PROLOGIS
HERCULES PIPELINE REMOVAL

BIOLOGICAL ASSESSMENT
AND
ESSENTIAL FISH HABITAT EVALUATION

Prepared for

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List of Acronyms

BA	Biological Assessment
COC	contaminants of concern
CDFG	California Department of Fish and Game (former CDFW name)
CDFW	California Department of Fish and Wildlife
cm	centimeters
cy	cubic yards
DPS	distinct population segment
EFH	Essential Fish Habitat
ESA	Endangered Species Act
ESU	evolutionarily significant unit
ft	feet
ft/sec	feet per second
ha	hectares
IEP	Interagency Ecological Program
km^2	square kilometers
kg	kilograms
m	meters
m^3	cubic meters
mm	millimeters
µg/kg	micrograms per kilogram
mg/L	milligrams per Liter
MLLW	Mean Lower Low Water
MSFCMA	Magnuson-Stevens Fishery Conservation and Management Act
NMFS	National Oceanic and Atmospheric Administration National Marine Fisheries Service
RWQCB	Regional Water Quality Control Board
SFA	Sustainable Fisheries Act
SLC	State Lands Commission
TSS	total suspended solid
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
WQC	water quality criteria
YOY	young-of-the-year

1 INTRODUCTION

This Biological Assessment (BA) has been prepared on behalf of Hercules LLC (Prologis) for the proposed removal of an abandoned waste water pipeline offshore of the city of Hercules (Project). The Project and its potential effects to threatened and endangered species are described and evaluated in this BA. The species of concern are under the purview of the National Oceanic and Atmospheric Administration National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS) under Section 7 of the Federal Endangered Species Act (FESA), and for Essential Fish Habitat (EFH) under the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA). This BA also addresses the potential for "take" of state listed species under the California Endangered Species Act (CESA) (Cal Fish and Game Code sec. 2080 *et. seq.)*.

The BA concludes that the removal activities are not likely to adversely affect individuals of the southern distinct population segment (DPS) green sturgeon, Sacramento River winter-run Chinook, Central Valley spring-run Chinook, Central valley steelhead, or Central California Coast steelhead evolutionarily significant units (ESUs), Longfin smelt, and Delta smelt. In addition, proposed pipeline removal activities are not expected to degrade EFH in the San Francisco Bay.

This analysis also concludes that, due to the temporary nature of the Project, the Project will not cause a "take" (as defined under CESA) of any state listed species.

1.1 Project Description

Prologis proposes to remove an 8 inch steel wastewater outfall pipeline located in Hercules (Figure 1-1). The pipeline extends approximately 2,000 ft into the San Pablo Bay (Bay). The wastewater outfall pipeline is buried approximately 1,200 feet from the shoreline in varying depths of sediment, and the remainder of the pipeline rests on the sediment surface.

The pipeline was originally associated with Sequoia Refining (Sequoia), a subsidiary of Gulf Oil. The pipeline was originally built in 1966 for the Sequoia Petroleum Refinery (Refinery), and operated for 31 years until ceasing operations in 1997. The Refinery was built on a 200 acre parcel of vacant industrial land adjacent to San Pablo Bay in Hercules, CA. Because of draft limitations (shallow mudline elevations) near shore, oil deliveries were received through a free-standing marine oil terminal (MOT), about ¾ mile out in the Bay. The oil was then transported to shore through pipelines buried under the Bay. Sequoia also installed the 8 inch wastewater outfall pipeline which shares a portion of the oil pipeline trench. The wastewater outfall pipeline is buried in varying depths of sediment for

Figure 1-1 Vicinity Map and Project Location

approximately 1,200 feet from the shoreline and the remainder of the pipeline rests on the sediment surface. The MOT and pipelines are situated on land leased from the California State Lands Commission (SLC).

Sequoia sold the refinery in 1976 to Pacific Refining (PRC), a subsidiary of Coastal Corporation (Coastal). (PRC is now known as Coscol Petroleum, a subsidiary of El Paso Natural Gas now owned by Kinder Morgan Inc.) In the mid-1990s, Coastal decided to sell the Refinery, and Catellus, through a joint venture known as Hercules LLC (HLLC). HLLC purchased the site in 1997 for redevelopment as a residential project. In a series of transactions over the years, Catellus became the sole partner in HLLC, an interest subsequently acquired by Prologis.

PRC retained ownership of and responsibility for the MOT, its pipelines, and the associated SLC lease. During the summer of 2010, PRC contractors demolished the MOT and abandoned its associated petroleum lines. SLC agreed that the petroleum pipelines could be cut below the mudline, grouted in, and abandoned in place. The PRC project complied with the California Environmental Quality Act (CEQA) through a Mitigated Negative Declaration (MND) with SLC as the lead agency (SCH #2009032085 File Ref: W30068-13; PRC 3414.1 CSLC MND #750).

The land-based portion of the Refinery was decommissioned, dismantled, remediated, and redeveloped for housing, commercial use, and open space. The site remediation plan included groundwater extraction and treatment for which the Refinery wastewater outfall pipeline was essential, so PRC's SLC lease was bifurcated, and the portion on which the wastewater pipeline is located was assigned to HLLC/Prologis. HLLC site remediation was completed in 2001, and the wastewater pipeline has been out of service since that time. The overall redevelopment project was substantially completed in 2006.

The HLLC/Prologis Lease No. PRC 7985.1 expires on August 31, 2017. At the termination of lease, the Lessee is obligated to remove all improvements (pipeline) and return the premises to conditions existing prior to construction. In order to meet the obligations of the lease, Prologis will be removing the pipeline.

1.2 Construction Methods

In-water construction activities and best management practices are based on design information provided by the Project Sponsor, and typical construction practices in San Francisco Bay. All in-water construction will be conducted in compliance with regulatory permits, including scheduling of work during appropriate seasons to minimize or avoid effects on sensitive biological resources. The following sections detail the proposed methods for removing the pipeline. Additional details, with any deviations to prescribed methods detailed in this application, will be provided to the regulatory agencies after the

construction bid is awarded and prior to initiation of construction. Detailed work plans will be provided for review and approval prior to any construction.

1.2.1 Shore-side portion of the pipeline removal

The shore-side work will be conducted first. The onshore work to abandon the pipeline in place would occur where the rip rap is located on the embankment portion of the Union Pacific Railroad Right of Way (UPRR ROW) where the rip rap would be temporarily relocated to expose the pipeline. Disturbance is not anticipated to the surface of Victoria By The Bay Park, the existing or planned Bay Trail sections, or the Union Pacific Railroad train tracks and immediate right-of-way. The work in the Bay would remove the pipeline buried beneath the Bay muds and transport it to a permitted and appropriate recycling or disposal facility.

The 160-foot-long section of the pipeline is located on land. When the remediation on the refinery site was completed, the pipeline was cut and capped with a steel flange which was welded in place, and the location was backfilled. From the point at which the line is capped underground inside the park, it continues toward the Bay and crosses through a steel sleeve beneath the Union Pacific Railroad tracks, and extends beneath shoreline rip rap and under the mudline at which point it extends approximately 2,000 feet bayward ending at the diffusers.

The 160-foot-long shore-side portion of the project pipeline would be abandoned in place. Work would occur from the water over an approximately 5-day period, using a 4-step process, as follows: (1) a small area of rip rap (10 feet length x 10 feet width x 5 feet deep) between the railroad tracks and the Bay would be removed to expose the pipeline, (2) the exposed section of pipeline on the west side of the railroad tracks would be cut at or near the mudline and where the pipeline turns east horizontally near the top of the embankment to cross beneath the railroad tracks, and the cut section removed, (3) the wastewater pipeline and the casing below the railroad tracks extending to the line's end in the Victoria By The Bay Park would be grouted and left in place, and (4) the rip rap would be replaced along the shoreline. Best management practices (BMPs) would be employed to prevent sediment, grout or other construction materials from entering the Bay as a result of activities associated with abandoning the pipeline segment in place.

The shore-side work would be done from the water. A tug boat would position a crane barge (a shallow draft barge with a crane) close to the shore during high tide, and the barge would remain in place for the duration of the shore-side work. The barge would be mobilized to the work location from the contractor’s shore-based marine facility. A crew boat would ferry key personnel to and from the barge. The barge would be located close to the shore, and personnel would also access the land via a gangway from the barge. The barge would have a five to seven person crew and the

tugboat would have a two person crew. When feasible, the barge would use spuds to secure its position. The spuds will minimize anchoring and disturbance to the surrounding sediments. To remove shoreline riprap and expose the final segment of pipeline, the shallow draft barge would remain in place to conduct construction activities. During low tides the barge may rest on the sediment surface until the rising tide. In addition to using a crew boat, personnel would be transported to the barge by means of a gangway from the shore which would further reduce disturbance to bottom sediments. The gangway would be hauled onto the barge every night for security purposes (i.e., to prevent unauthorized access). A tug boat, working skiff, or a crew boat would bring in materials and personnel to the barge as needed. Trips would be minimized and vessel speeds in this area would be limited to no-wake to minimize the disturbance to fish in the immediate vicinity.

The shore-side work would occur in 10 hour shifts from approximately 7:00AM-5:00PM during the weekdays to comply with the City noise ordinance unless extended work hours are approved by the City. There would be no work at night or any lights or noise from the barge once the work has shut down each day, other than safety-related lighting required to comply with United States Coast Guard regulations.

Rip Rap Removal

The crane on the crane barge would be used to access the rip rap area on the Bay (west) side of the railroad tracks. The crane would use a clam shell bucket to temporarily remove the rip rap, stockpile it atop other rip rap, and, after completion of the grouting, replace the rip rap. The volume of rock to be relocated would be approximately 20 cubic yards (10 feet length x 10 feet width x 5 feet deep). Authorization would be obtained from UPRR before the start of work.

Wastewater Pipeline Cut and Removal

Once the wastewater pipeline is exposed by removal of the rip rap on top of it, it will be cut at or near the mudline and near the top of the embankment. The pipe would be cut using an oxy-acetylene torch. The pipe would be cut by an approximately 3-4 person crew as needed to safely complete the work. The estimated duration of the work is one day. This work would occur within the UPRR ROW.

The cut section(s) would be lifted out and placed on the barge for transport to the Contractor's shore based facility where it would be loaded onto a truck for transport to a recycling and/or disposal facility.

Wastewater Pipeline Left in Place

The remaining pipeline between the top of the embankment and the end of the pipe beneath the park would be grouted, capped, and left in place. Both the wastewater pipeline and the casing surrounding the pipeline will be grouted. The grouting operation would be based on the barge. Support activities would also be primarily located on the barge. The pipeline would be grouted by inserting a tremie pipe horizontally into the line at its western terminus. Grout would then be pumped into the wastewater pipeline, working from the capped eastern terminus back to the western end of the pipeline. After completion, the western end of the pipeline would be capped. The only land-based activities that would be required to conduct this work would consist of having several workers present to insert the tremie pipe into the remnant wastewater pipe. Grouting of the pipeline is expected to take less than one day.

A Grout Management Plan and BMPs would be employed so that no grout or other materials are discharged into the Bay. All grouting equipment would be staged on the deck of the barge inside spill guards. Watertight portable tanks would be used to contain and transport washout water. Tremie methods would be used to place all grout so that placement can be monitored and controlled. Grout hoses and fittings would be in new or like-new condition, and would be visually inspected prior to use. Grout mix would be pre-mixed in super sacks and stored on the barge. Any spills of dry mix would be cleaned up with shovel and broom (i.e., no water would be used). Secondary containment would be used under Tremie hose connections. Any debris or excess grouting material would be removed from the site and recycled or disposed of at an appropriate facility.

Rip Rap Replacement

Upon completion of the onshore pipeline removal and grouting, the stockpiled rip rap rock would be placed back into position with the clamshell bucket. It is anticipated that the clean stockpiled rip rap would be sufficient to cover the area, and no import of new rip rap is proposed. The rip rap would be placed to cover the cut and capped end of the wastewater pipeline and result in a shoreline similar to existing conditions.

1.2.2 Pipeline Removal in the Bay

A barge (a derrick barge) and a tug boat would be used to remove the wastewater pipeline, diffuser, and the three steel plates that have been used to secure the pipeline near the diffuser. The barge would have a five to seven person crew plus 3 divers when necessary and the tugboat would have a two person crew. The barge would be equipped with two spuds and four anchors which would be controlled by deck-mounted winches. The spuds and anchors would be deployed to minimize the

disturbance of sediment (e.g. not dragging anchors along the seafloor). Only spuds would be used, unless currents and/or wind require the use of anchors; depending on the need to move or hold position, both spuds and anchor(s) could be utilized simultaneously. The anchors would be deployed and recovered with the use of a tugboat. All these operations are typical of marine industry standards in the San Francisco Bay area.

Pipeline removal would begin at the western end (diffusers) of the pipeline, approximately 2,000 feet offshore. Divers would attach straps and lines to the end of the pipeline, and a barge-mounted winch would lift the pipeline to the surface. The lifting operation would be conducted at a slow rate so that the small amount of sediment over the submerged portions of the pipeline would resettle with minimal disruption. No dredging or water-jetting of the Bay floor is planned in connection with the removal process. In shallower depths the barge would sit on the bottom during low tides. The footprint of the area potentially affected by the removal of the pipeline is the extent of the pipeline and approximately 10 feet on either side of the pipeline (approximately 40,000 square feet/0.92 acres).

The pipeline would be slowly winched in to lift the pipeline up through the sediment and water onto the barge. Because the pipeline is approximately 8 inches in diameter and the surrounding sediment is soft and loose (not significantly consolidated), the pipeline would be expected to move readily through the sediment to the surface. As the pipeline moves through the mud, the sediment would fall in on the void below. Sediment would only be resuspended at the point where the pipeline is pulled above the top of the sediment into the water. It is anticipated that only the top foot of the sediment would be disturbed as the pipeline is lifted and turbidity would be minimal at the point of extraction.

The turbidity would occur temporarily as each section of the pipeline is raised. Approximately 150-200 feet of pipeline would be removed each day. The work would occur in 10 hour shifts from approximately 7:00AM-5:00PM during the weekdays. Pipeline removal in the Bay is expected to require approximately 2 to 3 weeks. Work during the daylight hours without the use of lights will minimize the disturbance to fish and other animals in the project work area. There would be no work at night or any lights or noise from the vessel once the work has shut down each day, other than navigational safety lighting required by United States Coast Guard regulations.

The wastewater pipeline would be pulled onto the barge where divers and barge personnel would secure the pipe to be cut. The recovered pipe length for each segment that is pulled up would be determined by the final contracted barge capacity but is anticipated to be no more than approximately 50 feet in length. Once the pipeline has been extracted and placed on the barge, the

divers and platform personnel would secure the pipeline so that it can be cut. The pipeline would be cut with oxy-acetylene torches or mechanical shears. The cut portions of the pipeline would be stored on the barge. The procedure would continue shoreward with lifting pipeline, attaching it to the barge and cutting sections. The Project would minimize sediment disturbance and total suspended solids by keeping all equipment out of the water, and slowly lifting the pipeline from the sediment and through the water column. Due to the shallow water depth near shore, the last portion of the pipeline may be pulled from the shore toward the barge.

Once sufficient sections of pipeline are lifted and cut, the barge would transport the sections to the contractor's shore-based marine facility (the contractor's permanent base of operations). The barge would have the capacity to accumulate and then transport 20 50-foot sections. The entire project would therefore require two barge trips to haul the cut sections to the contractor's shore-based facility. The pipeline sections and any debris would be offloaded from the barge, the coatings would be removed as necessary, and the pipe sections would be loaded onto trucks for recycling and/or proper disposal. Any pre-recycling or pre-disposal testing of the pipeline required by the recycling/disposal facility would occur once the pipeline is on the barge or onshore at the contractor's shore-based facility. The pipeline would be recycled and/or disposed of, as appropriate, based on the type and condition of the pipe and coating.

A crew boat would ferry personnel to and from the barge. A tug boat would bring in a secondary barge and materials as needed. Trips would be minimized and vessel speeds in this area would be limited to no-wake in order to minimize disturbance to fish in the immediate vicinity.

1.3 Project Construction Schedule and Equipment to be Used

The entire project is expected to be completed over an approximately three-week period. Project-related activities would be performed between the hours of 7:00 am to 5:00 pm on weekdays, unless extended work hours are approved by the City.

Prior to commencement of the proposed Project. All construction in the water would be conducted in compliance with regulatory permits, including scheduling of work during appropriate seasons/construction windows to minimize or avoid effects on sensitive biological resources. Work would be conducted within the environmental windows between June 1 and October 31 to avoid impacts to listed species. All staging, fueling, and maintenance would be conducted on the barge in compliance with US Coast Guard (USCG) regulations.

Equipment that would be required to implement the project would consist of the following:

- A derrick barge **only** during the offshore pipeline work equipped with two spuds and four anchors (spuds and anchors are controlled by deck-mounted winches) and electrical generator;
- A crane barge **only** during the onshore pipeline work equipped with a crane and clamshell bucket, grout plant, grout pump and grout materials, mechanical pipe plugs, spuds, anchors (spuds and anchors are controlled by deck-mounted winches), and electrical generator;
- A tug to maneuver the barges;
- A work skiff for general support;
- A crew boat to shuttle the crew and material to and from the barge;
- Diver support equipment; and
- Air compressor, and welding equipment and tools.

Vessels and equipment that rely on internal combustion engines for power and/or propulsion would be kept in good working condition, and compliant with California emission regulations. Regular equipment maintenance and installation of mufflers, as appropriate on construction equipment, would be required of the contractor(s) to minimize noise levels on shore.

2 AVOIDANCE AND MINIMIZATION MEASURES

To avoid and minimize effects on federally listed species and their habitat within the Action Area, the following section provides avoidance and minimization measures that would be implemented:

- Divers will be used to affix straps to the pipeline; no jetting or mechanical disturbance of the sediments will be utilized.
- The pipeline will be lifted slowly to reduce resuspension.
- A spud barge will be used to pull the pipeline up. The spuds will minimize anchoring and disturbance to the surrounding sediments.
- Vessel fueling will be required at an approved docking facility. No cross vessel fueling will be allowed. Marine vessels generally will contain petroleum products within tankage that is internal to the hulls of the vessels.
- To remove shoreline rip-rap and expose the final segment of pipeline, the shallow draft barge shall remain in place to conduct construction activities. Spuds will be used to affix the barge in place and reduce the need for anchoring. Personnel shall be transported daily to the barge by means of a plank from the shore to limit having to used support vessels and to minimize disturbance to bottom sediments.
- If anchoring is deemed necessary by the selected contractor an anchoring plan will be developed to minimize nearshore and offshore habitat disturbance. The Anchoring Plan shall require that the use of mooring anchors by vessels and barges shall be minimized. The Anchoring Plan shall further specify that if mooring anchors must be used, then a secondary support workboat shall be used to deploy and retrieve mooring anchors and that mooring anchors shall not be dragged along the seafloor.
- Vessels and equipment that rely on internal combustion engines for power and/or propulsion will be kept in good working condition, and compliant with California emission regulations.
- General Practices will be employed to prevent soil, concrete or grout from entering the Bay as a result of activities associated with abandoning the remaining portion of pipeline onshore.
- Construction activities will be performed between June and October to avoid impacts to sensitive species.
- In coordination with the city of Hercules and town of Rodeo, residences in the vicinity of the proposed Project will be notified of the Project schedule and duration.
- The contractor will conduct the appropriate coordination with the U.S. Coast Guard (USCG) to notify other vessel traffic during removal of the pipeline offshore

3 PROJECT AREA SETTING

This section describes the action area for the removal of the pipeline. The action area is the defined geographic area potentially affected by the proposed Project. For the purpose of establishing baseline conditions from which to evaluate potential effects of the Project, the types of activities, as well as physical conditions such as substrate composition and timing, were examined and evaluated. The Project component that poses potential impacts to the species and their habitat is resuspended sediments and disturbance of benthic habitat from the removal of the pipeline. The action area for this Project is described as the extent of the pipeline and approximately 10 ft on either side of the pipeline (approximately 40,000 square feet/0.92 acres). In addition, the barge and riprap area comprise <0.01 acres.

3.1 Physical indicators

San Pablo Bay is part of a large, complex, and highly dynamic estuary. Circulation within the Bay is dependent upon tides, river flow, winds and bathymetry. It also receives inputs from stormwater runoff and wastewater from municipal and industrial sources that vary in proportion depending on the location and seasonal weather patterns. The pipeline is located within an area influenced by these hydrodynamic conditions. Current and wave patterns exhibited in the area are largely generated by the tides interacting with bottom and shoreline configurations.

Water Quality

The Project area lies within the San Francisco Bay Area Hydrologic Basin. The San Francisco Bay functions as the drainage outlet for waters of the Central Valley and includes the main Bay segments such as San Pablo and Suisun Bays. Because of its highly dynamic and complex environmental conditions, the basin supports an extraordinarily diverse and productive ecosystem. San Francisco Bay can be divided into distinct water bodies that have different physical and chemical properties. The northern reach includes three major embayments: Suisun Bay, San Pablo Bay, and Central Bay. Over 90 percent of the estuary's fresh water originates from the Sacramento- San Joaquin drainage basin and enters the northern reach. The Sacramento River provides about 80 percent of this flow, and the San Joaquin River and other tributaries, listed below, contribute the remainder. The remaining 10 percent of freshwater comes from the San Francisco Bay watershed and wastewater treatment plants `and flows into the southern reach. In the San Francisco Bay Basin Plan, the Regional Water Quality Control Board (RWQCB) identifies a number of beneficial uses of San Pablo Bay that must be protected. The beneficial uses include commercial and sport fishing, estuarine habitat, industrial service supply, fish migration, navigation, recreation, wildlife habitat, estuarine

San Pablo Bay receives water from several major tributaries: Gallinas Creek, Novato Creek, Petaluma River, Sonoma Creek, Wildcat Creek and Napa River. Of these, the Petaluma and Napa Rivers are the largest. However, the major sources of water to the bay are the Sacramento/San Joaquin delta to the east, and the ocean tides.

Since 1993, the Regional Monitoring Program (RMP) for Water Quality in the San Francisco Estuary associated with SFEI, collects water quality data and provides reports annually. The annual monitoring consists of conventional water quality parameters (ammonia, conductivity, dissolved oxygen, dissolved organic carbon, silicates, hardness, nitrate, nitrite, pH, phosphate, salinity, temperature, suspended solids, phaeophytin, and chlorophyll); trace elements (aluminum, arsenic, cadmium, cobalt, copper, iron, lead, manganese, mercury, methylmercury, nickel, selenium, silver, and zinc); trace organics (including PAHs, PCBs, phthalates, polybrominated diphenyl ethers, and pesticides); and toxicity. Water quality pollutants contained in the Bay at detectable levels include trace metals, pesticides, polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), algae blooms/low dissolved oxygen, and sediment contamination. The most recent annual RMP report indicates that, with the exception of PCBs, water quality conditions remain within water quality objectives established by the SFRWQCB for the parameters monitored.

Tidal Influence

Tidal currents in San Francisco Bay consist of semidiurnal and diurnal partial tides (USGS, 1984). Two high tides with unequal amplitudes and two low tides with unequal amplitudes occur in roughly a 24 hour period with pronounced spring-neap tidal variations (USACE, 1990). The Bay-wide tidal prism is large – representing 24 percent of the Bay volume – given the low average water depth of the Bay (6.1 meters [m]) (Conomos, 1979; Conomos et al., 1985). Specific tidal effects in the Bay are area-dependent. The Site is located along the south shore of what is referred to as San Pablo Bay.

Daily tidal fluctuations in the Bay affect sediment transport in the vicinity of the Site. Each day, an enormous volume of salt water is transported into and out of the estuary, causing strong currents that move water landward during rising (flooding) tides and seaward during falling (ebbing) tides. Under the appropriate velocities, this tidal action can facilitate either deposition or erosion, depending largely on wind-wave generated turbulence (Schoelhamer 2002). The U.S. Geological Survey (USGS) is in the process of measuring tidal exchange affects on sediment transport, but data are not currently available for the Site vicinity.

Resuspended Sediment/Turbidity

Suspended sediments are a key component of the estuarine system. The terms turbidity and suspended sediments are often used interchangeably. Turbidity refers to a number of different suspended particulates including plankton and sediments. Suspended sediments refer to the actual sediment component in the water column. Most near shore environments, and estuaries in particular, tend to have higher levels of turbidity or suspended sediment loads due to discharges from rivers, drainages and the relative shallow nature of the environment.

Suspended sediment concentrations in San Francisco Bay tend to be extremely variable and strongly correlated to season and water depth (Buchanan and Ganju, 2006and 2005, McKee, Ganju, Schoelhamer, 2006). Several groups, including the San Francisco Estuary Institute (SFEI) and the U.S. Geological Survey (USGS), have monitored suspended sediment loads throughout San Francisco Bay for many years. Suspended sediment concentrations have ranged from well over 1,000 milligrams per liter (mg/L) near the bottom, to as little as 10 mg/L in near surface measurements (Buchanan and Ganju, 2006). The Action Area footprint where the pipeline will be removed is in relatively shallow water with water depths ranging between -0 and -8 feet MLLW. This area is influenced by nearshore discharges, currents, and wind- generated sediment disruption.

Resuspended sediments can influence the behavior, distribution and growth of listed species. Water quality in the action area may be slightly impacted during construction activities. Disturbance of soft bottom sediments during the removal of the pipeline is likely to result in temporarily increased levels of suspended sediments/turbidity and potential release of contaminants from sediments in the substrate.

High levels of turbidity may affect fish by disrupting normal feeding behavior, reducing growth rates, increasing stress levels, and reducing respiratory functions (Benfield and Minello 1996; Nightingale and Simenstad 2001). Review of the literature regarding the effects of turbidity associated with construction in the aquatic environment on anadromous salmonids indicates turbidity may interfere with visual foraging, increase susceptibility to predation, and interfere with migratory behavior. There is little direct information available to assess the effects of turbidity in San Francisco Bay estuary on juvenile or adult green sturgeon. The green sturgeon forages in bottom sediments and thus is well adapted to living in estuaries with fine sediment substrate and is tolerant of elevated levels of turbidity.

The extent of turbidity or resuspended sediments directly resulting from removal of the portion of pipeline that is submerged will depend on the tide, currents, and wind conditions during

these activities. It is anticipated that the increased turbidity will be minor and localized due to the type of work performed by this Project. These areas of turbidity are expected to rapidly disperse from the Project area with tidal circulation, as strong currents are typical in this area.

Listed species in the estuary commonly encounter areas of increased turbidity due to storm flow runoff events, wind and wave action, and benthic foraging activities of other aquatic organisms. Fish generally react by avoiding areas of high turbidity and return when concentrations of suspended solids are lower. The minor and localized areas of turbidity associated with removal of the submerged portion of the pipeline is not expected to result in harm or injury, or behavioral responses that impair migration, foraging, or make listed fish more susceptible to predation. If listed fish species temporarily relocate from areas of increased turbidity, areas of similar value are available adjacent to the work site which offer habitat of equal or better value for displaced individuals. Adjacent habitat areas also provide adequate carrying capacity to support individual fish species that are temporarily displaced during the Project's construction activities.

Although removal of the pipeline may increase turbidity for a short period of time (3 weeks), operations will be restricted to the period between June 1 and October 31. This period avoids the migration seasons of both adult and juvenile anadromous salmonids; thus, no direct effects to CCC steelhead, CV steelhead, Sacramento River winter-run Chinook salmon, and CV spring-run Chinook are expected to occur. Green sturgeon, delta smelt and longfin smelt may be in the area year-round and may be exposed to the direct effects of the temporary disturbance of suspended sediments by the Project.

Sediment Quality

The sediment that has accumulated in the area of the pipeline is considered recent deposition of unconsolidated (loose) sediment. This material accretes or accumulates as a result of natural sediment inflows from rivers, creeks, surface runoff, and, from re-settlement of sediment suspended in Bay waters by natural processes (i.e., tidal action, wind, etc.).

Pipeline removal activities could resuspend chemicals of concern (COCs) into the water column. Resuspension of sediments within the water column increases the exposure potential of COCs and their bioavailability to receptors within the area. However, most organic contaminants in sediment are tightly bound and are not easily released during short-term resuspension. To address concerns related to potential resuspension of COCs the sediment within the project site was collected, tested for COCs and submitted for a suspended sediment bioassay test.

A sampling and analysis plan was developed and submitted to the DMMO agencies. The federal and state agencies that comprise the Dredge Material Management Office (DMMO) and are responsible for regulating sediment management programs in the San Francisco Bay area include: the U.S. Environmental Protection Agency, Region 9, (USEPA); the U.S. Army Corps of Engineers, San Francisco District, (USACE); the San Francisco Regional Water Quality Control Board, Region 2, (RWQCB); the Bay Conservation and Development Commission (BCDC); and the State Lands Commission (SLC) as well as the federal and state resource agencies NMFS, USFWS and California Department of Fish and Wildlife (CDFW).

The SAP was approved by the DMMO and resource agencies (PER 2012). In order to assess whether resuspended sediments will represent an adverse impact during pipe removal operations and per the approved Sampling and Analysis Plan (PER 2013), field personnel collected sediment cores approximately 1 foot below the estimated pipeline depth or refusal along the length of the buried portion of the pipeline (approximately 1,200 ft of pipeline). In areas where the pipeline is exposed (approximately 800 ft of pipeline), surface samples were collected using a Van-Veen sampler. A composite sample comprising equal portions of the sediment cores and surface sediment samples was then submitted for chemical and biological analysis as per the approved SAP (PER 2013). Eight samples were collected from the wastewater outfall pipeline area (Figure 3-1). A detailed results document was generated and is provided as Appendix A. Tables 3-1 through 3-5 summarize the chemical and conventional parameters from the composite sample.

The “HP-Comp” site sediment was ~61.9% total solids, and was 100% fines (silts and clays). TOC levels were moderate (1.0%). All of the metal analytes for the HP-Comp sediments were similar to or below San Francisco Bay (SF Bay) background levels (SFRWQCB 1998). While the cadmium level was slightly above SF Bay background levels, it was below the cadmium Effects Range-Low (ER-L) of 1.2 mg/kg (Long et al 1995) and is unlikely to cause an adverse biological effect. Organotins and organochlorine pesticides were below their respective MDLs. Total PAHs, total PCBs, and total DDTs were reported at 1,207 µg/kg, 19.3 µg/kg and 0 µg/kg, respectively; each was below SF Bay background levels (SFRWQCB 1998).(This data looks favorable- good)

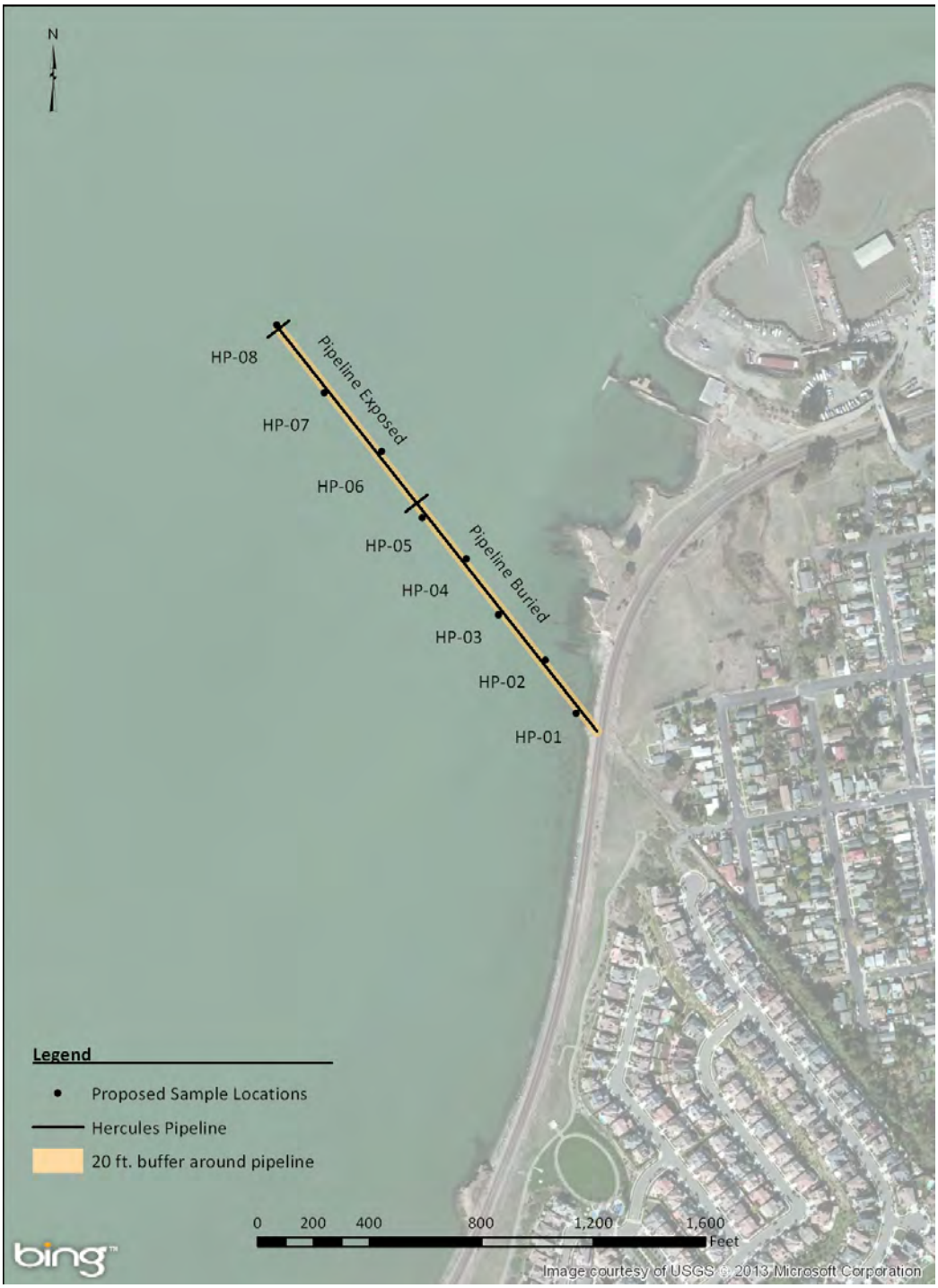

Figure 3-1 Sediment Sampling Station Locations

Table 3-1. Hercules Pipeline Sediment Grain Size, Total Solids (%), and Total Organic Carbon (%).

Analytes	HP-Comp
% Gravel	0.0
% Sand	0.0
% Silt	53.1
% Clay	46.9
Total % Fines (silt & clay)	100
Total Solids (%)	61.9
Total Organic Carbon (%)	1.0

Table 3-2. Hercules Pipeline Sediment Metals Concentrations (mg/kg, dry wt).

Metals	HP-Comp	Bay Ambient <100% Fines
Arsenic	6.34	15.3
Cadmium	0.438[a]	0.33
Chromium	37.3	112
Copper	25.0	68.1
Lead	17.5	43.2
Mercury	0.164	0.43, (0.469)[b]
Nickel	37.0	112
Selenium	<0.118	0.64
Silver	0.129 J	0.58
Zinc	59.3	158
Butyltin	<1.1	
Dibutyltin	<1.1	
Tributyltin	<0.93	
Tetrabutyltin	<1.2	

Notes: a - Result is below the cadmium ER-L of 1.2 mg/kg (Long et al 1995).
b - San Francisco Bay 99th percentile mercury concentration (SFEI 2013)

Table 3-3. Hercules Pipeline Sediment PAH Concentrations (µg/kg, dry wt).

PAHs	HP-Comp	Bay Ambient <100% Fines
Acenaphthene	<2.9	26.6
Acenaphthylene	12 J	31.7
Anthracene	41	88
Benzo(a)anthracene	44	244
Benzo(a)pyrene	61	412
Benzo(b)fluoranthene	200	371
Benzo(e)pyrene	130	-
Benzo(g,h,i)perylene	60	310
Benzo(k)fluoranthene	160	258
Biphenyl	2.5 J	-
Chrysene	66 J	289
Dibenzo(a,h)anthracene	15 J	32.7
2,6-Dimethylnaphthalene	11 J	-
Fluoranthene	60	514
Fluorene	6.0 J	25.3
Indeno(1,2,3-cd)pyrene	57	382
2-Methylnaphthalene	4.2 J	-
1-Methylnaphthalene	<3.2	-
1-Methylphenanthrene	<2.6	-
Naphthalene	8.4 J	55.8
Perylene	40	-
Phenanthrene	26	237
Pyrene	200	665
1,6,7-Trimethylnaphthalene	<2.3	-
Dibenzothiophene	2.2 J	-
Total Detected PAHs	**1,207**	**3,390 4800[a]**

a - San Francisco Bay Bioaccumulation Trigger Level (USACE/USEPA 2011, SFEI 2013).

J - Analyte was detected at a concentration below the reporting limit and above the laboratory method detection limit; the reported value is therefore an estimate.

All results below the MDL are reported as < the MDL.

Table 3-4. Hercules Pipeline Sediment Organochlorine Pesticide Concentrations (µg/kg, dry wt).

Organochlorine Pesticides	HP-Comp	Bay Ambient <100% Fines
Aldrin	<0.51	1.1
alpha-BHC	<0.52	-
beta-BHC	<0.43	-
delta-BHC	<0.41	-
gamma-BHC (Lindane)	<0.56	-
Total Detected BHC	**0**	**0.78**
Alpha Chlordane	<0.52	
Gamm Chlordane	<0.51	
Oxychlordane	<0.45	
Chlordane	<5.3	1.1, 37[a]
Dieldrin	<0.53	0.44, 1.9[a]
Endosulfan I	<0.42	-
Endosulfan II	<0.45	-
Endosulfan Sulfate	<0.55	-
Endrin	<0.58	-
Endrin Aldehyde	<0.39	-
Endrin Ketone	<0.56	
Heptachlor	<0.52	-
Heptachlor Epoxide	<0.57	-
Methoxychlor	<0.52	
Cis-nonachlor	<0.47	
Trans-nonachlor	<0.47	-
Toxaphene	<10	-
2,4'-DDD	<0.55	see total DDT
4,4'-DDD	<0.51	see total DDT
2,4'-DDE	<0.49	see total DDT
4,4'-DDE	<0.48	see total DDT
2,4'-DDT	<0.49	see total DDT
4,4'-DDT	<0.54	see total DDT
Total Detected DDT	**0**	**7.0, 50[a]**

a - San Francisco Bay Bioaccumulation Trigger Level (USACE/USEPA 2011, SFEI 2013).

J - Analyte was detected at a concentration below the reporting limit and above the laboratory method detection limit; the reported value is therefore an estimate.

All results below the MDL are reported as < the MDL.

Table 3-5. Hercules Pipeline Sediment PCB Congener Concentrations (µg/kg, dry wt).

PCBs	HP-Comp	Bay Ambient <100% Fines
PCB 008	<0.14	a
PCB 018	<0.25	a
PCB 028	<0.16	a
PCB 031	<0.19	a
PCB 033	<0.18	a
PCB 044	0.33 J	a
PCB 049	0.61 J	a
PCB 052	0.73 J	a
PCB 056	<0.22	a
PCB 060	<0.17	a
PCB 066	0.31 J	a
PCB 070	0.50 J	a
PCB 074	<0.15	a
PCB 087	0.41 J	a
PCB 095	1.3	a
PCB 097	0.70 J	a
PCB 099	0.81	a
PCB 101	1.9	a
PCB 105	0.56 J	a
PCB 110	1.7	a
PCB 118	1.6	a
PCB 128	0.53 J	a
PCB 132	<0.27	a
PCB 138/158	2.0	a
PCB 141	0.31 J	a
PCB 149	1.2	a
PCB 151	0.25 J	a
PCB 153	1.9	a
PCB 156	0.32 J	a
PCB 170	0.33 J	a
PCB 174	0.27 J	a
PCB 177	<0.20	a
PCB 180	0.44 J	a
PCB 183	<0.18	a

Table 3-5. cont. Hercules Pipeline Sediment PCB Congener Concentrations (µg/kg, dry wt).

PCBs	HP-Comp	Bay Ambient <100% Fines (SFRWQCB 1998)
PCB 187	0.25 J	a
PCB 194	<0.15	a
PCB 195	<0.085	a
PCB 201	<0.092	a
PCB 203	<0.17	a
Total Detected PCBs	**19.3[d], 12.4[e]**	22.7, 29.3[b] 17.0[c]

a - No reference value has been established for the individual congeners; the Total Detected PCB congener reference value (SFRWQCB 1998) is used as a default value.
b - San Francisco Bay 99th percentile PCB concentration (SFRWQCB 2013).
c - San Francisco Bay Bioaccumulation Trigger Level (USACE/USEPA 2011, SFEI 2013).
d - Summary includes J flagged data.
e - Summary excludes J flagged data.
J - Analyte was detected at a concentration below the reporting limit and above the laboratory method detection limit; the reported value is therefore an estimate.
All results below the MDL are reported as < the MDL.

In addition, the suspended sediment bioassay was conducted as well. The 96-hr survival test with *Americamysis bahia* was performed on the sediment elutriate to determine whether resuspended sediments would represent an adverse impact during pipeline removal operations. Positive and negative Lab Control treatments were tested concurrently with the site sediment elutriate.

The test results for the sediment composite elutriate were compared with the test organism responses at the negative Lab Control treatment to determine the potential impact of suspended sediment resulting from the proposed pipeline removal on pelagic organisms in the near vicinity. The following criteria were used:

1. If the survival response in the 100% sediment elutriate treatment is ≥ the Control (clean seawater) treatment response(s), the sediment is <u>not</u> predicted to be acutely toxic to water column organisms.
2. If the reduction in survival response in the 100% sediment elutriate treatment relative to the Control treatment is ≤10%, there is no need for statistical analyses and no indication of water column toxicity attributable to the test sediments.
3. If the reduction in survival response in the 100% sediment elutriate treatment relative to the Control treatment is >10%, then the data must be evaluated statistically to determine the magnitude of toxicity.

The results of this test are summarized below in Table 3-6. There was 100% survival at the Control treatment, indicating an acceptable survival response by the test organisms; there was 98% survival in the Site Water. There were ***no*** significant reductions in survival in any of the elutriate treatments; the No Observable Effect Concentratoin (NOEC) was 100% elutriate indicating that the 100% elutriate sample was not toxic to mysids.

Table 3-6. Effects of HP-Comp Sediment Elutriate on *Americamysis bahia.*

Test Treatment	Mean % Survival
Lab Control	100
1%	98
10%	100
50%	100
100%	100
Site Water	98
Survival NOEC =	100% elutriate[a]
Survival LC50 =	>100% elutriate[a]

a - Due to the absence of significant impairment, the LC50 could not be calculated but can be determined by inspection to be >100% elutriate.

Based on these results, sediments that may be displaced or resuspended during the removal of the Hercules pipeline would not represent an adverse environmental impact to species in the immediate or general vicinity of operations.

3.2 Habitats

The predominant habitat at the Project site is aquatic, including open water (pelagic), soft sediment (benthic) and intertidal rip rap. The open waters of San Pablo Bay vary in temperature, salinity, dissolved oxygen, and turbidity within the water column depending on water depth, location, and season. The water column can be classified as shallow-water/shoals and deepwater/channels (NOAA 2007). The water column provides habitat for plants (phytoplankton), invertebrates (zooplankton), fishes, birds, and marine mammals.

The fish community inhabiting San Pablo Bay and the western portions of Suisun Bay, including the Project site, is dominated by northern anchovy (*Engraulis mordax*), Pacific herring (*Clupea pallasii*), American shad (*Alosa sapidissima*), jacksmelt (*Atherinopsis californiensis*), longfin smelt (*Spirinchus thaleichthys*), and striped bass (*Morone saxatilis*). Seasonally, Chinook salmon (*Onchorhynchus tshawytscha*) becomes a

dominant species and the delta smelt (*Hypomesus transpacificus*) can also be present as well as adult steelhead trout and smolts (*Onchorhynchus mykiss*) (See Section 4 for more detail on these listed species.)

More than 30 fish taxa have been observed inhabiting or utilizing the benthic habitat of San Pablo Bay between 2000 and 2007. This fish community is dominated by the Bay goby (*Lepidogobius lepidus*), English sole (*Parophrys vetulus*), striped bass (*Morone saxatilis*), plainfin midshipman (*Porichthys notatus*), Pacific staghorn sculpin (*Leptococottus armatus*), longfin smelt (*Spirinchus thaleichthys*), yellowfin goby (*Acanthogobius flavimanus*), cheekspot goby (*Ilypnus gilberti*), white croaker (*Genyonomus lineatus*), speckled sanddab (*Citharichthys stigmaeus*), shiner surfperch (*Cymatogaster aggregata*), California halibut (*Paralichthys californicus*), starry flounder (*Platichthys stellatus*), Pacific herring (*Clupea pallasii*), American shad (*Alosa sapidissima*), and diamond turbot (*Pleuronichthys guttulatus*) (CDFG Interagency Ecological Program 2000-2007). Several of the groundfish listed above, such as English sole and starry flounder, as well as other occasional inhabitants such as sand sole (*Psettichthys melanostictus*) and big skate (*Raja binoculata*), are covered by the Pacific Groundfish Management Plan which identifies San Francisco Estuary as Essential Fish Habitat (EFH) for these species (*Olberding 2008*). The North American green sturgeon (*Acipenser medirostris*) is known to inhabit the waters and bottom (benthic) habitat of San Pablo Bay.

San Pablo Bay Intertidal Habitat - The pipeline reaches land and is protected by quarried rock and concrete debris. This shoreline riprap provides some hard bottom intertidal habitat that supports barnacles, bryozoans, hydrozoans, the bay mussel, occasional sponges, and green algae. In addition, several species of crabs, isopods, snails, and amphipods may also be present.

Soft bottom substrate ranges between soft mud with high silt and clay content and areas of sand. These latter tend to occur in locations subjected to high tidal or current flow. The predominant seafloor habitat in the Project area is soft sediment composed of combinations of mud/silt/clay particles. Exposure to wave and current action, temperature, salinity, and light penetration determine the composition and distribution of organisms within these soft sediments. These areas support mollusks, amphipods, polychaetes and several species of polydora (USFWS 1988).

4 LISTED SPECIES AND RESOURCES OF CONCERN POTENTIALY IN THE STUDY AREA

The federal Endangered Species Act provides for the listing of "any subspecies of fish or wildlife or plants, and any distinct population segment [DPS] of any species of vertebrate fish or wildlife which interbreeds when mature. For Pacific salmon (genus *Oncorhynchus*), the term "distinct population segment" has become nuanced, if not clarified, by use of the term ESU (Waples 1991). The mixed goals of management and conservation have resulted in applications of Waples' ESU framework that are neither biologically consistent nor legally stable (Ford 2004, Williams 2006). For the purpose of this assessment, the term ESU will be defined simply as a population segment, or part thereof, or a group of such segments, that has been accorded special status under authority of federal or California state endangered species statutes.

The five species dealt with in this section are southern DPS green sturgeon (*Acipenser medirostris*), chinook salmon *(Oncorhynchus tshawytscha)* , steelhead (*O. mykiss*), Delta smelt (*Hypomesus transpacificus*), and longfin smelt (*Spirinchus thaleichthys*). For all species except steelhead, catch data for San Pablo Bay stations (Figure 4-1) are available from the California Department of Fish and Wildlife (CDFW) and the Interagency Ecological Program for the San Francisco Estuary's Bay Study (Orsi 1999). Bay Study otter trawl and midwater trawl data consist of monthly samples for the years 1980 through 2011 and were supplied by Ms Kathy Hieb of CDFW Stockton. All catch data for both nets are reported as raw numbers, or as standardized catch per hectare or (in the case of longfin smelt) as estimated abundance per hectare.

San Pablo Bay is basically a shallow embayment bisected by a deep channel formed by tidal and residual flows to and from the Delta. The Site is on what will be referred to here as the southeast shoal (Figure 4-1), near CDFW Bay Study Station 319.

4.1 Green sturgeon Southern DPS (*Acipenser medirostris*): Status: federal threatened (FT)

Green sturgeon is the most widely distributed member and the most marine-oriented of the sturgeon family, entering rivers only to spawn. Adults (age 15 yrs +) of the southern DPS of green sturgeon enter the Sacramento River in winter and spawn in spring and early summer; juveniles remain in fresh and estuarine waters for one to four years and then begin to migrate out to the sea (Moyle et al 1995, Moyle 2002, Israel et al. 2004). Subadult green sturgeon present in San Francisco Bay in summer are probably a mix of Northern and Southern DPSs (NOAA 2005b), although most of them are of the southern DPS (Israel et al. 2009). The summertime aggregations in San Pablo Bay, and in estuaries in general, are not associated with spawning (Lindley et al. 2008, Israel et al. 2009).

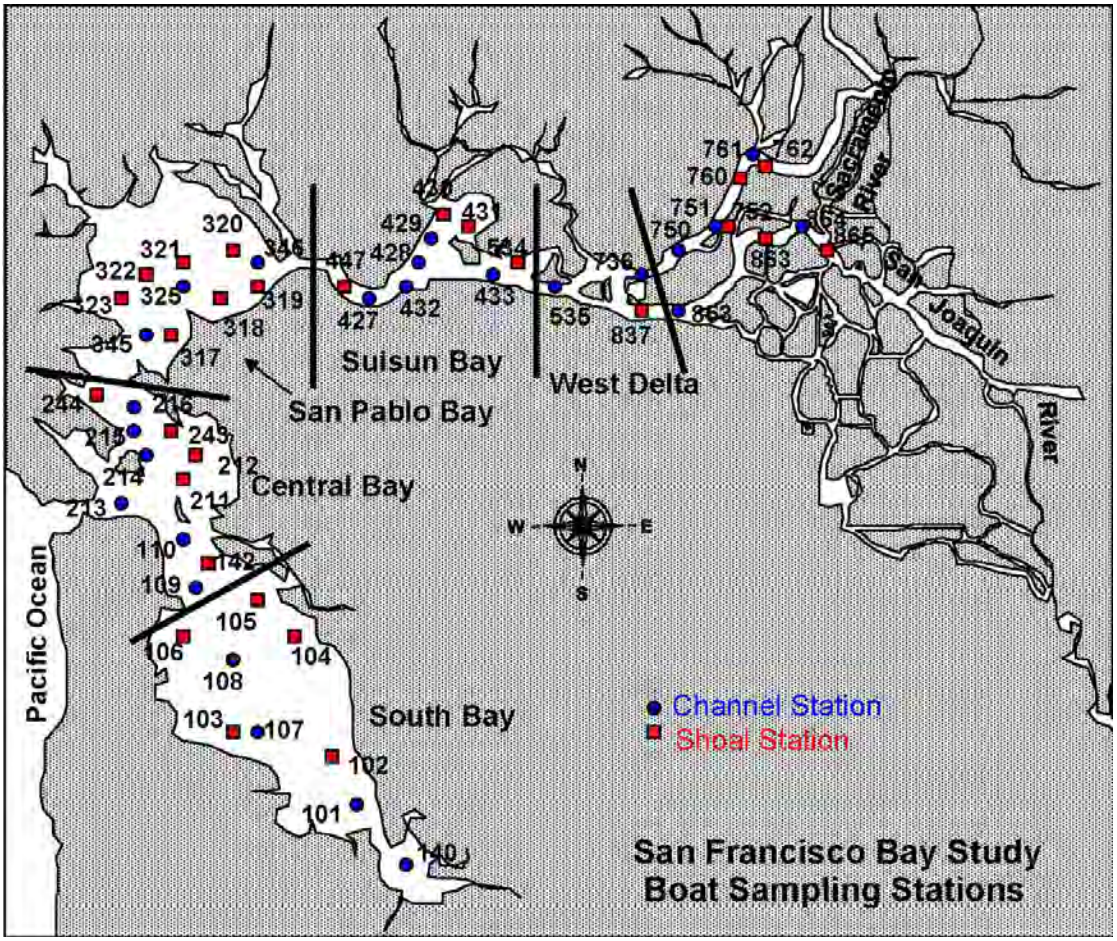

Figure 4-1 CDFW Sampling Stations

Presence during Project activities

The probability of a green sturgeon being in the Project vicinity at any time of year is low and encountering Project activities is very low. Given the uncertain numbers of this species in the Bay and uncertainties as to their movements, this probability cannot be quantified.

Encounter rates at Project site

Bay Study data are sparse for this large-bodied fish: in 32 years, only 63 specimens were captured by the otter trawl throughout the estuary, and just nine of these were taken in San Pablo Bay. None were taken on the southeast shoal in summertime, and none were taken at station 319 in any month. An alternate assessment of the distribution pattern of green sturgeon,

though not of their abundance, can be judged from studies of acoustically tagged individuals, as described below.

Hearn et al. (2010) reported that approximately 400 acoustically tagged green sturgeon were at large in the estuary at the time of their study, and that detections of these tags were common in San Pablo Bay. Some idea of the propensity of green sturgeon to venture very near shore may be had from those authors' observations at marina sites: "No green sturgeon were detected at most of the marina sites (Berkley, Larkspur, San Rafael Canal, Port Sonoma, Emeryville). One fish was detected at Richmond Point for 22 minutes, while five fish were detected at Vallejo Marina…. Most of the fish in the system were detected by the receiver at Martinez Marina (median exposure time = 20 minutes), although it must be taken into account that **this receiver probably detects fish out into the channel**. The median exposure time and number of fish detected were both greatest in the San Pablo Bay Channel (SP Buoys 7-10)" (emphasis added).

With regard to the exposure of green sturgeon to the proposed pipeline removal, it can thus be said that the probability of encounter, though unknown, is probably small, and that the location of the Project in shallow, nearshore water minimizes the chance of an encounter.

4.2 Salmonids (2 species, 4 ESUs)

San Francisco Bay serves as a migratory pathway for two anadromous salmonid species: chinook salmon *(Oncorhynchus tshawytscha)* and steelhead (*O. mykiss*). Williams (2006) stated, "Chinook salmon and steelhead have highly variable life-history patterns, with age at spawning in Chinook varying from one year to seven years, and age at emigration to estuaries or the ocean ranging from a few days to two years. Steelhead have even more variable life histories and may omit ocean rearing altogether…" Both species spawn in gravel-bed, freshwater streams. A biologically profound difference between the two species is that chinook die after spawning once (semelparous), whereas steelhead have the capacity to survive the spawning run, return to sea, and spawn again in future years (iteroparous) (for recent reviews of biological literature see Williams 2006, 2012; for recent data and discussions of out-migration of juveniles through San Francisco Bay see Hearn et al. 2010, Jahn 2011a). The following salmonid ESUs (NOAA Fisheries 2005) have the potential to be near the proposed dredging site.

Chinook Salmon, Sacramento winter-run: *Status: State and Federal Endangered (***SE, FE***).*

Winter chinook, cut off from their native spawning grounds by Shasta Dam, now spawn as a single population in the main stem of the Sacramento River below the dam, where cool water released from the reservoir provides naturalistic habitat (Moyle 2002, Lindley et al. 2007). Spawning occurs in early summer, and juveniles spend 5-10 months in the upper river before

migrating to the Delta, where they spend an "indeterminate time" before migrating to the ocean (Moyle 2002). Summer temperatures in the Delta and Suisun Bay are not salubrious for salmon, and therefore the migration through San Francisco Bay likely occurs in late winter and spring.

Chinook Salmon, Central Valley spring-run: *Status:* **ST, FT**.

Central Valley spring chinook currently exist as three independent naturally spawning populations in the upper Sacramento system plus a hatchery population on the Feather River (Lindley et al. 2007). The Feather River part of this ESU is now believed to be closely related to fall-run fish (Williams 2012). Williams (2012) stated, "Spring Chinook have the most variable juvenile patterns [of the four named Central Valley chinook runs], based on monitoring of wild populations on Mill, Deer, and Butte creeks." The Butte Creek population, at least, appear to be mainly fry migrants to low-gradient streams (Williams 2012), but some spring chinook have an ocean-type life history (Williams 2006), in which fry migrate to the ocean soon after emergence. Until on-going genetic work is complete, the timing of these fish entering San Francisco Bay will remain poorly known, although the migration probably occurs before summer temperatures arrive in the Delta and Suisun Bay.

Steelhead , Central California Coast: *Status:* **FT.**

The Central California Coast steelhead ESU extends from the Russian River in the north to Aptos Creek in the south and includes fish in tributaries to San Francisco and San Pablo Bays (Moyle 2002). These fish migrate to freshwater in winter and spawn in winter and spring, then return to the ocean if they are in good health and not isolated by low water (Moyle 2002). This ESU exists mainly as resident trout populations above dams, flood control projects, etc. (Moyle 2002). However, some steelhead runs do occur in streams tributary to San Francisco Bay. The nearest steelhead runs to the Project area are in the Napa River to the north and Pinole Creek just seaward of the site (Leidy et al. 2005). Koehler and Blank (2012) have documented outmigrations of several thousand juvenile steelhead from Napa River in recent years, with most leaving freshwater by June.

Steelhead , California Central Valley: *Status:* **FT.**

All Central Valley steelhead are considered winter steelhead. Busby et al. (1996) wrote, "Steelhead within this ESU have the longest freshwater migration of any population of winter steelhead. There is essentially a single continuous run of steelhead in the upper Sacramento River. River entry ranges from July through May, with peaks in September and February; spawning begins in late December and can extend into April (McEwan and Jackson 1996)."

Presence of Salmonids during Project Activities

Chinook and steelhead appear to make little use of nearshore habitats in San Francisco Bay (as opposed to the brackish marshes upstream of San Pablo Bay; Williams 2006). This is because the fish (at least in modern times) migrate rapidly through the lower bays on their way to the ocean (MacFarlane and Norton 2002, Hearn et al. 2010, Jahn 2011a). In the CDFW Bay study, trawl captures of juvenile chinook of all sizes/stages (fry/fingerling/smolt) were mainly in the deep channels of San Pablo and Central Bay (Jahn 2011a). Chinook considered by CDFW not to be fall-run fish (i.e., the larger fish believed to represent winter-, spring-, and late fall-run ESUs) were taken in CDFW's Bay study mainly in the months of April through early June (Jahn 2011a), although the size-at-date criteria by which the fish were assigned to runs is not reliable (Williams 2006, Jahn 2011b). . The timing of steelhead outmigration is even less well known, but trawl capture data are consistent with a late-winter and spring migration (Jahn 2011a). The best that can be said is that some fish in the listed salmonid ESUs may be present near the San Francisco waterfront at the proposed time of dredging (May), but are likely to be away form shore, in the tidal channel where the out-migration occurs (see the next section).

Encounter Rates at Project Site

Bay Study captures of steelhead were rare, with only a single specimen taken by otter trawl (in the San Joaquin River) and just seven taken by the midwater trawl in San Pablo Bay, all in winter and spring.

Chinook tend to outmigrate at smaller sizes than steelhead and so were taken in small but cumulatively significant numbers in the Bay Study, especially in the midwater trawl (Table 4-1). The identity of these chinook captures by run is poorly known (Harvey 2011, Jahn 2011b), but the vast majority of fish captured after May are deemed by CDFW to be fall-run fish (Figure 4-2), and thus not members of one of the listed ESUs.

Inasmuch as the population sizes of the four listed salmonid ESUs are poorly known, and their time of passage through the bay is only roughly known, there are no data from which to directly estimate the abundance of listed salmonid ESUs in the immediate vicinity of the Hercules Project. Salmonid smolts tend to migrate through San Pablo and Central Bays in a few days time (Hearn et al. 2010, Jahn 2011a). The fish also tend to remain in deep channel habitat, where the current is swifter, speeding their conveyance to the ocean. Moreover, because of the timing of the migration (red line in Figure 4-2), listed chinook are expected to be rare near Hercules during the time of the proposed Project. Steelhead captures in San Pablo Bay are not common, but here again, the Data of Koehler and Blank (2012) suggest that the outmigration occurs

mainly in winter and spring, such that few if any fish of the central California Coast ESU would be expected at the time of the proposed Project. Because summertime temperatures in the Delta are generally too warm for salmonids, outmigrants of the Central Valley ESU are also expected to have passed by the Project site before the onset of the Project.

Table 4-1. Total CDFW midwater trawl captures of chinook salmon in San Pablo Bay, 1980-2011.

Month\Station	317	318	319	320	321	322	323	325	345	346	Total
Jan	0	0	0	0	1	0	0	0	0	0	1
Feb	0	1	0	3	0	0	0	0	1	0	5
Mar	3	0	5	2	0	0	0	0	0	0	10
Apr	7	3	18	10	2	8	1	17	8	19	93
May	74	35	66	25	27	19	21	49	28	94	438
Jun	29	27	27	17	18	12	19	33	24	34	240
Jul	20	20	8	10	6	0	3	20	8	14	109
Aug	3	2	4	2	3	1	4	3	3	4	29
Sep	2	0	2	1	4	0	1	1	2	5	18
Oct	0	0	0	0	0	0	0	0	0	0	0
Nov	0	0	0	0	0	1	0	1	0	0	2
Dec	0	0	0	0	1	1	0	0	0	0	2
Total	138	88	130	70	62	42	49	124	74	170	947

4.3 Longfin smelt (*Spirinchus thaleichthys*): Status: ST.

The United States Fish and Wildlife Service (USFWS 2012) stated "The U.S. Fish and Wildlife Service has found that the San Francisco Bay-Delta Distinct Population Segment (DPS) of longfin smelt warrants protection under the Endangered Species Act. However, the Service is precluded at this time from proposing to add the species to the Federal List of Threatened and Endangered Species by the need to address other higher priority listing actions."

CDFW (CDFG 2009) summed up San Francisco Bay longfin smelt biology as follows:

> Longfin smelt are pelagic, estuarine fish which range from Monterey Bay northward to Hinchinbrook Island, Prince William Sound Alaska. In California, they have been commonly collected from San Francisco Bay, Eel River, Humboldt Bay and Klamath River. Presently, the only California collections made in the 1990s have been from the Klamath River and San

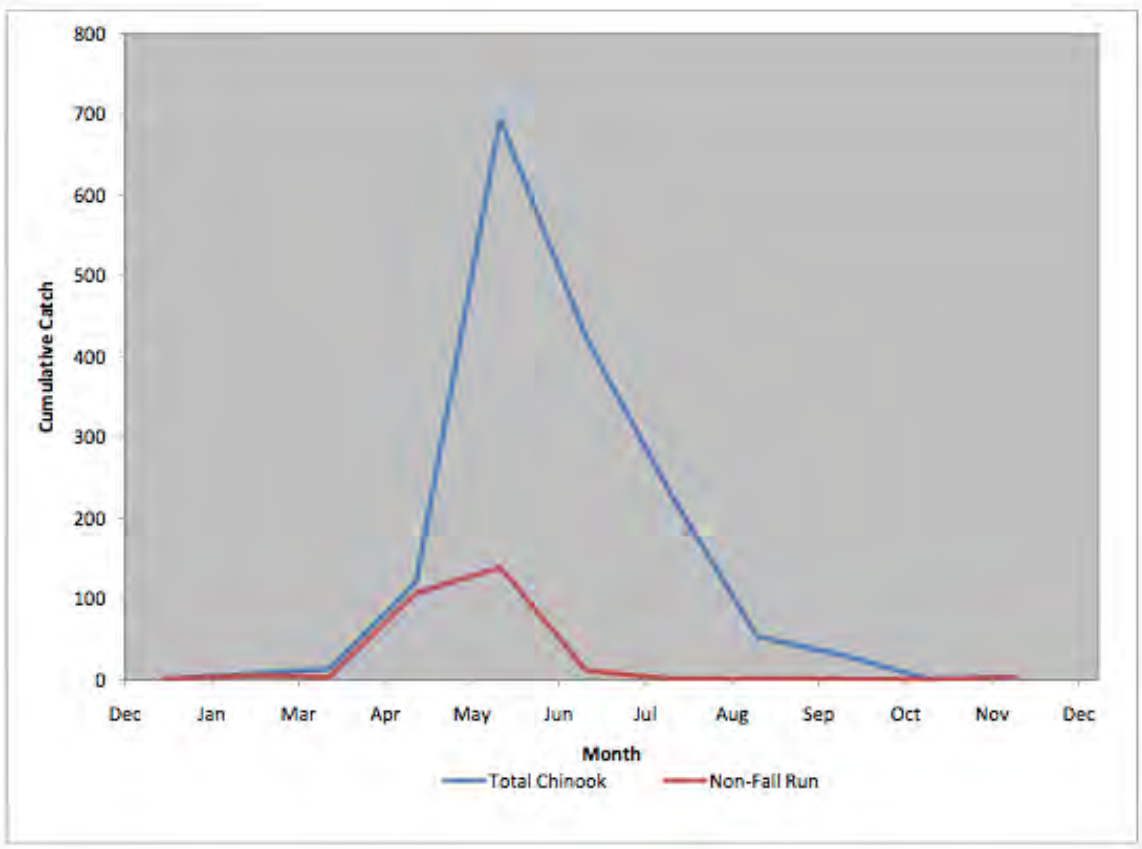

Figure 4-2. Cumultive Bay Study midwater trawl chinook captures by month (from Jahn 2011a)

Francisco Bay. Longfin smelt reach a maximum size of about 150 mm TL. Longfin smelt comprise a small portion of the "whitebait" fishery in San Francisco Bay and have no sport fishery value.

Maturity is reached toward the end of their second year. As they mature in the fall, adults found throughout San Francisco Bay migrate to brackish or freshwater in Suisun Bay, Montezuma Slough, and the lower reaches of the Sacramento and San Joaquin Rivers. Spawning probably takes place in freshwater.

In April and May, juveniles are believed to migrate downstream to San Pablo Bay; juvenile longfin smelt are collected throughout the Bay during the late spring, summer and fall , and occasionally venture into the Gulf of the Farallons. Juveniles tend to inhabit the middle and lower portions of the water column.

Longfin smelt is well-sampled by several programs run by the California Department of Fish and Wildlife (formerly CDFG), in particular the Bay Study, which provided data for the analyses presented below and in Appendix B. Annual abundance of longfin smelt is increased in wet years (as indicated by smaller values of X2; see Jassby et al. 2005), a relationship shown in Figure 4-3. In recent years, X2 (the distance upstream from the Golden gate at which the bottom salinity averages 2 PSU over a tidal cycle) is

managed such that large landward movements of the brackish habitat generally do not occur (Feyrer et al. 2007).

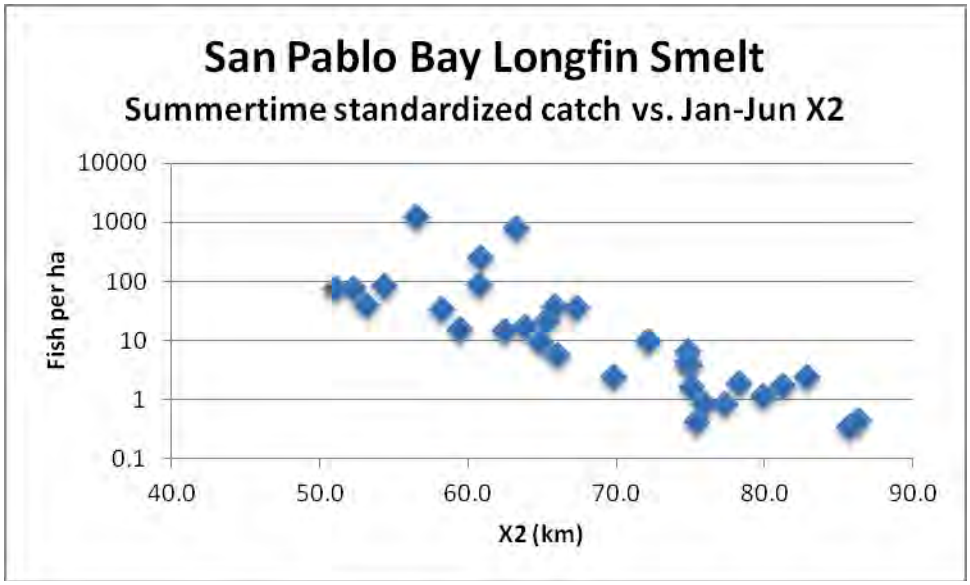

Figure 4-3. Annual average (June through October) CPUE of longfin smelt in San Pablo Bay otter trawl samples vs. January through June X2 (averaged data from http://www.water.ca.gov/dayflow/docs/)

The decline in abundance of longfin smelt in the past decade is well-documented (Jassby et al. 2005, CDFG 2009 and references therein) and is the reason for the State and incipient federal listings of the species. USFWS (2012) stated, "The combined effects of reduced freshwater flows, the invasive overbite clam (reduced levels of phytoplankton and zooplankton that are important to the Bay- Delta food web), and high ammonium concentrations act to significantly reduce habitat suitability for longfin smelt." We note here that none of these major threats apply to San Pablo Bay, although the movement of smelt into San Pablo Bay is certainly augmented by high river flows in some years, affecting local abundance even during the recent period of low abundance (Figure 4-4).

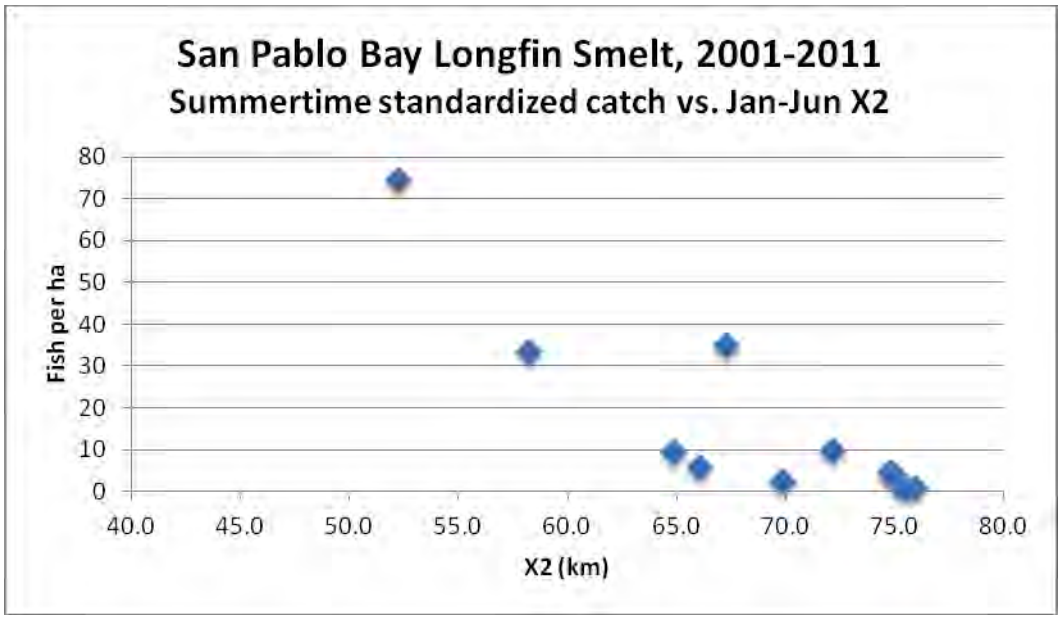

Figure 4-4. Summertime catch rate of longfin smelt during the modern era vs. X2

Presence during Project activities

Unless the Project is performed in a wet year, then the expected San Pablo Bay capture rate of smelt would be expected to be <10 fish per hectare (Figure 4-4; the average summer catch for all the years shown in the figure is 16 fish per Ha). The mean June-October catch rate from 2001-2011 at station 319, near the proposed Project site, was <4 fish/Ha. The catch rate is not abundance *per se*, because small fish can escape through the meshes of the net and older fish may avoid the net. As developed in Appendix A, a conservative estimate is that true longfin smelt abundance is roughly 4 times the standardized catch rate.

Encounter Rates at Project Site

Longfin smelt may be present within the footprint of the proposed construction activities.

4.4 Delta Smelt (*Hypomesus transpacificus*). Status: SE, FT.

Delta smelt is a small, annual osmerid that has declined in recent decades, such that it was listed as threatened under both federal and state Endangered Species Acts in 1993 and elevated to State Endangered status in 2010. This smelt is a low-salinity specialist endemic to the San Francisco estuary.

Bennet (2005) reported that >90% of all delta smelt captured were taken at salinities <6 psu. This salinity restriction included virtually all juveniles taken in the IEP Summer Tow Net samples.

While the historic range of delta smelt extends to western San Pablo Bay and even to Berkeley, Merz et al. (2011) show a more contracted distribution in recent years. They wrote,"Outside the [lower Sacramento River downstream to Suisun Marsh], the cache Slough and Ship Channel was the only region that yielded high catches of delta smelt relative to other regions across multiple life stages for years 1995-2009." The highest annual average frequency of capture for any life stage in eastern San Pablo Bay was 3.6% (for juvenile delta smelt in the Summer Tow Net surveys). However, Merz et al. chose a time period that covers part of two distinct eras in delta smelt abundance: post-drought and POD (pelagic organism decline; Sommer et al. 2007). In the POD period, i.e., since 2001, the CDFW/IEP Bay Study trawl program has captured only a single delta smelt in the midwater trawl and none in the otter trawl.

Presence during Project activities.

Unless 2014 is an exceedingly wet year, delta smelt will not likely occur in San Pablo Bay during the proposed activity.

4.5 EFH Species

The Action Area of San Pablo Bay is included in the listing of essential fish habitat for a variety of pelagic, groundfish, and salmon species covered by the Coastal Pelagic Fish Management Plan (FMP), the Pacific Groundfish FMP, and the Pacific Coast Salmon FMP developed by the Pacific Fishery Management Council under the requirements of the Magnuson-Stevens Act. Table 4-2 lists those fish species covered by these plans identified as utilizing the Action Area, along with the life stage and relative occurrence within the Action Area.

TABLE 4-2 MANAGED FISH SPECIES IN SAN PABLO BAY UNDER THE MAGNUSON-STEVENS ACT

Fisheries Management Plan	Species, Common Name	Species, Scientific Name	Life Stage*	Abundance
Coastal Pelagic	Northern anchovy	*Engraulis mordax*	J, A	Abundant
	Pacific sardine	*Sardinops sagax*	J, A	Present
Pacific Groundfish	English sole	*Parophrys vetulus*	J, A	Abundant
	Sand sole	*Psettichthys melanostictus*	L, J, A	Present
	Starry flounder	*Platichthys stellatus*	J, A	Present
	Lingcod	*Ophiodon elongatus*	J, A	Rare
	Brown rockfish	*Sebastes auriculatus*	J	Present
	Pacific whiting (hake)	*Merluccius productus*	E,L	Absent*
	Leopard shark	*Triakis semifasciata*	J, A	Present
	Spiny dogfish	*Squalus acanthias*	J, A	Present
	Skates	*Raja* ssp.	J, A	Present
	Other rockfish		J	Rare
	Cabezon	*Scorpaenichthys marmoratus*	J	Rare
Pacific Coast Salmon	Chinook salmon	*Oncorhynchus tshawytscha*	J, A	Seasonally Present
	Coho salmon	*Oncorhynchus kisutch*	J, A	Historically Present, Current Occurrence unknown

Table Information Sources: Pacific Fishery Management Council. 2011. Groundfish - http://www.pcouncil.org/groundfish/background/; Salmon- http://www.pcouncil.org/salmon/background/; Coastal Pelagic- http://www.pcouncil.org/coastal-pelagic-species/background-information/. Accessed April 20, 2011. CDFG IEP unpublished midwater trawl data 2005-2009 (Appendix D).

NOTES: A = Adult; J = Juvenile; L = Larvae; E = Egg
* Listing based on a 1961 record. No Bay Study records for this species; listed as Rare in the estuary by USACE&USEPA(2009)

4.6 Habitats of Particular Concern (HAPC)

Eelgrass (Zostera marina) Beds

Although eelgrass has been reported in some years in eastern San Pablo Bay (Boyer and Wyllie-Echeverria 2010), there are no existing or predicted eelgrass beds in the

project area (Merkel and Associates 2005).

Native Olympia oyster (Ostrea conchaphila) Beds

Zabin et al. (2010) suggested that the Project site is unlikely to support native oyster, because, "Sites in San Pablo Bay and northward appear subject to periodic die offs due to seasonal low salinity events."

5 ANALYSIS OF EFFECTS

5.1 Resuspension of Sediments from Removal of Pipeline

As stated in the Section 1, the proposed Action would require the removal of the pipeline and riprap on the shoreline which would be replaced after the final segment of pipeline is removed and the landward section is sealed. Removal of the pipeline and riprap would result in short-term disturbance of bottom sediments and resuspension of sediments. Disturbed or resuspended sediments could increase the exposure of chemical concentrations to aquatic receptors in the localized area and could result in adverse water quality and biological effects.

Temporary resuspension of sediments in the water column can lower levels of dissolved oxygen and possibly release chemicals present in the sediments into the water column. The concentration of suspended sediments will vary based on the production rate of removal and duration of the construction activity, and would depend also on the methods used, the quality of equipment, and care of the operator. In all cases, increased turbidity levels would be relatively short-lived and generally confined to within a few hundred feet of the activity depending on current velocity, tidal cycle and wind. After initially high levels of resupsended sediment, sediments would disperse and background levels would be restored within hours of disturbance.

The potential effects of suspended sediment within the water column on fish include gill lacerations (at very high and prolonged exposures), increased “coughing” behavior, decreased feeding success, and avoidance behaviors (Wilber and Clarke 2001). Removal of the pipeline has the potential to resuspend sediment in the immediate vicinity of extraction of the pipeline. The maximum volume of sediment disturbed by this operation would consist of the volume of sediment within a 50ft section of pipeline, a 1ft radius and a 2ft depth surrounding the portion of pipeline being pulled above the mudline surface. This volume equates to approximately 3.7 cubic yards per 50 ft section if all the sediment above and surrounding the 8inch pipeline were dispersed into the water column during extraction. In total, to remove the 2,000 ft of pipeline approximately 40 – 50 ft sections will be removed which equates to 148 cubic yards of sediment potentially being disturbed. It should be noted that this is a worst case scenario as approximately 800 ft of the pipeline is on the surface of the mud and not submerged. Futhermore, it is unlikely that the entire volume of sediment would be dispersed. As stated in Section 1 the pipeline is only 8 inches in diameter and the surrounding sediment is not significantly consolidated, it will move through the mud to the surface. As it traverses through the mud, the sediment will fall in upon the void below. Sediment would only be resuspended at the point where the pipeline is pulled above the

mudline into the water. It is anticipated that only a small percentage of the total volume would be resuspened at the point of extraction.

In comparison, even a small dredging Project would disturb upwards of 5,000 cubic yards per day. In addition, the sediment plumes that may be caused by the sections of pipeline removed are expected to be extremely small in area and short in duration. Based on studies of recent projects by the USACE, it is estimated that any potential impact due to resuspended sediments would be limited to a distance up and down current of approximately 100 feet (USACE, 2004). Recent studies by the San Francisco Estuary Institute (SFEI, September 2008) determined that the short term effects of dredging on sensitive fish species due to dredging activities would be minor. Considering that the volume of sediment being disturbed by removal of the pipeline would be a significantly smaller fraction (order of magnitude) of that disturbed by even a small scale dredging operation, it can be assumed that the water quality impacts of pipeline removal would be smaller still and well below the threshold of concern.

Resuspended sediment levels caused by natural phenomena such as floods, storms, large tides, and winds are often higher and of longer duration than those caused by dredging, especially in lakes and bays. Previous studies have demonstrated that marine organisms are accustomed to sediment resuspension levels greater than those generated by dredging (Stern and Stickle 1978, Parr et al. 1998, Environment Canada 1994, Pennekamp et al. 1996, Herbich 2000) or even the pipeline removal. Resuspended sediment concentrations within San Francisco Bay have been reported between 100-200 mg/L due to tidal influence alone (Buchanan and Schoellhamer 1996; Schoellhamer 1996). As stated above, normal circulation and strong currents along the waterfront rapidly circulate and disperse water temporarily affected by construction activities. Turbidity plumes would disperse within a matter of hours, and the particulate concentrations would be diluted to levels that would pose no major threat to water quality or aquatic wildlife.

The chemistry from sediment characterization of these sediments indicates that metal concentrations were similar to or below San Francisco Bay (SF Bay) background levels (SFRWQCB 1998). While the cadmium level was slightly above SF Bay background levels, it was below the cadmium Effects Range-Low (ER-L) of 1.2 mg/kg (Long et al 1995) and is unlikely to cause an adverse biological effect. Organotins and organochlorine pesticides were below their respective MDLs. Total PAHs, total PCBs, and total DDTs were reported at 1,207 µg/kg, 19.3 µg/kg and 0 µg/kg, respectively; each was below SF Bay background levels (SFRWQCB 1998). In addition, a suspended sediment bioassay was performed on the Project site sediment which did not exhibit toxicity. Based on these results, sediments that may be displaced or resuspended during the removal of the Hercules pipeline would not represent an adverse environmental impact to species in the immediate or general vicinity of operations.

Suspended sediment effects on fish

In order to evaluate the potential biological effects of resuspended sediments on the physiology of marine organisms, many different laboratory studies have attempted to determine the levels of suspended sediments that cause impacts. Peddicord and McFarland (1978) found that most of the fish and invertebrates studied could withstand levels of resuspended sediments of up to 250 to 400mg/L for a period of about 9 to 10 days without effect. Table 5-1 presents results from typical studies that have been conducted at which effects are noted. A more extensive table is available in Clarke and Wilber (2000).

Table 5-1
Response of Marine Species to a Certain Concentration Level of Suspended Sediments

Study	Species	Concentration (mg/L)	Response
Chiasson 1993	Rainbow Smelt *Osmerus Mordax*	10	Increased swimming behavior
Peddicord and McFarland 1978	Most fish and invertebrate	250-400	No effect
Auld and Shubel 1978	American Shad larvae	500	32% mortality after 4 days of exposure
Sherk et al. 1974 and 1975	White Perch	650	Elevated hematocrit levels after 5 days of exposure.
Sherk et al. 1974 and 1975	Striped Bass	1,500	Elevated hematocrit levels after 14 days of exposure
Nightingale and Simenstad 2001	Fish	4,000	Exhibits of erosion at gill filament tips
McFarland and Peddicord 1980	Shiner Perch	6,000	50% mortality
Ross 1982	Chinook Salmon smolts	11,000	50% mortality after 96 hours of exposure

As presented in Section 4 encounter rates for listed species will be minimal. Green sturgeon, salmonids, longfin smelt, and delta smelt in the estuary commonly encounter areas of increased turbidity due to storm flow runoff events, wind and wave action, and benthic foraging activities of other aquatic organisms. Fish may be expected to avoid areas of high turbidity (e.g., see Berg and Northcote 1985) and return when concentrations of suspended solids are lower. Moreover, as emphasized by Wilber and Clarke (2001), the short duration of expected encounters with the Project are an important aspect that minimize any expected effects of sediment suspension. The minor and localized areas of turbidity associated with this Project's construction is not expected to result in harm or injury, or behavioral responses that impair migration, foraging, or make listed fish more susceptible to predation. If green sturgeon, salmonids, longfin smelt or delta

smelt temporarily relocate from areas of increased turbidity, areas of similar value are available in San Pablo Bay adjacent to the work site which offer habitat of equal or better value for displaced individuals. Adjacent habitat areas also provide adequate carrying capacity to support individuals that are temporarily displaced during the Project's construction activities. Even if they encounter potentially resupended sediments it is unlikely that the duration and exposure would be significant to cause adverse impacts.

5.2 Potential impacts to benthic habitat

As stated previously the benthic habitat of the area where the pipeline will be removed as well as where the barge may ground during extreme low tides will be temporarily disturbed by these activities. These activities may result in physical displacement, habitat disturbance, and short-term temporary loss of foraging area for special-status fish such as, green sturgeon, salmonids, longfin smelt, and delta smelt and Fishery Management Plan managed groundfish. Potential total short-term habitat loss for these activities is estimated at less than 0.93 acres which includes the length of the pipeline, a 20 ft buffer surrounding the pipeline, the barge, and riprap area.

Altering benthic habitat and associated infaunal and epifaunal communities can result in the loss or reduction of suitability as fish foraging habitat, especially for sensitive species including salmon, steelhead, green sturgeon, and groundfish. Following pipeline removal and replacement of rip rap on the shoreline, the deposition of fine sand-mud sediments, comparable to pre-removal conditions, would begin almost immediately and the benthic community inhabiting those sediments is expected to recover to pre-Project composition and abundances within a few months to up to two years, depending on when dredging occurs and other ecological factors affecting recolonization (Newell et. al. 1998). Based on the very small area of San Pablo Bay affected, the temporary time period over which the habitat would be unavailable for use by sensitive species, and the overall temporary nature of the loss, the potential loss of seafloor habitat from the action is expected to be undetectable.

6 EFFECTS DETERMINATION

The analysis presented herein shows that removal of an 8 inch wastewater pipeline is not likely to adversely affect green sturgeon, individuals of the Sacramento River winter-run chinook, Central Valley spring-run chinook, Central Valley steelhead, or Central California Coast steelhead ESUs, longfin smelt, or delta smelt. In addition, it is concluded that the proposed Project will not result in the "take" of CESA listed species.

Based on the best available data relative to species presence, sensitive fish species as detailed in Section 4 are not anticipated to be present in significant numbers at the site. Slight increases in suspended sediment levels due to pipeline removal are not likely to occur or persist at levels that are significantly different from background levels in the water column. Fish generally react by avoiding areas of high turbidity and return when concentrations of suspended solids are lower. The areas of turbidity associated with this Project's construction are not expected to result in harm or injury, or behavioral responses that impair migration, foraging, or make green sturgeon, salmonids, longfin smelt, or delta smelt more susceptible to predation. Adjacent habitat areas also provide adequate carrying capacity to support individuals that are temporarily displaced during construction activities that may cause increases in turbidity.

The few individual fish that could potentially be present during construction activities would not likely be significantly affected by turbidity, and visibility for foraging activities would not likely be impaired to a significant degree. In addition, as described above, the quality of sediment is good, in that the sediment does not exceed Bay Ambient and other effects based criteria. Elutriate bioassays indicated that resuspended sediments would not contribute to any toxicity to aquatic organisms by a potential sediment plume. Green sturgeon, sensitive salmonid species, and longfin smelt, though possibly present in small numbers, would not likely be affected by exposure to sediments during removal activities. Delta smelt will not likely occur in the Project area during construction activities. In addition, based on the very small area of San Pablo Bay affected, the temporary time period over which the habitat would be unavailable for use by sensitive species, and the overall temporary nature of the loss, the potential loss of seafloor habitat from the action is expected to be undetectable.

7 ESSENTIAL FISH HABITAT EVALUATION

The entire San Francisco Bay has been designated by NOAA Fisheries as an EFH for coastal pelagics, Pacific groundfish, and Pacific coast salmon. Within the Project Site soft bottom benthos and the water column comprise the aquatic habitat potentially affected. Coastal pelagic fish species may use the water column in the vicinity of Project activities, as may Pacific coast salmon (albeit briefly, during migration through the Bay). Pacific groundfish may use the benthic habitat in the Project vicinity. The Project Site is not a unique area for supporting preferential habitat and after the pipeline is removed benthic assemblages will quickly re-establish and cycle normally.

7.1 Analysis of Effects on EFH

The specific elements of the pipeline removal Project that could impact groundfish, pelagic, and salmonid species EFH, and the impact mechanisms that avoid and minimize impacts are identified below.

Potential effects to EFH from removing the pipeline and removing and replacing shoreline rip rap include temporary displacement of benthic and intertidal habitat, which could potentially affect foraging and prey availability. During removal activities, some sediment will become suspended plumes and dissipate rapidly. These plumes could limit the vision of pelagic fish.

Although some EFH is likely to be disturbed during removal activities, these activities will be of short duration, and temporary in nature. The time duration for removal of the pipeline is three weeks. Benthic species (fish prey) maybe disturbed during these activities, possibly causing fish to temporarily move from the area. As stated previously this would be for a short duration and temporary in nature. Benthic successional stages follow predictable sequences after any major seafloor perturbation and re-colonize rapidly. The Project site represents approximately 0.93 acres which represents a negligible percentage within San Pablo Bay. Therefore, removal activities are not likely to have a significant adverse effect on benthic species.

As stated previously, the temporary effects from suspended sediments due to removing the pipeline are not likely to adversely affect EFH species within the area. Also as discussed above, sediments were characterized and results support that sediment is not likely to cause environmental impacts.

7.2 EFH Assessment

Pursuant to the MSFCMA and the SFA, an EFH evaluation has been completed and concludes that the proposed action will not adversely affect EFH. Potential impacts from the proposed Project on groundfish habitat, coastal pelagic habitat, and salmonid habitat would be from resuspension of

sediment and disturbance of benthic habitat, which will be temporary and localized and is not expected to impact primary productivity and food resources for groundfish. Therefore, it is concluded that the proposed Project will not adversely affect EFH.

7.3 Conclusions and Determinations of Effect

Due to the temporary nature of the Project and the implementation of conservation measures (Section 2) to reduce impacts to marine resources; it is concluded that the Project will not adversely affect EFH for groundfish, coastal pelagic, and salmonid species.

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APPENDIX A
Sampling and Analysis Results Report

Ms. Christine Boudreau
Boudreau Associates LLC
327 Jersey Street
San Francisco, CA 94114

April 30, 2013

Dear Ms. Boudreau:

Please find enclosed a copy of the report "Characterization of the Sediment for the Removal of a Wastewater Outfall Pipeline Located in Hercules, CA: Sampling and Analysis Results."

If you have any questions, please give me a call at (707) 207-7761. I look forward to hearing from you.

Sincerely,

Jeffrey Cotsifas
President

This testing was performed under Lab Order 20792 The test results reported herein conform to the most current NELAC standards, where applicable, unless otherwise narrated in the body of the report, and only relate to the sample tested. This report shall not be reproduced, except in full, without the written consent of Pacific EcoRisk.

DATA REPORT

Characterization of the Sediment for the Removal of a Wastewater Outfall Pipeline Located in Hercules, CA: Sampling and Analysis Results

Prepared for

Boudreau Associates LLC
327 Jersey Street
San Francisco, CA 94114

Prepared by

Pacific EcoRisk
2250 Cordelia Road
Fairfield, CA 94534

April 2013

PACIFIC ECORISK
ENVIRONMENTAL CONSULTING & TESTING

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List of Acronyms

ASTM	American Society for Testing and Materials
Bay	San Francisco Bay
BCDC	Bay Conservation and Development Commission
Calscience	Calscience Environmental Laboratories, Inc.
COC	Chain-of-custody
CV	Coefficient of variation
DMMO	Dredged Material Management Office
DU	Dredge unit
EC50	50% Effect Concentration
ESC	Elutriate Suitability Concentrations
GPS	Global positioning system
HLLC	Hercules LLC
HDPE	High density polyethylene
ITM	Inland Testing Manual
LC/LCSD	Laboratory Control/Laboratory Control Spike Duplicate
LC50	50% Lethality Concentration
MET	Modified elutriate test
MDL	Method detection limit
mg/Kg	Milligram per kilogram
mg/L	Milligram per liter
MLLW	Mean lower low water
MOT	Marine Oil Terminal
MRL	Method reporting limits
PAH	Polycyclic aromatic hydrocarbons
PCB	Polychlorinated biphenyls
PER	Pacific EcoRisk, Inc.
PRC	Pacific Refining Co.
Prologis	Prologis L.P.
QA/QC	Quality assurance/quality control
RL	Reporting limit
RPD	Relative percent difference
SFRWQCB	San Francisco Regional Water Quality Control Board
SLC	State Lands Commission

SOP	Standard operating procedures
SUAD	Suitable for unconfined aquatic disposal
TOC	Total organic carbon
TSS	Total suspended solids
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
WQO	Water quality objectives

1. INTRODUCTION

Prologis L.P. (Prologis) seeks authorization to remove an existing 8-inch wastewater outfall pipeline from leased property located in Hercules, CA (Figure 1-1 through 1-4).

On behalf of Prologis, Boudreau Associates has contracted Pacific EcoRisk (PER) to perform sediment characterization in the vicinity of the pipeline to support pipeline removal activities. This sampling and testing program was performed in support of CEQA analysis and permitting to assess sediment quality and potential impacts related to removing the pipeline due to sediment resuspension.

In order to assess whether resuspended sediments will represent an adverse impact during pipe removal operations and per the approved Sampling and Analysis Plan (PER 2013), field personnel collected sediment cores approximately 1 foot below the estimated pipeline depth or refusal along the length of the buried portion of the pipeline. In areas where the pipeline is exposed, surface samples were collected using a Van-Veen sampler. A composite sample comprising equal portions of the sediment cores and surface sediment samples was then submitted for chemical and biological analysis as per the SAP (PER 2013).

The remainder of the composite sample was archived for subsequent analysis, if needed. This Data Report has been prepared to provide the required characterization of these sediments.

1.1 Objectives of the Sediment Investigation

The purpose of this sampling and testing was to evaluate sediments in the vicinity of the pipeline (Figure 1-4) to determine whether resuspended sediments will represent an adverse impact during pipe removal operations. The procedures for sediment sample collection, sample processing and preparation, physical and chemical analyses, biological testing and data analyses were presented in a previously approved Sampling and Analysis Plan (PER 2013). The specific objectives of the SAP scope-of-work were as follows:

- Collect sediment core and sediment surface samples from within the designated sampling areas following field protocol detailed in the SAP (PER 2013); and
- Conduct chemical and biological analyses of the collected sediments to determine whether resuspended sediment will represent an adverse impact during pipe removal operations.

1.2 Organization of this Document

Sample collection and handling procedures are discussed in Sections 2 and 3. Results of chemical analyses and biological toxicity testing are provided in Sections 4 and 5. Section 6 discusses quality control and Section 7 presents whether resuspended sediments will represent an adverse impact during pipe removal operations.

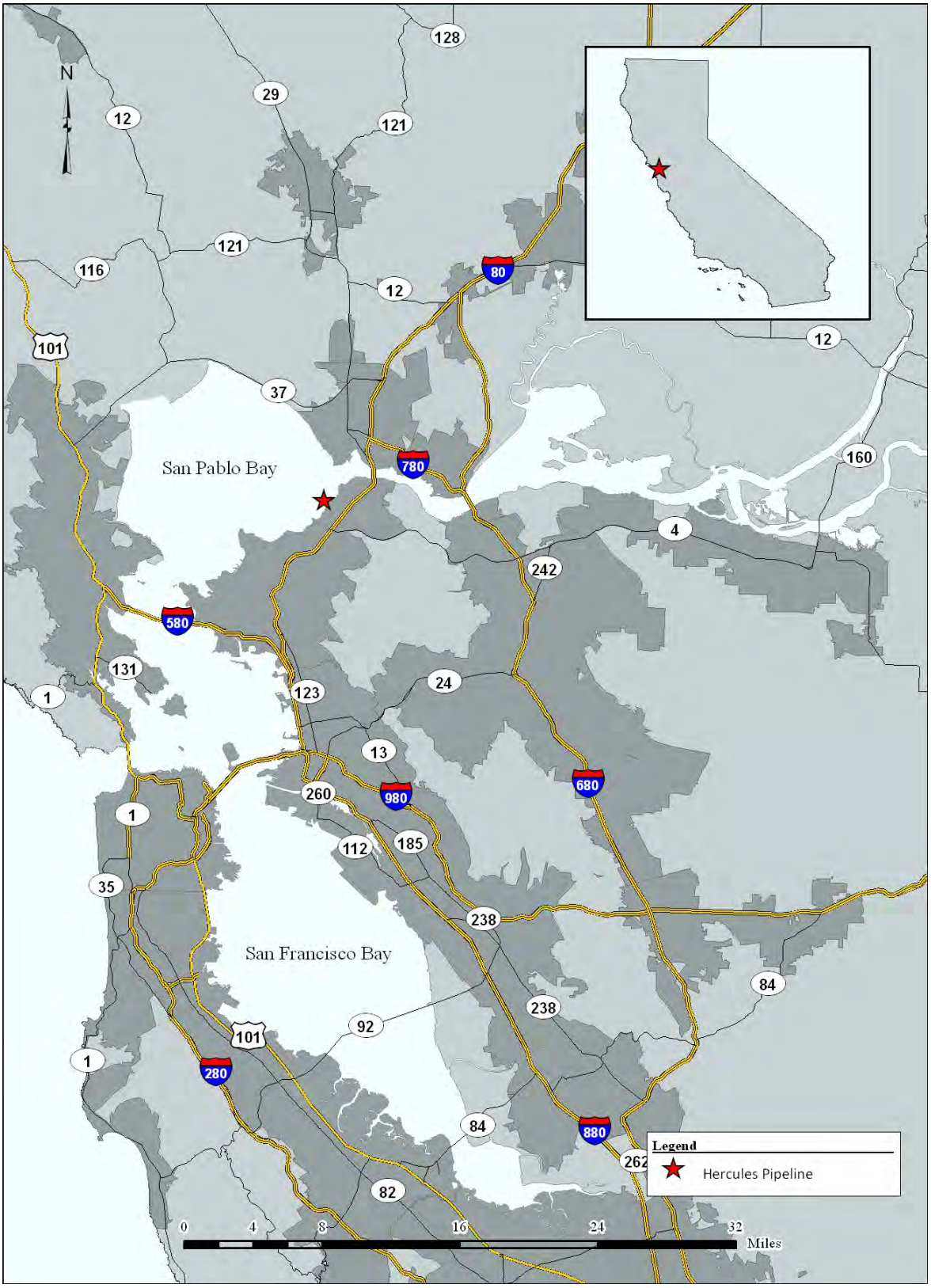


Figure 1-1. Location Map #1: Wastewater Outfall Pipeline Located in Hercules, CA

Figure 1-2. Location Map #2: Wastewater Outfall Pipeline Located in Hercules, CA

Figure 1-3. Vicinity Map #1: Wastewater Outfall Pipeline Located in Hercules, CA

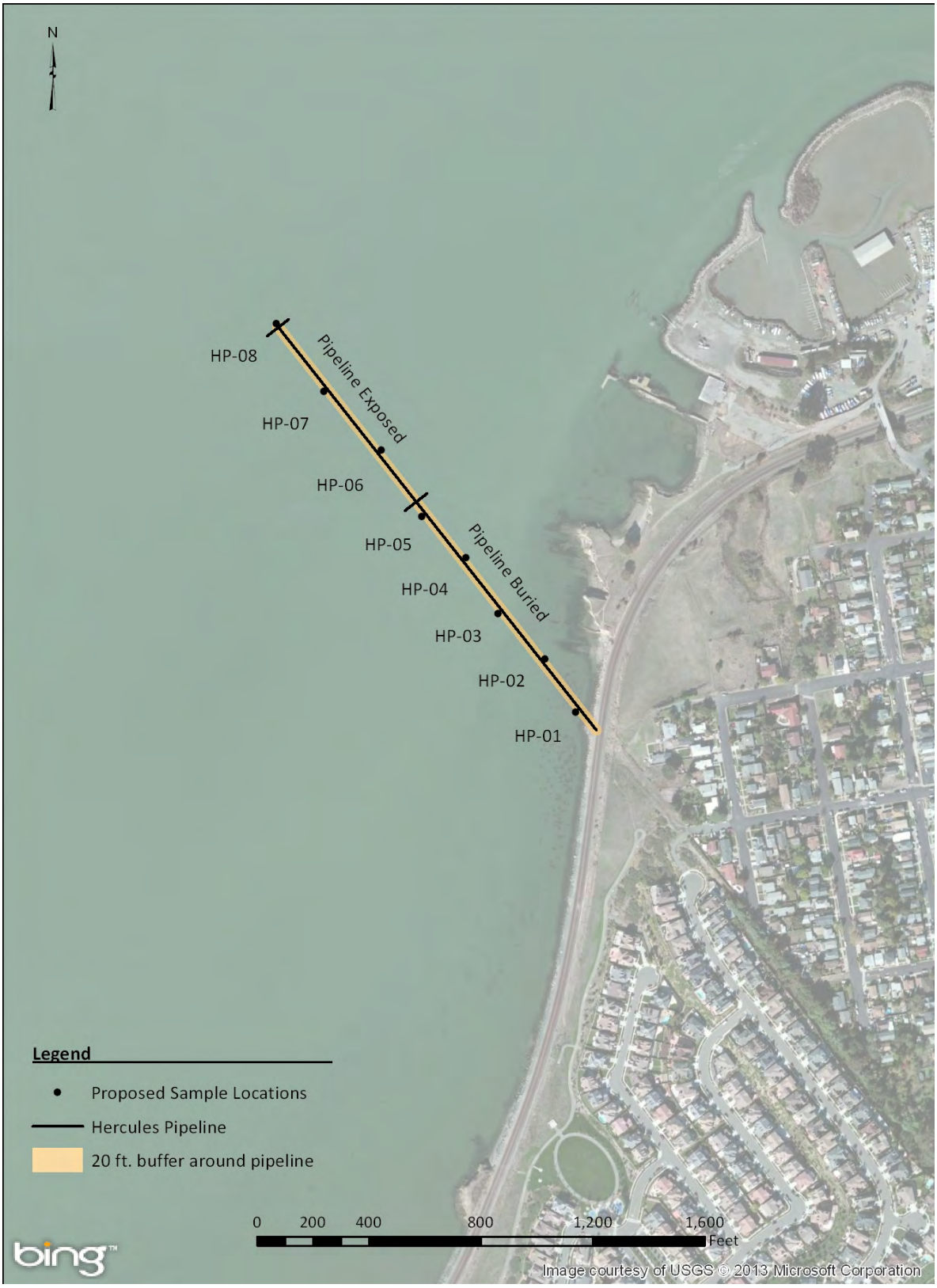


Figure 1-4. Vicinity Map #2: Wastewater Outfall Pipeline Located in Hercules, CA

2. FIELD SEDIMENT SAMPLE COLLECTION

All sediments were collected in accordance with guidelines and procedures outlined in the SAP (PER 2013). All sediment sampling field activities at the wastewater outfall pipeline were performed on March 25 and 28, 2013 under the direction of Mr. Jeffrey Cotsifas of Pacific EcoRisk. PER provided the sampling vessel, on-board positioning system, and sampling equipment. PER also provided additional Field Scientists to assist in sediment collection. Eight samples were collected from the wastewater outfall pipeline area (Figure 2-1). Field personnel collected sediment cores approximately 1 foot below the estimated pipeline depth or refusal along the length of the buried portion of the pipeline. In areas where the pipeline is exposed, sediment surface samples were collected using a Van-Veen sampler. Final sample site positions were determined with a differential global positioning system (GPS). Table 2-1 lists station identifiers, GPS coordinates for all core locations, mudline elevations, and core penetration depths for all stations.

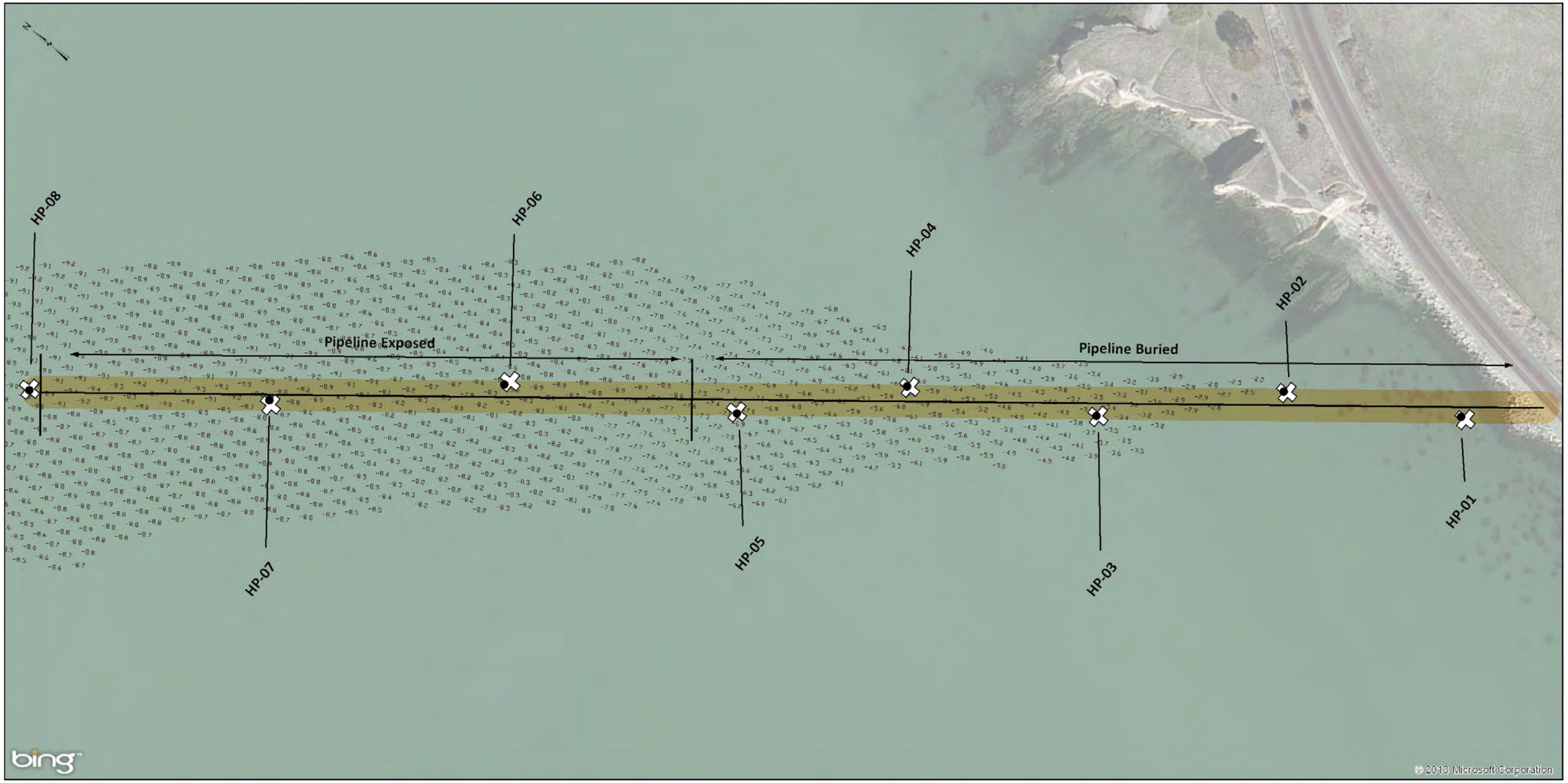
All sediment samples were maintained on ice until transported to the PER testing lab for processing. Upon receipt at PER, all samples were logged in and placed in cold storage at ≤4°C in the dark until needed. Field log sheets are presented in Appendix A. There were no unusual circumstances encountered during the fieldwork, and no major deviations from the SAP (PER 2013).

Table 2-1. Locations of Sampling Stations and Core Depths Achieved.

Hercules Pipeline Area		Sample Type	Sample ID	Latitude[A] (decimal degrees)	Longitude[A] (decimal degrees)	Mudline Elevation (ft MLLW)	Core Penetration Depth (ft)	Depth Sampled (ft)
HP-Comp	Buried	core	HP-01	38.03487°	-122.27500°	-0.9	3.9	3.0
		core	HP-02	38.03538°	-122.27540°	-2.3	5.3	3.0
		core	HP-03	38.03581°	-122.27599°	-3.8	6.8	3.0
		core	HP-04	38.03636°	-122.27641°	-6.3	9.3	3.0
		core	HP-05	38.03674°	-122.27696°	-6.4	9.4	3.0
	Exposed	surface	HP-06	38.03740°	-122.27750°	-7.8	8.3	0.5
		surface	HP-07	38.03797°	-122.27819°	-8.5	9.0	0.5
		surface	HP-08	38.03861°	-122.27881°	-8.7	9.2	0.5

[A]State Plane Coordinate System, California Zone 3, NAD 83

Figure 2-1. Wastewater Outfall Pipeline Sample Locations #1



Legend

- Actual Sample Locations
- Proposed Sample Locations
- Hercules Pipeline
- 20 ft. buffer around pipeline

PACIFIC ECORISK ENVIRONMENTAL CONSULTING & TESTING

0 50 100 200 300 400 Feet

Horizontal Datum: NAD 83
Map Projection: California State Plane Coordinate System (SPCS), Zone 2
Units: Feet

Notes:

1. Soundings obtained by the eTrac Engineering, LLC on January 10, 2013.
2. Soundings are based on MLLW.
3. The bathymetric information shown on this drawing is based on surveys made on the date(s) indicated and can only be considered as indicating the conditions existing at that time.
4. Horizonal Control: POS/MV positioning using US Coast Guard DGPS corrections.
5. Vertical Control:Tidal Benchmark 941 2178 L.
6. Position and mation data collected using an Applanix POSMV Wavemaster V5.
7. Soundings were collected using an R2SONIC 2024 Multibeam Sonar.
8. Map prepared by Pacific EcoRisk on May 1, 2013.

Figure 2-2. Wastewater Outfall Pipeline Sample Locations #2

3. SAMPLE PROCESSING

3.1 Homogenization and Compositing of Sediments

Homogenization and compositing of individual sediment samples were performed at the PER laboratory facility in Fairfield, CA. The sediment from each individual sediment sample was individually homogenized in a stainless-steel bowl. A 500-mL sub-sample of the homogenized sediment from each individual sediment sample was archived to allow for additional chemical analyses, if necessary; archived samples were stored frozen at -20 ± 10˚C for up to one [1] year after sample collection.

Proportionate amounts of the homogenized sediment from each of the Hercules pipeline individual sediment samples were composited and homogenized within a stainless steel container to form the "HP-Comp" composite sediment. A sub-sample of the HP-Comp sample was frozen for archival storage as described above. Samples of the composited sediments were submitted for chemical and conventional analyses and toxicity testing.

All sediment was processed following procedures outlined in the SAP (PER 2013), with no deviations.

3.2 Shipping of Sediment Samples to the Analytical Laboratories

Prior to shipping to the analytical laboratory, sample containers were wrapped in bubble wrap and securely packed inside a cooler with ice packs or crushed ice. A temperature blank was included in each cooler. The original signed chain-of-custody (COC) forms were placed in a sealed plastic bag and taped to the inside lid of the cooler. Appropriate packaging tape was wrapped completely around the cooler. A *This Side Up* arrow label was attached on each side of the cooler, a *Glass-Handle with Care* label was attached to the top of the cooler, and the cooler was sealed with custody seals on both the front and the back lid seams.

Sediment samples were shipped by overnight delivery. The sub-contracting analytical laboratories are not to dispose of any samples for this project unless notified by PER in writing.

3.2.1 Chain-of-Custody (COC) Protocol

COC procedures were followed for all samples throughout the collection, handling, and analyses activities. The Sampling and Analysis Project Manager, or a designee, was responsible for all sample tracking and COC procedures. This person was responsible for final sample inventory, maintenance of sample custody documentation, and completion of COC forms prior to transferring samples to the analytical laboratory. A COC form accompanied each cooler of samples to the respective analytical laboratories. Each custodian of the samples signed the COC form; copies of the COC forms are retained in the project file.

4. ANALYTICAL CHEMISTRY RESULTS

The sediment samples were analyzed by Calscience for the conventional and chemical parameters specified in the SAP (PER 2013). Conventional parameters included total organic carbon (TOC), total solids, and grain size. Chemical analyses included trace metals, polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), chlorinated pesticides, and butyltins. The results of these analyses are presented in Section 4.1; the full Data Reports are provided in Appendix B.

Sediment physical and chemical characteristics provide information about chemicals of concern present in the sediment and their potential bioavailability, and about non-chemical factors that could affect toxicity. The results of the physical and chemical analyses of the sediments were compared to Bay Ambient sediment concentrations (SFRWQCB 1998).

Analytical results are summarized in Tables 4-1 through 4-6.

4.1 HP-Comp Composite Analytical Chemistry Results

The “HP-Comp” site sediment was ~61.9% total solids, and was 100% fines (silts and clays). TOC levels were moderate (1.0%).

All of the metal analytes for the HP-Comp sediments were generally similar to or below San Francisco Bay (SF Bay) background levels (SFRWQCB 1998). While the cadmium level was slightly above SF Bay background levels, it was below the cadmium Effects Range-Low (ER-L) of 1.2 mg/kg (Long et al 1995) and is unlikely to cause an adverse biological effect. Organotins and organochlorine pesticides were below their respective MDLs. Total PAHs, total PCBs, and total DDTs were reported at 1,207 µg/kg, 19.3 µg/kg and 0 µg/kg, respectively; each was below SF Bay background levels (SFRWQCB 1998).

Table 4-1. Hercules Pipeline Sediment Grain Size, Total Solids (%), and Total Organic Carbon (%).

Analytes	HP-Comp
% Gravel	0.0
% Sand	0.0
% Silt	53.1
% Clay	46.9
Total % Fines (silt & clay)	100
Total Solids (%)	61.9
Total Organic Carbon (%)	1.0

Table 4-2. Hercules Pipeline Sediment Metals Concentrations (mg/kg, dry wt).

Metals	HP-Comp	Bay Ambient <100% Fines (SFRWQCB 1998)
Arsenic	6.34	15.3
Cadmium	0.438[a]	0.33
Chromium	37.3	112
Copper	25.0	68.1
Lead	17.5	43.2
Mercury	0.164	0.43, (0.469)[b]
Nickel	37.0	112
Selenium	<0.118	0.64
Silver	0.129 J	0.58
Zinc	59.3	158

a - Result is below the cadmium ER-L of 1.2 mg/kg (Long et al 1995).
b - San Francisco Bay 99th percentile mercury concentration (SFEI 2013)

Table 4-3. Hercules Pipeline Sediment Organotin Concentrations (µg/kg, dry wt).

Organotins	HP-Comp	Bay Ambient <100% Fines (SFRWQCB 1998)
Butyltin	<1.1	a
Dibutyltin	<1.1	a
Tributyltin	<0.93	a
Tetrabutyltin	<1.2	a
Total Detected Organotins	**<1.2**	**a**

a - no data available.
All results below laboratory the reporting limit (RL) are reported as < the RL.

Table 4-4. Hercules Pipeline Sediment PAH Concentrations (µg/kg, dry wt).

PAHs	HP-Comp	Bay Ambient <100% Fines (SFRWQCB 1998)
Acenaphthene	<2.9	26.6
Acenaphthylene	12 J	31.7
Anthracene	41	88
Benzo(a)anthracene	44	244
Benzo(a)pyrene	61	412
Benzo(b)fluoranthene	200	371
Benzo(e)pyrene	130	-
Benzo(g,h,i)perylene	60	310
Benzo(k)fluoranthene	160	258
Biphenyl	2.5 J	-
Chrysene	66 J	289
Dibenzo(a,h)anthracene	15 J	32.7
2,6-Dimethylnaphthalene	11 J	-
Fluoranthene	60	514
Fluorene	6.0 J	25.3
Indeno(1,2,3-cd)pyrene	57	382
2-Methylnaphthalene	4.2 J	-
1-Methylnaphthalene	<3.2	-
1-Methylphenanthrene	<2.6	-
Naphthalene	8.4 J	55.8
Perylene	40	-
Phenanthrene	26	237
Pyrene	200	665
1,6,7-Trimethylnaphthalene	<2.3	-
Dibenzothiophene	2.2 J	-
Total Detected PAHs	**1207**	**3390, 4800[a]**

a - San Francisco Bay Bioaccumulation Trigger Level (USACE/USEPA 2011, SFEI 2013).
J - Analyte was detected at a concentration below the reporting limit and above the laboratory method detection limit; the reported value is therefore an estimate.
All results below the MDL are reported as < the MDL.

Table 4-5. Hercules Pipeline Sediment Organochlorine Pesticide Concentrations (µg/kg, dry wt).

Organochlorine Pesticides	HP-Comp	Bay Ambient <100% Fines (SFRWQCB 1998)
Aldrin	<0.51	1.1
alpha-BHC	<0.52	-
beta-BHC	<0.43	-
delta-BHC	<0.41	-
gamma-BHC (Lindane)	<0.56	-
Total Detected BHC	**0**	**0.78**
Alpha Chlordane	<0.52	
Gamm Chlordane	<0.51	
Oxychlordane	<0.45	
Chlordane	<5.3	1.1, 37[a]
Dieldrin	<0.53	0.44, 1.9[a]
Endosulfan I	<0.42	-
Endosulfan II	<0.45	-
Endosulfan Sulfate	<0.55	-
Endrin	<0.58	-
Endrin Aldehyde	<0.39	-
Endrin Ketone	<0.56	
Heptachlor	<0.52	-
Heptachlor Epoxide	<0.57	-
Methoxychlor	<0.52	
Cis-nonachlor	<0.47	
Trans-nonachlor	<0.47	-
Toxaphene	<10	-
2,4'-DDD	<0.55	see total DDT
4,4'-DDD	<0.51	see total DDT
2,4'-DDE	<0.49	see total DDT
4,4'-DDE	<0.48	see total DDT
2,4'-DDT	<0.49	see total DDT
4,4'-DDT	<0.54	see total DDT
Total Detected DDT	**0**	**7.0, 50[a]**

a - San Francisco Bay Bioaccumulation Trigger Level (USACE/USEPA 2011, SFEI 2013).
J - Analyte was detected at a concentration below the reporting limit and above the laboratory method detection limit; the reported value is therefore an estimate.
All results below the MDL are reported as < the MDL.

Table 4-6. Hercules Pipeline Sediment PCB Congener Concentrations (µg/kg, dry wt).

PCBs	HP-Comp	Bay Ambient <100% Fines (SFRWQCB 1998)
PCB 008	<0.14	a
PCB 018	<0.25	a
PCB 028	<0.16	a
PCB 031	<0.19	a
PCB 033	<0.18	a
PCB 044	0.33 J	a
PCB 049	0.61 J	a
PCB 052	0.73 J	a
PCB 056	<0.22	a
PCB 060	<0.17	a
PCB 066	0.31 J	a
PCB 070	0.50 J	a
PCB 074	<0.15	a
PCB 087	0.41 J	a
PCB 095	1.3	a
PCB 097	0.70 J	a
PCB 099	0.81	a
PCB 101	1.9	a
PCB 105	0.56 J	a
PCB 110	1.7	a
PCB 118	1.6	a
PCB 128	0.53 J	a
PCB 132	<0.27	a
PCB 138/158	2.0	a
PCB 141	0.31 J	a
PCB 149	1.2	a
PCB 151	0.25 J	a
PCB 153	1.9	a
PCB 156	0.32 J	a
PCB 170	0.33 J	a
PCB 174	0.27 J	a
PCB 177	<0.20	a
PCB 180	0.44 J	a
PCB 183	<0.18	a

Table 4-6. *(continued)* Hercules Pipeline Sediment PCB Congener Concentrations (µg/kg, dry wt).

PCBs	HP-Comp	Bay Ambient <100% Fines (SFRWQCB 1998)
PCB 187	0.25 J	a
PCB 194	<0.15	a
PCB 195	<0.085	a
PCB 201	<0.092	a
PCB 203	<0.17	a
Total Detected PCBs	**19.3[d], 12.4[e]**	22.7, 29.3[b] 17.0[c]

a - No reference value has been established for the individual congeners; the Total Detected PCB congener reference value (SFRWQCB 1998) is used as a default value.
b - San Francisco Bay 99th percentile PCB concentration (SFRWQCB 2013).
c - San Francisco Bay Bioaccumulation Trigger Level (USACE/USEPA 2011, SFEI 2013).
d - Summary includes J flagged data.
e - Summary excludes J flagged data.
J - Analyte was detected at a concentration below the reporting limit and above the laboratory method detection limit; the reported value is therefore an estimate.
All results below the MDL are reported as < the MDL.

5. BIOLOGICAL TESTING RESULTS

A 96-hr mysid survival test with the mysid shrimp *Americamysis bahia* was performed for the site composite sample. These tests were performed following appropriate protocols as outlined in the SAP (PER 2013). Test data and summaries of the statistical analyses for the bioassay results are provided in Appendices C and D. Summaries of test conditions and test acceptability criteria are provided in Appendix E.

5.1 Sediment Porewater Characterization

Prior to the initiation of the sediment tests, the sediments were removed from refrigerated storage, and each sample was re-homogenized in a large stainless steel bowl. Aliquots of the re-homogenized composite sediments were centrifuged at 2,500 g for 15 minutes; the resulting supernatant porewaters were carefully collected and analyzed for ammonia analysis (Table 5-1).

Table 5-1. Sediment Porewater Initial Water Ammonia Levels.

Sample ID	pH	Total Ammonia (mg/L N)	Total Sulfide (mg/L)
HP-Comp	7.70	4.34	0.103

5.2 Water Column (Sediment Elutriate) Toxicity Testing

The 96-hr survival test with *A. bahia* was performed on the sediment elutriate to determine whether resuspended sediments would represent an adverse impact during pipe removal operations. Positive and negative Lab Control treatments were tested concurrently with the site sediment elutriate. The positive Lab Control consisted of a 'waterborne' reference toxicant test; the results of these tests were compared to PER's reference toxicant test response databases to determine whether these test organisms were responding to toxic stress in a typical fashion. The negative Lab Control (and dilution media) water for this test was prepared by adjustment of Type 1 lab water (reverse-osmosis, de-ionized water) to a salinity of 25 ppt using a commercial artificial sea salt (Crystal Sea Salt®-bioassay grade). As an additional QA measure, the site water that was collected from the same area as the sediment samples, and which was mixed with the sediments to prepare the 100% elutriates, was also tested.

The test results for the sediment composite elutriate were compared with the test organism responses at the negative Lab Control treatment to determine the potential impact of suspended sediment resulting from the proposed pipeline removal on pelagic organisms in the near vicinity. The following criteria were used:

1. If the survival response in the 100% sediment elutriate treatment is ≥ the Control (clean seawater) treatment response(s), the sediment is <u>not</u> predicted to be acutely toxic to water column organisms.
2. If the reduction in survival response in the 100% sediment elutriate treatment relative to the Control treatment is ≤10%, there is no need for statistical analyses and no indication of water column toxicity attributable to the test sediments.

3. If the reduction in survival response in the 100% sediment elutriate treatment relative to the Control treatment is >10%, then the data must be evaluated statistically to determine the magnitude of toxicity.

5.2.1 Toxicity of Sediment Elutriates to *Americamysis bahia*

The results of this test are summarized below in Table 5-2. There was 100% survival at the Control treatment, indicating an acceptable survival response by the test organisms; there was 98% survival in the Site Water. There were ***no*** significant reductions in survival in any of the elutriate treatments; the No Observable Effect Concentratoin (NOEC) was 100% elutriate indicating that the 100% elutriate sample was not toxic to mysids. The test data and summary of statistical analyses for these tests are attached as Appendix C.

Table 5-2. Effects of HP-Comp Sediment Elutriate on *Americamysis bahia.*

Test Treatment	Mean % Survival
Lab Control	100
1%	98
10%	100
50%	100
100%	100
Site Water	98
Survival NOEC =	100% elutriate[a]
Survival LC_{50} =	>100% elutriate[a]

a - Due to the absence of significant impairment, the LC50 could not be calculated but can be determined by inspection to be >100% elutriate.

5.2.1.1 Reference Toxicant Toxicity to *Americamysis bahia* - The results of this test are presented in Table 5-3. There was 90% survival in the Lab Control treatment; the LC_{50} value was 0.68 g/L KCl, which is consistent with the typical response range established by the reference toxicant test database for this species, indicating that these test organisms were responding to toxic stress in a typical fashion. The test data and summary of statistical analyses for this test is attached as Appendix D.

Table 5-3. Reference Toxicant Testing: Effects of KCl on *Americamysis bahia*.

KCl Treatment (g/L)	Mean % Survival
Lab Control	90
0.125	97.5
0.25	97.5
0.5	90
1	**0***
2	**0***
LC_{50} =	0.68 g/L KCl
Typical Response Range (mean ± 2 SD) =	0.39 – 0.80 g/L KCl

* The response at this test treatment was significantly less than the Lab Control treatment response at $p < 0.05$.

6. QUALITY CONTROL REVIEW

Any analyses that did not comply with the analytical laboratory QA/QC limits are presented below (also, see final analytical report in Appendix B for full case narrative).

The QA/QC review entailed reviewing the contract lab Data Report(s) for sample integrity, correct methodology, and compliance with all appropriate Lab QA/QC requirements. The overall data quality assessment found that all data were usable. Appendix B contains the conventional and chemical analyses reports, which includes the contract laboratory QA/QC narrative.

6.1 Sediment Conventional and Chemical Analytical QA/QC Summary

Calscience Report 13-04-0291

Metals – A trace level, below the reporting limit (RL) but above the method detection limit (MDL), of arsenic was found in the Method Blank. Also, the matrix spike (MS) recovery for lead and the matrix spike duplicate (MSD) recovery for zinc were outside the established control limits. Since the laboratory control sample (LCS) and laboratory control sample duplicate (LCSD) recoveries were within the control limits, the results were released with no further action.

Organochlorine Pesticides – The relative percent differences (RPD) for 4,4'-DDT and methoxychlor and the MS recovery for methoxychlor were out of control. The results were flagged with the appropriate qualifiers and were released with no further action taken.

Organotins – The MS recovery for tetrabutyltin was below the control limits. However, the results were released as is since the MSD, LCS, and LCSD recoveries were in control.

PAHs – Trace levels, below the RL but above the MDL, of pyrene and 1-methylnaphthalene were found in the method blank. The MS/MSD recoveries for benzo(b)fluoranthene, benzo(k)fluoranthene, and pyrene were below the established control limits due to matrix interference. However, since the associated LCS and LCSD recoveries were in control, the results were released with no further action. The 2-fluorobiphenyl recovery was high in both samples. Since the other surrogate recoveries were in control, matrix interference is probable and so the data was released as is.

6.2 Biological Testing Quality Lab Control Summary

The biological testing of the sediments incorporated standard QA/QC procedures to ensure that the test results were valid. Standard QA/QC procedures included the use of negative Lab Controls, positive Lab Controls, test replicates, and measurements of water quality during testing.

Quality assurance procedures that were used for sediment testing are consistent with methods described in the U.S.EPA/ACOE (1998). Sediments for the bioassay testing were stored appropriately at ≤4°C and were used within the 8 week holding time period. Sediment interstitial water characteristics were within test acceptability limits at the start of the tests. The sediment elutriate was prepared using site water, Type 1 lab water (reverse-osmosis, de-ionized water) adjusted to a salinity of 25 ppt using a commercial artificial sea salt (Crystal Sea Salt®-bioassay grade) was used as the dilution medium.

All measurements of routine water quality characteristics were performed as described in the PER Lab Standard Operating Procedures (SOPs). All biological testing water quality conditions were within the appropriate limits. Laboratory instruments were calibrated daily according to Lab SOPs, and calibration data were logged and initialed. Standard test conditions are presented in Appendix E.

Negative Lab Control – The biological responses for all the test organisms at the negative Lab Control treatments were within acceptable limits for the sediment and sediment elutriate tests.

Positive Lab Control – The reference toxicant test results were consistent with the "typical response" ranges established by the reference toxicant test database for this species, indicating that these organisms were responding to toxic stress in a typical and consistent fashion.

Concentration Response Relationships - The concentration-response relationships for the sediment elutriate test and reference toxicant test was evaluated as per EPA guidelines (EPA-821-B-00-004), and were determined to be acceptable.

7. SUMMARY

The Hercules Pipeline sediments were analyzed to determine whether resuspended sediments would represent an adverse impact during pipe removal operations. Sediments will be archived for up to a year should additional site-specific analytical chemistry be required.

All of the analytes for the HP-Comp sediment were generally similar to or below San Francisco Bay background levels (SFRWQCB 1998). It should be noted that cadmium was measured slightly above SF-Bay background levels; however, this concentration was below the cadmium ER-L (Long 1995) and is unlikely to cause an adverse biological effect. Additionally, the sediment elutriate test indicated that toxicity would not be expected sue to sediment resuspension during pipeline removal.

Based on these results, the Hercules pipeline sediments would not represent an adverse impact during pipe removal operations.

8. REFERENCES

PER (2013) Sediment Characterization Sampling and Analysis Plan (SAP) for the Removal of a Wastewater Outfall Pipeline Located in Hercules, CA. Prepared for Boudreau Associates LLC. Prepared by Pacific EcoRisk, Fairfield, CA.

Plumb RH, Jr (1981) Procedure for Handling and Chemical Analysis of Sediment and Water Samples. Technical Report U.S. EPA /CE-81-1, prepared by Great Lakes Laboratory, State University College at Buffalo, Buffalo, NY, for the U.S. Environmental Protection Agency/Corps of Army Engineer Waterways Experiment Station, Vicksburg, MS.

Long, E. R., D. D. MacDonald, S. L. Smith, and F. D. Calder. 1995. Incidence of Adverse Biological Effects within Ranges of Chemical Concentrations in Marine and Estuarine Sediments. Environ. Manage. 19(1):81-97.

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US EPA (1998a) EPA Requirements for Quality Assurance Project Plans. United States Environmental Protection Agency, Quality Assurance Division, Washington, DC 20460.

US EPA (1998b) EPA Guidance for Quality Assurance Project Plans. United States Environmental Protection Agency, Office of Research and Development, Washington, DC 20460.

US EPA (2002) Methods for Measuring the Acute Toxicity of Effluent and Receiving Waters to Freshwater and Marine Organisms, Fifth Edition. United States Environmental Protection Agency, Office of Water, Washington, DC 20460.

Appendix A

Sampling Field Logs and Data Sheets

CHAIN OF CUSTODY RECORD

PACIFIC ECORISK
2250 Cordelia Rd
Fairfield, CA 94534
Ph: (707) 207-7760
Fax: (707) 207-7916
www.pacificecorisk.com

RESULTS TO: Same
Attn: Jeff Cotsifas
Phone:
Email:

BILL TO: Same
Attn:
Phone:
Email:

PROJECT: Hercules Pipeline

ANALYSES REQUESTED

SAMPLE IDENTIFICATION	DATE	TIME	SAMPLE MATRIX	GRAB/ COMP.	# CONTAINERS/TYPE	Seal Chem	Seal Tox							REMARKS
HP-06	3/25/13	1020	Seal	G	1 1 poly Bag	✓	✓							
HP-07	3/25/13	0950	Seal	G	1 1 poly Bag	✓	✓							
HP-08	3/25/13	0845	Seal	G	1 1 Poly Bag	✓	✓							
					/									
					/									
					/									
					/									
					/									

METHOD OF SHIPMENT: FedEx:____ UPS:____ HAND: X OTHER:____

COMMENTS:

CODES:

RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	DATE	TIME	PAGE #
[signature]	3/25/13	1200	[signature] QA	3/25/13	1200	1 OF 1

WHITE - RETURN W/ SAMPLE YELLOW - KEEP FOR YOUR RECORDS.

CHAIN OF CUSTODY RECORD

PACIFIC ECORISK
2250 Cordelia Rd
Fairfield, CA 94534
Ph: (707) 207-7760
Fax: (707) 207-7916
www.pacificecorisk.com

RESULTS TO: Same
Attn: Jeff Cotsifas
Phone:
Email:

BILL TO: Same
Attn:
Phone:
Email:

PROJECT: Hercules Pipeline

ANALYSES REQUESTED

SAMPLE IDENTIFICATION	DATE	TIME	SAMPLE MATRIX	GRAB/ COMP.	# CONTAINERS/TYPE	Sed Chem	Sed Tox							REMARKS
HP-01	3/28/13	1200	Sed	G	1 1 Poly Bag	✓	✓							
HP-02	3/28/13	1130	Sed	G	1 1 Poly Bag	✓	✓							
HP-03	3/28/13	1040	Sed	G	1 1 Poly Bag	✓	✓							
HP-04	3/28/13	1015	Sed	G	1 1 Poly Bag	✓	✓							
HP-05	3/28/13	0945	Sed	G	1 1 Poly Bag	✓	✓							
HP-0-Site H2O	3/28/13	1150	H2O	G	2 1 Cubi		✓							
					1									
					1									

METHOD OF SHIPMENT: FedEx:____ UPS:____ HAND: X OTHER:____

COMMENTS:

CODES:

RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	DATE	TIME	PAGE #
[signature]	3/28/13	1430	[signature] CA	3/28/13	1430	1 OF 1

WHITE - RETURN W/ SAMPLE YELLOW - KEEP FOR YOUR RECORDS

Pacific EcoRisk
Environmental Consulting and Testing

Pacific EcoRisk
2250 Cordelia Road
Fairfield, CA 94534
Phone: (707) 207-7760
Fax: (707) 207-7916

Sediment Core Collection Form

Station ID: HP-01 **Date:** 3/28/13

Project Name: Hercules Pipeline **Project No.:** 20792

Coordinates:
Lat/Northing: 38.03487° Long/Easting: 122.27506°

Vertical Datum: (MLLW) MLW Other:

Depth Measurement: Sounder (Leadline)

Project Depth: 3.0' **Overdredge:** —

	Attempt 1	Attempt 2
Time:	12:00	
(A) Measured Water Depth	4.4'	
(B) Tide Height	~~3.5~~ 3.5'	
(C) Mudline Elevation (A–B=C)	0.9'	
(D) Calculated Core Length (PD+OD-C=D)	3.0'	
Estimated Penetration	3.0'	
Description of Core Drive	Smooth	
Refusal Encountered?	No	
Total Core Length Recovered	2.6'	

Core Characteristics

Sediment Type	cobble, gravel, sand C M F, silt clay, organic matter	cobble, gravel, sand C M F, silt clay, organic matter
Sediment Color	gray, black, brown, brown surface, olivine	gray, black, brown, brown surface, olivine
Sediment Odor	None, slight, mod, strong H_2S, petroleum, septic	None, slight, mod, strong H_2S, petroleum, septic
Any Layering Homogenous	Layering	

Comments: EPE: 6.6'
4 Cores Collected
- Top 6" were medium sand. Remainder of core was fine gray sediment.

Recorded by: DG

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Environmental Consulting and Testing

Pacific EcoRisk
2250 Cordelia Road
Fairfield, CA 94534
Phone: (707) 207-7760
Fax: (707) 207-7916

Sediment Core Collection Form

Station ID: HP-02 **Date:** 3/28/13

Project Name: Hercules Pipeline **Project No.:** 20792

Coordinates:
Lat/Northing: 38.03538° Long/Easting: 122.27540°

Vertical Datum: (MLLW) MLW Other:

Depth Measurement: Sounder (Leadline)

Project Depth: 3.0' b.s.s. **Overdredge:** —

	Attempt 1	Attempt 2
Time:	~~10~~ 11:30	
(A) Measured Water Depth	5.0'	
(B) Tide Height	2.7'	
(C) Mudline Elevation (A–B=C)	2.3'	
(D) Calculated Core Length (PD+OD-C=D)	3.0'	
Estimated Penetration	3.0	
Description of Core Drive	Smooth	
Refusal Encountered?	No	
Total Core Length Recovered	2.8'	

Core Characteristics

Sediment Type	cobble, gravel, sand C M F, silt clay, organic matter	cobble, gravel, sand C M F, silt clay, organic matter
Sediment Color	gray, black, brown, brown surface, olivine	gray, black, brown, brown surface, olivine
Sediment Odor	None, slight, mod, strong H_2S, petroleum, septic	None, slight, mod, strong H_2S, petroleum, septic
Any Layering Homogenous	Homogenous	

Comments: EPE: 7.3'
4 Cores Collected
Core homogenous: fine brn Gray fine mixed w fine sand.

Recorded by: DG

Pacific EcoRisk
Environmental Consulting and Testing

Pacific EcoRisk
2250 Cordelia Road
Fairfield, CA 94534
Phone: (707) 207-7760
Fax: (707) 207-7916

Sediment Core Collection Form

Station ID: HP-03 **Date:** 3/28/13

Project Name: Hercules Pipeline **Project No.:** 20792

Coordinates:
Lat/Northing: 38.03581° Long/Easting: 122.27599°

Vertical Datum: (MLLW) MLW Other:

Depth Measurement: Sounder (Leadline)

Project Depth: 3.0' bss **Overdredge:** —

	Attempt 1	Attempt 2
Time:	10:40	
(A) Measured Water Depth	5.3	
(B) Tide Height	1.5	
(C) Mudline Elevation (A–B=C)	3.8'	
(D) Calculated Core Length (PD+OD-C=D)	3.0'	
Estimated Penetration	3.0'	
Description of Core Drive	Smooth	
Refusal Encountered?	No	
Total Core Length Recovered	2.5'	

Core Characteristics

Sediment Type	cobble, gravel, sand C M F, silt clay, organic matter	cobble, gravel, sand C M F, silt clay, organic matter
Sediment Color	gray, black, brown, brown surface, olivine	gray, black, brown, brown surface, olivine
Sediment Odor	None, slight, mod, strong H_2S, petroleum, septic	None, slight, mod, strong H_2S, petroleum, septic
Any Layering Homogenous	Homogenous	

Comments: EPE: 9.9'
4 cores Collected
Cores are homogenous: Thin brown surface w/ the remainder of core consisting of fine and fine sand

Recorded by:

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Environmental Consulting and Testing

Pacific EcoRisk
2250 Cordelia Road
Fairfield, CA 94534
Phone: (707) 207-7760
Fax: (707) 207-7916

Sediment Core Collection Form

Station ID: HP-04 **Date:** 3/28/13

Project Name: Hercules Pipeline **Project No.:** 20792

Coordinates:
Lat/Northing: 38.03636° Long/Easting: 122.27641°

Vertical Datum: (MLLW) MLW Other:

Depth Measurement: Sounder (Leadline)

Project Depth: 3.0' b.s.s. **Overdredge:** –

	Attempt 1	Attempt 2
Time:	10:15	
(A) Measured Water Depth	7.3'	
(B) Tide Height	1.0'	
(C) Mudline Elevation (A–B=C)	6.3'	
(D) Calculated Core Length (PD+OD-C=D)	3.0'	
Estimated Penetration	3.0'	
Description of Core Drive	Smooth	
Refusal Encountered?	No	
Total Core Length Recovered	3.0'	

Core Characteristics

Sediment Type	cobble, gravel, (sand) C M F, (silt clay), organic matter	cobble, gravel, sand C M F, silt clay, organic matter
Sediment Color	(gray), black, brown, (brown surface), olivine	gray, black, brown, brown surface, olivine
Sediment Odor	(None), slight, mod, strong H_2S, petroleum, septic	None, slight, mod, strong H_2S, petroleum, septic
Any Layering Homogenous	Homogenous	

Comments: EPE: 6.9'
4 Cores Collected
Core homogenous: Thin brown surface remainder of core was uniform fine with fine sand mixed in.

Recorded by: DG

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Environmental Consulting and Testing

Pacific EcoRisk
2250 Cordelia Road
Fairfield, CA 94534
Phone: (707) 207-7760
Fax: (707) 207-7916

Sediment Core Collection Form

Station ID: HP-05 **Date:** 3/28/13

Project Name: Hercules Pipeline **Project No.:** 20792

Coordinates:
Lat/Northing: 38°.03674 Long/Easting: -122.27696

Vertical Datum: (MLLW) MLW Other:

Depth Measurement: Sounder (Leadline)

Project Depth: 3.0' **Overdredge:** —

	Attempt 1	Attempt 2
Time:	0945	
(A) Measured Water Depth	7.0'	
(B) Tide Height	0.6'	
(C) Mudline Elevation (A–B=C)	6.4'	
(D) Calculated Core Length (PD+OD-C=D)	3.0'	
Estimated Penetration	3.0'	
Description of Core Drive	Smooth	
Refusal Encountered?	No	
Total Core Length Recovered	2.5'	

Core Characteristics

Sediment Type	cobble, gravel, (sand) C M (F), (silt clay), organic matter	cobble, gravel, sand C M F, silt clay, organic matter
Sediment Color	(gray), black, brown, (brown surface), olivine	gray, black, brown, brown surface, olivine
Sediment Odor	(None), slight, mod, strong H_2S, petroleum, septic	None, slight, mod, strong H_2S, petroleum, septic
Any Layering Homogenous	Homogenous	

Comments: EPE: 8.6'
4 Cores Collected

Recorded by: [illegible]

Pacific EcoRisk
Environmental Consulting and Testing

Pacific EcoRisk
2250 Cordelia Road
Fairfield, CA 94534
Phone: (707) 207-7760
Fax: (707) 207-7916

Sediment Core Collection Form

Station ID: HP-06 **Date:** 3/25/13

Project Name: Hercules Pipeline **Project No.:** 20792

Coordinates:
Lat/Northing: 38.03740° Long/Easting: 122.27750°

Vertical Datum: (MLLW) MLW Other:

Depth Measurement: Sounder (Leadline)

Project Depth: 0.5' **Overdredge:** —

	Attempt 1	Attempt 2
Time:	10:20	
(A) Measured Water Depth	12.6'	
(B) Tide Height	4.8'	
(C) Mudline Elevation (A–B=C)	7.8'	
(D) Calculated Core Length (PD+OD-C=D)	0.5'	
Estimated Penetration	0.5'	
Description of Core Drive	smooth	
Refusal Encountered?	No	
Total Core Length Recovered	Homogenous	

Core Characteristics

Sediment Type	cobble, gravel, sand C M F, (silt clay), organic matter	cobble, gravel, sand C M F, silt clay, organic matter
Sediment Color	(gray), black, (brown), brown surface, olivine	gray, black, brown, brown surface, olivine
Sediment Odor	(None), slight, mod, strong H_2S, petroleum, septic	None, slight, mod, strong H_2S, petroleum, septic
Any Layering Homogenous	Homogenous	

Comments: EPE: 9.6'
Some shell hash present in sample.
Petite ponar used to collect samples

Recorded by: DS

Pacific EcoRisk
Environmental Consulting and Testing

Pacific EcoRisk
2250 Cordelia Road
Fairfield, CA 94534
Phone: (707) 207-7760
Fax: (707) 207-7916

Sediment Core Collection Form

Station ID: HP-07 **Date:** 3/25/13

Project Name: Hercules Pipeline **Project No.:** 20792

Coordinates:
Lat/Northing: 38.03797° Long/Easting: 122.27819°

Vertical Datum: (MLLW) MLW Other:

Depth Measurement: Sounder (Leadline)

Project Depth: 0.5" **Overdredge:** —

	Attempt 1	Attempt 2
Time:	0950	
(A) Measured Water Depth	12.8'	
(B) Tide Height	4.3'	
(C) Mudline Elevation (A–B=C)	8.5'	
(D) Calculated Core Length (PD+OD-C=D)	0.5'	
Estimated Penetration	0.5'	
Description of Core Drive	Smooth	
Refusal Encountered?	No	
Total Core Length Recovered	0.5'	

Core Characteristics

Sediment Type	cobble, gravel, sand C M F, silt clay, organic matter	cobble, gravel, sand C M F, silt clay, organic matter
Sediment Color	gray, black, brown, brown surface, olivine	gray, black, brown, brown surface, olivine
Sediment Odor	None, slight, mod, strong H_2S, petroleum, septic	None, slight, mod, strong H_2S, petroleum, septic
Any Layering Homogenous	Homogenous	

Comments: EPE: 12'
Some shell hash present
Used a petite ponar to collect sample

Recorded by: [illegible]

Pacific EcoRisk
Environmental Consulting and Testing

Pacific EcoRisk
2250 Cordelia Road
Fairfield, CA 94534
Phone: (707) 207-7760
Fax: (707) 207-7916

Sediment Core Collection Form

Station ID: HP-08 **Date:** 3/25/13

Project Name: Hercules Pipeline **Project No.:** 20792

Coordinates:
Lat/Northing: 38.03861° Long/Easting: 122.27881°

Vertical Datum: (MLLW) MLW Other:

Depth Measurement: Sounder (Leadline)

Project Depth: 0.5' **Overdredge:** —

	Attempt 1	Attempt 2
Time:	0845	
(A) Measured Water Depth	11.5'	
(B) Tide Height	2.8'	
(C) Mudline Elevation (A–B=C)	8.7'	
(D) Calculated Core Length (PD+OD-C=D)	0.5'	
Estimated Penetration	0.5'	
Description of Core Drive	Smooth	
Refusal Encountered?	No	
Total Core Length Recovered	0.5'	

Core Characteristics

Sediment Type	cobble, gravel, sand C M F, (silt clay), organic matter	cobble, gravel, sand C M F, silt clay, organic matter
Sediment Color	(gray), black, brown, brown surface, olivine	gray, black, brown, brown surface, olivine
Sediment Odor	(None), slight, mod, strong H_2S, petroleum, septic	None, slight, mod, strong H_2S, petroleum, septic
Any Layering Homogenous	Homogenous	

Comments: EPE: 6.4' Some shell hash present in Sediment. Used petite ponar to Collect Sample.

Recorded by: DCS

Appendix B

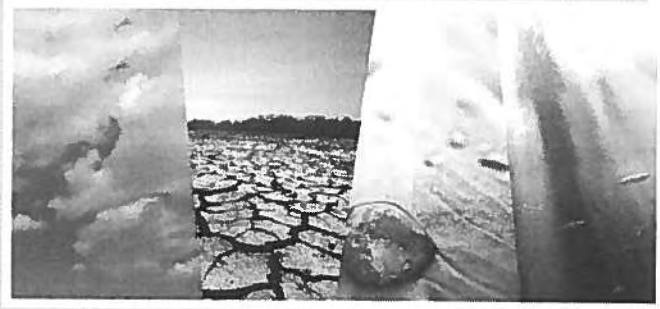
Results of the Sediment Conventional and Chemical Analyses: Laboratory Data Reports Submitted by Calscience

Calscience Environmental Laboratories, Inc.

CALSCIENCE

WORK ORDER NUMBER: 13-04-0291

The difference is service



AIR | SOIL | WATER | MARINE CHEMISTRY

Analytical Report For

Client: Pacific Ecorisk

Client Project Name: Hercules Pipeline 20792

Attention: Jeff Cotsifas
2250 Cordelia Road
Fairfield, CA 94534-1912

Approved for release on 04/19/2013 by:
Danielle Gonsman
Project Manager

ResultLink ▸

Email your PM ▸

7440 Lincoln Way, Garden Grove, CA 92841-1432 • TEL: (714) 895-5494 • FAX: (714) 894-7501 • www.calscience.com

NELAP ID: 03220CA | DoD ELAP ID: L10-41 | CSDLAC ID: 10109 | SCAQMD ID: 93LA0830

Calscience Environmental Laboratories, Inc.

Contents

Client Project Name: Hercules Pipeline 20792
Work Order Number: 13-04-0291

Calscience Environmental Laboratories, Inc.

ACCREDITED IN ACCORDANCE WITH nelac

CASE NARRATIVE

Calscience Work Order No.: 13-04-0291
Project ID: Hercules Pipeline

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

One sediment sample was received for this project on April 4, 2013. The sample was transferred to the laboratory in an ice-chest with wet ice, following strict chain-of-custody (COC) procedures. The temperature of the sample upon receipt at the laboratory was 1.7°C. The samples were given laboratory identification numbers, logged into the Laboratory Information Management System (LIMS) and then stored under refrigeration pending sediment chemistry testing.

Tests Performed

Total Solids by SM 2540B (M)
TOC by EPA 9060A
Trace Metals by EPA 6020
Mercury by EPA 7471A
OC Pesticides by EPA 8081A
PCB Congeners by EPA 8270C SIM
PAHs by EPA 8270C SIM
Organotins by Krone et al.
Particle Size by ASTM D4464

Data Summary

The 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.

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.

Trace levels, below the RL but above the MDL, of two PAH analytes and Arsenic were found in the Method Blanks. The results have been flagged with the appropriate qualifiers.

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.

Matrix Spikes

Matrix spike analyses were performed on project sample HP-Comp. All recoveries were within acceptable control limits for all analyses with the following exceptions.

The MS and/or MSD recoveries for Lead and Zinc were outside the established control limits. Since the PDS, LCS and LCSD recoveries were within the control limits, the results are released with no further action.

The MS recovery for Tetrabutyltin was below the control limits. However, the results are released as is since the MSD, LCS and LCSD recoveries were in control.

Several PAH MS/MSD recoveries were below the established control limits due to matrix interference. However, since the associated LCS and LCSD recoveries were in control, the results are released.

The RPDs and/or MS recoveries for two EPA 8081A analytes were out of control. The results have been flagged with the appropriate qualifiers and are released with no further action.

Surrogates

Surrogate recoveries for all applicable tests and samples were within the established control limits with the following exceptions

For PAHs by EPA 8270C SIM the 2-Fluorobiphenyl recovery was high in both samples. Since the other surrogate recoveries were in control, matrix interference is probable and so the data is released as is.

Laboratory Duplicate

A laboratory duplicate was created for this project with sample HP-Comp. The laboratory duplicate was analyzed for the requested analyses and the precision between the two samples was acceptable.

Acronyms

LCS/LCSD- Laboratory Control Sample/Laboratory Control Sample Duplicate
MS/MSD- Matrix Spike/Matrix Spike Duplicate
RPD- Relative Percent Difference

Condition Upon Receipt:

Samples were received under Chain of Custody (COC) on 04/04/2013. They were assigned to Work Order 13-04-0291.

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 an immediate holding time (HT </= 15 minutes --40CFR-136.3 Table II footnote 4), is considered a "field" test and reported samples results are not flagged unless the analysis is performed beyond 24 hours of the time of collection.

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:

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.

Subcontract Information:

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

Calscience Environmental Laboratories, Inc.

Analytical Report

Pacific Ecorisk		Date Received:	04/04/13
2250 Cordelia Road		Work Order No:	13-04-0291
Fairfield, CA 94534-1912		Preparation:	N/A
		Method:	EPA 9060A

Project: Hercules Pipeline 20792

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
HP-COMP	**13-04-0291-1-A**	**03/25/13 08:45**	**Sediment**	**TOC 5**	**04/08/13**	**04/09/13 18:19**	**D0408TOCL1**

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.
-Results are reported on a dry weight basis.

Parameter	Result	RL	MDL	DF	Qual	Units
Carbon, Total Organic	1.0	0.081	0.020	1		%

HP-COMP LAB DUP	**13-04-0291-3-A**	**03/25/13 08:45**	**Sediment**	**TOC 5**	**04/08/13**	**04/09/13 18:19**	**D0408TOCL1**

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.
-Results are reported on a dry weight basis.

Parameter	Result	RL	MDL	DF	Qual	Units
Carbon, Total Organic	0.88	0.079	0.019	1		%

Method Blank	**099-06-013-848**	**N/A**	**Solid**	**TOC 5**	**04/08/13**	**04/09/13 18:19**	**D0408TOCL1**

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	Qual	Units
Carbon, Total Organic	ND	0.050	0.012	1		%

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Calscience Environmental Laboratories, Inc.

Analytical Report

Pacific Ecorisk		Date Received:	04/04/13
2250 Cordelia Road		Work Order No:	13-04-0291
Fairfield, CA 94534-1912		Preparation:	N/A
		Method:	SM 2540 B (M)

Project: Hercules Pipeline 20792

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
HP-COMP	**13-04-0291-1-A**	**03/25/13 08:45**	**Sediment**	**N/A**	**04/08/13**	**04/08/13 16:00**	**D0408TSB1**

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	Qual	Units
Solids, Total	61.9	0.100	0.100	1		%

HP-COMP LAB DUP	**13-04-0291-3-A**	**03/25/13 08:45**	**Sediment**	**N/A**	**04/08/13**	**04/08/13 16:00**	**D0408TSB1**

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	Qual	Units
Solids, Total	63.3	0.100	0.100	1		%

Method Blank	**099-05-019-2,199**	**N/A**	**Solid**	**N/A**	**04/08/13**	**04/08/13 16:00**	**D0408TSB1**

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	Qual	Units
Solids, Total	ND	0.100	0.100	1		%

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Calscience Environmental Laboratories, Inc.

Analytical Report

Pacific Ecorisk		Date Received:	04/04/13
2250 Cordelia Road		Work Order No:	13-04-0291
Fairfield, CA 94534-1912		Preparation:	EPA 3545
		Method:	EPA 8081A
		Units:	ug/kg
Project: Hercules Pipeline 20792			Page 1 of 2

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
HP-COMP	**13-04-0291-1-B**	**03/25/13 08:45**	**Sediment**	**GC 51**	**04/08/13**	**04/10/13 11:33**	**130408L10**

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.
-Results are reported on a dry weight basis.

Parameter	Result	RL	MDL	DF	Qual	Parameter	Result	RL	MDL	DF	Qual
Aldrin	ND	1.6	0.51	1		Endosulfan I	ND	1.6	0.42	1	
Alpha-BHC	ND	1.6	0.52	1		Endosulfan II	ND	1.6	0.45	1	
Beta-BHC	ND	1.6	0.43	1		Endosulfan Sulfate	ND	1.6	0.55	1	
Delta-BHC	ND	1.6	0.41	1		Endrin	ND	1.6	0.58	1	
Gamma-BHC	ND	1.6	0.56	1		Endrin Aldehyde	ND	1.6	0.39	1	
Chlordane	ND	16	5.3	1		Endrin Ketone	ND	1.6	0.56	1	
Dieldrin	ND	1.6	0.53	1		Heptachlor	ND	1.6	0.52	1	
Trans-nonachlor	ND	1.6	0.47	1		Heptachlor Epoxide	ND	1.6	0.57	1	
2,4'-DDD	ND	1.6	0.55	1		Methoxychlor	ND	1.6	0.52	1	
2,4'-DDE	ND	1.6	0.49	1		Toxaphene	ND	32	10	1	
2,4'-DDT	ND	1.6	0.49	1		Alpha Chlordane	ND	1.6	0.52	1	
4,4'-DDD	ND	1.6	0.51	1		Gamma Chlordane	ND	1.6	0.51	1	
4,4'-DDE	ND	1.6	0.48	1		Cis-nonachlor	ND	1.6	0.47	1	
4,4'-DDT	ND	1.6	0.54	1		Oxychlordane	ND	1.6	0.45	1	

Surrogates:	REC (%)	Control Limits	Qual	Surrogates:	REC (%)	Control Limits	Qual
2,4,5,6-Tetrachloro-m-Xylene	90	50-130		Decachlorobiphenyl	105	50-130	

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Calscience Environmental Laboratories, Inc.

Analytical Report

ACCREDITED IN ACCORDANCE WITH nelac

Pacific Ecorisk		Date Received:	04/04/13
2250 Cordelia Road		Work Order No:	13-04-0291
Fairfield, CA 94534-1912		Preparation:	EPA 3545
		Method:	EPA 8081A
		Units:	ug/kg
Project: Hercules Pipeline 20792			Page 2 of 2

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
HP-COMP LAB DUP	**13-04-0291-3-B**	**03/25/13 08:45**	**Sediment**	**GC 51**	**04/08/13**	**04/10/13 11:47**	**130408L10**

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.
-Results are reported on a dry weight basis.

Parameter	Result	RL	MDL	DF	Qual	Parameter	Result	RL	MDL	DF	Qual
Aldrin	ND	1.6	0.50	1		Endosulfan I	ND	1.6	0.41	1	
Alpha-BHC	ND	1.6	0.51	1		Endosulfan II	ND	1.6	0.44	1	
Beta-BHC	ND	1.6	0.42	1		Endosulfan Sulfate	ND	1.6	0.53	1	
Delta-BHC	ND	1.6	0.40	1		Endrin	ND	1.6	0.57	1	
Gamma-BHC	ND	1.6	0.55	1		Endrin Aldehyde	ND	1.6	0.39	1	
Chlordane	ND	16	5.2	1		Endrin Ketone	ND	1.6	0.55	1	
Dieldrin	ND	1.6	0.52	1		Heptachlor	ND	1.6	0.51	1	
Trans-nonachlor	ND	1.6	0.45	1		Heptachlor Epoxide	ND	1.6	0.56	1	
2,4'-DDD	ND	1.6	0.54	1		Methoxychlor	ND	1.6	0.51	1	
2,4'-DDE	ND	1.6	0.48	1		Toxaphene	ND	32	10	1	
2,4'-DDT	ND	1.6	0.47	1		Alpha Chlordane	ND	1.6	0.51	1	
4,4'-DDD	ND	1.6	0.50	1		Gamma Chlordane	ND	1.6	0.50	1	
4,4'-DDE	ND	1.6	0.47	1		Cis-nonachlor	ND	1.6	0.46	1	
4,4'-DDT	ND	1.6	0.53	1		Oxychlordane	ND	1.6	0.44	1	

Surrogates:	REC (%)	Control Limits	Qual	Surrogates:	REC (%)	Control Limits	Qual
2,4,5,6-Tetrachloro-m-Xylene	82	50-130		Decachlorobiphenyl	100	50-130	

Method Blank	**099-12-858-197**	**N/A**	**Solid**	**GC 51**	**04/08/13**	**04/10/13 10:21**	**130408L10**

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	Qual	Parameter	Result	RL	MDL	DF	Qual
Aldrin	ND	1.0	0.31	1		Endosulfan I	ND	1.0	0.26	1	
Alpha-BHC	ND	1.0	0.32	1		Endosulfan II	ND	1.0	0.28	1	
Beta-BHC	ND	1.0	0.26	1		Endosulfan Sulfate	ND	1.0	0.34	1	
Delta-BHC	ND	1.0	0.26	1		Endrin	ND	1.0	0.36	1	
Gamma-BHC	ND	1.0	0.35	1		Endrin Aldehyde	ND	1.0	0.24	1	
Chlordane	ND	10	3.3	1		Endrin Ketone	ND	1.0	0.35	1	
Dieldrin	ND	1.0	0.33	1		Heptachlor	ND	1.0	0.32	1	
Trans-nonachlor	ND	1.0	0.29	1		Heptachlor Epoxide	ND	1.0	0.36	1	
2,4'-DDD	ND	1.0	0.34	1		Methoxychlor	ND	1.0	0.32	1	
2,4'-DDE	ND	1.0	0.31	1		Toxaphene	ND	20	6.3	1	
2,4'-DDT	ND	1.0	0.30	1		Alpha Chlordane	ND	1.0	0.32	1	
4,4'-DDD	ND	1.0	0.32	1		Gamma Chlordane	ND	1.0	0.32	1	
4,4'-DDE	ND	1.0	0.30	1		Cis-nonachlor	ND	1.0	0.29	1	
4,4'-DDT	ND	1.0	0.33	1		Oxychlordane	ND	1.0	0.28	1	

Surrogates:	REC (%)	Control Limits	Qual	Surrogates:	REC (%)	Control Limits	Qual
2,4,5,6-Tetrachloro-m-Xylene	110	50-130		Decachlorobiphenyl	106	50-130	

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Calscience Environmental Laboratories, Inc.

Analytical Report

ACCREDITED IN ACCORDANCE WITH nelac

Pacific Ecorisk		Date Received:	04/04/13
2250 Cordelia Road		Work Order No:	13-04-0291
Fairfield, CA 94534-1912		Preparation:	EPA 3545
		Method:	EPA 8270C SIM PAHs
		Units:	ug/kg
Project: Hercules Pipeline 20792			Page 1 of 2

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
HP-COMP	**13-04-0291-1-B**	**03/25/13 08:45**	**Sediment**	**GC/MS AAA**	**04/08/13**	**04/11/13 00:47**	**130408L01**

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.
-Results are reported on a dry weight basis.

Parameter	Result	RL	MDL	DF	Qual	Parameter	Result	RL	MDL	DF	Qual
Acenaphthene	ND	16	2.9	1		Fluoranthene	60	16	1.6	1	
Acenaphthylene	12	16	2.4	1	J	Fluorene	6.0	16	2.4	1	J
Anthracene	41	16	1.3	1		Indeno (1,2,3-c,d) Pyrene	57	16	1.7	1	
Benzo (a) Anthracene	44	16	2.5	1		2-Methylnaphthalene	4.2	16	2.9	1	J
Benzo (a) Pyrene	61	16	1.6	1		1-Methylnaphthalene	ND	16	3.2	1	
Benzo (b) Fluoranthene	200	16	1.6	1		1-Methylphenanthrene	ND	16	2.6	1	
Benzo (e) Pyrene	130	16	2.4	1		Naphthalene	8.4	16	4.9	1	J
Benzo (g,h,i) Perylene	60	16	1.5	1		Perylene	40	16	2.8	1	
Benzo (k) Fluoranthene	160	16	2.3	1		Phenanthrene	26	16	1.6	1	
Biphenyl	2.5	16	2.2	1	J	Pyrene	200	16	1.6	1	B
Chrysene	66	16	1.9	1		1,6,7-Trimethylnaphthalene	ND	16	2.3	1	
Dibenz (a,h) Anthracene	15	16	1.7	1	J	Dibenzothiophene	2.6	16	2.2	1	J
2,6-Dimethylnaphthalene	11	16	2.7	1	J						

Surrogates:	REC (%)	Control Limits	Qual	Surrogates:	REC (%)	Control Limits	Qual
2-Fluorobiphenyl	183	14-146	2,7	Nitrobenzene-d5	146	18-162	
p-Terphenyl-d14	107	34-148					

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Calscience Environmental Laboratories, Inc.

Analytical Report

Pacific Ecorisk		Date Received:	04/04/13
2250 Cordelia Road		Work Order No:	13-04-0291
Fairfield, CA 94534-1912		Preparation:	EPA 3545
		Method:	EPA 8270C SIM PAHs
		Units:	ug/kg
Project: Hercules Pipeline 20792			Page 2 of 2

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
HP-COMP LAB DUP	**13-04-0291-3-B**	**03/25/13 08:45**	**Sediment**	**GC/MS AAA**	**04/08/13**	**04/11/13 01:14**	**130408L01**

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.
-Results are reported on a dry weight basis.

Parameter	Result	RL	MDL	DF	Qual	Parameter	Result	RL	MDL	DF	Qual
Acenaphthene	3.0	16	2.8	1	J	Fluoranthene	70	16	1.6	1	
Acenaphthylene	9.3	16	2.4	1	J	Fluorene	5.9	16	2.3	1	J
Anthracene	28	16	1.3	1		Indeno (1,2,3-c,d) Pyrene	52	16	1.7	1	
Benzo (a) Anthracene	43	16	2.5	1		2-Methylnaphthalene	4.9	16	2.9	1	J
Benzo (a) Pyrene	62	16	1.6	1		1-Methylnaphthalene	3.2	16	3.2	1	B,J
Benzo (b) Fluoranthene	120	16	1.6	1		1-Methylphenanthrene	ND	16	2.6	1	
Benzo (e) Pyrene	91	16	2.4	1		Naphthalene	9.8	16	4.7	1	J
Benzo (g,h,i) Perylene	61	16	1.5	1		Perylene	47	16	2.7	1	
Benzo (k) Fluoranthene	95	16	2.2	1		Phenanthrene	33	16	1.6	1	
Biphenyl	3.0	16	2.2	1	J	Pyrene	150	16	1.6	1	B
Chrysene	54	16	1.8	1		1,6,7-Trimethylnaphthalene	2.8	16	2.2	1	J
Dibenz (a,h) Anthracene	13	16	1.6	1	J	Dibenzothiophene	3.2	16	2.1	1	J
2,6-Dimethylnaphthalene	14	16	2.6	1	J						

Surrogates:	REC (%)	Control Limits	Qual	Surrogates:	REC (%)	Control Limits	Qual
2-Fluorobiphenyl	166	14-146	2,7	Nitrobenzene-d5	144	18-162	
p-Terphenyl-d14	117	34-148					

Method Blank	**099-14-437-50**	**N/A**	**Solid**	**GC/MS AAA**	**04/08/13**	**04/09/13 16:06**	**130408L01**

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	Qual	Parameter	Result	RL	MDL	DF	Qual
Acenaphthene	ND	10	1.8	1		Fluoranthene	ND	10	0.98	1	
Acenaphthylene	ND	10	1.5	1		Fluorene	ND	10	1.5	1	
Anthracene	ND	10	0.81	1		Indeno (1,2,3-c,d) Pyrene	ND	10	1.1	1	
Benzo (a) Anthracene	ND	10	1.6	1		2-Methylnaphthalene	ND	10	1.8	1	
Benzo (a) Pyrene	ND	10	1.0	1		1-Methylnaphthalene	2.2	10	2.0	1	J
Benzo (b) Fluoranthene	ND	10	1.0	1		1-Methylphenanthrene	ND	10	1.6	1	
Benzo (e) Pyrene	ND	10	1.5	1		Naphthalene	ND	10	3.0	1	
Benzo (g,h,i) Perylene	ND	10	0.94	1		Perylene	ND	10	1.7	1	
Benzo (k) Fluoranthene	ND	10	1.4	1		Phenanthrene	ND	10	1.0	1	
Biphenyl	ND	10	1.4	1		Pyrene	1.1	10	0.99	1	J
Chrysene	ND	10	1.2	1		1,6,7-Trimethylnaphthalene	ND	10	1.4	1	
Dibenz (a,h) Anthracene	ND	10	1.0	1		Dibenzothiophene	ND	10	1.3	1	
2,6-Dimethylnaphthalene	ND	10	1.7	1							

Surrogates:	REC (%)	Control Limits	Qual	Surrogates:	REC (%)	Control Limits	Qual
2-Fluorobiphenyl	101	14-146		Nitrobenzene-d5	102	18-162	
p-Terphenyl-d14	119	34-148					

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Calscience Environmental Laboratories, Inc.

Analytical Report

Pacific Ecorisk
2250 Cordelia Road
Fairfield, CA 94534-1912

Date Received:	04/04/13
Work Order No:	13-04-0291
Preparation:	EPA 3545
Method:	EPA 8270C SIM PCB Congeners
Units:	ug/kg

Project: Hercules Pipeline 20792

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
HP-COMP	**13-04-0291-1-B**	**03/25/13 08:45**	**Sediment**	**GC/MS HHH**	**04/08/13**	**04/10/13 15:36**	**130408L02**

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.
-Results are reported on a dry weight basis.

Parameter	Result	RL	MDL	DF	Qual	Parameter	Result	RL	MDL	DF	Qual
PCB008	ND	0.81	0.14	1		PCB118	1.6	0.81	0.21	1	
PCB018	ND	0.81	0.25	1		PCB128	0.53	0.81	0.17	1	J
PCB028	ND	0.81	0.16	1		PCB132	ND	0.81	0.27	1	
PCB031	ND	0.81	0.19	1		PCB138/158	2.0	1.6	0.33	1	
PCB033	ND	0.81	0.18	1		PCB141	0.31	0.81	0.18	1	J
PCB044	0.33	0.81	0.21	1	J	PCB149	1.2	0.81	0.14	1	
PCB049	0.61	0.81	0.19	1	J	PCB151	0.25	0.81	0.17	1	J
PCB052	0.73	0.81	0.16	1	J	PCB153	1.9	0.81	0.17	1	
PCB056	ND	0.81	0.22	1		PCB156	0.32	0.81	0.16	1	J
PCB060	ND	0.81	0.17	1		PCB170	0.33	0.81	0.15	1	J
PCB066	0.31	0.81	0.15	1	J	PCB174	0.27	0.81	0.17	1	J
PCB070	0.50	0.81	0.13	1	J	PCB177	ND	0.81	0.20	1	
PCB074	ND	0.81	0.15	1		PCB180	0.44	0.81	0.099	1	J
PCB087	0.41	0.81	0.16	1	J	PCB183	ND	0.81	0.18	1	
PCB095	1.3	0.81	0.27	1		PCB187	0.25	0.81	0.17	1	J
PCB097	0.70	0.81	0.22	1	J	PCB194	ND	0.81	0.15	1	
PCB099	0.81	0.81	0.14	1		PCB195	ND	0.81	0.085	1	
PCB101	1.9	0.81	0.13	1		PCB201	ND	0.81	0.092	1	
PCB105	0.56	0.81	0.17	1	J	PCB203	ND	0.81	0.17	1	
PCB110	1.7	0.81	0.17	1							

Surrogates:	REC (%)	Control Limits	Qual	Surrogates:	REC (%)	Control Limits	Qual
2-Fluorobiphenyl	80	50-125		p-Terphenyl-d14	81	50-125	

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

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Calscience Environmental Laboratories, Inc.

Analytical Report

ACCREDITED IN ACCORDANCE WITH nelac

Pacific Ecorisk		Date Received:	04/04/13
2250 Cordelia Road		Work Order No:	13-04-0291
Fairfield, CA 94534-1912		Preparation:	EPA 3545
		Method:	EPA 8270C SIM PCB Congeners
		Units:	ug/kg
Project: Hercules Pipeline 20792			Page 2 of 3

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
HP-COMP LAB DUP	**13-04-0291-3-B**	**03/25/13 08:45**	**Sediment**	**GC/MS HHH**	**04/08/13**	**04/10/13 16:05**	**130408L02**

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.
-Results are reported on a dry weight basis.

Parameter	Result	RL	MDL	DF	Qual	Parameter	Result	RL	MDL	DF	Qual
PCB008	ND	0.79	0.13	1		PCB118	1.5	0.79	0.21	1	
PCB018	ND	0.79	0.25	1		PCB128	0.28	0.79	0.16	1	J
PCB028	ND	0.79	0.16	1		PCB132	ND	0.79	0.26	1	
PCB031	ND	0.79	0.18	1		PCB138/158	1.7	1.6	0.32	1	
PCB033	ND	0.79	0.17	1		PCB141	0.45	0.79	0.18	1	J
PCB044	0.35	0.79	0.21	1	J	PCB149	1.1	0.79	0.14	1	
PCB049	0.51	0.79	0.19	1	J	PCB151	0.27	0.79	0.16	1	J
PCB052	0.59	0.79	0.15	1	J	PCB153	1.6	0.79	0.16	1	
PCB056	ND	0.79	0.22	1		PCB156	0.22	0.79	0.15	1	J
PCB060	ND	0.79	0.17	1		PCB170	0.26	0.79	0.15	1	J
PCB066	0.35	0.79	0.14	1	J	PCB174	0.20	0.79	0.17	1	J
PCB070	0.40	0.79	0.13	1	J	PCB177	ND	0.79	0.19	1	
PCB074	0.16	0.79	0.15	1	J	PCB180	0.45	0.79	0.097	1	J
PCB087	0.32	0.79	0.16	1	J	PCB183	ND	0.79	0.18	1	
PCB095	1.3	0.79	0.26	1		PCB187	0.26	0.79	0.17	1	J
PCB097	0.68	0.79	0.22	1	J	PCB194	ND	0.79	0.15	1	
PCB099	0.81	0.79	0.13	1		PCB195	ND	0.79	0.083	1	
PCB101	1.8	0.79	0.13	1		PCB201	ND	0.79	0.090	1	
PCB105	0.47	0.79	0.17	1	J	PCB203	ND	0.79	0.17	1	
PCB110	1.5	0.79	0.16	1							

Surrogates:	REC (%)	Control Limits	Qual	Surrogates:	REC (%)	Control Limits	Qual
2-Fluorobiphenyl	53	50-125		p-Terphenyl-d14	59	50-125	

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Calscience Environmental Laboratories, Inc.

Analytical Report

ACCREDITED IN ACCORDANCE WITH nelac

Pacific Ecorisk		Date Received:	04/04/13
2250 Cordelia Road		Work Order No:	13-04-0291
Fairfield, CA 94534-1912		Preparation:	EPA 3545
		Method:	EPA 8270C SIM PCB Congeners
		Units:	ug/kg
Project: Hercules Pipeline 20792			Page 3 of 3

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	**099-14-341-95**	**N/A**	**Solid**	**GC/MS HHH**	**04/08/13**	**04/10/13 14:15**	**130408L02**

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	Qual	Parameter	Result	RL	MDL	DF	Qual
PCB008	ND	0.50	0.085	1		PCB118	ND	0.50	0.13	1	
PCB018	ND	0.50	0.16	1		PCB128	ND	0.50	0.10	1	
PCB028	ND	0.50	0.099	1		PCB132	ND	0.50	0.17	1	
PCB031	ND	0.50	0.12	1		PCB138/158	ND	1.0	0.20	1	
PCB033	ND	0.50	0.11	1		PCB141	ND	0.50	0.11	1	
PCB044	ND	0.50	0.13	1		PCB149	ND	0.50	0.089	1	
PCB049	ND	0.50	0.12	1		PCB151	ND	0.50	0.10	1	
PCB052	ND	0.50	0.097	1		PCB153	ND	0.50	0.10	1	
PCB056	ND	0.50	0.14	1		PCB156	ND	0.50	0.098	1	
PCB060	ND	0.50	0.11	1		PCB170	ND	0.50	0.093	1	
PCB066	ND	0.50	0.091	1		PCB174	ND	0.50	0.11	1	
PCB070	ND	0.50	0.082	1		PCB177	ND	0.50	0.12	1	
PCB074	ND	0.50	0.094	1		PCB180	ND	0.50	0.061	1	
PCB087	ND	0.50	0.10	1		PCB183	ND	0.50	0.11	1	
PCB095	ND	0.50	0.17	1		PCB187	ND	0.50	0.10	1	
PCB097	ND	0.50	0.14	1		PCB194	ND	0.50	0.096	1	
PCB099	ND	0.50	0.085	1		PCB195	ND	0.50	0.053	1	
PCB101	ND	0.50	0.081	1		PCB201	ND	0.50	0.057	1	
PCB105	ND	0.50	0.10	1		PCB203	ND	0.50	0.11	1	
PCB110	ND	0.50	0.10	1							

Surrogates:	REC (%)	Control Limits	Qual	Surrogates:	REC (%)	Control Limits	Qual
2-Fluorobiphenyl	94	50-125		p-Terphenyl-d14	95	50-125	

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Calscience Environmental Laboratories, Inc.

Analytical Report

Pacific Ecorisk		Date Received:	04/04/13
2250 Cordelia Road		Work Order No:	13-04-0291
Fairfield, CA 94534-1912		Preparation:	EPA 3550B (M)
		Method:	Organotins by Krone et al.
		Units:	ug/kg
Project: Hercules Pipeline 20792			Page 1 of 1

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
HP-COMP	**13-04-0291-1-B**	**03/25/13 08:45**	**Sediment**	**GC/MS JJJ**	**04/08/13**	**04/15/13 19:55**	**130408L06**

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.
-Results are reported on a dry weight basis.

Parameter	Result	RL	MDL	DF	Qual	Parameter	Result	RL	MDL	DF	Qual
Dibutyltin	ND	4.8	1.1	1		Tetrabutyltin	ND	4.8	1.2	1	
Monobutyltin	ND	4.8	1.1	1		Tributyltin	ND	4.8	0.93	1	

Surrogates:	REC (%)	Control Limits	Qual
Tripentyltin	81	48-126	

HP-COMP LAB DUP	**13-04-0291-3-B**	**03/25/13 08:45**	**Sediment**	**GC/MS JJJ**	**04/08/13**	**04/15/13 20:24**	**130408L06**

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.
-Results are reported on a dry weight basis.

Parameter	Result	RL	MDL	DF	Qual	Parameter	Result	RL	MDL	DF	Qual
Dibutyltin	ND	4.7	1.0	1		Tetrabutyltin	ND	4.7	1.2	1	
Monobutyltin	ND	4.7	1.0	1		Tributyltin	ND	4.7	0.91	1	

Surrogates:	REC (%)	Control Limits	Qual
Tripentyltin	99	48-126	

Method Blank	**099-07-016-1,016**	**N/A**	**Solid**	**GC/MS JJJ**	**04/08/13**	**04/15/13 19:25**	**130408L06**

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	Qual	Parameter	Result	RL	MDL	DF	Qual
Dibutyltin	ND	3.0	0.65	1		Tetrabutyltin	ND	3.0	0.77	1	
Monobutyltin	ND	3.0	0.65	1		Tributyltin	ND	3.0	0.58	1	

Surrogates:	REC (%)	Control Limits	Qual
Tripentyltin	86	48-126	

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Calscience Environmental Laboratories, Inc.

Analytical Report

ACCREDITED IN ACCORDANCE WITH nelac

Pacific Ecorisk		Date Received:	04/04/13
2250 Cordelia Road		Work Order No:	13-04-0291
Fairfield, CA 94534-1912		Preparation:	EPA 7471A Total
		Method:	EPA 7471A

Project: Hercules Pipeline 20792

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
HP-COMP	**13-04-0291-1-A**	**03/25/13 08:45**	**Sediment**	**Mercury**	**04/04/13**	**04/05/13 16:02**	**130404L05E**

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.
-Results are reported on a dry weight basis.

Parameter	Result	RL	MDL	DF	Qual	Units
Mercury	0.164	0.0324	0.00950	1		mg/kg

HP-COMP LAB DUP	**13-04-0291-3-B**	**03/25/13 08:45**	**Sediment**	**Mercury**	**04/08/13**	**04/09/13 14:51**	**130408L05E**

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.
-Results are reported on a dry weight basis.

Parameter	Result	RL	MDL	DF	Qual	Units
Mercury	0.225	0.0317	0.00929	1		mg/kg

Method Blank	**099-12-452-360**	**N/A**	**Solid**	**Mercury**	**04/04/13**	**04/05/13 15:51**	**130404L05E**

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	Qual	Units
Mercury	ND	0.0200	0.00588	1		mg/kg

Method Blank	**099-12-452-362**	**N/A**	**Solid**	**Mercury**	**04/08/13**	**04/08/13 17:32**	**130408L05E**

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	Qual	Units
Mercury	ND	0.0200	0.00588	1		mg/kg

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Calscience Environmental Laboratories, Inc.

Analytical Report

ACCREDITED IN ACCORDANCE WITH nelac

Pacific Ecorisk		Date Received:	04/04/13
2250 Cordelia Road		Work Order No:	13-04-0291
Fairfield, CA 94534-1912		Preparation:	EPA 3050B
		Method:	EPA 6020
		Units:	mg/kg
Project: Hercules Pipeline 20792			Page 1 of 1

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
HP-COMP	**13-04-0291-1-B**	**03/25/13 08:45**	**Sediment**	**ICP/MS 03**	**04/05/13**	**04/06/13 01:28**	**130405L04E**

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.
-Results are reported on a dry weight basis.

Parameter	Result	RL	MDL	DF	Qual	Parameter	Result	RL	MDL	DF	Qual
Arsenic	6.34	0.162	0.141	1		Nickel	37.0	0.162	0.0818	1	
Cadmium	0.438	0.162	0.0925	1		Selenium	ND	0.162	0.118	1	
Chromium	37.3	0.162	0.100	1		Silver	0.129	0.162	0.0506	1	J
Copper	25.0	0.162	0.0677	1		Zinc	59.3	1.62	1.28	1	
Lead	17.5	0.162	0.106	1							

HP-COMP LAB DUP	**13-04-0291-3-B**	**03/25/13 08:45**	**Sediment**	**ICP/MS 03**	**04/09/13**	**04/09/13 21:38**	**130409L01E**

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.
-Results are reported on a dry weight basis.

Parameter	Result	RL	MDL	DF	Qual	Parameter	Result	RL	MDL	DF	Qual
Arsenic	6.99	0.158	0.138	1	B	Nickel	34.1	0.158	0.0800	1	
Cadmium	0.380	0.158	0.0904	1		Selenium	0.179	0.158	0.115	1	
Chromium	31.8	0.158	0.0981	1		Silver	0.133	0.158	0.0494	1	J
Copper	24.7	0.158	0.0662	1		Zinc	56.7	1.58	1.26	1	
Lead	16.7	0.158	0.104	1							

Method Blank	**099-15-254-95**	**N/A**	**Solid**	**ICP/MS 03**	**04/05/13**	**04/06/13 01:05**	**130405L04E**

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	Qual	Parameter	Result	RL	MDL	DF	Qual
Arsenic	ND	0.100	0.0873	1		Nickel	ND	0.100	0.0506	1	
Cadmium	ND	0.100	0.0572	1		Selenium	ND	0.100	0.0731	1	
Chromium	ND	0.100	0.0621	1		Silver	ND	0.100	0.0313	1	
Copper	ND	0.100	0.0419	1		Zinc	ND	1.00	0.795	1	
Lead	ND	0.100	0.0659	1							

Method Blank	**099-15-254-96**	**N/A**	**Solid**	**ICP/MS 03**	**04/09/13**	**04/09/13 20:51**	**130409L01E**

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	Qual	Parameter	Result	RL	MDL	DF	Qual
Arsenic	0.123	0.100	0.0873	1		Nickel	ND	0.100	0.0506	1	
Cadmium	ND	0.100	0.0572	1		Selenium	ND	0.100	0.0731	1	
Chromium	ND	0.100	0.0621	1		Silver	ND	0.100	0.0313	1	
Copper	ND	0.100	0.0419	1		Zinc	ND	1.00	0.795	1	
Lead	ND	0.100	0.0659	1							

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Calscience Environmental Laboratories, Inc.

PARTICLE SIZE SUMMARY

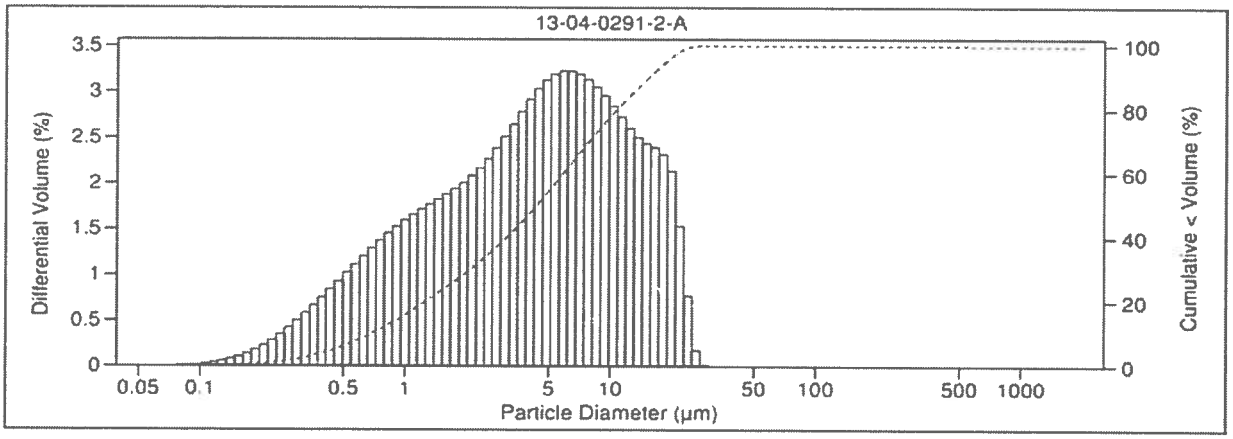
(ASTM D422 / D4464M)

Pacific Ecorisk		Date Sampled:	3/25/2013
2250 Cordelia Road		Date Received:	4/4/2013
Fairfield, CA 94534-1912		Work Order No:	13-04-0291
		Date Analyzed:	4/5/2013
		Method:	ASTM D4464M

Project: 20792-Hercules Pipeline

Sample ID	Depth ft	Description	Mean Grain Size mm
HP-COMP		Silt	0.006

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	0.00	0.00	53.09	46.91	100.00



Calscience Environmental Laboratories, Inc.

PARTICLE SIZE SUMMARY

(ASTM D422 / D4464M)

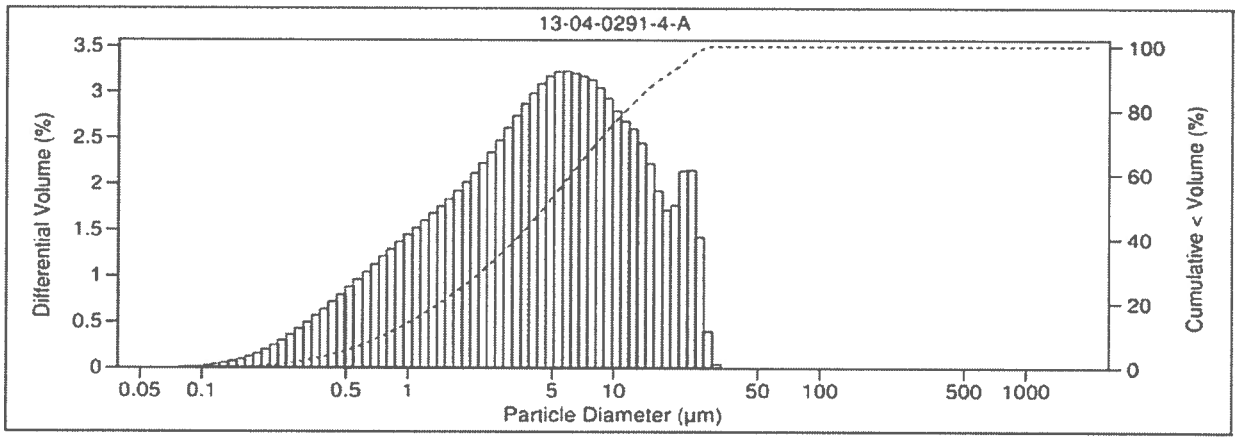
Pacific Ecorisk		Date Sampled:	3/25/2013
2250 Cordelia Road		Date Received:	4/4/2013
Fairfield, CA 94534-1912		Work Order No:	13-04-0291
		Date Analyzed:	4/5/2013
		Method:	ASTM D4464M

Project: 20792-Hercules Pipeline

Page 2 of 2

Sample ID	Depth ft	Description	Mean Grain Size mm
HP-COMP LAB DUP		Silt	0.006

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	55.17	44.83	100.00



Calscience Environmental Laboratories, Inc.

Quality Control - Spike/Spike Duplicate

ACCREDITED IN ACCORDANCE WITH nelac

Pacific Ecorisk		Date Received:	04/04/13
2250 Cordelia Road		Work Order No:	13-04-0291
Fairfield, CA 94534-1912		Preparation:	EPA 3050B
		Method:	EPA 6020

Project Hercules Pipeline 20792

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
HP-COMP	**Sediment**	**ICP/MS 03**	**04/05/13**	**04/06/13**	**130405S04**

Parameter	SAMPLE CONC	SPIKE ADDED	MS CONC	MS %REC	MSD CONC	MSD %REC	%REC CL	RPD	RPD CL	Qualifiers
Arsenic	3.927	25.00	29.49	102	30.81	108	80-120	4	0-20	
Cadmium	0.2708	25.00	25.96	103	25.74	102	80-120	1	0-20	
Chromium	23.07	25.00	51.52	114	46.69	94	80-120	10	0-20	
Copper	15.46	25.00	41.42	104	41.84	106	80-120	1	0-20	
Lead	10.85	25.00	42.13	125	37.54	107	80-120	12	0-20	3
Nickel	22.90	25.00	48.51	102	50.11	109	80-120	3	0-20	
Selenium	ND	25.00	23.73	95	21.30	85	80-120	11	0-20	
Silver	ND	12.50	12.28	98	12.10	97	80-120	2	0-20	
Zinc	36.69	25.00	65.23	114	70.21	134	80-120	7	0-20	3

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

Quality Control - PDS / PDSD

ACCREDITED IN ACCORDANCE WITH nelac

Pacific Ecorisk		Date Received	04/04/13
2250 Cordelia Road		Work Order No:	13-04-0291
Fairfield, CA 94534-1912		Preparation:	EPA 3050B
		Method:	EPA 6020

Project Hercules Pipeline 20792

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	PDS/PDSD Batch Number
HP-COMP	**Sediment**	**ICP/MS 03**	**04/05/13**	**04/06/13**	**130405S04**

Parameter	SAMPLE CONC	SPIKE ADDED	PDS CONC	PDS %REC	%REC CL	Qualifiers
Arsenic	3.927	25.00	29.55	102	75-125	
Cadmium	0.2708	25.00	25.33	100	75-125	
Chromium	23.07	25.00	43.35	81	75-125	
Copper	15.46	25.00	40.33	99	75-125	
Lead	10.85	25.00	35.29	98	75-125	
Nickel	22.90	25.00	46.26	93	75-125	
Selenium	ND	25.00	21.37	85	75-125	
Silver	ND	12.50	10.11	81	75-125	
Zinc	36.69	25.00	63.35	107	75-125	

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

Quality Control - Spike/Spike Duplicate

ACCREDITED IN ACCORDANCE WITH nelac

Pacific Ecorisk		Date Received:	04/04/13
2250 Cordelia Road		Work Order No:	13-04-0291
Fairfield, CA 94534-1912		Preparation:	EPA 3050B
		Method:	EPA 6020

Project Hercules Pipeline 20792

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
HP-COMP LAB DUP	**Sediment**	**ICP/MS 03**	**04/09/13**	**04/09/13**	**130409S01**

Parameter	SAMPLE CONC	SPIKE ADDED	MS CONC	MS %REC	MSD CONC	MSD %REC	%REC CL	RPD	RPD CL	Qualifiers
Arsenic	4.427	25.00	29.75	101	29.80	102	80-120	0	0-20	
Cadmium	0.2404	25.00	25.93	103	25.60	101	80-120	1	0-20	
Chromium	20.15	25.00	43.85	95	46.70	106	80-120	6	0-20	
Copper	15.64	25.00	40.10	98	40.70	100	80-120	1	0-20	
Lead	10.59	25.00	35.68	100	36.64	104	80-120	3	0-20	
Nickel	21.60	25.00	47.42	103	47.44	103	80-120	0	0-20	
Selenium	0.1132	25.00	23.04	92	23.65	94	80-120	3	0-20	
Silver	ND	12.50	12.82	103	12.82	103	80-120	0	0-20	
Zinc	35.92	25.00	65.66	119	62.85	108	80-120	4	0-20	

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

Quality Control - PDS / PDSD

ACCREDITED IN ACCORDANCE WITH nelac

Pacific Ecorisk		Date Received	04/04/13
2250 Cordelia Road		Work Order No:	13-04-0291
Fairfield, CA 94534-1912		Preparation:	EPA 3050B
		Method:	EPA 6020

Project Hercules Pipeline 20792

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	PDS/PDSD Batch Number
HP-COMP LAB DUP	**Sediment**	**ICP/MS 03**	**04/09/13**	**04/09/13**	**130409S01**

Parameter	SAMPLE CONC	SPIKE ADDED	PDS CONC	PDS %REC	%REC CL	Qualifiers
Arsenic	4.427	25.00	30.18	103	75-125	
Cadmium	0.2404	25.00	25.14	100	75-125	
Chromium	20.15	25.00	44.73	98	75-125	
Copper	15.64	25.00	41.11	102	75-125	
Lead	10.59	25.00	36.40	103	75-125	
Nickel	21.60	25.00	46.88	101	75-125	
Selenium	0.1132	25.00	22.97	91	75-125	
Silver	ND	12.50	11.21	90	75-125	
Zinc	35.92	25.00	62.26	105	75-125	

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

Quality Control - Spike/Spike Duplicate

ACCREDITED IN ACCORDANCE WITH nelac

Pacific Ecorisk		Date Received:	04/04/13
2250 Cordelia Road		Work Order No:	13-04-0291
Fairfield, CA 94534-1912		Preparation:	N/A
		Method:	EPA 9060A

Project Hercules Pipeline 20792

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
13-04-0280-1	**Sediment**	**TOC 5**	**04/08/13**	**04/09/13**	**D0408TOCS1**

Parameter	SAMPLE CONC	SPIKE ADDED	MS CONC	MS %REC	MSD CONC	MSD %REC	%REC CL	RPD	RPD CL	Qualifiers
Carbon, Total Organic	0.99	3.0	3.6	87	3.5	83	75-125	3	0-25	

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

Quality Control - Duplicate

Pacific Ecorisk		Date Received:	04/04/13
2250 Cordelia Road		Work Order No:	13-04-0291
Fairfield, CA 94534-1912		Preparation:	N/A
		Method:	SM 2540 B (M)

Project: Hercules Pipeline 20792

Quality Control Sample ID	Matrix	Instrument	Date Prepared:	Date Analyzed:	Duplicate Batch Number
HP-COMP	**Sediment**	**N/A**	**04/08/13**	**04/08/13**	**D0408TSD1**

Parameter	Sample Conc	DUP Conc	RPD	RPD CL	Qualifiers
Solids, Total	61.9	62.4	1	0-10	

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

Quality Control - Spike/Spike Duplicate

ACCREDITED IN ACCORDANCE WITH nelac

Pacific Ecorisk		Date Received:	04/04/13
2250 Cordelia Road		Work Order No:	13-04-0291
Fairfield, CA 94534-1912		Preparation:	EPA 7471A Total
		Method:	EPA 7471A

Project Hercules Pipeline 20792

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
HP-COMP	**Sediment**	**Mercury**	**04/04/13**	**04/05/13**	**130404S05**

Parameter	SAMPLE CONC	SPIKE ADDED	MS CONC	MS %REC	MSD CONC	MSD %REC	%REC CL	RPD	RPD CL	Qualifiers
Mercury	0.1018	0.8350	0.7942	83	0.8142	85	76-136	2	0-16	

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

Quality Control - Spike/Spike Duplicate

ACCREDITED IN ACCORDANCE WITH nelac

Pacific Ecorisk		Date Received:	04/04/13
2250 Cordelia Road		Work Order No:	13-04-0291
Fairfield, CA 94534-1912		Preparation:	EPA 7471A Total
		Method:	EPA 7471A

Project Hercules Pipeline 20792

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
13-04-0508-17	**Solid**	**Mercury**	**04/08/13**	**04/08/13**	**130408S05**

Parameter	SAMPLE CONC	SPIKE ADDED	MS CONC	MS %REC	MSD CONC	MSD %REC	%REC CL	RPD	RPD CL	Qualifiers
Mercury	ND	0.8350	0.7451	89	0.6961	83	71-137	7	0-14	

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

Quality Control - Spike/Spike Duplicate

ACCREDITED IN ACCORDANCE WITH nelac

Pacific Ecorisk		Date Received:	04/04/13
2250 Cordelia Road		Work Order No:	13-04-0291
Fairfield, CA 94534-1912		Preparation:	EPA 3550B (M)
		Method:	Organotins by Krone et al.

Project Hercules Pipeline 20792

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
HP-COMP	**Sediment**	**GC/MS JJJ**	**04/08/13**	**04/15/13**	**130408S06**

Parameter	SAMPLE CONC	SPIKE ADDED	MS CONC	MS %REC	MSD CONC	MSD %REC	%REC CL	RPD	RPD CL	Qualifiers
Tetrabutyltin	ND	100.0	77.34	77	99.80	100	79-175	25	0-31	3
Tributyltin	ND	100.0	76.57	77	98.39	98	69-135	25	0-29	

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

Quality Control - Spike/Spike Duplicate

ACCREDITED IN ACCORDANCE WITH nelac

Pacific Ecorisk		Date Received:	04/04/13
2250 Cordelia Road		Work Order No:	13-04-0291
Fairfield, CA 94534-1912		Preparation:	EPA 3545
		Method:	EPA 8081A

Project Hercules Pipeline 20792

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
HP-COMP	**Sediment**	**GC 51**	**04/08/13**	**04/10/13**	**130408S10**

Parameter	SAMPLE CONC	SPIKE ADDED	MS CONC	MS %REC	MSD CONC	MSD %REC	%REC CL	RPD	RPD CL	Qualifiers
Aldrin	ND	5.000	4.062	81	4.388	88	50-135	8	0-25	
Alpha-BHC	ND	5.000	4.683	94	4.665	93	50-135	0	0-25	
Beta-BHC	ND	5.000	4.779	96	4.615	92	50-135	3	0-25	
Delta-BHC	ND	5.000	4.529	91	4.553	91	50-135	1	0-25	
Gamma-BHC	ND	5.000	4.095	82	4.057	81	50-135	1	0-25	
Dieldrin	ND	5.000	4.422	88	4.445	89	50-135	1	0-25	
4,4'-DDD	ND	5.000	5.849	117	6.284	126	50-135	7	0-25	
4,4'-DDE	ND	5.000	4.917	98	4.892	98	50-135	1	0-25	
4,4'-DDT	ND	5.000	3.765	75	2.580	52	50-135	37	0-25	4
Endosulfan I	ND	5.000	4.109	82	4.055	81	50-135	1	0-25	
Endosulfan II	ND	5.000	4.405	88	4.364	87	50-135	1	0-25	
Endosulfan Sulfate	ND	5.000	4.660	93	4.725	94	50-135	1	0-25	
Endrin	ND	5.000	4.887	98	4.620	92	50-135	6	0-25	
Endrin Aldehyde	ND	5.000	4.167	83	4.116	82	50-135	1	0-25	
Endrin Ketone	ND	5.000	6.321	126	5.711	114	50-135	10	0-25	
Heptachlor	ND	5.000	4.318	86	3.777	76	50-135	13	0-25	
Heptachlor Epoxide	ND	5.000	4.363	87	4.416	88	50-135	1	0-25	
Methoxychlor	ND	5.000	3.442	69	1.833	37	50-135	61	0-25	3,4
Alpha Chlordane	ND	5.000	4.525	91	4.552	91	50-135	1	0-25	
Gamma Chlordane	ND	5.000	4.160	83	4.289	86	50-135	3	0-25	

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

Quality Control - Spike/Spike Duplicate

ACCREDITED IN ACCORDANCE WITH nelac

Pacific Ecorisk
2250 Cordelia Road
Fairfield, CA 94534-1912

Date Received: 04/04/13
Work Order No: 13-04-0291
Preparation: EPA 3545
Method: EPA 8270C SIM PCB Congeners

Project Hercules Pipeline 20792

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
HP-COMP	**Sediment**	**GC/MS HHH**	**04/08/13**	**04/10/13**	**130408S02**

Parameter	SAMPLE CONC	SPIKE ADDED	MS CONC	MS %REC	MSD CONC	MSD %REC	%REC CL	RPD	RPD CL	Qualifiers
PCB008	ND	25.00	20.35	81	16.86	67	50-125	19	0-30	
PCB018	ND	25.00	18.80	75	15.96	64	50-125	16	0-30	
PCB028	ND	25.00	18.91	76	16.05	64	50-125	16	0-30	
PCB044	ND	25.00	18.97	76	17.11	68	50-125	10	0-30	
PCB052	ND	25.00	19.45	78	17.87	71	50-125	8	0-30	
PCB066	ND	25.00	19.31	77	17.50	70	50-125	10	0-30	
PCB101	1.207	25.00	26.38	101	24.97	95	50-125	5	0-30	
PCB105	ND	25.00	20.75	83	18.75	75	50-125	10	0-30	
PCB118	1.018	25.00	27.67	107	26.14	100	50-125	6	0-30	
PCB128	ND	25.00	18.00	72	17.87	71	50-125	1	0-30	
PCB153	1.175	25.00	24.44	93	21.87	83	50-125	11	0-30	
PCB170	ND	25.00	16.83	67	15.88	64	50-125	6	0-30	
PCB180	ND	25.00	20.31	81	18.28	73	50-125	11	0-30	
PCB187	ND	25.00	18.28	73	16.45	66	50-125	11	0-30	
PCB195	ND	25.00	18.87	75	15.90	64	50-125	17	0-30	

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

Quality Control - Spike/Spike Duplicate

ACCREDITED IN ACCORDANCE WITH nelac

Pacific Ecorisk		Date Received:	04/04/13
2250 Cordelia Road		Work Order No:	13-04-0291
Fairfield, CA 94534-1912		Preparation:	EPA 3545
		Method:	EPA 8270C SIM PAHs

Project Hercules Pipeline 20792

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
HP-COMP	**Sediment**	**GC/MS AAA**	**04/08/13**	**04/09/13**	**130408S01**

Parameter	SAMPLE CONC	SPIKE ADDED	MS CONC	MS %REC	MSD CONC	MSD %REC	%REC CL	RPD	RPD CL	Qualifiers
Acenaphthene	ND	100.0	82.53	83	84.63	85	40-160	3	0-20	
Acenaphthylene	ND	100.0	80.82	81	82.66	83	40-160	2	0-20	
Anthracene	25.64	100.0	79.54	54	87.12	61	40-160	9	0-20	
Benzo (a) Anthracene	27.29	100.0	103.8	77	113.9	87	40-160	9	0-20	
Benzo (a) Pyrene	37.89	100.0	102.8	65	112.8	75	40-160	9	0-20	
Benzo (b) Fluoranthene	120.9	100.0	106.7	0	112.5	0	40-160	5	0-20	3
Benzo (g,h,i) Perylene	37.25	100.0	115.5	78	119.3	82	40-160	3	0-20	
Benzo (k) Fluoranthene	96.09	100.0	100.7	5	109.6	13	40-160	8	0-20	3
Chrysene	40.74	100.0	97.31	57	108.0	67	40-160	10	0-20	
Dibenz (a,h) Anthracene	ND	100.0	95.50	96	97.66	98	40-160	2	0-20	
Fluoranthene	36.89	100.0	110.6	74	122.3	85	40-160	10	0-20	
Fluorene	ND	100.0	82.45	82	84.38	84	40-160	2	0-20	
Indeno (1,2,3-c,d) Pyrene	35.25	100.0	111.7	76	116.6	81	40-160	4	0-20	
2-Methylnaphthalene	ND	100.0	83.97	84	90.18	90	40-160	7	0-20	
1-Methylnaphthalene	ND	100.0	85.65	86	90.10	90	40-160	5	0-20	
Naphthalene	ND	100.0	87.52	88	89.56	90	40-160	2	0-20	
Phenanthrene	15.85	100.0	94.09	78	105.7	90	40-160	12	0-20	
Pyrene	121.6	100.0	130.1	9	145.3	24	40-160	11	0-46	3

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

Quality Control - LCS/LCS Duplicate

Pacific Ecorisk		Date Received:	N/A
2250 Cordelia Road		Work Order No:	13-04-0291
Fairfield, CA 94534-1912		Preparation:	EPA 3050B
		Method:	EPA 6020

Project: Hercules Pipeline 20792

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number
099-15-254-95	Solid	ICP/MS 03	04/05/13	04/06/13	130405L04E

Parameter	SPIKE ADDED	LCS CONC	LCS %REC	LCSD CONC	LCSD %REC	%REC CL	RPD	RPD CL	Qualifiers
Arsenic	25.00	25.65	103	25.95	104	80-120	1	0-20	
Cadmium	25.00	24.46	98	25.78	103	80-120	5	0-20	
Chromium	25.00	24.72	99	24.21	97	80-120	2	0-20	
Copper	25.00	27.30	109	27.12	108	80-120	1	0-20	
Lead	25.00	24.76	99	25.94	104	80-120	5	0-20	
Nickel	25.00	26.47	106	26.67	107	80-120	1	0-20	
Selenium	25.00	22.64	91	21.22	85	80-120	6	0-20	
Silver	12.50	11.40	91	11.50	92	80-120	1	0-20	
Zinc	25.00	26.66	107	27.21	109	80-120	2	0-20	

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

Quality Control - LCS/LCS Duplicate

ACCREDITED IN ACCORDANCE WITH nelac

Pacific Ecorisk		Date Received:	N/A
2250 Cordelia Road		Work Order No:	13-04-0291
Fairfield, CA 94534-1912		Preparation:	EPA 3050B
		Method:	EPA 6020

Project: Hercules Pipeline 20792

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number
099-15-254-96	**Solid**	**ICP/MS 03**	**04/09/13**	**04/09/13**	**130409L01E**

Parameter	SPIKE ADDED	LCS CONC	LCS %REC	LCSD CONC	LCSD %REC	%REC CL	RPD	RPD CL	Qualifiers
Arsenic	25.00	24.93	100	24.54	98	80-120	2	0-20	
Cadmium	25.00	24.80	99	24.25	97	80-120	2	0-20	
Chromium	25.00	24.96	100	25.37	101	80-120	2	0-20	
Copper	25.00	27.85	111	27.30	109	80-120	2	0-20	
Lead	25.00	24.95	100	25.35	101	80-120	2	0-20	
Nickel	25.00	27.10	108	26.84	107	80-120	1	0-20	
Selenium	25.00	20.84	83	21.30	85	80-120	2	0-20	
Silver	12.50	11.15	89	10.92	87	80-120	2	0-20	
Zinc	25.00	27.59	110	27.21	109	80-120	1	0-20	

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

Quality Control - LCS/LCS Duplicate

ACCREDITED IN ACCORDANCE WITH nelac

Pacific Ecorisk		Date Received:	N/A
2250 Cordelia Road		Work Order No:	13-04-0291
Fairfield, CA 94534-1912		Preparation:	N/A
		Method:	EPA 9060A

Project: Hercules Pipeline 20792

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number
099-06-013-848	**Solid**	**TOC 5**	**04/08/13**	**04/09/13**	**D0408TOCL1**

Parameter	SPIKE ADDED	LCS CONC	LCS %REC	LCSD CONC	LCSD %REC	%REC CL	RPD	RPD CL	Qualifiers
Carbon, Total Organic	0.60	0.58	96	0.56	93	80-120	3	0-20	

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

Quality Control - LCS/LCS Duplicate

ACCREDITED IN ACCORDANCE WITH nelac

Pacific Ecorisk		Date Received:	N/A
2250 Cordelia Road		Work Order No:	13-04-0291
Fairfield, CA 94534-1912		Preparation:	EPA 7471A Total
		Method:	EPA 7471A

Project: Hercules Pipeline 20792

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number
099-12-452-360	**Solid**	**Mercury**	**04/04/13**	**04/05/13**	**130404L05E**

Parameter	SPIKE ADDED	LCS CONC	LCS %REC	LCSD CONC	LCSD %REC	%REC CL	RPD	RPD CL	Qualifiers
Mercury	0.8350	0.8579	103	0.8715	104	82-124	2	0-16	

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

Quality Control - LCS/LCS Duplicate

Pacific Ecorisk
2250 Cordelia Road
Fairfield, CA 94534-1912

Date Received: N/A
Work Order No: 13-04-0291
Preparation: EPA 7471A Total
Method: EPA 7471A

Project: Hercules Pipeline 20792

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number
099-12-452-362	Solid	Mercury	04/08/13	04/09/13	130408L05E

Parameter	SPIKE ADDED	LCS CONC	LCS %REC	LCSD CONC	LCSD %REC	%REC CL	RPD	RPD CL	Qualifiers
Mercury	0.8350	0.8127	97	0.8252	99	82-124	2	0-16	

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

Quality Control - LCS/LCS Duplicate

Pacific Ecorisk
2250 Cordelia Road
Fairfield, CA 94534-1912

Date Received:	N/A
Work Order No:	13-04-0291
Preparation:	EPA 3550B (M)
Method:	Organotins by Krone et al.

Project: Hercules Pipeline 20792

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number
099-07-016-1,016	Solid	GC/MS JJJ	04/08/13	04/15/13	130408L06

Parameter	SPIKE ADDED	LCS CONC	LCS %REC	LCSD CONC	LCSD %REC	%REC CL	RPD	RPD CL	Qualifiers
Tetrabutyltin	100.0	116.5	117	111.4	111	79-151	5	0-20	
Tributyltin	100.0	102.7	103	104.6	105	51-129	2	0-20	

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

Quality Control - LCS/LCS Duplicate

Accredited in accordance with nelac

Pacific Ecorisk		Date Received:	N/A
2250 Cordelia Road		Work Order No:	13-04-0291
Fairfield, CA 94534-1912		Preparation:	EPA 3545
		Method:	EPA 8081A

Project: Hercules Pipeline 20792

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number
099-12-858-197	Solid	GC 51	04/08/13	04/10/13	130408L10

Parameter	SPIKE ADDED	LCS CONC	LCS %REC	LCSD CONC	LCSD %REC	%REC CL	ME CL	RPD	RPD CL	Qualifiers
Aldrin	5.000	5.336	107	4.513	90	50-135	36-149	17	0-25	
Alpha-BHC	5.000	4.754	95	4.072	81	50-135	36-149	15	0-25	
Beta-BHC	5.000	5.162	103	4.462	89	50-135	36-149	15	0-25	
Delta-BHC	5.000	5.177	104	4.368	87	50-135	36-149	17	0-25	
Gamma-BHC	5.000	4.756	95	4.054	81	50-135	36-149	16	0-25	
Dieldrin	5.000	5.292	106	4.500	90	50-135	36-149	16	0-25	
4,4'-DDD	5.000	5.275	106	4.661	93	50-135	36-149	12	0-25	
4,4'-DDE	5.000	5.161	103	4.313	86	50-135	36-149	18	0-25	
4,4'-DDT	5.000	4.897	98	4.182	84	50-135	36-149	16	0-25	
Endosulfan I	5.000	5.249	105	4.544	91	50-135	36-149	14	0-25	
Endosulfan II	5.000	5.284	106	4.670	93	50-135	36-149	12	0-25	
Endosulfan Sulfate	5.000	5.152	103	4.360	87	50-135	36-149	17	0-25	
Endrin	5.000	5.259	105	4.091	82	50-135	36-149	25	0-25	
Endrin Aldehyde	5.000	5.505	110	4.705	94	50-135	36-149	16	0-25	
Endrin Ketone	5.000	5.463	109	4.828	97	50-135	36-149	12	0-25	
Heptachlor	5.000	5.281	106	4.505	90	50-135	36-149	16	0-25	
Heptachlor Epoxide	5.000	4.917	98	4.239	85	50-135	36-149	15	0-25	
Methoxychlor	5.000	4.893	98	4.072	81	50-135	36-149	18	0-25	
Alpha Chlordane	5.000	5.122	102	4.361	87	50-135	36-149	16	0-25	
Gamma Chlordane	5.000	4.954	99	4.230	85	50-135	36-149	16	0-25	

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

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

Quality Control - LCS/LCS Duplicate

Pacific Ecorisk
2250 Cordelia Road
Fairfield, CA 94534-1912

Date Received: N/A
Work Order No: 13-04-0291
Preparation: EPA 3545
Method: EPA 8270C SIM PCB Congeners

Project: Hercules Pipeline 20792

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number
099-14-341-95	Solid	GC/MS HHH	04/08/13	04/10/13	130408L02

Parameter	SPIKE ADDED	LCS CONC	LCS %REC	LCSD CONC	LCSD %REC	%REC CL	ME CL	RPD	RPD CL	Qualifiers
PCB008	25.00	20.14	81	19.81	79	50-125	38-138	2	0-30	
PCB018	25.00	19.22	77	19.16	77	50-125	38-138	0	0-30	
PCB028	25.00	18.93	76	18.74	75	50-125	38-138	1	0-30	
PCB044	25.00	19.60	78	19.68	79	50-125	38-138	0	0-30	
PCB052	25.00	17.99	72	18.23	73	50-125	38-138	1	0-30	
PCB066	25.00	19.55	78	19.50	78	50-125	38-138	0	0-30	
PCB101	25.00	20.10	80	20.26	81	50-125	38-138	1	0-30	
PCB105	25.00	17.59	70	19.41	78	50-125	38-138	10	0-30	
PCB118	25.00	21.29	85	22.30	89	50-125	38-138	5	0-30	
PCB128	25.00	15.80	63	18.50	74	50-125	38-138	16	0-30	
PCB153	25.00	17.17	69	18.43	74	50-125	38-138	7	0-30	
PCB170	25.00	17.67	71	17.39	70	50-125	38-138	2	0-30	
PCB180	25.00	16.23	65	19.06	76	50-125	38-138	16	0-30	
PCB187	25.00	16.05	64	18.43	74	50-125	38-138	14	0-30	
PCB195	25.00	18.35	73	17.96	72	50-125	38-138	2	0-30	

Total number of LCS compounds : 15
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 Limit

Calscience Environmental Laboratories, Inc.

Quality Control - LCS/LCS Duplicate

ACCREDITED IN ACCORDANCE WITH nelac

Pacific Ecorisk
2250 Cordelia Road
Fairfield, CA 94534-1912

Date Received: N/A
Work Order No: 13-04-0291
Preparation: EPA 3545
Method: EPA 8270C SIM PAHs

Project: Hercules Pipeline 20792

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number
099-14-437-50	Solid	GC/MS AAA	04/08/13	04/09/13	130408L01

Parameter	SPIKE ADDED	LCS CONC	LCS %REC	LCSD CONC	LCSD %REC	%REC CL	ME CL	RPD	RPD CL	Qualifiers
Acenaphthene	100.0	83.24	83	90.27	90	48-108	38-118	8	0-11	
Acenaphthylene	100.0	82.22	82	87.90	88	40-160	20-180	7	0-20	
Anthracene	100.0	79.83	80	88.70	89	40-160	20-180	11	0-20	
Benzo (a) Anthracene	100.0	94.87	95	104.6	105	40-160	20-180	10	0-20	
Benzo (a) Pyrene	100.0	83.15	83	92.37	92	40-160	20-180	11	0-20	
Benzo (b) Fluoranthene	100.0	85.93	86	99.67	100	40-160	20-180	15	0-20	
Benzo (g,h,i) Perylene	100.0	89.15	89	95.17	95	40-160	20-180	7	0-20	
Benzo (k) Fluoranthene	100.0	84.29	84	96.55	97	40-160	20-180	14	0-20	
Chrysene	100.0	84.62	85	94.50	94	40-160	20-180	11	0-20	
Dibenz (a,h) Anthracene	100.0	88.20	88	100.8	101	40-160	20-180	13	0-20	
Fluoranthene	100.0	85.91	86	93.46	93	40-160	20-180	8	0-20	
Fluorene	100.0	80.01	80	87.28	87	40-160	20-180	9	0-20	
Indeno (1,2,3-c,d) Pyrene	100.0	91.17	91	105.0	105	40-160	20-180	14	0-20	
2-Methylnaphthalene	100.0	80.46	80	85.36	85	40-160	20-180	6	0-20	
1-Methylnaphthalene	100.0	87.39	87	94.34	94	40-160	20-180	8	0-20	
Naphthalene	100.0	83.71	84	89.24	89	40-160	20-180	6	0-20	
Phenanthrene	100.0	78.39	78	87.12	87	40-160	20-180	11	0-20	
Pyrene	100.0	93.49	93	102.9	103	40-160	20-180	10	0-16	

Total number of LCS compounds : 18
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 Limit

Calscience Environmental Laboratories, Inc.

Glossary of Terms and Qualifiers

Work Order Number: 13-04-0291

Qualifier	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 matrix interference. The associated LCS and/or LCSD was in control and, therefore, the sample data was reported without further clarification.
4	The MS/MSD RPD was out of control due to matrix interference. The LCS/LCSD RPD was in control and, therefore, the sample data was reported without further clarification.
5	The PDS/PDSD or PES/PESD associated with this batch of samples was out of control due to a matrix interference effect. The associated batch LCS/LCSD was in control and, hence, the associated sample data was reported without further clarification.
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.
ME	LCS/LCSD Recovery Percentage is within Marginal Exceedance (ME) Control Limit range.
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.

For any analysis identified as a "field" test with a holding time (HT) </= 15 minutes where the sample is received outside of HT, Calscience will adhere to its internal HT of 24 hours. In cases where sample analysis does not meet Calscience's internal HT, results will be appropriately qualified.

CHAIN OF CUSTODY RECORD

PACIFIC ECORISK
2250 Cordelia Rd
Fairfield, CA 94534
Ph: (707) 207-7760
Fax: (707) 207-7916
www.pacificecorisk.com

RESULTS TO: Same
Attn: Jeff Catsifas
Phone:
Email:

BILL TO: Same **13-04-0291**
Attn: Cynthia Garcia
Phone:
Email:

PROJECT: Hercules Pipeline 20792

ANALYSES REQUESTED

	SAMPLE IDENTIFICATION	DATE	TIME	SAMPLE MATRIX	GRAB/ COMP.	# CONTAINERS/TYPE	See Attached List								REMARKS
1	HP-COMP	3/25/13	0845	Seal	C	1 1-L Jar	X								
2	HP-COMP	3/25/13	0845	Seal	C	1 1 Ziploc	X								
						/									
						/									
						/									
						/									
						/									
						/									

METHOD OF SHIPMENT: FedEx:____ UPS:____ HAND: X OTHER:____

COMMENTS: Please freeze sample in glass jar upon receipt.

CODES:

RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	DATE	TIME	PAGE #
A. Tanbas	4/3/13	1300	Tom O'Malley CEL	4/3/13	1300	1 OF 1
Tom O'Malley TO GSO	4/3/13	1730	[illegible]	4/4/13	10:30	

WHITE - RETURN W/ SAMPLE YELLOW - KEEP FOR YOUR RECORDS.

ANALYTE LIST

Pacific EcoRisk
2250 Cordelia Rd.
Fairfield, CA 94534

0291

Project Proponent:	Pacific EcoRisk
Project #:	20792 - Hercules Pipeline
Site #:	HP - COMP

ANALYTE	METHOD	TARGETED MRL	ANALYSIS REQUESTED
Solids, Total	160.3	0.10%	X
Total Organic Carbon	415.1	0.10%	X
Particle Size	ASTM 1992	0.10%	X
Arsenic	6020	2 mg/kg	X
Cadmium	6020	0.3 mg/kg	X
Chromium	6020	5 mg/kg	X
Copper	6020	5 mg/kg	X
Lead	6020	5 mg/kg	X
Nickel	6020	5 mg/kg	X
Silver	6020	0.2 mg/kg	X
Zinc	6020	1 mg/kg	X
Mercury	7471A	0.02 mg/kg	X
Selenium	7742	0.1 mg/kg	X
2,4'-DDD	8081 B	2 µg/kg	X
2,4'-DDE	8081 B	2 µg/kg	X
2,4'-DDT	8081 B	2 µg/kg	X
4,4'-DDD	8081 B	2 µg/kg	X
4,4'-DDE	8081 B	2 µg/kg	X
4,4'-DDT	8081 B	2 µg/kg	X
Aldrin	8081 B	2 µg/kg	X
alpha-BHC	8081 B	2 µg/kg	X
alpha-Chlordane	8081 B	2 µg/kg	X
beta-BHC	8081 B	2 µg/kg	X
Chlordane	8081 B	20 µg/kg	X
delta-BHC	8081 B	2 µg/kg	X
Dieldrin	8081 B	2 µg/kg	X
Endosulfan I	8081 B	2 µg/kg	X
Endosulfan II	8081 B	2 µg/kg	X
Endosulfan Sulfate	8081 B	2 µg/kg	X
Endrin	8081 B	2 µg/kg	X
Endrin Aldehyde	8081 B	2 µg/kg	X
gamma-BHC (Lindane)	8081 B	2 µg/kg	X
gamma-Chlordane	8081 B	2 µg/kg	X
Heptachlor	8081 B	2 µg/kg	X
Heptachlor Epoxide	8081 B	2 µg/kg	X
Toxaphene	8081 B	2 µg/kg	X
PCB 008	8082 ECD or 8270C	0.5 µg/kg	X
PCB 018	8082 ECD or 8270C	0.5 µg/kg	X
PCB 028	8082 ECD or 8270C	0.5 µg/kg	X
PCB 031	8082 ECD or 8270C	0.5 µg/kg	X
PCB 033	8082 ECD or 8270C	0.5 µg/kg	X
PCB 044	8082 ECD or 8270C	0.5 µg/kg	X
PCB 049	8082 ECD or 8270C	0.5 µg/kg	X
PCB 052	8082 ECD or 8270C	0.5 µg/kg	X
PCB 056	8082 ECD or 8270C	0.5 µg/kg	X
PCB 060	8082 ECD or 8270C	0.5 µg/kg	X
PCB 066	8082 ECD or 8270C	0.5 µg/kg	X
PCB 070	8082 ECD or 8270C	0.5 µg/kg	X
PCB 074	8082 ECD or 8270C	0.5 µg/kg	X
PCB 087	8082 ECD or 8270C	0.5 µg/kg	X
PCB 095	8082 ECD or 8270C	0.5 µg/kg	X
PCB 097	8082 ECD or 8270C	0.5 µg/kg	X
PCB 099	8082 ECD or 8270C	0.5 µg/kg	X
PCB 101	8082 ECD or 8270C	0.5 µg/kg	X
PCB 105	8082 ECD or 8270C	0.5 µg/kg	X
PCB 110	8082 ECD or 8270C	0.5 µg/kg	X
PCB 118	8082 ECD or 8270C	0.5 µg/kg	X
PCB 128	8082 ECD or 8270C	0.5 µg/kg	X
PCB 132	8082 ECD or 8270C	0.5 µg/kg	X
PCB 138	8082 ECD or 8270C	0.5 µg/kg	X
PCB 141	8082 ECD or 8270C	0.5 µg/kg	X
PCB 149	8082 ECD or 8270C	0.5 µg/kg	X

ANALYTE LIST

Pacific EcoRisk
2250 Cordelia Rd.
Fairfield, CA 94534

Project Proponent: **Pacific EcoRisk**
Project #: 20792 - Hercules Pipeline
Site #: HP - COMP

ANALYTE	METHOD	TARGETED MRL	ANALYSIS REQUESTED
PCB 151	8082 ECD or 8270C	0.5 µg/kg	X
PCB 153	8082 ECD or 8270C	0.5 µg/kg	X
PCB 156	8082 ECD or 8270C	0.5 µg/kg	X
PCB 158	8082 ECD or 8270C	0.5 µg/kg	X
PCB 170	8082 ECD or 8270C	0.5 µg/kg	X
PCB 174	8082 ECD or 8270C	0.5 µg/kg	X
PCB 177	8082 ECD or 8270C	0.5 µg/kg	X
PCB 180	8082 ECD or 8270C	0.5 µg/kg	X
PCB 183	8082 ECD or 8270C	0.5 µg/kg	X
PCB 187	8082 ECD or 8270C	0.5 µg/kg	X
PCB 194	8082 ECD or 8270C	0.5 µg/kg	X
PCB 195	8082 ECD or 8270C	0.5 µg/kg	X
PCB 201	8082 ECD or 8270C	0.5 µg/kg	X
PCB 203	8082 ECD or 8270C	0.5 µg/kg	X
Acenaphthene	8270C	20 µg/kg	X
Acenaphthylene	8270C	20 µg/kg	X
Anthracene	8270C	20 µg/kg	X
Benz(a)anthracene	8270C	20 µg/kg	X
Benzo(a)pyrene	8270C	20 µg/kg	X
Benzo(e)pyrene	8270C	20 µg/kg	X
Benzo(b)fluoranthene	8270C	20 µg/kg	X
Benzo(g,h,i)perylene	8270C	20 µg/kg	X
Benzo(k)fluoranthene	8270C	20 µg/kg	X
Biphenyl	8270C	20 µg/kg	X
Chrysene	8270C	20 µg/kg	X
Dibenz(a,h)anthracene	8270C	20 µg/kg	X
Dibenzothiophene	8270C	20 µg/kg	X
Dimethylnapthalene 2, 6-	8270C	20 µg/kg	X
Fluoranthene	8270C	20 µg/kg	X
Fluorene	8270C	20 µg/kg	X
Indeno(1,2,3-cd)pyrene	8270C	20 µg/kg	X
Methylnapthalene, 1-	8270C	20 µg/kg	X
Methylnapthalene, 2-	8270C	20 µg/kg	X
Methylphenanthrene, 1-	8270C	20 µg/kg	X
Naphthalene	8270C	20 µg/kg	X
Perylene	8270C	20 µg/kg	X
Phenanthrene	8270C	20 µg/kg	X
Pyrene	8270C	20 µg/kg	X
Trimethylnapthalene, 2, 3, 5-	8270C	20 µg/kg	X
Di-butyltin	Krone 1989	10 µg/kg	X
Mono-Butyltin	Krone 1989	10 µg/kg	X
Tetra-butyltin	Krone 1989	10 µg/kg	X
Tri-butyltin	Krone 1989	10 µg/kg	X
QA/QC			X

Please Perform Duplicate analysis, MS/MSD, etc. on the sample provided.

If you have any questions regarding this request as checked,
please call Jeff Cotsifas at (707)207-7760

0291

GSO

< WebShip > > > > >

800-322-5555 www.gso.com

Ship From:
ALAN KEMP
CAL SCIENCE- CONCORD
5063 COMMERCIAL CIRCLE #H
CONCORD, CA 94520

Ship To:
SAMPLE RECEIVING
CEL
7440 LINCOLN WAY
GARDEN GROVE, CA 92841

COD:
$0.00

Reference:
PHILLIPS 66, PACIFIC ECORISK

Delivery Instructions:

Signature Type:
SIGNATURE REQUIRED

Tracking #: 521475197

NPS

ORC

A

GARDEN GROVE

D92841A

10766497

Print Date : 04/03/13 14:30 PM

Package 1 of 1

Send Label To Printer | ☑ Print All | Edit Shipment | Finish

LABEL INSTRUCTIONS:

Do not copy or reprint this label for additional shipments - each package must have a unique barcode.

STEP 1 - Use the "Send Label to Printer" button on this page to print the shipping label on a laser or inkjet printer.
STEP 2 - Fold this page in half.
STEP 3 - Securely attach this label to your package, do not cover the barcode.
STEP 4 - Request an on-call pickup for your package, if you do not have scheduled daily pickup service or Drop-off your package at the nearest GSO drop box. Locate nearest GSO dropbox locations using this link.

ADDITIONAL OPTIONS:

Send Label Via Email | Create Return Label

TERMS AND CONDITIONS:

By giving us your shipment to deliver, you agree to all the service terms and conditions described in this section.
Our liability for loss or damage to any package is limited to your actual damages or $100 whichever is less, unless you pay for and declare a higher authorized value. If you declare a higher value and pay the additional charge, our liability will be the lesser of your declared value or the actual value of your loss or damage. In any event, we will not be liable for any damage, whether direct, incidental, special or consequential, in excess of the declared value of a shipment whether or not we had knowledge that such damage might be incurred including but not limited to loss of income or profit. We will not be liable for your acts or omissions, including but not limited to improper or insufficient packaging, securing, marking or addressing. Also, we will not be liable if you or the recipient violates any of the terms of our agreement. We will not be liable for loss, damage or delay caused by events we cannot control, including but not limited to acts of God, perils of the air, weather conditions, act of public enemies, war, strikes, or civil commotion. The highest declared value for our GSO Priority Letter or GSO Priority Package is $500. For other shipments the highest declared value is $10,000 unless your package contains items of "extraordinary value", in which case the highest declared value we allow is $500. Items of "extraordinary value" include, but or not limited to, artwork, jewelry, furs, precious metals, tickets, negotiable instruments and other items with intrinsic value.

Calscience Environmental Laboratories, Inc.

WORK ORDER #: 13-04-0291

SAMPLE RECEIPT FORM

Cooler 1 of 1

CLIENT: PACIFIC ECORISK

DATE: 04/04/13

TEMPERATURE: Thermometer ID: SC1 (Criteria: 0.0 °C – 6.0 °C, not frozen except sediment/tissue)

Temperature 1.9 °C - 0.2 °C (CF) = 1.7 °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 Initial: JS

CUSTODY SEALS INTACT:

☑ Cooler ☐ _____ ☐ No (Not Intact) ☐ Not Present ☐ N/A Initial: JS

☐ Sample ☐ _____ ☐ No (Not Intact) ☑ Not Present Initial: JS

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	☑	☐	☐
pH / Res. Chlorine / Diss. Sulfide / Diss. Oxygen received within 24 hours	☐	☐	☑
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 ☑~~8oz~~ 1 LITER CGJ ☐16ozCGJ ☐Sleeve (_____) ☐EnCores® ☐TerraCores® ☑ Z

JS 4/4/13

Water: ☐VOA ☐VOAh ☐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:** JS

Container: C: Clear A: Amber P: Plastic G: Glass J: Jar B: Bottle Z: Ziploc/Resealable Bag E: Envelope **Reviewed by:** [illegible]

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:** [illegible]

SOP T100_090 (11/20/12)

Appendix C

Test Data and Summary of Statistics for the Evaluation of the Toxicity of the Hercules Pipeline Sediment Elutriate to Mysids (*Americamysis bahia*)

CETIS Summary Report

Report Date: 20 Apr-13 13:24 (p 1 of 1)
Test Code: 51355 | 05-6964-8545

Acute Mysid Survival Test — **Pacific EcoRisk**

Batch ID:	00-4262-4422	**Test Type:**	Survival (96h)	**Analyst:**	Melinda Hooper
Start Date:	04 Apr-13 16:00	**Protocol:**	EPA-821-R-02-012 (2002)	**Diluent:**	Laboratory Water
Ending Date:	08 Apr-13 14:45	**Species:**	Americamysis bahia	**Brine:**	Crystal Sea
Duration:	95h	**Source:**	Aquatic Indicators, FL	**Age:**	4

Sample ID:	03-8524-1696	**Code:**	Elutriate	**Client:**	Boudreau Associates
Sample Date:	25 Mar-13 08:45	**Material:**	Sediment/Elutriate	**Project:**	20792
Receive Date:	25 Mar-13 12:00	**Source:**	Boudreau Associates		
Sample Age:	10d 7h (1 °C)	**Station:**	HP-COMP		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
03-3699-6049	96h Survival Rate	100	>100	NA	4.2%	1	Steel Many-One Rank Sum Test
14-0186-1882	96h Survival Rate	0	>0		4.74%		Wilcoxon Rank Sum Two-Sample Test

96h Survival Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Lab Water Contr	5	1	1	1	1	1	0	0	0.0%	0.0%
0	Site Water	5	0.98	0.963	0.997	0.9	1	0.02	0.0447	4.56%	2.0%
1		5	0.98	0.963	0.997	0.9	1	0.02	0.0447	4.56%	2.0%
10		5	1	1	1	1	1	0	0	0.0%	0.0%
50		5	1	1	1	1	1	0	0	0.0%	0.0%
100		5	1	1	1	1	1	0	0	0.0%	0.0%

96h Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Lab Water Contr	1	1	1	1	1
0	Site Water	1	1	1	1	0.9
1		0.9	1	1	1	1
10		1	1	1	1	1
50		1	1	1	1	1
100		1	1	1	1	1

96h Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Lab Water Contr	10/10	10/10	10/10	10/10	10/10
0	Site Water	10/10	10/10	10/10	10/10	9/10
1		9/10	10/10	10/10	10/10	10/10
10		10/10	10/10	10/10	10/10	10/10
50		10/10	10/10	10/10	10/10	10/10
100		10/10	10/10	10/10	10/10	9/9

CETIS Analytical Report

Report Date: 16 Apr-13 16:17 (p 1 of 2)
Test Code: 51355 | 05-6964-8545

Acute Mysid Survival Test — **Pacific EcoRisk**

Analysis ID:	14-0186-1882	**Endpoint:**	96h Survival Rate	**CETIS Version:**	CETISv1.8.5
Analyzed:	16 Apr-13 16:15	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	4.74%	Passes 96h survival rate

Wilcoxon Rank Sum Two-Sample Test

Control	vs	Control	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
Lab Water Control		Site Water	25	NA	1	8	0.5000	Exact	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.002655933	0.002655933	1	1	0.3466	Non-Significant Effect
Error	0.02124747	0.002655933	8			
Total	0.0239034		9			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Mod Levene Equality of Variance	1	13.7	0.3559	Equal Variances
Variances	Levene Equality of Variance	7.11	11.3	0.0285	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.625	0.741	0.0001	Non-normal Distribution

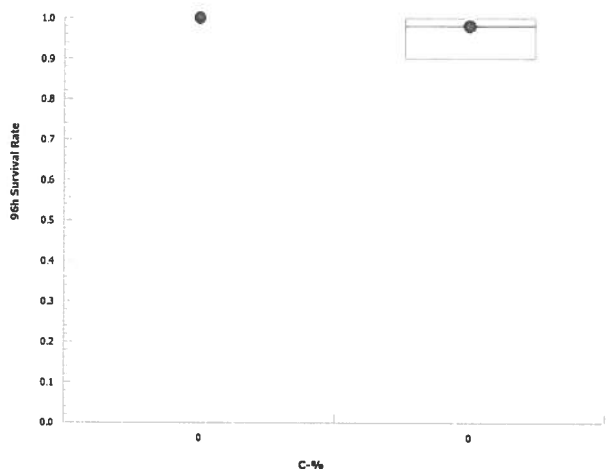
96h Survival Rate Summary

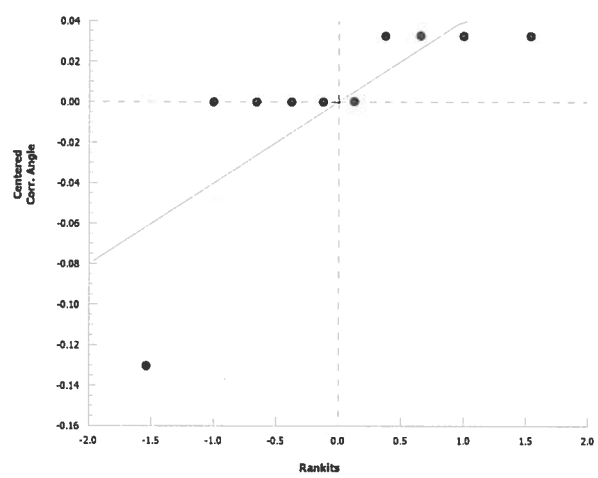
C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Site Water	5	0.98	0.924	1	1	0.9	1	0.02	4.56%	0.0%
0	Lab Water Contr	5	1	1	1	1	1	1	0	0.0%	-2.04%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Site Water	5	1.38	1.29	1.47	1.41	1.25	1.41	0.0326	5.28%	0.0%
0	Lab Water Cont	5	1.41	1.41	1.41	1.41	1.41	1.41	0	0.0%	-2.36%

Graphics





Acute Mysid Survival Test — **Pacific EcoRisk**

Analysis ID:	03-3699-6049	**Endpoint:**	96h Survival Rate	**CETIS Version:**	CETISv1.8.5
Analyzed:	16 Apr-13 16:16	**Analysis:**	Nonparametric-Control vs Treatments	**Official Results:**	Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C > T	NA	NA	4.2%	100	>100	NA	1

Steel Many-One Rank Sum Test

Control vs	C-%	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
Lab Water Control	1	25	17	1	8	0.5912	Asymp	Non-Significant Effect
	10	27.5	17	1	8	0.8000	Asymp	Non-Significant Effect
	50	27.5	17	1	8	0.8000	Asymp	Non-Significant Effect
	100	27.5	17	1	8	0.8000	Asymp	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.004148506	0.001037126	4	0.973	0.4439	Non-Significant Effect
Error	0.02130757	0.001065379	20			
Total	0.02545608		24			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Mod Levene Equality of Variance	0.973	4.89	0.4509	Equal Variances
Variances	Levene Equality of Variance	6.92	4.43	0.0011	Unequal Variances
Distribution	Shapiro-Wilk W Normality	0.475	0.888	<0.0001	Non-normal Distribution

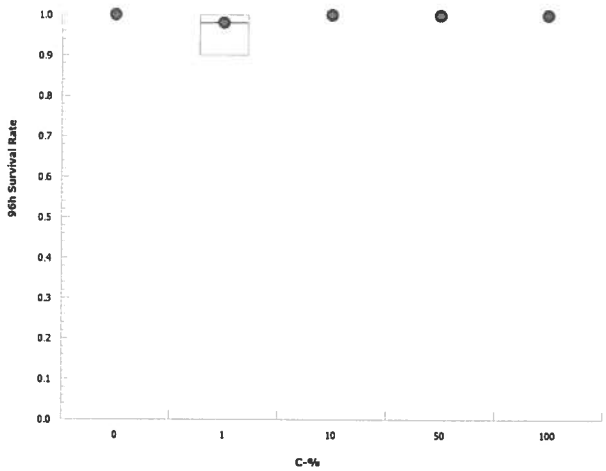
96h Survival Rate Summary

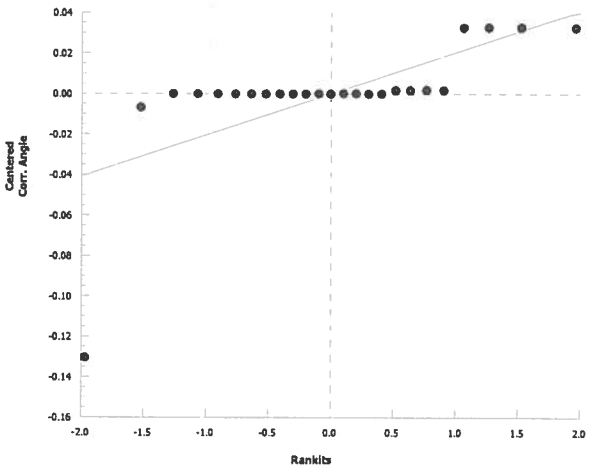
C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Water Contr	5	1	1	1	1	1	1	0	0.0%	0.0%
1		5	0.98	0.924	1	1	0.9	1	0.02	4.56%	2.0%
10		5	1	1	1	1	1	1	0	0.0%	0.0%
50		5	1	1	1	1	1	1	0	0.0%	0.0%
100		5	1	1	1	1	1	1	0	0.0%	0.0%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Water Cont	5	1.41	1.41	1.41	1.41	1.41	1.41	0	0.0%	0.0%
1		5	1.38	1.29	1.47	1.41	1.25	1.41	0.0326	5.28%	2.31%
10		5	1.41	1.41	1.41	1.41	1.41	1.41	0	0.0%	0.0%
50		5	1.41	1.41	1.41	1.41	1.41	1.41	0	0.0%	0.0%
100		5	1.41	1.41	1.42	1.41	1.4	1.41	0.00174	0.28%	0.12%

Graphics





96 Hour Acute *Americamysis bahia* Water Column Toxicity Test

Client: Boudreau and Associates - Hercules Pipeline
Test Material: HP-COMP
Test ID#: 51355 Project # 20792
Test Date: 4/4/13 Randomization: 5.7.1

Organism Log #: 7177 Age: 4d
Organism Supplier: Aquatic Indicators
Control/Diluent: 25 ppt
Control Water Batch: 919

Treatment (% Elutriate)	Temp (°C)	pH new	pH old	D.O. (mg/L) new	D.O. (mg/L) old	Salinity (ppt) new	Salinity (ppt) old	# Live Organisms Rep A	Rep B	Rep C	Rep D	Rep E	SIGN-OFF
Control	20.2	8.00		7.7		24.4		10	10	10	10	10	Test Solution Prep: DG
1	20.2	8.07		7.9		24.7		10	10	10	10	10	New WQ: AF
10	20.2	8.07		7.6		24.7		10	10	10	10	10	Initiation Date: 4/4/13
50	20.2	8.03		7.1		24.5		10	10	10	10	10	Initiation Time: 1600
100	20.2	7.98		6.4		24.6		10	10	10	10	10	Initiation Signoff: MK
Meter ID	38A	PH19		RD07		EC06							a.m. Feeding MK
													p.m. Feeding PL
Control	20.5		7.39		6.3		25.2	10	10	10	10	10	Count Date: 4.5.13
1	20.5		7.32		5.5		25.4	9	10	10	10	10	Count Time: 1530
10	20.5		7.30		5.9		25.4	10	10	10	10	10	Count Signoff: MM
50	20.5		7.29		5.5		25.5	10	10	10	10	10	Old WQ: PL
100	20.5		7.51		5.8		25.6	10	10	10	10	10	a.m. Feeding 1515
Meter ID	38A		PH19		RD05		EC08						p.m. Feeding MK
Control	20.4		7.55		6.3		25.3	10	10	10	10	10	Count Date: 4/6/13
1	20.4		7.59		7.0		25.4	9	10	10	10	10	Count Time: 1425
10	20.4		7.66		7.1		25.6	10	10	10	10	10	Count Signoff: KC
50	20.4		7.55		6.1		25.8	10	10	10	10	10	Old WQ: CO
100	20.4		7.45		3.5		26.2	10	10	10	10	10	a.m. Feeding MM
Meter ID	38A		PH16		RD04		EC04						p.m. Feeding SS
Control	20.9		7.67		7.1		25.3	10	10	10	10	10	Count Date: 4.7.13
1	20.9		7.61		7.0		26.4	9	10	10	10	10	Count Time: 1145
10	20.9		7.70		7.0		26.5	10	10	10	10	10	Count Signoff: PL
50	20.9		7.77		7.3		26.4	10	10	10	10	10	Old WQ: CE
100	20.9		7.88		7.4		26.6	10	10	10	10	10	a.m. Feeding MF
Meter ID	38A		PH18		RD05		EC08						p.m. Feeding KB
Control	20.0		7.47		5.1		29.5	10	10	10	10	10	Termination Date: 4/8/13
1	20.0		7.47		5.5		29.0	9	10	10	10	10	Termination Time: 1445
10	20.0		7.55		5.2		29.1	10	10	10	10	10	Termination Signoff: MF
50	20.0		7.61		5.2		28.9	10	10	10	10	10	Old WQ: CC
100	20.0		7.57		4.0		30.1	10	10	10	10	9	a.m. Feeding MF
Meter ID	38A		PH15		RD05		EC08						

96 Hour Acute *Americamysis bahia* Water Column Toxicity Test

Client: Boudreau and Associates - Hercules Pipeline
Test Material: Controls
Test ID#: 51355 Project # 20792
Test Date: 4/4/13 Randomization: 5.7.1

Organism Log #: 7177 Age: 4d
Organism Supplier: Aquatic Indicators
Control/Diluent: 25 ppt
Control Water Batch: 919

Treatment	Temp (°C)	pH new	pH old	D.O. (mg/L) new	D.O. (mg/L) old	Salinity (ppt) new	Salinity (ppt) old	# Live Organisms Rep A	Rep B	Rep C	Rep D	Rep E	SIGN-OFF
Control	20.2	8.00		7.7		24.4		10	10	10	10	10	Test Solution Prep: DG
Site Water	20.2	7.92		8.6		24.3		10	10	10	10	10	New WQ: AF
													Initiation Date: 4/4/13
													Initiation Time: 1600
													Initiation Signoff: MK
													a.m. Feeding Signoff: MK
Meter ID	38A	PH19		RD07		EC06							p.m. Feeding Signoff: YL
Control	20.5		7.36		6.3		25.2	10	10	10	10	10	Count Date: 4-5-13
Site Water	20.5		7.47		6.6		25.6	10	10	10	10	10	Count Time: 1530
													Count Signoff: MM
													Old WQ: PD
													a.m. Feeding Signoff: 1515
													p.m. Feeding Signoff: MK
Meter ID	38A		pH19		RD05		EC08						
Control	20.4		7.55		6.3		25.3	10	10	10	10	10	Count Date: 4/6/13
Site Water	20.4		7.58		6.7		25.8	10	10	10	10	10	Count Time: 1425
													Count Signoff: RC
													Old WQ: CO
													a.m. Feeding Signoff: [illegible]
Meter ID	38A		pH16		RD04		EC04						p.m. Feeding Signoff: SS
Control	20.9		7.67		7.1		25.3	10	10	10	10	10	Count Date: 4-7-13
Site Water	20.9		7.79		7.2		27.4	10	10	10	10	10	Count Time: 1175
													Count Signoff: PD
													Old WQ: CE
													a.m. Feeding Signoff: MF
Meter ID	38A		PH18		RD05		EC08						p.m. Feeding Signoff: KB
Control	20.0		7.47		5.1		29.5	10	10	10	10	10	Termination Date: 4/8/13
Site Water	20.0		7.66		5.5		29.0	10	10	10	10	9	Termination Time: 1445
													Termination Signoff: MF
													Old WQ: YL
Meter ID	38A		PH15		RD05		EC08						a.m. Feeding Signoff: MF

Appendix D

Test Data and Summary of Statistics for the Reference Toxicant Evaluation of the Mysid, *Americamysis bahia*

CETIS Summary Report

Report Date: 16 Apr-13 16:13 (p 1 of 1)
Test Code: 51355 | 05-1662-4914

Acute Mysid Survival Test — **Pacific EcoRisk**

Batch ID:	08-8937-5595	**Test Type:**	Survival (96h)	**Analyst:**	Melinda Hooper
Start Date:	04 Apr-13 16:10	**Protocol:**	EPA-821-R-02-012 (2002)	**Diluent:**	Laboratory Water
Ending Date:	08 Apr-13 14:30	**Species:**	Americamysis bahia	**Brine:**	Crystal Sea
Duration:	94h	**Source:**	Aquatic Indicators, FL	**Age:**	4

Sample ID:	08-2006-5052	**Code:**	KCl	**Client:**	Reference Toxicant
Sample Date:	04 Apr-13 16:10	**Material:**	Potassium chloride	**Project:**	20819
Receive Date:	04 Apr-13 16:10	**Source:**	Reference Toxicant		
Sample Age:	NA (20.5 °C)	**Station:**	In House		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
20-9473-2239	96h Survival Rate	0.5	1	0.7071	13.2%		Steel Many-One Rank Sum Test

Point Estimate Summary

Analysis ID	Endpoint	Level	g/L	95% LCL	95% UCL	TU	Method
04-1544-1891	96h Survival Rate	EC50	0.682	0.649	0.716		Spearman-Kärber

96h Survival Rate Summary

C-g/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Lab Water Contr	4	0.9	0.847	0.953	0.7	1	0.0707	0.141	15.7%	0.0%
0.125		4	0.975	0.956	0.994	0.9	1	0.025	0.05	5.13%	-8.33%
0.25		4	0.975	0.956	0.994	0.9	1	0.025	0.05	5.13%	-8.33%
0.5		4	0.9	0.87	0.93	0.8	1	0.0408	0.0816	9.07%	0.0%
1		4	0	0	0	0	0	0	0		100.0%
2		4	0	0	0	0	0	0	0		100.0%

96h Survival Rate Detail

C-g/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Lab Water Contr	0.7	1	1	0.9
0.125		0.9	1	1	1
0.25		1	1	1	0.9
0.5		0.8	1	0.9	0.9
1		0	0	0	0
2		0	0	0	0

96h Survival Rate Binomials

C-g/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Lab Water Contr	7/10	10/10	10/10	9/10
0.125		9/10	10/10	10/10	10/10
0.25		10/10	10/10	10/10	9/10
0.5		8/10	10/10	9/10	9/10
1		0/10	0/10	0/10	0/10
2		0/10	0/10	0/10	0/10

96 Hour Acute *Americamysis bahia* Reference Toxicant Test

Client: Reference Toxicant
Organism Log #: 7177 Age: 4 days
Test Material: Potassium chloride
Organism Supplier: Aquatic Indicator
Test ID#: 51355 Project # 20819
Control/Diluent: DI + Crystal Sea @ 25 ppt
Test Date: 4-4-13 Randomization: 4.6.1
Control Water Batch: 919

Treatment (g/L KCl)	Temp (°C)	pH new	pH old	D.O. (mg/L) new	D.O. (mg/L) old	Salinity (ppt) new	Salinity (ppt) old	# Live Organisms Rep A	Rep B	Rep C	Rep D	SIGN-OFF
Control	20.5	8.06		7.9		24.2		10	10	10	10	Test Solution Prep: JM
0.125	20.5	8.06		8.0		24.5		10	10	10	10	New WQ: LO
0.25	20.5	8.05		8.0		24.6		10	10	10	10	Initiation Date: 4-4-13
0.5	20.5	8.03		8.1		24.7		10	10	10	10	Initiation Time: 1610
1	20.5	7.99		8.1		24.9		10	10	10	10	Initiation Signoff: SS
2	20.5	7.86		8.3		25.8		10	10	10	10	RT Batch #: 92
Meter ID	38A	pH15		RD05		EC04						a.m. Feeding Signoff: [illegible]
												p.m. Feeding Signoff: [illegible]
Control	20.1		7.50		6.5		24.7	8	10	10	10	Count Date: 4/5/13
0.125	20.1		7.35		6.2		25.0	9	10	10	10	Count Time: 1715
0.25	20.1		7.35		6.3		25.1	10	10	10	10	Count Signoff: [illegible]
0.5	20.1		7.47		6.4		25.4	9	10	9	9	Old WQ: PA
1	20.1		7.49		6.8		25.8	0	0	0	0	a.m. Feeding Signoff: DS
2	20.1		7.47		7.0		26.6	0	0	0	0	p.m. Feeding Signoff: MK
Meter ID	38A		pH19		RD05		EC08					
Control	20.3	7.94	7.37	7.9	5.0	24.3	24.6	8	10	10	9	Test Solution Prep: SS
0.125	20.3	7.96	7.33	7.9	5.3	24.5	24.7	9	10	10	10	New WQ: NF
0.25	20.3	7.96	7.32	8.0	4.8	24.7	25.0	10	10	10	10	Renewal Date: 4/6/13
0.5	20.3	7.95	7.31	8.1	4.5	24.9	25.2	9	10	9	9	Renewal Time: 1400
1	—	—	—	—	—	—	—	—	—	—	—	Renewal Signoff: [illegible]
2	—	—	—	—	—	—	—	—	—	—	—	Old WQ: CO
Meter ID	38A	pH15	pH16	RD05	RD04	EC06	EC04					a.m. Feeding Signoff: [illegible]
												p.m. Feeding Signoff: SS
												RT Batch #: 92
Control	20.9		7.45		5.1		24.3	8	10	10	9	Count Date: 4-7-13
0.125	20.9		7.46		5.3		24.8	9	10	10	10	Count Time: 1200
0.25	20.9		7.42		5.1		24.9	10	10	10	10	Count Signoff: [illegible]
0.5	20.9		7.40		6.1		25.2	9	10	9	9	Old WQ: CE
1	—		—		—		—	—	—	—	—	a.m. Feeding Signoff: MF
2	—		—		—		—	—	—	—	—	p.m. Feeding Signoff: [illegible]
Meter ID	38A		pH18		RD05		EC08					
Control	20.0		7.20		4.4		24.4	7	10	10	9	Termination Date: 4/8/13
0.125	20.0		7.18		4.7		24.8	9	10	10	10	Termination Time: 1430
0.25	20.0		7.14		4.1		24.8	10	10	10	9	Termination Signoff: SVV
0.5	20.0		7.19		4.7		25.1	8	10	9	9	Old WQ: [illegible]
1	—		—		—		—	—	—	—	—	a.m. Feeding Signoff: MF
2	—		—		—		—	—	—	—	—	
Meter ID			pH18		RD05		EC08					

Appendix E

Bioassay Standard Test Conditions

Summary of Test Conditions and Acceptability Criteria for the Mysid (*Americamysis bahia*) Water Column Toxicity Test.	
1. Test type	Static non-renewal
2. Test duration	96 hours
3. Salinity	25-30 ppt ± 10 ppt
4. Temperature	20 ± 1°C
5. Light quality	Ambient Laboratory
6. Light intensity	50 –100 ft c.
7. Photoperiod	16L/8D
8. Test chamber size	400 mL beaker
9. Test solution volume	200 mL
10. Renewal of seawater	None
11. Age of test organisms	1-5 days; 24 hour range in age
12. # of organisms per test chamber	10
13. # of replicate chambers per concentration	5
14. # of organisms per concentration	50
15. Feeding regime	daily
16. Test chamber cleaning	Lab washing prior to test
17. Test chamber aeration	If needed to maintain >40% saturation
18. Elutriate preparation water	Site water or Clean sea water
19. Test concentrations	Test sites, and Lab Control
20. Dilution series	Four concentrations (1, 10, 50, 100%) and a Lab Control
21. Dilution water	Type 1 lab water (reverse-osmosis, de-ionized water) adjusted to a salinity of 25 ppt using a commercial artificial sea salt (Crystal Sea Salt®-bioassay grade)
22. Endpoints	% Survival
23. Sampling holding requirements	< 8 weeks
24. Sample volume required	2L
25. Test acceptability criteria	≥90% survival in the Lab Controls

APPENDIX B
Longfin smelt data analysis details

Appendix B. Deriving a catchability factor for longfin smelt.

References cited here are listed in the main document.

Newman (2008) fit a probability-of-capture model for delta smelt (*Hypomesus transpacificus*) from experimental data based on a midwater trawl with cod-end mesh size nominally identical to that used in the present data set. Here, the catchability curve derived by Newman is applied to longfin smelt, using CDFW Bay Study length frequency data for both trawls together for all years and months through 2008 (Figure A1 and Table A1). From Newman's Appendix A, Figure 5, a catchability quotient was estimated for each 5-mm size increment, assuming longfin smelt escape as delta smelt do. For fish > 90 mm FL (fork length), Q was taken as 1, based on Newman's empirical data The fraction of age-0 fish in each 5-mm increment was calculated from the longfin smelt length frequency data. Then a weighted catchability quotient, Q_0, was calculated from the sums of products of these fractions by their respective estimated Q's (Table A1). The resulting estimate is Q_0=0.38, i.e., 38% of longfin smelt are retained in the cod end of the trawl under these assumptions. That is, to estimate abundance from catch data, the catch rate should be multiplied by a factor of 2.6 to account for extrusion through the mesh of the net.

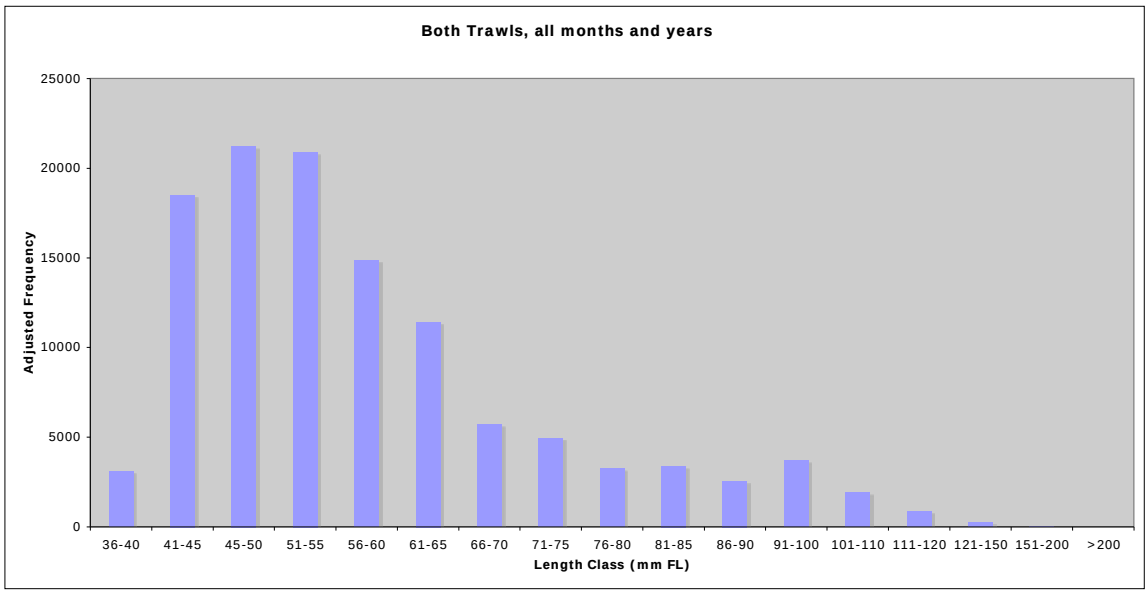


Figure A1. Combined length frequency plot for longfin smelt from otter trawl and midwater trawl, CDFW Bay Study, 1980-2008.

Table A1. Calculation of catchability quotient for longfin smelt due to extrusion

Length Class (mm)	Number of Fish	Fraction	Q*	FxQ
36-40	3094	0.027	0.15	0.004
41-45	18510	0.159	0.20	0.032
45-50	21235	0.182	0.25	0.046
51-55	20888	0.179	0.30	0.054
56-60	14847	0.127	0.35	0.045
61-65	11431	0.098	0.40	0.039
66-70	5719	0.049	0.50	0.025
71-75	4937	0.042	0.60	0.025
76-80	3247	0.028	0.65	0.018
81-85	3395	0.029	0.70	0.020
86-90	2555	0.022	0.80	0.018
91-100	3701	0.032	1.00	0.032
101-110	1930	0.017	1.00	0.017
111-120	858	0.007	1.00	0.007
121-150	247	0.002	1.00	0.002
151-200	15	0.000	1.00	0.000
>200	1	0.000	1.00	0.000
Total	**116610**		Q_0=	**0.383**

*Q=catchability from Newman (2008); values<1 based on his fitted curve in Appendix A, Fig 5; values=1 based on his empirical data.

Extrusion through the mesh of the net becomes less of a problem in the larger length categories (e.g., at lengths> 70 mm, 100% of smelt were retained according to Newman's observed data), but avoidance of the trawl may be a concern. There are no published data for net avoidance by longfin smelt. There is in fact surprisingly little quantitative data for any species, given that small otter trawls are common samplers in inshore habitats. DeMartini and Allen (1984) reported day-night differences in capture rates of queenfish (Seriphus politus), a small pelagic croaker. On the assumption that their trawl was 100% efficient at night, then the daytime efficiency for queenfish averged 24% at two depths where several hundred trawls were made. This would suggest a multiplier of about 4 for the larger fish, assuming longfin smelt to be capable of avoiding a small otter trawl to the same extent as do queenfish.

Finally, Figure A1 and Table A1 require further explanation. That is, longfin smelt <40 mm, though captured in the trawls, are not recorded (K. Hieb, personal communication: see also Orsi 1999). This means that the fish in the category reported here as 36-40 mm were all = 40mm FL, and that smaller fish, which may still be present in early summer (Orsi 1999) are not accounted for. For this reason, the multiplier of 2.6 based on the value of Q_0 developed above is not conservative for smaller fish, and of course does not cover avoidance by the less numerous, larger fish. It therefore seems prudent to use a multiplier >3, and conservative to use a value of 4 for all ages together in order to scale

the trawl catch to an estimate of abundance for use in estimating encounter rates with the project.

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
West Coast Region
777 Sonoma Avenue, Room 325
Santa Rosa, California 95404-4731

February 21, 2014 **Refer to NMFS No:** SWR-2013-9770

Lieutenant Colonel John K. Baker
U.S. Department of the Army
San Francisco District, Corps of Engineers
1455 Market Street
San Francisco, California 94103-1398

Re: Endangered Species Act Section 7(a)(2) Concurrence Letter and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for the Prologis Hercules Pipeline Removal Project (Corps File No. 2013-00058S)

Dear Colonel Baker:

On August 21, 2013, NOAA's National Marine Fisheries Service (NMFS) received your request for a written concurrence that the U.S. Army Corps of Engineers' (Corps) proposed authorization of the pipeline removal project pursuant to Section 404 of the Clean Water Act of 1973 (33 U.SC. Section 1344) is not likely to adversely affect (NLAA) species listed as threatened or endangered or critical habitats designated under the Endangered Species Act (ESA). This response to your request was prepared by NMFS pursuant to section 7(a)(2) of the ESA, implementing regulations at 50 CFR 402, and agency guidance for preparation of letters of concurrence.

NMFS also reviewed the proposed action for potential effects on essential fish habitat (EFH) designated under the Magnuson-Stevens Fishery Conservation and Management Act (MSA), including conservation measures and any determination you made regarding potential effects of the action. This review was pursuant to section 305(b) of the MSA, implementing regulations at 50 CFR 600.920, and agency guidance for use of the ESA consultation process to complete EFH consultation.

This letter underwent pre-dissemination review using standards for utility, integrity, and objectivity in compliance with applicable guidelines issued under the Data Quality Act (section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001, Public Law 106-554). The concurrence letter will be available through NMFS' Public Consultation Tracking System [https://pcts.nmfs.noaa.gov/pcts-web/homepage.pcts].[1] A complete record of this consultation is on file at NMFS' North Central Coast Office in Santa Rosa, California.

[1] Once on the PCTS homepage, use the following PCTS tracking number within the Quick Search column: SWR-2013-9770

Proposed Action and Action Area

The project site is located in the southeastern portion of San Pablo Bay near the City of Hercules in Contra Costa County, California. San Pablo Bay is approximately 90 square miles (60,000 acres) extending from Central San Francisco Bay to the western end of Carquinez Strait. The action area of this project consists of the shoreline area and sub-tidal area at and immediately adjacent to the Prologis 2,000-foot long pipeline. Water depths in the action area range from 0 to -8 feet, and the substrate is primarily silt and sand. Sub-tidal habitats with these characteristics in San Pablo Bay support benthic invertebrate communities such as bivalves, amphipods and polychaetes (Thompson *et al.* 2007). Prologis leases the land through the California State Lands Commission and the lease expires in August of 2017.

The project proposes to remove an 8-inch, 2000-foot long steel wastewater pipeline in San Pablo Bay that has not been in service since 2001. Removal of the structure includes both in-water work and work on the shoreline of San Pablo Bay. Work on the shore-side portion of the pipeline would be conducted first. The shore-side portion of the pipeline is approximately 160 feet long. A barge-mounted crane would be used to remove a small area of rip rap (10 feet length x 10 feet width x 5 feet deep) to fully expose the shore-side pipeline, and the pipe would then be grouted and left in place on the shore. The project proposes containment measures during shore-side construction activities to prevent the discharge of debris or contaminants into the waters of San Pablo Bay.

For the submerged portion of the project, the pipeline would be fully removed from the waters of San Pablo Bay. Divers would be used to attach straps to the pipeline and a barge-mounted winch would lift the pipeline off the bay floor. The pipeline would then be hoisted onto the barge for transport to the contractor's shore-based facility where it would be loaded onto a truck for transport to a recycling and/or disposal facility. It is anticipated that the pipeline is located under approximately one foot of unconsolidated sediment. Prologis proposes to lift the pipeline slowly to minimize suspension of the sediment overlying the pipe. No dredging or placement of fill would be associated with pipeline removal. All in-water work would be restricted to the period between June 1 and October 31, and work activities are expected to occur over a two to three week period.

There are no interrelated or interdependent activities associated with the proposed action.

Action Agency's Effects Determination

The Corps has determined that the proposed project is not likely to adversely affect ESA-listed fish and designated critical habitat, and has requested NMFS' concurrence with this determination. The Corps' finding of NLAA is based on the project's proposed avoidance and minimization measures. Available information indicates the following listed species (Distinct Population Segments [DPS] and Evolutionary Significant Units [ESU]) and critical habitat under the jurisdiction of NMFS may be affected by the proposed project:

Sacramento River winter-run Chinook salmon (*Oncorhynchus tshawytscha*) **ESU**
endangered (70 FR 37160; June 28, 2005)
critical habitat (58 FR 33212; June 16, 1993);

Central Valley spring-run Chinook salmon (*Oncorhynchus tshawytscha*) **ESU**
threatened (70 FR 37160; June 28, 2005);

Central California Coast steelhead (*Oncorhynchus mykiss*) **DPS**
Threatened (71 FR 834; January 5, 2006)
Critical habitat (70 FR 52488; September 2, 2005);
Central Valley steelhead (*Oncorhynchus mykiss*) **DPS**
threatened (71 FR 834; January 5, 2006); and
North American Green Sturgeon southern DPS (*Acipenser medirostris*)
threatened (71 FR 17757; April 7, 2006)
critical habitat (74 FR 52300; October 9, 2009).

The Corps has determined that the proposed project would not have a substantial adverse impact on EFH. The Corps finding is based on the project's avoidance and minimization measures. The project area is located within an area identified as EFH for various life stages of fish species managed with the Pacific Coast Salmon Fishery Management Plans (FMP), the Pacific Groundfish FMP, and the Coastal Pelagic FMP. The project area is also within an area designated as Habitat Areas of Particular Concern (HAPC) for various federally-managed fish species within the Pacific Groundfish FMP. HAPC are described in the regulations as subsets of EFH that are rare, particularly susceptible to human-induced degradation, especially ecologically important, or located in an environmentally stressed area. Designated HAPC are not afforded any additional regulatory protection under MSA; however, federal projects with potential adverse impacts to HAPC are more carefully scrutinized during the consultation process. As defined in the Pacific Groundfish FMP, San Francisco Bay, including the project area, is identified as estuary HAPC.

Consultation History

The Corps initiated informal consultation with NMFS by letter dated August 21, 2013, and provided the June 2013 Prologis Hercules Pipeline Removal Biological Assessment and Essential Fish Habitat Evaluation. Additional information regarding the project was provided to NMFS and the Corps by the project's consultant, Boudreau Associates LLC, on November 6, 2013, by electronic mail message.

ENDANGERED SPECIES ACT

Effects of the Action

Under the ESA, "effects of the action" means the direct and indirect effects of an action on the listed species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action (50 CFR 402.02). The applicable standard to find that a proposed action is not likely to adversely affect listed species or critical habitat is that all of the effects of the action are expected to be discountable, insignificant, or completely beneficial. Beneficial effects are contemporaneous positive effects without any adverse effects to the species or critical habitat. Insignificant effects relate to the size of the impact and should never reach the scale where take occurs. Discountable effects are those extremely unlikely to occur.

The effects of the proposed action are reasonably likely to include disturbance and degradation of water quality during pipeline removal activities. Post-construction, the project is expected to benefit habitat in San Pablo Bay by removing an abandoned steel pipeline which will restore the natural bay

bottom contour and substrate conditions. By restricting pipeline removal activities to the period between June 1 and October 31, the construction schedule avoids the migration seasons of adult and juvenile ESA-listed salmonids in San Pablo Bay. Thus, NMFS anticipates no ESA-listed anadromous salmonids will be present in the action area during construction. As presented below, impacts associated with construction will be temporary and fully dissipate when construction activities cease; therefore, any construction effects related to listed anadromous salmonids are anticipated to be discountable.

For threatened southern DPS green sturgeon, in-water construction activities may affect water quality. As the pipeline is removed from the bay floor, disturbance of the bottom substrate would likely result in temporary increases in turbidity in the adjacent water column. Increased levels of turbidity and suspended sediment can affect listed fish species by disrupting normal feeding behavior, reducing growth rates, increasing stress levels, and reducing respiratory functions. However, increased turbidity levels created by this project are expected to be minor, localized and considerably less than the thresholds commonly cited as the cause of the above-referenced possible behavioral and physical impacts. The minor and localized elevated levels of turbidity associated with pipeline removal by this project are expected to quickly disperse from the project area with tidal circulation. As a benthic dwelling species, green sturgeon are adapted to living in estuaries with fine sediment bottoms and they occupy high turbidity river systems (Allen and Cech 2007); specifically, they are tolerant of levels of turbidity that exceed levels expected to result during this project's construction activities.

If green sturgeon are present in the project area during construction activities, individuals could be startled and fish are likely to temporarily vacate the area. San Pablo Bay offers adequate areas with sufficient water depths and the open water habitat adjacent to the project site which would provide green sturgeon areas to disperse. Thus, startled fish would have sufficient area to escape disturbance during construction, and pipeline removal activities should not result in more than an insignificant effect. Construction activities on the shoreline of San Pablo Bay are limited to removal of rip rap and grouting the onshore portion of the pipeline in place. These activities are fully out of the water and measures are proposed to prevent the discharge of debris and contaminants into the waters of San Pablo Bay. Thus, shore-side construction activities are not expected to result in degradation of water quality or other impacts that affect listed fish or their habitat.

The action area is located within designated critical habitat for winter-run Chinook salmon, Central California Coast steelhead, and the southern DPS of green sturgeon. The physical and biological features essential for the conservation of Sacramento River winter-run Chinook salmon are: (1) access from the Pacific Ocean to appropriate areas in the upper Sacramento river, (2) availability of clean gravel for spawning substrate, (3) adequate river flows for spawning, incubation of eggs, fry development and emergence, and downstream transport of juveniles, (4) water temperatures between 42.5 and 57.5 °F (5.8 and 14.1 °C) for successful spawning, egg incubation, and fry development, (5) habitat areas and adequate prey that are not contaminated, (6) riparian habitat that provides for successful juvenile development and survival, and (7) access downstream so that juveniles can migrate from spawning grounds to San Francisco Bay and the Pacific Ocean. Primary constituent elements (PCEs) of designated critical habitat for CCC steelhead include estuarine areas free of obstruction with water quality, water quantity, and salinity conditions supporting juvenile and adult physiological transitions between fresh- and saltwater; natural cover such as submerged and

overhanging large wood, aquatic vegetation, large rocks and boulders, and side channels; and juvenile and adult forage, including aquatic invertebrates and fishes, supporting growth and maturation. The PCEs of designated critical habitat for the southern DPS of green sturgeon in estuarine areas include food resources, water flow, water quality, migratory corridor, water depth, and sediment quality. PCEs include sites essential to support one or more life stages of the species. These sites in turn contain physical and biological features that are essential to the conservation of the species.

Project activities would temporarily disrupt a total of 148 cubic yards (cy) of sediment during construction that will result in minor and temporary increases of turbidity. As discussed above, these increases in turbidity are expected to be temporary and minor given the small area affected and construction methods. Increased turbidity may lead to a loss of prey resources. However, for the reasons discussed above, the small increase in turbidity for a short time is expected to be insignificant. Similarly, based on the expected magnitude and duration of the turbidity, the number of prey resources affected will be small and recolonization will occur quickly; listed species are expected to utilize other food resources during this brief interim period without any reduction in fitness. The project's sediment analysis report provided verification that contaminants in sediments at the site are at insignificant levels and are not deleterious to aquatic life (Pacific EcoRisk 2013). Benthic invertebrates in the action area may be disturbed by pipeline removal, but the quantity of sediment (*i.e.,* 148 cy) disrupted is small considering the size of San Pablo Bay. Following removal of the pipeline, invertebrate communities are expected to recolonize the substrate currently occupied by the pipeline and the bottom contour of San Pablo Bay in the action area will be restored to a natural condition. Furthermore, there is ample area for foraging outside of the action area. For these reasons, project implementation is expected to ultimately benefit designated critical habitat through the removal of the abandoned steel pipeline.

Conclusion

Based on this analysis, NMFS concurs with the Corps that the proposed action is not likely to adversely affect the subject listed species and designated critical habitat.

Reinitiation of Consultation

Reinitiation of consultation is required and shall be requested by the Corps or by NMFS, where discretionary Federal involvement or control over the action has been retained or is authorized by law and (1) new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered; (2) the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this concurrence letter; or if (3) a new species is listed or critical habitat designated that may be affected by the identified action (50 CFR 402.16). This concludes the ESA portion of this consultation.

MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT

Under the MSA, this consultation is intended to promote the protection, conservation and enhancement of EFH as necessary to support sustainable fisheries and the managed species'

contribution to a healthy ecosystem. For the purposes of the MSA, EFH means "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity", and includes the associated physical, chemical, and biological properties that are used by fish (50 CFR 600.10), and "adverse effect" means any impact which reduces either the quality or quantity of EFH (50 CFR 600.910(a)). Adverse effects may include direct, indirect, site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions.

NMFS determined the proposed action would adversely affect EFH and HAPC due to localized degradation of water quality and loss/burial of benthic organisms. As discussed above, temporary increases in turbidity would be expected to occur during the removal of the pipeline from the substrate. Increased turbidity can reduce light in the water column. Limited light can cause detrimental impacts to native aquatic biota and phytoplankton (Dennison and Alberte 1986, Zimmerman *et al.* 1991). The contents of the suspended material may react with the dissolved oxygen in the water and result in short-term oxygen depletion to aquatic resources (Nightingale and Simenstad 2001). However, due to the small scale of this project, adverse effects to EFH are expected to be temporary, localized, and not rise to the level of impact to water quality and aquatic biota referenced above.

Project activities would result in temporary degradation of EFH through disturbance of benthic organisms within the action area during removal of the pipeline. In response to these impacts, foraging by fish may be temporarily affected until the benthic community and habitat functions recover. However, there is ample area for foraging adjacent to the action area. Post-construction, the project is expected to benefit EFH and HAPC by removing an existing anthropogenic structure (*i.e.,* steel pipeline) from the floor of San Pablo Bay and increasing the amount of benthic habitat available to native invertebrates and fish. Based on rates of community recovery listed in the scientific literature, NMFS expects the benthic community in the project area to recover within several months to a few years (Oliver *et al.* 1977; Watling *et al.* 2001).

As described in the above effects analysis, NMFS has determined the proposed action would adversely affect EFH for various life stages of fish species managed under the three FMPs identified above; however, the anticipated adverse effects are so minimal in nature that no EFH Conservation Recommendations are necessary to avoid, minimize, mitigate, or otherwise offset the adverse effects to EFH. Therefore, NMFS has no practical EFH conservation recommendations to provide to avoid or reduce the magnitude of these effects. The Corps must reinitiate EFH consultation with NMFS if the proposed action is substantially revised in a way that may adversely affect EFH (50 CFR 600. 920(l)). This concludes the MSA portion of this consultation.

Please direct questions regarding this letter to Autumn Cleave, North-Central Coast Office, San Francisco Bay Branch, 707-575-6056.

Sincerely,

Gary Stern

for William W. Stelle, Jr.
Regional Administrator

cc: Nina Cavett-Cox, US Army Corps of Engineers, San Francisco, California
Christine Boudreau, Boudreau Associates LLC, San Francisco, California
Copy to ARN File # 151422SWR2013SR00242

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