Environmental Summary Report
Kapolei Harborside Center
Former Hawaiian Western Steel Waste Pile
Malakole Road Parcel North of Chevron Refinery
Kapolei, Hawaii

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005-11083-00

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Exhibit "35"

CONTENTS

TABLES

FIGURES

APPENDICES

EXECUTIVE SUMMARY

Former Hawaiian Western Steel Wastepile

Beginning in 1959, Hawaiian Western Steel (HWS) built and operated a secondary steel mill in the Campbell Industrial Park to convert scrap metal into steel reinforcement bar (rebar). In approximately 1970, HWS began using the Waste Pile area for the disposal of plant-generated waste (e.g. wet scrubber material, mill scale [iron oxide], slag, scrap steel, electrode remnants, and furnace bricks). In 1976, a baghouse was installed at the plant site to collect arc furnace off-gasses and dust, and the baghouse dust was disposed in the Waste Pile area. HWS discontinued disposal operations at the Waste Pile in 1986; plant operations ceased in 1991. A total of approximately 100,800 cubic yards of material had been disposed at the Waste Pile during its operation.

On February 24, 1992, the Environmental Protection Agency (EPA), Region IX issued an Administrative Order on Consent ("the Order") pursuant to Sections 104 and 106 of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA Order Number 92-10) as amended by United States Code Sections 9604 and 9606. The Order required HWS to conduct waste removal at other HWS locations; consolidate the waste at the Waste Pile; grade and compact the waste materials; and install a CERCLA cap over the waste as part of closure of the Waste Pile. In November 1992, construction of a cap over the Waste Pile was initiated. The waste was graded, and a 6- to 8-inch layer of compacted coral fines was placed over the waste. A 30 and 40-mil high-density polyethylene (HDPE) geomembrane liner was then installed, and subsequently covered with a 6- to 9-inch layer of compacted coral fines. Closure activities were completed in January 1993.

LFR Inc. (LFR) implemented a Resource Conservation and Recovery Act (RCRA) facility investigation and closure plan in 1995. The investigation consisted of a geophysical survey, trenching, installation of soil borings and monitoring wells/piezometers, collection and analysis of soil and ground-water samples, and water-table elevation monitoring. The investigation identified waste material beyond the limits of the CERCLA cap at the north and south ends of the west lobe of the Waste Pile and at the southwest end of the east lobe. LFR recommended capping the three additional areas with coral fines and asphalt in conjunction with final closure of the Waste Pile. The final closure was performed in accordance with the revised *RCRA Closure Plan*, and included the following tasks: installing a perimeter drainage pipe; extending the geomembrane liner to the Hanua Street Extension roadway; installing the five remaining layers of the cap; extending the coverage of the cap to include the three additional areas; and disposing of sinkhole soil and construction-derived residuals.

Subsequent to closure and in accordance with the Landfill Administrative Order, a Waste Pile Post-Closure Plan was prepared and submitted to the EPA on January 23, 1996; it describes post-closure activities, including groundwater monitoring. Nine monitoring events were conducted during the closure and post-closure period of

January 1996 through May 1999. Based on the results of nine rounds of groundwater monitoring, LFR concluded that there was no evidence of migration of significant amounts of lead or cadmium from the waste pile into the groundwater. Furthermore, there was no indication of migration from the site of the low levels of total lead detected in the groundwater. LFR recommended that groundwater monitoring at the Waste Pile be discontinued and that the monitoring wells be properly abandoned in accordance with EPA approved procedures. In May 1998, LFR prepared a Certification of Low Potential for Migration of Hazardous Waste. The results of the January and May 1999 sampling events were consistent with the assumptions included in the certification. EPA allowed HWS to suspend groundwater monitoring activities from 1999 to 2005 when EPA approved the termination of groundwater monitoring and authorized the abandonment of the monitoring wells. EPA also approved semi-annual cap inspections as a modification of the inspection requirements detailed in the post-closure requirements of the Initial Decision/Order dated December 3, 1992.

Malakole Street Area North of Chevron Refinery

The area of petroleum affected soil and groundwater adjacent to the Chevron refinery represents the northern fringe of a large plume of phase-separated hydrocarbon (PSH) underlying the storage tank farm and adjacent areas of the refinery. The PSH plume was believed to be caused by tank overfill incidents, pipeline releases, or historical releases of various petroleum products leaking through the sidewall or bottom of the above-ground bulk fuel storage tanks before they were retrofitted with double-walled construction between 1985 and 2005.

In 1996 Chevron conducted an investigation of the area north of Malakole road to define the boundary of the PSH plume and collect information required to design a remediation system for the portion of the plume that was not on Chevron property. An active skimming remediation system consisting of three trenches containing horizontal slotted collection pipes which sloped to sumps outfitted with hydrophobic density skimmer pumps was installed and operated until the yield of PSH declined to levels that indicated skimming was no longer effective. The remediation effort was conducted with oversight from the EPA Region 9, and the DOH, and resulted in the recovery of approximately 6,500 gallons of PSH and groundwater.

A December 2005 soil and groundwater investigation indicated that no remaining PSH was found at the site and remaining concentrations is soil and groundwater had dropped below the current DOH environmental action levels (EALs).The only exception to the decreasing chemical concentrations was observed in soil boring/well F2-OBLO20A in an area where there was previously 0.2 to 0.4 feet of PSH. TPHg concentrations in the soil and groundwater samples from this location were above the DOH EALs.

Overall, the results indicate that the active remediation skimming system was quite successful in reducing the amount of PSH in the soil and in reducing the source of dissolved petroleum compounds in the groundwater. The results also indicate that natural bioattenuation is occurring at the site and the remaining affected soil and dissolved plume are stable and slowly receding.

1.0 INTRODUCTION

Kapolei Property Development, LLC (KPD) retained Group 70 International to prepare a draft Environmental Impact Statement (EIS) as part of a petition for a State Land Use Boundary Amendment from Agricultural to Urban District and a subsequent County Change of Zone request. As part of the EIS process, LFR was asked to prepare a summary of the environmental condition of two parcels within the project area which are impacted by petroleum hydrocarbons or hazardous waste (the Site).

1.1 Objectives and Scope of Work

The objective of the Environmental Summary Report is to provide a concise evaluation of the nature and extent of the impacted areas, the history of releases which affected the soil and groundwater, the actions which were taken to contain and remediate the areas, the present condition of the sites, the status of regulatory agency decisions and involvement, and the nature of potential environmental or exposure risks, if any.

The two sites which were evaluated are the former Hawaiian Western Steel (HWS) Waste Pile located on the Hanua Street extension north of Malakole Road, and the land on the north side of Malakole Road immediately adjacent to the Chevron Refinery.

2.0 REVIEW OF BACKGROUND INFORMATION

Relevant background information pertaining to the physical setting of the Site and surrounding properties was obtained from readily available records. This information includes local topography, a description of the local soil and geologic characteristics, a description of groundwater at the Site, and land use.

2.1 Site Description

The former (HWS) Waste Pile located on Hanua Street extension north of Malakole Road, and the land on the north side of Malakole Road immediately adjacent to the Chevron Refinery are shown in Figure 1.

The HWS waste pile is located on an approximately 6.5 acre parcel of land within the Campbell Industrial Park, Kapolei, Oahu, Hawaii (Figure 2). The waste pile is associated with the Former Hawaiian Western Steel facility and is located one mile north of the HWS plant site (91-150 Hanua Street), just north of Malokole Road. The Waste Pile is bounded by the remnants of a large coral pile to the west and a wholesale nursery to the east. Hanua Street Extension, providing access to the Grace Pacific rock quarry to the north, bisects the Waste Pile. Historical information related to waste disposal activities at the waste pile and previous environmental investigations is presented below in Section 3.0.

The area located on the north side of Malakole Road, adjacent to the Chevron Refinery, occupies approximately 25 acres within TMK Parcel 9-1-014:033 (Figure 3). TMK Parcel 9-1-014:033 is owned by the Estate of James Campbell (Campbell Estate) and encompasses an area of approximately 137 acres. The parcel is leased by Grace Pacific for use as a sand and gravel storage area, and by Hawaiian Earth Products, Ltd. for use as a green waste composting facility. A pipeline corridor is also located along the Malakole side of the parcel with pipelines owned and operated by Tesoro, Chevron, and Hawaiian Electric Company (HECO) (D&M 1997a). Historical information related to previous releases and environmental investigations conducted in the area north of Malakole Road is presented below in Section 4.0.

2.2 Geology

Regional

The island of Oahu is the weathered and eroded remnant of two major coalescing shield volcanoes, the Waianae and Koolau. Extrusive igneous rocks (lava flows) are in contact with karstic coralline limestone formations in the vicinity of Campbell Industrial Park. These carbonate formations are a result of marine sedimentation and precipitation with subsequent partial dissolution. The Site is located south of the Waianae Range on the southwestern Ewa coastal plain of Oahu. The Ewa coastal plain is situated on an extensive formation of interbedded carbonate and terrigenous sediments with a thick vertical component that is referred to as a "caprock". The geologic substrate underlying the Site is comprised of relatively homogeneous coral deposits. There are no known structural discontinuities (i.e., faults) in this area. Because there has not been any recent tectonic activity, dipping or folding of the deposits has not occurred.

Local

Based on a review of the United States Geological Survey (USGS) Ewa, Hawaii 7.5-minute quadrangle map (USGS, 1983), the regional topography is relatively flat, but sloping gently toward the Pacific Ocean located to the south and west of the Site. Ground surface elevations at the Site range from approximately 6 to 15 feet above mean sea level (msl).

The soil in the vicinity of the Site has been classified by the U.S. Department of Agriculture, Soil Conservation Service (USDA) as "coral outcrop." The material consists of coral or cemented calcareous sand. This material is composed primarily of calcium carbonate. The coral outcrop is highly permeable with hydraulic conductivities reportedly ranging between 2,000 and 10,000 feet per day (HLA, 1989). The USDA indicates that a thin layer of friable, red soil material formed as alluvium (Mamala Series) occurs in cracks, crevices, and depressions within the coral.

2.3 Hydrogeology

The Site is located on the seaward-side (makai) of the Underground Injection Control (UIC) line established by the DOH, Safe Drinking Water Branch. The UIC line is located approximately 0.5 mile north and inland from the Site. Therefore, the Site is assumed to immediately overlie groundwater that is not a source or potential source of drinking water.

Data presented in Aquifer Identification and Classification for Oahu: Groundwater Protection Strategy for Hawaii (Mink and Lau 1990) indicates groundwater within the Site vicinity occurs within the Ewa Aquifer System of the Pearl Harbor Aquifer Sector in an upper and lower aquifer. The uppermost aquifer is unconfined and comprised of caprock sediments that flank the Waianae basalt. The regional groundwater has a moderate salinity (1,000 to 5,000 milligrams/liter [mg/l] chlorides), is currently in use and is replaceable with a high vulnerability to contamination.

The underlying aquifer is classified as a basal flank, confined aquifer with low salinity water (250 to 1,000 mg/l chlorides) and is currently in use. The deep aquifer is neither ecologically important, nor used for drinking water purposes and is irreplaceable with a high vulnerability to contamination.

Nearby Drinking Water Wells

The well information presented below has been obtained from Sheet O-6 (Ewa Quadrangle) of the Underground Injection Control (UIC) Program Map Series of the State of Hawaii Department of Land and Natural Resources (DLNR). These data indicate the following:

The nearest drinking water supply well (DLNR well number 3-2004-05) is located approximately 2.2 miles northeast and hydraulically up gradient of the Site.

Nearest Surface Water Bodies

The nearest natural surface water body is the Pacific Ocean, located 0.37 miles west-southwest of the lot to the north of Malakole Street and 0.8 miles west-southwest of the HWS waste pile. Consequently, groundwater flow beneath the Site is most likely west-southwest towards the ocean. Due to the Site's proximity to the ocean, the water table beneath the Site is tidally influenced.

There are no lakes, rivers, or creeks within a one-mile radius of the Site, except for manmade drainage channels (Drains B and C) which receive stormwater runoff from the Industrial Park. Drain B is located approximately 0.75 mile south of the Site and Drain C is approximately 0.5 mile southeast of the Site.

Annual Rainfall

The average annual rainfall in the Site vicinity is approximately 24 inches.

3.0 FORMER HAWAIIAN WESTERN STEEL WASTE PILE

A summary of available historical information related to waste disposal activities at the waste pile and previous environmental investigations is presented below.

3.1 History of Hazardous Waste Disposal Activities

This section summarizes Hawaiian Western Steel (HWS) operations that led to the disposal of hazardous wastes at the Waste Pile Site. Volumes of hazardous wastes present at the Waste Pile are also discussed.

3.1.1 Hawaiian Western Steel Operations

Beginning in 1959, HWS built and operated a secondary steel mill in the Campbell Industrial Park to convert scrap metal into steel reinforcement bar (rebar); the property was previously undeveloped. Prior to demolition in 1995, structures at the HWS Plant Site consisted of a Furnace Melt Shop which included an electric arc furnace (EAF) and its associated baghouse; a Rolling Mill; a maintenance building; and a one-story office building. The EAF was first used in the Melt Shop in 1960. From 1974 until the baghouse went on-line, a wet scrubber system was used to collect furnace dust. In 1976, a baghouse system was installed for collection of furnace dust, and was in-service until 1991, at which time HWS ceased operations.

In approximately 1970, HWS began using the Waste Pile area for the disposal of plant-generated waste (e.g. wet scrubber material, mill scale [iron oxide], slag, scrap steel, electrode remnants, and furnace bricks). HWS discontinued disposal operations at the Waste Pile in 1986.

3.1.2 Waste Pile Landfill Inventory

The waste pile area is a monofill; it does not contain any containerized wastes. The western portion of the waste pile was estimated to span approximately 3.2 acres at an average depth of 10.6 feet prior to initiation of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) remedial activities (HLA 1989). This represented a volume of approximately 55,240 cubic yards of waste. Upon completion of CERCLA remedial activities by REMCOR at the HWS Plant Site, an additional 26,570 cubic yards of waste were added to the west portion of the waste pile. An estimated volume of 3,750 cubic yards of waste is also estimated to be present beneath the Hanua Street extension. The eastern portion of the waste pile spans 1.1 acres at an average depth of 9 feet, which represents approximately 15,250 cubic yards. The total volume waste material buried at the waste pile is thus estimated to be 100,800 cubic yards.

3.2 Investigation and Remediation Activities

Investigative activities have been conducted at the site under CERCLA and the Resource Conservation and Recovery Act (RCRA). A summary of investigations and remedial activities are listed below:

3.2.1 Preliminary Ground-Water Quality Assessment, Hawaiian Western Steel Waste Pile. June 16, 1989

Three ground water monitoring wells were installed within the waste pile area by Harding Lawson and Associates during a 1989 water quality investigation (HLA, 1989). Analysis of water samples indicated that cadmium was not present above detection levels of 0.001 mg/l. Lead was detected in one of the three samples at a concentration of 0.009 mg/l and below detection levels of 0.001 in the other two samples. The wells were subsequently abandoned during activities pursuant to the 1992 CERCLA order (Section 3.2.2).

3.2.2 EPA Administrative Order on Consent, Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) Order Number 92-10. February 24, 1992

On February 24, 1992, the Environmental Protection Agency (EPA), Region IX issued an Administrative Order on Consent ("the Order") pursuant to Sections 104 and 106 of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA Order Number 92-10) as amended by United States Code Sections 9604 and 9606. The Order required HWS to conduct waste removal at other HWS locations; consolidate the waste at the Waste Pile; grade and compact the waste materials; and install a CERCLA cap over the waste as part of closure of the Waste Pile.

3.2.3 Expanded Work Plan, Hawaiian Western Steel Limited, Ewa Beach, Oahu, Hawaii. March 18, 1992

Beginning in April 1992, HWS conducted investigation and cleanup activities at the plant site and other HWS locations. HWS' cleanup activities included removal of approximately 26,570 cubic yards (cy) of baghouse dust, slag, mill scale, and chemically-impacted soil and sediment for disposal at the Waste Pile. Including this material, a total of approximately 100,800 cy of material had been disposed at the Waste Pile during its operation (Remcor August 6, 1993). In accordance with Paragraph 29 of the Order, the waste was subsequently segregated, consolidated, and compacted in preparation for the installation of the CERCLA cap.

In November 1992, construction of a cap over the Waste Pile was initiated. The waste was graded, and a 6- to 8-inch layer of compacted coral fines was placed over the waste. A 30 and 40-mil high-density polyethylene (HDPE) geomembrane liner was then installed followed by an 6- to 9-inch layer of compacted coral fines; Later during

RCRA closure activities in 1995 five additional capping layers were added. RCRA closure activities were completed in November 1995 (See section 3.2.5).

3.2.4 Resource Conservation and Recovery Act (RCRA) Facility Investigation

LFR implemented an RCRA facility investigation in 1995. The investigation consisted of a geophysical survey, trenching, installation of soil borings and monitoring wells/piezometers, collection and analysis of soil and ground-water samples, and water-table elevation monitoring. The investigation identified waste material beyond the limits of the CERCLA cap at the north and south ends of the west lobe of the Waste Pile and at the southwest end of the east lobe. The investigation findings were reported in Levine•Fricke's *Phase I - Sampling and Analysis Report* (LFR, 1995).

3.2.5 RCRA Closure Plan Implementation

LFR recommended capping the three additional areas with coral fines and asphalt in conjunction with final closure of the Waste Pile. The final construction of the RCRA cap over the Waste Pile was performed in accordance with the revised *RCRA Closure Plan* (LFR, 1994b) by LFR between July and October 1995. The five remaining layers of the cap were installed, including, from bottom to top: a polypropylene non-woven geotextile; a 6-inch layer of coral base material; asphalt prime coat; a 2.5 to 3.0-inch layer of asphaltic concrete; and asphalt seal coat. In conjunction with completion of the cap, a perimeter drainage pipe was installed, the HDPE geomembrane liner was extended to the Hanua Street Extension roadway, and the coverage of the cap was increased. LFR also directed the disposal of sinkhole soil and construction-derived residuals.

Closure activities were summarized in the *Waste Pile Closure Certification Report* (LFR, 1996a).

3.2.6 Ground Water Monitoring Program

Based on the results of nine rounds of groundwater monitoring between October 1995 and May 1999, LFR concluded that there was no evidence of migration of significant amounts of lead or cadmium from the waste pile into the groundwater. Furthermore, there was no indication of migration from the site of the low levels of total lead detected in the groundwater. LFR recommended that groundwater monitoring at the Waste Pile be discontinued and that the monitoring wells be properly abandoned in accordance with Environmental Protection Agency (EPA) approved procedures. In May 1998, LFR prepared a Certification of Low Potential for Migration of Hazardous Waste. The results of the January and May 1999 sampling events were consistent with the assumptions included in the certification. EPA allowed HWS to suspend groundwater monitoring activities from 1999 to 2005 when EPA approved the termination of groundwater monitoring and authorized the abandonment of the monitoring wells.

3.2.7 *Post Closure Cap Inspections and Maintenance*

Inspections were conducted on a quarterly basis from 1996 to 1998, have been conducted on a semi annual basis since 1998, and will continue for the remainder of the 30 year post closure period. An inspection form is completed at the time of the inspection and a brief inspection report to file is written following inspection and completion of any required maintenance and repairs.

Periodic maintenance was planned and budgeted for as part of the post-closure plan for the waste pile facility. The asphalt cap is scheduled to be re-sealed in years 5, 10, 15, 20, 25 and 30 although the actual frequency is based on the results of the periodic inspections. Two major repair events, requiring the replacement of the asphalt seal coat over significant portions of the cap were also anticipated and will be preformed as-needed based on the periodic inspections.

3.3 Current Regulatory Status of the Site

The facility is currently in its tenth year of post closure- care of a thirty year period required by the RCRA program. An application for a RCRA Post Closure Permit has been prepared and will be submitted to the Hawaii Department of Health in 2006.

3.4 Current Conditions

The waste material is encapsulated in a 2 to 3 foot thick engineered containment, consisting of compacted coral, a geomembrane, a geotextile and a 2.5 to 3.0 inch asphaltic concrete cap. The portion of the waste pile that is transected by Hanua Street Extension is lined with concrete bollards to prevent vehicular entrance to the site. The facility is inspected on a semi-annual basis and repairs are made as needed.

4.0 MALAKOLE STREET SITE ADJACENT TO CHEVRON REFINERY

The area of petroleum affected soil and groundwater adjacent to the Chevron refinery represents the northern fringe of a large plume of phase-separated hydrocarbon (PSH) underlying the storage tank farm and adjacent areas of the refinery. The PSH plume was believed to be caused by historical releases of various petroleum products from tank overfill incidents and from product leaking through the shell or bottom of the above-ground bulk fuel storage tanks. Releases from pipelines represented a third potential source of the product present in the soil and groundwater at the site (Wagner, 1997a).

4.1 Previous Site Investigations

In the mid 1990s, Chevron conducted an investigation of the area north of Malakole road and designed a remediation system for the portion of the plume that was not on

Chevron property. The following is a summary of the most significant environmental investigations previously conducted at the Site.

4.1.1 August 1996 Chevron Site Assessment

Between August and October 1996 Chevron conducted an investigation of the area north of Malakole road to define the boundary of the PSH plume and collect information required to conduct a risk assessment (Dames and Moore, 1997a). Chevron installed 26 soil borings to depths ranging from 14 to 27 feet below ground surface (bgs), and converted five of the borings into permanent groundwater monitoring wells. Chevron collected soil samples from each boring near the surface and at the interval in the vadose zone immediately above the water table. Chevron analyzed the samples for benzene, toluene, ethylbenzene, and total xylenes (BTEX) and polynuclear aromatic hydrocarbons (PAHs). Chevron also measured the thickness of the PSH in the wells and borings, and collected groundwater samples from the monitoring wells.

PSH was measured in seven of the 26 temporary monitoring wells/piezometers at apparent thicknesses ranging from 0.25 feet to 0.77 feet (3 to 9 inches). The extent of the PSH plume was estimated to be less than 450 feet north of Malakole road and covered a maximum of 1,600 feet in the east/west direction along Malakole road (Figure 3). Dissolved levels of BTEX compounds and PAHs in soil and groundwater were present at levels above the DOH action levels in areas where the PSH plume was present. Outside the plume boundary, the soil and groundwater concentrations were below the action levels. Groundwater in the vicinity was found to flow from the east to the west. Additional chemical data collected during the investigation indicated that conditions were favorable for natural biological processes to degrade and consume the hydrocarbons in areas outside the PSH plume resulting in decreasing extent and concentrations over time.

4.1.2 Chevron 1997 Refined Conceptual Site Model, Technical Memorandum, and Tier II Risk Evaluation

Following the 1996 investigation of areas outside the boundaries of the Chevron refinery, Chevron recognized that the soil and groundwater underlying property that was not owned by Chevron was impacted by significant levels of chemicals of potential concern (COPCs) and light nonaqueous phase liquid (LNAPL). In conjunction with the off-site investigation of the area north of Malakole road, Chevron conducted the initial phases of an ecological and human-health risk assessment (Dames & Moore 1997b). The "conceptual site model" identified the potential sources of soil and groundwater contamination as the LNAPL plume from the refinery, the petroleum pipelines located on the northern side of Malakole road, dredge spoils that were deposited on the site during the construction of the Barbers Point deep draft harbor, and run-off from the roadway. COPCs that were identified in the soil and groundwater included benzene, chrysene (a PAH), and arsenic. COPCs in the LNAPL included BTEX, six PAHs, and four heavy metals including arsenic.

The conceptual site model also identified potential pathways and exposure routes that contaminants might follow that could lead to receptors. The potential ecological receptors identified were birds and mammals (the mongoose), while potential human receptors included trespassers, construction workers, outdoor workers, and future indoor workers (in buildings that might be built on the site in the future). The technical memorandum identified construction workers and future indoor workers as receptors that could be exposed to chemicals through complete exposure pathways, and recommended that a Tier II risk assessment be completed.

Additional air sampling was conducted adjacent to three off-site locations including sampling locations on the south side of Malakole road immediately opposite the Campbell Estate property. In June 1997 Chevron submitted the Tier II Risk Evaluation (Dames & Moore 1997c) to the DOH and U.S. EPA. The risk assessment report concluded that there were no significant completed exposure pathways from the off-refinery plume that would result in ecological risk. The risk assessment also concluded that potential construction worker exposure could be adequately addressed using "institutional controls" (in this case a health and safety plan for the construction activities and personal protective equipment.) Finally, the risk assessment concluded that indoor air vapor inhalation by future indoor workers in a commercial building at the site would not pose an unacceptable health risk. The excess risk posed by the carcinogenic chemical benzene was $1 X 10^{-7}$ while the excess risk range that EPA uses to set clean-up levels for sites requiring remediation is between $1 X 10^{-4}$ to $1 X 10^{-6}$. The Hazard Index for non-cancer causing chemicals calculated for the site was 0.02 compared with the EPA benchmark of 1.0 for sites requiring clean-up.

While Chevron argued that on the basis of the risk assessment no off-site remediation was required, negotiations with DOH, EPA, and the Campbell Estate resulted in Chevron agreeing to install and operate an active skimming remediation system at the Site.

4.1.3 Chevron 1997 Product Recovery System Design and Implementation

An active skimming remediation system consisting of three trenches containing approximately 950 linear feet of horizontal slotted collection pipe was installed in the area north of Malakole Road in the autumn of 1997, began PSH recovery on January 27, 1998 and was officially shut down on May 8, 2000. PSH that drained by gravity into the horizontal collection pipe flowed into six sumps outfitted with hydrophobic density skimmer pumps and was pumped into a 10,000 gallon storage tank located within a high-density polyethylene (HDPE) lined earthen containment enclosure (Dames & Moore 1997d).

The remediation system was expected to operate for a period of three to five years and was to be shut down when the product recovery rate dropped below levels that could be economically justified. The terms of operation of the system were specified in an Access Agreement between Campbell Estate and Chevron (Agreement No. A01086200, dated October 30, 1997) which granted Chevron access to the site for four years and eleven months from the date of system start-up, and specified that the system could be shut down (1) when the LNAPL recovery rate decreased to 10% of the initial recovery rate, or (2) by July 1, 2002.

Chevron's agreement with DOH and the EPA specified four criteria for shut-down of the remediation system: (1) recovery rates less than 10% of the initial recovery rate; (2) recovery rates of less than 200 gallons per trench per week; (3) an elapsed time of four years and 11 months; or, (4) less than 0.04 feet of product (PSH) in the recovery sumps or wells at low tide.

4.1.4 Chevron Product Recovery System Remediation Results

The results of the operation of the remediation system are summarized in an "Operation and Maintenance Review" letter report prepared for Chevron in December 2000 (URS, 2000). Data in the letter report indicates that the system operated for a total of 707 days between January 27, 1998 and May 8, 2000 and recovered a total of 6,494 gallons of "product". (The report did not specify what portion of the product was petroleum and what portion, if any, was water.) During that period, the recovery system was operational for 669 days and experienced 38 days of downtime (94.6% uptime).

As expected, product recovery began at a high rate and quickly tapered off to minimal rates. During the first full month of operation in February 1998 the system recovered 2,609 gallons of product; in March 1998 an additional 1163 gallons of product was recovered, while monthly recovery rates for the remainder of 1998 ranged from 0 to 626 gallons per month. The average recovery rate for the first half of 1998 was 853 gallons per month and had declined to less than 10% of the initial rate by the end of 1999: (99 gallons per month for 2nd half of 1998; 116 gallons per month for 1st half 1999; and, 6 gallons per month for 2nd half of 1999.) Between November 1999 and May 2000, no product was recovered from the skimming system. Product recovery data is summarized in Appendix A.

At the time that the skimming system was shut-down in May 2000, several of the shut-down performance criteria had been achieved: the final recovery rate (6 gallons per month) was less than 10% of the initial recovery rate; and, the rate was far below 200 gallons per week. URS recommended permanent shut-down and removal of the recovery system in their December 2000 report. URS was not certain how the remediation system was decommissioned. However, during an investigation conducted in December 2005, URS observed that the above-ground storage tank, the containment system and the above-ground piping had been removed, some areas of the site had been graded, and there were no remnants of many of the original monitoring wells. The access agreement with Campbell Estate called for the sumps to be cut-off two feet below the ground surface and filled with rock or grout, but it is not certain that this requirement was fulfilled. LFR has assumed that the sumps and the horizontal collection pipes were left in the ground on-site.

4.2 Source Control Actions and Remediation Results

Chevron retrofitted two thirds of the 65 above-ground storage tanks (ASTs) at the Oahu refinery with double-walled construction between 1985 and 1995. The remaining ASTs were scheduled to be retrofitted between 1995 and 2005 (Wagner, 1997a). Chevron also installed ultrasonic level indicators and improved operating procedures to prevent tank overfills. Chevron reported having conducted inspections of 95% of the above-ground and below-ground product piping at the refinery in a 1996 Sitewide Assessment Status Report to the U.S. EPA.

Product skimmer pumps installed in sumps located inside the Chevron Refinery recovered between 8,000 to 36,000 gallons per month of total fluids between October 1995 and April 1996. Approximately 80% to 90% of the total fluids were PSH consisting of weathered crude oil, diesel, and gasoline.

4.3 Current Conditions and Status of the Site

In December 2005 Chevron installed soil borings and temporary monitoring wells near 13 of the locations where wells and borings had been installed in 1996 (Figure 3). Chevron collected soil and groundwater samples from each of the soil borings/monitoring wells, measured the thickness of PSH in the new wells, and analyzed the samples for total petroleum hydrocarbons as gasoline (TPHg), total petroleum hydrocarbons as diesel (TPHd), BTEX, and PAHs (URS, 2006a). The results of the 2005 sampling indicate that the concentrations of BTEX and PAHs have decreased significantly in most of the areas that were sampled with the sampling locations around the former remediation system showing the greatest change. No measurable thickness of PSH was detected in any of the wells.

The only exception to the decreasing chemical concentrations was observed in soil boring/well F2-OBLO20A which is located 110 feet upgradient from most upgradient (northeasterly) former recovery trench in an area where there was previously 0.2 to 0.4 feet of PSH. The ethylbenzene and naphthalene concentrations measured in the soil samples from this location increased from 8.4 to 11.6 milligrams per kilogram (mg/kg) for ethylbenzene and from < 0.4 mg/kg to 5.06 mg/kg for naphthalene. TPHg concentrations in this soil sample were above the current DOH environmental action levels (EALs). The measured concentrations of TPHg in the groundwater sample from this location also exceeded the EALs. This result is not unexpected, but indicates the persistence of hydrocarbon compounds in areas where LNAPL was most recently present. Analytical results from the December 2005 sampling are summarized in Table 1 and Table 2. Full analytical results are presented in Appendix B.

Overall, the results indicate that the active remediation skimming system was quite successful in reducing the amount of LNAPL in the soil and in reducing the source of dissolved petroleum compounds in the groundwater. The results also indicate that natural bioattenuation is occurring at the site and the area of impacted soil and the dissolved plume are stable and slowly receding.

5.0 CONCLUSIONS AND RECOMMENDATIONS

The former HWS waste pile and the area north of Malakole Street adjacent to the Chevron refinery are both areas where past releases of hazardous chemicals were addressed through a combination of institutional controls, containment, and remediation. In both areas residual chemical concentrations require that the institutional controls and containment systems be maintained. At the former HWS waste pile, the integrity of the engineered containment system must be maintained through the post-closure period and the deed restrictions controlling access and excavation must be maintained in perpetuity.

Remaining elevated petroleum hydrocarbon concentrations in a limited portion of the area north of Malakole road will also require some on-going institutional controls. Specifically, future subsurface utility work or building construction which includes excavation to depths greater than four (4) feet in the vicinity of boring/well F2-OBLO20A will require the following precautions. First, construction workers at the site must have hazardous materials training (HAZWOPER) as required by 40 CFR 1910.120, and must prepare a health and safety plan prior to conducting any work at the site. Any soil that is excavated from depths greater than four feet will have to be sampled and characterized for proper re-use on site or off-site disposal. Finally, any groundwater that is pumped during de-watering activities must be treated before it is disposed on-site or off-site to avoid worker exposure or regulatory violations.

LIMITATIONS

The opinions and recommendations presented in this report are based upon the scope of services, information obtained through the performance of the services, and the schedule as agreed upon by LFR and the party for whom this report was originally prepared. This report is an instrument of professional service and was prepared in accordance with the generally accepted standards and level of skill and care under similar conditions and circumstances established by the environmental consulting industry. No representation, warranty, or guarantee, express or implied, is intended or given. To the extent that LFR relied upon any information prepared by other parties not under contract to LFR, LFR makes no representation as to the accuracy or completeness of such information. This report is expressly for the sole and exclusive use of the party for whom this report was originally prepared for a particular purpose. Only the party for whom this report was originally prepared and/or other specifically named parties have the right to make use of and rely upon this report. Reuse of this report or any portion thereof for other than its intended purpose, or if modified, or if used by third parties, shall be at the user's sole risk.

Results of any investigations or testing and any findings presented in this report apply solely to conditions existing at the time when LFR's investigative work was performed. It must be recognized that any such investigative or testing activities are inherently limited and do not represent a conclusive or complete characterization. Conditions in other parts of the project site may vary from those at the locations where data were collected. LFR's ability to interpret investigation results is related to the availability of the data and the extent of the investigation activities. As such, 100% confidence in environmental investigation conclusions cannot reasonably be achieved.

LFR, therefore, does not provide any guarantees, certifications, or warranties regarding any conclusions regarding environmental contamination of any such property. Furthermore, nothing contained in this document shall relieve any other party of its responsibility to abide by contract documents and applicable laws, codes, regulations, or standards.

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TABLES

TABLE 1
Soil Analytical Results
Area North of Malakole Street

Sample Number	Date Sampled	TPHg[1]	TPHd[2]	VOCs[3]				SVOCs[5]	
				Benzene	Toluene	Ethylbenzene	Total Xylenes[4]		
E2-OBL002A-6.5-7.0	12/19/2005	10.4	1490	nd<0.00994[6]	nd<0.00994	nd<0.00994	nd<0.01988	Acenaphthene Anthracene Benzo(a)anthracene Benzo(a)pyrene Chrysene Fluoranthene Fluorene Naphthalene Phenanthrene Pyrene	0.563 1.74 0.125 0.0768 0.230 0.0704 0.841 2.67 1.56 0.31
E2-OBL011A-6.5-8.0	12/16/2005	342	52.1	nd<0.1	nd<0.1	nd<0.1	0.4771	Acenaphthene Anthracene Chrysene Fluorene Naphthalene Phenanthrene	0.0389 0.0994 0.0114 0.0581 0.474 0.0892
E2-OWL012A-8.5-10.0	12/16/2005	nd<100	172	nd<0.492	nd<0.492	nd<0.492	nd<0.984	Acenaphthene Anthracene Chrysene Naphthalene Phenanthrene Pyrene	0.0457 0.12 0.0143 0.16 0.108 0.0163
E2-OWL030A-8.5-9.0	12/12/2005	nd<1.68	nd<4.92	nd<0.00933	nd<0.00933	nd<0.00933	nd<0.01866	nd(dlv)[7]	
F1-OWL027A-7.0-7.5	12/12/2005	nd<1.73	nd<4.82	nd<0.00874	nd<0.00874	nd<0.00874	nd<0.01748	nd(dlv)	
F2-OBL006A-7.5-9.0	12/21/2005	144	57.6	nd<0.5	nd<0.5	nd<0.5	nd<1	Acenaphthene Fluorene Naphthalene Phenanthrene	0.0257 0.0359 0.228 0.0519
F2-OBL035A-7.5-9.0 (duplicate of F2-OBL006A 7.5-9.0)	12/21/2005	nd<100	293	nd<0.5	nd<0.5	nd<0.5	nd<1	Acenaphthene Chrysene Fluoranthene Fluorene Naphthalene Phenanthrene Pyrene	0.454 0.0167 0.0196 0.778 0.726 1.21 0.0457
F2-OBL015A-11.0-11.5	12/15/2005	nd<100	7.76	nd<0.474	nd<0.474	nd<0.474	nd<0.948	nd(dlv)	
F2-OWL019A-7.5-8.0	12/13/2005	232	121	nd<0.476	nd<0.476	nd<0.476	nd<0.952	Acenaphthylene Anthracene Fluorene Naphthalene Phenanthrene Pyrene	0.0101 0.0922 0.0404 0.146 0.0785 0.00684
F2-OBL020A-9.5-10.0	12/13/2005	1590	1130	nd<0.351	nd<0.351	11.6	1.28	Acenaphthylene Benz(a)anthracene Chrysene Fluoranthene Fluorene Naphthalene Pyrene	0.134 0.0106 0.0202 0.0202 0.513 5.06 0.0473
F2-OBL021A-12.0-12.5	12/15/2005	nd<100	872	nd<0.477	nd<0.477	nd<0.477	nd<0.954	Acenaphthene Anthracene Benz(a)anthracene Chrysene Fluoranthene Naphthalene Phenanthrene Pyrene	0.942 0.389 0.00933 0.0203 0.197 4.75 0.0891 0.0443
F3-OBL004A-7.0-7.5	12/19/2005	nd<1.66	nd<4.88	nd<0.00873	nd<0.00873	nd<0.00873	nd<0.01746	nd(dlv)	
G2-OWL016A-10.5-11.0	12/20/2005	nd<2.07	nd<4.73	nd<0.00969	nd<0.00969	nd<0.00969	nd<0.01938	nd(dlv)	
G3-OBL008A-6.0-6.5	12/20/2006	nd<1.73	nd<4.67	nd<0.00912	nd<0.00912	nd<0.00912	nd<0.01824	nd(dlv)	
DOH EAL's[8]		1000	5000	0.53	29	33	180	ALV[9]	

Notes:
(1) TPHg = Total petroleum hydrocarbons as gasoline analyzed using EPA Method 8015M
(2) TPHd = Total Petroleum Hydrocarbons as diesel analyzed using EPA Method 8015M
(3) VOCs = Volatile organic compounds analyzed using EPA Method 8260
(4) Total Xylenes includes m, p, and o-xylenes
(5) SVOCs = Semi-Volatile Organic compounds analyzed using EPA Method 8270
(6) nd = Not detected above indicated reporting limit
(7) nd(dlv) = Not detected, detection limit varies with analytes
(8) EALs = DOH environmental action levels (EALs) for sites located > 150m from a surface water body, drinking water source threatened (DOH, May 2005)
(9) ALV = Action level varies

Bold value indicates concentration above laboratory reporting level
Boldfaced value indicates concentration above EAL
All values in milligrams per liter

Prepared by: OAM Date: 7/5/2006
Checked by: MLB Date: 7/5/2006

TABLE 2
Groundwater Analytical Results
Area North of Malakole Street

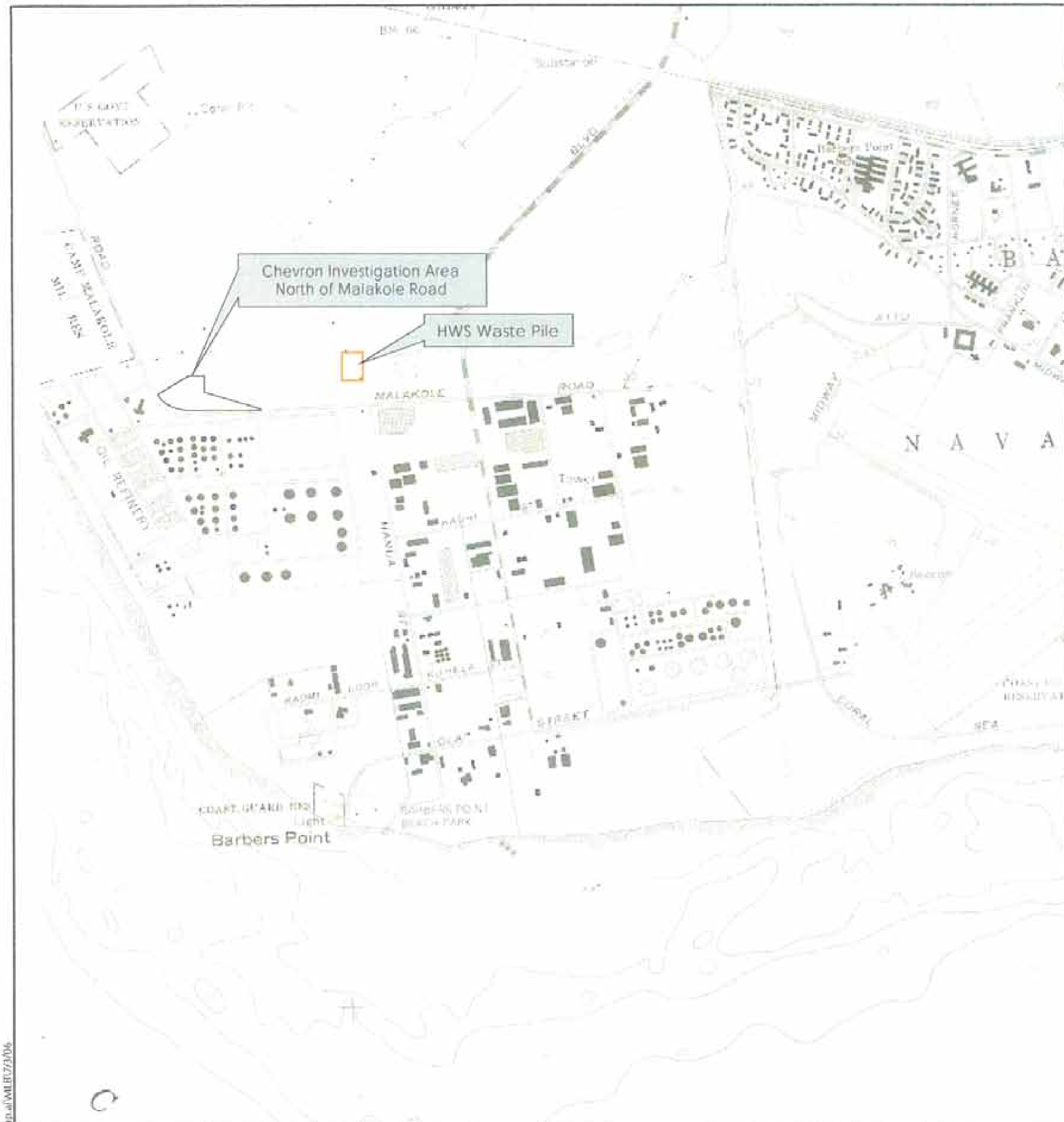
Sample Number	Date Sampled	TPHg[1]	TPHd[2]	VOCs[3]				SVOCs[5]
				Benzene	Toluene	Ethylbenzene	Total Xylenes[4]	
E2-OBL002A	1/4/2006	1.56	0.674	nd<0.005[6]	nd<0.005	0.0155	nd<0.01	Acenaphthene 0.00228 Fluorene 0.00119 Naphthalene 0.0335 Phenanthrene 0.00149
E2-OBL011A	1/3/2006	nd<1.0	nd<0.250	nd<0.005	nd<0.005	0.00914	nd<0.01	Acenaphthene 0.000244 Naphthalene 0.00485
E2-OWL012A	1/4/2006	1.32	0.278	nd<0.005	nd<0.005	0.00703	nd<0.01	Acenaphthene 0.000614 Fluorene 0.000213 Naphthalene 0.00382 Phenanthrene 0.000308
E2-OWL030A	1/3/2006	nd<1.0	nd<0.255	nd<0.005	nd<0.005	nd<0.005	nd<0.01	nd(dlv)[7]
F1-OWL027A	1/6/2006	nd<1.0	nd<0.258	nd<0.005	nd<0.005	nd<0.005	nd<0.01	nd(dlv)
F2-OBL006A	1/5/2006	nd<1.0	0.768	nd<0.005	nd<0.005	nd<0.005	nd<0.01	Acenaphthene 0.00288 Acenaphthylene 0.000548 Fluorene 0.000949 Naphthalene 0.0131 Phenanthrene 0.000799
F2-OBL035A	1/5/2006	1.12	0.59	nd<0.005	nd<0.005	nd<0.005	nd<0.01	Acenaphthene 0.00304 Acenaphthylene 0.000611 Fluorene 0.000954 Naphthalene 0.0165 Phenanthrene 0.000806
F2-OBL015A	1/6/2006	1.24	0.41	nd<0.005	nd<0.005	0.0193	nd<0.01	Acenaphthene 0.000904 Fluorene 0.000345 Naphthalene 0.0224 Phenanthrene 0.00039
F2-OWL019A	1/3/2006	1.43	0.367	nd<0.005	nd<0.005	0.165	nd<0.01	Acenaphthene 0.00107 Fluorene 0.000332 Naphthalene 0.00727 Phenanthrene 0.000540
F2-OBL020A	1/3/2006	7.53	0.815	nd<0.005	nd<0.005	0.192	0.00745	Acenaphthene 0.00125 Fluorene 0.000804 Naphthalene 0.0307 Phenanthrene 0.000955
F2-OBL021A	1/4/2006	1.7	0.954	nd<0.005	nd<0.005	nd<0.005	nd<0.01	Acenaphthene 0.00256 Acenaphthylene 0.000568 Fluorene 0.000856 Naphthalene 0.0117 Phenanthrene 0.00134
F3-OBL004A	1/6/2006	1.01	0.572	nd<0.005	nd<0.005	nd<0.005	nd<0.01	Acenaphthene 0.000442 Fluorene 0.000241 Naphthalene 0.0121 Phenanthrene 0.000436
G2-OWL016A	1/5/2006	nd<1.0	nd<0.250	nd<0.005	nd<0.005	nd<0.005	nd<0.01	nd(dlv)
G3-OBL008A	1/13/2006	nd<1.0	nd<0.258	nd<0.005	nd<0.005	nd<0.005	nd<0.01	nd(dlv)
DOH EAL's[8]		5	2.5	1.6	0.4	0.3	2	ALV[9]

Notes:
(1) TPHg = Total petroleum hydrocarbons as gasoline analyzed using EPA Method 8015M
(2) TPHd = Total Petroleum Hydrocarbons as diesel analyzed using EPA Method 8015M
(3) VOCs = Volatile organic compounds analyzed using EPA Method 8260
(4) Total Xylenes includes m, p, and o-xylenes
(5) SVOCs = Semi-Volatile Organic compounds analyzed using EPA Method 8270
(6) nd = Not detected above indicated reporting limit
(7) nd(dlv) = Not detected, detection limit varies with analytes
(8) EALs = DOH environmental action levels (EALs) for sites located > 150m
from a surface water body, drinking water source threatened (DOH, May 2005)
(9) ALV = Action level varies

Bold value indicates concentration above laboratory reporting level
Boldred value indicates concentration above EAL
All values in milligrams per liter

Prepared by: OAM Date: 7/5/2006
Checked by: MLB Date: 7/5/2006

FIGURES



MAP SOURCE: U.S.G.S Topographic Map. 7.5' Quadrangle. Honolulu. Ewa 1983.

0 500 1,000 2,000 feet

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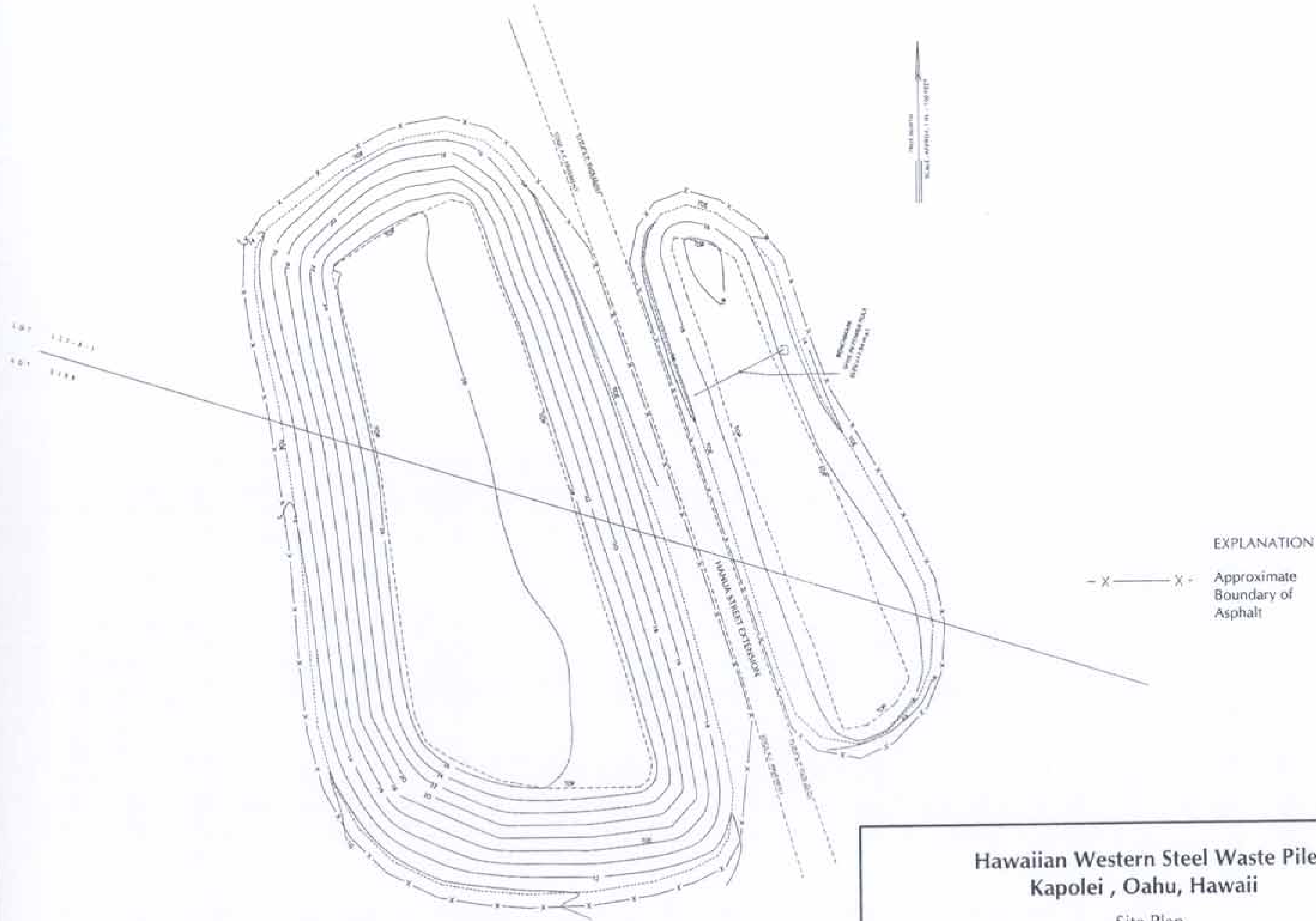
Hawaiian Western Steel Waste Pile and Chevron Investigation Area North of Malakole Road

Site Vicinity Map

LFR Project 005-11083-00

Figure 1

005-11083-00 Kapolei Harborside\Figure1 - SiteVicinityMap.ai\WLB\7/3/06



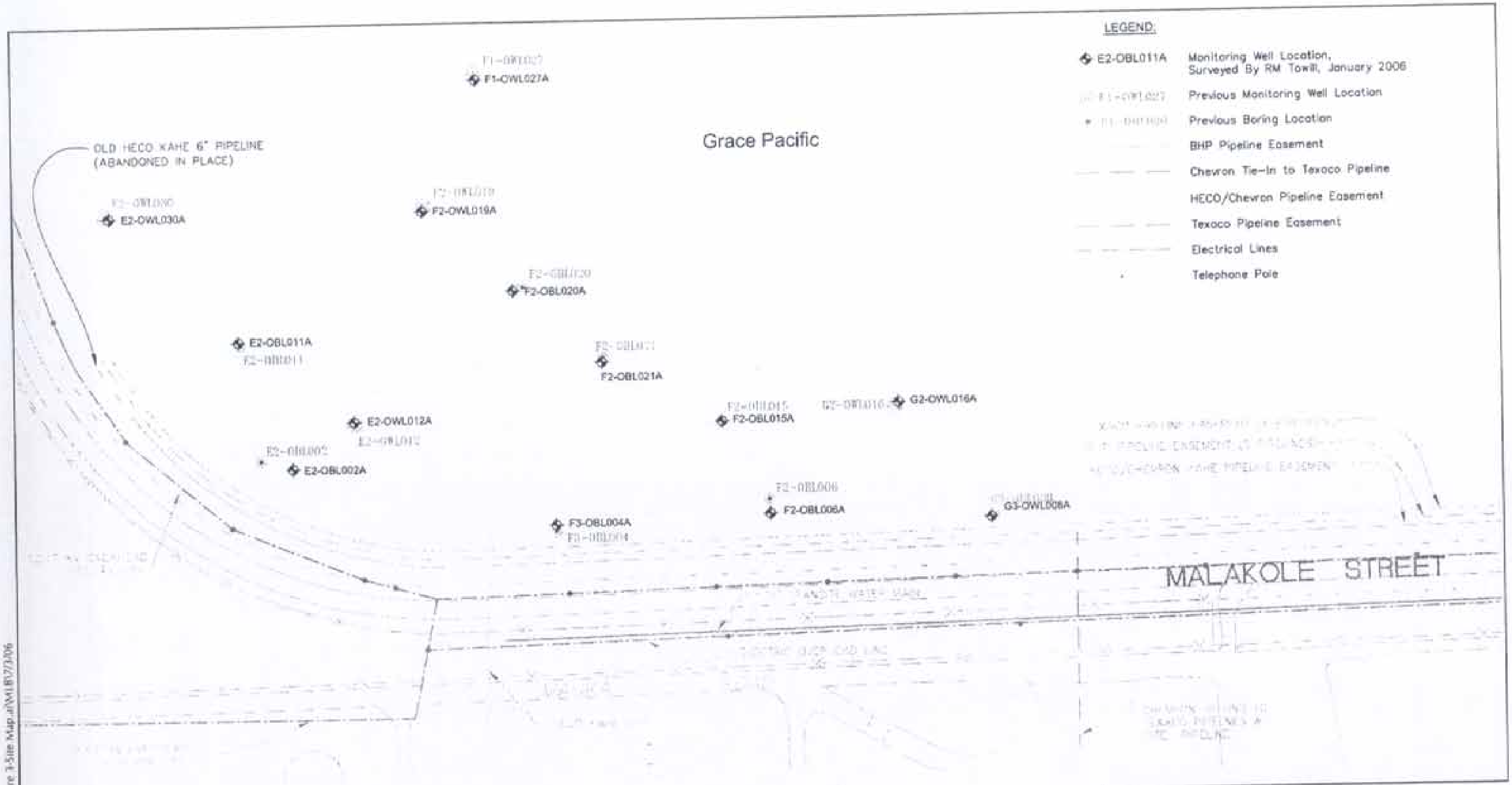
Hawaiian Western Steel Waste Pile
Kapolei , Oahu, Hawaii

Site Plan

LFR Project 005-11083-00

Figure 2

005-11083-00\Kapolei Harborside\Figure2 - Site Plan.ai\MLB7/3/3/06



NOTES:

1. Base map established by survey performed by R.M. Towill in 1996.
2. Horizontal and vertical locations of boring established by survey performed by R.M. Towill in January 2006.
3. Utility locations are depicted schematically, exact locations have not been verified.

Map Source: URS Dec. 5, 2005

Chevron Investigation Area North of Malakole Road
Kapolei, Oahu, Hawaii

Site Plan

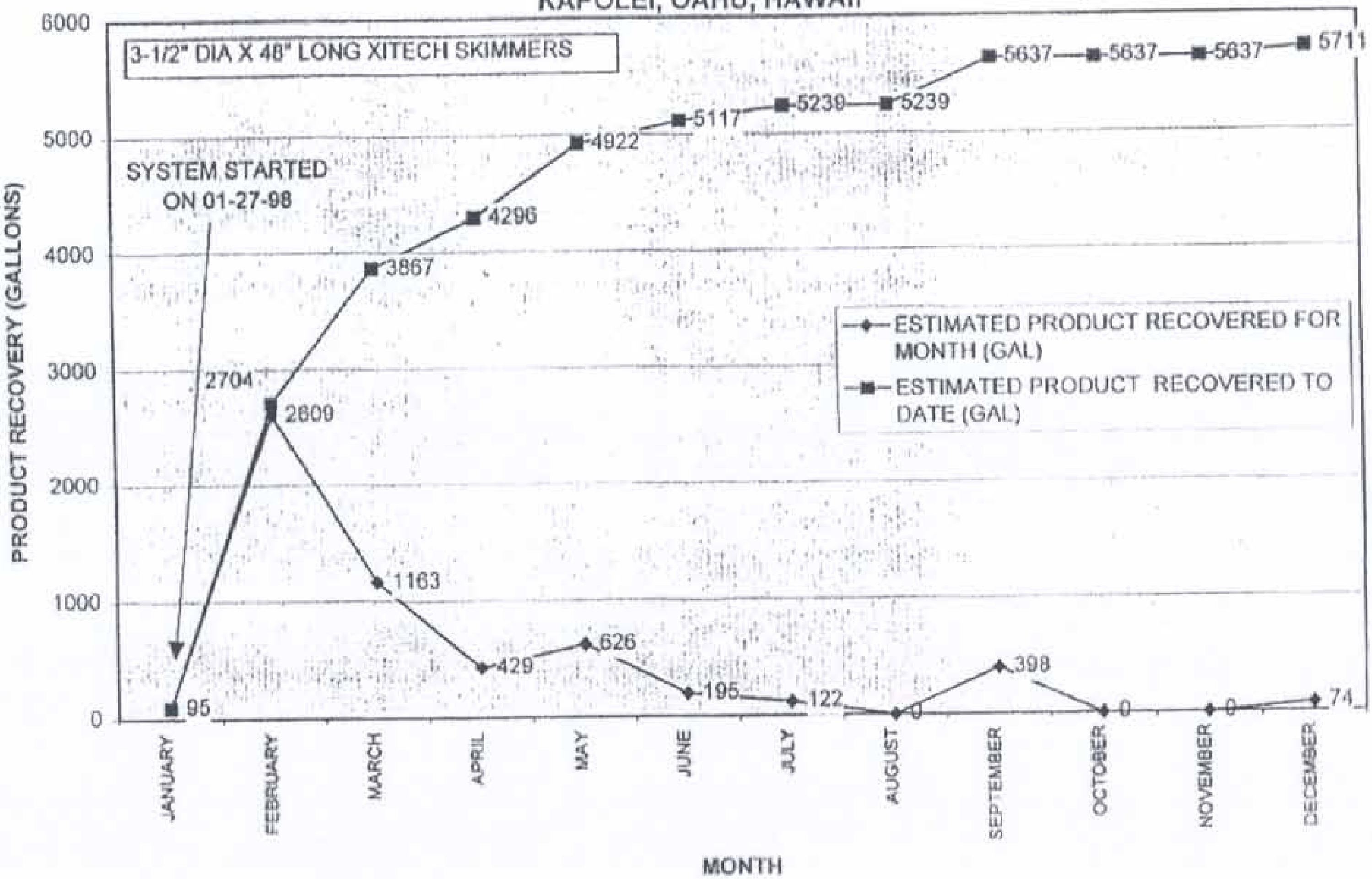
LFR 005-11083-00 Figure 3

APPENDICES

APPENDIX A

Product Recovery Summaries for 1998, 1999, and 2000 (Area North of Malakole)

FIGURE 1
PRODUCT RECOVERY SUMMARY FOR 1998
AREA NORTH OF MALAKOLE (ANM)
CHEVRON HAWAII REFINERY
KAPOLEI, OAHU, HAWAII



DAMES & MOORE

(00HON-042Fig98 xls 16000-373-0106-011)

FIGURE 1
PRODUCT RECOVERY SUMMARY FOR 1999
AREA NORTH OF MALAKOLE (ANM)
CHEVRON HAWAII REFINERY
KAPOLEI, OAHU, HAWAII

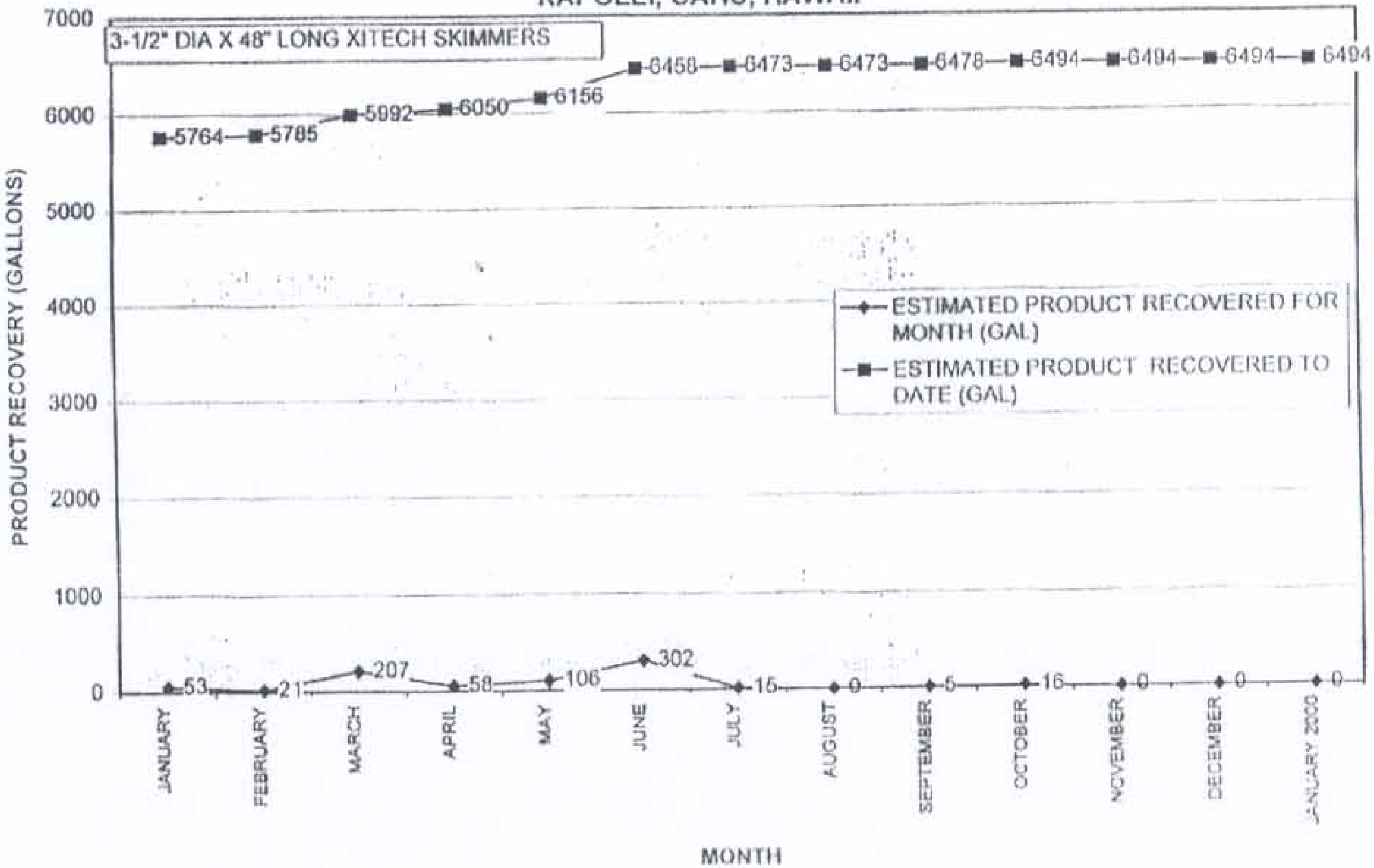
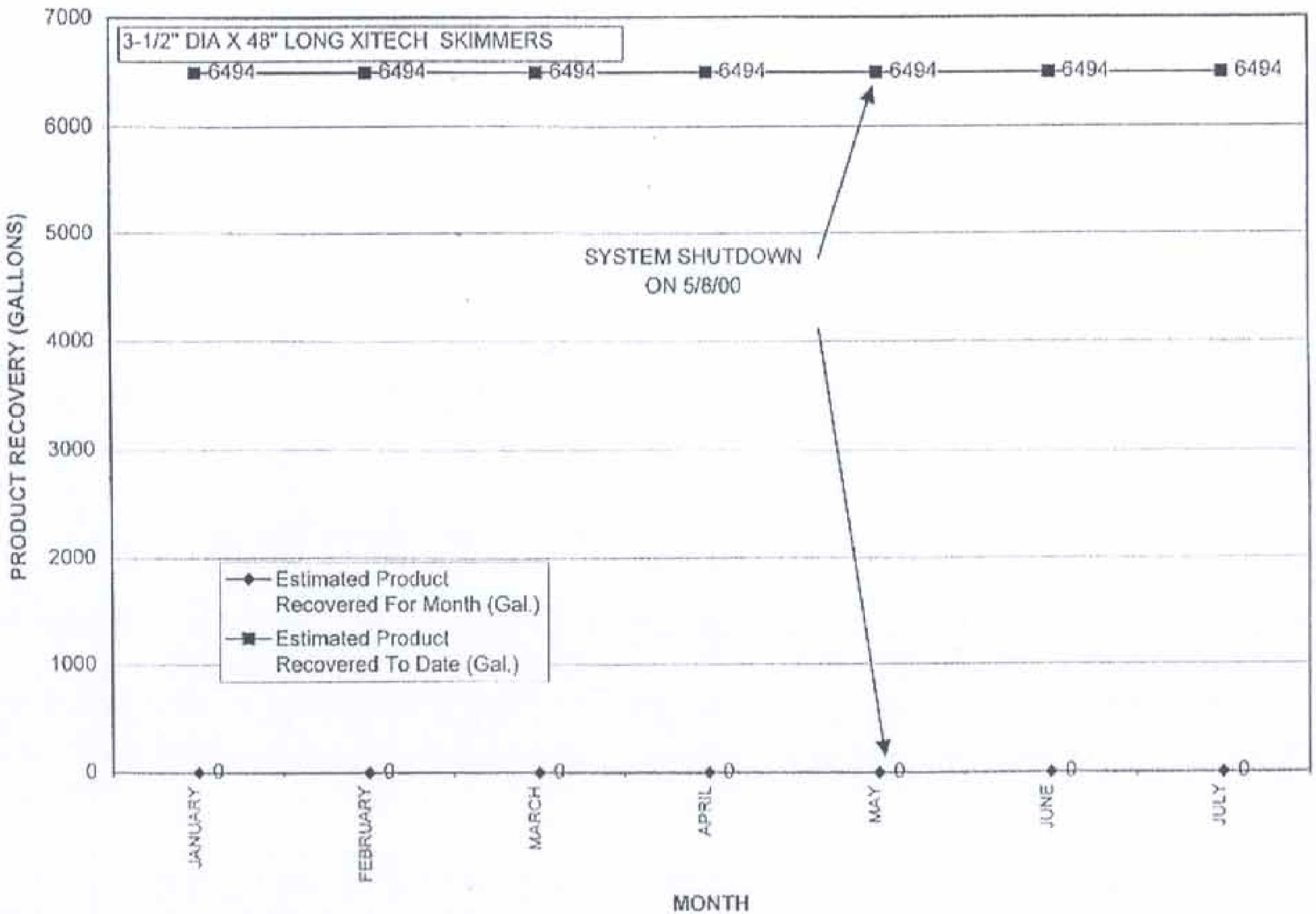


FIGURE A-1
Product Recovery Summary for 2000
Area North of Malakole (ANM)
Chevron Hawaii Refinery
Kapolei, Oahu, Hawaii



URS

(00HON-278.xls:16000-573-0106-011)

APPENDIX B

Soil and Groundwater Results

Table 1
SUMMARY DETECTIONS - SOIL ANALYTICAL RESULTS
Area North of Malakole Street
Kapolei, Oahu, Hawaii
(Page 1 of 3)

DRAFT

Analyte (Location / Date)	UNITS	DOH Tier 1 Soil Action Levels	DOH EALs	E2-OBL002A-6.5-7.0 12/19/2005	F3-OBL004A-7.0-7.5 12/19/2005	F2-OBL006A-7.5-9.0 12/21/2005	F2-OBL035A-7.5-9.0 12/21/2005 duplicate of F2-OBL006A-7.5-9.0	G3-OBL008A-6.0-6.5 12/20/2005	E2-OBL011A-6.5-8.0 12/16/2005	E2-OWL012A-8.5-10.0 12/16/2005
Volatile Organics (EPA 8260)										
Benzene	mg/kg	1.7	0.53	ND (<0.00994)	ND (<0.00873)	ND (<0.500)	ND (<0.500)	ND (<0.00912)	ND (<0.100)[2]	ND (<0.492)
Ethylbenzne	mg/kg	0.5	33	ND (<0.00994)	ND (<0.00873)	ND (<0.500)	ND (<0.500)	ND (<0.00912)	ND (<0.100)[2]	ND (<0.492)
m,p-xylene	mg/kg	20[1]	180[1]	ND (<0.00994)	ND (<0.00873)	ND (<0.500)	ND (<0.500)	ND (<0.00912)	ND (<0.200)[2]	ND (<0.492)
o-xylene	mg/kg			ND (<0.00994)	ND (<0.00873)	ND (<0.500)	ND (<0.500)	ND (<0.00912)	0.4771[2]	ND (<0.492)
Toluene	mg/kg	34	29	ND (<0.00994)	ND (<0.00873)	ND (<0.500)	ND (<0.500)	ND (<0.00912)	ND (<0.100)[2]	ND (<0.492)
Total Petroleum Hydrocarbons (EPA 8015M)										
TPH-Gasoline	mg/kg	2,000	1000[3]	10.4	ND (<1.66)	144	ND (<100)	ND (<1.73)	342	ND (<100)
TPH-Diesel	mg/kg	5,000	5000[3]	1490 J	ND (<4.88)	57.6J	293 J	ND (<4.67)	52.1 J	172 J
Semivolatile Organics (EPA 8270)										
Acenaphthene	mg/kg	18	130	0.563 J	ND (<0.00625) UJ	0.0257 J	0.454 J	ND (<0.00667)	0.0389	0.0457
Acenaphthylene	mg/kg	NS	130	ND (<0.0640) UJ	ND (<0.00625) UJ	ND (<0.00619) UJ	ND (<0.00644) UJ	ND (<0.00667)	ND (<0.00599)	ND (<0.00667)
Anthracene	mg/kg	NS	2.8	1.74 J	ND (<0.00625) UJ	ND (<0.00619) UJ	ND (<0.00644) UJ	ND (<0.00667)	0.0994	0.12
Benz(a)anthracene	mg/kg	NS	6.2	0.125 J	ND (<0.00625) UJ	ND (<0.00619) UJ	0.00934 J	ND (<0.00667)	ND (<0.00599)	ND (<0.00667)
Benzo(a)pyrene	mg/kg	1	0.62	0.0768 J	ND (<0.00625) UJ	ND (<0.00619) UJ	ND (<0.00644) UJ	ND (<0.00667)	ND (<0.00599)	ND (<0.00667)
Benzo(b)fluoranthene	mg/kg	NS	6.2	ND (<0.0640) UJ	ND (<0.00625) UJ	ND (<0.00619) UJ	ND (<0.00644) UJ	ND (<0.00667)	ND (<0.00599)	ND (<0.00667)
Benzo(g,h,I)perylene	mg/kg	NS	27	ND (<0.0640) UJ	ND (<0.00625) UJ	ND (<0.00619) UJ	ND (<0.00644) UJ	ND (<0.00667)	ND (<0.00599)	ND (<0.00667)
Benzo(k)fluoranthene	mg/kg	NS	37	ND (<0.0640) UJ	ND (<0.00625) UJ	ND (<0.00619) UJ	ND (<0.00644) UJ	ND (<0.00667)	ND (<0.00599)	ND (<0.00667)
Chrysene	mg/kg	NS	23	0.230 J	ND (<0.00625) UJ	ND (<0.00619) UJ	0.0167 J	ND (<0.00667)	0.0114	0.0143
Dibenz(a,h)anthracene	mg/kg	NS	0.62	ND (<0.0640) UJ	ND (<0.00625) UJ	ND (<0.00619) UJ	ND (<0.00644) UJ	ND (<0.00667)	ND (<0.00599)	ND (<0.00667)
Fluoranthene	mg/kg	11	40	0.0704 J	ND (<0.00625) UJ	ND (<0.00619) UJ	0.0196 J	ND (<0.00667)	ND (<0.00599)	ND (<0.00667)
Fluorene	mg/kg	NS	160	0.841 J	ND (<0.00625) UJ	0.0359 J	0.778 J	ND (<0.00667)	0.0581	ND (<0.00667)
Indeno(1,2,3-cd)pyrene	mg/kg	NS	6.2	ND (<0.0640) UJ	ND (<0.00625) UJ	ND (<0.00619) UJ	ND (<0.00644) UJ	ND (<0.00667)	ND (<0.00599)	ND (<0.00667)
Naphthalene	mg/kg	41	18	2.67 J	ND (<0.00625) UJ	0.228 J	0.726 J	ND (<0.00667)	0.474	0.16
Phenanthrene	mg/kg	NS	18	1.56 J	ND (<0.00625) UJ	0.0519 J	1.21 J	ND (<0.00667)	0.0892	0.108
Pyrene	mg/kg	NS	85	0.31 J	ND (<0.00625) UJ	ND (<0.00619) UJ	0.0457 J	ND (<0.00667)	ND (<0.00599)	0.0163

Notes:
[1] - Action levels are based on total xylenes (m,p-xylene and o-xylene)
[2] - BTEX results in the associated sample were analyzed by EPA Method 8021A in order to present reporting limits below DOH action levels. Analysis via EPA Method 8021A was done in parallel with the TPH - Gasoline analysis by EPA 8015M. The BTEX results obtained from using EPA Method 8260B required large dilutions for this sample due to hydrocarbon interference, that caused the reporting limits to exceed the DOH
[3] - TPH Soil Action Levels: Alternative action level based on potential leaching concerns. Alternative action levels for comercial/industrial properties applied to soils situated at least one meter below the ground surface (DOH, 2005. Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater).
Bold - Analytical result exceeds DOH Tier 1 Soil Action Levels for Sites receiving less than 200 centimeters of rainfall and drinking water not threatened
BTEX - Benzene, toluene, ethylbenzene, and xylenes
DOH - State of Hawaii Department of Health
EALs - Environmental Action Levels
EPA - United States Environmental Protection Agency
J - Reported concentrations are estimated based on Level III data validation
mg/kg - Milligrams per kilogram
ND (<reporting limit) - Analytical result not detected above stated reporting limit
NS - No standard
Shaded - Analytical result exceeds DOH EALs
TPH - Total petroleum hydrocarbons
UJ - Laboratory reporting limit flagged as estimated based on Level III data validation

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Table 1
SUMMARY DETECTIONS - SOIL ANALYTICAL RESULTS
Area North of Malakole Street
Kapolei, Oahu, Hawaii

Analyte (Location / Date)	UNITS	DOH Tier 1 Soil Action Levels	DOH EALs	F2-OBL015A-11.0-11.5 12/15/2005	G2-OWL016A-10.5-11.0 12/20/2005	F2-OWL019A-7.5-8.0 12/13/2005	F2-OBL020A-9.5-10.0 12/13/2005	F2-OBL021A-12.0-12.5 12/15/2005
Volatile Organics (EPA 8260)								
Benzene	mg/kg	1.7	0.53	ND (<0.474)	ND (<0.00969)	ND (<0.476)	ND (<0.351)[2]	ND (<0.477)
Ethylbenzne	mg/kg	0.5	33	ND (<0.474)	ND (<0.00969)	ND (<0.476)	**11.6**[2]	ND (<0.477)
m,p-xylene	mg/kg	20[1]	180[1]	ND (<0.474)	ND (<0.00969)	ND (<0.476)	ND (<0.703)[2]	ND (<0.477)
o-xylene	mg/kg			ND (<0.474)	ND (<0.00969)	ND (<0.476)	1.28[2]	ND (<0.477)
Toluene	mg/kg	34	29	ND (<0.474)	ND (<0.00969)	ND (<0.476)	ND (<0.351)[2]	ND (<0.477)
Total Petroleum Hydrocarbons (EPA 8015M)								
TPH-Gasoline	mg/kg	2,000	1000[3]	ND (<100)	ND (<2.07)	232	1590	ND (<100)
TPH-Diesel	mg/kg	5,000	5000[3]	7.76 UJ	ND (<4.73)	121 J	1130 J	872 J
Semivolatile Organics (EPA 8270)								
Acenaphthene	mg/kg	18	130	ND (<0.0067)	ND (<0.00667)	ND (<0.00652)	ND (<0.00662)	0.942
Acenaphthylene	mg/kg	NS	130	ND (<0.0067)	ND (<0.00667)	0.0101	0.134	ND (<0.0067)
Anthracene	mg/kg	NS	2.8	ND (<0.0067)	ND (<0.00667)	0.0922	ND (<0.00662)	0.389
Benz(a)anthracene	mg/kg	NS	6.2	ND (<0.0067)	ND (<0.00667)	ND (<0.00652)	0.0106	0.00933 UJ
Benzo(a)pyrene	mg/kg	1	0.62	ND (<0.0067)	ND (<0.00667)	ND (<0.00652)	ND (<0.00662)	ND (<0.0067)
Benzo(b)fluoranthene	mg/kg	NS	6.2	ND (<0.0067)	ND (<0.00667)	ND (<0.00652)	ND (<0.00662)	ND (<0.0067)
Benzo(g,h,I)perylene	mg/kg	NS	27	ND (<0.0067)	ND (<0.00667)	ND (<0.00652)	ND (<0.00662)	ND (<0.0067)
Benzo(k)fluoranthene	mg/kg	NS	37	ND (<0.0067)	ND (<0.00667)	ND (<0.00652)	ND (<0.00662)	ND (<0.0067)
Chrysene	mg/kg	NS	23	ND (<0.0067)	ND (<0.00667)	ND (<0.00652)	0.0202	0.0203
Dibenz(a,h)anthracene	mg/kg	NS	0.62	ND (<0.0067)	ND (<0.00667)	ND (<0.00652)	ND (<0.00662)	ND (<0.0067)
Fluoranthene	mg/kg	11	40	ND (<0.0067)	ND (<0.00667)	ND (<0.00652)	0.0202	0.197
Fluorene	mg/kg	NS	160	ND (<0.0067)	ND (<0.00667)	0.0404	0.513	ND (<0.0067)
Indeno(1,2,3-cd)pyrene	mg/kg	NS	6.2	ND (<0.0067)	ND (<0.00667)	ND (<0.00652)	ND (<0.00662)	ND (<0.0067)
Naphthalene	mg/kg	41	18	ND (<0.0067)	ND (<0.00667)	0.146	5.06	4.75
Phenanthrene	mg/kg	NS	18	ND (<0.0067)	ND (<0.00667)	0.0785	ND (<0.00662)	0.0891
Pyrene	mg/kg	NS	85	ND (<0.0067)	ND (<0.00667)	0.00684	0.0473	0.0443

Notes:

[1] - Action levels are based on total xylenes (m,p-xylene and o-xylene)

[2] - BTEX results in the associated sample were analyzed by EPA Method 8021A in order to present reporting limits below DOH action levels. Analysis via EPA Method 8021A was done in parallel with the TPH - Gasoline analysis by EPA 8015M. The BTEX results obtained from using EPA Method 8260B required large dilutions for this sample due to hydrocarbon interference, that caused the reporting limits to exceed the DOH

[3] - TPH Soil Action Levels: Alternative action level based on potential leaching concerns. Alternative action levels for comercial/industrical properties applied to soils situated at least one meter below the ground surface (DOH, 2005. Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater).

Bold - Analytical result exceeds DOH Tier 1 Soil Action Levels for Sites receiving less than 200 centimeters of rainfall and drinking water not threatened

BTEX - Benzene, toluene, ethylbenzene, and xylenes

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Table 1
SUMMARY DETECTIONS - SOIL ANALYTICAL RESULTS
Area North of Malakole Street
Kapolei, Oahu, Hawaii
(Page 3 of 3)

Analyte / Location / Date	UNITS	DOH Tier 1 Soil Action Levels	DOH EALs	F1-OWL027A-7.0-7.5 12/12/2005	E2-OWL030A-8.5-9.0 12/12/2005
Volatile Organics (EPA 8260)					
Benzene	mg/kg	1.7	0.53	ND (<0.00874)	ND (<0.00933)
Ethylbenzne	mg/kg	0.5	33	ND (<0.00874)	ND (<0.00933)
m,p-xylene	mg/kg	20[1]	180[1]	ND (<0.00874)	ND (<0.00933)
o-xylene	mg/kg			ND (<0.00874)	ND (<0.00933)
Toluene	mg/kg	34	29	ND (<0.00874)	ND (<0.00933)
Total Petroleum Hydrocarbons (EPA 8015M)					
TPH-Gasoline	mg/kg	2,000	1000[3]	ND (<1.73)	ND (<1.68)
TPH-Diesel	mg/kg	5,000	5000[3]	ND (<4.82)	ND (<4.92)
Semivolatile Organics (EPA 8270)					
Acenaphthene	mg/kg	18	130	ND (<0.00628)	ND (<0.00635)
Acenaphthylene	mg/kg	NS	130	ND (<0.00628)	ND (<0.00635)
Anthracene	mg/kg	NS	2.8	ND (<0.00628)	ND (<0.00635)
Benz(a)anthracene	mg/kg	NS	6.2	ND (<0.00628)	ND (<0.00635)
Benzo(a)pyrene	mg/kg	1	0.62	ND (<0.00628)	ND (<0.00635)
Benzo(b)fluoranthene	mg/kg	NS	6.2	ND (<0.00628)	ND (<0.00635)
Benzo(g,h,i)perylene	mg/kg	NS	27	ND (<0.00628)	ND (<0.00635)
Benzo(k)fluoranthene	mg/kg	NS	37	ND (<0.00628)	ND (<0.00635)
Chrysene	mg/kg	NS	23	ND (<0.00628)	ND (<0.00635)
Dibenz(a,h)anthracene	mg/kg	NS	0.62	ND (<0.00628)	ND (<0.00635)
Fluoranthene	mg/kg	11	40	ND (<0.00628)	ND (<0.00635)
Fluorene	mg/kg	NS	160	ND (<0.00628)	ND (<0.00635)
Indeno(1,2,3-cd)pyrene	mg/kg	NS	6.2	ND (<0.00628)	ND (<0.00635)
Naphthalene	mg/kg	41	18	ND (<0.00628)	ND (<0.00635)
Phenanthrene	mg/kg	NS	18	ND (<0.00628)	ND (<0.00635)
Pyrene	mg/kg	NS	85	ND (<0.00628)	ND (<0.00635)

Notes:

[1] - Action levels are based on total xylenes (m,p-xylene and o-xylene)

[2] - BTEX results in the associated sample were analyzed by EPA Method 8021A in order to present reporting limits below DOH action levels. Analysis via EPA Method 8021A was done in parallel with the TPH - Gasoline analysis by EPA 8015M. The BTEX results obtained from using EPA Method 8260B required large dilutions for this sample due to hydrocarbon interference, that caused the reporting limits to exceed the DOH

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Bold - Analytical result exceeds DOH Tier 1 Soil Action Levels for Sites receiving less than 200 centimeters of rainfall and drinking water not threatened

BTEX - Benzene, toluene, ethylbenzene, and xylenes
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Table 2
SUMMARY DETECTIONS - GROUNDWATER ANALYTICAL RESULTS
Area North of Malakole Street
Kapolei, Oahu, Hawaii
(Page 1 of 2)

Analyte (Location / Date)	UNITS	DOH Tier 1 Soil Action Levels	DOH EALs	E2-OBL002A 1/4/2006	F3-0BL004A 1/6/2006	F2-OBL006A 1/5/2006	F2-OBL035A 1/5/2006 duplicate of F2-OBL006A-7.5-9.0	G3-OBL008A 1/13/2006	E2-OBL011A 1/3/2006	E2-OWL012A 1/4/2006	F2-OBL015A 1/6/2006
Volatile Organics (EPA 8260)											
Benzene	mg/L	1.7	1.6	ND (<0.00500)	ND (<0.00500)	ND (<0.00500)	ND (<0.00500)	ND (<0.00500)	ND (<0.00500)	ND (<0.00500)	ND (<0.00500)
Ethylbenzne	mg/L	0.14	0.3	0.0155	ND (<0.00500)	ND (<0.00500)	ND (<0.00500)	ND (<0.00500)	0.00914	0.00703	0.0193
m,p-xylene	mg/L	10[1]	2[1]	ND (<0.00500)	ND (<0.00500)	ND (<0.00500)	ND (<0.00500)	ND (<0.00500)	ND (<0.00500)	ND (<0.00500)	ND (<0.00500)
o-xylene	mg/L			ND (<0.00500)	ND (<0.00500)	ND (<0.00500)	ND (<0.00500)	ND (<0.00500)	ND (<0.00500)	ND (<0.00500)	ND (<0.00500)
Toluene	mg/L	2.1	0.4	ND (<0.00500)	ND (<0.00500)	ND (<0.00500)	ND (<0.00500)	ND (<0.00500)	ND (<0.00500)	ND (<0.00500)	ND (<0.00500)
Total Petroleum Hydrocarbons (EPA 8015M)											
TPH-Gasoline	mg/L	NS	5	1.560 UJ	1.010 UJ	ND (<1.000)	1.120 UJ	ND (<1.000)	ND (<1.000)	1.320 UJ	1.240 UJ
TPH-Diesel	mg/L	NS	2.5	0.674 UJ	0.572 UJ	0.768 UJ	0.590 UJ	ND (<0.258)	ND (<0.250)	0.278 UJ	0.410 UJ
Semivolatile Organics (EPA 8270)											
Acenaphthene	mg/L	0.32	0.2	0.00228 J	0.000442	0.00288	0.00304	ND (<0.000205)	0.000244 J	0.000614 J	0.000904
Acenaphthylene	mg/L	NS	0.3	ND (<0.000211)	ND (<0.000205)	0.000548	0.000611	ND (<0.000205)	ND (<0.000211)	ND (<0.000208)	ND (<0.000219)
Anthracene	mg/L	NS	0.00073	ND (<0.000211)	ND (<0.000205)	ND (<0.000205)	ND (<0.000205)	ND (<0.000205)	ND (<0.000211)	ND (<0.000208)	ND (<0.000219)
Benz(a)anthracene	mg/L	NS	0.000027[2]	ND (<0.000211)	ND (<0.000205)	ND (<0.000205)	ND (<0.000205)	ND (<0.000205)	ND (<0.000211)	ND (<0.000208)	ND (<0.000219)
Benzo(a)pyrene	mg/L	0.0002	0.000014[2]	ND (<0.000105)	ND (<0.000103)	ND (<0.000103)	ND (<0.000103)	ND (<0.000103)	ND (<0.000105)	ND (<0.000104)	ND (<0.000109)
Benzo(b)fluoranthene	mg/L	NS	0.000092[2]	ND (<0.000211)	ND (<0.000205)	ND (<0.000205)	ND (<0.000205)	ND (<0.000205)	ND (<0.000211)	ND (<0.000208)	ND (<0.000219)
Benzo(g,h,I)perylene	mg/L	NS	0.0001[2]	ND (<0.000211)	ND (<0.000205)	ND (<0.000205)	ND (<0.000205)	ND (<0.000205)	ND (<0.000211)	ND (<0.000208)	ND (<0.000219)
Benzo(k)fluoranthene	mg/L	NS	0.00040	ND (<0.000211)	ND (<0.000205)	ND (<0.000205)	ND (<0.000205)	ND (<0.000205)	ND (<0.000211)	ND (<0.000208)	ND (<0.000219)
Chrysene	mg/L	NS	0.00035	ND (<0.000211)	ND (<0.000205)	ND (<0.000205)	ND (<0.000205)	ND (<0.000205)	ND (<0.000211)	ND (<0.000208)	ND (<0.000219)
Dibenz(a,h)anthracene	mg/L	NS	0.00025	ND (<0.000211)	ND (<0.000205)	ND (<0.000205)	ND (<0.000205)	ND (<0.000205)	ND (<0.000211)	ND (<0.000208)	ND (<0.000219)
Fluoranthene	mg/L	0.013	0.040	ND (<0.000211)	ND (<0.000205)	ND (<0.000205)	ND (<0.000205)	ND (<0.000205)	ND (<0.000211)	ND (<0.000208)	ND (<0.000219)
Fluorene	mg/L	NS	0.300	0.00119	0.000241	0.000949	0.000954	ND (<0.000205)	ND (<0.000211)	0.000213	0.000345
Indeno(1,2,3-cd)pyrene	mg/L	NS	0.000092[2]	ND (<0.000211)	ND (<0.000205)	ND (<0.000205)	ND (<0.000205)	ND (<0.000205)	ND (<0.000211)	ND (<0.000208)	ND (<0.000219)
Naphthalene	mg/L	0.77	0.210	0.0335	0.0121	0.0131	0.0165	ND (<0.000205)	0.00485	0.00382	0.0224
Phenanthrene	mg/L	NS	0.0077	0.00149	0.000436	0.000799	0.000806	ND (<0.000205)	ND (<0.000211)	0.000308	0.000390
Pyrene	mg/L	NS	0.0020	ND (<0.000211)	ND (<0.000205)	ND (<0.000205)	ND (<0.000205)	ND (<0.000205)	ND (<0.000211)	ND (<0.000208)	ND (<0.000219)

Notes:
[1] - Action levels are based on total xylenes (m,p-xylene and o-xylene)
[2] - In cases where an EAL for a specific chemical is less than the laboratory method reporting limit for that chemical, it is generally acceptable to consider the method reporting limit in place of the screening level (DOH, 2005. *Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater*).

Bold - Analytical result exceeds DOH Tier 1 Soil Action Levels for Sites receiving less than 200 centimeters of rainfall and drinking water not threatened
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EALs - Environmental Action Levels
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Table 2
SUMMARY DETECTIONS - GROUNDWATER ANALYTICAL RESULTS
Area North of Malakole Street
Kapolei, Oahu, Hawaii
(Page 2 of 2)

DRAFT

Analyte / Location / Date	UNITS	DOH Tier 1 Soil Action Levels	DOH EALs	G2-OWL016A 1/5/2006	F2-OWL019A 1/3/2006	F2-OBL020A 1/3/2006	F2-OBL021A 1/4/2006	F1-OWL027A 1/6/2006	E2-OWL030A 1/3/2006
Volatile Organics (EPA 8260)									
Benzene	mg/L	1.7	1.6	ND (<0.00500)	ND (<0.00500)	ND (<0.00500)	ND (<0.00500)	ND (<0.00500)	ND (<0.00500)
Ethylbenzne	mg/L	0.14	0.3	ND (<0.00500)	0.0165	**0.192**	ND (<0.00500)	ND (<0.00500)	ND (<0.00500)
m,p-xylene	mg/L	10^1	2^1	ND (<0.00500)	ND (<0.00500)	0.00745	ND (<0.00500)	ND (<0.00500)	ND (<0.00500)
o-xylene	mg/L			ND (<0.00500)	ND (<0.00500)	ND (<0.00500)	ND (<0.00500)	ND (<0.00500)	ND (<0.00500)
Toluene	mg/L	2.1	0.4	ND (<0.00500)	ND (<0.00500)	ND (<0.00500)	ND (<0.00500)	ND (<0.00500)	ND (<0.00500)
Total Petroleum Hydrocarbons (EPA 8015M)									
TPH-Gasoline	mg/L	NS	5	ND (<1.000)	1.430 UJ	**7.530**	1.700	ND (<1.000)	ND (<1.000)
TPH-Diesel	mg/L	NS	2.5	ND (<0.250)	0.367 UJ	0.815 UJ	0.954 J	ND (<0.258)	ND (<0.255)
Semivolatile Organics (EPA 8270)									
Acenaphthene	mg/L	0.32	0.2	ND (<0.000205)	0.00107 J	0.00125 J	0.00256 J	ND (<0.000211)	ND (<0.000205) UJ
Acenaphthylene	mg/L	NS	0.3	ND (<0.000205)	ND (<0.000203)	ND (<0.000215)	0.000568	ND (<0.000211)	ND (<0.000205)
Anthracene	mg/L	NS	0.00073	ND (<0.000205)	ND (<0.000203)	ND (<0.000215)	ND (<0.000200)	ND (<0.000211)	ND (<0.000205)
Benz(a)anthracene	mg/L	NS	0.000027[2]	ND (<0.000205)	ND (<0.000203)	ND (<0.000215)	ND (<0.000200)	ND (<0.000211)	ND (<0.000205)
Benzo(a)pyrene	mg/L	0.0002	0.000014[2]	ND (<0.000103)	ND (<0.000102)	ND (<0.000108)	ND (<0.000100)	ND (<0.000105)	ND (<0.000103)
Benzo(b)fluoranthene	mg/L	NS	0.000092[2]	ND (<0.000205)	ND (<0.000203)	ND (<0.000215)	ND (<0.000200)	ND (<0.000211)	ND (<0.000205)
Benzo(g,h,i)perylene	mg/L	NS	0.0001[2]	ND (<0.000205)	ND (<0.000203)	ND (<0.000215)	ND (<0.000200)	ND (<0.000211)	ND (<0.000205)
Benzo(k)fluoranthene	mg/L	NS	0.00040	ND (<0.000205)	ND (<0.000203)	ND (<0.000215)	ND (<0.000200)	ND (<0.000211)	ND (<0.000205)
Chrysene	mg/L	NS	0.00035	ND (<0.000205)	ND (<0.000203)	ND (<0.000215)	ND (<0.000200)	ND (<0.000211)	ND (<0.000205)
Dibenz(a,h)anthracene	mg/L	NS	0.00025	ND (<0.000205)	ND (<0.000203)	ND (<0.000215)	ND (<0.000200)	ND (<0.000211)	ND (<0.000205)
Fluoranthene	mg/L	0.013	0.040	ND (<0.000205)	ND (<0.000203)	ND (<0.000215)	ND (<0.000200)	ND (<0.000211)	ND (<0.000205)
Fluorene	mg/L	NS	0.300	ND (<0.000205)	0.000332	0.000804	0.000856	ND (<0.000211)	ND (<0.000205)
Indeno(1,2,3-cd)pyrene	mg/L	NS	0.000092[2]	ND (<0.000205)	ND (<0.000203)	ND (<0.000215)	ND (<0.000200)	ND (<0.000211)	ND (<0.000205)
Naphthalene	mg/L	0.77	0.210	ND (<0.000205)	0.00727	0.0307	0.0117	ND (<0.000211)	ND (<0.000205)
Phenanthrene	mg/L	NS	0.0077	ND (<0.000205)	0.000540	0.000955	0.00134	ND (<0.000211)	ND (<0.000205)
Pyrene	mg/L	NS	0.0020	ND (<0.000205)	ND (<0.000203)	ND (<0.000215)	ND (<0.000200)	ND (<0.000211)	ND (<0.000205)

Notes:
[1] - Action levels are based on total xylenes (m,p-xylene and o-xylene)
[2] - In cases where an EAL for a specific chemical is less than the laboratory method reporting limit for that chemical, it is generally acceptable to consider the method reporting limit in place of the screening level (DOH, 2005, *Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater*).

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presumably be worse), and the results indicated that there were no ignitability or explosive hazard risks.

This assertion is supported by the Organic Vapor Analyzer (OVA) results listed in Table 2 of the Dames and Moore 1997 Technical Memorandum which lists the highest concentration of volatile organic vapors in gas samples collected using surface isolation flux chambers as 170 ppmv in sample number F3-A04. The lower explosive limit (LEL) for gasoline is 14,000 ppmv.

In 1997, before the remediation was conducted, there was a plume of separate phase petroleum in the ground at the site at measured thicknesses up to one foot. After the remediation was completed, Chevron installed additional soil borings and monitoring wells in December 2005 in the subject area. No measurable thickness of separate phase petroleum was detected in any of the wells during the 2005 investigation. It is likely that the vapor concentrations now are significantly lower than they were in 1997.

(2) DOH – HEER comments on vapor and volatility

Industrial Landfill Area
Discuss the need to address potential vapor intrusion concerns for future buildings constructed in vicinity of the landfill. The landfill has been permanently capped and there are no plans to disturb the area during the proposed redevelopment. Direct-exposure to contaminated soil or other hazardous material that might be present in the landfill is therefore not likely to pose a concern to future workers in the redevelopment area. Vapors emitted from landfills can intrude into utility trenches or nearby buildings and pose potential explosion and toxicity concerns, (e.g., methane, petroleum and volatile organic compounds). The potential for these concerns to exist around the subject landfill needs to be discussed in the EIS, based on the nature of material disposed of in the landfill and data from past vapor studies. The presence or absence of vapors in the landfill was probably incorporated into the cap design so the information needed for the EIS should already exist.

Petroleum Contamination Area
Discuss the need to address potential vapor intrusion concerns for future buildings constructed in vicinity of the landfill. The nature and magnitude of remaining petroleum contamination along the southern margin of the site is not clearly discussed in the EIS. In some cases, the breakdown of petroleum in soil and groundwater over time can lead to the buildup of methane and potentially explosive condition in utility trenches and under buildings or other covered areas. This may require that engineered controls be included into the design of new utility trenches and buildings in areas where significant petroleum contamination is present.

Response: Industrial Landfill Area – The industrial landfill associated with the former Hawaiian Western Steel operations is a monofill comprised of scrap steel, wet scrubber material, mill scale [iron oxide], slag, electrode remnants, furnace bricks and inorganic baghouse dust containing iron, zinc, lead and cadmium. There were no records or evidence of any petroleum products or any appreciable amount of organic material being disposed of in the landfill. The design of the landfill cap was not required to incorporate provisions for the collection or venting of landfill gasses. With the exception of one area on the south slope of the west lobe of the waste pile where a buried tree stump was discovered and removed in 1995, there has been no evidence (such as bubbles or heaving of the asphalt) that gas has been generated in the landfill.

Response: Petroleum Contamination Area – Please see the response to the OEQC question, above. Additionally, the nature and magnitude of the remaining petroleum contamination was investigated in 2005 by the installation of four soil borings and monitoring wells located within 30 feet of the pipeline corridor along the southern boundary of the site. The results of the 2005 sampling indicate that no concentrations of BTEX and PAHs were detected in these wells or borings above the DOH environmental action levels (EALs). No measurable thickness of PSH was detected in any of the wells.

As noted in LFR's July 6, 2006 report, remaining elevated petroleum hydrocarbon concentrations in a limited portion of the area north of Malakole road will also require some on-going institutional controls. Specifically, future subsurface utility work or building construction which includes excavation to depths greater than five feet in the vicinity of boring/well F2-OBLO20A will require the following precautions. First, construction workers at the site must have hazardous materials training (HAZWOPER) as required by 40 CFR 1910.120, and must prepare a health and safety plan prior to conducting any work at the site. The health and safety plan should include requirements to monitor the LEL in the work area and monitor for hydrocarbon concentrations in the breathing zone. Any soil that is excavated from depths greater than four (4) feet will have to be sampled and characterized for proper re-use on site or off-site disposal. Finally, any groundwater that is pumped during de-watering activities may require treatment before it is disposed on-site or off-site to avoid worker exposure or regulatory violations.

If you have questions regarding these responses, please call me at (808) 522-0321.

Sincerely,

Jeffrey C. Morrell, P.E.
Principal Engineer, Operations Manager