 91 921 HANUA ST
KAPOLEI, HI 96707
EPA ID: HID009198797
Contact: ROBERT OLIVEIRA
Contact address: 91 921 HANUA ST
KAPOLEI, HI 96707
Contact country: US
Contact telephone: (808) 682-5704
Contact email: Not reported
EPA Region: 09
Land type: Private
Classification: TSDF
Description: Handler is engaged in the treatment, storage or disposal of hazardous waste
Classification: Conditionally Exempt Small Quantity Generator
Description: Handler: generates 100 kg or less of hazardous waste per calendar month, and accumulates 1000 kg or less of hazardous waste at any time; or generates 1 kg or less of acutely hazardous waste per calendar month, and accumulates at any time: 1 kg or less of acutely hazardous waste; or 100 kg or less of any residue or contaminated soil, waste or other debris resulting from the cleanup of a spill, into or on any land or water, of acutely hazardous waste; or generates 100 kg or less of any residue or contaminated soil, waste or other debris resulting from the cleanup of a spill, into or on any land or water, of acutely hazardous waste during any calendar month, and accumulates at any time: 1 kg or less of acutely hazardous waste; or 100 kg or less of any residue or contaminated soil, waste or other debris resulting from the cleanup of a spill, into or on any land or water, of acutely hazardous waste

HONOLULU WOOD TREATING CO LTD (Continued) **1000334042**

Owner/Operator Summary:
Owner/operator name: KOPPERS COMPANY INC
Owner/operator address: KOPPERS BUILDING
CITY NOT REPORTED, PA 99999
Owner/operator country: Not reported
Owner/operator telephone: (412) 227-2000
Legal status: Private
Owner/Operator Type: Operator
Owner/Op start date: Not reported
Owner/Op end date: Not reported

Owner/operator name: HONOLULU WOOD TREATING CO LTD
Owner/operator address: 91 921 HANUA ST
KAPOLEI, HI 96707
Owner/operator country: Not reported
Owner/operator telephone: (808) 682-5704
Legal status: Private
Owner/Operator Type: Owner
Owner/Op start date: Not reported
Owner/Op end date: Not reported

Handler Activities Summary:
U.S. importer of hazardous waste: No
Mixed waste (haz. and radioactive): No
Recycler of hazardous waste: No
Transporter of hazardous waste: No
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: No
Furnace exemption: No
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No

Historical Generators:
Date form received by agency: 10/14/1998
Facility name: HONOLULU WOOD TREATING CO LTD
Classification: Large Quantity Generator

Date form received by agency: 01/22/1996
Facility name: HONOLULU WOOD TREATING CO LTD
Classification: Small Quantity Generator

Date form received by agency: 10/15/1992
Facility name: HONOLULU WOOD TREATING CO LTD
Classification: Large Quantity Generator

Date form received by agency: 01/16/1992
Facility name: HONOLULU WOOD TREATING CO LTD
Site name: HONOLULU WOOD TREATING CO., LTD.
Classification: Large Quantity Generator

HONOLULU WOOD TREATING CO LTD (Continued) **1000334042**

Date form received by agency: 03/06/1990
Facility name: HONOLULU WOOD TREATING CO LTD
Site name: HONOLULU WOOD TREATING CO., LTD.
Classification: Large Quantity Generator

Hazardous Waste Summary:
Waste code: D004
Waste name: ARSENIC

Waste code: D007
Waste name: CHROMIUM

Waste code: F035
Waste name: WASTEWATERS, PROCESS RESIDUALS, PRESERVATIVE DRIPPAGE, AND SPENT FORMULATIONS FROM WOOD PRESERVING PROCESS GENERATED AT PLANTS THAT USE INORGANIC PRESERVATIVES CONTAINING ARSENIC OR CHROMIUM. THIS LISTING DOES NOT INCLUDE K001 BOTTOM SEDIMENT SLUDGE FROM THE TREATMENT OF WASTEWATER FROM WOOD PRESERVING PROCESSES THAT USE CREOSOTE AND/OR PENTACHLOROPHENOL (NOTE: THE LISTING OF WASTEWATERS THAT HAVE NOT COME INTO CONTACT WITH PROCESS CONTAMINANTS IS STAYED ADMINISTRATIVELY. THE STAY WILL REMAIN IN EFFECT UNTIL FURTHER ADMINISTRATIVE ACTION IS TAKEN.).

Corrective Action Summary:
Event date: 11/01/1980
Event: CA049SI

Event date: 02/01/1985
Event: CA049PA

Event date: 03/18/1994
Event: CA Prioritization, Facility or area was assigned a low corrective action priority.

Event date: 03/18/1994
Event: Stabilization Measures Evaluation,This facility is not amenable to stabilization activity at the present time for reasons other than 1- it appears to be technically infeasible or inappropriate (NF) or 2- there is a lack of technical information (IN). Reasons for this conclusion may be the status of closure at the facility, the degree of risk, timing considerations, the status of corrective action work at the facility, or other administrative considerations.

Event date: 09/30/2011
Event: CA550RC

Event date: 09/30/2011
Event: Current Human Exposures under Control, Yes, Current Human Exposures Under Control has been verified. Based on a review of information contained in the EI determination, current human exposures are expected to be under control at the facility under current and reasonably expected conditions. This determination will be re-evaluated when the Agency/State becomes aware of significant changes at the facility.

HONOLULU WOOD TREATING CO LTD (Continued) **1000334042**

Facility Has Received Notices of Violations:
Regulation violated: Not reported
Area of violation: Generators - General
Date violation determined: 05/24/2004
Date achieved compliance: 11/01/2004
Violation lead agency: EPA
Enforcement action: Not reported
Enforcement action date: 09/17/2004
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: EPA
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: Not reported
Area of violation: Generators - General
Date violation determined: 05/24/2004
Date achieved compliance: 11/01/2004
Violation lead agency: EPA
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 09/17/2004
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: EPA
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: F - 262.10-12.A
Area of violation: Generators - General
Date violation determined: 03/01/1993
Date achieved compliance: 01/01/1995
Violation lead agency: State
Enforcement action: INITIAL 3008(A) COMPLIANCE
Enforcement action date: 05/05/1994
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: EPA
Proposed penalty amount: 114860
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: F - 268.7
Area of violation: LDR - General
Date violation determined: 03/01/1993
Date achieved compliance: 01/01/1995
Violation lead agency: State
Enforcement action: FINAL 3008(A) COMPLIANCE ORDER
Enforcement action date: 06/21/1996
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: EPA
Proposed penalty amount: Not reported
Final penalty amount: 71865
Paid penalty amount: Not reported

HONOLULU WOOD TREATING CO LTD (Continued) **1000334042**

Regulation violated: F - 268.7
Area of violation: LDR - General
Date violation determined: 03/01/1993
Date achieved compliance: 01/01/1995
Violation lead agency: State
Enforcement action: INITIAL 3008(A) COMPLIANCE
Enforcement action date: 05/05/1994
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: EPA
Proposed penalty amount: 114860
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: F - 262.10-12.A
Area of violation: Generators - General
Date violation determined: 03/01/1993
Date achieved compliance: 01/01/1995
Violation lead agency: State
Enforcement action: FINAL 3008(A) COMPLIANCE ORDER
Enforcement action date: 06/21/1996
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: EPA
Proposed penalty amount: Not reported
Final penalty amount: 71865
Paid penalty amount: Not reported

Regulation violated: FR - 268.7
Area of violation: LDR - General
Date violation determined: 12/12/1990
Date achieved compliance: 02/19/1991
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 02/01/1991
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: FR - 264.140-150.H
Area of violation: TSD - Financial Requirements
Date violation determined: 12/12/1990
Date achieved compliance: 02/19/1991
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 02/01/1991
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: FR - 268 ALL

HONOLULU WOOD TREATING CO LTD (Continued) **1000334042**

Area of violation: LDR - General
Date violation determined: 12/12/1990
Date achieved compliance: 02/19/1991
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 02/01/1991
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: FR - 270
Area of violation: TSD - General
Date violation determined: 12/12/1990
Date achieved compliance: 02/19/1991
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 02/01/1991
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: FR - 270
Area of violation: TSD - General
Date violation determined: 04/20/1989
Date achieved compliance: 01/25/1990
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 11/24/1989
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: F - 270
Area of violation: TSD - General
Date violation determined: 12/07/1987
Date achieved compliance: 01/25/1990
Violation lead agency: State
Enforcement action: Not reported
Enforcement action date: Not reported
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: Not reported
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: FR - 270
Area of violation: TSD - General

HONOLULU WOOD TREATING CO LTD (Continued) **1000334042**

Date violation determined: 08/02/1985
Date achieved compliance: 02/10/1986
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 01/27/1986
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: EPA
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Evaluation Action Summary:
Evaluation date: 10/06/2005
Evaluation: FOCUSED COMPLIANCE INSPECTION
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 05/24/2004
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Generators - General
Date achieved compliance: 11/01/2004
Evaluation lead agency: EPA

Evaluation date: 06/21/1996
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Generators - General
Date achieved compliance: 01/01/1995
Evaluation lead agency: State

Evaluation date: 06/21/1996
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: LDR - General
Date achieved compliance: 01/01/1995
Evaluation lead agency: State

Evaluation date: 01/01/1995
Evaluation: NOT A SIGNIFICANT NON-COMPLIER
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 03/01/1993
Evaluation: SIGNIFICANT NON-COMPLIER
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 12/09/1992
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 12/27/1991
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE

HONOLULU WOOD TREATING CO LTD (Continued) **1000334042**

Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 12/12/1990
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: TSD - General
Date achieved compliance: 02/19/1991
Evaluation lead agency: State

Evaluation date: 12/12/1990
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: LDR - General
Date achieved compliance: 02/19/1991
Evaluation lead agency: State

Evaluation date: 12/12/1990
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: TSD - Financial Requirements
Date achieved compliance: 02/19/1991
Evaluation lead agency: State

Evaluation date: 04/20/1989
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: TSD - General
Date achieved compliance: 01/25/1990
Evaluation lead agency: State

Evaluation date: 12/07/1987
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: TSD - General
Date achieved compliance: 01/25/1990
Evaluation lead agency: State

Evaluation date: 08/14/1986
Evaluation: NON-FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 03/31/1986
Evaluation: FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: EPA

Evaluation date: 08/02/1985
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: TSD - General
Date achieved compliance: 02/10/1986
Evaluation lead agency: State

CERC-NFRAP:
Site ID: 0902837
Federal Facility: Not a Federal Facility
NPL Status: Not on the NPL
Non NPL Status: NFRAP-Site does not qualify for the NPL based on existing information

HONOLULU WOOD TREATING CO LTD (Continued) **1000334042**

CERCLIS-NFRAP Site Contact Details:
Contact Sequence ID: 13037487.00000
Person ID: 9000059.00000

CERCLIS-NFRAP Assessment History:
Action: DISCOVERY
Date Started: / /
Date Completed: 02/01/80
Priority Level: Not reported

Action: ARCHIVE SITE
Date Started: / /
Date Completed: 02/01/85
Priority Level: Not reported

Action: PRELIMINARY ASSESSMENT
Date Started: / /
Date Completed: 02/01/85
Priority Level: NFRAP-Site does not qualify for the NPL based on existing information

Action: SITE INSPECTION
Date Started: / /
Date Completed: 11/01/80
Priority Level: NFRAP-Site does not qualify for the NPL based on existing information

CORRACTS:

EPA ID: HID009198797
EPA Region: 09
Area Name: ENTIRE FACILITY
Actual Date: 19940318
Action: CA075LO - CA Prioritization, Facility or area was assigned a low corrective action priority
NAICS Code(s): Not reported
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: HID009198797
EPA Region: 09
Area Name: ENTIRE FACILITY
Actual Date: 20110930
Action: CA725YE - Current Human Exposures Under Control, Yes, Current Human Exposures Under Control has been verified
NAICS Code(s): Not reported
Original schedule date: 20110930
Schedule end date: Not reported

EPA ID: HID009198797
EPA Region: 09
Area Name: ENTIRE FACILITY
Actual Date: 20110930
Action: CA550RC
NAICS Code(s): Not reported
Original schedule date: 20110930
Schedule end date: Not reported

HONOLULU WOOD TREATING CO LTD (Continued) **1000334042**

HAZNET:
Year: 2003
Gepaid: HID009198797
Contact: --
Telephone: --
Mailing Name: Not reported
Mailing Address: --
Mailing City,St,Zip: EWA BEACH, HI 967060000
Gen County: Not reported
TSD EPA ID: CAD059494310
TSD County: Not reported
Waste Category: Not reported
Disposal Method: Disposal, Other
Tons: 1.35
Facility County: 99

Year: 2003
Gepaid: HID009198797
Contact: --
Telephone: --
Mailing Name: Not reported
Mailing Address: --
Mailing City,St,Zip: EWA BEACH, HI 967060000
Gen County: Not reported
TSD EPA ID: CAD059494310
TSD County: Not reported
Waste Category: Other inorganic solid waste
Disposal Method: Disposal, Other
Tons: 2.5
Facility County: 99

Year: 2003
Gepaid: HID009198797
Contact: --
Telephone: --
Mailing Name: Not reported
Mailing Address: --
Mailing City,St,Zip: EWA BEACH, HI 967060000
Gen County: Not reported
TSD EPA ID: CAD059494310
TSD County: Not reported
Waste Category: Hydrocarbon solvents (benzene, hexane, Stoddard, Etc.)
Disposal Method: Disposal, Other
Tons: 1.35
Facility County: 99

Year: 2003
Gepaid: HID009198797
Contact: --
Telephone: --
Mailing Name: Not reported
Mailing Address: --
Mailing City,St,Zip: EWA BEACH, HI 967060000
Gen County: Not reported
TSD EPA ID: CAD059494310
TSD County: Not reported
Waste Category: Waste oil and mixed oil

HONOLULU WOOD TREATING CO LTD (Continued) **1000334042**

Disposal Method: Transfer Station
Tons: 0.5
Facility County: 99

Year: 2003
Gepaid: HID009198797
Contact: --
Telephone: --
Mailing Name: Not reported
Mailing Address: --
Mailing City,St,Zip: EWA BEACH, HI 967060000
Gen County: Not reported
TSD EPA ID: CAD059494310
TSD County: Not reported
Waste Category: Pesticides and other waste associated with pesticide production
Disposal Method: Transfer Station
Tons: 5.05
Facility County: 99

Click this hyperlink while viewing on your computer to access
3 additional CA_HAZNET: record(s) in the EDR Site Report.

2020 COR ACTION:
EPA ID: HID009198797
Region: 9
Action: Not reported

F20 **HONOLULU WOOD TREATING COMPANY, LTD** **SHWS S104657436**
SE **91-291 HANUA ST** **UIC N/A**
1/2-1 **KAPOLEI, HI 96707** **SPILLS**
0.550 mi. **ENG CONTROLS**
2902 ft. **Site 2 of 2 in cluster F** **INST CONTROL**
VCP

Relative:
Lower

Actual:
10 ft.

SHWS:
Organization: Not reported
Supplemental Location Text: Not reported
Island: Oahu
Environmental Interest: Honolulu Wood Treating Co. Ltd.
HID Number: HID009198797
Facility Registry Identifier: 110000486313
Lead Agency: HEER
Program: Voluntary Response Program
Project Manager: Steve Mow
Hazard Priority: Medium
Potential Hazards And Controls: Hazard Managed With Controls
Organization: Not reported
Island: Oahu
Location Address Line 2: Not reported
Location Zip Suffix: Not reported
Supplemental Location Text: Not reported
SDAR Environmental Interest Name: Honolulu Wood Treating Co. Ltd.
HID Number: HID009198797
Facility Registry Identifier: 110000486313
Lead Agency: HEER
Progran Name: Voluntary Response Program
Potential Hazard And Controls: Hazard Managed With Controls

HONOLULU WOOD TREATING COMPANY, LTD (Continued) **S104657436**

Priority: Medium
Assessment: Response Necessary
Response: Response Ongoing
Nature of Contamination: Found: Dioxins, arsenic
Nature of Residual Contamination: Not reported
Use Restrictions: Controls Required to Manage Contamination
Engineering Control: Engineering Control Required
Description of Restrictions: Not reported
Institutional Control: Government - Hawaii Dept. of Health Letter Issued
Within Designated Areawide Contamination: Not reported
Site Closure Type: Not reported
Document Date: Not reported
Document Number: Not reported
Document Subject: Not reported
Project Manager: Steve Mow
Contact Information: (808) 586-4249 919 Ala Moana Blvd, Honolulu, HI 96814

UIC:
UIC Permit Number: UO-2087
Facility Id/Lat Long Minute Coordinates: 3-1806.10.1
Central Latitude Of The Site: Not reported
Central Longitude Of The Site: Not reported
Flow In Gallons Per Day: 6330 gpm
Total Number Of Inj. Well(S) On Permit: 1
Island: Oahu
Location In Relation To UIC Line: Not reported
Facility Type: DW
Subclass: C
Facility Operator, Not Contract Opr: Hon. Wood Treatment Co. & Ariel Truss Plant
Operator Address: 91-291 Hanua St., Kapolei, HI 96706
Facility Owner: Honolulu Wood Treatment Co. & Ariel Truss Plant
Owner Address: 91-291 Hanua St., Kapolei, HI 96706
Tax Map Key Number: 1:9-1-32:010
Owner Of Land Property On Leasehold: none
Consultant Serving The Application: Hawaii Engineering Group
Receipt Of Initial Application: 2/28/2000
Public Notice Date: Not reported
Approval-To-Construct Issuance Date: 6/13/2000
Exemption Issuance Date: Not reported
1st Issuance Of Permit: 6/2/2000
Last Issuance Of Permit: 8/31/2005
Type: Not reported
Permit Expiration Date: 8/30/2010
Date When File Is Closed: Not reported
UIC Project Geologist: NU
Remarks: Not reported

HI SPILLS:
Island: Oahu
Supplemental Loc. Text: Not reported
Case Number: 19910125-1
HID Number: HID009198797
Facility Registry Id: 110000486313
Lead and Program: HEER EP&R
ER: Not reported
Units: HANUA ST. 91-291 (HON. WOOD TREATING)

HONOLULU WOOD TREATING COMPANY, LTD (Continued) **S104657436**

Substances: WOOD PRESERVATIVE
Less Or Greater Than: Not reported
Numerical Quantity: 1000
Units: Gallons
Activity Type: Response
Activity Lead: Not reported
Assignment End Date: Not reported
Result: SOSC NFA
File Under: Honolulu Wood Treating Company, Ltd (Tad T. Ogi)

Island: Oahu
Supplemental Loc. Text: Not reported
Case Number: 19920928
HID Number: HID009198797
Facility Registry Id: 110000486313
Lead and Program: HEER EP&R
ER: Not reported
Units: Honolulu Wood Treating Co., Ltd. Hanua Street 91-291
Substances: SEE INCIDENT DESCRIPTION
Less Or Greater Than: Not reported
Numerical Quantity: Not reported
Units: Not reported
Activity Type: Response
Activity Lead: Terry Corpus
Assignment End Date: Not reported
Result: SOSC NFA
File Under: Honolulu Wood Treating Company, Ltd (Tad T. Ogi)

Island: Oahu
Supplemental Loc. Text: Not reported
Case Number: 19961115-1235
HID Number: HID009198797
Facility Registry Id: 110000486313
Lead and Program: HEER EP&R
ER: Not reported
Units: Honolulu Wood Treating
Substances: Not reported
Less Or Greater Than: Not reported
Numerical Quantity: Not reported
Units: Not reported
Activity Type: Response
Activity Lead: Terry Corpus
Assignment End Date: Not reported
Result: SOSC NFA
File Under: Honolulu Wood Treating Company, Ltd (Tad T. Ogi)

Island: Oahu
Supplemental Loc. Text: Not reported
Case Number: 20041005-1258
HID Number: HID009198797
Facility Registry Id: 110000486313
Lead and Program: HEER EP&R
ER: Referred
Units: Phase 2 testing
Substances: Chromated Copper Arsenate
Less Or Greater Than: Not reported
Numerical Quantity: Not reported

HONOLULU WOOD TREATING COMPANY, LTD (Continued) **S104657436**

Units: Unknown
Activity Type: Response
Activity Lead: Liz Galvez
Assignment End Date: 2004-10-11 00:00:00
Result: Refer to ISST
File Under: Honolulu Wood Treating Company, Ltd (Tad T. Ogi)

ENG CONTROLS:
Supplemental Location Text: Not reported
Zip Suffix: Not reported
Island: Oahu
Potential Hazards And Controls: Hazard Managed With Controls
Engineering Control: Engineering Control Required

INST CONTROL:
Potential hazards and controls: Hazard Managed With Controls
Supplemental Location: Not reported
Zip Suffix: Not reported
Island: Oahu
Institutional Control: Government - Hawaii Dept. of Health Letter Issued

VCP:
Program: Voluntary Response Program
Zip Suffix: Not reported
Supplemental Location: Not reported
Island: Oahu

21
East
1/2-1
0.677 mi.
3573 ft.

Relative:
Higher

Actual:
49 ft.

HECO - CAMPBELL INDUSTRIAL PARK SUBSTATION **SHWS** **S108859678**
91-550 KALAELOA BLVD **SPILLS** **N/A**
KAPOLEI, HI 96707 **ENG CONTROLS**

SHWS:
Organization: Not reported
Supplemental Location Text: Not reported
Island: Oahu
Environmental Interest: HECO - Campbell Industrial Park Substation
HID Number: Not reported
Facility Registry Identifier: Not reported
Lead Agency: HEER
Program: State
Project Manager: Amelia Hicks
Hazard Priority: NFA
Potential Hazards And Controls: Hazard Managed With Controls
Organization: Not reported
Island: Oahu
Location Address Line 2: Not reported
Location Zip Suffix: Not reported
Supplemental Location Text: Not reported
SDAR Environmental Interest Name: HECO - Campbell Industrial Park Substation
HID Number: Not reported
Facility Registry Identifier: Not reported
Lead Agency: HEER
Progran Name: State
Potential Hazard And Controls: Hazard Managed With Controls

HECO - CAMPBELL INDUSTRIAL PARK SUBSTATION (Continued) **S108859678**

Priority:	NFA
Assessment:	Response Necessary
Response:	Response Complete
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Diesel fuel impacted soil was excavated and disposed of at Wamanalo Gulch. Impacted area is capped wth HDPE liner to prohibit mobilization of petroleum away from the release area.
Use Restrictions:	Controls Required to Manage Contamination
Engineering Control:	Engineering Control Required
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	ISST NFA - No Letter
Document Date:	07/10/2012
Document Number:	2012-413-AH
Document Subject:	Concurrence with Hawaiian Electric Company, Inc. Campbell Estate Industrial Park Substation, 91-550
Project Manager:	Amelia Hicks
Contact Information:	(808) 586-4249 919 Ala Moana Blvd, Honolulu, HI 96814

HI SPILLS:

Island:	Oahu
Supplemental Loc. Text:	Not reported
Case Number:	20070625-0700
HID Number:	Not reported
Facility Registry Id:	Not reported
Lead and Program:	HEER EP&R
ER:	Site Visit
Units:	HECO - Campbell Industrial Park Substation Diesel Release
Substances:	Diesel Fuel
Less Or Greater Than:	Not reported
Numerical Quantity:	7200
Units:	Gallons
Activity Type:	Response
Activity Lead:	Liz Galvez
Assignment End Date:	2008-05-06 00:00:00
Result:	SOSC concurrence
File Under:	Hawaiian Electric Co., Inc. (HECO)

ENG CONTROLS:

Supplemental Location Text:	Not reported
Zip Suffix:	Not reported
Island:	Oahu
Potential Hazards And Controls:	Hazard Managed With Controls
Engineering Control:	Engineering Control Required

22
South
1/2-1
0.708 mi.
3738 ft.

Relative:
Lower

Actual:
3 ft.

BEI (BREWER ENVIRONMENTAL INDUSTRIES) KAOMI LOOP **SHWS S105262935**
91-291 KAOMI LP **SPILLS N/A**
KAPOLEI, HI 96707

SHWS:

Organization:	Not reported
Supplemental Location Text:	Not reported
Island:	Oahu
Environmental Interest:	Brewer Chemical Corporation

BEI (BREWER ENVIRONMENTAL INDUSTRIES) KAOMI LOOP (Continued) **S105262935**

HID Number:	HID000630251
Facility Registry Identifier:	110000486288
Lead Agency:	Not reported
Program:	State
Project Manager:	Curtis Martin
Hazard Priority:	NFA
Potential Hazards And Controls:	Hazard Undetermined
Organization:	Not reported
Island:	Oahu
Location Address Line 2:	Not reported
Location Zip Suffix:	Not reported
Supplemental Location Text:	Not reported
SDAR Environmental Interest Name:	Brewer Chemical Corporation
HID Number:	HID000630251
Facility Registry Identifier:	110000486288
Lead Agency:	Not reported
Progran Name:	State
Potential Hazard And Controls:	Hazard Undetermined
Priority:	NFA
Assessment:	Assessment Ongoing
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Undetermined
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	No Further Action - Type Undetermined
Document Date:	12/28/1999
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Curtis Martin
Contact Information:	(808) 586-4249 919 Ala Moana Blvd, Honolulu, HI 96814

HI SPILLS:

Island:	Oahu
Supplemental Loc. Text:	Not reported
Case Number:	19940124-3
HID Number:	HID000630251
Facility Registry Id:	110000486288
Lead and Program:	HEER EP&R
ER:	Not reported
Units:	Brewer 2000 Gallon Sulfuric Acid Release
Substances:	Sulfuric Acid
Less Or Greater Than:	Not reported
Numerical Quantity:	2000
Units:	Gallons
Activity Type:	Response
Activity Lead:	Not reported
Assignment End Date:	Not reported
Result:	SOSC NFA
File Under:	Brewer Environmental Industries, LLC

Island:	Oahu
Supplemental Loc. Text:	Not reported
Case Number:	19991126-0735

BEI (BREWER ENVIRONMENTAL INDUSTRIES) KAOMI LOOP (Continued) **S105262935**

HID Number: HID000630251
Facility Registry Id: 110000486288
Lead and Program: HEER EP&R
ER: Site Visit
Units: Brewer 35 Ton Sulfuric Acid Release
Substances: Sulfuric Acid 98%
Less Or Greater Than: Not reported
Numerical Quantity: 35
Units: Tons
Activity Type: Cost Recovery
Activity Lead: Lainie Tamashiro
Assignment End Date: 2003-06-30 00:00:00
Result: SOSC NFA
File Under: Brewer Environmental Industries, LLC

Island: Oahu
Supplemental Loc. Text: Not reported
Case Number: 19991126-0735
HID Number: HID000630251
Facility Registry Id: 110000486288
Lead and Program: HEER EP&R
ER: Site Visit
Units: Brewer 35 Ton Sulfuric Acid Release
Substances: Sulfuric Acid 98%
Less Or Greater Than: Not reported
Numerical Quantity: 35
Units: Tons
Activity Type: Cost Recovery
Activity Lead: Tricia Nagatani
Assignment End Date: 2002-11-30 00:00:00
Result: Change SOSC
File Under: Brewer Environmental Industries, LLC

Island: Oahu
Supplemental Loc. Text: Not reported
Case Number: 19991126-0735
HID Number: HID000630251
Facility Registry Id: 110000486288
Lead and Program: HEER EP&R
ER: Site Visit
Units: Brewer 35 Ton Sulfuric Acid Release
Substances: Sulfuric Acid 98%
Less Or Greater Than: Not reported
Numerical Quantity: 35
Units: Tons
Activity Type: Penalty
Activity Lead: Curtis Martin
Assignment End Date: 1999-12-28 00:00:00
Result: SOSC NFA
File Under: Brewer Environmental Industries, LLC

Island: Oahu
Supplemental Loc. Text: Not reported
Case Number: 19991126-0735
HID Number: HID000630251
Facility Registry Id: 110000486288
Lead and Program: HEER EP&R

BEI (BREWER ENVIRONMENTAL INDUSTRIES) KAOMI LOOP (Continued) **S105262935**

ER: Site Visit
Units: Brewer 35 Ton Sulfuric Acid Release
Substances: Sulfuric Acid 98%
Less Or Greater Than: Not reported
Numerical Quantity: 35
Units: Tons
Activity Type: Response
Activity Lead: Terry Corpus
Assignment End Date: 1999-11-26 00:00:00
Result: Change SOSC
File Under: Brewer Environmental Industries, LLC

Click this hyperlink while viewing on your computer to access
2 additional HI SPILLS: record(s) in the EDR Site Report.

23
SE
1/2-1
0.790 mi.
4171 ft.

Relative: Higher

Actual: 13 ft.

HICKLIN VALLEY DETROIT DIESEL **SHWS S106817692**
91-265 KALAELOA BLVD **SPILLS N/A**
KAPOLEI, HI

SHWS:
Organization: Not reported
Supplemental Location Text: Campbell Industrial Park
Island: Oahu
Environmental Interest: Valley Detroit Diesel
HID Number: Not reported
Facility Registry Identifier: 110013787214
Lead Agency: Not reported
Program: State
Project Manager: Mike Cripps
Hazard Priority: NFA
Potential Hazards And Controls: Hazard Undetermined
Organization: Not reported
Island: Oahu
Location Address Line 2: Not reported
Location Zip Suffix: Not reported
Supplemental Location Text: Campbell Industrial Park
SDAR Environmental Interest Name: Valley Detroit Diesel
HID Number: Not reported
Facility Registry Identifier: 110013787214
Lead Agency: Not reported
Progran Name: State
Potential Hazard And Controls: Hazard Undetermined
Priority: NFA
Assessment: Assessment Ongoing
Response: Not reported
Nature of Contamination: Not reported
Nature of Residual Contamination: Not reported
Use Restrictions: Undetermined
Engineering Control: Not reported
Description of Restrictions: Not reported
Institutional Control: Not reported
Within Designated Areawide Contamination: Not reported
Site Closure Type: No Further Action - Type Undetermined
Document Date: 01/15/1993
Document Number: Not reported
Document Subject: Not reported

HICKLIN VALLEY DETROIT DIESEL (Continued) **S106817692**

Project Manager: Mike Cripps
Contact Information: (808) 586-4249 919 Ala Moana Blvd, Honolulu, HI 96814

HI SPILLS:
Island: Oahu
Supplemental Loc. Text: Campbell Industrial Park
Case Number: 19920318
HID Number: Not reported
Facility Registry Id: 110013787214
Lead and Program: HEER EP&R
ER: Not reported
Units: Valley Detroit Diesel
Substances: Benzene
Less Or Greater Than: Not reported
Numerical Quantity: 385
Units: Gallons
Activity Type: Response
Activity Lead: Mike Cripps
Assignment End Date: Not reported
Result: Not reported
File Under: Detroit Diesel Corporation

Island: Oahu
Supplemental Loc. Text: Campbell Industrial Park
Case Number: 19920318
HID Number: Not reported
Facility Registry Id: 110013787214
Lead and Program: HEER EP&R
ER: Not reported
Units: Valley Detroit Diesel
Substances: Chromium
Less Or Greater Than: Not reported
Numerical Quantity: Not reported
Units: Not reported
Activity Type: Response
Activity Lead: Mike Cripps
Assignment End Date: Not reported
Result: Not reported
File Under: Detroit Diesel Corporation

Island: Oahu
Supplemental Loc. Text: Campbell Industrial Park
Case Number: 19920318
HID Number: Not reported
Facility Registry Id: 110013787214
Lead and Program: HEER EP&R
ER: Not reported
Units: Valley Detroit Diesel
Substances: Oil
Less Or Greater Than: Not reported
Numerical Quantity: 450
Units: Gallons
Activity Type: Response
Activity Lead: Mike Cripps
Assignment End Date: Not reported
Result: Not reported
File Under: Detroit Diesel Corporation

24 **COVAN WAREHOUSE** **SHWS** **1006820074**
SE **91-238 KALAELOA BLVD** **N/A**
1/2-1 **KAPOLEI, HI 96707**
0.791 mi.
4179 ft.

Relative:
Lower

Actual:
10 ft.

SHWS:
Organization: Not reported
Supplemental Location Text: Not reported
Island: Oahu
Environmental Interest: CoVan Warehouse
HID Number: Not reported
Facility Registry Identifier: 110013779624
Lead Agency: HEER
Program: State
Project Manager: Unassigned
Hazard Priority: Low
Potential Hazards And Controls: Hazard Present
Organization: Not reported
Island: Oahu
Location Address Line 2: Not reported
Location Zip Suffix: Not reported
Supplemental Location Text: Not reported
SDAR Environmental Interest Name: CoVan Warehouse
HID Number: Not reported
Facility Registry Identifier: 110013779624
Lead Agency: HEER
Progran Name: State
Potential Hazard And Controls: Hazard Present
Priority: Low
Assessment: Response Necessary
Response: Response Ongoing
Nature of Contamination: Found: Arsenic and chromium in soil
Nature of Residual Contamination: Not reported
Use Restrictions: Controls Required to Manage Contamination
Engineering Control: Not reported
Description of Restrictions: Not reported
Institutional Control: Not reported
Within Designated Areawide Contamination: Not reported
Site Closure Type: Not reported
Document Date: Not reported
Document Number: Not reported
Document Subject: Not reported
Project Manager: Unassigned
Contact Information: (808) 586-4249 919 Ala Moana Blvd, Honolulu, HI 96814

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25 **BONJON'S TUXEDOS** **SHWS** **S107769075**
SE **91-226 KAUHI ST.** **DRYCLEANERS** **N/A**
1/2-1 **KAPOLEI, HI 96707**
0.808 mi.
4266 ft.

Relative:
Lower

Actual:
10 ft.

SHWS:
Organization: Not reported
Supplemental Location Text: Not reported
Island: Oahu
Environmental Interest: Bon Jon's Tuxedos
HID Number: Not reported
Facility Registry Identifier: Not reported
Lead Agency: HEER

BONJON'S TUXEDOS (Continued) **S107769075**

Program:	Recognized Environmental Concern
Project Manager:	Fenix Grange
Hazard Priority:	Low
Potential Hazards And Controls:	Hazard Undetermined
Organization:	Not reported
Island:	Oahu
Location Address Line 2:	Not reported
Location Zip Suffix:	Not reported
Supplemental Location Text:	Not reported
SDAR Environmental Interest Name:	Bon Jon's Tuxedos
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER
Progran Name:	Recognized Environmental Concern
Potential Hazard And Controls:	Hazard Undetermined
Priority:	Low
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Presumed: Dry Cleaning Solvent.
Nature of Residual Contamination:	Not reported
Use Restrictions:	Undetermined
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Fenix Grange
Contact Information:	(808) 586-4249 919 Ala Moana Blvd, Honolulu, HI 96814

HI DRYCLEANERS:

Permit Number:	0094-20
Gal/Year:	330
Mach Type:	D-D
Island:	Oahu
Company:	BonJon LLC
Application Date:	11/22/1994
Issued Date:	05/18/1998
Phone Number:	682-2421
Responsible Official Name:	Ronald Bongiovanni
Responsible Official Title:	Owner
Responsible Official Address:	91-226 Kauhi St.
Responsible Official City,St,Zip:	Kapolei, HI 96707

26
SE
1/2-1
0.839 mi.
4428 ft.

Relative:
Lower

Actual:
10 ft.

TILECO, INC **SHWS S106820627**
91-209 HANUA ST **SPILLS N/A**
KAPOLEI, HI 96707

SHWS:

Organization:	Not reported
Supplemental Location Text:	Not reported
Island:	Oahu
Environmental Interest:	Hanua Street Petroleum on Groundwater

TILECO, INC (Continued) **S106820627**

HID Number:	Not reported
Facility Registry Identifier:	110001412711
Lead Agency:	HEER
Program:	State
Project Manager:	Unassigned
Hazard Priority:	Medium
Potential Hazards And Controls:	Hazard Undetermined
Organization:	Not reported
Island:	Oahu
Location Address Line 2:	Not reported
Location Zip Suffix:	Not reported
Supplemental Location Text:	Not reported
SDAR Environmental Interest Name:	Hanua Street Petroleum on Groundwater
HID Number:	Not reported
Facility Registry Identifier:	110001412711
Lead Agency:	HEER
Progran Name:	State
Potential Hazard And Controls:	Hazard Undetermined
Priority:	Medium
Assessment:	Response Necessary
Response:	Response Complete
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Undetermined
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Unassigned
Contact Information:	(808) 586-4249 919 Ala Moana Blvd, Honolulu, HI 96814

HI SPILLS:

Island:	Oahu
Supplemental Loc. Text:	Not reported
Case Number:	19890522
HID Number:	Not reported
Facility Registry Id:	110001412711
Lead and Program:	HEER EP&R
ER:	Not reported
Units:	Tileco
Substances:	Crude Oil
Less Or Greater Than:	Not reported
Numerical Quantity:	Not reported
Units:	Not reported
Activity Type:	Response
Activity Lead:	Mike Cripps
Assignment End Date:	Not reported
Result:	SOSC NFA
File Under:	Tileco, Inc.

Island:	Oahu
Supplemental Loc. Text:	Not reported
Case Number:	19971110-0003

TILECO, INC (Continued) **S106820627**

HID Number:	Not reported
Facility Registry Id:	110001412711
Lead and Program:	HEER EP&R
ER:	No
Units:	Hanua Street Petroleum on Groundwater
Substances:	Petroleum Hydrocarbon
Less Or Greater Than:	Not reported
Numerical Quantity:	Not reported
Units:	Not reported
Activity Type:	Response
Activity Lead:	Charley Langer
Assignment End Date:	Not reported
Result:	Refer to ISST
File Under:	Tileco, Inc.

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27 **HONOLULU RESOURCE RECOVERY VENTURE** **MLTS** **1000488623**
SSE **91-174 HANUA STREET** **SHWS** **N/A**
1/2-1 **KAPOLEI, HI 96707** **UST**
0.925 mi. **SPILLS**
4883 ft. **ENG CONTROLS**
INST CONTROL
Relative: **AIRS**
Lower **Financial Assurance**

Actual:
10 ft.

MLTS:

License Number:	53-23291-01
First License Date:	3/31/1989
License Date:	6/21/2005
Lic. Expiration Date:	10/31/2014
Contact Name:	ROBERT A WEBSTER
Contact Phone:	808-682-0201
Institution Code:	23291
Department/Bldg:	Not reported
States Allowing Use:	Not reported
Store Material Use:	No
Redistribution Use:	Yes
Incinerate Use:	No
Burial Use:	No
Last Inspection Date:	4/1/2010
Next Inspection Date:	4/1/2015
Licensee Contact:	Not reported
Inspector Name:	JAMES MOODY

SHWS:

Organization:	Not reported
Supplemental Location Text:	Not reported
Island:	Oahu
Environmental Interest:	Covanta HPOWER Diesel Fuel Oil Leak
HID Number:	Not reported
Facility Registry Identifier:	110005722138
Lead Agency:	HEER
Program:	State
Project Manager:	Mark Sutterfield
Hazard Priority:	NFA
Potential Hazards And Controls:	Hazard Managed With Controls
Organization:	Not reported
Island:	Oahu

HONOLULU RESOURCE RECOVERY VENTURE (Continued) **1000488623**

Location Address Line 2:	Not reported
Location Zip Suffix:	Not reported
Supplemental Location Text:	Not reported
SDAR Environmental Interest Name:	Covanta HPOWER Diesel Fuel Oil Leak
HID Number:	Not reported
Facility Registry Identifier:	110005722138
Lead Agency:	HEER
Progran Name:	State
Potential Hazard And Controls:	Hazard Managed With Controls
Priority:	NFA
Assessment:	Response Necessary
Response:	Response Complete
Nature of Contamination:	Found: Diesel fuel
Nature of Residual Contamination:	Contaminated soil remains beneath the concrete retainer for the Diesel AST. The soil must be remediated after the AST is removed. Current status is unknown.
Use Restrictions:	Controls Required to Manage Contamination
Engineering Control:	Engineering Control Required
Description of Restrictions:	Prohibit Any Activity That May Disturb the Integrity of the Capping System
Institutional Control:	Government - Hawaii Dept. of Health Letter Issued
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	No Further Action Letter - Restricted Use
Document Date:	10/27/2004
Document Number:	2004-451-MS
Document Subject:	NFA soil diesel release with condition for removal of contaminated soil once the ASTs are removed.
Project Manager:	Mark Sutterfield
Contact Information:	(808) 586-4249 919 Ala Moana Blvd, Honolulu, HI 96814
Organization:	Not reported
Supplemental Location Text:	Not reported
Island:	Oahu
Environmental Interest:	Covanta HPOWER Lead Contaminated Sand
HID Number:	Not reported
Facility Registry Identifier:	110005722138
Lead Agency:	HEER
Program:	State
Project Manager:	Mark Sutterfield
Hazard Priority:	NFA
Potential Hazards And Controls:	Hazard Managed With Controls
Organization:	Not reported
Island:	Oahu
Location Address Line 2:	Not reported
Location Zip Suffix:	Not reported
Supplemental Location Text:	Not reported
SDAR Environmental Interest Name:	Covanta HPOWER Lead Contaminated Sand
HID Number:	Not reported
Facility Registry Identifier:	110005722138
Lead Agency:	HEER
Progran Name:	State
Potential Hazard And Controls:	Hazard Managed With Controls
Priority:	NFA
Assessment:	Response Necessary
Response:	Response Complete
Nature of Contamination:	Found: Lead found above EAL. Risk assessment claims no hazrd. Site must reamin commercial industrial. Soil removed from the site must be

HONOLULU RESOURCE RECOVERY VENTURE (Continued) **1000488623**

treated or disposed of properly
Nature of Residual Contamination: Not reported
Use Restrictions: Controls Required to Manage Contamination
Engineering Control: Not reported
Description of Restrictions: Not reported
Institutional Control: Government - Hawaii Dept. of Health Letter Issued
Within Designated Areawide Contamination: Not reported
Site Closure Type: No Further Action Letter - Restricted Use
Document Date: 09/21/2006
Document Number: 2006-591-MS
Document Subject: Review of Risk Assessment and NFA
Project Manager: Mark Sutterfield
Contact Information: (808) 586-4249 919 Ala Moana Blvd, Honolulu, HI 96814

UST:
Facility ID: 9-201964
Owner: THE CONNECTICUT BANK AND TRUST
Owner Address: ONE CONSTITUTION PLAZA
Owndер City,St,Zip: Kapolei, 96707 96707

Tank ID: diesel
Date Installed: 03/29/1990
Tank Status: Currently In Use
Date Closed: Not reported
Tank Capacity: 6000
Substance: Diesel

HI SPILLS:
Island: Oahu
Supplemental Loc. Text: Not reported
Case Number: 19931214
HID Number: Not reported
Facility Registry Id: 110005722138
Lead and Program: HEER EP&R
ER: Not reported
Units: H-Power Plant, Ewa Beach, Oahu, HI illegal disposal of radioactive material
Substances: Radioactive material
Less Or Greater Than: Not reported
Numerical Quantity: Not reported
Units: Not reported
Activity Type: Response
Activity Lead: Not reported
Assignment End Date: Not reported
Result: SOSC NFA
File Under: Honolulu Resource Recovery Venture

Island: Oahu
Supplemental Loc. Text: Not reported
Case Number: 19931217
HID Number: Not reported
Facility Registry Id: 110005722138
Lead and Program: HEER EP&R
ER: Not reported
Units: H-Power, Ewa Beach, Oahu
Substances: Radioactive material
Less Or Greater Than: Not reported

HONOLULU RESOURCE RECOVERY VENTURE (Continued) **1000488623**

Numerical Quantity: Not reported
Units: Not reported
Activity Type: Response
Activity Lead: Not reported
Assignment End Date: Not reported
Result: SOSC NFA
File Under: Honolulu Resource Recovery Venture

Island: Oahu
Supplemental Loc. Text: Not reported
Case Number: 19940309-1212
HID Number: Not reported
Facility Registry Id: 110005722138
Lead and Program: HEER EP&R
ER: Not reported
Units: H-Power, Alarm Sounded
Substances: Not reported
Less Or Greater Than: Not reported
Numerical Quantity: Not reported
Units: Not reported
Activity Type: Response
Activity Lead: Curtis Martin
Assignment End Date: Not reported
Result: SOSC NFA
File Under: Honolulu Resource Recovery Venture

Island: Oahu
Supplemental Loc. Text: Not reported
Case Number: 19940328
HID Number: Not reported
Facility Registry Id: 110005722138
Lead and Program: HEER EP&R
ER: Not reported
Units: H-Power Radio active material tripped sensors at weighting station
Substances: Radioactive material
Less Or Greater Than: Not reported
Numerical Quantity: Not reported
Units: Not reported
Activity Type: Response
Activity Lead: Not reported
Assignment End Date: Not reported
Result: SOSC NFA
File Under: Honolulu Resource Recovery Venture

Island: Oahu
Supplemental Loc. Text: Not reported
Case Number: 19950321-3
HID Number: Not reported
Facility Registry Id: 110005722138
Lead and Program: HEER EP&R
ER: Not reported
Units: H-Power Weighing Station
Substances: Radioactive material
Less Or Greater Than: Not reported
Numerical Quantity: Not reported
Units: Not reported
Activity Type: Response

HONOLULU RESOURCE RECOVERY VENTURE (Continued) **1000488623**

Activity Lead: Terry Corpus
Assignment End Date: Not reported
Result: SOSC NFA
File Under: Honolulu Resource Recovery Venture

Click this hyperlink while viewing on your computer to access
34 additional HI SPILLS: record(s) in the EDR Site Report.

ENG CONTROLS:
Supplemental Location Text: Not reported
Zip Suffix: Not reported
Island: Oahu
Potential Hazards And Controls: Hazard Managed With Controls
Engineering Control: Engineering Control Required

INST CONTROL:
Potential hazards and controls: Hazard Managed With Controls
Supplemental Location: Not reported
Zip Suffix: Not reported
Island: Oahu
Institutional Control: Government - Hawaii Dept. of Health Letter Issued

Potential hazards and controls: Hazard Managed With Controls
Supplemental Location: Not reported
Zip Suffix: Not reported
Island: Oahu
Institutional Control: Government - Hawaii Dept. of Health Letter Issued

AIRS:
Facility ID: 0255-01-C
Island: Oahu
Mailing Address: Not reported
Locale: Not reported
Mailing City,St,Zip: HI
Business Phone: Not reported
Contact Name: Stephen Langham
Contact Title: Energy Recovery Coordinator
Description: H-POWER Refuse-Derived Fuel (RDF) Facility 1.This permit encompasses the following equipment and associated appurtenances:a.854 ton per day Combustion Engineering spreader-stoker RDF municipal waste combustor (MWC) boiler, model no. VU-40, serial no. 28185-01, with 290 feet high x 6.3 feet diameter flue stack in common stack for both RDF MWC boilers and the following post combustion controls:i.Combustion Engineering spray dryer absorber, model no. C-E ESD, serial no. 85187-01, with 189,500 actual cubic feet per minute (acfm) capacity and 14,000 revolution per minute (rpm) spray nozzles;ii.Lime injection system servicing the spray dryer absorber; andiii.SPE-Amerex baghouse, model no. RA-35-180-D12, serial no. 1921-01, with 8-10 modules and 175-200 bags per module.b.854 ton per day Combustion Engineering spreader-stoker RDF MWC boiler, model no. VU-40, serial no. 28185-02, with 290 feet high x 6.3 feet diameter flue stack in common stack for both RDF MWC boilers and the following post combustion controls:i.Combustion Engineering spray dryer absorber, model no. C-E ESD, serial no. 85187-02, with 189,500 acfm capacity and 14,000 rpm spray nozzles;ii.Lime injection system servicing the spray dryer absorber; andiii.SPE-Amerex baghouse, model

HONOLULU RESOURCE RECOVERY VENTURE (Continued) **1000488623**

no. RA-35-180-D13, serial no. 1921-02, with 8-10 modules and 175-200 bags per module.c.RDF processing and storage buildings with:i.Two (2) Ray-Jet Fabric Filter primary baghouses on building roof at municipal solid waste (MSW) feed and storage area, model nos. 696-8-SWIP, serial nos. 990476-01P, with 4,500 cubic feet per minute capacity.ii.Two (2) Ray-Jet Fabric Filter secondary baghouses on building roof at the RDF processing area, model nos. 61214-20, serial nos. 990467-01S, with 40,000 cfm capacity.iii.Twelve (12) HI series industrial grade filters installed upstream of twelve (12) exhaust vents on roof of the RDF processing and storage buildings. d.5-cell Lilie Hoffman induced draft cooling tower, serial no. 990467-01S, with 50,500 gallon per minute recirculation water flow rate and 0.002% drift rate.e.5-cell SPX Cooling Technologies crossflow mechanical draft cooling tower, with 52,000 gallon per minute recirculation water flow rate and 0.001% drift rate that is replacing the existing 5-cell Lilie Hoffman induced draft cooling tower.

Facility ID: 0255-02-C
Island: Oahu
Mailing Address: 91-174 Hanua Street
Locale: Not reported
Mailing City,St,Zip: Kapolei, HI 96707
Business Phone: Not reported
Contact Name: Robert Webster
Contact Title: Facility Manager
Description: H-POWER Mass-Burn Facility1.This permit encompasses the following equipment and associated appurtenances:a.900 ton per day Martin mass-burn waterwall municipal waste combustor (MWC) boiler with Covanta Very Low NOX (VLN) system, feed chute, moving grate, integrated furnace/boiler, associated ash collection systems, 277 feet high x 7.3 feet diameter exhaust stack, and the following post combustion controls; i.Selective non-catalytic reduction (SNCR) system;ii.Powdered activated carbon injection system;iii.Lime injection system;iv.Spray dryer absorber; andv.Fabric filter baghouse.b.2-cell Midwest induced draft counter flow cooling tower, model no. CLT4242-3005-2, with 29,000 gallon per minute recirculation water flow rate and 0.0005% drift rate.

HI Financial Assurance:
Alt Facility ID: 9-201964
Tank Id: diesel
Tank Status Desc: Currently in Use
FRTYPE: Other
Expiration Date: Not reported

Alt Facility ID: 9-201964
Tank Id: diesel
Tank Status Desc: Currently in Use
FRTYPE: Insurance
Expiration Date: 10/19/2014

28
SSE
1/2-1
0.932 mi.
4919 ft.

Relative:
Lower

Actual:
3 ft.

AES HAWAII, INC.
91-086 KAOMI LOOP
KAPOLEI, HI

SHWS **S107769084**
AIRS **N/A**

SHWS:

Organization:	Not reported
Supplemental Location Text:	Not reported
Island:	Oahu
Environmental Interest:	AES Hawaii Inc
HID Number:	Not reported
Facility Registry Identifier:	110000486359
Lead Agency:	SHWB
Program:	Resource Conservation and Recovery Act
Project Manager:	Barbara Brooks
Hazard Priority:	Not reported
Potential Hazards And Controls:	Hazard Present
Organization:	Not reported
Island:	Oahu
Location Address Line 2:	Not reported
Location Zip Suffix:	Not reported
Supplemental Location Text:	Not reported
SDAR Environmental Interest Name:	AES Hawaii Inc
HID Number:	Not reported
Facility Registry Identifier:	110000486359
Lead Agency:	SHWB
Progran Name:	Resource Conservation and Recovery Act
Potential Hazard And Controls:	Hazard Present
Priority:	Not reported
Assessment:	Assessment Ongoing
Response:	Not reported
Nature of Contamination:	Found: Mercury in ash.
Nature of Residual Contamination:	Not reported
Use Restrictions:	Controls Required to Manage Contamination
Engineering Control:	Not reported
Description of Restrictions:	Ash to be removed to a landfill.
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Barbara Brooks
Contact Information:	(808) 586-4249 919 Ala Moana Blvd, Honolulu, HI 96814

AIRS:

Facility ID:	0087-02-C
Island:	Oahu
Mailing Address:	91-086 Kaomi Loop
Locale:	Campbell Industrial Park
Mailing City,St,Zip:	Kapolei, HI 96707-1883
Business Phone:	Not reported
Contact Name:	Matt Riel
Contact Title:	President
Description:	203 MW Coal-Fired Cogeneration Plant1.Attachment IIA of the Covered Source Permit encompasses the following equipment and associated appurtenances:a.CFB Boilers A and BTwo (2) Alstrom Pyropower Corp. circulating fluidized bed (CFB) steam boilers with a total maximum

AES HAWAII, INC. (Continued) **S107769084**

design heat input of 2,150 MMBtu/hr.b.Air Pollution Control Equipment for CFB Boilers:1)Limestone injection system;2)Selective non-catalytic reduction (SNCR) with ammonia/urea injection (Thermal DeNOx); and3)Two (2) Asea Brown Boveri (ABB) baghouses (Flakt Model 2).c.25,000 gallon pressurized anhydrous ammonia storage tank.Attachment IIB:1.Attachment IIB of the Covered Source Permit encompasses the following equipment and associated appurtenances:275 tph Coal Processing Equipment:a.Overland Coal Conveyor;b.Two (2) Coal Lowering Wells;c.Four (4) Coal Conveyors;d.Coal Reclaim Hopper;e.275 tph Coal Crusher;f.Four (4) Coal Storage Silos; andg.One (1) Mikro-Pulsaire Baghouse for the Coal Crusher (model no. 64S-12-40).Attachment IIC:1.Attachment IIC of the Covered Source Permit encompasses the following equipment and associated appurtenances:One (1) Limestone storage hopper with two (2) complete Micron Powder Systems Limestone Processing Systems each with a maximum feed rate of 22 tph and each consisting of the following equipment:a.Limestone Feeder;b.4.75 MMBtu/hr limestone dryer (1A and 1B);c.Mikro pulverizer (model no. 300 ACM);d.Mikro-Pulsaire baghouse (model no. 420S-10-50 C); ande.Conveyors.Attachment IID:1.Attachment IID of the Covered Source Permit encompasses the following equipment and associated appurtenances:One (1) GEA Integrated Cooling Technologies, Inc. five-cell cooling tower (model no. 545438-5l-32FCF, fiberglass counter flow, maximum water circulating rate is 104,000 gal/min, maximum drift rate is 0.002%)Attachment IIE:1.Attachment IIE of the Covered Source Permit encompasses the following equipment and associated appurtenances:Ash Handling Equipmenta.Fly Ash Reinjection Surge Hopper;b.Bed Ash Storage Hopper;c.One (1) Fly Ash Silod.One (1) Bed Ash Silo; ande.Conditioned Ash MixerAttachment IIF:1.Attachment IIF of the Covered Source Permit encompasses the following equipment and associated appurtenances:60,000 gallons (230.7 m3) Above Ground Storage Tank:a.Storing fuel oil no. 2b.Dimensions are: 18 ft. high and 24 ft. in diameter; andc.Tank characteristics are: cone roof, white shell, and vertical fixed-roof

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29
ESE
1/2-1
0.946 mi.
4996 ft.

Relative:
Higher

Actual:
16 ft.

CHEMWOOD TREATMENT CO, INC.
91-476 KOMOHANA ST
KAPOLEI, HI 96707

SHWS **S106816697**
SPILLS **N/A**
ENG CONTROLS
INST CONTROL

SHWS:

Organization:	Not reported
Supplemental Location Text:	Campbell Industrial Park
Island:	Oahu
Environmental Interest:	Chemwood Treatment Co, Inc.
HID Number:	HID981424138
Facility Registry Identifier:	110013779704
Lead Agency:	SHWB
Program:	Resource Conservation and Recovery Act
Project Manager:	SHWB
Hazard Priority:	High
Potential Hazards And Controls:	Hazard Managed With Controls
Organization:	Not reported
Island:	Oahu
Location Address Line 2:	Not reported
Location Zip Suffix:	Not reported
Supplemental Location Text:	Campbell Industrial Park

CHEMWOOD TREATMENT CO, INC. (Continued) **S106816697**

SDAR Environmental Interest Name:	Chemwood Treatment Co, Inc.
HID Number:	HID981424138
Facility Registry Identifier:	110013779704
Lead Agency:	SHWB
Progran Name:	Resource Conservation and Recovery Act
Potential Hazard And Controls:	Hazard Managed With Controls
Priority:	High
Assessment:	Response Necessary
Response:	Response Ongoing
Nature of Contamination:	Found: Arsenic & Chromium under asphalt cap.
Nature of Residual Contamination:	Not reported
Use Restrictions:	Controls Required to Manage Contamination
Engineering Control:	Engineering Control Required
Description of Restrictions:	Prohibit Any Activity That May Disturb the Integrity of the Capping System
Institutional Control:	Government - Hawaii Dept. of Health Letter Issued
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	SHWB
Contact Information:	(808) 586-4249 919 Ala Moana Blvd, Honolulu, HI 96814

HI SPILLS:

Island:	Oahu
Supplemental Loc. Text:	Campbell Industrial Park
Case Number:	20011113-1330
HID Number:	HID981424138
Facility Registry Id:	110013779704
Lead and Program:	HEER EP&R
ER:	Not reported
Units:	Chemwood Treatment Co. Abandoned Drums
Substances:	Not reported
Less Or Greater Than:	Not reported
Numerical Quantity:	Not reported
Units:	Not reported
Activity Type:	Response
Activity Lead:	Bill Perry
Assignment End Date:	2003-10-15 00:00:00
Result:	Refer to ISST
File Under:	Chemwood Treatment Co.

Island:	Oahu
Supplemental Loc. Text:	Campbell Industrial Park
Case Number:	20081009-1620
HID Number:	HID981424138
Facility Registry Id:	110013779704
Lead and Program:	HEER EP&R
ER:	Site Visit
Units:	former Chemwood CCA dumping
Substances:	Chromated Copper Arsenate
Less Or Greater Than:	Not reported
Numerical Quantity:	10
Units:	Drum (55)
Activity Type:	Response
Activity Lead:	Liz Galvez

CHEMWOOD TREATMENT CO, INC. (Continued) **S106816697**

Assignment End Date:	Not reported
Result:	Refer to SHWB
File Under:	Chemwood Treatment Co.

ENG CONTROLS:

Supplemental Location Text:	Campbell Industrial Park
Zip Suffix:	Not reported
Island:	Oahu
Potential Hazards And Controls:	Hazard Managed With Controls
Engineering Control:	Engineering Control Required

INST CONTROL:

Potential hazards and controls:	Hazard Managed With Controls
Supplemental Location:	Campbell Industrial Park
Zip Suffix:	Not reported
Island:	Oahu
Institutional Control:	Government - Hawaii Dept. of Health Letter Issued

---

30
SE
1/2-1
0.961 mi.
5076 ft.

Relative:
Higher

Actual:
13 ft.

GRACE PACIFIC CORPORATION - GRACE PACIFIC BLOCK FACILITY **SHWS** **S108008510**
91-205 KALAELOA BLVD **N/A**
KAPOLEI, HI 96707

SHWS:

Organization:	Not reported
Supplemental Location Text:	Not reported
Island:	Oahu
Environmental Interest:	Grace Pacific Block Facility
HID Number:	Not reported
Facility Registry Identifier:	110013789971
Lead Agency:	HEER
Program:	State
Project Manager:	Mark Sutterfield
Hazard Priority:	NFA
Potential Hazards And Controls:	No Hazard
Organization:	Not reported
Island:	Oahu
Location Address Line 2:	Not reported
Location Zip Suffix:	Not reported
Supplemental Location Text:	Not reported
SDAR Environmental Interest Name:	Grace Pacific Block Facility
HID Number:	Not reported
Facility Registry Identifier:	110013789971
Lead Agency:	HEER
Progran Name:	State
Potential Hazard And Controls:	No Hazard
Priority:	NFA
Assessment:	Response Necessary
Response:	Response Complete
Nature of Contamination:	Found: Petroleum contamminated soil
Nature of Residual Contamination:	Not reported
Use Restrictions:	No Hazard Present for Unrestricted Residential Use
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported

GRACE PACIFIC CORPORATION - GRACE PACIFIC BLOCK FACILITY (Continued) **S108008510**

Site Closure Type:	No Further Action Letter - Unrestricted Residential Use
Document Date:	11/04/2003
Document Number:	2003-361-MS
Document Subject:	NFA Block Plant
Project Manager:	Mark Sutterfield
Contact Information:	(808) 586-4249 919 Ala Moana Blvd, Honolulu, HI 96814

31
SSE
1/2-1
0.966 mi.
5103 ft.

Relative:
Lower

Actual:
3 ft.

UNITEK ENVIRONMENTAL SERVICES, INC **SHWS S104657524**
91-125 KAOMI LP **SPILLS N/A**
KAPOLEI, HI 96707

SHWS:

Organization:	Not reported
Supplemental Location Text:	Campbell Industrial Park
Island:	Oahu
Environmental Interest:	Unitek Environmental Service, Inc.
HID Number:	HIT000603514
Facility Registry Identifier:	110013772738
Lead Agency:	EPA
Program:	Resource Conservation and Recovery Act
Project Manager:	Not reported
Hazard Priority:	NFA
Potential Hazards And Controls:	Hazard Undetermined
Organization:	Not reported
Island:	Oahu
Location Address Line 2:	Not reported
Location Zip Suffix:	Not reported
Supplemental Location Text:	Campbell Industrial Park
SDAR Environmental Interest Name:	Unitek Environmental Service, Inc.
HID Number:	HIT000603514
Facility Registry Identifier:	110013772738
Lead Agency:	EPA
Progran Name:	Resource Conservation and Recovery Act
Potential Hazard And Controls:	Hazard Undetermined
Priority:	NFA
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Undetermined
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	No HEER Environmental Interest
Document Date:	04/02/1996
Document Number:	Not reported
Document Subject:	ISST Site Screening Sheet, Unitek Environmental Service, Inc., 91-125 Kaomi Loop, Ewa Beach, EPA # H
Project Manager:	Not reported
Contact Information:	(808) 586-4249 919 Ala Moana Blvd, Honolulu, HI 96814

HI SPILLS:

Island:	Oahu
Supplemental Loc. Text:	Campbell Industrial Park

UNITEK ENVIRONMENTAL SERVICES, INC (Continued) **S104657524**

Case Number:	19951016-1
HID Number:	HIT000603514
Facility Registry Id:	110013772738
Lead and Program:	HEER EP&R
ER:	No
Units:	Unitek Envorinmental Service
Substances:	Oil, Used
Less Or Greater Than:	Not reported
Numerical Quantity:	1000
Units:	Gallons
Activity Type:	Response
Activity Lead:	Terry Corpus
Assignment End Date:	Not reported
Result:	SOSC NFA
File Under:	Unitek Environmental Services
Island:	Oahu
Supplemental Loc. Text:	Campbell Industrial Park
Case Number:	20020724-1325
HID Number:	HIT000603514
Facility Registry Id:	110013772738
Lead and Program:	HEER EP&R
ER:	No
Units:	50-gallon oil spill
Substances:	Used oil
Less Or Greater Than:	Not reported
Numerical Quantity:	Not reported
Units:	Not reported
Activity Type:	Response
Activity Lead:	Terry Corpus
Assignment End Date:	Not reported
Result:	SOSC NFA
File Under:	Unitek Environmental Services
Island:	Oahu
Supplemental Loc. Text:	Campbell Industrial Park
Case Number:	20021213-0949
HID Number:	HIT000603514
Facility Registry Id:	110013772738
Lead and Program:	HEER EP&R
ER:	No
Units:	Unitek Spec Fuel Spill
Substances:	Spec Fuel
Less Or Greater Than:	Not reported
Numerical Quantity:	500
Units:	Gallons
Activity Type:	Response
Activity Lead:	Ed Gomes
Assignment End Date:	2002-12-24 00:00:00
Result:	SOSC NFA
File Under:	Unitek Environmental Services
Island:	Oahu
Supplemental Loc. Text:	Campbell Industrial Park
Case Number:	19910808
HID Number:	HIT000603514
Facility Registry Id:	110013772738

UNITEK ENVIRONMENTAL SERVICES, INC (Continued) **S104657524**

Lead and Program:	HEER EP&R
ER:	Not reported
Units:	UNITEK TEMPORARY STORAGE & DISPOSAL FACILITY, CAMPBELL INDUSTRIAL PARK, KAOMI LP.
Substances:	Chlordane
Less Or Greater Than:	Not reported
Numerical Quantity:	170
Units:	Pounds
Activity Type:	Response
Activity Lead:	Not reported
Assignment End Date:	Not reported
Result:	SOSC NFA
File Under:	Unitek Environmental Services
Island:	Oahu
Supplemental Loc. Text:	Campbell Industrial Park
Case Number:	19911004
HID Number:	HIT000603514
Facility Registry Id:	110013772738
Lead and Program:	HEER EP&R
ER:	Not reported
Units:	Unitek Environmental Services, Inc.
Substances:	T-62
Less Or Greater Than:	Not reported
Numerical Quantity:	200
Units:	Pounds
Activity Type:	Response
Activity Lead:	Bill Perry
Assignment End Date:	Not reported
Result:	Not reported
File Under:	Unitek Environmental Services

Click this hyperlink while viewing on your computer to access
8 additional HI SPILLS: record(s) in the EDR Site Report.

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32 SE 1/2-1 0.977 mi. 5159 ft. **CHEVRON PIPELINE BREAK AT HAWAIIAN REFRACTORIES** **SHWS 1006820022**
220 KOMOHANA ST **SPILLS N/A**
KAPOLEI, HI 96707

Relative: Lower

Actual: 10 ft.

SHWS:

Organization:	Not reported
Supplemental Location Text:	Campbell Industrial Park
Island:	Oahu
Environmental Interest:	Hawaiian Refractories
HID Number:	Not reported
Facility Registry Identifier:	110013779054
Lead Agency:	HEER
Program:	State
Project Manager:	Richard Palmer
Hazard Priority:	NFA
Potential Hazards And Controls:	Hazard Undetermined
Organization:	Not reported
Island:	Oahu
Location Address Line 2:	Not reported
Location Zip Suffix:	Not reported
Supplemental Location Text:	Campbell Industrial Park
SDAR Environmental Interest Name:	Hawaiian Refractories

CHEVRON PIPELINE BREAK AT HAWAIIAN REFRACTORIES (Continued) **1006820022**

HID Number:	Not reported
Facility Registry Identifier:	110013779054
Lead Agency:	HEER
Progran Name:	State
Potential Hazard And Controls:	Hazard Undetermined
Priority:	NFA
Assessment:	Assessment Ongoing
Response:	Not reported
Nature of Contamination:	Presumed: Past leak in crude oil pipeline.
Nature of Residual Contamination:	Not reported
Use Restrictions:	Undetermined
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	No Further Action - Type Undetermined
Document Date:	08/13/2004
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Richard Palmer
Contact Information:	(808) 586-4249 919 Ala Moana Blvd, Honolulu, HI 96814
Organization:	Not reported
Supplemental Location Text:	Campbell Industrial Park
Island:	Oahu
Environmental Interest:	Hawaiian Meat Packers
HID Number:	Not reported
Facility Registry Identifier:	110013791520
Lead Agency:	SHWB
Program:	Underground Storage Tank
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Hazard Undetermined
Organization:	Not reported
Island:	Oahu
Location Address Line 2:	Not reported
Location Zip Suffix:	Not reported
Supplemental Location Text:	Campbell Industrial Park
SDAR Environmental Interest Name:	Hawaiian Meat Packers
HID Number:	Not reported
Facility Registry Identifier:	110013791520
Lead Agency:	SHWB
Progran Name:	Underground Storage Tank
Potential Hazard And Controls:	Hazard Undetermined
Priority:	Not reported
Assessment:	Response Necessary
Response:	Response Complete
Nature of Contamination:	Found: Bioremediation of petroleum contaminated soil
Nature of Residual Contamination:	Not reported
Use Restrictions:	Undetermined
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	No HEER Environmental Interest
Document Date:	03/14/1991
Document Number:	AH

City	EDR ID	Site Name	Site Address	Zip	Database(s)
KAPOLEI	1000434528	CHEVRON-HAWAII REFINERY	91-480 MALAKOLE ST	96707	CORRACTS,CERCLIS-NFRAP,FINDS
KAPOLEI	1000823278	A AND G ENVIRONMENTAL	91 607 MALAKOLE RD STE 227	96707	FINDS,RCRA-NLR
EWA BEACH	1006819246	KAPOLEI PIPELINE FUEL SPILL	KAMOKILA BLVD	96707	HWS,SPILLS
KAPOLEI	1006819575	TEXACO MALAKOLE STREET PIPELINE EX	MALAKOLE ST	96707	HWS,SPILLS
KAPOLEI	1006820896	HANUA STREET FUGITIVE OIL	HANUA ST	96707	HWS,SPILLS
KAPOLEI	1007092136	BERING SEA ECCOTECH	91 607 MALAKOLE RD STE 202	96707	RCRA-NLR,HAZNET
KAPOLEI	1009404012	KALAELOA STORAGE AND BUILDING	MALAKOLE STREET	96707	FINDS
KAPOLEI	1010428282	KALAELOA (BARBERS POINT) HARBOR AS	NORTHEAST END OF ACCESS ROAD (	96707	FINDS
KAPOLEI	1010683081	KALAELOA WARD (585-6330)	UNKNOWN	96707	FINDS
KAPOLEI	1010685131	KALAELOA HARBOR PONDS STOCKPILE (R	NORTHEAST END OF ACCESS ROAD (	96707	FINDS
KAPOLEI	1010784156	KALAELOA, FORMERLY NAVAL AIR STATI	BISMARCK SEA STREET	96707	RCRA-SQG
KAPOLEI	1011908277	KALAELOA BASEYARD	NORTHEAST END OF ACCESS ROAD (	96707	FINDS
KAPOLEI	1011908515	ACCESS AND ELECTRICAL IMPROVEMENTS	KALAELOA BARBERS POINT HARBOR	96707	FINDS
KAPOLEI	1011977084	KALAELOA (JOHN RODGERS	UNKNOWN	96707	FINDS
KAPOLEI	1011989998	WEST KALAELOA BUSINESS PARK	KAPOLEI, EWA, OAHU (SEE TMKS:	96707	FINDS
KAPOLEI	1011990006	WEST KALAELOA BUSINESS PARK STUDIO	KAPOLEI, EWA, OAHU (SEE TMKS:	96707	FINDS
KAPOLEI	1012087374	KALAELOA HARBOR PONDS (SEE FIGURE	NORTHWEST END OF HANUA ROAD AN	96707	FINDS
KAPOLEI	1012178229	NORTH SOUTH ROAD PHASE 1C	96-1260 FARRINGTON HWY	96707	RCRA-NLR
KAPOLEI	S106820144	PUMP 15 STATION, FORMER OAHU SUGAR	OLD FARRINGTON HWY	96707	HWS
KAPOLEI	S111677133	CORNER OF FARRINGTON HIGHWAY AND K	FARRINGTON HWY & KALAELOA BLVD	96707	SPILLS

Map ID
Direction
Distance
Elevation

Site

MAP FINDINGS

Database(s)

EDR ID Number
EPA ID Number

CHEVRON PIPELINE BREAK AT HAWAIIAN REFRACTORIES (Continued) **1006820022**

Document Subject: Hawaiian Meat Packers, Chemical & Oil Emergency Response Form
Project Manager: Not reported
Contact Information: (808) 586-4249 919 Ala Moana Blvd, Honolulu, HI 96814

HI SPILLS:

Island:	Oahu
Supplemental Loc. Text:	Campbell Industrial Park
Case Number:	19951023
HID Number:	Not reported
Facility Registry Id:	110013779054
Lead and Program:	HEER EP&R
ER:	No
Units:	Hawaiian Refractories
Substances:	Crude Oil
Less Or Greater Than:	Not reported
Numerical Quantity:	Not reported
Units:	Not reported
Activity Type:	Response
Activity Lead:	Mike Cripps
Assignment End Date:	Not reported
Result:	SOSC NFA
File Under:	Chevron USA Products Company

Island:	Oahu
Supplemental Loc. Text:	Campbell Industrial Park
Case Number:	19910301-2
HID Number:	Not reported
Facility Registry Id:	110013791520
Lead and Program:	HEER EP&R
ER:	Not reported
Units:	Hawaiian Meat Packers
Substances:	Oil
Less Or Greater Than:	Not reported
Numerical Quantity:	Not reported
Units:	Not reported
Activity Type:	Response
Activity Lead:	Liz Galvez
Assignment End Date:	Not reported
Result:	Refer to ISST
File Under:	Hawaii Meat Co. Ltd.

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

To maintain currency of the following federal and state databases, EDR contacts the appropriate governmental agency on a monthly or quarterly basis, as required.

Number of Days to Update: Provides confirmation that EDR is reporting records that have been updated within 90 days from the date the government agency made the information available to the public.

STANDARD ENVIRONMENTAL RECORDS

Federal NPL site list

NPL: National Priority List
National Priorities List (Superfund). The NPL is a subset of CERCLIS and identifies over 1,200 sites for priority cleanup under the Superfund Program. NPL sites may encompass relatively large areas. As such, EDR provides polygon coverage for over 1,000 NPL site boundaries produced by EPA's Environmental Photographic Interpretation Center (EPIC) and regional EPA offices.

Date of Government Version: 02/01/2013
Date Data Arrived at EDR: 03/01/2013
Date Made Active in Reports: 03/13/2013
Number of Days to Update: 12

Source: EPA
Telephone: N/A
Last EDR Contact: 04/10/2013
Next Scheduled EDR Contact: 07/22/2013
Data Release Frequency: Quarterly

NPL Site Boundaries

Sources:

EPA's Environmental Photographic Interpretation Center (EPIC)
Telephone: 202-564-7333

EPA Region 1
Telephone 617-918-1143

EPA Region 6
Telephone: 214-655-6659

EPA Region 3
Telephone 215-814-5418

EPA Region 7
Telephone: 913-551-7247

EPA Region 4
Telephone 404-562-8033

EPA Region 8
Telephone: 303-312-6774

EPA Region 5
Telephone 312-886-6686

EPA Region 9
Telephone: 415-947-4246

EPA Region 10
Telephone 206-553-8665

Proposed NPL: Proposed National Priority List Sites
A site that has been proposed for listing on the National Priorities List through the issuance of a proposed rule in the Federal Register. EPA then accepts public comments on the site, responds to the comments, and places on the NPL those sites that continue to meet the requirements for listing.

Date of Government Version: 02/01/2013
Date Data Arrived at EDR: 03/01/2013
Date Made Active in Reports: 03/13/2013
Number of Days to Update: 12

Source: EPA
Telephone: N/A
Last EDR Contact: 04/10/2013
Next Scheduled EDR Contact: 07/22/2013
Data Release Frequency: Quarterly

NPL LIENS: Federal Superfund Liens
Federal Superfund Liens. Under the authority granted the USEPA by CERCLA of 1980, the USEPA has the authority to file liens against real property in order to recover remedial action expenditures or when the property owner received notification of potential liability. USEPA compiles a listing of filed notices of Superfund Liens.

Date of Government Version: 10/15/1991
Date Data Arrived at EDR: 02/02/1994
Date Made Active in Reports: 03/30/1994
Number of Days to Update: 56

Source: EPA
Telephone: 202-564-4267
Last EDR Contact: 08/15/2011
Next Scheduled EDR Contact: 11/28/2011
Data Release Frequency: No Update Planned

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Federal Delisted NPL site list

DELISTED NPL: National Priority List Deletions
The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) establishes the criteria that the EPA uses to delete sites from the NPL. In accordance with 40 CFR 300.425.(e), sites may be deleted from the NPL where no further response is appropriate.

Date of Government Version: 02/01/2013
Date Data Arrived at EDR: 03/01/2013
Date Made Active in Reports: 03/13/2013
Number of Days to Update: 12

Source: EPA
Telephone: N/A
Last EDR Contact: 04/10/2013
Next Scheduled EDR Contact: 07/22/2013
Data Release Frequency: Quarterly

Federal CERCLIS list

CERCLIS: Comprehensive Environmental Response, Compensation, and Liability Information System
CERCLIS contains data on potentially hazardous waste sites that have been reported to the USEPA by states, municipalities, private companies and private persons, pursuant to Section 103 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). CERCLIS contains sites which are either proposed to or on the National Priorities List (NPL) and sites which are in the screening and assessment phase for possible inclusion on the NPL.

Date of Government Version: 02/04/2013
Date Data Arrived at EDR: 03/01/2013
Date Made Active in Reports: 03/13/2013
Number of Days to Update: 12

Source: EPA
Telephone: 703-412-9810
Last EDR Contact: 04/05/2013
Next Scheduled EDR Contact: 06/10/2013
Data Release Frequency: Quarterly

FEDERAL FACILITY: Federal Facility Site Information listing
A listing of National Priority List (NPL) and Base Realignment and Closure (BRAC) sites found in the Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) Database where EPA Federal Facilities Restoration and Reuse Office is involved in cleanup activities.

Date of Government Version: 07/31/2012
Date Data Arrived at EDR: 10/09/2012
Date Made Active in Reports: 12/20/2012
Number of Days to Update: 72

Source: Environmental Protection Agency
Telephone: 703-603-8704
Last EDR Contact: 04/10/2013
Next Scheduled EDR Contact: 07/22/2013
Data Release Frequency: Varies

Federal CERCLIS NFRAP site List

CERCLIS-NFRAP: CERCLIS No Further Remedial Action Planned
Archived sites are sites that have been removed and archived from the inventory of CERCLIS sites. Archived status indicates that, to the best of EPA's knowledge, assessment at a site has been completed and that EPA has determined no further steps will be taken to list this site on the National Priorities List (NPL), unless information indicates this decision was not appropriate or other considerations require a recommendation for listing at a later time. This decision does not necessarily mean that there is no hazard associated with a given site; it only means that, based upon available information, the location is not judged to be a potential NPL site.

Date of Government Version: 02/05/2013
Date Data Arrived at EDR: 03/01/2013
Date Made Active in Reports: 03/13/2013
Number of Days to Update: 12

Source: EPA
Telephone: 703-412-9810
Last EDR Contact: 04/05/2013
Next Scheduled EDR Contact: 03/11/2013
Data Release Frequency: Quarterly

Federal RCRA CORRACTS facilities list

CORRACTS: Corrective Action Report
CORRACTS identifies hazardous waste handlers with RCRA corrective action activity.

Date of Government Version: 02/12/2013
Date Data Arrived at EDR: 02/21/2013
Date Made Active in Reports: 02/27/2013
Number of Days to Update: 6

Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 04/03/2013
Next Scheduled EDR Contact: 07/15/2013
Data Release Frequency: Quarterly

Federal RCRA non-CORRACTS TSD facilities list

RCRA-TSDF: RCRA - Treatment, Storage and Disposal

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Transporters are individuals or entities that move hazardous waste from the generator offsite to a facility that can recycle, treat, store, or dispose of the waste. TSDFs treat, store, or dispose of the waste.

Date of Government Version: 02/12/2013
Date Data Arrived at EDR: 02/15/2013
Date Made Active in Reports: 02/27/2013
Number of Days to Update: 12

Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 04/03/2013
Next Scheduled EDR Contact: 07/15/2013
Data Release Frequency: Quarterly

Federal RCRA generators list

RCRA-LQG: RCRA - Large Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Large quantity generators (LQGs) generate over 1,000 kilograms (kg) of hazardous waste, or over 1 kg of acutely hazardous waste per month.

Date of Government Version: 02/12/2013
Date Data Arrived at EDR: 02/15/2013
Date Made Active in Reports: 02/27/2013
Number of Days to Update: 12

Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 04/03/2013
Next Scheduled EDR Contact: 07/15/2013
Data Release Frequency: Quarterly

RCRA-SQG: RCRA - Small Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Small quantity generators (SQGs) generate between 100 kg and 1,000 kg of hazardous waste per month.

Date of Government Version: 02/12/2013
Date Data Arrived at EDR: 02/15/2013
Date Made Active in Reports: 02/27/2013
Number of Days to Update: 12

Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 04/03/2013
Next Scheduled EDR Contact: 07/15/2013
Data Release Frequency: Quarterly

RCRA-CESQG: RCRA - Conditionally Exempt Small Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Conditionally exempt small quantity generators (CESQGs) generate less than 100 kg of hazardous waste, or less than 1 kg of acutely hazardous waste per month.

Date of Government Version: 02/12/2013
Date Data Arrived at EDR: 02/15/2013
Date Made Active in Reports: 02/27/2013
Number of Days to Update: 12

Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 04/03/2013
Next Scheduled EDR Contact: 07/15/2013
Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Federal institutional controls / engineering controls registries

US ENG CONTROLS: Engineering Controls Sites List

A listing of sites with engineering controls in place. Engineering controls include various forms of caps, building foundations, liners, and treatment methods to create pathway elimination for regulated substances to enter environmental media or effect human health.

Date of Government Version: 12/19/2012
Date Data Arrived at EDR: 12/26/2012
Date Made Active in Reports: 02/27/2013
Number of Days to Update: 63

Source: Environmental Protection Agency
Telephone: 703-603-0695
Last EDR Contact: 03/11/2013
Next Scheduled EDR Contact: 06/24/2013
Data Release Frequency: Varies

US INST CONTROL: Sites with Institutional Controls

A listing of sites with institutional controls in place. Institutional controls include administrative measures, such as groundwater use restrictions, construction restrictions, property use restrictions, and post remediation care requirements intended to prevent exposure to contaminants remaining on site. Deed restrictions are generally required as part of the institutional controls.

Date of Government Version: 12/19/2012
Date Data Arrived at EDR: 12/26/2012
Date Made Active in Reports: 02/27/2013
Number of Days to Update: 63

Source: Environmental Protection Agency
Telephone: 703-603-0695
Last EDR Contact: 03/11/2013
Next Scheduled EDR Contact: 06/24/2013
Data Release Frequency: Varies

LUCIS: Land Use Control Information System

LUCIS contains records of land use control information pertaining to the former Navy Base Realignment and Closure properties.

Date of Government Version: 12/09/2005
Date Data Arrived at EDR: 12/11/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 31

Source: Department of the Navy
Telephone: 843-820-7326
Last EDR Contact: 02/18/2013
Next Scheduled EDR Contact: 06/03/2013
Data Release Frequency: Varies

Federal ERNS list

ERNS: Emergency Response Notification System

Emergency Response Notification System. ERNS records and stores information on reported releases of oil and hazardous substances.

Date of Government Version: 12/31/2012
Date Data Arrived at EDR: 01/17/2013
Date Made Active in Reports: 02/15/2013
Number of Days to Update: 29

Source: National Response Center, United States Coast Guard
Telephone: 202-267-2180
Last EDR Contact: 04/02/2013
Next Scheduled EDR Contact: 07/15/2013
Data Release Frequency: Annually

State- and tribal - equivalent CERCLIS

SHWS: Sites List

Facilities, sites or areas in which the Office of Hazard Evaluation and Emergency Response has an interest, has investigated or may investigate under HRS 128D (includes CERCLIS sites).

Date of Government Version: 01/17/2013
Date Data Arrived at EDR: 02/28/2013
Date Made Active in Reports: 04/09/2013
Number of Days to Update: 40

Source: Department of Health
Telephone: 808-586-4249
Last EDR Contact: 02/28/2013
Next Scheduled EDR Contact: 06/10/2013
Data Release Frequency: Semi-Annually

State and tribal landfill and/or solid waste disposal site lists

SWF/LF: Permitted Landfills in the State of Hawaii
Solid Waste Facilities/Landfill Sites. SWF/LF type records typically contain an inventory of solid waste disposal facilities or landfills in a particular state. Depending on the state, these may be active or inactive facilities or open dumps that failed to meet RCRA Subtitle D Section 4004 criteria for solid waste landfills or disposal sites.

Date of Government Version: 04/01/2012
Date Data Arrived at EDR: 04/03/2012
Date Made Active in Reports: 05/01/2012
Number of Days to Update: 28
Source: Department of Health
Telephone: 808-586-4245
Last EDR Contact: 04/01/2013
Next Scheduled EDR Contact: 07/15/2013
Data Release Frequency: Varies

State and tribal leaking storage tank lists

LUST: Leaking Underground Storage Tank Database
Leaking Underground Storage Tank Incident Reports. LUST records contain an inventory of reported leaking underground storage tank incidents. Not all states maintain these records, and the information stored varies by state.

Date of Government Version: 03/05/2013
Date Data Arrived at EDR: 03/06/2013
Date Made Active in Reports: 04/09/2013
Number of Days to Update: 34
Source: Department of Health
Telephone: 808-586-4228
Last EDR Contact: 03/04/2013
Next Scheduled EDR Contact: 06/17/2013
Data Release Frequency: Semi-Annually

INDIAN LUST R1: Leaking Underground Storage Tanks on Indian Land
A listing of leaking underground storage tank locations on Indian Land.

Date of Government Version: 09/28/2012
Date Data Arrived at EDR: 11/01/2012
Date Made Active in Reports: 04/12/2013
Number of Days to Update: 162
Source: EPA Region 1
Telephone: 617-918-1313
Last EDR Contact: 02/01/2013
Next Scheduled EDR Contact: 05/13/2013
Data Release Frequency: Varies

INDIAN LUST R4: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Florida, Mississippi and North Carolina.

Date of Government Version: 02/06/2013
Date Data Arrived at EDR: 02/08/2013
Date Made Active in Reports: 04/12/2013
Number of Days to Update: 63
Source: EPA Region 4
Telephone: 404-562-8677
Last EDR Contact: 04/29/2013
Next Scheduled EDR Contact: 08/12/2013
Data Release Frequency: Semi-Annually

INDIAN LUST R6: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in New Mexico and Oklahoma.

Date of Government Version: 09/12/2011
Date Data Arrived at EDR: 09/13/2011
Date Made Active in Reports: 11/11/2011
Number of Days to Update: 59
Source: EPA Region 6
Telephone: 214-665-6597
Last EDR Contact: 04/29/2013
Next Scheduled EDR Contact: 08/12/2013
Data Release Frequency: Varies

INDIAN LUST R7: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Iowa, Kansas, and Nebraska

Date of Government Version: 12/31/2012
Date Data Arrived at EDR: 02/28/2013
Date Made Active in Reports: 04/12/2013
Number of Days to Update: 43
Source: EPA Region 7
Telephone: 913-551-7003
Last EDR Contact: 04/29/2013
Next Scheduled EDR Contact: 08/12/2013
Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

INDIAN LUST R8: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Colorado, Montana, North Dakota, South Dakota, Utah and Wyoming.

Date of Government Version: 08/27/2012
Date Data Arrived at EDR: 08/28/2012
Date Made Active in Reports: 10/16/2012
Number of Days to Update: 49
Source: EPA Region 8
Telephone: 303-312-6271
Last EDR Contact: 04/29/2013
Next Scheduled EDR Contact: 08/12/2013
Data Release Frequency: Quarterly

INDIAN LUST R9: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Arizona, California, New Mexico and Nevada

Date of Government Version: 03/01/2013
Date Data Arrived at EDR: 03/01/2013
Date Made Active in Reports: 04/12/2013
Number of Days to Update: 42
Source: Environmental Protection Agency
Telephone: 415-972-3372
Last EDR Contact: 04/29/2013
Next Scheduled EDR Contact: 08/12/2013
Data Release Frequency: Quarterly

INDIAN LUST R10: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Alaska, Idaho, Oregon and Washington.

Date of Government Version: 02/05/2013
Date Data Arrived at EDR: 02/06/2013
Date Made Active in Reports: 04/12/2013
Number of Days to Update: 65
Source: EPA Region 10
Telephone: 206-553-2857
Last EDR Contact: 04/29/2013
Next Scheduled EDR Contact: 08/12/2013
Data Release Frequency: Quarterly

State and tribal registered storage tank lists

UST: Underground Storage Tank Database
Registered Underground Storage Tanks. UST's are regulated under Subtitle I of the Resource Conservation and Recovery Act (RCRA) and must be registered with the state department responsible for administering the UST program. Available information varies by state program.

Date of Government Version: 03/05/2013
Date Data Arrived at EDR: 03/06/2013
Date Made Active in Reports: 04/09/2013
Number of Days to Update: 34
Source: Department of Health
Telephone: 808-586-4228
Last EDR Contact: 03/04/2013
Next Scheduled EDR Contact: 06/17/2013
Data Release Frequency: Semi-Annually

INDIAN UST R8: Underground Storage Tanks on Indian Land
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 8 (Colorado, Montana, North Dakota, South Dakota, Utah, Wyoming and 27 Tribal Nations).

Date of Government Version: 08/27/2012
Date Data Arrived at EDR: 08/28/2012
Date Made Active in Reports: 10/16/2012
Number of Days to Update: 49
Source: EPA Region 8
Telephone: 303-312-6137
Last EDR Contact: 04/29/2013
Next Scheduled EDR Contact: 08/12/2013
Data Release Frequency: Quarterly

INDIAN UST R7: Underground Storage Tanks on Indian Land
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 7 (Iowa, Kansas, Missouri, Nebraska, and 9 Tribal Nations).

Date of Government Version: 12/31/2012
Date Data Arrived at EDR: 02/28/2013
Date Made Active in Reports: 04/12/2013
Number of Days to Update: 43
Source: EPA Region 7
Telephone: 913-551-7003
Last EDR Contact: 04/29/2013
Next Scheduled EDR Contact: 08/12/2013
Data Release Frequency: Varies

INDIAN UST R6: Underground Storage Tanks on Indian Land
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 6 (Louisiana, Arkansas, Oklahoma, New Mexico, Texas and 65 Tribes).

Date of Government Version: 05/10/2011
Date Data Arrived at EDR: 05/11/2011
Date Made Active in Reports: 06/14/2011
Number of Days to Update: 34
Source: EPA Region 6
Telephone: 214-665-7591
Last EDR Contact: 04/29/2013
Next Scheduled EDR Contact: 08/12/2013
Data Release Frequency: Semi-Annually

INDIAN UST R5: Underground Storage Tanks on Indian Land
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 5 (Michigan, Minnesota and Wisconsin and Tribal Nations).

Date of Government Version: 08/02/2012
Date Data Arrived at EDR: 08/03/2012
Date Made Active in Reports: 11/05/2012
Number of Days to Update: 94
Source: EPA Region 5
Telephone: 312-886-6136
Last EDR Contact: 04/29/2013
Next Scheduled EDR Contact: 08/12/2013
Data Release Frequency: Varies

INDIAN UST R4: Underground Storage Tanks on Indian Land
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 4 (Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee and Tribal Nations)

Date of Government Version: 02/06/2013
Date Data Arrived at EDR: 02/08/2013
Date Made Active in Reports: 04/12/2013
Number of Days to Update: 63
Source: EPA Region 4
Telephone: 404-562-9424
Last EDR Contact: 04/29/2013
Next Scheduled EDR Contact: 08/12/2013
Data Release Frequency: Semi-Annually

INDIAN UST R1: Underground Storage Tanks on Indian Land
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 1 (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont and ten Tribal Nations).

Date of Government Version: 09/28/2012
Date Data Arrived at EDR: 11/07/2012
Date Made Active in Reports: 04/12/2013
Number of Days to Update: 156
Source: EPA, Region 1
Telephone: 617-918-1313
Last EDR Contact: 04/29/2013
Next Scheduled EDR Contact: 08/12/2013
Data Release Frequency: Varies

INDIAN UST R10: Underground Storage Tanks on Indian Land
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 10 (Alaska, Idaho, Oregon, Washington, and Tribal Nations).

Date of Government Version: 02/05/2013
Date Data Arrived at EDR: 02/06/2013
Date Made Active in Reports: 04/12/2013
Number of Days to Update: 65
Source: EPA Region 10
Telephone: 206-553-2857
Last EDR Contact: 04/29/2013
Next Scheduled EDR Contact: 08/12/2013
Data Release Frequency: Quarterly

INDIAN UST R9: Underground Storage Tanks on Indian Land
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 9 (Arizona, California, Hawaii, Nevada, the Pacific Islands, and Tribal Nations).

Date of Government Version: 02/21/2013
Date Data Arrived at EDR: 02/26/2013
Date Made Active in Reports: 04/12/2013
Number of Days to Update: 45
Source: EPA Region 9
Telephone: 415-972-3368
Last EDR Contact: 04/29/2013
Next Scheduled EDR Contact: 08/12/2013
Data Release Frequency: Quarterly

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

FEMA UST: Underground Storage Tank Listing
A listing of all FEMA owned underground storage tanks.

Date of Government Version: 01/01/2010
Date Data Arrived at EDR: 02/16/2010
Date Made Active in Reports: 04/12/2010
Number of Days to Update: 55
Source: FEMA
Telephone: 202-646-5797
Last EDR Contact: 04/18/2013
Next Scheduled EDR Contact: 07/29/2013
Data Release Frequency: Varies

State and tribal institutional control / engineering control registries

ENG CONTROLS: Engineering Control Sites
A listing of sites with engineering controls in place.

Date of Government Version: 01/17/2013
Date Data Arrived at EDR: 02/28/2013
Date Made Active in Reports: 04/09/2013
Number of Days to Update: 40
Source: Department of Health
Telephone: 404-586-4249
Last EDR Contact: 02/28/2013
Next Scheduled EDR Contact: 06/10/2013
Data Release Frequency: Varies

INST CONTROL: Sites with Institutional Controls
Voluntary Remediation Program and Brownfields sites with institutional controls in place.

Date of Government Version: 01/17/2013
Date Data Arrived at EDR: 02/28/2013
Date Made Active in Reports: 04/09/2013
Number of Days to Update: 40
Source: Department of Health
Telephone: 808-586-4249
Last EDR Contact: 02/28/2013
Next Scheduled EDR Contact: 06/10/2013
Data Release Frequency: Varies

State and tribal voluntary cleanup sites

VCP: Voluntary Response Program Sites
Sites participating in the Voluntary Response Program. The purpose of the VRP is to streamline the cleanup process in a way that will encourage prospective developers, lenders, and purchasers to voluntarily cleanup properties.

Date of Government Version: 01/17/2013
Date Data Arrived at EDR: 02/28/2013
Date Made Active in Reports: 04/09/2013
Number of Days to Update: 40
Source: Department of Health
Telephone: 808-586-4249
Last EDR Contact: 02/28/2013
Next Scheduled EDR Contact: 06/10/2013
Data Release Frequency: Varies

INDIAN VCP R1: Voluntary Cleanup Priority Listing
A listing of voluntary cleanup priority sites located on Indian Land located in Region 1.

Date of Government Version: 09/28/2012
Date Data Arrived at EDR: 10/02/2012
Date Made Active in Reports: 10/16/2012
Number of Days to Update: 14
Source: EPA, Region 1
Telephone: 617-918-1102
Last EDR Contact: 04/05/2013
Next Scheduled EDR Contact: 07/15/2013
Data Release Frequency: Varies

INDIAN VCP R7: Voluntary Cleanup Priority Lisitng
A listing of voluntary cleanup priority sites located on Indian Land located in Region 7.

Date of Government Version: 03/20/2008
Date Data Arrived at EDR: 04/22/2008
Date Made Active in Reports: 05/19/2008
Number of Days to Update: 27
Source: EPA, Region 7
Telephone: 913-551-7365
Last EDR Contact: 04/20/2009
Next Scheduled EDR Contact: 07/20/2009
Data Release Frequency: Varies

State and tribal Brownfields sites

BROWNFIELDS: Brownfields Sites
With certain legal exclusions and additions, the term 'brownfield site' means real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant.

Date of Government Version: 01/17/2013
Date Data Arrived at EDR: 02/28/2013
Date Made Active in Reports: 04/09/2013
Number of Days to Update: 40
Source: Department of Health
Telephone: 808-586-4249
Last EDR Contact: 02/28/2013
Next Scheduled EDR Contact: 06/10/2013
Data Release Frequency: Varies

ADDITIONAL ENVIRONMENTAL RECORDS

Local Brownfield lists

US BROWNFIELDS: A Listing of Brownfields Sites
Brownfields are real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant. Cleaning up and reinvesting in these properties takes development pressures off of undeveloped, open land, and both improves and protects the environment. Assessment, Cleanup and Redevelopment Exchange System (ACRES) stores information reported by EPA Brownfields grant recipients on brownfields properties assessed or cleaned up with grant funding as well as information on Targeted Brownfields Assessments performed by EPA Regions. A listing of ACRES Brownfield sites is obtained from Cleanups in My Community. Cleanups in My Community provides information on Brownfields properties for which information is reported back to EPA, as well as areas served by Brownfields grant programs.

Date of Government Version: 12/10/2012
Date Data Arrived at EDR: 12/11/2012
Date Made Active in Reports: 12/20/2012
Number of Days to Update: 9
Source: Environmental Protection Agency
Telephone: 202-566-2777
Last EDR Contact: 03/26/2013
Next Scheduled EDR Contact: 07/08/2013
Data Release Frequency: Semi-Annually

Local Lists of Landfill / Solid Waste Disposal Sites

DEBRIS REGION 9: Torres Martinez Reservation Illegal Dump Site Locations
A listing of illegal dump sites location on the Torres Martinez Indian Reservation located in eastern Riverside County and northern Imperial County, California.

Date of Government Version: 01/12/2009
Date Data Arrived at EDR: 05/07/2009
Date Made Active in Reports: 09/21/2009
Number of Days to Update: 137
Source: EPA, Region 9
Telephone: 415-947-4219
Last EDR Contact: 04/29/2013
Next Scheduled EDR Contact: 08/12/2013
Data Release Frequency: No Update Planned

ODI: Open Dump Inventory
An open dump is defined as a disposal facility that does not comply with one or more of the Part 257 or Part 258 Subtitle D Criteria.

Date of Government Version: 06/30/1985
Date Data Arrived at EDR: 08/09/2004
Date Made Active in Reports: 09/17/2004
Number of Days to Update: 39
Source: Environmental Protection Agency
Telephone: 800-424-9346
Last EDR Contact: 06/09/2004
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

INDIAN ODI: Report on the Status of Open Dumps on Indian Lands
Location of open dumps on Indian land.

Date of Government Version: 12/31/1998
Date Data Arrived at EDR: 12/03/2007
Date Made Active in Reports: 01/24/2008
Number of Days to Update: 52
Source: Environmental Protection Agency
Telephone: 703-308-8245
Last EDR Contact: 02/05/2013
Next Scheduled EDR Contact: 05/20/2013
Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Local Lists of Hazardous waste / Contaminated Sites

US CDL: Clandestine Drug Labs
A listing of clandestine drug lab locations. The U.S. Department of Justice ("the Department") provides this web site as a public service. It contains addresses of some locations where law enforcement agencies reported they found chemicals or other items that indicated the presence of either clandestine drug laboratories or dumpsites. In most cases, the source of the entries is not the Department, and the Department has not verified the entry and does not guarantee its accuracy. Members of the public must verify the accuracy of all entries by, for example, contacting local law enforcement and local health departments.

Date of Government Version: 11/14/2012
Date Data Arrived at EDR: 12/11/2012
Date Made Active in Reports: 02/15/2013
Number of Days to Update: 66
Source: Drug Enforcement Administration
Telephone: 202-307-1000
Last EDR Contact: 03/04/2013
Next Scheduled EDR Contact: 06/17/2013
Data Release Frequency: Quarterly

CDL: Clandestine Drug Lab Listing
A listing of clandestine drug lab site locations.

Date of Government Version: 08/04/2010
Date Data Arrived at EDR: 09/10/2010
Date Made Active in Reports: 10/22/2010
Number of Days to Update: 42
Source: Department of Health
Telephone: 808-586-4249
Last EDR Contact: 03/04/2013
Next Scheduled EDR Contact: 06/17/2013
Data Release Frequency: Varies

US HIST CDL: National Clandestine Laboratory Register
A listing of clandestine drug lab locations. The U.S. Department of Justice ("the Department") provides this web site as a public service. It contains addresses of some locations where law enforcement agencies reported they found chemicals or other items that indicated the presence of either clandestine drug laboratories or dumpsites. In most cases, the source of the entries is not the Department, and the Department has not verified the entry and does not guarantee its accuracy. Members of the public must verify the accuracy of all entries by, for example, contacting local law enforcement and local health departments.

Date of Government Version: 09/01/2007
Date Data Arrived at EDR: 11/19/2008
Date Made Active in Reports: 03/30/2009
Number of Days to Update: 131
Source: Drug Enforcement Administration
Telephone: 202-307-1000
Last EDR Contact: 03/23/2009
Next Scheduled EDR Contact: 06/22/2009
Data Release Frequency: No Update Planned

Local Land Records

LIENS 2: CERCLA Lien Information
A Federal CERCLA ('Superfund') lien can exist by operation of law at any site or property at which EPA has spent Superfund monies. These monies are spent to investigate and address releases and threatened releases of contamination. CERCLIS provides information as to the identity of these sites and properties.

Date of Government Version: 02/16/2012
Date Data Arrived at EDR: 03/26/2012
Date Made Active in Reports: 06/14/2012
Number of Days to Update: 80
Source: Environmental Protection Agency
Telephone: 202-564-6023
Last EDR Contact: 04/29/2013
Next Scheduled EDR Contact: 08/12/2013
Data Release Frequency: Varies

Records of Emergency Release Reports

HMIRS: Hazardous Materials Information Reporting System
Hazardous Materials Incident Report System. HMIRS contains hazardous material spill incidents reported to DOT.

Date of Government Version: 12/31/2012
Date Data Arrived at EDR: 01/03/2013
Date Made Active in Reports: 02/27/2013
Number of Days to Update: 55
Source: U.S. Department of Transportation
Telephone: 202-366-4555
Last EDR Contact: 04/02/2013
Next Scheduled EDR Contact: 07/15/2013
Data Release Frequency: Annually

SPILLS: Release Notifications
Releases of hazardous substances to the environment reported to the Office of Hazard Evaluation and Emergency Response since 1988.

Date of Government Version: 01/31/2012
Date Data Arrived at EDR: 02/28/2012
Date Made Active in Reports: 04/04/2012
Number of Days to Update: 36
Source: Department of Health
Telephone: 808-586-4249
Last EDR Contact: 03/01/2013
Next Scheduled EDR Contact: 06/10/2013
Data Release Frequency: Varies

SPILLS 90: SPILLS90 data from FirstSearch
Spills 90 includes those spill and release records available exclusively from FirstSearch databases. Typically, they may include chemical, oil and/or hazardous substance spills recorded after 1990. Duplicate records that are already included in EDR incident and release records are not included in Spills 90.

Date of Government Version: 03/10/2012
Date Data Arrived at EDR: 01/03/2013
Date Made Active in Reports: 02/11/2013
Number of Days to Update: 39
Source: FirstSearch
Telephone: N/A
Last EDR Contact: 01/03/2013
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

Other Ascertainable Records

RCRA NonGen / NLR: RCRA - Non Generators
RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Non-Generators do not presently generate hazardous waste.

Date of Government Version: 02/12/2013
Date Data Arrived at EDR: 02/15/2013
Date Made Active in Reports: 02/27/2013
Number of Days to Update: 12
Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 04/03/2013
Next Scheduled EDR Contact: 07/15/2013
Data Release Frequency: Varies

DOT OPS: Incident and Accident Data
Department of Transporation, Office of Pipeline Safety Incident and Accident data.

Date of Government Version: 07/31/2012
Date Data Arrived at EDR: 08/07/2012
Date Made Active in Reports: 09/18/2012
Number of Days to Update: 42
Source: Department of Transporation, Office of Pipeline Safety
Telephone: 202-366-4595
Last EDR Contact: 02/05/2013
Next Scheduled EDR Contact: 05/20/2013
Data Release Frequency: Varies

DOD: Department of Defense Sites
This data set consists of federally owned or administered lands, administered by the Department of Defense, that have any area equal to or greater than 640 acres of the United States, Puerto Rico, and the U.S. Virgin Islands.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 11/10/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 62
Source: USGS
Telephone: 888-275-8747
Last EDR Contact: 04/19/2013
Next Scheduled EDR Contact: 07/29/2013
Data Release Frequency: Semi-Annually

FUDS: Formerly Used Defense Sites
The listing includes locations of Formerly Used Defense Sites properties where the US Army Corps of Engineers is actively working or will take necessary cleanup actions.

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Date of Government Version: 12/31/2011
Date Data Arrived at EDR: 02/26/2013
Date Made Active in Reports: 03/13/2013
Number of Days to Update: 15
Source: U.S. Army Corps of Engineers
Telephone: 202-528-4285
Last EDR Contact: 03/11/2013
Next Scheduled EDR Contact: 06/24/2013
Data Release Frequency: Varies

CONSENT: Superfund (CERCLA) Consent Decrees
Major legal settlements that establish responsibility and standards for cleanup at NPL (Superfund) sites. Released periodically by United States District Courts after settlement by parties to litigation matters.

Date of Government Version: 12/31/2011
Date Data Arrived at EDR: 01/15/2013
Date Made Active in Reports: 03/13/2013
Number of Days to Update: 57
Source: Department of Justice, Consent Decree Library
Telephone: Varies
Last EDR Contact: 04/01/2013
Next Scheduled EDR Contact: 07/15/2013
Data Release Frequency: Varies

ROD: Records Of Decision
Record of Decision. ROD documents mandate a permanent remedy at an NPL (Superfund) site containing technical and health information to aid in the cleanup.

Date of Government Version: 12/18/2012
Date Data Arrived at EDR: 03/13/2013
Date Made Active in Reports: 04/12/2013
Number of Days to Update: 30
Source: EPA
Telephone: 703-416-0223
Last EDR Contact: 03/13/2013
Next Scheduled EDR Contact: 06/24/2013
Data Release Frequency: Annually

UMTRA: Uranium Mill Tailings Sites
Uranium ore was mined by private companies for federal government use in national defense programs. When the mills shut down, large piles of the sand-like material (mill tailings) remain after uranium has been extracted from the ore. Levels of human exposure to radioactive materials from the piles are low; however, in some cases tailings were used as construction materials before the potential health hazards of the tailings were recognized.

Date of Government Version: 09/14/2010
Date Data Arrived at EDR: 10/07/2011
Date Made Active in Reports: 03/01/2012
Number of Days to Update: 146
Source: Department of Energy
Telephone: 505-845-0011
Last EDR Contact: 02/25/2013
Next Scheduled EDR Contact: 06/10/2013
Data Release Frequency: Varies

US MINES: Mines Master Index File
Contains all mine identification numbers issued for mines active or opened since 1971. The data also includes violation information.

Date of Government Version: 08/18/2011
Date Data Arrived at EDR: 09/08/2011
Date Made Active in Reports: 09/29/2011
Number of Days to Update: 21
Source: Department of Labor, Mine Safety and Health Administration
Telephone: 303-231-5959
Last EDR Contact: 03/06/2013
Next Scheduled EDR Contact: 06/17/2013
Data Release Frequency: Semi-Annually

TRIS: Toxic Chemical Release Inventory System
Toxic Release Inventory System. TRIS identifies facilities which release toxic chemicals to the air, water and land in reportable quantities under SARA Title III Section 313.

Date of Government Version: 12/31/2009
Date Data Arrived at EDR: 09/01/2011
Date Made Active in Reports: 01/10/2012
Number of Days to Update: 131
Source: EPA
Telephone: 202-566-0250
Last EDR Contact: 02/26/2013
Next Scheduled EDR Contact: 06/10/2013
Data Release Frequency: Annually

TSCA: Toxic Substances Control Act
Toxic Substances Control Act. TSCA identifies manufacturers and importers of chemical substances included on the TSCA Chemical Substance Inventory list. It includes data on the production volume of these substances by plant site.

Date of Government Version: 12/31/2006
Date Data Arrived at EDR: 09/29/2010
Date Made Active in Reports: 12/02/2010
Number of Days to Update: 64

Source: EPA
Telephone: 202-260-5521
Last EDR Contact: 03/28/2013
Next Scheduled EDR Contact: 07/08/2013
Data Release Frequency: Every 4 Years

FTTS: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
FTTS tracks administrative cases and pesticide enforcement actions and compliance activities related to FIFRA, TSCA and EPCRA (Emergency Planning and Community Right-to-Know Act). To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 04/09/2009
Date Data Arrived at EDR: 04/16/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 25

Source: EPA/Office of Prevention, Pesticides and Toxic Substances
Telephone: 202-566-1667
Last EDR Contact: 02/25/2013
Next Scheduled EDR Contact: 06/10/2013
Data Release Frequency: Quarterly

FTTS INSP: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
A listing of FIFRA/TSCA Tracking System (FTTS) inspections and enforcements.

Date of Government Version: 04/09/2009
Date Data Arrived at EDR: 04/16/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 25

Source: EPA
Telephone: 202-566-1667
Last EDR Contact: 02/25/2013
Next Scheduled EDR Contact: 06/10/2013
Data Release Frequency: Quarterly

HIST FTTS: FIFRA/TSCA Tracking System Administrative Case Listing
A complete administrative case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006
Date Data Arrived at EDR: 03/01/2007
Date Made Active in Reports: 04/10/2007
Number of Days to Update: 40

Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 12/17/2007
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: No Update Planned

HIST FTTS INSP: FIFRA/TSCA Tracking System Inspection & Enforcement Case Listing
A complete inspection and enforcement case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006
Date Data Arrived at EDR: 03/01/2007
Date Made Active in Reports: 04/10/2007
Number of Days to Update: 40

Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 12/17/2008
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: No Update Planned

SSTS: Section 7 Tracking Systems
Section 7 of the Federal Insecticide, Fungicide and Rodenticide Act, as amended (92 Stat. 829) requires all registered pesticide-producing establishments to submit a report to the Environmental Protection Agency by March 1st each year. Each establishment must report the types and amounts of pesticides, active ingredients and devices being produced, and those having been produced and sold or distributed in the past year.

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Date of Government Version: 12/31/2009
Date Data Arrived at EDR: 12/10/2010
Date Made Active in Reports: 02/25/2011
Number of Days to Update: 77

Source: EPA
Telephone: 202-564-4203
Last EDR Contact: 04/29/2013
Next Scheduled EDR Contact: 08/12/2013
Data Release Frequency: Annually

ICIS: Integrated Compliance Information System
The Integrated Compliance Information System (ICIS) supports the information needs of the national enforcement and compliance program as well as the unique needs of the National Pollutant Discharge Elimination System (NPDES) program.

Date of Government Version: 07/20/2011
Date Data Arrived at EDR: 11/10/2011
Date Made Active in Reports: 01/10/2012
Number of Days to Update: 61

Source: Environmental Protection Agency
Telephone: 202-564-5088
Last EDR Contact: 04/15/2013
Next Scheduled EDR Contact: 07/29/2013
Data Release Frequency: Quarterly

PADS: PCB Activity Database System
PCB Activity Database. PADS Identifies generators, transporters, commercial storers and/or brokers and disposers of PCB's who are required to notify the EPA of such activities.

Date of Government Version: 11/01/2010
Date Data Arrived at EDR: 11/10/2010
Date Made Active in Reports: 02/16/2011
Number of Days to Update: 98

Source: EPA
Telephone: 202-566-0500
Last EDR Contact: 04/19/2013
Next Scheduled EDR Contact: 07/29/2013
Data Release Frequency: Annually

MLTS: Material Licensing Tracking System
MLTS is maintained by the Nuclear Regulatory Commission and contains a list of approximately 8,100 sites which possess or use radioactive materials and which are subject to NRC licensing requirements. To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 06/21/2011
Date Data Arrived at EDR: 07/15/2011
Date Made Active in Reports: 09/13/2011
Number of Days to Update: 60

Source: Nuclear Regulatory Commission
Telephone: 301-415-7169
Last EDR Contact: 03/11/2013
Next Scheduled EDR Contact: 06/24/2013
Data Release Frequency: Quarterly

RADINFO: Radiation Information Database
The Radiation Information Database (RADINFO) contains information about facilities that are regulated by U.S. Environmental Protection Agency (EPA) regulations for radiation and radioactivity.

Date of Government Version: 01/08/2013
Date Data Arrived at EDR: 01/09/2013
Date Made Active in Reports: 04/12/2013
Number of Days to Update: 93

Source: Environmental Protection Agency
Telephone: 202-343-9775
Last EDR Contact: 04/11/2013
Next Scheduled EDR Contact: 07/22/2013
Data Release Frequency: Quarterly

FINDS: Facility Index System/Facility Registry System
Facility Index System. FINDS contains both facility information and 'pointers' to other sources that contain more detail. EDR includes the following FINDS databases in this report: PCS (Permit Compliance System), AIRS (Aerometric Information Retrieval System), DOCKET (Enforcement Docket used to manage and track information on civil judicial enforcement cases for all environmental statutes), FURS (Federal Underground Injection Control), C-DOCKET (Criminal Docket System used to track criminal enforcement actions for all environmental statutes), FFIS (Federal Facilities Information System), STATE (State Environmental Laws and Statutes), and PADS (PCB Activity Data System).

Date of Government Version: 10/23/2011
Date Data Arrived at EDR: 12/13/2011
Date Made Active in Reports: 03/01/2012
Number of Days to Update: 79

Source: EPA
Telephone: (415) 947-8000
Last EDR Contact: 03/12/2013
Next Scheduled EDR Contact: 06/24/2013
Data Release Frequency: Quarterly

RAATS: RCRA Administrative Action Tracking System

RCRA Administration Action Tracking System. RAATS contains records based on enforcement actions issued under RCRA pertaining to major violators and includes administrative and civil actions brought by the EPA. For administration actions after September 30, 1995, data entry in the RAATS database was discontinued. EPA will retain a copy of the database for historical records. It was necessary to terminate RAATS because a decrease in agency resources made it impossible to continue to update the information contained in the database.

Date of Government Version: 04/17/1995
Date Data Arrived at EDR: 07/03/1995
Date Made Active in Reports: 08/07/1995
Number of Days to Update: 35

Source: EPA
Telephone: 202-564-4104
Last EDR Contact: 06/02/2008
Next Scheduled EDR Contact: 09/01/2008
Data Release Frequency: No Update Planned

RMP: Risk Management Plans

When Congress passed the Clean Air Act Amendments of 1990, it required EPA to publish regulations and guidance for chemical accident prevention at facilities using extremely hazardous substances. The Risk Management Program Rule (RMP Rule) was written to implement Section 112(r) of these amendments. The rule, which built upon existing industry codes and standards, requires companies of all sizes that use certain flammable and toxic substances to develop a Risk Management Program, which includes a(n): Hazard assessment that details the potential effects of an accidental release, an accident history of the last five years, and an evaluation of worst-case and alternative accidental releases; Prevention program that includes safety precautions and maintenance, monitoring, and employee training measures; and Emergency response program that spells out emergency health care, employee training measures and procedures for informing the public and response agencies (e.g the fire department) should an accident occur.

Date of Government Version: 05/08/2012
Date Data Arrived at EDR: 05/25/2012
Date Made Active in Reports: 07/10/2012
Number of Days to Update: 46

Source: Environmental Protection Agency
Telephone: 202-564-8600
Last EDR Contact: 04/29/2013
Next Scheduled EDR Contact: 08/12/2013
Data Release Frequency: Varies

BRS: Biennial Reporting System

The Biennial Reporting System is a national system administered by the EPA that collects data on the generation and management of hazardous waste. BRS captures detailed data from two groups: Large Quantity Generators (LQG) and Treatment, Storage, and Disposal Facilities.

Date of Government Version: 12/31/2011
Date Data Arrived at EDR: 02/26/2013
Date Made Active in Reports: 04/19/2013
Number of Days to Update: 52

Source: EPA/NTIS
Telephone: 800-424-9346
Last EDR Contact: 02/26/2013
Next Scheduled EDR Contact: 06/10/2013
Data Release Frequency: Biennially

UIC: Underground Injection Wells Listing

A listing of underground injection well locations.

Date of Government Version: 02/07/2013
Date Data Arrived at EDR: 02/12/2013
Date Made Active in Reports: 04/09/2013
Number of Days to Update: 56

Source: Department of Health
Telephone: 808-586-4258
Last EDR Contact: 03/17/2013
Next Scheduled EDR Contact: 06/17/2013
Data Release Frequency: Varies

DRYCLEANERS: Permitted Drycleaner Facility Listing

A listing of permitted drycleaner facilities in the state.

Date of Government Version: 12/31/2012
Date Data Arrived at EDR: 01/25/2013
Date Made Active in Reports: 02/28/2013
Number of Days to Update: 34

Source: Department of Health
Telephone: 808-586-4200
Last EDR Contact: 04/08/2013
Next Scheduled EDR Contact: 07/21/2013
Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

AIRS: List of Permitted Facilities

A listing of permitted facilities in the state.

Date of Government Version: 01/23/2013
Date Data Arrived at EDR: 01/25/2013
Date Made Active in Reports: 02/28/2013
Number of Days to Update: 34

Source: Department of Health
Telephone: 808-586-4200
Last EDR Contact: 04/23/2013
Next Scheduled EDR Contact: 07/22/2013
Data Release Frequency: Varies

INDIAN RESERV: Indian Reservations

This map layer portrays Indian administered lands of the United States that have any area equal to or greater than 640 acres.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 12/08/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 34

Source: USGS
Telephone: 202-208-3710
Last EDR Contact: 04/19/2013
Next Scheduled EDR Contact: 07/29/2013
Data Release Frequency: Semi-Annually

SCRD DRYCLEANERS: State Coalition for Remediation of Drycleaners Listing

The State Coalition for Remediation of Drycleaners was established in 1998, with support from the U.S. EPA Office of Superfund Remediation and Technology Innovation. It is comprised of representatives of states with established drycleaner remediation programs. Currently the member states are Alabama, Connecticut, Florida, Illinois, Kansas, Minnesota, Missouri, North Carolina, Oregon, South Carolina, Tennessee, Texas, and Wisconsin.

Date of Government Version: 03/07/2011
Date Data Arrived at EDR: 03/09/2011
Date Made Active in Reports: 05/02/2011
Number of Days to Update: 54

Source: Environmental Protection Agency
Telephone: 615-532-8599
Last EDR Contact: 04/23/2013
Next Scheduled EDR Contact: 08/05/2013
Data Release Frequency: Varies

2020 COR ACTION: 2020 Corrective Action Program List

The EPA has set ambitious goals for the RCRA Corrective Action program by creating the 2020 Corrective Action Universe. This RCRA cleanup baseline includes facilities expected to need corrective action. The 2020 universe contains a wide variety of sites. Some properties are heavily contaminated while others were contaminated but have since been cleaned up. Still others have not been fully investigated yet, and may require little or no remediation. Inclusion in the 2020 Universe does not necessarily imply failure on the part of a facility to meet its RCRA obligations.

Date of Government Version: 11/11/2011
Date Data Arrived at EDR: 05/18/2012
Date Made Active in Reports: 05/25/2012
Number of Days to Update: 7

Source: Environmental Protection Agency
Telephone: 703-308-4044
Last EDR Contact: 02/15/2013
Next Scheduled EDR Contact: 05/27/2013
Data Release Frequency: Varies

Financial Assurance: Financial Assurance Information Listing

A listing of financial assurance information for underground storage tank facilities. Financial assurance is intended to ensure that resources are available to pay for the cost of closure, post-closure care, and corrective measures if the owner or operator of a regulated facility is unable or unwilling to pay.

Date of Government Version: 03/18/2013
Date Data Arrived at EDR: 03/19/2013
Date Made Active in Reports: 04/09/2013
Number of Days to Update: 21

Source: Department of Health
Telephone: 808-586-4226
Last EDR Contact: 03/18/2013
Next Scheduled EDR Contact: 07/01/2013
Data Release Frequency: Varies

COAL ASH EPA: Coal Combustion Residues Surface Impoundments List

A listing of coal combustion residues surface impoundments with high hazard potential ratings.

Date of Government Version: 08/17/2010
Date Data Arrived at EDR: 01/03/2011
Date Made Active in Reports: 03/21/2011
Number of Days to Update: 77

Source: Environmental Protection Agency
Telephone: N/A
Last EDR Contact: 03/15/2013
Next Scheduled EDR Contact: 06/24/2013
Data Release Frequency: Varies

COAL ASH DOE: Steam-Electric Plan Operation Data
A listing of power plants that store ash in surface ponds.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 08/07/2009
Date Made Active in Reports: 10/22/2009
Number of Days to Update: 76
Source: Department of Energy
Telephone: 202-586-8719
Last EDR Contact: 04/18/2013
Next Scheduled EDR Contact: 07/29/2013
Data Release Frequency: Varies

PCB TRANSFORMER: PCB Transformer Registration Database
The database of PCB transformer registrations that includes all PCB registration submittals.

Date of Government Version: 02/01/2011
Date Data Arrived at EDR: 10/19/2011
Date Made Active in Reports: 01/10/2012
Number of Days to Update: 83
Source: Environmental Protection Agency
Telephone: 202-566-0517
Last EDR Contact: 02/01/2013
Next Scheduled EDR Contact: 05/13/2013
Data Release Frequency: Varies

US FIN ASSUR: Financial Assurance Information
All owners and operators of facilities that treat, store, or dispose of hazardous waste are required to provide proof that they will have sufficient funds to pay for the clean up, closure, and post-closure care of their facilities.

Date of Government Version: 11/20/2012
Date Data Arrived at EDR: 11/30/2012
Date Made Active in Reports: 02/27/2013
Number of Days to Update: 89
Source: Environmental Protection Agency
Telephone: 202-566-1917
Last EDR Contact: 02/19/2013
Next Scheduled EDR Contact: 06/03/2013
Data Release Frequency: Quarterly

EPA WATCH LIST: EPA WATCH LIST
EPA maintains a "Watch List" to facilitate dialogue between EPA, state and local environmental agencies on enforcement matters relating to facilities with alleged violations identified as either significant or high priority. Being on the Watch List does not mean that the facility has actually violated the law only that an investigation by EPA or a state or local environmental agency has led those organizations to allege that an unproven violation has in fact occurred. Being on the Watch List does not represent a higher level of concern regarding the alleged violations that were detected, but instead indicates cases requiring additional dialogue between EPA, state and local agencies - primarily because of the length of time the alleged violation has gone unaddressed or unresolved.

Date of Government Version: 07/31/2012
Date Data Arrived at EDR: 08/13/2012
Date Made Active in Reports: 09/18/2012
Number of Days to Update: 36
Source: Environmental Protection Agency
Telephone: 617-520-3000
Last EDR Contact: 02/12/2013
Next Scheduled EDR Contact: 05/27/2013
Data Release Frequency: Quarterly

PRP: Potentially Responsible Parties
A listing of verified Potentially Responsible Parties

Date of Government Version: 12/02/2012
Date Data Arrived at EDR: 01/03/2013
Date Made Active in Reports: 03/13/2013
Number of Days to Update: 69
Source: EPA
Telephone: 202-564-6023
Last EDR Contact: 04/04/2013
Next Scheduled EDR Contact: 07/15/2013
Data Release Frequency: Quarterly

US AIRS (AFS): Aerometric Information Retrieval System Facility Subsystem (AFS)
The database is a sub-system of Aerometric Information Retrieval System (AIRS). AFS contains compliance data on air pollution point sources regulated by the U.S. EPA and/or state and local air regulatory agencies. This information comes from source reports by various stationary sources of air pollution, such as electric power plants, steel mills, factories, and universities, and provides information about the air pollutants they produce. Action, air program, air program pollutant, and general level plant data. It is used to track emissions and compliance data from industrial plants.

Date of Government Version: 11/15/2012
Date Data Arrived at EDR: 11/16/2012
Date Made Active in Reports: 02/15/2013
Number of Days to Update: 91
Source: EPA
Telephone: 202-564-5962
Last EDR Contact: 04/01/2013
Next Scheduled EDR Contact: 07/15/2013
Data Release Frequency: Annually

FEDLAND: Federal and Indian Lands
Federally and Indian administrated lands of the United States. Lands included are administrated by: Army Corps of Engineers, Bureau of Reclamation, National Wild and Scenic River, National Wildlife Refuge, Public Domain Land, Wilderness, Wilderness Study Area, Wildlife Management Area, Bureau of Indian Affairs, Bureau of Land Management, Department of Justice, Forest Service, Fish and Wildlife Service, National Park Service.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 02/06/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 339
Source: U.S. Geological Survey
Telephone: 888-275-8747
Last EDR Contact: 04/19/2013
Next Scheduled EDR Contact: 07/29/2013
Data Release Frequency: N/A

US AIRS MINOR: Air Facility System Data
A listing of minor source facilities.

Date of Government Version: 11/15/2012
Date Data Arrived at EDR: 11/16/2012
Date Made Active in Reports: 02/15/2013
Number of Days to Update: 91
Source: EPA
Telephone: 202-564-5962
Last EDR Contact: 04/01/2013
Next Scheduled EDR Contact: 07/15/2013
Data Release Frequency: Annually

EDR HIGH RISK HISTORICAL RECORDS

EDR Exclusive Records

EDR MGP: EDR Proprietary Manufactured Gas Plants
The EDR Proprietary Manufactured Gas Plant Database includes records of coal gas plants (manufactured gas plants) compiled by EDR's researchers. Manufactured gas sites were used in the United States from the 1800's to 1950's to produce a gas that could be distributed and used as fuel. These plants used whale oil, rosin, coal, or a mixture of coal, oil, and water that also produced a significant amount of waste. Many of the byproducts of the gas production, such as coal tar (oily waste containing volatile and non-volatile chemicals), sludges, oils and other compounds are potentially hazardous to human health and the environment. The byproduct from this process was frequently disposed of directly at the plant site and can remain or spread slowly, serving as a continuous source of soil and groundwater contamination.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A
Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

EDR US Hist Auto Stat: EDR Exclusive Historic Gas Stations
EDR has searched selected national collections of business directories and has collected listings of potential gas station/filling station/service station sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include gas station/filling station/service station establishments. The categories reviewed included, but were not limited to gas, gas station, gasoline station, filling station, auto, automobile repair, auto service station, service station, etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A
Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

EDR US Hist Cleaners: EDR Exclusive Historic Dry Cleaners

EDR has searched selected national collections of business directories and has collected listings of potential dry cleaner sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include dry cleaning establishments. The categories reviewed included, but were not limited to dry cleaners, cleaners, laundry, laundromat, cleaning/laundry, wash & dry etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

Date of Government Version: N/A	Source: EDR, Inc.
Date Data Arrived at EDR: N/A	Telephone: N/A
Date Made Active in Reports: N/A	Last EDR Contact: N/A
Number of Days to Update: N/A	Next Scheduled EDR Contact: N/A
	Data Release Frequency: Varies

EDR US Hist Cleaners: EDR Proprietary Historic Dry Cleaners - Cole

Date of Government Version: N/A	Source: N/A
Date Data Arrived at EDR: N/A	Telephone: N/A
Date Made Active in Reports: N/A	Last EDR Contact: N/A
Number of Days to Update: N/A	Next Scheduled EDR Contact: N/A
	Data Release Frequency: Varies

EDR US Hist Auto Stat: EDR Proprietary Historic Gas Stations - Cole

Date of Government Version: N/A	Source: N/A
Date Data Arrived at EDR: N/A	Telephone: N/A
Date Made Active in Reports: N/A	Last EDR Contact: N/A
Number of Days to Update: N/A	Next Scheduled EDR Contact: N/A
	Data Release Frequency: Varies

OTHER DATABASE(S)

Depending on the geographic area covered by this report, the data provided in these specialty databases may or may not be complete. For example, the existence of wetlands information data in a specific report does not mean that all wetlands in the area covered by the report are included. Moreover, the absence of any reported wetlands information does not necessarily mean that wetlands do not exist in the area covered by the report.

Oil/Gas Pipelines: This data was obtained by EDR from the USGS in 1994. It is referred to by USGS as GeoData Digital Line Graphs from 1:100,000-Scale Maps. It was extracted from the transportation category including some oil, but primarily gas pipelines.

Electric Power Transmission Line Data
Source: Rextag Strategies Corp.
Telephone: (281) 769-2247
U.S. Electric Transmission and Power Plants Systems Digital GIS Data

Sensitive Receptors: There are individuals deemed sensitive receptors due to their fragile immune systems and special sensitivity to environmental discharges. These sensitive receptors typically include the elderly, the sick, and children. While the location of all sensitive receptors cannot be determined, EDR indicates those buildings and facilities - schools, daycares, hospitals, medical centers, and nursing homes - where individuals who are sensitive receptors are likely to be located.

AHA Hospitals:
Source: American Hospital Association, Inc.
Telephone: 312-280-5991
The database includes a listing of hospitals based on the American Hospital Association's annual survey of hospitals.

Medical Centers: Provider of Services Listing
Source: Centers for Medicare & Medicaid Services
Telephone: 410-786-3000
A listing of hospitals with Medicare provider number, produced by Centers of Medicare & Medicaid Services, a federal agency within the U.S. Department of Health and Human Services.

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Nursing Homes
Source: National Institutes of Health
Telephone: 301-594-6248
Information on Medicare and Medicaid certified nursing homes in the United States.

Public Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on elementary and secondary public education in the United States. It is a comprehensive, annual, national statistical database of all public elementary and secondary schools and school districts, which contains data that are comparable across all states.

Private Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on private school locations in the United States.

Flood Zone Data: This data, available in select counties across the country, was obtained by EDR in 2003 & 2011 from the Federal Emergency Management Agency (FEMA). Data depicts 100-year and 500-year flood zones as defined by FEMA.

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002 and 2005 from the U.S. Fish and Wildlife Service.

Scanned Digital USGS 7.5' Topographic Map (DRG)
Source: United States Geologic Survey
A digital raster graphic (DRG) is a scanned image of a U.S. Geological Survey topographic map. The map images are made by scanning published paper maps on high-resolution scanners. The raster image is georeferenced and fit to the Universal Transverse Mercator (UTM) projection.

STREET AND ADDRESS INFORMATION

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GEOCHECK ®- PHYSICAL SETTING SOURCE ADDENDUM

TARGET PROPERTY ADDRESS

KALAELOA HARBORS
JOHN WAYNE AVENUE
KAPOLEI, HI 96707

TARGET PROPERTY COORDINATES

Latitude (North):	21.3247 - 21° 19' 28.92"
Longitude (West):	158.1161 - 158° 6' 57.96"
Universal Tranverse Mercator:	Zone 4
UTM X (Meters):	591666.7
UTM Y (Meters):	2358202.0
Elevation:	13 ft. above sea level

USGS TOPOGRAPHIC MAP

Target Property Map:	21158-C1 EWA, HI
Most Recent Revision:	Not reported

EDR's GeoCheck Physical Setting Source Addendum is provided to assist the environmental professional in forming an opinion about the impact of potential contaminant migration.

Assessment of the impact of contaminant migration generally has two principal investigative components:

1. Groundwater flow direction, and
2. Groundwater flow velocity.

Groundwater flow direction may be impacted by surface topography, hydrology, hydrogeology, characteristics of the soil, and nearby wells. Groundwater flow velocity is generally impacted by the nature of the geologic strata.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

GROUNDWATER FLOW DIRECTION INFORMATION

Groundwater flow direction for a particular site is best determined by a qualified environmental professional using site-specific well data. If such data is not reasonably ascertainable, it may be necessary to rely on other sources of information, such as surface topographic information, hydrologic information, hydrogeologic data collected on nearby properties, and regional groundwater flow information (from deep aquifers).

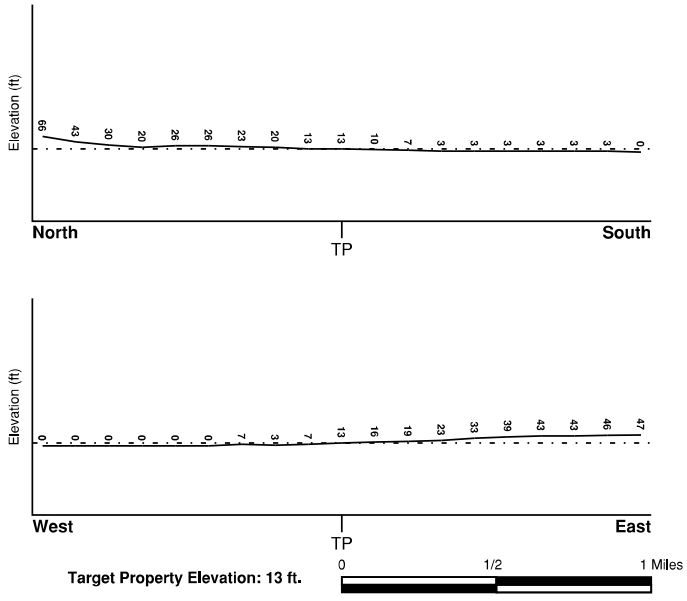
TOPOGRAPHIC INFORMATION

Surface topography may be indicative of the direction of surficial groundwater flow. This information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

TARGET PROPERTY TOPOGRAPHY

General Topographic Gradient: General SW

SURROUNDING TOPOGRAPHY: ELEVATION PROFILES



Source: Topography has been determined from the USGS 7.5' Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

HYDROLOGIC INFORMATION

Surface water can act as a hydrologic barrier to groundwater flow. Such hydrologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

Refer to the Physical Setting Source Map following this summary for hydrologic information (major waterways and bodies of water).

FEMA FLOOD ZONE

Target Property County	FEMA Flood Electronic Data
HONOLULU, HI	YES - refer to the Overview Map and Detail Map

Flood Plain Panel at Target Property: 15003C - FEMA DFIRM Flood data

Additional Panels in search area: Not Reported

NATIONAL WETLAND INVENTORY

NWI Quad at Target Property	NWI Electronic Data Coverage
EWA	YES - refer to the Overview Map and Detail Map

HYDROGEOLOGIC INFORMATION

Hydrogeologic information obtained by installation of wells on a specific site can often be an indicator of groundwater flow direction in the immediate area. Such hydrogeologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

AQUIFLOW®

Search Radius: 1.000 Mile.

EDR has developed the AQUIFLOW Information System to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted by environmental professionals to regulatory authorities at select sites and has extracted the date of the report, groundwater flow direction as determined hydrogeologically, and the depth to water table.

MAP ID	LOCATION FROM TP	GENERAL DIRECTION GROUNDWATER FLOW
Not Reported		

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

GROUNDWATER FLOW VELOCITY INFORMATION

Groundwater flow velocity information for a particular site is best determined by a qualified environmental professional using site specific geologic and soil strata data. If such data are not reasonably ascertainable, it may be necessary to rely on other sources of information, including geologic age identification, rock stratigraphic unit and soil characteristics data collected on nearby properties and regional soil information. In general, contaminant plumes move more quickly through sandy-gravelly types of soils than silty-clayey types of soils.

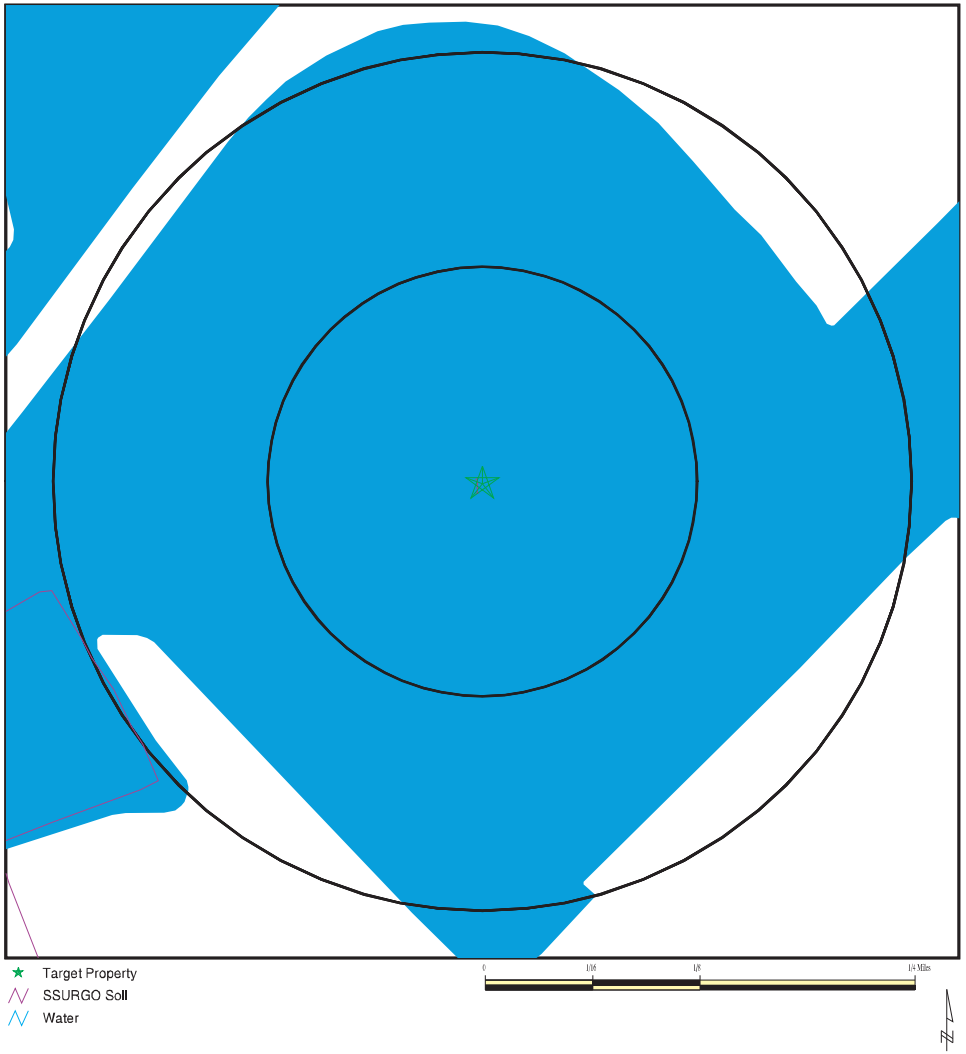
GEOLOGIC INFORMATION IN GENERAL AREA OF TARGET PROPERTY

Geologic information can be used by the environmental professional in forming an opinion about the relative speed at which contaminant migration may be occurring.

ROCK STRATIGRAPHIC UNIT		GEOLOGIC AGE IDENTIFICATION	
Era:	-	Category:	-
System:	-		
Series:	-		
Code:	N/A *(decoded above as Era, System & Series)*		

Geologic Age and Rock Stratigraphic Unit Source: P.G. Schruben, R.E. Arndt and W.J. Bawiec, Geology of the Conterminous U.S. at 1:2,500,000 Scale - a digital representation of the 1974 P.B. King and H.M. Beikman Map, USGS Digital Data Series DDS - 11 (1994).

SSURGO SOIL MAP - 3593654.2s



SITE NAME: Kalaeloa Harbors	CLIENT: ENPRO, Env. Professionals
ADDRESS: John Wayne Avenue	CONTACT: Roberta Bitzer
Kapolei HI 96707	INQUIRY #: 3593654.2s
LAT/LONG: 21.3247 / 158.1161	DATE: May 01, 2013 1:09 pm

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GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

DOMINANT SOIL COMPOSITION IN GENERAL AREA OF TARGET PROPERTY

The U.S. Department of Agriculture's (USDA) Soil Conservation Service (SCS) leads the National Cooperative Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. The following information is based on Soil Conservation Service SSURGO data.

Soil Map ID: 1

Soil Component Name: Coral outcrop

Soil Surface Texture: bedrock

Hydrologic Group: Class D - Very slow infiltration rates. Soils are clayey, have a high water table, or are shallow to an impervious layer.

Soil Drainage Class: Excessively drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Not Reported

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information

	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	59 inches	bedrock	Not reported	Not reported	Max: 42 Min: 1.41	Max: Min:

LOCAL / REGIONAL WATER AGENCY RECORDS

EDR Local/Regional Water Agency records provide water well information to assist the environmental professional in assessing sources that may impact ground water flow direction, and in forming an opinion about the impact of contaminant migration on nearby drinking water wells.

WELL SEARCH DISTANCE INFORMATION

DATABASE	SEARCH DISTANCE (miles)
Federal USGS	1.000
Federal FRDS PWS	Nearest PWS within 1 mile
State Database	1.000

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

FEDERAL USGS WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
A2	USGS40000269833	0 - 1/8 Mile West
B5	USGS40000269862	1/2 - 1 Mile ENE
B6	USGS40000269851	1/2 - 1 Mile ENE
C7	USGS40000269849	1/2 - 1 Mile ENE
C8	USGS40000269843	1/2 - 1 Mile East
G19	USGS40000269748	1/2 - 1 Mile SSE
I22	USGS40000269808	1/2 - 1 Mile ESE
J23	USGS40000269922	1/2 - 1 Mile NE
J24	USGS40000269930	1/2 - 1 Mile NE
J25	USGS40000269931	1/2 - 1 Mile NE
J26	USGS40000269928	1/2 - 1 Mile NE
J27	USGS40000269929	1/2 - 1 Mile NE
J28	USGS40000269932	1/2 - 1 Mile NE
J29	USGS40000269935	1/2 - 1 Mile NE
J30	USGS40000269936	1/2 - 1 Mile NE
J31	USGS40000269933	1/2 - 1 Mile NE
J32	USGS40000269934	1/2 - 1 Mile NE
H46	USGS40000269844	1/2 - 1 Mile East
J47	USGS40000269927	1/2 - 1 Mile NE
J48	USGS40000269926	1/2 - 1 Mile NE
J49	USGS40000269924	1/2 - 1 Mile NE
J50	USGS40000269925	1/2 - 1 Mile NE

FEDERAL FRDS PUBLIC WATER SUPPLY SYSTEM INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
No PWS System Found		

Note: PWS System location is not always the same as well location.

STATE DATABASE WELL INFORMATION

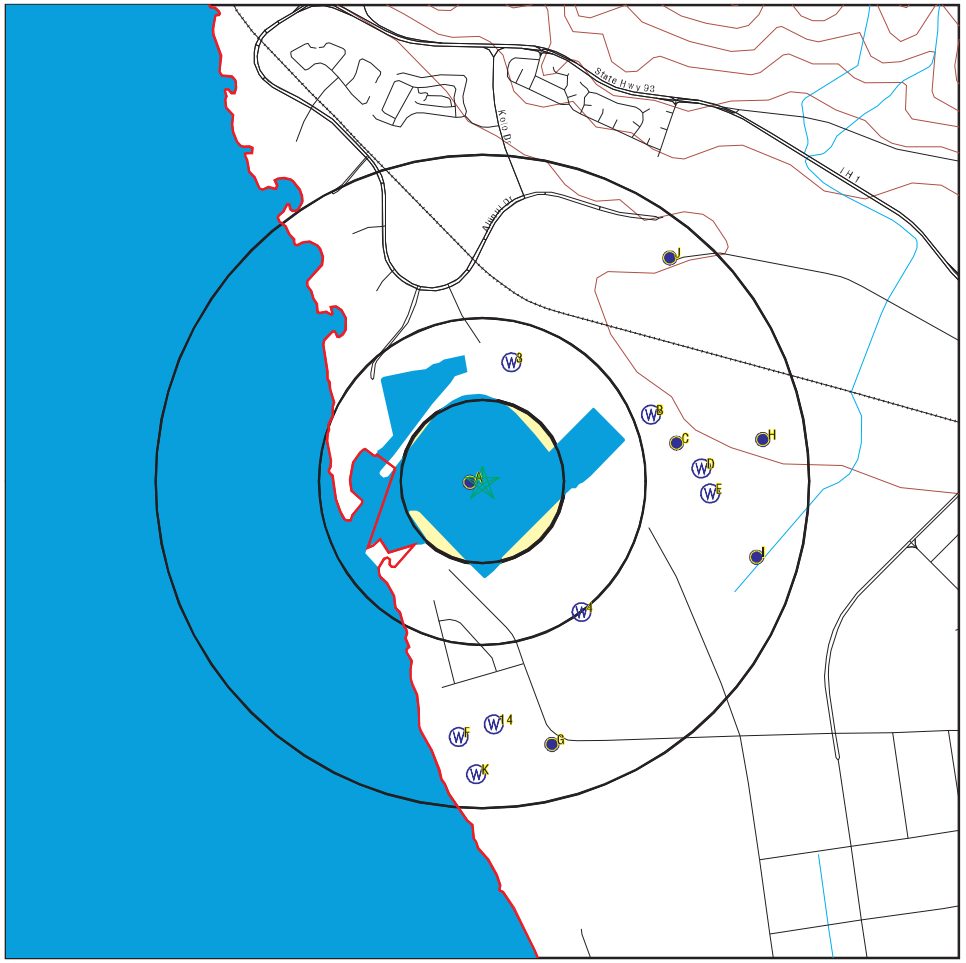
MAP ID	WELL ID	LOCATION FROM TP
A1	HI7000000002343	0 - 1/8 Mile West
3	HI7000000002401	1/4 - 1/2 Mile NNE
4	HI7000000002306	1/2 - 1 Mile SE
C9	HI7000000002359	1/2 - 1 Mile East
D10	HI7000000002353	1/2 - 1 Mile East
E11	HI7000000002332	1/2 - 1 Mile East
D12	HI7000000002347	1/2 - 1 Mile East
E13	HI7000000002341	1/2 - 1 Mile East
14	HI7000000002256	1/2 - 1 Mile South
F15	HI7000000002251	1/2 - 1 Mile South
F16	HI7000000002252	1/2 - 1 Mile South
G17	HI7000000002249	1/2 - 1 Mile SSE
H18	HI7000000002360	1/2 - 1 Mile East
H20	HI7000000002365	1/2 - 1 Mile ENE
I21	HI7000000002312	1/2 - 1 Mile ESE

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

STATE DATABASE WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
J33	HI7000000002463	1/2 - 1 Mile NE
J34	HI7000000002464	1/2 - 1 Mile NE
J35	HI7000000002462	1/2 - 1 Mile NE
J36	HI7000000002460	1/2 - 1 Mile NE
J37	HI7000000002461	1/2 - 1 Mile NE
J38	HI7000000002465	1/2 - 1 Mile NE
J39	HI7000000002469	1/2 - 1 Mile NE
J40	HI7000000002470	1/2 - 1 Mile NE
J41	HI7000000002468	1/2 - 1 Mile NE
J42	HI7000000002466	1/2 - 1 Mile NE
J43	HI7000000002467	1/2 - 1 Mile NE
K44	HI7000000002244	1/2 - 1 Mile South
K45	HI7000000002245	1/2 - 1 Mile South
H51	HI7000000002361	1/2 - 1 Mile East

PHYSICAL SETTING SOURCE MAP - 3593654.2s



County Boundary
Major Roads
Contour Lines
Earthquake epicenter, Richter 5 or greater
Water Wells
Public Water Supply Wells
Cluster of Multiple Icons

Groundwater Flow Direction
Indeterminate Groundwater Flow at Location
Groundwater Flow Varies at Location

SITE NAME:	Kalaeloa Harbors
ADDRESS:	John Wayne Avenue Kapolei HI 96707
LAT/LONG:	21.3247 / 158.1161
CLIENT:	ENPRO, Env. Professionals
CONTACT:	Roberta Bitzer
INQUIRY #:	3593654.2s
DATE:	May 01, 2013 1:09 pm

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GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance
Elevation

	Database	EDR ID Number
A1 **West** **0 - 1/8 Mile** **Lower**	**HI WELLS**	**HI7000000002343**

Wid:	3-1907-001	Island:	3
Well no:	1907-01	Well name:	Barbers Point
Old name:	Not Reported	Yr drilled:	1951
Driller:	NAT WHITON	Quad map:	06
Longitude2:	1580710	Latitude27:	211940
Longitude8:	1580700	Latitude83:	211929
Long83dd:	-158.11667		
Lat83dd:	21.32472		
Gps:	0	Utm:	1
Owner user:	U S State Dept	Old number:	276-1
Well type:	Not Reported	Casing dia:	8
Ground el:	8	Well depth:	30
Solid case:	8	Perf case:	Not Reported
Use:	ABN - Lost		
Use year:	81		
Init water:	1.5		
Init head:	1.5		
Init chlor:	2770		
Init cl:	2770		
Test date:	12/12/2006	Test gpm:	35
Test ddown:	0.7	Test chlor:	Not Reported
Test temp:	Not Reported	Temp unit:	Not Reported
Pump gpm:	0		
Draft mgy:	Not Reported	Head feet:	Not Reported
Max chlor:	2770	Min chlor:	Not Reported
Geology:	QLS	Pump yr:	Not Reported
Draft yr:	Not Reported	Head yr:	Not Reported
Maxchl:	01/18/1995	Maxchl yr:	0
Minchl:	06/03/1993	Minchl yr:	0
Bot hole:	-22	Bot solid:	0
Bot perf:	Not Reported	Spec capac:	50
Pump mgd:	Not Reported	Draft mgd:	Not Reported
Aquifer:	30204	Tmk:	9-1-014:002
Old aqui:	Not Reported	Aqui code:	30207
Latest hd:	0		
Cur head:	Not Reported	Cur cl:	Not Reported
Cur temp:	Not Reported	Wcr:	01/01/1951
Plr:	04/01/1994	Surveyor:	Not Reported
T:	0		
Pump elev:	Not Reported	Pump depth:	Not Reported
Site id:	HI7000000002343		

A2 **West** **0 - 1/8 Mile** **Lower**	**FED USGS**	**USGS40000269833**

Org. Identifier:	USGS-HI		
Formal name:	USGS Hawaii Water Science Center		
Monloc Identifier:	USGS-211940158071001		
Monloc name:	3-1907-01 W276-1 BP		
Monloc type:	Well		
Monloc desc:	Not Reported		
Huc code:	20060000	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	21.3246178
Longitude:	-158.116699	Sourcemap scale:	24000
Horiz Acc measure:	1	Horiz Acc measure units:	seconds
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	8.00
Vert measure units:	feet	Vertacc measure val:	2
Vert accmeasure units:	feet		
Vertcollection method:	Interpolated from topographic map		
Vert coord refsys:	HILOCAL	Countrycode:	US
Aquifername:	Not Reported		
Formation type:	Not Reported		
Aquifer type:	Not Reported		
Construction date:	19510306	Welldepth:	30
Welldepth units:	ft	Wellholedepth:	Not Reported
Wellholedepth units:	Not Reported		

Ground-water levels, Number of Measurements: 0

3
NNE
1/4 - 1/2 Mile
Higher

HI WELLS **HI7000000002401**

Wid:	3-1906-012	Island:	3
Well no:	1906-12	Well name:	Ko Olina Salt 1
Old name:	Not Reported	Yr drilled:	2006
Driller:	Not Reported	Quad map:	06
Longitude2:	1580703	Latitude27:	211959
Longitude8:	1580653	Latitude83:	211948
Long83dd:	-158.11472		
Lat83dd:	21.33		
Gps:	1	Utm:	0
Owner user:	Not Reported	Old number:	Not Reported
Well type:	ROT	Casing dia:	16
Ground el:	Not Reported	Well depth:	1303
Solid case:	914	Perf case:	Not Reported
Use:	UNU - Unused		
Use year:	06		
Init water:	Not Reported		
Init head:	0		
Init chlor:	Not Reported		
Init cl:	19300		
Test date:	12/12/2006	Test gpm:	2500
Test ddown:	5.5	Test chlor:	19300
Test temp:	62.2	Temp unit:	F
Pump gpm:	0		
Draft mgy:	Not Reported	Head feet:	Not Reported
Max chlor:	Not Reported	Min chlor:	Not Reported
Geology:	QLS	Pump yr:	Not Reported
Draft yr:	Not Reported	Head yr:	Not Reported
Maxchl:	01/18/1995	Maxchl yr:	Not Reported
Minchl:	06/03/1993	Minchl yr:	Not Reported
Bot hole:	Not Reported	Bot solid:	Not Reported
Bot perf:	Not Reported	Spec capac:	Not Reported

Pump mgd:	Not Reported	Draft mgd:	Not Reported
Aquifer:	Not Reported	Tmk:	9-1-057:024
Old aqui:	Not Reported	Aqui code:	30207
Latest hd:	0		
Cur head:	Not Reported	Cur cl:	Not Reported
Cur temp:	Not Reported	Wcr:	06/22/2007
Pir:	04/01/1994	Surveyor:	Not Reported
T:	0		
Pump elev:	Not Reported	Pump depth:	Not Reported
Site id:	HI7000000002401		

4
SE
1/2 - 1 Mile
Lower

HI WELLS **HI7000000002306**

Wid:	3-1906-008	Island:	3
Well no:	1906-08	Well name:	Barbers Pt. MW-1
Old name:	Not Reported	Yr drilled:	1997
Driller:	CMZ OF HAWAII	Quad map:	06
Longitude2:	1580651	Latitude27:	211919
Longitude8:	1580641	Latitude83:	211908
Long83dd:	-158.11139		
Lat83dd:	21.31889		
Gps:	0	Utm:	1
Owner user:	State DOT-Harbors	Old number:	Not Reported
Well type:	ROT	Casing dia:	2
Ground el:	12	Well depth:	115
Solid case:	5	Perf case:	112
Use:	OBS - Observation		
Use year:	97		
Init water:	Not Reported		
Init head:	0		
Init chlor:	Not Reported		
Init cl:	0		
Test date:	12/15/1987	Test gpm:	Not Reported
Test ddown:	Not Reported	Test chlor:	Not Reported
Test temp:	Not Reported	Temp unit:	Not Reported
Pump gpm:	0		
Draft mgy:	Not Reported	Head feet:	Not Reported
Max chlor:	Not Reported	Min chlor:	Not Reported
Geology:	PLS	Pump yr:	Not Reported
Draft yr:	Not Reported	Head yr:	Not Reported
Maxchl:	01/18/1995	Maxchl yr:	0
Minchl:	06/03/1993	Minchl yr:	0
Bot hole:	-103	Bot solid:	7
Bot perf:	-100	Spec capac:	Not Reported
Pump mgd:	Not Reported	Draft mgd:	Not Reported
Aquifer:	Not Reported	Tmk:	9-1-014:024
Old aqui:	Not Reported	Aqui code:	30207
Latest hd:	0		
Cur head:	Not Reported	Cur cl:	Not Reported
Cur temp:	Not Reported	Wcr:	09/05/1997
Pir:	04/01/1994	Surveyor:	R D FLEENOR
T:	0		
Pump elev:	Not Reported	Pump depth:	Not Reported
Site id:	HI7000000002306		

Map ID
Direction
Distance
Elevation | Database | EDR ID Number

B5
ENE
1/2 - 1 Mile
Higher | **FED USGS** | **USGS40000269862**

Org. Identifier:	USGS-HI		
Formal name:	USGS Hawaii Water Science Center		
Monloc Identifier:	USGS-211952158064001		
Monloc name:	3-1906-40 SAND PLANT B-1		
Monloc type:	Well		
Monloc desc:	Not Reported		
Huc code:	20060000	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	21.3279516
Longitude:	-158.1083657	Sourcemap scale:	24000
Horiz Acc measure:	1	Horiz Acc measure units:	seconds
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	21.
Vert measure units:	feet	Vertacc measure val:	2
Vert accmeasure units:	feet		
Vertcollection method:	Interpolated from topographic map		
Vert coord refsys:	HILOCAL	Countrycode:	US
Aquifername:	Not Reported		
Formation type:	Not Reported		
Aquifer type:	Not Reported		
Construction date:	19880118	Welldepth:	250
Welldepth units:	ft	Wellholedepth:	250
Wellholedepth units:	ft		

Ground-water levels, Number of Measurements: 0

B6
ENE
1/2 - 1 Mile
Higher | **FED USGS** | **USGS40000269851**

Org. Identifier:	USGS-HI		
Formal name:	USGS Hawaii Water Science Center		
Monloc Identifier:	USGS-211950158063801		
Monloc name:	3-1906-03 SAND PLANT C-1		
Monloc type:	Well		
Monloc desc:	Not Reported		
Huc code:	20060000	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	21.3273961
Longitude:	-158.1078102	Sourcemap scale:	24000
Horiz Acc measure:	1	Horiz Acc measure units:	seconds
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	21.
Vert measure units:	feet	Vertacc measure val:	2.
Vert accmeasure units:	feet		
Vertcollection method:	Interpolated from topographic map		
Vert coord refsys:	HILOCAL	Countrycode:	US
Aquifername:	Not Reported		
Formation type:	Not Reported		

Aquifer type:	Not Reported		
Construction date:	19871214	Welldepth:	118
Welldepth units:	ft	Wellholedepth:	118
Wellholedepth units:	ft		

Ground-water levels, Number of Measurements: 0

C7
ENE
1/2 - 1 Mile
Higher | **FED USGS** | **USGS40000269849**

Org. Identifier:	USGS-HI		
Formal name:	USGS Hawaii Water Science Center		
Monloc Identifier:	USGS-211948158063601		
Monloc name:	3-1906-04 SAND PLANT C-2		
Monloc type:	Well		
Monloc desc:	Not Reported		
Huc code:	20060000	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	21.3268406
Longitude:	-158.1072547	Sourcemap scale:	24000
Horiz Acc measure:	1	Horiz Acc measure units:	seconds
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	21.
Vert measure units:	feet	Vertacc measure val:	2.
Vert accmeasure units:	feet		
Vertcollection method:	Interpolated from topographic map		
Vert coord refsys:	HILOCAL	Countrycode:	US
Aquifername:	Not Reported		
Formation type:	Not Reported		
Aquifer type:	Not Reported		
Construction date:	19871121	Welldepth:	120
Welldepth units:	ft	Wellholedepth:	120
Wellholedepth units:	ft		

Ground-water levels, Number of Measurements: 0

C8
East
1/2 - 1 Mile
Higher | **FED USGS** | **USGS40000269843**

Org. Identifier:	USGS-HI		
Formal name:	USGS Hawaii Water Science Center		
Monloc Identifier:	USGS-211945158063401		
Monloc name:	3-1906-05 SAND PLANT C-3		
Monloc type:	Well		
Monloc desc:	Not Reported		
Huc code:	20060000	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	21.3260074
Longitude:	-158.1066992	Sourcemap scale:	24000
Horiz Acc measure:	1	Horiz Acc measure units:	seconds
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	21
Vert measure units:	feet	Vertacc measure val:	2
Vert accmeasure units:	feet		
Vertcollection method:	Interpolated from topographic map		
Vert coord refsys:	HILOCAL	Countrycode:	US
Aquifername:	Not Reported		
Formation type:	Not Reported		

Aquifer type:	Not Reported		
Construction date:	19880208	Welldepth:	120
Welldepth units:	ft	Wellholedepth:	120
Wellholedepth units:	ft		

Ground-water levels, Number of Measurements: 1

Date	Feet below Surface	Feet to Sealevel
1988-02-09	22	

C9
East
1/2 - 1 Mile
Higher

HI WELLS **HI7000000002359**

Wid:	3-1906-006	Island:	3
Well no:	1906-06	Well name:	Grace Pac C-1
Old name:	Not Reported	Yr drilled:	1987
Driller:	ROSCOE MOSS	Quad map:	06
Longitude2:	1580634	Latitude27:	211946
Longitude8:	1580624	Latitude83:	211935
Long83dd:	-158.10667		
Lat83dd:	21.32639		
Gps:	0	Utm:	1
Owner user:	Grace Pacific	Old number:	Not Reported
Well type:	PER	Casing dia:	16
Ground el:	Not Reported	Well depth:	118
Solid case:	45	Perf case:	65
Use:	ABN - Sealed		
Use year:	05		
Init water:	Not Reported		
Init head:	0		
Init chlor:	Not Reported		
Init cl:	0		
Test date:	12/15/1987	Test gpm:	1600
Test ddown:	5.1	Test chlor:	Not Reported
Test temp:	23.3	Temp unit:	C
Pump gpm:	1350		
Draft mgy:	Not Reported	Head feet:	Not Reported
Max chlor:	Not Reported	Min chlor:	Not Reported
Geology:	QLS	Pump yr:	88
Draft yr:	Not Reported	Head yr:	Not Reported
Maxchl:	03/11/1996	Maxchl yr:	0
Minchl:	11/21/1997	Minchl yr:	0
Bot hole:	Not Reported	Bot solid:	Not Reported
Bot perf:	Not Reported	Spec capac:	313
Pump mgd:	1.944	Draft mgd:	Not Reported
Aquifer:	30204	Tmk:	9-1-014:002
Old aqui:	Not Reported	Aqui code:	30207
Latest hd:	0		
Cur head:	Not Reported	Cur cl:	Not Reported
Cur temp:	Not Reported	Wcr:	12/01/1987
Pir:	04/01/1994	Surveyor:	Not Reported
T:	0		
Pump elev:	Not Reported	Pump depth:	Not Reported
Site id:	HI7000000002359		

Map ID
Direction
Distance
Elevation

Database EDR ID Number

D10
East
1/2 - 1 Mile
Higher

HI WELLS **HI7000000002353**

Wid:	3-1906-005	Island:	3
Well no:	1906-05	Well name:	Grace Pac B-1
Old name:	Not Reported	Yr drilled:	1988
Driller:	ROSCOE MOSS	Quad map:	06
Longitude2:	1580632	Latitude27:	211943
Longitude8:	1580622	Latitude83:	211932
Long83dd:	-158.10611		
Lat83dd:	21.32556		
Gps:	0	Utm:	1
Owner user:	Grace Pacific	Old number:	Not Reported
Well type:	PER	Casing dia:	12
Ground el:	Not Reported	Well depth:	250
Solid case:	120	Perf case:	160
Use:	ABN - Sealed		
Use year:	05		
Init water:	Not Reported		
Init head:	0		
Init chlor:	Not Reported		
Init cl:	0		
Test date:	01/19/1988	Test gpm:	1000
Test ddown:	5.1	Test chlor:	12500
Test temp:	23.3	Temp unit:	C
Pump gpm:	350		
Draft mgy:	Not Reported	Head feet:	Not Reported
Max chlor:	Not Reported	Min chlor:	Not Reported
Geology:	QLS	Pump yr:	88
Draft yr:	Not Reported	Head yr:	Not Reported
Maxchl:	03/11/1996	Maxchl yr:	0
Minchl:	11/21/1997	Minchl yr:	0
Bot hole:	Not Reported	Bot solid:	Not Reported
Bot perf:	Not Reported	Spec capac:	196
Pump mgd:	.504	Draft mgd:	Not Reported
Aquifer:	30204	Tmk:	9-1-014:002
Old aqui:	Not Reported	Aqui code:	30207
Latest hd:	0		
Cur head:	Not Reported	Cur cl:	Not Reported
Cur temp:	Not Reported	Wcr:	01/01/1988
Pir:	04/01/1994	Surveyor:	Not Reported
T:	0		
Pump elev:	Not Reported	Pump depth:	Not Reported
Site id:	HI7000000002353		

E11
East
1/2 - 1 Mile
Higher

HI WELLS **HI7000000002332**

Wid:	3-1906-009	Island:	3
Well no:	1906-09	Well name:	Barbers Pt. MW-2
Old name:	Not Reported	Yr drilled:	1997
Driller:	CMZ OF HAWAII	Quad map:	06
Longitude2:	1580630	Latitude27:	211937
Longitude8:	1580620	Latitude83:	211926
Long83dd:	-158.10556		
Lat83dd:	21.32389		
Gps:	0	Utm:	1
Owner user:	State DOT-Harbors	Old number:	Not Reported
Well type:	ROT	Casing dia:	2
Ground el:	26	Well depth:	135
Solid case:	2	Perf case:	130
Use:	ABN - Lost		
Use year:	00		
Init water:	Not Reported		
Init head:	0		
Init chlor:	Not Reported		
Init cl:	0		
Test date:	12/15/1987	Test gpm:	Not Reported
Test ddown:	Not Reported	Test chlor:	Not Reported
Test temp:	Not Reported	Temp unit:	Not Reported
Pump gpm:	0		
Draft mgy:	Not Reported	Head feet:	Not Reported
Max chlor:	Not Reported	Min chlor:	Not Reported
Geology:	PLS	Pump yr:	Not Reported
Draft yr:	Not Reported	Head yr:	Not Reported
Maxchl:	01/18/1995	Maxchl yr:	Not Reported
Minchl:	06/03/1993	Minchl yr:	Not Reported
Bot hole:	-109	Bot solid:	24
Bot perf:	-104	Spec capac:	Not Reported
Pump mgd:	Not Reported	Draft mgd:	Not Reported
Aquifer:	Not Reported	Tmk:	9-1-014:024
Old aqui:	Not Reported	Aqui code:	30207
Latest hd:	0		
Cur head:	Not Reported	Cur cl:	Not Reported
Cur temp:	Not Reported	Wcr:	09/12/1997
Pir:	04/01/1994	Surveyor:	R D FLEENOR
T:	0		
Pump elev:	Not Reported	Pump depth:	Not Reported
Site id:	HI7000000002332		

D12
East
1/2 - 1 Mile
Higher

HI WELLS **HI7000000002347**

Wid:	3-1906-004	Island:	3
Well no:	1906-04	Well name:	Grace Pac C-2
Old name:	Not Reported	Yr drilled:	1988
Driller:	ROSCOE MOSS	Quad map:	06
Longitude2:	1580629	Latitude27:	211941
Longitude8:	1580619	Latitude83:	211930
Long83dd:	-158.10528		
Lat83dd:	21.325		
Gps:	0	Utm:	1
Owner user:	Grace Pacific	Old number:	Not Reported

Well type:	PER	Casing dia:	16
Ground el:	Not Reported	Well depth:	120
Solid case:	40	Perf case:	63
Use:	ABN - Sealed		
Use year:	05		
Init water:	Not Reported		
Init head:	0		
Init chlor:	Not Reported		
Init cl:	0		
Test date:	01/29/1988	Test gpm:	1600
Test ddown:	Not Reported	Test chlor:	16200
Test temp:	23.3	Temp unit:	C
Pump gpm:	1550		
Draft mgy:	Not Reported	Head feet:	Not Reported
Max chlor:	Not Reported	Min chlor:	Not Reported
Geology:	QLS	Pump yr:	88
Draft yr:	Not Reported	Head yr:	Not Reported
Maxchl:	03/11/1996	Maxchl yr:	0
Minchl:	11/21/1997	Minchl yr:	0
Bot hole:	Not Reported	Bot solid:	Not Reported
Bot perf:	Not Reported	Spec capac:	Not Reported
Pump mgd:	2.232	Draft mgd:	Not Reported
Aquifer:	30204	Tmk:	9-1-014:002
Old aqui:	Not Reported	Aqui code:	30207
Latest hd:	0		
Cur head:	Not Reported	Cur cl:	Not Reported
Cur temp:	Not Reported	Wcr:	01/01/1988
Pir:	04/01/1994	Surveyor:	Not Reported
T:	0		
Pump elev:	Not Reported	Pump depth:	Not Reported
Site id:	HI7000000002347		

E13
East
1/2 - 1 Mile
Higher

HI WELLS **HI7000000002341**

Wid:	3-1906-003	Island:	3
Well no:	1906-03	Well name:	Grace Pac C-3
Old name:	Not Reported	Yr drilled:	1988
Driller:	ROSCOE MOSS	Quad map:	06
Longitude2:	1580628	Latitude27:	211939
Longitude8:	1580618	Latitude83:	211928
Long83dd:	-158.105		
Lat83dd:	21.32444		
Gps:	0	Utm:	1
Owner user:	Grace Pacific	Old number:	Not Reported
Well type:	PER	Casing dia:	16
Ground el:	Not Reported	Well depth:	120
Solid case:	40	Perf case:	60
Use:	ABN - Sealed		
Use year:	05		
Init water:	Not Reported		
Init head:	0		
Init chlor:	Not Reported		
Init cl:	0		
Test date:	02/12/1988	Test gpm:	1600
Test ddown:	8.6	Test chlor:	16000

Test temp:	22.8	Temp unit:	C
Pump gpm:	1550		
Draft mgy:	Not Reported	Head feet:	Not Reported
Max chlor:	Not Reported	Min chlor:	Not Reported
Geology:	QLS	Pump yr:	88
Draft yr:	Not Reported	Head yr:	Not Reported
Maxchl:	03/11/1996	Maxchl yr:	0
Minchl:	11/21/1997	Minchl yr:	0
Bot hole:	Not Reported	Bot solid:	Not Reported
Bot perf:	Not Reported	Spec capac:	186
Pump mgd:	2.232	Draft mgd:	Not Reported
Aquifer:	30204	Tmk:	9-1-014:002
Old aqui:	Not Reported	Aqui code:	30207
Latest hd:	0		
Cur head:	Not Reported	Cur cl:	Not Reported
Cur temp:	Not Reported	Wcr:	02/01/1988
Pir:	04/01/1994	Surveyor:	Not Reported
T:	0		
Pump elev:	Not Reported	Pump depth:	Not Reported
Site id:	HI7000000002341		

14
South
1/2 - 1 Mile
Lower

HI WELLS **HI7000000002256**

Wid:	3-1907-002	Island:	3
Well no:	1907-02	Well name:	Chevron Fire
Old name:	Not Reported	Yr drilled:	1991
Driller:	FOUND INTL	Quad map:	06
Longitude2:	1580706	Latitude27:	211901
Longitude8:	1580656	Latitude83:	211850
Long83dd:	-158.11556		
Lat83dd:	21.31389		
Gps:	0	Utm:	1
Owner user:	Chevron Products Co.	Old number:	Not Reported
Well type:	ROT	Casing dia:	36
Ground el:	5	Well depth:	41
Solid case:	10	Perf case:	39
Use:	IND - Fire Protection		
Use year:	91		
Init water:	Not Reported		
Init head:	.17		
Init chlor:	Not Reported		
Init cl:	0		
Test date:	03/29/1991	Test gpm:	1572
Test ddown:	6.2	Test chlor:	Not Reported
Test temp:	Not Reported	Temp unit:	Not Reported
Pump gpm:	1525		
Draft mgy:	Not Reported	Head feet:	Not Reported
Max chlor:	Not Reported	Min chlor:	Not Reported
Geology:	QLS	Pump yr:	91
Draft yr:	Not Reported	Head yr:	Not Reported
Maxchl:	01/18/1995	Maxchl yr:	0
Minchl:	06/03/1993	Minchl yr:	0
Bot hole:	-36	Bot solid:	-5
Bot perf:	-34	Spec capac:	254

Pump mgd:	2.196	Draft mgd:	Not Reported
Aquifer:	30204	Tmk:	9-1-014:010
Old aqui:	Not Reported	Aqui code:	30207
Latest hd:	0		
Cur head:	Not Reported	Cur cl:	Not Reported
Cur temp:	Not Reported	Wcr:	03/29/1991
Pir:	04/01/1994	Surveyor:	JAMES THOMPSON
T:	0		
Pump elev:	Not Reported	Pump depth:	Not Reported
Site id:	HI7000000002256		

F15
South
1/2 - 1 Mile
Lower

HI WELLS **HI7000000002251**

Wid:	3-1807-001	Island:	3
Well no:	1807-01	Well name:	LPG Storage Area
Old name:	Not Reported	Yr drilled:	1959
Driller:	Not Reported	Quad map:	06
Longitude2:	1580712	Latitude27:	211859
Longitude8:	1580702	Latitude83:	211848
Long83dd:	-158.11722		
Lat83dd:	21.31333		
Gps:	0	Utm:	1
Owner user:	Chevron Products Co.	Old number:	Not Reported
Well type:	Not Reported	Casing dia:	14
Ground el:	3	Well depth:	Not Reported
Solid case:	Not Reported	Perf case:	Not Reported
Use:	IND - Geothermal, Thermoelectric Cooling, Power De		
Use year:	61		
Init water:	Not Reported		
Init head:	0		
Init chlor:	Not Reported		
Init cl:	0		
Test date:	02/19/2009	Test gpm:	690
Test ddown:	Not Reported	Test chlor:	15000
Test temp:	25.0	Temp unit:	C
Pump gpm:	660		
Draft mgy:	Not Reported	Head feet:	Not Reported
Max chlor:	Not Reported	Min chlor:	Not Reported
Geology:	QLS	Pump yr:	Not Reported
Draft yr:	Not Reported	Head yr:	Not Reported
Maxchl:	01/01/1961	Maxchl yr:	0
Minchl:	01/01/1961	Minchl yr:	0
Bot hole:	Not Reported	Bot solid:	Not Reported
Bot perf:	Not Reported	Spec capac:	Not Reported
Pump mgd:	.950	Draft mgd:	Not Reported
Aquifer:	Not Reported	Tmk:	9-1-014:010
Old aqui:	Not Reported	Aqui code:	30207
Latest hd:	0		
Cur head:	Not Reported	Cur cl:	Not Reported
Cur temp:	Not Reported	Wcr:	01/01/1959
Pir:	05/03/2010	Surveyor:	Not Reported
T:	0		
Pump elev:	Not Reported	Pump depth:	Not Reported
Site id:	HI7000000002251		

Map ID
Direction
Distance
Elevation

	Database	EDR ID Number
F16		
South	**HI WELLS**	**HI7000000002252**
1/2 - 1 Mile		
Lower		

Wid:	3-1807-002	Island:	3
Well no:	1807-02	Well name:	Lpg Storage Area
Old name:	Not Reported	Yr drilled:	1959
Driller:	Not Reported	Quad map:	06
Longitude2:	1580712	Latitude27:	211859
Longitude8:	1580702	Latitude83:	211848
Long83dd:	-158.11722		
Lat83dd:	21.31333		
Gps:	0	Utm:	1
Owner user:	Chevron Products Co.	Old number:	Not Reported
Well type:	Not Reported	Casing dia:	14
Ground el:	3	Well depth:	Not Reported
Solid case:	Not Reported	Perf case:	Not Reported
Use:	IND - Geothermal, Thermoelectric Cooling, Power De		
Use year:	61		
Init water:	Not Reported		
Init head:	0		
Init chlor:	Not Reported		
Init cl:	0		
Test date:	02/19/2009	Test gpm:	690
Test ddown:	Not Reported	Test chlor:	15000
Test temp:	25.0	Temp unit:	C
Pump gpm:	660		
Draft mgy:	Not Reported	Head feet:	Not Reported
Max chlor:	Not Reported	Min chlor:	Not Reported
Geology:	QLS	Pump yr:	Not Reported
Draft yr:	Not Reported	Head yr:	Not Reported
Maxchl:	01/01/1961	Maxchl yr:	0
Minchl:	01/01/1961	Minchl yr:	0
Bot hole:	Not Reported	Bot solid:	Not Reported
Bot perf:	Not Reported	Spec capac:	Not Reported
Pump mgd:	.950	Draft mgd:	Not Reported
Aquifer:	Not Reported	Tmk:	9-1-014:010
Old aqui:	Not Reported	Aqui code:	30207
Latest hd:	0		
Cur head:	Not Reported	Cur cl:	Not Reported
Cur temp:	Not Reported	Wcr:	01/01/1959
Pir:	05/03/2010	Surveyor:	Not Reported
T:	0		
Pump elev:	Not Reported	Pump depth:	Not Reported
Site id:	HI7000000002252		

G17		
SSE	**HI WELLS**	**HI7000000002249**
1/2 - 1 Mile		
Lower		

Wid:	3-1806-002	Island:	3
Well no:	1806-02	Well name:	Barbers Point
Old name:	Not Reported	Yr drilled:	1957
Driller:	SAMSON-SMOCK	Quad map:	06
Longitude2:	1580656	Latitude27:	211858
Longitude8:	1580646	Latitude83:	211847
Long83dd:	-158.11278		
Lat83dd:	21.31306		
Gps:	0	Utm:	1
Owner user:	Chevron Products Co.	Old number:	T80-
Well type:	Not Reported	Casing dia:	7
Ground el:	7	Well depth:	50
Solid case:	2	Perf case:	Not Reported
Use:	ABN - Sealed		
Use year:	81		
Init water:	0.8		
Init head:	.8		
Init chlor:	7160		
Init cl:	7160		
Test date:	10/11/2004	Test gpm:	Not Reported
Test ddown:	Not Reported	Test chlor:	Not Reported
Test temp:	Not Reported	Temp unit:	Not Reported
Pump gpm:	0		
Draft mgy:	Not Reported	Head feet:	Not Reported
Max chlor:	Not Reported	Min chlor:	Not Reported
Geology:	QLS	Pump yr:	Not Reported
Draft yr:	Not Reported	Head yr:	Not Reported
Maxchl:	06/01/1993	Maxchl yr:	0
Minchl:	11/30/1992	Minchl yr:	0
Bot hole:	-43	Bot solid:	5
Bot perf:	Not Reported	Spec capac:	Not Reported
Pump mgd:	Not Reported	Draft mgd:	Not Reported
Aquifer:	30204	Tmk:	9-1-014:010
Old aqui:	Not Reported	Aqui code:	30207
Latest hd:	0		
Cur head:	Not Reported	Cur cl:	Not Reported
Cur temp:	Not Reported	Wcr:	01/01/1957
Pir:	05/30/2008	Surveyor:	Not Reported
T:	0		
Pump elev:	Not Reported	Pump depth:	Not Reported
Site id:	HI7000000002249		

H18		
East	**HI WELLS**	**HI7000000002360**
1/2 - 1 Mile		
Higher		

Wid:	3-1906-011	Island:	3
Well no:	1906-11	Well name:	HC Campbell Quarry
Old name:	Not Reported	Yr drilled:	2002
Driller:	VALLEY DRLG	Quad map:	06
Longitude2:	1580622	Latitude27:	211946
Longitude8:	1580612	Latitude83:	211935
Long83dd:	-158.10333		
Lat83dd:	21.32639		
Gps:	0	Utm:	1
Owner user:	Hawaiian Cement	Old number:	Not Reported

Well type:	ROT	Casing dia:	6
Ground el:	18	Well depth:	56
Solid case:	26	Perf case:	56
Use:	UNU - Unused		
Use year:	02		
Init water:	Not Reported		
Init head:	2.91		
Init chlor:	Not Reported		
Init cl:	3280		
Test date:	12/15/1987	Test gpm:	Not Reported
Test ddown:	Not Reported	Test chlor:	Not Reported
Test temp:	Not Reported	Temp unit:	Not Reported
Pump gpm:	0		
Draft mgy:	Not Reported	Head feet:	Not Reported
Max chlor:	Not Reported	Min chlor:	Not Reported
Geology:	PLS	Pump yr:	Not Reported
Draft yr:	Not Reported	Head yr:	Not Reported
Maxchl:	01/18/1995	Maxchl yr:	Not Reported
Minchl:	06/03/1993	Minchl yr:	Not Reported
Bot hole:	-38	Bot solid:	-8
Bot perf:	-38	Spec capac:	Not Reported
Pump mgd:	Not Reported	Draft mgd:	Not Reported
Aquifer:	Not Reported	Tmk:	9-1-014:027
Old aqui:	Not Reported	Aqui code:	30207
Latest hd:	0		
Cur head:	Not Reported	Cur cl:	Not Reported
Cur temp:	Not Reported	Wcr:	09/19/1997
Pir:	04/01/1994	Surveyor:	JAMES THOMPSON
T:	0		
Pump elev:	Not Reported	Pump depth:	Not Reported
Site id:	HI7000000002360		

G19
SSE **FED USGS** **USGS40000269748**
1/2 - 1 Mile
Lower

Org. Identifier:	USGS-HI		
Formal name:	USGS Hawaii Water Science Center		
Monloc Identifier:	USGS-211858158065601		
Monloc name:	3-1806-02 T80 BAR PT		
Monloc type:	Well		
Monloc desc:	Not Reported		
Huc code:	20060000	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	21.3129514
Longitude:	-158.1128104	Sourcemap scale:	24000
Horiz Acc measure:	1	Horiz Acc measure units:	seconds
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	7.00
Vert measure units:	feet	Vertacc measure val:	2
Vert accmeasure units:	feet		
Vertcollection method:	Interpolated from topographic map		
Vert coord refsys:	HILOCAL	Countrycode:	US
Aquifername:	Not Reported		
Formation type:	Not Reported		

Aquifer type:	Not Reported		
Construction date:	19571030	Welldepth:	50
Welldepth units:	ft	Wellholedepth:	Not Reported
Wellholedepth units:	Not Reported		

Ground-water levels, Number of Measurements: 0

H20
ENE **HI WELLS** **HI7000000002365**
1/2 - 1 Mile
Higher

Wid:	3-1906-010	Island:	3
Well no:	1906-10	Well name:	Barbers Pt. MW-3
Old name:	Not Reported	Yr drilled:	1997
Driller:	CMZ OF HAWAII	Quad map:	06
Longitude2:	1580622	Latitude27:	211949
Longitude8:	1580612	Latitude83:	211938
Long83dd:	-158.10333		
Lat83dd:	21.32722		
Gps:	0	Utm:	1
Owner user:	State DOT-Harbors	Old number:	Not Reported
Well type:	ROT	Casing dia:	2
Ground el:	36	Well depth:	140
Solid case:	20	Perf case:	140
Use:	OBS - Observation		
Use year:	97		
Init water:	Not Reported		
Init head:	0		
Init chlor:	Not Reported		
Init cl:	0		
Test date:	12/15/1987	Test gpm:	Not Reported
Test ddown:	Not Reported	Test chlor:	Not Reported
Test temp:	Not Reported	Temp unit:	Not Reported
Pump gpm:	0		
Draft mgy:	Not Reported	Head feet:	Not Reported
Max chlor:	Not Reported	Min chlor:	Not Reported
Geology:	PLS	Pump yr:	Not Reported
Draft yr:	Not Reported	Head yr:	Not Reported
Maxchl:	01/18/1995	Maxchl yr:	0
Minchl:	06/03/1993	Minchl yr:	0
Bot hole:	-104	Bot solid:	16
Bot perf:	-104	Spec capac:	Not Reported
Pump mgd:	Not Reported	Draft mgd:	Not Reported
Aquifer:	Not Reported	Tmk:	9-1-014:027
Old aqui:	Not Reported	Aqui code:	30207
Latest hd:	0		
Cur head:	Not Reported	Cur cl:	Not Reported
Cur temp:	Not Reported	Wcr:	09/19/1997
Pir:	04/01/1994	Surveyor:	R D FLEENOR
T:	0		
Pump elev:	Not Reported	Pump depth:	Not Reported
Site id:	HI7000000002365		

I21
ESE **HI WELLS** **HI7000000002312**
1/2 - 1 Mile
Higher

Wid:	3-1906-001	Island:	3
Well no:	1906-01	Well name:	Ewa Beach
Old name:	Not Reported	Yr drilled:	1957
Driller:	SAMSON-SMOCK	Quad map:	06
Longitude2:	1580621	Latitude27:	211928
Longitude8:	1580611	Latitude83:	211917
Long83dd:	-158.10306		
Lat83dd:	21.32139		
Gps:	0	Utm:	1
Owner user:	Campbell Estate	Old number:	T82-
Well type:	Not Reported	Casing dia:	6
Ground el:	32	Well depth:	50
Solid case:	4	Perf case:	Not Reported
Use:	UNU - Unused		
Use year:	74		
Init water:	1.0		
Init head:	1		
Init chlor:	830		
Init cl:	830		
Test date:	08/05/1993	Test gpm:	400
Test ddown:	2.7	Test chlor:	Not Reported
Test temp:	Not Reported	Temp unit:	Not Reported
Pump gpm:	0		
Draft mgy:	Not Reported	Head feet:	Not Reported
Max chlor:	839	Min chlor:	819
Geology:	QLS	Pump yr:	Not Reported
Draft yr:	Not Reported	Head yr:	Not Reported
Maxchl:	03/11/1996	Maxchl yr:	0
Minchl:	11/21/1997	Minchl yr:	0
Bot hole:	-18	Bot solid:	28
Bot perf:	Not Reported	Spec capac:	148
Pump mgd:	Not Reported	Draft mgd:	Not Reported
Aquifer:	30204	Tmk:	9-1-015:001
Old aqui:	Not Reported	Aqui code:	30207
Latest hd:	0		
Cur head:	Not Reported	Cur cl:	Not Reported
Cur temp:	Not Reported	Wcr:	01/01/1957
Pir:	04/01/1994	Surveyor:	Not Reported
T:	0		
Pump elev:	Not Reported	Pump depth:	Not Reported
Site id:	HI7000000002312		

I22
ESE
1/2 - 1 Mile
Higher

FED USGS **USGS40000269808**

Org. Identifier:	USGS-HI		
Formal name:	USGS Hawaii Water Science Center		
Monloc Identifier:	USGS-211928158062101		
Monloc name:	3-1906-01 T82 BRB PT		
Monloc type:	Well		
Monloc desc:	Not Reported		
Huc code:	20060000	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	21.3212856
Longitude:	-158.1030883	Sourcemap scale:	24000

Horiz Acc measure:	1	Horiz Acc measure units:	seconds
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	32.00
Vert measure units:	feet	Vertacc measure val:	5
Vert accmeasure units:	feet		
Vertcollection method:	Interpolated from topographic map		
Vert coord refsys:	HILOCAL	Countrycode:	US
Aquifername:	Not Reported		
Formation type:	Not Reported		
Aquifer type:	Not Reported		
Construction date:	19571107	Welldepth:	50
Welldepth units:	ft	Wellholedepth:	Not Reported
Wellholedepth units:	Not Reported		

Ground-water levels, Number of Measurements: 0

J23
NE
1/2 - 1 Mile
Higher

FED USGS **USGS40000269922**

Org. Identifier:	USGS-HI		
Formal name:	USGS Hawaii Water Science Center		
Monloc Identifier:	USGS-212015158063601		
Monloc name:	3-2006-07 W276-H BRB		
Monloc type:	Well		
Monloc desc:	Not Reported		
Huc code:	20060000	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	21.3343404
Longitude:	-158.1072544	Sourcemap scale:	24000
Horiz Acc measure:	5	Horiz Acc measure units:	seconds
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	41.00
Vert measure units:	feet	Vertacc measure val:	5
Vert accmeasure units:	feet		
Vertcollection method:	Interpolated from topographic map		
Vert coord refsys:	HILOCAL	Countrycode:	US
Aquifername:	Not Reported		
Formation type:	Not Reported		
Aquifer type:	Not Reported		
Construction date:	19080101	Welldepth:	Not Reported
Welldepth units:	Not Reported	Wellholedepth:	Not Reported
Wellholedepth units:	Not Reported		

Ground-water levels, Number of Measurements: 0

J24
NE
1/2 - 1 Mile
Higher

FED USGS **USGS40000269930**

Org. Identifier:	USGS-HI		
Formal name:	USGS Hawaii Water Science Center		
Monloc Identifier:	USGS-212016158063602		
Monloc name:	3-2006-09 W276-K BRB		
Monloc type:	Well		
Monloc desc:	Not Reported		
Huc code:	20060000	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	21.3346182
Longitude:	-158.1072544	Sourcemap scale:	24000

Horiz Acc measure:	1	Horiz Acc measure units:	seconds
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	41.00
Vert measure units:	feet	Vertacc measure val:	5
Vert accmeasure units:	feet		
Vertcollection method:	Interpolated from topographic map		
Vert coord refsys:	HILOCAL	Countrycode:	US
Aquifername:	Not Reported		
Formation type:	Not Reported		
Aquifer type:	Not Reported		
Construction date:	19130101	Welldepth:	Not Reported
Welldepth units:	Not Reported	Wellholedepth:	Not Reported
Wellholedepth units:	Not Reported		

Ground-water levels, Number of Measurements: 0

J25
NE
1/2 - 1 Mile
Higher

FED USGS **USGS40000269931**

Org. Identifier:	USGS-HI		
Formal name:	USGS Hawaii Water Science Center		
Monloc Identifier:	USGS-212016158063604		
Monloc name:	3-2006-04 W276-E BRB		
Monloc type:	Well		
Monloc desc:	Not Reported		
Huc code:	20060000	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	21.3346182
Longitude:	-158.1072544	Sourcemap scale:	24000
Horiz Acc measure:	1	Horiz Acc measure units:	seconds
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	41.00
Vert measure units:	feet	Vertacc measure val:	5
Vert accmeasure units:	feet		
Vertcollection method:	Interpolated from topographic map		
Vert coord refsys:	HILOCAL	Countrycode:	US
Aquifername:	Not Reported		
Formation type:	Not Reported		
Aquifer type:	Not Reported		
Construction date:	19080101	Welldepth:	155
Welldepth units:	ft	Wellholedepth:	Not Reported
Wellholedepth units:	Not Reported		

Ground-water levels, Number of Measurements: 0

J26
NE
1/2 - 1 Mile
Higher

FED USGS **USGS40000269928**

Org. Identifier:	USGS-HI		
Formal name:	USGS Hawaii Water Science Center		
Monloc Identifier:	USGS-212016158063600		
Monloc name:	3-2006-10 W276-B BRB		
Monloc type:	Well		
Monloc desc:	Not Reported		
Huc code:	20060000	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	21.3346182
Longitude:	-158.1072544	Sourcemap scale:	24000

Horiz Acc measure:	1	Horiz Acc measure units:	seconds
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	41.00
Vert measure units:	feet	Vertacc measure val:	5
Vert accmeasure units:	feet		
Vertcollection method:	Interpolated from topographic map		
Vert coord refsys:	HILOCAL	Countrycode:	US
Aquifername:	Not Reported		
Formation type:	Not Reported		
Aquifer type:	Not Reported		
Construction date:	19230101	Welldepth:	160
Welldepth units:	ft	Wellholedepth:	Not Reported
Wellholedepth units:	Not Reported		

Ground-water levels, Number of Measurements: 0

J27
NE
1/2 - 1 Mile
Higher

FED USGS **USGS40000269929**

Org. Identifier:	USGS-HI		
Formal name:	USGS Hawaii Water Science Center		
Monloc Identifier:	USGS-212016158063601		
Monloc name:	3-2006-11 W276-I BRB		
Monloc type:	Well		
Monloc desc:	Not Reported		
Huc code:	20060000	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	21.3346182
Longitude:	-158.1072544	Sourcemap scale:	24000
Horiz Acc measure:	1	Horiz Acc measure units:	seconds
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	41.00
Vert measure units:	feet	Vertacc measure val:	5
Vert accmeasure units:	feet		
Vertcollection method:	Interpolated from topographic map		
Vert coord refsys:	HILOCAL	Countrycode:	US
Aquifername:	Not Reported		
Formation type:	Not Reported		
Aquifer type:	Not Reported		
Construction date:	19230101	Welldepth:	160
Welldepth units:	ft	Wellholedepth:	Not Reported
Wellholedepth units:	Not Reported		

Ground-water levels, Number of Measurements: 0

J28
NE
1/2 - 1 Mile
Higher

FED USGS **USGS40000269932**

Org. Identifier:	USGS-HI		
Formal name:	USGS Hawaii Water Science Center		
Monloc Identifier:	USGS-212016158063605		
Monloc name:	3-2006-02 W276-C BRB		
Monloc type:	Well		
Monloc desc:	Not Reported		
Huc code:	20060000	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	21.3346182
Longitude:	-158.1072544	Sourcemap scale:	24000

Horiz Acc measure:	1	Horiz Acc measure units:	seconds
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	41.00
Vert measure units:	feet	Vertacc measure val:	5
Vert accmeasure units:	feet		
Vertcollection method:	Interpolated from topographic map		
Vert coord refsys:	HILOCAL	Countrycode:	US
Aquifername:	Not Reported		
Formation type:	Not Reported		
Aquifer type:	Not Reported		
Construction date:	19080101	Welldepth:	282
Welldepth units:	ft	Wellholedepth:	Not Reported
Wellholedepth units:	Not Reported		

Ground-water levels, Number of Measurements: 0

J29
NE
1/2 - 1 Mile
Higher

FED USGS **USGS40000269935**

Org. Identifier:	USGS-HI		
Formal name:	USGS Hawaii Water Science Center		
Monloc Identifier:	USGS-212016158063609		
Monloc name:	3-2006-01 W276-A BRB		
Monloc type:	Well		
Monloc desc:	Not Reported		
Huc code:	20060000	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	21.3346182
Longitude:	-158.1072544	Sourcemap scale:	24000
Horiz Acc measure:	1	Horiz Acc measure units:	seconds
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	41.00
Vert measure units:	feet	Vertacc measure val:	5
Vert accmeasure units:	feet		
Vertcollection method:	Interpolated from topographic map		
Vert coord refsys:	HILOCAL	Countrycode:	US
Aquifername:	Not Reported		
Formation type:	Not Reported		
Aquifer type:	Not Reported		
Construction date:	19080101	Welldepth:	Not Reported
Welldepth units:	Not Reported	Wellholedepth:	Not Reported
Wellholedepth units:	Not Reported		

Ground-water levels, Number of Measurements: 0

J30
NE
1/2 - 1 Mile
Higher

FED USGS **USGS40000269936**

Org. Identifier:	USGS-HI		
Formal name:	USGS Hawaii Water Science Center		
Monloc Identifier:	USGS-212016158063610		
Monloc name:	3-2006-08 W276-J BRB		
Monloc type:	Well		
Monloc desc:	Not Reported		
Huc code:	20060000	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	21.3346182
Longitude:	-158.1072544	Sourcemap scale:	24000

Horiz Acc measure:	1	Horiz Acc measure units:	seconds
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	41.00
Vert measure units:	feet	Vertacc measure val:	5
Vert accmeasure units:	feet		
Vertcollection method:	Interpolated from topographic map		
Vert coord refsys:	HILOCAL	Countrycode:	US
Aquifername:	Not Reported		
Formation type:	Not Reported		
Aquifer type:	Not Reported		
Construction date:	19130101	Welldepth:	Not Reported
Welldepth units:	Not Reported	Wellholedepth:	Not Reported
Wellholedepth units:	Not Reported		

Ground-water levels, Number of Measurements: 0

J31
NE
1/2 - 1 Mile
Higher

FED USGS **USGS40000269933**

Org. Identifier:	USGS-HI		
Formal name:	USGS Hawaii Water Science Center		
Monloc Identifier:	USGS-212016158063607		
Monloc name:	3-2006-05 W276-F BRB		
Monloc type:	Well		
Monloc desc:	Not Reported		
Huc code:	20060000	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	21.3346182
Longitude:	-158.1072544	Sourcemap scale:	24000
Horiz Acc measure:	1	Horiz Acc measure units:	seconds
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	41.00
Vert measure units:	feet	Vertacc measure val:	5
Vert accmeasure units:	feet		
Vertcollection method:	Interpolated from topographic map		
Vert coord refsys:	HILOCAL	Countrycode:	US
Aquifername:	Not Reported		
Formation type:	Not Reported		
Aquifer type:	Not Reported		
Construction date:	19080101	Welldepth:	165
Welldepth units:	ft	Wellholedepth:	Not Reported
Wellholedepth units:	Not Reported		

Ground-water levels, Number of Measurements: 0

J32
NE
1/2 - 1 Mile
Higher

FED USGS **USGS40000269934**

Org. Identifier:	USGS-HI		
Formal name:	USGS Hawaii Water Science Center		
Monloc Identifier:	USGS-212016158063608		
Monloc name:	3-2006-03 W276-D BRB		
Monloc type:	Well		
Monloc desc:	Not Reported		
Huc code:	20060000	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	21.3346182
Longitude:	-158.1072544	Sourcemap scale:	24000

Horiz Acc measure:	1	Horiz Acc measure units:	seconds
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	41.00
Vert measure units:	feet	Vertacc measure val:	5
Vert accmeasure units:	feet		
Vertcollection method:	Interpolated from topographic map		
Vert coord refsys:	HILOCAL	Countrycode:	US
Aquifername:	Not Reported		
Formation type:	Not Reported		
Aquifer type:	Not Reported		
Construction date:	19080101	Welldepth:	Not Reported
Welldepth units:	Not Reported	Wellholedepth:	Not Reported
Wellholedepth units:	Not Reported		

Ground-water levels, Number of Measurements: 0

J33
NE
1/2 - 1 Mile
Higher

HI WELLS **HI7000000002463**

Wid:	3-2006-004	Island:	3
Well no:	2006-04	Well name:	EP 10 E
Old name:	Not Reported	Yr drilled:	1908
Driller:	Not Reported	Quad map:	06
Longitude2:	1580636	Latitude27:	212016
Longitude8:	1580626	Latitude83:	212005
Long83dd:	-158.10722		
Lat83dd:	21.33472		
Gps:	0	Utm:	1
Owner user:	Campbell Estate	Old number:	276-E
Well type:	Not Reported	Casing dia:	12
Ground el:	41	Well depth:	155
Solid case:	Not Reported	Perf case:	Not Reported
Use:	AGR - Crops and Processing		
Use year:	96		
Init water:	16.7		
Init head:	16.7		
Init chlor:	476		
Init cl:	476		
Test date:	04/10/1981	Test gpm:	Not Reported
Test ddown:	Not Reported	Test chlor:	Not Reported
Test temp:	Not Reported	Temp unit:	Not Reported
Pump gpm:	800		
Draft mgy:	Not Reported	Head feet:	13.0
Max chlor:	628	Min chlor:	460
Geology:	TWDC	Pump yr:	Not Reported
Draft yr:	76	Head yr:	Not Reported
Maxchl:	06/01/1993	Maxchl yr:	0
Minchl:	04/01/1972	Minchl yr:	0
Bot hole:	-114	Bot solid:	Not Reported
Bot perf:	Not Reported	Spec capac:	Not Reported
Pump mgd:	1.152	Draft mgd:	Not Reported
Aquifer:	30204	Tmk:	9-1-014:002
Old aqui:	Not Reported	Aqui code:	30204
Latest hd:	13		
Cur head:	Not Reported	Cur cl:	Not Reported
Cur temp:	Not Reported	Wcr:	01/01/1908
Pir:	02/15/1996	Surveyor:	Not Reported
T:	0		
Pump elev:	-13	Pump depth:	54
Site id:	HI7000000002463		

Map ID
Direction
Distance
Elevation — Database — EDR ID Number

J34
NE
1/2 - 1 Mile
Higher

HI WELLS **HI7000000002464**

Wid:	3-2006-005	Island:	3
Well no:	2006-05	Well name:	EP 10 F
Old name:	Not Reported	Yr drilled:	1908
Driller:	Not Reported	Quad map:	06
Longitude2:	1580636	Latitude27:	212016
Longitude8:	1580626	Latitude83:	212005
Long83dd:	-158.10722		
Lat83dd:	21.33472		
Gps:	0	Utm:	1
Owner user:	Campbell Estate	Old number:	276-F
Well type:	Not Reported	Casing dia:	12
Ground el:	41	Well depth:	165
Solid case:	Not Reported	Perf case:	Not Reported
Use:	UNU - Unused		
Use year:	95		
Init water:	16.7		
Init head:	16.7		
Init chlor:	476		
Init cl:	476		
Test date:	04/10/1981	Test gpm:	Not Reported
Test ddown:	Not Reported	Test chlor:	Not Reported
Test temp:	Not Reported	Temp unit:	Not Reported
Pump gpm:	0		
Draft mgy:	Not Reported	Head feet:	13.0
Max chlor:	628	Min chlor:	460
Geology:	TWDC	Pump yr:	Not Reported
Draft yr:	76	Head yr:	Not Reported
Maxchl:	06/01/1993	Maxchl yr:	Not Reported
Minchl:	04/01/1972	Minchl yr:	Not Reported
Bot hole:	-124	Bot solid:	Not Reported
Bot perf:	Not Reported	Spec capac:	Not Reported
Pump mgd:	Not Reported	Draft mgd:	Not Reported
Aquifer:	30204	Tmk:	9-1-014:002
Old aqui:	Not Reported	Aqui code:	30204
Latest hd:	13		
Cur head:	Not Reported	Cur cl:	Not Reported
Cur temp:	Not Reported	Wcr:	01/01/1908
Pir:	02/15/1996	Surveyor:	Not Reported
T:	0		
Pump elev:	Not Reported	Pump depth:	Not Reported
Site id:	HI7000000002464		

J35
NE
1/2 - 1 Mile
Higher

HI WELLS **HI7000000002462**

Wid:	3-2006-003	Island:	3
Well no:	2006-03	Well name:	EP 10 D
Old name:	Not Reported	Yr drilled:	1908
Driller:	Not Reported	Quad map:	06
Longitude2:	1580636	Latitude27:	212016
Longitude8:	1580626	Latitude83:	212005
Long83dd:	-158.10722		
Lat83dd:	21.33472		
Gps:	0	Utm:	1
Owner user:	Campbell Estate	Old number:	276-D
Well type:	Not Reported	Casing dia:	12
Ground el:	41	Well depth:	Not Reported
Solid case:	Not Reported	Perf case:	Not Reported
Use:	UNU - Unused		
Use year:	95		
Init water:	13.0		
Init head:	13		
Init chlor:	387		
Init cl:	387		
Test date:	04/10/1981	Test gpm:	Not Reported
Test ddown:	Not Reported	Test chlor:	Not Reported
Test temp:	Not Reported	Temp unit:	Not Reported
Pump gpm:	0		
Draft mgy:	Not Reported	Head feet:	13.0
Max chlor:	628	Min chlor:	460
Geology:	TWDC	Pump yr:	Not Reported
Draft yr:	76	Head yr:	Not Reported
Maxchl:	06/01/1993	Maxchl yr:	0
Minchl:	04/01/1972	Minchl yr:	0
Bot hole:	Not Reported	Bot solid:	Not Reported
Bot perf:	Not Reported	Spec capac:	Not Reported
Pump mgd:	Not Reported	Draft mgd:	Not Reported
Aquifer:	30204	Tmk:	9-1-014:002
Old aqui:	Not Reported	Aqui code:	30204
Latest hd:	13		
Cur head:	Not Reported	Cur cl:	Not Reported
Cur temp:	Not Reported	Wcr:	01/01/1908
Pir:	02/15/1996	Surveyor:	Not Reported
T:	0		
Pump elev:	Not Reported	Pump depth:	Not Reported
Site id:	HI7000000002462		

J36
NE
1/2 - 1 Mile
Higher

HI WELLS **HI7000000002460**

Wid:	3-2006-001	Island:	3
Well no:	2006-01	Well name:	EP 10 A
Old name:	Not Reported	Yr drilled:	1908
Driller:	Not Reported	Quad map:	06
Longitude2:	1580636	Latitude27:	212016
Longitude8:	1580626	Latitude83:	212005
Long83dd:	-158.10722		
Lat83dd:	21.33472		
Gps:	0	Utm:	1
Owner user:	Campbell Estate	Old number:	276-A

Well type:	Not Reported	Casing dia:	12
Ground el:	41	Well depth:	Not Reported
Solid case:	Not Reported	Perf case:	Not Reported
Use:	UNU - Unused		
Use year:	95		
Init water:	13.0		
Init head:	13		
Init chlor:	387		
Init cl:	387		
Test date:	04/10/1981	Test gpm:	Not Reported
Test ddown:	Not Reported	Test chlor:	Not Reported
Test temp:	Not Reported	Temp unit:	Not Reported
Pump gpm:	0		
Draft mgy:	5867	Head feet:	13.0
Max chlor:	628	Min chlor:	460
Geology:	TWDC	Pump yr:	Not Reported
Draft yr:	76	Head yr:	Not Reported
Maxchl:	06/01/1993	Maxchl yr:	0
Minchl:	04/01/1972	Minchl yr:	0
Bot hole:	Not Reported	Bot solid:	Not Reported
Bot perf:	Not Reported	Spec capac:	Not Reported
Pump mgd:	Not Reported	Draft mgd:	16.1
Aquifer:	30204	Tmk:	9-1-015:004
Old aqui:	Not Reported	Aqui code:	30204
Latest hd:	13		
Cur head:	Not Reported	Cur cl:	Not Reported
Cur temp:	Not Reported	Wcr:	01/01/1908
Pir:	06/07/2010	Surveyor:	Not Reported
T:	0		
Pump elev:	Not Reported	Pump depth:	Not Reported
Site id:	HI7000000002460		

J37
NE
1/2 - 1 Mile
Higher

HI WELLS **HI7000000002461**

Wid:	3-2006-002	Island:	3
Well no:	2006-02	Well name:	EP 10 C
Old name:	Not Reported	Yr drilled:	1908
Driller:	Not Reported	Quad map:	06
Longitude2:	1580636	Latitude27:	212016
Longitude8:	1580626	Latitude83:	212005
Long83dd:	-158.10722		
Lat83dd:	21.33472		
Gps:	0	Utm:	1
Owner user:	Campbell Estate	Old number:	276-C
Well type:	Not Reported	Casing dia:	12
Ground el:	41	Well depth:	282
Solid case:	62	Perf case:	Not Reported
Use:	AGR - Crops and Processing		
Use year:	96		
Init water:	13.0		
Init head:	13		
Init chlor:	387		
Init cl:	387		
Test date:	04/10/1981	Test gpm:	Not Reported
Test ddown:	Not Reported	Test chlor:	Not Reported

Test temp:	Not Reported	Temp unit:	Not Reported
Pump gpm:	800		
Draft mgy:	Not Reported	Head feet:	13.0
Max chlor:	628	Min chlor:	460
Geology:	TWDC	Pump yr:	Not Reported
Draft yr:	76	Head yr:	Not Reported
Maxchl:	06/01/1993	Maxchl yr:	Not Reported
Minchl:	04/01/1972	Minchl yr:	Not Reported
Bot hole:	-241	Bot solid:	-21
Bot perf:	Not Reported	Spec capac:	Not Reported
Pump mgd:	1.152	Draft mgd:	Not Reported
Aquifer:	30204	Tmk:	9-1-014:002
Old aqui:	Not Reported	Aqui code:	30204
Latest hd:	13		
Cur head:	Not Reported	Cur cl:	Not Reported
Cur temp:	Not Reported	Wcr:	01/01/1908
Pir:	02/15/1996	Surveyor:	Not Reported
T:	0		
Pump elev:	-13	Pump depth:	54
Site id:	HI7000000002461		

J38
NE
1/2 - 1 Mile
Higher

HI WELLS **HI7000000002465**

Wid:	3-2006-006	Island:	3
Well no:	2006-06	Well name:	EP 10 G
Old name:	Not Reported	Yr drilled:	1908
Driller:	Not Reported	Quad map:	06
Longitude2:	1580636	Latitude27:	212016
Longitude8:	1580626	Latitude83:	212005
Long83dd:	-158.10722		
Lat83dd:	21.33472		
Gps:	0	Utm:	1
Owner user:	Campbell Estate	Old number:	276-G
Well type:	Not Reported	Casing dia:	12
Ground el:	41	Well depth:	165
Solid case:	Not Reported	Perf case:	Not Reported
Use:	AGR - Crops and Processing		
Use year:	96		
Init water:	16.7		
Init head:	16.7		
Init chlor:	476		
Init cl:	476		
Test date:	04/10/1981	Test gpm:	Not Reported
Test ddown:	Not Reported	Test chlor:	Not Reported
Test temp:	Not Reported	Temp unit:	Not Reported
Pump gpm:	800		
Draft mgy:	Not Reported	Head feet:	13.0
Max chlor:	628	Min chlor:	460
Geology:	TWDC	Pump yr:	Not Reported
Draft yr:	76	Head yr:	Not Reported
Maxchl:	06/01/1993	Maxchl yr:	0
Minchl:	04/01/1972	Minchl yr:	0
Bot hole:	-124	Bot solid:	Not Reported
Bot perf:	Not Reported	Spec capac:	Not Reported

Pump mgd:	1.152	Draft mgd:	Not Reported
Aquifer:	30204	Tmk:	9-1-014:002
Old aqui:	Not Reported	Aqui code:	30204
Latest hd:	13		
Cur head:	Not Reported	Cur cl:	Not Reported
Cur temp:	Not Reported	Wcr:	01/01/1908
Pir:	02/15/1996	Surveyor:	Not Reported
T:	0		
Pump elev:	-13	Pump depth:	54
Site id:	HI7000000002465		

J39
NE
1/2 - 1 Mile
Higher

HI WELLS **HI7000000002469**

Wid:	3-2006-010	Island:	3
Well no:	2006-10	Well name:	EP 10 B
Old name:	Not Reported	Yr drilled:	1923
Driller:	Not Reported	Quad map:	06
Longitude2:	1580636	Latitude27:	212016
Longitude8:	1580626	Latitude83:	212005
Long83dd:	-158.10722		
Lat83dd:	21.33472		
Gps:	0	Utm:	1
Owner user:	Campbell Estate	Old number:	276-B
Well type:	Not Reported	Casing dia:	12
Ground el:	41	Well depth:	160
Solid case:	60	Perf case:	Not Reported
Use:	UNU - Unused		
Use year:	95		
Init water:	13.0		
Init head:	13		
Init chlor:	387		
Init cl:	387		
Test date:	04/10/1981	Test gpm:	Not Reported
Test ddown:	Not Reported	Test chlor:	Not Reported
Test temp:	Not Reported	Temp unit:	Not Reported
Pump gpm:	0		
Draft mgy:	Not Reported	Head feet:	13.0
Max chlor:	628	Min chlor:	460
Geology:	TWDC	Pump yr:	Not Reported
Draft yr:	76	Head yr:	Not Reported
Maxchl:	06/01/1993	Maxchl yr:	0
Minchl:	04/01/1972	Minchl yr:	0
Bot hole:	-119	Bot solid:	-19
Bot perf:	Not Reported	Spec capac:	Not Reported
Pump mgd:	Not Reported	Draft mgd:	Not Reported
Aquifer:	30204	Tmk:	9-1-014:002
Old aqui:	Not Reported	Aqui code:	30204
Latest hd:	13		
Cur head:	Not Reported	Cur cl:	Not Reported
Cur temp:	Not Reported	Wcr:	01/01/1923
Pir:	02/15/1996	Surveyor:	Not Reported
T:	0		
Pump elev:	Not Reported	Pump depth:	Not Reported
Site id:	HI7000000002469		

Map ID
Direction
Distance
Elevation

	Database	EDR ID Number
J40		
NE	**HI WELLS**	**HI7000000002470**
1/2 - 1 Mile		
Higher		

Wid:	3-2006-011	Island:	3
Well no:	2006-11	Well name:	EP 10 I
Old name:	Not Reported	Yr drilled:	1923
Driller:	Not Reported	Quad map:	06
Longitude2:	1580636	Latitude27:	212016
Longitude8:	1580626	Latitude83:	212005
Long83dd:	-158.10722		
Lat83dd:	21.33472		
Gps:	0	Utm:	1
Owner user:	Campbell Estate	Old number:	276-I
Well type:	Not Reported	Casing dia:	12
Ground el:	41	Well depth:	160
Solid case:	57	Perf case:	Not Reported
Use:	UNU - Unused		
Use year:	95		
Init water:	15.0		
Init head:	15		
Init chlor:	400		
Init cl:	400		
Test date:	04/10/1981	Test gpm:	Not Reported
Test ddown:	Not Reported	Test chlor:	Not Reported
Test temp:	Not Reported	Temp unit:	Not Reported
Pump gpm:	0		
Draft mgy:	Not Reported	Head feet:	13.0
Max chlor:	628	Min chlor:	460
Geology:	TWDC	Pump yr:	Not Reported
Draft yr:	76	Head yr:	Not Reported
Maxchl:	06/01/1993	Maxchl yr:	0
Minchl:	04/01/1972	Minchl yr:	0
Bot hole:	-119	Bot solid:	-16
Bot perf:	Not Reported	Spec capac:	Not Reported
Pump mgd:	Not Reported	Draft mgd:	Not Reported
Aquifer:	30204	Tmk:	9-1-014:002
Old aqui:	Not Reported	Aqui code:	30204
Latest hd:	13		
Cur head:	Not Reported	Cur cl:	Not Reported
Cur temp:	Not Reported	Wcr:	01/01/1923
Pir:	02/15/1996	Surveyor:	Not Reported
T:	0		
Pump elev:	Not Reported	Pump depth:	Not Reported
Site id:	HI7000000002470		

J41		
NE	**HI WELLS**	**HI7000000002468**
1/2 - 1 Mile		
Higher		

Wid:	3-2006-009	Island:	3
Well no:	2006-09	Well name:	EP 10 K
Old name:	Not Reported	Yr drilled:	1913
Driller:	Not Reported	Quad map:	06
Longitude2:	1580636	Latitude27:	212016
Longitude8:	1580626	Latitude83:	212005
Long83dd:	-158.10722		
Lat83dd:	21.33472		
Gps:	0	Utm:	1
Owner user:	Campbell Estate	Old number:	276-K
Well type:	Not Reported	Casing dia:	12
Ground el:	41	Well depth:	Not Reported
Solid case:	Not Reported	Perf case:	Not Reported
Use:	UNU - Unused		
Use year:	95		
Init water:	15.0		
Init head:	15		
Init chlor:	400		
Init cl:	400		
Test date:	04/10/1981	Test gpm:	Not Reported
Test ddown:	Not Reported	Test chlor:	Not Reported
Test temp:	Not Reported	Temp unit:	Not Reported
Pump gpm:	0		
Draft mgy:	Not Reported	Head feet:	13.0
Max chlor:	628	Min chlor:	460
Geology:	TWDC	Pump yr:	Not Reported
Draft yr:	76	Head yr:	Not Reported
Maxchl:	06/01/1993	Maxchl yr:	0
Minchl:	04/01/1972	Minchl yr:	0
Bot hole:	Not Reported	Bot solid:	Not Reported
Bot perf:	Not Reported	Spec capac:	Not Reported
Pump mgd:	Not Reported	Draft mgd:	Not Reported
Aquifer:	30204	Tmk:	9-1-014:002
Old aqui:	Not Reported	Aqui code:	30204
Latest hd:	13		
Cur head:	Not Reported	Cur cl:	Not Reported
Cur temp:	Not Reported	Wcr:	01/01/1913
Pir:	02/15/1996	Surveyor:	Not Reported
T:	0		
Pump elev:	Not Reported	Pump depth:	Not Reported
Site id:	HI7000000002468		

J42		
NE	**HI WELLS**	**HI7000000002466**
1/2 - 1 Mile		
Higher		

Wid:	3-2006-007	Island:	3
Well no:	2006-07	Well name:	EP 10 H
Old name:	Not Reported	Yr drilled:	1908
Driller:	Not Reported	Quad map:	06
Longitude2:	1580636	Latitude27:	212016
Longitude8:	1580626	Latitude83:	212005
Long83dd:	-158.10722		
Lat83dd:	21.33472		
Gps:	0	Utm:	1
Owner user:	Campbell Estate	Old number:	276-H

Well type:	Not Reported	Casing dia:	12
Ground el:	41	Well depth:	Not Reported
Solid case:	Not Reported	Perf case:	Not Reported
Use:	UNU - Unused		
Use year:	95		
Init water:	16.7		
Init head:	16.7		
Init chlor:	476		
Init cl:	476		
Test date:	04/10/1981	Test gpm:	Not Reported
Test ddown:	Not Reported	Test chlor:	Not Reported
Test temp:	Not Reported	Temp unit:	Not Reported
Pump gpm:	0		
Draft mgy:	Not Reported	Head feet:	13.0
Max chlor:	628	Min chlor:	460
Geology:	TWDC	Pump yr:	Not Reported
Draft yr:	76	Head yr:	Not Reported
Maxchl:	06/01/1993	Maxchl yr:	0
Minchl:	04/01/1972	Minchl yr:	0
Bot hole:	Not Reported	Bot solid:	Not Reported
Bot perf:	Not Reported	Spec capac:	Not Reported
Pump mgd:	Not Reported	Draft mgd:	Not Reported
Aquifer:	30204	Tmk:	9-1-014:002
Old aqui:	Not Reported	Aqui code:	30204
Latest hd:	13		
Cur head:	Not Reported	Cur cl:	Not Reported
Cur temp:	Not Reported	Wcr:	01/01/1908
Pir:	02/15/1996	Surveyor:	Not Reported
T:	0		
Pump elev:	Not Reported	Pump depth:	Not Reported
Site id:	HI7000000002466		

J43
NE
1/2 - 1 Mile
Higher

HI WELLS **HI7000000002467**

Wid:	3-2006-008	Island:	3
Well no:	2006-08	Well name:	EP 10 J
Old name:	Not Reported	Yr drilled:	1913
Driller:	Not Reported	Quad map:	06
Longitude2:	1580636	Latitude27:	212016
Longitude8:	1580626	Latitude83:	212005
Long83dd:	-158.10722		
Lat83dd:	21.33472		
Gps:	0	Utm:	1
Owner user:	Campbell Estate	Old number:	276-J
Well type:	Not Reported	Casing dia:	12
Ground el:	41	Well depth:	Not Reported
Solid case:	Not Reported	Perf case:	Not Reported
Use:	UNU - Unused		
Use year:	95		
Init water:	15.0		
Init head:	15		
Init chlor:	476		
Init cl:	476		
Test date:	04/10/1981	Test gpm:	Not Reported
Test ddown:	Not Reported	Test chlor:	Not Reported

Test temp:	Not Reported	Temp unit:	Not Reported
Pump gpm:	0		
Draft mgy:	Not Reported	Head feet:	13.0
Max chlor:	628	Min chlor:	460
Geology:	TWDC	Pump yr:	Not Reported
Draft yr:	76	Head yr:	Not Reported
Maxchl:	06/01/1993	Maxchl yr:	Not Reported
Minchl:	04/01/1972	Minchl yr:	Not Reported
Bot hole:	Not Reported	Bot solid:	Not Reported
Bot perf:	Not Reported	Spec capac:	Not Reported
Pump mgd:	Not Reported	Draft mgd:	Not Reported
Aquifer:	30204	Tmk:	9-1-014:002
Old aqui:	Not Reported	Aqui code:	30204
Latest hd:	13		
Cur head:	Not Reported	Cur cl:	Not Reported
Cur temp:	Not Reported	Wcr:	01/01/1913
Pir:	02/15/1996	Surveyor:	Not Reported
T:	0		
Pump elev:	Not Reported	Pump depth:	Not Reported
Site id:	HI7000000002467		

K44
South
1/2 - 1 Mile
Lower

HI WELLS **HI7000000002244**

Wid:	3-1807-003	Island:	3
Well no:	1807-03	Well name:	Mauka-Makai St
Old name:	Not Reported	Yr drilled:	1959
Driller:	Not Reported	Quad map:	06
Longitude2:	1580709	Latitude27:	211853
Longitude8:	1580659	Latitude83:	211842
Long83dd:	-158.11639		
Lat83dd:	21.31167		
Gps:	0	Utm:	1
Owner user:	Chevron Products Co.	Old number:	Not Reported
Well type:	Not Reported	Casing dia:	20
Ground el:	4	Well depth:	Not Reported
Solid case:	Not Reported	Perf case:	Not Reported
Use:	IND - Industrial Other		
Use year:	60		
Init water:	Not Reported		
Init head:	0		
Init chlor:	Not Reported		
Init cl:	0		
Test date:	12/08/1990	Test gpm:	350
Test ddown:	Not Reported	Test chlor:	12000
Test temp:	25.0	Temp unit:	C
Pump gpm:	600		
Draft mgy:	Not Reported	Head feet:	Not Reported
Max chlor:	Not Reported	Min chlor:	Not Reported
Geology:	QLS	Pump yr:	Not Reported
Draft yr:	Not Reported	Head yr:	Not Reported
Maxchl:	06/01/1993	Maxchl yr:	Not Reported
Minchl:	11/30/1992	Minchl yr:	Not Reported
Bot hole:	Not Reported	Bot solid:	Not Reported
Bot perf:	Not Reported	Spec capac:	Not Reported

Pump mgd:	.864	Draft mgd:	Not Reported
Aquifer:	Not Reported	Tmk:	9-1-014:010
Old aqui:	Not Reported	Aqui code:	30207
Latest hd:	0		
Cur head:	Not Reported	Cur cl:	Not Reported
Cur temp:	Not Reported	Wcr:	01/01/1959
Pir:	05/30/2008	Surveyor:	Not Reported
T:	0		
Pump elev:	Not Reported	Pump depth:	Not Reported
Site id:	HI7000000002244		

K45
South
1/2 - 1 Mile
Lower

HI WELLS **HI7000000002245**

Wid:	3-1807-004	Island:	3
Well no:	1807-04	Well name:	Mauka-Makai St
Old name:	Not Reported	Yr drilled:	1959
Driller:	Not Reported	Quad map:	06
Longitude2:	1580709	Latitude27:	211853
Longitude8:	1580659	Latitude83:	211842
Long83dd:	-158.11639		
Lat83dd:	21.31167		
Gps:	0	Utm:	1
Owner user:	Chevron Products Co.	Old number:	Not Reported
Well type:	Not Reported	Casing dia:	20
Ground el:	4	Well depth:	Not Reported
Solid case:	Not Reported	Perf case:	Not Reported
Use:	IND - Industrial Other		
Use year:	60		
Init water:	Not Reported		
Init head:	0		
Init chlor:	Not Reported		
Init cl:	0		
Test date:	12/08/1990	Test gpm:	350
Test ddown:	Not Reported	Test chlor:	12000
Test temp:	25.0	Temp unit:	C
Pump gpm:	600		
Draft mgy:	Not Reported	Head feet:	Not Reported
Max chlor:	Not Reported	Min chlor:	Not Reported
Geology:	QLS	Pump yr:	Not Reported
Draft yr:	Not Reported	Head yr:	Not Reported
Maxchl:	06/01/1993	Maxchl yr:	0
Minchl:	11/30/1992	Minchl yr:	0
Bot hole:	Not Reported	Bot solid:	Not Reported
Bot perf:	Not Reported	Spec capac:	Not Reported
Pump mgd:	.864	Draft mgd:	Not Reported
Aquifer:	Not Reported	Tmk:	9-1-014:010
Old aqui:	Not Reported	Aqui code:	30207
Latest hd:	0		
Cur head:	Not Reported	Cur cl:	Not Reported
Cur temp:	Not Reported	Wcr:	01/01/1959
Pir:	05/30/2008	Surveyor:	Not Reported
T:	0		
Pump elev:	Not Reported	Pump depth:	Not Reported
Site id:	HI7000000002245		

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance
Elevation — Database — EDR ID Number

H46
East
1/2 - 1 Mile
Higher

FED USGS **USGS40000269844**

Org. Identifier:	USGS-HI		
Formal name:	USGS Hawaii Water Science Center		
Monloc Identifier:	USGS-211946158061801		
Monloc name:	3-1906-02 T83 BRB PT		
Monloc type:	Well		
Monloc desc:	Not Reported		
Huc code:	20060000	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	21.3262855
Longitude:	-158.1022548	Sourcemap scale:	24000
Horiz Acc measure:	1	Horiz Acc measure units:	seconds
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	60.00
Vert measure units:	feet	Vertacc measure val:	5
Vert accmeasure units:	feet		
Vertcollection method:	Interpolated from topographic map		
Vert coord refsys:	HILOCAL	Countrycode:	US
Aquifername:	Not Reported		
Formation type:	Not Reported		
Aquifer type:	Not Reported		
Construction date:	19571118	Welldepth:	75
Welldepth units:	ft	Wellholedepth:	Not Reported
Wellholedepth units:	Not Reported		

Ground-water levels, Number of Measurements: 0

J47
NE
1/2 - 1 Mile
Higher

FED USGS **USGS40000269927**

Org. Identifier:	USGS-HI		
Formal name:	USGS Hawaii Water Science Center		
Monloc Identifier:	USGS-212016158063503		
Monloc name:	3-2006-09 TO 11 276 I-K OSCO EP12 OAHU		
Monloc type:	Well		
Monloc desc:	Not Reported		
Huc code:	20060000	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	21.3346182
Longitude:	-158.1069766	Sourcemap scale:	Not Reported
Horiz Acc measure:	Unknown	Horiz Acc measure units:	Unknown
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	Not Reported
Vert measure units:	Not Reported	Vertacc measure val:	Not Reported
Vert accmeasure units:	Not Reported		
Vertcollection method:	Not Reported		
Vert coord refsys:	Not Reported	Countrycode:	US
Aquifername:	Not Reported		
Formation type:	Not Reported		

Aquifer type:	Not Reported		
Construction date:	Not Reported	Welldepth:	Not Reported
Welldepth units:	Not Reported	Wellholedepth:	Not Reported
Wellholedepth units:	Not Reported		

Ground-water levels, Number of Measurements: 0

J48
NE
1/2 - 1 Mile
Higher

FED USGS **USGS40000269926**

Org. Identifier:	USGS-HI		
Formal name:	USGS Hawaii Water Science Center		
Monloc Identifier:	USGS-212016158063502		
Monloc name:	3-2006-01 TO 04 276 A-D OSCO EP11 OAHU		
Monloc type:	Well		
Monloc desc:	Not Reported		
Huc code:	20060000	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	21.3346182
Longitude:	-158.1069766	Sourcemap scale:	Not Reported
Horiz Acc measure:	Unknown	Horiz Acc measure units:	Unknown
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	Not Reported
Vert measure units:	Not Reported	Vertacc measure val:	Not Reported
Vert accmeasure units:	Not Reported		
Vertcollection method:	Not Reported		
Vert coord refsys:	Not Reported	Countrycode:	US
Aquifername:	Not Reported		
Formation type:	Not Reported		
Aquifer type:	Not Reported		
Construction date:	Not Reported	Welldepth:	Not Reported
Welldepth units:	Not Reported	Wellholedepth:	Not Reported
Wellholedepth units:	Not Reported		

Ground-water levels, Number of Measurements: 0

J49
NE
1/2 - 1 Mile
Higher

FED USGS **USGS40000269924**

Org. Identifier:	USGS-HI		
Formal name:	USGS Hawaii Water Science Center		
Monloc Identifier:	USGS-212016158063500		
Monloc name:	3-2006-01 TO 11		
Monloc type:	Well: Multiple wells		
Monloc desc:	Not Reported		
Huc code:	20060000	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	21.3346182
Longitude:	-158.1069766	Sourcemap scale:	24000
Horiz Acc measure:	5	Horiz Acc measure units:	seconds
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	41
Vert measure units:	feet	Vertacc measure val:	1
Vert accmeasure units:	feet		
Vertcollection method:	Unknown		
Vert coord refsys:	HILOCAL	Countrycode:	US
Aquifername:	Not Reported		
Formation type:	Not Reported		

Aquifer type:	Not Reported		
Construction date:	Not Reported	Welldepth:	Not Reported
Welldepth units:	Not Reported	Wellholedepth:	Not Reported
Wellholedepth units:	Not Reported		

Ground-water levels, Number of Measurements: 0

J50
NE
1/2 - 1 Mile
Higher

FED USGS **USGS40000269925**

Org. Identifier:	USGS-HI		
Formal name:	USGS Hawaii Water Science Center		
Monloc Identifier:	USGS-212016158063501		
Monloc name:	3-2006-06 W276-G BRB		
Monloc type:	Well		
Monloc desc:	Not Reported		
Huc code:	20060000	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	21.3346182
Longitude:	-158.1069766	Sourcemap scale:	24000
Horiz Acc measure:	5	Horiz Acc measure units:	seconds
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	41.00
Vert measure units:	feet	Vertacc measure val:	5
Vert accmeasure units:	feet		
Vertcollection method:	Interpolated from topographic map		
Vert coord refsys:	HILOCAL	Countrycode:	US
Aquifername:	Not Reported		
Formation type:	Not Reported		
Aquifer type:	Not Reported		
Construction date:	19080101	Welldepth:	165
Welldepth units:	ft	Wellholedepth:	Not Reported
Wellholedepth units:	Not Reported		

Ground-water levels, Number of Measurements: 0

H51
East
1/2 - 1 Mile
Higher

HI WELLS **HI7000000002361**

Wid:	3-1906-002	Island:	3
Well no:	1906-02	Well name:	Ewa Beach
Old name:	Not Reported	Yr drilled:	1957
Driller:	SAMSON-SMOCK	Quad map:	06
Longitude2:	1580618	Latitude27:	211946
Longitude8:	1580608	Latitude83:	211935
Long83dd:	-158.10222		
Lat83dd:	21.32639		
Gps:	0	Utm:	1
Owner user:	Campbell Estate	Old number:	T83-
Well type:	Not Reported	Casing dia:	10
Ground el:	60	Well depth:	75
Solid case:	4	Perf case:	Not Reported
Use:	UNU - Unused		
Use year:	74		
Init water:	1.7		
Init head:	1.7		
Init chlor:	764		
Init cl:	764		
Test date:	08/05/1993	Test gpm:	300
Test ddown:	1.0	Test chlor:	Not Reported

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Test temp:	Not Reported	Temp unit:	Not Reported
Pump gpm:	0		
Draft mgy:	Not Reported	Head feet:	Not Reported
Max chlor:	773	Min chlor:	764
Geology:	QLS	Pump yr:	Not Reported
Draft yr:	Not Reported	Head yr:	Not Reported
Maxchl:	03/11/1996	Maxchl yr:	0
Minchl:	11/21/1997	Minchl yr:	0
Bot hole:	-15	Bot solid:	56
Bot perf:	Not Reported	Spec capac:	300
Pump mgd:	Not Reported	Draft mgd:	Not Reported
Aquifer:	30204	Tmk:	9-1-015:001
Old aqui:	Not Reported	Aqui code:	30207
Latest hd:	0		
Cur head:	Not Reported	Cur cl:	Not Reported
Cur temp:	Not Reported	Wcr:	01/01/1957
Pir:	04/01/1994	Surveyor:	Not Reported
T:	0		
Pump elev:	Not Reported	Pump depth:	Not Reported
Site id:	HI7000000002361		

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS
RADON

AREA RADON INFORMATION

Federal EPA Radon Zone for HONOLULU County: 3

Note: Zone 1 indoor average level > 4 pCi/L.
: Zone 2 indoor average level >= 2 pCi/L and <= 4 pCi/L.
: Zone 3 indoor average level < 2 pCi/L.

Federal Area Radon Information for Zip Code: 96707

Number of sites tested: 7

Area	Average Activity	% <4 pCi/L	% 4-20 pCi/L	% >20 pCi/L
Living Area - 1st Floor	0.143 pCi/L	100%	0%	0%
Living Area - 2nd Floor	Not Reported	Not Reported	Not Reported	Not Reported
Basement	Not Reported	Not Reported	Not Reported	Not Reported

PHYSICAL SETTING SOURCE RECORDS SEARCHED

TOPOGRAPHIC INFORMATION

USGS 7.5' Digital Elevation Model (DEM)
Source: United States Geologic Survey
EDR acquired the USGS 7.5' Digital Elevation Model in 2002 and updated it in 2006. The 7.5 minute DEM corresponds to the USGS 1:24,000- and 1:25,000-scale topographic quadrangle maps. The DEM provides elevation data with consistent elevation units and projection.

Scanned Digital USGS 7.5' Topographic Map (DRG)
Source: United States Geologic Survey
A digital raster graphic (DRG) is a scanned image of a U.S. Geological Survey topographic map. The map images are made by scanning published paper maps on high-resolution scanners. The raster image is georeferenced and fit to the Universal Transverse Mercator (UTM) projection.

HYDROLOGIC INFORMATION

Flood Zone Data: This data, available in select counties across the country, was obtained by EDR in 2003 & 2011 from the Federal Emergency Management Agency (FEMA). Data depicts 100-year and 500-year flood zones as defined by FEMA.

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002 and 2005 from the U.S. Fish and Wildlife Service.

HYDROGEOLOGIC INFORMATION

AQUIFLOW^{R} Information System
Source: EDR proprietary database of groundwater flow information
EDR has developed the AQUIFLOW Information System (AIS) to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted to regulatory authorities at select sites and has extracted the date of the report, hydrogeologically determined groundwater flow direction and depth to water table information.

GEOLOGIC INFORMATION

Geologic Age and Rock Stratigraphic Unit
Source: P.G. Schruben, R.E. Arndt and W.J. Bawiec, Geology of the Conterminous U.S. at 1:2,500,000 Scale - A digital representation of the 1974 P.B. King and H.M. Beikman Map, USGS Digital Data Series DDS - 11 (1994).

STATSGO: State Soil Geographic Database
Source: Department of Agriculture, Natural Resources Conservation Services
The U.S. Department of Agriculture's (USDA) Natural Resources Conservation Service (NRCS) leads the national Conservation Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. Soil maps for STATSGO are compiled by generalizing more detailed (SSURGO) soil survey maps.

SSURGO: Soil Survey Geographic Database
Source: Department of Agriculture, Natural Resources Conservation Services (NRCS)
Telephone: 800-672-5559
SSURGO is the most detailed level of mapping done by the Natural Resources Conservation Services, mapping scales generally range from 1:12,000 to 1:63,360. Field mapping methods using national standards are used to construct the soil maps in the Soil Survey Geographic (SSURGO) database. SSURGO digitizing duplicates the original soil survey maps. This level of mapping is designed for use by landowners, townships and county natural resource planning and management.

PHYSICAL SETTING SOURCE RECORDS SEARCHED

LOCAL / REGIONAL WATER AGENCY RECORDS

FEDERAL WATER WELLS

PWS: Public Water Systems
Source: EPA/Office of Drinking Water
Telephone: 202-564-3750
Public Water System data from the Federal Reporting Data System. A PWS is any water system which provides water to at least 25 people for at least 60 days annually. PWSs provide water from wells, rivers and other sources.

PWS ENF: Public Water Systems Violation and Enforcement Data
Source: EPA/Office of Drinking Water
Telephone: 202-564-3750
Violation and Enforcement data for Public Water Systems from the Safe Drinking Water Information System (SDWIS) after August 1995. Prior to August 1995, the data came from the Federal Reporting Data System (FRDS).

USGS Water Wells: USGS National Water Inventory System (NWIS)
This database contains descriptive information on sites where the USGS collects or has collected data on surface water and/or groundwater. The groundwater data includes information on wells, springs, and other sources of groundwater.

STATE RECORDS

Well Index Database
Source: Commission on Water Resource Management
Telephone: 808-587-0214
CWRM maintains a Well Index Database to track specific information pertaining to the construction and installation of production wells in Hawaii

OTHER STATE DATABASE INFORMATION

RADON

Area Radon Information
Source: USGS
Telephone: 703-356-4020
The National Radon Database has been developed by the U.S. Environmental Protection Agency (USEPA) and is a compilation of the EPA/State Residential Radon Survey and the National Residential Radon Survey. The study covers the years 1986 - 1992. Where necessary data has been supplemented by information collected at private sources such as universities and research institutions.

EPA Radon Zones
Source: EPA
Telephone: 703-356-4020
Sections 307 & 309 of IRAA directed EPA to list and identify areas of U.S. with the potential for elevated indoor radon levels.

OTHER

Airport Landing Facilities: Private and public use landing facilities
Source: Federal Aviation Administration, 800-457-6656

Epicenters: World earthquake epicenters, Richter 5 or greater
Source: Department of Commerce, National Oceanic and Atmospheric Administration

PHYSICAL SETTING SOURCE RECORDS SEARCHED

STREET AND ADDRESS INFORMATION

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City & County of Honolulu

Department of Planning & Permitting (DPP)

Property Information

Thursday, May 23, 2013 | 3:22:24 PM

Select Unit: [Select Unit]



General Information

TMK:	91014008:0000
Building Value:	$0.00
Building Exemption:	$0.00
Land Value:	$62,687,200.00
Land Exempt:	$0.00
Acres:	205
Square Feet	0
Property Tax Class:	Industrial
City:	Kapolei
Zip Code:	96707
Realtor Neighborhood:	Campbell Industrial Park
Nearest Park:	

Tax Bill Owner Information

Name	Type	Address	Address 2	City State Zip
S OF H DOT HARBORS DIV	Fee Owner		>	

2010 Census Information

Tract Number:	008502
Block Number:	1012
Population (block):	0

Voting Information

City Council Member:	
Polling Place:	
Address:	
Neighborhood Board:	MAKAKILO/KAPOLEI/HONOKAI HALE

School and Transit Information

Elementary School:	Makakilo	show route
High School:	KAPOLEI	show route
Near Transit Route:	Yes	
Near Bus Routes:		

Zoning and Flood Information

Zoning (LUO) Designation:	I-3 / P-2
Ohana Zoning Designation:	Ineligible
FEMA Flood Designation:	D / VE / VE
Tsunami Evacuation Zone:	Yes

more public safety info >>

Page Tools: PRINT | BOOKMARK | EMAIL | STREET/BIRD'S EYE

More info: ZONE INFO | BUILDING PERMITS | PROPERTY TAX

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City & County of Honolulu

Department of Planning & Permitting (DPP)

Property Information

Thursday, May 23, 2013 | 3:22:32 PM

Select Unit: [Select Unit]



General Information

TMK:	91014024:0000
Building Value:	$0.00
Building Exemption:	$0.00
Land Value:	$97,746,200.00
Land Exempt:	$0.00
Acres:	225
Square Feet	0
Property Tax Class:	Industrial
City:	
Zip Code:	
Realtor Neighborhood:	Campbell Industrial Park
Nearest Park:	

Tax Bill Owner Information

Name	Type	Address	Address 2	City State Zip
S OF H DOT HARBORS DIV	Fee Owner		>	

2010 Census Information

Tract Number:	008610
Block Number:	1001
Population (block):	49

Voting Information

City Council Member:	Kymberly Marcos Pine
Polling Place:	
Address:	
Neighborhood Board:	MAKAKILO/KAPOLEI/HONOKAI HALE

School and Transit Information

Elementary School:	Makakilo	show route
High School:	KAPOLEI	show route
Near Transit Route:	Yes	
Near Bus Routes:		

Zoning and Flood Information

Zoning (LUO) Designation:	I-3 / P-2
Ohana Zoning Designation:	Ineligible
FEMA Flood Designation:	D / VE / VE
Tsunami Evacuation Zone:	Yes

more public safety info >>

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Department of Planning & Permitting (DPP)

Property Information

Thursday, May 23, 2013 | 3:30:42 PM

General Information

TMK:	91014025:0000
Building Value:	$0.00
Building Exemption:	$0.00
Land Value:	$2,757,400.00
Land Exempt:	$0.00
Acres:	3
Square Feet	147,138
Property Tax Class:	Industrial
City:	Kapolei
Zip Code:	96707
Realtor Neighborhood:	Campbell Industrial Park
Nearest Park:	



Tax Bill Owner Information

Name	Type	Address	Address 2	City State Zip
STATE OF HAWAII	Fee Owner		>	
MARISCO LTD	Lessee		91-607 MALAKOLE ST	KAPOLEI HI 96707 1831

2010 Census Information

Tract Number:	008502
Block Number:	1011
Population (block):	0

Voting Information

City Council Member:	Kymberly Marcos Pine
Polling Place:	Kapolei High School
Address:	91-5007 Kapolei Hwy
Neighborhood Board:	MAKAKILO/KAPOLEI/HONOKAI HALE

School and Transit Information

Elementary School:	Makakilo
High School:	KAPOLEI
Near Transit Route:	Yes
Near Bus Routes:	413

Zoning and Flood Information

Zoning (LUO) Designation:	I-3
Ohana Zoning Designation:	Ineligible
FEMA Flood Designation:	D
Tsunami Evacuation Zone:	Yes

more public safety info >>

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Department of Planning & Permitting (DPP)

Property Information

91 500 MALAKOLE ST

Thursday, May 23, 2013 | 3:32:24 PM

General Information

TMK:	91014026:0000
Building Value:	$54,100.00
Building Exemption:	$0.00
Land Value:	$32,148,900.00
Land Exempt:	$0.00
Acres:	64
Square Feet	0
Property Tax Class:	Industrial
City:	Kapolei
Zip Code:	96707
Realtor Neighborhood:	Campbell Industrial Park



Nearest Park: Barbers Point Beach Park show route

Tax Bill Owner Information

Name	Type	Address	Address 2	City State Zip
CAMPBELL HAWAII INVESTOR LLC	Fee Owner		1001 KAMOKILA BLVD	KAPOLEI HI 96707

2010 Census Information

Tract Number:	008502
Block Number:	1011
Population (block):	0

Voting Information

City Council Member:	Kymberly Marcos Pine
Polling Place:	Kapolei High School
Address:	91-5007 Kapolei Hwy
Neighborhood Board:	MAKAKILO/KAPOLEI/HONOKAI HALE

School and Transit Information

Elementary School:	Makakilo	show route
High School:	KAPOLEI	show route
Near Transit Route:	Yes	
Near Bus Routes:		

Zoning and Flood Information

Zoning (LUO) Designation:	I-3
Ohana Zoning Designation:	Ineligible
FEMA Flood Designation:	D
Tsunami Evacuation Zone:	No

more public safety info >>

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More info: ZONE INFO | BUILDING PERMITS | PROPERTY TAX

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Department of Planning & Permitting (DPP)

Property Information

Thursday, May 23, 2013 | 3:33:56 PM

Select Unit: [Select Unit]

General Information

TMK:	91014028:0000
Building Value:	$0.00
Building Exemption:	$0.00
Land Value:	$1,973,600.00
Land Exempt:	$0.00
Acres:	0
Square Feet	73,095
Property Tax Class:	Industrial
City:	Kapolei
Zip Code:	96707
Realtor Neighborhood:	Campbell Industrial Park
Nearest Park:	



Tax Bill Owner Information

Name	Type	Address	Address 2	City State Zip
STATE OF HAWAII	Fee Owner		>	

2010 Census Information

Tract Number:	008502 / 008502
Block Number:	1012 / 1011
Population (block):	0 / 0

Voting Information

City Council Member:	Kymberly Marcos Pine
Polling Place:	
Address:	
Neighborhood Board:	MAKAKILO/KAPOLEI/HONOKAI HALE

School and Transit Information

Elementary School:	Makakilo
High School:	KAPOLEI
Near Transit Route:	Yes
Near Bus Routes:	

Zoning and Flood Information

Zoning (LUO) Designation:	I-3 / P-2
Ohana Zoning Designation:	Ineligible
FEMA Flood Designation:	D / VE
Tsunami Evacuation Zone:	Yes

more public safety info >>

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More info: ZONE INFO | BUILDING PERMITS | PROPERTY TAX

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Department of Planning & Permitting (DPP)

Property Information

Thursday, May 23, 2013 | 3:34:43 PM

General Information

TMK:	91014030:0000
Building Value:	$0.00
Building Exemption:	$0.00
Land Value:	$297,600.00
Land Exempt:	$0.00
Acres:	0
Square Feet	33,065
Property Tax Class:	Industrial
City:	Kapolei
Zip Code:	96707
Realtor Neighborhood:	Campbell Industrial Park
Nearest Park:	



Tax Bill Owner Information

Name	Type	Address	Address 2	City State Zip
MARISCO LTD	Lessee		91-607 MALAKOLE RD	KAPOLEI HI 96707
S OF H DOT HARBORS DIV	Fee Owner		>	

2010 Census Information

Tract Number:	008502
Block Number:	1011
Population (block):	0

Voting Information

City Council Member:	Kymberly Marcos Pine
Polling Place:	Kapolei High School
Address:	91-5007 Kapolei Hwy
Neighborhood Board:	MAKAKILO/KAPOLEI/HONOKAI HALE

School and Transit Information

Elementary School:	Makakilo
High School:	KAPOLEI
Near Transit Route:	Yes
Near Bus Routes:	

Zoning and Flood Information

Zoning (LUO) Designation:	I-3 / P-2
Ohana Zoning Designation:	Ineligible
FEMA Flood Designation:	VE
Tsunami Evacuation Zone:	Yes

more public safety info >>

Page Tools: PRINT | BOOKMARK | EMAIL | STREET/BIRD'S EYE

More info: ZONE INFO | BUILDING PERMITS | PROPERTY TAX

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Department of Planning & Permitting (DPP)

Property Information

Thursday, May 23, 2013 | 3:35:21 PM

General Information

TMK:	91014031:0000
Building Value:	$0.00
Building Exemption:	$0.00
Land Value:	$1,500.00
Land Exempt:	$1,500.00
Acres:	0
Square Feet	64
Property Tax Class:	Industrial
City:	Kapolei
Zip Code:	96707
Realtor Neighborhood:	Campbell Industrial Park
Nearest Park:	



Tax Bill Owner Information

Name	Type	Address	Address 2	City State Zip
STATE OF HAWAII	Fee Owner		>	

2010 Census Information

Tract Number:	008502
Block Number:	1011
Population (block):	0

Voting Information

City Council Member:	Kymberly Marcos Pine
Polling Place:	Kapolei High School
Address:	91-5007 Kapolei Hwy
Neighborhood Board:	MAKAKILO/KAPOLEI/HONOKAI HALE

School and Transit Information

Elementary School:	Makakilo
High School:	KAPOLEI
Near Transit Route:	Yes
Near Bus Routes:	

Zoning and Flood Information

Zoning (LUO) Designation:	I-3 / P-2
Ohana Zoning Designation:	Ineligible
FEMA Flood Designation:	D / VE
Tsunami Evacuation Zone:	Yes

more public safety info >>

Page Tools: PRINT | BOOKMARK | EMAIL | STREET/BIRD'S EYE

More info: ZONE INFO | BUILDING PERMITS | PROPERTY TAX

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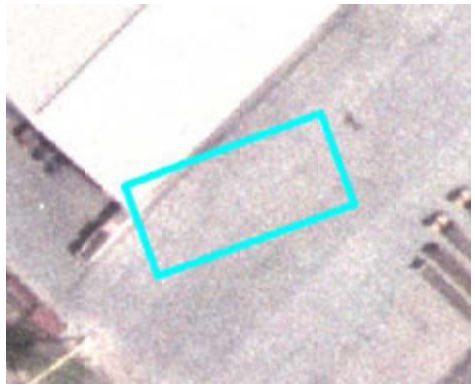
Property Information

Thursday, May 23, 2013 | 3:36:07 PM

General Information

TMK:	91014036:0000
Building Value:	$0.00
Building Exemption:	$0.00
Land Value:	$72,000.00
Land Exempt:	$0.00
Acres:	0
Square Feet	6,000
Property Tax Class:	Industrial
City:	Kapolei
Zip Code:	96707
Realtor Neighborhood:	Campbell Industrial Park
Nearest Park:	Barbers Point Beach Park



show route

Tax Bill Owner Information

Name	Type	Address	Address 2	City State Zip
S OF H DOT HARBORS DIV	Fee Owner		>	
MARITIME LICENSE CENTER INC	Lessee	C/O CARLYLE J DEVOE	707 ALAKEA ST STE 314	HONOLULU HI 96813

2010 Census Information

Tract Number:	008502
Block Number:	1011
Population (block):	0

Voting Information

City Council Member:	Kymberly Marcos Pine
Polling Place:	Kapolei High School
Address:	91-5007 Kapolei Hwy
Neighborhood Board:	MAKAKILO/KAPOLEI/HONOKAI HALE

School and Transit Information

Elementary School:	Makakilo
High School:	KAPOLEI
Near Transit Route:	Yes
Near Bus Routes:	413

Zoning and Flood Information

Zoning (LUO) Designation:	I-3
Ohana Zoning Designation:	Ineligible
FEMA Flood Designation:	D
Tsunami Evacuation Zone:	No

more public safety info >>

Page Tools: PRINT | BOOKMARK | EMAIL | STREET/BIRD'S EYE

More info: ZONE INFO | BUILDING PERMITS | PROPERTY TAX

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City & County of Honolulu

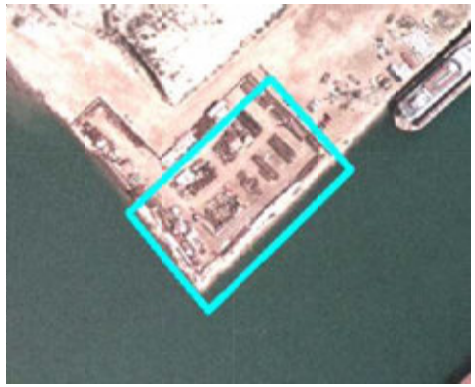
Department of Planning & Permitting (DPP)

Property Information

Thursday, May 23, 2013 | 3:36:43 PM

General Information

TMK:	91014037:0000
Building Value:	$0.00
Building Exemption:	$0.00
Land Value:	$1,266,000.00
Land Exempt:	$0.00
Acres:	2
Square Feet	93,775
Property Tax Class:	Industrial
City:	Kapolei
Zip Code:	96707
Realtor Neighborhood:	Campbell Industrial Park
Nearest Park:	



Tax Bill Owner Information

Name	Type	Address	Address 2	City State Zip
HEALY TIBBITTS BUILDERS INC	Lessee		99-994A IWAENA ST	AIEA HI 96701
STATE OF HAWAII	Fee Owner		>	

2010 Census Information

Tract Number:	008502 / 008502
Block Number:	1012 / 1011
Population (block):	0 / 0

Voting Information

City Council Member:	Kymberly Marcos Pine
Polling Place:	
Address:	
Neighborhood Board:	MAKAKILO/KAPOLEI/HONOKAI HALE

School and Transit Information

Elementary School:	Makakilo
High School:	KAPOLEI
Near Transit Route:	Yes
Near Bus Routes:	

Zoning and Flood Information

Zoning (LUO) Designation:	I-3
Ohana Zoning Designation:	Ineligible
FEMA Flood Designation:	D / VE
Tsunami Evacuation Zone:	Yes

more public safety info >>

Page Tools: PRINT | BOOKMARK | EMAIL | STREET/BIRD'S EYE

More info: ZONE INFO | BUILDING PERMITS | PROPERTY TAX

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Department of Planning & Permitting (DPP)

Property Information

Thursday, May 23, 2013 | 3:37:26 PM

General Information

TMK:	91014039:0000
Building Value:	$0.00
Building Exemption:	$0.00
Land Value:	$8,714,100.00
Land Exempt:	$8,714,100.00
Acres:	11
Square Feet	480,380
Property Tax Class:	Industrial
City:	Kapolei
Zip Code:	96707
Realtor Neighborhood:	Campbell Industrial Park



Nearest Park: Barbers Point Beach Park show route

Tax Bill Owner Information

Name	Type	Address	Address 2	City State Zip
S OF H DOT HARBORS DIV	Fee Owner		>	

2010 Census Information

Tract Number:	008502 / 980300
Block Number:	1011 / 1003
Population (block):	0 / 0

Voting Information

City Council Member:	Kymberly Marcos Pine
Polling Place:	Kapolei High School
Address:	91-5007 Kapolei Hwy
Neighborhood Board:	MAKAKILO/KAPOLEI/HONOKAI HALE

School and Transit Information

Elementary School:	Makakilo
High School:	KAPOLEI
Near Transit Route:	Yes
Near Bus Routes:	413

Zoning and Flood Information

Zoning (LUO) Designation:	I-3
Ohana Zoning Designation:	Ineligible
FEMA Flood Designation:	D
Tsunami Evacuation Zone:	Yes

more public safety info >>

Page Tools: PRINT | BOOKMARK | EMAIL | STREET/BIRD'S EYE

More info: ZONE INFO | BUILDING PERMITS | PROPERTY TAX

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Department of Planning & Permitting (DPP)

Property Information

Thursday, May 23, 2013 | 3:38:03 PM

General Information

TMK:	91014040:0000
Building Value:	$0.00
Building Exemption:	$0.00
Land Value:	$90,000.00
Land Exempt:	$0.00
Acres:	0
Square Feet	5,000
Property Tax Class:	Industrial
City:	Kapolei
Zip Code:	96707
Realtor Neighborhood:	Campbell Industrial Park
Nearest Park:	



Tax Bill Owner Information

Name	Type	Address	Address 2	City State Zip
MARISCO LTD	Lessee		91-607 MALAKOLE RD	KAPOLEI HI 96707 1831
S OF H DOT HARBORS DIV	Fee Owner		>	

2010 Census Information

Tract Number:	008502
Block Number:	1011
Population (block):	0

Voting Information

City Council Member:	Kymberly Marcos Pine
Polling Place:	Kapolei High School
Address:	91-5007 Kapolei Hwy
Neighborhood Board:	MAKAKILO/KAPOLEI/HONOKAI HALE

School and Transit Information

Elementary School:	Makakilo
High School:	KAPOLEI
Near Transit Route:	Yes
Near Bus Routes:	

Zoning and Flood Information

Zoning (LUO) Designation:	I-3
Ohana Zoning Designation:	Ineligible
FEMA Flood Designation:	VE
Tsunami Evacuation Zone:	Yes

more public safety info >>

Page Tools: PRINT | BOOKMARK | EMAIL | STREET/BIRD'S EYE

More info: ZONE INFO | BUILDING PERMITS | PROPERTY TAX

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City & County of Honolulu

Department of Planning & Permitting (DPP)

Property Information

Thursday, May 23, 2013 | 3:38:39 PM

General Information

TMK:	91014043:0000
Building Value:	$0.00
Building Exemption:	$0.00
Land Value:	$3,248,300.00
Land Exempt:	$0.00
Acres:	4
Square Feet	0
Property Tax Class:	Industrial
City:	Kapolei
Zip Code:	96707
Realtor Neighborhood:	Campbell Industrial Park
Nearest Park:	



Tax Bill Owner Information

Name	Type	Address	Address 2	City State Zip
S OF H DOT HARBORS DIV	Fee Owner			
GLP ASPHALT LLC	Lessee	949 KAMOKILA BLVD STE 100		KAPOLEI HI 96707 2046

2010 Census Information

Tract Number:	008502
Block Number:	1011
Population (block):	0

Voting Information

City Council Member:	Kymberly Marcos Pine
Polling Place:	Kapolei High School
Address:	91-5007 Kapolei Hwy
Neighborhood Board:	MAKAKILO/KAPOLEI/HONOKAI HALE

School and Transit Information

Elementary School:	Makakilo
High School:	KAPOLEI
Near Transit Route:	Yes
Near Bus Routes:	

Zoning and Flood Information

Zoning (LUO) Designation:	I-3
Ohana Zoning Designation:	Ineligible
FEMA Flood Designation:	D
Tsunami Evacuation Zone:	No

more public safety info >>

Page Tools: PRINT | BOOKMARK | EMAIL | STREET/BIRD'S EYE

More info: ZONE INFO | BUILDING PERMITS | PROPERTY TAX

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City & County of Honolulu

Department of Planning & Permitting (DPP)

Property Information

91 496 MALAKOLE ST

Thursday, May 23, 2013 | 3:39:21 PM

General Information

TMK:	91074037:0000
Building Value:	$0.00
Building Exemption:	$0.00
Land Value:	$3,090,400.00
Land Exempt:	$3,090,400.00
Acres:	0
Square Feet	114,459
Property Tax Class:	Industrial
City:	Kapolei
Zip Code:	96707
Realtor Neighborhood:	Kapolei



Nearest Park: Barbers Point Beach Park show route

Tax Bill Owner Information

Name	Type	Address	Address 2	City State Zip
STATE OF HAWAII	Fee Owner		>	

2010 Census Information

Tract Number:	008502
Block Number:	1011
Population (block):	0

Voting Information

City Council Member:	Kymberly Marcos Pine
Polling Place:	Kapolei High School
Address:	91-5007 Kapolei Hwy
Neighborhood Board:	MAKAKILO/KAPOLEI/HONOKAI HALE

School and Transit Information

Elementary School:	Makakilo	show route
High School:	KAPOLEI	show route
Near Transit Route:	Yes	
Near Bus Routes:	413	

Zoning and Flood Information

Zoning (LUO) Designation:	I-3
Ohana Zoning Designation:	Ineligible
FEMA Flood Designation:	D / VE
Tsunami Evacuation Zone:	Yes

more public safety info >>

Page Tools: PRINT | BOOKMARK | EMAIL | STREET/BIRD'S EYE

More info: ZONE INFO | BUILDING PERMITS | PROPERTY TAX

Information shown on these maps are derived from public records that are constantly undergoing change and do not replace a site survey, and is not warranted for content or accuracy.

2010 Assessed Values as of October 1, 2009.

Department of Planning & Permitting
650 S. King St, Ste 8, Honolulu, HI 96813
gis@honolulu.gov
Property Info Page FAQ

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City & County of Honolulu - Department of Planning & Permitting - Pro... http://gis.hicentral.com/pubwebsite/TMKDetails.aspx?tmk=91074038&l...

City & County of Honolulu

Department of Planning & Permitting (DPP)

Property Information

Thursday, May 23, 2013 | 3:39:59 PM

General Information

TMK:	91074038:0000
Building Value:	$0.00
Building Exemption:	$0.00
Land Value:	$3,192,600.00
Land Exempt:	$3,192,600.00
Acres:	0
Square Feet	118,246
Property Tax Class:	Industrial
City:	Kapolei
Zip Code:	96707
Realtor Neighborhood:	Kapolei



Nearest Park: Barbers Point Beach Park show route

Tax Bill Owner Information

Name	Type	Address	Address 2	City State Zip
STATE OF HAWAII	Fee Owner		>	

2010 Census Information

Tract Number:	008502 / 980300
Block Number:	1011 / 1003
Population (block):	0 / 0

Voting Information

City Council Member:	Kymberly Marcos Pine
Polling Place:	Kapolei High School
Address:	91-5007 Kapolei Hwy
Neighborhood Board:	MAKAKILO/KAPOLEI/HONOKAI HALE

School and Transit Information

Elementary School:	Makakilo
High School:	KAPOLEI
Near Transit Route:	Yes
Near Bus Routes:	413

Zoning and Flood Information

Zoning (LUO) Designation:	I-3
Ohana Zoning Designation:	Ineligible
FEMA Flood Designation:	D
Tsunami Evacuation Zone:	Yes

more public safety info >>

Page Tools: PRINT | BOOKMARK | EMAIL | STREET/BIRD'S EYE

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2010 Assessed Values as of October 1, 2009.

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910140080000
S OF H DOT HARBORS DIV **NA**

Permits

Date	Amount	Reason for Permit	Permit No
12/13/1991	$330,000		311579
02/03/1992	$180,000		313701
12/24/1996	$500,000		397805
02/24/1999	$4,200		427919
12/05/2007	$2,000	REPAIR	620594

Land

Valuation Class	Square Feet	Acreage	Agricultural Indicator
Industrial	8929800	205	

2013 Assessed Values as of October 1, 2012

TMK	910140080000
Property Class	CONDO MASTER. See values on CPR units.
Total Property Assessed Value	
Total Property Exemption	
Total Property Net Taxable Assessed Value	
Land Assessed Value	
Dedicated/Use Value	
Land Exemption	
Net Taxable Land Value	
Building Assessed Value	
Building Exemption	
Net Taxable Building Value	

Sales

Instrument Date	Sale Amount	Instrument #	Instrument Type	Recordation Date	Land Court Doc#	Certificate Number	Book/Page
10/16/2001			LEASE				/
01/26/1993			LEASE				/
01/26/1993			LEASE				/
06/10/1992							/
04/22/1991							/
08/20/1990			LEASE	09/13/1990	1763500	235391	/
07/18/1990							/
07/10/1990			LEASE	07/11/1990	1745839	235391	/
06/12/1990							/
02/23/1990			LEASE	02/23/1990	1707929	235391	/
06/09/1988				11/29/1988	1595473	235391	/
05/24/1988			LEASE				/

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910140240000
S OF H DOT HARBORS DIV **NA**

Permits

Date	Amount	Reason for Permit	Permit No
12/09/1996	$350,000		397200
08/02/2000	$61,000		511395
08/02/2000	$9,000,000		511396
10/26/2000	$15,000	OTHER WORK	514595
10/26/2000	$10,000	FENCE	514596
05/02/2008	$500,000	RETAINING WALL	626355
05/12/2008	$2,000,000	OTHER WORK	626741
05/12/2008	$1,000,000	OTHER WORK	626742

Land

Valuation Class	Square Feet	Acreage	Agricultural Indicator
Industrial	9784408	224.6191	

2013 Assessed Values as of October 1, 2012

TMK	910140240000
Property Class	CONDO MASTER. See values on CPR units.
Total Property Assessed Value	
Total Property Exemption	
Total Property Net Taxable Assessed Value	
Land Assessed Value	
Dedicated/Use Value	
Land Exemption	
Net Taxable Land Value	
Building Assessed Value	
Building Exemption	
Net Taxable Building Value	

Sales

Instrument Date	Sale Amount	Instrument #	Instrument Type	Recordation Date	Land Court Doc#	Certificate Number	Book/Page
12/14/2010			LEASE				/
11/17/2009			LEASE				/
07/31/2009			LEASE				/
09/25/2008			LEASE				/
07/29/2008			LEASE				/
05/07/2008			LEASE				/
11/15/2007			LEASE				/
10/18/2004			FEE CONVEYANCE				/
08/12/2003			LEASE				/
08/26/2002			LEASE				/
10/01/2001			LEASE				/
09/08/2000			LEASE				/
06/01/2000							/
02/17/2000			LEASE				/
01/15/2000			LEASE				/
12/01/1999			LEASE				/
10/27/1999			LEASE				/
06/09/1999							/
05/27/1999			LEASE				/
09/15/1998			LEASE				/
11/03/1997							/
10/31/1997			LEASE				/
05/07/1997			LEASE				/
04/02/1997			LEASE				/
10/24/1995			LEASE				/
08/16/1995							/
12/27/1994							/
09/28/1994		9400161500	LEASE	09/30/1994	2184740	235391	/
06/03/1994							/
01/27/1993			LEASE				/
01/27/1993			LEASE				/
01/27/1993			LEASE				/
01/27/1993			LEASE				/
01/26/1993			LEASE				/
01/26/1993			LEASE				/
01/26/1993			LEASE				/
06/09/1988				11/29/1988	1595473	235391	/
05/24/1988			LEASE				/

910140250000
MARISCO LTD **NA**

Parcel Data

TMK	910140250000
Site Address	
Apartment No.	
Property Class	Please select the Assessed Values tab.
Total Parcel Area	3.3778 Acres
Zoning	U/43/70

Ownership

Owner	Owner Type
STATE OF HAWAII	Fee Owner
MARISCO LTD	Lessee

Land

Valuation Class	Square Feet	Acreage	Agricultural Indicator
Industrial	147138	3.3778	

2013 Assessed Values as of October 1, 2012

TMK	910140250000
Property Class	INDUSTRIAL
Total Property Assessed Value	$2,757,400
Total Property Exemption	$0
Total Property Net Taxable Assessed Value	$2,757,400
Land Assessed Value	$2,757,400
Dedicated/Use Value	$0
Land Exemption	$0
Net Taxable Land Value	$2,757,400
Building Assessed Value	$0
Building Exemption	$0
Net Taxable Building Value	$0

Sales

Instrument Date	Sale Amount	Instrument #	Instrument Type	Recordation Date	Land Court Doc#	Certificate Number	Book/Page
09/25/2008			LEASE				/
09/25/2008			LEASE				/
06/26/2008			LEASE				/
04/30/1993							/
01/27/1993			LEASE				/
01/27/1993			LEASE				/
01/27/1993			LEASE				/

Commercial

TMK	910140250000
Property Class	Please select the Land Details tab.
Building Number	0001
Improvement Name	MASTER MARISCO BLDG
Identical Units	1
Units	1
Structure Type	WAREHOUSE MET/LOW
Year Built	1991
Effective Year	
Gross Building Value	
Description	

Building Sections

Card	Line	Section Number	Level From	Level To	Area	Perimeter	Use Type	Wall Height	Exterior Wall	Frame Type
1	1	1	01	01	35000	900	WAREHOUSE	30	STEEL	STEEL
1	2	1	E1	E1	5000	100	MEZZ ENCL OFFICE	10	NONE	NO COST VALUE
1	3	1	E2	E3	5000	100	MEZZ ENCL OFFICE	10	NONE	NO COST VALUE
1	4	2	01	01	7500	350	WAREHOUSE	30	STEEL	STEEL

Tax Details 2011

Period	Description	Tax	Paid / Adjust	Penalty Paid	Interest Paid	Other
2011-1	Beginning Tax	17,091.54	0.00	0.00	0.00	0.00
2011-1	Payment	0.00	-17,091.54	0.00	0.00	0.00
2011-2	Beginning Tax	17,091.54	0.00	0.00	0.00	0.00
2011-2	Payment	0.00	-17,091.54	0.00	0.00	0.00
Total:		34,183.08	-34,183.08	0.00	0.00	0.00

Payment Summary

Year	Payment #	Date	Tax	Penalty	Interest	Other
2011	5743954	18-AUG-11	-17,091.54	0.00	0.00	0.00
2011	5879191	10-FEB-12	-17,091.54	0.00	0.00	0.00
Total:			-34,183.08	0.00	0.00	0.00

Tax Details 2010

Period	Description	Tax	Paid / Adjust	Penalty Paid	Interest Paid	Other
2010-1	Beginning Tax	17,091.54	0.00	0.00	0.00	0.00
2010-1	Payment	0.00	-17,091.54	0.00	0.00	0.00
2010-2	Beginning Tax	17,091.54	0.00	0.00	0.00	0.00
2010-2	Payment	0.00	-17,091.54	0.00	0.00	0.00
Total:		34,183.08	-34,183.08	0.00	0.00	0.00

Payment Summary

Year	Payment #	Date	Tax	Penalty	Interest	Other
2010	5185991	19-AUG-10	-17,091.54	0.00	0.00	0.00
2010	5456542	22-FEB-11	-17,091.54	0.00	0.00	0.00
Total:			-34,183.08	0.00	0.00	0.00

Tax Details 2009

Period	Description	Tax	Paid / Adjust	Penalty Paid	Interest Paid	Other
2009-1	Beginning Tax	17,091.54	0.00	0.00	0.00	0.00
2009-1	Payment	0.00	-17,091.54	0.00	0.00	0.00
2009-2	Beginning Tax	17,091.54	0.00	0.00	0.00	0.00
2009-2	Payment	0.00	-17,091.54	-355.50	-7.11	0.00
Total:		34,183.08	-34,183.08	-355.50	-7.11	0.00

Payment Summary

Year	Payment #	Date	Tax	Penalty	Interest	Other
2009	4604117	14-AUG-09	-17,091.54	0.00	0.00	0.00
2009	4911938	26-FEB-10	-16,749.71	-341.83	0.00	0.00
2009	4920109	16-APR-10	-341.83	-13.67	-7.11	0.00
Total:			-34,183.08	-355.50	-7.11	0.00

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910140260000
CAMPBELL HAWAII INVESTOR LLC Dropped Par **NA**

Parcel Data

TMK	910140260000
Site Address	MALAKOLE ST
Apartment No.	
Property Class	Dropped Parcel
Total Parcel Area	Acres
Zoning	Dropped Parcel

Ownership

Owner	Owner Type
DROPPED INTO 9114-44 & 45 2013/05/02	Dropped Parcel
CAMPBELL HAWAII INVESTOR LLC Dropped Par	Dropped Parcel

Permits

Date	Amount	Reason for Permit	Permit No
10/13/2009	$5,000,000	NEW BUILDING	647918

Land

Valuation Class	Square Feet	Acreage	Agricultural Indicator
Industrial	2769066	63.569	

2013 Assessed Values as of October 1, 2012

TMK	910140260000
Property Class	INDUSTRIAL
Total Property Assessed Value	$32,203,000
Total Property Exemption	$0
Total Property Net Taxable Assessed Value	$32,203,000
Land Assessed Value	$32,148,900
Dedicated/Use Value	$0
Land Exemption	$0
Net Taxable Land Value	$32,148,900
Building Assessed Value	$54,100
Building Exemption	$0
Net Taxable Building Value	$54,100

Sales

Instrument Date	Sale Amount	Instrument #	Instrument Type	Recordation Date	Land Court Doc#	Certificate Number	Book/Page
12/24/2012			FEE CONVEYANCE	01/07/2013	8407302		/
05/02/2012			FEE CONVEYANCE	05/14/2012	T-8169111	600219	/
01/17/2005			LEASE	01/28/2005	3224610		/
08/09/2004			FEE CONVEYANCE				/
01/02/2002	$20,912,700		FEE CONVEYANCE	01/02/2002	2766586	600216	/
12/27/1994				12/27/1994			/

Commercial

TMK	910140260000
Property Class	Please select the Land Details tab.
Building Number	1
Improvement Name	CONTROL BLDG
Identical Units	
Units	
Structure Type	WAREHOUSE MET/AVG
Year Built	2010
Effective Year	
Gross Building Value	
Description	

Building Sections

Card	Line	Section Number	Level From	Level To	Area	Perimeter	Use Type	Wall Height	Exterior Wall	Frame Type
1	1		01	01	372	86	WAREHOUSE	11	STEEL	STEEL

Tax Details 2011

Period	Description	Tax	Paid / Adjust	Penalty Paid	Interest Paid	Other
2011-1	Beginning Tax	165,902.08	0.00	0.00	0.00	0.00
2011-1	Payment	0.00	-165,902.08	0.00	0.00	0.00
2011-2	Beginning Tax	165,902.08	0.00	0.00	0.00	0.00
2011-2	Payment	0.00	-165,902.08	0.00	0.00	0.00
Total:		331,804.16	-331,804.16	0.00	0.00	0.00

Payment Summary

Year	Payment #	Date	Tax	Penalty	Interest	Other
2011	5712623	18-AUG-11	-165,902.08	0.00	0.00	0.00
2011	5997583	17-FEB-12	-165,902.08	0.00	0.00	0.00
Total:			-331,804.16	0.00	0.00	0.00

Tax Details 2010

Period	Description	Tax	Paid / Adjust	Penalty Paid	Interest Paid	Other
2010-1	Beginning Tax	173,742.60	0.00	0.00	0.00	0.00
2010-1	Payment	0.00	-173,742.60	0.00	0.00	0.00
2010-2	Beginning Tax	173,742.60	0.00	0.00	0.00	0.00
2010-2	Payment	0.00	-173,742.60	0.00	0.00	0.00
Total:		347,485.20	-347,485.20	0.00	0.00	0.00

Payment Summary

Year	Payment #	Date	Tax	Penalty	Interest	Other
2010	5089309	19-AUG-10	-173,742.60	0.00	0.00	0.00
2010	5432499	18-FEB-11	-173,742.60	0.00	0.00	0.00
Total:			-347,485.20	0.00	0.00	0.00

Tax Details 2009

Period	Description	Tax	Paid / Adjust	Penalty Paid	Interest Paid	Other
2009-1	Beginning Tax	189,537.10	0.00	0.00	0.00	0.00
2009-1	Payment	0.00	-189,537.10	0.00	0.00	0.00
2009-2	Beginning Tax	189,537.10	0.00	0.00	0.00	0.00
2009-2	Payment	0.00	-189,537.10	0.00	0.00	0.00
Total:		379,074.20	-379,074.20	0.00	0.00	0.00

Payment Summary

Year	Payment #	Date	Tax	Penalty	Interest	Other
2009	4616881	20-AUG-09	-189,537.10	0.00	0.00	0.00
2009	4892655	19-FEB-10	-189,537.10	0.00	0.00	0.00
Total:			-379,074.20	0.00	0.00	0.00

Tax Details 2008

Period	Description	Tax	Paid / Adjust	Penalty Paid	Interest Paid	Other
2008-1	Beginning Tax	150,049.92	0.00	0.00	0.00	0.00
2008-1	Payment	0.00	-150,049.92	0.00	0.00	0.00
2008-2	Beginning Tax	150,049.92	0.00	0.00	0.00	0.00
2008-2	Payment	0.00	-150,049.92	0.00	0.00	0.00
Total:		300,099.84	-300,099.84	0.00	0.00	0.00

Payment Summary

Year	Payment #	Date	Tax	Penalty	Interest	Other
2008	3977793	20-AUG-08	-150,049.92	0.00	0.00	0.00
2008	4344192	20-FEB-09	-150,049.92	0.00	0.00	0.00
Total:			-300,099.84	0.00	0.00	0.00

Tax Details 2007

Period	Description	Tax	Paid / Adjust	Penalty Paid	Interest Paid	Other
2007-1	Beginning Tax	118,460.92	0.00	0.00	0.00	0.00
2007-1	Payment	0.00	-118,460.92	0.00	0.00	0.00
2007-2	Beginning Tax	118,460.92	0.00	0.00	0.00	0.00
2007-2	Payment	0.00	-118,460.92	0.00	0.00	0.00
Total:		236,921.84	-236,921.84	0.00	0.00	0.00

Payment Summary

Year	Payment #	Date	Tax	Penalty	Interest	Other
2007	3513980	20-AUG-07	-118,460.92	0.00	0.00	0.00
2007	3718248	20-FEB-08	-118,460.92	0.00	0.00	0.00
Total:			-236,921.84	0.00	0.00	0.00

Tax Details 2006

Period	Description	Tax	Paid / Adjust	Penalty Paid	Interest Paid	Other

2006-1	Beginning Tax	91,481.92	0.00	0.00	0.00	0.00
2006-1	Payment	0.00	-91,481.92	0.00	0.00	0.00
2006-2	Beginning Tax	91,481.92	0.00	0.00	0.00	0.00
2006-2	Payment	0.00	-91,481.92	0.00	0.00	0.00
Total:		182,963.84	-182,963.84	0.00	0.00	0.00

Payment Summary

Year	Payment #	Date	Tax	Penalty	Interest	Other
2006	2988106	21-AUG-06	-91,481.92	0.00	0.00	0.00
2006	3243547	20-FEB-07	-91,481.92	0.00	0.00	0.00
Total:			-182,963.84	0.00	0.00	0.00

Tax Details 2005

Period	Description	Tax	Paid / Adjust	Penalty Paid	Interest Paid	Other
2005-1	Beginning Tax	76,034.60	0.00	0.00	0.00	0
2005-1	Payment	0.00	-76,034.60	0.00	0.00	0
2005-2	Beginning Tax	76,034.60	0.00	0.00	0.00	0
2005-2	Payment	0.00	-76,034.60	0.00	0.00	0
Total:		152,069.20	-152,069.20	0.00	0.00	0.00

Payment Summary

Year	Payment #	Date	Tax	Penalty	Interest	Other
2005	2444688	23-AUG-05	-76,034.60	0.00	0.00	0.00
2005	2689057	21-FEB-06	-76,034.60	0.00	0.00	0.00
Total:			-152,069.20	0.00	0.00	0.00

Tax Details 2004

Period	Description	Tax	Paid / Adjust	Penalty Paid	Interest Paid	Other
2004-1	Beginning Tax	68,793.05	0.00	0.00	0.00	0.00
2004-1	Payment	0.00	-68,793.05	0.00	0.00	0.00
2004-2	Beginning Tax	68,793.05	0.00	0.00	0.00	0.00
2004-2	Payment	0.00	-68,793.05	0.00	0.00	0.00
Total:		137,586.10	-137,586.10	0.00	0.00	0.00

Payment Summary

Year	Payment #	Date	Tax	Penalty	Interest	Other
2004	1901943	23-AUG-04	-68,793.05	0.00	0.00	0.00
2004	2115497	22-FEB-05	-68,793.05	0.00	0.00	0.00
Total:			-137,586.10	0.00	0.00	0.00

Tax Details 2003

Period	Description	Tax	Paid / Adjust	Penalty Paid	Interest Paid	Other
2003-1	Beginning Tax	64,315.75	0.00	0.00	0.00	0.00
2003-1	Payment	0.00	-64,315.75	0.00	0.00	0.00
2003-2	Beginning Tax	64,315.75	0.00	0.00	0.00	0.00
2003-2	Payment	0.00	-64,315.75	0.00	0.00	0.00
Total:		128,631.50	-128,631.50	0.00	0.00	0.00

Payment Summary

Year	Payment #	Date	Tax	Penalty	Interest	Other
2003	1351363	20-AUG-03	-64,315.75	0.00	0.00	0.00
2003	1581885	20-FEB-04	-64,315.75	0.00	0.00	0.00
Total:			-128,631.50	0.00	0.00	0.00

Tax Details 2002

Period	Description	Tax	Paid / Adjust	Penalty Paid	Interest Paid	Other
2002-1	Beginning Tax	56,813.26	0.00	0.00	0.00	0.00
2002-1	Payment	0.00	-56,813.26	0.00	0.00	0.00
2002-2	Beginning Tax	56,813.25	0.00	0.00	0.00	0.00
2002-2	Payment	0.00	-56,813.25	0.00	0.00	0.00
Total:		113,626.51	-113,626.51	0.00	0.00	0.00

Payment Summary

Year	Payment #	Date	Tax	Penalty	Interest	Other
2002	876197	20-AUG-02	-56,813.26	0.00	0.00	0.00
2002	1127866	20-FEB-03	-56,813.25	0.00	0.00	0.00

Total:			-113,626.51	0.00	0.00	0.00

Tax Details 2001

Period	Description	Tax	Paid / Adjust	Penalty Paid	Interest Paid	Other
2001-1	Beginning Tax	56,813.26	0.00	0.00	0.00	0.00
2001-1	Payment	0.00	-56,813.26	0.00	0.00	0.00
2001-2	Beginning Tax	56,813.25	0.00	0.00	0.00	0.00
2001-2	Payment	0.00	-56,813.25	0.00	0.00	0.00
Total:		113,626.51	-113,626.51	0.00	0.00	0.00

Payment Summary

Year	Payment #	Date	Tax	Penalty	Interest	Other
2001	219570	20-AUG-01	-56,813.26	0.00	0.00	0.00
2001	457879	20-FEB-02	-56,813.25	0.00	0.00	0.00
Total:			-113,626.51	0.00	0.00	0.00

910140300000
MARISCO LTD **NA**

Parcel Data

TMK	910140300000
Site Address	
Apartment No.	
Property Class	Please select the Assessed Values tab.
Total Parcel Area	.7591 Acres
Zoning	U/43/70

Ownership

Owner	Owner Type
S OF H DOT HARBORS DIV	Fee Owner
MARISCO LTD	Lessee

Land

Valuation Class	Square Feet	Acreage	Agricultural Indicator
Industrial	33065	.7591	

2013 Assessed Values as of October 1, 2012

TMK	910140300000
Property Class	INDUSTRIAL
Total Property Assessed Value	$297,600
Total Property Exemption	$0
Total Property Net Taxable Assessed Value	$297,600
Land Assessed Value	$297,600
Dedicated/Use Value	$0
Land Exemption	$0
Net Taxable Land Value	$297,600
Building Assessed Value	$0
Building Exemption	$0
Net Taxable Building Value	$0

Sales

Instrument Date	Sale Amount	Instrument #	Instrument Type	Recordation Date	Land Court Doc#	Certificate Number	Book/Page
12/01/1999			LEASE				/

Tax Details 2011

Period	Description	Tax	Paid / Adjust	Penalty Paid	Interest Paid	Other
2011-1	Beginning Tax	1,845.12	0.00	0.00	0.00	0.00
2011-1	Payment	0.00	-1,845.12	0.00	0.00	0.00
2011-2	Beginning Tax	1,845.12	0.00	0.00	0.00	0.00
2011-2	Payment	0.00	-1,845.12	0.00	0.00	0.00
Total:		3,690.24	-3,690.24	0.00	0.00	0.00

Payment Summary

Year	Payment #	Date	Tax	Penalty	Interest	Other
2011	5743955	18-AUG-11	-1,845.12	0.00	0.00	0.00
2011	5879190	10-FEB-12	-1,845.12	0.00	0.00	0.00
Total:			-3,690.24	0.00	0.00	0.00

Tax Details 2010

Period	Description	Tax	Paid / Adjust	Penalty Paid	Interest Paid	Other
2010-1	Beginning Tax	1,845.12	0.00	0.00	0.00	0.00
2010-1	Payment	0.00	-1,845.12	0.00	0.00	0.00
2010-2	Beginning Tax	1,845.12	0.00	0.00	0.00	0.00
2010-2	Payment	0.00	-1,845.12	0.00	0.00	0.00
Total:		3,690.24	-3,690.24	0.00	0.00	0.00

Payment Summary

Year	Payment #	Date	Tax	Penalty	Interest	Other
2010	5185990	19-AUG-10	-1,845.12	0.00	0.00	0.00
2010	5456543	22-FEB-11	-1,845.12	0.00	0.00	0.00
Total:			-3,690.24	0.00	0.00	0.00

Tax Details 2009

Period	Description	Tax	Paid / Adjust	Penalty Paid	Interest Paid	Other
2009-1	Beginning Tax	1,845.12	0.00	0.00	0.00	0.00
2009-1	Payment	0.00	-1,845.12	0.00	0.00	0.00
2009-2	Beginning Tax	1,845.12	0.00	0.00	0.00	0.00
2009-2	Payment	0.00	-1,845.12	-38.38	-0.77	0.00
Total:		3,690.24	-3,690.24	-38.38	-0.77	0.00

City and County of Honolulu Public Access http://www.honolulupropertytax.com/Forms/PrintDatalet.aspx?pin=910...

Payment Summary

Year	Payment #	Date	Tax	Penalty	Interest	Other
2009	4604119	14-AUG-09	-1,845.12	0.00	0.00	0.00
2009	4911939	26-FEB-10	-1,808.22	-36.90	0.00	0.00
2009	4920111	16-APR-10	-36.90	-1.48	-0.77	0.00
Total:			-3,690.24	-38.38	-0.77	0.00

Tax Details 2008

Period	Description	Tax	Paid / Adjust	Penalty Paid	Interest Paid	Other
2008-1	Beginning Tax	1,845.12	0.00	0.00	0.00	0.00
2008-1	Payment	0.00	-1,845.12	-38.38	-0.77	0.00
2008-2	Beginning Tax	1,845.12	0.00	0.00	0.00	0.00
2008-2	Payment	0.00	-1,845.12	0.00	0.00	0.00
Total:		3,690.24	-3,690.24	-38.38	-0.77	0.00

Payment Summary

Year	Payment #	Date	Tax	Penalty	Interest	Other
2008	4092779	22-AUG-08	-1,808.22	-36.90	0.00	0.00
2008	4101955	18-OCT-08	-36.90	-1.48	-0.77	0.00
2008	4203257	17-FEB-09	-1,845.12	0.00	0.00	0.00
Total:			-3,690.24	-38.38	-0.77	0.00

Tax Details 2007

Period	Description	Tax	Paid / Adjust	Penalty Paid	Interest Paid	Other
2007-1	Beginning Tax	1,845.12	0.00	0.00	0.00	0.00
2007-1	Payment	0.00	-1,845.12	0.00	0.00	0.00
2007-2	Beginning Tax	1,845.12	0.00	0.00	0.00	0.00
2007-2	Payment	0.00	-1,845.12	0.00	0.00	0.00
Total:		3,690.24	-3,690.24	0.00	0.00	0.00

Payment Summary

Year	Payment #	Date	Tax	Penalty	Interest	Other
2007	3494325	20-AUG-07	-1,845.12	0.00	0.00	0.00
2007	3721799	20-FEB-08	-1,845.12	0.00	0.00	0.00
Total:			-3,690.24	0.00	0.00	0.00

Tax Details 2006

Period	Description	Tax	Paid / Adjust	Penalty Paid	Interest Paid	Other
2006-1	Beginning Tax	1,781.14	0.00	0.00	0.00	0.00
2006-1	Payment	0.00	-1,781.14	0.00	0.00	0.00
2006-2	Beginning Tax	1,781.13	0.00	0.00	0.00	0.00
2006-2	Payment	0.00	-1,781.13	0.00	0.00	0.00
Total:		3,562.27	-3,562.27	0.00	0.00	0.00

Payment Summary

Year	Payment #	Date	Tax	Penalty	Interest	Other
2006	2990269	21-AUG-06	-1,781.14	0.00	0.00	0.00
2006	3233788	16-FEB-07	-1,781.13	0.00	0.00	0.00
Total:			-3,562.27	0.00	0.00	0.00

Tax Details 2005

Period	Description	Tax	Paid / Adjust	Penalty Paid	Interest Paid	Other
2005-1	Beginning Tax	1,691.86	0.00	0.00	0.00	0
2005-1	Payment	0.00	-1,691.86	0.00	0.00	0
2005-2	Beginning Tax	1,691.85	0.00	0.00	0.00	0
2005-2	Payment	0.00	-1,691.85	0.00	0.00	0
Total:		3,383.71	-3,383.71	0.00	0.00	0.00

Payment Summary

Year	Payment #	Date	Tax	Penalty	Interest	Other

2005	2427397	22-AUG-05	-1,691.86	0.00	0.00	0.00
2005	2665122	17-FEB-06	-1,691.85	0.00	0.00	0.00
Total:			-3,383.71	0.00	0.00	0.00

Tax Details 2004

Period	Description	Tax	Paid / Adjust	Penalty Paid	Interest Paid	Other
2004-1	Beginning Tax	1,691.86	0.00	0.00	0.00	0.00
2004-1	Payment	0.00	-1,691.86	0.00	0.00	0.00
2004-2	Beginning Tax	1,691.85	0.00	0.00	0.00	0.00
2004-2	Payment	0.00	-1,691.85	0.00	0.00	0.00
Total:		3,383.71	-3,383.71	0.00	0.00	0.00

Payment Summary

Year	Payment #	Date	Tax	Penalty	Interest	Other
2004	1825927	19-AUG-04	-1,691.86	0.00	0.00	0.00
2004	2016798	16-FEB-05	-1,691.85	0.00	0.00	0.00
Total:			-3,383.71	0.00	0.00	0.00

Tax Details 2003

Period	Description	Tax	Paid / Adjust	Penalty Paid	Interest Paid	Other
2003-1	Beginning Tax	1,581.75	0.00	0.00	0.00	0.00
2003-1	Payment	0.00	-1,581.75	0.00	0.00	0.00
2003-2	Beginning Tax	1,581.74	0.00	0.00	0.00	0.00
2003-2	Payment	0.00	-1,581.74	0.00	0.00	0.00
Total:		3,163.49	-3,163.49	0.00	0.00	0.00

Payment Summary

Year	Payment #	Date	Tax	Penalty	Interest	Other
2003	1252948	15-AUG-03	-1,581.75	0.00	0.00	0.00
2003	1524616	19-FEB-04	-1,581.74	0.00	0.00	0.00
Total:			-3,163.49	0.00	0.00	0.00

Tax Details 2002

Period	Description	Tax	Paid / Adjust	Penalty Paid	Interest Paid	Other
2002-1	Beginning Tax	1,397.23	0.00	0.00	0.00	0.00
2002-1	Payment	0.00	-1,397.23	0.00	0.00	0.00
2002-2	Beginning Tax	1,397.23	0.00	0.00	0.00	0.00
2002-2	Payment	0.00	-1,397.23	0.00	0.00	0.00
Total:		2,794.46	-2,794.46	0.00	0.00	0.00

Payment Summary

Year	Payment #	Date	Tax	Penalty	Interest	Other
2002	684760	15-AUG-02	-1,397.23	0.00	0.00	0.00
2002	998150	13-FEB-03	-1,397.23	0.00	0.00	0.00
Total:			-2,794.46	0.00	0.00	0.00

Tax Details 2001

Period	Description	Tax	Paid / Adjust	Penalty Paid	Interest Paid	Other
2001-2	Adjustment	2,794.46	0.00	0.00	0.00	0.00
2001-2	Payment	0.00	-2,794.46	0.00	0.00	0.00
Total:		2,794.46	-2,794.46	0.00	0.00	0.00

Payment Summary

Year	Payment #	Date	Tax	Penalty	Interest	Other
2001	219573	04-OCT-01	-2,794.46	0.00	0.00	0.00
Total:			-2,794.46	0.00	0.00	0.00

910140310000
STATE OF HAWAII **NA**

Parcel Data

TMK	910140310000
Site Address	
Apartment No.	
Property Class	Please select the Assessed Values tab.
Total Parcel Area	.0015 Acres
Zoning	U/43/70

Ownership

Owner	Owner Type
STATE OF HAWAII	Fee Owner

Land

Valuation Class	Square Feet	Acreage	Agricultural Indicator
Industrial	64	.0015	

2013 Assessed Values as of October 1, 2012

TMK	910140310000
Property Class	INDUSTRIAL
Total Property Assessed Value	$1,500
Total Property Exemption	$1,500
Total Property Net Taxable Assessed Value	$0
Land Assessed Value	$1,500
Dedicated/Use Value	$0
Land Exemption	$1,500
Net Taxable Land Value	$0
Building Assessed Value	$0
Building Exemption	$0
Net Taxable Building Value	$0

Sales

Instrument Date	Sale Amount	Instrument #	Instrument Type	Recordation Date	Land Court Doc#	Certificate Number	Book/Page
05/30/2001			LEASE				/
01/15/2000			LEASE				/

910140360000
MARITIME LICENSE CENTER INC **BARBERS POINT**

Parcel Data

TMK	910140360000
Site Address	BARBERS POINT
Apartment No.	
Property Class	Please select the Assessed Values tab.
Total Parcel Area	.1377 Acres
Zoning	U/43/70

Ownership

Owner	Owner Type
S OF H DOT HARBORS DIV	Fee Owner
MARITIME LICENSE CENTER INC	Lessee

Land

Valuation Class	Square Feet	Acreage	Agricultural Indicator
Industrial	6000	.1377	

2013 Assessed Values as of October 1, 2012

TMK	910140360000
Property Class	INDUSTRIAL
Total Property Assessed Value	$72,000
Total Property Exemption	$0
Total Property Net Taxable Assessed Value	$72,000
Land Assessed Value	$72,000
Dedicated/Use Value	$0
Land Exemption	$0
Net Taxable Land Value	$72,000
Building Assessed Value	$0
Building Exemption	$0
Net Taxable Building Value	$0

Sales

Instrument Date	Sale Amount	Instrument #	Instrument Type	Recordation Date	Land Court Doc#	Certificate Number	Book/Page
11/17/2009			LEASE				/
08/12/2003			LEASE				/
10/01/2001			LEASE				/

Tax Bill Information

Period	Description	Original Due Date	Tax/ Assmt	Tax Credits	Net Tax	Penalty	Interest	Other	Total
2012-1	Property Tax	08-20-12	344.85	0.00	344.85	20.69	29.24	0.00	394.78
2012-2	Property Tax	02-20-13	446.40	0.00	446.40	35.71	14.46	0.00	496.57
Total:			791.25	0.00	791.25	56.40	43.70	0.00	891.35

Tax Bill data is computed to: May 31, 2013

Tax Details 2011

Period	Description	Tax	Paid / Adjust	Penalty Paid	Interest Paid	Other
2011-1	Beginning Tax	781.20	0.00	0.00	0.00	0.00
2011-1	Payment	0.00	-781.20	-78.11	-110.92	0.00
2011-2	Beginning Tax	781.20	0.00	0.00	0.00	0.00
2011-2	Payment	0.00	-781.20	-78.12	-60.15	0.00
Total:		1,562.40	-1,562.40	-156.23	-171.07	0.00

Payment Summary

Year	Payment #	Date	Tax	Penalty	Interest	Other
2011	5759315	06-OCT-11	0.00	0.00	-13.75	0.00
2011	6313856	13-SEP-12	-1,562.40	-156.23	-157.32	0.00
Total:			-1,562.40	-156.23	-171.07	0.00

Tax Details 2010

Period	Description	Tax	Paid / Adjust	Penalty Paid	Interest Paid	Other
2010-1	Beginning Tax	818.40	0.00	0.00	0.00	0.00
2010-1	Payment	0.00	-818.40	-81.85	-115.39	0.00
2010-2	Beginning Tax	818.40	0.00	0.00	0.00	0.00
2010-2	Payment	0.00	-818.40	-81.84	-70.37	0.00
Total:		1,636.80	-1,636.80	-163.69	-185.76	0.00

Payment Summary

Year	Payment #	Date	Tax	Penalty	Interest	Other
2010	5598393	11-AUG-11	-174.92	-163.69	-161.39	0.00
2010	5757581	23-SEP-11	-485.39	0.00	-14.61	0.00
2010	5759315	06-OCT-11	-976.49	0.00	-9.76	0.00
Total:			-1,636.80	-163.69	-185.76	0.00

Tax Details 2009

Period	Description	Tax	Paid / Adjust	Penalty Paid	Interest Paid	Other
2009-1	Beginning Tax	892.80	0.00	0.00	0.00	0.00
2009-1	Payment	0.00	-892.80	-89.28	-110.30	0.00
2009-2	Beginning Tax	892.80	0.00	0.00	0.00	0.00
2009-2	Payment	0.00	-892.80	-89.28	-75.03	0.00
Total:		1,785.60	-1,785.60	-178.56	-185.33	0.00

Payment Summary

Year	Payment #	Date	Tax	Penalty	Interest	Other
2009	4930667	14-JUL-10	-664.32	-178.56	-157.12	0.00
2009	4973422	03-AUG-10	-488.79	0.00	-11.21	0.00
2009	5208783	20-OCT-10	-487.35	0.00	-12.65	0.00
2009	5240122	31-JAN-11	-145.14	0.00	-4.35	0.00
Total:			-1,785.60	-178.56	-185.33	0.00

Tax Details 2008

Period	Description	Tax	Paid / Adjust	Penalty Paid	Interest Paid	Other
2008-1	Beginning Tax	706.80	0.00	0.00	0.00	0.00
2008-1	Payment	0.00	-706.80	0.00	0.00	0.00
2008-2	Beginning Tax	706.80	0.00	0.00	0.00	0.00
2008-2	Payment	0.00	-706.80	-70.68	-93.30	0.00
Total:		1,413.60	-1,413.60	-70.68	-93.30	0.00

Payment Summary

Year	Payment #	Date	Tax	Penalty	Interest	Other
2008	4071468	20-AUG-08	-706.80	0.00	0.00	0.00
2008	4889344	22-FEB-10	-706.80	-70.68	-93.30	0.00
Total:			-1,413.60	-70.68	-93.30	0.00

Tax Details 2007

Period	Description	Tax	Paid / Adjust	Penalty Paid	Interest Paid	Other
2007-1	Beginning Tax	558.00	0.00	0.00	0.00	0.00
2007-1	Payment	0.00	-558.00	0.00	0.00	0.00
2007-2	Beginning Tax	558.00	0.00	0.00	0.00	0.00
2007-2	Payment	0.00	-558.00	0.00	0.00	0.00
Total:		1,116.00	-1,116.00	0.00	0.00	0.00

Payment Summary

Year	Payment #	Date	Tax	Penalty	Interest	Other
2007	3308797	31-JUL-07	-558.00	0.00	0.00	0.00
2007	3576063	24-JAN-08	-558.00	0.00	0.00	0.00
Total:			-1,116.00	0.00	0.00	0.00

Tax Details 2006

Period	Description	Tax	Paid / Adjust	Penalty Paid	Interest Paid	Other
2006-1	Beginning Tax	430.92	0.00	0.00	0.00	0.00
2006-1	Payment	0.00	-430.92	0.00	0.00	0.00
2006-2	Beginning Tax	430.92	0.00	0.00	0.00	0.00
2006-2	Payment	0.00	-430.92	0.00	0.00	0.00
Total:		861.84	-861.84	0.00	0.00	0.00

Payment Summary

Year	Payment #	Date	Tax	Penalty	Interest	Other
2006	2786304	02-AUG-06	-861.84	0.00	0.00	0.00
Total:			-861.84	0.00	0.00	0.00

Tax Details 2005

Period	Description	Tax	Paid / Adjust	Penalty Paid	Interest Paid	Other
2005-1	Beginning Tax	358.16	0.00	0.00	0.00	0
2005-1	Payment	0.00	-358.16	-35.82	-7.88	0
2005-2	Beginning Tax	358.15	0.00	0.00	0.00	0
2005-2	Payment	0.00	-358.15	-35.82	-7.88	0
Total:		716.31	-716.31	-71.64	-15.76	0.00

Payment Summary

Year	Payment #	Date	Tax	Penalty	Interest	Other
2005	2477056	31-OCT-05	-358.16	-35.82	-7.88	0.00
2005	2743469	10-APR-06	-358.15	-35.82	-7.88	0.00
Total:			-716.31	-71.64	-15.76	0.00

Tax Details 2004

Period	Description	Tax	Paid / Adjust	Penalty Paid	Interest Paid	Other
2004-1	Beginning Tax	324.05	0.00	0.00	0.00	0.00
2004-1	Payment	0.00	-324.05	-32.41	-7.13	0.00
2004-2	Beginning Tax	324.04	0.00	0.00	0.00	0.00
2004-2	Payment	0.00	-324.04	-32.40	-0.65	0.00
Total:		648.09	-648.09	-64.81	-7.78	0.00

Payment Summary

Year	Payment #	Date	Tax	Penalty	Interest	Other
2004	1940052	04-OCT-04	-324.05	-32.41	-7.13	0.00
2004	2131186	28-FEB-05	-291.64	-32.40	0.00	0.00
2004	2186942	15-APR-05	-32.40	0.00	-0.65	0.00
Total:			-648.09	-64.81	-7.78	0.00

910140370000
HEALY TIBBITTS BUILDERS INC **BARBERS POINT**

Parcel Data

TMK	910140370000
Site Address	BARBERS POINT
Apartment No.	
Property Class	Please select the Assessed Values tab.
Total Parcel Area	2.1528 Acres
Zoning	U/43/70

Ownership

Owner	Owner Type
STATE OF HAWAII	Fee Owner
HEALY TIBBITTS BUILDERS INC	Lessee

Land

Valuation Class	Square Feet	Acreage	Agricultural Indicator
Industrial	93775	2.1528	

2013 Assessed Values as of October 1, 2012

TMK	910140370000
Property Class	INDUSTRIAL
Total Property Assessed Value	$1,266,000
Total Property Exemption	$0
Total Property Net Taxable Assessed Value	$1,266,000
Land Assessed Value	$1,266,000
Dedicated/Use Value	$0
Land Exemption	$0
Net Taxable Land Value	$1,266,000
Building Assessed Value	$0
Building Exemption	$0
Net Taxable Building Value	$0

Sales

Instrument Date	Sale Amount	Instrument #	Instrument Type	Recordation Date	Land Court Doc#	Certificate Number	Book/Page
11/15/2007			LEASE				/

Tax Details 2011

Period	Description	Tax	Paid / Adjust	Penalty Paid	Interest Paid	Other
2011-1	Beginning Tax	7,849.20	0.00	0.00	0.00	0.00
2011-1	Payment	0.00	-7,849.20	0.00	0.00	0.00
2011-2	Beginning Tax	7,849.20	0.00	0.00	0.00	0.00
2011-2	Payment	0.00	-7,849.20	-166.50	-5.04	0.00
Total:		15,698.40	-15,698.40	-166.50	-5.04	0.00

Payment Summary

Year	Payment #	Date	Tax	Penalty	Interest	Other
2011	5585869	11-AUG-11	-7,849.20	0.00	0.00	0.00
2011	6018923	29-FEB-12	-7,692.22	-156.98	0.00	0.00
2011	6031147	01-MAY-12	-152.12	-9.42	-4.99	0.00
2011	6036130	19-JUN-12	-4.86	-0.10	-0.05	0.00
Total:			-15,698.40	-166.50	-5.04	0.00

Tax Details 2010

Period	Description	Tax	Paid / Adjust	Penalty Paid	Interest Paid	Other
2010-1	Beginning Tax	7,849.20	0.00	0.00	0.00	0.00
2010-1	Payment	0.00	-7,849.20	0.00	0.00	0.00
2010-2	Beginning Tax	7,849.20	0.00	0.00	0.00	0.00
2010-2	Payment	0.00	-7,849.20	0.00	0.00	0.00
Total:		15,698.40	-15,698.40	0.00	0.00	0.00

Payment Summary

Year	Payment #	Date	Tax	Penalty	Interest	Other
2010	4980130	06-AUG-10	-7,849.20	0.00	0.00	0.00
2010	5269745	10-FEB-11	-7,849.20	0.00	0.00	0.00
Total:			-15,698.40	0.00	0.00	0.00

Tax Details 2009

Period	Description	Tax	Paid / Adjust	Penalty Paid	Interest Paid	Other
2009-1	Beginning Tax	7,849.20	0.00	0.00	0.00	0.00
2009-1	Payment	0.00	-7,849.20	0.00	0.00	0.00
2009-2	Beginning Tax	7,849.20	0.00	0.00	0.00	0.00
2009-2	Payment	0.00	-7,849.20	0.00	0.00	0.00
Total:		15,698.40	-15,698.40	0.00	0.00	0.00

Payment Summary

Year	Payment #	Date	Tax	Penalty	Interest	Other
2009	4428661	07-AUG-09	-7,849.20	0.00	0.00	0.00
2009	4784367	19-FEB-10	-7,849.20	0.00	0.00	0.00
Total:			-15,698.40	0.00	0.00	0.00

Tax Details 2008

Period	Description	Tax	Paid / Adjust	Penalty Paid	Interest Paid	Other
2008-1	Beginning Tax	7,849.20	0.00	0.00	0.00	0.00
2008-1	Payment	0.00	-7,849.20	-784.92	-518.05	0.00
2008-2	Beginning Tax	7,849.20	0.00	0.00	0.00	0.00
2008-2	Payment	0.00	-7,849.20	0.00	0.00	0.00
Total:		15,698.40	-15,698.40	-784.92	-518.05	0.00

Payment Summary

Year	Payment #	Date	Tax	Penalty	Interest	Other
2008	4368125	20-FEB-09	-15,698.40	-784.92	-518.05	0.00
Total:			-15,698.40	-784.92	-518.05	0.00

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910140390000
S OF H DOT HARBORS DIV **BARBERS POINT**

Parcel Data

TMK	910140390000
Site Address	BARBERS POINT
Apartment No.	
Property Class	Please select the Assessed Values tab.
Total Parcel Area	11.028 Acres
Zoning	U/43/70

Ownership

Owner	Owner Type
S OF H DOT HARBORS DIV	Fee Owner

Land

Valuation Class	Square Feet	Acreage	Agricultural Indicator
Industrial	480380	11.028	

2013 Assessed Values as of October 1, 2012

TMK	910140390000
Property Class	INDUSTRIAL
Total Property Assessed Value	$8,714,100
Total Property Exemption	$8,714,100
Total Property Net Taxable Assessed Value	$0
Land Assessed Value	$8,714,100
Dedicated/Use Value	$0
Land Exemption	$8,714,100
Net Taxable Land Value	$0
Building Assessed Value	$0
Building Exemption	$0
Net Taxable Building Value	$0

Sales

Instrument Date	Sale Amount	Instrument #	Instrument Type	Recordation Date	Land Court Doc#	Certificate Number	Book/Page
08/19/2010			LEASE				/
08/10/2010			LEASE				/
11/17/2009			LEASE				/
11/17/2009			LEASE				/

Tax Details 2008

Period	Description	Tax	Paid / Adjust	Penalty Paid	Interest Paid	Other
2008-3	Adjustment	44,405.64	-44,405.64	0.00	0.00	0.00
Total:		44,405.64	-44,405.64	0.00	0.00	0.00

910140400000
MARISCO LTD **BARBERS POINT**

Parcel Data

TMK	910140400000
Site Address	BARBERS POINT
Apartment No.	
Property Class	Please select the Assessed Values tab.
Total Parcel Area	.1148 Acres
Zoning	U/43/70

Ownership

Owner	Owner Type
S OF H DOT HARBORS DIV	Fee Owner
MARISCO LTD	Lessee

Land

Valuation Class	Square Feet	Acreage	Agricultural Indicator
Industrial	5000	.1148	

2013 Assessed Values as of October 1, 2012

TMK	910140400000
Property Class	INDUSTRIAL
Total Property Assessed Value	$90,000
Total Property Exemption	$0
Total Property Net Taxable Assessed Value	$90,000
Land Assessed Value	$90,000
Dedicated/Use Value	$0
Land Exemption	$0
Net Taxable Land Value	$90,000
Building Assessed Value	$0
Building Exemption	$0
Net Taxable Building Value	$0

Sales

Instrument Date	Sale Amount	Instrument #	Instrument Type	Recordation Date	Land Court Doc#	Certificate Number	Book/Page
07/31/2009			LEASE				/

Tax Details 2011

Period	Description	Tax	Paid / Adjust	Penalty Paid	Interest Paid	Other
2011-1	Beginning Tax	558.00	0.00	0.00	0.00	0.00
2011-1	Payment	0.00	-558.00	0.00	0.00	0.00
2011-2	Beginning Tax	558.00	0.00	0.00	0.00	0.00
2011-2	Payment	0.00	-558.00	0.00	0.00	0.00
Total:		1,116.00	-1,116.00	0.00	0.00	0.00

Payment Summary

Year	Payment #	Date	Tax	Penalty	Interest	Other
2011	5743952	18-AUG-11	-558.00	0.00	0.00	0.00
2011	5879188	10-FEB-12	-558.00	0.00	0.00	0.00
Total:			-1,116.00	0.00	0.00	0.00

Tax Details 2010

Period	Description	Tax	Paid / Adjust	Penalty Paid	Interest Paid	Other
2010-1	Beginning Tax	558.00	0.00	0.00	0.00	0.00
2010-1	Payment	0.00	-558.00	0.00	0.00	0.00
2010-2	Beginning Tax	558.00	0.00	0.00	0.00	0.00
2010-2	Payment	0.00	-558.00	0.00	0.00	0.00
Total:		1,116.00	-1,116.00	0.00	0.00	0.00

Payment Summary

Year	Payment #	Date	Tax	Penalty	Interest	Other
2010	5185993	19-AUG-10	-558.00	0.00	0.00	0.00
2010	5456540	22-FEB-11	-558.00	0.00	0.00	0.00
Total:			-1,116.00	0.00	0.00	0.00

910140430000
GLP ASPHALT LLC **BARBERS POINT**

Parcel Data

TMK	910140430000
Site Address	BARBERS POINT
Apartment No.	
Property Class	Please select the Assessed Values tab.
Total Parcel Area	4.313 Acres
Zoning	U/43/70

Ownership

Owner	Owner Type
S OF H DOT HARBORS DIV	Fee Owner
GLP ASPHALT LLC	Lessee

Land

Valuation Class	Square Feet	Acreage	Agricultural Indicator
Industrial	187874	4.313	

2013 Assessed Values as of October 1, 2012

TMK	910140430000
Property Class	INDUSTRIAL
Total Property Assessed Value	$3,248,300
Total Property Exemption	$0
Total Property Net Taxable Assessed Value	$3,248,300
Land Assessed Value	$3,248,300
Dedicated/Use Value	$0
Land Exemption	$0
Net Taxable Land Value	$3,248,300
Building Assessed Value	$0
Building Exemption	$0
Net Taxable Building Value	$0

Sales

Instrument Date	Sale Amount	Instrument #	Instrument Type	Recordation Date	Land Court Doc#	Certificate Number	Book/Page
09/01/2011			LEASE	11/15/2011	4111447	448245	/
12/14/2010			LEASE				/

Tax Details 2011

Period	Description	Tax	Paid / Adjust	Penalty Paid	Interest Paid	Other
2011-1	Beginning Tax	20,139.46	0.00	0.00	0.00	0.00
2011-1	Payment	0.00	-20,139.46	0.00	0.00	0.00
2011-2	Beginning Tax	20,139.46	0.00	0.00	0.00	0.00
2011-2	Payment	0.00	-20,139.46	0.00	0.00	0.00
Total:		40,278.92	-40,278.92	0.00	0.00	0.00

Payment Summary

Year	Payment #	Date	Tax	Penalty	Interest	Other
2011	5582133	05-AUG-11	-20,139.46	0.00	0.00	0.00
2011	5784779	26-JAN-12	-20,139.46	0.00	0.00	0.00
Total:			-40,278.92	0.00	0.00	0.00

Tax Details 2010

Period	Description	Tax	Paid / Adjust	Penalty Paid	Interest Paid	Other
2010-3	Adjustment	40,278.92	0.00	0.00	0.00	0.00
2010-3	Payment	0.00	-40,278.92	0.00	0.00	0.00
Total:		40,278.92	-40,278.92	0.00	0.00	0.00

Payment Summary

Year	Payment #	Date	Tax	Penalty	Interest	Other
2010	6327039	13-DEC-12	-40,278.92	0.00	0.00	0.00
Total:			-40,278.92	0.00	0.00	0.00

Tax Details 2009

Period	Description	Tax	Paid / Adjust	Penalty Paid	Interest Paid	Other
2009-3	Adjustment	40,278.92	0.00	0.00	0.00	0.00
2009-3	Payment	0.00	-40,278.92	0.00	0.00	0.00

Total:		40,278.92	-40,278.92	0.00	0.00	0.00

Payment Summary

Year	Payment #	Date	Tax	Penalty	Interest	Other
2009	6327039	13-DEC-12	-40,278.92	0.00	0.00	0.00
Total:			-40,278.92	0.00	0.00	0.00

Tax Details 2008

Period	Description	Tax	Paid / Adjust	Penalty Paid	Interest Paid	Other
2008-3	Adjustment	19,978.88	0.00	0.00	0.00	0.00
2008-3	Payment	0.00	-19,978.88	0.00	0.00	0.00
Total:		19,978.88	-19,978.88	0.00	0.00	0.00

Payment Summary

Year	Payment #	Date	Tax	Penalty	Interest	Other
2008	6327039	13-DEC-12	-19,978.88	0.00	0.00	0.00
Total:			-19,978.88	0.00	0.00	0.00

910140280000
STATE OF HAWAII **NA**

Land

Valuation Class	Square Feet	Acreage	Agricultural Indicator
Industrial	73095	1.678	

2013 Assessed Values as of October 1, 2012

TMK	910140280000
Property Class	CONDO MASTER. See values on CPR units.
Total Property Assessed Value	
Total Property Exemption	
Total Property Net Taxable Assessed Value	
Land Assessed Value	
Dedicated/Use Value	
Land Exemption	
Net Taxable Land Value	
Building Assessed Value	
Building Exemption	
Net Taxable Building Value	

Sales

Instrument Date	Sale Amount	Instrument #	Instrument Type	Recordation Date	Land Court Doc#	Certificate Number	Book/Page
04/02/1997			LEASE				/

910740370000
STATE OF HAWAII **MALAKOLE ST**

Parcel Data

TMK	910740370000
Site Address	MALAKOLE ST
Apartment No.	
Property Class	Please select the Assessed Values tab.
Total Parcel Area	2.6276 Acres
Zoning	U/43/80

Ownership

Owner	Owner Type
STATE OF HAWAII	Fee Owner

Land

Valuation Class	Square Feet	Acreage	Agricultural Indicator
Industrial	114459	2.6276	

2013 Assessed Values as of October 1, 2012

TMK	910740370000
Property Class	INDUSTRIAL
Total Property Assessed Value	$3,090,400
Total Property Exemption	$3,090,400
Total Property Net Taxable Assessed Value	$0
Land Assessed Value	$3,090,400
Dedicated/Use Value	$0
Land Exemption	$3,090,400
Net Taxable Land Value	$0
Building Assessed Value	$0
Building Exemption	$0
Net Taxable Building Value	$0

Sales

Instrument Date	Sale Amount	Instrument #	Instrument Type	Recordation Date	Land Court Doc#	Certificate Number	Book/Page
06/18/1993	$1,163,525		FEE CONVEYANCE	09/24/1993	2069304	422290	/
06/18/1993	$1,163,525		FEE CONVEYANCE	09/24/1993	2069303	422289	/
01/25/1993							/

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910740380000
STATE OF HAWAII **MALAKOLE ST**

Parcel Data

TMK	910740380000
Site Address	MALAKOLE ST
Apartment No.	
Property Class	Please select the Assessed Values tab.
Total Parcel Area	2.7146 Acres
Zoning	U/43/80

Ownership

Owner	Owner Type
STATE OF HAWAII	Fee Owner

Land

Valuation Class	Square Feet	Acreage	Agricultural Indicator
Industrial	118246	2.7146	

2013 Assessed Values as of October 1, 2012

TMK	910740380000
Property Class	INDUSTRIAL
Total Property Assessed Value	$3,192,600
Total Property Exemption	$3,192,600
Total Property Net Taxable Assessed Value	$0
Land Assessed Value	$3,192,600
Dedicated/Use Value	$0
Land Exemption	$3,192,600
Net Taxable Land Value	$0
Building Assessed Value	$0
Building Exemption	$0
Net Taxable Building Value	$0

Sales

Instrument Date	Sale Amount	Instrument #	Instrument Type	Recordation Date	Land Court Doc#	Certificate Number	Book/Page
06/18/1993	$1,163,525		FEE CONVEYANCE	09/24/1993	2069304	422290	/
06/18/1993	$1,163,525		FEE CONVEYANCE	09/24/1993	2069303	422289	/
01/25/1993							/

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Building Permit	277927	Relocation Suffix:	
Application Number:	A1989-03-0051		
Description:	HAWAIIAN INDEPENDENT - OT		
Issued Date:	Nov 24, 1989	Created Date:	Nov 24, 1989
Status:	Completed	Completed Date:	Jun 4, 1991
Job Location:	91-607 MALAKOLE ST		

Tax Map Key

Warning	Display Format
	z*** NOT CURRENT *** TMK 9-1-014:008-97 [13491534 sq ft.] 309.723 ac. POID= 223480 04/28/1989 to 10/28/1998 TAXPIN =

Details

Project Name:	HAWAIIAN INDEPENDENT
Owner Name:	HAWAIIAN INDEPENDENT REFINERY
Plan Maker:	MICHAEL J TURINA
Contractor:	AMERICAN PIPING & BOILER CO
Electrical Contractor:	
Plumbing Contractor:	
Accepted Value:	600000
Occupancy Group Category:	M-2 PIPELINE
Occupancy Group:	19 - Other non residential
Structure Code:	37 - WHARF, DOCK SHED
Construction Type Actual:	
Construction Type Min:	
Number Of Stories:	0
Total Floor Area:	0
Ownership Type:	Private

Residential Units / Hotel Rooms (Code: A=Add; D=Delete)

Hotel Room Code:	
Number of Rooms:	
Residential Units Code:	
Number of Units:	

Inspections (RC=Received; CP=Completed; NA=Not Applicable)

	Code	Date
Building Code Inspection:	CP	Jun 4, 1991
Electrical Code Inspection:	NA	Nov 24, 1989
Plumbing Code Inspection:	NA	Nov 24, 1989

Type of Work

☐ New Building	☐ Repair	☐ Plumbing Work
☐ Foundation Only	☐ Demolition	☑ Other Work
☐ Shell Only	☐ Fence	PIPELINE
☐ Addition	☐ Retaining Wall	
☐ Alteration	☐ Electrical Work	
☐ Sidewalk	☐ Curb	☐ Driveway

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Building Permit	297715	Relocation Suffix:	
Application Number:	A1990-09-1346		
Description:	MARISCO, LTD - NB,EL,PL,OT		
Issued Date:	Feb 1, 1991	Created Date:	Feb 1, 1991
Status:	Completed	Completed Date:	Jan 14, 1997
Job Location:	91-607 MALAKOLE ST		

Tax Map Key

Warning	Display Format
	z*** NOT CURRENT *** TMK 9-1-014:008-97 [13491534 sq ft.] 309.723 ac. POID= 223480 04/28/1989 to 10/28/1998 TAXPIN =

Details

Project Name:	MARISCO, LTD
Owner Name:	MARISCO, LTD
Plan Maker:	DOUGLAS P LUNA
Contractor:	JAMES YEE
Electrical Contractor:	MALCOLM BARCARSE
Plumbing Contractor:	SUBURBAN PLBG/PRO FIRE SPRNKLR
Accepted Value:	1000000
Occupancy Group Category:	B-2
Occupancy Group:	07 - Industrial
Structure Code:	26 - ASSEMBLY PLANT, REPAIR GARAGE/SHOP
Construction Type Actual:	IIN/VN
Construction Type Min:	IIN/VN
Number Of Stories:	3
Total Floor Area:	49800
Ownership Type:	Private

Residential Units / Hotel Rooms (Code: A=Add; D=Delete)

Hotel Room Code:	
Number of Rooms:	
Residential Units Code:	
Number of Units:	

Inspections (RC=Received; CP=Completed; NA=Not Applicable)

	Code	Date
Building Code Inspection:	CP	Jan 14, 1997
Electrical Code Inspection:	CP	Jun 29, 1992
Plumbing Code Inspection:	CP	Jun 12, 1992

Type of Work

☑ New Building	☐ Repair	☑ Plumbing Work
☐ Foundation Only	☐ Demolition	☑ Other Work
☐ Shell Only	☐ Fence	F/S A/C
☐ Addition	☐ Retaining Wall	
☐ Alteration	☑ Electrical Work	
☐ Sidewalk	☐ Curb	☐ Driveway

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Building Permit	313701	Relocation Suffix:	
Application Number:	A1991-12-0063		
Description:	AES BARBERS PT CONV - OT		
Issued Date:	Feb 3, 1992	Created Date:	Feb 3, 1992
Status:	Completed	Completed Date:	Dec 7, 1992
Job Location:	91-650 MALAKOLE ST		

Tax Map Key

Warning	Display Format
	z*** NOT CURRENT *** TMK 9-1-014:008-97 [13491534 sq ft.] 309.723 ac. POID= 223480 04/28/1989 to 10/28/1998 TAXPIN =

Details

Project Name:	AES BARBERS PT CONV
Owner Name:	AES BARBERS POINT INC
Plan Maker:	N T W ASSOC
Contractor:	ROBINS ENGINEERS
Electrical Contractor:	
Plumbing Contractor:	
Accepted Value:	180000
Occupancy Group Category:	M-2 CONVEYOR
Occupancy Group:	07 - Industrial
Structure Code:	28 - PLANT,POWER/TRANSFORMER,PUMPING STATION
Construction Type Actual:	
Construction Type Min:	
Number Of Stories:	0
Total Floor Area:	0
Ownership Type:	Private

Residential Units / Hotel Rooms (Code: A=Add; D=Delete)

Hotel Room Code:	
Number of Rooms:	
Residential Units Code:	
Number of Units:	

Inspections (RC=Received; CP=Completed; NA=Not Applicable)

	Code	Date
Building Code Inspection:	CP	Dec 7, 1992
Electrical Code Inspection:	NA	Feb 3, 1992
Plumbing Code Inspection:	NA	Feb 3, 1992

Type of Work

☐ New Building	☐ Repair	☐ Plumbing Work
☐ Foundation Only	☐ Demolition	☑ Other Work
☐ Shell Only	☐ Fence	CONVEYOR BELT
☐ Addition	☐ Retaining Wall	
☐ Alteration	☐ Electrical Work	
☐ Sidewalk	☐ Curb	☐ Driveway

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Building Permit	397805	Relocation Suffix:	
Application Number:	A1996-11-0887		
Description:	ALOHA PETROLEUM - OT		
Issued Date:	Dec 24, 1996	Created Date:	Dec 24, 1996
Status:	Completed	Completed Date:	Apr 24, 1998
Job Location:	91-611 *MALAKOLE ST		

Tax Map Key

Warning	Display Format
	z*** NOT CURRENT *** TMK 9-1-014:008-96 [8929800 sq ft.] 205 ac. POID= 114031 607 MALAKOLE ST 02/05/1993 to 01/12/2012 TAXPIN = 114031

Details

Project Name:	ALOHA PETROLEUM
Owner Name:	ALOHA PETROLEUM LTD
Plan Maker:	NTW ASSOCIATES INC
Contractor:	PITT-DES MOINES INC
Electrical Contractor:	
Plumbing Contractor:	
Accepted Value:	500000
Occupancy Group Category:	M-2
Occupancy Group:	20 - Structure other than building & unclassified
Structure Code:	01 - NO STRUCTURE,FOUNDATION,SPRINKLER SYSTEM
Construction Type Actual:	
Construction Type Min:	
Number Of Stories:	0
Total Floor Area:	0
Ownership Type:	Private

Residential Units / Hotel Rooms (Code: A=Add; D=Delete)

Hotel Room Code:	
Number of Rooms:	
Residential Units Code:	
Number of Units:	

Inspections (RC=Received; CP=Completed; NA=Not Applicable)

	Code	Date
Building Code Inspection:	CP	Apr 24, 1998
Electrical Code Inspection:	NA	Dec 24, 1996
Plumbing Code Inspection:	NA	Dec 24, 1996

Type of Work

☐ New Building	☐ Repair	☐ Plumbing Work
☐ Foundation Only	☐ Demolition	☑ Other Work
☐ Shell Only	☐ Fence	EXTEND FUEL PIP
☐ Addition	☐ Retaining Wall	
☐ Alteration	☐ Electrical Work	
☐ Sidewalk	☐ Curb	☐ Driveway

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Building Permit	397200	Relocation Suffix:	
Application Number:	A1996-07-1409		
Description:	TEXACO PIPING IMP - OT		
Issued Date:	Dec 9, 1996	Created Date:	Dec 9, 1996
Status:	Completed	Completed Date:	Feb 11, 1998
Job Location:	91-620 *MALAKOLE ST		

Tax Map Key

Warning	Display Format
	z*** NOT CURRENT *** TMK 9-1-014:024-96 [8178216 sq ft.] 187.746 ac. POID= 223462 01/30/1995 to 10/28/1998 TAXPIN =

Details

Project Name:	TEXACO PIPING IMP
Owner Name:	TEXACO REFINING & MARKETING
Plan Maker:	WILLIAM GG BHARDT
Contractor:	DELTA CONSTRUCTION
Electrical Contractor:	
Plumbing Contractor:	
Accepted Value:	350000
Occupancy Group Category:	M-2 SITEWORK
Occupancy Group:	20 - Structure other than building & unclassified
Structure Code:	98 - OTHER ACCESSORY BLDGS-SHED,DOG HSE,BARN
Construction Type Actual:	
Construction Type Min:	
Number Of Stories:	0
Total Floor Area:	0
Ownership Type:	Private

Residential Units / Hotel Rooms (Code: A=Add; D=Delete)

Hotel Room Code:	
Number of Rooms:	
Residential Units Code:	
Number of Units:	

Inspections (RC=Received; CP=Completed; NA=Not Applicable)

	Code	Date
Building Code Inspection:	CP	Feb 11, 1998
Electrical Code Inspection:	NA	Dec 9, 1996
Plumbing Code Inspection:	NA	Dec 9, 1996

Type of Work

☐ New Building	☐ Repair	☐ Plumbing Work
☐ Foundation Only	☐ Demolition	☑ Other Work
☐ Shell Only	☐ Fence	PIPELINE
☐ Addition	☐ Retaining Wall	
☐ Alteration	☐ Electrical Work	
☐ Sidewalk	☐ Curb	☐ Driveway

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Building Permit	050380(HIST)	Relocation Suffix:	
Application Number:			
Description:	POWERINE OIL COMPANY - ,OT		
Issued Date:	Jun 16, 1975	Created Date:	Jun 16, 1975
Status:	Converted	Completed Date:	Sep 1, 1979
Job Location:	MALAKOLE RD		

Tax Map Key

Warning	Display Format
	z*** NOT CURRENT *** TMK 9-1-014:008-99 [10483062 sq ft.] 240.658 ac. POID= 223484 07/13/1988 to 10/28/1998 TAXPIN =

Details

Project Name:	
Owner Name:	POWERINE OIL COMPANY
Plan Maker:	ROBERT HAMILTON
Contractor:	JAS W GLOVER LTD
Electrical Contractor:	
Plumbing Contractor:	
Accepted Value:	200000
Occupancy Group Category:	J STOR TANK
Occupancy Group:	20 - Structure other than building & unclassified
Structure Code:	39 - OTHER
Construction Type Actual:	
Construction Type Min:	
Number Of Stories:	0
Total Floor Area:	0
Ownership Type:	Private

Residential Units / Hotel Rooms (Code: A=Add; D=Delete)

Hotel Room Code:	
Number of Rooms:	
Residential Units Code:	
Number of Units:	

Inspections (RC=Received; CP=Completed; NA=Not Applicable)

	Code	Date
Building Code Inspection:		Dec 14, 1979
Electrical Code Inspection:		Sep 1, 1979
Plumbing Code Inspection:		Sep 1, 1979

Type of Work

☐ New Building	☐ Repair	☐ Plumbing Work
☐ Foundation Only	☐ Demolition	☑ Other Work
☐ Shell Only	☐ Fence	STORAGE TANK
☐ Addition	☐ Retaining Wall	
☐ Alteration	☐ Electrical Work	
☐ Sidewalk	☐ Curb	☐ Driveway

Cancel Submit

City and County of Honolulu
Department of Permitting & Planning
650 So. King St, Honolulu, HI 96813
Fax: (808) 527-6743
E-mail: info@honoluludpp.org

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Department of Planning and Permitting (DPP)

Building Permit (pre 1999)

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Building Permit	308369	Relocation Suffix:	
Application Number:	A1991-04-0262		
Description:	HAWAII PAC INDUSTR - OT		
Issued Date:	Oct 2, 1991	Created Date:	Oct 2, 1991
Status:	Completed	Completed Date:	Jan 7, 1997
Job Location:	91-607 MALAKOLE ST		

Tax Map Key

Warning	Display Format
	z*** NOT CURRENT *** TMK 9-1-014:008-97 [13491534 sq ft.] 309.723 ac. POID= 223480 04/28/1989 to 10/28/1998 TAXPIN =

Details

Project Name:	HAWAII PAC INDUSTR
Owner Name:	HAWAII PACIFIC INDUSTRIES INC
Plan Maker:	RICHARD M SATO & ASSOC
Contractor:	ROBINS ENGR & CONSTR
Electrical Contractor:	
Plumbing Contractor:	
Accepted Value:	90000
Occupancy Group Category:	M-2 TANK
Occupancy Group:	20 - Structure other than building & unclassified
Structure Code:	08 - STORAGE TANK, SILOS, WATER TANK
Construction Type Actual:	
Construction Type Min:	
Number Of Stories:	0
Total Floor Area:	0
Ownership Type:	Private

Residential Units / Hotel Rooms (Code: A=Add; D=Delete)

Hotel Room Code:	
Number of Rooms:	
Residential Units Code:	
Number of Units:	

Inspections (RC=Received; CP=Completed; NA=Not Applicable)

	Code	Date
Building Code Inspection:	CP	Jan 7, 1997
Electrical Code Inspection:	NA	Oct 2, 1991
Plumbing Code Inspection:	NA	Oct 2, 1991

Type of Work

☐ New Building	☐ Repair	☐ Plumbing Work
☐ Foundation Only	☐ Demolition	☑ Other Work
☐ Shell Only	☐ Fence	TANK
☐ Addition	☐ Retaining Wall	
☐ Alteration	☐ Electrical Work	
☐ Sidewalk	☐ Curb	☐ Driveway

Cancel Submit

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Application Number	Building Permit No.	Issue Date	TMK	Status	Description
	050379(HIST)	Jun 16, 1975	91014008-99	Converted	POWERINE OIL COMPANY - ,FC,RW
	050380(HIST)	Jun 16, 1975	91014008-99	Converted	POWERINE OIL COMPANY - ,OT
	050381(HIST)	Jun 16, 1975	91014008-99	Converted	POWERINE OIL COMPANY - ,OT
	056801(HIST)	Oct 21, 1975	91014008-99	Converted	HAWAIIAN DREDGING & CONST - ,OT
	056802(HIST)	Oct 21, 1975	91014008-99	Converted	HAWAIIAN DREDGING - ,FC
	060197(HIST)	Jan 7, 1976	91014008-99	Converted	POWERLINE OIL CO - ,EL
	061963(HIST)	Feb 20, 1976	91014008-99	Converted	POWERINE OIL COMPANY INC - ,NB,EL,PL
	090890(HIST)	Oct 20, 1977	91014008-99	Converted	PACIFIC POWER - ,EL
	222974	Apr 24, 1986	91014008-99	Completed	MARISCO, LTD. - EL,OT
	250785	Feb 26, 1988	91014008-99	Completed	MARISCO - EL,PL
	277927	Nov 24, 1989	91014008-97	Completed	HAWAIIAN INDEPENDENT - OT
	286869	Jun 15, 1980	91014008-97	Completed	MARISCO LTD - FN
	289587	Aug 6, 1990	91014008-97	Completed	MARISCO LTD - FN,EL,PL
	296584	Jan 8, 1991	91014008-97	Completed	PIER6/BARBERS POINT - EL
	297715	Feb 1, 1991	91014008-97	Completed	MARISCO, LTD - NB,EL,PL,OT
	300057	Mar 28, 1991	91014008-97	Completed	MARISCO LTD - EL
	302291	May 17, 1991	91014008-97	Completed	HAWAII PACIFIC IND - FN
	303789	Jun 20, 1991	91014008-97	Completed	MARISCO, LTD - EL,PL,OT
	303790	Jun 20, 1991	91014008-97	Completed	MARISCO, LTD - EL,OT
	304314	Jul 1, 1991	91014008-97	Completed	HAWAII PACIFIC IND - EL
	304665	Jul 9, 1991	91014008-97	Completed	HI PAC INDUSTRIES - EL

Application Number	Building Permit No.	Issue Date	TMK	Status	Description
	304959	Jul 16, 1991	91014008-97	Completed	HAWAII PACIFIC IND. - OT
	308369	Oct 2, 1991	91014008-97	Completed	HAWAII PAC INDUSTR - OT
	309753	Nov 4, 1991	91014008-97	Completed	HI PAC IND CONTROL - NB,EL,PL
	311579	Dec 13, 1991	91014008-97	Completed	AES BARBERS POINT - EL,OT
	312741	Jan 13, 1992	91014008-97	Completed	HAWAII PACIFIC F/S - PL
	313701	Feb 3, 1992	91014008-97	Completed	AES BARBERS PT CONV - OT
	317801	Apr 29, 1992	91014008-97	Completed	HI PAC IND- ELEC - EL
	318431	May 13, 1992	91014008-97	Completed	MARISCO LTD - PL
	397805	Dec 24, 1996	91014008-96	Completed	ALOHA PETROLEUM - OT
	427919	Feb 24, 1999	91014008-96	Completed	MORISCO LTD - FC
2007/IBP2217		mmm dd, yyyy	91014008	POSSE BP subjob created	[TMK: 91014008] AES Hawaii, Inc - Building Permit
A2007-08-0736	620594	Dec 5, 2007	91014008	Inspection(s) in Progress	(BP #620594) [TMK: 91014008] AES Hawaii, Inc - Replace existing fire alarm system and associated devices. Remove and replace same devices. Existing FAS box will remain (2007/IBP2217)

Cancel Search

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Application Number	Building Permit No.	Issue Date	TMK	Status	Description
	397200	Dec 9, 1996	91014024-96	Completed	TEXACO PIPING IMP - OT
	404522	Jun 25, 1997	91014024-95	Completed	ENG SURVEYORS HI - EL
	405069	Jul 8, 1997	91014024-95	Completed	HEALY TIBBITS BLDRS - EL
	415471	Mar 30, 1998	91014024-94, 91014024-95	Permit application closed	WALDRON STEAMSHIP CO - EL
2007/IBP4804		mmm dd, yyyy	91014024	POSSE BP subjob created	Kalaeloa Harbor Asphalt Terminal - GLP Asphalt LLC - Grading and Paving
2008/IBP4684		mmm dd, yyyy	91014024	POSSE BP subjob created	Kalaeloa Harbor Asphalt Terminal - GLP Asphalt LLC - Proposed Maintenance/Dispatch Office - New 1-story maintenance/office building
2008/IBP4686		mmm dd, yyyy	91014024	POSSE BP subjob created	Kalaeloa Harbor Asphalt Terminal - GLP Asphalt LLC - New Perimeter Fencing, New Perimeter Lighting, and New Leaching Field - New Perimeter Fencing, New Perimeter Lighting, New Leaching Field
2008/IBP6644		mmm dd, yyyy	91014024	POSSE BP subjob created	Kalaeloa Harbor Asphalt Terminal - GLP Asphalt LLC - Process Equipment & Piping Plans - New Process Equipment & Piping
2010/IBP07884		mmm dd, yyyy	91014024	POSSE BP subjob created	[TMK: 91014024] Kalaeloa Harbor - Building Permit
A2000-05-0535	511396	Aug 2, 2000	91014024	Permit application closed	(BP #511396) [TMK: 91014024] Hawaiian Cement - new industrial facility (cement import terminal, storage domes [2], control building, truck loading tower)
A2000-08-0077	511395	Aug 2, 2000	91014024	Permit application closed	(BP #511395) [TMK: 91014024] Hawaiian Cement -temporary underground service for construction power A2000-05-0535
A2000-09-0239	514595	Oct 26, 2000	91014024	Permit application closed	(BP #514595) [TMK: 91014024] HECo Hanua 46KV Substation @ Hawaiian Cement site - new steel substation
A2000-09-0240	514596	Oct 26, 2000	91014024	Permit application closed	(BP #514596) [TMK: 91014024] HECo Hanua 46KV Substation @ Hawaiian Cement site - chain link fence
A2003-09-1065		mmm dd, yyyy	91014024	Job Cancelled	[TMK: 91014024] Trouble Free Corp. Boat House - New Cover All Building.
A2007-07-0342		mmm dd, yyyy	91014024	Plans review in progress	[TMK: 91014024] Imperium Hawaii Biodiesel Facility - Tank foundations and tanks [THIRD PARTY REVIEW]

Application Number	Building Permit No.	Issue Date	TMK	Status	Description
A2007-09-0502	626741	May 12, 2008	91014024	Permit application closed	(BP #626741) [TMK: 91014024] 9/52 KALAELOA HARBOR ASPHALT TERMINAL -- GLP ASPHALT LLC – 2 NEW 140' DIA. ASPHALT TANK
A2007-09-0504	626742	May 12, 2008	91014024	Permit application closed	(BP #626742) [TMK: 91014024] KALAELOA HARBOR ASPHALT TERMINAL – GLP ASPHALT LLC – 2 NEW 28' DIA. ASPHALT TANK
A2007-11-0224	626355	May 2, 2008	91014024	Permit application closed	(BP #626355) [TMK: 91014024] 11/28 KALAELOA HARBOR ASPHALT TERMINAL -- GLP ASPHALT LLC – 14'-0" MAX HT RETAINING WALL & MIN HT 3'-6" MIN HT GUARDRAIL
A2008-05-1247		mmm dd, yyyy	91014024	Job Cancelled	[TMK: 91014024] 6/24 KALAELOA HARBOR ASPHALT TERMINAL -- GLP ASPHALT LLC – NEW 1-STORY MAINTENANCE/OFFICE BUILDING (2008/IBP4684) 09/09/08 CANCEL JOB PER PROJ MANAGER LEVINS
A2008-05-1248		mmm dd, yyyy	91014024	Job Cancelled	[TMK: 91014024] KALAELOA HARBOR ASPLALT TERMINAL -- GLP ASPHALT LLC – SITEWORK TO INCLUDE 6'-0" CHAINLINK FENCE W/ 1'-0" BARBED WIRE ON TOP AROUND PORTION OF PROPERTY AND PERIMETER LIGHTING (2008/IBP4686) 09/09/08 CANCEL JOB PER PROJ MANAGER LEVINS
A2008-07-0838		mmm dd, yyyy	91014024	Job Cancelled	[TMK: 91014024] 7/80 Kalaeloa Harbor Asphalt Terminal - GLP Asphalt LLC - Process Equipment & Piping Plans - New Process Equipment & Piping 09/09/08 CANCEL JOB PER PROJ MANAGER LEVINS
A2010-08-0536		mmm dd, yyyy	91014024	Job Cancelled	[TMK: 91014024] Kalaeloa Harbor - Install New Electrical Trench AT PEIR 6

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Application Number	Building Permit No.	Issue Date	TMK	Status	Description
2008/IBP8477		mmm dd, yyyy	91014026	POSSE BP subjob created	Kalaeloa Baseyard Portable Asphalt Plant - New baseyard portable asphalt plant
A2008-09-0620	647918	Oct 13, 2009	91014026	Inspection(s) in Progress	(BP #647918) [TMK: 91014026] 9/45 - Kalaeloa Baseyard Portable Asphalt Plant - New baseyard portable asphalt plant with fence and gate.(2008/IBP8477)

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RECORDS OF COMMUNICATION/INTERVIEW

REQUEST TO ACCESS A GOVERNMENT RECORD

DATE: May 1, 2013

TO: **Hazard Evaluation & Emergency Response Office (Fax: 586-7537)**

FROM: Roberta Bitzer ENPRO Environmental

Name or Alias

Contact Information 151 Hekili Street, Suite 210 (808) 748-2111 phone

Kailua, Hawaii 96734 (808) 262-4449 fax

Although you are not required to provide any personal information, you should provide enough information to allow the agency to contact you about this request. The processing of this request may be stopped if the agency is unable to contact you. Therefore, please provide any information that will allow the agency to contact you (name or alias, telephone or fax number, mailing address, e-mail address, etc.).

I WOULD LIKE THE FOLLOWING GOVERNMENT RECORD:

Describe the government record as specifically as possible so that it can be located. Try to provide a record name, subject matter, date, location, purpose, or names of persons to whom the record refers, or other information that could help the agency identify the record. A complete and accurate description of the government record you request will prevent delays in locating the record. Attach a second page if needed.

Aloha,
I am currently working on a Phase I Environmental Site Assessment for Kalaeloa Barbers Point Harbor in Kapolei, Hawaii. I would like to review regulatory records for the following properties:

- Barbers Point Harbor Pier 5
- Honsador, 91-151 Malakole Street
- 91-063 Malakole Street
- 91-127 Malakole Street
- 91-505 Awakumoku Street
- 91-567 Nukuawa Street
- 91-325 Komohana Street
- 91-543 Nukuawa Street
- 91-522 Nukuawa Street
- 91-343 Kaiholo Street
- 91-515 Nukuawa Street
- Hawaiian Western Steel Dump, Hanua Street and Malakole Street
- 91-480 Malakole Street
- 91-201 Malakole Street
- 91-310 Hanua Street

My report is due May 9, 2013. In light of my timeline, I would greatly appreciate any assistance you can provide in expediting access to the files. Mahalo for your time.
Roberta Bitzer

I WOULD LIKE: (please check one or more of the options below)

☐ To inspect the government record.

☐ A copy of the government record: (Please check one of the options below.) See the back of this page for information about fees that you may be required to pay for agency services to process your record request. Note: Copying and transmission charges may also apply to certain options.

- ☐ Pick up at agency (date and time): _____
- ☐ Mail
- ☐ Fax (toll free and only if available)
- ☐ Other, if available (please specify): _____

☐ If the agency maintains the records in a form other than paper, please advise in which format you would prefer to have the record.

☐ Electronic ☐ Audio ☐ Other (please specify): _____

☐ Check this box if you are attaching a request for waiver of fees in the public interest (see waiver information on back).

OFFICIAL USE ONLY:

Office Manager: Date: OIP (rev. 07/29/99)

REQUEST TO ACCESS A GOVERNMENT RECORD

DATE: Addendum to May 1, 2013 request (5/23/13)

TO: **Hazard Evaluation & Emergency Response Office (Fax: 586-7537)**

FROM:

Name or Alias		
Roberta Bitzer	ENPRO Environmental	
Contact Information	151 Hekili Street, Suite 210	(808) 748-2111 phone
	Kailua, Hawaii 96734	(808) 262-4449 fax

Although you are not required to provide any personal information, you should provide enough information to allow the agency to contact you about this request. The processing of this request may be stopped if the agency is unable to contact you. Therefore, please provide any information that will allow the agency to contact you (name or alias, telephone or fax number, mailing address, e-mail address, etc.).

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Aloha,
I am currently working on a Phase I Environmental Site Assessment for Kalaeloa Barbers Point Harbor in Kapolei, Hawaii. I have sent a request on May 1, 2013 and I would like to add the following sites for review:

- Kalaeloa Barbers Point Harbor, Kapolei
- TEXACO MALAKOLE STREET PIPELINE EXCAVATION at MALAKOLE ST

In light of my timeline, I would greatly appreciate any assistance you can provide in expediting access to the files. Mahalo for your time.
Roberta Bitzer

I WOULD LIKE: (please check one or more of the options below)

☐ To **inspect the government record.**

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Office Manager: Date: OIP (rev. 07/29/99)

REQUEST TO ACCESS A GOVERNMENT RECORD

DATE: May 1, 2013

TO: **DOH/EMD/Solid & Hazardous Waste Branch (Fax: 808-586-7509)**

FROM: Roberta Bitzer ENPRO Environmental

Name or Alias

Contact Information 151 Hekili Street, Suite 210 (808) 748-2111 phone

Kailua, Hawaii 96734 (808) 262-4449 fax

Although you are not required to provide any personal information, you should provide enough information to allow the agency to contact you about this request. The processing of this request may be stopped if the agency is unable to contact you. Therefore, please provide any information that will allow the agency to contact you (name or alias, telephone or fax number, mailing address, e-mail address, etc.).

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- 91-325 Komohana Street
- 91-543 Nukuawa Street
- 91-522 Nukuawa Street
- 91-343 Kaiholo Street
- 91-515 Nukuawa Street
- Hawaiian Western Steel Dump, Hanua Street and Malakole Street
- 91-480 Malakole Street
- 91-201 Malakole Street
- 91-310 Hanua Street

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Roberta Bitzer

I WOULD LIKE: (please check one or more of the options below)

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Office Manager: Date:

OIP (rev. 07/29/99)

REQUEST TO ACCESS A GOVERNMENT RECORD

DATE: Addendum to May 1, 2013 request (5/23/13)

TO: **DOH/EMD/Solid & Hazardous Waste Branch (Fax: 808-586-7509)**

FROM: Roberta Bitzer ENPRO Environmental

Name or Alias

Contact Information 151 Hekili Street, Suite 210 (808) 748-2111 phone
Kailua, Hawaii 96734 (808) 262-4449 fax

Although you are not required to provide any personal information, you should provide enough information to allow the agency to contact you about this request. The processing of this request may be stopped if the agency is unable to contact you. Therefore, please provide any information that will allow the agency to contact you (name or alias, telephone or fax number, mailing address, e-mail address, etc.).

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Aloha,
I am currently working on a Phase I Environmental Site Assessment for Kalaeloa Barbers Point Harbor in Kapolei, Hawaii. I have sent a request on May 1, 2013 and I would like to add the following sites for review:

- Kalaeloa Barbers Point Harbor, Kapolei
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In light of my timeline, I would greatly appreciate any assistance you can provide in expediting access to the files. Mahalo for your time.
Roberta Bitzer

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- ☐ Mail
- ☐ Fax (toll free and only if available)
- ☐ Other, if available (please specify): _____

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☐ Electronic ☐ Audio ☐ Other (please specify): _____

☐ Check this box if you are attaching a request for waiver of fees in the public interest (see waiver information on back).

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OFFICIAL USE ONLY:

Office Manager: Date: OIP (rev. 07/29/99)

REQUEST TO ACCESS A GOVERNMENT RECORD

DATE: May 1, 2013

TO: **Honolulu Fire Prevention Bureau (Fax: 808-723-7179)**

FROM: Roberta Bitzer ENPRO Environmental

Name or Alias

Contact Information 151 Hekili Street, Suite 210 (808) 748-2111 phone
Kailua, Hawaii 96734 (808) 262-4449 fax

Although you are not required to provide any personal information, you should provide enough information to allow the agency to contact you about this request. The processing of this request may be stopped if the agency is unable to contact you. Therefore, please provide any information that will allow the agency to contact you (name or alias, telephone or fax number, mailing address, e-mail address, etc.).

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Aloha,

I am currently working on a Phase I Environmental Site Assessment for the following properties at Kalaeloa Barbers Point Harbor in Kapolei:

TMKs: 9-1-014:008, 024, 025, 026, 028, 030, 031, 036, 037, 039, 040, & 043
9-1-074:37 & 38

I wanted to know if your office had any information regarding any fires, complaints, permits, violations involving hazardous materials use, USTs or ASTs on record for the subject properties and/or adjoining properties.

My report is due May 9, 2013. In light of my timeline, I would greatly appreciate any assistance you can provide in expediting access to the files. Mahalo
.

I WOULD LIKE: (please check one or more of the options below)

☐ **To inspect the government record.**

☐ **A copy of the government record:** (Please check one of the options below.) See the back of this page for information about fees that you may be required to pay for agency services to process your record request. Note: Copying and transmission charges may also apply to certain options.

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OFFICIAL USE ONLY: SEE BACK FOR IMPORTANT INFORMATION

Office Manager: Date: OIP (rev. 07/29/99)

Fax Cover Sheet

Date: May 16, 2013
Send to: HECO
Attention: Mr. Virgil Kong
Office location:
Fax number: (808) 543-4511
From: Roberta Bitzer
Office location: 151 Hekili Street
Phone number: 808.262.0909

151 Hekili Street
Suite 210
Kailua, HI 96734

Phone: 808.262.0909
Fax: 808.262.4449
Email: rbitzer@enproenvironmental.com
Website: www.enproenvironmental.com

[ ] URGENT [X] REPLY ASAP [ ] PLEASE AUTHORIZE AND RETURN [ ] PLEASE REVIEW [ ] FOR YOUR INFORMATION

Total pages, including cover: 1

Comments:

Dear Mr. Kong:

As a representative of ENPRO Environmental, I would like to inquire about transformers located at Barbers Point Harbor, along John Wayne Avenue and Malakole Street in Kapolei, Hawaii.

We are in the process of completing a Phase I for property at the above address. We would like to know if the transformers contain PCBs.

Thank you for your time.

Sincerely,
Roberta Bitzer

TSC 2.5.1 (HECO)
Due Diligence Inquiries

May 17, 2013

Ms. Roberta Bitzer
Enpro Environmental
151 Hekili Street, Suite 210
Kailua, Hawaii 96734

Re: Transformer Information; Barbers Point Harbor, Kapolei

Ms. Bitzer:

In response to your request for information regarding HECO transformers at the above referenced location, we provide the following information:

Pole / Vault Number	Transformer Number	Address	Date Purchased	PCB Status
P54	55584 55585 55586	91-607 Malakole Street	05/01/90	Non PCB
V9584	83322	91-303 Kaiholo Street	08/03/10	Non PCB
P52	59242	91-600 Malakole Road	11/01/92	Non PCB
V7141	83549	91-550 Malakole Street	10/18/11	Non PCB
V6293	55329	91-600 Malakole Road	03/01/90	Non PCB
V9284	78641	91-750 Malakole Street	07/31/07	Non PCB
V6292	55218	91-600 Malakole Road	03/01/90	Non PCB
V8212	72847	91-700 Malakole Street	01/28/02	Non PCB
V6555	56960	91-650 Malakole Street	06/01/91	Non PCB
V6554A	56663	91-650 Malakole Street	04/01/91	Non PCB
V7994	70971	92-105 Kekai Place	03/17/00	Non PCB
V6574	Customer-owned	91-601 Malakole Road	Unknown	Unknown
V6944	61570	91-601 Malakole Road	02/09/94	Non PCB
V8732	73872	91-571 Malakole Street	05/13/04	Non PCB
V8699	73754	91-573 Malakole Street	10/08/03	Non PCB

The transformer located in vault 6574 is customer-owned. Therefore, we do not have information regarding PCB content for this unit.

If you have any other questions, please contact me at 543-4517.

Sincerely,

Virgil Kong
Environmental Scientist

Phase I Environmental Site Assessment Property Questionnaire

Circle all that apply: User • Owner • Key Site Manager

Please complete **ALL** sections of this questionnaire and return a **signed and dated** copy to ENPRO Environmental via FAX at **808-262-4449** or e-mail at **info@enproenvironmental.com** as soon as possible.

Communication with:

Name: DEAN WATASE / RANDY LEONG
Company: DOT HARBORS DIVISION
Phone Number: 587.1883 / 587.1878
Date: 5/7/13
Amount of Time Familiar With Site:
Relationship to Site: HARBORS STAFF

PROJECT NAME/ADDRESS: Kalaeloa Harbors

Prior to answering the questions supplied in the table below, please provide ENPRO with the following information:

A. What is your purpose/reason for requesting a Phase I Environmental Site Assessment of the above referenced property? TO SUPPORT THE PLANNING & ENV WORK.

B. Can you supply a floor plan diagram and list of tenants for the structures at the property? If so, please attach copies with your questionnaire responses or send separately prior to the site visit.

DIRECTIONS: Please answer all questions to the best of your knowledge and in good faith. Mark the appropriate response with an "**X**". (Note: **U/NR** indicates "Unknown" or "No Response").
If you not know the answer, please check the **U/NR** box rather than the **No** box.
Please also elaborate on ALL **Yes** responses in the **Comment** box (for example, if the response to "Is the adjoining property used for an industrial use?" is **Yes**, please explain, e.g., "The building next door is used for canning tomatoes"). You may also provide additional information to **U/NR** and **No** responses as necessary.
If you have any questions while completing the questionnaire, please contact us.

	Question	Response			Comment
		Yes	No	U/NR	
1.	Are you aware of any pending, threatened, or past ***litigation*** relevant to hazardous substances or petroleum products in, on, or from the property?		✓		
2.	Are you aware of any pending, threatened, or past ***administrative proceedings*** relevant to hazardous substances or petroleum products in, on, or from the property?		✓		
3.	Are you aware of any ***notices from any governmental entity*** regarding any possible violation(s) of environmental laws or possible liability relating to hazardous substances or petroleum products in, on, or from the property?		✓		

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PROJECT NAME/ADDRESS: Kalaeloa Harbors

	Question	Response			Comment
		Yes	No	U/NR	
4.	Are you aware of any ***environmental cleanup liens*** against the property that are filed or recorded under federal, tribal, state, or local law?		✓		
5.	Are you aware of any ***Activity and Use Limitations (AULs)***, including engineering controls, land use restrictions, or institutional controls that are in place at the property and/or have been filed or recorded in a registry under federal, tribal, state, or local law?	✓			encapsulated lead contaminated soil
6.	Do you have any ***specialized knowledge*** or experience related to possible environmental concerns at the property or nearby properties? (For example, are you involved in the same line of business as the current or former occupants at the property or adjacent/nearby properties such that you would have specialized knowledge of the chemicals and processes used by this type of business?)	✓			
7.	Does the purchase price being paid for this property reasonably reflect the fair market value of the property? If you conclude that there is a difference, have you considered whether the ***devalued purchase price*** is because contamination is known or believed to be present at the property? (Please reply in **Comment** section)			✓	
8.	Are you aware of ***commonly known or reasonably ascertainable information*** about the property or nearby properties that would help ENPRO to identify conditions indicative of releases or threatened releases? (For example, neighboring property is known to have once been a vehicle junk yard)				
9.	Do you know any ***past uses*** of the property which may have contributed to potential contaminant releases?		✓		
10.	Do you know of any ***specific chemicals*** that are present or once were present at the property?		✓		[illegible] lead
11.	Do you know of any ***spills or other chemical releases*** that have taken place at the property?	✓			Oil [illegible] - cleaned
12.	Do you know of any ***environmental cleanups*** that have taken place at the property?	✓			See 11.
13.	Based on your knowledge and experience related to the property, are there any ***obvious indicators*** that point to the presence or likely presence of contamination at the property?		✓		
14.	a.) Is the ***property*** used for an industrial use?	✓			
	b.) Are any ***adjacent properties*** used for an industrial use?	✓			
15.	a.) Has the ***property*** been used for an industrial use ***in the past***?		✓		
	b.) Have any of the ***adjacent properties*** been used for an industrial use ***in the past***?	✓			

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PROJECT NAME/ADDRESS: Kalaeloa Harbors

	Question	Response			Comment
		Yes	No	U/ NR	
16.	a.) Is the ***property*** used as a gasoline station, motor repair facility, commercial printing facility, dry cleaners, photo developing laboratory, junkyard or landfill, or as a waste treatment, storage, disposal, processing, or recycling facility?		✓		
	b.) Are any of the ***adjacent properties*** used as a gasoline station, motor repair facility, commercial printing facility, dry cleaners, photo developing laboratory, junkyard or landfill, or as a waste treatment, storage, disposal, processing, or recycling facility?			✓	Mirfokalu Industrial Park (night)
17.	a.) Has the ***property*** been used ***in the past*** as a gasoline station, motor repair facility, commercial printing facility, dry cleaners, photo developing laboratory, junkyard or landfill, or as a waste treatment, storage, disposal, processing, or recycling facility?		✓		
	b.) Have any of the ***adjacent properties*** been used ***in the past*** as a gasoline station, motor repair facility, commercial printing facility, dry cleaners, photo developing laboratory, junkyard or landfill, or as a waste treatment, storage, disposal, processing, or recycling facility?	✓			
18.	a.) Are there ***currently*** any automotive or industrial **batteries** damaged or discarded, or **pesticides, paints, or other chemicals** in individual containers of greater than five gallons in volume or fifty gallons in the aggregate, stored on, or used at the ***property*** or at the *facility*?			✓	
	b.) Have there been ***previously*** any automotive or industrial **batteries** damaged or discarded, or **pesticides, paints, or other chemicals** in individual containers of greater than five gallons in volume or fifty gallons in the aggregate, stored on or used at the ***property*** or at the *facility*?			✓	
19.	a.) Are there ***currently*** any industrial **drums** (typically 55-gallon) or **sacks of chemical** located on the ***property***?			✓	
	a.) Have there been ***previously*** any industrial **drums** (typically 55-gallon) or **sacks of chemical** located on the ***property***?			✓	
20.	a.) Are there ***currently*** any ground water monitoring wells or other **ground water wells** (e.g., drinking water wells) located on the ***property***?	✓			
	b.) Have there been ***previously*** any ground water monitoring wells or other **ground water wells** (e.g., drinking water wells) located on the ***property***?	✓			
21.	a.) Are there ***currently*** any ground water monitoring wells or other **ground water wells** (e.g., drinking water wells) located on any of the ***adjacent properties***?			✓	
	b.) Have there been ***previously*** any ground water monitoring wells or other **ground water wells** (e.g., drinking water wells) located on any of the ***adjacent properties***?			✓	

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PROJECT NAME/ADDRESS: Kalaeloa Harbors

	Question	Response			Comment
		Yes	No	U/ NR	
22.	a.) Has ***fill dirt*** been brought onto the property which originated from a ***contaminated site?***		✓		
	b.) Has ***fill dirt*** been brought onto the property which is of ***unknown origin?***		✓		
23.	a.) Are there ***currently*** any ***pits, ponds or lagoons*** on the property in connection with waste treatment or waste disposal?		✓		
	b.) Have there been ***previously*** any ***pits, ponds or lagoons*** on the property in connection with waste treatment or waste disposal?		✓		
24.	a.) Is there ***currently*** any ***stained soil*** on the property?		✓		
	b.) Has there been ***previously*** any ***stained soil*** on the property?		✓		
25.	a.) Are there ***currently*** any registered or unregistered ***storage tanks*** (above ground or underground) located on the property?	✓			GTP Facility
	a.) Have there been ***previously*** any registered or unregistered ***storage tanks*** (above ground or underground) located on the property?		✓		
26.	a.) Are there ***currently*** any ***vent pipes, fill pipes, or access ways indicating a fill pipe*** protruding from the ground on the property ***or*** adjacent to any structures on the property?		✓		
	b.) Have there been ***previously*** any ***vent pipes, fill pipes, or access ways indicating a fill pipe*** protruding from the ground on the property ***or*** adjacent to any structures on the property?		✓		
27.	a.) Are there ***currently*** any ***flooring, drains, or walls*** located within the structure(s) on the property that are stained by substances other than water ***or*** are emitting foul odors?		✓		
	b.) Have there been ***previously*** any ***flooring, drains, or walls*** located within the structure(s) on the property that are stained by substances other than water ***or*** are emitting foul odors?		✓		
28.	a.) ***If the property is served by a private well*** or non-public water system, ***have contaminants been identified*** in the well or system that exceed guidelines applicable to the water system?		✓		
	b.) ***If the property is served by a private well*** or non-public water system, ***has the well been designated as contaminated*** by any government environmental/health agency?		✓		
29.	a.) Are there any ***environmental liens or government notifications*** relating to ***current violations*** of environmental laws with respect to the property or any facility located on the property?				
	b.) Are you aware of the ***past existence*** of any ***environmental violations*** of environmental laws with respect to the property or any facility located on the property?		✓		

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PROJECT NAME/ADDRESS: Kalaeloa Harbors

	Question	Response: Yes	Response: No	Response: U/ NR	Comment
30.	a.) Have you been informed of the existence of any ***hazardous substances or petroleum products*** which are ***currently*** used or stored on the property?	✓			Level information not encountered
	b.) Have you been informed of the ***past*** existence of any ***hazardous substances or petroleum products*** used or stored on the property?	✓			"
31.	a.) Are you ***aware*** of any ***previous Environmental Site Assessments*** of the property or facility which indicated the presence of ***hazardous materials or petroleum products?***	✓			"
	b.) Are you aware of any ***previous Environmental Site Assessments*** which indicated the ***contamination of the property or facility?***	✓			"
	c.) Are you aware of any ***previous Environmental Site Assessments*** which ***recommended further assessment*** of the property or facility?		✓		
32.	a.) Are you ***aware*** of any ***pending, threatened, or past litigation*** relevant to hazardous substances or petroleum products involving the property?		✓		
	b.) Are you aware of any ***pending, threatened, or past administrative proceedings*** relevant to hazardous substances or petroleum products involving the property?		✓		
	c.) Are you aware of any notices from any government entity regarding any ***possible violations*** of environmental laws or ***possible liability*** relevant to hazardous substances or petroleum products involving the property?		✓		
33.	a.) Does the property ***discharge waste water*** on or adjacent to the property, other than storm water, into a ***storm water sewer system?***		✓		
	b.) Does the property ***discharge waste water*** on or adjacent to the property, other than storm water, into a ***sanitary sewer system?***	✓			
34.	Have any hazardous substances or petroleum products, unidentified waste materials, tires, automotive or industrial batteries, or any other waste materials been ***dumped above grade, buried, and/or burned on the property?***		✓		
35.	Is there any ***transformer, capacitor, or any hydraulic equipment*** on the property for which there are any records of the presence of ***PCBs?***		✓		
36.	a.) Is there now, or have there ever been any ***asbestos-containing materials (ACM)*** in any application on the property?		✓		
	b.) Has there ever been any ***testing for ACM*** conducted on the property?		✓		

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PROJECT NAME/ADDRESS: Kalaeloa Harbors

	Question	Response: Yes	Response: No	Response: U/ NR	Comment
36.	c.) Is there an ***asbestos Operations and Maintenance*** (O & M) program in place at the property?		✓		
37.	a.) Is there now, or have there ever been any ***Lead-Based Paint (LBP)*** in any application on the property?		✓		
	b.) Has there ever been any ***testing for LBP*** conducted on the property?		✓		
	c.) Is there a ***LBP O & M*** program in place at the property?		✓		
38.	Has the ***water*** at the property ever been tested for ***lead?***		✓		
39.	Has ***radon testing*** ever been conducted at the property?		✓		
40.	Is the property, or any portion of the property, located or involved in any ***Ecologically Sensitive Areas*** (i.e., wetlands, coastal barrier resource areas, coastal barrier improvement act areas, flood plain, endangered species, etc.)?		✓		
41.	a.) Is the property, ***or*** any property within 1.0 mile of the property, listed on the Federal ***National Priorities List (NPL)?***			✓	
	b.) Is the property, ***or*** any property within 0.5 miles of the property, listed on the Federal ***CERCLIS List?***			✓	
	c.) Is the property, ***or*** any property within 1.0 mile of the property, listed by the Federal government as a ***RCRA TSD Facility?***		✓		
42.	a.) Is the property, ***or*** any property within 1.0 mile of the property, listed by the State government as a ***Hazardous Waste site?***			✓	Old sites not encountered
	b.) Is the property, ***or*** any property within 0.5 miles of the property, listed by the State government as a ***CERCLIS-equivalent site?***			✓	
	c.) Is the property, ***or*** any property within 0.5 miles of the property, listed by the State as a ***Leaking Underground Storage Tank (LUST) site?***		✓		
	c.) Is the property, ***or*** any property within 0.5 miles of the property, listed by the State as a ***Solid Waste/Landfill facility?***		✓		

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PROJECT NAME/ADDRESS: Kalaeloa Harbors

Respondent Affirmation:

Respondent represents that to the best of the respondent's knowledge the above statements and facts are true and correct and to the best of the respondent's actual knowledge, no material facts have been suppressed or misstated.

Signature _____ Date 5/7/13
(For oral communications, the word "Affirmed" appears on the signature line)

or

Answers to this questionnaire have been orally communicated to a representative of Environmental Professionals, completed by:

Name _____ Signature _____ Date _____

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From: Dean.Watase@hawaii.gov
To: Roberta Bitzer
Cc: Barbara Natale; Kawika McKeague
Subject: Kalaeloa Harbor: ESA Questionnaire
Date: Thursday, May 16, 2013 7:09:45 AM
Attachments: 2011-05 Phase I ESA Kalaeloa Aquisition (Tetra Tech)..pdf

Good morning Roberta,

Randal from our environmental section provided the below. As he indicated, all information should be confirmed. Regarding Question 25, there is a Phase I ESA on the acquisition parcel, attached. Please confirm receipt of this.

Mahalo

Dean Watase, Senior Planner
Department of Transportation, Harbors Division
79 South Nimitz Highway
Honolulu, HI 96813
Phone: 587-1883
Fax: 587-2504

----- Forwarded by Dean Watase/HAR/HIDOT on 05/16/2013 06:43 AM -----

From: Randal Leong/HAR/HIDOT
To: Dean Watase/HAR/HIDOT@HIDOT,
Date: 05/15/2013 04:56 PM
Subject: Re: Kalaeloa Harbor: ESA Questionnaire

Dean,
I only have superficial knowledge. Your consultant will need to do some research. I've added a bit more about what I know in blue.

Randal Leong
Department of Transportation, Harbors Division
Engineering Branch
Phone: (808)587-1962, -1878; Fax: (808)587-1864
E-mail: randal.leong@hawaii.gov

Dean Watase/HAR/HIDOT
05/15/2013 03:43 PM

To Randal Leong/HAR/HIDOT@HIDOT,
cc
Subject Kalaeloa Harbor: ESA Questionnaire

The environmental consultant is requesting some clarifications to some of the responses. Would you be able to respond?

Mahalo
.....

Dean Watase, Senior Planner
Department of Transportation, Harbors Division
79 South Nimitz Highway
Honolulu, HI 96813
Phone: 587-1883
Fax: 587-2504

----- Forwarded by Dean Watase/HAR/HIDOT on 05/15/2013 03:26 PM -----

From: Roberta Bitzer <rbitzer@enproenvironmental.com>
To: "dean.watase@hawaii.gov" <dean.watase@hawaii.gov>,
Date: 05/15/2013 10:26 AM
Subject: questionnaire- Kalaeloa Harbor

Dean,

Below are the questions I have for you, based on your answers to our questionnaire:

5.	Are you aware of any ***Activity and Use Limitations (AULs)***, including engineering controls, land use restrictions, or institutional controls that are in place at the property and/or have been filed or recorded in a registry under federal, tribal, state, or local law?	You said there is encapsulated lead contaminated soil. I received a report entitled Excavation and Disposal of Lead Contaminated Soil for Pier P-7 and Storage Yard S-6. Are these the areas that you referred to in the questionnaire?

Yes

11.	Do you know of any ***spills or other chemical releases*** that have taken place at the property?	You stated "oil lines leaks- contained". Could you please indicate the location of the leaks, the source, the affected media, the approximate date and who contained/cleaned up the leak?

It was in the pipeline easement; they should check with the operators who addressed the matter. Don't recall exactly when happened.

17.	a.) Has the ***property*** been used ***in the past*** as a gasoline station, motor repair facility, commercial printing facility, dry cleaners, photo developing laboratory, junkyard or landfill, or as a waste treatment, storage, disposal, processing, or recycling facility?	
	b.) Have any of the ***adjacent properties*** been used ***in the past*** as a gasoline station, motor repair facility, commercial printing facility, dry cleaners, photo developing laboratory, junkyard or landfill, or as a waste treatment, storage, disposal, processing, or recycling facility?	You checked the "yes" box. Could you please indicate the specific use of the adjacent property?

The Malakole industrial subdivision adjacent has many of these uses.

20.	a.) Are there ***currently*** any ground water monitoring wells or other **ground water wells** (e.g., drinking water wells) located on the ***property***?	Is it groundwater monitoring wells or other type? Please indicate the location.

There were ground water monitoring wells used during the construction of the expansion project. Probably abandoned. Don't know locations.

25..	a.) Are there ***currently*** any registered or unregistered ***storage tanks*** (above ground or underground) located on the property?	Please indicate if above or under ground, the location of GRP facility and fuel type.

Dean should know which parcel Grace leases from the State.

42.	a.) Is the property, ***or*** any property within 1.0 mile of the property, listed by the State government as a ***Hazardous Waste site?***	You mentioned an "old steel site encapsulated". Please indicate the location.

On the corner of Honua (mauka extension) and Malakole Road. Believe site has solar panels now. May be more than a mile from harbor though.
Thank you!

Roberta Bitzer
Project Manager

environmental ENPRO

151 Hekili Street Suite 210 Kailua HI 96734
Direct Line: 808-748-2111
Ph: 808-262-0909 Fx: 808-262-4449
www.enproenvironmental.com

QUALIFICATIONS



Kenton Beal
Executive Vice President

CAREER HISTORY

Twenty years of professional environmental project development and management. Strong emphasis on risk evaluation, risk ranking and environmental hazard assessment. Experienced in portfolio-wide environmental management and prioritizing resource allocation to address environmental liabilities in a cost effective manner. Has developed thousands of project budgets for planning and implementation purposes. Performed numerous RCRA hazardous waste characterization investigations, Phase I and II environmental investigations, remediation of soil and groundwater and environmental management of large construction projects. Projects have included urban renewal, remediation management at petroleum refineries, best management practices, storm water management, solid waste management, construction-related permitting, indoor air quality evaluations, closure of RCRA Treatment Storage and Disposal (TSD) facilities, remediation management for fungal contamination, evaluation of environmental issues related to lease disputes and commercial property transactions. Has performed and managed hundreds of mold and moisture investigations ranging from single-family residential properties to high-rise commercial and resort properties.

PROFESSIONAL AFFILIATIONS

Registered Environmental Assessor (California)
Past President, Hawaii Chapter of the Institute of Hazardous Materials Managers
Registered Geologist (California)
Certified Professional Geologist (American Institute of Professional Geologists)
American Indoor Air Quality Council (Board of Directors, Hawaii Chapter)
Certified Indoor Environmentalist (Indoor Air Quality Association)
Certified in Mold Loss Prevention (Indoor Air Quality Association)
American Industrial Hygiene Association

EDUCATION

MBA, Hawaii Pacific University, 2001
M.S., Geology and Geophysics, University of Hawaii, 1987
B.A., Geology, University of California at Santa Barbara, 1984

GEOGRAPHIC EXPERIENCE

Successfully completed projects throughout the major Hawaiian Islands, Guam, Saipan, CNMI, Puerto Rico, Japan, and throughout the United States

ENVIRONMENTAL INVESTIGATION/ REMEDIATION EXPERIENCE

Projects have included wood treatment facilities, petroleum refineries, underground storage tank (UST) sites, agricultural facilities, urban renewal projects, petroleum bulk storage terminals impacted with free floating petroleum hydrocarbons, dry cleaners, and a variety of commercial/industrial facilities. Received No Further Action status at multiple sites from the State of Hawaii Department of Health. Successful experience with investigation and remediation projects for real property transfers and redevelopment. Design of corrective measures for indoor air quality complaints. Mold and moisture training, prevention and response planning.

Kenton Beal
Executive Vice President

SPECIALIZED TRAINING

Mold Loss Prevention, Indoor Air Quality Association
Groundwater Flow through Porous and Fractured Media, University of Wisconsin-Madison
Corrective Action for Containing and Controlling Ground Water Contamination, National Water Well Association
Basic Ground Water Modeling, National Water Well Association
Project Management, University of Hawaii
Clean Air Act Amendment 112 ®, U.S. EPA
Management & Supervision of Hazardous Waste Operations, Unitek Environmental Consultants
AHERA Asbestos Management Planner
AHERA Asbestos Inspector
HVAC and the Indoor Environment, American Indoor Air Quality Council
IICRC S520 Mold Remediation Guideline, American Indoor Air Quality Council
Case Studies in Environmental Mold, American Industrial Hygiene Association
Health Effects of Mold, American Indoor Air Quality Council
40-hour Hazwoper Training and Refreshers, Various
Understanding Environmental Sampling and Data Analysis
Managing Uncertainty with Sytematic Planning

PROFESSIONAL PRESENTATIONS

Storm Water Monitoring, Law Seminars International, Honolulu
Mold Remediation Boot Camp, Las Vegas
Mold University™, Honolulu and Houston
Indoor Air Quality for Property Managers, San Francisco, Honolulu, Las Vegas, Los Angeles
Mold Report™, San Francisco, Honolulu, Las Vegas, Los Angeles
Mold Awareness, International Executive Housekeepers Association
Advanced Conference on Real Estate, Law Seminars International
Hot Topics in the Mold Industry, American Indoor Air Quality Council, Hawaii
Mold Investigation Training, Pensacola, Fort Lauderdale, Orlando, Tampa, Florida
Environmental Investigation for Emergency Services, Burbank and Long Beach California
Multi-Family Residential Development, Lohrman Education Services
Environmental Law Seminar A to Z, NBI, Inc.

Roberta Bitzer
Project Manager

CAREER HISTORY

Experienced in conducting ASTM Standard Phase I Environmental Site Assessments.

Experienced in conducting Phase II Environmental Site Assessments.

Served as project manager for risk evaluation for a large trust estate. Evaluation involved ranking sites by relative risk and establishing recommendations for further investigation and/or remediation.

Risk evaluation and site assessment work has addressed PCBs, petroleum-related contaminants, pesticides, asbestos, metals, USTs, and non-point source contaminants. Review of federal, state and county databases and regulatory files pertaining to environmental issues as well as Environmental Impact Statements.

Experienced in conducting Limited Survey for Moisture Intrusion and Visible Suspect Mold, Indoor Air Quality Investigations, Hazardous Materials Surveys and Environmental Site Assessments for Asbestos Containing Building Materials, including development of remediation protocols. Evaluation of indoor environments and microbiological laboratory data to assess the extent of fungal contamination and/or the efficacy of mold remediation projects (post remediation verification).

Research experience includes writing, research, and fieldwork in support of the preparation of a dissertation and a thesis; and investigation of the larvicidal activity of plant extracts against mosquito larvae of *Aedes aegypti* and *Culex quinquefasciatus*.

Experience working with public and private special interest groups.

EDUCATION

B.S. Biology, 2002. Universidade Estadual do Norte Fluminense do Norte Fluminense – Rio de Janeiro, Brazil.

M.S. Exchange Program, 2004: The Environment, Economic Development and Quality of Life Nexus, US-Brazil Higher Education Consortia, Fairfield University – Connecticut, USA.

M.S. Environmental Sciences, 2006. Universidade Estadual do Norte Fluminense do Norte Fluminense – Rio de Janeiro, Brazil.

PUBLICATIONS

Roberta P. De Souza. *Organic Matter, Specific Surface Area, and Heavy Metal Interactions in Guanabara Bay Sediments.* Undergraduate Dissertation, Universidade Estadual do Norte Fluminense do Norte Fluminense – Rio de Janeiro, Brazil. Speciality: Environmental Sciences. 83p. 2002.

Roberta P. De Souza. *Heavy Metal Pollution in Guanabara Bay sediments*. Master's Thesis, Universidade Estadual do Norte Fluminense do Norte Fluminense – Rio de Janeiro, Brazil. Speciality: Environmental Sciences. 90p. 2006.

PRESENTATIONS

Roberta P. de Souza, Carlos E. Rezende, Luiz R. Gaelzer and Eliane R. Goncalez, *"Heavy Metal Pollution in Sediments of Guanabara Bay, Rio de Janeiro, Brazil," XIII International Conference on Heavy Metals in the Environment* – ICHMET held in Rio de Janeiro, Brazil, June 5 - 9, 2005.

Roberta Bitzer
Project Manager

SPECIALIZED TRAINING

Training in Environmental Management System Auditing, March 21 and 27, 2005.
Training in EPA All Appropriate Inquiries by the HDOH and USEPA; June 14, 2007
Training in Asbestos and Lead Paint Regulations; September, 2007
Training in Managing Multiple Priorities; September, 2007
Training in Building Science and Understanding Building Failures; May, 2008
Training in HVAC & Mold Remediation; November, 2008

CERTIFICATIONS

Certified Asbestos and Lead Paint Inspector

LANGUAGE SKILLS

Portuguese and Spanish.

AWARDS

FIPSE/CAPES Scholarship, 2004.
CNPq Scholarship, 2003/2004.
Research Institute for Marine Ecosystems Almirante Paulo Moreira Scholarship, 2002.
FAPERJ Scholarship, 2001.

Appendix G
Fuels Market in Hawai‘i:
Current Situation and Future Prospects
(Facts Global Energy)

Fuels Market in Hawaii:

Current Situation and Future Prospects

Submitted to

Department of Transportation, State of Hawaii

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1. Fuels Market in Hawaii

1.1. Energy Overview

It is often said that Hawaii is the most fossil-fuel-dependent state in the US. Depending on how the issue is defined, this may or may not be correct. States like North Dakota both use and produce more fossil fuels per capita, or as a percent of energy supply, than Hawaii.

In truth, such hair splitting metrics are unimportant. Hawaii is unique among US states in that almost all of its energy is imported from foreign sources. Hawaii has very little access to primary energy apart from foreign imports.

'Primary energy' includes all energy inputs—including the energy used to make other energy. Primary energy includes crude oil, coal, natural gas, nuclear energy, the heat generated from burning biomass, the energy contained in hydropower or wind, the heat captured by solar water heaters, etc.

Electricity, on the other hand, is a secondary energy source, which is generated from primary energy. Oil products such as gasoline, jet fuel, or diesel, are also secondary energy sources, as they are made from crude oil.

Hawaii's primary energy demand pattern is dramatically different from the pattern seen in the US as a whole. The figure below shows the shares of primary energy provided by different energy sources in Hawaii and the US for 1990 and 2011.

In 1990, oil was about 40% of total primary energy demand, while in Hawaii oil was an amazing 91% of primary energy.

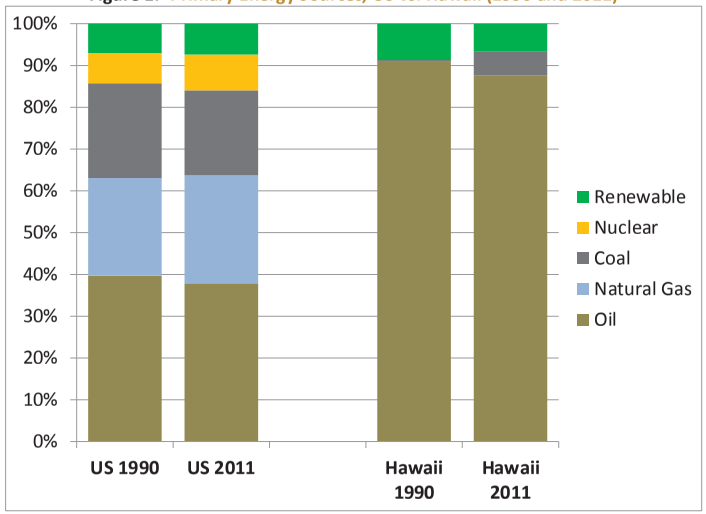
By 2011, oil's share of primary energy supply had fallen in both the US (38%) and Hawaii (88%). In the US overall, this was largely the result of increased use of natural gas, which pushed down reliance on both oil and on coal.

By contrast, in Hawaii the big change was the introduction of large-scale coal use at the AES power plant on Oahu.

It is surprising to note that renewable energy's share of total consumption in Hawaii actually dropped between 1990 and 2011. In fact, absolute consumption of renewable energy in Hawaii

dropped by nearly a third in this period—largely owing to the contraction of Hawaii's agricultural sector, which used a large amount of renewable agricultural waste (notably bagasse) as an energy source.

Figure 1: Primary Energy Sources, US vs. Hawaii (1990 and 2011)

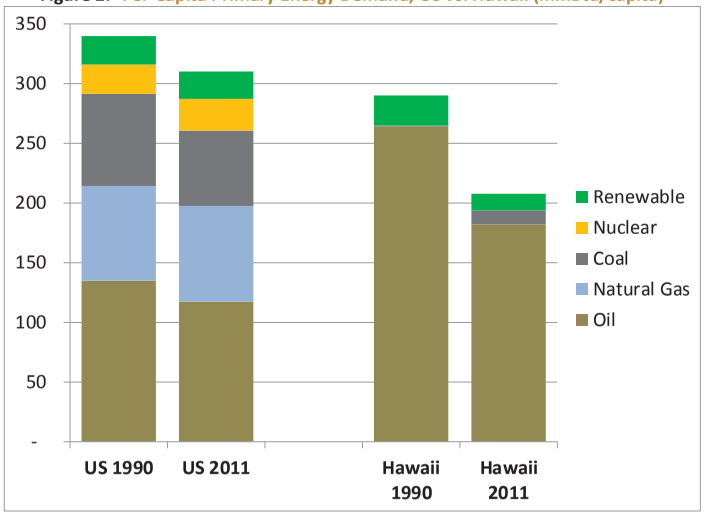


If we add up the fossil fuels (oil, natural gas, and coal), it is clear that Hawaii's percent reliance on fossil fuels is somewhat above the national average (84% fossil fuels in the US total, 93% in Hawaii).

However, working solely with percentages masks some important facts. While the share of fossil fuels in Hawaii's overall primary energy supply is considerably higher than the US average, the average use of primary energy per person is far higher in the US than in Hawaii.

This is shown clearly in the figure below, which shows use of energy by source per person. In 2011, the US used about 310 mmBtu per person, while Hawaii used only 208 mmBtu/person. (For reference, these correspond to the energy of about 53 barrels of oil per person for the US average, and 36 for Hawaii.)

Figure 2: Per-Capita Primary Energy Demand, US vs. Hawaii (mmBtu/capita)



There are many reasons that Hawaii uses less energy per capita than the US average. Space heating in Hawaii is nearly non-existent, and air conditioning is less common than on the mainland. Heavy industry and manufacturing, which tend to be energy-intensive, are more important on the mainland but relatively minor in Hawaii. Moreover, energy on average is far more expensive in Hawaii, giving stronger incentives to conserve.

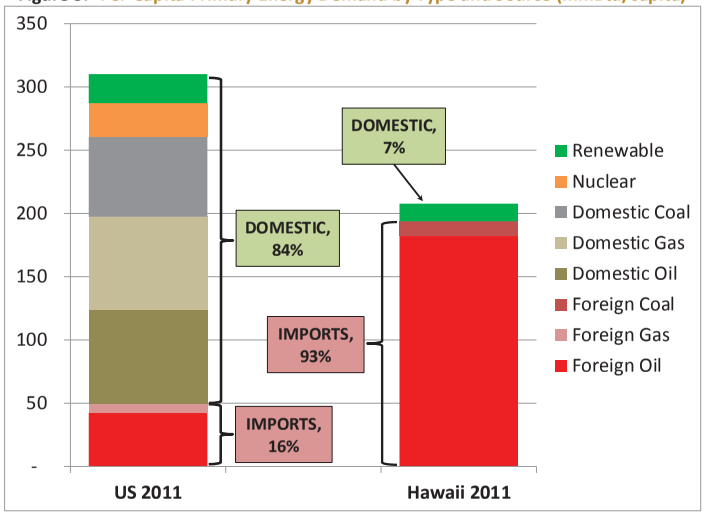
It is worth noting that Hawaii does not have the lowest per-capita consumption among US states. Several highly urbanized states—California, New York, Connecticut, and Rhode Island—have similar per capita consumption levels. States with highly energy-intensive industries and small populations, such as Wyoming, Louisiana, and Alaska, top the list, using more than four times as much primary energy per capita as Hawaii.

It is interesting to see that energy use per capita has fallen across these two decades—and fallen most strongly in Hawaii (a 9% drop in the US average versus a 28% drop in Hawaii). Some of this substantial decline is undoubtedly due to conservation (both policy and price-induced), but some of it is also due to curtailment of energy-intensive activities in Hawaii. (The drop in

renewable energy supply, as mentioned before, is largely due to the decline in plantation-style agriculture.)

Perhaps a more useful way to characterize the problem is by looking at the geographical sources of the energy supply. As the figure below shows, the US as a whole imports only about 16% of its energy supply (figured on a net basis). In Hawaii, the share of imports is 93%.

Figure 3: Per-Capita Primary Energy Demand by Type and Source (mmBtu/capita)



In both cases, the bulk of the imported energy is oil, but in the US today imported oil is a small fraction of the total; in Hawaii, it is the dominant energy source. (It should be noted that both Hawaii and the US as a whole do import some volumes of renewable energy, notably ethanol, but the volumes are too small to show on this graph.)

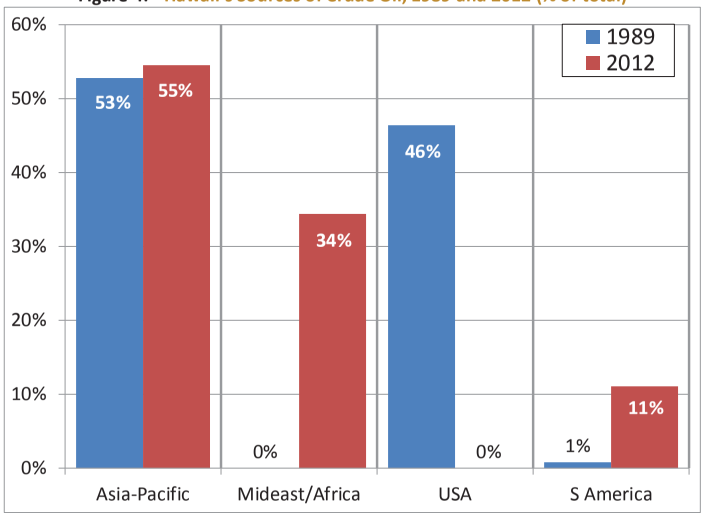
Some people are surprised to discover that Hawaii's energy imports are virtually all from foreign sources. In the case of coal, sulfur is a major determining factor, and coal imports generally arrive on term contracts from Indonesia and Australia.

Although occasionally some volumes of finished oil products are imported from the US mainland, US crude oil has virtually vanished from the crude diet. As the figure below shows, US

crudes—mainly Alaskan North Slope crude (ANS)—were once about half of the total crude supply to Hawaii.

The situation changed rapidly in the 1990s. In the 1970s and 1980s, there was a large surplus of ANS on the market. Even after US West Coast markets (including Hawaii) had been served, there was still so much crude that cargoes were shipped all the way to the US Gulf Coast and Caribbean via Cape Horn—a long and expensive voyage. But ANS production dwindled, and the 'surplus' vanished.

Figure 4: Hawaii's Sources of Crude Oil, 1989 and 2012 (% of total)



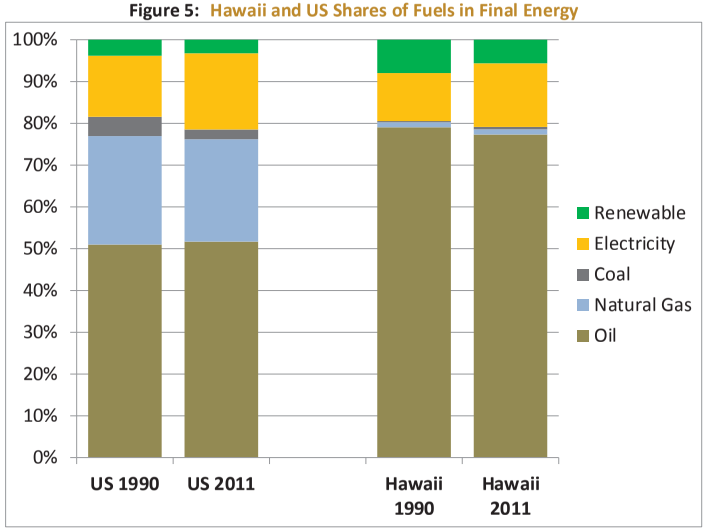
Perhaps even more important, environmental specifications began to change across the US, including in Hawaii. ANS produces fuel oil of about 1.8% sulfur, as compared to the 0.5% sulfur LSFO now used on Oahu. As will be discussed in the section on refining, for many good reasons the Hawaiian refineries did not make the kinds of investments most US West Coast refiners made; but tightening sulfur specifications made them increasingly dependent on imports of low-sulfur crudes.

Although the US does produce low-sulfur ('sweet') crudes, most of them are produced on the Gulf Coast and in the Great Plains. US West Coast (and most Canadian crudes) are largely heavy, high-sulfur crudes than cannot be processed in Hawaii's refineries. The quest for low-sulfur crudes has taken the purchasing patterns of Hawaii's refiners far afield: substantial volumes are now imported from as far as Argentina and West Africa.

Thus, Hawaii's crude imports are virtually all low-sulfur crudes—the least common and most expensive sorts of crude. Add in long sea voyages that stretch to the South Atlantic and Hawaii ends up with one of the most expensive crude slates on the planet.

Up to this point, we have focused on primary energy. The overall picture does not change much if we consider final energy, the energy used by ultimate customers (excluding transformation industries such as power generation).

Figure 5: Hawaii and US Shares of Fuels in Final Energy



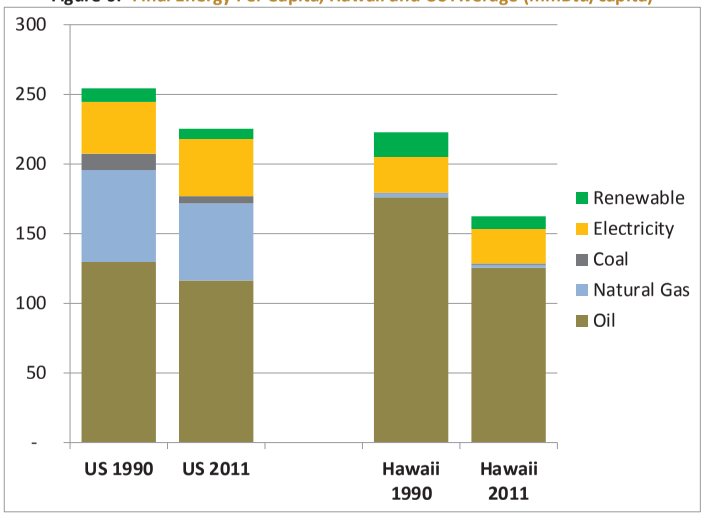
Hawaii's share of oil in final energy is much higher than the US average—but the total fossil-fuel shares in end-use energy are quite similar. The difference is that Hawaii end-users consume very little coal or natural gas, and this share is made up for by oil. (The small amount of natural

gas consumed in Hawaii is not in fact natural gas at all, but SNG—synthetic natural gas—manufactured from oil products.)

As with primary energy, looking at shares of demand demonstrates one kind of point, but masks others. For completeness, it is worth looking at comparative per-capita final energy. In terms of energy used by final consumers (as opposed to utilities or other energy enterprises), the results are rather surprising.

In 2011, the per capita demand for oil by final users is only about 8% higher than the national average. The much higher consumption of oil per capita in Hawaii compared to the US average is largely at the level of primary energy demand, and the difference is largely explained by the large volume of oil used to generate electric power.

Figure 6: Final Energy Per Capita, Hawaii and US Average (mmBtu/capita)



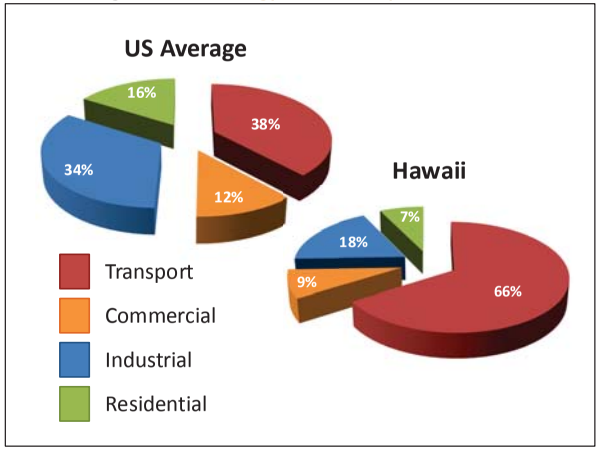
Hawaii's electricity demand per capita is lower than the US average. Much of this can be explained by the lower use of air conditioning, but the fact that Hawaii's electricity prices are the highest in the nation also plays a role.

At the end-use level, Hawaii uses more renewable energy than the national average. In earlier years, this reflected a higher use of biomass for direct heat, but it has recently been supplemented with a rapid growth in solar water heating.

Hawaii's final energy demand also differs in terms of which sectors consume the energy. There are many different ways of calculating sectoral energy use, which yield somewhat different results. The numbers used here are EIA's sectoral consumption excluding electrical line losses.

As the figure shows, the two biggest sectors in both Hawaii and the US at large are Transport and Industrial—but the proportions are quite different. Transport is 38% of US average demand, but two-thirds (66%) of demand in Hawaii. As might be expected, Industrial use is much more important on the US mainland. (Refinery energy use is a significant portion of Industrial use in Hawaii.

Figure 7: Final Energy Use Shares by Sector, 2011



In both Hawaii and the US as a whole, transportation energy use is largely provided by oil. This underlines an important point: even though Hawaii may be able to move away from oil in power generation (as is common in most of the world), unless other, more speculative measures are implemented, Hawaii is likely to remain heavily oil dependent owing to transportation energy use.

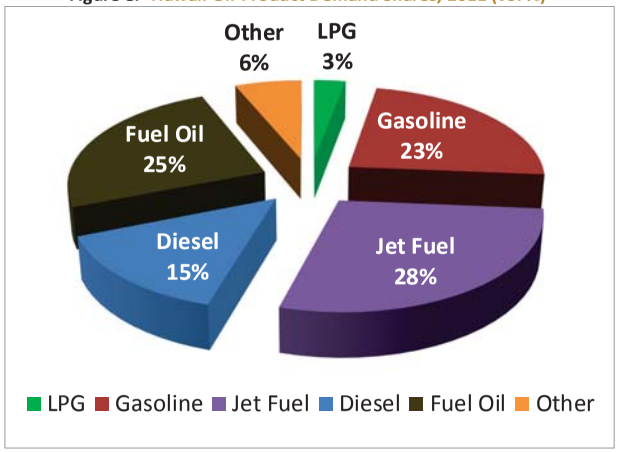
There are options for conserving transport energy—increased mass transit, more efficient vehicles, and increased use of bicycles or walking. There are also options for moving away from oil in transport—biofuels, natural-gas fuelled vehicles, or electric cars—but as of yet none of these provide comprehensive answers to oil dependence in transport. Of the goals set by the Hawaii Clean Energy Initiative, it is the transportation goals that have been assessed as possibly not feasible (in a report by NREL, the National Renewable Energy Laboratory).

As will be discussed later, this poses serious problems for Hawaii's refining industry. If fuel oil is driven out of the power sector but major demands for transport fuels remain, this creates a demand slate that is impossible for the refineries to match.

1.2. Current and Historical Petroleum Product Demand

When the press talks about oil, the discussion tends to focus on gasoline. In the US overall, gasoline is by far the most important fuel, accounting for 54% of all oil product demand.

Figure 8: Hawaii Oil-Product Demand Shares, 2011 (vol %)



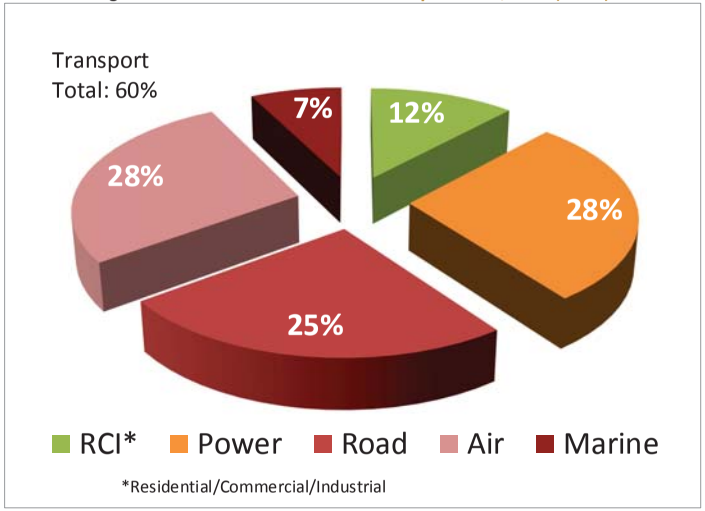
As the figure shows, however, in Hawaii it is a very different story. For Hawaii, jet fuel is the most important product, followed by fuel oil, with gasoline coming in third. Diesel, the second-most important fuel in the US (23% of demand), comes in fourth in Hawaii, at a mere 15%.

In terms of how oil products are used in Hawaii, transportation use accounts for 60% of the total volume. (The end-use distribution shown here should not be confused with final sectoral demands show earlier. Not only were those for total energy rather than barrels of oil, but they also did not include the demand of the power sector.)

The two largest demands for oil are air transport (which accounts for almost half of total transportation oil demand) and fuel for the power sector. Behind air transport comes road transport, which is dominated by gasoline.

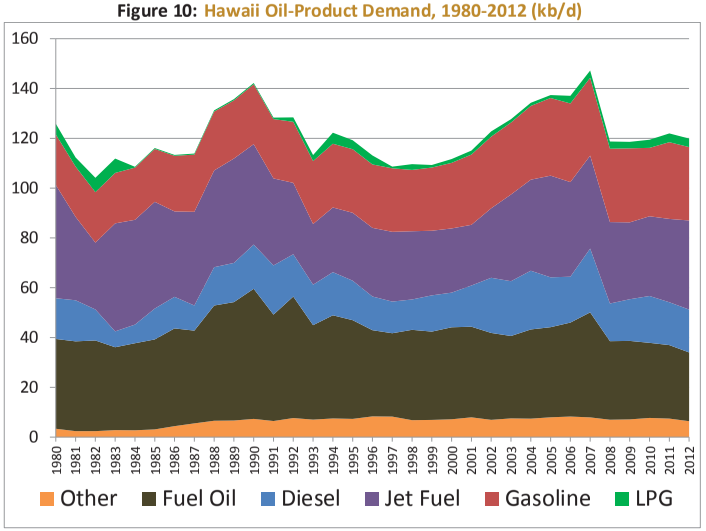
The total use of oil products in the residential, commercial, and industrial sector is a small share of the total. The smallest sector shown here is nonetheless one of the most important for Hawaii: marine transport, which accounts for almost all of the flow of goods in and out of the state and between the various islands.

Figure 9: Hawaii Oil-Product Demand by End-Use, 2011 (vol %)



The long-term history of Hawaii's overall oil demand doesn't show any clear trend. There are peaks and troughs, but total oil demand in recent years is not much different from the early 1980s or the mid-1990s.

Figure 10: Hawaii Oil-Product Demand, 1980-2012 (kb/d)



Although the picture suggests that Hawaii's demand is quite volatile, much of the volatility is a result of exposure to the world market. In the case of jet fuel, tourist arrivals are an obvious factor—but so is the growth of 'overflights,' where planes that once would have stopped in Hawaii partially as a convenient refueling site now fly direct between the US mainland and Asia. Similar volatility can be seen in the sharp peaks in demand for fuel oil and diesel. In typical years, most of the marine bunkering done in Hawaii is to serve ships that are loading or unloading cargoes in Hawaii. But in some years, logistics and pricing draw international marine traffic (such as the Japanese long-line fishing fleet) to Oahu specifically to purchase bunkers. This accounts for the recent sharp peak in demand in 2007, as well as much of the apparent surge in demand in the 1988-92 period. Onshore demand for fuel oil and diesel in those years was much flatter.

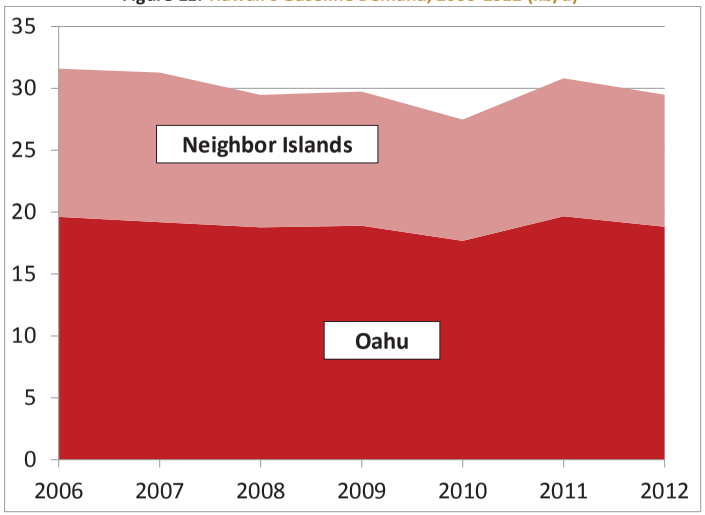
The 2007 peak is also accentuated by a significant drop (17%) in jet fuel demand between from 2007 to 2009. Higher oil prices and the world financial crisis hit travel hard, and was especially challenging for tourism.

To look at the more stable underlying trends in recent years, it is necessary to look at the most important individual fuels.

1.2.1. Gasoline

Gasoline is the most familiar oil product, and also generally the easiest to understand. Although there are uses for gasoline apart from ground transportation—such as aviation gasoline, some farm equipment, or small consumer items such as lawn mowers—the vast majority of consumption is for automobiles and small trucks.

Figure 11: Hawaii's Gasoline Demand, 2006-2012 (kb/d)



About two-thirds of Hawaii's gasoline is consumed on Oahu, which is slightly less than Oahu's share of state population. Longer driving distances, more dispersed population, and less mass transit on Neighbor Islands result in slightly higher consumption per capita.

Gasoline demand is sensitive to both price and to economic conditions. At the margin, it is affected by tourism, since tourists require ground transportation. In the 2006-2012 period, demand has been relatively flat, with a distinct decline in 2007-2010.

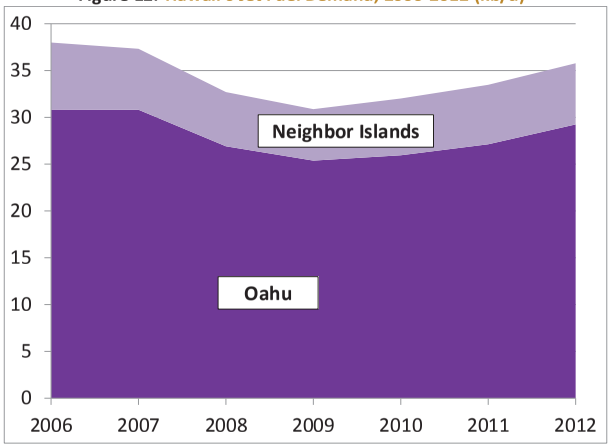
As will be discussed in Chapter 2, both State and Federal policy measures will affect Hawaii's gasoline demand in coming years.

1.2.2. Jet Fuel

Jet fuel is a special case in Hawaii. Not only is it the dominant fuel, it is also the only major fuel where the state is highly reliant on product imports. At present rates of throughput (see refinery sections later in this chapter), the Oahu refineries cannot meet demand, and significant imports of jet fuel have been a fact of life for many years.

It should be mentioned that the 'official' demand figures published by the State or by EIA generally underestimate jet fuel demand by a significant amount. In the case of State figures, the problem is that the data is garnered from tax assessments—and fuels for international flights are exempted. Therefore, the State data on Neighbor Island jet demand is relatively accurate, but underestimates jet demand on Oahu.

Figure 12: Hawaii's Jet Fuel Demand, 2006-2012 (kb/d)



In the case of EIA, the problem seems to be definitional with respect to bunkers, bonding status, and the Hawaii Free Trade Zone. Some of the fuel loaded onto some international flights has

never technically entered the US, and some international bunkers are not considered to be part of Hawaii's demand.

Despite any definitional quibbles, jet fuel is by far the most important fuel in Hawaii's demand barrel, and it is vital to account for the full volume of demand. HFFC has been kind enough to provide us with annual demand figures. As expected, their numbers match quite well with State data for the Neighbor Islands, but are considerably higher for Oahu.

Oahu's demand is consistently slightly more that 80% of the State's demand, which is not surprising giving that it is the site of arrival for international flights. Although direct flights between the Mainland and Neighbor Islands are common, Oahu is still the main portal to Hawaii for most travellers.

This may change somewhat in coming years, as more flights connect directly from the Mainland to Neighbor Islands. In addition, many tourism projections show the growth in tourist days on Neighbor Islands to increase more rapidly than tourism on Oahu. Nonetheless, any change in the proportions of consumption will be slow and incremental.

1.2.3. Diesel Fuel

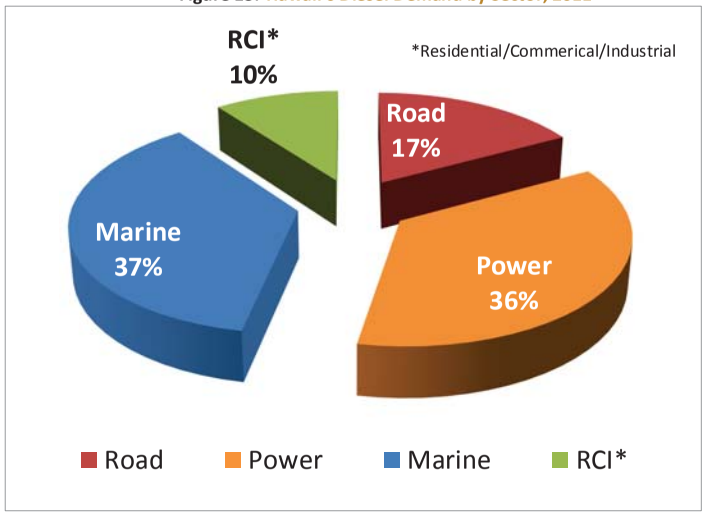
Diesel is in many ways the most complex of the major fuels—and its naming reflects this. Diesel is also referred to as distillate, home heating oil, light marine fuel, #2 fuel oil, gasoil, and several other names. Diesel is used in ground transport, marine transport, industrial heating, home heating, and in power generation.

Diesel specifications also vary widely. US road diesel today is ultralow sulfur diesel (ULSD), with a sulfur content of 0.0015% wt—far lower than almost any other product. (Compare this to the maximum of 0.3% allowed in international jet fuel—two hundred times higher!) Prior to 2007, however, 0.05% was allowed in road use in the US, and before 2000 much higher levels were allowed except when banned by state or local regulations.

In much of the world (including Europe) diesel rather than gasoline is the dominant fuel for road transport. Although Europe's road diesel is ultraclean, in other countries, sulfur content of road diesel still runs as high as 0.5%, and sulfur contents in the range of 0.5-1.5% are still common in non-road uses such as power generation or marine bunkers.

Although Hawaii has no demand for diesel in space heating, as the Figure below shows, diesel demand is scattered over many uses.

Figure 13: Hawaii's Diesel Demand by Sector, 2011

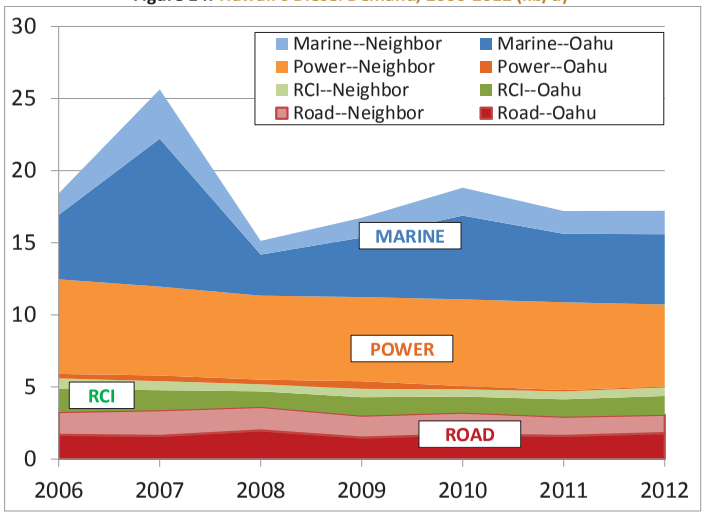


Marine and Power use account for nearly three-quarters of total demand, with the most familiar use of diesel, road transport, at only 17%.

The use of diesel in the Marine and Power sectors is not evenly spread across the state, however. As the figure below shows, most marine bunkering of diesel takes place on Oahu. As mentioned earlier, this market accounts for a great deal of the occasional large swings in oil demand; the Road, RCI and Power sector demands for diesel show little variation apart from a slow general decline.

The disproportion in demand between Oahu and Neighbor Islands is even larger for diesel in the Power sector. In this case, however, almost all the demand is in the Neighbor Islands. Diesel is a key fuel for power generation in the Neighbor Islands (particularly on Maui). On Oahu, diesel demand in the power sector is quite small, and diesel is used mainly for supplemental power in following fluctuating loads.

Figure 14: Hawaii's Diesel Demand, 2006-2012 (kb/d)



1.2.4. Fuel Oil

At one time, heavy fuel oil (also referred to as residual fuel oil, bunker fuel oil, Bunker C, Number 6 fuel oil or resid) was a widespread and important product. It was the main fuel for large international shipping, a key fuel for power generation, and an important direct-heating fuel for heavy industry.

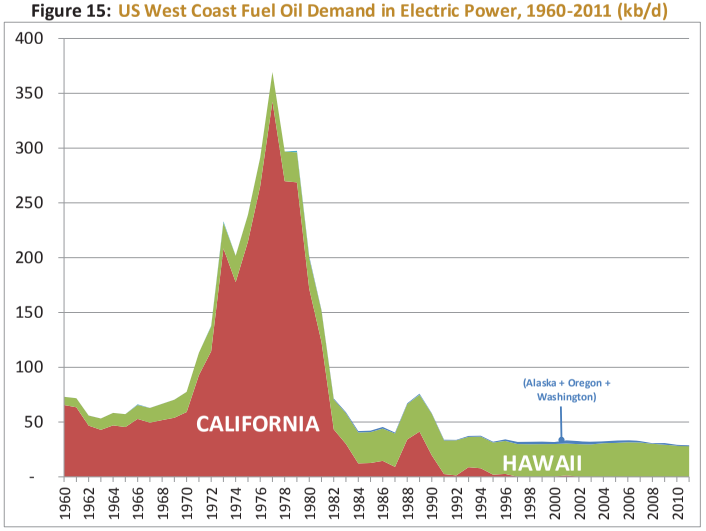
Two factors have changed this. First, beginning in the mid-1970s, the increase in oil prices drove users to replace oil with cheaper fuels wherever possible. In the case of power and industrial heat, the easiest oil to replace was fuel oil.

Second, tightening environmental standards have pushed fuel oil out of many uses. Heavy fuel oil is "the bottom of the barrel"—the portion of oil that is so heavy it did not boil at the temperatures of 650-700°F in a refinery's crude distillation tower. The pollutants such as sulfur, metals, and ash, are disproportionately concentrated in the heavy fuel oil.

For example, in the world's most-traded crude, Arab Light, the sulfur content of the crude oil is 1.8%. The sulfur content of the heavy fuel oil from Arab Light is 3.1%. For a low-sulfur crude, like Indonesia's Minas, the crude sulfur is 0.08%, but the sulfur in the fuel oil from Minas is about 0.13%. There are no hard-and-fast rules, but in general a heavy fuel oil can be expected to have 60-80% more sulfur than the crude from which it is made.

Although fuel oil demand in the power sector surged in the US in the 1960s and early 1970s, new environmental restrictions quickly drove it back out of the market. The figure below shows US West Coast demand for fuel oil in the power sector by state.

Figure 15: US West Coast Fuel Oil Demand in Electric Power, 1960-2011 (kb/d)



California's demand for fuel oil in electric power reached nearly 350 kb/d in the mid-1970s, but virtually vanished by the mid-1990s (and is zero today.) By contrast, Hawaii's demand for fuel oil in power grew to near its present level by the late 1970s, and has been comparatively steady across the period.

To put this in a broader context: In 2011, Hawaii consumed 98% of all the fuel oil consumed in the US West Coast power sector, and 70% of all the fuel oil consumed in the entire US power

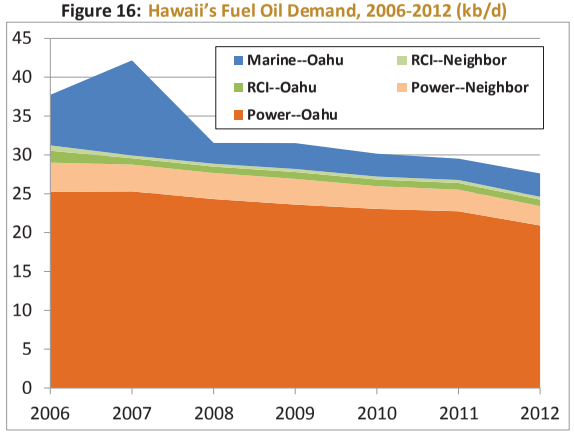
sector. It is somewhat astonishing that one small state can account for 70% of the nation's fuel oil consumed in electrical generation.

At the risk of belaboring the point, in 2011 despite the AES coal plant and various renewable energy projects, 82% of all of Hawaii's electrical power came from oil—most of it fuel oil. By contrast, oil generated less than 0.4% of the nation's total electricity.

Although the use of fuel oil in the power sector is now uncommon in the US (and rapidly disappearing in many countries), it is by far the dominant use of fuel oil in Hawaii. In 2011, 86% of all fuel oil use in the state was for electrical power (77% on Oahu and 9% on Neighbor Islands). As a result of conservation and the deployment of renewable power generation, the total demand for fuel oil in the power sector is on a slow decline.

As with diesel, the one volatile element of the overall demand picture is marine bunkering, where there was a sharp upward swing in 2007. In general, marine bunkering of fuel oil is small and tending to shrink; there is only a tiny volume used in interisland shipping (mainly for cruise ships), and in normal years bunkering is limited to ships that are already calling at Honolulu to discharge or load cargoes.

Figure 16: Hawaii's Fuel Oil Demand, 2006-2012 (kb/d)



The bulk of Hawaii's demand for fuel oil in the power sector is for the 0.5% sulfur fuel burned on Oahu. This low-sulfur fuel oil (LSFO) is a very minor product in the Pacific. Japan and Korea

continue to burn some volumes of LSFO, but it has been driven out of the market in most countries. The LSFO market long-ago disappeared on the US West Coast, and there is no Singapore spot market in LSFO. (There is still a market in the related product, low-sulfur waxy resid, but the supply of this product is now so thin and unpredictable that many buyers and sellers refuse to use it as a pricing basis.)

1.2.5. Other Oil Products

There are six other significant classes of oil products used in Hawaii:

- LPG
- Naphtha
- Lubricants
- Asphalt
- Unfinished oils
- Refinery gases

LPG. LPG in Hawaii is almost exclusively propane rather than the propane-butane mix common elsewhere. This is used as a heating and cooking fuel, and is a substitute for synthetic natural gas (SNG) where SNG is not available. Much of the LPG supplied to Hawaii is from the local refineries, but refinery production is insufficient to keep up with demand, so about a third of supply is imported.

LPG is presently somewhat less than 3% of Hawaii's oil-product demand, though its share has shown general growth in recent years.

LPG is unique in the Hawaiian context in that propane is frequently imported directly to Neighbor Island ports from foreign countries. With only rare exceptions, all other supply of products to Neighbor Islands originates from Oahu.

Naphtha. Naphtha is a light product in the same general boiling range as gasoline. Indeed, distillation of crude oil does not produce any gasoline; in that boiling range, it only produces naphtha, which may then be further processed (or blended with other intermediates) to produce saleable gasoline. Because of this, refiners tend to regard naphtha as gasoline that couldn't make the grade.

Apart from its use in gasoline, naphtha is primarily used as a solvent, or as a feedstock to various petrochemical processes. The main demand for naphtha in Hawaii is as a feedstock: all of Oahu's SNG is produced by HawaiiGas from naphtha (presently supplied by the HIE Refinery). There is a lot of confusion about 'naphtha,' however. There is material produced by the local refineries that is similar to naphtha in boiling range, but might be classed as 'naphtha' or as 'unfinished oils' or simply as 'other oil products.' Small but significant volumes (1-3 kb/d) of naphtha-range material is supplied to power plants on Kauai and Hawaii for use in gas turbine power plants. Different sources report these volumes under different names.

In addition, some classes of naphtha may be reported as 'gasoline blending components' (GBCs) depending on their planned use. Naphtha is not a major product in the state, but it is presently vital for a few uses (SNG, small power stations)—and also accounts for why many oil statistics in Hawaii do not balance out.

Lubricants: Lube oils are familiar to all car owners, but they are vital in a vast array of uses in virtually every sector. Because so many of these products are delivered in a packaged fashion, they are often treated as finished goods rather than fuels or oil products. Hawaiian refiners do not produce lube oils. Official statistics give the sale of lube oil in Hawaii as about 0.2 kb/d, but this is probably an underestimate.

Asphalt: Both of Hawaii's refineries have asphalt manufacturing units, but changes in product specifications over the previous decades have meant that the crudes now imported by the refiners (generally low-sulfur, and non-asphaltic) are poor inputs for producing asphalt. For this reason, asphalt and similar products are now generally imported.

Because of the small and specific nature of the trade, and because much of the asphalt supply comes from California and is not therefore 'imported,' official estimates of asphalt demand in Hawaii tend to be too low. Based on import levels and conversations with industry observers, asphalt consumption in Hawaii is typically in the range of 0.5-1.5 kb/d. Official numbers from EIA are considerably lower.

Unfinished Oils. This category has a large overlap with other categories, and reporting is inconsistent (not only from source to source, but from year to year from the same source). In Hawaii, naphtha is the material most likely to bounce back and forth between classification as a

product and classification as 'unfinished,' but it is also a problem for material in the diesel and fuel oil ranges.

The biggest issue with this is consumption inside the refineries themselves. When a refiner sells a product, it generally meets certain standards (many of them quite obscure to outsiders). When the refiner chooses to burn the same material inside the refinery, how it is classified is rather arbitrary, and it may simply be reported as 'internal fuel.'

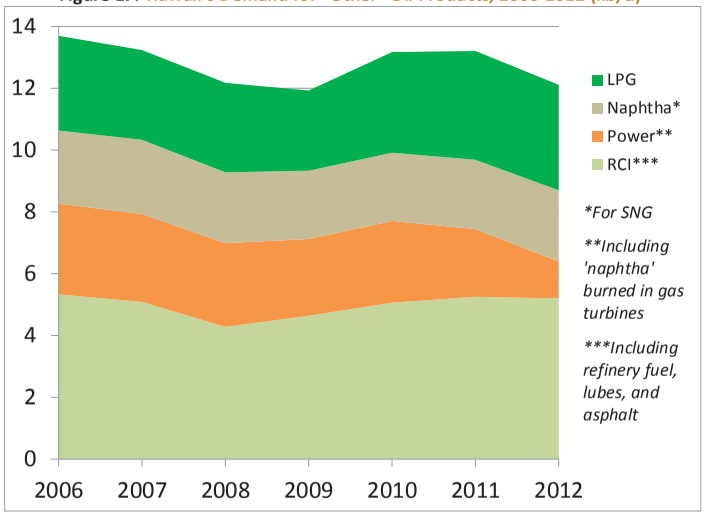
Refinery Gases: Refinery Gases are generally a mix of methane, ethane, light olefins, and miscellaneous compounds. Some of them are stripped out for feed to hydrogen units, but most of them end up burned as fuel inside the facility. Once again, these may be separately reported in this category, or lumped into 'internal fuel.'

Summary—Other Products: LPG is thankfully a separate and agreed-upon product. The other products here overlap, are underreported, and/or can change classification from year to year.

None of these are large-volume products, but all are important. Some of them—such as imports of asphalt and lubricants—can go on mostly below the radar in terms of existing infrastructure.

Some of the most important components of "Other Products" in terms of volume are the materials used as refinery fuel. These enter the state as crude oil, and never leave the refineries as finished products. In energy terms, they might amount to as much as 3% of consumption, but in volume terms (barrels) they are likely to be smaller because of volume gain in processing (and because some share of consumption is met by imports of products, notably jet fuel). Obviously, they are not an inherent element of required supply; that is, in the absence of refineries, there would be no production or demand for refinery fuels, and they do not affect product import needs.

Figure 17: Hawaii's Demand for "Other" Oil Products, 2006-2012 (kb/d)



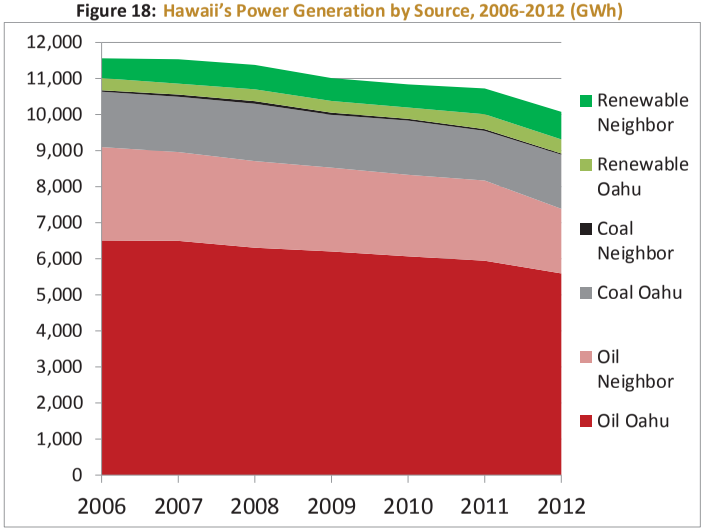
1.3. Fuels for Electric Power

The electric-power sector in Hawaii has undergone many changes in recent years. A combination of deliberate conservation plus price-induced conservation has pushed demand down slowly but steadily.

At the same time an increased drive for generation from renewable sources has taken the share of renewables in Hawaii's power mix from 7.5% of generation in 2006 to an estimated 11.5% in 2012.

With declining demand for power, a relatively steady role for coal, and increasing generation from renewables, the net effect has been a rather steep decline in power generation from oil—especially on the Neighbor Islands. Across the 2006-2012 period, generation from oil fell at an annualized rate of -3.4%, while renewables rose at 4.5%.

Figure 18: Hawaii's Power Generation by Source, 2006-2012 (GWh)



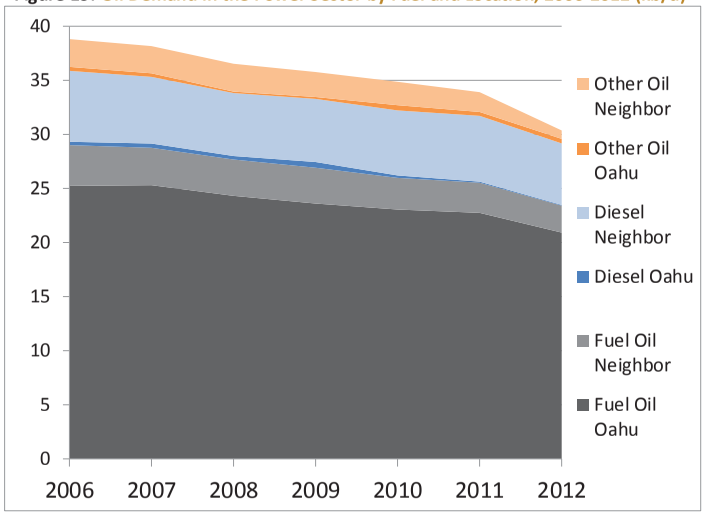
(Some caution needs to be applied in looking at power generation from various fuel sources, incidentally. The figures above are actual generation, but the most commonly cited figures are sales numbers. Power stations use significant amounts of electricity with the stations, and there are also losses in transmission lines. In total, the station consumption and the line losses amount to about 8% of the power generated—although that percentage varies by island, and tends to be lowest on Oahu. To determine future fuel demand, it is necessary to project future power sales, and also to project losses, since fuel is needed for the total of the two, not sales alone.)

The types and specifications of oil-products differ considerably between Oahu and the Neighbor Islands. On Oahu, the largest demand is for LSFO, low-sulfur fuel oil; this is supplemented with small volumes of very low-sulfur diesel and a tiny quantity of unfinished oil (burned mostly in the refineries).

Neighbor Islands burn fuel oil as well, but these volumes are much higher in sulfur than allowed on Oahu, consisting of various grades of MSFO and IFO (medium-sulfur fuel oil and industrial

fuel oil). The largest demand for oil in power on Neighbor Islands is for diesel, which also is allowed higher sulfur content than power diesel on Oahu. Finally, both Kauai and the Big Island burn significant volumes of unfinished oils, most of them with boiling points in the naphtha range.

Figure 19: Oil Demand in the Power Sector by Fuel and Location, 2006-2012 (kb/d)



There have been significant declines in every category of oil product in the power sector since 2006. The largest decline in volume terms has been LSFO on Oahu, which is by far the source of power in Hawaii; demand dropped by more than 4 kb/d (17%). In percentage terms, however, the largest decline has been in "other oil" on Neighbor Islands, where preliminary figures for 2012 suggest a decline of about two-thirds since 2006.

This chapter is intended to give an overview of the current situation in Hawaii; forecasts and scenarios are left for the second chapter. Nonetheless, it is useful to note that three major factors could (and likely will) alter the size and structure of oil demand in Hawaii's power sector:

1. **The HCEI and the Renewable Portfolio Standard (RPS).** HEI and others have signed agreements with the state to adhere to the renewable goals of the HCEI. There are various milestones, but the ultimate goal is for renewables to provide 40% of Hawaii's electric power by 2030. At the same time, conservation goals will rein in growth in power demand.
2. **LNG Imports.** LNG imports into Hawaii have been studied for several years, but only in the last year has the concept gained real traction. The largest and most obvious market for LNG is in the power sector, where it is possible that large volumes of oil could be displaced.
3. **New EPA emissions standards.** Although LSFO is generally considered a clean fuel, the new EPA standard coming into effect before the end of the decade places a whole series of tight new controls on emissions, especially emissions of metals and particulates. In general, fuel oils cannot meet these standards without adding 'scrubbers' at the back-end of the power plant. The cost of such changes in Hawaii has been estimated at over $1 billion. An option is to convert from fuel oil to low-sulfur diesel. Another option, which has not been well-studied, is to convert to a diesel-fuel oil blend.

The implications of all three of these factors will be examined in our scenarios in the next chapter.

1.4. Main Oil Supply Infrastructure

1.4.1. Oahu Oil Ports

Oahu is served by four major oil ports. Two are the offshore mooring buoys owned by the refiners. The other two are the Honolulu Marine Terminals (HMT, more than one pier in oil service), and the Kalaeloa Barber's Point Harbor (KBPH, presently only one pier in service).

The vast bulk of Hawaii's oil supply arrives through the Chevron or HIE offshore moorings, primarily in the form of crude oil. As will be seen below, a huge fraction of Oahu's overall oil tankage is at these two ports (especially if the Navy's underground reserve is excluded). The pipeline facilities themselves are capable of delivering more oil than Hawaii is ever likely to need, but the throughput system is designed for fairly large tankers.

Both Chevron and HIE have the capability to receive and send out products as well as crude oil—although the actual permits for their pipelines specify relatively limited movements of refined products. In practice, however, the system was designed for relatively large (by Hawaii standards) tankers, and the logistics of supplying small units such as barges for interisland traffic are unattractive. In general, both of the refinery terminals are designed for large-scale movements.

The oil-product piers at HMT and KBPH are primarily in the business of moving refined products from Oahu to Neighbor Islands via barge. There are some small exceptions to this, and one major exception (HFFC).

Both KBPH and HMT serve the needs for occasional imports of products for smaller buyers, as well as imports of minor products. They are also capable of supplying volumes of imports to the systems of the refiners, although they are not used for this purpose for crude oil or for large volumes of major products.

There are two major import terminals apart from those of the refiners. One is the Aloha terminal, which is served by the KBPH port facility. Aloha's tankage is not fully utilized for imports, but it is an important third oil-company presence in the market

The other major terminal is HFFC, which is served by Pier 51A at HMT. Although HFFC deals solely in aviation fuels, it is by far the largest importer of oil products into Hawaii, and is the third largest importer of oil (crude or products) overall.

HFFC's supply via Pier 51A faces serious supply difficulties. The pier is shared with a container operation, which are given priority over deliveries of jet, as well as other non-oil cargo operations. This problem became especially acute following the shutdown of the HIE refinery (although the HIE terminal remained active). When a tanker cannot berth and deliver its cargo on time, the buyer must generally pay demurrage fees, which significantly raises the cost of delivery (and the cost to the consumer).

KBPH faces similar problems in that the existing piers share functions between fuel and non-fuel uses.

The Oahu supply system has evolved in the presence of the refineries. If refinery operations were to close, the system could survive on product imports. But if the ports and terminals and

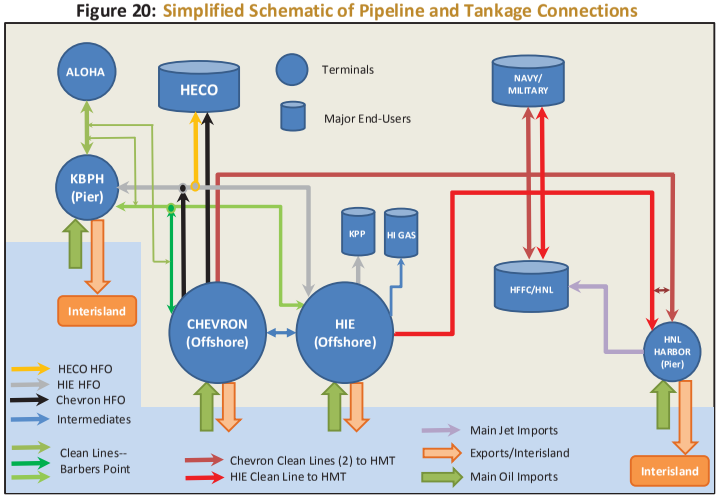
pipelines associated with both refineries were to close as well, KBPH and Pier 51A are not capable of handling Hawaii's import needs. Indeed, most observers would concede that Pier 51A is already overstretched by current demands.

1.4.2. Main Pipeline Connections

Pipelines, pipeline throughput agreements, and pipeline easements are a complex topic. The goal here is not to give a detailed description of the pipeline system, but to give a functional overview of the major connections. Even at the simplified level shown here, the system may seem somewhat Byzantine.

The figure below gives an abbreviated indication of how the pipeline system works. In some cases, a single pipeline shown here (for example, Chevron's clean products pipeline to Honolulu Harbor) is actually more than one line. In other cases, clean and dirty products may be carried on the same line. ('Dirty' or "black' products are crude oils and fuel oils whose properties are not harmed by mixture with other products. 'Clean' or 'white' products are those that must be kept clearly segregated, and, if there is any contamination, the contaminated portion must be downblended to lower grades of product. For obvious reasons, jet fuel is product which must be kept most segregated and uncontaminated.)

Figure 20: Simplified Schematic of Pipeline and Tankage Connections



HIE has two black lines, one from the refinery to KBPH, and one to the Kalaeloa Partners (KPP) power plant. The HIE-KBPH line has a HECO-owned spur line that serves HECO's fuel storage and distribution system.

HIE and KPP are tightly integrated. The power plant receives fuel oil (LSFO) from HIE, and has lines to return byproduct process steam to the refinery.

In earlier days, Chevron had a black line running to Honolulu Harbor, delivering fuel oil to the military and to HECO's Waiau power plant on the way. After HECO's supply line from Barbers Point to Waiau (not shown) was completed. Chevron then converted the black line to a clean line carrying gasoline and diesel.

Chevron has a direct connection to HECO's Barber Point tank farm and distribution system. Chevron can deliver fuel oil to KBPH through a tie-in to HIE's line.

Aloha has lines between its tankage and KBPH, as well as lines connecting to both refineries, and HFFC has lines for aviation fuels from Pier 51A at HMT to its tank farms.

Like Kalaeloa Partners, HawaiiGas has a direct connection to the HIE refinery for its unstabilized naphtha feedstock. Although HawaiiGas can receive naphtha from Chevron, this requires a transfer from Chevron to the HIE system, and from HIE through the pipeline to HawaiiGas.

Figure 21: Main Pipeline Connectivities Between Ports—Clean Products

FROM: \ TO:	CHEVRON	HIE	KBPH	HMT
CHEVRON		connected	only through HIE pipeline	connected
HIE	connected		connected	connected
KBPH	only through HIE pipeline	connected*		through HIE, then via Chevron or HIE*
HMT	connected*	connected*	through HIE, then via Chevron or HIE*	

*** not a common flow**

In terms of clean products, Chevron is well connected to HMT, but must rely on HIE pipelines to reach KBPH.

HIE has excellent connections to both KBPH and HMT.

KBPH and HMT are connected…but only through the HIE-KBPH line first, and then through either the Chevron or HIE clean lines to HMT.

The general situation is similar for black products, except that there is no longer (after conversion of the Chevron black line) any connection to HMT.

Figure 22: Main Pipeline Connectivities Between Ports—Black Products

FROM: \ TO:	CHEVRON	HIE	KBPH	HMT
CHEVRON		connected	only through HIE pipeline	no connection
HIE	connected		connected	no connection
KBPH	only through HIE pipeline	connected*		no connection
HMT	**no connection**	no connection	no connection	

*** not a common flow**

What are the key points of all these connectivities? Obviously Chevron is now less connected than HIE; and neither party can deliver fuel oil to neighbor islands via HMT.

These are minor issues, however. The most important point is that KBPH and HMT are only connected through the refiners' pipelines. Any product movement between the two ports must pass through the HIE-KBPH line, and then must further transit through either the Chevron-HMT clean lines or the HIE-HMT clean line.

In the normal course of events, this would probably not be a problem—although someone might have to pay high transit fees to move product from one port to the other. The situation today, however, is outside the normal course of events. One or both refineries might close. If this happens, their own port facilities and tankage might close. More important, their pipelines might close.

This would be an emergency. Obviously, no major oil company wants to create an emergency—apart from basic civic responsibility, it is bad for business elsewhere. And it is unlikely that both refineries would close rather than at least one converting to an import terminal, and the

pipelines are so vital that undoubtedly some purchase or handover agreement would be reached.

The pipelines are critical infrastructure. Without the refinery-owned infrastructure, there is essentially no overland connection between KBPH and HMT. So even if KBPH is expanded to handle product imports and storage to replace one or both refineries, there is no way to get the products from KBPH to HMT. This may not be critical for some uses—presumably KBPH could pick up much of HMT's service of Neighbor Island needs—but there is no way in such a scenario to, for example, import jet fuel at KPBH and service the needs of the airport (except of course by shipping to Pier 51A—which is already overloaded).

The point is that harbor infrastructure is only part of the system. 'Redundancy' has a bad sound to it, but redundant infrastructure is safer infrastructure. There are largely unnoticed bottlenecks in Oahu's oil-supply infrastructure that are privately owned—and that have no backup systems. At the minimum, there should be a plan for orderly handover of this infrastructure in case an owner wants to leave—and perhaps contracts between the State and the owner that guarantee certain kinds of access under certain conditions.

1.4.3. Bulk Product Storage

1.4.3.1. Overview

This is intended only to cover the major bulk storage units. There are many tanks of various capacities at smaller end-user locations (including underground tanks at fueling stations).

There are many different types of storage tanks, and some, for products like gases, are quite specialized. Concentrating on liquids, for our purposes here, the most important distinction is between floating-roof tanks and fixed-roof tanks.

The empty space inside a tank is called "ullage." If the ullage is large and becomes filled with evaporated gases, there is a serious chance of an explosion or fire. Obviously, fixed-roof tanks develop ullage as the tanks are drawn down. Therefore, fixed-roof tanks can only hold non-volatile products such as fuel oil and diesel. (Jet is a marginal case, but is usually stored in floating-roof tanks.)

Floating-roof tanks effectively have no ullage, because the roof follows the surface of the liquid. That means that volatile products such as gasoline and naphtha can be stored safely in floating-roofed storage.

Surprisingly to some, crude oil also must usually be stored in floating roof tanks. Although the vapor pressure of crude oil is lower than, say naphtha, there is naphtha and LPG in the crude oil, and these light components can evaporate and create hazardous conditions.

So, in general, fixed-roof tanks can hold only non-volatile oils. Floating-roof tanks can hold volatile oils, but they can also store non-volatile oil just as well. For this reason, many facilities install the more-expensive floating-roof tanks so they can switch easily between products.

Tanks for high-viscosity fuels usually must be heated. This includes some fuel oils, many heavy intermediate products, and some crude oils. Details on which tanks in Hawaii are heated are not publically available. We know that at one time HIE had only one heated crude tank (and several heated tanks for intermediates).

In Hawaii, the refineries sometimes hold fairly large inventories of certain products (gasoline and diesel in particular). Many other products, however, are transferred to buyer tankage fairly rapidly. For example, the bulk of the fuel oil stock held on Oahu is stored in HECO facilities. Similarly, little jet is held at the refineries; most is quickly transferred to HFFC or sent to airports at neighbor islands.

Some product tanks are licensed and permitted only to hold one or two products, while others may have wide-ranging permits.

In refinery-to-terminal conversions, it is quite common for crude tanks to be converted to product storage. Since they are floating-roof tanks, this means that crude tanks are usually suitable for conversion to most products. This process is usually straightforward and cheap by oil-industry standards, though it may require repermitting and additional investment.

In some cases, the seals and vapor-control gaskets on crude tanks may not be suitable for high-volatility products, and may need to be changed. Repiping is usually necessary; crude tanks are usually piped to serve the crude tower, not to deliver refined products to outside pipelines or end-users.

If one examines the capacities of the refineries and the capacities of the crude tanks, it is clear that both refineries were designed for about four weeks of crude storage.

At recent rates of throughput, though, HIE has more than six weeks, and Chevron has about 4 ½ weeks.

These are very high numbers for the US. West Coast refiners on average hold only about 7 days of crude storage. Most West Coast refiners outside Hawaii, however, receive the bulk of their crude oil via pipeline plus various short-haul voyages.

Hawaii has longer supply lines, and needs a cushion against possible shipping accidents or disruptions. Data on Hawaii's crude stocks at the refineries is gathered by EIA, but it is not released to the public because of confidentiality. While there is no firm, data long-term data crude stocks in Hawaii appear to average a little in excess of two weeks of refinery runs.

In terms of maintaining supply security, it needs to be understood that a significant fraction of Hawaii's product supplies are held "inside the crude" waiting to be refined. This means that in the absence of one or both refineries, the actual stocks of products would have to be expanded to maintain the same number of days of on-island supply.

1.4.3.2. HIE's Storage Capacity

HIE's tankage for some products seems small. In the case of jet, this is because jet is not stored in large volumes before being dispatched to HFFC or airports on Neighbor Islands.

In the case of gasoline, most of the naphtha and mixed-use tanks are only a short step away from being blended in gasoline. Therefore, most of the naphtha and mixed-use capacity is effectively gasoline capacity.

The table below is focused only on oil liquid storage. HIE also has pressurized storage for LPG and SNG feed, as well as assorted wastewater and slurry tanks. These specialized uses are in a completely different category from oil storage.

Figure 23: HIE Refinery Storage Capacity

FLOATING ROOF	# tanks	kb
Crude	8	2,772
Fuel Oil /1	3	212
Heavy Oils /2	2	231
Diesel	1	5
Jet /3	8	525
Gasoline	4	204
Naphtha	9	452
Mixed Use	1	110
TOTAL	**36**	**4,510**

FIXED ROOF	# tanks	kb
Asphalt	2	41
Diesel	6	300
Heavy Oils	10	216
Fuel Oil	11	851
TOTAL	**29**	**1,409**

TOTAL CAPACITY	# tanks	kb
Crude	8	2,772
Fuel Oil + Heavy	26	1,510
Jet	8	525
Oth. Products	23	1,112
TOTAL	**65**	**5,919**

1/ including mixed-use fuel oil/heavy oil tanks
2/ mostly VGO (cracker feed), cutter stock, and fuel oil blendstock
3/ includes one 126 kb tank that also has stored naphtha and gasoline

HIE maintains some clean-product storage on the Neighbor Islands, but it amounts to only about 4% of the storage capacity at the refinery. HIE also supplies fuel oil to the Neighbor Islands, but it is received and stored by the utilities.

Figure 24: HIE Storage Capacities on Neighbor Islands

	Big Island (Hilo)		Maui		TOTAL	
	# tanks	kb	# tanks	kb	# tanks	kb
Gasoline			3	60	**3**	**60**
Naphtha	2	50			**2**	**50**
Jet	1	12	2	65	**3**	**77**
Diesel	2	24	1	20	**3**	**44**
TOTAL	**5**	**86**	**6**	**145**	**11**	**231**

HIE also maintains a small volume of storage at the Honolulu Marine Terminal. This storage is largely a buffering system for the pipeline supplies.

1.4.3.3. Chevron's Storage Capacity

Chevron's refinery tankage differs from HIE's in a number of ways. First, all but two of the tanks are floating-roof, meaning that almost all of its storage can easily be repurposed. Second, almost all of the tanks other than crude and jet are declared in their licenses as being for "Gasoline Intermediates or Finished Products." In other words, Chevron has a great deal of flexibility in how it handles its storage.

Although Chevron is the smaller refinery, Chevron maintains more Neighbor Island storage than HIE. In part, this is because of significant storage on Kauai, where HIE does not have a terminal. Chevron's storage capacity on Neighbor Islands amounts to about 11% of its storage capacity at the refinery.

Like HIE, Chevron has some storage capacity at Honolulu Harbor, but this is mainly to serve exports to Neighbor Islands rather than to provide bulk storage.

Figure 25: Chevron's Main Storage Capacities

	Refinery	Big Island	Maui	Kauai	TOTAL
	kb	kb	kb	kb	kb
Crude	1,469				1,469
Fuel Oil	420	43	11		474
Jet	130	8	14		152
Oth Products	730	48	54	111	944
TOTAL	**2,749**	**99**	**79**	**111**	**3,039**

Chevron also has pressurized storage for LPGs, as well as assorted wastewater and slurry tanks.

1.4.3.4. Other Major Oahu Storage

Apart from Chevron and HIE, Aloha Petroleum is the only oil company with an import terminal on Oahu. It has about 530 kb of gasoline and diesel storage that receives deliveries via Kalaeloa Harbor. The storage is underutilized, as with the lack of growth in demand, Aloha can generally strike better terms for supply from the refiners than importing from the international market.

There are three very large storage systems on Oahu that are not owned by oil companies. The biggest is the Navy's underground strategic storage at Red Hill. The tankage at this site is roughly equivalent to all of HIE's storage.

Figure 26: Other Major Storage Capacities on Oahu

	Aloha	Red Hill (Navy)*	HECO	HFFC
	kb	kb	kb	kb
Gasoline	436			
Jet		3,000		1,000
Diesel	93	3,000	159	
Fuel Oil			1,900	
TOTAL	**529**	**6,000**	**2,059**	**1,000**

*** Jet and Diesel. Exact split varies and can be altered**

Of course, Red Hill is not designed for general or commercial use, but it means that neither of the refiners needs to hold jet or diesel stocks for eventual supply to the Navy; any volumes produced can be accommodated by the end-user.

HECO has more than 2 million barrels of storage (mostly fuel oil) on Oahu. For reliability and supply security, a high capacity has always been maintained; with the decline in fuel-oil demand, the storage at HECO has become very large compared to daily consumption.

HFFC is the final major storage site, but the HFFC facilities are dedicated to jet fuel. HFFC has roughly a million barrels of storage, with the major facility on Sand Island, and additional tankage at the Honolulu airport.

Ignoring the Navy's storage, the figure below gives a general understanding of Oahu's storage infrastructure and capabilities. In terms of days of storage, these are underestimates, since this looks at storage capacity relative to statewide demand, and there is also some storage on Neighbor Islands. Nonetheless, this is a good gauge of overall capability, as most of the Neighbor Island's supply must be held on Oahu before movement to local storage.

Figure 27: Main Oahu Oil Storage Capacities and Days of Supply

	HIE Refinery	Chevron Refinery	Aloha	OIL COs	HECO	HFFC	NON-OIL COs	OAHU TOTAL
	kb	kb	kb	kb	kb	kb	kb	kb
Fuel Oil	1,510	420		1,930	1,900	-	1,900	3,830
Jet	525	130		655	-	1,000	1,000	1,655
Oth Products	1,112	730	529	2,371	159	-	159	2,530
TOTAL	**3,147**	**1,280**	**529**	**4,956**	**2,059**	**1,000**	**3,059**	**8,015**
Products Only	**days***	**days***	**days***	**days***	**days***	**days***	**days***	**days***
Fuel Oil	55	15	-	70	69	-	69	139
Jet	15	4	-	18	-	28	28	46
Oth Products	21	14	10	45	3	-	3	48
TOTAL	**27**	**11**	**5**	**133**	**18**	**9**	**26**	**69**

* based on 2012 demand, excluding LPG. Does not account for the Navy's 6,000 kb of storage.

With an average of 69 days of tankage, Oahu is quite well supplied, even without considering the Navy tankage or tanks on Neighbor Islands. In addition, if one or both refineries were to convert to import terminals, there is another 4.2 million barrels of crude capacity that could be converted to product storage.

In light of likely declines in product demand, there is more than enough tankage on Oahu—unless a refinery closes entirely without converting to an import terminal. In fact, there may be enough tankage even minus the tanks of one refinery.

A major question going forward is whether HFFC's capacity is sufficient for the long term; jet fuel is the one product that seems to have substantial growth potential.

1.4.4. The Refineries

1.4.4.1. Refining Basics and Hawaii's Refineries

A study of this size and nature can cover refining in only the most rudimentary way. Nonetheless, some details of the industry are needed to understand the challenges the Hawaiian refiners face.

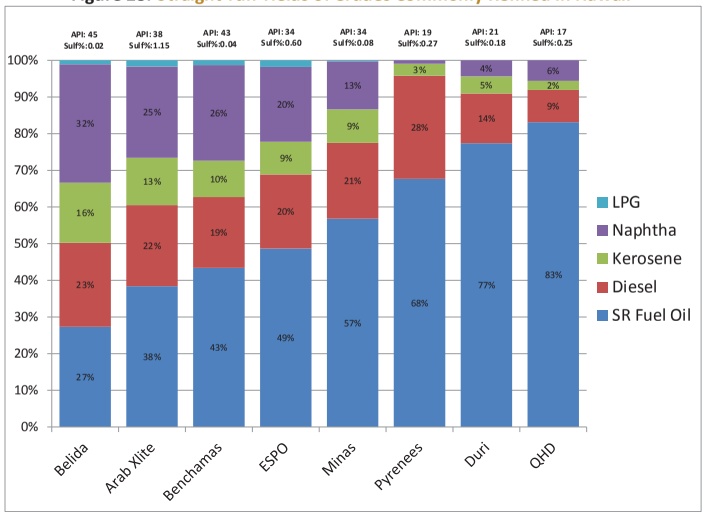
It is common to talk about "the price of crude oil," but crude oils differ widely in characteristics—and these characteristics strongly affect the price. The most important characteristics are API gravity, and sulfur content.

API gravity—measured in degrees API, and often just called "the API of the crude"—is a measure of the density of the oil, but it is "upside-down:" the less dense the crude oil, the higher the API. A very heavy crude oil might be 10°API. A very light crude might be 50°API. Most crude oils are in the range of 30 to 40°API.

Refined products have specific density ranges as well. Lighter products boil at lower temperatures. Gasoline is a light product, and boils or evaporates easily. Fuel oil is a heavy product, and is usually that part of the crude oil that still doesn't boil at 650 °F. Jet fuel and diesel are somewhere in between (and are often called "middle distillates"). Very heavy (fuel oil, asphalt) products tend to be worth less than products such as gasoline, jet fuel, and diesel—although low-sulfur fuel oil can be an exception.

The most basic refining process is crude distillation, which splits the crude oil into different boiling ranges. The figure below—which compares crudes that are often imported into Hawaii for refining—shows how much difference this can make. (The cut called "naphtha" in the figure is the material from which gasoline is made.)

Figure 28: Straight-run Yields of Crudes Commonly Refined in Hawaii



On seeing this graph, it is reasonable to ask: where is the gasoline? The answer is that in general marketable gasoline cannot be distilled directly out of a crude oil. Heavy naphtha is commonly run to a catalytic reformer, which increases the octane; other components, from more complex processing units, are blended in; and some light naphtha is also blended. Many people wonder why gasoline is priced so much higher than crude oil; this is one of the reasons.

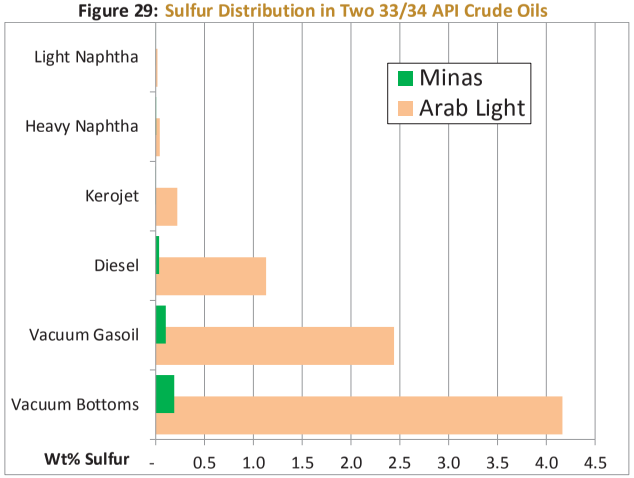
Some crudes imported to Hawaii yield less than 20% fuel oil; some are more than 80% fuel oil. All else held equal, lighter crudes—with less fuel oil—are usually more expensive.

But, as mentioned above, crude oils also differ in sulfur content. Sulfur is the main pollutant from oil; when sulfur is burned, it forms sulfur dioxide (the compound responsible for the smell of rotten eggs), and, when it encounters water in the atmosphere it forms "acid rain." Crude oils are often 1-3% sulfur by weight. Some crudes, however, have almost no sulfur.

Crudes with less than 0.5% sulfur by weight are called "sweet" crudes; crudes with more sulfur are called "sour" crudes. In general, sweet crudes are more expensive than sour crudes.

To complicate matters, sulfur is not evenly distributed in the crude oil. The light cuts, like naphtha (the gasoline cuts) contain very little of the sulfur; the vacuum gasoil and vacuum bottoms (fuel oil cuts) have sulfur contents much higher than the crude. The figure below shows the distribution of sulfur in two well-known crude oils with similar API gravity: Arab Light (Saudi Arabia, 1.8% sulfur), and Minas (Indonesia, 0.08% sulfur).

Figure 29: Sulfur Distribution in Two 33/34 API Crude Oils



As a point of reference, on Oahu the maximum sulfur content of fuel oil is 0.5%. Minas achieves this easily, but Arab Light—the crude with the largest production on the planet—doesn't even come close.

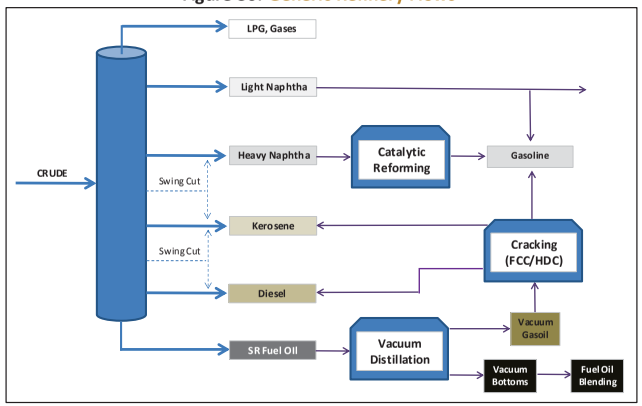
Thus, the most expensive crudes tend to be light, sweet crudes; the cheapest tend to be heavy, sour crudes.

Refinery technology has been developed to alter the yields and quality of straight-run products after crude distillation. Fuel oil, which consists of long, heavy molecules, can be "cracked" into lighter products such as gasoline and diesel. High-sulfur products can be hydrodesulfurized to remove most of the sulfur. Both of these processes, however, use considerable energy, and are hugely expensive. A single fuel oil desulfurization unit can cost up to a billion dollars.

The following figure gives an overview of generic refinery processing. The left half of the diagram shows the crude distillation process. Crude distillation operates at about 650-700 F. The material that boils below this temperature is piped out the side of the tower, with the lightest (lowest boiling point) materials coming out successively higher on the distillation column. Liquids coming directly from to distillation tower are called "straight-run" products.

The material that still has not boiled at 650-700 F comes out the bottom of the tower, and is called straight-run fuel oil.

Figure 30: Generic Refinery Flows

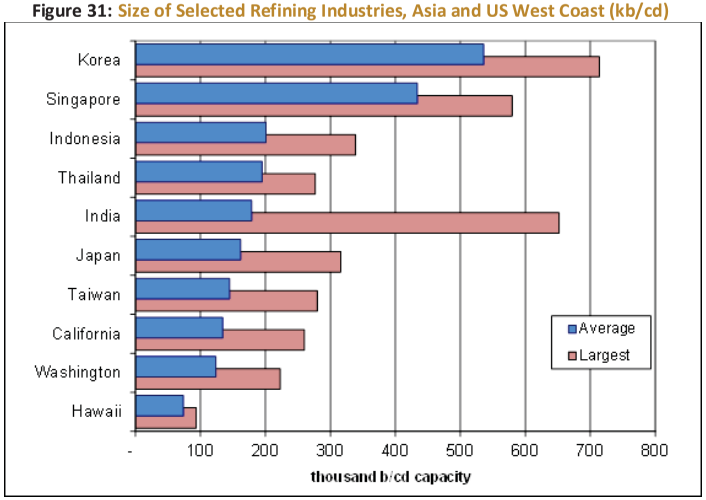


The processes on the left are common to all refineries. The processes on the right—vacuum distillation, cracking, reforming—differ dramatically from refinery to refinery, and not all refineries have these "downstream" units. (The configuration and process flows of Hawaii's refineries will be discussed further below.)

Hawaii's refiners have certain advantages. They are considerable distances from possible competitors, and they operate in a market with major barriers to entry. In general, however, Hawaii's refiners face major challenges in today's international market.

Hawaii's refineries are relatively small, which results in high overhead costs per barrel processed. Chevron is 54 kb/cd, and HIE is about 95 kb/cd. By way of comparison, the average Californian refinery is almost 135 kb/cd, and the largest is 260 kb/cd. As the figure below shows, however, the Californian refineries are no longer considered "worldscale."

Figure 31: Size of Selected Refining Industries, Asia and US West Coast (kb/cd)



The average Korean refinery is 536 kb/cd, and the largest is 840 kb/cd—both more than seven times their Hawaiian equivalents. Singapore's average is 434 kb/cd, and the largest is 580 kb/cd. Even a "small" refiner like Thailand has refineries that are two to three times larger than their Hawaiian counterparts.

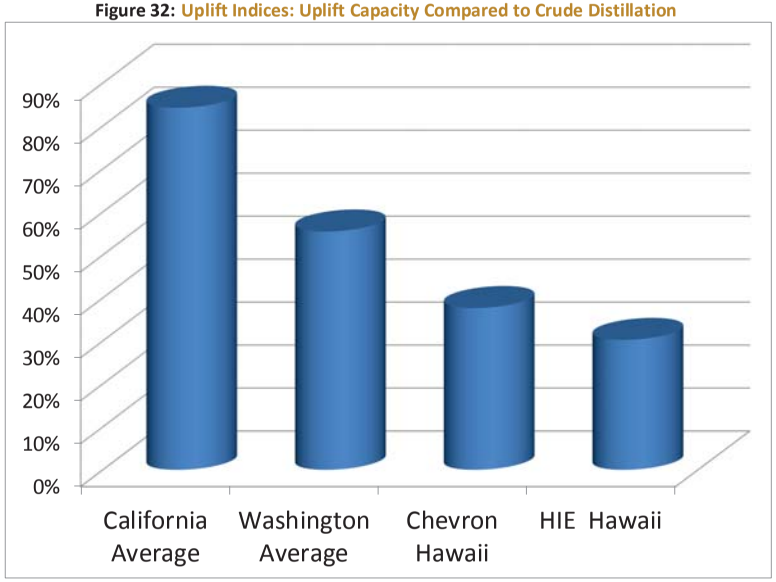
Hawaii's demand is below refinery capacity, so the refiners cannot run at full capacity without exporting. But export markets are distant, and Hawaii does not set the price in importing areas. Except for a market center that sets regional prices (such as Singapore), oil-product exports are almost never as profitable as local sales, since exports must be delivered to an external market at a competitive price. In general, this means that the exporter must absorb the freight costs.

Hawaii's refiners have about 150 kb/cd of refining capacity. In 2012, total oil product demand was about 117 kb/d—but about 11 kb/d (mostly jet fuel) was imported. So product demand was only about 71% of refining capacity.

Ideally, a refiner likes to see product demand higher than refining capacity. At present demand levels, Hawaii has a surplus of refining capacity.

Hawaii's refiners have limited "uplift" capacity. Uplift capacity is shorthand for processes that change lower-value products (such as fuel oil, naphtha, or LPG), into higher-value products (gasoline, jet fuel, and diesel). Typical uplift processes are cracking, catalytic reforming, and alkylation. (Hawaii's refiners have had little incentive to expand cracking because the market for fuel oil in the power sector has been fairly robust. With higher prices, the advent of the HCEI, and the possibility of LNG imports, this situation may be on the verge of dramatic changes.)

Figure 32: Uplift Indices: Uplift Capacity Compared to Crude Distillation



Hawaii's refiners have no vacuum bottoms destruction capacity, and are reliant on a good market for fuel oil sales. This seemingly obscure statement requires some explanation. In a refinery, much fuel oil from distillation is split into a lighter component (Vacuum Gas Oil, VGO), and a heavier component (Vacuum Bottoms, VB).

The VGO is commonly used as feed to the more common sorts of cracking units (such as Fluid Catalytic Crackers or Hydrocrackers). To crack VB requires specialized, extremely expensive

cracking units, such as Cokers (or specially modified Resid Cat Crackers or Hydrocrackers, which are even more expensive as well as being costly to operate).

If the VB is not cracked into lighter products, then it must be blended to fuel oil and sold. In California, where fuel oil demand all but vanished long ago, units for cracking VBs have been widely installed. The result is that even though California runs a heavy, low-API crude slate, Californian refiners output of fuel oil is only about 3% of the total. This is burned inside the refineries or exported into the bunker market.

In Hawaii, fuel oil is the only outlet for the VBs, so a healthy demand for fuel oil is important to the refiners. In addition, if the refineries are run at full capacity, there is not enough VGO cracking capacity to handle all the VGO, and any excess VGO must also be blended to fuel oil.

Hawaii's refiners have very little desulfurization capacity. Modern environmental specifications are increasingly strict about the percentage of sulfur that oil products can contain. There are two ways to produce low-sulfur products. One is to run only low-sulfur crudes. The difficulty with this approach is that low-sulfur crudes are not plentiful, and they tend to command premium prices.

The second way to produce low-sulfur products is to install desulfurizers. Desulfurization is expensive to install, and also expensive and energy-intensive to operate. (In general, the heavier the fuel, the more expensive to desulfurize; it is far more expensive to desulfurize fuel oil than gasoline.) In addition, even the lowest-sulfur crudes cannot produce modern US road diesel (ULSD) without a diesel desulfurizer or equivalent technology.

The one "equivalent technology" is a hydrocracker, which desulfurizes as a side effect of the cracking process. HIE has a hydrocracker as its main cracking unit.

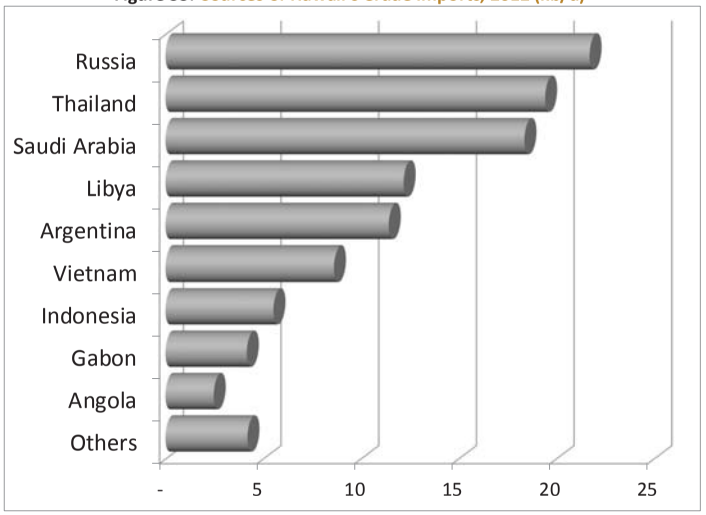
Hawaii's refiners are at a serious geographical disadvantage in terms of procuring crude supplies. The US West Coast and Asia as a whole are both crude-short; the crude-surpluses of the Middle East, Africa, and Venezuela are distant. Moreover, although in the past Hawaiian refiners were able to run some US West Coast crudes (notably Alaskan North Slope), these crudes are too high in sulfur to meet today's sulfur standards—and are also in tight supply.

The Asia-Pacific region is well-known as a producer of low-sulfur crudes; the problem is that the region is the world's largest crude importer. Not only do the producers themselves use up most

of what they produce, but the region as a whole is massively short of crude. Therefore, the volume of low-sulfur crudes available is small, and the prices demanded are high.

Unfortunately, the next-nearest major supplies of low-sulfur crudes are in the Atlantic (Eastern South American and West Africa) and the Mediterranean (North Africa). This is shown clearly in the figure below: Libya, Argentina, Gabon, and Angola are all on the other side of the world.

Figure 33: Sources of Hawaii's Crude Imports, 2012 (kb/d)



As a side note, although Saudi Arabia is known mainly as an exporter of heavier, high-sulfur crudes, the crudes imported into Hawaii are grades of Saudi Extralight and Saudi Superlight, which have much lower sulfur than the Saudi average. Nonetheless, they are high enough in sulfur that they are imported only by HIE (which can handle more sulfur than Chevron because of the hydrocracker).

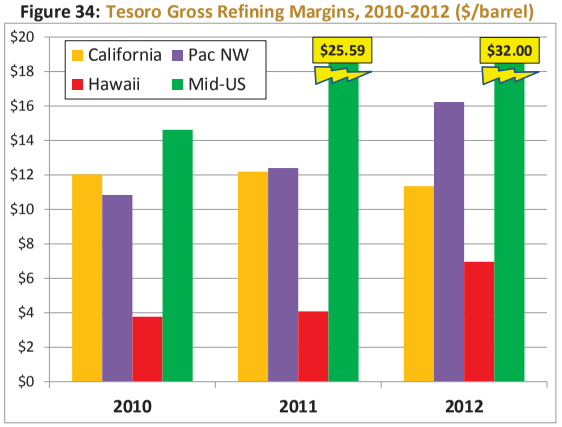
Hawaii has no cheap local sources of refinery fuel. Refining uses prodigious amounts of energy. Not only are large quantities of heat needed, but refining also uses large amounts of electricity. Hydrogen is also important for many purposes, including desulfurization and some forms of cracking—and marginal supplies of hydrogen are usually made from natural gas.

Countries where refiners can buy natural gas and electricity cheaply have an important advantage in operating costs. Hawaii, of course, does not have low-cost sources of electricity (at least not near the refiners on Oahu), and natural gas in Hawaii is all manufactured from oil.

In context of the regional market and competitors, the Hawaiian refiners have a generally poor outlook. This is not a revelation. Both of the Hawaiian refiners have complained about poor financial results for many years, and both have examined selling or closing their refineries (particularly after the disastrous results in 2009, which was a painful year for refiners worldwide).

Chevron does not publish results for its refining regions. (Refining is only a small part of Chevron's business, and Hawaii is only about 3% of Chevron's refining capacity, so nothing happens at Chevron's Hawaii refinery that moves the company's results in a way worth reporting.) Tesoro, however—which is only in the downstream business, without any oil or gas production—publishes details on the performance of its refining groups, and Hawaii is in a group of its own. The gross refining margin (GRM) for these groups is shown in the figure below. (The GRM is the margin between sales value and costs before accounting for depreciation and amortization, so it is possible—even common—to have a positive GRM and have a loss for the year.)

Figure 34: Tesoro Gross Refining Margins, 2010-2012 ($/barrel)



Although Hawaii's results improved substantially in 2012, the HIE Hawaii refinery is always its worst-performing refining group. This reflects the problems discussed above. And, although Chevron does not publish these statistics, Chevron faces the same problems.

Although it has no real bearing on the discussion of Hawaii, the startling GRMs for the mid-US deserve an explanation. HIE's mid-US refineries are in North Dakota and Utah—near the glut of light, sweet crude from the shale revolution. There isn't enough pipeline capacity to move these crudes to other regions, and so they are moved out by railcar—or sold at huge discounts to anyone who can process them locally.

It is important not to let the massive Mid-US GRMs distract from the main point: Even in California and the Pacific Northwest, the GRMs are generally 200-300% of the Hawaii GRM. When HIE announced the sale or closure of the Hawaii refinery, it took some people by surprise, but it was expected by anyone who had been following HIE's filings with SEC.

1.4.4.2. Overview of the Refineries

As mentioned, Hawaii's two refineries face many of the same challenges and share a number of similarities with respect to the external market. Yet they are very different facilities, and are owned by very different kinds of oil companies.

Most of these details will be of interest only to those familiar with oil refining. Three things are easy to note, however. First, the configurations are quite different, with each refinery operating very different kinds of process units. Second, Chevron has far more cracking capacity relative to its crude distillation than does HIE. Third, although HIE does not have a great deal of desulfurization (hydrotreating plus hydrocracking) capacity by Californian standards (only 32% as compared to 107% in California), it has much more desulfurization than Chevron, which has only a tiny 3 kb/cd hydrotreater.

Figure 35: Configuration of Hawaii's Refineries (kb/cd)

Refinery Unit Capacities, kb/cd

	Chevron	HIE
Crude Distillation	54.0	93.7
Vacuum Distillation	30.0	39.5
Hydrotreating	3.0	12.8
Isomerization	1.2	
Alkylation	4.0	
Polymerization	1.0	
Catalytic Reforming		12.8
Fluid Catalytic Cracking	21.0	
Hydrocracking		17.6
Visbreaking		11.5
Asphalt	1.3	1.0
Cracking-to-Distillation*	***39%***	***19%***
Uplift-to-Distillation	***38%***	***30%***
Desulfurization-to-Distillation**	***6%***	***32%***

** excluding visbreaking*
*** including hydrocracking*

Even the most complex refinery in the world cannot make any set of products out of any set of crudes. The proportions of different products are always limited. A refiner cannot buy a barrel of crude oil and turn it into only gasoline, or, more relevant in the case of Hawaii, into only jet. Hawaii's refineries are not the world's most complex. Skills in crude selection and operational strategy can allow some adjustment of output patterns, but the flexibility is limited.

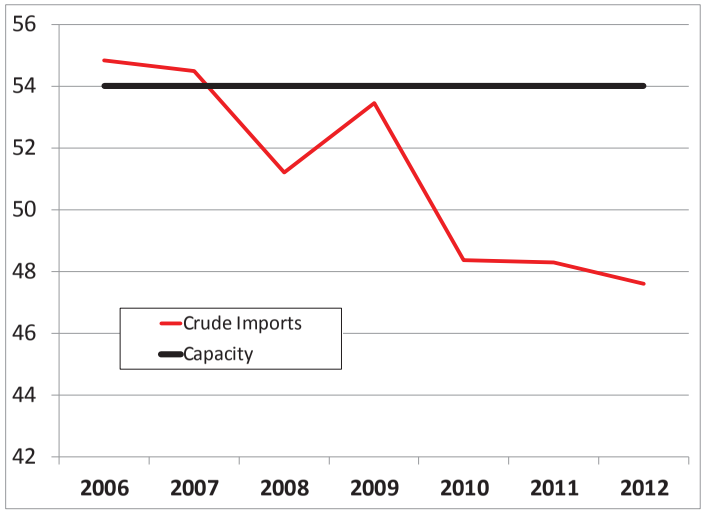
This means that any policy decisions taken by the state—for example, the role of renewables, or the entry of LNG into the market—has repercussions in terms of how well the refiners can match their outputs to Hawaii's needs.

1.4.5. The Chevron Refinery

The Chevron refinery is a small refinery, but is surprisingly sophisticated for a plant of its size. It is a gasoline-oriented refinery. Fluid cat crackers (FCCs) produce excellent gasoline (and comparatively poor diesel and jet fuel), and alkylation, isomerization, and polymerization are all technologies to make high-quality gasoline blendstocks.

Chevron does not publish its Hawaii crude runs, but its crude imports are known, and these form a rough proxy of refinery throughput. (It is only a rough proxy because of stock changes from year to year, and also because Chevron sometimes engages in the unusual practice of importing ultraheavy crude oils and blending them with cutter stock from the refinery to make saleable fuel oil.) Crude imports are shown against refinery capacity in the figure below.

Figure 36: Chevron Hawaii Crude Capacity versus Crude Imports, 2006-2012 (kb/d)

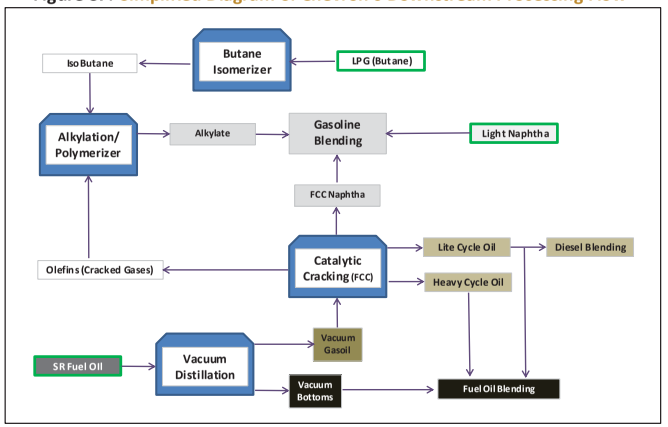


As the figure shows, Chevron typically runs at a fairly high rate of utilization—though imports have been declining since 2009.

Chevron has a global crude production and trading network that gives the company access to a wide variety of crudes. The refinery has at times in recent years imported some of the world's heaviest crudes and some of the world's lightest crudes in an attempt to maintain profitability and meet changing demand patterns and specifications. The one thing that is invariant is that all of the crudes are low-sulfur crudes. Chevron cannot produce road diesel (ULSD) because it has no diesel desulfurizer, but it can produce low-sulfur diesels suitable for other uses (such as utility and marine fuel).

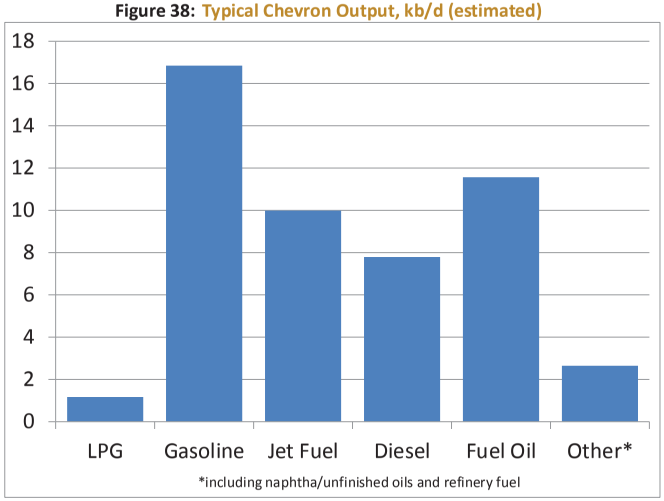
The figure below shows a simplified version of the "downstream" portion of Chevron's Hawaii refinery. The streams outlined in green come from the crude distillation process discussed previously. (Straight-run jet and diesel are not shown.) The diagram makes it clear how much of Chevron's downstream processing revolves around gasoline.

Figure 37: Simplified Diagram of Chevron's Downstream Processing Flow



Chevron does not publish its production or sales statistics. Based on industry sources as well as its crude slates and refinery capabilities, our estimate of 'typical' output at about 50 kb/d output is shown in the figure below.

Figure 38: Typical Chevron Output, kb/d (estimated)



It should be kept in mind that these relationships are by no means fixed. If the market for fuel oil were lower, then Chevron could run a lighter slate. Nonetheless, refinery flexibility is not infinite, and flexibility through adjusting crude slates can become an expensive proposition.

As stated before, Chevron faces many of the same kinds of problems as HIE. It has two advantages, however. First, the capital costs of the refinery were amortized long ago. Second, it has been able to maintain higher utilization rates.

Chevron would be well-placed to make a few further investments in its refinery to adapt to changing circumstances. For a number of reasons, at present this seems somewhat improbable. Hawaii's demand for oil has been declining, and there are strong possibilities that the introduction of LNG, or the effects of the HCEI, or both, will cause oil-product demand to fall further.

In addition, it is not a secret that Chevron is skeptical about investing additional money in refining in Hawaii.

1.4.6. The Hawaii Independent Energy (HIE) Refinery

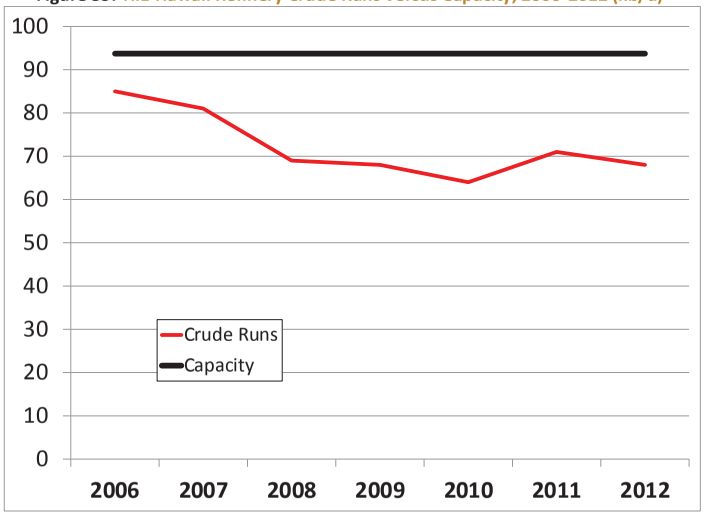
At the end of the summer of 2013, Tesoro sold their Kapolei refinery to Par Petroleum, which restarted the facility as the HIE (Hawaiian Independent Energy) Refinery. Although this name and ownership change took place after the writing of most of this text, throughout the report the facility is referred to as HIE refinery (except when the company Tesoro is meant specifically).

The HIE refinery might be thought of as two interconnected refineries. The original refinery, of less than 30 kb/cd capacity, was expanded slightly and a 17.6 kb/cd hydrocracker was added—a move aimed squarely at the jet fuel market. The hydrocracker gave the refinery a very high cracking-to-distillation ratio and uplift index. A visbreaking unit allowed the VBs to be processed into saleable fuel without large additions of cutter stock to control viscosity. Although hydrocrackers produce superb jet fuel and diesel, they produce poor gasoline blendstock. For this reason, a catalytic reformer was built.

Later, however, the decision was made to expand the refinery's crude capacity dramatically, and to further expand reforming. Conceptually, this amounts to adding a large but rather simple refinery (in industry jargon, a 'hydroskimmer,' because it 'skims' the light products off the top but leaves the fuel oil uncracked) to a highly sophisticated small refinery. This oversimplifies, as there is some synergy involved; but the point is that at higher throughput, the additional output is determined largely by the type of crude processed.

In the middle of the last decade, HIE's utilization was high, but as the figure below shows the trend has been downward. (Unlike the case with Chevron above, the data in the figure show actual crude runs for each year rather than crude imports.) Although the hydrocracker allows HIE to produce some volumes of road diesel, even if somewhat higher-sulfur crudes are used, at the margin HIE needs to buy low-sulfur crudes to meet specifications.

Figure 39: HIE Hawaii Refinery Crude Runs versus Capacity, 2006-2012 (kb/d)

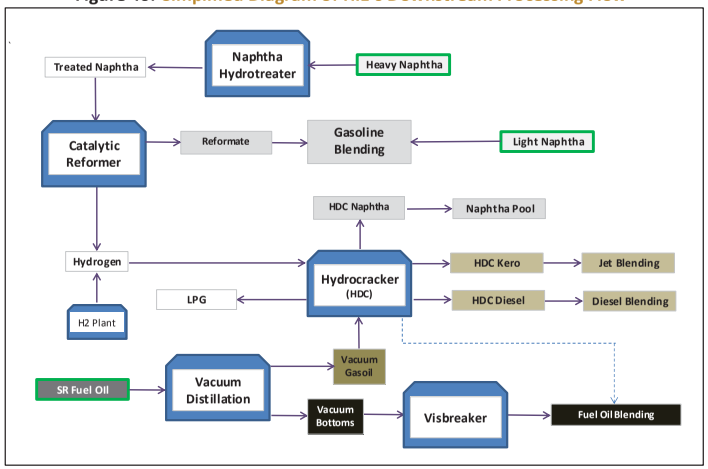


Since the expanded portion of the refinery is a hydroskimmer, when runs are high each additional barrel of crude run produces uncracked fuel oil. When fuel oil demand is high, of course, this presents no problem, but when fuel oil demand declines, HIE must shift to lighter (and usually more expensive) crudes. (To be fair, this applies to Chevron as well—but Chevron can crack a much larger proportion of its straight-run fuel oil output.)

The figure below shows HIE's downstream processing flow. (As with the Chevron diagram, the straight-run diesel and jet are not shown.) The key operation is the hydrocracker, which mainly produces quality jet and diesel, as well as low-octane naphtha. For gasoline blending, HIE uses a catalytic reformer to increase the octane of the heavy naphtha produced. In addition, where the Chevron refinery uses FCC cycle oils to reduce viscosity of VBs, HIE relies on a visbreaking unit.

An important point to keep in mind is that although the HIE downstream processing is sophisticated and somewhat complex, many of these downstream facilities were sized for a smaller original refinery.

Figure 40: Simplified Diagram of HIE's Downstream Processing Flow

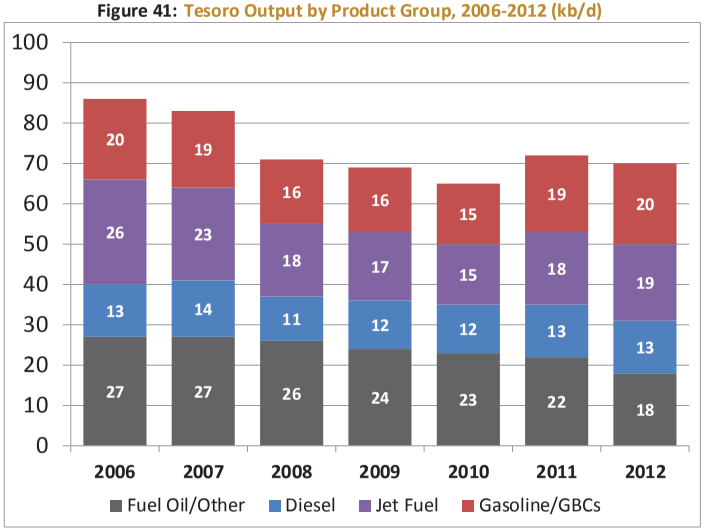


When throughput at HIE is high, the refinery can produce about 70% of Hawaii's jet fuel needs—but it also produces a substantial amount of fuel oil. At the risk of oversimplification, if fuel oil demand is not strong enough to support this volume, then refinery runs fall to cut fuel oil output, and jet fuel output falls as well. At recent levels of crude runs, HIE produces only about 45-55% of Hawaii's jet fuel needs.

Tesoro is a company that is relatively open with its stockholders and with the public, so it publishes a large amount of information about its operations. The numbers shown in the figure below are from Tesoro's reports submitted to the SEC.

Of course, the numbers are somewhat lacking in detail. Some blendstocks are lumped into the gasoline total, and the Fuel Oil/Other category includes refinery gases and unfinished oils burned in the refinery, LPG, and volumes of feedstock sent to the HawaiiGas syngas plant.

Figure 41: Tesoro Output by Product Group, 2006-2012 (kb/d)



The big question is what Par Petroleum has in mind for the refinery. Hawaii's plans to slash oil demand through the HCEI are well-known, and plans for importing LNG have been widely discussed. Par must know that it is entering a market where local demand is likely—though not certain—to decline.

One possibility is to focus more on product exports. Although Hawaii is not at a geographical advantage as an exporter, and Asia—which is expanding refining at a heated pace—is not a logical target, a number of Latin American countries on the Pacific, such as Chile, Ecuador, and Peru, have increased product imports from US refiners dramatically in the last few years. Moreover, the product specifications in these countries tend to be less stringent than in the US. The economics of such a strategy are questionable, but it is one approach.

Another possibility is to invest in the refinery. Like Chevron, Tesoro was not been anxious to put more money into a declining market, but the new operator might feel differently. Although it has been announced that Par agreed to pay roughly $390 million for the refinery, the majority of this was for working capital (in particular oil inventories on hand); the actual purchase price

excluding working capital is much lower, and includes the company's valuable retail network. If the plan is to upgrade the refinery, then the output pattern could change dramatically in the future.

1.5. Oil Product Trade

Oil trade in Hawaii is largely a one-way affair: Oil comes in, but little oil is exported.

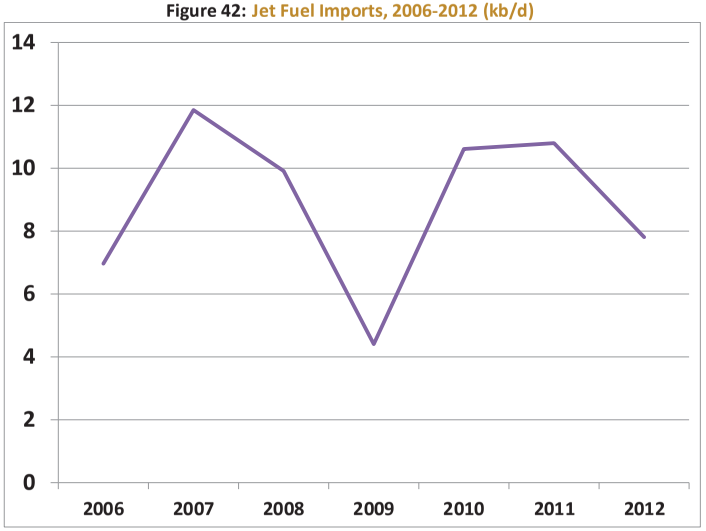
It is also important to note that trade has two possible meanings in the Hawaiian context. Strictly speaking, words like 'imports' are used to denote imports from foreign countries, but from an island perspective it is also useful to consider what is brought into the islands from other US sources.

Of course, official trade records do not track movements between states as imports or exports, so 'trade' statistics do not cover all movements of oil products.

Fortunately, movements of oil products between Hawaii and the US mainland are not frequent or large in recent years. The refiners do bring in small volumes of unfinished oils from the mainland, and sometimes move cargoes of gasoline blending components to US mainland refineries.

Only four products are imported on a regular basis. The most significant of these is jet fuel. Hawaii is chronically short of jet fuel, but imports vary based on fluctuating demand at airports, refinery throughput, and prevailing prices on the world market.

Figure 42: Jet Fuel Imports, 2006-2012 (kb/d)



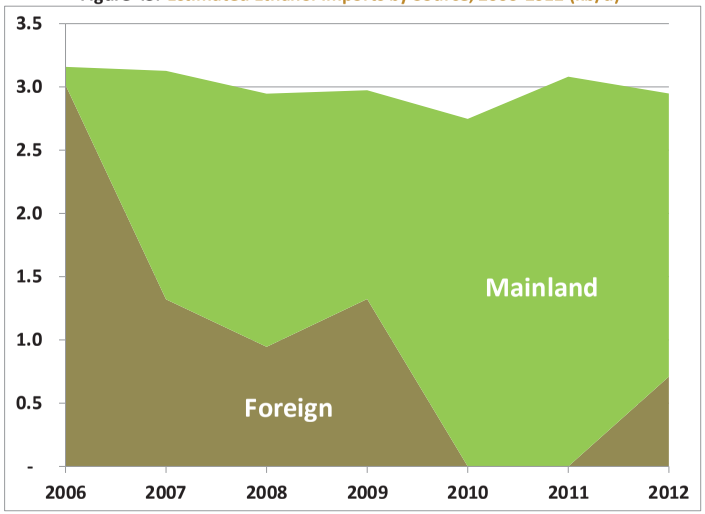
Import statistics for jet fuel are often conflicting depending on source, and with bonded products and a Free Trade Zone in Honolulu, not too much credence should be placed in the exact numbers. In addition, jet sometimes moves for purely commercial reasons; the airlines may import jet to try to push down the refiners' price demands, and the refiners in turn may export cargoes rather than lower their local price.

That said, the only consistent flow of jet is into rather than out of Hawaii, and the 'typical' level of imports in past years was been 9-10 kb/d. During the shutdown period of the Tesoro (now HIE) refinery, however, imports in the April-August 2013 period rose to more than 30 kb/d. (After refinery startup, the imports have declined to their previous levels.)

The second largest product import into Hawaii is not, strictly speaking, an oil product at all. Blending of ethanol into gasoline at 10% by volume is required by law, and Hawaii is not presently a producer. The US mainland is of course a major producer, as are many Latin American countries. Hawaii imports roughly 3 kb/d of ethanol for blending, but the source varies considerably. Initially most ethanol was sourced from the Caribbean, but recently it has

narrowed down to a duel between the US Mainland and Brazil. If the statistics are believed, then in some recent years all ethanol has been sourced from the US.

Figure 43: Estimated Ethanol Imports by Source, 2006-2012 (kb/d)



Hawaii also imports propane on an ongoing basis. Propane imports are unique in that they are primarily delivered directly to the Neighbor Island ports on very small (< 20 kb) tankers. These imports are low in volume (typically less than 700 b/d), but the overall volume in the last few years has increased to over 1 kb/d.

There is reason to believe that economics would favor replacing these long-haul, tiny ships with larger ships delivering to a central point for distribution on short-haul barges. This of course would require expanded storage and receiving on Oahu.

Finally, asphalt is now imported to Hawaii on an ongoing basis, in volumes of 0.5-1.2 kb/d. The Oahu refinery system actually has about 2.3 kb/d of asphalt capacity on the books, but it has been years since it was operational. The change in crude slates (because of the changes in environmental specifications) has pushed purchases of crudes to sweeter crudes. In general,

crudes suitable for asphalt manufacture are also high-sulfur crudes; low-sulfur crudes tend toward the waxy or aromatic end of crude compositions.

1.6. Concluding Remarks

Although Hawaii's oil-product demand has fluctuated over the last three decades, if observed from a distance there is no obvious trend. If viewed naively, the downward slope of recent years might look like one more trough in a series of slow peaks and troughs.

With more insight into the forces at work, however, this idea seems less likely. The following factors make it probable that many fundamentals are being transformed:

- Although oil prices may not stay at their recent peak levels, it is doubtful that they will plunge to anything like the lows of the last few decades: we are probably facing a prolonged high-price environment.
- The HCEI, and especially the RPS, have already begun to chip away at oil demand. If successful, their impact will be massive.
- LNG imports may offer a cheaper alternative to oil and could rapidly displace oil in many uses—especially in the power sector.
- New federal environmental standards mean that the continued burning of LSFO in the power sector has become more difficult and costly. (This may not mean that burning some modified version of LSFO will be impossible).
- Hawaii's refiners already face a challenging and relatively unprofitable outlook. Major shifts in demand patterns threaten their viability.

With all these factors in play, there is little certainty that Hawaii's future oil demand will look anything like the past. The next chapter looks at scenarios of future oil demand in detail.

2. Fuels Demand in the Future

2.1. The Hawaii Clean Energy Initiative (HCEI) and the Renewable Portfolio Standard (RPS)

The HCEI is a system of goals that run from the very specific to the somewhat abstract. The overarching goal is easy to state: 70% of Hawaii's energy from 'clean' sources by 2030. Clean sources are specified as conservation or renewables.

With conservation at play in the mix, it will of course be impossible to tell with any certainty whether the goals have been achieved or not, since this would involve knowing what energy demand would have been in the absence of conservation. (The HCEI acknowledges that some aspects of the goals are 'moving targets.')

The goals are clearest and easiest to measure for the power sector, where the goal is to provide (or, more accurately, to save) 30% of electricity demand by 2030, and to provide 40% of generation from renewable sources. While levels of conservation achieved will always be open to debate, 40% of power generation from renewable sources is a specific and measurable goal.

This level of renewables in power generation—40% by 2030, with milestones along the way—has been agreed to by the electric utilities as a binding plan, and is referred to as the Renewable Portfolio Standard.

In road transportation, the goals are also relatively specific—certain reductions in vehicle miles traveled, increased miles per gallon, increased numbers of electric vehicles, blending of biofuels in gasoline and diesel, and overall volumetric goals for biofuel use in road transport. (It should be noted that some of these measures, such as increased miles per gallon, are not a consequence of the HCEI itself, but will occur because of federal mandates. Similarly, ethanol blending standards exist in at least some seasons in most of the US.)

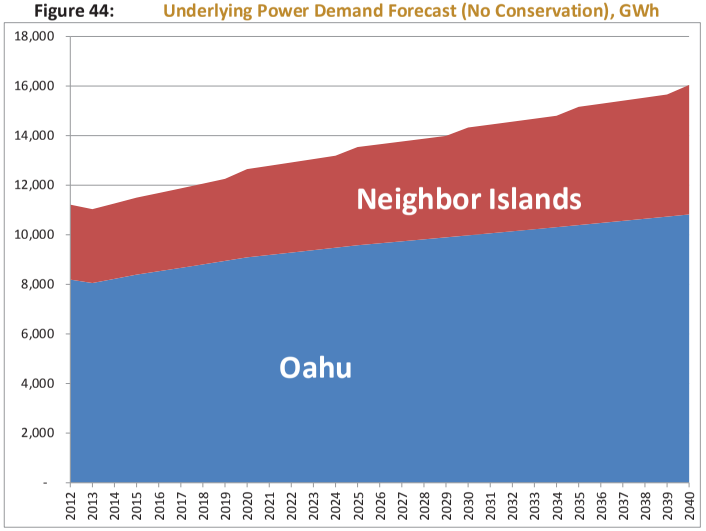
At the other end of the spectrum are aviation and marine fuels, where specific measures are difficult to imagine with present knowledge. The goals remain unaltered—increased conservation and a greater share of renewables—but how these should be achieved is not specified.

2.2. Scenarios of HCEI Effectiveness

It is always possible to imagine higher or lower drivers for scenarios. We have tried to devise scenarios that cover the range of likely outcomes, but this does not mean that these provide estimates of the highest possible demand or the lowest possible demand.

As mentioned before, when conservation goals are in play, there must be an underlying, hypothetical demand. Our underlying forecast—which is in general agreement with the reference basis used by the utilities—is shown in the figure below.

Figure 44: Underlying Power Demand Forecast (No Conservation), GWh



It needs to be understood that these numbers are purely hypothetical, as considerable conservation has already occurred, and these numbers include that conservation as part of demand. They simply form a reference basis for calculation.

None of our scenarios assume major replacement of jet or marine fuels with biofuels, nor do they assume that pure biofuels (rather than 10% and 20% blends) will be used in ground transport. Although there is presently considerable excitement about emerging biofuel

technologies (such as oils from algae, cellulosic ethanol, or renewable jet fuel), not enough is known about the commercial potential to make logical assumptions.

In addition, even members of the HCEI cooperative research team at NREL (National Renewable Energy Laboratory) have expressed doubts that Hawaii can meet the biofuel goals for ground transportation from local sources. In this case, such volumes would have to be imported—just like oil and oil products. Some may argue that there are major environmental benefits because such fuels are renewable—but there are also environmentalists who argue that imported biofuels cause major environmental damage, and are generally managed in such a way that they are not genuinely renewable fuels. We have no position on this topic, but contend that not enough is known to create sensible scenarios for these end-uses.

2.2.1. Scenario 1: Business-As-Usual

Our Business-As-Usual scenario assumes that many of the planned measures of the HCEI falter. In power this does not foresee a reversal of or end to RPS achievements or conservation. Instead, it assumes that the shares of conservation and renewables in power supply stall close to their projected 2015 shares of power. Statewide, this implies that conservation and renewables each provide ongoing shares of electricity of roughly 15%.

In ground transportation, all scenarios assume that planned US CAFE (fuel efficiency) standards will be in place. This scenario sees no change in vehicle miles traveled, but it does assume that electric vehicles will achieve a 3% penetration rate by 2040.

Ethanol blending in gasoline is assumed to continue at 10% volume, and the small share of biodiesel (B20) maintains its share of road diesel.

2.2.2. Scenario 2: RPS Falls Short

In this scenario, conservation goals are achieved in the power sector, but renewables grow their share more slowly that in the RPS, reaching 25% only in 2040 (as opposed to the goal of 40% of power generation by 2030).

In ground transportation, vehicle miles traveled are reduced 1% by 2030, and the penetration of electric vehicles rises to 12% in 2030 and to 24% in 2040.

Blending of ethanol at 10% in gasoline continues, and blending of biodiesel to road diesel rises to 20% by 2020.

2.2.3. Scenario 3: RPS Succeeds

This scenario is identical to the previous scenario except that the RPS achieves its goal of 40% of power generation by 2030.

2.2.4. Scenario 4: HCEI Mostly Succeeds

As in the previous scenario, this case assumes that all goals in the power sector are met. In ground transportation, vehicle miles traveled is cut by 8% by 2030, and the penetration of electric vehicles reaches 15% by 2030 and 40% by 2040.

2.2.5. Summary

The details of the scenarios by year and by Oahu and Neighbor Islands is given in the Appendices, but for easy reference the 2030 assumptions are tabulated below.

Figure 45: Key Statewide Parameters for HCEI Scenarios in 2030

	Business-As-Usual	RPS Falls Short	RPS Succeeds	HCEI Mostly Succeeds
POWER				
Conservation	15%	30%	30%	30%
Renewables	15%	21%	40%	40%
ROAD TRANSPORT				
VMT Reduction	0%	1%	1%	8%
MPG Improvement	33%	33%	33%	33%
Elec Vehicle Penetration	2%	12%	12%	15%
Ethanol Blending	10%	10%	10%	10%
Biodiesel Road Blending	1%	20%	20%	20%

2.3. LNG Imports

2.3.1. Offshore versus Onshore/Nearshore

In the wake of falling gas prices on the Mainland, LNG imports into Hawaii now seem like a practical possibility. Indeed, imports of small volumes of LNG in "ISO containers" (essentially tank-truck sized thermos bottles) have already been initiated by HawaiiGas. Real savings in cost terms, however, can only be achieved by bulk imports in tankers or large cryogenic barges.

There are still many unanswered questions about how bulk LNG can be brought in, where the facilities might be sited, and what their capabilities might be. One of the biggest debates has been between Offshore storage and gasification, and Onshore or "Nearshore" storage and gasification.

Without going into detail, Offshore storage and gasification has been generally assumed to mean that only regasified LNG could be brought onshore. This would restrict the use of gas to Oahu, and to uses such as the power sector and utility gas. It would largely bar the use of LNG or CNG in ground transport or shipping.

With Onshore LNG, or Nearshore LNG (where the floating storage unit is in a sheltered area), LNG can be used in transport and similar uses. In addition, the LNG can in principle be offloaded onto barges or ISO containers and transported to Neighbor Islands.

It has been concluded by most of the preliminary studies that offloading of LNG from deepwater, Offshore LNG is not generally feasible because of wave heights in the Pacific. But recently this has been questioned, and some now claim that it is feasible—or feasible under most ocean conditions. We are not marine engineers, and so cannot comment except to note that the experts are at odds on the subject.

Initially we planned to have three LNG scenarios: 1) No LNG; 2) LNG Offshore; and LNG Onshore/Nearshore. This has been reduced to two scenarios—No LNG Imports and LNG Imports, with the latter scenario assuming that LNG would be available statewide (whether offshore, onshore, or nearshore).

The former "Offshore" scenario (which might be called the Only-Gas-and-Only-On-Oahu scenario) has been abandoned partly because of possible misunderstandings or controversy, and partly because it increases the number of total scenarios by 50% (12 total scenarios as opposed to 8—see the next section for clarification) without adding much useful information. In terms of the impact on oil product demand and oil shipping demand, the "Offshore" scenario is between the No LNG Imports and the Onshore/Nearshore option. The possible outcomes in terms of oil-product demand are fully bracketed by the two scenarios we have selected.

2.3.2. Stepwise Analysis

For simplicity of assumptions, the LNG scenarios are subsidiary to the HCEI Effectiveness Scenarios. In other words, in a given case, LNG is only allowed to substitute for whatever is left over after the reductions of the HCEI assumptions are calculated. To take a simple example, if we choose a scenario where the RPS is successful and reaches 40% of power generation, then the amount of oil that can be substituted by gas is limited to whatever oil is left after renewables have been deployed.

It might seem that this is missing a key possibility: Suppose that LNG is so cost-effective and useful that the HCEI is derailed in favor of LNG? In the view of some, this is not an implausible conjecture.

This possibility is amply covered by the Business-As-Usual and RPS Falls Short Scenarios. The assumptions say nothing about why HCEI goals are not met; it could be a policy change, or it could be as a result of LNG stalling further renewable development. For purposes of projecting future oil demand, the why doesn't really matter.

At the opposite end of the spectrum, it would be possible to argue that the HCEI should take precedence. This is also covered by the stepwise approach, in that LNG only replaces what is left after the HCEI assumptions have been applied.

2.3.3. LNG Assumptions

In the LNG Imports scenario, we assume that bulk LNG will not be available until after 2020, but that LNG in ISO containers will be available much sooner. We assume that LNG will substitute for 15% of HawaiiGas' existing SNG by 2015, and increase to 100% by 2020.

In the power sector, it is assumed that 85% of remaining (after accounting from renewables and coal) oil-fired generation will be substituted by LNG on both Oahu and Neighbor Islands by 2025. It is assumed that LNG will provide 20% of power for heavy-duty vehicles by 2030, and 50% by 2040. In CNG for light-duty vehicles (passenger cars and small trucks), the economics are less favorable, and penetration is limited to 3% by 2030 and 10% by 2040.

2.4. Other Key Assumptions

2.4.1. Power Sector Fuels

When the new EPA regulations were announced recently, it appeared that most fuel-oil burning power plants in Hawaii would either have to add expensive scrubbers or switch away from fuel oil. The problem with adding scrubbers is that in a situation where the industry is poised to switch away from oil in general, adding scrubbers that would be used for only a few years would result in massive additional costs to power consumers.

A fuel switch—assumed to be from fuel oil to low-sulfur diesel in most cases—would have come as soon as 2017/18. In some of our previous analyses, it was assumed that a large volume of diesel would be substituted for fuel oil unless a waiver could be obtained until alternative generation sources (additional renewables or LNG) could be brought online.

Since then, some of the dates for implementation have slipped. In addition, some test results suggest that the fuel oils burned in the power sector in Hawaii are not as far from meeting the new specifications as feared. It appears that a compliant fuel oil could be blended—possibly by the refiners, possibly through additives. In some cases, it appears that blending 10% or less diesel into the fuel oil might solve the problem.

There are reasons for everyone to hope that a solution other than a full diesel switch can be found, as such a switch would be hugely disruptive. Fuel oil demand would suddenly drop, leaving the refiners with excess fuel oil to export, and diesel demand would surge far beyond the capabilities of the refiners to produce, resulting in huge imports of diesel. And, then, after this major change, LNG might enter the equation and slash the diesel demand. It is a scenario that benefits no one (with the possible exception of shippers and some overseas diesel exporters—though even they might have a short ride).

We believe that the most likely solution is for some sort of modified fuel oil, or specially blended fuel oil, to be burned in coming years. But if this requires up to 10% diesel, or up to 10% additive, how can we account for this in our projections?

Our solution has been to calculate 10% of power fuel oil (10% PFO) in all scenarios. This is a rough gauge of the amount of fuel oil that might need to be replaced by diesel or additives. In

essence, this means that the fuel oil demands shown here might be too high by as much as the 10% PFO. If it is assumed that the volume needs to be made up from diesel, then the diesel demand might be low by that amount. (Actually, since diesel has lower energy content per barrel than fuel oil, the amount of diesel needed would be roughly 1.07 times the amount of the fuel oil decrease.) If the additives are non-refinery additives, then the fuel oil might be low by as much as 10% PFO, and imports of additives in a corresponding volume would be needed.

In the present state of knowledge, this is a way to provide a quantitative margin of uncertainty to the volumes involved. When the most likely approach to the problem becomes clear over the next year or so, the forecasts can be modified by knowing this margin.

2.4.2. IMO/MARPOL Standards

Hawaii is within the North American Emissions Control Area (ECA) designated by the International Maritime Organization (IMO). Beginning in 2015, ships inside the ECA will only be able to burn fuel with 0.1% sulfur or less—a level well below Oahu's low-sulfur fuel oil (0.5%). Fuel oil of 0.1% is virtually nonexistent.

A number of possibilities exist for meeting these new standards—including onboard scrubbers or conversion to LNG bunkering—but these are not practical alternatives in the immediate future.

What is most likely to happen, at least through 2020, is that ships moving interisland and ships moving between Hawaii and the North American Mainland, will burn low-sulfur diesel. Ships arriving in Hawaii from other areas will burn high-sulfur fuel oil until they enter the ECA, and switch to tanks holding low-sulfur diesel for their time in the ECA. (Time in the ECA could be quite extended if they then move on to the US West Coast.)

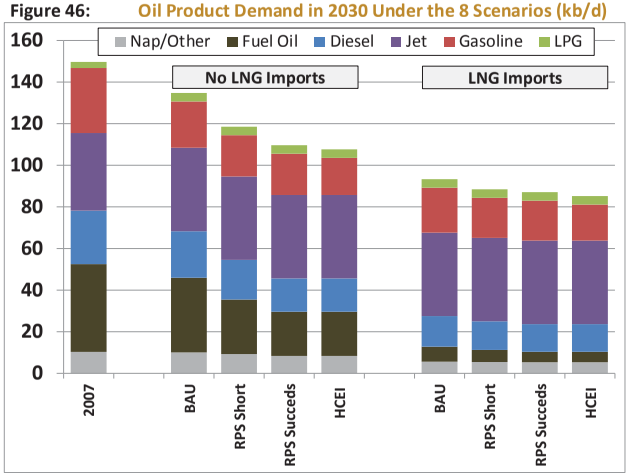
From the point of view of Hawaii's oil demand, this means that most fuel-oil bunkering on Oahu will switch to low-sulfur diesel beginning in 2015. We continue to carry forward a demand for 1 kb/d of fuel-oil bunkering for ships that may elect to pick up fuel in Hawaii (even if they cannot burn it in Hawaiian territorial waters).

2.5. Demand Results From the Scenarios

It is always difficult to summarize results that span multiple products over a range of years under several scenarios. All of the details by product, year, and scenario are given in the Appendices, but here is best to concentrate on a few key graphics.

The figure below shows demand by product for each scenario in the year 2030—the ultimate target year for the HCEI goals, and a year far enough in the future that LNG imports (if they come) could be fully deployed.

Figure 46: Oil Product Demand in 2030 Under the 8 Scenarios (kb/d)



Taking 2007—a peak year—as a base, even under the Business-As-Usual Scenario with no LNG, future demand is expected to be lower. This is partly the result of higher overall oil prices, but is also the result of conservation and renewable measures already undertaken, as well as national measures like the CAFE mileage standards.

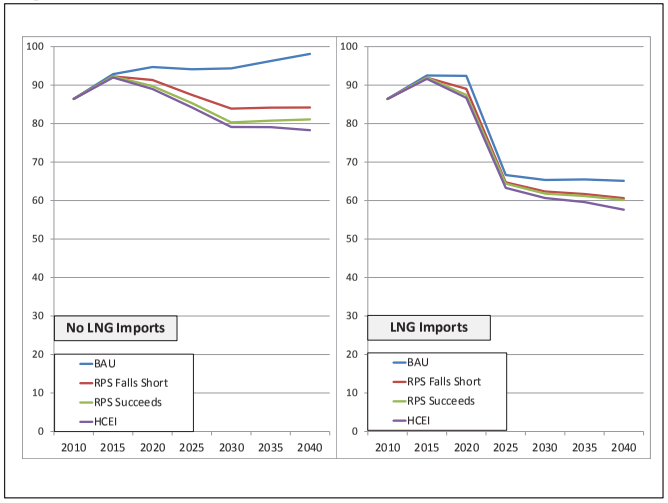
Additional scenarios with increasing success of the HCEI continue to whittle away at oil demand. Keep in mind that the underlying energy demand is relatively vigorous; it is oil that is being displaced.

It is also worth noting that it is the power-sector fuels that are affected the most, followed by road transport fuels. Jet fuel is not affected, and so its importance in the energy mix continues to rise.

LNG imports could take a huge bite out of demand—even in the Business-As-Usual case, where HCEI measures stall out. In this case, of course, fuel oil is driven near to extinction—and jet fuel rises vary close to half of oil demand. This is a demand slate no refinery can match.

The figure below shows the overall oil-product demand for Oahu in the various scenarios. An interesting feature for Oahu is how closely the scenarios are grouped when LNG imports are assumed. On Oahu, oil for power demand is readily substituted for by LNG, but many of the other oil demands that are not strongly affected by either LNG or the HCEI—jet fuel and marine bunkering, for example—are disproportionately concentrated on Oahu.

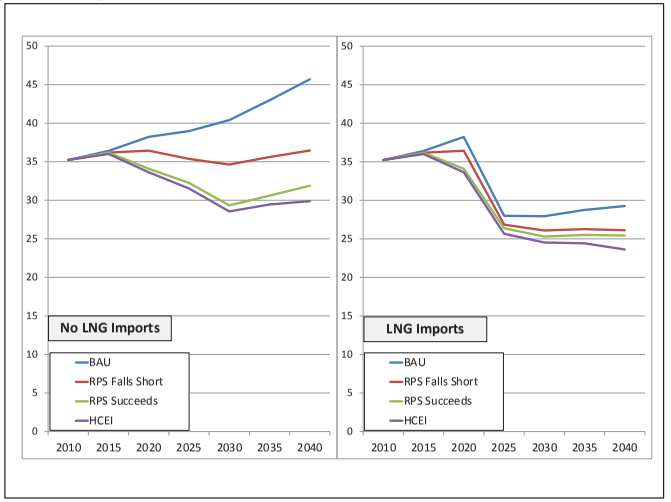
Figure 47: Oahu Total Oil Demand in the 8 Scenarios, 2010-2040 (kb/d)



Of special interest to the present project are the oil-import needs of Neighbor Islands under the various scenarios. In general, the "spread" of scenarios on the Neighbor Islands is wider than on Oahu—this again reflects the fact that the demand not affected by policy (jet and bunkering)

form a larger share of Oahu's demand. Put another way, demand on the Neighbor Islands is potentially much more policy-responsive.

Figure 48: Neighbor Island Total Oil Demand under the 8 Scenarios, 2010-2040 (kb/d)



2.6. Implications for Product Imports

2.6.1. Projected Output Patterns of the Refineries

Getting from product demand to product imports might seem like a relatively simple matter. All that is needed is to start with demand and subtract out whatever the refineries might provide. This is in fact the case, but the output pattern of the refineries is far from fixed. The crude runs for each refinery can be varied. In an abstract sense, the runs can be varied from zero up to the maximum capacity. In practice, overheads and various operational constraints are such that refineries normally only operate in the range of about 60-98% of capacity, and 75-95% is more commonly seen. Even that leaves a substantial range: with Hawaii's installed capacity, that represents a possible fluctuation of about 30 kb/d—nearly a quarter of today's total demand.

In addition, this simple calculation doesn't reckon with possible changes in the crude slate. Hawaii runs a very low-sulfur crude slate, but the API gravity (density) of the crudes is rather middle-of-the-road—typically 32-37°API, with Tesoro/HIE generally at the low end of the scale.

Recent years are not a good guide to the capabilities of the refineries. Chevron has been running somewhat below capacity, and Tesoro had been running considerably below capacity. The moderate API of the slate is partly because light crudes are more expensive, but also because there is still a substantial fuel oil market in Hawaii.

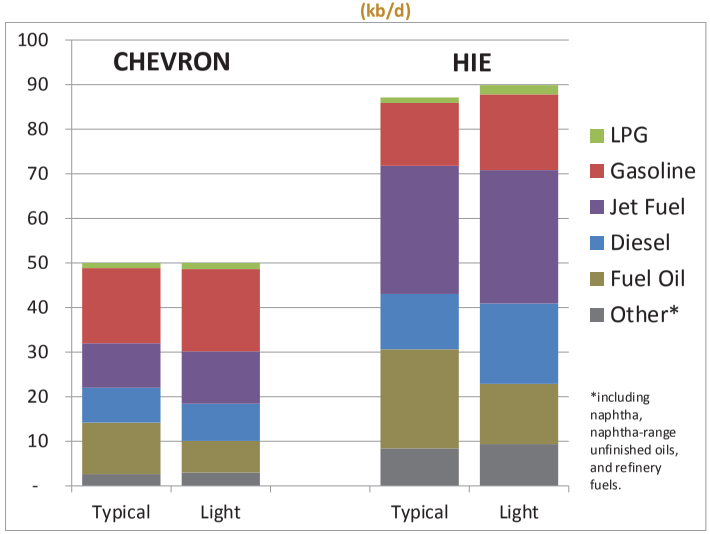
Although Hawaii's refineries are not the most flexible facilities in the world, they are still able to make substantial adjustments in their output patterns through a process of selecting the proper crude slate and changing the operating strategy. The strategy selected will invariably be a combination of adjusting the crude slate and strategy based on demand patterns, the differences in the cost of various crudes, and the strategies adopted by competitors.

It is possible to model such behaviors. Indeed, the refineries themselves employ complex optimization models (usually linear programming models or 'LPs") to select crudes, throughput levels, and operating strategies for their units. We have often constructed such models for various purposes, but applying LPs to behavior many years or decades into the future goes well beyond the scope of this study. (In addition, predicting relative prices and corporate investment policies out through 2040 involve huge uncertainties.)

Nonetheless, it is important to recognize that there is some flexibility in the refining system. The figure below shows our estimates of refinery output at high crude runs with lighter crude slates. In the case of Chevron (which already has a lighter crude slate), this assumes a switch to a 50:50 mixture of Benchamas (already an important crude) and a very light crude such as Bekapai.

In the case of HIE, the move to a lighter crude slate assumes an elimination of very heavy crudes like Duri, Pyrenees, and Escalante, in favor of light (38°API) crudes similar to Sokol. It also assumes running the hydrocracker at higher throughput rates. (This should be easy to accomplish at the high throughputs assumed here.)

Figure 49: **Hawaii's Refineries: Typical and Lighter-Slate Outputs at Higher Utilization (kb/d)**



These levels of production assume a slight increase in Chevron's total throughput of crude, and a substantial increase in Tesoro's recent throughput. (The new owner's at HIE have said that they plan to return the plant to high levels of throughput.) In that sense, these numbers represent upper limits of likely product output.

It is important to understand that these are essentially "reference" output slates. Either refinery could easily run at lower rates (they have been doing so for several years). Within certain limits, the crude slates could be adjusted, with consequent changes in output; in particular, it is always easy to move to a heavier slate and produce more fuel oil.

Furthermore, in the blending process in the refinery, some adjustment can be made between adjacent product classes. A classic example is jet fuel and diesel, where a fraction of the blendstock can be "upblended" to jet fuel or "downblended" to diesel. There are limitations (determined by product specifications) on how far this can be carried, and most refiners are typically pushed up against a specification constraint. (For example, in Hawaii, often the refiner is already upblending as much as possible to maximize jet fuel output.) The point is that the

lines between product categories are often not hard and fast boundaries, and can sometimes—but not always—be nudged a bit in favor of one product or another.

The levels and patterns of output shown in the figure above are certainly technically feasible. Whether they are economically practical—especially if demand continues to decline—is very much open to question. If both refineries are operating at these levels, in most years in most demand scenarios, Hawaii becomes a significant net exporter of refined products. To date, neither refiner has decided that this would be economically attractive. Once again, both refineries running at this level of throughput represents something near the upper limit of what is possible.

2.6.2. Imports: Refinery Operation Cases

While both refineries running indefinitely at high throughput seems improbable in the face of stagnant or declining demand, high throughput becomes more likely for either refinery if their neighbor closes.

There are essentially four possible cases:

- Both refineries operating
- Chevron operating
- HIE operating
- Both refineries closed

It is vital to recognize that as we move forward in time toward 2040, it is quite likely that the actual outcome will switch from one case to another, and possibly switch more than once. To take one possible outlook, it is easy to imagine that both refineries will be operating in the near future, but only one will be operating in 2020, and none might be operating in 2030.

For simplicity, in this chapter we do not discuss product-by-product import needs under the various cases, as the amount of data involved is huge. In addition, although the difference between "Typical" and "Light" output slates affects the pattern of product imports, it has very little effect on the total import needs.

In this chapter, we also exclude LPG imports from the total imports, as the types of ships and storage are quite different from other products. In addition, LPG imports seem likely to grow in all scenarios, irrespective of refinery operation levels.

Detailed results by products (and including exports) are given in the appendices. It should be mentioned that while determining the import levels involves no more than arithmetic, there are some nuances. In particular, if a refinery closes, it also slightly affects demand, since the need for refinery fuel drops (and refinery fuel is part of demand).

The results of the various demand scenarios and refinery-operation cases are shown in the figure below. These should be understood as indicative of minimum required levels of imports in the three cases where refineries are operating, since it is always possible for the refineries to operate at lower throughput.

Figure 50: Product Import Scenarios (Typical Output Slates), (kb/d)

Product Imports--No LNG

	BOTH REFINERIES	CHEVRON ONLY	HIE ONLY	NO REFINERIES
	Business-As-Usual LNG Imports			
2015	0	74	39	122
2020	1	78	43	126
2025	3	78	43	126
2030	6	79	44	127
2035	9	84	48	132
2040	12	88	53	136
	RPS Falls Short--LNG Imports			
2015	0	76	39	122
2020	1	75	38	121
2025	1	70	33	116
2030	1	66	29	111
2035	2	67	30	112
2040	2	67	30	113
	RPS Succeeds--LNG Imports			
2015	0	76	39	122
2020	1	71	34	117
2025	1	65	28	110
2030	1	57	21	102
2035	2	58	21	104
2040	2	60	23	105
	HCEI Mostly Succeeds--LNG Imports			
2015	0	76	39	121
2020	1	70	33	116
2025	1	63	26	108
2030	1	55	19	100
2035	2	56	19	101
2040	2	58	18	100

Product Imports--LNG Imports

	BOTH REFINERIES	CHEVRON ONLY	HIE ONLY	NO REFINERIES
	Business-As-Usual LNG Imports			
2015	0	74	39	122
2020	1	76	43	124
2025	1	44	23	87
2030	1	42	21	86
2035	2	43	22	87
2040	2	42	21	86
	RPS Falls Short--LNG Imports			
2015	0	76	39	121
2020	1	73	38	118
2025	1	44	21	84
2030	1	41	18	81
2035	2	40	17	80
2040	2	39	15	79
	RPS Succeeds--LNG Imports			
2015	0	76	39	121
2020	1	69	34	114
2025	1	44	21	83
2030	1	41	17	80
2035	2	40	17	79
2040	2	39	15	78
	HCEI Mostly Succeeds--LNG Imports			
2015	0	75	39	121
2020	1	68	33	113
2025	1	42	19	82
2030	1	39	15	78
2035	2	38	14	76
2040	2	39	12	73

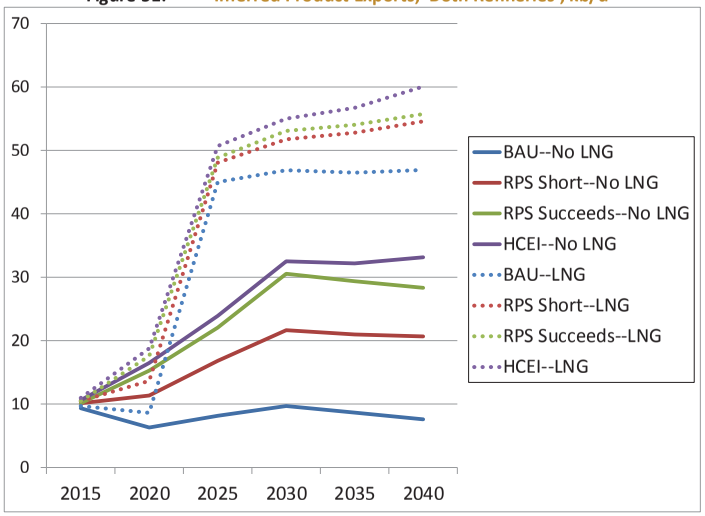
The overall results match with common sense: with both refineries running at high throughput, import needs are negligible. Import needs take a large jump if Chevron is closed and HIE continues operation, and an even bigger jump if the situation is reversed; this reflects the difference in capacity between the two refineries. Finally, with both refineries closed, product imports equal product demand.

As with most major industrial operations, the supply side of the equation is "lumpy." True, it is possible to scale back operations, but there comes a point where the economics of production no longer work; a plant closes and supply takes a sudden drop.

As in the demand scenarios shown earlier, the effects of the HCEI and of LNG substitution can both be seen, with each contributing significantly to the fall in import needs.

There is an important item that does not show in the previous figure, however, and that is the inferred product exports if both refineries are running at high throughput. In most scenarios other than the BAU with no LNG, the exports reach rather high levels.

Figure 51: Inferred Product Exports, 'Both Refineries', kb/d



This shows the challenge of running the refineries at high throughput. Even the exports of around 10 kb/d that would be seen in 2015 are not negligible: that amounts to about 3.7 million barrels each year. There may or may not be a loss associated with each barrel exported, but there is little doubt that the economics are less attractive than selling the products locally (thereby avoiding the transport cost).

With one or the other of the refineries closed, of course, export levels are negligible for most products—with one exception. When LNG imports displace oil in the power sector, fuel oil exports rise. This is especially significant in the case of HIE—although it can be partially ameliorated by moving to a lighter crude slate.

The fact that the viability of the refiners is severely challenged by both the HCEI and by LNG imports should not be surprising. The primary aim of both policies is to cut oil demand. To a refiner, that amounts to cutting the market for the refinery's output. That lowers revenues, and also increases the cost per barrel of product (since many refinery costs are fixed).

A question often posed is what effect would be seen if, for whatever reason, LNG displaced renewables. (We take no position on whether this is probable or desirable.) The answer is that it would obviously increase the need for LNG imports, but from the point of view of this study it would not have a major impact. The main displacement of renewables would be in the power sector, but it would amount to swapping one oil substitute for another: it does not have a substantive effect on oil-product demand.

2.6.3. General Implications

Product imports into Hawaii fluctuate, but in general they are less than 15 kb/d, with the bulk of that being jet fuel, along with a small but steady flow of asphalt and LPG.

With the closure of either refinery, the need for imports increases substantially. In cases other than the Business-As-Usual case, the increase is gradually eroded across time as the effects of conservation and fuel substitution become more pronounced.

Would these possible increases in imports present a crisis for Oahu's import infrastructure? The definitive answer is: It depends.

2.6.3.1. Refinery-to-Terminal Conversion

Either of the refineries could be converted into an import terminal. This practice is now so common on the US East Coast that it is often referred to as an acronym, RTT.

In event of RTT conversion of either refinery, Oahu's overall infrastructure is, if anything, overbuilt. As seen in the previous chapter, there is ample tankage on the island, and tanks at many end-user sites (notably HECO and Red Hill) are in excess of any envisioned needs. This is even more the case if crude tanks at the two refineries are repurposed to product storage.

The import capacity of the pipelines at the refineries is huge. At present, the pipelines are not licensed for anything near the volumes of product that would be required (they are licensed for large volumes of crude and small volumes of products), but repurposing should be relatively easy.

And, of course, if both refineries were to close and convert to import terminals, the import infrastructure would be far in excess of what is needed.

This sweeping statement requires two caveats. First, infrastructure for LPG is inadequate without the refiners operating, and requires different infrastructure from other oil products.

Second, conversion of one or both refineries to import terminals might or might not solve the problem of demurrage and operational constraints at Pier 51A. If a refinery is converted to an import terminal, the owner might or might not allow the new terminal to be used for third-party imports—and third-party imports are the bulk of jet fuel imports that arrive at Pier 51A.

2.6.3.2. Full Closure

If either refinery elects to close and is not repurposed as an import terminal, it would definitely stress the import system. Providing the state with needed fuel would be a major challenge, and would require the cooperation of everyone involved: in particular, the remaining refiner; Aloha (through its import terminal); HECO, and HFFC.

Our own evaluation is that it would be difficult, but not impossible, to meet fuel needs even if one refinery site were to close fully. We have also discussed the problem informally with a number of industry analysts, who agree that it would be possible—but all of whom emphasize that it would require some changes and considerable advance notice.

In the event one refinery closes and does not reopen as a terminal, the first response of the other refiner would be to increase crude runs—but this would not be nearly sufficient to solve the problem.

The second response would be to bring more products in through the refinery. This creates logistical problems for refinery operations (one reason for the need for advance notice), but in principle the refinery bring in considerable volumes of products and push them out to end-user storage as quickly as possible.

The third response would be to turn to Aloha. Aloha has import capacity through KBPH for gasoline and diesel, as well as interconnections with the refineries. It would certainly be possible to employ the Aloha terminal as a partial means of serving Oahu.

The fourth response would be to increase the use of KBPH and HMT for imports. A considerable volume of these could be transshipments—direct imports into KBPH, for example, which are then loaded for neighbor islands. This might be particularly important in the case of jet fuel, where transshipment of jet at KBPH could relieve pressure on HFFC.

A key problem is the pipeline infrastructure. This would be particularly important if the HIE infrastructure was taken out of commission, as Chevron's present connection to KBPH is through HIE.

Of course, it is unlikely that needed infrastructure would remain permanently unavailable, but at present there is no plan for how to handle a full refinery closure. As mentioned before, this is an emergency preparedness issue where the State ought to develop a plan in cooperation with the refiners for supply in event of a disaster that curtails operations. We consider this to be a bigger risk than a sudden and complete closure of a refinery, terminal, and pipeline system.

If Chevron fully closes and HIE remains open, many problems are minimized. Clean products, including jet, can be brought in at KBPH and moved to Aloha, and many end-users can be serviced, including HFFC…if the owners of the HIE facility allow it. (This is an issue related to competitive advantage. At present, for example, we are told that Chevron's agreement with HIE for use of the HIE line to KBPH rules out the transit of jet fuel.)

If HIE fully closes and Chevron remains open, then there are a number of infrastructure questions that need to be addressed. The first and most pressing is the use of the HIE pipeline

system—specifically the line connecting the HIE refinery to KBPH, which is Chevron's access to KBPH. Chevron has excellent clean line capacity to Honolulu and HFFC (including a dedicated jet line), but the interface between KBPH and the Chevron lines is the HIE-KBPH line. (The Aloha-KBPH and Aloha-Chevron lines may be a possible workaround, but this is bound to be suboptimal, and maybe not feasible for some products.)

Secondary—but vitally important—issues if HIE fully closes are the supplies of feedstock to HawaiiGas, and fuel oil to the Kalaeloa Partners power plant, which appear to be served directly from the HIE refinery.

In most of our demand scenarios, the need for fuel declines in the future, so that the full closure of a refinery becomes progressively less troubling as time moves on.

And if both refineries close and do not undergo an RTT conversion? This would be a true emergency, and would require that the State step in, probably invoking eminent domain. We consider this case to be an extremely remote possibility. Major refiners don't suddenly slam the doors and vanish; it's bad for business elsewhere. Furthermore, operation as a terminal allows the company to continue to maintain existing contracts as well as its own marketing network. There might or might not be enough demand to make two RTTs attractive in the future, but there is probably enough demand to justify at least one.

2.6.4. Implications for KBPH

- In most scenarios, apart from jet fuel and LPG, demand for fuels in Hawaii show a steep downward trend.
- LNG has the potential to be as important, or even more important, than the HCEI in cutting Hawaii's oil demand—but there appear to be few onshore or nearshore sites appropriate for siting an LNG import facility.
- Neighbor Island demand is subject to the same forces as Oahu's demand, but in most scenarios Neighbor Island demand is somewhat more resilient than Oahu's. Since the costs and details of LNG distribution to Neighbor Islands is less certain than on Oahu, the Neighbor Islands oil-product demand could easily be higher than shown in our LNG scenarios.

- If both refineries are run at full capacity, then in most scenarios the need for imports is small—but in most scenarios, this results in the need for large and growing product exports, which may face poor economics.
- If either refinery or both refineries are converted to import terminals, imports will increase—but the import terminals should be able to handle the additional load.
- In cases where a refinery closes, more LPG imports will be needed, and there are limitations on the infrastructure for this. Indeed, increased LPG import infrastructure may be desirable in any case to lower freight rates.
- If a refinery closes down without converting to an import terminal, then the demand for direct imports at Pier 51A, KBPH, and possibly HMT, could be increased—especially to serve transshipment needs to Neighbor Islands.
- There are other factors that could result in small increased imports above those cited here, as this analysis looked at net imports. Although jet fuel may be a major net import, it may also continue to be a two-way trade in some scenarios, as end-users may wish to procure some of their own deals internationally rather than buy from refiners (or importers after RTTs). Chevron is unable to produce ultra-low sulfur diesel and already imports its (relatively small) sales volume.

The baseload demand on KBPH will be its share of movements from Oahu to Neighbor Islands. Beyond this, there is the question of what might happen in a "one-refinery-only" Oahu, where one refinery closes and does not convert to an import terminal. In this case, KBPH might find itself receiving imports destined for Neighbor Islands—thereby effectively doubling the expected volumes of oil handled in the harbor. In addition, it is possible that pressure on Pier 51A might argue for some of Oahu's own jet fuel needs being imported at KBPH.

One limitation faced in using KBPH as a transshipment terminal for imports to serve Neighbor Islands is the possible lack of storage accessible from KBPH. The refinery tank farms are of course the first resource in this regard, but if one of the refineries is fully closed, then the storage situation could become a bottleneck.

Potentially the Aloha Petroleum terminal could serve to handle at least diesel and gasoline transshipments, receiving, holding, and re-exporting product through KBPH. This unfortunately

would not solve the critical issue of jet transshipment (unless Aloha chose to add jet tankage at its present tank farm).

In addition, if HECO builds an access line to import fuel directly from KBPH to their Barber's Point tank farm, this could potentially be used to receive and re-export fuels for power generation.

These considerations go beyond the scope of the present study, which was designed to be a description of the basic supply and demand situation, and scenarios of future demand and import requirements. Nonetheless, future work needs to take a broader look not only at the harbors but also at the onshore infrastructure, the control of that infrastructure, and the logistics optimizing supply in event of refinery closures or physical disasters.

2.6.5. Quantification of Uncertainties: Specific Scenarios

2.6.5.1. The Problem

Taking all variables into account, the future oil-shipping demand on KPBH could fall significantly, or in some scenarios, could rise substantially. Depending on the future of the refineries and whether they are converted to terminals, it is even possible for demand on KBPH to rise and then fall sharply. Here we can do little more than outline the range of possibilities.

Based on DOT data for FY 2012, a rough overview of the total demands on KBPH at present are given in the following table.

Figure 52: DOT Data On Use of KBPH for Fuels, FY 2012 (kb/d)

	Barge	"Overseas"*	TOTAL
LPG	-	0.5	**0.5**
Gasoline	6.5	0.2	**6.6**
Jet Fuel	5.0	0.1	**5.1**
Diesel	7.1	5.7	**12.8**
Fuel Oil/Other**	5.6	1.4	**6.9**
Ethanol	0.2	0.7	**0.9**
Asphalt	-	0.9	**0.9**
Bunkers	0.9	3.3	**4.1**
TOTAL	**25.2**	**12.7**	**37.8**

* All traffic apart from Interisland. Data does not distinguish between imports and exports.

The largest element in fuels-handling at the port is supply to Neighbor Islands. If the bunkering of the barges in included, this accounts for almost exactly two-thirds of the demand for throughput.

There are actually considerable uncertainties about the current utilization of the KBPH terminal for oil product movements. The DOT data system tracks movements by "Barge" and "Overseas" (the latter including both international shipping and shipping to and from the US Mainland), but it doesn't track directionality; we are told it is not able to distinguish between fuel shipped to the port and fuel shipped from the port. There is also believed to be some amount of double counting, since what is tracked is the volume handled, and cargoes or portions thereof may be handled multiple times.

There are six specific elements driving demand for oil movements through KBPH:

- Neighbor Island demand (including ethanol) through barge deliveries.
- Imports of products from US West Coast and international sources. (Some share of these may be then be re-exported by barge to Neighbor Islands.) This is included in "Overseas."
- Exports of excess products from the refineries.

- Bunkering
- Imports of LPG.
- Imports of asphalt.
- Imports of ethanol.

2.6.5.2. Neighbor Island Demand via Barge

Generally speaking, Neighbor Island demand is served by barge. (The two exceptions to this, LPG and asphalt, are discussed separately below.) There have at times in the past been deliveries of fuel on the Big Island by small tankers after the tanker dropped the bulk of its cargo on Oahu.

The barge traffic is effectively a one-way transaction, with loadings on Oahu and deliveries on Neighbor Islands. Although there are problems in interpreting the DOT data, the loading of barges is relatively straightforward. Based on FY 2012 data, the estimated balances for barge traffic are shown in the table below.

Figure 53: Barge Movements of Fuel to Neighbor Islands, FY 2012

	DOT Barge Movements KBPH		Neighbor Island Demand	Implied non-KBPH Movements*
	bbl	*kb/d*	*kb/d*	*kb/d*
Gasoline	2,356,358	6.5	10.7	4.3
Jet Fuel	1,811,293	5.0	6.4	1.5
Diesel	2,608,611	7.1	9.4	2.2
Fuel Oil	1,102,535	3.0	3.0	0.0
Other**	925,196	2.5	2.5	0.0
Ethanol	58,206	0.2	0.2	0.0
NI Total	**8,862,199**	**24.2**	**32.2**	**8.0**

* attributed to Chevron's Honolulu Marine Terminal

** excluding asphalt and LPG. Primarily naphtha. Included in "Fuel Oil" in DOT data system.

It appears that Chevron's Honolulu Marine Terminal (HMT) handles about 25% of the total interisland fuels traffic. (It is worth noting that HMT no longer handles black products; all supplies of fuel oil to Neighbor Islands now move through KBPH.) As a basic assumption, this proportion of Neighbor Island demand might be held constant. It should be kept in mind, however, that if Chevron chose to withdraw from the market entirely, that this volume of demand might be transferred to KBPH.

2.6.5.3. Overseas Imports and Exports of Products

At present, the majority of trade in oil products between Hawaii and other locations is carried out through KBPH. This is not a one-way trade; products are both imported and exported. Some of these are matters of temporary volumetric imbalances, but product specifications also play a major role.

As seen in Figure 52 previously, the largest trade volume is in diesel fuels. Chevron cannot produce EPA-certified, ultralow-sulfur diesel fuel, and the HIE refinery can produce only certain volumes. This means that the same refiner may find itself both importing and exporting different grades of diesel fuel.

Refiners may also find themselves producing an excess of some kinds of gasoline blending components, while still needing to import components mandated by law (e.g. ethanol). In this case, ethanol imports may cause some volume of unfinished gasoline to be sent to other markets where it can be used.

At present, virtually all of the overseas imports and exports of oil products (other than LPG, asphalt, and lube oils) move through KBPH. Were the volumes traded to change dramatically, however, this pattern could change dramatically.

The refineries are licensed for only small volumes of product imports and exports through their offshore pipelines and moorings. The licensing and practices could change; thus far, there has been little incentive to make these alterations. The essential reason is logistics. Receiving or sending out small cargoes of products through an offshore pipeline is complex, especially if the carrier is a small multiproducts bottom such as a barge. Keeping segregation of products in the pipeline for small volumes poses many challenges, and barges were not generally designed for open-water moorage. Therefore, to date the refiners have chosen to handle the majority of

their waterborne product movements through KBPH or HMT—and there will be an incentive to continue to do so for interisland barge traffic.

If exports or imports rise to high levels, however, then there will be an incentive to move overseas cargoes in or out of the Oahu through the refinery terminal and pipeline itself. This is a standard changeover in a Refinery-To-Terminal (RTT) conversion: the crude import line becomes a product import line. But it is also seen when a refinery run for local use suddenly becomes a substantial international exporter: the offshore line carries crude in, but carries products out.

What this means is that there is not a proportional correlation between trade needs and the demands that are likely to be placed on Oahu's oil harborage. If refinery imbalances increase (as is likely under most scenarios), the need for overseas imports and exports of products are likely to increase…until a tipping point is reached, and larger, more frequent cargoes are preferred. (This point may or may not be reached before an RTT seems like the most economic option.) At this point, the demand on facilities such as KBPH will fall, possibly sharply—although it will probably remain the dominant facility for serving the Neighbor Islands. The effects of a refinery closure on demand on KBPH thus depends on circumstance and business decisions, and can either raise or lower demand.

Under most scenarios, however, either refinery, if converted to an import terminal, could probably eliminate the role of KBPH in meeting import needs. Indeed, even with such a conversion, with a different operating strategy and some mechanical changes, it is probable that as demand declines, either refinery alone would be able to supply refined products and also meet product import needs at the margin.

2.6.5.4. Bunkering

As discussed earlier, IMO regulations will be causing a massive realignment in bunker-fuel specifications, and these will affect Hawaii beginning in 2015. It is unclear how this will affect bunkering volumes at KBPH. Hawaii is not a low-cost site for bunkering, but it is sometimes cost-competitive on high-sulfur fuel oil (HSFO) bunkers. Even if this cost advantage remains, ships electing to bunker with HSFO would have to load the fuel into segregated tanks and avoid

burning them until out of the North American ECA. Under the new standards, even Oahu-grade utility LSFO will not be allowed for burning in the ECA.

One effect will probably be to shift bunkering demand to more diesel. (On a volume basis, the effect is more than proportionate, since it can take nearly ten percent more diesel to provide the same energy as a barrel of fuel oil.)

Furthermore, if Hawaii's oil demand declines, there will be less need for oil to fuel oil deliveries. Deliveries of other goods, however, might expand. Bunkering is a small share of Hawaii's oil demand, but it is easy to construct plausible scenarios where it rises or falls. For our purposes here, it is probably most sensible to hold the KBPH volume constant, but it is equally easy to make arguments for increases or decreases.

Another uncertainty in the bunkering outlook is the trend toward bunkering with LNG to meet IMO regulations. There is presently a small amount of LNG bunkering in Europe, and there are many plans for supplying LNG bunkers to US mainland coastal trade. Whether international, high-seas transport will turn to LNG in the longer term is very much an open question.

If LNG becomes available in Hawaii, there is potential for interisland cargo bunkers to be displaced by LNG. According to a study done for HNEI, however, the volume of fuel potentially displaced is comparatively small (probably less than 1 k/bd).

What of the possibility of international bunkering of LNG in Hawaii? Physically it is certainly possible, but the economics lobby against it. It is true that if LNG bunkering for international marine transport becomes widespread, that many major bunkering centers will have to provide their LNG from imports. But hauling LNG to Hawaii from anywhere is quite expensive, and the competitiveness of Hawaii as an entrepot bunkering center for LNG is seriously reduced by the small scale of Hawaii's possible import facilities. In addition, there are serious questions about where such bunkering would take place; if at HMT or KBPH, there would have to be specialized storage, loading, and offloading facilities capable of handling cryogenic temperatures.

In summary, then, Hawaii as an international LNG bunkering center presently seems unlikely for economic, logistical, and infrastructural reasons.

That said, it is good to keep in mind that there are plausible reasons that bunkering in Hawaii might significantly rise or fall (or even rise and then fall thereafter). If Hawaii's overall demand

continues to decline and the refineries continue to operate at high throughput, then the refiners may be willing to provide bunkers at very competitive prices as an alternative to the lower returns from exporting. But at the other extreme, if one or both refineries close, all bunkering would have to be based on imported products, and this would make Hawaii a very high-cost source of bunkers. As with other aspects of the outlook for demand on KBPH, this could easily result in a situation where demand for bunkering first expands, and then later significantly contracts. LNG bunkering is just one more reason for uncertainty.

2.6.5.5. LPG

LPG (which, in the case of Hawaii is almost exclusively propane) is the only product other than jet fuel that seems likely to see increased demand in all scenarios.

Hawaii's LPG demand exceeds its refinery output by a considerable percentage. Since LPG requires specialized ships and specialized storage tanks, this results in a peculiar import pattern. Small LPG tankers perform long-haul voyages, and then deliver propane to the various import terminals on a "milk run." Unlike other products, where Oahu is the hub, for propane Oahu is just one of the stops—and only occasionally.

It would probably be more economical to establish a central "breakbulk" terminal at KBPH, so that propane could be imported on larger ships and then distributed to Neighbor Islands, instead of running small ships across thousands of sea miles. This has not yet occurred for a variety of reasons, including uncertainties in the market, infrastructure problems, and competitive strategies of the players.

Centralizing KBPH as an LPG hub has a highly leveraged effect on demand for throughput at KBPH. In 2012, about 0.5 kb/d of LPG was shipped from KBPH to Neighbor Islands, while another 2 kb/d of LPG was imported directly to Neighbor Islands. If imports were centralized, 2 kb/d of LPG would have been imported to Oahu, and 2.5 exported to Neighbor Islands. The increase in port demand for LPG at KPBH would be 800% ([2 in + 2.5 out – 0.5 base] / 0.5 = 8).

Although many parties in Hawaii are excited about the prospects for growth in LPG demand, it is important to keep it in perspective. While the growth in demand may be high, and the increase in KBPH port demand is a large percentage jump, LPG represents only 3% of Hawaii's

oil-product demand—and, even under the most extreme scenario examined, is unlikely to represent more than 6% of the State's demand in 2040.

2.6.5.6. Asphalt

Both of Hawaii's refineries were built with asphalt units, but the switch to low-sulfur waxy crudes means that there is not sufficient feedstock to support asphalt units. (The heavy components of waxy crudes are, in fact, waxes, rather than the tars found in crudes suitable for asphalt.)

For this reason, in recent years all asphalt in Hawaii has been imported, and KBPH is the import center. Unlike other products, however, asphalt is not moved to Neighbor Islands on tankers from KBPH. In general, it is moved onto suitable containers and the moved as freight (mostly out of Honolulu Harbor).

Thus, almost all asphalt demand typically arrives at KBPH, but its transshipment doesn't affect the fuel throughput at KBPH.

2.6.5.7. Ethanol

Virtually all of Hawaii's imports of ethanol end up blended into gasoline. The bulk of this is done on Oahu, but about 20% of imports arrive at KBPH and are transshipped to Neighbor Islands.

If the refineries were to close, it is possible that ethanol imports would cease, and all gasoline would be imported with ethanol already blended; US refiners can easily supply gasoline with ethanol already blended to meet Hawaii's standards. On the other hand, if the main sources of gasoline imports are countries other than the US, then Hawaii might need to import non-oxygenated (i.e. gasoline with no ethanol blended) and import ethanol separately for blending in the islands. Whether such blending would take place on Oahu or elsewhere is unclear. Once again, this is a case where the volumes involved are only a small fraction of the State's total oil product demand. In terms of total import volumes, there is no significant difference between the two situations. But even if the refineries convert to import terminals, any imports of ethanol (as opposed to gasoline that contains ethanol) will probably be handled at KBPH.

2.6.5.8. Representative Scenarios

The uncertainties in the present situation are so great that there are literally hundreds of plausible scenarios that could be provided, and those who wish to argue for higher or lower demand at KBPH can find plenty of "but what if" examples.

To get some perspective on the topic, we need to examine a reference case. It is easiest to start by bracketing the possibilities with the highest and lowest plausible cases.

It should be understood that the High Throughput Case is not a base case; it is closer to a ceiling.

The assumptions of the High Throughput Case are as follows:

- Business-as-Usual demand. In other words, this assumes that the HCEI and renewable portfolio standard both fail, and that state policies have no effect on demand growth beyond what has already been accomplished. We believe this is somewhere near the feasible demand ceiling.
- No LNG.
- Both refineries continue to operate. They ramp up to higher levels of runs to follow growing demand, and adopt a somewhat lighter crude slate. (As noted before, closure of one or both refineries does not necessarily increase demand on KBPH; indeed, with terminal conversions, some of the existing traffic might be rerouted to refinery-based terminals. In addition, without refineries, any exportable surpluses disappear.)
- Neighbor Island Fuel demand on KBPH (excluding asphalt, ethanol and LPG) at 75% of Neighbor Island demand; 25% covered by HMT.
- Overseas Baseline: Baseyear (2012) balancing volumes projected as percent of total demand.
- Supplemental jet: The lesser of 1) the total jet deficit, or 2) 10% of Oahu's jet demand imported at KBPH to avoid delays and congestion at HFFC's import pier.
- HEI direct fuel imports at KBPH = any volumes not available from the refineries.
- Additional imports: Volumes not met by refiners or other specified imports. (These are import needs above the assumed Baseline balancing.)

- Additional exports: Product surpluses from refiners. (These are import needs above the assumed Baseline balancing.)
- Asphalt/Ethanol: KBPH ethanol imports at constant share of total gasoline demand; re-exports by barge at constant share of Neighbor Island gasoline demand.
- Bunkering: Held constant.
- LPG: KBPH becomes import hub; demand on KBPH is two times imports (imports plus re-export) plus refinery supply to Neighbor Islands

Figure 54: High Throughput Case (kb/d)

	2012	2020	2030	2040
Neighbor Island Fuels	24.1	26.5	27.9	31.6
Overseas Baseline	7.3	7.9	8.0	8.6
Supplemental Jet	-	0.7	1.4	2.1
HEI Imports	-	-	2.1	5.7
Additional Imports	-	0.1	2.1	4.4
Additional Exports	-	4.9	8.8	7.2
Asphalt/Ethanol	1.8	1.8	1.6	1.7
Bunkers	4.1	4.1	4.1	4.1
LPG	0.5	4.0	4.7	5.5
TOTAL	**37.8**	**50.0**	**60.8**	**70.8**
Increase over 2012	***0%***	***32%***	***61%***	***87%***

The High Throughput Case sees massive growth in demand on facilities at KBPH. This is largely a result of growing refinery imbalances, though HECO imports and supplies of supplemental jet for HFFC also have a strong effect from 2030 onward.

This scenario is plausible, but how likely is it? In our estimation, it is rather improbable. Not only does it presume that most State policies on conservation and renewables fail, it also assumes that as demand growth for oil resumes that no major new sources of energy—such as LNG—are deployed. It also assumes high levels of refinery operations through the coming decades, which we consider exceedingly improbable unless large new investments are made.

Let us now consider the opposite end of the spectrum, the Low Throughput Case. In this case the assumptions are:

- Demand from the HCEI Succeeds (Mostly) Case. This assumes the RPS is met, and that most conservation goals succeed. It also assumes that some, but not all, of the goals for the use of renewables in transportation are met.
- Unconstrained imports of LNG (as in scenarios discussed earlier in the chapter).
- The refineries close and at least one converts to an import terminal. All major fuel imports arrive the new import terminals.
- Neighbor Island Fuel continues to be supplied through KBPH at 75% of Neighbor Island demand; 25% covered by HMT.
- Overseas Baseline: Without refineries, balancing volumes are no longer required.
- Supplemental jet: None.
- HEI direct fuel imports at KBPH: None.
- Additional imports: All arrive at the new import terminals.
- Additional exports: None.
- Asphalt/Ethanol: KBPH ethanol imports at constant share of total gasoline demand; re-exports by barge at constant share of Neighbor Island gasoline demand.
- Bunkering: Falls by half after new IMO regulations take effect.
- LPG: All imports served by small tankers on milk runs; deliveries to KBPH serve Oahu's import needs.

As the results show, in the Low Throughput Case the demands on KBPH decline steeply, falling by a quarter by 2020, and by nearly half in later years. This is a plausible scenario, and, in our view, more probable than the High Throughput Case.

Figure 55: Low Throughput Case (kb/d)

	2012	2020	2030	2040
Neighbor Island Fuels	24.1	23.1	16.1	15.1
Overseas Baseline	7.3	-	-	-
Supplemental Jet	-	-	-	-
HEI Imports	-	-	-	-
Additional Imports	-	-	-	-
Additional Exports	-	-	-	-
Asphalt/Ethanol	1.8	1.7	1.4	1.3
Bunkers	4.1	2.1	2.1	2.1
LPG	0.5	1.0	1.1	1.2
TOTAL	**37.8**	**27.8**	**20.6**	**19.6**
Increase over 2012	***0%***	***-26%***	***-45%***	***-48%***

Between these two scenarios there are a huge number of other possibilities. Some of them are more likely than others, and also seem more probable than either the High or Low Throughput cases.

The main variable is whether or not one of the refineries converts to an import terminal. If an import terminal is established at one of the refineries, then long-haul product imports (with the exceptions of jet, LPG, ethanol, and asphalt) will most likely arrive at the new import terminal. It is also worth noting that in any scenario where Hawaii's oil demand is declining, the conversion of one of the refineries to an import terminal will put serious competitive pressure on the remaining refinery, as one import terminal would easily be able to serve the whole state's import needs.

To give some an example of an intermediate case, however, let's consider a scenario where one of the refineries continues operating alongside an import terminal.

We consider the RPS Succeeds scenario to be a likely demand outlook; both the State and the utilities have made strong commitments to conservation and renewables. Under this scenario, if there is no import of LNG then there is no major surplus of products for export, and, with a

refinery converted to an import terminal, there is no new pressure on KBPH. If LNG is imported, however, the cuts in demand result in imbalances even with only one refinery in operation.

For this example, we will assume the smaller of the two refineries (Chevron) continues in operation, and uses KBPH to handle any surplus products. In addition, half the previous Overseas Baseline is maintained to support Chevron's needs to balance sulfur on diesel grades.

This scenario also assumes that KBPH becomes the LPG hub for the state. After Oahu's demand is satisfied by the refinery, excess is shipped out to Neighbor Islands; and the State's net deficit in LPG is received at KBPH and then transshipped to Neighbor Islands. Bunkers are held constant, and ethanol and asphalt are treated as in previous scenarios.

As the figure below shows, under this scenario there is a slight growth in demand for shipping of fuels at KBPH. The main increases are from exports of surpluses (mostly fuel oil) and the establishment of KBPH as the LPG hub for the State.

Figure 56: Intermediate Scenario I: One Refinery, RPS, LNG (kb/d)

	2012	2020	2030	2040
Neighbor Island Fuels	23.6	23.4	16.6	16.5
Overseas Baseline	7.3	3.7	3.7	3.7
Supplemental Jet	-	-	-	-
HEI Imports	-	-	-	-
Additional Imports	-	-	-	-
Additional Exports	-	-	6.5	6.3
Asphalt/Ethanol	1.8	1.7	1.5	1.4
Bunkers	4.1	4.1	4.1	4.1
LPG	0.5	5.2	5.9	6.7
TOTAL	**37.3**	**38.1**	**38.3**	**38.6**
Increase over 2012	***0%***	***2%***	***3%***	***4%***

It is worth exploring this from another angle. Suppose that both refineries close, and one or both convert to import terminals. But also hypothesize that a) the refiners stop using HMT to serve Neighbor Islands and convert these facilities to other uses; b) another party takes over the Neighbor Island jet market by imports at KPBH (perhaps by building jet tankage at the Aloha terminal); and, c) as before, KBPH becomes the State's LPG hub.

Figure 57: Intermediate Scenario II: No Refineries, RPS, LNG, New Jet Supplier (kb/d)

	2012	2020	2030	2040
Neighbor Island Fuels	23.6	31.2	22.2	22.0
Overseas Baseline	7.3	-	-	-
Neighbor Island Jet	-	7.7	8.0	8.3
HEI Imports	-	-	-	-
Additional Imports	-	-	-	-
Additional Exports	-	-		
Asphalt/Ethanol	1.8	1.7	1.5	1.4
Bunkers	4.1	4.1	4.1	4.1
LPG	0.5	6.4	7.1	7.9
TOTAL	**37.3**	**51.1**	**42.8**	**43.6**
Increase over 2012	***0%***	***37%***	***15%***	***17%***

In this case, demand on KBPH takes a large jump by 2020 (because of replacing HMT shipments and the new jet imports), but the gradual decline in oil demand erodes the throughput at KBPH in later years.

How likely is this scenario? As presented, none too likely; it is improbable that a new entrant could claw away the entire Neighbor Island jet market, and there aren't signs that Chevron plans to abandon shipping from HMT. Nonetheless, this shows that even some fairly dramatic changes may not have a game-changing impact.

Conclusions

- The two biggest variables affecting the required throughput KBPH are the level of oil demand in the State and the possible conversion of refineries to import terminals.
- Under most scenarios, Hawaii faces a declining demand for oil products, with the exception of LPG and jet fuel. The expected decline is largely the result of planned conservation and use of renewable energy, and may be greatly expanded if LNG is introduced.

- In the face of declining demand, overall there is more import and storage infrastructure already in place in the state than is likely to be needed. Much of this is presently devoted solely to crude oil, but it is capable of being converted to importing and storing finished products.
- Past 2020, in principle, if either refinery converts to an import terminal, it would be physically capable of meeting all of the State's oil-import needs. This would not be easy or convenient in the short run, but appears to be a possibility. Strictly speaking, in a volumetric sense, KPBH is not needed, and under most scenarios is needed even less with every passing year.
- In a practical sense, however, KBPH is needed for various purposes. Most transport of oil products to Neighbor Islands is by barge, and is it quite inconvenient to fill a multiproducts barge from a large offshore mooring buoy. The baseload on KBPH is therefore the Neighbor Island demand (less shipments via Honolulu Marine Terminal).
- In addition, KBPH is an important bunkering center. Furthermore, there may be strong economic incentives to create an LPG hub at KPBH so that larger cargoes may be brought to central storage and then distributed to Neighbor Islands.
- While the general trends in oil demand in Hawaii are downward, the demand in Neighbor Islands is somewhat more bullish. Therefore, all things held equal, the baseload on KBPH holds steadier, or falls less, than state demand.
- With only the information we have presented above, if anyone asked if a petroleum-oriented expansion of fuels capacity is needed at KBPH, the answer would almost certainly be, "Of course not—demand is dropping, not rising." The situation is more complicated than that, however.
- KBPH is used not only to transport products to Neighbor Islands, but also for imports of asphalt and ethanol. A more important use, in terms of volume and potential volume, are imports and exports of products by the refiners. At present, most excess products are "exported" (though many move to other US ports) through KBPH, while some shortages—once again, with the notable exception of jet fuel—come in through KBPH. A classic instance is Chevron exporting low-sulfur diesel through KBPH, while also importing ultralow-sulfur diesel through KBPH (since Chevron cannot manufacture ultralow-sulfur diesel).
- It might seem as if the higher Hawaii's oil-product import or export need, the higher the demand on KBPH. This idea is fallacious. In fact, when import and export needs from the

state are low or moderate, the refiners will be likely to use smaller ships and move product through KBPH. When the volumes become large—and especially when they become large enough to warrant closing a refinery and converting to an import terminal—they are more likely to use their own offshore moorings for both import and export (with the exception of loading interisland barges).

- *Ceteris paribus*, the probable demand on KBPH as a function of product movements in and out of the state is probably shaped something like a bell curve. At low levels of product imports and exports, the demand on KBPH is probably limited to Neighbor Island needs plus some overseas balancing.
- At higher levels of imports and exports, demand on KBPH begins to grow…until it reaches the point where the volumes are so large that a refiner closes and decides to operate as an import terminal. At this point, the demand on KBPH begins to fall rapidly back toward the level of baseline Neighbor Island imports.
- Even without the participation of the refiners, if the Aloha terminal were used as a transshipment point, then in event of a refinery closure, Aloha could become a link in the supply chain for gasoline and diesel to the Neighbor Islands. If Aloha were to add jet tankage, then KBPH could become a critical transshipment point for jet fuel—the most important fuel in Hawaii's future energy mix.
- The range of possible, plausible scenarios of required throughput is very large, reflecting the huge uncertainties about future demand and about the viability of refining on Oahu. The High Throughput case we show here, with oil demand rising and both refineries running near capacity, is certainly possible, and would require a large expansion in fuels throughput at KBPH. Nonetheless, we are skeptical both about the prospect for demand growth in Hawaii and about the long-term viability of two refineries on Oahu.
- The Low Throughput case is, in our view, more likely than the High Throughput case, but we suspect that it understates likely throughput at KBPH.
- Overall, we do not believe that there are powerful pressures for major capacity expansions of fuels facilities at KBPH, and feel it is most probable that the need for throughput will expand or contract slightly from current levels. It should be kept in mind that the near-term trajectory—which will have two refineries running, and will not include major cuts in demand—may be very different than the long-term trajectory. Pressure on KBPH may increase for a number of years, and then decline as the product balances and import options change.

- Ultimately, it is policymakers who must decide what assumptions to adopt about demand scenarios, future refinery operations, and the import of LNG. These are the factors that drive the need for throughput at KBPH, and the uncertainties about each of them are great.

3. Overall Energy Demand: Implications for the Environment

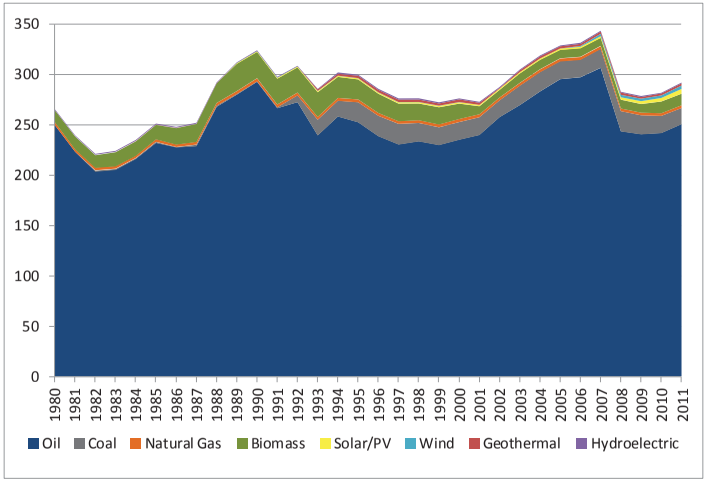
3.1. Outlook for Energy Demand of All Fuels by 2020 and 2030

This section builds upon Chapters 1 and 2, extending the energy demand outlook to all energy sources at a statewide level; other fossil fuels—coal and synthetic natural gas (SNG)—and renewables are included in addition to oil-products.

3.1.1. Current and Historical Energy Demand

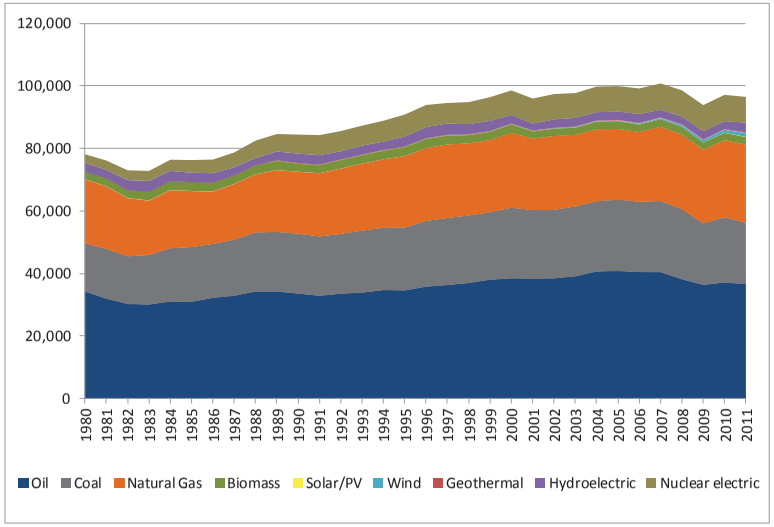
Aside from oil-products' long-standing majority share and the source of volatility in Hawaii's energy demand, as the figure shows, coal (since the 1990s) and biomass have steadily been the next two largest demand components, accounting for 5-7% and 3-4% in recent years respectively, followed by SNG and other renewables. Other renewables—solar thermal and photovoltaics (PV), geothermal, wind, and hydroelectric—comprise a minimal, yet slowly growing share of Hawaii's consumption portfolio.

Figure 58: Hawaii Energy Demand, 1980 – 2011 (tbtu)



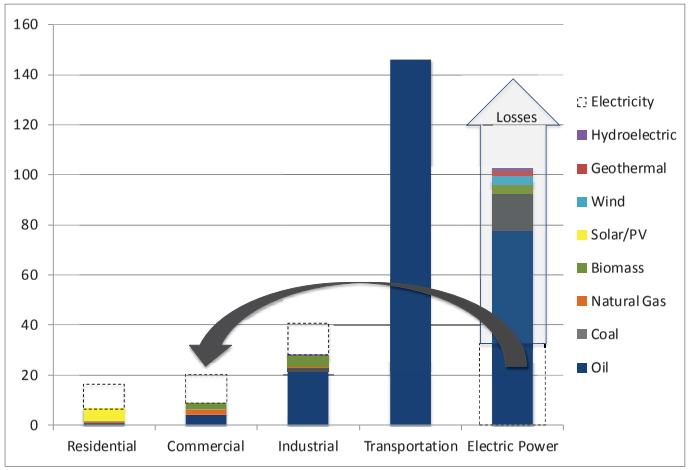
As previously mentioned, Hawaii's energy picture is very different from the US as a whole, where not only has demand remained relatively stable, but also there is no one source, namely petroleum, that clearly dominates demand. Instead, a mix of oil (38%), coal (20%), and natural gas (26%) somewhat proportionately forms the three pillars of US consumption, in addition to nuclear electric, which makes up roughly 9%. Biomass and other renewables similarly constitute a marginal share of energy consumption.

Figure 59: US Energy Demand, 1980 – 2011 (tbtu)



In terms of sectoral demand for energy sources, Hawaii also differs from the US, where natural gas is the dominant fuel of choice in residential, commercial, and industrial sectors, while coal is the main source for electric power generation, along with natural gas and nuclear power as the two other prime fuels. The only striking similarity (at least currently) to Hawaii, with the exception of a mere 3% of natural gas used in the transportation sector (for CNG vehicles and LNG trucking—this is growing with the expansion of America's Natural Gas Highway), is that petroleum products meets all of transportation demand.

Figure 60: Hawaii Energy Demand by Source by Sector, 2011 (tbtu)



As shown in the figure, the four end-use sectors are residential, commercial, industrial, and transportation. As explained in Chapter 1, the electric power sector is not an end-use sector since electricity is secondary energy (converted from primary energy by power plants) and is ultimately "used" in the residential, commercial, industrial, and transportation applications. As electricity is generated and then transmitted and distributed to end-users, loss occurs in the form of thermal conversion efficiency and heat, and consequently the amount of electric power actually used is less than the amount of energy consumed by the electric power sector.

Excluding electricity from the end-use sectors (i.e., treating electric power as a fifth sector), as anticipated, oil comprises a significant portion (nearly half) of Hawaii's commercial sector and is the majority fuel in the industrial and electric power sectors while solar/PV mainly powers the residential sector.

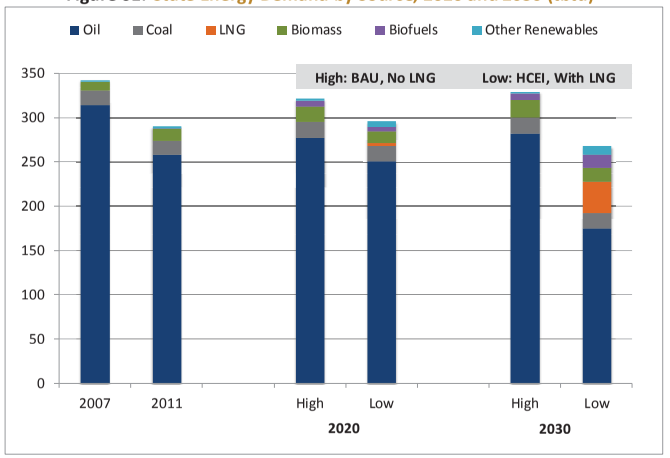
3.1.2. Energy Demand Outlook

In projecting demand for all fuels, two extreme scenarios are considered: "high" and "low." As described in Chapter 2, the scenarios are two-fold, the first of which is based on HCEI effectiveness, (i.e., diminishing oil demand), and the latter, which is adjusted for the availability

of LNG. "High" is a combination of Scenario 1: Business as Usual (BAU)—which is considered to be the effective ceiling on oil demand—and No LNG. Hence this is the high demand for energy case (specifically in terms of oil demand). "Low" merges Scenario 4: HCEI Mostly Succeeds and the subsidiary scenario, with LNG; this is therefore the low demand for energy situation (with respect to oil demand). As the remaining six scenarios fall somewhere in between (refer to Chapter 2), they are excluded from this portion of the analysis. The purpose here is to show the range of overall state energy demand.

The figure below shows demand by energy source for the two scenarios in the year 2020—when implementation of stricter environmental regulations are just around the corner and when LNG is not yet available—and 2030, the key target year of HCEI goals (RPS, EEPS/conservation, and transportation) and a year when LNG could be fully deployed, if imports in fact come. Biomass and biofuels are separated from the other renewables (geothermal, hydro, wind, and solar) to show the impact of ethanol blending and biodiesel blending—part of the renewable transportation goals—and they could be transshipped into/between islands.

Figure 61: State Energy Demand by Source, 2020 and 2030 (tbtu)



As illustrated, 2007 was a peak year for state energy demand, attributable primarily to increased demand for fuel oil and diesel in marine transportation; in contrast, 2011 is shown to represent a more typical year. Comparable to the oil product demand forecast in Chapter 2, future demand scenarios of all fuels, even under BAU with no LNG, is never expected to reach as high as 2007. In fact, total energy demand is projected to shrink 7% by 2020 and bounce back to 5% below 2007 by 2030 under the high scenario; considering the low scenario, however, total energy demand could fall considerably beyond 2007 levels (13% by 2020 and 22% by 2030). Again, the lower expected future demand in these scenarios with respect to 2007 is due to higher overall oil prices, conservation and renewable measures already implemented, and national measures like the CAFE mileage standards.

To put 2007 and Hawaii's progress in perspective, future energy demand should be compared to 2011; among the four forecasted figures, the only one in which total energy demand drops beyond the 2011 level is under the low scenario, as HCEI mostly succeeds and energy efficiency measures are almost fully achieved, by 2030 (only 7% though). In the other three cases, total energy demand is expected to top the 2011 level by 2% (2020 low), 9% (2020 high), and 12% (2030 high).

Also similar to the oil product demand forecast, the most impacted fuels are those in the power sector, followed by ground transportation. Air transportation and marine transportation fuels are unaltered, as there is neither any existing substitute fuel nor much or any local control on the activity levels and technologies.

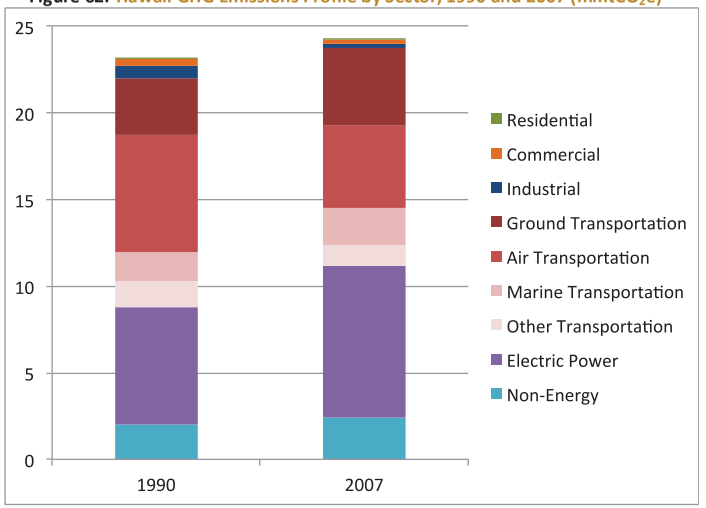
3.2. Implications for the Environment

3.2.1. GHG Emissions Reduction Goals

In addition to high prices and energy security concerns, human-induced climate change is another factor motivating the reduction of Hawaii's dependence on oil. While HCEI targets increased renewable energy and energy efficiency, Hawaii's Global Warming Solutions Act (Act 234) mandates that statewide greenhouse gas (GHG) emissions be reduced to 1990 levels by 2020 (excluding airplane emissions). Passed in 2007, Act 234 also created GHG Task Force, which prepared a work plan and regulatory scheme to achieve the statewide GHG limit. The

State Department of Health is still in the process of establishing these rules. The following six key GHGs are expected to be regulated: carbon dioxide (CO_2), methane (CH_4), nitrogen oxides (N_2O), hydrofluorocarbons (HFCs), perflourocarbons (PFCs), and sulfur hexafluoride (SF_6).

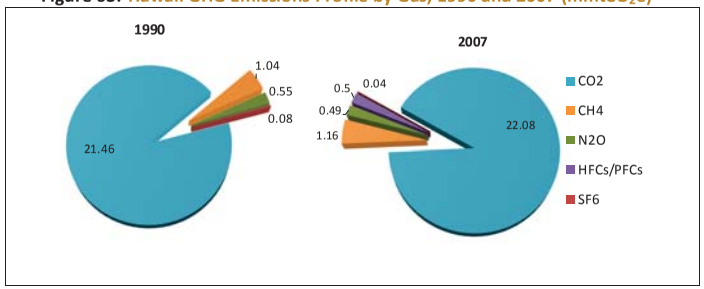
Figure 62: Hawaii GHG Emissions Profile by Sector, 1990 and 2007 ($mmtCO_2e$)[1]



As shown in the above figure, total GHG emissions grew by 5% overall between 1990 and 2007. While non-energy sources (industrial processes, waste, and agricultural, forestry, and other land use) are not major contributors of GHG emissions, ground transportation and the electric power are not only the largest emitters, but also the fastest growing (38% and 29%, respectively). Hawaii's sectoral emissions and trends are consistent with the US in that the electric power sector is the largest source of GHG emissions, followed by the transportation sector, where both have historically increased. For Hawaii, this is supported by the fact that oil overwhelmingly makes up the lion's share of Hawaii's energy demand in both sectors.

[1] ICF International, 2008. Hawaii Greenhouse Gas Inventory: 1990 and 2007.

Figure 63: Hawaii GHG Emissions Profile by Gas, 1990 and 2007 ($mmtCO_2e$)[2]

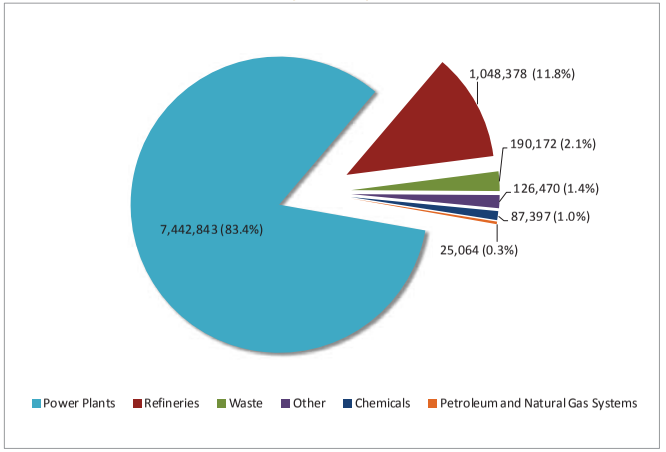


Separating emissions by GHG, carbon dioxide (CO_2) is by far the major GHG player. As the most well-known and prevalent GHG, CO_2 is emitted into the atmosphere mainly from burning fossil fuels (coal, natural gas, and oil) for power generation and transportation. On a smaller scale certain industrial processes and land-use changes (i.e., burning solid waste, trees and wood products) also release CO_2.

Of the total GHG emissions, less than half is monitored and regulated by the EPA; these include emissions of only large facilities. In 2011, from a total of 9,275,935 tCO_2e reported to the EPA, CO_2 accounted for 96%, 83% of which power plants were responsible for. As the figure shows, transportation (marine, ground, and air) is excluded along with small fuel volumes (i.e., from RCI).

[2] ICF International, 2008. Hawaii Greenhouse Gas Inventory: 1990 and 2007.

Figure 64: Hawaii Direct CO_2 Emissions by Sector from Large Facilities, 2011 ($mmtCO_2$)



Clearly for Hawaii, the majority of CO_2 emissions are attributable to using oil for 75% of power generation, and as a remote island, fuel for air transportation. Yet when compared per capita, Hawaii actually has lower CO_2 emissions—19 tCO_2e—than the national average of 23 tCO_2e in 2007. This is because coal forms half of the fuel burned for power generation in the US, combined with less electricity use per capita in Hawaii (due to no extreme space cooling/heating needs) as well as shorter commuting distances. Based on the energy demand forecast, a CO_2 emissions outlook will be presented in a later subsection.

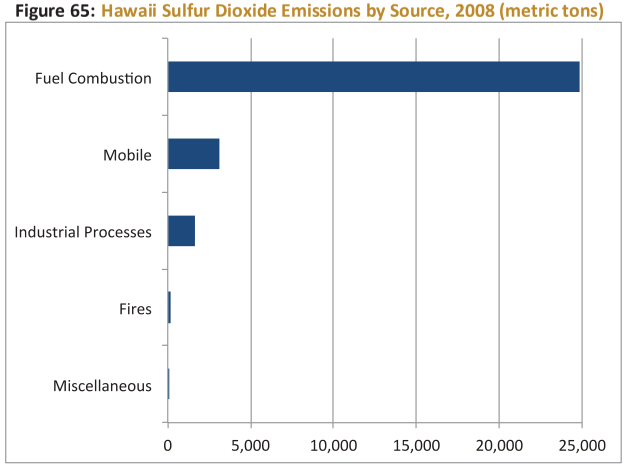
3.2.2. Other Environmental Regulations and Compliance

Two specific EPA standards, both of which fall under the CAA—National Ambient Air Quality Standards (NAAQS) and Mercury and Air Toxic Standards (MATS)—are of particular importance to Hawaii. Much of the chatter in the last year about the state's fuel strategy is centered on how to most reliably and cost-effectively comply with these upcoming tighter environmental regulations.

NAAQS. EPA has set national ambient air quality standards for six common air pollutants—carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO_2), ozone (O_3), particular matter (PM), and sulfur dioxide (SO_2)—considered harmful to public health and the environment. In practice, these standards are separated into primary (health-based) and secondary (welfare-based) standards, which protect against environmental damage. In the most recent five-year NAAQS review process in 2010, the EPA established stricter concentration levels for SO_2 and NO_2 as well as more stringent compliance requirements for PM.

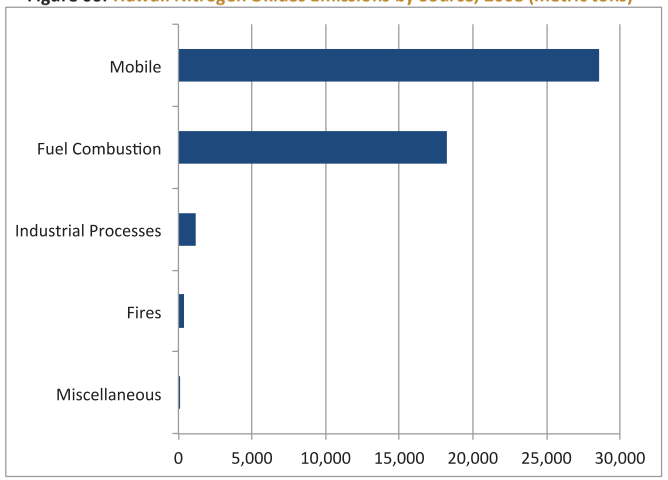
SO_2: Fossil fuel combustion at power plants and other industrial facilities is the main source of SO_2 emissions; to a lesser extent, industrial processes including extracting metal from ore, and the burning of high sulfur containing fuels by locomotives, larger ships and non-road equipment are also contributing activities. The EPA first introduced SO_2 standards in 1971, with a primary standard of 140 ppb and a 30 ppb averaged annually, and a secondary standard of 500 ppb averaged over three hours. It was not until 2010 that the first revisions were made; with the establishment of a new 75 ppb 1-hour standard, the other two primary standards were no longer necessary. In 2012, the EPA ruled to keep the original (current) 3-hour average secondary standard at 500 ppb.

Figure 65: Hawaii Sulfur Dioxide Emissions by Source, 2008 (metric tons)



NO_2: NO_2 is a member of nitrogen oxides (NOx), a group of highly reactive gases. Originating from emissions from cars, trucks, buses, power plants, off-road equipment, and agriculture sources, NO_2 is a contributor to ground-level ozone and fine particle pollution. A primary standard and a secondary standard of 53 ppb, averaged over a year, was first set in 1971 and reviewed twice with no revisions prior to 2010, when in addition to the 53 ppb, a new primary standard of 100 ppb averaged over one hour, was established.

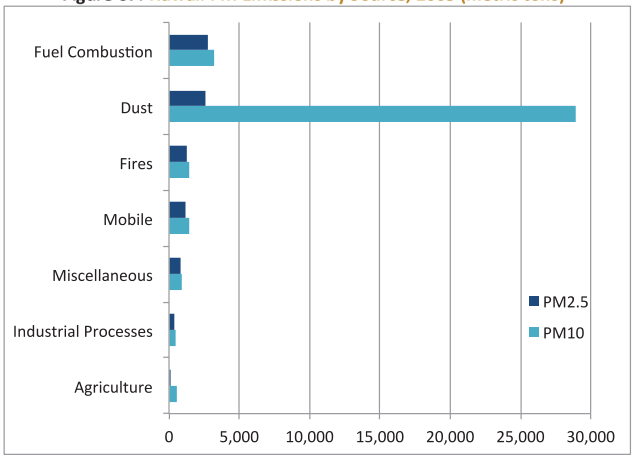
Figure 66: Hawaii Nitrogen Oxides Emissions by Source, 2008 (metric tons)



PM: Particulate matter is the combination of extremely small particles and liquid droplets, made up of acids, organic chemicals, metals and soil or dust particles. PM is grouped into two categories according to the size of the particles. PM_{10}, or "inhalable coarse particles," range from 2.5-10 micrometers and come from road dust, some agricultural operations, construction and demolition operations, industrial processes and biomass burning. $PM_{2.5}$ are considered "fine particles," 2.5 micrometers in diameter and smaller. Direct sources of $PM_{2.5}$ include vehicles, smokestacks, and fires, while secondary sources come from sulfur dioxides and nitrogen oxides emitted from power plants, industrial processes, and gasoline and diesel

engines, reacting in the atmosphere to form these particles. It is the later (those formed from emitted gases reacting in the atmosphere), which comprise most of $PM_{2.5}$.

Figure 67: Hawaii PM Emissions by Source, 2008 (metric tons)



Adopted from the EPA, the following table presents the current NAAQS for $PM_{2.5}$ and PM_{10}, as well as summarizes that of sulfur dioxide and nitrogen dioxide.

Figure 68: NAAQS Summary of Selected Pollutants

Pollutant		Primary/ Secondary	Averaging Time	Level	Form
Particle Pollution	$PM_{2.5}$	primary	Annual	12 $\mu g/m^3$	Annual mean, avged over 3 years
		secondary	Annual	15 $\mu g/m^3$	Annual mean, avged over 3 years
		primary & secondary	24-hour	35 $\mu g/m^3$	98th percentile, avged over 3 years
	PM_{10}	primary & secondary	24-hour	150 $\mu g/m^3$	Not to be exceeded more than once per year on avg over 3 years
Sulfur Dioxide		primary	1-hour	75 ppb	99th percentile of 1-hour daily max concent, avged over 3 years
		secondary	3-hour	500 ppb	Not to be exceeded more than once per year
Nitrogen Dioxide		primary	1-hour	100 ppb	98th percentile, avged over 3 years
		primary & secondary	Annual	53 ppb	Annual Mean

Of the three air pollutants' standards revisions, reducing SO_2 emissions pose the greatest challenge, particularly for generation units running on fuel oil. The LSFO burned by HECO's power plants has a sulfur content of 0.5%, while HELCO and MECO use a variety of fuel from 0.4% sulfur (maximum) diesel to 2.0% sulfur (maximum) IFO; NAAQS, however, requires much lower sulfur contents. Adhering to the new SO_2 requirements means 1) either adding expensive backend controls to the power plant, 2) switching to lower emissions fuels, such as diesel and lower sulfur fuel oil, fuel-blending diesel and fuel oil (not yet well-studied), or 3) switching to LNG. The Hawaiian Electric Companies' understanding of the EPA rules is that State emitters are expected to be in complete compliance with the NAAQS standards by 2022 or 2025 (depending on the utilities' plan of action), which was recently extended from the 2017 deadline, much to their relief. Note however, as specific NAAQS compliance requirements and schedules at the statewide level have not been established yet, additional EPA rules and guidance may follow. In their July 2013 Fuels Master Plan, the Hawaiian Electric Companies stated that their preferred option to comply with NAAQS is to switch to LNG as it is the most cost effective NAAQS compliant fuel. To do so, they plan to develop bulk importation and the required infrastructure, and make the necessary generating unit modifications by 2020, two years ahead of the earliest possible NAAQS deadline.

MATS. A much sooner deadline of concern is complying with MATS by April 2015, with the possibility of two 1-year extensions—the Broadly Available One Year Extension for technology installation under the CAA and can be granted by the Department of Health, and the second, through the EPA Administrative Order which entails stricter criteria—bringing the compliance date to April 2017 at the latest. Aimed at reducing air pollution from coal and oil-fired power plants, the 2011 final rule sets standards for all hazardous air pollutants (HAPs) including mercury, heavy metals and acid gases, and PM from generating units with a capacity of 25 MW or greater. Based on the EPA list of power plants likely covered by the MATS, only the island of Oahu is affected—HECO's steam units (Honolulu, Kahe, and Waiau power plants) and AES Hawaii are the only plants listed.

As laid out in their master plan, HECO is exploring whether they can continue to consume the current grade of LSFO in their steam units in combination with the following alternatives: fuel

additive, increased air flow to improve combustion efficiency, increased frequency of boiler furnace and/or air-preheater washes, and by retrofitting boilers with steam atomization.

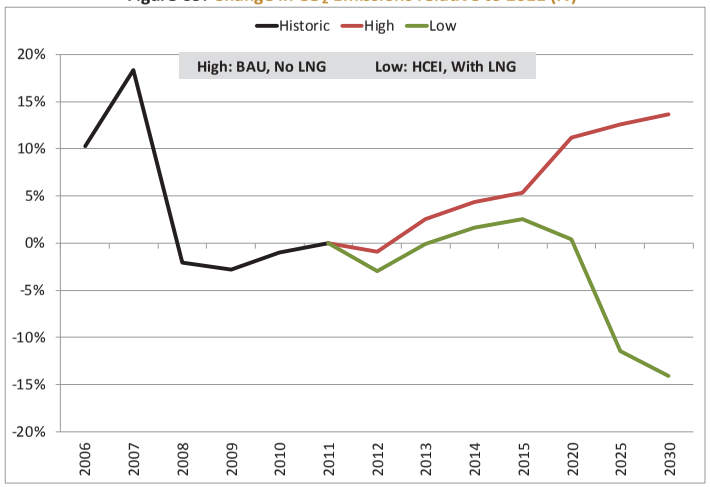
3.2.3. Emissions Outlook

The emissions outlook focuses on two gases: CO_2 and SO_2; CO_2 is the major GHG and SO_2 is a major concern of the new EPA regulations, as discussed above.

Carbon Dioxide.

Applying the same definition of "high" and "low" scenarios provided in Section 3.1.2 and using the same demand outlook for the two scenarios, the relative change in CO_2 emissions is calculated between 2011 and 2030. CO_2 emission factors—by source and by activity—are taken from the EPA's Emissions Factors Hub at the Center for Corporate Climate Leadership.

Figure 69: Change in CO_2 Emissions relative to 2011 (%)



CO_2 emissions in 2011 were around 21 mmtCO_2. From this historical data point, it should be observed that the divergence in the two forecasted scenario paths does not occur until 2015. Prior to then, both follow the same downward drop in 2012, falling below 2011 levels, and then steadily increases such that in both scenarios, emissions are higher relative to 2011. This is

mainly due to a first cut in power fuel between 2015 and 2020 to comply with MATS and then the power fuel switch (to LNG) between 2020 and 2025 in the low scenario. Another contributing factor is the difference in the amount of biofuels-based generation in the two scenarios.[3] It is worth mentioning that in line with both EPA's Mandatory Reporting Rule and Climate Leaders technical guidance, biofuels' CO_2 emission factors are non-zero and are very close to their petroleum-based counterparts (i.e., the emission factor used for biodiesel in power generation is nearly the same as the emission factor used for diesel in power generation). As expected in the years further out, under the high demand case (high demand for oil), emissions are higher by 11% in 2020 and 14% in 2030. On the other hand, under the low scenario, relative to 2011, emissions remain constant in 2020, and falls by 14% in 2030.

Sulfur.

Similarly, the relative change in sulfur emissions is calculated based on the energy demand forecast and respective two scenarios. In addition to using EPA's emission factors (by source and by activity), the below assumptions are made regarding the sulfur content on fuel oil and diesel in the power and marine transportation sectors. It should be noted that by looking at the change in fuel quality (in terms of sulfur content) in the power and marine transportation sectors, we are able to capture 95% of total SO_2 emissions in our emission trend analysis (as shown in Figure 8).

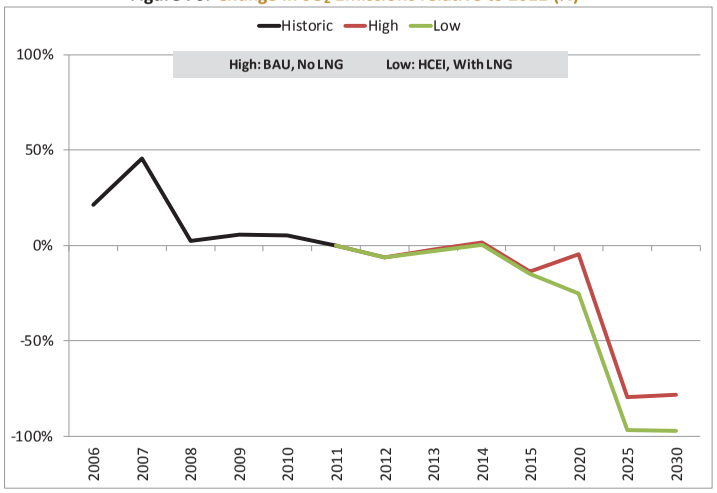
For power generation, following Hawaiian Electric Companies' Environmental Regulation Compliance Schedule, NAAQS imposes a sulfur content of 0.05% in 2022. In the meantime, to comply with MATS PM by 2015, power utilities could switch completely to diesel, or find a blending solution. Either way, we assume the sulfur content to remain at 0.5%. Beyond 2022, it is assumed that utilities comply with 0.05% sulfur content by switching entirely to diesel, installing back-end controls, or transitioning to LNG.

For marine transportation, the International Maritime Organization (IMO) will require all fuels burned in Emission Control Areas (ECAs)—which includes Hawaii as of 2015—emit no more

[3] In the High scenario, as no gas-fired generation is assumed on the grid, Oahu's RPS is assumed to be met by a larger share of biofuels (up to 43 MW of biofuel-based generation, equal to 3.6 kb/d or 55 mgpy of biofuels). In the Low scenario, however, assuming 85% of oil-based generation conversion to gas-fired generation, which allows for higher intermittent resource penetration on the grid, limited biofuel-based generation is assumed (up to 16 MW of generation, equivalent to 1.3 kb/d or 20 mgpy of biofuels).

than the equivalent of 0.1% sulfur bunker fuel. Since there is no real market in that grade for diesel, we assume that all marine diesel fuel will be low sulfur diesel (LSD), with 0.05% sulfur content. To meet the 0.1% sulfur bunker fuel regulation using fuel oil, onboard scrubbers would need to be installed since fuel oil of 0.1% is virtually nonexistent.

Figure 70: Change in SO_2 Emissions relative to 2011 (%)



Recall that 2007 was a peak year in energy demand, specifically, a unique year in marine fuel demand, with twice the average fuel oil use. This explains the spike in SO_2 emissions in 2007 as the figure shows. Moving forward from 2011 as a baseline year, both scenarios follow a distinctly similar path, with not much change in sulfur emissions until 2015, where both scenarios reflect 14-15% drop. This first cut is caused by expected IMO regulations in 2015. The anticipated NAAQS regulation in 2022 drives the second, more observable drop in emissions, bringing emissions close to zero (80-97% reduction from 2011) by 2025. The gap between the two scenarios beyond 2020 corresponds to the difference in fuel demand for power generation due to the combined impact of HCEI and LNG substitution.

3.3. Concluding Remarks

Hawaii's energy demand and implications for the environment are tightly linked. Despite the growing share of renewables in Hawaii's portfolio, fossil fuels—specifically oil—are the most prevalent energy source. Capturing the effects of HCEI and fuel switching due to environmental regulations yields the following key projections:

- State energy demand increases beyond 2011 levels under the high scenario in 2020 (9%) and even further by 2030 (12%). As a result, CO_2 emissions follow an increasing trend since power generation and transportation are the key sources of fossil fuel emissions. SO_2 emissions, however, despite increasing energy demand as a whole, remain relatively constant through 2020, and by 2030 are 75% lower than in 2011 because of mandatory sulfur reduction in petroleum product specifications. Early on, emissions remain stable as upcoming compliance standards are yet to be met; sulfur content fuel switching begins in 2015 with IMO regulations in the marine transportation sector, followed by NAAQS in the power generation sector.
- The low scenario only achieves an energy demand level lower than that of 2011 by 2030 (7%), as opposed to 2020. This is because 2030 is the ultimate target year of HCEI and efficiency targets are almost fully achieved by then. While demand is higher than 2011 levels in 2020, CO_2 emissions are roughly the same. By 2030, however, emissions fall considerably to 15% below, as LNG forms 13% of the overall energy demand. Likewise, the drop in sulfur emissions by 100% from 2011 reflects the use of LNG in marine transportation and power generation sectors.

Fuels Market in Hawaii:

Data Appendices

Submitted to

Department of Transportation, State of Hawaii

March 2014

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APPENDIX A:
Assumptions for Demand Scenarios

The overarching assumptions are explained in the main report, but there are a large number of subsidiary assumptions. This section provides details on those inputs, as well as information on conversion factors and other important variables.

TABLE A.1.(a) Demand Scenario Assumptions

	Unit	2015	2020	2025	2030	2035	2040
Business As Usual							
Electricity Conservation	%	14%	15%	15%	15%	15%	15%
Oahu	%	15%	16%	16%	17%	17%	17%
Non-oahu	%	12%	12%	12%	11%	11%	11%
Renewable Electricity - State	%	15%	15%	15%	15%	15%	15%
Oahu	%	8%	8%	9%	9%	9%	9%
Non-oahu	%	33%	32%	31%	30%	29%	28%
Ground Transp Fuel Conservation	%						
VMT reduction	%	0%	0%	0%	0%	0%	0%
MPG improvement	%	5%	10%	25%	33%	33%	33%
EV penetration	%	0.5%	1.0%	1.5%	2.0%	2.5%	3.0%
Renewable Transportation Fuel	kb/d	-	-	-	-	-	-
Ethanol blending	%	10%	10%	10%	10%	10%	10%
Biodiesel blending	%	1%	1%	1%	1%	1%	1%
RPS Falls Short							
Electricity Conservation	%	15%	20%	25%	30%	30%	30%
Oahu	%	16%	21%	27%	33%	34%	34%
Non-oahu	%	13%	16%	20%	23%	22%	21%
Renewable Electricity - State	%	15%	17%	19%	21%	23%	25%
Oahu	%	8%	9%	11%	12%	13%	15%
Non-oahu	%	33%	36%	39%	41%	44%	46%
Ground Transp Fuel Conservation	%						
VMT reduction	%	0.25%	0.50%	0.75%	1.00%	1.00%	1.00%
MPG improvement	%	5%	10%	25%	33%	33%	33%
EV penetration	%	1%	3%	6%	12%	18%	24%
Renewable Transportation Fuel	kb/d	-	-	-	-	-	-
Ethanol blending	%	10%	10%	10%	10%	10%	10%
Biodiesel blending	%	3%	20%	20%	20%	20%	20%

TABLE A.1.(b) Demand Scenario Assumptions (continued)

	Unit	2015	2020	2025	2030	2035	2040
RPS Succeeds							
Electricity Conservation	%	15%	20%	25%	30%	30%	30%
Oahu	%	16%	21%	27%	33%	34%	34%
Non-oahu	%	13%	16%	20%	23%	22%	21%
Renewable Electricity - State	%	15%	25%	30%	40%	40%	40%
Oahu	%	8%	14%	17%	23%	23%	24%
Non-oahu	%	33%	53%	61%	79%	76%	74%
Ground Transp Fuel Conservation	%						
VMT reduction	%	0.25%	0.50%	0.75%	1.00%	1.00%	1.00%
MPG improvement	%	5%	10%	25%	33%	33%	33%
EV penetration	%	1%	3%	6%	12%	18%	24%
Renewable Transportation Fuel	kb/d	-	-	-	-	-	-
Ethanol blending	%	10%	10%	10%	10%	10%	10%
Biodiesel blending	%	3%	20%	20%	20%	20%	20%
HCEI Mostly Succeeds							
Electricity Conservation	%	15%	20%	25%	30%	30%	30%
Oahu	%	16%	21%	27%	33%	34%	34%
Non-oahu	%	13%	16%	20%	23%	22%	21%
Renewable Electricity - State	%	15%	25%	30%	40%	40%	40%
Oahu	%	8%	14%	17%	23%	23%	24%
Non-oahu	%	33%	53%	61%	79%	76%	74%
Ground Transp Fuel Conservation	%						
VMT reduction	%	2%	4%	6%	8%	8%	8%
MPG improvement	%	5%	10%	25%	33%	33%	33%
EV penetration	%	1%	4%	9%	15%	25%	40%
Renewable Transportation Fuel	kb/d	3.26	4.89	6.52	9.78	9.78	9.78
Ethanol blending	%	10%	10%	10%	10%	10%	10%
Biodiesel blending	%	3%	20%	20%	20%	20%	20%

TABLE A.2. LNG Scenario Assumptions

	Unit	2015	2020	2025	2030	2035	2040
No LNG							
LNG for SNG substitution on Oahu	%	0%	0%	0%	0%	0%	0%
LNG for HDV Transportation	%	0%	0%	0%	0%	0%	0%
CNG for LDV Transportation	%	0%	0%	0%	0%	0%	0%
LNG for Power on Oahu	%	0%	0%	0%	0%	0%	0%
LNG for Power on Neighbor Islands	%	0%	0%	0%	0%	0%	0%
FO share of oil-based gen							
Oahu	%	98%	98%	98%	98%	98%	98%
Non-Oahu	%	30%	30%	30%	30%	30%	30%
Diesel share of oil-based gen							
Oahu	%	1%	1%	1%	1%	1%	1%
Non-Oahu	%	55%	55%	55%	55%	55%	55%
Biomass Capacity (RE)							
Oahu	MW	40	60	80	80	80	80
Non-Oahu	MW	16	15	15	15	15	15
Ohshore/Nearshore LNG							
LNG for SNG substitution on Oahu	%	15%	100%	100%	100%	100%	100%
LNG for HDV Transportation	%	0%	0.01%	10%	20%	35%	50%
CNG for LDV Transportation	%	0%	0.01%	1.5%	3%	5%	10%
LNG for Power on Oahu	%	0%	0%	85%	85%	85%	85%
LNG for Power on Neighbor Islands	%	0%	0%	85%	85%	85%	85%
FO share of oil-based gen							
Oahu	%	98%	98%	98%	98%	98%	98%
Non-Oahu	%	30%	30%	30%	30%	30%	30%
Diesel share of oil-based gen							
Oahu	%	1%	1%	1%	1%	1%	1%
Non-Oahu	%	55%	55%	55%	55%	55%	55%
Biomass Capacity (RE)							
Oahu	MW	40	60	80	80	80	80
Non-Oahu	MW	16	15	15	15	15	15

TABLE A.3. Other Assumptions and Derived Variables

	Unit	2015	2020	2025	2030	2035	2040
AES/Coal Power	MWh	1,550,000	1,550,000	1,550,000	1,550,000	1,550,000	1,550,000
T&D Losses	%	8.7%	8.7%	8.7%	8.7%	8.7%	8.7%
Oahu	%	8.3%	8.3%	8.3%	8.3%	8.3%	8.3%
Non-Oahu	%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%

Demand breakdown

Oahu Shares of Totals		2015	2020	2025	2030	2035	2040
Gasoline	%	63%	62%	61%	60%	59%	58%
Electricity	%	73%	72%	71%	70%	69%	67%
Road Diesel	%	55%	54%	53%	52%	52%	51%
LPG	%	28%	28%	27%	27%	26%	26%
Jet fuel	%	78.5%	78.0%	77.5%	77.0%	76.5%	76.0%
Marine Diesel	%	75%	74%	73%	72%	70%	69%
Marine Fuel Oil	%	100%	100%	100%	100%	100%	100%

TABLE A.4. Key Factors

	Unit	
Conversion Factors		
LNG	[mmbtu/tonne]	51.32
LPG	[Therms/gal]	0.91
Coal	[mmbtu/tonne]	20.47
Fuel Oil	[mmbtu/bbl]	6.26
Diesel	[mmbtu/bbl]	5.73
Other oil (waste oil)	[mmbtu/bbl]	5.54
Biofuels	[mmbtu/bbl]	5.43
Biomass	[mmbtu/short tons]	11.63
Gasoline	[btu/gal]	112,000
Diesel	[btu/gal]	127,500
CNG	[btu/therm]	93,000
LNG	[btu/gal]	71,100
CNG	[therm/gge]	0.83
LNG	[gal/dge]	0.56
Avg Heat Rates		
Oil-fired	[Btu/kWh]	10,395
Coal	[Btu/kWh]	10,105
Gas	[Btu/kWh]	7,518
GT	[Btu/kWh]	8,421
CCGT	[Btu/kWh]	6,614
Biofuels	[Btu/kWh]	18,627
Biomass	[Btu/kWh]	14,216

TABLE A.5. Key Drivers (adopted from DBEDT and UHERO forecasts)							
	Unit						
Population		2015	2020	2025	2030	2035	2040
Oahu share	%	69%	68%	67%	66%	65%	64%
Oahu	#	976,190	1,003,710	1,029,410	1,052,130	1,071,220	1,086,710
Non-Oahu	#	442,060	477,540	513,840	550,200	586,280	622,200
Maui	#	168,010	181,020	194,200	207,310	220,210	232,860
Hawai'i	#	202,670	220,880	239,640	258,510	277,340	296,320
Kauai	#	71,380	75,640	80,000	84,380	88,730	93,020
Tourism forecast		2015	2020	2025	2030	2035	2040
(Visitor Arrival) growth	%	2.2	0.9	0.9	0.9	0.9	0.9
Oahu	%	1.2	0.4	0.4	0.4	0.4	0.4
Non-Oahu	%	2.5	1.7	1.7	1.7	1.7	1.7

APPENDIX B:
Detailed Oil-Product Demand Scenarios

The demand outlook in Hawaii could hardly be less clear. In addition to the uncertainties about the effects of international prices, renewable energy sources, LNG, and the HCEI, the effects of new nationwide environmental regulations could have a major effect on the composition of oil demand—especially the demand for fuel oil as opposed to diesel in the power sector.

To be specific, if oil continues to be a major fuel in the power sector (which it no longer is in the rest of the United States), environmental compliance may make it necessary to substitute diesel for fuel oil. This may not mean the wholesale displacement of fuel oil by diesel; 80/20, or even 90/10 fuel-oil/diesel blends might be able to meet specifications, and some analysts feel that even low-sulfur fuel oil could be made compliant in the majority of applications. (Furthermore, if LNG displaces oil in the power sector, much of the debate might become moot.)

Any continued power-sector demand for fuel oil thus might be actual fuel oil; or, alternatively, it might be demand for a specialized blend (or, in an extreme case, might be transferred entirely to diesel). Since diesel has a heat content lower than fuel oil, to the extent that diesel replaces fuel oil, the volumes of diesel required will be about 7% greater than the fuel oil they replace.

TABLE B.1. Business-As-Usual with No LNG Imports (kb/d)								
STATE	LPG	Naphtha	Gasoline	Jet	Diesel	Fuel Oil	Other	TOTAL
2006	3.1	2.4	31.6	38.0	18.5	37.7	8.3	**139.5**
2007	2.9	2.4	31.3	37.3	25.7	42.2	7.9	**149.7**
2008	2.9	2.3	29.5	32.7	15.2	31.5	7.0	**121.1**
2009	2.6	2.2	29.7	30.9	16.8	31.5	7.1	**120.8**
2010	3.3	2.2	27.5	32.0	18.9	30.2	7.7	**121.7**
2011	3.5	2.2	30.8	33.5	17.2	29.5	7.4	**124.2**
2012	3.4	2.3	29.5	35.8	17.3	27.6	6.4	**122.2**
2013	3.4	2.3	27.7	37.3	17.0	30.2	6.9	**124.8**
2014	3.5	2.3	27.9	38.2	17.4	31.0	7.0	**127.3**
2015	3.5	2.3	28.1	39.1	19.5	29.7	7.0	**129.3**
2020	3.7	2.3	27.7	39.4	20.3	32.2	7.3	**132.9**
2025	3.9	2.3	24.0	39.8	21.4	34.2	7.5	**133.1**
2030	4.1	2.3	22.2	40.1	22.3	35.9	7.8	**134.8**
2035	4.3	2.3	23.0	40.5	23.5	37.7	8.0	**139.2**
2040	4.5	2.3	23.8	40.8	24.6	39.5	8.3	**143.8**
OAHU	LPG	Naphtha	Gasoline	Jet	Diesel	Fuel Oil	Other	TOTAL
2006	0.9	2.4	19.6	30.8	8.1	33.3	4.0	**99.1**
2007	0.8	2.4	19.2	30.8	13.7	38.3	3.8	**109.1**
2008	0.8	2.3	18.8	26.9	6.3	27.8	3.1	**86.0**
2009	0.7	2.2	18.9	25.4	7.5	27.8	3.4	**85.8**
2010	0.9	2.2	17.7	25.9	8.9	26.8	4.0	**86.4**
2011	1.0	2.2	19.7	27.1	7.7	26.3	4.0	**88.0**
2012	1.0	2.3	18.8	29.2	8.1	24.7	4.0	**88.1**
2013	1.0	2.3	17.5	30.2	8.3	27.3	3.8	**90.4**
2014	1.0	2.3	17.6	30.9	8.3	27.9	3.9	**91.9**
2015	1.0	2.3	17.8	31.5	9.8	26.6	3.9	**92.8**
2020	1.0	2.3	17.2	31.7	9.9	28.7	3.9	**94.7**
2025	1.1	2.3	14.7	31.9	9.9	30.3	3.9	**94.1**
2030	1.1	2.3	13.4	32.1	9.9	31.6	3.9	**94.4**
2035	1.1	2.3	13.7	32.3	9.9	33.0	3.9	**96.2**
2040	1.2	2.3	13.9	32.5	9.9	34.3	4.0	**98.1**
NEIGHBOR	LPG	Naphtha	Gasoline	Jet	Diesel	Fuel Oil	Other	TOTAL
2006	2.2	-	12.0	7.2	10.4	4.5	4.2	**40.4**
2007	2.1	-	12.1	6.5	12.0	3.8	4.1	**40.6**
2008	2.1	-	10.7	5.8	8.9	3.7	3.9	**35.1**
2009	1.9	-	10.8	5.5	9.3	3.7	3.8	**35.0**
2010	2.3	-	9.8	6.1	10.0	3.3	3.7	**35.2**
2011	2.5	-	11.1	6.4	9.5	3.2	3.5	**36.2**
2012	2.5	-	10.7	6.5	9.2	2.9	2.4	**34.1**
2013	2.5	-	10.2	7.1	8.7	2.9	3.0	**34.4**
2014	2.5	-	10.3	7.4	9.1	3.0	3.1	**35.4**
2015	2.5	-	10.4	7.6	9.7	3.1	3.2	**36.4**
2020	2.7	-	10.5	7.7	10.5	3.5	3.4	**38.2**
2025	2.8	-	9.3	7.8	11.5	3.9	3.6	**39.0**
2030	3.0	-	8.8	8.0	12.5	4.3	3.8	**40.4**
2035	3.2	-	9.4	8.1	13.5	4.7	4.1	**43.0**
2040	3.3	-	9.9	8.3	14.7	5.2	4.3	**45.7**

Note: Naphtha/Unfinished Oils in power sector included in "Other"

TABLE B.2. RPS Falls Short with No LNG Imports (kb/d)								
STATE	LPG	Naphtha	Gasoline	Jet	Diesel	Fuel Oil	Other	TOTAL
2006	3.1	2.4	31.6	38.0	18.4	37.7	8.3	**139.4**
2007	2.9	2.4	31.3	37.3	25.6	42.2	7.9	**149.6**
2008	2.9	2.3	29.5	32.7	15.1	31.5	7.0	**121.0**
2009	2.6	2.2	29.7	30.9	16.7	31.5	7.1	**120.8**
2010	3.3	2.2	27.5	32.0	18.8	30.2	7.7	**121.6**
2011	3.5	2.2	30.8	33.5	17.2	29.5	7.4	**124.2**
2012	3.4	2.3	29.5	35.8	17.2	27.6	6.4	**122.2**
2013	3.4	2.3	27.5	37.3	16.8	29.8	6.9	**124.0**
2014	3.5	2.3	27.7	38.2	17.2	30.6	7.0	**126.5**
2015	3.5	2.3	27.9	39.1	19.4	29.3	7.0	**128.5**
2020	3.7	2.3	27.1	39.4	19.0	29.3	7.0	**127.8**
2025	3.9	2.3	22.8	39.8	19.1	28.0	7.0	**122.8**
2030	4.1	2.3	19.8	40.1	19.0	26.2	6.9	**118.5**
2035	4.3	2.3	19.2	40.5	19.6	26.9	7.0	**119.8**
2040	4.5	2.3	18.6	40.8	19.9	27.4	7.1	**120.6**
OAHU	LPG	Naphtha	Gasoline	Jet	Diesel	Fuel Oil	Other	TOTAL
2006	0.9	2.4	19.6	30.8	8.1	33.3	4.0	**99.1**
2007	0.8	2.4	19.2	30.8	13.6	38.3	3.8	**109.0**
2008	0.8	2.3	18.8	26.9	6.2	27.8	3.1	**85.9**
2009	0.7	2.2	18.9	25.4	7.4	27.8	3.4	**85.8**
2010	0.9	2.2	17.7	25.9	8.8	26.8	4.0	**86.4**
2011	1.0	2.2	19.7	27.1	7.7	26.3	4.0	**88.0**
2012	1.0	2.3	18.8	29.2	8.0	24.7	4.0	**88.1**
2013	1.0	2.3	17.4	30.2	8.2	26.9	3.8	**89.9**
2014	1.0	2.3	17.5	30.9	8.3	27.6	3.9	**91.3**
2015	1.0	2.3	17.6	31.5	9.8	26.2	3.9	**92.3**
2020	1.0	2.3	16.8	31.7	9.5	26.1	3.9	**91.3**
2025	1.1	2.3	13.9	31.9	9.5	24.9	3.8	**87.4**
2030	1.1	2.3	12.0	32.1	9.4	23.2	3.8	**83.9**
2035	1.1	2.3	11.4	32.3	9.4	23.7	3.8	**84.1**
2040	1.2	2.3	10.9	32.5	9.4	24.1	3.8	**84.2**
NEIGHBOR	LPG	Naphtha	Gasoline	Jet	Diesel	Fuel Oil	Other	TOTAL
2006	2.2	-	12.0	7.2	10.4	4.5	4.2	**40.4**
2007	2.1	-	12.1	6.5	12.0	3.8	4.1	**40.6**
2008	2.1	-	10.7	5.8	8.9	3.7	3.9	**35.1**
2009	1.9	-	10.8	5.5	9.3	3.7	3.8	**35.0**
2010	2.3	-	9.8	6.1	10.0	3.3	3.7	**35.2**
2011	2.5	-	11.1	6.4	9.5	3.2	3.5	**36.2**
2012	2.5	-	10.7	6.5	9.2	2.9	2.4	**34.1**
2013	2.5	-	10.1	7.1	8.6	2.8	3.0	**34.1**
2014	2.5	-	10.2	7.4	9.0	3.0	3.1	**35.2**
2015	2.5	-	10.3	7.6	9.6	3.1	3.1	**36.2**
2020	2.7	-	10.2	7.7	9.5	3.1	3.2	**36.4**
2025	2.8	-	8.8	7.8	9.6	3.1	3.2	**35.4**
2030	3.0	-	7.9	8.0	9.6	3.0	3.1	**34.6**
2035	3.2	-	7.8	8.1	10.1	3.2	3.2	**35.6**
2040	3.3	-	7.7	8.3	10.6	3.3	3.3	**36.5**

Note: Naphtha/Unfinished Oils in power sector included in "Other"

TABLE B.3. RPS Succeeds with No LNG Imports (kb/d)								
STATE	LPG	Naphtha	Gasoline	Jet	Diesel	Fuel Oil	Other	TOTAL
2006	3.1	2.4	31.6	38.0	18.4	37.7	8.3	**139.4**
2007	2.9	2.4	31.3	37.3	25.6	42.2	7.9	**149.6**
2008	2.9	2.3	29.5	32.7	15.1	31.5	7.0	**121.0**
2009	2.6	2.2	29.7	30.9	16.7	31.5	7.1	**120.8**
2010	3.3	2.2	27.5	32.0	18.8	30.2	7.7	**121.6**
2011	3.5	2.2	30.8	33.5	17.2	29.5	7.4	**124.2**
2012	3.4	2.3	29.5	35.8	17.2	27.6	6.4	**122.2**
2013	3.4	2.3	27.5	37.3	16.8	29.8	6.9	**124.0**
2014	3.5	2.3	27.7	38.2	17.2	30.6	7.0	**126.5**
2015	3.5	2.3	27.9	39.1	19.4	29.3	7.0	**128.5**
2020	3.7	2.3	27.1	39.4	17.6	27.1	6.7	**123.8**
2025	3.9	2.3	22.8	39.8	17.3	25.1	6.5	**117.6**
2030	4.1	2.3	19.8	40.1	16.0	21.2	6.1	**109.6**
2035	4.3	2.3	19.2	40.5	16.7	22.2	6.2	**111.4**
2040	4.5	2.3	18.6	40.8	17.3	23.1	6.4	**113.0**
OAHU	LPG	Naphtha	Gasoline	Jet	Diesel	Fuel Oil	Other	TOTAL
2006	0.9	2.4	19.6	30.8	8.1	33.3	4.0	**99.1**
2007	0.8	2.4	19.2	30.8	13.6	38.3	3.8	**109.0**
2008	0.8	2.3	18.8	26.9	6.2	27.8	3.1	**85.9**
2009	0.7	2.2	18.9	25.4	7.4	27.8	3.4	**85.8**
2010	0.9	2.2	17.7	25.9	8.8	26.8	4.0	**86.4**
2011	1.0	2.2	19.7	27.1	7.7	26.3	4.0	**88.0**
2012	1.0	2.3	18.8	29.2	8.0	24.7	4.0	**88.1**
2013	1.0	2.3	17.4	30.2	8.2	26.9	3.8	**89.9**
2014	1.0	2.3	17.5	30.9	8.3	27.6	3.9	**91.3**
2015	1.0	2.3	17.6	31.5	9.8	26.2	3.9	**92.3**
2020	1.0	2.3	16.8	31.7	9.5	24.6	3.8	**89.7**
2025	1.1	2.3	13.9	31.9	9.5	22.8	3.8	**85.3**
2030	1.1	2.3	12.0	32.1	9.4	19.7	3.8	**80.3**
2035	1.1	2.3	11.4	32.3	9.4	20.4	3.8	**80.8**
2040	1.2	2.3	10.9	32.5	9.3	21.1	3.8	**81.1**
NEIGHBOR	LPG	Naphtha	Gasoline	Jet	Diesel	Fuel Oil	Other	TOTAL
2006	2.2	-	12.0	7.2	10.4	4.5	4.2	**40.4**
2007	2.1	-	12.1	6.5	12.0	3.8	4.1	**40.6**
2008	2.1	-	10.7	5.8	8.9	3.7	3.9	**35.1**
2009	1.9	-	10.8	5.5	9.3	3.7	3.8	**35.0**
2010	2.3	-	9.8	6.1	10.0	3.3	3.7	**35.2**
2011	2.5	-	11.1	6.4	9.5	3.2	3.5	**36.2**
2012	2.5	-	10.7	6.5	9.2	2.9	2.4	**34.1**
2013	2.5	-	10.1	7.1	8.6	2.8	3.0	**34.1**
2014	2.5	-	10.2	7.4	9.0	3.0	3.1	**35.2**
2015	2.5	-	10.3	7.6	9.6	3.1	3.1	**36.2**
2020	2.7	-	10.2	7.7	8.2	2.5	2.8	**34.1**
2025	2.8	-	8.8	7.8	7.8	2.2	2.7	**32.2**
2030	3.0	-	7.9	8.0	6.7	1.5	2.3	**29.3**
2035	3.2	-	7.8	8.1	7.3	1.8	2.4	**30.6**
2040	3.3	-	7.7	8.3	8.0	2.0	2.6	**31.9**

Note: Naphtha/Unfinished Oils in power sector included in "Other"

TABLE B.4. HCEI Generally Succeeds with No LNG Imports (kb/d)								
STATE	LPG	Naphtha	Gasoline	Jet	Diesel	Fuel Oil	Other	TOTAL
2006	3.1	2.4	31.6	38.0	18.4	37.7	8.3	**139.4**
2007	2.9	2.4	31.3	37.3	25.6	42.2	7.9	**149.6**
2008	2.9	2.3	29.5	32.7	15.1	31.5	7.0	**121.0**
2009	2.6	2.2	29.7	30.9	16.7	31.5	7.1	**120.8**
2010	3.3	2.2	27.5	32.0	18.8	30.2	7.7	**121.6**
2011	3.5	2.2	30.8	33.5	17.2	29.5	7.4	**124.2**
2012	3.4	2.3	29.5	35.8	17.2	27.6	6.4	**122.2**
2013	3.4	2.3	27.0	37.3	16.8	29.8	6.9	**123.5**
2014	3.5	2.3	27.2	38.2	17.2	30.6	7.0	**126.0**
2015	3.5	2.3	27.5	39.1	19.4	29.3	7.0	**128.0**
2020	3.7	2.3	25.9	39.4	17.6	27.1	6.7	**122.6**
2025	3.9	2.3	20.9	39.8	17.3	25.1	6.5	**115.7**
2030	4.1	2.3	17.9	40.1	16.0	21.2	6.1	**107.7**
2035	4.3	2.3	16.4	40.5	16.7	22.2	6.2	**108.5**
2040	4.5	2.3	13.8	40.8	17.3	23.1	6.4	**108.2**
OAHU	LPG	Naphtha	Gasoline	Jet	Diesel	Fuel Oil	Other	TOTAL
2006	0.9	2.4	19.6	30.8	8.1	33.3	4.0	**99.1**
2007	0.8	2.4	19.2	30.8	13.6	38.3	3.8	**109.0**
2008	0.8	2.3	18.8	26.9	6.2	27.8	3.1	**85.9**
2009	0.7	2.2	18.9	25.4	7.4	27.8	3.4	**85.8**
2010	0.9	2.2	17.7	25.9	8.8	26.8	4.0	**86.4**
2011	1.0	2.2	19.7	27.1	7.7	26.3	4.0	**88.0**
2012	1.0	2.3	18.8	29.2	8.0	24.7	4.0	**88.1**
2013	1.0	2.3	17.1	30.2	8.2	26.9	3.8	**89.6**
2014	1.0	2.3	17.2	30.9	8.3	27.6	3.9	**91.0**
2015	1.0	2.3	17.3	31.5	9.8	26.2	3.9	**92.0**
2020	1.0	2.3	16.1	31.7	9.5	24.6	3.8	**89.0**
2025	1.1	2.3	12.8	31.9	9.5	22.8	3.8	**84.2**
2030	1.1	2.3	10.8	32.1	9.4	19.7	3.8	**79.1**
2035	1.1	2.3	9.8	32.3	9.4	20.4	3.8	**79.1**
2040	1.2	2.3	8.1	32.5	9.3	21.1	3.8	**78.3**
NEIGHBOR	LPG	Naphtha	Gasoline	Jet	Diesel	Fuel Oil	Other	TOTAL
2006	2.2	-	12.0	7.2	10.4	4.5	4.2	**40.4**
2007	2.1	-	12.1	6.5	12.0	3.8	4.1	**40.6**
2008	2.1	-	10.7	5.8	8.9	3.7	3.9	**35.1**
2009	1.9	-	10.8	5.5	9.3	3.7	3.8	**35.0**
2010	2.3	-	9.8	6.1	10.0	3.3	3.7	**35.2**
2011	2.5	-	11.1	6.4	9.5	3.2	3.5	**36.2**
2012	2.5	-	10.7	6.5	9.2	2.9	2.4	**34.1**
2013	2.5	-	10.0	7.1	8.6	2.8	3.0	**34.0**
2014	2.5	-	10.0	7.4	9.0	3.0	3.1	**35.0**
2015	2.5	-	10.1	7.6	9.6	3.1	3.1	**36.0**
2020	2.7	-	9.8	7.7	8.2	2.5	2.8	**33.6**
2025	2.8	-	8.1	7.8	7.8	2.2	2.7	**31.5**
2030	3.0	-	7.1	8.0	6.7	1.5	2.3	**28.5**
2035	3.2	-	6.7	8.1	7.3	1.8	2.4	**29.5**
2040	3.3	-	5.7	8.3	8.0	2.0	2.6	**29.9**

Note: Naphtha/Unfinished Oils in power sector included in "Other"

TABLE B.5. Business-As-Usual with LNG Imports (kb/d)								
STATE	LPG	Naphtha	Gasoline	Jet	Diesel	Fuel Oil	Other	TOTAL
2006	3.1	2.4	31.6	38.0	18.5	37.7	8.3	**139.5**
2007	2.9	2.4	31.3	37.3	25.7	42.2	7.9	**149.7**
2008	2.9	2.3	29.5	32.7	15.2	31.5	7.0	**121.1**
2009	2.6	2.2	29.7	30.9	16.8	31.5	7.1	**120.8**
2010	3.3	2.2	27.5	32.0	18.9	30.2	7.7	**121.7**
2011	3.5	2.2	30.8	33.5	17.2	29.5	7.4	**124.2**
2012	3.4	2.3	29.5	35.8	17.3	27.6	6.4	**122.2**
2013	3.4	2.3	27.7	37.3	17.0	30.2	6.9	**124.8**
2014	3.5	2.1	27.9	38.2	17.4	31.0	7.0	**127.1**
2015	3.5	2.0	28.1	39.1	19.5	29.7	7.0	**128.9**
2020	3.7	-	27.7	39.4	20.3	32.2	7.3	**130.6**
2025	3.9	-	23.7	39.8	14.8	7.0	5.5	**94.6**
2030	4.1	-	21.6	40.1	14.7	7.3	5.6	**93.3**
2035	4.3	-	21.9	40.5	14.5	7.5	5.6	**94.2**
2040	4.5	-	21.5	40.8	14.1	7.8	5.7	**94.4**
OAHU	LPG	Naphtha	Gasoline	Jet	Diesel	Fuel Oil	Other	TOTAL
2006	0.9	2.4	19.6	30.8	8.1	33.3	4.0	**99.1**
2007	0.8	2.4	19.2	30.8	13.7	38.3	3.8	**109.1**
2008	0.8	2.3	18.8	26.9	6.3	27.8	3.1	**86.0**
2009	0.7	2.2	18.9	25.4	7.5	27.8	3.4	**85.8**
2010	0.9	2.2	17.7	25.9	8.9	26.8	4.0	**86.4**
2011	1.0	2.2	19.7	27.1	7.7	26.3	4.0	**88.0**
2012	1.0	2.3	18.8	29.2	8.1	24.7	4.0	**88.1**
2013	1.0	2.3	17.5	30.2	8.3	27.3	3.8	**90.4**
2014	1.0	2.1	17.6	30.9	8.3	27.9	3.9	**91.7**
2015	1.0	2.0	17.8	31.5	9.8	26.6	3.9	**92.5**
2020	1.0	-	17.2	31.7	9.9	28.7	3.9	**92.4**
2025	1.1	-	14.5	31.9	9.5	6.1	3.6	**66.6**
2030	1.1	-	13.0	32.1	9.2	6.3	3.6	**65.4**
2035	1.1	-	13.0	32.3	8.9	6.5	3.6	**65.5**
2040	1.2	-	12.6	32.5	8.5	6.7	3.6	**65.1**
NEIGHBOR	LPG	Naphtha	Gasoline	Jet	Diesel	Fuel Oil	Other	TOTAL
2006	2.2	-	12.0	7.2	10.4	4.5	4.2	**40.4**
2007	2.1	-	12.1	6.5	12.0	3.8	4.1	**40.6**
2008	2.1	-	10.7	5.8	8.9	3.7	3.9	**35.1**
2009	1.9	-	10.8	5.5	9.3	3.7	3.8	**35.0**
2010	2.3	-	9.8	6.1	10.0	3.3	3.7	**35.2**
2011	2.5	-	11.1	6.4	9.5	3.2	3.5	**36.2**
2012	2.5	-	10.7	6.5	9.2	2.9	2.4	**34.1**
2013	2.5	-	10.2	7.1	8.7	2.9	3.0	**34.4**
2014	2.5	-	10.3	7.4	9.1	3.0	3.1	**35.4**
2015	2.5	-	10.4	7.6	9.7	3.1	3.2	**36.4**
2020	2.7	-	10.5	7.7	10.5	3.5	3.4	**38.2**
2025	2.8	-	9.2	7.8	5.3	0.9	1.9	**28.0**
2030	3.0	-	8.6	8.0	5.5	1.0	2.0	**27.9**
2035	3.2	-	8.9	8.1	5.6	1.0	2.0	**28.8**
2040	3.3	-	8.9	8.3	5.6	1.1	2.0	**29.3**

Note: Naphtha/Unfinished Oils in power sector included in "Other"

TABLE B.6. RPS Falls Short with LNG Imports (kb/d)								
STATE	LPG	Naphtha	Gasoline	Jet	Diesel	Fuel Oil	Other	TOTAL
2006	3.1	2.4	31.6	38.0	18.4	37.7	8.3	**139.4**
2007	2.9	2.4	31.3	37.3	25.6	42.2	7.9	**149.6**
2008	2.9	2.3	29.5	32.7	15.1	31.5	7.0	**121.0**
2009	2.6	2.2	29.7	30.9	16.7	31.5	7.1	**120.8**
2010	3.3	2.2	27.5	32.0	18.8	30.2	7.7	**121.6**
2011	3.5	2.2	30.8	33.5	17.2	29.5	7.4	**124.2**
2012	3.4	2.3	29.5	35.8	17.2	27.6	6.4	**122.2**
2013	3.4	2.3	27.5	37.3	16.8	29.8	6.9	**124.0**
2014	3.5	2.1	27.7	38.2	17.2	30.6	7.0	**126.3**
2015	3.5	2.0	27.9	39.1	19.4	29.3	7.0	**128.1**
2020	3.7	-	27.1	39.4	19.0	29.3	7.0	**125.5**
2025	3.9	-	22.4	39.8	13.9	6.1	5.5	**91.6**
2030	4.1	-	19.3	40.1	13.7	5.8	5.5	**88.4**
2035	4.3	-	18.3	40.5	13.5	5.9	5.5	**88.0**
2040	4.5	-	16.8	40.8	13.2	6.0	5.5	**86.7**
OAHU	LPG	Naphtha	Gasoline	Jet	Diesel	Fuel Oil	Other	TOTAL
2006	0.9	2.4	19.6	30.8	8.1	33.3	4.0	**99.1**
2007	0.8	2.4	19.2	30.8	13.6	38.3	3.8	**109.0**
2008	0.8	2.3	18.8	26.9	6.2	27.8	3.1	**85.9**
2009	0.7	2.2	18.9	25.4	7.4	27.8	3.4	**85.8**
2010	0.9	2.2	17.7	25.9	8.8	26.8	4.0	**86.4**
2011	1.0	2.2	19.7	27.1	7.7	26.3	4.0	**88.0**
2012	1.0	2.3	18.8	29.2	8.0	24.7	4.0	**88.1**
2013	1.0	2.3	17.4	30.2	8.2	26.9	3.8	**89.9**
2014	1.0	2.1	17.5	30.9	8.3	27.6	3.9	**91.1**
2015	1.0	2.0	17.6	31.5	9.8	26.2	3.9	**91.9**
2020	1.0	-	16.8	31.7	9.5	26.1	3.9	**89.0**
2025	1.1	-	13.7	31.9	9.1	5.3	3.6	**64.7**
2030	1.1	-	11.6	32.1	8.9	5.0	3.6	**62.4**
2035	1.1	-	10.9	32.3	8.6	5.1	3.6	**61.7**
2040	1.2	-	9.8	32.5	8.3	5.2	3.6	**60.6**
NEIGHBOR	LPG	Naphtha	Gasoline	Jet	Diesel	Fuel Oil	Other	TOTAL
2006	2.2	-	12.0	7.2	10.4	4.5	4.2	**40.4**
2007	2.1	-	12.1	6.5	12.0	3.8	4.1	**40.6**
2008	2.1	-	10.7	5.8	8.9	3.7	3.9	**35.1**
2009	1.9	-	10.8	5.5	9.3	3.7	3.8	**35.0**
2010	2.3	-	9.8	6.1	10.0	3.3	3.7	**35.2**
2011	2.5	-	11.1	6.4	9.5	3.2	3.5	**36.2**
2012	2.5	-	10.7	6.5	9.2	2.9	2.4	**34.1**
2013	2.5	-	10.1	7.1	8.6	2.8	3.0	**34.1**
2014	2.5	-	10.2	7.4	9.0	3.0	3.1	**35.2**
2015	2.5	-	10.3	7.6	9.6	3.1	3.1	**36.2**
2020	2.7	-	10.2	7.7	9.5	3.1	3.2	**36.4**
2025	2.8	-	8.7	7.8	4.8	0.8	1.9	**26.8**
2030	3.0	-	7.6	8.0	4.9	0.8	1.8	**26.1**
2035	3.2	-	7.4	8.1	4.9	0.8	1.9	**26.3**
2040	3.3	-	7.0	8.3	4.9	0.8	1.9	**26.1**

Note: Naphtha/Unfinished Oils in power sector included in "Other"

TABLE B.7. RPS Succeeds with LNG Imports (kb/d)								
STATE	LPG	Naphtha	Gasoline	Jet	Diesel	Fuel Oil	Other	TOTAL
2006	3.1	2.4	31.6	38.0	18.4	37.7	8.3	**139.4**
2007	2.9	2.4	31.3	37.3	25.6	42.2	7.9	**149.6**
2008	2.9	2.3	29.5	32.7	15.1	31.5	7.0	**121.0**
2009	2.6	2.2	29.7	30.9	16.7	31.5	7.1	**120.8**
2010	3.3	2.2	27.5	32.0	18.8	30.2	7.7	**121.6**
2011	3.5	2.2	30.8	33.5	17.2	29.5	7.4	**124.2**
2012	3.4	2.3	29.5	35.8	17.2	27.6	6.4	**122.2**
2013	3.4	2.3	27.5	37.3	16.8	29.8	6.9	**124.0**
2014	3.5	2.1	27.7	38.2	17.2	30.6	7.0	**126.3**
2015	3.5	2.0	27.9	39.1	19.4	29.3	7.0	**128.1**
2020	3.7	-	27.1	39.4	17.6	27.1	6.7	**121.5**
2025	3.9	-	22.4	39.8	13.7	5.6	5.4	**90.8**
2030	4.1	-	19.3	40.1	13.3	5.1	5.3	**87.1**
2035	4.3	-	18.3	40.5	13.1	5.2	5.4	**86.7**
2040	4.5	-	16.8	40.8	12.8	5.3	5.4	**85.6**
OAHU	LPG	Naphtha	Gasoline	Jet	Diesel	Fuel Oil	Other	TOTAL
2006	0.9	2.4	19.6	30.8	8.1	33.3	4.0	**99.1**
2007	0.8	2.4	19.2	30.8	13.6	38.3	3.8	**109.0**
2008	0.8	2.3	18.8	26.9	6.2	27.8	3.1	**85.9**
2009	0.7	2.2	18.9	25.4	7.4	27.8	3.4	**85.8**
2010	0.9	2.2	17.7	25.9	8.8	26.8	4.0	**86.4**
2011	1.0	2.2	19.7	27.1	7.7	26.3	4.0	**88.0**
2012	1.0	2.3	18.8	29.2	8.0	24.7	4.0	**88.1**
2013	1.0	2.3	17.4	30.2	8.2	26.9	3.8	**89.9**
2014	1.0	2.1	17.5	30.9	8.3	27.6	3.9	**91.1**
2015	1.0	2.0	17.6	31.5	9.8	26.2	3.9	**91.9**
2020	1.0	-	16.8	31.7	9.5	24.6	3.8	**87.4**
2025	1.1	-	13.7	31.9	9.1	5.0	3.6	**64.4**
2030	1.1	-	11.6	32.1	8.9	4.5	3.6	**61.8**
2035	1.1	-	10.9	32.3	8.6	4.6	3.6	**61.2**
2040	1.2	-	9.8	32.5	8.3	4.7	3.6	**60.1**
NEIGHBOR	LPG	Naphtha	Gasoline	Jet	Diesel	Fuel Oil	Other	TOTAL
2006	2.2	-	12.0	7.2	10.4	4.5	4.2	**40.4**
2007	2.1	-	12.1	6.5	12.0	3.8	4.1	**40.6**
2008	2.1	-	10.7	5.8	8.9	3.7	3.9	**35.1**
2009	1.9	-	10.8	5.5	9.3	3.7	3.8	**35.0**
2010	2.3	-	9.8	6.1	10.0	3.3	3.7	**35.2**
2011	2.5	-	11.1	6.4	9.5	3.2	3.5	**36.2**
2012	2.5	-	10.7	6.5	9.2	2.9	2.4	**34.1**
2013	2.5	-	10.1	7.1	8.6	2.8	3.0	**34.1**
2014	2.5	-	10.2	7.4	9.0	3.0	3.1	**35.2**
2015	2.5	-	10.3	7.6	9.6	3.1	3.1	**36.2**
2020	2.7	-	10.2	7.7	8.2	2.5	2.8	**34.1**
2025	2.8	-	8.7	7.8	4.6	0.7	1.8	**26.4**
2030	3.0	-	7.6	8.0	4.4	0.6	1.7	**25.3**
2035	3.2	-	7.4	8.1	4.5	0.6	1.7	**25.5**
2040	3.3	-	7.0	8.3	4.5	0.6	1.8	**25.4**

Note: Naphtha/Unfinished Oils in power sector included in "Other"

TABLE B.8. HCEI Generally Succeeds with LNG Imports (kb/d)								
STATE	LPG	Naphtha	Gasoline	Jet	Diesel	Fuel Oil	Other	TOTAL
2006	3.1	2.4	31.6	38.0	18.4	37.7	8.3	**139.4**
2007	2.9	2.4	31.3	37.3	25.6	42.2	7.9	**149.6**
2008	2.9	2.3	29.5	32.7	15.1	31.5	7.0	**121.0**
2009	2.6	2.2	29.7	30.9	16.7	31.5	7.1	**120.8**
2010	3.3	2.2	27.5	32.0	18.8	30.2	7.7	**121.6**
2011	3.5	2.2	30.8	33.5	17.2	29.5	7.4	**124.2**
2012	3.4	2.3	29.5	35.8	17.2	27.6	6.4	**122.2**
2013	3.4	2.3	27.0	37.3	16.8	29.8	6.9	**123.5**
2014	3.5	2.1	27.2	38.2	17.2	30.6	7.0	**125.8**
2015	3.5	2.0	27.5	39.1	19.4	29.3	7.0	**127.6**
2020	3.7	-	25.9	39.4	17.6	27.1	6.7	**120.3**
2025	3.9	-	20.6	39.8	13.7	5.6	5.4	**89.0**
2030	4.1	-	17.3	40.1	13.3	5.1	5.3	**85.2**
2035	4.3	-	15.6	40.5	13.1	5.2	5.4	**84.0**
2040	4.5	-	12.4	40.8	12.8	5.3	5.4	**81.2**
OAHU	LPG	Naphtha	Gasoline	Jet	Diesel	Fuel Oil	Other	TOTAL
2006	0.9	2.4	19.6	30.8	8.1	33.3	4.0	**99.1**
2007	0.8	2.4	19.2	30.8	13.6	38.3	3.8	**109.0**
2008	0.8	2.3	18.8	26.9	6.2	27.8	3.1	**85.9**
2009	0.7	2.2	18.9	25.4	7.4	27.8	3.4	**85.8**
2010	0.9	2.2	17.7	25.9	8.8	26.8	4.0	**86.4**
2011	1.0	2.2	19.7	27.1	7.7	26.3	4.0	**88.0**
2012	1.0	2.3	18.8	29.2	8.0	24.7	4.0	**88.1**
2013	1.0	2.3	17.1	30.2	8.2	26.9	3.8	**89.6**
2014	1.0	2.1	17.2	30.9	8.3	27.6	3.9	**90.8**
2015	1.0	2.0	17.3	31.5	9.8	26.2	3.9	**91.6**
2020	1.0	-	16.1	31.7	9.5	24.6	3.8	**86.7**
2025	1.1	-	12.6	31.9	9.1	5.0	3.6	**63.3**
2030	1.1	-	10.5	32.1	8.9	4.5	3.6	**60.7**
2035	1.1	-	9.3	32.3	8.6	4.6	3.6	**59.6**
2040	1.2	-	7.3	32.5	8.3	4.7	3.6	**57.6**
NEIGHBOR	LPG	Naphtha	Gasoline	Jet	Diesel	Fuel Oil	Other	TOTAL
2006	2.2	-	12.0	7.2	10.4	4.5	4.2	**40.4**
2007	2.1	-	12.1	6.5	12.0	3.8	4.1	**40.6**
2008	2.1	-	10.7	5.8	8.9	3.7	3.9	**35.1**
2009	1.9	-	10.8	5.5	9.3	3.7	3.8	**35.0**
2010	2.3	-	9.8	6.1	10.0	3.3	3.7	**35.2**
2011	2.5	-	11.1	6.4	9.5	3.2	3.5	**36.2**
2012	2.5	-	10.7	6.5	9.2	2.9	2.4	**34.1**
2013	2.5	-	10.0	7.1	8.6	2.8	3.0	**34.0**
2014	2.5	-	10.0	7.4	9.0	3.0	3.1	**35.0**
2015	2.5	-	10.1	7.6	9.6	3.1	3.1	**36.0**
2020	2.7	-	9.8	7.7	8.2	2.5	2.8	**33.6**
2025	2.8	-	8.0	7.8	4.6	0.7	1.8	**25.7**
2030	3.0	-	6.9	8.0	4.4	0.6	1.7	**24.5**
2035	3.2	-	6.3	8.1	4.5	0.6	1.7	**24.4**
2040	3.3	-	5.1	8.3	4.5	0.6	1.8	**23.6**

Note: Naphtha/Unfinished Oils in power sector included in "Other"

APPENDIX C:
Detailed Import and Export Scenarios

These 48 scenario tables detail the range of product import and export results determined by

- The four Demand Scenarios
- The two LNG Scenarios
- The three Refinery Scenarios (Both Refineries, Chevron Only, HIE Only)
- The two Refinery Feed Scenarios (Standard Operations vs. Lighter Feedstock)

In principle, there are four Refinery Scenarios, since one obvious possibility is that neither refinery continues to operate in the longer term. These scenarios are not included, however, because they are already covered by the tabulation of demand scenarios in Appendix B. If no refineries are operating, then for all products, Imports = Demand, and Exports = 0.

	TABLE C.1. Business As Usual Demand, Both Refineries, StanOps, No LNG (kb/d)							
Imports	**LPG**	**Naphtha**	**Gasoline**	**Jet**	**Diesel**	**Fuel Oil**	**Other**	**TOTAL**
2015	1.1	-	-	0.4	-	-	-	1.5
2020	1.3	-	-	0.7	0.1	-	-	2.1
2025	1.5	-	-	1.0	1.2	0.4	-	4.1
2030	1.7	-	-	1.4	2.1	2.1	-	7.3
2035	1.9	-	-	1.7	3.3	3.9	-	10.7
2040	2.1	-	-	2.1	4.4	5.7	-	14.2
Exports								
2015	-	0.1	2.8	-	0.7	4.1	1.6	9.3
2020	-	0.1	3.2	-	-	1.6	1.4	6.3
2025	-	0.1	6.9	-	-	-	1.1	8.2
2030	-	0.1	8.7	-	-	-	0.9	9.7
2035	-	0.1	7.9	-	-	-	0.6	8.7
2040	-	0.1	7.1	-	-	-	0.4	7.6

	TABLE C.2. Business As Usual Demand, Chevron Only, StanOps, No LNG (kb/d)							
Imports	**LPG**	**Naphtha**	**Gasoline**	**Jet**	**Diesel**	**Fuel Oil**	**Other**	**TOTAL**
2015	2.4	2.3	11.3	29.1	11.7	18.1	2.0	76.9
2020	2.5	2.3	10.9	29.4	12.5	20.6	2.2	80.5
2025	2.7	2.3	7.2	29.8	13.6	22.6	2.5	80.7
2030	2.9	2.3	5.4	30.1	14.6	24.3	2.7	82.4
2035	3.1	2.3	6.2	30.5	15.7	26.1	3.0	86.8
2040	3.3	2.3	7.0	30.8	16.8	28.0	3.2	91.4
Exports								
2015	-	-	-	-	-	-	-	-
2020	-	-	-	-	-	-	-	-
2025	-	-	-	-	-	-	-	-
2030	-	-	-	-	-	-	-	-
2035	-	-	-	-	-	-	-	-
2040	-	-	-	-	-	-	-	-

Note: StanOps = Standard Operation; Lite = Lighter Crude Slate

	TABLE C.3. Business As Usual Demand, HIE Only, StanOps, No LNG (kb/d)							
Imports	LPG	Naphtha	Gasoline	Jet	Diesel	Fuel Oil	Other	TOTAL
2015	2.3	-	14.0	10.3	7.1	7.5	0.1	41.3
2020	2.4	-	13.6	10.7	7.9	9.9	0.4	45.0
2025	2.6	-	9.9	11.0	9.0	12.0	0.6	45.2
2030	2.8	-	8.1	11.4	9.9	13.7	0.9	46.8
2035	3.0	-	8.9	11.7	11.1	15.5	1.1	51.3
2040	3.3	-	9.7	12.1	12.1	17.3	1.4	55.9
Exports								
2015	-	-	-	-	-	-	-	-
2020	-	-	-	-	-	-	-	-
2025	-	-	-	-	-	-	-	-
2030	-	-	-	-	-	-	-	-
2035	-	-	-	-	-	-	-	-
2040	-	-	-	-	-	-	-	-

	TABLE C.4. Business As Usual Demand, Both Refineries, Lite, No LNG (kb/d)							
Imports	LPG	Naphtha	Gasoline	Jet	Diesel	Fuel Oil	Other	TOTAL
2015	0.1	-	-	-	-	9.1	-	9.2
2020	0.3	-	-	-	-	11.6	-	11.8
2025	0.4	-	-	-	-	13.6	-	14.1
2030	0.6	-	-	-	-	15.3	-	16.0
2035	0.9	-	-	-	-	17.1	-	18.0
2040	1.1	-	-	-	-	18.9	-	20.0
Exports								
2015	-	0.1	7.3	2.6	6.8	-	3.0	19.8
2020	-	0.1	7.7	2.2	6.0	-	2.7	18.8
2025	-	0.1	11.4	1.9	4.9	-	2.5	20.9
2030	-	0.1	13.2	1.6	4.0	-	2.2	21.1
2035	-	0.1	12.4	1.2	2.9	-	2.0	18.6
2040	-	0.1	11.6	0.9	1.8	-	1.7	16.1

Note: StanOps = Standard Operation; Lite = Lighter Crude Slate

	TABLE C.5. Business As Usual Demand, Chevron Only, Lite, No LNG (kb/d)							
Imports	LPG	Naphtha	Gasoline	Jet	Diesel	Fuel Oil	Other	TOTAL
2015	2.1	2.3	9.7	27.3	11.2	22.6	1.6	76.9
2020	2.3	2.3	9.3	27.7	12.0	25.1	1.9	80.5
2025	2.5	2.3	5.6	28.0	13.1	27.1	2.1	80.7
2030	2.7	2.3	3.8	28.4	14.0	28.8	2.4	82.4
2035	2.9	2.3	4.6	28.7	15.1	30.6	2.6	86.8
2040	3.1	2.3	5.4	29.1	16.2	32.4	2.9	91.4
Exports								
2015	-	-	-	-	-	-	-	-
2020	-	-	-	-	-	-	-	-
2025	-	-	-	-	-	-	-	-
2030	-	-	-	-	-	-	-	-
2035	-	-	-	-	-	-	-	-
2040	-	-	-	-	-	-	-	-

	TABLE C.6. Business As Usual Demand, HIE Only, Lite, No LNG (kb/d)							
Imports	LPG	Naphtha	Gasoline	Jet	Diesel	Fuel Oil	Other	TOTAL
2015	1.4	-	11.1	9.2	1.5	16.2	-	39.4
2020	1.6	-	10.7	9.5	2.3	18.6	-	42.8
2025	1.8	-	7.0	9.8	3.4	20.7	-	42.8
2030	2.0	-	5.2	10.2	4.3	22.4	-	44.2
2035	2.2	-	6.0	10.5	5.5	24.2	0.1	48.5
2040	2.4	-	6.8	10.9	6.6	26.0	0.4	53.1
Exports								
2015	-	0.1	-	-	-	-	0.9	1.0
2020	-	0.1	-	-	-	-	0.6	0.7
2025	-	0.1	-	-	-	-	0.4	0.5
2030	-	0.1	-	-	-	-	0.1	0.2
2035	-	0.1	-	-	-	-	-	0.1
2040	-	0.1	-	-	-	-	-	0.1

Note: StanOps = Standard Operation; Lite = Lighter Crude Slate

TABLE C.7. RPS Falls Short Demand, Both Refineries, StanOps, No LNG (kb/d)								
Imports	**LPG**	**Naphtha**	**Gasoline**	**Jet**	**Diesel**	**Fuel Oil**	**Other**	**TOTAL**
2015	1.1	-	-	0.4	-	-	-	1.5
2020	1.3	-	-	0.7	-	-	-	2.0
2025	1.5	-	-	1.0	-	-	-	2.5
2030	1.7	-	-	1.4	-	-	-	3.0
2035	1.9	-	-	1.7	-	-	-	3.6
2040	2.1	-	-	2.1	-	-	-	4.2
Exports								
2015	-	0.1	3.0	-	0.8	4.5	1.7	10.1
2020	-	0.1	3.9	-	1.2	4.5	1.6	11.3
2025	-	0.1	8.2	-	1.1	5.8	1.6	16.8
2030	-	0.1	11.1	-	1.2	7.6	1.7	21.6
2035	-	0.1	11.7	-	0.6	6.9	1.6	21.0
2040	-	0.1	12.4	-	0.3	6.4	1.5	20.7

TABLE C.8. RPS Falls Short Demand, Chevron Only, StanOps, No LNG (kb/d)								
Imports	**LPG**	**Naphtha**	**Gasoline**	**Jet**	**Diesel**	**Fuel Oil**	**Other**	**TOTAL**
2015	2.4	2.3	11.1	29.1	11.6	17.7	4.3	78.5
2020	2.5	2.3	10.2	29.4	11.2	17.7	4.4	77.8
2025	2.7	2.3	5.9	29.8	11.3	16.4	4.4	72.8
2030	2.9	2.3	3.0	30.1	11.2	14.7	4.3	68.5
2035	3.1	2.3	2.4	30.5	11.8	15.3	4.4	69.8
2040	3.3	2.3	1.7	30.8	12.1	15.8	4.5	70.6
Exports								
2015	-	-	-	-	-	-	-	-
2020	-	-	-	-	-	-	-	-
2025	-	-	-	-	-	-	-	-
2030	-	-	-	-	-	-	-	-
2035	-	-	-	-	-	-	-	-
2040	-	-	-	-	-	-	-	-

Note: StanOps = Standard Operation; Lite = Lighter Crude Slate

TABLE C.9. RPS Falls Short Demand, HIE Only, StanOps, No LNG (kb/d)								
Imports	**LPG**	**Naphtha**	**Gasoline**	**Jet**	**Diesel**	**Fuel Oil**	**Other**	**TOTAL**
2015	2.3	-	13.8	10.3	7.0	7.0	1.0	41.4
2020	2.4	-	13.0	10.7	6.5	7.0	1.0	40.7
2025	2.6	-	8.7	11.0	6.7	5.8	1.0	35.8
2030	2.8	-	5.7	11.4	6.6	4.0	0.9	31.5
2035	3.0	-	5.1	11.7	7.1	4.6	1.0	32.7
2040	3.3	-	4.5	12.1	7.5	5.2	1.1	33.6
Exports								
2015	-	-	-	-	-	-	-	-
2020	-	-	-	-	-	-	-	-
2025	-	-	-	-	-	-	-	-
2030	-	-	-	-	-	-	-	-
2035	-	-	-	-	-	-	-	-
2040	-	-	-	-	-	-	-	-

TABLE C.10. RPS Falls Short Demand, Both Refineries, Lite, No LNG (kb/d)								
Imports	**LPG**	**Naphtha**	**Gasoline**	**Jet**	**Diesel**	**Fuel Oil**	**Other**	**TOTAL**
2015	0.1	-	-	-	-	8.7	-	8.7
2020	0.3	-	-	-	-	8.7	-	8.9
2025	0.4	-	-	-	-	7.4	-	7.9
2030	0.6	-	-	-	-	5.6	-	6.3
2035	0.9	-	-	-	-	6.3	-	7.1
2040	1.1	-	-	-	-	6.8	-	7.9
Exports								
2015	-	0.1	7.5	2.6	7.0	-	3.0	20.2
2020	-	0.1	8.4	2.2	7.4	-	2.9	21.1
2025	-	0.1	12.7	1.9	7.3	-	3.0	24.9
2030	-	0.1	15.6	1.6	7.3	-	3.0	27.6
2035	-	0.1	16.2	1.2	6.8	-	2.9	27.3
2040	-	0.1	16.9	0.9	6.4	-	2.9	27.1

Note: StanOps = Standard Operation; Lite = Lighter Crude Slate

TABLE C.11. RPS Falls Short Demand, Chevron Only, Lite, No LNG (kb/d)								
Imports	LPG	Naphtha	Gasoline	Jet	Diesel	Fuel Oil	Other	TOTAL
2015	2.1	2.3	9.5	27.3	11.0	22.2	4.0	78.5
2020	2.3	2.3	8.6	27.7	10.6	22.2	4.0	77.8
2025	2.5	2.3	4.3	28.0	10.7	20.9	4.0	72.8
2030	2.7	2.3	1.4	28.4	10.7	19.2	3.9	68.5
2035	2.9	2.3	0.8	28.7	11.2	19.8	4.0	69.8
2040	3.1	2.3	0.1	29.1	11.6	20.3	4.1	70.6
Exports								
2015	-	-	-	-	-	-	-	-
2020	-	-	-	-	-	-	-	-
2025	-	-	-	-	-	-	-	-
2030	-	-	-	-	-	-	-	-
2035	-	-	-	-	-	-	-	-
2040	-	-	-	-	-	-	-	-

TABLE C.12. RPS Falls Short Demand, HIE Only, Lite, No LNG (kb/d)								
Imports	LPG	Naphtha	Gasoline	Jet	Diesel	Fuel Oil	Other	TOTAL
2015	1.4	-	10.9	9.2	1.4	15.7	0.0	38.7
2020	1.6	-	10.1	9.5	1.0	15.8	0.1	38.0
2025	1.8	-	5.8	9.8	1.1	14.5	0.0	33.0
2030	2.0	-	2.8	10.2	1.0	12.7	-	28.8
2035	2.2	-	2.2	10.5	1.6	13.4	0.1	30.0
2040	2.4	-	1.6	10.9	1.9	13.9	0.1	30.9
Exports								
2015	-	0.1	-	-	-	-	-	0.1
2020	-	0.1	-	-	-	-	-	0.1
2025	-	0.1	-	-	-	-	-	0.1
2030	-	0.1	-	-	-	-	0.0	0.1
2035	-	0.1	-	-	-	-	-	0.1
2040	-	0.1	-	-	-	-	-	0.1

Note: StanOps = Standard Operation; Lite = Lighter Crude Slate

TABLE C.13. RPS Succeeds Demand, Both Refineries, StanOps, No LNG (kb/d)								
Imports	LPG	Naphtha	Gasoline	Jet	Diesel	Fuel Oil	Other	TOTAL
2015	1.1	-	-	0.4	-	-	-	1.5
2020	1.3	-	-	0.7	-	-	-	2.0
2025	1.5	-	-	1.0	-	-	-	2.5
2030	1.7	-	-	1.4	-	-	-	3.0
2035	1.9	-	-	1.7	-	-	-	3.6
2040	2.1	-	-	2.1	-	-	-	4.2
Exports								
2015	-	0.1	3.0	-	0.8	4.5	1.7	10.1
2020	-	0.1	3.9	-	2.6	6.7	2.0	15.3
2025	-	0.1	8.2	-	2.9	8.7	2.2	22.1
2030	-	0.1	11.1	-	4.2	12.6	2.6	30.5
2035	-	0.1	11.7	-	3.5	11.6	2.4	29.4
2040	-	0.1	12.4	-	2.9	10.7	2.3	28.3

TABLE C.14. RPS Succeeds Demand, Chevron Only, StanOps, No LNG (kb/d)								
Imports	LPG	Naphtha	Gasoline	Jet	Diesel	Fuel Oil	Other	TOTAL
2015	2.4	2.3	11.1	29.1	11.6	17.7	4.3	78.5
2020	2.5	2.3	10.2	29.4	9.8	15.5	4.0	73.8
2025	2.7	2.3	5.9	29.8	9.5	13.5	3.8	67.6
2030	2.9	2.3	3.0	30.1	8.2	9.7	3.4	59.6
2035	3.1	2.3	2.4	30.5	8.9	10.6	3.6	61.4
2040	3.3	2.3	1.7	30.8	9.5	11.5	3.7	63.0
Exports								
2015	-	-	-	-	-	-	-	-
2020	-	-	-	-	-	-	-	-
2025	-	-	-	-	-	-	-	-
2030	-	-	-	-	-	-	-	-
2035	-	-	-	-	-	-	-	-
2040	-	-	-	-	-	-	-	-

Note: StanOps = Standard Operation; Lite = Lighter Crude Slate

TABLE C.15. RPS Succeeds Demand, HIE Only, StanOps, No LNG (kb/d)								
Imports	LPG	Naphtha	Gasoline	Jet	Diesel	Fuel Oil	Other	TOTAL
2015	2.3	-	13.8	10.3	7.0	7.0	1.0	41.4
2020	2.4	-	13.0	10.7	5.2	4.8	0.7	36.8
2025	2.6	-	8.7	11.0	4.9	2.8	0.5	30.5
2030	2.8	-	5.7	11.4	3.6	-	0.1	23.6
2035	3.0	-	5.1	11.7	4.3	-	0.2	24.4
2040	3.3	-	4.5	12.1	4.9	0.9	0.4	25.9
Exports								
2015	-	-	-	-	-	-	-	-
2020	-	-	-	-	-	-	-	-
2025	-	-	-	-	-	-	-	-
2030	-	-	-	-	-	-	-	-
2035	-	-	-	-	-	-	-	-
2040	-	-	-	-	-	-	-	-

TABLE C.16. RPS Succeeds Demand, Both Refineries, Lite, No LNG (kb/d)								
Imports	LPG	Naphtha	Gasoline	Jet	Diesel	Fuel Oil	Other	TOTAL
2015	0.1	-	-	-	-	8.7	-	8.7
2020	0.3	-	-	-	-	6.5	-	6.7
2025	0.4	-	-	-	-	4.5	-	4.9
2030	0.6	-	-	-	-	0.6	-	1.3
2035	0.9	-	-	-	-	1.6	-	2.4
2040	1.1	-	-	-	-	2.5	-	3.6
Exports								
2015	-	0.1	7.5	2.6	7.0	-	3.0	20.2
2020	-	0.1	8.4	2.2	8.7	-	3.3	22.8
2025	-	0.1	12.7	1.9	9.0	-	3.5	27.2
2030	-	0.1	15.6	1.6	10.3	-	3.9	31.5
2035	-	0.1	16.2	1.2	9.6	-	3.8	30.9
2040	-	0.1	16.9	0.9	9.0	-	3.6	30.5

Note: StanOps = Standard Operation; Lite = Lighter Crude Slate

TABLE C.17. RPS Succeeds Demand, Chevron Only, Lite, No LNG (kb/d)								
Imports	LPG	Naphtha	Gasoline	Jet	Diesel	Fuel Oil	Other	TOTAL
2015	2.1	2.3	9.5	27.3	11.0	22.2	4.0	78.5
2020	2.3	2.3	8.6	27.7	9.3	20.0	3.6	73.8
2025	2.5	2.3	4.3	28.0	9.0	18.0	3.5	67.6
2030	2.7	2.3	1.4	28.4	7.7	14.2	3.1	59.7
2035	2.9	2.3	0.8	28.7	8.4	15.1	3.2	61.4
2040	3.1	2.3	0.1	29.1	9.0	16.0	3.3	63.0
Exports								
2015	-	-	-	-	-	-	-	-
2020	-	-	-	-	-	-	-	-
2025	-	-	-	-	-	-	-	-
2030	-	-	-	-	-	-	-	-
2035	-	-	-	-	-	-	-	-
2040	-	-	-	-	-	-	-	-

TABLE C.18. RPS Succeeds Demand, HIE Only, Lite, No LNG (kb/d)								
Imports	LPG	Naphtha	Gasoline	Jet	Diesel	Fuel Oil	Other	TOTAL
2015	1.4	-	10.9	9.2	1.4	15.7	0.0	38.7
2020	1.6	-	10.1	9.5	-	13.5	-	34.7
2025	1.8	-	5.8	9.8	-	11.6	-	29.0
2030	2.0	-	2.8	10.2	-	7.7	-	22.7
2035	2.2	-	2.2	10.5	-	8.6	-	23.6
2040	2.4	-	1.6	10.9	-	9.6	-	24.5
Exports								
2015	-	0.1	-	-	-	-	-	0.1
2020	-	0.1	-	-	0.4	-	0.3	0.8
2025	-	0.1	-	-	0.7	-	0.5	1.3
2030	-	0.1	-	-	2.0	-	0.9	3.0
2035	-	0.1	-	-	1.3	-	0.8	2.2
2040	-	0.1	-	-	0.7	-	0.6	1.4

Note: StanOps = Standard Operation; Lite = Lighter Crude Slate

TABLE C.19. HCEI Mostly Succeeds Demand, Both Refineries, StanOps, No LNG (kb/d)								
Imports	**LPG**	**Naphtha**	**Gasoline**	**Jet**	**Diesel**	**Fuel Oil**	**Other**	**TOTAL**
2015	1.1	-	-	0.4	-	-	-	1.5
2020	1.3	-	-	0.7	-	-	-	2.0
2025	1.5	-	-	1.0	-	-	-	2.5
2030	1.7	-	-	1.4	-	-	-	3.0
2035	1.9	-	-	1.7	-	-	-	3.6
2040	2.1	-	-	2.1	-	-	-	4.2
Exports								
2015	-	0.1	3.5	-	0.8	4.5	1.7	10.6
2020	-	0.1	5.1	-	2.6	6.7	2.0	16.5
2025	-	0.1	10.0	-	2.9	8.7	2.2	23.9
2030	-	0.1	13.1	-	4.2	12.6	2.6	32.5
2035	-	0.1	14.5	-	3.5	11.6	2.4	32.2
2040	-	0.1	17.2	-	2.9	10.7	2.3	33.1

TABLE C.20. HCEI Mostly Succeeds Demand, Chevron Only, StanOps, No LNG (kb/d)								
Imports	**LPG**	**Naphtha**	**Gasoline**	**Jet**	**Diesel**	**Fuel Oil**	**Other**	**TOTAL**
2015	2.4	2.3	10.6	29.1	11.6	17.7	4.3	78.0
2020	2.5	2.3	9.0	29.4	9.8	15.5	4.0	72.6
2025	2.7	2.3	4.1	29.8	9.5	13.5	3.8	65.7
2030	2.9	2.3	1.0	30.1	8.2	9.7	3.4	57.7
2035	3.1	2.3	-	30.5	8.9	10.6	3.6	59.0
2040	3.3	2.3	-	30.8	9.5	11.5	3.7	61.2
Exports								
2015	-	-	-	-	-	-	-	-
2020	-	-	-	-	-	-	-	-
2025	-	-	-	-	-	-	-	-
2030	-	-	-	-	-	-	-	-
2035	-	-	0.4	-	-	-	-	0.4
2040	-	-	3.1	-	-	-	-	3.1

Note: StanOps = Standard Operation; Lite = Lighter Crude Slate

TABLE C.21. HCEI Mostly Succeeds Demand, HIE Only, StanOps, No LNG (kb/d)								
Imports	**LPG**	**Naphtha**	**Gasoline**	**Jet**	**Diesel**	**Fuel Oil**	**Other**	**TOTAL**
2015	2.3	-	13.4	10.3	7.0	7.0	1.0	40.9
2020	2.4	-	11.8	10.7	5.2	4.8	0.7	35.6
2025	2.6	-	6.8	11.0	4.9	2.8	0.5	28.7
2030	2.8	-	3.8	11.4	3.6	-	0.1	21.6
2035	3.0	-	2.3	11.7	4.3	-	0.2	21.6
2040	3.3	-	-	12.1	4.9	0.9	0.4	21.5
Exports								
2015	-	-	-	-	-	-	-	-
2020	-	-	-	-	-	-	-	-
2025	-	-	-	-	-	-	-	-
2030	-	-	-	-	-	-	-	-
2035	-	-	-	-	-	-	-	-
2040	-	-	-	-	-	-	-	-

TABLE C.22. HCEI Mostly Succeeds Demand, Both Refineries, Lite, No LNG (kb/d)								
Imports	**LPG**	**Naphtha**	**Gasoline**	**Jet**	**Diesel**	**Fuel Oil**	**Other**	**TOTAL**
2015	0.1	-	-	-	-	8.7	-	8.7
2020	0.3	-	-	-	-	6.5	-	6.7
2025	0.4	-	-	-	-	4.5	-	4.9
2030	0.6	-	-	-	-	0.6	-	1.3
2035	0.9	-	-	-	-	1.6	-	2.4
2040	1.1	-	-	-	-	2.5	-	3.6
Exports								
2015	-	0.1	8.0	2.6	7.0	-	3.0	20.7
2020	-	0.1	9.6	2.2	8.7	-	3.3	24.0
2025	-	0.1	14.5	1.9	9.0	-	3.5	29.1
2030	-	0.1	17.6	1.6	10.3	-	3.9	33.5
2035	-	0.1	19.0	1.2	9.6	-	3.8	33.8
2040	-	0.1	21.7	0.9	9.0	-	3.6	35.3

Note: StanOps = Standard Operation; Lite = Lighter Crude Slate

TABLE C.23. HCEI Mostly Succeeds Demand, Chevron Only, Lite, No LNG (kb/d)								
Imports	LPG	Naphtha	Gasoline	Jet	Diesel	Fuel Oil	Other	TOTAL
2015	2.1	2.3	9.0	27.3	11.0	22.2	4.0	78.0
2020	2.3	2.3	7.4	27.7	9.3	20.0	3.6	72.6
2025	2.5	2.3	2.5	28.0	9.0	18.0	3.5	65.7
2030	2.7	2.3	-	28.4	7.7	14.2	3.1	58.3
2035	2.9	2.3	-	28.7	8.4	15.1	3.2	60.6
2040	3.1	2.3	-	29.1	9.0	16.0	3.3	62.9
Exports								
2015	-	-	-	-	-	-	-	-
2020	-	-	-	-	-	-	-	-
2025	-	-	-	-	-	-	-	-
2030	-	-	0.6	-	-	-	-	0.6
2035	-	-	2.0	-	-	-	-	2.0
2040	-	-	4.7	-	-	-	-	4.7

TABLE C.24. HCEI Mostly Succeeds Demand, HIE Only, Lite, No LNG (kb/d)								
Imports	LPG	Naphtha	Gasoline	Jet	Diesel	Fuel Oil	Other	TOTAL
2015	1.4	-	10.5	9.2	1.4	15.7	0.0	38.2
2020	1.6	-	8.9	9.5	-	13.5	-	33.5
2025	1.8	-	3.9	9.8	-	11.6	-	27.1
2030	2.0	-	0.9	10.2	-	7.7	-	20.8
2035	2.2	-	-	10.5	-	8.6	-	21.4
2040	2.4	-	-	10.9	-	9.6	-	22.9
Exports								
2015	-	0.1	-	-	-	-	-	0.1
2020	-	0.1	-	-	0.4	-	0.3	0.8
2025	-	0.1	-	-	0.7	-	0.5	1.3
2030	-	0.1	-	-	2.0	-	0.9	3.0
2035	-	0.1	0.6	-	1.3	-	0.8	2.7
2040	-	0.1	3.2	-	0.7	-	0.6	4.6

Note: StanOps = Standard Operation; Lite = Lighter Crude Slate

TABLE C.25. Business As Usual Demand, Both Refineries, StanOps, LNG (kb/d)								
Imports	LPG	Naphtha	Gasoline	Jet	Diesel	Fuel Oil	Other	TOTAL
2015	1.1	-	-	0.4	-	-	-	1.5
2020	1.3	-	-	0.7	0.1	-	-	2.1
2025	1.5	-	-	1.0	-	-	-	2.5
2030	1.7	-	-	1.4	-	-	-	3.0
2035	1.9	-	-	1.7	-	-	-	3.6
2040	2.1	-	-	2.1	-	-	-	4.2
Exports								
2015	-	0.4	2.8	-	0.7	4.1	1.6	9.7
2020	-	2.4	3.2	-	-	1.6	1.4	8.6
2025	-	2.4	7.3	-	5.4	26.8	3.1	45.0
2030	-	2.4	9.4	-	5.5	26.5	3.1	46.9
2035	-	2.4	9.1	-	5.7	26.3	3.0	46.5
2040	-	2.4	9.5	-	6.1	26.0	3.0	46.9

TABLE C.26. Business As Usual Demand, Chevron Only, StanOps, LNG (kb/d)								
Imports	LPG	Naphtha	Gasoline	Jet	Diesel	Fuel Oil	Other	TOTAL
2015	2.4	2.0	11.3	29.1	11.7	18.1	2.0	76.5
2020	2.5	-	10.9	29.4	12.5	20.6	2.2	78.2
2025	2.7	-	6.8	29.8	7.0	-	0.5	46.8
2030	2.9	-	4.7	30.1	6.9	-	0.5	45.2
2035	3.1	-	5.0	30.5	6.7	-	0.6	45.9
2040	3.3	-	4.6	30.8	6.3	-	0.6	45.8
Exports								
2015	-	-	-	-	-	-	-	-
2020	-	-	-	-	-	-	-	-
2025	-	-	-	-	-	4.6	-	4.6
2030	-	-	-	-	-	4.3	-	4.3
2035	-	-	-	-	-	4.0	-	4.0
2040	-	-	-	-	-	3.8	-	3.8

Note: StanOps = Standard Operation; Lite = Lighter Crude Slate

TABLE C.27. Business As Usual Demand, HIE Only, StanOps, LNG (kb/d)								
Imports	LPG	Naphtha	Gasoline	Jet	Diesel	Fuel Oil	Other	TOTAL
2015	2.3	-	14.0	10.3	7.1	7.5	0.1	41.3
2020	2.4	-	13.6	10.7	7.9	9.9	0.4	45.0
2025	2.6	-	9.6	11.0	2.4	-	-	25.6
2030	2.8	-	7.5	11.4	2.3	-	-	23.9
2035	3.0	-	7.8	11.7	2.1	-	-	24.6
2040	3.3	-	7.4	12.1	1.7	-	-	24.4
Exports								
2015	-	-	-	-	-	-	-	-
2020	-	-	-	-	-	-	-	-
2025	-	-	-	-	-	-	-	-
2030	-	-	-	-	-	-	-	-
2035	-	-	-	-	-	-	-	-
2040	-	-	-	-	-	-	-	-

TABLE C.28. Business As Usual Demand, Both Refineries, Lite, LNG (kb/d)								
Imports	LPG	Naphtha	Gasoline	Jet	Diesel	Fuel Oil	Other	TOTAL
2015	0.1	-	-	-	-	9.1	-	9.2
2020	0.3	-	-	-	-	11.6	-	11.8
2025	0.4	-	-	-	-	-	-	0.4
2030	0.6	-	-	-	-	-	-	0.6
2035	0.9	-	-	-	-	-	-	0.9
2040	1.1	-	-	-	-	-	-	1.1
Exports								
2015	-	0.4	7.3	2.6	6.8	-	3.0	20.1
2020	-	2.4	7.7	2.2	6.0	-	2.7	21.1
2025	-	2.4	11.8	1.9	11.6	13.6	4.4	45.7
2030	-	2.4	13.9	1.6	11.7	13.3	4.4	47.2
2035	-	2.4	13.6	1.2	11.9	13.1	4.4	46.5
2040	-	2.4	14.0	0.9	12.2	12.8	4.3	46.6

Note: StanOps = Standard Operation; Lite = Lighter Crude Slate

TABLE C.29. Business As Usual Demand, Chevron Only, Lite, LNG (kb/d)								
Imports	LPG	Naphtha	Gasoline	Jet	Diesel	Fuel Oil	Other	TOTAL
2015	2.1	2.0	9.7	27.3	11.2	22.6	1.6	76.5
2020	2.3	-	9.3	27.7	12.0	25.1	1.9	78.2
2025	2.5	-	5.2	28.0	6.4	-	0.1	42.3
2030	2.7	-	3.1	28.4	6.3	0.2	0.2	40.9
2035	2.9	-	3.4	28.7	6.1	0.5	0.2	41.9
2040	3.1	-	3.0	29.1	5.8	0.7	0.3	42.0
Exports								
2015	-	-	-	-	-	-	-	-
2020	-	-	-	-	-	-	-	-
2025	-	-	-	-	-	0.1	-	0.1
2030	-	-	-	-	-	-	-	-
2035	-	-	-	-	-	-	-	-
2040	-	-	-	-	-	-	-	-

TABLE C.30. Business As Usual Demand, HIE Only, Lite, LNG (kb/d)								
Imports	LPG	Naphtha	Gasoline	Jet	Diesel	Fuel Oil	Other	TOTAL
2015	1.4	-	11.1	9.2	1.5	16.2	-	39.4
2020	1.6	-	10.7	9.5	2.3	18.6	-	42.8
2025	1.8	-	6.7	9.8	-	-	-	18.3
2030	2.0	-	4.6	10.2	-	-	-	16.8
2035	2.2	-	4.9	10.5	-	-	-	17.6
2040	2.4	-	4.5	10.9	-	-	-	17.8
Exports								
2015	-	0.4	-	-	-	-	0.9	1.3
2020	-	2.4	-	-	-	-	0.6	3.0
2025	-	2.4	-	-	3.2	6.5	2.3	14.5
2030	-	2.4	-	-	3.3	6.3	2.3	14.3
2035	-	2.4	-	-	3.5	6.0	2.3	14.2
2040	-	2.4	-	-	3.9	5.7	2.2	14.2

Note: StanOps = Standard Operation; Lite = Lighter Crude Slate

TABLE C.31. RPS Falls Short Demand, Both Refineries, StanOps, LNG (kb/d)								
Imports	LPG	Naphtha	Gasoline	Jet	Diesel	Fuel Oil	Other	TOTAL
2015	1.1	-	-	0.4	-	-	-	1.5
2020	1.3	-	-	0.7	-	-	-	2.0
2025	1.5	-	-	1.0	-	-	-	2.5
2030	1.7	-	-	1.4	-	-	-	3.0
2035	1.9	-	-	1.7	-	-	-	3.6
2040	2.1	-	-	2.1	-	-	-	4.2
Exports								
2015	-	0.4	3.0	-	0.8	4.5	1.7	10.5
2020	-	2.4	3.9	-	1.2	4.5	1.6	13.6
2025	-	2.4	8.5	-	6.3	27.7	3.2	48.1
2030	-	2.4	11.7	-	6.5	28.0	3.2	51.7
2035	-	2.4	12.6	-	6.7	27.9	3.2	52.8
2040	-	2.4	14.2	-	7.0	27.8	3.2	54.6

TABLE C.32. RPS Falls Short Demand, Chevron Only, StanOps, LNG (kb/d)								
Imports	LPG	Naphtha	Gasoline	Jet	Diesel	Fuel Oil	Other	TOTAL
2015	2.4	2.0	11.1	29.1	11.6	17.7	4.3	78.1
2020	2.5	-	10.2	29.4	11.2	17.7	4.4	75.5
2025	2.7	-	5.6	29.8	6.1	-	2.8	47.1
2030	2.9	-	2.4	30.1	5.9	-	2.8	44.2
2035	3.1	-	1.5	30.5	5.7	-	2.8	43.6
2040	3.3	-	-	30.8	5.4	-	2.8	42.4
Exports								
2015	-	-	-	-	-	-	-	-
2020	-	-	-	-	-	-	-	-
2025	-	-	-	-	-	5.5	-	5.5
2030	-	-	-	-	-	5.8	-	5.8
2035	-	-	-	-	-	5.7	-	5.7
2040	-	-	0.1	-	-	5.6	-	5.7

Note: StanOps = Standard Operation; Lite = Lighter Crude Slate

TABLE C.33. RPS Falls Short Demand, HIE Only, StanOps, LNG (kb/d)								
Imports	LPG	Naphtha	Gasoline	Jet	Diesel	Fuel Oil	Other	TOTAL
2015	2.3	-	13.8	10.3	7.0	7.0	1.0	41.4
2020	2.4	-	13.0	10.7	6.5	7.0	1.0	40.7
2025	2.6	-	8.3	11.0	1.5	-	-	23.5
2030	2.8	-	5.2	11.4	1.3	-	-	20.7
2035	3.0	-	4.2	11.7	1.1	-	-	20.1
2040	3.3	-	2.7	12.1	0.8	-	-	18.8
Exports								
2015	-	-	-	-	-	-	-	-
2020	-	-	-	-	-	-	-	-
2025	-	-	-	-	-	-	-	-
2030	-	-	-	-	-	-	-	-
2035	-	-	-	-	-	-	-	-
2040	-	-	-	-	-	-	-	-

TABLE C.34. RPS Falls Short Demand, Both Refineries, Lite, LNG (kb/d)								
Imports	LPG	Naphtha	Gasoline	Jet	Diesel	Fuel Oil	Other	TOTAL
2015	0.1	-	-	-	-	8.7	-	8.7
2020	0.3	-	-	-	-	8.7	-	8.9
2025	0.4	-	-	-	-	-	-	0.4
2030	0.6	-	-	-	-	-	-	0.6
2035	0.9	-	-	-	-	-	-	0.9
2040	1.1	-	-	-	-	-	-	1.1
Exports								
2015	-	0.4	7.5	2.6	7.0	-	3.0	20.5
2020	-	2.4	8.4	2.2	7.4	-	2.9	23.4
2025	-	2.4	13.0	1.9	12.4	14.5	4.5	48.8
2030	-	2.4	16.2	1.6	12.6	14.8	4.5	52.1
2035	-	2.4	17.1	1.2	12.8	14.7	4.5	52.8
2040	-	2.4	18.7	0.9	13.2	14.6	4.5	54.2

Note: StanOps = Standard Operation; Lite = Lighter Crude Slate

TABLE C.35. RPS Falls Short Demand, Chevron Only, Lite, LNG (kb/d)								
Imports	LPG	Naphtha	Gasoline	Jet	Diesel	Fuel Oil	Other	TOTAL
2015	2.1	2.0	9.5	27.3	11.0	22.2	4.0	78.1
2020	2.3	-	8.6	27.7	10.6	22.2	4.0	75.5
2025	2.5	-	4.0	28.0	5.6	-	2.5	42.6
2030	2.7	-	0.8	28.4	5.4	-	2.5	39.7
2035	2.9	-	-	28.7	5.2	-	2.5	39.3
2040	3.1	-	-	29.1	4.8	-	2.5	39.5
Exports								
2015	-	-	-	-	-	-	-	-
2020	-	-	-	-	-	-	-	-
2025	-	-	-	-	-	1.0	-	1.0
2030	-	-	-	-	-	1.3	-	1.3
2035	-	-	0.1	-	-	1.2	-	1.3
2040	-	-	1.7	-	-	1.1	-	2.8

TABLE C.36. RPS Falls Short Demand, HIE Only, Lite, LNG (kb/d)								
Imports	LPG	Naphtha	Gasoline	Jet	Diesel	Fuel Oil	Other	TOTAL
2015	1.4	-	10.9	9.2	1.4	15.7	0.0	38.7
2020	1.6	-	10.1	9.5	1.0	15.8	0.1	38.0
2025	1.8	-	5.4	9.8	-	-	-	17.1
2030	2.0	-	2.3	10.2	-	-	-	14.4
2035	2.2	-	1.3	10.5	-	-	-	14.1
2040	2.4	-	-	10.9	-	-	-	13.3
Exports								
2015	-	0.4	-	-	-	-	-	0.4
2020	-	2.4	-	-	-	-	-	2.4
2025	-	2.4	-	-	4.1	7.4	1.5	15.4
2030	-	2.4	-	-	4.3	7.7	1.5	15.9
2035	-	2.4	-	-	4.5	7.6	1.5	16.0
2040	-	2.4	0.2	-	4.8	7.5	1.5	16.5

Note: StanOps = Standard Operation; Lite = Lighter Crude Slate

TABLE C.37. RPS Succeeds Demand, Both Refineries, StanOps, LNG (kb/d)								
Imports	LPG	Naphtha	Gasoline	Jet	Diesel	Fuel Oil	Other	TOTAL
2015	1.1	-	-	0.4	-	-	-	1.5
2020	1.3	-	-	0.7	-	-	-	2.0
2025	1.5	-	-	1.0	-	-	-	2.5
2030	1.7	-	-	1.4	-	-	-	3.0
2035	1.9	-	-	1.7	-	-	-	3.6
2040	2.1	-	-	2.1	-	-	-	4.2
Exports								
2015	-	0.4	3.0	-	0.8	4.5	1.7	10.5
2020	-	2.4	3.9	-	2.6	6.7	2.0	17.6
2025	-	2.4	8.5	-	6.5	28.2	3.3	48.9
2030	-	2.4	11.7	-	6.9	28.7	3.3	53.1
2035	-	2.4	12.6	-	7.1	28.6	3.3	54.0
2040	-	2.4	14.2	-	7.4	28.5	3.3	55.7

TABLE C.38. RPS Succeeds Demand, Chevron Only, StanOps, LNG (kb/d)								
Imports	LPG	Naphtha	Gasoline	Jet	Diesel	Fuel Oil	Other	TOTAL
2015	2.4	2.0	11.1	29.1	11.6	17.7	4.3	78.1
2020	2.5	-	10.2	29.4	9.8	15.5	4.0	71.5
2025	2.7	-	5.6	29.8	5.9	-	2.7	46.7
2030	2.9	-	2.4	30.1	5.5	-	2.7	43.6
2035	3.1	-	1.5	30.5	5.3	-	2.7	43.1
2040	3.3	-	-	30.8	5.0	-	2.7	41.9
Exports								
2015	-	-	-	-	-	-	-	-
2020	-	-	-	-	-	-	-	-
2025	-	-	-	-	-	5.9	-	5.9
2030	-	-	-	-	-	6.5	-	6.5
2035	-	-	-	-	-	6.4	-	6.4
2040	-	-	0.1	-	-	6.2	-	6.3

Note: StanOps = Standard Operation; Lite = Lighter Crude Slate

TABLE C.39. RPS Succeeds Demand, HIE Only, StanOps, LNG (kb/d)								
Imports	LPG	Naphtha	Gasoline	Jet	Diesel	Fuel Oil	Other	TOTAL
2015	2.3	-	13.8	10.3	7.0	7.0	1.0	41.4
2020	2.4	-	13.0	10.7	5.2	4.8	0.7	36.8
2025	2.6	-	8.3	11.0	1.3	-	-	23.2
2030	2.8	-	5.2	11.4	0.9	-	-	20.2
2035	3.0	-	4.2	11.7	0.7	-	-	19.6
2040	3.3	-	2.7	12.1	0.4	-	-	18.4
Exports								
2015	-	-	-	-	-	-	-	-
2020	-	-	-	-	-	-	-	-
2025	-	-	-	-	-	-	-	-
2030	-	-	-	-	-	-	-	-
2035	-	-	-	-	-	-	-	-
2040	-	-	-	-	-	-	-	-

TABLE C.40. RPS Succeeds Demand, Both Refineries, Lite, LNG (kb/d)								
Imports	LPG	Naphtha	Gasoline	Jet	Diesel	Fuel Oil	Other	TOTAL
2015	0.1	-	-	-	-	8.7	-	8.7
2020	0.3	-	-	-	-	6.5	-	6.7
2025	0.4	-	-	-	-	-	-	0.4
2030	0.6	-	-	-	-	-	-	0.6
2035	0.9	-	-	-	-	-	-	0.9
2040	1.1	-	-	-	-	-	-	1.1
Exports								
2015	-	0.4	7.5	2.6	7.0	-	3.0	20.5
2020	-	2.4	8.4	2.2	8.7	-	3.3	25.1
2025	-	2.4	13.0	1.9	12.7	15.0	4.6	49.5
2030	-	2.4	16.2	1.6	13.1	15.5	4.6	53.4
2035	-	2.4	17.1	1.2	13.2	15.4	4.6	54.0
2040	-	2.4	18.7	0.9	13.6	15.3	4.6	55.4

Note: StanOps = Standard Operation; Lite = Lighter Crude Slate

TABLE C.41. RPS Succeeds Demand, Chevron Only, Lite, LNG (kb/d)								
Imports	LPG	Naphtha	Gasoline	Jet	Diesel	Fuel Oil	Other	TOTAL
2015	2.1	2.0	9.5	27.3	11.0	22.2	4.0	78.1
2020	2.3	-	8.6	27.7	9.3	20.0	3.6	71.5
2025	2.5	-	4.0	28.0	5.3	-	2.4	42.2
2030	2.7	-	0.8	28.4	4.9	-	2.3	39.1
2035	2.9	-	-	28.7	4.8	-	2.3	38.7
2040	3.1	-	-	29.1	4.4	-	2.4	39.0
Exports								
2015	-	-	-	-	-	-	-	-
2020	-	-	-	-	-	-	-	-
2025	-	-	-	-	-	1.4	-	1.4
2030	-	-	-	-	-	2.0	-	2.0
2035	-	-	0.1	-	-	1.9	-	2.0
2040	-	-	1.7	-	-	1.7	-	3.4

TABLE C.42. RPS Succeeds Demand, HIE Only, Lite, LNG (kb/d)								
Imports	LPG	Naphtha	Gasoline	Jet	Diesel	Fuel Oil	Other	TOTAL
2015	1.4	-	10.9	9.2	1.4	15.7	0.0	38.7
2020	1.6	-	10.1	9.5	-	13.5	-	34.7
2025	1.8	-	5.4	9.8	-	-	-	17.1
2030	2.0	-	2.3	10.2	-	-	-	14.4
2035	2.2	-	1.3	10.5	-	-	-	14.1
2040	2.4	-	-	10.9	-	-	-	13.3
Exports								
2015	-	0.4	-	-	-	-	-	0.4
2020	-	2.4	-	-	0.4	-	0.3	3.1
2025	-	2.4	-	-	4.3	7.9	1.6	16.2
2030	-	2.4	-	-	4.7	8.5	1.6	17.2
2035	-	2.4	-	-	4.9	8.3	1.6	17.3
2040	-	2.4	0.2	-	5.2	8.2	1.6	17.6

Note: StanOps = Standard Operation; Lite = Lighter Crude Slate

TABLE C.43. HCEI Mostly Succeeds Demand, Both Refineries, StanOps, LNG (kb/d)								
Imports	LPG	Naphtha	Gasoline	Jet	Diesel	Fuel Oil	Other	TOTAL
2015	1.1	-	-	0.4	-	-	-	1.5
2020	1.3	-	-	0.7	-	-	-	2.0
2025	1.5	-	-	1.0	-	-	-	2.5
2030	1.7	-	-	1.4	-	-	-	3.0
2035	1.9	-	-	1.7	-	-	-	3.6
2040	2.1	-	-	2.1	-	-	-	4.2
Exports								
2015	-	0.4	3.5	-	0.8	4.5	1.7	11.0
2020	-	2.4	5.1	-	2.6	6.7	2.0	18.8
2025	-	2.4	10.3	-	6.5	28.2	3.3	50.7
2030	-	2.4	13.6	-	6.9	28.7	3.3	55.0
2035	-	2.4	15.3	-	7.1	28.6	3.3	56.7
2040	-	2.4	18.5	-	7.4	28.5	3.3	60.1

TABLE C.44. HCEI Mostly Succeeds Demand, Chevron Only, StanOps, LNG (kb/d)								
Imports	LPG	Naphtha	Gasoline	Jet	Diesel	Fuel Oil	Other	TOTAL
2015	2.4	2.0	10.6	29.1	11.6	17.7	4.3	77.6
2020	2.5	-	9.0	29.4	9.8	15.5	4.0	70.3
2025	2.7	-	3.8	29.8	5.9	-	2.7	44.9
2030	2.9	-	0.5	30.1	5.5	-	2.7	41.7
2035	3.1	-	-	30.5	5.3	-	2.7	41.6
2040	3.3	-	-	30.8	5.0	-	2.7	41.9
Exports								
2015	-	-	-	-	-	-	-	-
2020	-	-	-	-	-	-	-	-
2025	-	-	-	-	-	5.9	-	5.9
2030	-	-	-	-	-	6.5	-	6.5
2035	-	-	1.2	-	-	6.4	-	7.6
2040	-	-	4.4	-	-	6.2	-	10.6

Note: StanOps = Standard Operation; Lite = Lighter Crude Slate

TABLE C.45. HCEI Mostly Succeeds Demand, HIE Only, StanOps, LNG (kb/d)								
Imports	LPG	Naphtha	Gasoline	Jet	Diesel	Fuel Oil	Other	TOTAL
2015	2.3	-	13.4	10.3	7.0	7.0	1.0	40.9
2020	2.4	-	11.8	10.7	5.2	4.8	0.7	35.6
2025	2.6	-	6.5	11.0	1.3	-	-	21.4
2030	2.8	-	3.2	11.4	0.9	-	-	18.3
2035	3.0	-	1.5	11.7	0.7	-	-	17.0
2040	3.3	-	-	12.1	0.4	-	-	15.7
Exports								
2015	-	-	-	-	-	-	-	-
2020	-	-	-	-	-	-	-	-
2025	-	-	-	-	-	-	-	-
2030	-	-	-	-	-	-	-	-
2035	-	-	-	-	-	-	-	-
2040	-	-	-	-	-	-	-	-

TABLE C.46. HCEI Mostly Succeeds Demand, Both Refineries, Lite, LNG (kb/d)								
Imports	LPG	Naphtha	Gasoline	Jet	Diesel	Fuel Oil	Other	TOTAL
2015	0.1	-	-	-	-	8.7	-	8.7
2020	0.3	-	-	-	-	6.5	-	6.7
2025	0.4	-	-	-	-	-	-	0.4
2030	0.6	-	-	-	-	-	-	0.6
2035	0.9	-	-	-	-	-	-	0.9
2040	1.1	-	-	-	-	-	-	1.1
Exports								
2015	-	0.4	8.0	2.6	7.0	-	3.0	21.0
2020	-	2.4	9.6	2.2	8.7	-	3.3	26.3
2025	-	2.4	14.8	1.9	12.7	15.0	4.6	51.4
2030	-	2.4	18.1	1.6	13.1	15.5	4.6	55.3
2035	-	2.4	19.8	1.2	13.2	15.4	4.6	56.7
2040	-	2.4	23.0	0.9	13.6	15.3	4.6	59.7

Note: StanOps = Standard Operation; Lite = Lighter Crude Slate

	TABLE C.47. HCEI Mostly Succeeds Demand, Chevron Only, Lite, LNG (kb/d)							
Imports	**LPG**	**Naphtha**	**Gasoline**	**Jet**	**Diesel**	**Fuel Oil**	**Other**	**TOTAL**
2015	2.1	2.0	9.0	27.3	11.0	22.2	4.0	77.6
2020	2.3	-	7.4	27.7	9.3	20.0	3.6	70.3
2025	2.5	-	2.2	28.0	5.3	-	2.4	40.4
2030	2.7	-	-	28.4	4.9	-	2.3	38.3
2035	2.9	-	-	28.7	4.8	-	2.3	38.7
2040	3.1	-	-	29.1	4.4	-	2.4	39.0
Exports								
2015	-	-	-	-	-	-	-	-
2020	-	-	-	-	-	-	-	-
2025	-	-	-	-	-	1.4	-	1.4
2030	-	-	1.1	-	-	2.0	-	3.1
2035	-	-	2.8	-	-	1.9	-	4.7
2040	-	-	6.0	-	-	1.7	-	7.8

	TABLE C.48. HCEI Mostly Succeeds Demand, HIE Only, Lite, LNG (kb/d)							
Imports	**LPG**	**Naphtha**	**Gasoline**	**Jet**	**Diesel**	**Fuel Oil**	**Other**	**TOTAL**
2015	1.4	-	10.5	9.2	1.4	15.7	0.0	38.2
2020	1.6	-	8.9	9.5	-	13.5	-	33.5
2025	1.8	-	3.6	9.8	-	-	-	15.3
2030	2.0	-	0.3	10.2	-	-	-	12.5
2035	2.2	-	-	10.5	-	-	-	12.8
2040	2.4	-	-	10.9	-	-	-	13.3
Exports								
2015	-	0.4	-	-	-	-	-	0.4
2020	-	2.4	-	-	0.4	-	0.3	3.1
2025	-	2.4	-	-	4.3	7.9	1.6	16.2
2030	-	2.4	-	-	4.7	8.5	1.6	17.2
2035	-	2.4	1.4	-	4.9	8.3	1.6	18.6
2040	-	2.4	4.6	-	5.2	8.2	1.6	22.0

Note: StanOps = Standard Operation; Lite = Lighter Crude Slate

Appendix H
Fuel Forecast Report
(Amergent Techs)

Summary

Although the future demand for liquid bulk petroleum products in Hawaii is forecasted to decline by 2030, the demand for waterborne movements of liquid bulk petroleum products in and out of Hawaii between 2015 and 2040 is forecasted to increase, resulting in an increase in the number of ships calling KBPH. The primary reason for the increase in ship activity at the fuel pier over the forecast period is that any decreases in fuel oil demand from the power generation sector, whether from conservation or replacement fuels, ultimately results in excess local fuel oil supply from the refineries. With no local market, this excess fuel oil needs to be exported by ship or barge to other markets through KBPH facilities. In other cases, such as one or both of Hawaii's refineries closing, it would be necessary to bring in large volumes of liquid bulk commodities such as jet fuel, diesel and gasoline through the waterfront facilities at KBPH to meet Hawaii demand.

Based on the four cases outlined in the Facts Global Energy (FGE) report *Fuels Market in Hawaii: Current Situation and Future Prospects* (both refineries operating, no refineries operating, Chevron only and Hawaii Independent Energy only) and the eight scenarios within each case, this analysis quantifies the kilo barrel per day (kb/d) impact on KBPH and the associated ship activity for the time frames 2015, 2020, 2025, 2030, 2035 and 2040. As each scenario results in a different volume outcome; the resulting increase in the number of ships varies from two to thirteen per month, in the cases with both or just one of the refineries operating. In the case where no refineries are operating and all product demand is met through imports, the number of additional monthly ship calls ranges from 16-18 per month. However, in the no refinery case, there would be no crude oil coming in through the off-shore mooring system. Therefore it is reasonable to consider the off-shore system might be utilized for product imports and significantly reducing the impact on the KBPH fuel pier.

Methodology

This purpose of this analysis is to forecast the fuel pier ship activity at KBPH in the years 2015, 2020, 2025, 2030, 2035 and 2040. The Facts Global Energy (FGE) report *Fuels Market in Hawaii: Current Situation and Future Prospects* was used as a basis for this analysis, specifically, *Section 2.6., Implications for Product Imports,* which also includes inferred product exports. This data was used to derive the incremental impacts to KBPH and to quantify the resulting increases in ship activity.

The four cases presented in the FGE report: both refineries operating, no refineries operating, Chevron only and Hawaii Independent Energy (HIE) only were analyzed from a KBPH perspective and the incremental impacts calculated. Additionally, each case included the eight scenarios from the FGE report: Business as usual (BAU), Renewable Portfolio Standard (RPS) falls short, RPS succeeds and Hawaii Clean Energy Initiative (HCEI) mostly succeeds, with and without LNG. The results were then presented as the number and frequency of incremental ships that would be required in each case.

In the case of both refineries operating, the volumes of imports as presented in the FGE report on page 79 were used for each scenario. Export volumes were obtained from the FGE report, page 80, *Figure 51. Inferred Product Exports, 'both refineries', kb/d.* These were added together to provide a total incremental volume for KBPH. In the case of no refineries operating, the volumes of imports as presented in the FGE report on page 79 were used for each scenario, less the current total imports of product. Export volumes were assumed to be zero for this case. In the case of one or the other refineries operating, the volumes of imports as presented in the FGE report on page 79 were used for each scenario, less the current total imports of product. Export volumes were obtained from the FGE report, page 80, *Figure 51. Inferred Product Exports, 'both refineries', kb/d* but the export volumes were attributed to each refineries based on a percentage of their output volumes. Import and export volumes were added together to provide a total incremental volume for KBPH.

From the volume information calculated for each five year period: 2015, 2020, 2025, 2030, 2035 and 2040, the number and frequency of ships was then calculated based on 10 kb/d equaling an additional 50,000 DWT ship/month. However, due to draft restrictions, a 50,000 DWT can only bring in 7 kb/day. Therefore, an additional adjustment was made to account for the smaller amount of cargo that can be brought into KBPH on this size ship at the current draft of 36 ft.

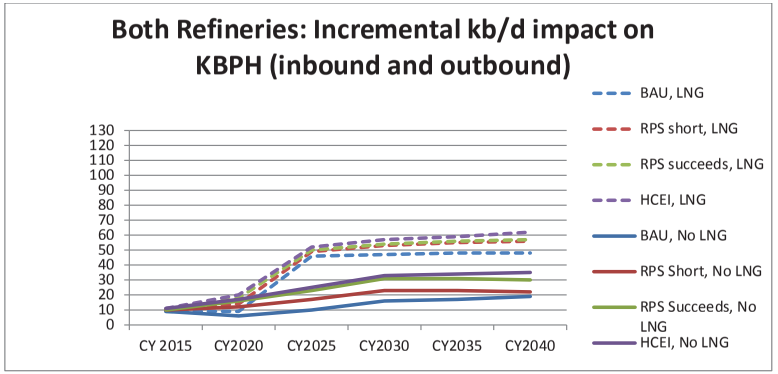
Other information obtained from the FGE report and used in this analysis includes current Hawaii import volumes, refinery output volumes, and general information about the refining process. Current throughput for KBPH was calculated using volumes provided by the Harbor Department for FY2012 (56 kb/d). Additionally, to keep this analysis within the project scope, certain assumptions were used:

- KBPH will absorb any increases in inbound or outbound waterborne petroleum activity. Honolulu activity will be held constant for this analysis.
- Any changes in crude oil volumes through the off-shore moorings will not impact the fuel pier except possibly in the no refineries operating case.
- Current shoreside storage/pipeline infrastructure is sufficient.
- Asphalt will not be considered as part of this analysis.
- Increases/decreases in jet, diesel ethanol and gasoline have been accounted for in the data set used for this analysis.
- Neighbor island demand is accounted for in the data set used for this analysis.
- LPG imports, although reported as likely to grow in the FGE report, are not included in this analysis.
- Bunkering impacts due to increases in ship traffic are not included in this analysis.

Both Refineries Operating:

The incremental kb/d impact on KBPH above the current 56 kb/d for all scenarios (capturing both inbound and outbound movements) with both refineries continuing to operate out to 2040 is illustrated in the graph below. For the no LNG case, in the scenarios where RPS and HCEI succeed, there is a gradual increase in volume from about 10 kb/d in 2015 until about 2030 where it remains relatively steady between 30 and 35 kb/d through 2040. In the cases of BAU and RPS falls short, the trend is similar, but at a smaller volume level. The increase between 2015 and 2040 is primarily due to exports of the excess fuel oil that is produced but not used in Hawaii.

With the introduction of LNG, the graph illustrates a steeper climb between 2020 and 2025 due to the more rapid displacement of fuel oil as an energy source for the power generation sector and the resulting exports out of KBPH. This levels off for the BAU, LNG case, but continues to rise slightly in the other scenarios as exports of fuel oil continue to grow out through 2040.



Both Refineries Operating, Fuel Pier Activity Impacts:

The following table reflects the additional number of 50,000 DWT ships that would be needed each month at KBPH, at current 36 ft draft conditions, (covering all eight of the scenarios) with both refineries continuing to operate.

Both Refineries: incremental monthly ship counts at KBPH @ 36 ft draft

	CY 2015	CY2020	CY2025	CY2030	CY2035	CY2040
Without LNG	2	1-3	2-4	3-5	3-5	3-5
With LNG	2	2-3	7-8	7-9	7-9	7-9

The following table reflects the additional number of 50,000 DWT ships that would be needed each month at KBPH, at potential future dredged draft conditions of 42 ft, (covering all eight of the scenarios) with both refineries continuing to operate.

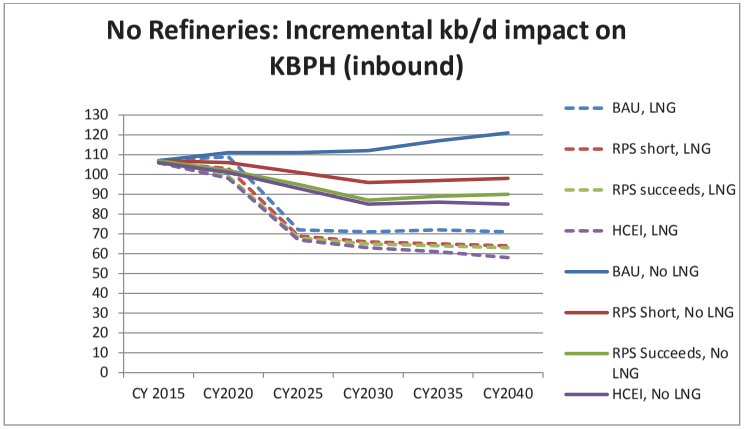
Both Refineries: incremental monthly ship counts at KBPH @ 42 ft draft

	CY 2015	CY2020	CY2025	CY2030	CY2035	CY2040
Without LNG	1	1-2	2-3	2-3	3-4	2-4
With LNG	1	1-2	5	5-6	5-6	5-6

No Refineries Operating:

The incremental kb/d impact on KBPH above the current 56 kb/d for all scenarios with neither refinery continuing to operate out to 2040 is illustrated in the graph below. With both refineries closing, all of Hawaii's liquid bulk energy would need to be imported. With or without the introduction of LNG, this would result in an immediate jump in import volume of approximately 105 kb/d. For the no LNG case, volumes would gradually decrease between 2020 and 2030 in all scenarios except the BAU, No LNG. After 2030, volumes would rise in all cases as energy demand overcomes the conservation efforts. The BAU, No LNG case rise is somewhat steeper as there are no additional conservation elements.

With LNG, the decline would be steeper between 2020 and 2025 when the commodity is introduced, leveling off for the BAU scenario, but continuing to decrease in the other scenarios. Without LNG, with the exception of the BAU scenario, the incremental volume through KBPH would be between 85 and 100 kb/d. With LNG it is lower, between 60 – 70 kb/d.



No Refineries Operating, Fuel Pier Activity Impacts:

The following table reflects the additional number of 50,000 DWT ships that would be needed each month at KBPH, at current 36 ft draft conditions, (covering all eight of the scenarios) with no refineries operating. However, in the no refinery case, there would be no crude oil coming in through the off-shore mooring system. Therefore it is reasonable to consider the off-shore system might be utilized for some or all of the product imports, significantly reducing the impact on the KBPH as they would not have the complexities of conducting line displacements and the potential for cargo contamination that comes with switching between crude oil and clean products.

No Refineries: incremental monthly ship counts at KBPH @ 36 ft draft

	CY 2015	CY2020	CY2025	CY2030	CY2035	CY2040
Without LNG	16	15-16	14-16	13-16	13-17	13-18
With LNG	16	14-16	10-11	9-11	9-11	9-11

The following table reflects the additional number of 50,000 DWT ships that would be needed each month at KBPH, at potential future dredged draft conditions of 42 ft, (covering all eight of the scenarios) with no refineries operating. As stated before, if both refineries are closed, there will be no movement of crude oil through the off-shore moorings allowing for some or all of the inbound product volume to be brought in from off-shore, significantly decreasing the activity on the fuel pier below what is shown in the table.

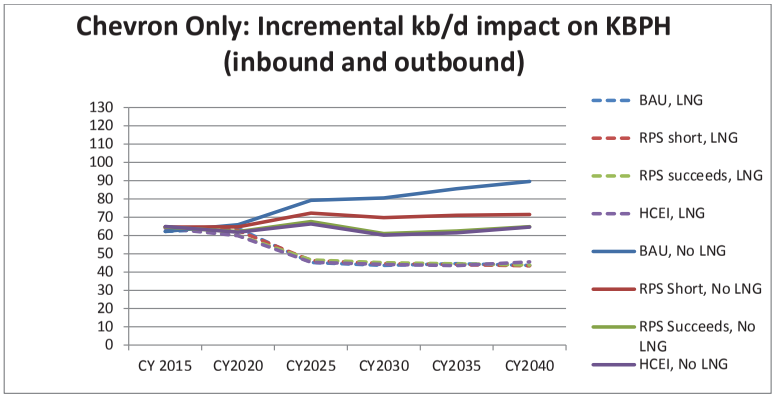
No Refineries: incremental monthly ship counts at KBPH @ 42ft draft

	CY 2015	CY2020	CY2025	CY2030	CY2035	CY2040
Without LNG	11	10-11	9-11	9-11	9-12	9-12
With LNG	11	10-11	7	6-7	6-7	6-7

Chevron Refinery Only:

In the case where one refinery chooses to close and the other continues to operate, the KBPH impact would include an increase in imported products to meet the local demand as well as an increase in exports of refinery produced fuel oil in excess of local demand. As the Chevron refinery is smaller than HIE, the import impact is larger, and the export impact smaller.

With only the Chevron refinery operating, the incremental volume impact on KBPH would jump immediately by approximately 65 kb/d in all scenarios. In the case of no LNG, there would be a moderate rise between 202O and 2025, becoming somewhat stable after 2025 within a 10 kb/d band for all scenarios other than BAU. With the introduction of LNG, the impact is about the same until 2020, with a decrease of about 15 kb/d occurring between 2020 and 2025, leveling off out until 2040.



Chevron Only Operating, Fuel Pier Activity Impacts:

The following table reflects the additional number of 50,000 DWT ships that would be needed each month at KBPH at current 36 ft draft conditions (covering all eight of the scenarios) in the case that Chevron is the only refinery that continues to operate.

Chevron Only: incremental monthly ship counts at KBPH @ 36 ft draft

	CY 2015	CY2020	CY2025	CY2030	CY2035	CY2040
Without LNG	9-10	9-10	10-12	9-12	9-13	10-13
With LNG	9-10	9-10	7	7	7	7

The following table reflects the additional number of 50,000 DWT ships that would be needed each month at KBPH, at potential future dredged draft conditions of 42 ft, (covering all eight of the scenarios) in the case that Chevron is the only refinery that continues to operate.

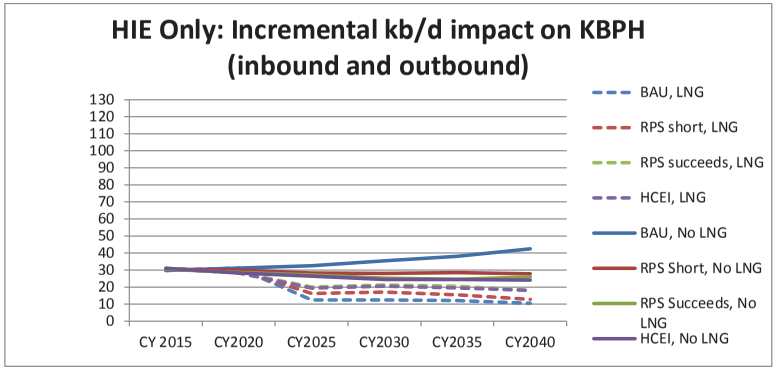
Chevron Only: incremental monthly ship counts at KBPH @ 42ft draft

	CY 2015	CY2020	CY2025	CY2030	CY2035	CY2040
Without LNG	6	6-7	7-8	6-8	6-9	6-9
With LNG	6	6	5	4-5	4	4-5

Hawaii Independent Energy (HIE) Refinery Only:

With only the HIE refinery operating, the incremental volume impact on KBPH would be approximately 30 kb/d in all scenarios. In the BAU, No LNG scenario, there would be a moderate rise between 202O and 2040 of slightly over 10 kb/d. In the other no LNG scenarios, volumes remain quite stable with a slight decline in the RPS and HCEI succeeds scenarios.

With the introduction of LNG, the impact is about the same until 2020, with a decrease between 15 and 20 kb/d occurring between 2020 and 2025 and basically leveling off out until 2040.



Hawaii Independent Energy (HIE) Only Operating, Fuel Pier Activity Impacts:

The following table reflects the additional number of 50,000 DWT ships that would be needed each month at KBPH, at current 36 ft draft conditions, (covering all eight of the scenarios) in the case that HIE is the only refinery that continues to operate.

HIE Only: incremental monthly ship counts at KBPH @ 36 ft draft

	CY 2015	CY2020	CY2025	CY2030	CY2035	CY2040
Without LNG	5	4-5	4-5	4-5	4-6	4-6
With LNG	5	3-5	2-3	2-3	2-3	2-3

The following table reflects the additional number of 50,000 DWT ships that would be needed each month at KBPH, at potential future dredged draft conditions of 42 ft, (covering all eight of the scenarios) in the case that HIE is the only refinery that continues to operate.

HIE Only: incremental monthly ship counts at KBPH @ 42ft draft

	CY 2015	CY2020	CY2025	CY2030	CY2035	CY2040
Without LNG	3	3	3	2-4	2-4	2-4
With LNG	3	3	1-2	1-2	1-2	1-2

Appendices:

Appendix A: KBPH Water Movements FY 2012 (bbls)

KBPH Water Movements		
FY 2012 (bbls) 411 days	bbls	Kb/d
Diesel	**4,676,190.80**	**11.38**
(Barge Inter-Island)	2,608,611.10	**6.35**
(Tank Ship Overseas)	2,067,579.70	**5.03**
Fuel Oil	**2,521,769.50**	**6.14**
(Barge Inter-Island)	2,027,731.00	**4.93**
(Tank Ship Overseas)	494,038.50	**1.20**
Gasoline	**2,417,837.30**	**5.88**
(Barge Inter-Island)	2,356,358.30	**5.73**
(Tank Ship Overseas)	61,479.00	**0.15**
Jet Fuel	**1,851,321.00**	**4.50**
(Barge Inter-Island)	1,811,293.00	**4.41**
(Tank Ship Overseas)	40,028.00	**0.10**
Total	***11,467,118.60***	***55.80***

Source: Harbor Department

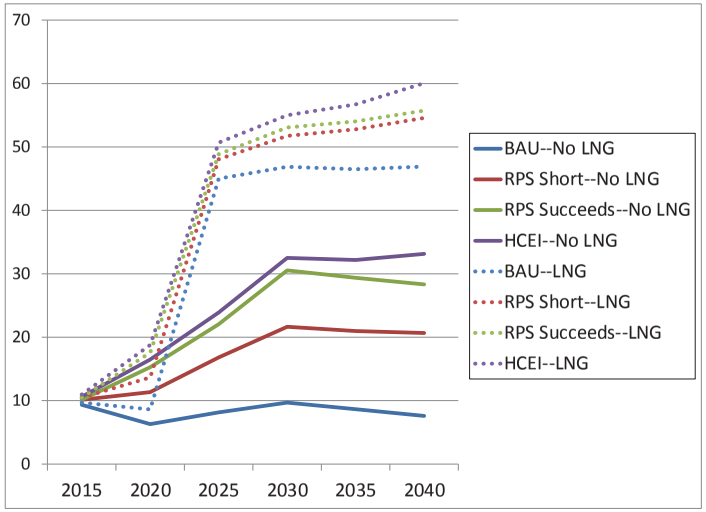
Appendix B: Product Import Scenarios (Typical Output Slates), (kb/d)

Product Imports--No LNG				
	BOTH REFINERIES	CHEVRON ONLY	TESORO ONLY	NO REFINERIES
Business-As-Usual LNG Imports				
2015	0	74	39	122
2020	1	78	43	126
2025	3	78	43	126
2030	6	79	44	127
2035	9	84	48	132
2040	12	88	53	136
RPS Falls Short--LNG Imports				
2015	0	76	39	122
2020	1	75	38	121
2025	1	70	33	116
2030	1	66	29	111
2035	2	67	30	112
2040	2	67	30	113
RPS Succeeds--LNG Imports				
2015	0	76	39	122
2020	1	71	34	117
2025	1	65	28	110
2030	1	57	21	102
2035	2	58	21	104
2040	2	60	23	105
HCEI Mostly Succeeds--LNG Imports				
2015	0	76	39	121
2020	1	70	33	116
2025	1	63	26	108
2030	1	55	19	100
2035	2	56	19	101
2040	2	58	18	100

Product Imports--LNG Imports				
	BOTH REFINERIES	CHEVRON ONLY	TESORO ONLY	NO REFINERIES
Business-As-Usual LNG Imports				
2015	0	74	39	122
2020	1	76	43	124
2025	1	44	23	87
2030	1	42	21	86
2035	2	43	22	87
2040	2	42	21	86
RPS Falls Short--LNG Imports				
2015	0	76	39	121
2020	1	73	38	118
2025	1	44	21	84
2030	1	41	18	81
2035	2	40	17	80
2040	2	39	15	79
RPS Succeeds--LNG Imports				
2015	0	76	39	121
2020	1	69	34	114
2025	1	44	21	83
2030	1	41	17	80
2035	2	40	17	79
2040	2	39	15	78
HCEI Mostly Succeeds--LNG Imports				
2015	0	75	39	121
2020	1	68	33	113
2025	1	42	19	82
2030	1	39	15	78
2035	2	38	14	76
2040	2	39	12	73

Source: Facts Global Energy (FGE) report Fuels Market in Hawaii: Current Situation and Future Prospects, page 79

Appendix C: Inferred Product Exports, 'both refineries', (kb/d)



Source: Facts Global Energy (FGE) report Fuels Market in Hawaii: Current Situation and Future Prospects, page 80

Appendix I
Stakeholder Meeting Notes

STATE DEPARTMENT OF TRANSPORTATION
HARBORS DIVISION
79 South Nimitz Highway • Honolulu, HI 96813

KALAELOA HARBOR 2040 MASTER PLAN

Notes from Planning Workshop #1
July 18, 2013

The meeting was opened up by Carter Luke and Randy Grune of Department of Transportation, Harbors Division (DOT-H), and Jeff Overton of Group 70. Jeff presented the powerpoint presentation on existing conditions and known issues. The presentation is posted on the following website: http://kalaeloaharbor2040.com. Meeting participants were given the opportunity towards the end of the presentation to comment and ask questions.

Below are the various topics covered and comments made by attendees. DOT-H and Group 70 comments and/or responses where included are *italicized.*

Goals

Be Realistic and Achievable

- *DOT-H would like to stress that this is a user group-directed process and plan, not a State-directed plan. This is an opportunity for the stakeholders to present their thoughts and tell us what would be the most preferable for their operations. From this information, we can then make assessments to obtain a realistic plan.*

Be Flexible to Meet Future Needs

- Need to be flexible in the fuel trending demand forecast, which will affect the volume of products coming into the harbor facility.
- Consider both dry and liquid bulk uses (no restrictions) for the land area, and consider safety areas in the plan, so that lessees will already have this information. Without this flexibility, it may limit lands that could otherwise be leased (i.e., dry bulk areas only for dry bulk).
- We are planning for a maximum ship size 751' and will include the necessary safeguards with manageable risk.

Be Compatible with Surrounding Uses

- Understanding how the zoning works is important, and then need to talk with neighbors early in the process in order to take their concerns into consideration. Wouldn't be surprised if neighbors would object to light and dust.

  The harbor is zoned I-3, and the state will not be required to get county zoning (although this does not apply to tenants). DOT-H will be conducting individual meetings with adjacent landowners and key stakeholders early in the process to understand and address their concerns.

Consider Environmental Issues

- Will there be a problem with live coral in the harbor? This could be considered a constraint.

  We have done an initial marine survey at the harbor. There is a common variety of coral, but we believe there is a workable solution through design. There has been a problem with coral in the past with deepening of the basin and channel.

Consider Safety and Security

- Need to have water access and facilities to support the response community, as all users are required to have rapid response ability.
- Risk management tools
  - International users present risks when they don't strictly comply with international standards and best practices (i.e. International Maritime Organization (IMO), International Safety Management code (ISM), International Standard Organization (ISO)). This impacts each of us and creates complex issues.
  - Safety zones have issues that need to be included in the report. Each user has their own safety and evacuation plan, but there needs to be an alarm that all will recognize and people can get out. There is not currently a PA or alarm system for the overall harbor, although there are individual PA systems at specific user locations that can be heard elsewhere.

Outline a Phased Sequence of Improvements

- *Improvements, land leases and integration will be phased beginning with most immediate needs and every 5 years thereafter.*

Joint Stakeholder Projects

- The harbor users may want to consider teaming up on improvements. It is also important to establish industry protocols not just for individuals, but for clusters of stakeholders that have a common interest.

  We may need to look at a consortium for the pipelines at the fuel pier.

Opportunities

Increase Berthing Capacity to Meet Future Growth

- In the tug and barge industry, delays occur while waiting for scheduling to free things up. Problem is point of accessibility.

  The Fuel Pier will free up piers 5 and 6, reducing berthing conflicts.

- If Pier 1 was dredged deeper, it could be utilized more and might alleviate a barge or two. The storage area next to that is not used very often and could be used for covered storage.

Enable 24-hour Transit

- Will the report also look at nighttime transit?

  Previous lighting studies for nighttime transit will be reviewed and updated in this plan. Note: nighttime cargo operations are a current practice.

Improve Utilities Infrastructure

- DOT-H cannot control the economy, but we can be prepared with enough infrastructure to handle forecasted capacity. This includes additional berthing, roads, navigational enhancements for night transit, adequate laydown area, possible crane, accommodations throughout, etc.

- In the maritime industries, need to look at the height as well. Bigger ships will be taller - need to look at FAA obstruction for storage tanks, cranes (i.e. rubber tire gantry), RO/RO facility, etc.

- There will be no space in 2040 for containerized cargo at Honolulu Harbor, as it is already over capacity. Matson and others may say they need container area.

If a user tells us that they need it, then we can make accommodations for it. Note: There are plans to add 2 berths and 70 acres of yard for containerized cargo at Honolulu Harbor.

New Harbor Access Road from Hanua Street

- Current infrastructure is inadequate for increased and different types of cargo. The windmill operation was a snapshot of the entire cargo storage yard and adjacent staging areas at maximum capacity. All of these industries can't be reliant on one artery that gets clogged at 3pm. Whatever is improved in the harbor will also have an effect on the infrastructure. Need to look at: 1) Key Access route, 2) Traffic and 3) Heavy lift area limits.

USACE: Deepen Basin and Widen Channel

- Before expanding the harbor, make sure the draft is deep enough for future ships. Ships / barges will be larger, requiring larger tugs. Liquefied Natural Gas (LNG) could be a future user, which is not a small ship.

  We will need to make sure the facility can handle the throughput. Need to put pressure on USACE to deepen the channel, but the cost/benefit ratio needs to make sense. If ship is not fully laden, it is inefficient. This plan will feed into USACE deepening study.

- If the channel is deepened to accommodate larger and fully-laden vessels, it also needs to be widened due to cross currents. Currently, pilots are limited by the width, and there is no choice once in the channel. Can't go in safely even at 5 to 7 knots.

  Yes, the current can change in a matter of hours. There are studies in progress by USACE for widening and/or flaring the channel.

- How will we accommodate for the surge? If the channel is widened then it will bring in the surge. This will end up at the "toilet bowl" (upper inner basin) at Pier 7, and start snapping lines.

  We believe this is mainly offshore, but will need to be studied.

- A flow/current meter in the channel is needed to assist pilots in the entry way.

Resilience and Recovery.

- What if Honolulu Harbor were in a disaster and some temporary operations needed to move to Kalaeloa?

  We will need to review how Honolulu Harbor and KBPH can complement each other based on resilience, security, capability, and efficiency.

- Hawaii doesn't have a large warehouse capacity. This affects resiliency by not having supplies to last more than 30 days.

  We don't want to limit open yard storage as there are really no other harbors with as much open yard capacity in the state. For example, during previous hurricane disasters the open yard was needed for emergency relief equipment, supplies, and infrastructure repairs (i.e. utility poles). In some cases, vessels were turned away because space ran out at neighbor island harbors.

Constraints

Lighting and Noise from 24-hour Transit Operations

- Lighting may cause conflicts with Kapolei West in the mauka area. Need to look at possible mitigation measures.

Neighboring Land Uses (Resort, Residential)

- What can be located in the mauka portion of the harbor? How close can we get to the residential area without conflicting with our neighbor, such as a type of storage? Are we limited to dry? Or we were here first so too bad?

  There is generally a buffer with our northern neighbors due to the OR&L right-of-way, a proposed golf course and cultural park. However, there may be some setbacks for fuel area storage, and other impacts related to harbor use which will need to be studied.

Lengthy Process to Plan, Permit, and Construct

- *The Master Plan process will feed into the USACE process, but it will still take 8 years to complete. The permits and appropriations of funds are on demand, and USACE does not pay 100%. However, private operations will move more quickly.*

Funding for Projects

- Politicians/decision makers need to be educated. All they see is pipelines and are blind to how much cargo is going through the conveyor belts. They don't realize that this is the second busiest port in the system.

  We should have a good draft plan by the 2014 session to direct the legislature on the amount of money needed at the harbor.

- The need to play with everyone and feed the needs of the harbor is understood. But there are concerns about the costs of the fuel pier, as there have already been sizeable investments into fuel piers 5&6. What will the cost be to fuel users?

  Any fuel lines and additional equipment will need to be provided by the users. Depending on the option chosen, cost estimates will be provided in the development plan. DOT-H will be responsible for the cost of building the pier itself.

Master Plan Relative to Neighbor Islands

- Planning for the harbor needs to be separated into two primary parts – Oahu imports/exports, and Neighbor Island exports. Will have changes at Oahu that will not happen at neighbor islands. Need to consider how the other harbors are not changing, and how this will have an effect on ship size and scheduling, possibly causing more complexity and delays. Need a layberth to help make up for this.

  A layberth is being considered for tugs and barges that are not currently loading to alleviate congestion. Coordination with neighboring island ports will be considered as part of the Master Plan.

- Will the master plan be integrated into other harbor projects statewide? Are there other projects at Honolulu harbor that are on the table that should be accelerated, so that we can understand what needs to take place at KBPH?

  Any throughput analysis will be looked at, that is why the information from the questionnaire is so important. This directly translates to what will be needed on the neighbor islands. DOT-H has fuels leasing requests, which translates into Neighbor Island storage. Barge traffic on the Neighbor Islands may then increase by 30-40%, and will be different products. There may not be complete integration into their plans, but will feed them information.

Those Present:

AES – J. Holden
Aloha Consulting – M. Zopresti
Amergent Techs – W. Anonsen, R. Beauchamp, F. Whipple
Ameron Hawaii – E. Yoshizawa
BAE Systems (HSY) – J. Cummings
Chevron – H. Maxie
DOT Harbors – D. Ancheta, S. Dale, R. Grune, C. Luke, A. Murakami, D. Watase, D. Yogi
Group 70 – B. Natale, J. Overton
Hawaii Gas – T. Young, R. DeGarmo, J. Vient
Hawaii Pilots Association – T. Heberle
Hawaiian Cement – R. Bautista
Healy Tibbitts Builders, Inc. – C. Hutchinson
HECO – J. Arakaki
Kirby Offshore – D. Naunguyan, R. Brown
Marine Cargo Surveys of Hawaii – R. Lund
Marisco – F. Anawati
Maritime Licensing Center – C. Devoe
Matson – K. Park
McCabe – J. Zane
National Cargo Bureau – N. Fotu
Oahu Gas Service – B. Kawano
PENCO/AMC – D. Carter
Sause Bros., Inc. – K. Pomaikai
Tesoro Hawaii – L. Tanaka
Transmarine – K. Kinerney
USCG – R. Deakin, D. Tonen, C. Petersen
Waldron Norton Lilly International – M. McCormik

STATE DEPARTMENT OF TRANSPORTATION
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KALAELOA HARBOR FUEL PIER DEVELOPMENT PLAN

Notes from Planning Workshop #1
July 18, 2013

The meeting was opened up by Carter Luke and Randy Grune of Department of Transportation, Harbors Division (DOT-H), and Jeff Overton of Group 70. Jeff presented the powerpoint presentation on existing conditions and known issues. The presentation is posted on the following website: http://kalaeloaharbor2040.com. Meeting participants were given the opportunity towards the end of the presentation to comment and ask questions.

Below are the various topics covered and comments made by attendees. DOT-H and Group 70 comments and/or responses where included are *italicized.*

Goals

Address Berth Conflicts

- Why build pipelines at Pier 3 and 4 when there are already fuel-related uses at Piers 5-7?

  The fuel pier will be able to double berthing capacity for the harbor, and relieve congestion at Piers 5 & 6 due to competition for berthing with dry bulk uses (the fuel pier does not require similar yard space needed for dry bulk). This area is further away from residents and closer to current fuel lines.

- Does construction of this dedicated fuel pier mean that Piers 5 and 6 will be abandoned?

  No. Even though Piers 3 and 4 would be a preferred berth, Piers 5 and 6 would still be available. Priorities of fuel vs. cargo are based on the current infrastructure, and we are open to suggestions.

- It will be very expensive to build this pipeline. Is this cheaper than to make bulk landings at piers 3 & 4 to free up berthing space?

  There is not sufficient landside area at 3&4 for laying down cargo, although there is some space at neighboring Pier 1. To expand cargo space past pier 3 & 4, nearby industrial park lots would have to be condemned.

- Will harbor traffic increase to Kalaeloa from Honolulu Harbor?

  We don't expect it to, as Honolulu is primarily a container terminal, and DOT-H is building another 80 acres in Honolulu to accommodate growth in container traffic. There may be an increase of bulk cargo at Kalaeloa, however.

Be Flexible for All Fuel Types

- Pier 1 is currently used for propane but has periodic surge conditions that affect operations seasonally for approximately three months out of the year. Is propane access to Piers 3 and 4 an option? Piers 5 & 6 were being evaluated for alternative locations.

  The development plan will take into consideration various fuel type options, including propane, LNG and potential land-based safety zones.

- Will this pier be able to handle the full suite of fuels?

  This is currently under investigation. We are planning for the next 25 years, but it is difficult to predict what will happen with the current volatility of the world market. The basic infrastructure will be flexible to handle many fuel types, but some types will require on-site storage or safety zones which would have to be developed and/or permitted by the users as they respond to market demand.

Address New Pipelines

- Is the intent to tie into the existing pipelines? If so, then the pipeline capacity has not doubled, only the moorings. May be able to load two additional vessels, but not necessarily the same fuels.

  Users would need to install appropriate piping for their specific needs. A consortium for pipelines is being considered. Depending on the future of the refineries, there may be more imported refined product. We will need to evaluate those scenarios with a wide range of options.

- This could potentially cause a problem. When you have different lines and different products, how do you look at scheduling? Different vessels, fuels, storage, and use will have to be studied.

  Scheduling will be managed by harbor operations as they see fit to best utilize the harbor facilities in the most efficient manner. Sufficient piping would need to be developed by the users for their particular needs and to alleviate conflicts as necessary.

- Does the project limit the number of pipelines?

  Not at this time. Above ground piping is more flexible to accommodate additional piping as racks can be added. If below ground piping is desired, this may be an issue due to limited space, and will be considered as part of the planning process.

- Will there be individual company lines or a consortium?

  DOT-H is currently reviewing the pros and cons of a consortium to manage the pipelines.

Consider Safety and Security

- Pre-staged boom equipment will save everyone time and effort in day to day activity. It is important to think through the design with consideration to response, maintenance, and vessel water access. In responding to oil spills, may want to consider a 3-stage containment boom for the fuel berth, similar to Piers 5 and 6.

  First response and in water boom systems will be considered and incorporated into the planning alternatives.

- Locating spill response at Pier 8 could be a possibility, but the current location puts us in front of spill instead of chasing it. We also have an 800ft boom, which would be nice to have in an area that is accessible.

Relocate Existing Tenants

- A new tenant location should allow for lay space, cleaning tugs, and dry dock.

  Preliminary thoughts on locations include Piers 8 and 9.

- Does tenant relocation trigger an EIS for master plan?

  The Fuel Pier EIS will generally discuss reasonably foreseeable tenant relocation(s), however, the tenant(s) will be responsible to comply with Chapter 343 individually and provide details of their specific improvements and operations.

Opportunities

Evaluate Fuel Pier Design Alternatives

- The design should take into consideration berthing scenarios for Piers 3, 4, and 5a. It is important to avoid conflicts while providing maximum utilization. What is accessibility to P5a if a 750' ship is located at Pier 4? The key to 5a and 5 is where will the hatches and manifolds be placed? It should also be recognized that when pilots charter a ship within a class, it could be a variety of sizes.

  Berthing conflicts with Pier 5A will be considered as part of the planning process. Specific information from users will need to be considered. Phasing construction of Pier 3 first will alleviate these concerns initially.

- What is the full length of the pier?

  Approximately 1200' – 1400'

- So may be able to fit both a 720' and 400' ship.

  Yes, we can put the larger ship first at Pier 3 then 4, freeing up 5a.

- But we still wouldn't be able to fit a 750'. Would have to go to Pier 5.

  At present the pier design alternatives will handle up to a 750 foot panamax tanker (although current harbor draft would require it to be only partially loaded).

- Will the ferry pier where the tugs are have to be relocated? What are we looking at for relocating the tugs?

  Pier 8 might be a possible area for layberth if it was expanded. Could double or even triple breast here. The fuel pier can be phased so that Pier 3 is built first, leaving the finger pier available for as long as possible.

- Is it possible to put in a 2 point - 4 point mooring at the north quadrant of the harbor basin that is currently undeveloped, towards the golf course side? This may provide a layberth for small vessels, and a floating catwalk could also be provided if need be. May need a 4 point mooring because of the wind.

  A lay berth mooring area is being considered as part of the Master Plan.

- Will there be bunkers at the fuel pier? Currently only done by barge.

  This is dependent on users demand and supplier's ability to supply, and the type of bunkers available.

- Is the fuel pipeline system above or below ground? The less expensive system may be best.

  Both above and below ground pipeline infrastructure designs are being considered as part of the planning process. Safety issues for each will need to be considered. Because it is a fuel pier only, it could be partially above ground, and below ground for Stevedores forklift crossing.

- When determining dolphins and mooring points, need to take into consideration ship sizes and berthing techniques.

  The fuel pier will be flexible to accommodate a range of vessel and berthing techniques wherever possible.

- If we expand the entrance, then Pier 3 is sticking out there. Would this need to be shortened?

  USACE is investigating widening the entry channel to facilitate navigation, but this would not affect the Pier 3 jetty.

- Where do you put things while you are dredging and building?

  There will be some operational service disturbance, although the USACE tries to minimize disruption and work around the harbor schedule.

Consider Vapor Control Systems

- Will the Fuel Pier need vapor control?

  This may be a requirement of Department of Health.

Constraints

New Dredging Requirements

The federal line is a concern for dredging of the Fuel Pier. If construction of the pier is pushed past this line, federal regulations will apply.

Neighbor Island Capacity

- The Neighbor Islands have storage limits, and fuel is a priority.

  Several of the commercial harbors throughout the state are undergoing planning improvements as a result of the Governor's "New Day Initiatives" which may increase storage on neighboring islands. Demand for fuel on neighboring islands is being considered as part of the KBPH planning process.

Funding

- Who will pay for the Fuel Pier?

  A bond sale may be used to fund the Fuel Pier. DOT-H is looking to those that will use the pier (the fuel industry) to pay for the new pipelines. At this point, it is important to look at what we want in the Fuel Pier, and then determine financing later. We may have to push the pricing down to the user (i.e. per barrel charge/pipeline toll) – it depends on how we can finance the bond.

Those Present:

AES – J. Holden
Aloha Gas – J. Lovan
Amergent Techs – W. Anonsen, R. Beauchamp, F. Whipple
Chevron – H. Maxie, K. Jacobsen
Clean Islands Council– K. Beasley, J. Jacobi
DOT Harbor Division – D. Ancheta, S. Dale, R. Grune, C. Luke, A. Murakami, D. Watase, D. Yogi
FACTS Global Energy – I. Nasseri, S. Wee
Group 70 – B. Natale, J. Overton
Hawaii Gas – T. Young, J. Strickler, R. DeGarmo, J. Vient
Hawaii Pilots – T. Heberle
Healy Tibbitts Builders, Inc. – D. Masumoto
HECO – C. Barnes, J. Arakaki
Kirby Offshore – D. Naungayan, R. Brown
Mid Pac Petroleum – R. Whang
PENCO/AMC – D. Carter
Petrospect – D. Harrington
Sause Bros., Inc. – D. Won
Tesoro – R. Rivas, C. De Almeida, G. Merchant
Transmarine – K. Kinerney
USCG – C. Petersen

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KALAELOA BARBERS POINT HARBOR 2040 MASTER PLAN AND FUEL PIER EIS

Notes from Public Meeting #1
September 3, 2013

The meeting was opened by Jadine Urasaki, Department of Transportation (DOT), Deputy Director for Projects. Carter Luke, DOT Harbors Division (DOT-H), Engineering Program Manager introduced the project team. Jeff Overton of Group 70 presented the power point presentation on existing conditions and known issues. The presentation is posted on the following website: http://kalaeloaharbor2040.com. Meeting participants were given the opportunity after the presentation to provide input and ask questions.

Below is a summary of the various topics and the discussions. DOT-H and Group 70 responses were included are *italicized.*

EIS Process

- When you complete the EIS and submit for approval, can you renew it if a change happens?

  An EIS should disclose the full range of reasonably foreseeable actions contemplated in a project. Chapter 343 environmental documents have no shelf life. However, if a long period of time passes, or major changes occur in the project, a supplemental EIS might be requested by the courts (e.g. Turtle Bay).

Harbor Dredging

- What is the basin depth are you targeting?

  The U.S. Army Corps of Engineers (USACE) is conducting a feasibility study for deepening the harbor up to minus 45 feet, depending on the outcome of the feasibility study. DOT-H is sponsoring this study. The basin is currently at minus 38 feet. The 2040 Master Plan will support the USACE feasibility study by indicating the potential future ships that could call the harbor. The feasibility study is undergoing its own EIS review process. There will need to be dredging specifically associated with the fuel pier under the State's jurisdiction. A hydrographic survey has been completed.

  [Channel has a design controlling depth chart datum minus 42 feet Mean Lower Low Water (MLLW) and the Harbor Inner Basin controlling depth of chart datum minus 38 feet MLLW. Maximum vessel draft permitted is minus 36' 00" with under keel clearance of 2 feet. Additional allowance for a vessel's draft can be requested to minus 36"06" on a 1-foot rising tide.]

- What will you do with the dredge spoils?

  The first choice would be ocean disposal, if it is suitable and clean. This will require early consultations with US Environmental Protection Agency (EPA) and will need a USACE Section 103 permit application. Those spoils not suitable for ocean disposal will be disposed of at a landfill or stored onsite for reuse pending space availability.

- Many fuel tankers currently in use are expected to be taken out of service by 2040. The new tankers will be larger. Draft for new LNG ships is over 40 feet, and longer than 750 feet. When Panama Canal is widened, the new ships are expected to be wider (i.e., greater than 106 feet wide). Kalaeloa Barbers Point Harbor (KBPH) may not be able to accommodate these ships.

  This raises an interesting question of when will the harbor improvements be ready for these larger ships? Until then, users at KBPH will continue to function with vessels that are able to access under current conditions. Some of the activities may be happening at a faster rate than the harbor will be built. The 2040 Master Plan will help the USACE to support the need for basin deepening. Until then, KBPH will continue to function with vessels that are able to function under current conditions.

- There was a concern stated that widening or deepening will likely witness some pushback from the community.

Marine Life

- This area is very shallow – when you dredge, when you dig deep, you will destroy a lot of the marine life – the limu and the fish. How much are you going to destroy? You can study the Ewa Marina / Haseko report on the damage that is being done from the sand.

  The focus of this planning effort is within the harbor and not the entrance channel. USACE is conducting a separate feasibility study for widening the channel, including an EIS. The interior areas of the harbor do not contain rich marine communities like those found outside of the harbor.

Accidental Fuel Spills and Safety

- One of the concerns from the community was regarding construction of the new Fuel Pier (i.e., Piers 3 and 4) near the ocean. How are you going to be able to protect the ocean if there is a spill?

  Present fuel transfers at Piers 5 and 6 cannot occur without all of the spill protection protocols set in place. One of the steps is to have a floating boom deployed before the fuel transfer can take place. Due to harbor configuration, prevailing trade winds help to contain spills against Piers 3 and 4. The oil response boats are also at a location to trap any accidental spills before it would leak out into the ocean.

- As far as a catastrophic spill, we encourage the State to work with the hui of oil response teams. Realistically, if you had the facilities in place and the people, you would reduce the spills. But no one wants to spend the money. If the State and US Coast Guard were to force this cost on all users, it would reduce the cost for all overall. KBPH, and nowhere else in the state, mandates the use for tugs. A discussion of tug use and safety is needed. It is important to look at incorporating the best and safest technology with as big of ships that we are bringing in today, and what you are considering for the future. You need to build in these safety costs today. You don't want to have the discussion/conversation with representatives bringing in their cargo safely. If you want all business to conduct operations safely, need to plan to spend that money today, before the catastrophic event happens.

  The 2040 Master Plan will include a safety assessment reviewing tug operations, docking procedures, spill containment, and other operational safety concerns.

Surge Conditions

- Concern was expressed about surge conditions inside the harbor.

  At this point, there are no plans for reducing the surge / current conditions. There is 4,700 linear feet of wave absorbing material within KBPH. Some of the channel plans have considered construction of a groin to mitigate cross currents; however, USACE has since removed this alternative from the feasibility study. Surge mitigation is not currently part of the 2040 Master Plan.

Fuel Pier

- Is Pier 1 going to be part of the Master Plan?

  Yes, the 2040 Master Plan may consider cross connection of the Fuel Pier with Pier 1.

- HawaiiGAS currently has liquefied petroleum gas (LPG,i.e., propane) operations at Pier 1, and is requesting access to the Fuel Pier in order to continue these operations.

- There was some discussion of potential for incorporating a liquefied natural gas (LNG) terminal into the Fuel Pier. Could use Piers 3 and 4 and not use Pier 1. There is a big concern for harbor traffic, having to compete at Piers 5 and 6 with large tankers. Anytime that happens, cargo vessels are forced to hold offshore doing donuts in the ocean, waiting for the Pier. Use of Pier 1 would help with traffic until USACE comes in to widen and deepen the channel. Until then, we can't bring in certain ships, and have to go to the offshore moorings. The Fuel Pier is really important for keeping the harbor open and moving traffic.

  The anticipated volumes of dry-bulk cargo, particularly with the construction demands for cement and aggregate, will increase harbor traffic between 30 to 40% within the next 5 years. Other materials include grain and ash exports. Construction of the Fuel Pier will help in alleviating the congested berthing conditions that will arise from these dry bulk increases.

Phasing

- Do you have an idea of sequence of modifications to the Harbor?

  Implementation scenarios will be studied as part of the 2040 Master Plan. We know we can't do everything at once, and there will be a need to prioritize projects due to constrained financial resources. We will need to look at cost-benefits of each project.

Layberth

- *The project team recently performed a berthing analysis to determine how to accommodate all the different uses. The analysis found that between 18 and 20% of the activity is not cargo – it is tugs, support vessels, and idle vessels. One of the components of the 2040 Master Plan will likely recommend a layberth area be provided.*

Storage

- The harbor lacks storage for bulk cargo. We bring the products in and it goes on the shelf. All of the companies do not have enough storage capacity. The EIS should look at facilities for storage and fuel lines to their terminals. So unless we increase the storage, the harbor will only function as a transfer facility.

  Additional storage will be considered as one of the components of the 2040 Master Plan. Another component to the Plan is the land availability. If there becomes a need to store large amounts of equipment (i.e., for hurricane recovery), a large available laydown area is strongly needed, and KBPH is the only place in the State where this can happen. [The only two harbor facilities that are built to handle their receiving cargo capacity are bulk cement and liquid asphalt.]

Night Operations

- KBPH could increase pier usage with the proper lighting.

  The technology is available and will be considered. At night the depth perception is lacking.

Liquefied Natural Gas (LNG)

- Will this EIS look specifically at LNG for transfer?

  The project team will look at LNG/LPG as part of the 2040 Master Plan. Our best information has come from HawaiiGAS. We appreciate the input they have given us. DOT cannot state if LNG will be in the 2040 Master Plan for certain because the study hasn't been completed. We have to do our job, and look at the options, because there are constraints that are associated with certain fuels. We must consider that there are not any other bulk harbors in the state, and KBPH has the most shipments of fuel to the Neighbor Islands. As part of the planning effort, we are conducting a fuels demand assessment; however, it is a challenge for the fuel consultants to define the most likely scenarios. We recognize that this project is important for the State, and part of the governor's New Day Initiative, and will do our best to accommodate a balance of uses.

- Piers 1, 2, 3, and 4 may be difficult locations to site a terminal for bulk LNG. Compressed natural gas for transfer at these locations to the neighbor islands may be a more feasible option.

Fuels Scenarios

We are finalizing a comprehensive fuels demand assessment. The most likely fuels scenarios will dictate the energy demand. The challenge will be evaluating these scenarios and remaining flexible for the range of fuel types that may need to be accommodated. Demand will also change over time, for example, this analysis would have been different 15 years ago.

- You are looking at fuels and berthing?

  Yes, Amergent Techs is doing the berthing analysis, and FGE is doing the fuels demand assessment.

- I assume you are going to look at vapor control, etc.?

  Requirements for vapor recovery will be addressed in the Fuel Pier Development Plan and 2040 Harbor Master Plan.

- When harbor operations are slowed, this has a ripple effect on providing jet fuel in a timely manner, which slows the economy. The money that is being spent will be better for the state of Hawai'i. We need to realize how important the harbors are to the State, not just O'ahu.

  Yes, and there is a misperception that energy is the largest user of fuel, when jet fuel actually has the largest share.

- Even with the increase in wind electricity, Hawai'i will still need oil as a backup. We will still have the demand for oil. LNG may replace it, but there will still be a need for additional fuels. Wind energy does not produce consistent power.

  The energy market is evolving, and until all these renewable pieces come into play, Hawaii will remain very dependent on petroleum. The fuel pier still makes sense - that is why the State has embarked on this planning process. The 2040 Master Plan will consider a wide range of options.

Those Present:

A. Arnaho, T. Arnaho
Alston Hunt – B. Kaneko
Amergent Techs – W. Anonsen
BAE Systems – J. Cummings
Chevron – A. Chee, B. Liu, H. Maxie
City Council – K. Pine, J. Schaedel
Consumer Advocate – J. Ono
Department of Business Economic Development (DBEDT) – M. Glick
DOT – J Urasaki, C. Sluyter
DOT Harbors – C. Luke, B. Toba, A. Liu, D. Vo, D. Watase, S. Dale, G. Gomes
Foss Maritime – S. Merritt
Group 70 – B. Natale, J. Overton
Hawaii Gas – J. Boivin, M. Futrell, R. Sterzenbach, J. Strickler, B. Treat, T. Young
Hawaii Public Policy Advocates – P. Kaneshige
HTB/YB – M. MacDonald
Healy Tibbitts Builders, Inc. – G. Toyama
HECO – J. Hichborn, T. Kanja, T. Koyamatsu
Honolulu Fire Department – S. Lawton
Kirby Hawaii – J. Patmont
Marisco – F. Anawati, J. Stewart, M. Stewart
Pacific Shipyards – B. Nakaoka
P&M / P&R Water Taxi – S. Morita
Sause Bros., Inc. – D. Pomaikai, P. Pomaikai
Senator Gabbard's Office – R. Riggs
State Harbor Pilot – E. Enos
State House of Representative – K. Awana

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KALAELOA HARBOR 2040 MASTER PLAN

Notes from Planning Workshop #2
April 3, 2014

The meeting was opened by Jadine Urasaki, Department of Transportation (DOT), Deputy Director for Projects. Carter Luke, DOT Harbors Division (DOT-H), Engineering Program Manager introduced the project team. Jeff Overton of Group 70 presented the PowerPoint presentation on proposed harbor improvements. The presentation is posted on the following website: http://kalaeloaharbor2040.com. Meeting participants were given the opportunity after the presentation to provide input and ask questions. Below is a summary of the various topics and discussions.

HawaiiGAS Presentation
Due to the impact a proposed Liquefied Natural Gas (LNG) terminal could have at Kalaeloa Barbers Point Harbor (KBPH), HawaiiGAS was allowed the opportunity to provide a presentation at the workshop. Their presentation is posted on the above website. An LNG terminal would allow HawaiiGAS the ability to have backup LNG supply, serve the neighbor islands and potentially serve the marine industry.

LNG Import and Distribution
- Jones Act feeder ships bring LNG to the Floating Storage Regasification Unit (FSRU).
- LNG is re-gasified and travels as a gas through a pipeline to the Oahu distribution system.
- A 474-foot length overall (LOA), 8 million gallon (30,000 m^3) vessel loads LNG from the FSRU, or the West Coast, and brings it into KBPH.
- The LNG is transferred into a storage tank, where it is later transferred into ISO containers.
- ISOs are stored on land for distribution on Oahu via trucks or Neighbor Islands via barges.

Zones of Concern
- A 100-foot security zone surrounding the transfer connection prohibiting combustible activities is in effect during LNG transfer.
- A control zone of approximately 700-foot radius, centered at LNG ship transfer is needed in case of emergency. Other compatible activities (including ship transport) can continue. The United States Coast Guard (USCG) will have final determination of acceptable activities, but they have not been engaged in the conversation to date.
- Zones of concern are primarily a function of the LNG transfer pipe size and flow rate.
- Another control zone of approximately 500-foot radius will be in effect at the point of transfer from the 15 million gallon storage tank to the ISO containers. The zone of concern will vary depending on the transfer rate from the tank to the ISO containers.
- Pending further modeling and engineering, the size of the control zones is approximate. These zones may be reduced with further engineering.

Harbor / Adjacent Neighbor Compatibility
- LNG vessel activity will occur approximately every 10 days for a 48-hour period (approximately 6 days/month total time).
- Pier 3 (HawaiiGAS' preferred alternative) or Pier 9 are being considered as possible LNG terminal locations.
- HawaiiGAS will need to prepare an Environmental Impact Statement determining risks and potential impacts to neighboring Ko Olina and the H-1 freeway as well as current and proposed residential housing.
- LNG bunkering opportunities are being considered as part of the Statewide LNG fuel supply plan.

Master Plan Proposed Improvements

Piers 3 and 4
- Piers 3 and 4 will be the site of the dedicated Fuel Pier.
- Phasing of the Fuel Pier will allow the Finger Pier to remain for as long as possible.
- The T-pier at the corner of Piers 4 and 5A will remain for spill response vessels.
- Financing options for pipelines at the fuel pier are still being discussed, with the options of a consortium or private funding.

Pier 7
- The berthing schedule at Pier 7 is already tight.
- The 2040 Master Plan recommends extending Pier 7 towards Pier 8 by 325 feet.
- Hawaiian Cement received approval for a larger barge, which will come into service towards the end of 2015. This will have an impact on the berth, so expanding capability on Pier 7 is important.
- Although a firm timeline for construction has not been set, the 2040 Master Plan recommends that Pier 7 as a designated priority project to be built in the early stages within the next 10 years.
- In the interim, Hawaiian Cement may extend their pipeline, allowing the cement ships to fall back further and provide for more berthing space at Pier 6.

Pier 8
- The 2040 Master Plan recommends that Pier 8 be improved to serve as additional layberth.
- Improvements to the pier face will not extend far enough into the basin to affect the turning area within Piers 7, 8 and 9.
- Construction of layberth at Piers 8 and 9 will be phased in coordination with the Fuel Pier.
- The need for this layberth may be approaching quickly with the LNG and LPG demand in addition to activity at Piers 5 and 6.

Pier 9 and 10
- Marine support will be relocated to Piers 9 and 10 in the Alternative A, Dry Bulk Focus.
- In one of the two options in Alternative B, Energy Focus would place an LNG facility at Pier 9 next to a marine support facility at Pier 10. Healy Tibbitts currently has a yard at Pier 9 and does not do any hot work at this location, but the effects to Marisco operations need to be determined.
- Healy Tibbitts currently enjoys the convenience of loading supplies directly onto ships from their Pier 9 location. Moving their operations inland and transporting supplies by truck to ship is a possibility, but an inconvenience.

Infrastructure
- Kapolei Properties, a neighboring landowner, will develop the new Harbor Access Road depending on demand within the next 10 years. This road will meet with H-1 and replace the current Malakole Street entrance.
- A 250-foot wide drainage channel bordering the KBPH property is currently being excavated. This channel will drain 4,000 acres from upland developments.

Phasing
- The 2040 Master Plan will identify when construction activities are recommended to take place.
- Phasing will be tied to basin deepening, under United States Army Corps of Engineers (USACE) jurisdiction. If deepening and bringing in larger ships, the channel will need to be flared. A groin at the access has been ruled out.
- Although there are depth perception issues, 24-hour navigation would be helpful in harbor efficiency, requiring additional lighting and other navigational aids.
- The 2040 Master Plan will recommend that these improvements occur within the proposed 25-year time horizon.

Potential Harbor Users

Kaiuli Energy

- Kaiuli Energy is proposing Sea Water Air Conditioning (SWAC) as an alternative to traditional air conditioning. The system pulls in cold water from the ocean to a heat exchanger that cools freshwater used in the air conditioner.
- There is enough demand for SWAC at KBPH. Potential customers are nearby hotels and big box stores, as well as harbor users with central air conditioning.
- This would temporarily affect harbor operation due to the potential location of the pipeline through the harbor. Pipeline construction would involve trenching and then burying the pipe. Kaiuli doesn't want to affect the tugs in the area. Pipes would need to be timed with dredging or buried well below current harbor basin depths.
- Kaiuli would like to site their operations on approximately one acre in the Maritime Support-designated area of the harbor.

Zilkha

- Zilkha is proposing to bring in a solid fuel (wood pellets). There is no need to establish safety zones. Wood pellets have storage properties similar to coal.
- The fuel is flexible and could unload at Piers 5, 6, or 7 and then be transported to a storage facility. No further special consideration is needed.
- Ten acres of land storage would be the maximum, but could be reduced to five acres.
- Ultimately the end user would be one of the power plants, fulfilling EPA emission standards and proving less expensive than current fuels. Agreements with the utilities are ready – the timeframe for implementation is dependent upon decisions made. Short term service to the utility would transport the fuel by truck. Long term service might require a conveyance system.
- The product is coming from the U.S. and British Columbia. Millions of dead pine trees need to be removed which were killed by a beetle in Colorado up through Canada. This could supply fuel to all of Kahe power plant if necessary.

Hidden Villa Ranch

- An egg production farm will require bulk cornmeal to mix with supplements for chicken feed. Hidden Villa would like to import via KBPH but doesn't want to affect current operations. Fertilizer from this operation may be reused on Oahu.

Those Present:

Aloha Petroleum – J. Finch
Amergent Techs – W. Anonsen
DBEDT - M. Glick
DOT Harbors – S. Dale, R. Grune, A. Liu, C. Luke, B. Toba, A. Murakami, J. Urasaki, D. Vo, D. Watase, L. Williams
DOT Statewide Transportation Office - M. McLaurin, A. Setogawa
Facts Global Energy - S. Wee
GMP / KCR - J. Littenberg
Group 70 – B. Natale, J. Overton
Hawaii Gas – J. Boivin, R. DeGarmo, B. Treat, T. Young
Hawaii Pilots Association – S. Brown
Hawaiian Cement – J. Gomes
Healy Tibbitts Builders, Inc. – D. Masumoto
HECO – J. Arakaki, C. Barnes, T. Koyamatsu
James Campbell Co. - S. Kelly
Kaiuli Energy - D. Nakamoto
Marine Cargo Surveys of Hawaii – R. Lund
Oahu Gas Service – B. Kawano
P & R Water Taxi / P & M Marine - S. Morita
PENCO/AMC – D. Carter
Petrospect – D. Harrington
Sause Bros., Inc. – P. Pomaikai, D. Won
Tesoro Hawaii – L. Tanaka
Transmarine – S. Lambert
USACE - M. Yoshimoto
USCG – C. Petersen, B. Marhoffer, S. Whaley
Wespac Midstream – B. Thompson
Zilkha - T. Tolkinen

STATE DEPARTMENT OF TRANSPORTATION
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KALAELOA HARBOR FUEL PIER DEVELOPMENT PLAN

Notes from Planning Workshop #2
April 3, 2014

The meeting was opened by Carter Luke, DOT Harbors Division (DOT-H), Engineering Program Manager. Jeff Overton of Group 70 presented the PowerPoint presentation on proposed Fuel Pier improvements. The presentation is posted on the following website: http://kalaeloaharbor2040.com. Meeting participants were given the opportunity after the presentation to provide input and ask questions. Below is a summary of the various topics and discussions. DOT-H and Group 70 responses where included are *italicized.*

Fuel Forecast

- Do the vessel forecasts (slide 12 in presentation) include Liquefied Natural Gas (LNG) ships? Offshore moorings access for refined fuels import will also change these numbers.

  No, this vessel forecast does not include the number of ships that will come in to unload at an LNG terminal. These calculations will be reviewed and updated.

Alternative Pier Designs

It is a balancing act for DOT-H to try to design the project with funding constraints. By understanding what options are best for operations and other considerations, DOT-H can have a better idea of what to look out for when reviewing the design.

Alternative A: Segmented Pier Design

- This configuration has been done in Alaska and elsewhere, and is not uncommon.
- It seems that the choice for having a segmented pier is driven by its low cost. Prevailing tradewinds will be pushing the ship into the pier. Has the mass of fuel ships and side loads been considered in this design? With a segmented pier, the lateral forces are not distributed evenly. A 750-foot length overall (LOA) ship coming up to a segmented pier may displace the whole pier. Wouldn't there need to be as many piles in this configuration as a continuous pier?
- Hoses laid all over the pier may be a problem, as space will be at a premium. Stevedores need to know that the pier design will work functionally and operationally.

  This is a 20% design, but these details will need to be fleshed out.

- Sustaining the weight of the ship is one thing, but allowing the ship flexible berthing also helps. If you build the whole pier at once and place all the manifolds at once, it would be more accommodating.

  The need for phasing of the fuel pier is being analyzed.

- Allowing the ship to take on provisions at one place instead of going to another pier would be beneficial to shippers. What about accommodating larger vehicles on the segmented pier, in the case of offloading an 18-wheeler and using forklifts?

  The design incorporates the turning radius of trucks and other factors of forklift operation, but other larger vehicles have not been considered. Designing the pier to accommodate a large vehicle like an 18-wheeler would compromise some of the inherent features of a fuel pier, making the pier operationally unusable for its design characteristics.

Alternative C: Continuous Sheet Pile Bulkhead

- The surge in the winter months is excessive. If a bulkhead system is installed, it could increase surge within the harbor. This should be reviewed. Piles are preferred, allowing for surge to be attenuated under the pier and on the revetment.
- It would depend on whether the pier was built strictly for a fuel pier or not. Eventually there may be overflow of dry goods (i.e., if other piers are being fixed, etc). If so, then a backfilled pier (i.e., continuous sheetpile pier) would offer the most flexibility.

  To design the fuel pier as a multi-purpose pier to accommodate dry bulk / break-bulk cargo vessels is not practicable as the jetty does not have sufficient yard area to support this type of activity. The use of the fuel pier with the presence of an LNG (or LPG) terminal further compounds its infeasibility. We feel the expansion of the linear feet of Pier 7 (extending an additional 325 feet) coupled with the increased access of Piers 5 and 6 for dry bulk / break-bulk cargo vessels provides sufficient cargo handling areas that will be available to meet future demand.

Infrastructure

Pier Construction

- The Fuel Pier will have approximately the same elevation as the other piers in KBPH.
- Do we know the composition of the harbor floor? If it is solid coral, the piles will be able to support better than if there is soft material. Otherwise, the piles would not be able to hold up a ship.

  Yes, the bed of the harbor is solid coral.

Pipelines

- Above-ground racks to secure the pipelines to are preferred to underground galleries. Because a gallery is an enclosed space, it would require a chemist each time it is accessed to determine the safety. Europe has raised steel platforms supporting pipelines on either side.
- It would be advantageous for potential Fuel Pier users to talk with DOT and determine their needs.

  Group 70 has met with most groups and will need to meet with them again for additional details.

- Will pipelines tie into the refineries?

  Yes, pipelines will be needed for exports and trans-shipments of fuels to Neighbor Islands.

Loading Arms vs. Hoses

- Loading arms restrict pier operations because of their fixed nature, unlike hoses. Just like a segmented pier, the fixed loading arms restrict the ship docking flexibility.

Fire Suppression

- Anything on land that is intended to shoot water onto a ship will need to account for the 25-30 knot prevailing tradewinds in KBPH.

Spill Response

- Spill response will need to have storage on land like they do now.

  Storage will be included in Fuel Pier concept plan.

Impact

- There are 58 corals across the US proposed for candidate species, and 30 in Hawaii. This may make construction of the pier difficult.

  Initial studies have indicated a limited number of corals with one candidate species in the vicinity.

Pipeline Ownership / Financing

- The Port Authority of Guam has shared ownership of lines with fuel companies. This has become a bit of a contractual nightmare when looking at upgrading 60 year old lines.

  DOT-H will not retain ownership of any fuel lines.

- Will the pipelines be a part of the proposed action of the Environmental Impact Statement (EIS)?

  Yes, the pipelines will be part of the proposed action in the EIS. DOT-H will not provide pipelines, but will look at putting in what is needed to support the pier users. The number of pipelines that will be needed has not been determined at this time – this will occur in the future when more detailed plans are made. Proposed actions of pipeline users will not be incorporated into the EIS.

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Master Plan Related Comments

Piers 9 & 10

- Pier 10 with a dry dock is possible, but downwind of LNG is not preferred. If ship repair was located upwind of LNG, there would be much less of a problem for hot work, sources of ignition and sandblasting activities. Even with lunch trucks there will be open flame.

  Yes, but the operating range is a 100-foot radius zone for all hot work activities and possible sources of ignition. The 700-foot safety zone is just for planning and control purposes to shut down operations and/or evacuate if there is a spill or leak. Also depending on the authority having jurisdiction, it is possible that no non-facility structures could be constructed within this zone, i.e., no churches or schools. The 700-foot radius control zone is contingent on the size of the pipe and the flow rate, i.e., smaller pipe, smaller zone, but longer unloading time.

- By berthing an LNG ship at Pier 9 instead of Pier 10, there would be an impact every ten days for about two days or about six days per month in an extended control zone with a 700-foot radius. This zone would be larger than the 500-foot radius of the control zone created by filling the ISO containers. That smaller zone, however, would be in effect continually as the ISO filling would be continual, and would restrict some neighboring activity on a daily basis.
- Would the LNG facility conduct LNG bunkering activities from the pier as well?

  HawaiiGAS would not offer bunkering from the fuel pier, as current practice is for a fuel barge to bunker the ships while they are parked at a pier. An ISO container bunker barge will fuel the ships with LNG and the ISO containers could be filled at the pier or moved to another pier and be transferred onto the bunker barge.

- An LNG barge will supply KBPH with LNG six days per month from the Floating Storage Regasification Unit (FSRU). Where will it go the other 24 days per month?

  HawaiiGAS – Shipping logistics are still in the preliminary stage and we are reviewing multiple options depending on the timing, volume, number of ships, and infrastructure size. However, one option is to have one of the feeder ships bringing LNG from the Mainland to come straight into KBPH and unload its cargo directly into the LNG storage tank, instead of at the FSRU. This would keep that vessel dedicated to delivering gas straight into land-based storage.

- Will LNG occur within the next seven to nine years? If/when Marisco is moved, will the pier be developed for them to continue operations?

  Introduction of LNG in large quantities is moving at a rapid pace. The 2040 Master Plan will determine the timing of the projects based on need and financial availability.

- If extending Pier 7, might as well construct Piers 8 and 9 all at the same time.
- The Pier 9 area is in need of electricity.

Dredging

- DOT-H is working with USACE regarding future dredging. The new Fuel Pier will accommodate a 45-foot draft instead of the current 38 feet. Ships are currently not fully loaded, and there will probably be an interim phase of light loads at the Fuel Pier until the harbor is dredged.
- The dry dock will need to have further dredging to accommodate its size.

Lighting

- When will there be lighting in the harbor for 24-hour navigation?

  This has not yet been determined. Lighting for the 24-hour navigation ability is under the jurisdiction of DOT-H and navigational aids under the jurisdiction of USCG.

Those Present:

Aloha Petroleum – D. Belknap, J. Finch
Amergent Techs – W. Anonsen
Dalian Inteh Group Co. Ltd. – V. Yu
DBEDT - M. Glick
DOT Harbors – S. Dale, C. Luke, B. Toba, A. Murakami, D. Vo, D. Watase
DOT Statewide Transportation Office - M. McLaurin, A. Setogawa
Facts Global Energy - S. Wee
Foss Maritime Co. - M. MacDonald
Group 70 – B. Natale, J. Overton
Hawaii Gas –R. DeGarmo, B. Treat
Hawaii Independent Energy – D. Richards, R. Rivas, L. Tanaka
Hawaii Pilots Association – E. Enos
Healy Tibbitts Builders, Inc. – D. Masumoto
HECO – J. Arakaki
Kirby / GM - M. Lewis
Marisco - F. Anawati, M. Stewart
Mid Pac Petroleum - R. Whang
PENCO/AMC – D. Carter
Tesoro Hawaii – L. Tanaka
USCG – B. Marhoffer
Wespac Midstream – B. Thompson
Zilkha - T. Tolkinen

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KALAELOA BARBERS POINT HARBOR FUEL PIER AND HARBOR IMPROVEMENTS EIS AND 2040 MASTER PLAN

Notes from Public Meeting #2
October 13, 2014

The meeting was opened by Mr. Ford Fuchigami, Interim Director of Department of Transportation (DOT). Mr. Randy Grune, Deputy Director of DOT Harbors Division (DOT-H), briefly described the importance of Kalaeloa Barbers Point Harbor (KBPH) and the collaborative process undertaken for the *KBPH 2040 Master Plan* and *KBPH Fuel Pier and Harbor Improvements Environmental Impact Statement* (EIS) efforts. Mr. Carter Luke, Engineering Program Manager of DOT-H, introduced the project team and elaborated on the efforts to gather information from harbor users and the public throughout the process to date. He also noted DOT-H is enterprising and independent of the Hawaii State Government's general fund, wholly dependent on revenues generated by relevant user fees. Mr. Jeff Overton, Principal of Group 70, presented the power point presentation on the EIS and the *2040 Master Plan*. The presentation is posted on the following website: http://kalaeloaharbor2040.com. Meeting participants were given the opportunity during and after the presentation to provide input and ask questions.

Below is a summary of the various topics and the discussions. DOT-H and Group 70 responses where included are *italicized.*

Fuel Pier and Harbor Improvements EIS

Dredging at the Fuel Pier

- There is a need for dredging at Piers 3 and 4 to allow for larger tankers to come in.

  A hydrographic study was completed and volume calculations estimate approximately 580 cubic yards of sediment will need to be dredged in the area outside of the Federal Project Line. This will be maintenance dredging, but any increase beyond the minus 38 feet will be new, 'virgin' dredging. The Piers 3 and 4 structures (e.g., pilings or sheet piles) will be designed and built to accommodate a minus 45 feet design depth to accommodate the future deepening project. The U.S. Army Corps of Engineers (USACE) will be dredging the remainder of the harbor basin and the entrance channel once the Feasibility Study is complete and federal funds are available to complete the design and construction phases.

Liquefied Natural Gas (LNG)

- Does this EIS preclude a bulk LNG storage facility from being built?

  No, the EISPN determination at this time does not preclude an applicant from seeking to develop bulk LNG at KBPH. LNG may be considered at such time that there is enough information to evaluate the feasibility, proposed land requirements, operational needs, and specific impacts on other users within KBPH.

- Are LNG International Standards Organization (ISO) containers being reviewed in the EIS?

  ISO containers would be considered as containerized cargo at Piers 5 and 6, and are not part of the EIS proposed action. Environmental review for ISO containers activity would need to be undertaken by an applicant seeking to lease land at KBPH for storage.

Public Access

- Will the boat ramp be cut off from public access?

  No, the restricted access will just be for entry to the Fuel Terminal (i.e., the Piers 1, 3 and 4 area). The current access to the ramp is through the Phoenician lease area and is assumed to remain unaffected at this time.

Accidental Fuel Spill

- In the event of an accidental spill at the Fuel Pier, how would you contain it, and would you have containment material on site? You have the Ko Olina Marina and the open ocean. You have two cross currents not too far offshore – one heading 'Ewa, and the other heading Diamond Head.

  Yes, by law, spill response organizations are already at KBPH. Each vessel licensed to carry fuel is required to prevent spills and to rapidly respond to any spills. Oil spill response equipment and personnel are staged at KBPH during fuel transfers as back-up. Coverage outside of the harbor has not been conducted as the scope is focused on containment within the harbor.

  At present, there is an absorbent boom mounted within the piling system under Piers 5 and 6, and U.S. Coast Guard regulations for the commercial harbors require vessels be encircled by absorbent booms prior to fuel transfer. A boom would be put across the opening of the harbor entrance in the event of a spill. One advantage to the Fuel Pier at this location is that the harbor configuration in prevailing trade winds would push spills against Piers 3 and 4. Spill response boats within KBPH would quickly respond to trap any accidental spills before spreading out into the ocean.

2040 Master Plan

Roadways and Access

- It is highly urged to open up the Kalaeloa Harbor Access Road as soon as possible, and should coincide with the building of the Fuel Pier. Right now, Sause Bros imports between five and ten tons of cargo every month. This translates to a significant number of trucks on the road. DOT did a good job on Kapolei Highway that links Campbell to KBPH. Traffic from North / South Road (Kualakai) has increased. This new access road will help with emergency response if something happens at Malakole Road.

  The timing for the construction of Kalaeloa Harbor Access Road will depend upon the development of neighboring Kapolei Harborside.

- Wasn't there an overall master plan for the area to have a road out to Honokai Hale?

  There was a road planned for Kapolei West, but it did not tie in to relieving harbor traffic.

- The controlled access near the new harbor entrance would not work very well for those that have to go in every day to access Maritime Support Services.

  This controlled access could be moved further south and S-7 cargo yard fenced in to allow for uninterrupted access to daily users.

Master Plan Projects Phasing

- When will some of these projects occur? It seems like the access road is important, and some of these projects are tied in to other processes. If the Fuel Pier is initiated, utilities will need to be installed.

  Initial projects that the 2040 Master Plan will recommend includes the installation of electric and water utilities in the Pier 9 / Maritime Support Services Area. This will prepare the site for the Marisco move from their current location at Pier 3 to the new location at Pier 9. During this time design of the Fuel Pier will take place. Appropriations have been requested to start the design of the Fuel Pier in fiscal year 2016. The 2040 Master Plan will recommend the installation of a bollard at Pier 6 and the extension of Pier 7 and its associated cargo yard to occur within the next five years. Construction of Kalaeloa Harbor Access Road will be dependent on the development of neighboring Kapolei Harborside.

Liquid Bulk at Piers 5 and 6

- Will Piers 5 and 6 no longer be available for fuel transfer use?

  Piers 5 and 6 will be available as a backup fueling berth to Piers 3 and 4 as long as the pipelines are maintained. This will also allow for redundancy and ensure the security of fuel supply.

- Sause Bros. contends with the fuel tankers that are at Pier 5, and are getting squeezed by berthing space and time. The Fuel Pier will help to relieve this pressure.

Harbor Dredging

- Will planning for the Fuel Pier re-engage the harbor dredge study that was previously initiated? How long will the process take, and will this affect the Fuel Pier? If fuel companies lean on Congress, will it help the USACE to progress on the study?

  Yes, the Feasibility Study for the deepening of the harbor will restart. The USACE has to complete the Study within three years per new requirements. This Study is independent of the Fuel Pier and will not affect construction schedule of it. One thing industry can do to support the process is to respond to upcoming requests from USACE for specific information in a timely manner.

Those Present:

A and B Electric – M. Barcurle, Jr.
Aloha Petroleum – J. Finch
Alston Hunt Floyed & Ing – B. Kaneko
Amergent Techs – W. Anonsen
AmeriGas – B. Kawano
Campbell Companies – S. Kelly
City and County of Honolulu, Department of Planning and Permitting – G. Atta
Clean Islands Council – K. Beasley
Councilmember Pine's Office – K. Polk
Grace Pacific – J. Shacat
Hawaii Army National Guard – A. Kieran-Vast
Hawaii Fire Department – J. Pacheco
Hawaii Independent Energy – J. Hibner, L. Tanaka
Hawaii Pilots Association – S. Brown, E. Enos
Hawaiian Cement – J. Gomes
HawaiiGas – J. Boivin
HDR, Inc. – G. Haraguchi, K. Komatsubara
Healy Tibbitts – C. Hutchinson
Kanehili – P.K. Pomaikai
Ko Olina Marina – D. Everson
Ko Olina Resort – K. Vasquez
Marisco – F. Anawati, M. Anawati, J. Stewart, M. Stewart
Resident – G. Gomes, L. Leonardi, D. Pomaikai
Road & Highway Builders – M. Mooney
State of Hawaii, Department of Business Economic Development – L. Viray
State of Hawaii, Department of Land and Natural Resources, Division of Aquatic Resources – P. Murakawa
State of Hawaii, Department of Transportation (DOT) – F. Fuchigami
State of Hawaii, DOT, Harbors Division – R. Grune, C. Luke, B. Toba, D. Watase, S. Dale, S. Rossetter, D. Vo
State of Hawaii, House of Representatives – K. Awana
State of Hawaii, Public Utilities Commission – M. Tome
U.S. Army Corps of Engineers – M. Yoshimoto
U.S. Department of Homeland Security – R. Mitchem
Villa Rose – D. Lawson
Wespac – B. Thompson
Zilkha – T. Tolkinen

Appendix J
Fuel Pier Configurations Memorandum
(Amergent Techs)

Memorandum

Date: 27 January 2014

From: William Anonsen

To: Barbara Natale/Jeff Overton

Subject: Fuel Piers Development Plan – Vessel Berthing Configurations

Alternative Design A: Segmented Partial Piers (Piers 3, 4a, and 4b)

Phase 1
The following vessel configurations are available options, to include LHG tank vessels:

a) One x 700 ft. to 751 ft. Panamax Tank Ship
b) One x 650 ft. to 700 ft. Handimax/ATB Tank Vessel
c) One x 600 ft. Handimax/ATB Tank Vessel; and
One x 300 ft. Tank Barge
d) Two x 300 ft. to 400 ft. Tank Barges (to serve the vast majority of inter-island barge transfer activities). These vessels will be able to berth either port/starboard side to, although the preferred berthing will be portside to Pier 3 and starboard side to Pier 4. During this incremental phase, on conflicting days, either the Tank Ship or Tank Barge can be accommodated at Piers 5 or 6.

Dock apron fuel/LHG connection points

Pier 3
350 ft. mark: Inter-Island Tank Barges
400 ft. mark: Fuel/LHG Tank Vessels
425 ft. mark: Fuel/LHG Tank Vessels

Pier 4a
850 ft. mark: Inter-Island Tank Vessels
900 ft. mark: Inter-Island Tank Vessels

Details of each configuration are as follows:

1. **Panamax 751 ft. Tank Ship** (Pier 3: Centerline raiser 425 ft. mark, with bow/stern at 50 ft. mark and stern/bow at 801 ft. mark). The vast majority of Panamax tank ships will not be larger than 650 ft. to 700 ft. Similar berthing allowances can be anticipated with the ATB mooring portside or starboard side.
2. **Handimax/ATB 600 ft. Tank Ship** (Pier 3: Centerline raiser 350 ft. mark, with bow/stern at 50 ft. mark and stern/bow at 650' mark.
and
Inter-Island 300 ft. Tank Barge (Pier 4a: Centerline raiser 900 ft. mark, with bow/stern at 750' mark and stern/bow at 1050' mark

Memorandum

3. **ATB/LHG 600 ft. Tank Ship**
    1. Moored *portside* to, and with tug in notch an additional 100 ft. is added for an overall length of approximately 700 ft. (Pier 3: Centerline raiser 400 ft. mark, with ATB bow at 100 ft. and stern at 700 ft. mark, tug stern at 800 ft.).
        i. Option of using the centerline raiser at 425 ft. mark, with ATB bow at 125 ft. and stern at 725 ft. mark, tug stern at 825 ft.
        ii. Option of using the centerline raiser at 350 ft. mark, with ATB bow at 50 ft. and stern at 650 ft. mark, tug stern at 750 ft.

    2. Moored *starboard* side to, and with tug in notch an additional 100 ft. is added for an overall length of approximately 700 ft. (Pier 3: Centerline raiser 400 ft. mark, with ATB stern at 100 ft. mark, tug stern at 00 ft. and bow at 700 ft. mark).
        i. Option of using the centerline raiser at 425 ft. mark, with ATB stern at 125 ft., tug stern at 25 ft. and bow at 725 ft. mark.
        ii. Option of using the centerline raiser at 350 ft. mark, with ATB stern at 50 ft., and bow at 650 ft. mark, tug would need to disengaged from ATB

4. **Two Inter-Island Tank Barges up to 400 ft.**
    a.) **Tank Barge # 1** (Pier 3: Centerline raiser 350 ft. mark, with bow at 150 ft. and stern at 550 ft. marks) with 100 ft. between the two tank barges. If only a single Tank Barge is on the berth, there would also be the option of using the centerline raiser at 400 ft. and 425 ft. marks.

    b.) **Tank Barge # 2** (Pier 4a: Centerline raiser 850 ft. mark, with bow at 650 ft. and stern at 1,050 ft. marks) with 150 ft. to the finger pier, thus providing 100 ft. safety zone with a tug / workboat moored on the west side of the finger pier.

The location of Pier 4a is as close to the Finger Pier as possible to provide full access to both sides of the Finger Pier with a safe navigational allowance. The beam of the customary / new generation ASD (Azmiuth Stern Drive) assist tugs are nearly 50 ft., and with a 100 ft. safety zone around the tank barge, this is the recommended positioning for that series of dockside fuel transfer connections. Although standard ASD are approximately 600 ft. in length, with their push tug unit it adds approximately 100 ft. to their overall length when engaged. This is the preferred configuration, although to accommodate rare / unique berthing allowances the tug unit can be disengaged from the tank barge if necessary.

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Phase 2

Construction of Pier 4b extension

If deemed by the harbor users/stakeholders and/or DOT-H as desirable in the future, then a consideration should be employed to implement a Phase 2. Phase 2 of Alternative A would expand the Pier 4 breasting dolphin to service as a segmented pier with a fuel hatch connection, with one additional segmented pier and one breasting dolphin. This would remove the Finger Pier and replacement of the berthing (i.e. to Pier 8, etc.) for the on-station commercial support service vessels. This could become problematic if an LNG Terminal facility is planned for Pier 8 (in the mauka area of KBPH).

This incremental expansion may be needed due to any potential increase in refined products in the future with the anticipated closure of one or both of the local refineries. With the introduction of LNG, the overall petroleum products (particularly crude oil) will drop significantly.

For Phase 2, all of the similar configurations available, in addition to the following:

a) **One x 700 ft. to 751 ft. Panamax Tank Vessel; and**
   One x 300 ft. to 400 ft. Tank Barge
b) **Two x 600 ft. Handimax/ATB Tank Vessels**

Additional dock apron fuel connection points

Pier 4b
1,020 ft. mark: Inter-Island Tank Vessels
1,120 ft. mark: Inter-Island Tank Vessels

Details of each configuration are as follows:

1. **Panamax 751 ft. Tank Ship** (Pier 3: Centerline raiser 425 ft. mark, with bow/stern at 50 ft. mark and stern/bow at 801 ft. mark). The vast majority of Panamax tank ships will not be larger than 650 ft. to 700 ft. Similar berthing allowances can be anticipated with the ATB mooring portside or starboard side.
   Inter-Island 400 ft. Tank Barge (Pier 4b: Centerline raiser 1,120 ft. mark, with bow/stern at 920 ft. mark and stern/bow at 1,320 ft. mark)

2. **Handimax 600 ft. Tank Ship** (Pier 3: Centerline raiser 350 ft. mark, with hose extension to 320 ft. mark, with bow/stern at 20 ft. mark and stern/bow at 620' mark)
   Handimax 600 ft. Tank Ship (Pier 4b: Centerline raiser 1,020 ft. mark, with bow/stern at 720' mark and stern/bow at 1,320' mark)

Alternative Design B: Continuous Wharf on Concrete Piles
Alternative Design C: Continuous Bulkhead with Sheet Piles

Phase 1; Alternative Designs B and C will have the same vessel mooring configurations as Alternative A (Phase 1)
Phase 2; Alternative Designs B and C will have the same vessel mooring configurations as Alternative A (Phase 2)

Appendix K
2014 Cost Estimates for Fuel Pier Development
(Kai Hawai‘i)

2/26/2014

Alternative A - Segmented Piers, Phase 1

Various Segments

20" square reinforced concrete piles

124 piles
Deck Slab: 6" thick reinforced concrete over 18" thick precast planks

Pile caps: 4'-0" wide x 5-0" thick

ITEM NO.	DESCRIPTION	QTY	UNIT	UNIT COST LABOR	MAT	EQUIP	SUB TOTAL	TOTAL
1.0	**Mobilization**							
1.1	Mobilization	1	LS	$ 150,000	$ 100,000	$ 100,000	$ 350,000	$ 350,000
1.2	Install BMP's	1	LS	$ 15,000	$ 10,000	$ 5,000	$ 30,000	$ 30,000
2.0	**DEMOLITION**							
2.1	Demolition of existing structures	1	LS	$ 500,000	$ 500,000	$ 500,000	$ 1,500,000	$ 1,500,000
3.0	**CONSTRUCTION**							
3.1	Adjust BMP's	1	LS	$ 5,000	$ 5,000	$ 5,000	$ 15,000	$ 15,000
3.2	Furnish prestressed concrete piles (124 piles x 70 lf ea.)	8680	LF	$ 50	$ 50	$ 50	$ 150.00	$ 1,302,000
3.3	Drive concrete piles	8680	LF	$ 25	$ 25.00	$ 30	$ 80.00	$ 694,400
3.4	Predrilling for piles	2170	LF	$ 40.00	$ 40.00	$ 40.00	$ 120.00	$ 260,400
3.5	Furnish and Install test pile	2	EA	$ 6,000	$ 6,000	$ 6,000	$ 18,000	$ 36,000
3.6	Testing (pile dynamic analysis)	2	LS	$ 4,000	$ -	$ 4,000	$ 8,000	$ 16,000
3.7	Form new pilecaps	18000	CF	$ 1.50	$ 1.75	$ 0.50	$ 4	$ 67,500
3.8	Place rebar for new pilecaps	24500	LBS	$ 0.65	$ 1.25	$ 0.10	$ 2	$ 49,000
3.9	Concrete for new pilecaps	700	CY	$ 450	$ 325	$ 75	$ 850	$ 595,000
3.10	Strip formwork, repair bugholes	18000	CF	$ 1.35	$ 0.50	$ 0.15	$ 2	$ 36,000
3.11	Furnish precast deck planks (8' wide x 20' long x 18" deep)	13800	SF	$ 4.50	$ 17.00	$ 4.50	$ 26.00	$ 358,800
3.12	Install precast deck planks	13800	SF	$ 4.50	$ 1.00	$ 4.50	$ 10.00	$ 138,000
3.13	Rebar for deck	8960	LBS	$ 1.10	$ 0.50	$ 0.15	$ 1.75	$ 15,680
3.14	Concrete for deck	256	CY	$ 450	$ 325	$ 75	$ 850	$ 217,600
3.15	Finish concrete deck	13800	SF	$ 0.65	$ -	$ 0.20	$ 0.85	$ 11,730
3.16	Install new mooring bollard	12	EA	$ 10,000	$ 5,000	$ 1,000	$ 16,000	$ 192,000
3.17	Install new rubber fenders	450	LF	$ 50.00	$ 125.00	$ 25.00	$ 200	$ 90,000
3.18	Aluminum Walkways	1	LS	$ 75,000.00	$ 50,000.00	$ 25,000.00	$ 150,000	$ 150,000
3.19	Embankment Erosion Protection	1200	LF	$ 150.00	$ 300.00	$ 150.00	$ 600	$ 720,000
4.0	**UTILITIES**							
4.1	Water	1	LS	$ 250,000	$ 250,000	$ 250,000	$ 750,000	$ 750,000
4.2	Electric	1	LS	$ 300,000.00	$ 300,000.00	$ 300,000.00	$ 900,000	$ 900,000
4.3	Fuel System	1	LS	$ 500,000	$ 500,000	$ 500,000	$ 1,500,000	$ 1,500,000
		SUB-TOTAL OF ALTERNATIVE A, PHASE 1 =						**$ 9,995,110**
5.1	General Conditions (25% of direct labor cost)							$ 878,938
5.2	Insurance (25% of direct labor cost)							$ 878,938
5.3	Profit (15% of direct labor and insurance)							$ 263,681
5.4	Bond (1% of direct labor, insurance, profit, and equipment rental)							$ 20,216
5.4	Tax (4.712%)							$483,394
		TOTAL CONSTRUCTION OF ALTERNATIVE A, PHASE 1 =						**$12,520,277**

Kalaeloa Barbers Point
Fuel Pier
Preliminary Structural Cost Estimate

2/26/2014

Alternative A - Segmented Piers, Phase 2

Various Segments

20" square reinforced concrete piles

161 piles
Deck Slab: 6" thick reinforced concrete over 18" thick precast planks

Pile caps: 4'-0" wide x 5-0" thick

ITEM NO.	DESCRIPTION	QTY	UNIT	UNIT COST LABOR	MAT	EQUIP	SUB TOTAL	TOTAL
1.0	**Mobilization**							
1.1	Mobilization	1	LS	$ 200,000	$ 150,000	$ 150,000	$ 500,000	$ 500,000
1.2	Install BMP's	1	LS	$ 25,000	$ 15,000	$ 10,000	$ 50,000	$ 50,000
2.0	**DEMOLITION**							
2.1	Demolition of existing structures	1	LS	$ 500,000	$ 500,000	$ 500,000	$ 1,500,000	$ 1,500,000
3.0	**CONSTRUCTION**							
3.1	Adjust BMP's	1	LS	$ 5,000	$ 5,000	$ 5,000	$ 15,000	$ 15,000
3.2	Furnish prestressed concrete piles (161 piles x 70 lf ea.)	11270	LF	$ 50	$ 50	$ 50	$ 150.00	$ 1,690,500
3.3	Drive concrete piles	11270	LF	$ 25	$ 25.00	$ 30	$ 80.00	$ 901,600
3.4	Predrilling for piles	2818	LF	$ 40.00	$ 40.00	$ 40.00	$ 120.00	$ 338,160
3.5	Furnish and install test pile	2	EA	$ 6,000	$ 6,000	$ 6,000	$ 18,000	$ 36,000
3.6	Testing (pile dynamic analysis)	2	LS	$ 4,000	$ -	$ 4,000	$ 8,000	$ 16,000
3.7	Form new pilecaps	23000	CF	$ 1.50	$ 1.75	$ 0.50	$ 4	$ 86,250
3.8	Place rebar for new pilecaps	31325	LBS	$ 0.65	$ 1.25	$ 0.10	$ 2	$ 62,650
3.9	Concrete for new pilecaps	895	CY	$ 450	$ 325	$ 75	$ 850	$ 760,750
3.10	Strip formwork, repair bugholes	23000	CF	$ 1.35	$ 0.50	$ 0.15	$ 2	$ 46,000
3.11	Furnish precast deck planks (8' wide x 20' long x 18" deep)	18450	SF	$ 4.50	$ 17.00	$ 4.50	$ 26.00	$ 479,700
3.12	Install precast deck planks	18450	SF	$ 4.50	$ 1.00	$ 4.50	$ 10.00	$ 184,500
3.13	Rebar for deck	11970	LBS	$ 1.10	$ 0.50	$ 0.15	$ 1.75	$ 20,948
3.14	Concrete for deck	342	CY	$ 450	$ 325	$ 75	$ 850	$ 290,700
3.15	Finish concrete deck	18450	SF	$ 0.65	$ -	$ 0.20	$ 0.85	$ 15,683
3.16	Install new mooring bollard	14	EA	$ 10,000	$ 5,000	$ 1,000	$ 16,000	$ 224,000
3.17	Install new rubber fenders	575	LF	$ 50.00	$ 125.00	$ 25.00	$ 200	$ 115,000
3.18	Aluminum Walkways	1	LS	$ 85,000.00	$ 60,000.00	$ 30,000.00	$ 175,000	$ 175,000
3.19	Embankment Erosion Protection	1200	LF	$ 150.00	$ 300.00	$ 150.00	$ 600	$ 720,000
3.20	Demolition of Finger Pier at Pier 4	1	LS	$ 125,000.00	$ 125,000.00	$ 125,000.00	$ 375,000	$ 375,000
4.0	**UTILITIES**							
4.1	Water	1	LS	$ 300,000	$ 300,000	$ 300,000	$ 900,000	$ 900,000
4.2	Electric	1	LS	$ 400,000	$ 400,000	$ 400,000	$ 1,200,000	$ 1,200,000
4.3	Fuel System	1	LS	$ 600,000	$ 600,000	$ 600,000	$ 1,800,000	$ 1,800,000
		SUB-TOTAL OF ALTERNATIVE A, PHASE 2 =						**$ 12,503,440**
5.1	General Conditions (25% of direct labor cost)							$ 1,100,123
5.2	Insurance (25% of direct labor cost)							$ 1,100,123
5.3	Profit (15% of direct labor and insurance)							$ 330,037
5.4	Bond (1% of direct labor, insurance, profit, and equipment rental)							$ 25,303
5.5	Tax (4.712%)							$604,713
		TOTAL CONSTRUCTION OF ALTERNATIVE A, PHASE 2 =						**$15,663,738**
		TOTAL CONSTRUCTION OF ALTERNATIVE A, PHASE 1 =						**$12,520,277**
		ADDITIONAL COST FOR ALTERNATIVE A, PHASE 2 ONLY =						**$3,143,462**

2/26/2014

Alternative B - Continuous Wharf, Phase 1

65'-3" wide x 905' long

20" square reinforced concrete piles

228 piles
Deck Slab: 6" thick reinforced concrete over 18" thick precast planks

Pile caps: 4'-0" wide x 5-0" thick

ITEM NO.	DESCRIPTION	QTY	UNIT	UNIT COST LABOR	UNIT COST MAT	UNIT COST EQUIP	UNIT COST SUB TOTAL	TOTAL
1.0	**Mobilization**							
1.1	Mobilization	1	LS	$ 150,000	$ 100,000	$ 100,000	$ 350,000	$ 350,000
1.2	Install BMP's	1	LS	$ 15,000	$ 10,000	$ 5,000	$ 30,000	$ 30,000
2.0	**DEMOLITION**							
2.1	Demolition of existing structures	1	LS	$ 500,000	$ 500,000	$ 500,000	$ 1,500,000	$ 1,500,000
3.0	**CONSTRUCTION**							
3.1	Adjust BMP's	1	LS	$ 5,000	$ 5,000	$ 5,000	$ 15,000	$ 15,000
3.2	Furnish prestressed concrete piles (228 piles x 80 lf ea.)	18240	LF	$ 50.00	$ 50.00	$ 50.00	$ 150.00	$ 2,736,000
3.3	Drive concrete piles	18240	LF	$ 25.00	$ 25.00	$ 30.00	$ 150.00	$ 2,736,000
3.4	Predrilling for piles	4560	LF	$ 40.00	$ 40.00	$ 40.00	$ 120.00	$ 547,200
3.5	Install test pile	2	EA	$ 6,000	$ 6,000	$ 6,000	$ 13,000	$ 26,000
3.6	Testing (pile dynamic analysis)	2	LS	$ 4,000	$ -	$ 4,000	$ 8,000	$ 16,000
3.7	Form new pilecaps	36200	CF	$ 1.50	$ 1.75	$ 0.50	$ 3.75	$ 135,750
3.8	Place rebar for new pilecaps	45500	LBS	$ 0.65	$ 1.25	$ 0.10	$ 2	$ 91,000
3.9	Concrete for new pilecaps	1340	CY	$ 450	$ 325	$ 75	$ 850	$ 1,139,000
3.10	Strip formwork, repair bugholes	36200	CF	$ 1.35	$ 0.50	$ 0.15	$ 2.00	$ 72,400
3.11	Furnish precast deck planks (8' wide x 20' long x 18" deep)	58825	SF	$ 4.50	$ 17.00	$ 4.50	$ 26.00	$ 1,529,450
3.12	Install precast deck planks	58825	SF	$ 4.50	$ 1.00	$ 4.50	$ 10.00	$ 588,250
3.13	Rebar for deck	36900	LBS	$ 1.10	$ 0.50	$ 0.15	$ 1.75	$ 64,575
3.14	Concrete for deck	1090	CY	$ 450	$ 325	$ 75	$ 850	$ 926,500
3.15	Finish concrete deck	58825	SF	$ 0.65	$ -	$ 0.20	$ 0.85	$ 50,001
3.16	Install new mooring bollard	13	EA	$ 10,000	$ 5,000	$ 1,000	$ 16,000	$ 208,000
3.17	Install new rubber fenders	905	LF	$ 50.00	$ 125.00	$ 25.00	$ 200	$ 181,000
3.18	Embankment Erosion Protection	1200	LF	$ 150.00	$ 300.00	$ 150.00	$ 600	$ 720,000
4.0	**UTILITIES**							
4.1	Water	1	LS	$ 250,000	$ 250,000	$ 250,000	$ 750,000	$ 750,000
4.2	Electric	1	LS	$ 300,000	$ 300,000	$ 300,000	$ 900,000	$ 900,000
4.3	Fuel System	1	LS	$ 500,000	$ 500,000	$ 500,000	$ 1,500,000	$ 1,500,000
		SUB-TOTAL OF ALTERNATIVE B, PHASE 1 =						**$ 16,812,126**
5.1	General Conditions (25% of direct labor cost)							$ 1,370,037
5.2	Insurance (25% of direct labor cost)							$ 1,370,037
5.3	Profit (15% of direct labor and insurance)							$ 411,011
5.4	Bond (1% of direct labor, insurance, profit, and equipment rental)							$ 31,511
5.5	Tax (4.712%)							$811,554
		TOTAL CONSTRUCTION OF ALTERNATIVE B, PHASE 1 =						**$20,806,275**

Kalaeloa Barbers Point
Fuel Pier
Preliminary Structural Cost Estimate

2/26/2014

Alternative B - Continuous Wharf, Phase 2

65'-3" wide x 145' long

20" square reinforced concrete piles

36 piles
Deck Slab: 6" thick reinforced concrete over 18" thick precast planks

Pile caps: 4'-0" wide x 5-0" thick

ITEM NO.	DESCRIPTION	QTY	UNIT	UNIT COST LABOR	UNIT COST MAT	UNIT COST EQUIP	UNIT COST SUB TOTAL	TOTAL
1.0	**Mobilization**							
1.1	Mobilization	1	LS	$ 200,000	$ 150,000	$ 150,000	$ 500,000	$ 500,000
1.2	Install BMP's	1	LS	$ 25,000	$ 15,000	$ 10,000	$ 50,000	$ 50,000
2.0	**DEMOLITION**							
2.1	Demolition of existing structures	1	LS	$ 500,000	$ 500,000	$ 500,000	$ 1,500,000	$ 1,500,000
3.0	**CONSTRUCTION**							
3.1	Adjust BMP's	1	LS	$ 5,000	$ 5,000	$ 5,000	$ 15,000	$ 15,000
3.2	Furnish prestressed concrete piles (36 piles x 80 lf ea.)	2880	LF	$ 50.00	$ 50.00	$ 50.00	$ 150.00	$ 432,000
3.3	Drive concrete piles	2880	LF	$ 25.00	$ 25.00	$ 30.00	$ 80.00	$ 230,400
3.4	Predrilling for piles	720	LF	$ 40.00	$ 40.00	$ 40.00	$ 120.00	$ 86,400
3.5	Install test pile	2	EA	$ 6,000	$ 6,000	$ 6,000	$ 18,000	$ 36,000
3.6	Testing (pile dynamic analysis)	2	LS	$ 4,000	$ -	$ 4,000	$ 8,000	$ 16,000
3.7	Form new pilecaps	42000	CF	$ 1.50	$ 1.75	$ 0.50	$ 3.75	$ 157,500
3.8	Place rebar for new pilecaps	57190	LBS	$ 0.65	$ 1.25	$ 0.10	$ 2	$ 114,380
3.9	Concrete for new pilecaps	1634	CY	$ 450	$ 325	$ 75	$ 850	$ 1,388,900
3.10	Strip formwork, repair bugholes	42000	CF	$ 1.35	$ 0.50	$ 0.15	$ 2.00	$ 84,000
3.11	Furnish precast deck planks (8' wide x 20' long x 18" deep)	68515	SF	$ 4.50	$ 17.00	$ 4.50	$ 26.00	$ 1,781,390
3.12	Install precast deck planks	68515	SF	$ 4.50	$ 1.00	$ 4.50	$ 10.00	$ 685,150
3.13	Rebar for deck	44415	LBS	$ 1.10	$ 0.50	$ 0.15	$ 1.75	$ 77,726
3.14	Concrete for deck	1269	CY	$ 450	$ 325	$ 75	$ 850	$ 1,078,650
3.15	Finish concrete deck	68515	SF	$ 0.65	$ -	$ 0.20	$ 0.85	$ 58,238
3.16	Install new mooring bollard	15	EA	$ 10,000	$ 5,000	$ 1,000	$ 16,000	$ 240,000
3.17	Install new rubber fenders	1050	LF	$ 50.00	$ 125.00	$ 25.00	$ 200	$ 210,000
3.18	Embankment Erosion Protection	1200	LF	$ 150.00	$ 300.00	$ 150.00	$ 600	$ 720,000
3.19	Demolition of Finger Pier at Pier 4	1	LS	$ 125,000.00	$ 125,000.00	$ 125,000.00	$ 375,000	$ 375,000
4.0	**UTILITIES**							
4.1	Water	1	LS	$ 300,000	$ 300,000	$ 300,000	$ 900,000	$ 900,000
4.2	Electric	1	LS	$ 400,000	$ 400,000	$ 400,000	$ 1,200,000	$ 1,200,000
4.3	Fuel System	1	LS	$ 600,000	$ 600,000	$ 600,000	$ 1,800,000	$ 1,800,000
		SUB-TOTAL OF ALTERNATIVE B, PHASE 2 =						**$ 13,736,734**
5.1	General Conditions (25% of direct labor cost)							$ 1,243,887
5.2	Insurance (25% of direct labor cost)							$ 1,243,887
5.3	Profit (15% of direct labor and insurance)							$ 373,166
5.4	Bond (1% of direct labor, insurance, profit, and equipment rental)							$ 28,609
5.5	Tax (4.712%)							$664,858
		TOTAL CONSTRUCTION OF ALTERNATIVE B, PHASE 2 =						**$17,291,143**
		TOTAL CONSTRUCTION OF ALTERNATIVE B, PHASE 1 =						**$20,806,275**
		ADDITIONAL COST FOR ALTERNATIVE B, PHASE 2 ONLY =						**-$3,515,132**

2/26/2014

Alternative C - Continuous Bulkhead, Phase 1

55' wide x 900' long

Continuous Steel Sheet Pile

0 piles
Deck Slab: 6" thick reinforced concrete
Pile cap: 4'-0" wide x 6-9" thick, Deadman: 5'-6" x 3'-0" wide

ITEM NO.	DESCRIPTION	QTY	UNIT	UNIT COST LABOR	MAT	EQUIP	SUB TOTAL	TOTAL
1.0	**Mobilization**							
1.1	Mobilization	1	LS	$ 150,000	$ 100,000	$ 100,000	$ 350,000	$ 350,000
1.2	Install BMP's	1	LS	$ 15,000	$ 10,000	$ 5,000	$ 30,000	$ 30,000
2.0	**DEMOLITION**							
2.1	Demolition of existing structures	1	LS	$ 500,000	$ 500,000	$ 500,000	$ 1,500,000	$ 1,500,000
3.0	**CONSTRUCTION**							
3.1	Adjust BMP's	1	LS	$ 2,000	$ 1,500	$ 500	$ 4,000	$ 4,000
3.2	Backfill (material, placement and compaction)	15000	CY	$ 7.50	$ 10.00	$ 7.50	$ 25.00	$ 375,000
3.3	Furnish and install steel sheet pile (1000' long x 80 lf ea.)	80000	SF	$ 15.00	$ 14.00	$ 15.00	$ 44.00	$ 3,520,000
3.4	Form new pilecap	27000	CF	$ 1.50	$ 1.75	$ 0.50	$ 3.75	$ 101,250
3.5	Trenching for deadman	580	CY	$ 4.00	$ 1.00	$ 4.00	$ 9.00	$ 5,220
3.6	Place rebar for new pilecap and deadman	57050	LBS	$ 0.65	$ 1.25	$ 0.10	$ 2	$ 114,100
3.7	Concrete for new pilecap and deadman	1630	CY	$ 450	$ 325	$ 75	$ 850	$ 1,385,500
3.8	Strip formwork, repair bugholes	27000	CF	$ 1.35	$ 0.50	$ 0.15	$ 2	$ 54,000
3.9	Rebar for deck	32200	LBS	$ 1.10	$ 0.50	$ 0.15	$ 1.75	$ 56,350
3.10	Concrete for deck	920	CY	$ 450	$ 325	$ 75	$ 850	$ 782,000
3.11	Finish concrete deck	49500	SF	$ 0.65	$ -	$ 0.20	$ 0.85	$ 42,075
3.12	Install new mooring bollard	13	EA	$ 10,000	$ 5,000	$ 1,000	$ 16,000	$ 208,000
3.13	Install new rubber fenders	900	LF	$ 50.00	$ 125.00	$ 25.00	$ 200	$ 180,000
4.0	**UTILITIES**							
4.1	Water	1	LS	$ 250,000	$ 250,000	$ 250,000	$ 750,000	$ 750,000
4.2	Electric	1	LS	$ 300,000	$ 300,000	$ 300,000	$ 900,000	$ 900,000
4.3	Fuel System	1	LS	$ 500,000	$ 500,000	$ 500,000	$ 1,500,000	$ 1,500,000
		SUB-TOTAL OF ALTERNATIVE C, PHASE 1 =						**$ 11,857,495**
5.1	General Conditions (25% of direct labor cost)							$ 1,133,987
5.2	Insurance (25% of direct labor cost)							$ 1,133,987
5.3	Profit (15% of direct labor and insurance)							$ 340,196
5.4	Bond (1% of direct labor, insurance, profit, and equipment rental)							$ 26,082
5.5	Tax (4.712%)							$ 574,755
		TOTAL CONSTRUCTION OF ALTERNATIVE C, PHASE 1 =						**$15,066,502**

2/26/2014

Alternative C - Continuous Bulkhead, Phase 2

55' wide x 1050' long

Continuous Steel Sheet Pile

0 piles
Deck Slab: 6" thick reinforced concrete
Pile cap: 4'-0" wide x 6-9" thick, Deadman: 5'-6" x 3'-0" wide

ITEM NO.	DESCRIPTION	QTY	UNIT	UNIT COST LABOR	MAT	EQUIP	SUB TOTAL	TOTAL
1.0	**Mobilization**							
1.1	Mobilization	1	LS	$ 200,000	$ 150,000	$ 150,000	$ 500,000	$ 500,000
1.2	Install BMP's	1	LS	$ 25,000	$ 15,000	$ 10,000	$ 50,000	$ 50,000
2.0	**DEMOLITION**							
2.1	Demolition of existing structures	1	LS	$ 500,000	$ 500,000	$ 500,000	$ 1,500,000	$ 1,500,000
3.0	**CONSTRUCTION**							
3.1	Adjust BMP's	1	LS	$ 2,000	$ 1,500	$ 500	$ 4,000	$ 4,000
3.2	Backfill (material, placement and compaction)	17500	CY	$ 7.50	$ 10.00	$ 7.50	$ 25.00	$ 437,500
3.3	Furnish and install steel sheet pile (1200' long x 80 lf ea.)	96000	SF	$ 15.00	$ 14.00	$ 15.00	$ 44.00	$ 4,224,000
3.4	Form new pilecap	32400	CF	$ 1.50	$ 1.75	$ 0.50	$ 3.75	$ 121,500
3.5	Trenching for deadman	675	CY	$ 4.00	$ 1.00	$ 4.00	$ 9.00	$ 6,075
3.6	Place rebar for new pilecap and deadman	67725	LBS	$ 0.65	$ 1.25	$ 0.10	$ 2	$ 135,450
3.7	Concrete for new pilecap and deadman	1935	CY	$ 450	$ 325	$ 75	$ 850	$ 1,644,750
3.8	Strip formwork, repair bugholes	32400	CF	$ 1.35	$ 0.50	$ 0.15	$ 2	$ 64,800
3.9	Rebar for deck	37800	LBS	$ 1.10	$ 0.50	$ 0.15	$ 1.75	$ 66,150
3.10	Concrete for deck	1080	CY	$ 450	$ 325	$ 75	$ 850	$ 918,000
3.11	Finish concrete deck	57750	SF	$ 0.65	$ -	$ 0.20	$ 0.85	$ 49,088
3.12	Install new mooring bollard	14	EA	$ 10,000	$ 5,000	$ 1,000	$ 16,000	$ 224,000
3.13	Install new rubber fenders	1050	LF	$ 50.00	$ 125.00	$ 25.00	$ 200	$ 210,000
3.14	Demolition of Finger Pier at Pier 4	1	LS	$ 125,000.00	$ 125,000.00	$ 125,000.00	$ 375,000	$ 375,000
4.0	**UTILITIES**							
4.1	Water	1	LS	$ 300,000	$ 300,000	$ 300,000	$ 900,000	$ 900,000
4.2	Electric	1	LS	$ 400,000	$ 400,000	$ 400,000	$ 1,200,000	$ 1,200,000
4.3	Fuel System	1	LS	$ 600,000	$ 600,000	$ 600,000	$ 1,800,000	$ 1,800,000
		SUB-TOTAL CONSTRUCTION OF ALTERNATIVE C =						**$ 14,430,313**
2.15	General Conditions (25% of direct labor cost)							$ 1,372,670
2.16	Insurance (25% of direct labor cost)							$ 1,372,670
2.17	Profit (15% of direct labor and insurance)							$ 411,801
2.18	Bond (1% of direct labor, insurance, profit, and equipment rental)							$ 31,571
2.19	Tax (4.712%)							$ 699,360
		TOTAL CONSTRUCTION OF ALTERNATIVE C =						**$18,318,385**
		TOTAL CONSTRUCTION OF ALTERNATIVE C, PHASE 1 =						**$15,066,502**
		ADDITIONAL COST FOR ALTERNATIVE C, PHASE 2 ONLY =						**$3,251,883**

Appendix L

2014 Rough Order of Magnitude Cost Estimates
(Rider Levett Bucknall)

DOT-Harbors Kalaeloa Barbers Point Harbor Master Plan
ROM Cost Estimate R2-110314

Summary with Margins Distributed

Rates Current At December 2014

Location			Total Cost
A	**MAJOR PROJECTS**		
	A1	Storage Yards S-7, Multi-Purpose Yard and Maritime Support Services: Coral Stockpile Removal	10,620,439
	A2	Northern Harbor (Piers 7, 8, 9 10): Utilities Infrastructure	3,101,614
	A3	Relocate Perimeter Road	10,190,602
	A4	Pier 9: Improvements	Excl.
	A5	Pier 7: Pier Extension and Cargo Yard Expansion	39,892,987
	A6	Piers 3&4: Fuel Pier Construction Phase I	43,020,722
	A7	Fuel Terminal: Fuel Terminal Construction	22,532,381
	A8	Pier 8: Layberth and Multi-Purpose Yard	73,938,621
	A9	Pier 4B: Finger Pier Removal and Fuel Pier Construction Phase II	20,278,561
	A10	Storage Yards S-7, Multi-Purpose Yard and Martime Support Services: Install Underground Power Lines	3,755,737
	A11	Kalaeloa Harbor Access Road: Construction on Property	794,028
	A12	Pier 10: Layberth	1,357,122
	A13	Dredging/Flaring Harbor Entrance and Dredging KBPH Basin (USACE)	80,000,232
		A - MAJOR PROJECTS	***$309,483,046***
B	**MINOR PROJECTS**		
	B1	Pier 6: Bollard Installation	111,240
	B2	Piers 5 and 6: Pier Improvements - Deleted	
	B3	Finger Pier and T-Pier: Minor Improvements	27,661
	B4	Pier 10: Emergency Access Connection to Ko Olina	14,090
	B5	Bulk Storage Areas S-A1, A2, B: Coral Stockpile Removal	6,466,951
	B6	Ko Olina Mole: Perimeter Lighting Improvements	35,597
	B7	Piers 5/6 and 7: Personnel Shelter Construction	2,589,522
	B8	Harbor Office Relocation	12,823,766
	B9	Piers 4/5, 8 and 10: Personnel Shelter Construction	2,992,681
	B10	Landscaping	148,320
		B - MINOR PROJECTS	***$25,209,828***
C	**NON-DOT-HARBORS PROJECTS**		
	C1	Marisco Relcoation (Marisco)	Excl.
	C2	Nagivational Aids (USCG)	
	C3	Installation of Fuel Pipelines (tenants)	
	C4	Dredging/Flaring Harbor Entrance and Dredging KBPH Basin (USACE) - moved to A13	
	C5	Kalaeloa Harbor Access Road: Construction Off Property (DOT-Highways, Kapolei Properties)	

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DOT-Harbors Kalaeloa Barbers Point Harbor Master Plan
ROM Cost Estimate R2-110314

Summary with Margins Distributed

Rates Current At December 2014

Location			Total Cost
	C6	Weigh Station (DOT-Highways)	
		C - NON-DOT-HARBORS PROJECTS	***Excl.***
		ESTIMATED NET COST	**$334,692,874**
MARGINS & ADJUSTMENTS			
Escalation beyond 2014			Excl.
		ESTIMATED TOTAL COST	**$334,692,874**

DOT-Harbors Kalaeloa Barbers Point Harbor Master Plan
ROM Cost Estimate R5-120114

Summary with Margins Separated

Rates Current At December 2014

Location			Total Cost
A MAJOR PROJECTS			
A1 Storage Yards S-7, Multi-Purpose Yard and Maritime Support Services: Coral Stockpile Removal			7,227,438
		A - MAJOR PROJECTS	***$7,227,438***
		ESTIMATED NET COST	**$7,227,438**
MARGINS & ADJUSTMENTS			
General Conditions	10.0 %		$722,744
Bond & Insurance	2.0 %		$159,004
Overhead and Profit	7.0 %		$567,643
General Excise Tax	2.0 %		$173,537
Estimating Contingency	20.0 %		$1,770,073
Escalation beyond 2014			Excl.
		ESTIMATED TOTAL COST	**$10,620,439**

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DOT-Harbors Kalaeloa Barbers Point Harbor Master Plan
ROM Cost Estimate R5-120114

Location Elements Item

A MAJOR PROJECTS

A1 Storage Yards S-7, Multi-Purpose Yard and Maritime Support Services: Coral Stockpile Removal

Rates Current At December 2014

Description	Unit	Qty	Rate	Total
G1010 Site Clearing				
1 Remove coral stockpile - volume based on assumed average height of 5' - by others	CY	246,481.60		Excl.
Site Clearing				***Excl.***
G1030 Site Earthwork				
2 Mass grading	SF	2,890,975.00	0.50	1,445,488
Site Earthwork				***$1,445,488***
G3030 Storm Sewer				
3 Drainage improvements	SF	2,890,975.00	2.00	5,781,950
Storm Sewer				***$5,781,950***
STORAGE YARDS S-7, MULTI-PURPOSE YARD AND MARITIME SUPPORT SERVICES: CORAL STOCKPILE REMOVAL				***$7,227,438***

DOT-Harbors Kalaeloa Barbers Point Harbor Master Plan
ROM Cost Estimate R5-120114

Summary with Margins Separated

Rates Current At December 2014

Location		Total Cost
A MAJOR PROJECTS		
A2 Northern Harbor (Piers 7, 8, 9 10): Utilities Infrastructure		2,000,250
A - MAJOR PROJECTS		***$2,000,250***
ESTIMATED NET COST		**$2,000,250**
MARGINS & ADJUSTMENTS		
General Conditions	15.0 %	$300,038
Bond & Insurance	2.0 %	$46,006
Overhead and Profit	8.0 %	$187,704
General Excise Tax	2.0 %	$50,680
Estimating Contingency	20.0 %	$516,936
Escalation beyond 2014		Excl.
ESTIMATED TOTAL COST		**$3,101,614**

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DOT-Harbors Kalaeloa Barbers Point Harbor Master Plan
ROM Cost Estimate R5-120114

Location Elements Item

A MAJOR PROJECTS

A2 Northern Harbor (Piers 7, 8, 9 10): Utilities Infrastructure

Rates Current At December 2014

Description	Unit	Qty	Rate	Total
G1030 Site Earthwork				
2 Mass grading	SF	61,700.00	0.50	30,850
Site Earthwork				***$30,850***
G3010 Water Supply				
4 Water & fire protection infrastructure lines & fire hydrants to piers 7-10 and 3 personnel shelters	LF	2,870.00	200.00	574,000
Water Supply				***$574,000***
G3030 Storm Sewer				
3 Drainage improvements	SF	61,700.00	2.00	123,400
Storm Sewer				***$123,400***
G4010 Electrical Distribution				
5 Temporary overhead power lines, telecommunication lines to piers 7-10 and 3 personnel shelters	LF	5,300.00	240.00	1,272,000
Electrical Distribution				***$1,272,000***
NORTHERN HARBOR (PIERS 7, 8, 9 10): UTILITIES INFRASTRUCTURE				***$2,000,250***

DOT-Harbors Kalaeloa Barbers Point Harbor Master Plan
ROM Cost Estimate R5-120114

Summary with Margins Separated

Rates Current At December 2014

Location		Total Cost
A MAJOR PROJECTS		
A3 Relocate Perimeter Road		6,934,925
	A - MAJOR PROJECTS	***$6,934,925***
	ESTIMATED NET COST	**$6,934,925**
MARGINS & ADJUSTMENTS		
General Conditions	10.0 %	$693,493
Bond & Insurance	2.0 %	$152,568
Overhead and Profit	7.0 %	$544,669
General Excise Tax	2.0 %	$166,513
Estimating Contingency	20.0 %	$1,698,434
Escalation beyond 2014		Excl.
	ESTIMATED TOTAL COST	**$10,190,602**

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DOT-Harbors Kalaeloa Barbers Point Harbor Master Plan
ROM Cost Estimate R5-120114

Location Elements Item

A MAJOR PROJECTS

A3 Relocate Perimeter Road

Rates Current At December 2014

Description		Unit	Qty	Rate	Total
G1030 Site Earthwork					
2 Mass grading		SF	1,931,170.00	0.50	965,585
	Site Earthwork				***$965,585***
G2010 Roadways					
7 New roadway, including AC paving & gutter		SF	103,200.00	12.00	1,238,400
	Roadways				***$1,238,400***
G3010 Water Supply					
10 Water system to Marisco, including meters, hydrants, backflow preventers, etc.		LF	2,000.00		Excl.
	Water Supply				***Excl.***
G3020 Sanitary Water					
11 Sewer system to Marisco, including manholes		LF	2,000.00		Excl.
	Sanitary Water				***Excl.***
G3030 Storm Sewer					
3 Drainage improvements		SF	1,827,970.00	2.00	3,655,940
9 Roadway drainage		LF	4,300.00	50.00	215,000
	Storm Sewer				***$3,870,940***
G4020 Site Lighting					
8 Roadway lighting		LF	4,300.00	200.00	860,000
	Site Lighting				***$860,000***
	RELOCATE PERIMETER ROAD				***$6,934,925***

DOT-Harbors Kalaeloa Barbers Point Harbor Master Plan
ROM Cost Estimate R5-120114

Summary with Margins Separated

Rates Current At December 2014

Location	Total Cost
A MAJOR PROJECTS	
A4 Pier 9: Improvements	Excl.
A - MAJOR PROJECTS	***Excl.***
ESTIMATED NET COST	**Excl.**

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DOT-Harbors Kalaeloa Barbers Point Harbor Master Plan
ROM Cost Estimate R5-120114

Location Elements Item

A MAJOR PROJECTS

A4 Pier 9: Improvements

Rates Current At December 2014

Description	Unit	Qty	Rate	Total
G2040 Site Development				
15 Pier 9 - by tenant	LF	950.00		Excl.
Site Development				***Excl.***
G3010 Water Supply				
16 Pier 9 improvements (water, sewer, power, lighting) by tenants	LS	1.00		Excl.
Water Supply				***Excl.***
PIER 9: IMPROVEMENTS				***Excl.***

DOT-Harbors Kalaeloa Barbers Point Harbor Master Plan
ROM Cost Estimate R5-120114

Summary with Margins Separated

Rates Current At December 2014

Location		Total Cost
A MAJOR PROJECTS		
A5 Pier 7: Pier Extension and Cargo Yard Expansion		27,911,640
A - MAJOR PROJECTS		***$27,911,640***
ESTIMATED NET COST		**$27,911,640**
MARGINS & ADJUSTMENTS		
General Conditions	8.0 %	$2,232,931
Bond & Insurance	2.0 %	$602,891
Overhead and Profit	6.0 %	$1,844,848
General Excise Tax	2.0 %	$651,846
Estimating Contingency	20.0 %	$6,648,831
Escalation beyond 2014		Excl.
ESTIMATED TOTAL COST		**$39,892,987**

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ROM Cost Estimate R5-120114

Location Elements Item

A MAJOR PROJECTS

A5 Pier 7: Pier Extension and Cargo Yard Expansion

Rates Current At December 2014

Description	Unit	Qty	Rate	Total
E2010 Fixed Furnishings				
26 First aid station	EA	1.00	400.00	400
Fixed Furnishings				***$400***
G2040 Site Development				
55 Vehicle gates	EA	1.00	5,000.00	5,000
17 Pier 7 extension (continuous wharf)	LF	200.00	43,400.00	8,680,000
21 Concrete hardstand	SF	566,280.00	25.00	14,157,000
24 Fencing	LF	3,100.00	105.00	325,500
54 Gates	Pr	1.00	1,500.00	1,500
Site Development				***$23,169,000***
G3010 Water Supply				
19 Spigot, wash/first aid station	LS	1.00	10,000.00	10,000
Water Supply				***$10,000***
G4010 Electrical Distribution				
43 Underground power lines	LF	400.00	500.00	200,000
Electrical Distribution				***$200,000***
G4020 Site Lighting				
23 Site lighting	SF	566,280.00	8.00	4,530,240
Site Lighting				***$4,530,240***
G4030 Site Communications & Security				
25 Emergency communication	LS	1.00	2,000.00	2,000
Site Communications & Security				***$2,000***
PIER 7: PIER EXTENSION AND CARGO YARD EXPANSION				***$27,911,640***

DOT-Harbors Kalaeloa Barbers Point Harbor Master Plan

ROM Cost Estimate R5-120114

Summary with Margins Separated

Rates Current At December 2014

Location		Total Cost
A MAJOR PROJECTS		
A6 Piers 3&4: Fuel Pier Construction Phase I		30,100,000
	A - MAJOR PROJECTS	***$30,100,000***
	ESTIMATED NET COST	**$30,100,000**
MARGINS & ADJUSTMENTS		
General Conditions	8.0 %	$2,408,000
Bond & Insurance	2.0 %	$650,160
Overhead and Profit	6.0 %	$1,989,490
General Excise Tax	2.0 %	$702,953
Estimating Contingency	20.0 %	$7,170,121
Escalation beyond 2014		Excl.
	ESTIMATED TOTAL COST	**$43,020,724**

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DOT-Harbors Kalaeloa Barbers Point Harbor Master Plan

ROM Cost Estimate R5-120114

Location Elements Item

A MAJOR PROJECTS

A6 Piers 3&4: Fuel Pier Construction Phase I

Rates Current At December 2014

Description	Unit	Qty	Rate	Total
G2040 Site Development				
27 Pier 3 & 4 (segmented)	LF	1,000.00	30,100.00	30,100,000
Site Development				***$30,100,000***
PIERS 3&4: FUEL PIER CONSTRUCTION PHASE I				***$30,100,000***

DOT-Harbors Kalaeloa Barbers Point Harbor Master Plan
ROM Cost Estimate R5-120114

Summary with Margins Separated

Rates Current At December 2014

Location		Total Cost
A MAJOR PROJECTS		
A7 Fuel Terminal: Fuel Terminal Construction		15,333,774
	A - MAJOR PROJECTS	***$15,333,774***
	ESTIMATED NET COST	**$15,333,774**
MARGINS & ADJUSTMENTS		
General Conditions	10.0 %	$1,533,377
Bond & Insurance	2.0 %	$337,343
Overhead and Profit	7.0 %	$1,204,315
General Excise Tax	2.0 %	$368,176
Estimating Contingency	20.0 %	$3,755,397
Escalation beyond 2014		Excl.
	ESTIMATED TOTAL COST	**$22,532,382**

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DOT-Harbors Kalaeloa Barbers Point Harbor Master Plan
ROM Cost Estimate R5-120114

Location Elements Item

A MAJOR PROJECTS

A7 Fuel Terminal: Fuel Terminal Construction

Rates Current At December 2014

Description	Unit	Qty	Rate	Total
F1010 Special Structures				
33 Fuel building - size assumed	SF	1,000.00	1,000.00	1,000,000
37 Security shack	EA	1.00	50,000.00	50,000
Special Structures				***$1,050,000***
G1020 Site Demolition and Relocations				
28 Miscellaneous demolition	SF	518,364.00	3.00	1,555,092
Site Demolition and Relocations				***$1,555,092***
G1030 Site Earthwork				
2 Mass grading	SF	518,364.00	0.50	259,182
Site Earthwork				***$259,182***
G2020 Parking Lots				
34 AC paving	SF	517,300.00	10.00	5,173,000
Parking Lots				***$5,173,000***
G2040 Site Development				
55 Vehicle gates	EA	1.00	5,000.00	5,000
24 Fencing	LF	2,300.00	105.00	241,500
36 Security fencing & video monitoring @ secondary containment	LF	1.00	300.00	300
39 Navigation (signage)	LS	1.00	50,000.00	50,000
54 Gates	Pr	1.00	1,500.00	1,500
Site Development				***$298,300***
G3010 Water Supply				
18 Water & fire protection lines & fire hydrants to piers	LF	2,000.00	200.00	400,000
30 Potable water for vessels	LS	1.00	100,000.00	100,000
32 Upgrade fire suppression system	LS	1.00	250,000.00	250,000
Water Supply				***$750,000***
G3020 Sanitary Water				
11 Sewer system to Marisco, including manholes	LF	1.00		Excl.
31 Upgraded individual wastewater system (IWS)	LS	1.00	300,000.00	300,000
Sanitary Water				***$300,000***
G3060 Fuel Distribution				
35 Pipeline rack (Arcadis less markups)	LS	1.00	1,527,800.00	1,527,800
Fuel Distribution				***$1,527,800***
G4010 Electrical Distribution				
29 Shore based electrical power for vessels	LS	1.00	80,000.00	80,000
Electrical Distribution				***$80,000***

DOT-Harbors Kalaeloa Barbers Point Harbor Master Plan

ROM Cost Estimate R5-120114

Location Elements Item

A MAJOR PROJECTS

A7 Fuel Terminal: Fuel Terminal Construction (continued)

Rates Current At December 2014

Description	Unit	Qty	Rate	Total
G4020 Site Lighting				
23 Site lighting	SF	517,300.00	8.00	4,138,400
Site Lighting				***$4,138,400***
G4030 Site Communications & Security				
25 Emergency communication	LS	1.00	2,000.00	2,000
38 Cameras, video	LS	1.00	200,000.00	200,000
Site Communications & Security				***$202,000***
FUEL TERMINAL: FUEL TERMINAL CONSTRUCTION				***$15,333,774***

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DOT-Harbors Kalaeloa Barbers Point Harbor Master Plan

ROM Cost Estimate R5-120114

Summary with Margins Separated

Rates Current At December 2014

Location		Total Cost
A MAJOR PROJECTS		
A8 Pier 8: Layberth and Multi-Purpose Yard		53,721,800
A - MAJOR PROJECTS		***$53,721,800***
ESTIMATED NET COST		**$53,721,800**
MARGINS & ADJUSTMENTS		
General Conditions	6.0 %	$3,223,308
Bond & Insurance	2.0 %	$1,138,902
Overhead and Profit	4.0 %	$2,323,360
General Excise Tax	2.0 %	$1,208,147
Estimating Contingency	20.0 %	$12,323,103
Escalation beyond 2014		Excl.
ESTIMATED TOTAL COST		**$73,938,620**

DOT-Harbors Kalaeloa Barbers Point Harbor Master Plan

ROM Cost Estimate R5-120114

Location Elements Item

A MAJOR PROJECTS

A8 Pier 8: Layberth and Multi-Purpose Yard — Rates Current At December 2014

Description	Unit	Qty	Rate	Total
E2010 Fixed Furnishings				
26 First aid station	EA	1.00	400.00	400
Fixed Furnishings				***$400***
G2040 Site Development				
55 Vehicle gates	EA	1.00	5,000.00	5,000
40 Pier 8 (heavy duty floating dock)	LF	410.00	15,000.00	6,150,000
21 Concrete hardstand	SF	1,416,800.00	25.00	35,420,000
24 Fencing	LF	3,700.00	105.00	388,500
54 Gates	Pr	1.00	1,500.00	1,500
Site Development				***$41,965,000***
G3010 Water Supply				
19 Spigot, wash/first aid station	LS	1.00	10,000.00	10,000
Water Supply				***$10,000***
G4010 Electrical Distribution				
43 Underground power lines	LF	820.00	500.00	410,000
Electrical Distribution				***$410,000***
G4020 Site Lighting				
23 Site lighting	SF	1,416,800.00	8.00	11,334,400
Site Lighting				***$11,334,400***
G4030 Site Communications & Security				
25 Emergency communication	LS	1.00	2,000.00	2,000
Site Communications & Security				***$2,000***
PIER 8: LAYBERTH AND MULTI-PURPOSE YARD				***$53,721,800***

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DOT-Harbors Kalaeloa Barbers Point Harbor Master Plan

ROM Cost Estimate R5-120114

Summary with Margins Separated — Rates Current At December 2014

Location		Total Cost
A MAJOR PROJECTS		
A9 Pier 4B: Finger Pier Removal and Fuel Pier Construction Phase II		13,800,000
A - MAJOR PROJECTS		***$13,800,000***
ESTIMATED NET COST		**$13,800,000**
MARGINS & ADJUSTMENTS		
General Conditions	10.0 %	$1,380,000
Bond & Insurance	2.0 %	$303,600
Overhead and Profit	7.0 %	$1,083,852
General Excise Tax	2.0 %	$331,349
Estimating Contingency	20.0 %	$3,379,760
Escalation beyond 2014		Excl.
ESTIMATED TOTAL COST		**$20,278,561**

DOT-Harbors Kalaeloa Barbers Point Harbor Master Plan

ROM Cost Estimate R5-120114

Location Elements Item

A MAJOR PROJECTS

A9 Pier 4B: Finger Pier Removal and Fuel Pier Construction Phase II — Rates Current At December 2014

Description	Unit	Qty	Rate	Total
G1020 Site Demolition and Relocations				
42 Finger pier removal	LF	170.00	500.00	85,000
Site Demolition and Relocations				***$85,000***
G2040 Site Development				
41 Pier 4B (continuous wharf)	LF	325.00	42,200.00	13,715,000
Site Development				***$13,715,000***
PIER 4B: FINGER PIER REMOVAL AND FUEL PIER CONSTRUCTION PHASE II				***$13,800,000***

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DOT-Harbors Kalaeloa Barbers Point Harbor Master Plan

ROM Cost Estimate R5-120114

Summary with Margins Separated — Rates Current At December 2014

Location		Total Cost
A MAJOR PROJECTS		
A10 Storage Yards S-7, Multi-Purpose Yard and Martime Support Services: Install Underground Power Lines		2,422,100
A - MAJOR PROJECTS		***$2,422,100***
ESTIMATED NET COST		**$2,422,100**
MARGINS & ADJUSTMENTS		
General Conditions	15.0 %	$363,315
Bond & Insurance	2.0 %	$55,708
Overhead and Profit	8.0 %	$227,290
General Excise Tax	2.0 %	$61,368
Estimating Contingency	20.0 %	$625,956
Escalation beyond 2014		Excl.
ESTIMATED TOTAL COST		**$3,755,737**

DOT-Harbors Kalaeloa Barbers Point Harbor Master Plan
ROM Cost Estimate R5-120114

Location Elements Item

A MAJOR PROJECTS

A10 Storage Yards S-7, Multi-Purpose Yard and Martime Support Services: Install Underground Power Lines

Rates Current At December 2014

Description	Unit	Qty	Rate	Total
G1020 Site Demolition and Relocations				
44 Remove temporary overhead power lines	LF	4,570.00	30.00	137,100
Site Demolition and Relocations				***$137,100***
G4010 Electrical Distribution				
43 Underground power lines	LF	4,570.00	500.00	2,285,000
Electrical Distribution				***$2,285,000***
STORAGE YARDS S-7, MULTI-PURPOSE YARD AND MARTIME SUPPORT SERVICES: INSTALL UNDERGROUND POWER LINES				***$2,422,100***

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DOT-Harbors Kalaeloa Barbers Point Harbor Master Plan
ROM Cost Estimate R5-120114

Summary with Margins Separated

Rates Current At December 2014

Location		Total Cost
A MAJOR PROJECTS		
A11 Kalaeloa Harbor Access Road: Construction on Property		535,350
A - MAJOR PROJECTS		***$535,350***
ESTIMATED NET COST		**$535,350**
MARGINS & ADJUSTMENTS		
General Conditions	10.0 %	$53,535
Bond & Insurance	2.0 %	$11,778
Overhead and Profit	8.0 %	$48,053
General Excise Tax	2.0 %	$12,974
Estimating Contingency	20.0 %	$132,338
Escalation beyond 2014		Excl.
ESTIMATED TOTAL COST		**$794,028**

DOT-Harbors Kalaeloa Barbers Point Harbor Master Plan

ROM Cost Estimate R5-120114

Location Elements Item

A MAJOR PROJECTS

A11 Kalaeloa Harbor Access Road: Construction on Property — Rates Current At December 2014

Description	Unit	Qty	Rate	Total
G1020 Site Demolition and Relocations				
28 Miscellaneous demolition	SF	27,200.00	3.00	81,600
Site Demolition and Relocations				***$81,600***
G1030 Site Earthwork				
2 Mass grading	SF	27,200.00	0.50	13,600
Site Earthwork				***$13,600***
G2010 Roadways				
7 New roadway, including AC paving & gutter	SF	27,200.00	12.00	326,400
Roadways				***$326,400***
G3030 Storm Sewer				
9 Roadway drainage	LF	455.00	50.00	22,750
Storm Sewer				***$22,750***
G4020 Site Lighting				
8 Roadway lighting	LF	455.00	200.00	91,000
Site Lighting				***$91,000***
KALAELOA HARBOR ACCESS ROAD: CONSTRUCTION ON PROPERTY				***$535,350***

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DOT-Harbors Kalaeloa Barbers Point Harbor Master Plan
ROM Cost Estimate R5-120114

Summary with Margins Separated — Rates Current At December 2014

Location		Total Cost
A MAJOR PROJECTS		
A12 Pier 10: Layberth		915,000
A - MAJOR PROJECTS		***$915,000***
ESTIMATED NET COST		**$915,000**
MARGINS & ADJUSTMENTS		
General Conditions	10.0 %	$91,500
Bond & Insurance	2.0 %	$20,130
Overhead and Profit	8.0 %	$82,130
General Excise Tax	2.0 %	$22,175
Estimating Contingency	20.0 %	$226,187
Escalation beyond 2014		Excl.
ESTIMATED TOTAL COST		**$1,357,122**

DOT-Harbors Kalaeloa Barbers Point Harbor Master Plan

ROM Cost Estimate R5-120114

Location Elements Item

A MAJOR PROJECTS

A12 Pier 10: Layberth

Rates Current At December 2014

Description	Unit	Qty	Rate	Total
G2040 Site Development				
45 Pier 10 mooring dolphins and bollards - allow	LS	1.00	390,000.00	390,000
Site Development				***$390,000***
G4010 Electrical Distribution				
43 Underground power lines	LF	1,050.00	500.00	525,000
Electrical Distribution				***$525,000***
PIER 10: LAYBERTH				***$915,000***

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DOT-Harbors Kalaeloa Barbers Point Harbor Master Plan

ROM Cost Estimate R5-120114

Location Summary

Rates Current At December 2014

Location		Total Cost
A MAJOR PROJECTS		
A13 Dredging/Flaring Harbor Entrance and Dredging KBPH Basin (USACE)		58,126,000
A - MAJOR PROJECTS		***$58,126,000***
ESTIMATED NET COST		**$58,126,000**
MARGINS & ADJUSTMENTS		
General Conditions	6.0 %	$3,487,560
Bond & Insurance	2.0 %	$1,232,271
Overhead and Profit	4.0 %	$2,513,833
General Excise Tax	2.0 %	$1,307,193
Estimating Contingency	20.0 %	$13,333,371
Escalation beyond 2014		Excl.
ESTIMATED TOTAL COST		**$80,000,228**

DOT-Harbors Kalaeloa Barbers Point Harbor Master Plan

ROM Cost Estimate R5-120114

Location Elements Item

A MAJOR PROJECTS

A13 Dredging/Flaring Harbor Entrance and Dredging KBPH Basin (USACE) Rates Current At December 2014

Description	Unit	Qty	Rate	Total
G9090 Other Site Systems & Equipment				
74 Dredging/flaring harbor entrance and dredging KBPH basin (per 2008 Kalaeloa Deepening Cost Apportionment)	LS	1.00	58,126,000.00	58,126,000
Other Site Systems & Equipment				***$58,126,000***
DREDGING/FLARING HARBOR ENTRANCE AND DREDGING KBPH BASIN (USACE)				***$58,126,000***

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DOT-Harbors Kalaeloa Barbers Point Harbor Master Plan
ROM Cost Estimate R5-120114

Summary with Margins Separated Rates Current At December 2014

Location		Total Cost
B MINOR PROJECTS		
B1 Pier 6: Bollard Installation		75,000
B - MINOR PROJECTS		***$75,000***
ESTIMATED NET COST		**$75,000**
MARGINS & ADJUSTMENTS		
General Conditions	10.0 %	$7,500
Bond & Insurance	2.0 %	$1,650
Overhead and Profit	8.0 %	$6,732
General Excise Tax	2.0 %	$1,818
Estimating Contingency	20.0 %	$18,540
Escalation beyond 2014		Excl.
ESTIMATED TOTAL COST		**$111,240**

DOT-Harbors Kalaeloa Barbers Point Harbor Master Plan

ROM Cost Estimate R5-120114

Location Elements Item

B MINOR PROJECTS

B1 Pier 6: Bollard Installation

Rates Current At December 2014

Description	Unit	Qty	Rate	Total
G2040 Site Development				
49 Bollard installation at pier 6	LS	1.00	75,000.00	75,000
Site Development				***$75,000***
PIER 6: BOLLARD INSTALLATION				***$75,000***

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DOT-Harbors Kalaeloa Barbers Point Harbor Master Plan

ROM Cost Estimate R5-120114

Summary with Margins Separated

Rates Current At December 2014

Location		Total Cost
B MINOR PROJECTS		
B3 Finger Pier and T-Pier: Minor Improvements		18,650
B - MINOR PROJECTS		***$18,650***
ESTIMATED NET COST		**$18,650**
MARGINS & ADJUSTMENTS		
General Conditions	10.0 %	$1,865
Bond & Insurance	2.0 %	$410
Overhead and Profit	8.0 %	$1,674
General Excise Tax	2.0 %	$452
Estimating Contingency	20.0 %	$4,610
Escalation beyond 2014		Excl.
ESTIMATED TOTAL COST		**$27,661**

DOT-Harbors Kalaeloa Barbers Point Harbor Master Plan

ROM Cost Estimate R5-120114

Location Elements Item

B MINOR PROJECTS

B3 Finger Pier and T-Pier: Minor Improvements — Rates Current At December 2014

Description	Unit	Qty	Rate	Total
G2040 Site Development				
52 Gated access	LF	110.00	105.00	11,550
54 Gates	Pr	1.00	1,500.00	1,500
Site Development				***$13,050***
G3010 Water Supply				
50 Water spigots	EA	2.00	800.00	1,600
Water Supply				***$1,600***
G4010 Electrical Distribution				
51 Shore side power connection	LS	2.00	2,000.00	4,000
Electrical Distribution				***$4,000***
FINGER PIER AND T-PIER: MINOR IMPROVEMENTS				***$18,650***

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DOT-Harbors Kalaeloa Barbers Point Harbor Master Plan

ROM Cost Estimate R5-120114

Summary with Margins Separated — Rates Current At December 2014

Location		Total Cost
B MINOR PROJECTS		
B4 Pier 10: Emergency Access Connection to Ko Olina		9,500
B - MINOR PROJECTS		***$9,500***
ESTIMATED NET COST		**$9,500**
MARGINS & ADJUSTMENTS		
General Conditions	10.0 %	$950
Bond & Insurance	2.0 %	$209
Overhead and Profit	8.0 %	$853
General Excise Tax	2.0 %	$230
Estimating Contingency	20.0 %	$2,348
Escalation beyond 2014		Excl.
ESTIMATED TOTAL COST		**$14,090**

DOT-Harbors Kalaeloa Barbers Point Harbor Master Plan

ROM Cost Estimate R5-120114

Location Elements Item

B MINOR PROJECTS

B4 Pier 10: Emergency Access Connection to Ko Olina

Rates Current At December 2014

Description	Unit	Qty	Rate	Total
G1010 Site Clearing				
53 Clear for dirt road access	LF	800.00	10.00	8,000
Site Clearing				***$8,000***
G2040 Site Development				
54 Gates	Pr	1.00	1,500.00	1,500
Site Development				***$1,500***
PIER 10: EMERGENCY ACCESS CONNECTION TO KO OLINA				***$9,500***

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DOT-Harbors Kalaeloa Barbers Point Harbor Master Plan

ROM Cost Estimate R5-120114

Summary with Margins Separated

Rates Current At December 2014

Location		Total Cost
B MINOR PROJECTS		
B5 Bulk Storage Areas S-A1, A2, B: Coral Stockpile Removal		4,400,900
B - MINOR PROJECTS		***$4,400,900***
ESTIMATED NET COST		**$4,400,900**
MARGINS & ADJUSTMENTS		
General Conditions	10.0 %	$440,090
Bond & Insurance	2.0 %	$96,820
Overhead and Profit	7.0 %	$345,647
General Excise Tax	2.0 %	$105,669
Estimating Contingency	20.0 %	$1,077,825
Escalation beyond 2014		Excl.
ESTIMATED TOTAL COST		**$6,466,951**

DOT-Harbors Kalaeloa Barbers Point Harbor Master Plan
ROM Cost Estimate R5-120114

Location Elements Item

B MINOR PROJECTS

B5 Bulk Storage Areas S-A1, A2, B: Coral Stockpile Removal — Rates Current At December 2014

Description	Unit	Qty	Rate	Total
G1010 Site Clearing				
1 Remove coral stockpile - volume based on assumed average height of 5' - by others	CY	121,722.40		Excl.
Site Clearing				***Excl.***
G1030 Site Earthwork				
2 Mass grading	SF	3,961,800.00	0.50	1,980,900
57 Fill existing drainage channel	LF	2,700.00	600.00	1,620,000
Site Earthwork				***$3,600,900***
G3010 Water Supply				
72 Fire line	LF	2,000.00	200.00	400,000
56 Potable water line	LF	2,000.00	200.00	400,000
Water Supply				***$800,000***
G3030 Storm Sewer				
73 Drainage improvements - by tenant	SF	3,961,800.00		Excl.
Storm Sewer				***Excl.***
BULK STORAGE AREAS S-A1, A2, B: CORAL STOCKPILE REMOVAL				***$4,400,900***

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DOT-Harbors Kalaeloa Barbers Point Harbor Master Plan
ROM Cost Estimate R5-120114

Summary with Margins Separated — Rates Current At December 2014

Location		Total Cost
B MINOR PROJECTS		
B6 Ko Olina Mole: Perimeter Lighting Improvements		24,000
B - MINOR PROJECTS		***$24,000***
ESTIMATED NET COST		**$24,000**
MARGINS & ADJUSTMENTS		
General Conditions	10.0 %	$2,400
Bond & Insurance	2.0 %	$528
Overhead and Profit	8.0 %	$2,154
General Excise Tax	2.0 %	$582
Estimating Contingency	20.0 %	$5,933
Escalation beyond 2014		Excl.
ESTIMATED TOTAL COST		**$35,597**

DOT-Harbors Kalaeloa Barbers Point Harbor Master Plan

ROM Cost Estimate R5-120114

Location Elements Item

B MINOR PROJECTS

B6 Ko Olina Mole: Perimeter Lighting Improvements — Rates Current At December 2014

Description	Unit	Qty	Rate	Total
G4020 Site Lighting				
66 Remove and replace light fixtures with marine-friendly	EA	20.00	1,200.00	24,000
Site Lighting				***$24,000***
KO OLINA MOLE: PERIMETER LIGHTING IMPROVEMENTS				***$24,000***

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DOT-Harbors Kalaeloa Barbers Point Harbor Master Plan
ROM Cost Estimate R5-120114

Summary with Margins Separated — Rates Current At December 2014

Location		Total Cost
B MINOR PROJECTS		
B7 Piers 5/6 and 7: Personnel Shelter Construction		1,670,000
B - MINOR PROJECTS		***$1,670,000***
ESTIMATED NET COST		**$1,670,000**
MARGINS & ADJUSTMENTS		
General Conditions	15.0 %	$250,500
Bond & Insurance	2.0 %	$38,410
Overhead and Profit	8.0 %	$156,713
General Excise Tax	2.0 %	$42,312
Estimating Contingency	20.0 %	$431,587
Escalation beyond 2014		Excl.
ESTIMATED TOTAL COST		**$2,589,522**

DOT-Harbors Kalaeloa Barbers Point Harbor Master Plan

ROM Cost Estimate R5-120114

Location Elements Item

B MINOR PROJECTS

B7 Piers 5/6 and 7: Personnel Shelter Construction — Rates Current At December 2014

Description	Unit	Qty	Rate	Total
F1010 Special Structures				
59 New personnel shelter	SF	3,000.00	500.00	1,500,000
Special Structures				***$1,500,000***
G3010 Water Supply				
61 Water system for new personnel shelter	EA	2.00	25,000.00	50,000
Water Supply				***$50,000***
G3020 Sanitary Water				
60 Septic system for new personnel shelter	EA	2.00	40,000.00	80,000
Sanitary Water				***$80,000***
G4010 Electrical Distribution				
62 Power, telecommunications for new personnel shelter	EA	2.00	20,000.00	40,000
Electrical Distribution				***$40,000***
PIERS 5/6 AND 7: PERSONNEL SHELTER CONSTRUCTION				***$1,670,000***

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DOT-Harbors Kalaeloa Barbers Point Harbor Master Plan

ROM Cost Estimate R5-120114

Summary with Margins Separated — Rates Current At December 2014

Location		Total Cost
B MINOR PROJECTS		
B8 Harbor Office Relocation		8,726,850
B - MINOR PROJECTS		***$8,726,850***
ESTIMATED NET COST		**$8,726,850**
MARGINS & ADJUSTMENTS		
General Conditions	10.0 %	$872,685
Bond & Insurance	2.0 %	$191,991
Overhead and Profit	7.0 %	$685,407
General Excise Tax	2.0 %	$209,539
Estimating Contingency	20.0 %	$2,137,294
Escalation beyond 2014		Excl.
ESTIMATED TOTAL COST		**$12,823,766**

DOT-Harbors Kalaeloa Barbers Point Harbor Master Plan
ROM Cost Estimate R5-120114

Location Elements Item

B MINOR PROJECTS

B8 Harbor Office Relocation

Rates Current At December 2014

Description	Unit	Qty	Rate	Total
F1010 Special Structures				
69 Garage	SF	1,440.00	140.00	201,600
70 Hazardous material shed	EA	1.00	25,000.00	25,000
68 Maintenance Shop	SF	4,620.00	225.00	1,039,500
63 Wash facility (single vehicle car wash)	EA	1.00	35,000.00	35,000
64 Storage warehouse	SF	5,500.00	175.00	962,500
46 Harbor operations building	SF	3,900.00	500.00	1,950,000
Special Structures				***$4,213,600***
G1020 Site Demolition and Relocations				
67 Building demolition (existing Harbor Office)	SF	2,000.00	15.00	30,000
Site Demolition and Relocations				***$30,000***
G1030 Site Earthwork				
2 Mass grading	SF	230,868.00	0.50	115,434
Site Earthwork				***$115,434***
G2020 Parking Lots				
22 AC paving	SF	43,560.00	10.00	435,600
Parking Lots				***$435,600***
G3010 Water Supply				
47 Water system to Harbor Operations building, including meters, hydrants, backflow preventers, etc.	LF	2,600.00	300.00	780,000
Water Supply				***$780,000***
G3020 Sanitary Water				
48 Sewer system to Harbor Operations building, including manholes	LF	2,600.00	400.00	1,040,000
71 Other sewer: effluent ejector system, septic tank (250 gal) & sewer cleanout	LS	1.00	2,000.00	2,000
Sanitary Water				***$1,042,000***
G3030 Storm Sewer				
3 Drainage improvements	SF	230,868.00	2.00	461,736
Storm Sewer				***$461,736***
G4010 Electrical Distribution				
43 Underground power lines	LF	2,600.00	500.00	1,300,000
Electrical Distribution				***$1,300,000***
G4020 Site Lighting				
23 Site lighting	SF	43,560.00	8.00	348,480
Site Lighting				***$348,480***
HARBOR OFFICE RELOCATION				***$8,726,850***

RLB | Rider Levett Bucknall

DOT-Harbors Kalaeloa Barbers Point Harbor Master Plan
ROM Cost Estimate R5-120114

Summary with Margins Separated

Rates Current At December 2014

Location		Total Cost
B MINOR PROJECTS		
B9 Piers 4/5, 8 and 10: Personnel Shelter Construction		1,930,000
B - MINOR PROJECTS		***$1,930,000***
ESTIMATED NET COST		**$1,930,000**
MARGINS & ADJUSTMENTS		
General Conditions	15.0 %	$289,500
Bond & Insurance	2.0 %	$44,390
Overhead and Profit	8.0 %	$181,111
General Excise Tax	2.0 %	$48,900
Estimating Contingency	20.0 %	$498,780
Escalation beyond 2014		Excl.
ESTIMATED TOTAL COST		**$2,992,681**

DOT-Harbors Kalaeloa Barbers Point Harbor Master Plan

ROM Cost Estimate R5-120114

Location Elements Item

B MINOR PROJECTS

B9 Piers 4/5, 8 and 10: Personnel Shelter Construction — Rates Current At December 2014

Description	Unit	Qty	Rate	Total
F1010 Special Structures				
58 Renovate existing personnel shelters	SF	1,300.00	200.00	260,000
59 New personnel shelter	SF	3,000.00	500.00	1,500,000
Special Structures				***$1,760,000***
G3010 Water Supply				
61 Water system for new personnel shelter	EA	2.00	25,000.00	50,000
Water Supply				***$50,000***
G3020 Sanitary Water				
60 Septic system for new personnel shelter	EA	2.00	40,000.00	80,000
Sanitary Water				***$80,000***
G4010 Electrical Distribution				
62 Power, telecommunications for new personnel shelter	EA	2.00	20,000.00	40,000
Electrical Distribution				***$40,000***
PIERS 4/5, 8 AND 10: PERSONNEL SHELTER CONSTRUCTION				***$1,930,000***

RLB | Rider Levett Bucknall

DOT-Harbors Kalaeloa Barbers Point Harbor Master Plan

ROM Cost Estimate R5-120114

Summary with Margins Separated — Rates Current At December 2014

Location		Total Cost
B MINOR PROJECTS		
B10 Landscaping		100,000
B - MINOR PROJECTS		***$100,000***
ESTIMATED NET COST		**$100,000**
MARGINS & ADJUSTMENTS		
General Conditions	10.0 %	$10,000
Bond & Insurance	2.0 %	$2,200
Overhead and Profit	8.0 %	$8,976
General Excise Tax	2.0 %	$2,424
Estimating Contingency	20.0 %	$24,720
Escalation beyond 2014		Excl.
ESTIMATED TOTAL COST		**$148,320**

DOT-Harbors Kalaeloa Barbers Point Harbor Master Plan

ROM Cost Estimate R5-120114

Location Elements Item

B MINOR PROJECTS

B10 Landscaping

Rates Current At December 2014

Description	Unit	Qty	Rate	Total
G2050 Landscaping				
65 Landcaping - minimal	LS	1.00	100,000.00	100,000
Landscaping				***$100,000***
LANDSCAPING				***$100,000***

Appendix M
2014 Adjusted Fuel Pier Cost Estimates
(Group 70 International)

KBPH Fuel Pier Cost Estimates

Alternative A

Description	Unit	Qty	Rate	Total
Phase 1: Pier 3 & 4 (segmented)	LF	850	30,100	25,585,000
MARGINS & ADJUSTMENTS				
General Conditions			8.00%	2,046,800
Bond & Insurance			2.00%	511,700
Overhead and Profit			6.00%	1,535,100
General Excise Tax			2.00%	511,700
Estimating Contingency			20.00%	5,117,000
			ESTIMATED TOTAL COST	**$35,307,300**

Description	Unit	Qty	Rate	Total
Finger Pier Removal	LF	150	500	75,000
MARGINS & ADJUSTMENTS				
General Conditions			8.00%	6,000
Bond & Insurance			2.00%	1,500
Overhead and Profit			6.00%	4,500
General Excise Tax			2.00%	1,500
Estimating Contingency			20.00%	15,000
			ESTIMATED TOTAL COST	**$103,500**

Description	Unit	Qty	Rate	Total
Phase 2: Pier 4B (segmented)	LF	200	30,100	6,020,000
MARGINS & ADJUSTMENTS				
General Conditions			8.00%	481,600
Bond & Insurance			2.00%	120,400
Overhead and Profit			6.00%	361,200
General Excise Tax			2.00%	120,400
Estimating Contingency			20.00%	1,204,000
			ESTIMATED TOTAL COST	**$8,307,600**

Total Pier **$43,614,900**
Finger Pier Removal $103,500

KBPH Fuel Pier Cost Estimates

Alternative B

Description	Unit	Qty	Rate	Total
Phase 1: Pier 3 & 4 (continuous wharf)	LF	900	42,200	37,980,000
MARGINS & ADJUSTMENTS				
General Conditions			8.00%	3,038,400
Bond & Insurance			2.00%	759,600
Overhead and Profit			6.00%	2,278,800
General Excise Tax			2.00%	759,600
Estimating Contingency			20.00%	7,596,000
			ESTIMATED TOTAL COST	**$52,412,400**

Description	Unit	Qty	Rate	Total
Phase 2: Pier 4B (continuous wharf)	LF	150	42,200	6,330,000
MARGINS & ADJUSTMENTS				
General Conditions			8.00%	506,400
Bond & Insurance			2.00%	126,600
Overhead and Profit			6.00%	379,800
General Excise Tax			2.00%	126,600
Estimating Contingency			20.00%	1,266,000
			ESTIMATED TOTAL COST	**$8,735,400**

Total Pier **$61,147,800**

KBPH Fuel Pier Cost Estimates

Alternative C

Description	Unit	Qty	Rate	Total
Phase 1: Pier 3 & 4 (bulkhead)	LF	900	35,700	32,130,000
MARGINS & ADJUSTMENTS				
General Conditions			8.00%	2,570,400
Bond & Insurance			2.00%	642,600
Overhead and Profit			6.00%	1,927,800
General Excise Tax			2.00%	642,600
Estimating Contingency			20.00%	6,426,000
			ESTIMATED TOTAL COST	**$44,339,400**

Description	Unit	Qty	Rate	Total
Phase 2: Pier 4B (bulkhead)	LF	150	35,700	5,355,000
MARGINS & ADJUSTMENTS				
General Conditions			8.00%	428,400
Bond & Insurance			2.00%	107,100
Overhead and Profit			6.00%	321,300
General Excise Tax			2.00%	107,100
Estimating Contingency			20.00%	1,071,000
			ESTIMATED TOTAL COST	**$7,389,900**

Total Pier **$51,729,300**

Appendix N
2014 Pipeline Preliminary Probable Costs
(Arcadis)

ARCADIS

PRELIMINARY PROBABLE COST - MAY 29, 2014

OVERHEAD PIPING ON PIPE RACKS

GROUP 70 INTERNATIONAL - G70 HARBOR PIPELINE

Items	Quantities		Material		Labor		Total Cost	
			Rate	Amount	Rate	Amount	Rate	Amount
Mobilization	1	l.s.			$118,000.00	$118,000.00	$118,000.00	$118,000.00
Excavation, Backfill and/or Disposal	2,419	c.y.			$27.00	$65,313.00	$27.00	$65,313.00
Concrete Foundation & Containment Curb	1,633	l.f.	$133.00	$217,189.00	$212.00	$346,196.00	$345.00	$563,385.00
Pipe Racks @ 20' c/c	76	each	$2,250.00	$171,000.00	$1,210.00	$91,960.00	$3,460.00	$262,960.00
Pipe Racks @ Crossovers	6	each	$2,800.00	$16,800.00	$1,420.00	$8,520.00	$4,220.00	$25,320.00
20" Welded Steel Pipe	1,633	l.f.	$149.00	$243,317.00	$199.00	$324,967.00	$348.00	$568,284.00
20" Bends	14	each	$2,695.00	$37,730.00	$1,755.00	$24,570.00	$4,450.00	$62,300.00
20" Tee	5	each	$5,225.00	$26,125.00	$2,675.00	$13,375.00	$7,900.00	$39,500.00
20" Blind Flange	1	each	$4,200.00	$4,200.00	$1,190.00	$1,190.00	$5,390.00	$5,390.00
20" Weld-On Flanges	20	each	$833.80	$16,676.00	$1,716.20	$34,324.00	$2,550.00	$51,000.00
20" Valve	5	each	$12,870.00	$64,350.00	$430.00	$2,150.00	$13,300.00	$66,500.00
20" Cutting-In Tee and Valve	1	each	$7,837.50	$7,837.50	$4,012.50	$4,012.50	$11,850.00	$11,850.00
20" Gasket and Bolt Sets	20	each	$144.10	$2,882.00	$300.90	$6,018.00	$445.00	$8,900.00
Painting 20" Pipe	1,633	l.f.	$0.64	$1,047.84	$5.13	$8,369.13	$5.77	$9,416.97
Painting 20" Fittings	46	each	$1.93	$88.55	$15.38	$707.25	$17.30	$795.80
20" Pipe Insulation	1,633	l.f.	$34.10	$55,685.30	$17.40	$28,414.20	$51.50	$84,099.50
20" Fitting Insulation	46	each	$102.30	$4,705.80	$52.20	$2,401.20	$154.50	$7,107.00
Protective Jacket for 20" Pipe	1,633	l.f.	$3.84	$6,269.09	$9.71	$15,858.06	$13.55	$22,127.15
Protective Jacket for 20" Fittings	46	each	$27.74	$1,276.04	$19.24	$885.04	$46.98	$2,161.08
12" Welded Steel Pipe	3,266	l.f.	$109.00	$355,994.00	$92.00	$300,472.00	$201.00	$656,466.00
12" Bends	28	each	$649.00	$18,172.00	$801.00	$22,428.00	$1,450.00	$40,600.00
12" Tee	10	each	$1,072.50	$10,725.00	$1,277.50	$12,775.00	$2,350.00	$23,500.00
12" Blind Flange	2	each	$1,265.00	$2,530.00	$260.00	$520.00	$1,525.00	$3,050.00
12" Weld-On Flanges	40	each	$233.20	$9,328.00	$671.80	$26,872.00	$905.00	$36,200.00
12" Valve	10	each	$1,622.50	$16,225.00	$327.50	$3,275.00	$1,950.00	$19,500.00
12" Cutting-In Tee and Valve	2	each	$1,608.75	$3,217.50	$1,916.25	$3,832.50	$3,525.00	$7,050.00
12" Gasket and Bolt Sets	40	each	$41.25	$1,650.00	$166.75	$6,670.00	$208.00	$8,320.00
Painting 12" Pipe	3,266	l.f.	$0.39	$1,257.41	$3.08	$10,042.95	$3.46	$11,300.36
Painting 12" Fittings	92	each	$1.16	$106.26	$9.23	$848.70	$10.38	$954.96
10" Welded Steel Pipe	3,266	l.f.	$92.00	$300,472.00	$74.00	$241,684.00	$166.00	$542,156.00
10" Bends	28	each	$440.00	$12,320.00	$660.00	$18,480.00	$1,100.00	$30,800.00
10" Tee	10	each	$764.50	$7,645.00	$1,010.50	$10,105.00	$1,775.00	$17,750.00
10" Blind Flange	2	each	$671.00	$1,342.00	$194.00	$388.00	$865.00	$1,730.00
10" Weld-On Flanges	40	each	$157.30	$6,292.00	$497.70	$19,908.00	$655.00	$26,200.00
10" Valve	10	each	$1,237.50	$12,375.00	$312.50	$3,125.00	$1,550.00	$15,500.00
10" Cutting-In Tee and Valve	2	each	$1,146.75	$2,293.50	$1,515.75	$3,031.50	$2,662.50	$5,325.00
10" Gasket and Bolt Sets	40	each	$39.05	$1,562.00	$153.95	$6,158.00	$193.00	$7,720.00
Painting 10" Pipe	3,266	l.f.	$0.32	$1,047.84	$2.56	$8,369.13	$2.88	$9,416.97
Painting 10" Fittings	92	each	$0.96	$88.55	$7.69	$707.25	$8.65	$795.80
8" Welded Steel Pipe	6,532	l.f.	$71.00	$463,772.00	$61.00	$398,452.00	$132.00	$862,224.00
8" Bends	56	each	$220.00	$12,320.00	$535.00	$29,960.00	$755.00	$42,280.00
8" Tee	20	each	$390.50	$7,810.00	$809.50	$16,190.00	$1,200.00	$24,000.00
8" Blind Flange	4	each	$451.00	$1,804.00	$164.00	$656.00	$615.00	$2,460.00
8" Weld-On Flanges	80	each	$90.75	$7,260.00	$404.25	$32,340.00	$495.00	$39,600.00
8" Valve	20	each	$1,012.00	$20,240.00	$313.00	$6,260.00	$1,325.00	$26,500.00
8" Cutting-In Tee and Valve	4	each	$585.75	$2,343.00	$1,214.25	$4,857.00	$1,800.00	$7,200.00
8" Gasket and Bolt Sets	80	each	$21.51	$1,720.40	$139.50	$11,159.60	$161.00	$12,880.00
Painting 8" Pipe	6,532	l.f.	$0.26	$1,676.55	$2.05	$13,390.60	$2.31	$15,067.15
Painting 8" Fittings	184	each	$0.77	$141.68	$6.15	$1,131.60	$6.92	$1,273.28
8" Pipe Insulation	6,532	l.f.	$14.91	$97,359.46	$11.10	$72,472.54	$26.00	$169,832.00
8" Fitting Insulation	184	each	$44.72	$8,227.56	$33.29	$6,124.44	$78.00	$14,352.00
Protective Jacket for 8" Pipe	6,532	l.f.	$2.71	$17,675.59	$8.79	$57,442.41	$11.50	$75,118.00
Protective Jacket for 8" Fittings	184	each	$19.58	$3,602.72	$17.42	$3,205.28	$37.00	$6,808.00
Heat Trace System (20" & 8")	8,165	l.f.	$9.50	$77,567.50	$2.50	$20,412.50	$12.00	$97,980.00
Demobilization and Site Cleanup	1	l.s.			$59,000.00	$59,000.00	$59,000.00	$59,000.00

ARCADIS

PRELIMINARY PROBABLE COST - MAY 29, 2014

OVERHEAD PIPING ON PIPE RACKS

GROUP 70 INTERNATIONAL - G70 HARBOR PIPELINE

Items	Quantities	Material		Labor		Total Cost	
		Rate	Amount	Rate	Amount	Rate	Amount
Subtotal			**$2,365,342.64**		**$2,529,976.37**		**$4,895,319.01**
Area Cost Factor (Hawaii)		**36.40%**	**$860,984.72**	**6.40%**	**$161,918.49**		**$1,022,903.21**
Subtotal			**$3,226,327.36**		**$2,691,894.86**		**$5,918,222.22**
Insurance	**3%**						**$146,859.58**
Bonding	**2%**						**$100,843.58**
Overhead and Profit	**15%**						**$924,974.62**
Subtotal							**$7,090,900.00**
Contingencies	**30%**						**$2,129,100.00**
Total							**$9,220,000.00**

ARCADIS

PRELIMINARY PROBABLE COST - MAY 29, 2014

BURIED PIPING

GROUP 70 INTERNATIONAL - G70 HARBOR PIPELINE

Items	Quantities		Material		Labor		Total Cost	
			Rate	Amount	Rate	Amount	Rate	Amount
Mobilization	1	l.s.			$92,600.00	$92,600.00	$92,600.00	$92,600.00
Excavation, Backfill and/or Disposal	5,080	c.y.			$27.00	$137,160.00	$27.00	$137,160.00
Bedding Material	3,266	c.y.	$31.35	$102,389.10	$12.15	$39,681.90	$43.50	$142,071.00
20" Welded Steel Pipe	1,633	l.f.	$149.00	$243,317.00	$199.00	$324,967.00	$348.00	$568,284.00
20" Bends	14	each	$2,695.00	$37,730.00	$1,755.00	$24,570.00	$4,450.00	$62,300.00
20" Tee	5	each	$5,225.00	$26,125.00	$2,675.00	$13,375.00	$7,900.00	$39,500.00
20" Blind Flange	1	each	$4,200.00	$4,200.00	$1,190.00	$1,190.00	$5,390.00	$5,390.00
20" Weld-On Flanges	20	each	$833.80	$16,676.00	$1,716.20	$34,324.00	$2,550.00	$51,000.00
20" Valve	5	each	$12,870.00	$64,350.00	$430.00	$2,150.00	$13,300.00	$66,500.00
20" Cutting-In Tee and Valve	1	each	$7,837.50	$7,837.50	$4,012.50	$4,012.50	$11,850.00	$11,850.00
20" Gasket and Bolt Sets	20	each	$144.10	$2,882.00	$300.90	$6,018.00	$445.00	$8,900.00
Corrosion Protection Wrap	1,633	l.f.	$3.50	$5,715.50	$0.75	$1,224.75	$4.25	$6,940.25
12" Welded Steel Pipe	3,266	l.f.	$109.00	$355,994.00	$92.00	$300,472.00	$201.00	$656,466.00
12" Bends	28	each	$649.00	$18,172.00	$801.00	$22,428.00	$1,450.00	$40,600.00
12" Tee	10	each	$1,072.50	$10,725.00	$1,277.50	$12,775.00	$2,350.00	$23,500.00
12" Blind Flange	2	each	$1,265.00	$2,530.00	$260.00	$520.00	$1,525.00	$3,050.00
12" Weld-On Flanges	40	each	$233.20	$9,328.00	$671.80	$26,872.00	$905.00	$36,200.00
12" Valve	10	each	$1,622.50	$16,225.00	$327.50	$3,275.00	$1,950.00	$19,500.00
12" Cutting-In Tee and Valve	2	each	$1,608.75	$3,217.50	$1,916.25	$3,832.50	$3,525.00	$7,050.00
12" Gasket and Bolt Sets	40	each	$41.25	$1,650.00	$166.75	$6,670.00	$208.00	$8,320.00
Corrosion Protection Wrap	3,266	l.f.	$2.00	$6,532.00	$0.50	$1,633.00	$2.50	$8,165.00
10" Welded Steel Pipe	3,266	l.f.	$92.00	$300,472.00	$74.00	$241,684.00	$166.00	$542,156.00
10" Bends	28	each	$440.00	$12,320.00	$660.00	$18,480.00	$1,100.00	$30,800.00
10" Tee	10	each	$764.50	$7,645.00	$1,010.50	$10,105.00	$1,775.00	$17,750.00
10" Blind Flange	2	each	$671.00	$1,342.00	$194.00	$388.00	$865.00	$1,730.00
10" Weld-On Flanges	40	each	$157.30	$6,292.00	$497.70	$19,908.00	$655.00	$26,200.00
10" Valve	10	each	$1,237.50	$12,375.00	$312.50	$3,125.00	$1,550.00	$15,500.00
10" Cutting-In Tee and Valve	2	each	$1,146.75	$2,293.50	$1,515.75	$3,031.50	$2,662.50	$5,325.00
10" Gasket and Bolt Sets	40	each	$39.05	$1,562.00	$153.95	$6,158.00	$193.00	$7,720.00
Corrosion Protection Wrap	3,266	l.f.	$2.00	$6,532.00	$0.50	$1,633.00	$2.50	$8,165.00
8" Welded Steel Pipe	6,532	l.f.	$71.00	$463,772.00	$61.00	$398,452.00	$132.00	$862,224.00
8" Bends	56	each	$220.00	$12,320.00	$535.00	$29,960.00	$755.00	$42,280.00
8" Tee	20	each	$390.50	$7,810.00	$809.50	$16,190.00	$1,200.00	$24,000.00
8" Blind Flange	4	each	$451.00	$1,804.00	$164.00	$656.00	$615.00	$2,460.00
8" Weld-On Flanges	80	each	$90.75	$7,260.00	$404.25	$32,340.00	$495.00	$39,600.00
8" Valve	20	each	$1,012.00	$20,240.00	$313.00	$6,260.00	$1,325.00	$26,500.00
8" Cutting-In Tee and Valve	4	each	$585.75	$2,343.00	$1,214.25	$4,857.00	$1,800.00	$7,200.00
8" Gasket and Bolt Sets	80	each	$21.51	$1,720.40	$139.50	$11,159.60	$161.00	$12,880.00
Corrosion Protection Wrap	6,532	l.f.	$2.00	$13,064.00	$0.50	$3,266.00	$2.50	$16,330.00
Cathodic Protection System	14,697	l.f.	$5.00	$73,485.00	$2.50	$36,742.50	$7.50	$110,227.50
Demobilization and Site Cleanup	1	l.s.			$46,300.00	$46,300.00	$46,300.00	$46,300.00
Subtotal				**$1,890,247.50**		**$1,950,446.25**		**$3,840,693.75**
Area Cost Factor (Hawaii)			**36.40%**	**$688,050.09**	**6.40%**	**$124,828.56**		**$812,878.65**
Subtotal				**$2,578,297.59**		**$2,075,274.81**		**$4,653,572.40**
Insurance	**3%**							**$115,220.82**
Bonding	**2%**							**$79,118.30**
Overhead and Profit	**15%**							**$727,188.48**
Subtotal								**$5,575,100.00**
Contingencies	**30%**							**$1,674,900.00**
Total								**$7,250,000.00**

ARCADIS

PRELIMINARY PROBABLE COST - MAY 30, 2014

OVERHEAD PIPING ON PIPE RACKS AND OPEN CUT PIPING QUANTITIES

GROUP 70 INTERNATIONAL - G70 HARBOR PIPELINE

Items	No.	Dimensions			Quantities		Material		Labor & Equipment		Total Cost	
		Length	Width	Depth			Rate	Amount	Rate	Amount	Rate	Amount
Excavation, Backfill and/or Disposal		1,633.00	16.00	2.50	2,419.0	c.y.						
Concrete Foundation and Containment Curb												
Stone Fill Under Slab		1,633.00	12.00	0.50	362.9	c.y.	$34.65	$12,574.49	$19.35	$7,022.12	$54.00	$19,596.60
Concrete Foundation	2	1,633.00	1.25	1.50	226.8	c.y.	$220.00	$49,896.00	$401.00	$90,946.80	$621.00	$140,842.80
Concrete Slab		1,633.00	12.00	0.50	362.9	c.y.	$229.00	$83,104.10	$292.00	$105,966.80	$521.00	$189,070.90
Concrete Piers	164	1.50	1.50	1.50	20.5	c.y.	$340.00	$6,970.00	$1,234.00	$25,297.00	$1,574.00	$32,267.00
Concrete Walls		3,020.00	1.00	1.50	167.8	c.y.	$260.00	$43,628.00	$603.00	$101,183.40	$863.00	$144,811.40
Water Stop	2	1,633.00			3,266.0	l.f.	$6.00	$19,579.67	$4.56	$14,876.63	$10.55	$34,456.30
								$215,752.26		$345,292.75		$561,045.00
							TOTAL PER FOOT	$133.00		$212.00		$345.00
Pipe Racks												
Base Plates	2	1.00	1.00		2.0	s.f.	$30.00	$60.00	$30.00	$60.00	$60.00	$120.00
Adhesive Anchors	8				8.0	each	$15.00	$120.00	$35.00	$280.00	$50.00	$400.00
Columns	2	10.00			20.0	l.f.	$41.80	$836.00	$10.70	$214.00	$52.50	$1,050.00
Beams	2	10.00			20.0	l.f.	$41.80	$836.00	$10.70	$214.00	$52.50	$1,050.00
Pipe Straps and/or Hangers												
20"	1				1.0	each	$128.70	$128.70	$33.30	$33.30	$162.00	$162.00
12"	2				2.0	each	$19.25	$38.50	$14.25	$28.50	$33.50	$67.00
10"	2				2.0	each	$14.91	$29.81	$13.10	$26.19	$28.00	$56.00
8"	4				4.0	each	$8.31	$33.22	$12.70	$50.78	$21.00	$84.00
Painting					40.0	l.f.	$1.50	$60.00	$6.00	$240.00	$7.50	$300.00
							TOTAL EACH	$2,250.00		$1,210.00		$3,460.00
Pipe Racks @ Crossovers												
Base Plates	2	1.00	1.00		2.0	s.f.	$30.00	$60.00	$30.00	$60.00	$60.00	$120.00
Adhesive Anchors	8				8.0	each	$15.00	$120.00	$35.00	$280.00	$50.00	$400.00
Columns	2	16.00			32.0	l.f.	$41.80	$1,337.60	$10.70	$342.40	$52.50	$1,680.00
Beams	2	10.00			20.0	l.f.	$41.80	$836.00	$10.70	$214.00	$52.50	$1,050.00
Pipe Straps and/or Hangers												
20"	1				1.0	each	$128.70	$128.70	$33.30	$33.30	$162.00	$162.00
12"	2				2.0	each	$19.25	$38.50	$14.25	$28.50	$33.50	$67.00
10"	2				2.0	each	$14.91	$29.81	$13.10	$26.19	$28.00	$56.00
8"	4				4.0	each	$8.31	$33.22	$12.70	$50.78	$21.00	$84.00
Painting					52.0	l.f.	$1.50	$78.00	$6.00	$312.00	$7.50	$390.00
							TOTAL EACH	$2,800.00		$1,420.00		$4,220.00
Open Cut Excavation		1,633.00	12.00	7.00	5,080.0	c.y.						
Bedding Material		1,633.00	12.00	4.50	3,266.0	c.y.						

ARCADIS

PRELIMINARY PROBABLE COST - July 10, 2015

SUBSURFACE VAULT WITH PIPING ON PIPE RACKS

GROUP 70 INTERNATIONAL - G70 HARBOR PIPELINE

Items	Quantities		Material		Labor		Total Cost	
			Rate	Amount	Rate	Amount	Rate	Amount
Mobilization	1	l.s.			$131,200.00	$131,200.00	$131,200.00	$131,200.00
Excavation, Backfill and/or Disposal	10,161	c.y.			$27.00	$274,347.00	$27.00	$274,347.00
Concrete Foundation & Walls	1,633	l.f.	$372.00	$607,476.00	$703.00	$1,147,999.00	$1,075.00	$1,755,475.00
Pipe Racks @ 20' c/c	82	each	$4,500.00	$369,000.00	$2,410.00	$197,620.00	$6,910.00	$566,620.00
Structural Concrete Vault Roof	1,633	l.f.	$260.00	$424,580.00	$603.00	$984,699.00	$863.00	$1,409,279.00
Ventilation	1,633	l.f.						
Transformers and Power	2	each	$10,000.00	$20,000.00	$2,500.00	$5,000.00	$12,500.00	$25,000.00
Electrical Wiring	4,899	l.f.	$12.00	$58,788.00	$25.00	$122,475.00	$37.00	$181,263.00
Sensors and Controls	18	each	$250.00	$4,500.00	$750.00	$13,500.00	$1,000.00	$18,000.00
Fans	16	each	$350.00	$5,715.50	$750.00	$12,247.50	$1,100.00	$17,963.00
Ducts	327	l.f.	$120.00	$39,240.00	$125.00	$40,875.00	$245.00	$80,115.00
Structural Supports	33	each	$500.00	$16,500.00	$700.00	$23,100.00	$1,200.00	$39,600.00
Lighting								
Electrical Wiring	4,899	l.f.	$12.00	$58,788.00	$25.00	$122,475.00	$37.00	$181,263.00
Sensors and Controls	18	each	$250.00	$4,500.00	$750.00	$13,500.00	$1,000.00	$18,000.00
Fixtures and Bulbs	33	each	$250.00	$8,250.00	$750.00	$24,750.00	$1,000.00	$33,000.00
Atmospheric Monitoring								
Electrical Wiring	4,899	l.f.	$12.00	$58,788.00	$25.00	$122,475.00	$37.00	$181,263.00
Sensors and Controls	18	each	$250.00	$4,500.00	$750.00	$13,500.00	$1,000.00	$18,000.00
Pipeline Leak Detection								
Electrical Wiring	327	l.f	$12.00	$3,924.00	$25.00	$8,175.00	$37.00	$12,099.00
Sensors and Controls	2	each	$3,500.00	$7,000.00	$1,125.00	$2,250.00	$4,625.00	$9,250.00
Stairways, Doorway, Ladders	1	L.S.	$35,000.00	$35,000.00	$25,000.00	$25,000.00	$60,000.00	$60,000.00
Painting	627,072	s.f.	$0.08	$50,165.76	$0.50	$313,536.00	$0.58	$363,701.76
Demobilization and Site Cleanup	1	l.s.			$65,600.00	$65,600.00	$65,600.00	$65,600.00
Subtotal				**$1,776,715.26**		**$3,664,323.50**		**$5,441,038.76**
Area Cost Factor (Hawaii)			**36.40%**	**$646,724.35**	**6.40%**	**$234,516.70**		**$881,241.05**
Subtotal				**$2,423,439.61**		**$3,898,840.20**		**$6,322,279.81**
Insurance	**3%**							**$163,231.17**
Bonding	**2%**							**$112,085.40**
Overhead and Profit	**15%**							**$989,703.62**
Subtotal								**$7,587,300.00**
Contingencies	**30%**							**$2,282,700.00**
Total								**$9,870,000.00**

ARCADIS

PRELIMINARY PROBABLE COST - July 10, 2015

VAULT PIPING ON PIPE RACKS QUANTITIES

GROUP 70 INTERNATIONAL - G70 HARBOR PIPELINE

Items	No.	Dimensions			Quantities		Material		Labor & Equipment		Total Cost	
		Length	Width	Depth			Rate	Amount	Rate	Amount	Rate	Amount
Excavation, Backfill and/or Disposal		1,633.00	16.00	10.50	10,161.0	c.y.						
Concrete Foundation and Containment Vault												
Stone Fill Under Slab		1,633.00	12.00	0.50	362.9	c.y.	$34.65	$12,574.49	$19.35	$7,022.12	$54.00	$19,596.60
Concrete Foundation	2	1,633.00	3.00	3.00	1,088.7	c.y.	$220.00	$239,514.00	$401.00	$436,568.70	$621.00	$676,082.70
Concrete Slab	1	1,633.00	12.00	0.50	362.9	c.y.	$229.00	$83,104.10	$292.00	$105,966.80	$521.00	$189,070.90
						c.y.	$340.00		$1,234.00		$1,574.00	
Concrete Walls		3,266.00	1.00	8.00	967.7	c.y.	$260.00	$251,602.00	$603.00	$583,523.10	$863.00	$835,125.10
Water Stop	2	1,633.00			3,266.0	l.f.	$6.00	$19,579.67	$4.56	$14,876.63	$10.55	$34,456.30
								$606,374.26		$1,147,957.35		$1,754,331.60
Area inside Vault (s.f.)	4	1,633.00	12.00	8.00	627,072.0		TOTAL PER FOOT	$372.00		$703.00		$1,075.00
Structural Concrete Vault Roof	1	1,633.00	12.00	0.67	483.9	c.y.	$260.00	$125,814.00	$603.00	$291,791.70	$863.00	$417,605.70
Pipe Racks												
Base Plates	4	1.00	1.00		4.0	s.f.	$30.00	$120.00	$30.00	$120.00	$60.00	$240.00
Adhesive Anchors	16				16.0	each	$15.00	$240.00	$35.00	$560.00	$50.00	$800.00
Columns	4	10.00			40.0	l.f.	$41.80	$1,672.00	$10.70	$428.00	$52.50	$2,100.00
Beams	4	10.00			40.0	l.f.	$41.80	$1,672.00	$10.70	$428.00	$52.50	$2,100.00
Pipe Straps and/or Hangers												
20"	2				2.0	each	$128.70	$257.40	$33.30	$66.60	$162.00	$324.00
12"	4				4.0	each	$19.25	$77.00	$14.25	$57.00	$33.50	$134.00
10"	4				4.0	each	$14.91	$59.62	$13.10	$52.38	$28.00	$112.00
8"	8				8.0	each	$8.31	$66.44	$12.70	$101.56	$21.00	$168.00
Painting					80.0	l.f.	$1.50	$120.00	$6.00	$480.00	$7.50	$600.00
							TOTAL EACH	$4,500.00		$2,410.00		$6,910.00
Open Cut Excavation		1,633.00	16.00	12.00	11,612.0	c.y.						
Bedding Material		1,633.00	16.00	4.50	4,355.0	c.y.						

Appendix O
Air Quality Impact Assessment
(Arcadis)

Air Quality Impact Assessment

Hawaii State Department of Transportation (DOT)
Kalaeloa Barbers Point Harbor Fuel Pier and Harbor Improvements

November 30, 2015

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Prepared by Arcadis U.S., Inc.

ARCADIS Design & Consultancy for natural and built assets

Executive Summary

Arcadis U.S., Inc. (Arcadis) performed a review of applicable federal, state, and local regulations, and performed an assessment of air quality impacts relating to the construction and operation of the proposed Hawaii Department of Transportation (DOT) Kalaeloa Barbers Point Harbor (KBPH) Fuel Pier and Master Plan ("KPBH Project").

Arcadis has conducted an emissions analysis to quantify the total emissions of criteria pollutants: carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), and volatile organic compounds (VOCs), and particulate pollutants: particulates less than 10 microns (PM_{10}), and less than 2.5 microns ($PM_{2.5}$), as well as carbon dioxide (CO_2), during construction and operation of the project. During construction, emission sources are assumed to be primarily fugitive dust from vehicle and earth movement, construction equipment exhaust, and off-gassing of pollutants from applying asphalt paving. Operational, or post-construction, emission sources are assumed to be increased harbor vessel traffic, cargo handling equipment, cargo trucking, and evaporative losses of VOCs during liquid petroleum cargo loading operations (loading losses).

Construction emissions will be intermittent and short term and will be spread over many acres. Maximum annual emissions of criteria pollutants from construction activities are projected at less than 10 tons per year for all years.

Operational emissions are projected to decrease for the pollutants NOx, SOx, PM10, and PM2.5. Total VOCs are projected to increase less than two tons per year for the RPS Succeeds scenario and RPS Falls Short scenario, with a potential significant increase only in the Business as Usual scenario. If the HCEI scenario succeeds, total VOC emissions will decrease significantly. Total emissions for all scenarios are projected to remain below major source criteria, and therefore no significant negative impacts to air quality are expected.

1. Introduction

The purpose of this Air Quality Impact Assessment is to evaluate whether emissions from the proposed DOT KBPH Fuel Pier and KBPH Master Plan would cause or contribute to the deterioration of the air quality in the area. The impacts are evaluated by quantitatively and qualitatively assessing the air pollutant emissions resulting from the construction and operation of the proposed project. During construction, emission sources are assumed to be primarily fugitive dust from vehicle and earth movement, construction equipment exhaust, and off-gassing of pollutants from applying asphalt paving and architectural coatings. Operational, or post-construction, emission sources are assumed to be increased harbor vessel traffic, cargo handling equipment, cargo trucking, and evaporative losses of VOCs during liquid petroleum cargo loading operations (loading losses).. The emission rates were compared to the applicable local, state and federal regulatory requirements pertaining to air quality, and a recommendation for permitting requirements was made.

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2. Project Description

The proposed KBPH project consists of large-scale infrastructure, land use change, and construction activities to take place between 2015 through 2040. Improvements include the construction of a new fuel pier, including two fueling berths with a total length of approximately 1,325 feet. The berths would accommodate a small fuel tanker and a large fuel barge, or two large fuel barges, simultaneously. The proposed pier will be located at the current Piers 3 and 4 inside the southwest perimeter of the harbor, and is bounded by Pier 1 and the harbor entrance to the west and Pier 5 to the east. Improvements also include a service road, two fuel transfer platforms, a series of breasting dolphins and mooring bollards, fuel hoses, a fire suppression system, and various monitoring systems. Additional activities include the removal of 2,000,000 cubic yards (c.y.) of stockpiled coral material, demolition, and reconstruction of DOT Harbors' tenant facilities at Pier 3 to Pier 9, construction of Harbor Operations facility at Pier 7, paving a new perimeter road, and ultimately the conversion of approximately 172 acres of undedicated area and coral stockpiled area to bulk storage, cargo yard, and multi-purpose yard areas.

A site vicinity map is presented on **Figure 1**, and figures depicting KBPH existing land use and proposed land use for 2040 are presented in **Appendix A**.

3. Environmental Setting

The KBPH project location, regional and local climate, and State of Hawaii ambient air quality standards are summarized in the following sections.

3.1 Project Location

KBPH (the "Site") is located on an approximately 300-acre parcel along the southwestern tip of the Ewa District of Oahu. The Site is adjacent to the island's major industrial center, James Campbell Industrial Park, and is bounded to the north by Ko'Olina Resort; northeast by the Oahu Railway & Land Company right of way; to the east by the future Kapolei Harborside development; to the south by Kenai Industrial Park, and to the west by the Pacific Ocean. Residential areas nearest the Site include the subdivisions of the Fairways at Ko'Olina, Ko'Olina Hillside Villas, and Honokai Hale.

3.2 Climate

Regional and local climate patterns are summarized in the following sections.

3.2.1 Regional

Hawaii is comprised of several islands with diverse topography, but is generally classified as mountainous. These factors contribute to a mixture of climate regimes that exist within the island chain. Diverse climates can exist within relatively short distances on the same island due to topographical effects on wind direction and speed and rainfall patterns.

Oahu is the third-largest of the Hawaiian Islands. The Ko'olau Range, at an average elevation of 2,000 feet, parallels the northeastern coast. The Wai'anae Mountains, somewhat higher in elevation, parallel the west coast. Honolulu International Airport, the business and Waikiki districts, and a number of Honolulu's residential areas lie along the southern coastal plain.

The predominant winds that affect the island are the trade winds that generally flow from the northeast, although its average frequency varies from 80 to 90 percent during the summer to only 50 percent in January. Lighter southeasterly winds prevail in the cooler winter months, with occasional strong wind events from winter storms.

The moderate temperature range is associated with the small seasonal variation in energy received from the sun and the tempering effect of the surrounding ocean. Honolulu International Airport has recorded temperatures as high as the lower 90s and as low as the lower 50s.

Heavy mountain rainfall sustains agricultural irrigation and Honolulu's water supply. The high elevations of the Ko'olau Mountains are extremely wet year-round, averaging over 200 inches per year. O'ahu is driest along the coast west of the Wainae Mountains, where rainfall drops to about 20 inches a year. Daytime showers, usually light, often occur while the sun continues to shine.

Intense rains in the October to April winter season sometimes causes serious flash flooding. Thunderstorms are infrequent and usually mild, and hail seldom occurs. Infrequently, a small tornado or waterspout may cause some damage. Only a few tropical cyclones have struck Hawaii, although others have come near enough for their outlying winds, waves, clouds, and rain to affect the islands.

3.2.2 Local

The Site topography is relatively flat with an elevation of approximately five to ten feet above mean sea level (MSL), and abuts the harbor at its lowest elevation.

Climate within the Site vicinity is tropical with northeasterly, offshore trade winds blowing much of the year. Winds typically blow from the northeasterly direction at an average maximum of approximately 6 to 8 meters per second (m/s) (13 to 18 mph), with light winds (0 to 2 m/s) (0 to 5 mph) being the most common, especially in the winter. During winter and spring, southerly and southeasterly winds are slightly more common (10-25% frequency of all winds). Onshore (southwesterly to westerly) winds are rare (< 5% frequency) in all seasons, minimizing downwind impacts on land. Wind velocity and direction measured seasonally at Kalaeloa Airport (John Rodgers Field) are displayed on wind rose diagrams (**Figure 2**).

The warmest month of the year is August with an average maximum temperature of 88.2 degrees Fahrenheit (°F). The coldest month of the year is February with an average minimum temperature of 66.3 °F. Temperature variations between night and day tend to be fairly limited throughout the year with average differences between 14.4 °F and 15.9 °F.

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Total yearly precipitation within the Site vicinity averages approximately 14.67 inches. The driest month of the year is July with an average rainfall total of approximately 0.16 inches, and the wettest month of the year is December with an average monthly rainfall total of approximately 2.57 inches.

Climate and precipitation data was accessed from the Western Regional Climate Center website (WRCC 2015). Data was recorded over a period from September 1999 to December 2008 at Kalaeloa Airport.

3.3 Ambient Air Quality

The ambient air quality in an area can be characterized in terms of whether it complies with National Ambient Air Quality Standards (NAAQS) and State Ambient Air Quality Standards (SAAQS), where applicable. The Clean Air Act (42 U.S.C. 7401 et seq.) requires the U.S. Environmental Protection Agency (USEPA) to set national standards for emissions that are considered harmful to public health and the environment (criteria pollutants). The seven criteria pollutants are: carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), lead (Pb), ozone (O_3), and particulate matter (PM_{10} and $PM_{2.5}$). Based on air monitoring data, Hawaii is currently classified as attainment for all Federal and State standards, except for 1-hour NO_2, for which attainment status is currently unclassified. **Table 3.1** presents the NAAQS and SAAQS for each criteria pollutant and the 2013 attainment designations for the State of Hawaii.

Table 3.1 Air Quality Standards Attainment Status for Hawaii

Parameter		State Standard		Federal Standard		Ambient Air Quality*
Ozone	1-Hour	–	–	0.12 ppm	Attainment	0.026 ppm[S]
	8-Hour	0.080 ppm	Attainment	0.075 ppm	Attainment	
Carbon Monoxide	1-Hour	9 ppm	Attainment	35 ppm	Attainment	0.4 ppm[H]
	8-Hour	4.4 ppm	Attainment	9 ppm	Attainment	
Nitrogen Dioxide	1-Hour	–	–	0.100 ppm	Unclassified	0.003 ppm[K]
	Annual Mean	0.040 ppm	Attainment	0.053 ppm	Attainment	
Sulfur Dioxide	1-Hour	–	–	0.075 ppm	Attainment	0.001 ppm[H]
	3-Hour	0.5 ppm	Attainment	0.5 ppm (secondary)	Attainment	
	24-Hour	0.14 ppm	Attainment	–	Attainment	
	Annual Mean	0.030 ppm	Attainment	–	Attainment	
Particulate Matter (PM_{10})	24-Hour	150 µg/m^3	Attainment	150 µg/m^3	Attainment	11.4 µg/m^{3H}
	Annual Mean	50 µg/m^3	Attainment	–	–	
Particulate Matter – Fine ($PM_{2.5}$)	24-Hour	–	–	35 µg/m^3	Attainment	5.3 µg/m^{3H}
	Annual Mean	–	–	12 µg/m^3 (primary)	Attainment	
		–	–	15 µg/m^3 (secondary)	Attainment	

Notes:
– = no standard available
µg/m^3 = micrograms per cubic meter
ppm = parts per million
[S] = air quality measurements recorded at Sand Island HDOH site
[H] = air quality measurements recorded at Honolulu HDOH site
[K] = air quality measurements recorded at Kapolei HDOH site
* = ambient air quality measured as annual mean of 1-hour average
Sources: HAR 11-59; Ambient Air Quality Standards; 40 CFR Part 50: National Primary and Secondary Ambient Air Quality Standard; State of Hawaii Department of Health: *State of Hawaii Annual Summary 2013 Air Quality Data*

4. Emissions Evaluation

4.1 Construction Emissions

Under the proposed scenario, air quality impacts would be intermittent and short term. Construction would generate emissions of the criteria pollutants, as well as CO_2. Emissions were calculated using the

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URBEMIS 2007 v. 9.2.4 environmental management software. The URBEMIS model provides a platform to calculate construction emissions using equipment emission factors (mass of emissions per unit time) from sources such as USEPA, California Air Resources Board (CARB) and site-specific information. URBEMIS also provides default values when site-specific information is not available.

Construction activities will occur in phases. Phases will consist of excavating and hauling coral stockpiles; utilities infrastructure and perimeter road relocation; relocation of Marisco facilities; fuel pier grading (Phase I); fuel pier and terminal construction (Phase I); Pier 7 extension and cargo yard expansion; Kalaeloa Harbor Access Road; Pier 8 layberth and mulit-purpose yard construction; Finger Pier removal; Fuel Pier grading and construction (Phase II); and Pier 10 layberth and parking lot construction. Preliminary estimates are for construction activities to occur between 2015 and 2033, with construction activities beginning in the first quarter of 2015. Construction activities, projected start date, projected duration, construction equipment, and assumptions are included in **Table 4.1a**.

The URBEMIS software allows the user to select pre-programmed "Mitigations" to control certain emissions. The measures selected and assumed to be implemented are:

- replacing ground cover in disturbed areas quickly
- using water to control dust during loading and unloading activities
- applying water to disturbed surfaces and haul roads three times per day, and
- reducing speed on unpaved roads to < 15 miles per hour

These measures are all common practices that are required by local and state regulations to control dust and prevent storm water pollution.

Annual emissions calculated from URBEMIS are summarized in **Table 4.1b**. Emissions for the proposed project are minimal due to the phased nature and low intensity of construction activities. Modeling assumptions and results are presented in **Appendix B**.

Table 4-1a Construction Assumptions by Activity

Activity	Start	Duration	Equipment	Assumptions
Remove coral stockpile	Q1 2015	5 years	20 cubic yard (c.y.) dump trucks 2 excavators 2 loaders	2,000,000 c.y. removed
Grading at Piers 9 and 10	Q1 2016	9 months	1 excavator 1 loader 1 grader 1 dozer 1 water truck	Assume 1,000 c.y. soil imported, 20 c.y. per truck, 20 miles per trip Assume 24 acres to be graded; maximum of 0.5 acres per day

Activity	Start	Duration	Equipment	Assumptions
Northern Harbor utilities infrastructure	Q4 2016	4 months	1 loader 1 backhoe 1 trencher	
Deconstruct Marisco buildings	Q2 2017	6 months	20 c.y. dump trucks 1 excavator 1 loader 1 other demo equipment	1,500 c.y. removed
Pave Pier 7 cargo yard, boat ramp, emergency access road	Q4 2017	6 months	2 cement mixers 1 paver 2 other paving equipment 2 rollers	Assume 15 acres to be paved
Fuel Pier (Phase I) – Grading	Q1 2020	7 months	1 excavator 1 loader 1 grader 1 dozer 1 water truck	Assume 1,000 c.y. soil imported, 20 c.y. per truck, 20 miles per trip Assume 15 acres to be graded; maximum of 0.5 acres per day
Fuel Pier (Phase I) – Paving	Q3 2020	6 months	2 cement mixers 1 paver 2 other paving equipment 2 rollers	Assume 15 acres to be paved
Fuel Pier Construction (Phase 1); Fuel Pier Control Building; Fuel Terminal; Pipeline installation	Q1 2021	2.5 years	1 bore/drill rig 1 cement mixer 1 crane 1 excavator 2 forklifts 1 generator 1 skid-steer loader 1 loader 1 trencher 1 welder	Assume 8 hours per day, 5 days per week
Pier 8 Layberth & Storage Yard grading	Q3 2023	10 months	1 excavator 1 loader 2 grader 1 dozer 1 water truck	Assume 1,000 c.y. soil imported, 20 c.y. per truck, 20 miles per trip Assume 30 acres to be graded; maximum of 0.5 acres per day
Pier 8 and Storage Yard paving	Q2 2024	10 months	4 cement mixers 1 paver 2 other paving equipment 2 rollers	Assume 28 acres to be paved
Pier 8 and Storage Yard construction	Q2 2025	10 months	1 bore/drill rig 1 cement mixer 1 crane 1 excavator	Assume 8 hours per day, 5 days per week

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Activity	Start	Duration	Equipment	Assumptions
			2 forklifts 1 generator 1 skid-steer loader 1 loader 1 trencher 1 welder	
Demolition of Finger Pier	Q1 2025	4 months	20 c.y. dump trucks 1 excavator 1 loader 1 other demo equipment	2,200 c.y. removed
Fuel Pier improvements (Phase II)	Q3 2025	12 months	1 bore/drill rig 1 cement mixer 1 crane 1 excavator 2 forklifts 1 generator 1 skid-steer loader 1 loader 1 trencher 1 welder	Assume 8 hours per day, 5 days per week
Pier 7 extension	Q3 2026	13 months	1 bore/drill rig 1 cement mixer 1 crane 1 excavator 2 forklifts 1 generator 1 skid-steer loader 1 loader 1 trencher 1 welder	Assume 8 hours per day, 5 days per week
Kalaeloa Harbor Access Rd. grading	Q3 2027	4 months	1 excavator 1 loader 1 grader 1 dozer 1 water truck	Assume 5 acres to be graded; maximum 0.5 acres per day
Kalaeloa Harbor Access Rd. paving	Q1 2028	3 months	1 paver 2 other paving equipment 2 rollers	Assume 5 acres to be paved
Harbor Office Construction	Q2 2028	5 months	1 cement mixer 1 excavator 2 forklifts 1 generator 1 skid-steer loader 1 loader 1 trencher 1 welder	Assume 8 hours per day, 5 days per week

Activity	Start	Duration	Equipment	Assumptions
Storage yards A1 and A2 site grading	Q3 2028	14 months	1 excavator 1 loader 2 graders 1 dozer 1 water truck	Assume 80 acres to be graded; maximum 0.5 acres per day
Pier 10 Layberth	Q4 2029	10 months	1 cement mixer 1 crane 1 excavator 2 forklifts 1 generator 1 skid-steer loader 1 loader 1 trencher 1 welder	Assume 8 hours per day, 5 days per week
Storage Yards A1 and A2 – Paving	Q3 2030	12 months	2 cement mixers 2 paver 2 other paving equipment 2 rollers	Assume 80 acres to be paved; maximum 0.5 acres per day
Pier 10 Parking Lot - Grading	Q3 2031	4 months	1 excavator 1 loader 2 graders 1 dozer 1 water truck	Assume 2 acres to be graded
Pier 10 Parking Lot – Paving	Q1 2032	1 month	1 cement mixers 1 paver 1 other paving equipment 1 rollers	Assume 2 acres to be paved

Table 4-1b Estimated Proposed Construction Emissions (Tons per Year)

Construction Year	Annual Emissions (tons per year)						
	VOCs(1)	NO_2(2)	CO	SO_2	PM_{10}	$PM_{2.5}$	CO_2
2015	0.43	4.11	2.41	0.01	4.72	1.12	858.9
2016	**0.73**	**6.12**	**4.13**	**0.01**	**5.47**	**1.34**	**1,256.9**
2017	0.52	4.30	3.14	0.01	5.19	1.22	1,091.1
2018	0.46	3.62	2.79	0.01	5.13	1.20	1,008.4
2019	0.34	2.79	2.29	0.01	5.08	1.15	938.0
2020	0.28	1.71	1.68	0.00	0.70	0.21	388.4
2021	0.41	2.74	2.52	0.00	0.12	0.11	827.2
2022	0.44	3.00	2.75	0.00	0.12	0.11	928.3
2023	0.34	2.26	2.13	0.00	0.17	0.10	656.7
2024	0.64	4.09	3.91	0.00	0.35	0.22	1,065.9
2025	0.37	2.41	2.33	0.00	0.15	0.11	699.4
2026	0.43	2.95	2.71	0.00	0.12	0.11	914.0
2027	0.34	2.32	2.16	0.00	0.20	0.11	667.7
2028	0.32	2.10	1.97	0.00	0.19	0.11	548.8
2029	0.28	1.88	1.73	0.00	0.33	0.13	441.9
2030	0.42	2.58	2.37	0.00	0.13	0.12	717.8
2031	0.35	1.75	1.64	0.00	0.21	0.13	325.7
2032	0.16	0.97	0.91	0.00	0.08	0.07	144.0
2033	0.04	0.24	0.23	0.00	0.02	0.02	35.8

Notes: Detailed annual results presented in Appendix B.
Highest yearly total shown in **bold**
(1) Reactive organic gas (ROG) emissions reported in URBEMIS is used as a surrogate for VOCs in this analysis.
(2) Nitrogen oxide (NOx) emissions reported in URBEMIS is used as a surrogate for NO_2 in this analysis.

4.2 Operational Emissions

Under the proposed scenario, the primary air quality considerations associated with operational activities at the Site are increased harbor vessel (ships and barges) traffic, cargo handling equipment, cargo hauling (trucking), and evaporative losses of VOCs during liquid petroleum cargo tank filling activities. The evaporative losses, called loading losses, result in emissions of VOCs during loading of liquid petroleum cargo vessels and offsite fuel storage tanks. The offsite emissions were not considered in this analysis.

4.2.1 Vessel Traffic Emissions

Vessel traffic emissions consist of internal combustion engine exhaust from ships and barges when entering, exiting, and maneuvering within the harbor. Offsite emissions during ocean transit or docking at neighbor island ports were not considered. Additionally, it has been assumed that while docked all vessels will run on land-based electrical power (shore power); therefore, vessels will not emit exhaust for onboard power generation. The emissions estimate is based on assumptions of fixed parameters such as type and size of vessel, engine power and utilization (main and auxiliary), engine load rating, distance travelled, and docking time; as well as parameters that will change over time, such as number of calls per year, type of fuel used, and engine emission factors (grams emitted per kilowatt-hour (g/kW-hr). **Table 4.2.1a** presents assumptions made for calculating current (2012) and projected (2040) vessel utilization. As indicated, total trips per year for ocean-going vessels and barges are anticipated to rise significantly, with overall vessel traffic decreasing slightly.

Table 4.2.1a – Current and Projected Annual Vessel Utilization Associated with In-Harbor Maneuvering

Vessel Type		Avg. Travel Time (hours)	Total Hours/trip[1]	Trips/year[2]		Engine Utilization (% of time)	
				2012	2040	Main	Auxiliary
Ocean-going Vessel	Dry Bulk Ship (Panamax)	0.48	0.98	30	50	49.0%[3]	51.0%
	Container/Gen. Cargo (Handymax)	0.48	0.98	6	11	49.0%[3]	51.0%
	Fuel Tanker (Panamax)	0.48	0.98	60	75	49.0%[3]	51.0%
	Fuel Tanker (Handymax)	0.48	0.98	1	20	49.0%[3]	51.0%
Harbor Vessel	Excursion Vessel	0.48	0.58	1,384	720	82.8%[3]	17.2%
	Ocean Tug	0.48	1.08	40 [4]	761[4]	75.0%[5]	50.0%
	Assist Tug	0.08	0.68	1,310 [6]	730[6]	75.0%[5]	50.0%
Barge	Dry Bulk Barge - Large	0.48	0.98	18	390	0%[7]	100%
	Dry Bulk Barge - Small	0.48	0.98	74	56	0%[7]	100%
	Fuel Barge - Large	0.48	0.98	3	5	0%[7]	100%
	Fuel Barge - Small	0.48	0.98	220	260	0%[7]	100%
	LPG Barge	0.48	0.98	50	50	0%[7]	100%
			Total	3,196	3,128		

Notes

(1) Travel time plus docking time, round-trip

(2) Based on information provided by Amergent Techs, LLC

(3) Assumes main engine operates from the channel entrance to the dock, and auxiliary engine operates only during docking

(4) Assumes 1 tug per barge

(5) Assumes tugs use main engine the majority of the time, the auxiliary engine only 25% of the time, and both engines combined 25% of the time

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(6) Assumes 2 tugs per vessel (all types)

(7) Barges are unpowered except for a steam turbine (boiler) engine used for electricity when not docked

For each trip, average travel time per each vessel trip was calculated based on expected average roundtrip distance travelled within the harbor or from the harbor channel entrance to a vessel's docking location. An average speed of 5 miles per hour and a docking time of 15 minutes was used based on values in the cited references. Utilizing these assumptions, the total number of trips per year was calculated for both the current 2012 and projected 2040 annual operation for each vessel.

The second step in the analysis was to determine emissions factors for each vessel type, engine type, engine age, and different fuels. Emission factors are presented in **Table 4.2.1b**.

Table 4.2.1b – Annual Emission Factors by In-Harbor Vessel Traffic

Vessel Type	Engine Type	Year	Emission Factor (g/kW-hr)[1]							
			NOx	PM10	PM2.5	HC/ VOC[2]	CO	SOx	CO_2	CH_4
Ocean-going Vessels	Main	2012[3]	14	1.43	1.32	0.5	1.1	11.24	678	0.08
		2040[4]	9.44	0.154	0.149	0.5	1.1	0.0059	646	0.004
	Auxiliary	2012[5]	13.9	0.49	0.45	0.4	1.1	4.24	691	0.004
		2040[4]	9.67	0.15	0.14	0.4	1.1	0.0059	646	0.004
Harbor Vessels	Main	2012[5]	13	0.30	0.29	0.27	2.5	1.3	690	0.09
		2040[4]	6.8	0.26	0.25	0.27	2.5	0.0065	690	0.09
	Auxiliary	2012[5]	10	0.40	0.39	0.27	1.5	1.3	690	0.09
		2040[4]	6.8	0.3	0.29	0.27	1.5	0.0065	690	0.09
Barges	Steam Turbine	2012[3]	2.1	1.47	1.35	0.1	0.2	16.1	971	0.002
		2040[4]	2.0	0.58	0.53	0.1	0.2	5.67	923	0.002

Notes:

(1) Source: USEPA, 2009. *Current Methodologies in Preparing Mobile Source Port-Related Emission Inventories*. April

(2) HC = total hydrocarbons; VOC = volatile organic carbon

(3) Using residual oil fuel

(4) Using ultra-low sulfur marine diesel

(5) Using marine diesel

Finally, the emission factors were multiplied by the current and projected annual hourly operation, by the estimated engine power, and load rating (for main and auxiliary) to yield current (2012) and projected (2040) vessel utilization annual emissions and are presented in **Table 4.2.1c** and **Table 4.2.1d**, respectively.

Table 4.2.1c - Estimated Annual Emissions Associated with In-Harbor Vessel Traffic – 2012

Vessel Type		Main Engine			Auxiliary Engine			Emissions (tons/year)							
		Rated*	Avg.*	Hours	Rated*	Avg.*	Hours	NOx	PM10	PM2.5	HC/ VOC(1)	CO	SOx	CO_2	CH_4
Ocean-going Vessel	Dry Bulk Ship (Panamax)	25,000	8,250	14.4	5,500	1,550	15.0	2.19	0.20	0.18	0.08	0.17	1.58	106.40	0.01
	Container/Gen. Cargo (Handymax)	10,000	3,300	2.9	2,200	670	3.0	0.18	0.02	0.01	0.01	0.01	0.13	8.63	0.001
	Fuel Tanker (Panamax)	25,000	8,250	28.8	5,500	1,550	30.0	4.38	0.40	0.37	0.15	0.34	3.16	212.80	0.02
	Fuel Tanker (Handymax)	10,000	3,300	0.5	2,200	670	0.5	0.03	0.003	0.002	0.001	0.002	0.02	1.44	0.0001
Harbor Vessel	Excursion Vessel	400	200	664.3	100	50	138.4	1.98	0.21	0.20	0.08	0.17	1.68	104.48	0.012
	Ocean Tug	2,400	1,600	32.4	450	160	21.6	0.78	0.08	0.08	0.03	0.07	0.66	41.34	0.005
	Assist Tug	2,000	500	668.1	150	100	445.4	5.27	0.55	0.51	0.20	0.46	4.34	283.33	0.030
Barge	Dry Bulk Barge - Large	-	-	0.0	1,500	750	17.6	0.03	0.02	0.02	0.001	0.003	0.23	14.15	0.00003
	Dry Bulk Barge - Small	-	-	0.0	750	400	72.5	0.07	0.05	0.04	0.003	0.006	0.51	31.02	0.00006
	Fuel Barge - Large	-	-	0.0	1,500	750	2.9	0.01	0.004	0.003	0.0002	0.0005	0.04	2.36	0.000005
	Fuel Barge - Small	-	-	0.0	750	400	215.6	0.20	0.14	0.13	0.009	0.019	1.53	92.22	0.00019
	LPG Barge	-	-	0.0	750	400	49.0	0.05	0.03	0.03	0.002	0.004	0.35	20.96	0.00004
Total		-			-			**15.15**	**1.71**	**1.57**	**0.56**	**1.26**	**14.23**	**919.1**	**0.079**

Notes
(1) HC = total hydrocarbons; VOC = volatile organic carbon
*Estimated based on cited references

Table 4.2.1d - Projected Annual Emissions Associated with In-Harbor Vessel Traffic – 2040

Vessel Type		Main Engine			Auxiliary Engine			Emissions (tons/year)							
		Rated*	Avg.*	Hours	Rated*	Avg.*	Hours	NOx	PM10	PM2.5	HC/ VOC(1)	CO	SOx	CO_2	CH_4
Ocean-going Vessel	Dry Bulk Ship (Panamax)	25,000	8,250	24.0	5,500	1,550	25.0	2.47	0.04	0.04	0.13	0.29	0.0015	168.44	0.0010
	Container/Gen. Cargo (Handymax)	10,000	3,300	5.3	2,200	670	5.5	0.22	0.004	0.003	0.01	0.03	0.0001	15.02	0.0001
	Fuel Tanker (Panamax)	25,000	8,250	36.0	5,500	1,550	37.5	3.71	0.06	0.06	0.19	0.43	0.0023	252.66	0.0016
	Fuel Tanker (Handymax)	10,000	3,300	9.6	2,200	670	10.0	0.40	0.01	0.01	0.02	0.05	0.0002	27.31	0.0002
Harbor Vessel	Excursion Vessel	400	200	345.6	100	50	72.0	0.54	0.021	0.020	0.02	0.20	0.0005	55.26	0.007
	Ocean Tug	2,400	1,600	616.4	450	160	410.9	7.88	0.30	0.29	0.31	2.82	0.0075	799.43	0.104
	Assist Tug	2,000	500	372.3	150	100	248.2	1.58	0.061	0.059	0.06	0.55	0.0015	160.32	0.021
Barge	Dry Bulk Barge - Large	-	-	0.0	1,500	750	382.2	0.63	0.183	0.167	0.03	0.06	1.7900	291.39	0.001
	Dry Bulk Barge - Small	-	-	0.0	750	400	54.9	0.05	0.01	0.01	0.002	0.005	0.1371	22.31	0.00005
	Fuel Barge - Large	-	-	0.0	1,500	750	4.9	0.01	0.002	0.002	0.0004	0.001	0.0229	3.74	0.00001
	Fuel Barge - Small	-	-	0.0	750	400	254.8	0.22	0.065	0.059	0.01	0.02	0.6364	103.60	0.00022
	LPG Barge	-	-	0.0	750	400	49.0	0.04	0.01	0.01	0.002	0.004	0.1224	19.92	0.00004
Projected Total		-						**17.76**	**0.77**	**0.73**	**0.79**	**4.46**	**2.72**	**1,919.4**	**0.136**
Projected Change		-						**+2.61**	**-0.94**	**-0.84**	**+0.23**	**+3.20**	**-11.51**	**+1,000.3**	**+0.057**

Notes
(1) HC = total hydrocarbons; VOC = volatile organic carbon
*Estimated based on cited references

Results indicate the criteria pollutants NO_x, VOCs, and CO will increase with the harbor improvements between 2012 and 2040 based on the significant increase in trips per year by large ocean-going vessels and barges. Emissions of CO_2 and methane (CH_4) are also projected to increase. Concurrently, emissions of PM10, PM2.5, and SO_x are projected to decrease due to projected engine emissions regulations with better control technology and requirements for cleaner-burning fuels. Full calculations for vessel traffic emissions are presented in **Appendix C**.

4.2.2 Emissions from Cargo-Handling Equipment

Cargo handling equipment (CHE) includes offroad vehicles and fuel-burning mobile and stationary equipment associated with loading and unloading of containers, bulk cargo, and vehicles, and peripheral equipment supporting these activities. CHE generates emissions through internal combustion exhaust. Emissions are dependent on the type and number of each piece of equipment, including variables such as engine horsepower, model year, type of fuel used (typically diesel), annual hours of operation, and average engine load.

Rather than conducting a lengthy inventory and assessment of all of the CHE currently present at KBPH, Arcadis estimated the inventory and operational data under guidance from the USEPA document *Current Methodologies in Preparing Mobile Source Port-Related Emission Inventories* (USEPA 2009), which compiled CHE information from various ports in the United States. Arcadis used CHE inventory and operational data for the Port of Seattle (because it was closest in size to KBPH), and adjusted the equipment numbers proportionally downward based on the lower container and dry cargo tonnage reported for KBPH. For 2040 projections, Arcadis increased the inventory of CHE by the projected bulk cargo growth rate of 43% for bulk cargo and 22% for container cargo. The inventories and parameters are summarized in **Table 4.2.2a**.

Table 4.2.2a – Estimated Current and Projected Harbor CHE Inventory and Operating Data

Equipment Type	Avg. Horsepower(1)	Avg. Hours/ Year(1)	Avg. Hours/ Day	Load Factor(1)	Estimated Count	
					2012(2)	2040(3)
Car loader	150	500	1.4	0.51	1	2
Crane	300	300	0.8	0.43	3	4
Forklift	130	1,212	3.3	0.30	18	25
Generator	130	873	2.4	0.59	4	5
Manlift	60	113	0.3	0.30	1	1
Side handler	195	771	2.1	0.59	2	2
Sweeper	50	441	1.2	0.68	1	1
Top handler	282	2,095	5.7	0.59	7	10
Yard tractor	188	1,956	5.4	0.65	19	27

Notes:

(1) Based on Table 4-2 of USEPA, 2009. *Current Methodologies in Preparing Mobile Source Port-Related Emission Inventories*. April

(2) Same proportions as Table 4-2 but adjusted down based on KBPH cargo handling capacity

(3) Based on projected growth of 43% for bulk cargo and 22% for container cargo

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CHE emissions were then estimated using the OFFROAD model built into URBEMIS 2007. Default parameters for engine horsepower, load factor, and daily usage were modified to match the inventory and operational data. The OFFROAD model accounts for projected improvements in emissions control based on selected year (2012 and 2040). Emission results are presented in **Table 4.2.2b**.

Table 4.2.2b – Estimated Current and Projected Emissions for Harbor CHE

Year	Cargo Tonnage		Emissions (tons/year)(2)						
	Dry bulk(1)	Liquid Bulk(1)	NOx	PM10	PM2.5	ROG(3)	CO	SO_2	CO_2
2012	1,785,000	1,555,000	23.01	0.84	0.77	2.38	7.93	0.00	2,926
2040	2,550,000	1,900,000	12.42	0.47	0.44	2.15	10.05	0.00	4,133
Change	**+765,000**	**+345,000**	**-10.59**	**-0.37**	**-0.33**	**-0.23**	**+2.12**	**0.00**	**+1,207**

Notes:

(1) Source: DOT, 2015. Kalaeloa Barbers Point Harbor Master Plan. January

(2) As calculated in URBEMIS 2007 model

(3) ROG = reactive organic compounds (equivalent to volatile organic compounds [VOC])

Results indicate emissions of all criteria pollutants will decrease or remain constant despite the increased usage, due to forthcoming or projected emissions regulations with better control technology and requirements for cleaner-burning fuels. CO_2 emissions are projected to increase due to the significant increase in CHE operation outweighing projected future gains in engine efficiency. Modeling data and complete current and projected emissions calculations are included in **Appendix C**.

4.2.3 Cargo Hauling and Traffic Emissions

Traffic emissions are associated with commercial trucks hauling cargo to and from KBPH from various locations on Oahu, as well as from the movement of passenger vehicles arriving in or departing from Oahu at KBPH. Current and projected vehicle use is based on cargo type and volume. Estimated vehicle trips was provided by Group 70 International, Inc. Projections show increases in all vehicle types in order to handle the increased cargo. Arcadis considered vehicle emissions at three speeds: stationary (idle) for 6 minutes per trip, 10 miles per hour for 0.5 miles per trip (on KBPH property, and 35 miles per hour for 20 miles per trip (average distance from KBPH to a final destination in Oahu). Traffic input data is summarized in **Table 4.2.3a**.

Table 4.2.3a – Estimated Current and Projected Vehicle Traffic Associated with Bulk Cargo Loading/Unloading

Vehicle Type	Estimated Vehicle Trips/Year[1]		Speed (miles/hr)	% of total miles travelled*	Vehicle miles [hours]/trip*	Vehicle miles [hours]/year	
	Current	2040				Current	2040
30-ton truck	38,659	42,689	Idle[2]	-	0.10	3,866	4,269
			10[3]	10%	0.5	1,933	2,134
			35[4]	90%	20	695,862	853,780
10-ton truck	20,636	22,787	Idle	-	0.10	2,064	2,064
			10	10%	0.5	1,032	1,032
			35	90%	20	371,448	412,720
TEU[4] - 20-ton	5,282	5,833	Idle	-	0.10	528	528
			10	10%	0.5	264	264
			35	90%	20	95,076	105,640
Passenger Car/Truck	771	852	Idle	-	0.05	39	39
			10	10%	0.5	39	39
			35	90%	10	6,939	7,710
Trailer - 5-ton	1,052	1,162	Idle	-	0.10	105	105
			10	10%	0.5	53	53
			35	90%	20	18,941	21,046
Total	**66,400**	**73,323**					

Notes:
(1) Based on traffic information provided by KBPH Consultant Team
(2) Emission factor units are in grams per hour
(3) Assumed average speed on KBPH property
(4) Assumed average speed of offsite roadways
(5) TEU = Twenty-foot equivalent units
*Estimated

To calculate exhaust and dust emissions from vehicles based on total miles traveled, Arcadis used the model EMFAC, which accounts for vehicle type, speed, and average model year for 2015 and 2040 to generate emissions factors for the criteria pollutants plus CO_2 in grams emitted per mile travelled. Resulting emissions factors are presented in **Appendix C**.

Emission factors were then multiplied by the miles travelled at each speed for each vehicle type to yield emissions in tons per year. Current annual emissions and projected annual emissions are presented in **Table 4.2.3b** and **Table 4.2.3c**, respectively.

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Table 4.2.3b - Current (2015) Annual Emissions from Vehicle Traffic Associated with Bulk Cargo Loading/Unloading

Vehicle Type	Current Emissions (tons/year)						
	ROG[1]	TOG[2]	CO	NOx	CO_2	PM10	PM2.5
30-ton truck	0.300	0.341	1.164	7.650	1460.4	0.096	0.088
10-ton truck	0.101	0.115	0.334	1.656	500.4	0.048	0.044
TEU[3] - 20-ton	0.0172	0.0196	0.0577	0.6962	129.2	0.0070	0.0065
Passenger Car/Truck	0.00031	0.00044	0.01075	0.00095	2.7	0.00002	0.00001
Trailer - 5-ton	0.00394	0.00449	0.01798	0.07456	11.3	0.00088	0.00081
Total	**0.422**	**0.481**	**1.584**	**10.077**	**2104.1**	**0.152**	**0.140**

Table 4.2.3c - Projected (2040) Annual Emissions from Vehicle Traffic Associated with Bulk Cargo Loading/Unloading

Vehicle Type	Projected Emissions (tons/year)						
	ROG[1]	TOG[2]	CO	NOx	CO_2	PM10	PM2.5
30-ton truck	0.270	0.308	0.972	2.208	1749.5	0.057	0.052
10-ton truck	0.053	0.060	0.169	0.483	547.2	0.014	0.012
TEU[3] - 20-ton	0.0149	0.0169	0.0474	0.1435	140.1	0.0039	0.0036
Passenger Car/Truck	0.00011	0.00019	0.00590	0.00054	3.0	0.00002	0.00002
Trailer - 5-ton	0.00175	0.00199	0.01463	0.02095	12.4	0.00048	0.00044
Total	**0.340**	**0.387**	**1.208**	**2.856**	**2452.1**	**0.075**	**0.069**
Change 2015 to 2040	**-0.082**	**-0.094**	**-0.376**	**-7.221**	**348.0**	**-0.077**	**-0.071**

Notes:
(1) ROG = Reactive organic gases (equivalent to volatile organic compounds [VOCs])
(2) TOG = Total organic gases (equivalent to total organic compounds [TOC])
(3) TEU = Twenty-foot equivalent units

Results indicate emissions of all criteria pollutants will decrease despite the increased vehicle traffic, due to forthcoming or projected emissions regulations with better control technology and requirements for cleaner-burning fuels. CO_2 emissions are projected to increase due to the significant increase in cargo hauling and vehicle traffic outweighing projected future gains in engine efficiency. Projected cargo hauling and traffic emissions calculations are included in **Appendix C**.

4.2.4 Fuel Loading Losses

Forecasted marine vessel activities in 2040 at KBPH are anticipated to include imports and exports of liquid petroleum products (gasoline, jet fuel, diesel fuel, fuel oil, other petroleum products) and liquefied petroleum gas (LPG). Liquid petroleum products can be a source of evaporative VOC emissions when exposed to the atmosphere or when filling storage tanks or cargo holds (referred to as loading losses). LPG contains negligible VOCs and thus does not contribute to loading losses.

It is assumed product imports will be transferred from cargo vessels directly to offsite storage locations via offshore moorings or pipelines and thus will not result in any onsite evaporative loading losses. However, exporting of petroleum products from KBPH to outer islands requires filling vessel/barge cargo holds at KBPH and thus does result in onsite evaporative loading losses, which were considered as a source of VOCs.

Arcadis assessed four 2040 detailed petroleum-product demand scenarios: Business-As-Usual (BAU); Renewable Portfolio Standard (RPS) Falls Short; RPS Succeeds; and Hawaiian Clean Energy Initiative (HCEI) Generally Succeeds as presented in Facts Global Energy *Fuels Market in Hawai'i: Current Situation and Future Prospects* to estimate the volume of petroleum products loaded at KBPH en route to neighbor islands. Using the four 2040 demand scenarios and a current conditions scenario, Arcadis calculated an estimate of VOC emissions from outbound barge movements to neighboring islands. Arcadis made necessary assumptions to complete an approximate calculation of petroleum product demand scenarios, and because of the assumptions required to make these estimates, the estimated emission values are overestimated and considered "worst-case-scenario". The assumptions are presented:

- KBPH will operate at full throughput capacity;
- Share of neighbor island demand met by KBPH estimated from 2012 Barge Movements of Fuel to Neighbor Islands (Facts Global Energy 2015);
- Gaseous petroleum product (LPG) loading activities do not results in VOC emissions;
- Neighbor island demand for "other" petroleum-products will be treated as if it were a combination of all other fuels in the same proportions; and
- Ocean barges are assumed not to be ballasted. This is a conservative assumption made for calculation purposes; in reality, ballasting will likely decrease total VOC emissions by approximately 10-20%.

Total VOC emission estimates were calculated from product specific emissions factors and emissions equations provided by USEPA AP-42, *Compilation of Air Pollutant Emission Factors*. Estimated VOC emissions for each demand scenario are included in **Table 4.2.4** and are presented in full detail in **Appendix C**.

VOC emissions associated with gasoline loading losses account for approximately 98-99% of total VOC emissions. Gasoline contains seven hazardous air pollutants (HAPs): hexane, toluene, benzene, 2, 2, 4-trimethylpentane, xylene, POM as 16-PAH (polycyclic organic matter), and ethylbenzene, as designated by the USEPA. Hazardous air pollutants (HAPs) for gasoline loading was calculated from HAP vapor profiles (weight percentage for total VOC) for gasoline provided by USEPA *Documentation for the 1999 Base Year Nonpoint Source National Emission Inventory for Hazardous Air Pollutants*. An estimate of HAPs emissions from gasoline loading activities was calculated for current conditions and the four 2040 demand scenario and is presented in **Table 4.2.4**.

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Table 4.2.4 – Current and Projected VOC and HAPs Emissions from Fuel Transfer Activities

Demand Forecast	Total VOCs	Hexane (1.4%[1])	Toluene (1.1%)	Benzene (0.4%)	2,2,4-Trimethyl-pentane (0.7%)	Xylene (0.4%)	POM as 16-PAH[2] (0.5%)	Ethyl-benzene (0.1%)	Total HAPs
Current Conditions	**63.1**	**0.88**	**0.69**	**0.25**	**0.44**	**0.25**	**0.32**	**0.06**	**2.9**
BAU - 2040	81.7	1.14	0.90	0.33	0.57	0.33	0.41	0.08	3.8
RPS Falls Short - 2040	64.6	0.90	0.71	0.26	0.45	0.26	0.32	0.06	3.0
RPS Succeeds - 2040	**64.5**	**0.90**	**0.71**	**0.26**	**0.45**	**0.26**	**0.32**	**0.06**	**3.0**
HCEI Generally Succeeds - 2040	47.4	0.66	0.52	0.19	0.33	0.19	0.24	0.05	2.2

Notes:

All values are reported in tons per year

Current and most likely projected scenario shown in **bold**

(1) Represents percentages of VOCs that is the constituent. Based on gasoline fuel. Source: Johnson, G. 1999 Developing a Consistent Methodology to Calculate VOC and HAP Evaporative Emissions for State I and Stage II Operations at Gasoline Service Stations for the 1999 NEI (Draft v2.0), Table

(2) POM as 16-PAH = Polycyclic Organic Matter as EPA 16 Priority Polycyclic Aromatic Hydrocarbons

Results indicate that VOCs and HAPs may increase or decrease depending on the demand forecast situation. It is anticipated that the RPS Succeeds demand scenario is the most likely projected scenario for 2040; thus, VOCs emissions are anticipated to increase by approximately 1.4 tons per year and HAPs are anticipated to increase or decrease according to each constituent's emission percentage. The Business as Usual Scenario results in an increase in emissions of all constituents.

4.2.5 Operational Emissions Summary

A summary of total current and projected operational emissions for activities performed at the Site including fuel transfer, vehicle traffic from cargo hauling, harbor vessel traffic, and cargo handling equipment are presented in **Tables 4.2.5a and 4.2.5b**, respectively. **Table 4.2.5b** presents the total VOC emissions from the four 2040 detailed oil-product demand scenarios. RPS Succeeds demand scenario is the most likely projected scenario for 2040, and is thus incorporated in the projected emissions calculations.

Table 4.2.5a – Summary of Total Operational Emissions - Current

Activity	Criteria Pollutants						Greenhouse Gas Emissions	
	Total VOCs	CO	NOx	SOx	PM10	PM2.5	CH_4	CO_2
Fuel Transfer	63.1	-	-	-	-	-	-	-
Vehicle Traffic from Cargo Hauling	0.42	1.58	10.08	0.00	0.15	0.14	-	2,104.09
Vessel Traffic	0.6	1.26	15.1	14.2	1.71	1.57	0.08	919.1
Cargo Handling Equipment	2.38	7.93	23.0	0.00	0.84	0.77	-	2,926.0
Estimated Total	**66.4**	**10.8**	**48.2**	**14.2**	**2.70**	**2.48**	**0.08**	**5,949.2**

Notes:

All values are reported in tons per year

Table 4.2.5b – Summary of Total Operational Emissions - Projected

Activity	Criteria Pollutants						Greenhouse Gas Emissions	
	Total VOCs	CO	NOx	SOx	PM10	PM2.5	CH_4	CO_2
Fuel Transfer - Business as Usual	63.1	-	-	-	-	-	-	-
Fuel Transfer - HCEI Succeeds	64.5	-	-	-	-	-	-	-
Fuel Transfer - RPS Falls Short	81.7	-	-	-	-	-	-	-
Fuel Transfer - RPS Succeeds	64.6	-	-	-	-	-	-	-
Vehicle Traffic from Cargo Hauling	0.34	1.21	2.86	0.00	0.07	0.07	-	2,452.1
Vessel Traffic	0.8	4.46	17.8	2.72	0.77	0.73	0.06	1,919.4
Cargo Handling Equipment	2.15	10.1	12.4	0.00	0.47	0.44	-	4,133.0
Projected Total, RPS Succeeds	**67.9**	**15.7**	**33.0**	**2.7**	**1.3**	**1.2**	**0.06**	**8,504.5**
Projected Change	**+1.5**	**+4.9**	**-15.2**	**-11.5**	**-1.4**	**-1.2**	**-0.02**	**+2,555.3**

Notes:

All values are reported in tons per year

Results indicate the criteria pollutants VOCs and CO will increase with operational activities between 2012 and 2040 due to the increased volume associated with fuel loading activities, increased trips by ocean-going vessels and barges, and increased use of cargo handling equipment. Concurrently, emissions of NOx, SOx, PM10, and PM2.5 are projected to decrease due to projected engine emissions regulations with better control technology and requirements for cleaner-burning fuels. Emissions of greenhouse gases, specifically, CO2 are also projected to increase due to increased vehicle traffic from cargo hauling, ocean-going vessel and barge traffic, and cargo handling equipment. However, methane is projected to slightly decrease as engine emissions regulations with better control technology and requirements for cleaner-burning fuels are implemented for marine vessels.

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4.3 Greenhouse Gas Emissions

Greenhouse gases (GHGs) are pollutants of concern for air quality and climate change. GHGs include water vapor, CO_2, methane, N_2O, O_3, and several chlorofluorocarbons. Water vapor is a naturally occurring GHG and accounts for the largest percentage of the greenhouse effect. Next to water vapor, CO_2 is the second-most abundant GHG and is typically produced from human-related activities. The largest source of CO_2 emissions globally is the combustion of fossil fuels such as coal, oil, and gas in power plants, automobiles, industrial facilities and other sources. Additionally, a number of specialized industrial production processes and product uses such as mineral production, metal production, and the use of petroleum-based products can also lead to CO_2 emissions.

Although regulatory agencies are taking actions to address GHG effects, there are currently no state or Federal standards or regulations limiting CO_2 emissions and concentrations in the ambient air. In response to the *FY2008 Consolidated Appropriations Act* (House Resolution 2764; Public Law 110–161), USEPA issued the *Final Mandatory Reporting of Greenhouse Gases Rule* (GHG Reporting Rule), which became effective on January 1, 2010. The GHG Reporting Rule requires annual reporting of GHG emissions to the USEPA from large sources and suppliers in the United States, including suppliers of fossil fuels or industrial GHGs; manufacturers of vehicles and engines; and facilities that emit greater than 25,000 metric tons per year (mtpy) (27,558 tons per year [tpy]) each of CO_2 and other GHGs. The intent of the rule is to collect accurate and timely emissions data to inform future policy decisions and programs to reduce emissions, as well as fight against the effects of climate change.

Additionally, on September 30, 2009, USEPA proposed, under the Clean Air Act (CAA), new thresholds for GHG that would require that facilities subjected to the New Source Review and Title V operating permit programs to obtain permits and would cover nearly 70 percent of the nation's largest stationary source GHG emitters—including power plants, refineries, and cement production facilities, while shielding small businesses and farms from permitting requirements. The Final Rule, known as the GHG Tailoring Rule, affects sources with the potential to emit 100,000 tpy or greater of GHGs.

Construction of the proposed project will result in intermittent, short term emissions of GHGs resulting from the combustion process in fuel-burning construction equipment. As shown in **Table 4.1b**, the maximum annual emissions of CO_2 associated with constriction activities are projected to be approximately 1,257 tons.

The proposed projected will results in long-term, yearly, operational emissions associated with fuel transfer ("loading losses"), vehicle traffic from cargo hauling, harbor vessel traffic, and cargo handling equipment. As shown in **Table 4.2.5b**, the maximum annual emissions of CO_2 associated with operational activities are projected to be approximately 8,505 tons. Additionally, the maximum annual emissions of methane associated with operational activities are projected to be approximately 0.06 tons. Different greenhouse gases persist in the atmosphere for different lengths of time, and absorb different amounts of heat. The "global warming potential" (GWP) of a greenhouse gas indicates the amount of warming a gas causes over a given period of time. For instance, CO_2 has an index value of 1, and the

GWP for all other GHGs is the number of times more warming they cause compared to CO_2. The mass of a greenhouse gas can be multiplied by its GWP to obtain a CO_2 equivalent (CO_2e), so that different mixtures of greenhouses gasses can be easily compared (Equation 1).

$$\Sigma \text{ [Mass of Greenhouse Gas (tons) X GWP]} = CO_2e \text{ (tons)} \quad \text{(Equation 1)}$$

$$(8{,}505 \text{ tons of } CO_2 \text{ X } 1) + (0.06 \text{ tons of methane X } 25) = 8{,}506.4\ CO_2e \text{ (tons)} \quad \text{(Equation 2)}$$

Operational emissions are estimated to release approximately 8,506.4 tons of CO_2e to the atmosphere on a yearly basis (Equation 2).

5. Air Permitting Considerations

The State of Hawaii Department of Health (DOH) Clean Air Branch (CAB) is the permitting authority for new and existing sources of pollutant emissions. Arcadis performed a regulatory review of Hawaii Administrative Rules (HAR) Title 11 Chapter 60.1 and Code of Federal Regulations 40 CFR 52.21, 40 CFR 60, and 40 CFR 63.

5.1 HAR Title 11 Chapter 60.1

All stationary sources of air pollutants are regulated under HAR Title 11 Chapter 60.1 unless they are otherwise exempt. Ocean-going vessels and cargo equipment are not stationary and are exempt, but fuel transfer operations are not; therefore, KBPH will require an air permit. Air permits in Hawaii are classified as either covered source permits (CSP) or noncovered source permits (NSP). Covered sources are defined as:

- Any major source;
- Any source subject to a New Source Performance Standard (NSPS), as defined in 40 CFR 60;
- Any source subject to an emissions standard or other requirement of the National Emissions Standards for Hazardous Air Pollutants (NESHAP), as defined in 50 CFR 63;
- Any source subject to the rules for the Prevention of Significant Deterioration (PSD) of air quality, as defined in 40 CFR 52.21.

The KBPH project is not a major source because it does not meet the following annual emissions thresholds:

Table 5.1 – Emissions Thresholds for Major Sources

Major Source Emissions Threshold (tons/year)						
VOC/TOC	**PM**	**CO**	**NOx**	**SOx**	**HAPs (total)**	**HAPs (any single)**
100	100	100	100	100	25	10

Air Quality Impact Assessment

DOT KBPH Fuel Pier and Harbor Improvements

Additionally, as described in sections 5.2 to 5.4, below, it does not meet any of the other requirements for a covered source, and therefore will be considered a noncovered source.

5.2 40 CFR 52.21 – Prevention of Significant Deterioration Requirements

This facility is not subject to Prevention of Significant Deterioration (PSD) requirements because this facility is not a major stationary source as described above.

5.3 40 CFR 60 – New Source Performance Standards

Based on a review of a potentially applicable NSPS, the KBPH project will not likely be subject to any NSPS. The following specific standards were reviewed:

5.3.1 40 CFR 60 Subpart XX – Standards of Performance for Bulk Gasoline Terminals

A bulk gasoline terminal is defined as any gasoline facility which receives gasoline by pipeline, ship or barge, and has a gasoline throughput greater than 75,700 liters per day. Though the fuel terminal at KBPH meets the definition, the NSPS to not apply because KBPH does not contain an "affected facility", which is defined as loading racks which deliver liquid product to gasoline tank trucks. Therefore KBPH is no subject to Subpart XX.

5.3.2 40 CFR 60 Subpart Kb – Standards of Performance for Volatile Organic Liquid Storage Vessels (Including Petroleum Liquid Storage Vessels) for Which Construction, Reconstruction, or Modification Commenced after July 23, 1984

This Subpart applies to storage vessels with a capacity greater than or equal to 75 cubic meters (m^3) (approximately 20,000 gallons) that are used to store volatile organic liquids (VOL). Though the KBPH project may have storage vessels associated with the fuel terminal that are larger than the threshold, they are exempt because vessels located at bulk gasoline plants are considered exempt according to Subpart 61.110b (5).

5.3.3 40 CFR 60 Subpart IIII – Standards of Performance for Stationary Compression Ignition Internal Combustion Engines

The standards of this subpart are potentially applicable to the owners and operators of stationary compression ignition (CI) internal combustion engines (ICE) which may be used at KBPH as emergency generators. If generators are used, they should be evaluated for compliance with Subpart IIII. However, as described in Subpart 60.4200 (c), coverage under Subpart IIII does not in itself trigger the requirement to obtain a covered source permit as described in Section 5.1.

5.4 40 CFR 63 – National Emission Standards for Hazardous Air Pollutants Requirements

Based on a review of a potentially applicable NSPS, the KBPH project will not likely be subject to any NSPS. The following specific standards were reviewed:

5.4.1 40 CFR 63 Subpart Y – National Emissions Standards for Marine Tank Vessel Loading Operations

The provisions of this subpart are applicable to existing and new sources with HAP emissions of 10 tons for any single HAP or 25 tons of total HAPs, and to new sources with emissions less than 10 and 25 tons. The KBPH is considered a new source with HAP emission less than 10 and 25 tons; however, according to Subpart 63.561, "Source with emissions less than 10 and 25 tons means *major* source(s)…" The KBPH project is not a major source as defined by HAR Title 11 Chapter 60.1 (Table 5.1), and thus neither a vapor balancing system, nor a vapor collection system are necessary as defined in Subpart 63.561.

Based on these air permitting considerations, KBPH will require coverage under a noncovered source permit and the relevant requirements of HAR Title 11 Chapter 60.1.

6. Conclusions

Based on a review of State and Federal Regulations and preliminary emission calculations, there do not appear to be any significant emissions that would cause or contribute to any appreciable impact to local or regional air quality. Construction emissions will be intermittent and short term and will be spread over many acres. Maximum annual emissions of criteria pollutants from construction activities are projected at less than 10 tons per year for all years. Operational emissions are projected to decrease for the pollutants NOx, SOx, PM10, and PM2.5. Total VOCs are projected to increase less than two tons per year for the RPS Succeeds scenario and RPS Falls Short scenario, with a potential significant increase only in the Business as Usual scenario. If the HCEI scenario succeeds, total VOC emissions will decrease significantly. Total emissions for all scenarios are projected to remain below major source criteria, and therefore no significant negative impacts to air quality are expected. If any significant changes to the proposed construction or operation of the project alter the potential to emit, or if the DOH imparts additional restrictions, the air quality impacts may need to be re-evaluated for compliance.

Air Quality Impact Assessment

DOT KBPH Fuel Pier and Harbor Improvements

7. References

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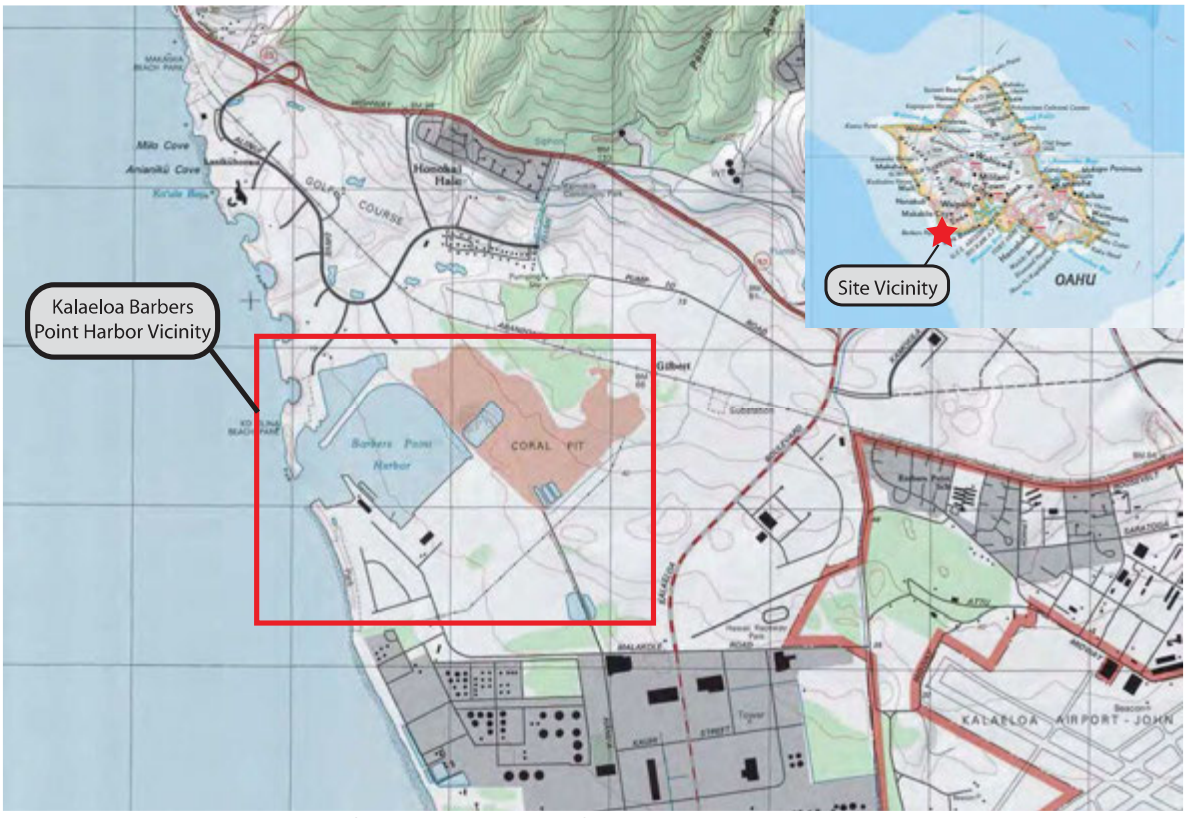
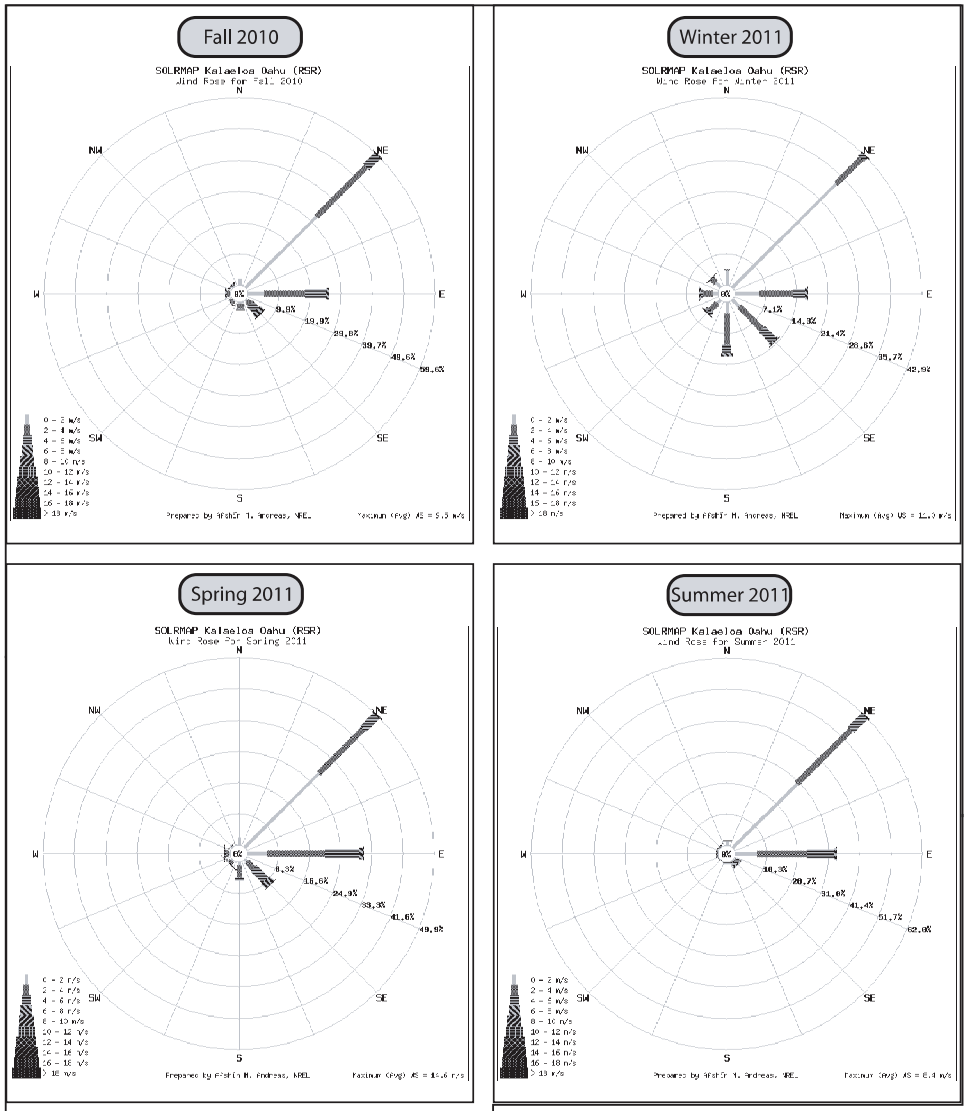


Source: TOPO!® ©2002 National Geographic (www.nationalgeographic.com/topo)

Site Vicinity Map
Kalaeloa Barbers Point Harbor Fuel Pier

ARCADIS

Figure 1



Note: Seasonal Wind Rose Diagrams from Kalaeloa Airport over the period of Fall 2010 - Summer 2011.

Source: National Renewable Energy Laboratory (NREL), SOLRMAPs prepared by Afshin M. Andres.

Seasonal Wind Rose Diagrams
for Kalaeloa Airport

Kalaeloa Barbers Point Harbor Fuel Pier

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Figure 2

Appendix **A**

Client Provided Documents



Figure 3.5 – Existing Land Use at KBPH



Figure 5.1 – Kalaeloa Barbers Point Harbor 2040 Master Plan Preferred Alternative

KALAELOA BARBERS POINT HARBOR - 2040 MASTER PLAN PROJECTIONS

CARGO ACTIVITIES

Vessel Type	Commodity	Frequency of port calls	Per Voyage (tons-bbls.)	Annual Tons / Barrels	LOA + Allowance	Berth Foot Days (BFD)	Annual Voyages	Engine Type	Duration In port	Cumulative Berth Days	Remarks
Dry Bulk Ship	Biomass	6 weeks	50,000 s/t	450,000 s/t	750+100	45,900	9	A	6 days	54	conventional/self-unloader
Dry Bulk Ship	Coal/Biomass	5-6 weeks	60,000 s/t	540,000 s/t	750+100	61,200	9	A	8 days	72	dock unloader
Dry Bulk Ship	Bulk Cement	5-6 weeks	50,000 s/t	500,000 s/t	730+ 100	58,100	10	A	7 days	70	dock unloader
Dry Bulk Ship	Bulk Grain	10-weeks	15,000 s/t	70,000 s/t	700+100	16,000	5	A	4 days	20	ship's crane (discharge)
Dry Bulk Ship	Aggregate/Sand	7-8 weeks	50,000 s/t	375,000 s/t	750+100	11,900	7	A	2 days	14	self-unloader
Dry Bulk Ship	Bulk Ash	8-9 weeks	30,000 s/t	180,000 s/t	750+100	30,600	6	A	6 days	36	ship's crane (load)
Dry Bulk Ship	Scrap/Recycle	13 weeks	30,000 s/t	120,000 s/t	730+100	16,600	4	A	5 days	20	ship's crane (load)
				2,235,000 s/t		240,300	50			286	
Dry Barge	Neobulk/Genr'l	2- weeks	13,000 s/t	338,000 s/t	400+100	32,500	26	C	2.5 days	65	Cap. 15,000 s/t (13k per voyage)
Neobulk/Genr'l	Neobulk/Genr'l	12- weeks	8,000 s/t	32,000 s/t	400+100	5,000	4	C	2.5 days	10	Barge cargo charters
Inter-island barge	Neobulk/Genr'l	8-weeks	5,000 s/t	30,000 s/t	300+100	4,800	6	D	2 days	12	Barge cargo charters
				400,000 s/t		42,300	36			87	
Genr'l Cargo	Special Project	8-9 weeks	10,000 s/t	60,000 s/t	600+100	16,800	6	B	3-5 days	24	Special Project Cargoes
Cntr Vessel/Barge	ISO containers	daily	2,000 s/t	720,000 s/t	400+100	90,000	360	C	12 hrs.	180	Disch/load - 20' & 40' cntrs.
100 x 40' (200 TEUs x 2 (Discharge-full /Loadback-empy) / 360 day/year operation					400 TEUs daily - 140,000 TEUs/YR - Cargo Payload Weight 20 s/tons per container						
Cement barge	Bulk Cement	1- week	4,500 s/t	225,000 s/t	224+100	48,600	50	D	3 days	150	New barge 224' / Loads 4,500 s/t
Product Tank Ship	Liquid Asphalt	8-9 weeks	80,000 bbls	600,000 bbls.	500+100	14,400	8	F	3 days	24	Discharge via temp dock pipeline
LPG Barge	LPG	1-week	4,600 bbls	230,000 bbl.	245+100	10,800	50	I	15-hrs.	31.25	Cap. 4,000-6,000 bbls
LPG Tank Ship	LPG	4 weeks	30,000 bbls.	360,000 bbls.	525+100	11,250	12	F	1.5 days	18	Tank ship 525'(cap 30K bbls)
Typical LPG Tank Ship 18,000 cu.mtr. (150,000 bbls or 10,000 s/ton)				590, 000 bbls.		22,050	62			49.25	
(LPG: bbls to tonnes 0.086 / 350,000 x .086 = 30,100 or (33,180 s/tons)											
Fuel/LHG Tank Ship	Overseas Fuel	6 per month	225,000	16,200,000 bbls.	650+100	168,750	75	E	3-days	225	Capacity 200,000-400,000 bbls
Fuel Barge	Overseas Fuel	10-11 weeks	80,000	400,000 bbls.	400+100	5,000	5	G	2-days	10	Capacity 80,000 bbls
Fuel Barge	Inter-island Fuel	5 per week	40,000	10,400,000 bbls	400+100	65,000	260	H	12-hrs.	130	Capacity 40,000 bbls
(Avg. 2,250,000 bbls. per month or 10 tank vessels @ 225,000 bbls)				27,000,000 bbls.		238,750	340			365	

HARBOR SUPPORT ACTIVITIES

Tug	Vessel Assist	24/7- Daily	n/a	n/a	100+50	54,750	365	M	24 hrs.	365	Stationed harbor tug
Tug	Vessel Assist	24/7 - Daily	n/a	n/a	100+50	54,750	365	M	24 hrs.	365	Stationed harbor tug
Workboat	Spill Response	24/7 -Daily	n/a	n/a	50+0	36,500	365	N/A	24 hrs.	730	2 spill response vessels
Tug	Overseas Towing	2-12 weeks	n/a	n/a	125+50	14,875	35	K	2.5 days	85	Towing SBI & Charter barges
Tug	Local Towing	Daily	n/a	n/a	125+0	46,250	726	K	1/2 day	370	Barges (LPG, Fuel, Cntr., Cement)
Workboat	Special charters	1-2 weeks	n/a	n/a	175+50	13,500	30	N/A	2-days	60	Special charters
						220,625	1,886			1,975	
Excursion Vessel	Day Excursions	2-trips daily	n/a	n/a	150+50	14,600	720	J	16-hrs./daily	240	149 pax, 2x4-hr trips (360-days)
Other Vessels	Emerg Port Call	10-11 weeks	n/a	n/a	500+100	15,000	5	B	5-days	25	Distress/Emergency Port call

MARITIME SERVICE SUPPORT (Vessel Repair /Dry-Docking)

Vessel Type	Activity	Frequency of port calls	Equipment Handled	Vessel Size Range	LOA + Allowance	Dry-dock Repair area (BFD)	Haul-Out Vessels		Dry-Dock Repair Days	Berth Days	Remarks
Floating Drydock	Ship Repair				450	164,250	23	N/A	Daily	365	Floating drydock: 450' x 150'
Docking Barge	Ship Repair				150	54,750	13	N/A	Daily	365	Docking Barge: 150' x 50'
						219,000	36				
Barges	Ship Repair	4-5 weeks	11 barges	200' - 400'	450+0	- -	11	N/A	220 days	220	Dry-dock/haul out
Tug/Workboat	Ship Repair	1 per month	12 tugs	75' - 125'	150+0	- -	12	N/A	240-days	240	Dry-dock/haul out
Gov't Vessel	Ship Repair	6-7 weeks	8-Gov't	100' - 400'	300	- -	8	N/A	180-days	180	Wet-dock/repair
Other Vessels	Ship Repair	10-11 weeks	5-vessels	100' - 400'	200	- -	5	N/A	60-days	60	Wet-dock/repair
							36			700	
Marine Barge	Ship Repair	200 days-year	n/a	up to 200'	125	25,000	20-hauls	N/A	200 days	200	Barges: LOA 100'- 150'
Tug/Workboat	Ship Repair	100 days-year	n/a	up to 200'	75	7,500	10-hauls	N/A	100-days	100	Workboats: LOA - avg 75'
						32,500	30			300	

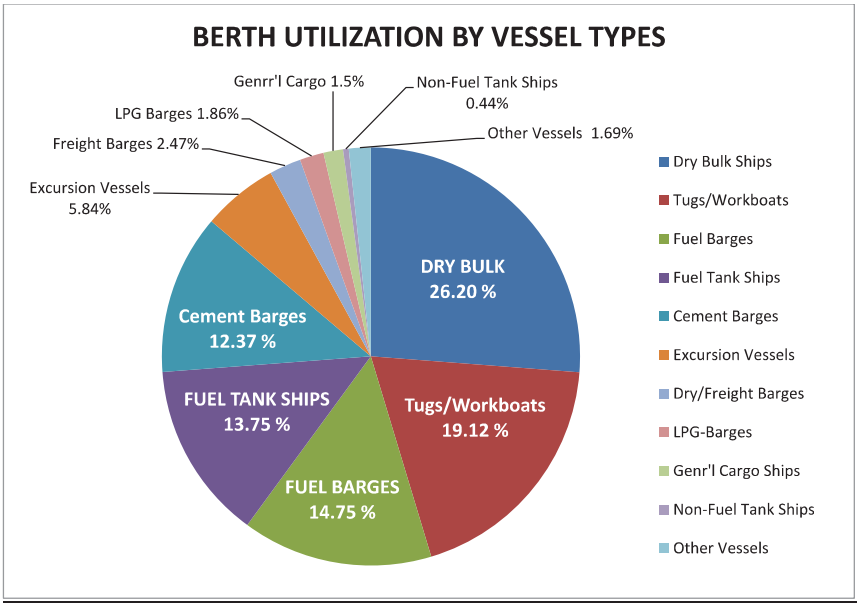
KALAELOA BARBERS POINT HARBOR

Berth Utilization by Vessel Types (FY- 2012)

Total Linear Berthing Length 3,255 ft.	Vessel Port calls		Vessel Berth Days	Engine Type	Average Port Call (hours)	Available Berth Foot Days 1,188,075	Percentage Overall Berth Utilization (BFD)	Percentage of Vessel Port Call Movements
Vessel Type	Inter-Island	Overseas				Used BFD		
Dry Bulk Ships	0	30	171.1	A	136.9 hrs.	149,652.3	12.60 %	26.20 %
Tugs/Workboats	1,310	40	774.2	M-1310 K-40	13.76 hrs.	109,214.3	9.19 %	19.12 %
Fuel Barges	220	3	196.4	G-3/H-220	21.1 hrs.	84,240.5	7.09 %	14.75 %
Fuel Tank Ships	0	60	138.3	E	55.32 hrs.	78,502.3	6.61 %	13.75 %
Cement Barges	65	0	248.7	D	91.8 hrs.	70,623.9	5.94 %	12.37 %
Excursion Vessels	1,332	0	339.4	J	6.1 hrs.	33,365.1	2.81 %	5.84%
Dry/Freight Barges	9	18	36.0	D-9 / C-18	32 hrs.	14,133.5	1.19 %	2.47 %
LPG-Barges	50	0	32.5	I	15.6 hrs.	10,628.7	0.89 %	1.86 %
Genr'l Cargo Ships	0	5	10.9	B	52.3 hrs.	8,553.7	0.72 %	1.50 %
Non-Fuel Tank Ships	0	1	3.1	F	74.4 hrs.	2,513.5	0.21 %	0.44 %
Other Vessels	52	1	60.5	J -52/B-1	27.40 hrs.	9,680.2	0.81 %	1.69 %
Total	**3,038**	**158**	**2,011.1**			**571,108**	**48.06%**	**100%**

Source: State of Hawaii DOT-Harbors Division data base (FY 2012)

Note: Tabulation exclusive of Dry-Dock/Ship Repair vessel activity



Annual Projected Berth Allocation - 2040

Vessel Type and Activity by Berth

Total Linear Berthing (2040) Length 6,365 ft. 2,323,225 BFD	**Pier 1 255' BFD 93,075**		**Pier 3 725' BFD 264,625**		**Pier 4 600' BFD 219,000**		**Pier 5 1,100' BFD 401,500**		**Pier 6 800' BFD 292,000**		**Pier 7 1,000' BFD 365,000**		**Pier 8 410' BFD 149,650**		**Pier 9 950' BFD 346,750**		**Pier 10 525' BFD 191,625**	
Vessel Type	Berth Days	BFD %	Berth Days	BFD %	Berth Days	BFD %	Berth Days	BFD %	Berth Days	BFD %	Berth Days	BFD %	Berth Days	BFD %	Berth Days	BFD %	Berth Davys	BFD %
Dry Bulk Ships									86	73,100 25.03%	200	167,200 45.81%						
Tugs/Workboats	50	3,900 4.20%	30(*)	3,750 1.42%	60(*)	7,500 3.42%	127(*)	21,125 5.26%	90(*)	11,250 3.85%	90(*)	11,250 3.08%	365	146,000 97.56%				
Fuel Barges			60 (30(#)	15,000 5.67%	120 (60(#)	30,000 13.70	80 (40(#)	20,000 4.98%	10	5,000 1.71%								
Fuel/LHG Tank Ships			225	112,500 42,51%	75 (++)	56,250 25.68%												
Liquid Non-Fuel Tank Ships									12	7,200 2.47%	12	7,200 1.97%						
Container Vessels									90(+)	45,000 15.41%	90(+)	45,000 12.33%						
Cement Barges											75	24,300 6.66%					100	24,300 12.68%
Excursion Vessels													240	14,600 9.76%				
Neobulk Barges Genr'l Cargo							87	42,300 10.54%										
LPG Vessels	50	10,800 11.60%	18	11,250 4.25%														
Project Cargo Ships/Neobulk							12	8,400 2.09%	12	8,400 2.88%								
Vessel Repair Dry-dock															365	161,500 72.53%	180	90,000 46.97%
TOTAL	**50**	**14,700 15.79%**	**303**	**131,250 49.60%**	**195**	**93,750 42.81%**	**179**	**91,825 22.87%**	**210**	**149,950 51.35%**	**377**	**254,950 69.85%**	**605**	**160,600 107.32%**	**365**	**251,500 46.58%**	**280**	**114,300 59.65%**

Remarks:

(#) Regular Inter-island fuel barges on-berth for portion of day preclude full access to fuel berth-connections for Panamax sized Tank Ships operating on inducement and harbor transits restricted to daylight hours.

(*) Towing tugs w/barges depicted as single/combined berth days

(++) Larger Panamax sized Fuel Tank Ships berthed at Pier 3, overhang and preclude the full access to Pier 4 for other vessels (frequency projection - 1/3rd of Fuel Tank Ship calls

Traffic Related KBPH Dry Bulk Projections

Dry Bulk	Cargo Short Tons (s/tons) 2012 (current)	Truck Unit Load Size*	Associated Annual Truck Traffic (in/out)	Projected Commodity Growth by Year (Economic Growth Factor) 2015 (2.0%)	2020 (1.8%)	2025 (1.7%)	2030 (1.6%)	2035 (1.5%)	2040 (1.4%)	Truck Unit Load Size	2040 Associated Annual Truck Traffic (in/out)
Aggregate / Sand	153,085.9	30 ton	10,206	156,147.6	158,958.3	161,660.6	164,247.1	166,710.8	169,044.8	30 ton	11,270
Cement	305,516.7	30 ton	20,368	311,627.0	317,236.3	322,629.3	327,791.4	332,708.3	337,366.2	30 ton	22,491
Other Dry Bulk Cargo	4,464.4	30 ton	298	4,553.7	4,635.7	4,714.5	4,789.9	4,861.7	4,929.8	30 ton	329

Neo Bulk	Cargo Short Tons (s/tons) 2012 (current)	Truck Unit Load Size	Associated Truck Traffic (in/out)	Projected Growth by Year (Economic Growth Factor) 2015 (2.0%)	2020 (1.8%)	2025 (1.7%)	2030 (1.6%)	2035 (1.5%)	2040 (1.4%)	Truck Unit Load Size	Associated Truck Traffic (in/out)
Scrap Metal	116,822.7	30 ton	7,788.2	119,159.2	121,304.0	123,366.2	125,340.0	127,220.1	129,001.2	30 ton	8,600.1
Lumber	38,815.6	10 ton	7,763.1	39,591.9	40,304.6	40,989.7	41,645.6	42,270.3	42,862.0	10 ton	8,572.4

Containerized Cargo	Twenty Food Equivalent Unit (TEU) 2012 (current)	Truck Unit Load Size	Associated Truck Traffic (in/out)	Projected Growth by Year (Economic Growth Factor) 2015 (2.0%)	2020 (1.8%)	2025 (1.7%)	2030 (1.6%)	2035 (1.5%)	2040 (1.4%)	Truck Unit Load Size	Associated Truck Traffic (in/out)
Containers Loaded	1,550.0	1 TEU	3,100.0	1,581.0	1,609.5	1,636.8	1,663.0	1,688.0	1,711.6	1 TEU	3,423.2
Containers Empty	1,091.0	1 TEU	2,182.0	1,112.8	1,132.9	1,152.1	1,170.5	1,188.1	1,204.7	1 TEU	2,409.5

General Cargo	Cargo Short Tons (s/tons) 2012 (current)	Truck Unit Load Size	Associated Truck Traffic (in/out)	Projected Growth by Year (Economic Growth Factor) 2015 (2.0%)	2020 (1.8%)	2025 (1.7%)	2030 (1.6%)	2035 (1.5%)	2040 (1.4%)	Truck Unit Load Size	Associated Truck Traffic (in/out)
General Merchandise	64,362.7	10 tons	12,872.5	65,650.0	66,831.7	67,967.8	69,055.3	70,091.1	71,072.4	10 tons	14,214.5
Autos	771 units	Single Unit**	771 (out only)	786.4	800.6	814.2	827.2	839.6	851.4	Single Unit*	852 (out only)
Transport Trucks / Machinery	2,630.7	Trailer - 5 tons ea***	1,052.3	2,683.3	2,731.6	2,778.1	2,822.5	2,864.8	2,904.9	Trailer - 5 tons ea**	1,162.0

	688,339.7								760,949.1		
	1,785,000.0								2,550,000.0		
*Maximum truck weight limit is 40 tons. Truck deadweight is 10 tons, therefore load weight is approximately 30 tons								increase	765,000.0	365	
**Used autos driven out of the pier, no trailer used								tons/vessel		2095.9	
***Assume one bulldozer at 5 tons, hauled by trailer								2015	851.7	1216.7	

Truck size	Trips/yr 2012	% of total	Trips/yr 2040
30 ton	38,659	58%	42,689
10-ton	20,636	31%	22,787
5-ton	1,052.30	2%	1,162.00
TEU (20-ton)	5,282.00	8%	5,832.60
Car	771	1%	852
Total trips	66,400		73,323

Table 7.1 - Phasing Table for Priority Projects and Actions

MAJOR PROJECTS	Proponent	2015	2020	2025	2030
Northern Harbor: Coral Stockpile Removal and Improvements	DOT-Harbors				
Northern Harbor: Utilities Infrastructure and Perimeter Road Relocation	DOT-Harbors				
Pier 3 to Pier 9: Marisco Relocation	Tenant				
Piers 3 & 4: Fuel Pier Construction Phase I	DOT-Harbors				
Fuel Terminal: Fuel Terminal Construction	DOT-Harbors				
Fuel Terminal: Pipeline installation	Tenant				
Pier 7: Pier Extension and Cargo Yard Expansion	DOT-Harbors				
Hanua Street Extension: Construction On and Off Property	DOT-H & HWY				
Off-Site: Hanua Street Extension Weigh Station Construction	DOT-Highways				
Pier 8: Layberth and Multi-purpose Yard	DOT-Harbors				
Pier 4B: Finger Pier Removal and Fuel Pier Construction Phase II	DOT-Harbors				
Pier 10: Layberth	DOT-Harbors				
Northern Harbor: Install Underground Power Lines	DOT-Harbors				

MINOR PROJECTS	Proponent	2015	2020	2025	2030
Pier 6: Bollard Installation	DOT-Harbors				
Finger Pier and T-Pier: Minor Improvements	DOT-Harbors				
Pier 10: Emergency Access Connection to Ko 'Olina	DOT-Harbors				
Bulk Storage Areas S-A1, A2, B: Coral Stockpile Removal and Improvements	DOT-Harbors				
Navigational Aids: Marker Placements, Monitoring, Range Sensitivity	USCG				
Ko 'Olina mole: Perimeter Lighting Improvements	DOT-Harbors				
Piers 5/6 and 7: Personnel Shelter Construction	DOT-Harbors				
Harbor Office Relocation	DOT-Harbors				
Piers 4/5, 8/9 and 10: Personnel Shelter Construction	DOT-Harbors				

EA/EIS / Land Use Permitting
Design/Building Permit/Construct

Appendix **B**

Construction Emissions Calculation
Tables and Model Outputs

11/16/2015 3:08:56 PM

Urbemis 2007 Version 9.2.4

Combined Annual Emissions Reports (Tons/Year)

File Name: G:\Active Projects\HI011171-xxxx Group 70 DOT Harbor Pier\Air Quality EA\Calculations\Construction Emissions\URBEMIS outputs\KBPH Construction 7-01-15.urb924

Project Name: KBPH Construction 7-01-15

Project Location: California State-wide

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

Summary Report:

CONSTRUCTION EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2
2015 TOTALS (tons/year unmitigated)	0.43	4.11	2.41	0.01	4.54	0.18	4.72	0.95	0.17	1.12	858.93
2015 TOTALS (tons/year mitigated)	0.43	4.11	2.41	0.01	4.54	0.18	4.72	0.95	0.17	1.12	858.93
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2016 TOTALS (tons/year unmitigated)	0.73	6.12	4.13	0.01	5.94	0.29	6.23	1.24	0.26	1.50	1,256.87
2016 TOTALS (tons/year mitigated)	0.73	6.12	4.13	0.01	5.18	0.29	5.47	1.08	0.26	1.34	1,256.87
Percent Reduction	0.00	0.00	0.00	0.00	12.82	0.00	12.23	12.83	0.00	10.59	0.00
2017 TOTALS (tons/year unmitigated)	0.52	4.30	3.14	0.01	4.99	0.20	5.19	1.04	0.18	1.22	1,091.13
2017 TOTALS (tons/year mitigated)	0.52	4.30	3.14	0.01	4.99	0.20	5.19	1.04	0.18	1.22	1,091.13
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

2018 TOTALS (tons/year unmitigated)	0.46	3.62	2.79	0.01	4.96	0.18	5.13	1.03	0.16	1.20	1,008.35
2018 TOTALS (tons/year mitigated)	0.46	3.62	2.79	0.01	4.96	0.18	5.13	1.03	0.16	1.20	1,008.35
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2019 TOTALS (tons/year unmitigated)	0.34	2.79	2.29	0.01	4.96	0.12	5.08	1.03	0.11	1.15	938.00
2019 TOTALS (tons/year mitigated)	0.34	2.79	2.29	0.01	4.96	0.12	5.08	1.03	0.11	1.15	938.00
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2020 TOTALS (tons/year unmitigated)	0.28	1.71	1.68	0.00	1.21	0.09	1.30	0.25	0.08	0.34	388.42
2020 TOTALS (tons/year mitigated)	0.28	1.71	1.68	0.00	0.61	0.09	0.70	0.13	0.08	0.21	388.42
Percent Reduction	0.00	0.00	0.00	0.00	49.29	0.00	45.80	49.28	0.00	36.92	0.00
2021 TOTALS (tons/year unmitigated)	0.41	2.74	2.52	0.00	0.00	0.12	0.12	0.00	0.11	0.11	827.21
2021 TOTALS (tons/year mitigated)	0.41	2.74	2.52	0.00	0.00	0.12	0.12	0.00	0.11	0.11	827.21
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2022 TOTALS (tons/year unmitigated)	0.44	3.00	2.75	0.00	0.00	0.12	0.12	0.00	0.11	0.11	928.32
2022 TOTALS (tons/year mitigated)	0.44	3.00	2.75	0.00	0.00	0.12	0.12	0.00	0.11	0.11	928.32
Percent Reduction	0.00	0.00	0.00			0.00	0.00		0.00	0.00	0.00
2023 TOTALS (tons/year unmitigated)	0.34	2.26	2.13	0.00	0.33	0.09	0.43	0.07	0.09	0.16	656.72
2023 TOTALS (tons/year mitigated)	0.34	2.26	2.13	0.00	0.08	0.09	0.17	0.02	0.09	0.10	656.72
Percent Reduction	0.00	0.00	0.00	0.00	77.26	0.00	60.04	77.22	0.00	34.12	0.00

2024 TOTALS (tons/year unmitigated)	0.64	4.09	3.91	0.00	0.67	0.20	0.87	0.14	0.18	0.32	1,065.95
2024 TOTALS (tons/year mitigated)	0.64	4.09	3.91	0.00	0.15	0.20	0.35	0.03	0.18	0.22	1,065.95
Percent Reduction	0.00	0.00	0.00	0.00	77.12	0.00	59.26	76.98	0.00	33.12	0.00
2025 TOTALS (tons/year unmitigated)	0.37	2.41	2.33	0.00	0.04	0.11	0.15	0.01	0.10	0.11	699.44
2025 TOTALS (tons/year mitigated)	0.37	2.41	2.33	0.00	0.04	0.11	0.15	0.01	0.10	0.11	699.44
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2026 TOTALS (tons/year unmitigated)	0.43	2.95	2.71	0.00	0.00	0.12	0.12	0.00	0.11	0.11	914.04
2026 TOTALS (tons/year mitigated)	0.43	2.95	2.71	0.00	0.00	0.12	0.12	0.00	0.11	0.11	914.04
Percent Reduction	0.00	0.00	0.00			0.00	0.00		0.00	0.00	0.00
2027 TOTALS (tons/year unmitigated)	0.34	2.32	2.16	0.00	0.44	0.10	0.54	0.09	0.09	0.18	667.73
2027 TOTALS (tons/year mitigated)	0.34	2.32	2.16	0.00	0.10	0.10	0.20	0.02	0.09	0.11	667.73
Percent Reduction	0.00	0.00	0.00	0.00	77.28	0.00	63.32	77.24	0.00	39.21	0.00
2028 TOTALS (tons/year unmitigated)	0.32	2.10	1.97	0.00	0.40	0.10	0.50	0.08	0.09	0.18	548.84
2028 TOTALS (tons/year mitigated)	0.32	2.10	1.97	0.00	0.09	0.10	0.19	0.02	0.09	0.11	548.84
Percent Reduction	0.00	0.00	0.00	0.00	77.21	0.00	61.80	77.13	0.00	36.77	0.00
2029 TOTALS (tons/year unmitigated)	0.28	1.88	1.73	0.00	1.10	0.08	1.18	0.23	0.08	0.31	441.94
2029 TOTALS (tons/year mitigated)	0.28	1.88	1.73	0.00	0.25	0.08	0.33	0.05	0.08	0.13	441.94
Percent Reduction	0.00	0.00	0.00	0.00	77.28	0.00	71.85	77.24	0.00	57.96	0.00

2030 TOTALS (tons/year unmitigated)	0.42	2.58	2.37	0.00	0.00	0.13	0.13	0.00	0.12	0.12	717.79
2030 TOTALS (tons/year mitigated)	0.42	2.58	2.37	0.00	0.00	0.13	0.13	0.00	0.12	0.12	717.79
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2031 TOTALS (tons/year unmitigated)	0.35	1.75	1.64	0.00	0.41	0.12	0.53	0.09	0.11	0.19	325.74
2031 TOTALS (tons/year mitigated)	0.35	1.75	1.64	0.00	0.09	0.12	0.21	0.02	0.11	0.13	325.74
Percent Reduction	0.00	0.00	0.00	0.00	76.90	0.00	59.62	76.62	0.00	33.74	0.00
2032 TOTALS (tons/year unmitigated)	0.16	0.97	0.91	0.00	0.01	0.07	0.08	0.00	0.07	0.07	144.02
2032 TOTALS (tons/year mitigated)	0.16	0.97	0.91	0.00	0.00	0.07	0.08	0.00	0.07	0.07	144.02
Percent Reduction	0.00	0.00	0.00	0.00	68.15	0.00	4.86	62.78	0.00	1.17	0.00
2033 TOTALS (tons/year unmitigated)	0.04	0.24	0.23	0.00	0.00	0.02	0.02	0.00	0.02	0.02	35.78
2033 TOTALS (tons/year mitigated)	0.04	0.24	0.23	0.00	0.00	0.02	0.02	0.00	0.02	0.02	35.78
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Construction Mitigated Detail Report:

CONSTRUCTION EMISSION ESTIMATES Annual Tons Per Year, Mitigated

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2

2015	0.43	4.11	2.41	0.01	4.54	0.18	4.72	0.95	0.17	1.12	858.93
Demolition 02/01/2015-02/01/2020	0.43	4.11	2.41	0.01	4.54	0.18	4.72	0.95	0.17	1.12	858.93
Fugitive Dust	0.00	0.00	0.00	0.00	1.38	0.00	1.38	0.29	0.00	0.29	0.00
Demo Off Road Diesel	0.24	1.73	1.45	0.00	0.00	0.10	0.10	0.00	0.09	0.09	245.31
Demo On Road Diesel	0.18	2.38	0.87	0.01	0.02	0.09	0.11	0.01	0.08	0.09	601.39
Demo Worker Trips	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.23
2016	0.73	6.12	4.13	0.01	5.18	0.29	5.47	1.08	0.26	1.34	1,256.87
Demolition 02/01/2015-02/01/2020	0.43	3.56	2.52	0.01	4.96	0.16	5.13	1.03	0.16	1.20	937.99
Fugitive Dust	0.00	0.00	0.00	0.00	1.51	0.00	1.51	0.31	0.00	0.31	0.00
Demo Off Road Diesel	0.25	1.70	1.58	0.00	0.00	0.09	0.09	0.00	0.09	0.09	267.90
Demo On Road Diesel	0.18	2.28	0.85	0.01	0.02	0.08	0.11	0.01	0.08	0.08	656.74
Demo Worker Trips	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	13.35
Mass Grading 02/01/2016-11/01/2016	0.26	1.91	1.40	0.00	0.22	0.09	0.32	0.05	0.08	0.13	289.86
Mass Grading Dust	0.00	0.00	0.00	0.00	0.22	0.00	0.22	0.05	0.00	0.05	0.00
Mass Grading Off Road Diesel	0.26	1.90	1.31	0.00	0.00	0.09	0.09	0.00	0.08	0.08	275.25
Mass Grading On Road Diesel	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.01
Mass Grading Worker Trips	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.60
Trenching 10/03/2016-02/01/2017	0.04	0.22	0.20	0.00	0.00	0.02	0.02	0.00	0.02	0.02	29.02
Trenching Off Road Diesel	0.04	0.22	0.19	0.00	0.00	0.02	0.02	0.00	0.02	0.02	26.52
Trenching Worker Trips	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.49

2017	0.52	4.30	3.14	0.01	4.99	0.20	5.19	1.04	0.18	1.22	1,091.13
Demolition 02/01/2015-02/01/2020	0.40	3.52	2.42	0.01	4.94	0.15	5.09	1.03	0.14	1.17	934.40
Fugitive Dust	0.00	0.00	0.00	0.00	1.51	0.00	1.51	0.31	0.00	0.31	0.00
Demo Off Road Diesel	0.23	1.50	1.57	0.00	0.00	0.08	0.08	0.00	0.07	0.07	266.87
Demo On Road Diesel	0.17	2.01	0.77	0.01	0.02	0.07	0.10	0.01	0.07	0.08	654.23
Demo Worker Trips	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	13.31
Trenching 10/03/2016-02/01/2017	0.01	0.07	0.07	0.00	0.00	0.01	0.01	0.00	0.00	0.00	10.27
Trenching Off Road Diesel	0.01	0.07	0.07	0.00	0.00	0.01	0.01	0.00	0.00	0.00	9.38
Trenching Worker Trips	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.88
Demolition 05/01/2017-11/01/2017	0.08	0.58	0.54	0.00	0.06	0.03	0.08	0.01	0.02	0.04	129.48
Fugitive Dust	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Demo Off Road Diesel	0.08	0.56	0.49	0.00	0.00	0.03	0.03	0.00	0.02	0.02	116.94
Demo On Road Diesel	0.00	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.44
Demo Worker Trips	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.10
Asphalt 12/01/2017-05/01/2018	0.02	0.13	0.11	0.00	0.00	0.01	0.01	0.00	0.01	0.01	16.98
Paving Off-Gas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving Off Road Diesel	0.02	0.12	0.09	0.00	0.00	0.01	0.01	0.00	0.01	0.01	13.36
Paving On Road Diesel	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.74
Paving Worker Trips	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.88

2018	0.46	3.62	2.79	0.01	4.96	0.18	5.13	1.03	0.16	1.20	1,008.35
Asphalt 12/01/2017-05/01/2018	0.10	0.49	0.43	0.00	0.00	0.04	0.04	0.00	0.04	0.04	70.35
Paving Off-Gas	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving Off Road Diesel	0.08	0.47	0.38	0.00	0.00	0.04	0.04	0.00	0.03	0.03	55.35
Paving On Road Diesel	0.00	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.21
Paving Worker Trips	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.79
Demolition 02/01/2015-02/01/2020	0.37	3.13	2.36	0.01	4.96	0.14	5.09	1.03	0.13	1.16	938.00
Fugitive Dust	0.00	0.00	0.00	0.00	1.51	0.00	1.51	0.31	0.00	0.31	0.00
Demo Off Road Diesel	0.21	1.34	1.58	0.00	0.00	0.07	0.07	0.00	0.07	0.07	267.90
Demo On Road Diesel	0.15	1.79	0.70	0.01	0.02	0.07	0.09	0.01	0.06	0.07	656.74
Demo Worker Trips	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	13.36
2019	0.34	2.79	2.29	0.01	4.96	0.12	5.08	1.03	0.11	1.15	938.00
Demolition 02/01/2015-02/01/2020	0.34	2.79	2.29	0.01	4.96	0.12	5.08	1.03	0.11	1.15	938.00
Fugitive Dust	0.00	0.00	0.00	0.00	1.51	0.00	1.51	0.31	0.00	0.31	0.00
Demo Off Road Diesel	0.19	1.19	1.58	0.00	0.00	0.06	0.06	0.00	0.06	0.06	267.90
Demo On Road Diesel	0.14	1.60	0.64	0.01	0.02	0.06	0.08	0.01	0.05	0.06	656.74
Demo Worker Trips	0.00	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	13.36

2020	0.28	1.71	1.68	0.00	0.61	0.09	0.70	0.13	0.08	0.21	388.42
Demolition 02/01/2015-02/01/2020	0.03	0.22	0.20	0.00	0.44	0.01	0.45	0.09	0.01	0.10	82.66
Fugitive Dust	0.00	0.00	0.00	0.00	0.13	0.00	0.13	0.03	0.00	0.03	0.00
Demo Off Road Diesel	0.02	0.09	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.61
Demo On Road Diesel	0.01	0.13	0.05	0.00	0.00	0.00	0.01	0.00	0.00	0.00	57.87
Demo Worker Trips	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.18
Mass Grading 01/01/2020-08/03/2020	0.16	1.01	1.01	0.00	0.18	0.05	0.22	0.04	0.04	0.08	227.04
Mass Grading Dust	0.00	0.00	0.00	0.00	0.17	0.00	0.17	0.04	0.00	0.04	0.00
Mass Grading Off Road Diesel	0.15	1.00	0.96	0.00	0.00	0.05	0.05	0.00	0.04	0.04	215.17
Mass Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.01
Mass Grading Worker Trips	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.85
Asphalt 08/17/2020-02/11/2021	0.09	0.48	0.48	0.00	0.00	0.04	0.04	0.00	0.03	0.03	78.72
Paving Off-Gas	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving Off Road Diesel	0.07	0.46	0.43	0.00	0.00	0.04	0.04	0.00	0.03	0.03	62.98
Paving On Road Diesel	0.00	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.87
Paving Worker Trips	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.87

2021	0.41	2.74	2.52	0.00	0.00	0.12	0.12	0.00	0.11	0.11	827.21
Asphalt 08/17/2020-02/11/2021	0.03	0.14	0.14	0.00	0.00	0.01	0.01	0.00	0.01	0.01	23.86
Paving Off-Gas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving Off Road Diesel	0.02	0.14	0.13	0.00	0.00	0.01	0.01	0.00	0.01	0.01	19.09
Paving On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.08
Paving Worker Trips	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.69
Building 02/22/2021-08/01/2023	0.38	2.60	2.38	0.00	0.00	0.11	0.11	0.00	0.10	0.10	803.35
Building Off Road Diesel	0.38	2.60	2.38	0.00	0.00	0.11	0.11	0.00	0.10	0.10	803.35
Building Vendor Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Building Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2022	0.44	3.00	2.75	0.00	0.00	0.12	0.12	0.00	0.11	0.11	928.32
Building 02/22/2021-08/01/2023	0.44	3.00	2.75	0.00	0.00	0.12	0.12	0.00	0.11	0.11	928.32
Building Off Road Diesel	0.44	3.00	2.75	0.00	0.00	0.12	0.12	0.00	0.11	0.11	928.32
Building Vendor Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Building Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

2023	0.34	2.26	2.13	0.00	0.08	0.09	0.17	0.02	0.09	0.10	656.72
Building 02/22/2021-08/01/2023	0.26	1.75	1.61	0.00	0.00	0.07	0.07	0.00	0.07	0.07	542.71
Building Off Road Diesel	0.26	1.75	1.61	0.00	0.00	0.07	0.07	0.00	0.07	0.07	542.71
Building Vendor Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Building Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading 09/29/2023-07/03/2024	0.08	0.51	0.52	0.00	0.08	0.02	0.10	0.02	0.02	0.04	114.02
Mass Grading Dust	0.00	0.00	0.00	0.00	0.07	0.00	0.07	0.02	0.00	0.02	0.00
Mass Grading Off Road Diesel	0.08	0.50	0.50	0.00	0.00	0.02	0.02	0.00	0.02	0.02	106.28
Mass Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.67
Mass Grading Worker Trips	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.07

2024	0.64	4.09	3.91	0.00	0.15	0.20	0.35	0.03	0.18	0.22	1,065.95
Mass Grading 09/29/2023-07/03/2024	0.16	1.02	1.05	0.00	0.15	0.05	0.20	0.03	0.04	0.07	229.76
Mass Grading Dust	0.00	0.00	0.00	0.00	0.15	0.00	0.15	0.03	0.00	0.03	0.00
Mass Grading Off Road Diesel	0.16	1.01	1.02	0.00	0.00	0.05	0.05	0.00	0.04	0.04	218.19
Mass Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.35
Mass Grading Worker Trips	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.22
Building 04/01/2024-02/03/2025	0.33	2.27	2.09	0.00	0.00	0.09	0.09	0.00	0.09	0.09	703.38
Building Off Road Diesel	0.33	2.27	2.09	0.00	0.00	0.09	0.09	0.00	0.09	0.09	703.38
Building Vendor Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Building Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Asphalt 06/10/2024-04/01/2025	0.15	0.79	0.78	0.00	0.00	0.06	0.06	0.00	0.06	0.06	132.81
Paving Off-Gas	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving Off Road Diesel	0.12	0.77	0.71	0.00	0.00	0.06	0.06	0.00	0.06	0.06	104.28
Paving On Road Diesel	0.00	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.59
Paving Worker Trips	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.94

2025	0.37	2.41	2.33	0.00	0.04	0.11	0.15	0.01	0.10	0.11	699.44
Asphalt 06/10/2024-04/01/2025	0.07	0.35	0.34	0.00	0.00	0.03	0.03	0.00	0.02	0.03	58.73
Paving Off-Gas	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving Off Road Diesel	0.06	0.34	0.31	0.00	0.00	0.03	0.03	0.00	0.02	0.02	46.11
Paving On Road Diesel	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.12
Paving Worker Trips	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.49
Building 04/01/2024-02/03/2025	0.04	0.28	0.25	0.00	0.00	0.01	0.01	0.00	0.01	0.01	85.69
Building Off Road Diesel	0.04	0.28	0.25	0.00	0.00	0.01	0.01	0.00	0.01	0.01	85.69
Building Vendor Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Building Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Demolition 02/10/2025-06/09/2025	0.04	0.26	0.33	0.00	0.04	0.01	0.05	0.01	0.01	0.02	83.73
Fugitive Dust	0.00	0.00	0.00	0.00	0.09	0.00	0.09	0.02	0.00	0.02	0.00
Demo Off Road Diesel	0.04	0.25	0.32	0.00	0.00	0.01	0.01	0.00	0.01	0.01	75.61
Demo On Road Diesel	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.81
Demo Worker Trips	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.30
Building 07/01/2025-07/10/2026	0.22	1.52	1.40	0.00	0.00	0.06	0.06	0.00	0.06	0.06	471.30
Building Off Road Diesel	0.22	1.52	1.40	0.00	0.00	0.06	0.06	0.00	0.06	0.06	471.30
Building Vendor Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Building Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

2026	0.43	2.95	2.71	0.00	0.00	0.12	0.12	0.00	0.11	0.11	914.04
Building 07/01/2025-07/10/2026	0.23	1.58	1.45	0.00	0.00	0.06	0.06	0.00	0.06	0.06	489.15
Building Off Road Diesel	0.23	1.58	1.45	0.00	0.00	0.06	0.06	0.00	0.06	0.06	489.15
Building Vendor Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Building Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Building 07/20/2026-08/01/2027	0.20	1.37	1.26	0.00	0.00	0.06	0.06	0.00	0.05	0.05	424.88
Building Off Road Diesel	0.20	1.37	1.26	0.00	0.00	0.06	0.06	0.00	0.05	0.05	424.88
Building Vendor Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Building Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2027	0.34	2.32	2.16	0.00	0.10	0.10	0.20	0.02	0.09	0.11	667.73
Building 07/20/2026-08/01/2027	0.25	1.74	1.60	0.00	0.00	0.07	0.07	0.00	0.07	0.07	539.14
Building Off Road Diesel	0.25	1.74	1.60	0.00	0.00	0.07	0.07	0.00	0.07	0.07	539.14
Building Vendor Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Building Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading 08/31/2027-12/30/2027	0.09	0.57	0.56	0.00	0.10	0.03	0.13	0.02	0.02	0.04	128.59
Mass Grading Dust	0.00	0.00	0.00	0.00	0.10	0.00	0.10	0.02	0.00	0.02	0.00
Mass Grading Off Road Diesel	0.09	0.57	0.55	0.00	0.00	0.03	0.03	0.00	0.02	0.02	122.95
Mass Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Worker Trips	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.64

2028	0.32	2.10	1.97	0.00	0.09	0.10	0.19	0.02	0.09	0.11	548.84
Asphalt 01/01/2028-04/02/2028	0.06	0.36	0.36	0.00	0.00	0.03	0.03	0.00	0.02	0.02	59.46
Paving Off-Gas	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving Off Road Diesel	0.06	0.35	0.35	0.00	0.00	0.03	0.03	0.00	0.02	0.02	51.53
Paving On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.94
Paving Worker Trips	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00
Building 04/10/2028-09/01/2028	0.18	1.21	1.11	0.00	0.00	0.05	0.05	0.00	0.05	0.05	374.90
Building Off Road Diesel	0.18	1.21	1.11	0.00	0.00	0.05	0.05	0.00	0.05	0.05	374.90
Building Vendor Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Building Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading 09/10/2028-11/01/2029	0.08	0.53	0.49	0.00	0.09	0.02	0.12	0.02	0.02	0.04	114.49
Mass Grading Dust	0.00	0.00	0.00	0.00	0.09	0.00	0.09	0.02	0.00	0.02	0.00
Mass Grading Off Road Diesel	0.08	0.53	0.48	0.00	0.00	0.02	0.02	0.00	0.02	0.02	109.36
Mass Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Worker Trips	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.12

2029	0.28	1.88	1.73	0.00	0.25	0.08	0.33	0.05	0.08	0.13	441.94
Mass Grading 09/10/2028-11/01/2029	0.22	1.46	1.35	0.00	0.25	0.07	0.31	0.05	0.06	0.11	313.40
Mass Grading Dust	0.00	0.00	0.00	0.00	0.25	0.00	0.25	0.05	0.00	0.05	0.00
Mass Grading Off Road Diesel	0.22	1.46	1.32	0.00	0.00	0.07	0.07	0.00	0.06	0.06	299.38
Mass Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Worker Trips	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	14.03
Building 11/10/2029-09/01/2030	0.06	0.42	0.38	0.00	0.00	0.02	0.02	0.00	0.02	0.02	128.54
Building Off Road Diesel	0.06	0.42	0.38	0.00	0.00	0.02	0.02	0.00	0.02	0.02	128.54
Building Vendor Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Building Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2030	0.42	2.58	2.37	0.00	0.00	0.13	0.13	0.00	0.12	0.12	717.79
Building 11/10/2029-09/01/2030	0.29	2.01	1.84	0.00	0.00	0.08	0.08	0.00	0.08	0.08	621.26
Building Off Road Diesel	0.29	2.01	1.84	0.00	0.00	0.08	0.08	0.00	0.08	0.08	621.26
Building Vendor Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Building Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Asphalt 09/10/2030-09/01/2031	0.12	0.57	0.53	0.00	0.00	0.04	0.04	0.00	0.04	0.04	96.53
Paving Off-Gas	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving Off Road Diesel	0.09	0.55	0.50	0.00	0.00	0.04	0.04	0.00	0.04	0.04	73.07
Paving On Road Diesel	0.00	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.16
Paving Worker Trips	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.30

2031	0.35	1.75	1.64	0.00	0.09	0.12	0.21	0.02	0.11	0.13	325.74
Asphalt 09/10/2030-09/01/2031	0.27	1.22	1.13	0.00	0.00	0.09	0.10	0.00	0.09	0.09	207.37
Paving Off-Gas	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving Off Road Diesel	0.19	1.18	1.07	0.00	0.00	0.09	0.09	0.00	0.08	0.08	156.96
Paving On Road Diesel	0.00	0.04	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	32.58
Paving Worker Trips	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.84
Mass Grading 09/10/2031-01/01/2032	0.08	0.53	0.51	0.00	0.09	0.02	0.12	0.02	0.02	0.04	118.36
Mass Grading Dust	0.00	0.00	0.00	0.00	0.09	0.00	0.09	0.02	0.00	0.02	0.00
Mass Grading Off Road Diesel	0.08	0.53	0.50	0.00	0.00	0.02	0.02	0.00	0.02	0.02	113.17
Mass Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Worker Trips	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.19
2032	0.16	0.97	0.91	0.00	0.00	0.07	0.08	0.00	0.07	0.07	144.02
Mass Grading 09/10/2031-01/01/2032	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.46
Mass Grading Dust	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Off Road Diesel	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.40
Mass Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06
Asphalt 01/10/2032-03/31/2033	0.16	0.96	0.90	0.00	0.00	0.07	0.07	0.00	0.07	0.07	142.56
Paving Off-Gas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving Off Road Diesel	0.15	0.96	0.87	0.00	0.00	0.07	0.07	0.00	0.07	0.07	128.54
Paving On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.95
Paving Worker Trips	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	13.07

2033	0.04	0.24	0.23	0.00	0.00	0.02	0.02	0.00	0.02	0.02	35.78
Asphalt 01/10/2032-03/31/2033	0.04	0.24	0.23	0.00	0.00	0.02	0.02	0.00	0.02	0.02	35.78
Paving Off-Gas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving Off Road Diesel	0.04	0.24	0.22	0.00	0.00	0.02	0.02	0.00	0.02	0.02	32.26
Paving On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.24
Paving Worker Trips	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.28

Construction Related Mitigation Measures

The following mitigation measures apply to Phase: Mass Grading 2/1/2016 - 11/1/2016 - Grading at Piers 9 and 10

For Soil Stabilizing Measures, the Apply soil stabilizers to inactive areas mitigation reduces emissions by:

PM10: 84% PM25: 84%

For Soil Stabilizing Measures, the Replace ground cover in disturbed areas quickly mitigation reduces emissions by:

PM10: 5% PM25: 5%

For Soil Stabilizing Measures, the Water exposed surfaces 2x daily watering mitigation reduces emissions by:

PM10: 55% PM25: 55%

For Soil Stabilizing Measures, the Equipment loading/unloading mitigation reduces emissions by:

PM10: 69% PM25: 69%

The following mitigation measures apply to Phase: Mass Grading 1/1/2020 - 8/3/2020 - Site grading at Fuel Pier (Phase I)

For Soil Stabilizing Measures, the Apply soil stabilizers to inactive areas mitigation reduces emissions by:

PM10: 84% PM25: 84%

For Soil Stabilizing Measures, the Replace ground cover in disturbed areas quickly mitigation reduces emissions by:

PM10: 5% PM25: 5%

For Soil Stabilizing Measures, the Water exposed surfaces 2x daily watering mitigation reduces emissions by:

PM10: 55% PM25: 55%

For Soil Stabilizing Measures, the Equipment loading/unloading mitigation reduces emissions by:

PM10: 69% PM25: 69%

The following mitigation measures apply to Phase: Mass Grading 9/29/2023 - 7/3/2024 - Pier 8 Layberth & storage yard grading

For Soil Stabilizing Measures, the Apply soil stabilizers to inactive areas mitigation reduces emissions by:

PM10: 84% PM25: 84%

For Soil Stabilizing Measures, the Replace ground cover in disturbed areas quickly mitigation reduces emissions by:

PM10: 5% PM25: 5%

For Soil Stabilizing Measures, the Water exposed surfaces 2x daily watering mitigation reduces emissions by:

PM10: 55% PM25: 55%

For Soil Stabilizing Measures, the Equipment loading/unloading mitigation reduces emissions by:

PM10: 69% PM25: 69%

The following mitigation measures apply to Phase: Mass Grading 8/31/2027 - 12/30/2027 - Grading for Hanua St. extension

For Soil Stabilizing Measures, the Apply soil stabilizers to inactive areas mitigation reduces emissions by:

PM10: 84% PM25: 84%

For Soil Stabilizing Measures, the Replace ground cover in disturbed areas quickly mitigation reduces emissions by:

PM10: 5% PM25: 5%

For Soil Stabilizing Measures, the Water exposed surfaces 2x daily watering mitigation reduces emissions by:

PM10: 55% PM25: 55%

For Soil Stabilizing Measures, the Equipment loading/unloading mitigation reduces emissions by:

PM10: 69% PM25: 69%

The following mitigation measures apply to Phase: Mass Grading 9/10/2028 - 11/1/2029 - Grading storage yards A1, A2

For Soil Stabilizing Measures, the Apply soil stabilizers to inactive areas mitigation reduces emissions by:

PM10: 84% PM25: 84%

For Soil Stabilizing Measures, the Replace ground cover in disturbed areas quickly mitigation reduces emissions by:

PM10: 5% PM25: 5%

For Soil Stabilizing Measures, the Water exposed surfaces 2x daily watering mitigation reduces emissions by:

PM10: 55% PM25: 55%

For Soil Stabilizing Measures, the Equipment loading/unloading mitigation reduces emissions by:

PM10: 69% PM25: 69%

The following mitigation measures apply to Phase: Mass Grading 9/10/2031 - 1/1/2032 - Pier 10 parking lot

For Soil Stabilizing Measures, the Apply soil stabilizers to inactive areas mitigation reduces emissions by:

PM10: 84% PM25: 84%

For Soil Stabilizing Measures, the Replace ground cover in disturbed areas quickly mitigation reduces emissions by:

PM10: 5% PM25: 5%

For Soil Stabilizing Measures, the Water exposed surfaces 2x daily watering mitigation reduces emissions by:

PM10: 55% PM25: 55%

For Soil Stabilizing Measures, the Equipment loading/unloading mitigation reduces emissions by:

PM10: 69% PM25: 69%

Appendix C

Operational Emissions Calculation Tables and Model Outputs

Current and Projected Annual Vessel Utilization Associated with In-Harbor Maneuvering

Inputs:		
Avg. vessel speed	5 mph	
Avg. Round-Trip Distance		
All vessels besides assist tugs	2.4 miles	channel entrance to dock
Assist tug	0.4 miles	tug dock to vessel dock
Docking/Undocking Time		
All cargo vessels/barges	0.5 hours	
Tugs	0.6 hours	0.1 hours for itself and 0.5 to assist vessels
Excursion vessel	0.1 hours	

Vessel Type		Avg. Travel Time (hours)	Total Hours/trip[1]	Trips/year[2]		Engine Utilization (% of time)		Hours/year			
								Main	Auxiliary	Main	Auxiliary
				2012	2040	Main	Auxiliary	2012		2040	
Ocean-going Vessel	Dry Bulk Ship (Panamax)	0.48	0.98	30	50	49.0% [3]	51.0%	14.4	15.0	24.0	25.0
	Container/Gen. Cargo (Handymax)	0.48	0.98	6	11	49.0% [3]	51.0%	2.9	3.0	5.3	5.5
	Fuel Tanker (Panamax)	0.48	0.98	60	75	49.0% [3]	51.0%	28.8	30.0	36.0	37.5
	Fuel Tanker (Handymax)	0.48	0.98	1	20	49.0% [3]	51.0%	0.5	0.5	9.6	10.0
Harbor Vessel	Excursion Vessel	0.48	0.58	1,384	720	82.8% [3]	17.2%	664.3	138.4	345.6	72.0
	Ocean Tug	0.48	1.08	40 [4]	761 [4]	75.0% [5]	50.0%	32.4	21.6	616.4	410.9
	Assist Tug	0.08	0.68	1,310 [6]	730 [6]	75.0% [5]	50.0%	668.1	445.4	372.3	248.2
Barge	Dry Bulk Barge - Large	0.48	0.98	18	390	0% [7]	100%	0.0	17.6	0.0	382.2
	Dry Bulk Barge - Small	0.48	0.98	74	56	0% [7]	100%	0.0	72.5	0.0	54.9
	Fuel Barge - Large	0.48	0.98	3	5	0% [7]	100%	0.0	2.9	0.0	4.9
	Fuel Barge - Small	0.48	0.98	220	260	0% [7]	100%	0.0	215.6	0.0	254.8
	LPG Barge	0.48	0.98	50	50	0% [7]	100%	0.0	49.0	0.0	49.0
			Total	3,196	3,128						

Notes

(1) Travel time plus docking time, round-trip

(2) Based on information provided by Amergent.

(3) Assumes main engine operates from the channel entrance to the dock, and auxiliary engine operates only during docking

(4) Assumes 1 tug per barge

(5) Assumes tugs use main engine the majority of the time, the auxiliary engine only 25% of the time, and both engines combined 25% of the time

(6) Assumes 2 tugs per vessel (all types)

(7) Barges are unpowered except for a steam turbine (boiler) engine used for electricity when not docked

Annual Emission Factors by In-Harbor Vessel Traffic

Vessel Type	Engine Type	Year	Emission Factor (g/kW-hr)[1]							
			NOx	PM10	PM2.5	HC/VOC[2]	CO	SOx	CO_2	CH_4
Ocean-going Vessels	Main	2012[3]	14	1.43	1.32	0.5	1.1	11.24	678	0.08
		2040[4]	9.44	0.154	0.149	0.5	1.1	0.0059	646	0.004
	Auxiliary	2012[5]	13.9	0.49	0.45	0.4	1.1	4.24	691	0.004
		2040[4]	9.67	0.15	0.14	0.4	1.1	0.0059	646	0.004
Harbor Vessels	Main	2012[5]	13	0.30	0.29	0.27	2.5	1.3	690	0.09
		2040[4]	6.8	0.26	0.25	0.27	2.5	0.0065	690	0.09
	Auxiliary	2012[5]	10	0.40	0.39	0.27	1.5	1.3	690	0.09
		2040[4]	6.8	0.3	0.29	0.27	1.5	0.0065	690	0.09
Barges	Steam Turbine	2012[3]	2.1	1.47	1.35	0.1	0.2	16.1	971	0.002
		2040[4]	2.0	0.58	0.53	0.1	0.2	5.67	923	0.002

Notes

(1) Source: US EPA, 2009, *Current Methodologies in Preparing Mobile Source Port-Related Emission Inventories*, April

(2) HC = total hydrocarbons; VOC = volatile organic carbon

(3) Using residual oil fuel

(4) Using ultra-low sulfur marine diesel

(5) Using marine diesel

Estimated Annual Emissions Associated with In-Harbor Vessel Traffic - 2012

Vessel Type		Main Engine			Auxiliary Engine			Emissions (tons/year)							
		Rated*	Average*	Hours	Rated*	Average*	Hours	NOx	PM10	PM2.5	HC/VOC[1]	CO	SOx	CO_2	CH_4
Ocean-going Vessel	Dry Bulk Ship (Panamax)	25,000	8,250	14.4	5,500	1,550	15.0	2.19	0.20	0.18	0.08	0.17	1.58	106.40	0.01
	Container/Gen. Cargo (Handymax)	10,000	3,300	2.9	2,200	670	3.0	0.18	0.02	0.01	0.01	0.01	0.13	8.63	0.001
	Fuel Tanker (Panamax)	25,000	8,250	28.8	5,500	1,550	30.0	4.38	0.40	0.37	0.15	0.34	3.16	212.80	0.02
	Fuel Tanker (Handymax)	10,000	3,300	0.5	2,200	670	0.5	0.03	0.003	0.002	0.001	0.002	0.02	1.44	0.0001
Harbor Vessel	Excursion Vessel	400	200	664.3	100	50	138.4	1.98	0.21	0.20	0.08	0.17	1.68	104.48	0.012
	Ocean Tug	2,400	1,600	32.4	450	160	21.6	0.78	0.08	0.08	0.03	0.07	0.66	41.34	0.005
	Assist Tug	2,000	500	668.1	150	100	445.4	5.27	0.55	0.51	0.20	0.46	4.34	283.33	0.030
Barge	Dry Bulk Barge - Large	-	-	0.0	1,500	750	17.6	0.03	0.02	0.02	0.001	0.003	0.23	14.15	0.00003
	Dry Bulk Barge - Small	-	-	0.0	750	400	72.5	0.07	0.05	0.04	0.003	0.006	0.51	31.02	0.00006
	Fuel Barge - Large	-	-	0.0	1,500	750	2.9	0.01	0.004	0.003	0.0002	0.0005	0.04	2.36	0.000005
	Fuel Barge - Small	-	-	0.0	750	400	215.6	0.20	0.14	0.13	0.009	0.019	1.53	92.22	0.00019
	LPG Barge	-	-	0.0	750	400	49.0	0.05	0.03	0.03	0.002	0.004	0.35	20.96	0.00004
Total		**-**			**-**			**15.15**	**1.71**	**1.57**	**0.56**	**1.26**	**14.23**	**919.1**	**0.079**

Notes

(1) HC = total hydrocarbons; VOC = volatile organic carbon

*Estimated

Projected Annual Emissions Associated with In-Harbor Vessel Traffic - 2040

Vessel Type		Main Engine			Auxiliary Engine			Emissions (tons/year)							
		Rated*	Average*	Hours	Rated*	Average*	Hours	NOx	PM10	PM2.5	HC/VOC[1]	CO	SOx	CO_2	CH_4
Ocean-going Vessel	Dry Bulk Ship (Panamax)	25,000	8,250	24.0	5,500	1,550	25.0	2.47	0.04	0.04	0.13	0.29	0.0015	168.44	0.0010
	Container/Gen. Cargo (Handymax)	10,000	3,300	5.3	2,200	670	5.5	0.22	0.004	0.003	0.01	0.03	0.0001	15.02	0.0001
	Fuel Tanker (Panamax)	25,000	8,250	36.0	5,500	1,550	37.5	3.71	0.06	0.06	0.19	0.43	0.0023	252.66	0.0016
	Fuel Tanker (Handymax)	10,000	3,300	9.6	2,200	670	10.0	0.40	0.01	0.01	0.02	0.05	0.0002	27.31	0.0002
Harbor Vessel	Excursion Vessel	400	200	345.6	100	50	72.0	0.54	0.021	0.020	0.02	0.20	0.0005	55.26	0.007
	Ocean Tug	2,400	1,600	616.4	450	160	410.9	7.88	0.30	0.29	0.31	2.82	0.0075	799.43	0.104
	Assist Tug	2,000	500	372.3	150	100	248.2	1.58	0.061	0.059	0.06	0.55	0.0015	160.32	0.021
Barge	Dry Bulk Barge - Large	-	-	0.0	1,500	750	382.2	0.63	0.183	0.167	0.03	0.06	1.7900	291.39	0.001
	Dry Bulk Barge - Small	-	-	0.0	750	400	54.9	0.05	0.01	0.01	0.002	0.005	0.1371	22.31	0.00005
	Fuel Barge - Large	-	-	0.0	1,500	750	4.9	0.01	0.002	0.002	0.0004	0.001	0.0229	3.74	0.00001
	Fuel Barge - Small	-	-	0.0	750	400	254.8	0.22	0.065	0.059	0.01	0.02	0.6364	103.60	0.00022
	LPG Barge	-	-	0.0	750	400	49.0	0.04	0.01	0.01	0.002	0.004	0.1224	19.92	0.00004
Projected Total		**-**						**17.76**	**0.77**	**0.73**	**0.79**	**4.46**	**2.72**	**1,919.4**	**0.136**
Projected Change		**-**						**2.61**	**-0.94**	**-0.84**	**0.23**	**3.20**	**-11.51**	**1,000.3**	**0.057**

Notes

(1) HC = total hydrocarbons; VOC = volatile organic carbon

*Estimated

Estimated Average Parameters for Cargo-Handling Equipment

Equipment Type	Avg. Horsepower[1]	Avg. Hours/ Year[1]	Avg. Hours/ Day	Load Factor[1]	Estimated Count	
					2012[2]	2040[3]
Car loader	150	500	1.4	0.51	1	2
Crane	300	300	0.8	0.43	3	4
Forklift	130	1,212	3.3	0.30	18	25
Generator	130	873	2.4	0.59	4	5
Manlift	60	113	0.3	0.30	1	1
Side handler	195	771	2.1	0.59	2	2
Sweeper	50	441	1.2	0.68	1	1
Top handler	282	2,095	5.7	0.59	7	10
Yard tractor	188	1,956	5.4	0.65	19	27

Notes:

(1) Based on Table 4-2 of US EPA, 2009. *Current Methodologies in Preparing Mobile Source Port-Related Emission Inventories*. April

(2) Same proportions as Table 4-2 but adjusted down based on KBPH cargo handling capacity

(3) Based on projected growth of 43% for bulk cargo and 22% for container cargo

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Urbemis 2007 Version 9.2.4

Combined Annual Emissions Reports (Tons/Year)

File Name:

Project Name: Kalaeloa cargo handling activities

Project Location: California State-wide

On Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

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Construction Unmitigated Detail Report:

CONSTRUCTION EMISSION ESTIMATES Annual Tons Per Year, Unmitigated

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2
2012	2.38	23.01	7.93	0.00	0.00	0.84	0.84	0.00	0.77	0.77	2,926.33
Building 01/01/2012-12/31/2012	2.38	23.01	7.93	0.00	0.00	0.84	0.84	0.00	0.77	0.77	2,926.33
Building Off Road Diesel	2.38	23.01	7.93	0.00	0.00	0.84	0.84	0.00	0.77	0.77	2,926.33
Building Vendor Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Building Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Phase Assumptions

Phase: Building Construction 1/1/2012 - 12/31/2012 - Annual operations

Off-Road Equipment:

1 Aerial Lifts (60 hp) operating at a 0.3 load factor for 0.3 hours per day

3 Cranes (300 hp) operating at a 0.51 load factor for 0.8 hours per day

18 Forklifts (130 hp) operating at a 0.3 load factor for 3.3 hours per day

4 Generator Sets (130 hp) operating at a 0.59 load factor for 2.4 hours per day

2 Other Equipment (195 hp) operating at a 0.59 load factor for 2.1 hours per day

7 Other Material Handling Equipment (282 hp) operating at a 0.59 load factor for 5.7 hours per day

1 Rubber Tired Loaders (150 hp) operating at a 0.51 load factor for 5.4 hours per day

1 Sweepers/Scrubbers (50 hp) operating at a 0.68 load factor for 1.2 hours per day

19 Tractors/Loaders/Backhoes (188 hp) operating at a 0.65 load factor for 5.4 hours per day

6/11/2015 3:04:16 PM

Urbemis 2007 Version 9.2.4

Combined Annual Emissions Reports (Tons/Year)

File Name:

Project Name: Kalaeloa cargo handling activities

Project Location: California State-wide

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

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Construction Unmitigated Detail Report:

CONSTRUCTION EMISSION ESTIMATES Annual Tons Per Year, Unmitigated

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2
2040	2.15	12.42	10.05	0.00	0.00	0.47	0.47	0.00	0.44	0.44	4,133.33
Building 01/01/2040-12/31/2040	2.15	12.42	10.05	0.00	0.00	0.47	0.47	0.00	0.44	0.44	4,133.33
Building Off Road Diesel	2.15	12.42	10.05	0.00	0.00	0.47	0.47	0.00	0.44	0.44	4,133.33
Building Vendor Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Building Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Phase Assumptions

Phase: Building Construction 1/1/2040 - 12/31/2040 - Annual operations

Off-Road Equipment:

1 Aerial Lifts (60 hp) operating at a 0.3 load factor for 0.3 hours per day

4 Cranes (300 hp) operating at a 0.51 load factor for 0.8 hours per day

25 Forklifts (130 hp) operating at a 0.3 load factor for 3.3 hours per day

5 Generator Sets (130 hp) operating at a 0.59 load factor for 2.4 hours per day

2 Other Equipment (195 hp) operating at a 0.59 load factor for 2.1 hours per day

10 Other Material Handling Equipment (282 hp) operating at a 0.59 load factor for 5.7 hours per day

2 Rubber Tired Loaders (150 hp) operating at a 0.51 load factor for 5.4 hours per day

1 Sweepers/Scrubbers (50 hp) operating at a 0.68 load factor for 1.2 hours per day

27 Tractors/Loaders/Backhoes (188 hp) operating at a 0.65 load factor for 5.4 hours per day

Estimated Current and Projected Emissions for Cargo-Handling Equipment

Year	Cargo Tonnage		Emissions (tons/year)[2]						
	Dry bulk[1]	Liquid Bulk[1]	NOx	PM10	PM2.5	ROG[3]	CO	SO_2	CO_2
2012	1,785,000	1,555,000	23.01	0.84	0.77	2.38	7.93	0.00	2,926
2040	2,550,000	1,900,000	12.42	0.47	0.44	2.15	10.05	0.00	4,133
Change	765,000	345,000	-10.59	-0.37	-0.33	-0.23	2.12	0.00	1,207

Notes:

(1) Source: DOT, 2015, *Kalaeloa Barbers Point Harbor Master Plan* , January

(2) As calculated in URBEMIS 2007 model

(3) ROG = reactive organic compounds (equivalent to volatile organic compounds [VOC])

EMFAC Emissions Factors for Vehicle Traffic Associated with Bulk Cargo Loading/Unloading

Vehicle Type	Fuel	Speed (miles/hr)	Emission Factors (grams/mile)													
			ROG[1]		TOG[2]		CO		NOx		CO_2		PM10		PM2.5	
			2015	2040	2015	2040	2015	2040	2015	2040	2015	2040	2015	2040	2015	2040
30-ton truck	Diesel	Idle[3]	18.9089	12.9635	21.5263	14.7580	34.3755	25.9102	144.2576	34.4054	20,132.26	19,782.28	2.3733	0.3941	2.1834	0.3626
		10[4]	2.2151	1.5077	2.5217	1.7164	4.6107	3.2272	20.5150	5.1720	3,326.17	3,268.34	0.3402	0.0723	0.3130	0.0665
		35[5]	0.2800	0.2190	0.3187	0.2493	1.3154	0.8960	9.1232	2.1628	1,784.59	1,753.54	0.1112	0.0581	0.1023	0.0534
10-ton truck	Diesel	Idle	12.1287	5.2582	13.8076	5.9860	19.2036	9.3242	59.6997	15.6886	12,925.34	12,798.88	1.8970	0.1959	1.7453	0.1802
		10	1.4171	0.6122	1.6132	0.6969	2.5450	1.1625	8.6137	2.3625	2,135.48	2,114.58	0.2790	0.0360	0.2567	0.0331
		35	0.1761	0.0885	0.2004	0.1007	0.7018	0.3213	3.6917	0.9791	1,145.58	1,134.52	0.1051	0.0287	0.0967	0.0264
TEU[6] - 20-ton	Diesel	Idle	8.3964	5.7900	9.5586	6.5915	12.5107	10.2674	97.6071	18.2385	13,040.56	12,799.22	1.5646	0.2222	1.4394	0.2044
		10	0.9843	0.6743	1.1205	0.7676	1.7119	1.2805	13.5401	2.7473	2,154.51	2,114.63	0.2185	0.0408	0.2010	0.0375
		35	0.1150	0.0973	0.1309	0.1107	0.4768	0.3532	6.0692	1.1357	1,155.75	1,134.55	0.0579	0.0325	0.0533	0.0299
Passenger Car/Truck	Gasoline	Idle	1.0715	0.3547	1.5262	0.6274	13.9960	5.4829	1.0810	0.5428	5,499.40	5,523.42	0.0574	0.0692	0.0527	0.0642
		10	0.1298	0.0438	0.1851	0.0776	2.2385	0.9801	0.1751	0.0916	813.52	818.38	0.0073	0.0087	0.0067	0.0081
		35	0.0344	0.0108	0.0477	0.0184	1.3169	0.6623	0.1173	0.0608	320.59	321.85	0.0017	0.0019	0.0015	0.0018
Trailer - 5-ton	Diesel	Idle	2.5402	0.9907	2.8918	1.1279	16.6716	11.9704	31.4036	7.7572	2,621.58	2,595.29	0.5648	0.2659	0.5196	0.2446
		10	0.4489	0.1752	0.5111	0.1995	2.7544	1.9834	5.6887	1.4034	524.29	519.06	0.0997	0.0471	0.0917	0.0433
		35	0.1737	0.0701	0.1977	0.0798	0.7616	0.5665	3.3840	0.8616	523.68	519.05	0.0386	0.0192	0.0355	0.0176

Notes:
(1) ROG = Reactive organic gases (equivalent to volatile organic compounds [VOCs])
(2) TOG = Total organic gases (equivalent to total organic compounds [TOC])
(3) Emission factor units are in grams per hour
(4) Assumed average speed on KBPH property
(5) Assumed average speed of offsite roadways
(6) TEU = Twenty-foot equivalent units

EMFAC2011 Emission Rates
Region Type: Statewide
Region: California
Calendar Year: 2015
Season: Annual
Vehicle Classification: EMFAC2011 Categories

Region	CalYr	Season	Veh_Class	Vehicle Definition	Fuel	MdlYr	Speed (miles/hr)	VMT (miles/day)	ROG_RUNEX (gms/mile)	TOG_RUNEX (gms/mile)	CO_RUNEX (gms/mile)	NOX_RUNEX (gms/mile)	CO2_RUNEX (gms/mile)	CO2_RUNEX(P (gms/mile)	PM10_RUNEX (gms/mile)	PM2_5_RUNEX (gms/mile)
Statewide	2015	Annual	LDA	Passenger Cars	GAS	Aggregatec	5	902851.9342	0.214309343	0.305233591	2.799194514	0.216193685	1099.879974	937.1149625	0.011488695	0.010546126
Statewide	2015	Annual	LDA	Passenger Cars	DSL	Aggregatec	5	4127.163643	0.119854708	0.136446613	0.854173142	0.803668491	459.2873583	380.9330365	0.087372405	0.080382616
Statewide	2015	Annual	LDA	Passenger Cars	GAS	Aggregatec	10	3087720.469	0.129845417	0.185051756	2.238461783	0.175112444	813.5216589	695.3282769	0.007267526	0.006666818
Statewide	2015	Annual	LDA	Passenger Cars	DSL	Aggregatec	10	12587.8688	0.107450157	0.122324855	0.704719993	0.710363632	426.6133934	355.0096114	0.079143942	0.072812432
Statewide	2015	Annual	LDA	Passenger Cars	GAS	Aggregatec	15	8197525.675	0.091359221	0.129081003	1.980100312	0.156884696	628.9860798	536.8753338	0.004895108	0.004486339
Statewide	2015	Annual	LDA	Passenger Cars	DSL	Aggregatec	15	32141.32036	0.084265548	0.095907952	0.503974923	0.606363817	374.503609	313.3682543	0.062112226	0.057143251
Statewide	2015	Annual	LDA	Passenger Cars	GAS	Aggregatec	20	21100286.85	0.065559682	0.092060126	1.725693836	0.13952867	502.3637637	429.1814273	0.003474797	0.003181974
Statewide	2015	Annual	LDA	Passenger Cars	DSL	Aggregatec	20	82041.61319	0.068574019	0.07806696	0.379662157	0.532326751	339.107386	285.3627741	0.050666559	0.046611398
Statewide	2015	Annual	LDA	Passenger Cars	GAS	Aggregatec	25	49967195.05	0.048594836	0.068207775	1.523353191	0.126339282	416.3900483	355.7383363	0.002563527	0.002346475
Statewide	2015	Annual	LDA	Passenger Cars	DSL	Aggregatec	25	190838.3138	0.055882786	0.063618835	0.297056981	0.483694948	315.7662985	267.1094171	0.041263272	0.037962213
Statewide	2015	Annual	LDA	Passenger Cars	GAS	Aggregatec	30	78968584.9	0.039832963	0.055572934	1.40579358	0.120787442	357.8604211	305.6607232	0.0020592	0.001882711
Statewide	2015	Annual	LDA	Passenger Cars	DSL	Aggregatec	30	305541.2453	0.04839702	0.055096788	0.249664944	0.466615762	302.7588969	257.7016037	0.035689321	0.032834177
Statewide	2015	Annual	LDA	Passenger Cars	GAS	Aggregatec	35	55172694.13	0.03442203	0.047653589	1.316891618	0.11729017	320.5891602	273.1887686	0.001690699	0.001544654
Statewide	2015	Annual	LDA	Passenger Cars	DSL	Aggregatec	35	216454.2534	0.041106148	0.046796615	0.212179556	0.454590175	296.9704833	252.7716681	0.030166977	0.02775362
Statewide	2015	Annual	LDA	Passenger Cars	GAS	Aggregatec	40	47198981.59	0.03122155	0.042946622	1.248155336	0.115887459	297.867554	253.3313297	0.001480062	0.001351331
Statewide	2015	Annual	LDA	Passenger Cars	DSL	Aggregatec	40	182735.298	0.036298203	0.041323089	0.188860827	0.457999367	298.7009162	253.9957016	0.02652786	0.024405632
Statewide	2015	Annual	LDA	Passenger Cars	GAS	Aggregatec	45	40392733.81	0.030258767	0.041268269	1.20646072	0.117628133	286.9786946	244.0503496	0.001369485	0.001249437
Statewide	2015	Annual	LDA	Passenger Cars	DSL	Aggregatec	45	156639.1651	0.033362232	0.037980682	0.175501237	0.476278591	308.06065	261.2812509	0.024329931	0.022383538
Statewide	2015	Annual	LDA	Passenger Cars	GAS	Aggregatec	50	35725847.22	0.030246149	0.04101866	1.168972989	0.119295872	286.9346261	243.8877975	0.001335381	0.001217282
Statewide	2015	Annual	LDA	Passenger Cars	DSL	Aggregatec	50	143795.637	0.03157604	0.035947222	0.170745518	0.515420913	326.1496793	275.7239011	0.022940415	0.021105182
Statewide	2015	Annual	LDA	Passenger Cars	GAS	Aggregatec	55	35979307.05	0.031573378	0.042596193	1.142088225	0.123038757	296.8773764	252.160945	0.001363857	0.001242763
Statewide	2015	Annual	LDA	Passenger Cars	DSL	Aggregatec	55	148089.0455	0.030600589	0.034836735	0.171731542	0.572133665	354.5642193	298.0980902	0.022112948	0.020343913
Statewide	2015	Annual	LDA	Passenger Cars	GAS	Aggregatec	60	51005532.33	0.031371483	0.042719107	1.082705813	0.119783972	317.3433236	270.3440889	0.001458832	0.001328695
Statewide	2015	Annual	LDA	Passenger Cars	DSL	Aggregatec	60	201020.1567	0.031209505	0.035529946	0.179976934	0.647217963	397.4740337	332.2906924	0.022574544	0.020768581
Statewide	2015	Annual	LDA	Passenger Cars	GAS	Aggregatec	65	61052065.26	0.039215272	0.05256977	1.162662078	0.1343002	354.0422903	301.2098113	0.001646256	0.001498482
Statewide	2015	Annual	LDA	Passenger Cars	DSL	Aggregatec	65	252545.5162	0.031838642	0.036246177	0.193581206	0.758488878	460.8454618	382.6960918	0.022826533	0.021000409
Statewide	2015	Annual	LDA	Passenger Cars	GAS	Aggregatec	70	9174203.259	0.041719753	0.056758429	1.260357085	0.13832878	387.1360053	326.6337961	0.001712573	0.001558693
Statewide	2015	Annual	LDA	Passenger Cars	DSL	Aggregatec	70	30682.30995	0.032929264	0.037487777	0.201740398	0.890614038	561.3548956	457.8837445	0.023039077	0.021195951
Statewide	2015	Annual	LDT1	Light-Duty Trucks (GVWR <=6000 lbs. and ETW <= 3750 lbs)	GAS	Aggregatec	5	122153.8798	0.636126852	0.81107187	8.694769169	0.683632955	1271.225447	1109.975498	0.025556221	0.023387378
Statewide	2015	Annual	LDT1	Light-Duty Trucks (GVWR <=6000 lbs. and ETW <= 3750 lbs)	DSL	Aggregatec	5	149.7867589	0.219592526	0.249991479	1.302132522	0.969466235	452.3732662	372.4304478	0.18338977	0.168718598
Statewide	2015	Annual	LDT1	Light-Duty Trucks (GVWR <=6000 lbs. and ETW <= 3750 lbs)	GAS	Aggregatec	10	373881.2055	0.355811095	0.463062671	6.142964152	0.516603795	938.8476492	825.2294171	0.016417485	0.015060296
Statewide	2015	Annual	LDT1	Light-Duty Trucks (GVWR <=6000 lbs. and ETW <= 3750 lbs)	DSL	Aggregatec	10	491.6433322	0.19917661	0.226749323	1.1156481	0.90180453	421.6526935	350.7149306	0.166575702	0.153249657
Statewide	2015	Annual	LDT1	Light-Duty Trucks (GVWR <=6000 lbs. and ETW <= 3750 lbs)	GAS	Aggregatec	15	1026525.003	0.257015731	0.332144878	5.301570335	0.453195953	726.0784773	635.9014377	0.011357645	0.01041024
Statewide	2015	Annual	LDT1	Light-Duty Trucks (GVWR <=6000 lbs. and ETW <= 3750 lbs)	DSL	Aggregatec	15	1352.771941	0.153982106	0.175298383	0.779492113	0.760980665	378.2246448	317.2044774	0.128852217	0.118544049
Statewide	2015	Annual	LDT1	Light-Duty Trucks (GVWR <=6000 lbs. and ETW <= 3750 lbs)	GAS	Aggregatec	20	2609941.329	0.186430834	0.240857314	4.548456338	0.395772011	579.5812763	508.7595813	0.008270064	0.007576429
Statewide	2015	Annual	LDT1	Light-Duty Trucks (GVWR <=6000 lbs. and ETW <= 3750 lbs)	DSL	Aggregatec	20	3424.452934	0.126500018	0.144011853	0.591530197	0.677699606	348.5507806	295.4767642	0.105842142	0.097374776
Statewide	2015	Annual	LDT1	Light-Duty Trucks (GVWR <=6000 lbs. and ETW <= 3750 lbs)	GAS	Aggregatec	25	6098782.217	0.131943714	0.172359208	3.809028715	0.339604492	480.2685675	421.5896409	0.006083557	0.005576053
Statewide	2015	Annual	LDT1	Light-Duty Trucks (GVWR <=6000 lbs. and ETW <= 3750 lbs)	DSL	Aggregatec	25	8026.212427	0.103767615	0.118132523	0.459010921	0.61436216	328.9819154	280.3691001	0.086809503	0.079864748
Statewide	2015	Annual	LDT1	Light-Duty Trucks (GVWR <=6000 lbs. and ETW <= 3750 lbs)	GAS	Aggregatec	30	9588693.874	0.1098241	0.143169966	3.50038043	0.324771436	412.9184887	362.652865	0.004913445	0.004499563
Statewide	2015	Annual	LDT1	Light-Duty Trucks (GVWR <=6000 lbs. and ETW <= 3750 lbs)	DSL	Aggregatec	30	12742.73235	0.089088237	0.10142103	0.379744276	0.585306848	318.0979966	272.5992108	0.074540336	0.06857711
Statewide	2015	Annual	LDT1	Light-Duty Trucks (GVWR <=6000 lbs. and ETW <= 3750 lbs)	GAS	Aggregatec	35	7127902.125	0.094876327	0.122812709	3.212948262	0.308952911	370.0128664	323.2614639	0.004025094	0.003680635
Statewide	2015	Annual	LDT1	Light-Duty Trucks (GVWR <=6000 lbs. and ETW <= 3750 lbs)	DSL	Aggregatec	35	9112.584617	0.07424617	0.084524324	0.312958651	0.554958967	311.6975503	266.1871391	0.061972307	0.057014523
Statewide	2015	Annual	LDT1	Light-Duty Trucks (GVWR <=6000 lbs. and ETW <= 3750 lbs)	GAS	Aggregatec	40	6215983.853	0.086543137	0.111273709	3.034048799	0.304759982	343.8478731	299.4599686	0.00351736	0.003212828
Statewide	2015	Annual	LDT1	Light-Duty Trucks (GVWR <=6000 lbs. and ETW <= 3750 lbs)	DSL	Aggregatec	40	7874.053916	0.06474282	0.073705395	0.274017845	0.550739506	312.4145631	265.936344	0.05390836	0.049595693
Statewide	2015	Annual	LDT1	Light-Duty Trucks (GVWR <=6000 lbs. and ETW <= 3750 lbs)	GAS	Aggregatec	45	5292991.496	0.086357689	0.109698006	2.992052485	0.315515378	331.5118037	288.5162886	0.003265553	0.002977665
Statewide	2015	Annual	LDT1	Light-Duty Trucks (GVWR <=6000 lbs. and ETW <= 3750 lbs)	DSL	Aggregatec	45	6830.528711	0.05915742	0.067346786	0.254832901	0.57353594	320.630287	272.1482132	0.049152176	0.045220004
Statewide	2015	Annual	LDT1	Light-Duty Trucks (GVWR <=6000 lbs. and ETW <= 3750 lbs)	GAS	Aggregatec	50	4678148.145	0.085716981	0.108357864	2.921973159	0.322708553	331.5252629	288.4000308	0.003145565	0.002864297
Statewide	2015	Annual	LDT1	Light-Duty Trucks (GVWR <=6000 lbs. and ETW <= 3750 lbs)	DSL	Aggregatec	50	6087.423725	0.055296794	0.062951722	0.245869462	0.614058365	336.2905341	283.8282855	0.045806333	0.042141827
Statewide	2015	Annual	LDT1	Light-Duty Trucks (GVWR <=6000 lbs. and ETW <= 3750 lbs)	GAS	Aggregatec	55	4629469.759	0.088985115	0.111832641	2.904757365	0.333836678	343.2166639	298.6308032	0.003168851	0.002880301
Statewide	2015	Annual	LDT1	Light-Duty Trucks (GVWR <=6000 lbs. and ETW <= 3750 lbs)	DSL	Aggregatec	55	6107.203445	0.053231614	0.060600652	0.247512438	0.679943552	361.388588	302.6125765	0.043893441	0.040381967
Statewide	2015	Annual	LDT1	Light-Duty Trucks (GVWR <=6000 lbs. and ETW <= 3750 lbs)	GAS	Aggregatec	60	6416497.694	0.086693174	0.110577321	2.820849668	0.340670496	366.7548241	320.6074842	0.003361066	0.003060688
Statewide	2015	Annual	LDT1	Light-Duty Trucks (GVWR <=6000 lbs. and ETW <= 3750 lbs)	DSL	Aggregatec	60	8366.018561	0.054090827	0.061578808	0.267464273	0.794549216	398.3439757	331.709439	0.044341118	0.040793829
Statewide	2015	Annual	LDT1	Light-Duty Trucks (GVWR <=6000 lbs. and ETW <= 3750 lbs)	GAS	Aggregatec	65	8342210.466	0.091889131	0.117706922	2.841630594	0.354112944	408.869132	356.2823872	0.003581057	0.003262299
Statewide	2015	Annual	LDT1	Light-Duty Trucks (GVWR <=6000 lbs. and ETW <= 3750 lbs)	DSL	Aggregatec	65	10211.37584	0.052979281	0.060313387	0.282172242	0.909054649	454.9086008	372.5387476	0.042829824	0.039403437
Statewide	2015	Annual	LDT1	Light-Duty Trucks (GVWR <=6000 lbs. and ETW <= 3750 lbs)	GAS	Aggregatec	70	1401283.433	0.121425675	0.151553244	3.387265028	0.412957402	446.8230955	382.7226839	0.003832974	0.00347644
Statewide	2015	Annual	LDT1	Light-Duty Trucks (GVWR <=6000 lbs. and ETW <= 3750 lbs)	DSL	Aggregatec	70	1776.370609	0.051514565	0.058645905	0.289788845	1.025788685	549.5826347	439.3306688	0.040297679	0.037037864
Statewide	2015	Annual	LDT2	Light-Duty Trucks (GVWR <=6000 lbs. and ETW > 3750 lbs)	GAS	Aggregatec	5	347724.7194	0.302316541	0.430769695	4.087867955	0.469529471	1500.305451	1338.831344	0.012934051	0.011895136
Statewide	2015	Annual	LDT2	Light-Duty Trucks (GVWR <=6000 lbs. and ETW > 3750 lbs)	DSL	Aggregatec	5	143.2360029	0.147707759	0.168155457	1.006353864	0.939273809	452.7737333	386.3988343	0.118382992	0.108912356
Statewide	2015	Annual	LDT2	Light-Duty Trucks (GVWR <=6000 lbs. and ETW > 3750 lbs)	GAS	Aggregatec	10	1074377.347	0.173227163	0.250721215	3.173361928	0.356638633	1110.265787	994.5656705	0.007942484	0.007303705
Statewide	2015	Annual	LDT2	Light-Duty Trucks (GVWR <=6000 lbs. and ETW > 3750 lbs)	DSL	Aggregatec	10	484.5653497	0.133704415	0.152213584	0.858535526	0.867921061	420.7721201	361.3664133	0.107052393	0.098488205
Statewide	2015	Annual	LDT2	Light-Duty Trucks (GVWR <=6000 lbs. and ETW > 3750 lbs)	GAS	Aggregatec	15	2980316.704	0.124447643	0.177747571	2.860646568	0.318607092	858.0438923	767.1718558	0.005420734	0.004979371
Statewide	2015	Annual	LDT2	Light-Duty Trucks (GVWR <=6000 lbs. and ETW > 3750 lbs)	DSL	Aggregatec	15	1318.448484	0.103224692	0.117514444	0.606813916	0.74096454	374.3777417	323.7007889	0.082728492	0.076110213
Statewide	2015	Annual	LDT2	Light-Duty Trucks (GVWR <=6000 lbs. and ETW > 3750 lbs)	GAS	Aggregatec	20	7579172.768	0.087490541	0.124863841	2.487188756	0.274807487	685.3200393	613.4301163	0.003822437	0.003508727
Statewide	2015	Annual	LDT2	Light-Duty Trucks (GVWR <=6000 lbs. and ETW > 3750 lbs)	DSL	Aggregatec	20	3356.1232	0.084827316	0.096570257	0.461329615	0.656506416	342.9780818	298.6423166	0.068018645	0.062577154

Statewide	2015 Annual	LDT2	Light-Duty Trucks (GVWR <=6000 lbs. and ETW > 3750 lbs)	GAS	Aggregatec	25	17666448.14	0.061622623	0.088899476	2.151056969	0.237339412	567.9788852	508.5316026	0.002763456	0.002536692
Statewide	2015 Annual	LDT2	Light-Duty Trucks (GVWR <=6000 lbs. and ETW > 3750 lbs)	DSL	Aggregatec	25	8007.861863	0.069494511	0.079114877	0.359450518	0.594442722	322.2012766	281.5860756	0.055571598	0.051125873
Statewide	2015 Annual	LDT2	Light-Duty Trucks (GVWR <=6000 lbs. and ETW > 3750 lbs)	GAS	Aggregatec	30	27681761.19	0.050381886	0.072252685	1.98341166	0.224856914	488.2799393	437.2667634	0.002194988	0.002012872
Statewide	2015 Annual	LDT2	Light-Duty Trucks (GVWR <=6000 lbs. and ETW > 3750 lbs)	DSL	Aggregatec	30	12727.06099	0.059687759	0.067950543	0.297997244	0.564586081	310.4065457	272.2739307	0.047722118	0.043904442
Statewide	2015 Annual	LDT2	Light-Duty Trucks (GVWR <=6000 lbs. and ETW > 3750 lbs)	GAS	Aggregatec	35	20100079.8	0.043533593	0.061829199	1.849689349	0.215317059	437.3321702	390.4578501	0.001822832	0.001670032
Statewide	2015 Annual	LDT2	Light-Duty Trucks (GVWR <=6000 lbs. and ETW > 3750 lbs)	DSL	Aggregatec	35	9126.929014	0.04993165	0.056843861	0.248347419	0.539705474	304.3147461	266.5151659	0.039746994	0.036567235
Statewide	2015 Annual	LDT2	Light-Duty Trucks (GVWR <=6000 lbs. and ETW > 3750 lbs)	GAS	Aggregatec	40	17327321.52	0.039688437	0.055863121	1.749160986	0.211550834	406.2986334	362.1143855	0.001604704	0.001468727
Statewide	2015 Annual	LDT2	Light-Duty Trucks (GVWR <=6000 lbs. and ETW > 3750 lbs)	DSL	Aggregatec	40	7839.650778	0.043773341	0.049833037	0.218913085	0.538475098	305.484234	267.0797387	0.034726965	0.031948809
Statewide	2015 Annual	LDT2	Light-Duty Trucks (GVWR <=6000 lbs. and ETW > 3750 lbs)	GAS	Aggregatec	45	15079019.89	0.039425966	0.054753282	1.709783028	0.219335312	391.4957413	348.6621753	0.001512867	0.001383686
Statewide	2015 Annual	LDT2	Light-Duty Trucks (GVWR <=6000 lbs. and ETW > 3750 lbs)	DSL	Aggregatec	45	6673.401975	0.040304337	0.045883807	0.204123012	0.561978251	314.2270438	274.2212732	0.031931283	0.029376781
Statewide	2015 Annual	LDT2	Light-Duty Trucks (GVWR <=6000 lbs. and ETW > 3750 lbs)	GAS	Aggregatec	50	13454320.31	0.039942268	0.055009003	1.665251662	0.226509912	391.4287338	348.3835496	0.001490652	0.001362406
Statewide	2015 Annual	LDT2	Light-Duty Trucks (GVWR <=6000 lbs. and ETW > 3750 lbs)	DSL	Aggregatec	50	5966.38666	0.037751073	0.042977086	0.196548842	0.602035001	330.5862407	287.3794768	0.029748293	0.027368431
Statewide	2015 Annual	LDT2	Light-Duty Trucks (GVWR <=6000 lbs. and ETW > 3750 lbs)	GAS	Aggregatec	55	13647631.9	0.040888645	0.056202556	1.613060173	0.234120694	405.1164867	360.5246975	0.001520473	0.001389518
Statewide	2015 Annual	LDT2	Light-Duty Trucks (GVWR <=6000 lbs. and ETW > 3750 lbs)	DSL	Aggregatec	55	5951.961943	0.036779013	0.04187046	0.198040807	0.663943304	356.8082598	308.4642041	0.028823403	0.026517531
Statewide	2015 Annual	LDT2	Light-Duty Trucks (GVWR <=6000 lbs. and ETW > 3750 lbs)	GAS	Aggregatec	60	18207168.98	0.039296878	0.054955593	1.486012002	0.224599989	433.2327542	386.8931668	0.001560703	0.001425807
Statewide	2015 Annual	LDT2	Light-Duty Trucks (GVWR <=6000 lbs. and ETW > 3750 lbs)	DSL	Aggregatec	60	8262.785701	0.037479444	0.042667854	0.210927759	0.767945239	395.7189323	340.4005394	0.029102331	0.026774146
Statewide	2015 Annual	LDT2	Light-Duty Trucks (GVWR <=6000 lbs. and ETW > 3750 lbs)	GAS	Aggregatec	65	22357312.74	0.040339215	0.054583384	1.481087134	0.231227122	483.1196268	431.0309872	0.001712137	0.001563413
Statewide	2015 Annual	LDT2	Light-Duty Trucks (GVWR <=6000 lbs. and ETW > 3750 lbs)	DSL	Aggregatec	65	10209.39717	0.037346854	0.042516909	0.222930693	0.889675225	454.5411686	386.8174915	0.02847263	0.026194821
Statewide	2015 Annual	LDT2	Light-Duty Trucks (GVWR <=6000 lbs. and ETW > 3750 lbs)	GAS	Aggregatec	70	3577790.954	0.059617573	0.080515412	1.814494335	0.275114175	527.9104851	465.9400174	0.001954571	0.00177754
Statewide	2015 Annual	LDT2	Light-Duty Trucks (GVWR <=6000 lbs. and ETW > 3750 lbs)	DSL	Aggregatec	70	1706.845579	0.038015085	0.043277645	0.234847443	1.036858215	548.6134	460.2978725	0.027907831	0.025675205
Statewide	2015 Annual	LHD1	Light-Heavy-Duty Trucks (GVWR 8501-10000 lbs)	GAS	Aggregatec	5	471370.1448	0.699219768	0.806929116	8.553859554	0.444158583	2513.497213	2450.659783	0.009804975	0.009055986
Statewide	2015 Annual	LHD1	Light-Heavy-Duty Trucks (GVWR 8501-10000 lbs)	DSL	Aggregatec	5	191502.5729	0.508033956	0.578362861	3.33432704	6.280714834	524.3153168	511.2074339	0.112953603	0.103917317
Statewide	2015 Annual	LHD1	Light-Heavy-Duty Trucks (GVWR 8501-10000 lbs)	GAS	Aggregatec	10	1201699.288	0.568571825	0.655438907	6.971795877	0.454860974	2036.128168	1985.224964	0.007888947	0.007285593
Statewide	2015 Annual	LHD1	Light-Heavy-Duty Trucks (GVWR 8501-10000 lbs)	DSL	Aggregatec	10	601347.2914	0.448927228	0.511073781	2.754368261	5.688740825	524.2863228	511.1791647	0.099715496	0.091738259
Statewide	2015 Annual	LHD1	Light-Heavy-Duty Trucks (GVWR 8501-10000 lbs)	GAS	Aggregatec	15	2863442.032	0.379856718	0.438033014	4.75984014	0.475589282	1392.429583	1357.618844	0.005269785	0.004866865
Statewide	2015 Annual	LHD1	Light-Heavy-Duty Trucks (GVWR 8501-10000 lbs)	DSL	Aggregatec	15	1354439.816	0.356325008	0.405652319	1.943202515	4.808628611	524.2990501	511.1915738	0.079204103	0.072867777
Statewide	2015 Annual	LHD1	Light-Heavy-Duty Trucks (GVWR 8501-10000 lbs)	GAS	Aggregatec	20	3605614.403	0.264045638	0.305489573	3.426531154	0.497533551	1006.068532	980.9168183	0.003648848	0.003369531
Statewide	2015 Annual	LHD1	Light-Heavy-Duty Trucks (GVWR 8501-10000 lbs)	DSL	Aggregatec	20	1540793.63	0.28863282	0.328589266	1.435490984	4.19007659	524.2394495	511.1334633	0.064200333	0.059064307
Statewide	2015 Annual	LHD1	Light-Heavy-Duty Trucks (GVWR 8501-10000 lbs)	GAS	Aggregatec	25	3655718.414	0.188319006	0.219749134	2.565526965	0.514683567	768.0120889	748.8117866	0.002589117	0.002390566
Statewide	2015 Annual	LHD1	Light-Heavy-Duty Trucks (GVWR 8501-10000 lbs)	DSL	Aggregatec	25	1796928.529	0.238422399	0.271428038	1.109897685	3.776529505	524.0880512	510.9858499	0.053058395	0.048813724
Statewide	2015 Annual	LHD1	Light-Heavy-Duty Trucks (GVWR 8501-10000 lbs)	GAS	Aggregatec	30	3718876.132	0.141206786	0.165862596	2.04554772	0.531170632	619.4336085	603.9477683	0.001934652	0.001786197
Statewide	2015 Annual	LHD1	Light-Heavy-Duty Trucks (GVWR 8501-10000 lbs)	DSL	Aggregatec	30	1674293.139	0.201281891	0.229146043	0.898163049	3.510981272	523.9172763	510.8193444	0.044800827	0.041216761
Statewide	2015 Annual	LHD1	Light-Heavy-Duty Trucks (GVWR 8501-10000 lbs)	GAS	Aggregatec	35	2143643.94	0.108792454	0.128679601	1.699142058	0.54623638	527.8465443	514.6503807	0.001483433	0.00136947
Statewide	2015 Annual	LHD1	Light-Heavy-Duty Trucks (GVWR 8501-10000 lbs)	DSL	Aggregatec	35	1043683.952	0.17366767	0.19770909	0.761634829	3.383973253	523.6762654	510.5843587	0.038623418	0.035533545
Statewide	2015 Annual	LHD1	Light-Heavy-Duty Trucks (GVWR 8501-10000 lbs)	GAS	Aggregatec	40	1634118.021	0.089853677	0.107225037	1.517807095	0.562664066	475.233189	463.3523592	0.001186485	0.001095116
Statewide	2015 Annual	LHD1	Light-Heavy-Duty Trucks (GVWR 8501-10000 lbs)	DSL	Aggregatec	40	769959.4211	0.154738334	0.176159299	0.685005058	3.353542137	523.3239713	510.240872	0.03420497	0.031468573
Statewide	2015 Annual	LHD1	Light-Heavy-Duty Trucks (GVWR 8501-10000 lbs)	GAS	Aggregatec	45	1668977.327	0.075351844	0.090252857	1.423805737	0.574084859	452.0558582	440.7544618	0.001013286	0.000935356
Statewide	2015 Annual	LHD1	Light-Heavy-Duty Trucks (GVWR 8501-10000 lbs)	DSL	Aggregatec	45	787746.3029	0.139163235	0.158428085	0.629909145	3.503266557	523.3450062	510.2613811	0.030834456	0.0283677
Statewide	2015 Annual	LHD1	Light-Heavy-Duty Trucks (GVWR 8501-10000 lbs)	GAS	Aggregatec	50	3364163.476	0.069205434	0.081726357	1.490092123	0.617457872	454.3218062	442.9637611	0.000964903	0.000890987
Statewide	2015 Annual	LHD1	Light-Heavy-Duty Trucks (GVWR 8501-10000 lbs)	DSL	Aggregatec	50	1942666.78	0.129852306	0.147828213	0.60463208	3.920273869	523.9412396	510.8427086	0.028841002	0.026533723
Statewide	2015 Annual	LHD1	Light-Heavy-Duty Trucks (GVWR 8501-10000 lbs)	GAS	Aggregatec	55	1838112.209	0.06032805	0.072787198	1.49368992	0.620020961	482.415528	470.3551398	0.000852118	0.000786764
Statewide	2015 Annual	LHD1	Light-Heavy-Duty Trucks (GVWR 8501-10000 lbs)	DSL	Aggregatec	55	1377422.456	0.121408757	0.138215793	0.610800191	4.344216837	523.6876005	510.5954105	0.027015695	0.02485444
Statewide	2015 Annual	LHD1	Light-Heavy-Duty Trucks (GVWR 8501-10000 lbs)	GAS	Aggregatec	60	2045948.922	0.057906281	0.070693029	1.646516473	0.62768448	541.2091877	527.678958	0.000799804	0.000738195
Statewide	2015 Annual	LHD1	Light-Heavy-Duty Trucks (GVWR 8501-10000 lbs)	DSL	Aggregatec	60	1021793.273	0.112071689	0.127586164	0.645431479	4.67947822	522.4494316	509.3881958	0.02519237	0.023176981
Statewide	2015 Annual	LHD1	Light-Heavy-Duty Trucks (GVWR 8501-10000 lbs)	GAS	Aggregatec	65	1741434.106	0.061207488	0.074689937	2.007920303	0.671327285	641.4978913	625.4604441	0.000812957	0.000750457
Statewide	2015 Annual	LHD1	Light-Heavy-Duty Trucks (GVWR 8501-10000 lbs)	DSL	Aggregatec	65	1071627.893	0.111239033	0.126638237	0.718888938	5.600900618	522.3986414	509.3386754	0.024773468	0.022791591
Statewide	2015 Annual	LHD1	Light-Heavy-Duty Trucks (GVWR 8501-10000 lbs)	GAS	Aggregatec	70	585827.4028	0.076151605	0.092800266	2.843865857	0.799689377	803.3624954	783.278433	0.00087765	0.000810593
Statewide	2015 Annual	LHD1	Light-Heavy-Duty Trucks (GVWR 8501-10000 lbs)	DSL	Aggregatec	70	544378.9287	0.123890059	0.141040595	0.919832799	7.12318423	522.3394618	509.2809752	0.026481644	0.024363112
Statewide	2015 Annual	LHD2	Light-Heavy-Duty Trucks (GVWR 10001-14000 lbs)	GAS	Aggregatec	5	38684.68767	0.517269276	0.607745171	7.26984748	0.373981424	2513.497264	2450.659832	0.008342084	0.007578248
Statewide	2015 Annual	LHD2	Light-Heavy-Duty Trucks (GVWR 10001-14000 lbs)	DSL	Aggregatec	5	44866.86059	0.459023447	0.522567655	3.147584406	5.779108563	523.1387559	510.060287	0.104526697	0.096164562
Statewide	2015 Annual	LHD2	Light-Heavy-Duty Trucks (GVWR 10001-14000 lbs)	GAS	Aggregatec	10	99436.81993	0.418159746	0.491051262	5.883487238	0.381969503	2036.128129	1985.224925	0.006685362	0.006073595
Statewide	2015 Annual	LHD2	Light-Heavy-Duty Trucks (GVWR 10001-14000 lbs)	DSL	Aggregatec	10	140303.9409	0.405924415	0.462117942	2.602441513	5.23671579	523.075963	509.9990639	0.092287184	0.084904211
Statewide	2015 Annual	LHD2	Light-Heavy-Duty Trucks (GVWR 10001-14000 lbs)	GAS	Aggregatec	15	238398.6955	0.280364716	0.329373223	4.027257653	0.401498109	1392.429571	1357.618831	0.00448413	0.004075025
Statewide	2015 Annual	LHD2	Light-Heavy-Duty Trucks (GVWR 10001-14000 lbs)	DSL	Aggregatec	15	317483.7332	0.322224318	0.36683095	1.835783375	4.425485576	523.1344898	510.0561275	0.07336962	0.067500051
Statewide	2015 Annual	LHD2	Light-Heavy-Duty Trucks (GVWR 10001-14000 lbs)	GAS	Aggregatec	20	308012.3362	0.196011744	0.231227309	2.907670507	0.42382434	1006.068563	980.9168488	0.003120636	0.002838348
Statewide	2015 Annual	LHD2	Light-Heavy-Duty Trucks (GVWR 10001-14000 lbs)	DSL	Aggregatec	20	367997.2939	0.261706613	0.297935569	1.358488721	3.859433673	523.2006608	510.1206443	0.059737618	0.05495861
Statewide	2015 Annual	LHD2	Light-Heavy-Duty Trucks (GVWR 10001-14000 lbs)	GAS	Aggregatec	25	329584.0505	0.140988174	0.168005521	2.158533235	0.44648574	768.0121092	748.8118064	0.002238144	0.002039456
Statewide	2015 Annual	LHD2	Light-Heavy-Duty Trucks (GVWR 10001-14000 lbs)	DSL	Aggregatec	25	442158.5233	0.217128709	0.247186591	1.053120595	3.485088264	523.2449422	510.1638186	0.049704638	0.045728268
Statewide	2015 Annual	LHD2	Light-Heavy-Duty Trucks (GVWR 10001-14000 lbs)	GAS	Aggregatec	30	341101.9272	0.10553764	0.126396314	1.739076526	0.464021861	619.4336173	603.9477768	0.001678354	0.001530362
Statewide	2015 Annual	LHD2	Light-Heavy-Duty Trucks (GVWR 10001-14000 lbs)	DSL	Aggregatec	30	424626.5985	0.18421487	0.209716375	0.854640046	3.249978587	523.2642313	510.1826255	0.042255678	0.038875225
Statewide	2015 Annual	LHD2	Light-Heavy-Duty Trucks (GVWR 10001-14000 lbs)	GAS	Aggregatec	35	203790.615	0.081570023	0.098763763	1.448091784	0.484086514	527.8465455	514.6503818	0.001300397	0.001187452
Statewide	2015 Annual	LHD2	Light-Heavy-Duty Trucks (GVWR 10001-14000 lbs)	DSL	Aggregatec	35	273802.0622	0.159814611	0.181938302	0.726691981	3.144621861	523.2421857	510.1611311	0.0366967	0.033760965
Statewide	2015 Annual	LHD2	Light-Heavy-Duty Trucks (GVWR 10001-14000 lbs)	GAS	Aggregatec	40	161824.8566	0.067063606	0.081998388	1.289740282	0.506127467	475.2331907	463.352361	0.001053917	0.000963851
Statewide	2015 Annual	LHD2	Light-Heavy-Duty Trucks (GVWR 10001-14000 lbs)	DSL	Aggregatec	40	211337.4075	0.143596339	0.163474881	0.656303392	3.138581617	523.1528659	510.0740442	0.032813129	0.030188079
Statewide	2015 Annual	LHD2	Light-Heavy-Duty Trucks (GVWR 10001-14000 lbs)	GAS	Aggregatec	45	164208.4931	0.056352636	0.069184849	1.210493416	0.516474519	452.0558411	440.7544451	0.000899306	0.000822225
Statewide	2015 Annual	LHD2	Light-Heavy-Duty Trucks (GVWR 10001-14000 lbs)	DSL	Aggregatec	45	214181.226	0.129107604	0.146980418	0.603470741	3.279281138	523.1236163	510.0455259	0.029546011	0.02718233
Statewide	2015 Annual	LHD2	Light-Heavy-Duty Trucks (GVWR 10001-14000 lbs)	GAS	Aggregatec	50	298551.5029	0.051210893	0.06186052	1.260689768	0.532447202	454.3218165	442.9637711	0.000829822	0.000755887
Statewide	2015 Annual	LHD2	Light-Heavy-Duty Trucks (GVWR 10001-14000 lbs)	DSL	Aggregatec	50	481682.2579	0.118471322	0.13487172	0.574390519	3.625753121	523.0771025	510.000175	0.027025985	0.024863906
Statewide	2015 Annual	LHD2	Light-Heavy-Duty Trucks (GVWR 10001-14000 lbs)	GAS	Aggregatec	55	173100.1933	0.045263636	0.055942919	1.276842298	0.549739413	482.4155263	470.3551381	0.000747299	0.000682298
Statewide	2015 Annual	LHD2	Light-Heavy-Duty Trucks (GVWR 10001-14000 lbs)	DSL	Aggregatec	55	354366.3461	0.111407088	0.126829561	0.581623057	4.035725226	523.1093425	510.031609	0.025541554	0.02349823
Statewide	2015 Annual	LHD2	Light-Heavy-Duty Trucks (GVWR 10001-14000 lbs)	GAS	Aggregatec	60	208055.1215	0.04369557	0.054761219	1.409981245	0.576373184	541.2091876	527.678958	0.000718081	0.000657041
Statewide	2015 Annual	LHD2	Light-Heavy-Duty Trucks (GVWR 10001-14000 lbs)	DSL	Aggregatec	60	329001.5402	0.107265596	0.122114745	0.625382642	4.517121623	523.4759893	510.3890896	0.025150298	0.023138274
Statewide	2015 Annual	LHD2	Light-Heavy-Duty Trucks (GVWR 10001-14000 lbs)	GAS	Aggregatec	65	169925.5087	0.045551273	0.057020848	1.72178372	0.606597341	641.4978995	625.460452	0.000728334	0.000665225
Statewide	2015 Annual	LHD2	Light-Heavy-Duty Trucks (GVWR 10001-14000 lbs)	DSL	Aggregatec	65	330961.7326	0.105922898	0.120586172	0.695406001	5.414819803	522.9448131	509.8711928	0.024439743	0.022484565
Statewide	2015 Annual	LHD2	Light-Heavy-Duty Trucks (GVWR 10001-14000 lbs)	GAS	Aggregatec	70	48422.07331	0.051309507	0.063859799	2.224789776	0.610213035	803.3624851	783.278423	0.000731614	0.000663356
Statewide	2015 Annual	LHD2	Light-Heavy-Duty Trucks (GVWR 10001-14000 lbs)	DSL	Aggregatec	70	161051.4876	0.118858682	0.135312705	0.894985598	7.046686016	521.5272311	508.4890504	0.025537929	0.023494895
Statewide	2015 Annual	MDV	Medium-Duty Trucks (GVWR 6001-8500 lbs)	GAS	Aggregatec	5	276657.8591	0.519080213	0.723527677	6.198707092	0.818997938	1904.420175	1751.628286	0.014988492	0.013812143
Statewide	2015 Annual	MDV	Medium-Duty Trucks (GVWR 6001-8500 lbs)	DSL	Aggregatec	5	262.4294385	0.113493155	0.129204406	0.742324548	0.633231153	474.7610756	427.1573552	0.093513727	0.086032632
Statewide	2015 Annual	MDV	Medium-Duty Trucks (GVWR 6001-8500 lbs)	GAS	Aggregatec	10	812261.1302	0.293709264	0.415036047	4.727398859	0.597230893	1410.398968	1299.785025	0.009074781	0.008360883
Statewide	2015 Annual	MDV	Medium-Duty Trucks (GVWR 6001-8500 lbs)	DSL	Aggregatec	10	863.4666888	0.100977927	0.114956652	0.631401111	0.586346024	435.8704163	392.859085	0.083087104	0.076440142
Statewide	2015 Annual	MDV	Medium-Duty Trucks (GVWR 6001-8500 lbs)	GAS	Aggregatec	15	2428330.1	0.205012591	0.288664951	4.208553649	0.529251467	1090.004638	1003.709684	0.006176955	0.005688098
Statewide	2015 Annual	MDV	Medium-Duty Trucks (GVWR 6001-8500 lbs)	DSL	Aggregatec	15	2350.961194	0.079856787	0.090911642	0.460518494	0.510061986	378.4163618	341.873653	0.065821153	0.060555464
Statewide	2015 Annual	MDV	Medium-Duty Trucks (GVWR 6001-8500 lbs)	GAS	Aggregatec	20	5887133.256	0.144954913	0.203842755	3.660648143	0.454956958	870.4464055	801.8620916	0.004380987	0.00403119
Statewide	2015 Annual	MDV	Medium-Duty Trucks (GVWR 6001-8500 lbs)	DSL	Aggregatec	20	5967.657136	0.06446104	0.073384606	0.350102706	0.454160574	339.6995548	307.6943331	0.053167946	0.048914513
Statewide	2015 Annual	MDV	Medium-Duty Trucks (GVWR 6001-8500 lbs)	GAS	Aggregatec	25	13554360.4	0.102711752	0.145892861	3.163357214	0.389438106	721.9084632	664.8627626	0.003178768	0.002924372
Statewide	2015 Annual	MDV	Medium-Duty Trucks (GVWR 6001-8500 lbs)	DSL	Aggregatec	25	14101.07661	0.053193035	0.060556734	0.277511499	0.416076757	314.4504827	285.183134	0.043826068	0.040319985
Statewide	2015 Annual	MDV	Medium-Duty Trucks (GVWR 6001-8500 lbs)	GAS	Aggregatec	30	21455668.67	0.081936451	0.11681325	2.901155114	0.368789272	620.646117	571.2450881	0.002521209	0.002319438
Statewide	2015 Annual	MDV	Medium-Duty Trucks (GVWR 6001-8500 lbs)	DSL	Aggregatec	30	22406.78071	0.045316647	0.051589988	0.230973971	0.395452849	299.7256578	272.0865153	0.037294464	0.034310908
Statewide	2015 Annual	MDV	Medium-Duty Trucks (GVWR 6001-8500 lbs)	GAS	Aggregatec	35	16331490.36	0.070158257	0.099419615	2.707551839	0.354499767	555.9415475	510.7321402	0.002099767	0.001930171
Statewide	2015 Annual	MDV	Medium-Duty Trucks (GVWR 6001-8500 lbs)	DSL	Aggregatec	35	16028.08028	0.039043674	0.044448626	0.197430142	0.382983281	293.3830987	266.1479309	0.03208421	0.029517474
Statewide	2015 Annual	MDV	Medium-Duty Trucks (GVWR 6001-8500 lbs)	GAS	Aggregatec	40	14454845.05	0.063415649	0.089378707	2.565743859	0.350772262	516.3775095	473.8324502	0.001855483	0.001704786
Statewide	2015 Annual	MDV	Medium-Duty Trucks (GVWR 6001-8500 lbs)	DSL	Aggregatec	40	13803.31141	0.034861386	0.039687368	0.176596496	0.384031675	295.2971883	267.6452933	0.028566751	0.026281412
Statewide	2015 Annual	MDV	Medium-Duty Trucks (GVWR 6001-8500 lbs)	GAS	Aggregatec	45	12556856.03	0.061155803	0.085429901	2.477278073	0.359059363	497.5121258	456.1684613	0.001722517	0.001581919
Statewide	2015 Annual	MDV	Medium-Duty Trucks (GVWR 6001-8500 lbs)	DSL	Aggregatec	45	11844.837	0.031995986	0.036425302	0.163621151	0.396541411	305.5292113	276.5532021	0.026161036	0.024068154
Statewide	2015 Annual	MDV	Medium-Duty Trucks (GVWR 6001-8500 lbs)	GAS	Aggregatec	50	11308758.37	0.060540401	0.08421717	2.395277473	0.367032566	497.3199304	455.9508632	0.00167558	0.00153802
Statewide	2015 Annual	MDV	Medium-Duty Trucks (GVWR 6001-8500 lbs)	DSL	Aggregatec	50	10512.8109	0.030351028	0.034552627	0.157665539	0.420889785	325.2954643	293.9987944	0.02467793	0.022703697
Statewide	2015 Annual	MDV	Medium-Duty Trucks (GVWR 6001-8500 lbs)	GAS	Aggregatec	55	11318774.13	0.061886517	0.086000436	2.325610529	0.379359995	514.5408123	471.777285	0.001704237	0.001563886
Statewide	2015 Annual	MDV	Medium-Duty Trucks (GVWR 6001-8500 lbs)	DSL	Aggregatec	55	10560.02751	0.029547308	0.033637645	0.15664295	0.458693222	356.9516375	321.9745647	0.023862207	0.021953232
Statewide	2015 Annual	MDV	Medium-Duty Trucks (GVWR 6001-8500 lbs)	GAS	Aggregatec	60	14597909.73	0.061159033	0.086370424	2.192494322	0.37232545	550.8991113	505.9085894	0.001781969	0.001635226
Statewide	2015 Annual	MDV	Medium-Duty Trucks (GVWR 6001-8500 lbs)	DSL	Aggregatec	60	14654.09774	0.030070281	0.034233014	0.163531457	0.521148541	404.4084341	364.0907739	0.024019688	0.022098114
Statewide	2015 Annual	MDV	Medium-Duty Trucks (GVWR 6001-8500 lbs)	GAS	Aggregatec	65	18291399.38	0.068187442	0.09637696	2.213731014	0.393089223	614.5669421	564.6550817	0.00196748	0.001805008
Statewide	2015 Annual	MDV	Medium-Duty Trucks (GVWR 6001-8500 lbs)	DSL	Aggregatec	65	17959.66171	0.031708321	0.036097815	0.177503286	0.609213865	474.3076212	425.6706414	0.024993935	0.022994421
Statewide	2015 Annual	MDV	Medium-Duty Trucks (GVWR 6001-8500 lbs)	GAS	Aggregatec	70	3642868.881	0.081989891	0.113767525	2.49148784	0.439768633	669.7483822	610.5023245	0.002161683	0.001980556
Statewide	2015 Annual	MDV	Medium-Duty Trucks (GVWR 6001-8500 lbs)	DSL	Aggregatec	70	2978.157903	0.034192688	0.0389261	0.190673485	0.718367023	581.4124447	517.1973593	0.026264089	0.024162963
Statewide	2015 Annual	T6 Instate I	Medium-Heavy Duty Diesel Instate Truck with GVWR>26000 lbs	GAS	Aggregatec	5	13830.87957	1.679277695	1.931729827	2.502146837	19.52142102	2608.111589	2542.9088	0.312918808	0.287885303
Statewide	2015 Annual	T6 Instate I	Medium-Heavy Duty Diesel Instate Truck with GVWR>26000 lbs	DSL	Aggregatec	5	67502.32867	0.984255528	1.120499996	1.711877333	13.54009557	2154.512536	2100.649723	0.218479093	0.201000765
Statewide	2015 Annual	T6 Instate I	Medium-Heavy Duty Diesel Instate Truck with GVWR>26000 lbs	GAS	Aggregatec	15	95670.82724	0.499506221	0.56864981	1.125703854	9.434210645	1769.015102	1724.789725	0.145468841	0.133831333
Statewide	2015 Annual	T6 Instate I	Medium-Heavy Duty Diesel Instate Truck with GVWR>26000 lbs	DSL	Aggregatec	15	124867.3593	0.202982284	0.231079879	0.698923903	7.016035189	1395.458816	1360.572345	0.089660953	0.082488077
Statewide	2015 Annual	T6 Instate I	Medium-Heavy Duty Diesel Instate Truck with GVWR>26000 lbs	GAS	Aggregatec	25	180155.6898	0.166528607	0.189580142	0.604702997	6.585127553	1301.869367	1269.322633	0.074367692	0.068418277
Statewide	2015 Annual	T6 Instate I	Medium-Heavy Duty Diesel Instate Truck with GVWR>26000 lbs	DSL	Aggregatec	25	232344.4729	0.137566526	0.156609018	0.532233701	6.278645159	1221.989994	1191.440244	0.064049415	0.058925922
Statewide	2015 Annual	T6 Instate I	Medium-Heavy Duty Diesel Instate Truck with GVWR>26000 lbs	GAS	Aggregatec	35	235823.4266	0.114966596	0.130880718	0.47678834	6.069234799	1155.754203	1126.860348	0.05791569	0.053282435
Statewide	2015 Annual	T6 Instate I	Medium-Heavy Duty Diesel Instate Truck with GVWR>26000 lbs	DSL	Aggregatec	35	275479.1716	0.098051646	0.111624335	0.434936009	5.91799352	1103.09497	1075.517596	0.055449766	0.051013785
Statewide	2015 Annual	T6 Instate I	Medium-Heavy Duty Diesel Instate Truck with GVWR>26000 lbs	GAS	Aggregatec	45	252408.2681	0.086687679	0.098687323	0.405946352	5.793115636	1063.951039	1037.352261	0.050504281	0.051983939
Statewide	2015 Annual	T6 Instate I	Medium-Heavy Duty Diesel Instate Truck with GVWR>26000 lbs	DSL	Aggregatec	50	267558.0305	0.081614924	0.092912378	0.393350106	5.767323638	1038.453362	1012.492028

Statewide	2015	Annual	T6TS	Medium-Heavy Duty Gasoline Truck	GAS	Aggregatec	65	166239.5959	0.136782389	0.163104279	5.318690271	1.652646299	641.4978974	625.46045	0.000747063	0.000668172
Statewide	2015	Annual	T6TS	Medium-Heavy Duty Gasoline Truck	GAS	Aggregatec	70	40099.7608	0.172271302	0.202476165	7.352481594	1.914168706	803.3624759	783.278414	0.000706345	0.000631032
Statewide	2015	Annual	T7 tractor	Heavy-Heavy Duty Diesel Tractor Truck	DSL	Aggregatec	5	23946.95142	3.78177151	4.305258991	6.875104555	28.85153682	4026.4523	3925.790992	0.474659786	0.436687003
Statewide	2015	Annual	T7 tractor	Heavy-Heavy Duty Diesel Tractor Truck	DSL	Aggregatec	10	90324.96891	2.215056151	2.521672815	4.610687655	20.51497671	3326.174422	3243.020061	0.340190006	0.312974805
Statewide	2015	Annual	T7 tractor	Heavy-Heavy Duty Diesel Tractor Truck	DSL	Aggregatec	15	125210.7026	1.128939404	1.285211575	2.966702019	14.65460182	2731.043656	2662.767565	0.23627251	0.217370709
Statewide	2015	Annual	T7 tractor	Heavy-Heavy Duty Diesel Tractor Truck	DSL	Aggregatec	20	288439.169	0.468599317	0.533464652	1.822262254	11.02025762	2154.522445	2100.659384	0.156708939	0.144172224
Statewide	2015	Annual	T7 tractor	Heavy-Heavy Duty Diesel Tractor Truck	DSL	Aggregatec	25	389679.6361	0.393819631	0.448333672	1.615472347	10.24048917	2010.214178	1959.958824	0.135042608	0.124239199
Statewide	2015	Annual	T7 tractor	Heavy-Heavy Duty Diesel Tractor Truck	DSL	Aggregatec	30	620992.3475	0.331068417	0.376896192	1.44750796	9.619533027	1886.919099	1839.746122	0.120011475	0.110410557
Statewide	2015	Annual	T7 tractor	Heavy-Heavy Duty Diesel Tractor Truck	DSL	Aggregatec	35	892353.6429	0.279960269	0.318713455	1.315379372	9.123184157	1784.587528	1739.972839	0.111247455	0.102347659
Statewide	2015	Annual	T7 tractor	Heavy-Heavy Duty Diesel Tractor Truck	DSL	Aggregatec	40	852596.1028	0.240659664	0.273972708	1.220193943	8.742284133	1703.23795	1660.657001	0.108897769	0.100185948
Statewide	2015	Annual	T7 tractor	Heavy-Heavy Duty Diesel Tractor Truck	DSL	Aggregatec	45	1138166.764	0.213175913	0.24268455	1.161864635	8.488807751	1642.866253	1601.794596	0.112955564	0.103919119
Statewide	2015	Annual	T7 tractor	Heavy-Heavy Duty Diesel Tractor Truck	DSL	Aggregatec	50	1170058.26	0.197508473	0.224848362	1.140387313	8.353070849	1603.465574	1563.378935	0.123404451	0.113532095
Statewide	2015	Annual	T7 tractor	Heavy-Heavy Duty Diesel Tractor Truck	DSL	Aggregatec	55	1401754.249	0.193883942	0.220722109	1.156592333	8.360225015	1585.078143	1545.45119	0.140471906	0.129234153
Statewide	2015	Annual	T7 tractor	Heavy-Heavy Duty Diesel Tractor Truck	DSL	Aggregatec	60	846705.8553	0.202331706	0.230339246	1.21001929	8.475974345	1587.682005	1547.989955	0.164111457	0.15098254
Statewide	2015	Annual	T7 tractor	Heavy-Heavy Duty Diesel Tractor Truck	DSL	Aggregatec	65	673333.3857	0.225264557	0.256446551	1.303801084	8.874791871	1611.502709	1571.215142	0.196102302	0.180414117
Statewide	2015	Annual	T7 tractor	Heavy-Heavy Duty Diesel Tractor Truck	DSL	Aggregatec	70	233389.0754	0.268530048	0.305701019	1.44385781	9.73010335	1656.813763	1615.393419	0.240083196	0.22087654
Statewide	2015	Annual	T7IS	Heavy-Heavy Duty Gasoline Truck	GAS	Aggregatec	5	1510.065428	5.179753583	5.967360727	141.466999	3.97833262	2513.497092	2450.659665	0.005107047	0.004367606
Statewide	2015	Annual	T7IS	Heavy-Heavy Duty Gasoline Truck	GAS	Aggregatec	10	6866.857375	4.182975609	4.801787769	115.1198744	4.060153097	2036.128116	1985.224913	0.004108844	0.003511602
Statewide	2015	Annual	T7IS	Heavy-Heavy Duty Gasoline Truck	GAS	Aggregatec	15	10407.2585	2.599104233	2.998600068	75.50529096	4.103204122	1392.429649	1357.618908	0.0024609	0.002115099
Statewide	2015	Annual	T7IS	Heavy-Heavy Duty Gasoline Truck	GAS	Aggregatec	20	21140.09943	1.752926848	2.029371202	53.61863336	4.244725442	1006.0686	980.9168853	0.001640746	0.001413358
Statewide	2015	Annual	T7IS	Heavy-Heavy Duty Gasoline Truck	GAS	Aggregatec	25	38213.07755	1.220173441	1.421690364	39.90365489	4.344569619	768.0121423	748.8118387	0.001111541	0.00096204
Statewide	2015	Annual	T7IS	Heavy-Heavy Duty Gasoline Truck	GAS	Aggregatec	30	55121.86311	0.960216509	1.118060927	32.84033691	4.616439795	619.4336077	603.9477675	0.000893053	0.000770472
Statewide	2015	Annual	T7IS	Heavy-Heavy Duty Gasoline Truck	GAS	Aggregatec	35	66146.83063	0.820040032	0.950275641	29.24530525	4.985494579	527.8465777	514.6504133	0.000793779	0.000680517
Statewide	2015	Annual	T7IS	Heavy-Heavy Duty Gasoline Truck	GAS	Aggregatec	40	61255.22211	0.66730299	0.775685043	26.21968618	5.167037442	475.2332326	463.3524018	0.000636443	0.000546398
Statewide	2015	Annual	T7IS	Heavy-Heavy Duty Gasoline Truck	GAS	Aggregatec	45	65637.20583	0.574110671	0.668862809	24.98224155	5.388071292	452.0558496	440.7544534	0.000550907	0.000472812
Statewide	2015	Annual	T7IS	Heavy-Heavy Duty Gasoline Truck	GAS	Aggregatec	50	64214.48564	0.512967498	0.599460464	25.15096561	5.583413616	454.3218099	442.9637646	0.000495544	0.000425027
Statewide	2015	Annual	T7IS	Heavy-Heavy Duty Gasoline Truck	GAS	Aggregatec	55	80375.86661	0.495077839	0.576937106	27.2339521	5.858795048	482.4155468	470.3551581	0.000489037	0.000418078
Statewide	2015	Annual	T7IS	Heavy-Heavy Duty Gasoline Truck	GAS	Aggregatec	60	47503.71245	0.426588412	0.508250724	28.55776047	5.846171747	541.209176	527.6789466	0.00038597	0.000334364
Statewide	2015	Annual	T7IS	Heavy-Heavy Duty Gasoline Truck	GAS	Aggregatec	65	38635.60492	0.461917194	0.548893723	35.39118843	6.324327747	641.4979157	625.4604678	0.000390201	0.000337913
Statewide	2015	Annual	T7IS	Heavy-Heavy Duty Gasoline Truck	GAS	Aggregatec	70	8960.973278	0.780661857	0.903731032	61.25128507	8.757601776	803.3625197	783.2784567	0.000509081	0.000441217

Vehicle Definition	Fuel	Speed (miles/hr)	VMT (miles/day	ROG_RUNE (gms/mile)	TOG_RUNE (gms/mile)	CO_RUNEX (gms/mile)	NOX_RUNE (gms/mile)	CO2_RUNE (gms/mile)	PM10_RUN (gms/mile)	PM2_5_RUNEX (gms/mile)
Passenger Cars	GAS	5	1475320	0.070948	0.125488	1.096575	0.108558	1104.685	0.013838	0.012839
Passenger Cars	DSL	5	6111.009	0.01885	0.02146	0.123709	0.320278	503.4684	0.011454	0.010538
Passenger Cars	GAS	10	4136216	0.043849	0.077572	0.980139	0.091648	818.3805	0.008709	0.00808
Passenger Cars	DSL	10	15708.4	0.01591	0.018112	0.114987	0.301043	454.8401	0.009671	0.008898
Passenger Cars	GAS	15	10255745	0.029222	0.051847	0.90424	0.081385	631.2797	0.005782	0.005364
Passenger Cars	DSL	15	38922.49	0.012117	0.013794	0.104021	0.277709	381.6088	0.007358	0.006769
Passenger Cars	GAS	20	24972578	0.020412	0.035993	0.811643	0.071646	504.1167	0.004049	0.003757
Passenger Cars	DSL	20	93372.72	0.009403	0.010704	0.092212	0.252438	332.2507	0.005719	0.005262
Passenger Cars	GAS	25	57897543	0.015721	0.02728	0.750067	0.066274	417.6581	0.002991	0.002775
Passenger Cars	DSL	25	213047	0.007809	0.00889	0.08384	0.237215	300.1806	0.004752	0.004371
Passenger Cars	GAS	30	91294831	0.011854	0.020819	0.685496	0.061077	359.0581	0.002332	0.002164
Passenger Cars	DSL	30	340182.9	0.006897	0.007851	0.077447	0.228748	281.4456	0.004196	0.00386
Passenger Cars	GAS	35	66933433	0.010764	0.018402	0.662293	0.060774	321.851	0.001917	0.001779
Passenger Cars	DSL	35	252006.6	0.00643	0.00732	0.072256	0.22545	273.7529	0.003908	0.003596
Passenger Cars	GAS	40	57486655	0.009497	0.0162	0.621979	0.05911	298.9041	0.001663	0.001543
Passenger Cars	DSL	40	214113.9	0.006283	0.007153	0.067389	0.224778	276.2692	0.003817	0.003512
Passenger Cars	GAS	45	50325686	0.009317	0.015651	0.600082	0.060271	288.0425	0.001522	0.001412
Passenger Cars	DSL	45	187935.6	0.006562	0.00747	0.064063	0.230905	289.2704	0.00398	0.003662
Passenger Cars	GAS	50	43913679	0.009417	0.015603	0.5666	0.060862	287.8713	0.001469	0.001363
Passenger Cars	DSL	50	169748.6	0.007087	0.008068	0.059983	0.236852	314.2781	0.0043	0.003956
Passenger Cars	GAS	55	45865968	0.008956	0.015144	0.516178	0.059432	297.9006	0.001496	0.001388
Passenger Cars	DSL	55	179078.6	0.008119	0.009243	0.056779	0.248449	354.2808	0.004924	0.00453
Passenger Cars	GAS	60	58784009	0.008327	0.014555	0.446614	0.056063	318.067	0.001607	0.001491
Passenger Cars	DSL	60	223748.1	0.009534	0.010854	0.052535	0.258251	414.4314	0.005793	0.00533
Passenger Cars	GAS	65	70085737	0.01284	0.020568	0.468473	0.068086	355.1212	0.001821	0.00169
Passenger Cars	DSL	65	281093.9	0.012357	0.014067	0.051019	0.283884	503.1956	0.007495	0.006895
Passenger Cars	GAS	70	10688865	0.009921	0.018226	0.448843	0.06292	387.3364	0.001978	0.001835
Passenger Cars	DSL	70	34390.38	0.017685	0.020133	0.051495	0.329216	634.5929	0.010669	0.009816
Light-Duty Trucks (GVWR <=6000 lbs. and ETW <= 3750 lbs)	GAS	5	209577.2	0.081768	0.145738	1.351212	0.130464	1284.893	0.013774	0.01278
Light-Duty Trucks (GVWR <=6000 lbs. and ETW <= 3750 lbs)	DSL	5	283.4358	0.021033	0.023944	0.12792	0.365633	504.8272	0.010769	0.009908
Light-Duty Trucks (GVWR <=6000 lbs. and ETW <= 3750 lbs)	GAS	10	552383.2	0.051019	0.090838	1.210775	0.108936	952.1278	0.008688	0.008061
Light-Duty Trucks (GVWR <=6000 lbs. and ETW <= 3750 lbs)	DSL	10	771.7775	0.017766	0.020225	0.121888	0.345853	455.7246	0.0091	0.008372
Light-Duty Trucks (GVWR <=6000 lbs. and ETW <= 3750 lbs)	GAS	15	1395277	0.034324	0.061034	1.110116	0.09645	734.3447	0.005772	0.005355
Light-Duty Trucks (GVWR <=6000 lbs. and ETW <= 3750 lbs)	DSL	15	1970.164	0.013488	0.015356	0.113422	0.320474	381.8904	0.006902	0.00635
Light-Duty Trucks (GVWR <=6000 lbs. and ETW <= 3750 lbs)	GAS	20	3353337	0.023837	0.042338	0.994683	0.084265	586.2085	0.004046	0.003754
Light-Duty Trucks (GVWR <=6000 lbs. and ETW <= 3750 lbs)	DSL	20	4728.913	0.01042	0.011862	0.101975	0.291362	332.1473	0.005342	0.004914

Light-Duty Trucks (GVWR <=6000 lbs. and ETW <= 3750 lbs)	GAS	25	7644163	0.017496	0.031137	0.90511	0.075689	485.6581	0.002991	0.002775
Light-Duty Trucks (GVWR <=6000 lbs. and ETW <= 3750 lbs)	DSL	25	10829.44	0.008677	0.009878	0.093986	0.27487	299.8324	0.004449	0.004093
Light-Duty Trucks (GVWR <=6000 lbs. and ETW <= 3750 lbs)	GAS	30	11885000	0.013786	0.02455	0.839819	0.071253	417.7079	0.002335	0.002167
Light-Duty Trucks (GVWR <=6000 lbs. and ETW <= 3750 lbs)	DSL	30	16942.3	0.007695	0.008761	0.087714	0.266119	280.9196	0.003944	0.003628
Light-Duty Trucks (GVWR <=6000 lbs. and ETW <= 3750 lbs)	GAS	35	9275567	0.011348	0.020255	0.780569	0.067565	374.3958	0.001919	0.001781
Light-Duty Trucks (GVWR <=6000 lbs. and ETW <= 3750 lbs)	DSL	35	12777.93	0.007222	0.008222	0.082337	0.262563	273.1753	0.003698	0.003402
Light-Duty Trucks (GVWR <=6000 lbs. and ETW <= 3750 lbs)	GAS	40	8078003	0.009872	0.017637	0.726456	0.065302	347.7002	0.001664	0.001544
Light-Duty Trucks (GVWR <=6000 lbs. and ETW <= 3750 lbs)	DSL	40	11072.95	0.007111	0.008095	0.077061	0.261874	275.7125	0.00364	0.003349
Light-Duty Trucks (GVWR <=6000 lbs. and ETW <= 3750 lbs)	GAS	45	7060048	0.009232	0.016483	0.691703	0.06539	335.2662	0.001521	0.001411
Light-Duty Trucks (GVWR <=6000 lbs. and ETW <= 3750 lbs)	DSL	45	9828.225	0.007516	0.008557	0.073624	0.269708	288.82	0.003841	0.003534
Light-Duty Trucks (GVWR <=6000 lbs. and ETW <= 3750 lbs)	GAS	50	6150278	0.008903	0.015899	0.643812	0.064741	335.1101	0.001467	0.001361
Light-Duty Trucks (GVWR <=6000 lbs. and ETW <= 3750 lbs)	DSL	50	8608.737	0.008161	0.009291	0.068626	0.275141	314.0175	0.004172	0.003838
Light-Duty Trucks (GVWR <=6000 lbs. and ETW <= 3750 lbs)	GAS	55	6280783	0.009015	0.016114	0.600058	0.065305	346.8572	0.001493	0.001385
Light-Duty Trucks (GVWR <=6000 lbs. and ETW <= 3750 lbs)	DSL	55	8900.599	0.009397	0.010697	0.064485	0.286631	354.3531	0.004803	0.004419
Light-Duty Trucks (GVWR <=6000 lbs. and ETW <= 3750 lbs)	GAS	60	7789095	0.00934	0.016746	0.542333	0.065335	370.2973	0.001604	0.001489
Light-Duty Trucks (GVWR <=6000 lbs. and ETW <= 3750 lbs)	DSL	60	10937.42	0.011107	0.012645	0.059084	0.295648	415.025	0.005689	0.005234
Light-Duty Trucks (GVWR <=6000 lbs. and ETW <= 3750 lbs)	GAS	65	9901252	0.010703	0.019232	0.520527	0.069229	413.3189	0.001817	0.001686
Light-Duty Trucks (GVWR <=6000 lbs. and ETW <= 3750 lbs)	DSL	65	13196.46	0.014686	0.016719	0.057639	0.327389	504.508	0.007504	0.006903
Light-Duty Trucks (GVWR <=6000 lbs. and ETW <= 3750 lbs)	GAS	70	1676477	0.011904	0.021471	0.531782	0.074506	450.2319	0.001969	0.001827
Light-Duty Trucks (GVWR <=6000 lbs. and ETW <= 3750 lbs)	DSL	70	2314.985	0.020894	0.023787	0.057538	0.377182	636.5282	0.010637	0.009786
Light-Duty Trucks (GVWR <=6000 lbs. and ETW > 3750 lbs)	GAS	5	598614.9	0.080709	0.146668	1.285822	0.135182	1502.362	0.013746	0.012754
Light-Duty Trucks (GVWR <=6000 lbs. and ETW > 3750 lbs)	DSL	5	249.034	0.024085	0.027419	0.164742	0.40984	501.9482	0.012589	0.011582
Light-Duty Trucks (GVWR <=6000 lbs. and ETW > 3750 lbs)	GAS	10	1557588	0.05	0.090969	1.153467	0.113192	1114.113	0.008646	0.008022
Light-Duty Trucks (GVWR <=6000 lbs. and ETW > 3750 lbs)	DSL	10	686.2381	0.020488	0.023325	0.153257	0.386505	453.6605	0.010732	0.009874
Light-Duty Trucks (GVWR <=6000 lbs. and ETW > 3750 lbs)	GAS	15	3988491	0.033762	0.061316	1.066026	0.10116	858.7502	0.005744	0.00533
Light-Duty Trucks (GVWR <=6000 lbs. and ETW > 3750 lbs)	DSL	15	1710.149	0.015578	0.017734	0.135384	0.353573	381.2084	0.008166	0.007513
Light-Duty Trucks (GVWR <=6000 lbs. and ETW > 3750 lbs)	GAS	20	9671522	0.023198	0.042126	0.951411	0.088088	685.8557	0.004022	0.003732
Light-Duty Trucks (GVWR <=6000 lbs. and ETW > 3750 lbs)	DSL	20	4156.254	0.012142	0.013823	0.11863	0.321012	332.4056	0.006382	0.005872
Light-Duty Trucks (GVWR <=6000 lbs. and ETW > 3750 lbs)	GAS	25	22027898	0.016964	0.030874	0.866156	0.07907	568.311	0.00297	0.002756
Light-Duty Trucks (GVWR <=6000 lbs. and ETW > 3750 lbs)	DSL	25	9683.75	0.01009	0.011486	0.106866	0.30164	300.6914	0.005301	0.004877
Light-Duty Trucks (GVWR <=6000 lbs. and ETW > 3750 lbs)	GAS	30	34001031	0.013293	0.024206	0.801905	0.074244	488.7307	0.002315	0.002148
Light-Duty Trucks (GVWR <=6000 lbs. and ETW > 3750 lbs)	DSL	30	15165.82	0.008909	0.010143	0.098373	0.291697	282.1388	0.004674	0.004301
Light-Duty Trucks (GVWR <=6000 lbs. and ETW > 3750 lbs)	GAS	35	25926550	0.011042	0.020134	0.751859	0.070689	437.9108	0.001904	0.001767
Light-Duty Trucks (GVWR <=6000 lbs. and ETW > 3750 lbs)	DSL	35	11418.55	0.008217	0.009355	0.090955	0.286203	274.4395	0.004294	0.003951
Light-Duty Trucks (GVWR <=6000 lbs. and ETW > 3750 lbs)	GAS	40	22338437	0.009653	0.017605	0.702832	0.068465	406.6147	0.001652	0.001533
Light-Duty Trucks (GVWR <=6000 lbs. and ETW > 3750 lbs)	DSL	40	9790.554	0.007978	0.009082	0.084564	0.285132	276.891	0.004157	0.003825
Light-Duty Trucks (GVWR <=6000 lbs. and ETW > 3750 lbs)	GAS	45	19897531	0.009088	0.016547	0.671626	0.068927	391.8667	0.001512	0.001403
Light-Duty Trucks (GVWR <=6000 lbs. and ETW > 3750 lbs)	DSL	45	8544.059	0.008309	0.009459	0.080544	0.293766	289.7786	0.004312	0.003967
Light-Duty Trucks (GVWR <=6000 lbs. and ETW > 3750 lbs)	GAS	50	17490652	0.008792	0.015993	0.624755	0.068377	391.6075	0.00146	0.001355
Light-Duty Trucks (GVWR <=6000 lbs. and ETW > 3750 lbs)	DSL	50	7533.094	0.008906	0.010139	0.075289	0.300985	314.551	0.004613	0.004244
Light-Duty Trucks (GVWR <=6000 lbs. and ETW > 3750 lbs)	GAS	55	18140912	0.008935	0.016249	0.581863	0.069171	405.3016	0.001487	0.001379
Light-Duty Trucks (GVWR <=6000 lbs. and ETW > 3750 lbs)	DSL	55	7757.168	0.010122	0.011524	0.071224	0.315615	354.2054	0.00523	0.004812
Light-Duty Trucks (GVWR <=6000 lbs. and ETW > 3750 lbs)	GAS	60	21910259	0.009156	0.016712	0.520477	0.068295	432.961	0.001595	0.00148
Light-Duty Trucks (GVWR <=6000 lbs. and ETW > 3750 lbs)	DSL	60	9682.945	0.011865	0.013507	0.066533	0.330907	413.762	0.006132	0.005642
Light-Duty Trucks (GVWR <=6000 lbs. and ETW > 3750 lbs)	GAS	65	26299408	0.010562	0.019336	0.501511	0.07197	483.3327	0.001807	0.001676
Light-Duty Trucks (GVWR <=6000 lbs. and ETW > 3750 lbs)	DSL	65	11601.5	0.015485	0.017628	0.065609	0.368544	501.7764	0.007959	0.007322
Light-Duty Trucks (GVWR <=6000 lbs. and ETW > 3750 lbs)	GAS	70	4296172	0.012153	0.022284	0.529154	0.079356	526.3316	0.001966	0.001824
Light-Duty Trucks (GVWR <=6000 lbs. and ETW > 3750 lbs)	DSL	70	1990.731	0.021596	0.024586	0.064577	0.416703	632.7138	0.011026	0.010144
Light-Heavy-Duty Trucks (GVWR 8501-10000 lbs)	GAS	5	606268.4	0.050517	0.082929	0.789853	0.106398	2513.497	0.001449	0.001345
Light-Heavy-Duty Trucks (GVWR 8501-10000 lbs)	DSL	5	245105	0.198144	0.225574	2.394078	1.551439	519.0578	0.053178	0.048923
Light-Heavy-Duty Trucks (GVWR 8501-10000 lbs)	GAS	10	1555827	0.040742	0.066852	0.641477	0.108711	2036.128	0.001161	0.001077
Light-Heavy-Duty Trucks (GVWR 8501-10000 lbs)	DSL	10	777499.7	0.175222	0.199478	1.983427	1.4034	519.0575	0.047117	0.043348
Light-Heavy-Duty Trucks (GVWR 8501-10000 lbs)	GAS	15	3615508	0.02732	0.044811	0.439488	0.114085	1392.43	0.000779	0.000722
Light-Heavy-Duty Trucks (GVWR 8501-10000 lbs)	DSL	15	1722244	0.13913	0.158391	1.398138	1.187973	519.0578	0.037384	0.034393
Light-Heavy-Duty Trucks (GVWR 8501-10000 lbs)	GAS	20	4603001	0.018904	0.031106	0.316321	0.119399	1006.069	0.000541	0.000502
Light-Heavy-Duty Trucks (GVWR 8501-10000 lbs)	DSL	20	1977281	0.11303	0.128677	1.034995	1.038489	519.0565	0.030414	0.027981
Light-Heavy-Duty Trucks (GVWR 8501-10000 lbs)	GAS	25	4550154	0.013591	0.02248	0.240985	0.125352	768.0121	0.00039	0.000362
Light-Heavy-Duty Trucks (GVWR 8501-10000 lbs)	DSL	25	2264644	0.094163	0.107198	0.806098	0.943977	519.0547	0.025423	0.023389
Light-Heavy-Duty Trucks (GVWR 8501-10000 lbs)	GAS	30	4577281	0.010236	0.016983	0.193928	0.130162	619.4336	0.000294	0.000273
Light-Heavy-Duty Trucks (GVWR 8501-10000 lbs)	DSL	30	2099595	0.080116	0.091207	0.656694	0.884921	519.0523	0.021709	0.019973
Light-Heavy-Duty Trucks (GVWR 8501-10000 lbs)	GAS	35	2786706	0.007962	0.013311	0.164774	0.135391	527.8466	0.000229	0.000212
Light-Heavy-Duty Trucks (GVWR 8501-10000 lbs)	DSL	35	1353937	0.070098	0.079802	0.566515	0.861586	519.0482	0.01916	0.017628
Light-Heavy-Duty Trucks (GVWR 8501-10000 lbs)	GAS	40	2082809	0.006506	0.010948	0.14917	0.140063	475.2332	0.000185	0.000172
Light-Heavy-Duty Trucks (GVWR 8501-10000 lbs)	DSL	40	1002570	0.063118	0.071856	0.517463	0.867777	519.0431	0.017477	0.016079
Light-Heavy-Duty Trucks (GVWR 8501-10000 lbs)	GAS	45	2171765	0.005557	0.009372	0.140857	0.144081	452.0559	0.000159	0.000148
Light-Heavy-Duty Trucks (GVWR 8501-10000 lbs)	DSL	45	1045336	0.056943	0.064825	0.476766	0.905245	519.0434	0.01574	0.01448
Light-Heavy-Duty Trucks (GVWR 8501-10000 lbs)	GAS	50	4279351	0.005075	0.008465	0.14151	0.150927	454.3218	0.000146	0.000136
Light-Heavy-Duty Trucks (GVWR 8501-10000 lbs)	DSL	50	2473440	0.051378	0.058491	0.440286	0.982773	519.0526	0.013912	0.012799
Light-Heavy-Duty Trucks (GVWR 8501-10000 lbs)	GAS	55	2709261	0.004622	0.007803	0.149964	0.157398	482.4155	0.000133	0.000124
Light-Heavy-Duty Trucks (GVWR 8501-10000 lbs)	DSL	55	1916284	0.049282	0.056104	0.458485	1.103598	519.0477	0.013489	0.01241
Light-Heavy-Duty Trucks (GVWR 8501-10000 lbs)	GAS	60	2641134	0.004399	0.007497	0.166333	0.161207	541.2092	0.000128	0.000119
Light-Heavy-Duty Trucks (GVWR 8501-10000 lbs)	DSL	60	1380312	0.048562	0.055285	0.506244	1.274634	519.03	0.013549	0.012465
Light-Heavy-Duty Trucks (GVWR 8501-10000 lbs)	GAS	65	1953503	0.004578	0.007778	0.20451	0.172914	641.4979	0.000128	0.000119
Light-Heavy-Duty Trucks (GVWR 8501-10000 lbs)	DSL	65	1296572	0.048807	0.055564	0.581218	1.531798	519.0312	0.013794	0.012691
Light-Heavy-Duty Trucks (GVWR 8501-10000 lbs)	GAS	70	503579.3	0.005151	0.008645	0.275348	0.189979	803.3624	0.000133	0.000123
Light-Heavy-Duty Trucks (GVWR 8501-10000 lbs)	DSL	70	571624.1	0.052013	0.059214	0.736262	1.930025	519.035	0.015112	0.013903
Light-Heavy-Duty Trucks (GVWR 10001-14000 lbs)	GAS	5	50549.13	0.035597	0.064501	0.565387	0.077867	2513.497	0.001058	0.000982
Light-Heavy-Duty Trucks (GVWR 10001-14000 lbs)	DSL	5	57752.6	0.182902	0.208222	2.276021	1.414082	519.1259	0.04995	0.045954
Light-Heavy-Duty Trucks (GVWR 10001-14000 lbs)	GAS	10	130381.6	0.0287	0.052012	0.459623	0.079658	2036.128	0.00085	0.000789
Light-Heavy-Duty Trucks (GVWR 10001-14000 lbs)	DSL	10	181908.4	0.161897	0.184309	1.888072	1.279764	519.1232	0.044317	0.040772
Light-Heavy-Duty Trucks (GVWR 10001-14000 lbs)	GAS	15	303298.5	0.019233	0.034842	0.314594	0.083508	1392.43	0.00057	0.000528
Light-Heavy-Duty Trucks (GVWR 10001-14000 lbs)	DSL	15	404670.4	0.128505	0.146295	1.330466	1.082985	519.125	0.035149	0.032337
Light-Heavy-Duty Trucks (GVWR 10001-14000 lbs)	GAS	20	397604.4	0.013385	0.024263	0.227499	0.08762	1006.069	0.000397	0.000368
Light-Heavy-Duty Trucks (GVWR 10001-14000 lbs)	DSL	20	473969	0.104439	0.118897	0.985424	0.946539	519.124	0.028609	0.02632
Light-Heavy-Duty Trucks (GVWR 10001-14000 lbs)	GAS	25	413101.3	0.009709	0.01761	0.174441	0.092264	768.0121	0.000288	0.000267
Light-Heavy-Duty Trucks (GVWR 10001-14000 lbs)	DSL	25	557170.2	0.087077	0.099131	0.768377	0.86031	519.1227	0.023941	0.022025
Light-Heavy-Duty Trucks (GVWR 10001-14000 lbs)	GAS	30	422258.7	0.007353	0.013346	0.140973	0.096176	619.4336	0.000218	0.000202
Light-Heavy-Duty Trucks (GVWR 10001-14000 lbs)	DSL	30	531712.9	0.074141	0.084405	0.626375	0.806839	519.1203	0.020458	0.018821

Light-Heavy-Duty Trucks (GVWR 10001-14000 lbs)	GAS	35	266487.7	0.005796	0.010533	0.120875	0.100716	527.8465	0.000172	0.000159
Light-Heavy-Duty Trucks (GVWR 10001-14000 lbs)	DSL	35	355749.5	0.064932	0.073921	0.540553	0.786307	519.1155	0.018067	0.016621
Light-Heavy-Duty Trucks (GVWR 10001-14000 lbs)	GAS	40	207227.4	0.004782	0.0087	0.110077	0.104801	475.2332	0.000141	0.000131
Light-Heavy-Duty Trucks (GVWR 10001-14000 lbs)	DSL	40	274857.3	0.058519	0.066619	0.493496	0.793568	519.109	0.01648	0.015162
Light-Heavy-Duty Trucks (GVWR 10001-14000 lbs)	GAS	45	214458	0.004102	0.007467	0.104272	0.108056	452.0558	0.000121	0.000112
Light-Heavy-Duty Trucks (GVWR 10001-14000 lbs)	DSL	45	285240.3	0.052812	0.060123	0.454783	0.828238	519.1084	0.014845	0.013658
Light-Heavy-Duty Trucks (GVWR 10001-14000 lbs)	GAS	50	380275.3	0.003665	0.006663	0.103061	0.111822	454.3218	0.000109	0.000101
Light-Heavy-Duty Trucks (GVWR 10001-14000 lbs)	DSL	50	611369.2	0.047541	0.054122	0.419482	0.897046	519.1184	0.013098	0.012051
Light-Heavy-Duty Trucks (GVWR 10001-14000 lbs)	GAS	55	259688.6	0.0034	0.006193	0.110565	0.117661	482.4155	0.000101	9.36E-05
Light-Heavy-Duty Trucks (GVWR 10001-14000 lbs)	DSL	55	505259.1	0.045683	0.052007	0.437484	1.008437	519.1136	0.012723	0.011705
Light-Heavy-Duty Trucks (GVWR 10001-14000 lbs)	GAS	60	267324.3	0.003287	0.005997	0.123726	0.121927	541.2092	9.8E-05	9.09E-05
Light-Heavy-Duty Trucks (GVWR 10001-14000 lbs)	DSL	60	440105	0.044801	0.051003	0.477181	1.166822	519.1047	0.012626	0.011616
Light-Heavy-Duty Trucks (GVWR 10001-14000 lbs)	GAS	65	185271.2	0.003353	0.006119	0.149837	0.129973	641.4979	9.88E-05	9.16E-05
Light-Heavy-Duty Trucks (GVWR 10001-14000 lbs)	DSL	65	394548.3	0.04519	0.051446	0.547809	1.41478	519.097	0.012881	0.01185
Light-Heavy-Duty Trucks (GVWR 10001-14000 lbs)	GAS	70	36985.2	0.0035	0.006427	0.19183	0.13917	803.3624	0.000102	9.47E-05
Light-Heavy-Duty Trucks (GVWR 10001-14000 lbs)	DSL	70	165464	0.048201	0.054874	0.690727	1.80174	519.0798	0.014082	0.012956
Medium-Duty Trucks (GVWR 6001-8500 lbs)	GAS	5	482458.5	0.116674	0.201593	1.766758	0.196495	1927.622	0.013412	0.012444
Medium-Duty Trucks (GVWR 6001-8500 lbs)	DSL	5	455.7194	0.019058	0.021697	0.120389	0.324777	504.22	0.011536	0.010613
Medium-Duty Trucks (GVWR 6001-8500 lbs)	GAS	10	1217221	0.071965	0.124644	1.577806	0.160052	1429.946	0.008419	0.007812
Medium-Duty Trucks (GVWR 6001-8500 lbs)	DSL	10	1240.299	0.016144	0.018379	0.114083	0.307224	455.2825	0.009776	0.008994
Medium-Duty Trucks (GVWR 6001-8500 lbs)	GAS	15	3293468	0.048728	0.084206	1.458981	0.143272	1102.11	0.005602	0.005198
Medium-Duty Trucks (GVWR 6001-8500 lbs)	DSL	15	3123.03	0.012228	0.013921	0.104289	0.283002	381.748	0.0074	0.006808
Medium-Duty Trucks (GVWR 6001-8500 lbs)	GAS	20	7552335	0.033685	0.058251	1.302175	0.124165	879.8652	0.003918	0.003635
Medium-Duty Trucks (GVWR 6001-8500 lbs)	DSL	20	7529.319	0.009485	0.010798	0.093296	0.257523	332.2036	0.00575	0.00529
Medium-Duty Trucks (GVWR 6001-8500 lbs)	GAS	25	16930813	0.024553	0.042648	1.18287	0.110147	729.1287	0.00289	0.002681
Medium-Duty Trucks (GVWR 6001-8500 lbs)	DSL	25	17374.15	0.007903	0.008997	0.085542	0.242908	300.0222	0.004792	0.004408
Medium-Duty Trucks (GVWR 6001-8500 lbs)	GAS	30	26432389	0.019237	0.033523	1.095585	0.103475	627.2245	0.002256	0.002093
Medium-Duty Trucks (GVWR 6001-8500 lbs)	DSL	30	27138.87	0.007004	0.007973	0.079567	0.235194	281.1884	0.004244	0.003904
Medium-Duty Trucks (GVWR 6001-8500 lbs)	GAS	35	21083534	0.015837	0.027648	1.018025	0.097815	562.0527	0.001857	0.001723
Medium-Duty Trucks (GVWR 6001-8500 lbs)	DSL	35	20341.06	0.006524	0.007427	0.074164	0.231079	273.4588	0.00395	0.003634
Medium-Duty Trucks (GVWR 6001-8500 lbs)	GAS	40	18598691	0.013825	0.024146	0.948745	0.094836	521.8209	0.001614	0.001497
Medium-Duty Trucks (GVWR 6001-8500 lbs)	DSL	40	17477.31	0.006396	0.007281	0.069244	0.230273	275.9838	0.003871	0.003562
Medium-Duty Trucks (GVWR 6001-8500 lbs)	GAS	45	16634752	0.012869	0.022453	0.898391	0.094943	503.0302	0.001478	0.001371
Medium-Duty Trucks (GVWR 6001-8500 lbs)	DSL	45	15369.07	0.006691	0.007618	0.065691	0.235836	289.0289	0.004045	0.003721
Medium-Duty Trucks (GVWR 6001-8500 lbs)	GAS	50	14743705	0.012434	0.021691	0.836418	0.094612	502.6485	0.001427	0.001324
Medium-Duty Trucks (GVWR 6001-8500 lbs)	DSL	50	13421.53	0.007242	0.008244	0.061293	0.240918	314.1327	0.004378	0.004028
Medium-Duty Trucks (GVWR 6001-8500 lbs)	GAS	55	15071301	0.012643	0.022085	0.78241	0.096547	520.1358	0.001452	0.001347
Medium-Duty Trucks (GVWR 6001-8500 lbs)	DSL	55	13890.8	0.008335	0.009489	0.057876	0.25214	354.3211	0.005038	0.004635
Medium-Duty Trucks (GVWR 6001-8500 lbs)	GAS	60	17586975	0.013075	0.022991	0.708217	0.096326	555.9244	0.001556	0.001444
Medium-Duty Trucks (GVWR 6001-8500 lbs)	DSL	60	17345.5	0.009892	0.011262	0.053656	0.262805	414.7501	0.005988	0.005509
Medium-Duty Trucks (GVWR 6001-8500 lbs)	GAS	65	21181454	0.014974	0.026375	0.683423	0.102207	620.7471	0.001761	0.001634
Medium-Duty Trucks (GVWR 6001-8500 lbs)	DSL	65	20645.95	0.013042	0.014847	0.052551	0.291777	503.8895	0.007874	0.007244
Medium-Duty Trucks (GVWR 6001-8500 lbs)	GAS	70	4386071	0.016198	0.02865	0.679772	0.105421	674.9496	0.001923	0.001785
Medium-Duty Trucks (GVWR 6001-8500 lbs)	DSL	70	3516.578	0.01819	0.020708	0.051436	0.329641	635.6956	0.01095	0.010074

Medium-Heavy Duty Diesel instate Truck with GVWR>26000 lbs	DSL	5	19230.24	1.158006	1.318302	2.053473	3.64769	2559.843	0.044444	0.040889
Medium-Heavy Duty Diesel instate Truck with GVWR>26000 lbs	DSL	10	90363.45	0.674268	0.767602	1.28047	2.747338	2114.631	0.040809	0.037545
Medium-Heavy Duty Diesel instate Truck with GVWR>26000 lbs	DSL	15	125578.1	0.342457	0.389861	0.742468	2.064741	1736.295	0.037221	0.034244
Medium-Heavy Duty Diesel instate Truck with GVWR>26000 lbs	DSL	20	166165	0.146699	0.167006	0.401133	1.550511	1369.762	0.033273	0.030611
Medium-Heavy Duty Diesel instate Truck with GVWR>26000 lbs	DSL	25	221752	0.127806	0.145498	0.37757	1.382533	1278.017	0.031644	0.029112
Medium-Heavy Duty Diesel instate Truck with GVWR>26000 lbs	DSL	30	288064.2	0.111372	0.126789	0.361629	1.244928	1199.612	0.031396	0.028885
Medium-Heavy Duty Diesel instate Truck with GVWR>26000 lbs	DSL	35	305928.8	0.097279	0.110745	0.35317	1.135693	1134.546	0.032523	0.029922
Medium-Heavy Duty Diesel instate Truck with GVWR>26000 lbs	DSL	40	353831.7	0.085248	0.097049	0.35135	1.049029	1082.819	0.034936	0.032141
Medium-Heavy Duty Diesel instate Truck with GVWR>26000 lbs	DSL	45	321099.1	0.075124	0.085523	0.355387	0.981208	1044.429	0.038526	0.035444
Medium-Heavy Duty Diesel instate Truck with GVWR>26000 lbs	DSL	50	346263.7	0.067273	0.076586	0.366856	0.940682	1019.379	0.043501	0.04002
Medium-Heavy Duty Diesel instate Truck with GVWR>26000 lbs	DSL	55	453104.6	0.061587	0.070112	0.385424	0.925253	1007.667	0.049832	0.045846
Medium-Heavy Duty Diesel instate Truck with GVWR>26000 lbs	DSL	60	578360.5	0.057852	0.06586	0.409705	0.928912	1009.293	0.057287	0.052704
Medium-Heavy Duty Diesel instate Truck with GVWR>26000 lbs	DSL	65	184906.6	0.056215	0.063996	0.440448	0.955107	1024.257	0.065968	0.06069
Medium-Heavy Duty Diesel instate Truck with GVWR>26000 lbs	DSL	70	19083.58	0.057391	0.065335	0.483671	1.029198	1052.567	0.077096	0.070928
Medium-Heavy Duty Diesel instate Truck with GVWR<=26000 lbs	DSL	5	54709.71	1.051636	1.197207	1.864848	3.137713	2559.777	0.039185	0.03605
Medium-Heavy Duty Diesel instate Truck with GVWR<=26000 lbs	DSL	10	256646	0.612168	0.696907	1.162541	2.362462	2114.576	0.035969	0.033091
Medium-Heavy Duty Diesel instate Truck with GVWR<=26000 lbs	DSL	15	356965.8	0.310963	0.354007	0.674186	1.775798	1736.25	0.032812	0.030187
Medium-Heavy Duty Diesel instate Truck with GVWR<=26000 lbs	DSL	20	475728.8	0.133361	0.151821	0.364662	1.335519	1369.728	0.029372	0.027022
Medium-Heavy Duty Diesel instate Truck with GVWR<=26000 lbs	DSL	25	638398.8	0.116291	0.132389	0.343552	1.192242	1277.986	0.027963	0.025726
Medium-Heavy Duty Diesel instate Truck with GVWR<=26000 lbs	DSL	30	830437	0.10136	0.115391	0.329121	1.073892	1199.583	0.027752	0.025532
Medium-Heavy Duty Diesel instate Truck with GVWR<=26000 lbs	DSL	35	879643.6	0.088494	0.100743	0.321274	0.979074	1134.519	0.028733	0.026434
Medium-Heavy Duty Diesel instate Truck with GVWR<=26000 lbs	DSL	40	1015037	0.07752	0.088251	0.319499	0.903916	1082.792	0.03085	0.028382
Medium-Heavy Duty Diesel instate Truck with GVWR<=26000 lbs	DSL	45	923402.7	0.068341	0.077801	0.323297	0.845904	1044.404	0.034036	0.031313
Medium-Heavy Duty Diesel instate Truck with GVWR<=26000 lbs	DSL	50	994508	0.061186	0.069656	0.333662	0.810745	1019.354	0.038421	0.035348
Medium-Heavy Duty Diesel instate Truck with GVWR<=26000 lbs	DSL	55	1297322	0.055988	0.063738	0.350385	0.79696	1007.642	0.043989	0.04047
Medium-Heavy Duty Diesel instate Truck with GVWR<=26000 lbs	DSL	60	1659985	0.052613	0.059896	0.372602	0.80053	1009.269	0.050593	0.046546
Medium-Heavy Duty Diesel instate Truck with GVWR<=26000 lbs	DSL	65	531381.4	0.051124	0.0582	0.400557	0.822944	1024.233	0.058255	0.053594
Medium-Heavy Duty Diesel instate Truck with GVWR<=26000 lbs	DSL	70	53572.97	0.051975	0.059169	0.438024	0.881854	1052.538	0.067736	0.062317
Medium-Heavy Duty Gasoline Truck	GAS	5	20109.3	0.077121	0.123664	1.144184	0.129438	2513.497	0.001041	0.000966
Medium-Heavy Duty Gasoline Truck	GAS	10	93288.09	0.061925	0.09927	0.924372	0.132955	2036.128	0.000837	0.000777
Medium-Heavy Duty Gasoline Truck	GAS	15	128842.9	0.041691	0.066743	0.635346	0.138478	1392.43	0.00056	0.000519
Medium-Heavy Duty Gasoline Truck	GAS	20	178151.7	0.029192	0.046733	0.460681	0.144634	1006.069	0.000391	0.000363
Medium-Heavy Duty Gasoline Truck	GAS	25	263938.6	0.021343	0.03415	0.35393	0.15133	768.0121	0.000284	0.000264
Medium-Heavy Duty Gasoline Truck	GAS	30	319776	0.016136	0.02587	0.285349	0.158007	619.4336	0.000215	0.0002
Medium-Heavy Duty Gasoline Truck	GAS	35	331809.2	0.012685	0.020366	0.242497	0.165189	527.8466	0.00017	0.000158
Medium-Heavy Duty Gasoline Truck	GAS	40	377067.4	0.010444	0.016778	0.218795	0.17253	475.2332	0.00014	0.00013
Medium-Heavy Duty Gasoline Truck	GAS	45	364459.2	0.008978	0.014421	0.208281	0.178268	452.0559	0.00012	0.000112
Medium-Heavy Duty Gasoline Truck	GAS	50	355690.3	0.007982	0.012868	0.208396	0.185571	454.3218	0.000107	9.97E-05
Medium-Heavy Duty Gasoline Truck	GAS	55	409072.1	0.007391	0.011965	0.221427	0.19404	482.4155	0.0001	9.29E-05
Medium-Heavy Duty Gasoline Truck	GAS	60	462510.2	0.007072	0.011545	0.245704	0.200682	541.2092	9.73E-05	9.03E-05
Medium-Heavy Duty Gasoline Truck	GAS	65	180019.3	0.007545	0.012187	0.3102	0.215179	641.4979	9.81E-05	9.11E-05
Medium-Heavy Duty Gasoline Truck	GAS	70	29415.07	0.008258	0.013214	0.419893	0.238239	803.3625	0.000101	9.41E-05
Heavy-Heavy Duty Diesel Tractor Truck	DSL	5	39418.83	2.592705	2.951597	5.182031	6.881072	3956.455	0.078821	0.072516
Heavy-Heavy Duty Diesel Tractor Truck	DSL	10	142659.8	1.507703	1.716406	3.227165	5.172027	3268.341	0.072256	0.066475

Heavy-Heavy Duty Diesel Tractor Truck	DSL	15	192333.7	0.765991	0.872023	1.871815	3.887942	2683.591	0.065929	0.060655
Heavy-Heavy Duty Diesel Tractor Truck	DSL	20	453463.9	0.329255	0.374832	1.014754	2.937152	2117.086	0.059196	0.05446
Heavy-Heavy Duty Diesel Tractor Truck	DSL	25	583135.7	0.287824	0.327666	0.958387	2.632091	1975.289	0.056542	0.052019
Heavy-Heavy Duty Diesel Tractor Truck	DSL	30	939703	0.25106	0.285813	0.918826	2.374922	1854.108	0.056171	0.051678
Heavy-Heavy Duty Diesel Tractor Truck	DSL	35	1371514	0.21896	0.249269	0.895978	2.162767	1753.542	0.058075	0.053429
Heavy-Heavy Duty Diesel Tractor Truck	DSL	40	1312425	0.191789	0.218337	0.89094	1.99558	1673.592	0.062344	0.057357
Heavy-Heavy Duty Diesel Tractor Truck	DSL	45	1751672	0.169227	0.192653	0.902323	1.871716	1614.258	0.068863	0.063354
Heavy-Heavy Duty Diesel Tractor Truck	DSL	50	1808201	0.151471	0.172438	0.931007	1.792846	1575.541	0.077708	0.071491
Heavy-Heavy Duty Diesel Tractor Truck	DSL	55	2225174	0.138504	0.157676	0.976979	1.759232	1557.439	0.088883	0.081772
Heavy-Heavy Duty Diesel Tractor Truck	DSL	60	1300585	0.130107	0.148117	1.038541	1.76242	1559.952	0.102183	0.094008
Heavy-Heavy Duty Diesel Tractor Truck	DSL	65	956503.5	0.127972	0.145686	1.130185	1.848398	1583.088	0.119506	0.109945
Heavy-Heavy Duty Diesel Tractor Truck	DSL	70	262982.9	0.129084	0.146953	1.226217	1.955282	1626.833	0.137525	0.126523
Heavy-Heavy Duty Gasoline Truck	GAS	5	1756.654	2.497157	3.138593	120.877	3.444771	2513.497	0.000957	0.000888
Heavy-Heavy Duty Gasoline Truck	GAS	10	7479.799	2.064751	2.566947	99.32423	3.565236	2036.128	0.00077	0.000714
Heavy-Heavy Duty Gasoline Truck	GAS	15	10379.19	1.373499	1.706989	67.65037	3.701605	1392.43	0.000514	0.000477
Heavy-Heavy Duty Gasoline Truck	GAS	20	23027.67	0.930931	1.162578	47.93425	3.804664	1006.069	0.000357	0.000332
Heavy-Heavy Duty Gasoline Truck	GAS	25	37843.11	0.674195	0.84593	36.62383	3.964063	768.0122	0.00026	0.000241
Heavy-Heavy Duty Gasoline Truck	GAS	30	55292.05	0.510535	0.645226	29.66863	4.162746	619.4336	0.000197	0.000183
Heavy-Heavy Duty Gasoline Truck	GAS	35	68282.27	0.410124	0.519336	25.64852	4.411292	527.8466	0.000156	0.000145
Heavy-Heavy Duty Gasoline Truck	GAS	40	63768.27	0.33774	0.42957	23.18834	4.592299	475.2332	0.000128	0.000119
Heavy-Heavy Duty Gasoline Truck	GAS	45	68762.95	0.287656	0.367668	21.9922	4.7742	452.0559	0.00011	0.000102
Heavy-Heavy Duty Gasoline Truck	GAS	50	68995.66	0.256879	0.330612	22.17457	4.965851	454.3218	9.84E-05	9.13E-05
Heavy-Heavy Duty Gasoline Truck	GAS	55	88056.31	0.242712	0.311973	23.80167	5.185779	482.4155	9.19E-05	8.53E-05
Heavy-Heavy Duty Gasoline Truck	GAS	60	55263.36	0.219209	0.289968	25.68895	5.210776	541.2092	8.87E-05	8.23E-05
Heavy-Heavy Duty Gasoline Truck	GAS	65	43209.31	0.264496	0.345511	34.88992	6.112212	641.4979	8.96E-05	8.31E-05
Heavy-Heavy Duty Gasoline Truck	GAS	70	9899.275	0.343209	0.442226	51.758	7.466416	803.3624	9.4E-05	8.72E-05

Vehicle Traffic Associated with Bulk Cargo Loading/Unloading

Vehicle Type	Estimated Vehicle Trips/Year[1]		Speed (miles/hr)	% of total miles travelled*	Vehicle miles [hours]/trip*	Vehicle miles [hours]/year	
	Current	2040				Current	2040
30-ton truck	38,659	42,689	Idle[2]	-	0.10	3,866	4,269
			10[3]	10%	0.5	1,933	2,134
			35[4]	90%	20	695,862	853,780
10-ton truck	20,636	22,787	Idle	-	0.10	2,064	2,064
			10	10%	0.5	1,032	1,032
			35	90%	20	371,448	412,720
TEU[4] - 20-ton	5,282	5,833	Idle	-	0.10	528	528
			10	10%	0.5	264	264
			35	90%	20	95,076	105,640
Passenger Car/Truck	771	852	Idle	-	0.05	39	39
			10	10%	0.5	39	39
			35	90%	10	6,939	7,710
Trailer - 5-ton	1,052	1,162	Idle	-	0.10	105	105
			10	10%	0.5	53	53
			35	90%	20	18,941	21,046
Total	**66,400**	**73,323**					

Notes:
(1) Based on traffic information provided by Group 70
(2) Emission factor units are in grams per hour
(3) Assumed average speed on KBPH property
(4) Assumed average speed of offsite roadways
(5) TEU = Twenty-foot equivalent units
*Estimated

Annual Emissions from Vehicle Traffic Associated with Bulk Cargo Loading/Unloading

Vehicle Type	Emissions (tons/year)													
	ROG[1]		TOG[2]		CO		NOx		CO_2		PM10		PM2.5	
	2015	2040	2015	2040	2015	2040	2015	2040	2015	2040	2015	2040	2015	2040
30-ton truck	0.081	0.0609	0.092	0.0694	0.15	0.1218	0.61	0.1618	85.72	93.01	0.01	0.0019	0.01	0.0017
	0.005	0.0035	0.005	0.0040	0.010	0.0076	0.044	0.0122	7.08	7.68	0.001	0.0002	0.001	0.0002
	0.215	0.2059	0.244	0.2344	1.008	0.8425	6.992	2.0336	1,367.7	1,648.8	0.085	0.0546	0.078	0.0502
10-ton truck	0.028	0.0120	0.031	0.0136	0.044	0.0212	0.136	0.0357	29.38	29.09	0.004	0.0004	0.004	0.0004
	0.002	0.0007	0.002	0.0008	0.003	0.0013	0.010	0.0027	2.43	2.40	0.0003	0.00004	0.0003	0.00004
	0.072	0.0402	0.082	0.0458	0.287	0.1460	1.510	0.4450	468.6	515.7	0.043	0.0131	0.040	0.0120
TEU[3] - 20-ton	0.0049	0.0034	0.0056	0.0038	0.0073	0.0060	0.0568	0.0106	7.59	7.45	0.00091	0.0001	0.00084	0.0001
	0.00029	0.0002	0.00033	0.0002	0.00050	0.0004	0.0039	0.0008	0.63	0.62	0.00006	0.000012	0.00006	0.0000
	0.0120	0.0113	0.0137	0.0129	0.0499	0.0411	0.6355	0.1321	121.0	132.0	0.00606	0.0038	0.00558	0.0035
Passenger Car/Truck	0.00005	0.00002	0.00006	0.00003	0.00059	0.0002	0.00005	0.00002	0.23	0.23	0.000002	0.000003	0.000002	0.000003
	0.00001	0.000002	0.00001	0.000003	0.00010	0.00004	0.00001	0.000004	0.035	0.035	0.0000003	0.0000004	0.0000003	0.0000003
	0.00026	0.0001	0.00036	0.0002	0.01006	0.0056	0.00090	0.0005	2.45	2.73	0.00001	0.00002	0.00001	0.00002
Trailer - 5-ton	0.00029	0.00011	0.00034	0.00013	0.00193	0.0014	0.00364	0.0009	0.30	0.30	0.00007	0.00003	0.00006	0.00003
	0.00003	0.00001	0.00003	0.00001	0.00016	0.0001	0.00033	0.0001	0.030	0.030	0.00001	0.000003	0.00001	0.000003
	0.0036	0.0016	0.0041	0.0018	0.0159	0.0131	0.07059	0.0200	10.9	12.03	0.00081	0.0004	0.00074	0.0004
Total	**0.422**	**0.340**	**0.481**	**0.387**	**1.584**	**1.208**	**10.077**	**2.856**	**2,104.09**	**2,452.11**	**0.152**	**0.075**	**0.140**	**0.069**
Change 2015 to 2040	-0.082		-0.094		-0.376		-7.221		348.02		-0.077		-0.071	

Notes:
(1) ROG = Reactive organic gases (equivalent to volatile organic compounds [VOCs])
(2) TOG = Total organic gases (equivalent to total organic compounds [TOC])
(3) TEU = Twenty-foot equivalent units

Current Fuel Loading Evaporative Losses - VOC Emissions

Outbound

Product	Neighbor Island Demand (kb/d)[1]	Oahu Volume (bbls/yr)	KBPH Volume (bbls/yr)	VOC emissions (ton/yr)
LPG	0	0	0	0
Naphtha	0	0	0	0
Gasoline	6.5	2,356,358	1,418,178	53.6
Jet	5	1,811,293	1,393,302	0.15
Diesel	7.1	2,608,611	1,991,520	0.30
Fuel Oil	3	1,102,535	1,102,535	1.83E-03
Other[2]	2.7	983,402	983,402	9.0
Total	**24.3**	**8,862,199**	**6,888,938**	**63.1**

Notes
kb/d = kilobarrels per day (1 kilobarrel = 1,000 barrels)
1 barrel = 42 gallons
(1) Outbound volume estimates derived from Facts Global Energy 2015 *Fuels Market in Hawaii*, Figure 53 "Barge Movements of Fuel to Neighbor Islands, FY 2012
(2) Assume other products are a mixture of all the above fuels.

VOC Loading Losses from Fuel Transfer - Current

Parameter	Value				Units	Definition
	Gasoline	Jet Fuel	Diesel	Fuel Oil		
S	-	0.2 [1]	0.2	0.2	unitless	saturation factor
P	-	0.0085 [2]	0.012 [3]	0.00009 [4]	lbs per square inch absolute (psia)	true vapor pressure of liquid loaded
M	-	130	130	190	lbs/lbs-mole	molecular weight of vapors
T[5]	-	520	540	540	°R where °R=°F + 460	temperature of bulk liquid loaded
L_L	1.8 [6]	0.00530	0.00720	0.000079	$lb/10^3$ gallons	$L_L = 12.46*(S*P*M/T)$ [7]
Fuel Transfer	59,563,494	58,518,697	83,643,849	46,306,470	gallons/year	
VOC emissions	107,214.29	309.89	602.16	3.65	lbs/year	
	53.61	**0.15**	**0.30**	**0.0018**	**tons/year**	

Notes:

(1) Source: AP-42 Chapter 5.2 - Table 5.2-1

(2) Source: AP-42 Chapter 7.1 Table 7.1-2; Assumes Jet Kerosene at 60°F

(3) Assumes Distillate fuel oil No.2 at 80°F

(4) Assumes residual fuel oil No.6 at 80°F

(5) Assumes fuel is stored in white tanks

(6) Source: AP-42 Chapter 5.2 - Table 5.2.2; L_L value is for Ships/Ocean Barges and Vessel Tank Condition is "Typical Overall Situation"

(7) Source: AP-42 Chapter 5.2 - Equation 1

2040 Fuel Loading Evaporative Losses - VOC Emissions - Business as Usual

Outbound

Product	Neighbor Island Demand (kb/d)[1]	Oahu Volume (bbls/yr)	KBPH Volume (bbls/yr)	VOC emissions (ton/yr)
LPG	3.3	1,204,500	1,204,500	0
Naphtha	0	0	0	0
Gasoline	8.9	3,248,500	1,955,116	73.90
Jet	8.3	3,029,500	2,330,385	0.26
Diesel	5.6	2,044,000	1,560,473	0.24
Fuel Oil	1.1	401,500	401,500	6.65E-04
Other[2]	2	730,000	730,000	7.29
Total	**29.2**	**10,658,000**	**8,181,973**	**81.7**

Notes

kb/d = kilobarrels per day (1 kilobarrel = 1,000 barrels)

1 barrel = 42 gallons

(1) Outbound volume estimates derived from Facts Global Energy 2015 *Fuels Market in Hawaii* , Figure 53 "Barge Movements of Fuel to Neighbor Islands, FY 2012

(2) Assume other products are a mixture of all the above fuels.

VOC Loading Losses from Fuel Transfer - 2040 - Business as Usual

Parameter	Value				Units	Definition
	Gasoline	Jet Fuel	Diesel	Fuel Oil		
S	-	0.2 [1]	0.2	0.2	unitless	saturation factor
P	-	0.0085 [2]	0.012 [3]	0.00009 [4]	lbs per square inch absolute (psia)	true vapor pressure of liquid loaded
M	-	130	130	190	lbs/lbs-mole	molecular weight of vapors
T[5]	-	520	540	540	°R where °R=°F + 460	temperature of bulk liquid loaded
L_L	1.8 [6]	0.00530	0.00720	0.000079	$lb/10^3$ gallons	$L_L = 12.46*(S*P*M/T)$[7]
Fuel Transfer	82,114,861	97,876,154	65,539,871	16,863,000	gallons/year	
VOC emissions	147,806.75	518.30	471.83	1.33	lbs/year	
	73,90	**0.26**	**0.24**	**0,0007**	**tons/year**	

Notes:

(1) Source: AP-42 Chapter 5.2 - Table 5.2-1

(2) Source: AP-42 Chapter 7.1 Table 7.1-2; Assumes Jet Kerosene at 60 °F

(3) Assumes Distillate fuel oil No.2 at 80°F

(4) Assumes residual fuel oil No.6 at 80°F

(5) Assumes fuel is stored in white tanks

(6) Source: AP-42 Chapter 5.2 - Table 5.2.2; L_L value is for Ships/Ocean Barges and Vessel Tank Condition is "Typical Overall Situation"

(7) Source: AP-42 Chapter 5.2 - Equation 1

2040 Fuel Loading Evaporative Losses - VOC Emissions - RPS Falls Short

Outbound

Product	Neighbor Island Demand (kb/d)[1]	Oahu Volume (bbls/yr)	KBPH Volume (bbls/yr)	VOC emissions (ton/yr)
LPG	3.3	1,204,500	1,204,500	0
Naphtha	0	0	0	0
Gasoline	7	2,555,000	1,537,731	58.13
Jet	8.3	3,029,500	2,330,385	0.26
Diesel	4.9	1,788,500	1,365,414	0.21
Fuel Oil	0.8	292,000	292,000	4.84E-04
Other[2]	1.9	693,500	693,500	6.04
Total	**26.2**	**9,563,000**	**7,423,530**	**64.6**

Notes

kb/d = kilobarrels per day (1 kilobarrel = 1,000 barrels)

1 barrel = 42 gallons

(1) Outbound volume estimates derived from Facts Global Energy 2015 Fuels Market in Hawaii, Figure 53 "Barge Movements of Fuel to Neighbor Islands, FY 2012

(2) Assume other product is gasoline (e.g. product with highest VOC emissions)

VOC Loading Losses from Fuel Transfer - 2040 - RPS Falls Short

Parameter	Value				Units	Definition
	Gasoline	Jet Fuel	Diesel	Fuel Oil		
S	-	0.2 [1]	0.2	0.2	unitless	saturation factor
P	-	0.0085 [2]	0.012 [3]	0.00009 [4]	lbs per square inch absolute (psia)	true vapor pressure of liquid loaded
M	-	130	130	190	lbs/lbs-mole	molecular weight of vapors
T[5]	-	520	540	540	^{o}R where $^{o}R=^{o}F + 460$	temperature of bulk liquid loaded
L_L	1.8 [6]	0.00530	0.00720	0.000079	$lb/10^3$ gallons	$L_L = 12.46*(S*P*M/T)$ [7]
Fuel Transfer	64,584,722	97,876,154	57,347,387	12,264,000	gallons/year	
VOC emissions	116,252.50	518.30	412.85	0.97	lbs/year	
	58.13	**0.26**	**0.21**	**0.0005**	**tons/year**	

Notes:

(1) Source: AP-42 Chapter 5.2 - Table 5.2-1

(2) Source: AP-42 Chapter 7.1 Table 7.1-2; Assumes Jet Kerosene at 60°F

(3) Assumes Distillate fuel oil No.2 at 80°F

(4) Assumes residual fuel oil No.6 at 80°F

(5) Assumes fuel is stored in white tanks

(6) Source: AP-42 Chapter 5.2 - Table 5.2.2; L_L value is for Ships/Ocean Barges and Vessel Tank Condition is "Typical Overall Situation"

(7) Source: AP-42 Chapter 5.2 - Equation 1

2040 Fuel Loading Evaporative Losses - VOC Emissions - RPS Succeeds

Outbound

Product	Neighbor Island Demand (kb/d)[1]	Oahu Volume (bbls/yr)	KBPH Volume (bbls/yr)	VOC emissions (ton/yr)
LPG	3.3	1,204,500	1,204,500	0
Naphtha	0	0	0	0
Gasoline	7	2,555,000	1,537,731	58.13
Jet	8.3	3,029,500	2,330,385	0.26
Diesel	4.5	1,642,500	1,253,952	0.19
Fuel Oil	0.6	219,000	219,000	3.63E-04
Other[2]	1.8	657,000	657,000	5.88
Total	**25.5**	**9,307,500**	**7,202,568**	**64.5**

Notes

kb/d = kilobarrels per day (1 kilobarrel = 1,000 barrels)

1 barrel = 42 gallons

(1) Outbound volume estimates derived from Facts Global Energy 2015 *Fuels Market in Hawaii*, Figure 53 "Barge Movements of Fuel to Neighbor Islands, FY 2012

(2) Assume other products are a mixture of all the above fuels.

VOC Loading Losses from Fuel Transfer - 2040 - RPS Succeeds

Parameter	Value				Units	Definition
	Gasoline	Jet Fuel	Diesel	Fuel Oil		
S	-	0.2 [1]	0.2	0.2	unitless	saturation factor
P	-	0.0085 [2]	0.012 [3]	0.00009 [4]	lbs per square inch absolute (psia)	true vapor pressure of liquid loaded
M	-	130	130	190	lbs/lbs-mole	molecular weight of vapors
T[5]	-	520	540	540	°R where °R=°F + 460	temperature of bulk liquid loaded
L_L	1.8 [6]	0.00530	0.00720	0.000079	lb/10^3 gallons	$L_L = 12.46*(S*P*M/T)$ [7]
Fuel Transfer	64,584,722	97,876,154	52,665,968	9,198,000	gallons/year	
VOC emissions	116,252.50	518.30	379.15	0.73	lbs/year	
	58.13	**0.26**	**0.19**	**0.0004**	**tons/year**	

Notes:

(1) Source: AP-42 Chapter 5.2 - Table 5.2-1

(2) Source: AP-42 Chapter 7.1 Table 7.1-2; Assumes Jet Kerosene at 60°F

(3) Assumes Distillate fuel oil No.2 at 80°F

(4) Assumes residual fuel oil No.6 at 80°F

(5) Assumes fuel is stored in white tanks

(6) Source: AP-42 Chapter 5.2 - Table 5.2.2; L_L value is for Ships/Ocean Barges and Vessel Tank Condition is "Typical Overall Situation"

(7) Source: AP-42 Chapter 5.2 - Equation 1

2040 Fuel Loading Evaporative Losses - VOC Emissions - HCEI Succeeds

Outbound

Product	Neighbor Island Demand (kb/d)[1]	Oahu Volume (bbls/yr)	KBPH Volume (bbls/yr)	VOC emissions (ton/yr)
LPG	3.3	1,204,500	1,204,500	0
Naphtha	0	0	0	0
Gasoline	5.1	1,861,500	1,120,347	42.35
Jet	8.3	3,029,500	2,330,385	0.26
Diesel	4.5	1,642,500	1,253,952	0.19
Fuel Oil	0.6	219,000	219,000	3.63E-04
Other[2]	1.8	657,000	657,000	4.59
Total	**23.6**	**8,614,000**	**6,785,183**	**47.4**

Notes

kb/d = kilobarrels per day (1 kilobarrel = 1,000 barrels)

1 barrel = 42 gallons

(1) Outbound volume estimates derived from Facts Global Energy 2015 *Fuels Market in Hawaii* , Figure 53 "Barge Movements of Fuel to Neighbor Islands, FY 2012

(2) Assume other products are a mixture of all the above fuels.

VOC Loading Losses from Fuel Transfer - 2040 - HCEI Succeeds

Parameter	Value				Units	Definition
	Gasoline	Jet Fuel	Diesel	Fuel Oil		
S	-	0.2 [1]	0.2	0.2	unitless	saturation factor
P	-	0,0085 [2]	0,012 [3]	0,00009 [4]	lbs per square inch absolute (psia)	true vapor pressure of liquid loaded
M	-	130	130	190	lbs/lbs-mole	molecular weight of vapors
T[5]	-	520	540	540	^{o}R where ^{o}R=^{o}F + 460	temperature of bulk liquid loaded
L_L	1.8 [6]	0.00530	0.00720	0.000079	lb/10^3 gallons	$L_L = 12.46*(S*P*M/T)$ [7]
Fuel Transfer	47,054,583	97,876,154	52,665,968	9,198,000	gallons/year	
VOC emissions	84,698.25	518.30	379.15	0.73	lbs/year	
	42.35	**0.26**	**0.19**	**0.0004**	**tons/year**	

Notes:

(1) Source: AP-42 Chapter 5.2 - Table 5.2-1

(2) Source: AP-42 Chapter 7.1 Table 7.1-2; Assumes Jet Kerosene at 60°F

(3) Assumes Distillate fuel oil No.2 at 80°F

(4) Assumes residual fuel oil No.6 at 80°F

(5) Assumes fuel is stored in white tanks

(6) Source: AP-42 Chapter 5.2 - Table 5.2.2; L_L value is for Ships/Ocean Barges and Vessel Tank Condition is "Typical Overall Situation"

(7) Source: AP-42 Chapter 5.2 - Equation 1

Appendix P
20 Percent Design - Segmented Partial Piers
(Kai Hawai‘i)

GENERAL STRUCTURAL NOTES

GENERAL:

A. WORKMANSHIP AND MATERIALS SHALL CONFORM TO THE BUILDING CODE OF THE CITY AND COUNTY OF HONOLULU (AMENDED IBC, 2006 EDITION). HOWEVER, WHERE REFERENCE IS MADE TO PERFORMANCE CONFORMING TO OTHER STANDARDS THE MORE STRINGENT SHALL APPLY.
B. THE CONTRACTOR SHALL COMPARE SPECIFICATIONS AND ALL OTHER CONTRACT DOCUMENTS WITH EACH OTHER AND REPORT IN WRITING TO THE ENGINEER ALL INCONSISTENCIES AND OMISSIONS.
C. THE CONTRACTOR SHALL TAKE FIELD MEASUREMENTS AND VERIFY FIELD CONDITIONS AND SHALL COMPARE SUCH FIELD MEASUREMENTS AND CONDITIONS WITH THE DRAWINGS BEFORE COMMENCING WORK. REPORT IN WRITING TO THE ENGINEER ALL INCONSISTENCIES AND OMISSIONS.
D. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING THE WORK OF ALL TRADES.
E. THE CONTRACTOR SHALL BE RESPONSIBLE FOR METHODS OF CONSTRUCTION, WORKMANSHIP AND JOB SAFETY. THE CONTRACTOR SHALL PROVIDE TEMPORARY SHORING AND BRACING AS REQUIRED FOR STABILITY OF STRUCTURAL MEMBERS AND SYSTEMS.
F. CONSTRUCTION LOADING SHALL NOT EXCEED DESIGN LIVE LOAD UNLESS SPECIAL SHORING IS PROVIDED. ALLOWABLE LOADS SHALL BE REDUCED IN AREAS WHERE THE STRUCTURE HAS NOT ATTAINED FULL DESIGN STRENGTH.
G. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTION OF THE ADJACENT PROPERTIES, STRUCTURES, STREETS AND UTILITIES DURING THE CONSTRUCTION PERIOD.
H. DETAILS NOTED AS TYPICAL ON THE STRUCTURAL DRAWINGS SHALL APPLY IN ALL CONDITIONS UNLESS SPECIFICALLY SHOWN OR NOTED.

DESIGN CRITERIA:

A. CODES AND REFERENCE
   a. INTERNATIONAL BUILDING CODE, IBC 2006
   b. ASCE/COPRI 61-14, "SEISMIC DESIGN OF PIERS AND WHAVES"
   c. UNIFIED FACILITIES CRITERIA, UFC 4-152-01, "PIERS AND WHARVES"
   d. CALIFORNIA BUILDING CODE 2010, CHAPTER 31F (SLC) "MARINE OIL TERMINALS"
B. DEAD LOAD
   a. WEIGHT OF ALL COMPONENTS OF THE STRUCTURES, APPURTENANCES ATTACHED THERETO.
C. LIVE LOAD
   a. UNIFORM LOAD
      FUEL PIER = 300 PSF
      WALKWAY = 90 PSF
   b. VEHICLE (NON CONCURRENT WITH UNIFORM LOAD)
      HYSTER 50CT AXLE LOADING (FRONT/REAR) = 11,559/1,369 LBS
D. WIND LOAD
   a. WIND LOAD ON PIER STRUCTURE = 105 MPH (EXPOSUSE D)
   b. WIND LOAD ON SHIP = 40 MPH
E. SEISMIC LOAD
   0.20 SECOND SPECTRAL RESPONSE ACCELERATION COEFFICIENT, Ss = 0.59
   1.0 SECOND SPECRAL RESPONSE ACCELERATION COEFFICIENT, S_1 = 0.17
   SITE CLASS =
F. SHIP NORMAL BERTHING VELOCITY
   a. PANAMAX TANK SHIP (DEAD WEIGHT TONNAGE, DWT = 75,000 TONS) = 0.26 FT/SEC
   b. ATB TANK VESSEL (DEAD WEIGHT TONNAGE, DWT = 50,000 TONS) = 0.33 FT/SEC
G. THE RATED PERFORMANCE PER FOOT LENGTH OF CYLINDRICAL FENDERS AT 50% DEFLECTION SHALL BE:
a. ENERGY ABSORPTION $\geq$ 34 KIP-FT/FT
b. REACTION LOAD $\leq$ 40 KIP/FT

CONCRETE:

A. CONCRETE CONSTRUCTION SHALL CONFORM TO AMERICAN CONCRETE INSTITUTE ACI 318R-05.
B. CONCRETE SHALL BE REGULAR WEIGHT HARD ROCK CONCRETE AND SHALL MEET THE FOLLOWING REQUIREMENTS:

	28-DAY MINIMUM COMPRESSIVE STRENGTH	MAXIMUM AGGREGATE SIZE
a. BULKHEAD	4,000 PSI	3/4"
b. BEAMS	4,000 PSI	3/4"
c. DRILLED SHAFTS	5,000 PSI	SEE ALSO NOTES ON SHEET S-
d. PRESTRESSED PLANKS	6,000 PSI	SEE ALSO NOTES ON SHEET S-
e. ALL OTHER CONCRETE	4,000 PSI	3/4"

ALL CONCRETE SHALL HAVE MAXIMUM WATER/CEMENT RATIO OF 0.40.

C. CONCRETE DELIVERY TICKETS SHALL RECORD ALL FREE WATER IN THE MIX: AT BATCHING BY PLANT, FOR CONSISTENCY BY DRIVER, AND ANY ADDITIONAL REQUEST BY CONTRACTOR IF PERMITTED BY THE MIX DESIGN.
D. ALL INSERTS, ANCHOR BOLTS, PLATES, AND OTHER ITEMS TO BE CAST IN THE CONCRETE SHALL BE HOT-DIPPED GALVANIZED UNLESS OTHERWISE NOTED.
E. REINFORCING BARS, ANCHOR BOLTS, INSERTS, AND OTHER ITEMS TO BE CAST IN THE CONCRETE SHALL BE SECURED IN POSITION PRIOR TO PLACEMENT OF CONCRETE.
F. CONDUITS, PIPES, AND SLEEVES PASSING THROUGH A SLAB OR FOOTING AND NOT CONFORMING TO TYPICAL DETAILS SHALL BE LOCATED AND SUBMITTED TO THE ENGINEER FOR APPROVAL.
G. CONDUITS, PIPES, AND SLEEVES EMBEDDED WITHIN A SLAB OR WALL (OTHER THAN THOSE MERELY PASSING THROUGH) SHALL BE:
   a. NO LARGER IN OUTSIDE DIMENSIONS THAN ONE THIRD THE OVERALL SLAB OR WALL THICKNESS IN WHICH THEY ARE EMBEDDED.
   b. PLACED IN THE MIDDLE ONE THIRD OF SLAB OR WALL THICKNESS
   c. SPACED NO CLOSER THAN THREE DIAMETERS OR WIDTHS ON CENTER.
H. CONDUITS, PIPES, AND SLEEVES SHALL NOT BE PLACED THROUGH OR EMBEDDED IN A BEAM UNLESS SPECIFICALLY DETAILED.
I. THE CONTRACTOR SHALL LOCATE CONSTRUCTION JOINTS SO AS NOT TO IMPAIR THE STRENGTH OF THE STRUCTURE AND TO MINIMIZE SHRINKAGE STRESSES. SUBMIT LOCATION OF CONSTRUCTION JOINTS TO THE ENGINEER FOR APPROVAL, UNLESS OTHERWISE NOTED.
J. NON-SHRINK GROUT SHALL HAVE A 7-DAY COMPRESSIVE STRENGTH OF 6,000 PSI.
K. EPOXY FOR DOWELS SHALL BE "SIMPSON SET" HIGH STRENGTH EPOXY OR APPROVED EQUAL. INSTALL PER MANUFACTURER'S RECOMMENDATIONS.

REINFORCING STEEL:

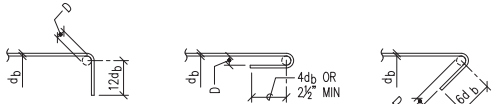
A. REINFORCING STEEL SHALL BE DEFORMED BARS CONFORMING TO ASTM A615, GRADE 60 AND SHALL BE EPOXY COATED IN ACCORDANCE WITH ASTM A775, UNLESS OTHERWISE NOTED.
B. CLEAR CONCRETE COVER FOR REINFORCING BARS SHALL BE AS FOLLOWS, UNLESS OTHERWISE NOTED:
   a. FOOTINGS, ETC. CAST AGAINST EARTH — 4"
   b. FOOTINGS, ETC. FORMED AND EXPOSED TO EARTH OR WEATHER — 3"
   c. BEAMS
      PRIMARY REINFORCEMENT, STIRRUPS, TIES AND SPIRALS — 3"
   d. STRUCTURAL SLABS
      1. FACES EXPOSED TO EARTH OR WEATHER — 2 1/2"
   e. PRESTRESSED PLANKS — 3"
   f. PRESTRESSED PILES — 3"
C. BAR BENDS AND HOOKS SHALL BE "STANDARD HOOKS" IN ACCORDANCE WITH ACI 318.
D. REINFORCING STEEL SHALL BE SPLICED WHERE INDICATED ON PLANS. PROVIDE LAP SPLICE LENGTH PER TYPICAL DETAILS AND TABLE, UNLESS OTHERWISE NOTED.

TABLE OF MINIMUM SPLICE AND EMBEDMENT LENGTHS

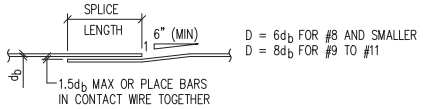
CONCRETE STRENGTH = 4,000 PSI

BAR SIZE	LAP SPLICE		EMBEDMENT		
			STRAIGHT		
	BOT BAR OR WALL BAR	TOP BAR	BOT BAR OR WALL BAR	TOP BAR	WITH STANDARD 90° HOOK
#4	37"	42"	29"	33"	8"
#5	47"	53"	36"	41"	10"
#6	56"	63"	43"	49"	12"
#7	81"	92"	63"	71"	14"
#8	93"	105"	72"	81"	16"
#9	105"	119"	81"	91"	18"
#10	118"	134"	91"	103"	21"
#11	131"	148"	101"	114"	23"

NOTES:
1. LENGTHS ARE FOR CONCRETE WITH EPOXY COATED REBARS WITH CLEAR COVER LESS THAN 3 BAR DIAMETERS OR CLEAR SPACING LESS THAN 6 BAR DIAMETERS.
2. "TOP BARS" ARE HORIZONTAL BARS WITH 12" OR MORE OF CONCRETE CAST BELOW.
3. EMBEDMENT LENGTHS FOR BARS WITH 90° HOOK ARE BARS WITH SIDE COVER, NORMAL TO PLANE OF HOOK, OF NOT LESS THAN 2½" AND COVER ON BAR EXTENSION BEYOND HOOK NOT LESS THAN 2". INCREASE EMBEDMENT LENGTH BY 43% FOR BARS NOT MEETING THESE REQUIREMENTS.



90° BEND 180° BEND 135° BEND



D = $6d_b$ FOR #8 AND SMALLER
D = $8d_b$ FOR #9 TO #11

BAR LAP

E. MECHANICAL SPLICE CONNECTORS SHALL DEVELOP IN TENSION 125 PERCENT OF THE SPECIFIED MINIMUM YIELD STRENGTH OF REINFORCING BARS.
F. CONTRACTOR SHALL USE PLASTIC SPACER "CHAIRS" OR CONCRETE BLOCKS TO MAINTAIN REQUIRED MINIMUM CONCRETE CLEAR COVER AS NOTED ABOVE.

STRUCTURAL STEEL:

A. FABRICATION AND ERECTION OF STRUCTURAL STEEL SHALL CONFORM TO THE AMERICAN INSTITUTE OF STEEL CONSTRUCTION MANUAL OF STEEL CONSTRUCTION, NINTH EDITION.
B. STRUCTURAL STEEL SHALL CONFORM TO ASTM A36 UNLESS OTHERWISE NOTED.
C. STEEL WIDE FLANGE SECTIONS SHALL CONFORM TO ASTM A572, GRADE 50 PER AISC TECHNICAL BULLETIN #3.
D. STEEL PIPES SHALL CONFORM TO ASTM A53, GRADE B.
E. STEEL TUBES SHALL CONFORM TO ASTM A500, GRADE B.
F. BOLTS SHALL CONFORM TO ASTM A325, GRADE A UNLESS OTHERWISE NOTED.
G. WELDS AND WELDING PROCEDURES SHALL CONFORM TO THE STRUCTURAL WELDING CODE AWS D1.1 OF THE AMERICAN WELDING SOCIETY.
H. WELDING SHALL BE PERFORMED BY WELDERS PREQUALIFIED FOR WELDING PROCEDURES TO BE USED.
I. WELDING ELECTRODES SHALL BE E70XX.
J. ALL STEEL SHALL BE HOT-DIPPED GALVANIZED AND PAINTED WITH A THREE-COAT EPOXY SYSTEM.
K. STEEL AND IRON ITEMS, SUCH AS ANCHOR BOLTS, BOLTS, COVERS, FRAMES, GRATINGS, ANCHORS INSERTS, ETC. SHALL BE HOT-DIPPED GALVANIZED AFTER FABRICATIONS IN ACCORDANCE WITH ASTM A-153. UNLESS NOTED OTHERWISE, THIS PROVISION DOES NOT APPLY TO REINFORCING BARS IN CONCRETE, SHEET PILES, PIPES, STAINLESS STEEL, CAST IRON, AND DUCTILE IRON.
L. GALVANIZED SURFACES DAMAGE BY WELDING ABRASIONS OR DURING INSTALLATION SHALL BE CLEANED AND COATED WITH ZINC RICH PRIMER.

PRESTRESSED CONCRETE:

A. SEE SHEET S- FOR PRESTRESSED CONCRETE PILES.
B. SEE SHEET S- FOR PRESTRESSED PLANKS.

REVISION	DATE	DESCRIPTION	BY	APPROVED

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HARBORS DIVISION

JOB TITLE
KALAELOA BARBERS POINT FUEL PIER
SEGMENTED PARTIAL PIERS
KALAELOA BARBERS POINT HARBOR, OAHU

SHEET TITLE
GENERAL NOTES

SUBMITTED BY: _____ SECTION HEAD
RECOMMENDED BY: _____ ENGINEERING PROGRAM MANAGER

DESIGNED BY:	JM
DRAWN BY:	JM
CHECKED BY:	MH
DATE:	2/3/14
SCALE:	AS SHOWN

APPROVED BY: _____ HARBORS ADMINISTRATOR

JOB NUMBER H.C. ---

SHEET S-1
1 OF 9 SHTS.

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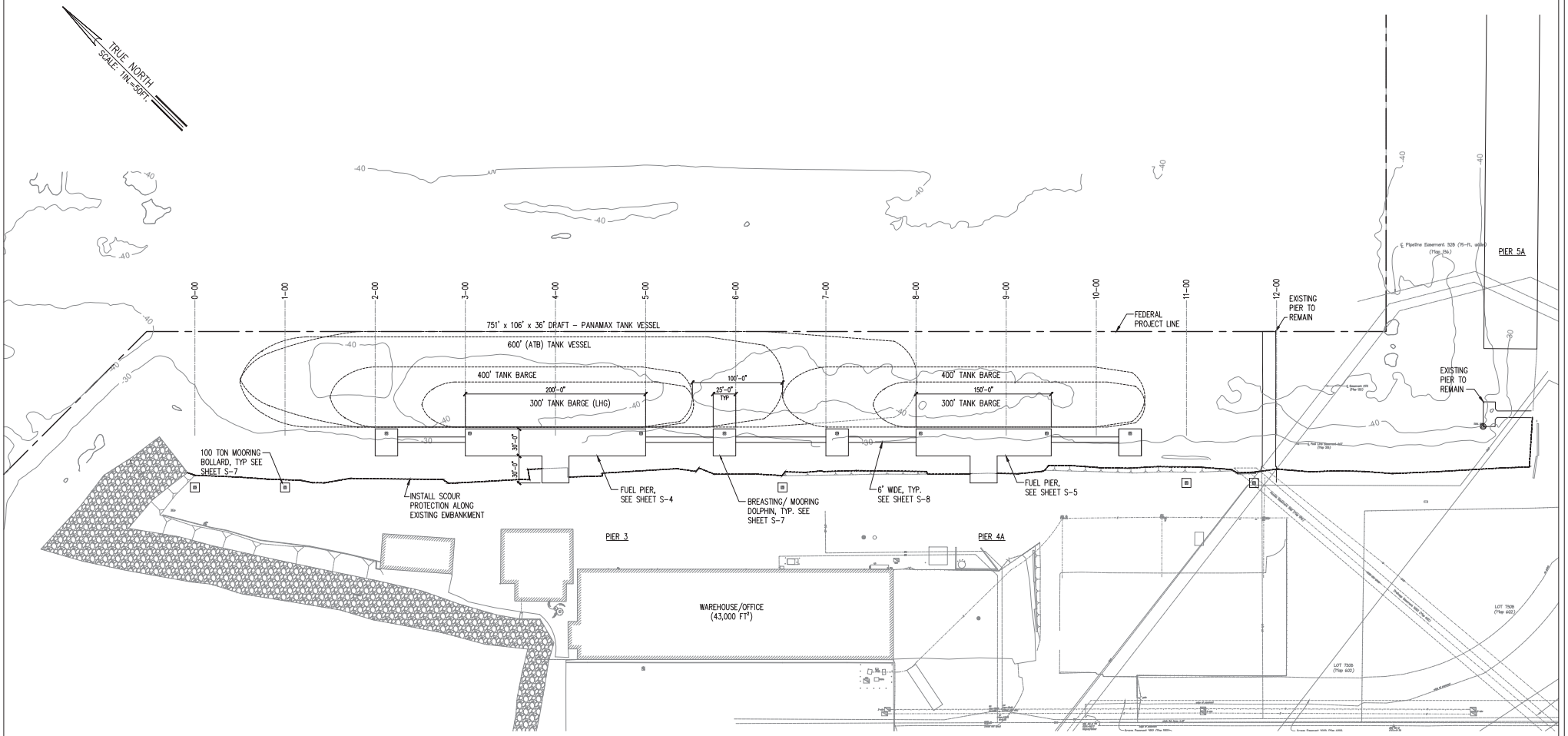

50' 0 50' 100'

SCALE: 1"=50'-0"

PIER LAYOUT PLAN - PHASE 1

SCALE: 1" = 50'

REVISION	DATE	DESCRIPTION	BY	APPROVED

STATE OF HAWAII

DEPARTMENT OF TRANSPORTATION

HARBORS DIVISION

JOB TITLE

KALAELOA BARBERS POINT FUEL PIER
SEGMENTED PARTIAL PIERS
KALAELOA BARBERS POINT HARBOR, OAHU

SHEET TITLE

PIER LAYOUT PLAN – PHASE 1

SUBMITTED BY: _____ SECTION HEAD

RECOMMENDED BY: _____ ENGINEERING PROGRAM MANAGER

DESIGNED BY:	JM
DRAWN BY:	JM
CHECKED BY:	MH
DATE:	2/3/14
SCALE:	AS SHOWN

APPROVED BY: _____ HARBORS ADMINISTRATOR

JOB NUMBER H.C. ---

SHEET S-2

2 OF 9 SHTS.

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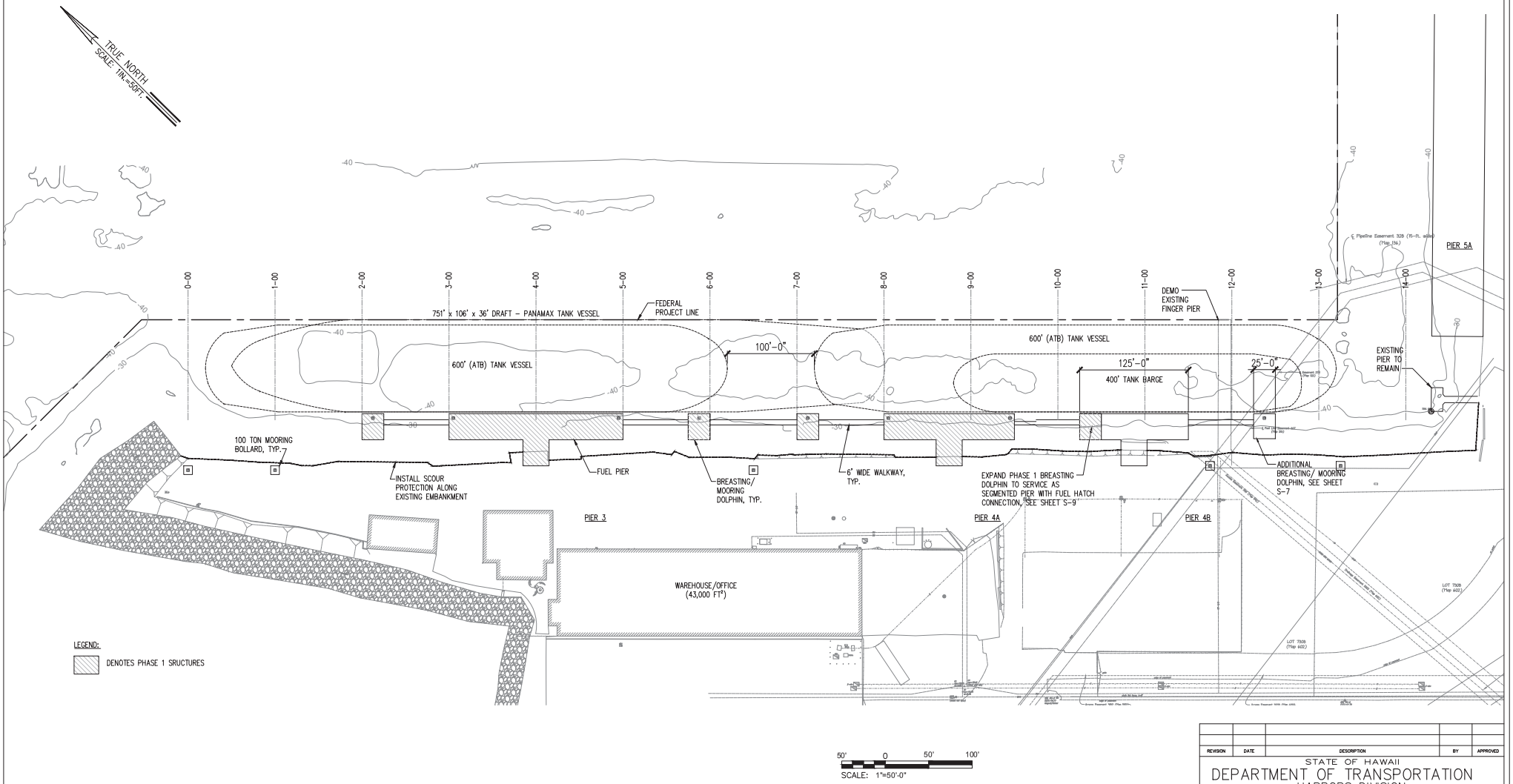

PIER LAYOUT PLAN - PHASE 2

SCALE: 1" = 50'

REVISION	DATE	DESCRIPTION	BY	APPROVED

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HARBORS DIVISION

JOB TITLE
KALAELOA BARBERS POINT FUEL PIER
SEGMENTED PARTIAL PIERS
KALAELOA BARBERS POINT HARBOR, OAHU

SHEET TITLE
PIER LAYOUT PLAN – PHASE 2

SUBMITTED BY: _____ SECTION HEAD
RECOMMENDED BY: _____ ENGINEERING PROGRAM MANAGER

DESIGNED BY:	JM
DRAWN BY:	JM
CHECKED BY:	MH
DATE:	2/3/14
SCALE:	AS SHOWN

APPROVED BY: _____ HARBORS ADMINISTRATOR

JOB NUMBER H.C. ---

SHEET S-3
3 OF 9 SHTS.

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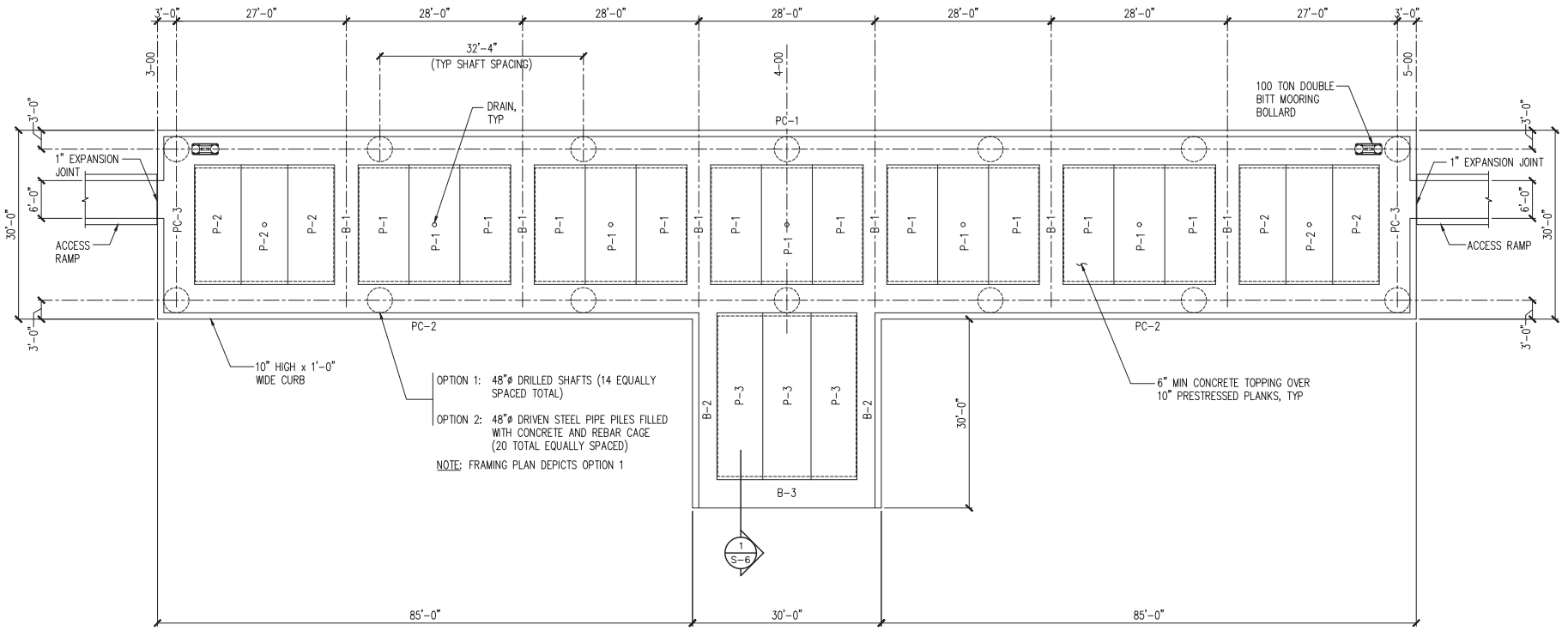

LEGEND:	
PC-1 THRU PC-3	DENOTES PILE CAP TYPE
B-1	DENOTES BEAM TYPE
P-1	DENOTES 8'-1 "WIDE x 10" THICK PRESTRESSED PLANKS
P-2	DENOTES 7'-5" WIDE x 10" THICK PRESTRESSED PLANKS
P-3	DENOTES 7'-5" WIDE x 10" THICK PRESTRESSED PLANKS

1 / S-4 PIER 3 FRAMING PLAN - PHASE 1

SCALE: 1/8" = 1'-0"

REVISION	DATE	DESCRIPTION	BY	APPROVED

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HARBORS DIVISION

JOB TITLE
KALAELOA BARBERS POINT FUEL PIER
SEGMENTED PARTIAL PIERS
KALAELOA BARBERS POINT HARBOR, OAHU

SHEET TITLE
PIER 3 FRAMING PLAN – PHASE 1

SUBMITTED BY: SECTION HEAD
RECOMMENDED BY: ENGINEERING PROGRAM MANAGER

DESIGNED BY:	JM
DRAWN BY:	JM
CHECKED BY:	MH
DATE:	2/3/14
SCALE:	AS SHOWN

APPROVED BY: HARBORS ADMINISTRATOR

JOB NUMBER H.C. ---

SHEET S-4

4 OF 9 SHTS.

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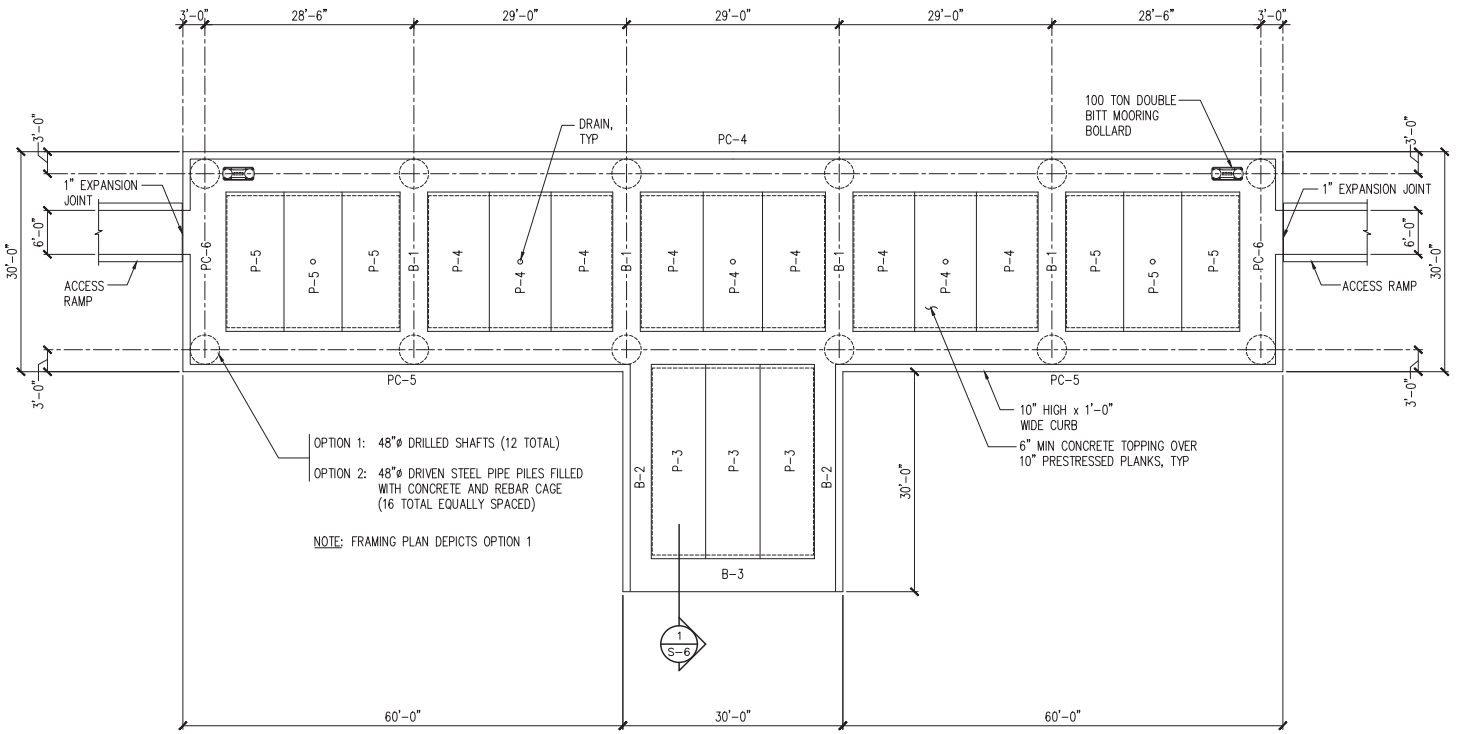

LEGEND:

PC-4 THRU PC-6	DENOTES PILE CAP TYPE
B-1	DENOTES BEAM TYPE
P-4	DENOTES 8'-5" WIDE x 10" THICK PRESTRESSED PLANKS
P-5	DENOTES 7'-11" WIDE x 10" THICK PRESTRESSED PLANKS
P-3	DENOTES 7'-5" WIDE x 10" THICK PRESTRESSED PLANKS

1 / S-5 PIER 4A FRAMING PLAN - PHASE 1

SCALE: 1/8" = 1'-0"

REVISION	DATE	DESCRIPTION	BY	APPROVED

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HARBORS DIVISION

JOB TITLE
KALAELOA BARBERS POINT FUEL PIER
SEGMENTED PARTIAL PIERS
KALAELOA BARBERS POINT HARBOR, OAHU

SHEET TITLE
PIER 4A FRAMING PLAN – PHASE 1

SUBMITTED BY: SECTION HEAD
RECOMMENDED BY: ENGINEERING PROGRAM MANAGER

DESIGNED BY:	JM
DRAWN BY:	JM
CHECKED BY:	MH
DATE:	2/3/14
SCALE:	AS SHOWN

APPROVED BY: HARBORS ADMINISTRATOR

JOB NUMBER H.C. ---

SHEET S-5

5 OF 9 SHTS.

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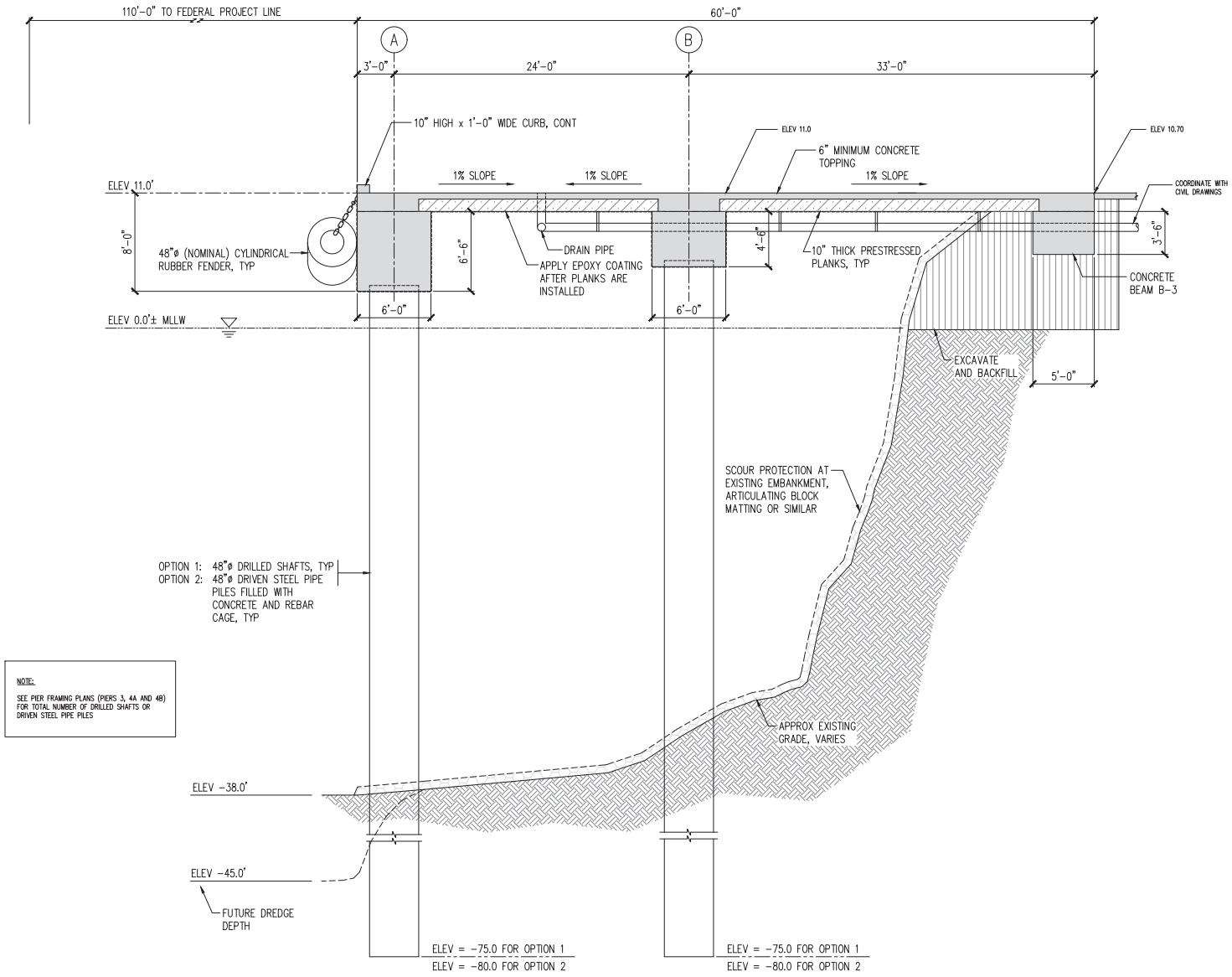

1 / S-6 TYPICAL PIER CROSS-SECTION

SCALE: 1/4" = 1'-0"

REVISION	DATE	DESCRIPTION	BY	APPROVED

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HARBORS DIVISION

JOB TITLE
KALAELOA BARBERS POINT FUEL PIER
SEGMENTED PARTIAL PIERS
KALAELOA BARBERS POINT HARBOR, OAHU

SHEET TITLE
TYPICAL PIER CROSS-SECTION

SUBMITTED BY: _____ SECTION HEAD
RECOMMENDED BY: _____ ENGINEERING PROGRAM MANAGER

DESIGNED BY:	JM
DRAWN BY:	JM
CHECKED BY:	MH
DATE:	2/3/14
SCALE:	AS SHOWN

APPROVED BY: _____ HARBORS ADMINISTRATOR

JOB NUMBER
H.C. ---

SHEET
S-6
6 OF 9 SHTS.

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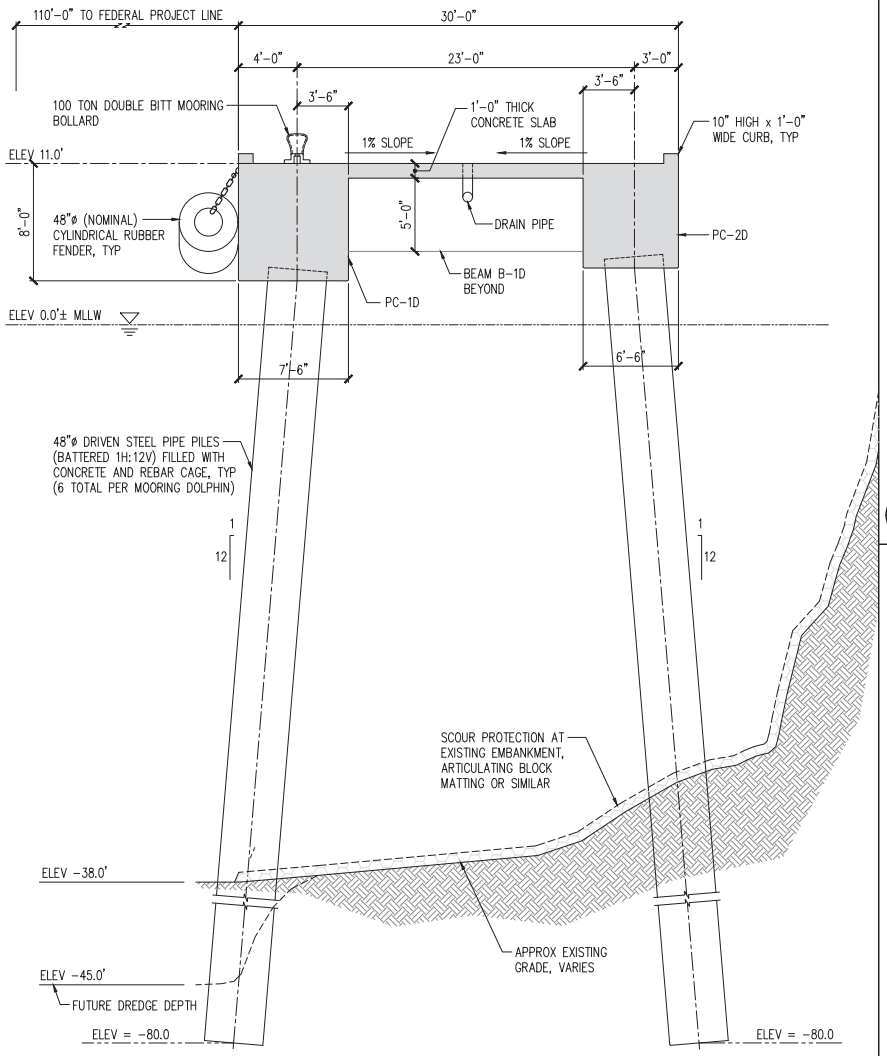
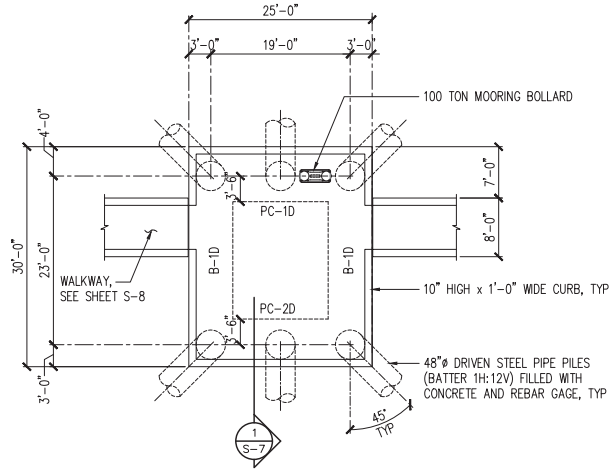


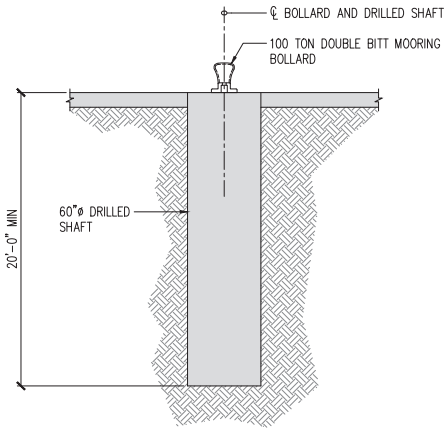
1 S-7 SECTION AT BREASTING/MOORING DOLPHIN

SCALE: 1/4" = 1'-0"



2 S-7 TYPICAL BREASTING/MOORING DOLPHIN FRAMING PLAN

SCALE: 1/8" = 1'-0"



3 S-7 SECTION

SCALE: 1/4" = 1'-0"

REVISION	DATE	DESCRIPTION	BY	APPROVED

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HARBORS DIVISION

JOB TITLE
KALAELOA BARBERS POINT FUEL PIER
SEGMENTED PARTIAL PIERS
KALAELOA BARBERS POINT HARBOR, OAHU

SHEET TITLE
TYPICAL BREASTING/MOORING DOLPHIN FRAMING PLAN AND SECTIONS

SUBMITTED BY: SECTION HEAD
RECOMMENDED BY: ENGINEERING PROGRAM MANAGER

DESIGNED BY:	JM
DRAWN BY:	JM
CHECKED BY:	MH
DATE:	2/3/14
SCALE:	AS SHOWN

APPROVED BY: HARBORS ADMINISTRATOR

JOB NUMBER H.C. ---

SHEET S-7

7 OF 9 SHTS.

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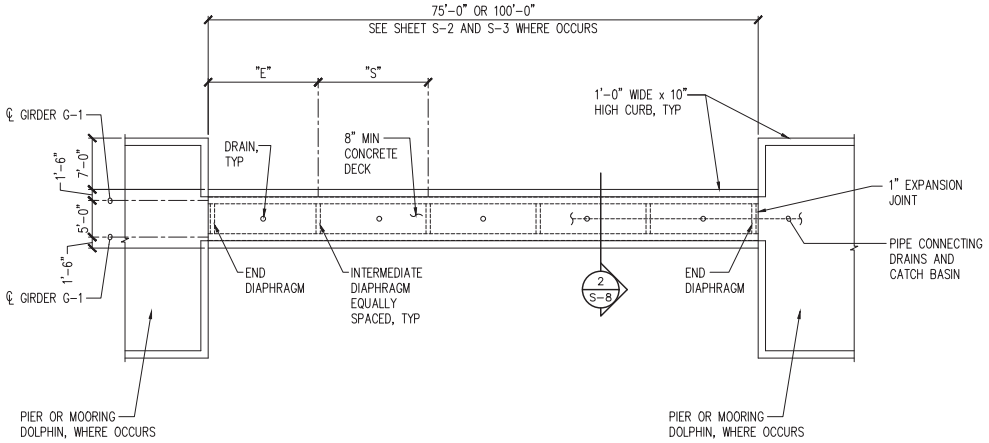
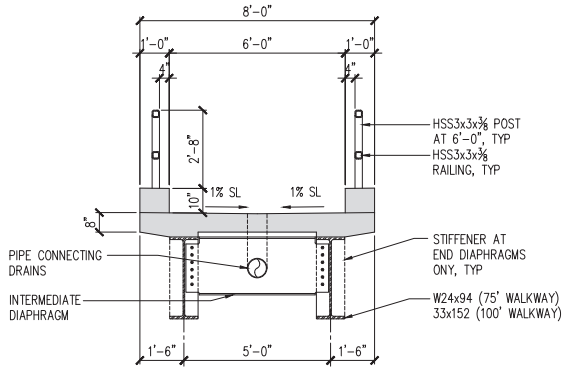


GIRDER AND DIAPHRAGM SCEDULE		
MARK	75'-0" WALKWAY	100'-0" WALKWAY
GIRDER G-1	W24x94	W33x152
END DIAPHRAGM	W18x50	W24x62
INTERMEDIATE DIAPHRAGM	W18x50 (4 TOTAL)	W24x62 (5 TOTAL)
"E"	15'-0"	16'-8"
"S"	15'-0"	16'-8"

1 S-8 WALKWAY FRAMING PLAN
SCALE: 1/8" = 1'-0"



2 S-8 TYPICAL WALKWAY CROSS-SECTION
SCALE: 1/2" = 1'-0"

REVISION	DATE	DESCRIPTION	BY	APPROVED

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HARBORS DIVISION

JOB TITLE
KALAELOA BARBERS POINT FUEL PIER
SEGMENTED PARTIAL PIERS
KALAELOA BARBERS POINT HARBOR, OAHU

SHEET TITLE
WALKWAY FRAMING PLAN AND SECTION

SUBMITTED BY: SECTION HEAD
RECOMMENDED BY: ENGINEERING PROGRAM MANAGER

DESIGNED BY:	JM
DRAWN BY:	JM
CHECKED BY:	MH
DATE:	2/3/14
SCALE:	AS SHOWN

APPROVED BY: HARBORS ADMINISTRATOR
JOB NUMBER H.C. ---
SHEET S-8
8 OF 9 SHTS.

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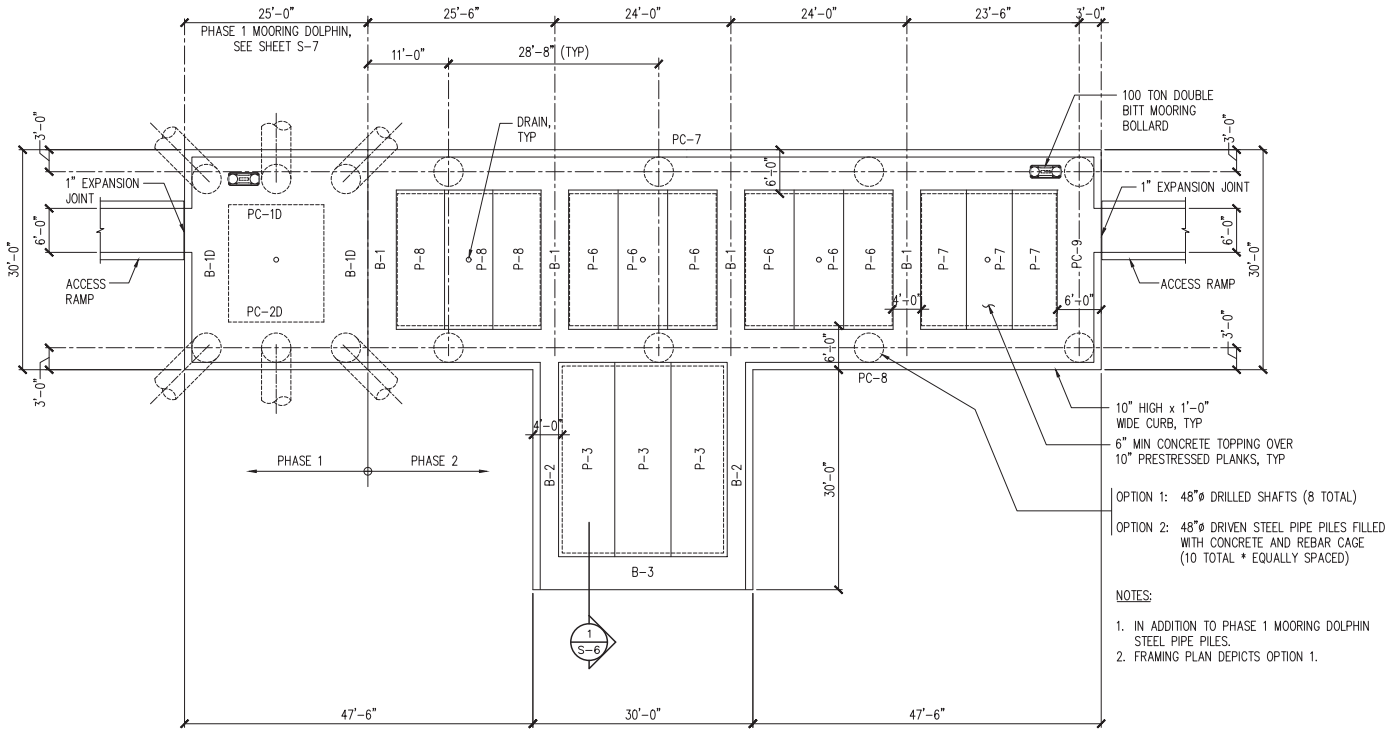

NOTES:

1. IN ADDITION TO PHASE 1 MOORING DOLPHIN STEEL PIPE PILES.
2. FRAMING PLAN DEPICTS OPTION 1.

LEGEND:

PC-7 THRU PC-9	DENOTES PILE CAP TYPE
B-1	DENOTES BEAM TYPE
P-3	DENOTES 7'-5" WIDE x 10" THICK PRESTRESSED PLANKS
P-6	DENOTES 6'-9" WIDE x 10" THICK PRESTRESSED PLANKS
P-7	DENOTES 6'-3" WIDE x 10" THICK PRESTRESSED PLANKS
P-8	DENOTES 6'-7" WIDE x 10" THICK PRESTRESSED PLANKS

1 / S-9 PIER 4B FRAMING PLAN - PHASE 2

SCALE: 1/8" = 1'-0"

REVISION	DATE	DESCRIPTION	BY	APPROVED

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HARBORS DIVISION

JOB TITLE
KALAELOA BARBERS POINT FUEL PIER
SEGMENTED PARTIAL PIERS
KALAELOA BARBERS POINT HARBOR, OAHU

SHEET TITLE
PIER 4B FRAMING PLAN – PHASE 2

SUBMITTED BY: SECTION HEAD
RECOMMENDED BY: ENGINEERING PROGRAM MANAGER
APPROVED BY: HARBORS ADMINISTRATOR

DESIGNED BY:	JM
DRAWN BY:	JM
CHECKED BY:	MH
DATE:	2/3/14
SCALE:	AS SHOWN

JOB NUMBER H.C. ---

SHEET S-9
9 OF 9 SHTS.

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