2.0 PROJECT DESCRIPTION

2.1 NEED FOR PROJECT

The proposed Cabrillo Power I LLC Encina Marine Oil Terminal Decommissioning Project (Project) is needed to decommission the Marine Oil Terminal (MOT) components in a manner that satisfies the terms of California State Lands Commission (CSLC) Lease PRC 791.1 and other public agencies with jurisdictional authority over Project elements.

2.2 PROJECT LOCATION

The proposed Project is located in and offshore of the City of Carlsbad, San Diego County. The property under lease from the CSLC includes parcels of tidelands and submerged lands lying immediately west and offshore of Carlsbad State Beach south of Agua Hedionda. The leased land encompasses a mooring area and a pipeline corridor. (See Section 1.3, Project Location, and Figure A1-1 in Appendix A.)

2.3 ENCINA MOT COMPONENTS AND THEIR EXISTING DISPOSITION

2.3.1 Fuel Oil Submarine Pipeline

The fuel oil submarine pipeline extends approximately 3,855 feet[3] from an onshore beach valve pit at the Encina Power Station (EPS), underneath Carlsbad Boulevard and Carlsbad State Beach, to its termination in approximately 60 feet water depth. It is comprised of a 20-inch-diameter by 0.5-inch wall welded steel pipe with a 2-inch external somastic and cement weight coating, and it terminates in a 300-pound, 20-inch-diameter flange. The pipeline is anchored on the seafloor with two 14,000-pound Danforth anchors that lie on either side of the line and are connected to the pipeline's steel collar with 90-foot-long anchor chains (see Figure A2-1 in Appendix A). A plastic spar buoy, which served as the pipeline end marker buoy, was anchored to the seafloor with a steel cable attached to a small concrete clump.

In 2010, during initial EPS MOT decommissioning activities, a steel pipe reducer and a fuel oil cargo hose that were located at the offshore end of the fuel oil submarine pipeline were removed. The anchoring cable for the end marker buoy, which had broken loose and was lost prior to 2010, was found on the seafloor near the end of pipeline. The pipeline was pigged and flushed three times with potable water from its offshore termination to its onshore termination to bring the hydrocarbon level below 15 parts per

[3] An approximately 500-foot extension was added to the offshore end of the pipeline in about 1973, and a steel collar was later placed around the pipeline near its offshore termination (due to a change in MOT ownership, some facility records are unavailable, and dates of certain activities are inferred from available documents).

million (ppm) (see Section 2.4.2.7). The flush water was sampled during each of the three pigging events and tested for hydrocarbon content; the final sample was tested and found to be at non-detect levels. The fuel oil submarine pipeline was then filled with 1,450 barrels (approximately 60,900 gallons) of potable water and 385 gallons of Nalco EC6106A corrosion inhibitor (for a total of approximately 61,285 gallons) containing a biocide ingredient approved by the CSLC (see Appendix B, Nalco EC6106A Material Safety Data Sheet). The pipeline was capped with a blind flange with a fitted flushing port and has since been under vacuum with no signs of leakage.

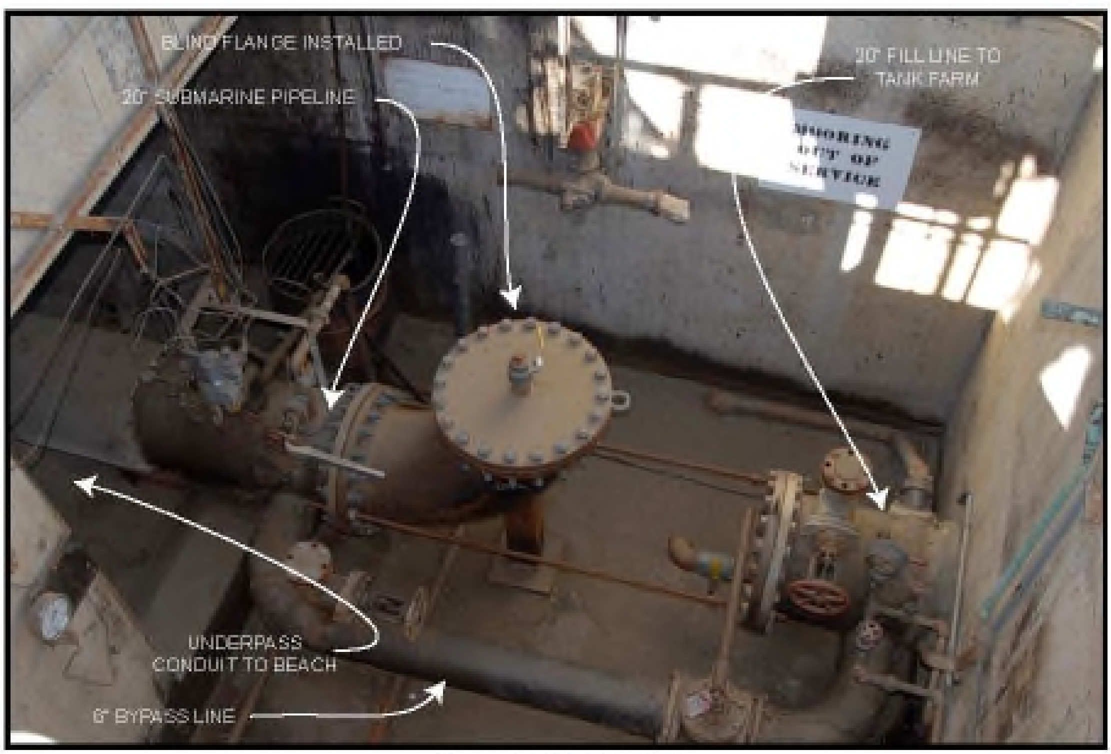
2.3.2 Beach Valve Pit

The beach valve pit is located inside the EPS facility alongside Carlsbad Boulevard. This reinforced concrete structure consists of a rectangular vault, a buried rectangular horizontal shaft, and miscellaneous pipes and electrical appurtenances (see Figure 2-1). The outside measurements of the rectangular vault are approximately 14 feet long, 12 feet wide, and 15 feet deep, including a sump. The beach valve pit is secured with a hand railing around the rim of the pit and is accessible via a welded steel ladder attached to the pit wall. Additionally, an awning is elevated over the beach valve pit. The rectangular horizontal shaft is a homogeneous part of the vault that extends in a west/southwest direction underneath the sidewalk and terminates underneath Carlsbad Boulevard where it connects to a reinforced concrete pipe underpass. The horizontal shaft portion of the beach valve pit is approximately 17 feet long from the westerly wall of the vault and is approximately 10 feet high by 10 feet wide (outside dimensions).

The beach valve pit houses the onshore termination of the fuel oil submarine pipeline, which was connected to (and could be isolated from) the fill line (to the tank farm) via a beach valve, but now terminates in a flanged connection (90-degree elbow) with a 2-inch-diameter sampling port fitted into the blind flange (see bottom photograph in Figure 2-1).

A 6-inch-diameter bypass pipe taps into the side of the fuel oil submarine pipeline termination and connects to the side of the fuel oil fill line to the tank farm. The fill line is comprised of 20-inch-diameter by 0.31-inch-thick wall, ASTM A-155 Grade B carbon steel pipe, with an external corrosion coating. The fill line extends approximately 18 inches through the east wall of the beach valve pit and continues approximately 380 feet underground to a second valve pit where it passes through a valve and continues beyond that point to the tank farm. The distance from the fill line's point of origin in the beach valve pit to the end of the tank farm is approximately 1,650 feet. The beach valve pit remains intact and in good condition, and no decommissioning work has been performed on this structure.

BEACH VALVE PIT EXTERIOR



BEACH VALVE PIT INTERIOR

Figure 2-1. Beach Valve Pit Photographs

2.3.3 Underpass Conduit

The underpass conduit is a reinforced concrete pipe that contains the fuel oil submarine pipeline. Buried approximately 2 to 3 feet underneath Carlsbad Boulevard (see Appendix C), the 8-foot-diameter underpass conduit measures approximately 73 feet in length, socket to socket, and is supported on the east and west end with concrete footings. The shoreward termination of the underpass conduit begins at its socketed connection to the horizontal shaft of the beach valve pit located underneath the east side of Carlsbad Boulevard. The underpass conduit extends underneath Carlsbad Boulevard and ties into the horizontal shaft of the underpass end structure (see Section 2.3.4, below) buried underneath the beach adjacent to the west of Carlsbad Boulevard.

At the westerly (seaward) end of the underpass conduit, where it connects to the horizontal shaft of the underpass end structure, reinforced concrete retaining wing walls were constructed. The wing walls extend approximately 10 feet in length at approximately 30-degree angles off the underpass centerline to the northwest and southwest of the underpass end structure. The wing walls were originally constructed to be approximately 5 feet above the top of the underpass conduit; however, the wing walls were cut and lowered to accommodate the widening of Carlsbad Boulevard and the existing sidewalk (see Figure A1-2 in Appendix A). As a result, the wing walls are not visible and their present status cannot be confirmed at this time.

Inside the underpass conduit, the fuel oil submarine pipeline is bedded on a layer of sand (approximately 1 foot in depth) placed on the inside floor of the underpass conduit. According to a hazardous materials survey performed by Royal Environmental Services, Inc. and reported on February 12, 2013 (see Appendix D), the sand inside the underpass near the beach valve pit was tested and found to contain total hydrocarbons at levels ranging from 1,300 milligrams/kilogram (mg/kg) to 35,000 mg/kg.

The underpass conduit remains intact and in good condition, and no decommissioning work has been performed on this structure.

2.3.4 Underpass End Structure

The underpass end structure consists of a reinforced concrete vertical vault and horizontal shaft that connects to the west end of the underpass conduit (see Figure 2-2 and Appendix C). The fuel oil submarine pipeline exits the underpass conduit and end structure through a port and is currently buried underneath the beach.

The horizontal shaft and vertical vault of the underpass end structure are homogeneous. The horizontal shaft is approximately 10 square feet and 10 feet deep (outside dimensions), and is connected to the underpass conduit via a formed socket filled with hot-poured para-plastic.

Photograph of original construction in 1953. The termination of the underpass pipe conduit (8' dia) and retaining wall (wing walls) can be seen. The underpass end structure is shown under construction. The retaining wall is now located underneath the #2 southbound lane of Carlsbad Blvd. The end structure, when constructed, extended another 16'-7-1/4" toward the beach.

Photograph of end structure taken January 2013. The round vent and manhole access port of the underpass end strucure are all that is visible of above the beach sand. Approximately 10' of the end structure's 16'-7-1/4" length is located underneath Carlsbad Blvd. and the sidewalk shown in this photograph.

Figure 2-2. Underpass End Structure Photographs

The vertical vault is approximately 15.5 feet high, 10 feet wide, and 6.5 feet deep (outside dimensions). The top of the vertical vault contains a 30-square-inch manhole and a vent pipe that is approximately 18 inches in diameter and 7 feet high. The floor of the vertical vault consists of a gravel-filled sump or drain that is open to the beach on the bottom of the structure (beneath the gravel fill).

Compared to as-built plans, it appears that Carlsbad Boulevard was widened after the underpass end structure was constructed in 1954. As a result, the horizontal shaft appears to be covered by the existing sidewalk on the west side of Carlsbad Boulevard, while the vertical vault's manhole and vent pipe are exposed at the edge of the sidewalk on the beach. The end structure remains intact and in good condition, and no decommissioning work has been performed on this structure.

2.3.5 Riprap Groin

A riprap groin protects the fuel oil submarine pipeline on the beach and in the surf zone. At its widest visible point, the groin measures approximately 55 feet and extends approximately 160 feet into the surf zone from the high water line; however, the actual width and length of the groin is unknown because much of it is buried beneath sand. Based on the as-built drawing of the underpass end structure, it is possible that the groin extends approximately 250 feet below the existing beach to the wing walls of the underpass end structure (see Appendix C). The depth of the fuel oil submarine pipeline underneath the groin is unknown. The riprap groin remains intact and in good condition, and no decommissioning work has been performed on this structure.

2.3.6 Seven-Point Mooring System

A seven-point mooring system was used to moor ships or barges offloading fuel oil into the MOT's submarine pipeline. Each leg of this system consisted of: a single 30,000 pound (105 ton) Baldt Light Weight Type anchor; four to six shots (360 feet to 540 feet) of 2.75-inch to 3-inch anchor chain weighing approximately 119.8 tons; and one horizontal cylindrical painted steel mooring buoy (see Figure A2-2 in Appendix A). In operation, mooring wires from a tanker or barge were connected to the top of each mooring buoy and tensioned by the tanker's or barge's mooring winches to center the vessel near the end of the fuel oil submarine pipeline. The mooring buoy was removed during the EPS MOT 2010 decommissioning, but the anchors and chains of the seven-point mooring system remain on the seafloor at depths ranging from 42 feet to 78 feet.

2.3.7 Single-Point Mooring System

A single-point mooring was placed offshore of the tanker berth mooring for use by an attending tugboat. This single-point mooring consisted of: a single 14,000-pound Navy stockless anchor; approximately 450 feet of 2.75- to 3.25-inch anchor chain; and a single horizontal cylindrical painted steel mooring buoy (West Coast can type). The mooring buoy for this single-point mooring was removed during the EPS MOT 2010 decommissioning, but the chain and anchor remain on the seafloor.

2.3.8 Navigation Buoy

A lighted navigation buoy fitted with a bell was used to mark the offshore entrance of the MOT. Located approximately 1,800 feet offshore of the fuel oil submarine pipeline termination, in approximately 110 feet of water, the buoy was anchored to the seafloor by a 1.5- to 2.75-inch-diameter anchor chain attached to a 64-cubic-foot concrete clump on the seafloor. The navigation buoy was removed during the EPS MOT 2010 decommissioning, but the anchor chain and concrete clump remain on the seafloor.

2.4 PROJECT OVERVIEW

2.4.1 Project Elements

The Project described herein is comprised of the following decommissioning elements:

1. Removal of the entire fuel oil submarine pipeline including the two 14,000-pound Danforth pipeline end anchors and any remaining components of the pipeline termination marker buoy;
2. Decommissioning of the beach valve pit and all associated electrical and piping components;
3. Decommissioning of the underpass conduit;
4. Decommissioning of the underpass end structure;
5. Temporary removal of the riprap groin and restoration of the groin after the underlying fuel oil submarine pipeline has been removed;
6. Restoration of the beach;
7. Removal of the remaining seven-point mooring system (chains and anchors);
8. Removal of the remaining single-point mooring (chain and anchor);
9. Removal of the remaining navigation buoy (chain and clump); and
10. Removal of all seafloor debris associated with the MOT operations.

2.4.2 Pre- and Post-Decommissioning Deliverables and Activities

Certain activities and deliverables would be performed or provided prior to or after the completion of decommissioning operations. These activities and deliverables are listed and described below.

2.4.2.1 Marine Safety and Anchoring Plan

A preliminary Marine Safety and Anchoring Plan (MSAP) was prepared for the Project (see Appendix E). The MSAP would be updated prior to Project commencement to reflect the most current ocean floor conditions in the Project area based upon a pre-decommissioning seafloor survey. The purpose of the MSAP is to provide a precise set of procedures and protocols that would be used by the decommissioning contractor when executing the marine decommissioning work. The primary concerns addressed by the MSAP are personal, environmental, and vessel safety.

2.4.2.2 Marine Wildlife Contingency Plan

A Marine Wildlife Contingency Plan (MWCP) was prepared for the Project and is provided in Appendix F. The purpose of the MWCP is to provide measures that would be incorporated into the Project that are designed to reduce or eliminate impacts of the proposed decommissioning activities on marine wildlife.

2.4.2.3 Oil Spill Response Plan

An Oil Spill Response Plan (OSRP) was prepared for the Project and is provided in Appendix G. The purpose of the OSRP is to present an overview of the measures incorporated into the Project design to minimize the potential for a hydrocarbon release and to outline the procedures and protocols that would be used in the event of an onshore or offshore oil spill resulting from Project activities.

2.4.2.4 Contractor Work Plan

A technical consultant and marine contractor would develop and submit a Contractor Work Plan (CWP) a minimum of 60 days prior to the start of decommissioning for review by the CSLC staff and other appropriate permitting agencies. The CWP would include engineered decommissioning plans and specifications provided by a licensed professional engineer and fully detail the contractor’s planned scope of work, methodologies, manpower, equipment, and schedule. Additionally, the CWP would incorporate all permit conditions and include critical operations and curtailment plans, a spill response and cleanup plan, a site safety plan, a dive safety plan, an emergency response plan, noise management plans, best management practices, and other essential plans and information pertinent to decommissioning operations.

2.4.2.5 Mitigation Compliance Plan

An environmental consultant would develop and submit an environmental Mitigation Compliance Plan (MCP) at least 60 days prior to the start of decommissioning operations. The MCP would be used by environmental monitors to assure that all Project operations comply with all permit conditions and reporting requirements.

2.4.2.6 Pre- and Post-Decommissioning Seafloor Debris Surveys

The offshore decommissioning work would begin and end with a seafloor debris survey. The survey would be completed by a marine surveyor, technicians, and an environmental monitor aboard a commercial survey boat (approximately 35 feet in length) with a side-scan sonar system (400% coverage) and fathometer (alternatively a 3D multi-beam sonar system), and a commercial grade differential global positioning system with sub-meter accuracy.[4] The survey would encompass the entire underwater worksite bordered by the contractor's planned derrick barge anchorages, which would be positioned to avoid rock outcroppings and kelp beds plus an offset of approximately 500 feet. The surveyor would produce a map to serve as the baseline for seafloor conditions at the underwater worksite prior to the start of decommissioning operations. After decommissioning is complete, a seafloor debris survey of the underwater worksite would be repeated with the same equipment to identify any debris introduced during Project operations. If debris is found at the worksite, all items would be removed by the contractor, transported off-site, and recycled at appropriate permitted facilities. The pre- and post-decommissioning survey map would be provided to CSLC staff and other permitting agencies for approval and sign-off of Project completion.

2.4.2.7 Pre-Decommissioning Fuel Oil Submarine Pipeline Flush

During the 2010 EPS MOT decommissioning, the fuel oil submarine pipeline was pigged, flushed to lower hydrocarbon levels to non-detect levels, and placed in storage with a mixture of potable water and Nalco EC6106A totaling approximately 61,285 gallons. As a precautionary measure, prior to the start of decommissioning work, the pipeline contents would be re-sampled for hydrocarbon content. If hydrocarbon levels of 15 ppm or higher are found in the pipeline, it would be pigged and flushed to bring the hydrocarbon level to a non-detect level. The Nalco EC6106A preservative currently in the pipeline contains a biocide ingredient (see Appendix B, Nalco EC6106A Material Safety Data Sheet), so the storage water would be displaced from the pipeline with a seawater flush prior to opening the pipeline to the ocean for decommissioning. The pipeline would be flushed from its offshore termination to its onshore termination at the beach valve pit, where the potable water and preservative mixture would be recovered and transported off-site for treatment and disposal.

The flushed water used to clean the interior of the fuel oil submarine pipeline would be chemically analyzed for the presence of volatile organic compounds (VOCs) using U.S. Environmental Protection Agency (USEPA) Method 8260 (gas chromatography mass spectrometry) or for isopropanol by USEPA Method 8015M (flame ionization detection-

---

[4] Because the surveys would require the use of geophysical equipment that generates noise during data acquisition, the survey must be conducted by an operator that possesses an Offshore Geophysical Survey Permit through the CSLC's Low-Energy Offshore Geophysical Permit Program.

direct injection), and for the presence of semi-volatile organic compounds (SVOCs) using USEPA Method 8270. Acceptable residual concentrations of VOCs, isopropanol, and SVOCs would be determined in coordination with the Regional Water Quality Control Board and would be in compliance with California Ocean Plan discharge requirements (State Water Resources Control Board [SWCRB] 2012). Alternatively, the pipeline contents may be displaced from the offshore termination to the onshore termination with air or nitrogen to lighten the fuel oil submarine pipeline for recovery using a reverse pipe lay removal method (discussed in Section 2.5.4, Offshore Decommissioning Activities). Depending on the method selected to remove the offshore segment of the pipeline, the offshore termination may be left open to the ocean after flushing to permit the water level inside the pipeline to fall to sea level.

2.4.2.8 Final Report and As-Built Drawings

A Project report would be prepared for submission to CSLC staff within 30 days of Project completion. This report would include: (1) an overview of the Project; (2) the final disposition of all facility components, a discussion of any major events that occurred during decommissioning, and lessons learned; (3) a scaled map showing the location and coordinates of any facilities abandoned-in-place and a description of those facilities; and (4) MCP documentation.

2.5 MOT DECOMMISSIONING PLANS AND PROCEDURES

This section provides the general plans and procedures that may be employed during MOT decommissioning; final plans and procedures would be provided in the CWP. For decommissioning planning purposes, the Project components and facilities have been divided into four discrete work segments (onshore, beach, surf zone, and offshore) based on the environment in which they are located, methods and equipment required to perform the decommissioning work, and seasonal work constraints. Although the MOT facilities and decommissioning activities are presented from east to west (onshore to offshore), the scheduled progression of these activities does not follow this order. The Project schedule is discussed in Section 2.6, Preliminary Decommissioning Schedule.

2.5.1 Onshore Decommissioning Activities

The onshore segment begins at the beach valve pit inside the EPS and extends approximately 110 feet to the underpass end structure adjacent to Carlsbad Boulevard on the eastern edge of the beach (see Figure 2-3). Facilities located within the onshore segment include a section of the fuel oil submarine pipeline and fill line, the beach valve pit, the underpass conduit, underpass end structure, and all piping, electrical components, and appurtenances located inside or attached to the outside of these structures. The decommissioning work for the onshore segment would be performed by land-based crews and equipment and accomplished as described below.

Figure 2-3. Onshore and Beach Site Map

2.5.1.1 Fuel Oil Submarine Pipeline

This section of the fuel oil submarine pipeline is approximately 110 feet long and weighs approximately 13.4 tons (dry weight). The entire pipeline would be removed from inside the beach valve pit, the underpass conduit, and the underpass end structure. This section of the pipeline would be extracted from the underpass conduit and end structure through the beach valve pit and into the EPS facility (see Figure A2-3 in Appendix A). The recovered pipeline would be disposed or recycled off-site.

Prior to removal, this section of pipeline would be flushed with seawater or purged with air or nitrogen to free any water inside the pipeline. To remove this segment, pipeline would be cut into sections using flame (oxy-acetylene) or saw cutting methods. If the flame cutting method is used, the somastic and cement weight coating on the pipeline would need to be removed at each cut point, and because the somastic coating contains small amounts of asbestos, an asbestos safety plan and asbestos trained crews would be required to remove, contain, and dispose of the somastic waste (see Appendix D, page 3). Once the pipeline is cut, a winch and rigging would be used to drag the pipeline sections one at a time from the underpass to the beach valve pit. A crane stationed alongside the beach valve pit would be used to raise the pipeline sections out of the beach valve pit and place them on trucks for off-site disposal and recycling.

2.5.1.2 Fill Line

The fill line would be filled with a Class G oilfield cement slurry plug[5] and remain buried within the EPS facility to be decommissioned at a future date. Only the fill line termination point located inside the beach valve pit is within the scope of this Project. The blind flange inside the beach valve pit would be removed and a soft pig would be inserted in the fill line. The blind flange would then be fitted with a cement port and reinstalled. A cement hose would be attached to the port and cement slurry would be pumped into the fill line, pressing the soft pig in front of it. Approximately 20 feet of cement slurry would be placed in the fill line (1.5 cubic yards of slurry); however, the cement slurry may be installed the entire length of the fill line (a distance of approximately 380 feet) to the second valve pit within the EPS facility (28 cubic yards of slurry) (see Figure A2-4 in Appendix A). Once the cement slurry plug solidifies in the fill line, the flanged end and pipe stub would be cut (via flame or saw cutting) and removed (less than 300 pounds of recyclable steel), and a permanent steel plate cap would be welded on the cut end of the fill line. The flanged end and pipe stub would be placed on trucks for off-site disposal and recycling.

[5] A Class G cement is intended for use as a basic cement from surface to 8,000 feet depth.

2.5.1.3 Beach Valve Pit

The beach valve pit houses the onshore termination of the fuel oil submarine pipeline and consists of a rectangular vault and a buried rectangular horizontal shaft. Soil samples would be taken from underneath the floor of the beach valve pit. If contaminated soil exceeding allowable limits is found, the floor of the beach valve pit would be demolished and the underlying contaminated soil would be remediated to comply with regulatory requirements. Should the soil samples reveal no contamination or levels less than allowable limits, the bottom portion (5 feet below grade and deeper) of the beach valve pit would be left intact, and the top portion (surface to 5 feet below grade) would be demolished and broken down to 5 feet below existing contours or to the top of the horizontal shaft, whichever is greater. The concrete walls would be broken down with concrete breakers mounted on excavators (or equivalent), creating approximately 8.7 cubic yards of concrete and reinforcing bar debris that would be recovered and shipped off-site for recycling or disposal. The beach valve pit would then be backfilled and compacted with approximately 87 cubic yards of native soil from off-site sources (see Figure A1-3 and Figure A2-5 in Appendix A). Native soil and sand backfill from off-site sources will have similar grain size characteristics and color to the surrounding soil and sand at the Project site, and will be derived from approved and permitted sources in accordance with the Surface Mining and Reclamation Act.

2.5.1.4 Underpass Conduit

The underpass conduit (and rectangular horizontal shafts of the beach valve pit and underpass end structure) would be filled with Class G oilfield cement slurry and abandoned in place. These components are buried under existing sidewalks and Carlsbad Boulevard.

Inside the underpass conduit, the fuel oil submarine pipeline rests on a 12-inch-deep bed of sand (15 cubic yards). A portion of this sand was checked and found to contain hydrocarbon contamination, but the bulk of this sand has not been surveyed for hydrocarbons. As such, samples would be taken to determine the level of hydrocarbon contamination. The sand would be removed and disposed or recycled off-site depending on the presence and quantity of contamination.

After the fuel oil submarine pipeline, vertical vault, and all sand bedding, electrical components, piping, and appurtenances have been removed, a cement slurry plug would be installed in the underpass conduit. To install the cement slurry plug, a temporary framework (wood or metal forms) would be constructed at each end of the underpass conduit. One form would be placed at the horizontal shaft opening on the west wall of the beach valve pit. The second form would be placed where the vertical vault of the underpass end structure was cut and removed from the horizontal shaft (see Section 2.5.2.5, Underpass End Structure). Cement slurry installation ports would be installed in the forms, and tremie pipes may be required to distribute the slurry the full length of the underpass conduit. Vent pipes would also be installed, as appropriate, to ensure that the cement slurry completely fills the underpass conduit from floor to ceiling. The total cement slurry volume is estimated at approximately 198 cubic yards. Detailed engineered plans and specifications for the forms and cementing process would be provided with the CWP. Once the cement plug has been installed and set, the temporary forms would be removed (see Figure A1-4 and Figure A2-6 in Appendix A).

2.5.1.5 Underpass End Structure

Prior to demolition, the vent pipe, manhole, metal ladder, and any other appurtenances located inside the vertical vault and horizontal shaft of the underpass end structure would be removed. The vertical vault would then be excavated, demolished, and removed in its entirety, separating it from the end structure horizontal shaft. In addition, the gravel bed underneath the vertical vault (approximately 7.1 cubic yards) would be removed, and the soil underneath the gravel bed would be tested for contaminants. If the soil exceeds regulatory allowable limits, it would be excavated, transported off-site, and properly disposed. The horizontal shaft, wing walls, and concrete footing of the underpass end structure would be abandoned in place.

Because the vertical vault is completely buried underneath the beach, approximately 452 cubic yards of sand and possibly riprap would be excavated to expose the vertical vault for cutting and demolition (assuming an excavation that is 18 feet deep with a 36-foot radius and walls at a 2:1 slope) (see Figure A2-7 and Figure A2-8 in Appendix A). The beach sand would be stockpiled on the beach and used for backfill after the vertical vault is removed. As-built drawings indicate the possible presence of riprap (as much as 45 tons) below the beach at the underpass end structure; if riprap is found, it would be stored onsite and used as backfill after the vertical vault is removed. Once excavated, the vertical vault would be cut and separated from the horizontal shaft using abrasive saws, concrete saws, diamond wire cutting, or other concrete cutting methods that produce a reasonably smooth cut suitable to seal off the horizontal shaft with cement. Once broken up, the vertical vault would be trucked off-site for recycling or disposal.

The horizontal shaft, wing walls, and concrete footing of the underpass end structure would be abandoned in place. These structures are located below the existing westerly sidewalk and southbound lane within the Carlsbad Boulevard right-of-way. If these components were removed, both southbound lanes of Carlsbad Boulevard may need to be temporarily shut down to facilitate excavation; therefore, limiting the removal of these structures would ensure that the current roadway sub-grade and sub-base remain undisturbed. However, removal of the vertical vault may require demolition and replacement of the western sidewalk where it crosses the underpass end structure (see Figure A1-5 in Appendix A).

The beach at the underpass end structure would be restored to pre-project contours by backfilling the excavation with native sand (approximately 452 cubic yards); however, the actual amount of sand required to backfill the excavation would depend on the amount of riprap, if any, found below the existing sand beach. Assuming approximately 45 tons of riprap is found and removed, approximately 127 cubic yards of sand would be required for backfill (see Figure A2-9 in Appendix A).

2.5.1.6 Electrical Components, Piping, and Appurtenances

All electrical components, piping, and appurtenances would be removed from inside the beach valve pit, the underpass conduit, and the underpass end structure. This would include removal of all above ground electrical components, the existing awning structure and slab that surrounds the top edge of the beach valve pit, the concrete block wall, and all handrails. Crews certified in the removal and containment of hazardous materials would abate all contaminates including lead, asbestos, and hydrocarbons that exceed regulatory allowable limits and transport them off-site for disposal. The volume of debris generated during this phase of demolition is estimated to weigh less than 1 ton.

2.5.2 Beach Decommissioning Activities

The beach segment begins at the west side of the underpass end structure and extends approximately 220 feet into the intertidal zone near the mean low water line. Facilities located within the beach segment include a section of the fuel submarine pipeline and the riprap groin. Decommissioning work for the beach segment would be performed by land-based crews and equipment, but limited to extreme low tide conditions when working in the intertidal zone. Work within the beach segment would be accomplished as described below.

2.5.2.1 Riprap Groin

In order to excavate and remove the fuel oil submarine pipeline, the riprap groin would need to be permanently or temporarily removed. To determine potential near-field effects of removing the riprap groin (also referred to as the South Beach Groin), Jenkins (2013) conducted a shoreline evolution analysis (see Appendix L) to predict shoreline evolution over 20-year-long historic periods of waves, tides, currents, and dredge disposal. The study showed that, although removal would have no apparent short-term effect on shoreline change, long-term (10 to 20 years) cumulative impacts, generally erosional in nature, to the shoreline would occur. Therefore, to retain the width of the existing shoreline, the riprap groin would be restored to pre-Project contours following the removal of the fuel oil submarine pipeline. The largest erosional impacts would occur at South Beach, where beach widths would be locally reduced by as much as 17 feet, 20 years after the groin is removed. Removal of the South Beach Groin would also reduce the median retention time of dredged sands placed on South Beach by 1 month.

Since dredging and beach disposal of the dredged sands typically occurs every 2 years, an average loss of 1 month of retention time adds up to a significant loss of beach sand volume over many years for the North Beach/Middle Beach/South Beach back-passing, sand re-cycling system. Therefore, to retain the width of the existing shoreline, the riprap groin would be temporarily removed to excavate the fuel oil submarine pipeline and restored to pre-Project contours following the pipeline removal process.

The riprap groin may extend under the beach to the west face of the underpass end structure and, if so, would require the excavation of overlying sand to reach and temporarily remove the groin to access the pipeline. To dismantle the groin, a bulldozer and front-end loader would push existing sand from the beach onto the groin to provide a temporary pad for a crawler crane to reach the seaward end of the groin. The crawler crane would be equipped with rock tongs or similar tools to remove the riprap, working from the seaward edge of the groin and moving shoreward. Because the groin may extend underneath the beach to the under-pass end structure, a bulldozer and front-end loader would excavate the sand to expose the groin. The maximum excavation depth is estimated at 10 feet, and the walls of all sand excavations would be cut back to a 2:1 slope for safety purposes. Temporary shoring may also be used to hold the sand excavation open to facilitate removal of this section of the pipeline. A front-end loader or equivalent equipment would be used to transport the riprap to a pre-designated storage area on the beach until the pipeline is removed. Once the underlying pipeline is removed, the groin would be restored to pre-project contours starting from the west end of the underpass structure and working seaward. Because the original riprap would be reused to restore the groin, no off-site rock disposal or additional rock and sand backfill is anticipated (see Figure A2-10 in Appendix A).

2.5.2.2 Fuel Oil Submarine Pipeline

This segment of the fuel oil submarine pipeline is approximately 220 feet long and weighs approximately 26.7 tons (dry weight). Prior to removal, the pipeline segment would be flushed with seawater to free any wastewater from inside this pipeline. The pipeline would be removed in its entirety across the beach. As the pipeline is excavated and exposed it would be cut into sections to facilitate removal. Cutting would be performed using flame (oxy-acetylene torches) or saw cutting methods. If the flame cutting method is used, the somastic and cement weight coating on the pipeline would need to be removed at each cut point, and because the somastic coating contains small amounts of asbestos, an asbestos safety plan and asbestos trained crews would be required to remove, contain, and dispose of the somastic waste. Once the pipeline is cut, a crane stationed alongside the pipeline would be used to raise the pipe sections onto a truck for off-site disposal and recycling. After the pipeline is removed, all required excavation would be backfilled with native sand and the riprap groin would be restored to pre-project conditions (see Figure A2-11 in Appendix A).

2.5.3 Surf Zone Decommissioning Activities

The surf zone segment begins at the approximate mean low water line and extends approximately 750 feet offshore to the -15 foot bathymetric contour. Facilities located within the surf zone segment include the fuel oil submarine pipeline and riprap groin. Excavation and removal of the pipeline in the surf zone would involve both land- and offshore-based crews and equipment. Land-based work would be limited to extreme low tide conditions when working in the surf zone, and offshore-based work would be limited by the shallowest depth (-15 foot bathymetric contour) at which a barge or other floating support equipment can safely operate near the surf zone. The riprap groin would be temporarily removed to accommodate removal of the pipeline and later restored as described above in Section 2.5.2.1, Riprap Groin. Fuel oil submarine pipeline decommissioning work in the surf zone segment would be accomplished as described below.

2.5.3.1 Fuel Oil Submarine Pipeline

This section of the fuel oil submarine pipeline is 750 feet in length and weighs approximately 91.1 tons (total dry weight), and would be removed in its entirety if feasible. In the surf zone, the pipeline is covered by an existing riprap groin, which would be temporarily removed and stored on the beach during the pipeline removal process. The depth of the pipeline underneath the groin is unknown; however, it is thought to be fairly shallow. There are two reasons for this assumption: (1) the pipeline was pulled offshore from the beach and never excavated and buried; and (2) groin protection over a pipeline is typically only required when a pipeline becomes exposed on the beach and seafloor. Additionally, past seafloor surveys revealed exposed portions of the offshore fuel oil submarine pipeline, which could mean that the pipeline may only have a shallow cover over it in the surf zone. If this is the case, it may be feasible to remove the entire surf zone section using conventional or low-impact methods (Option 1). Should the as-found disposition of the pipeline foil efforts for removal using the methods in Option 1, dynamic pipe ramming (DPR) technology would be employed in an attempt to vibrate and extract the pipeline from under the seafloor (Option 2).[6] If Option 1 or Option 2 is successful, this section of the pipeline would be pulled offshore and raised to the surface, cut into truckable sections to be transported by barge to shore, and trucked to off-site disposal or recycling facilities. If both options fail to extract the surf zone section, the remaining portion of pipeline would be abandoned in place and the ends of the pipeline would be opened to fill with sand. After work in the surf zone is complete, the groin would be restored to pre-project contours. The removal methods for Option 1 and Option 2 are described in Table 2-1.

[6] Although DPR has not been previously used to remove pipelines in the surf zone, it has been successfully used to remove longer sections of pipeline stuck in horizontal directional drilling bores. Most recently, DPR was used to extract buried subsea pipelines in the Gulf of Mexico and Midwest.

Table 2-1. Surf Zone Fuel Oil Submarine Pipeline Removal Options

Option 1 – Surf Zone Removal Using Conventional Crews and Equipment	Land-based crews and equipment would work from onshore into the surf zone, as far as low tide and surf conditions permit, to remove as much of the pipeline in the surf zone as possible. Marine-based crews and equipment would then work from offshore into the surf zone, as far as tides and surf conditions permit, to extract the remaining pipeline in the surf zone. At each cut-point on the pipeline, a bell hole would be dug underneath the pipeline and the somastic and cement weight coatings would be removed. If above water, the pipeline would be cut with oxy-acetylene; if underwater, it would be cut with an oxy-arc or a guillotine saw. Compared to an oxy-arc, a guillotine saw may eliminate the need to remove the somastic and cement weight coating and minimize the bell hole excavation. Both the oxy-arc and guillotine saw are handheld or hand-applied, and neither produces appreciable noise nor substantial waste or byproduct. During the removal process, floatation may be used in combination with the above methods to lighten the pipeline and pull the remaining section out of the surf zone. Once removed, the pipeline would be lightened with floatation or filled with air, then lifted onto the barge deck to be cut into sections for off-site recycling or disposal.
Option 2 – Surf Zone Removal by DPR	DPR may be ideally suited to remove this section of the pipeline because the pipeline is relatively short (750 feet), may be exposed on the seafloor or only moderately buried, and is of known composition, construction, and integrity. To remove this segment using DPR, a pneumatic ram (hammer), attached to the offshore end of the pipeline, would vibrate the pipeline out of the surf zone while the tension winch, stationed on the offshore support barge, would drag the recovered pipeline offshore (see Figure A2-12 in Appendix A). Pull forces necessary to extract the pipeline out of the surf zone would be calculated and analyzed by a California licensed professional engineer and provided in the CWP. A six-point anchor system would be required for the barge, with four of the six points acting as reaction anchors to keep the barge in place while the tension winch drags the pipeline out of the surf zone. Once removed, the pipeline would be lightened with floatation or filled with air and then lifted onto the deck of the barge to be cut for off-site recycling and disposal.

2.5.4 Offshore Decommissioning Activities

The offshore segment begins at the backside of the surf zone (at approximately the -15 foot bathymetric contour) and terminates approximately 2,525 feet offshore in approximately 60 feet of water. This segment includes the fuel oil submarine pipeline and all of the remaining mooring and navigation components and seafloor debris associated with the tanker berth. Work within the offshore segment would be performed by offshore crews and equipment and accomplished as described below.

2.5.4.1 Fuel Oil Submarine Pipeline End Anchors

The two fuel oil submarine pipeline end anchors and their chains would be removed in their entirety from the seafloor. The anchors weigh 14,000 pounds each and are connected to the pipeline via a steel collar fastened to the pipeline end and attached with two 90-foot lengths of 2-inch stud link anchor chains. To remove the end anchors from the pipeline, offshore crews and equipment would either cut the collar bolts and remove the collar, or cut the 2-inch stud link anchor chain near the steel anchor collar. The two end anchors would be raised to the surface using the 2-inch stud link anchor chains, lifted to the deck of the derrick barge using the deck winch, and hauled onboard for off-site recycling and disposal. No excavation would be necessary.

2.5.4.2 Fuel Oil Submarine Pipeline

The offshore segment of the fuel oil submarine pipeline is approximately 2,775 feet long and weighs approximately 337.2 tons (dry weight). If the offshore section of the pipeline is buried, underwater excavation would be required. Once the pipeline is freed from the end anchors, the pipeline would be raised to the deck of the derrick barge and cut into sections (Option 1), or the pipeline would be cut on the seafloor by divers and recovered (Option 2). The latter option is less desirable as it requires extensive diver intervention with inherent safety risks, while the former, and preferred, option requires substantially less diver intervention and can be performed on the deck of the barge. In either case, the offshore segment would be cut into truckable sections and transported by barge to shore to be offloaded and trucked to off-site disposal or recycling facilities. The removal methods in Option 1 and Option 2 are shown in Table 2-2.

Table 2-2. Offshore Fuel Oil Submarine Pipeline Removal Options

Option 1 – Reverse Pipe Lay Method	The reverse pipe lay method would keep the pipeline intact (with minimal loss of external coatings) while it is pulled aboard the barge and cut into sections, would avoid underwater cutting, and could be performed fairly rapidly assuming that the depth of cover over the pipeline is minimal or non-existent. Engineered plans and calculations for this method would be provided by a California licensed engineer and included with the CWP. Under this method, the end of the pipeline would be raised to the surface (possibly with the aid of flotation buoys and/or applied tension) and winched aboard the derrick barge through a stinger (projecting from the end of the barge) that transitions the pipeline out of the water and onto the deck. As the pipeline is brought aboard the derrick barge, the pulling operation would be periodically halted, and a sling or other rigging brake would be applied to the pipeline section near the gunwale of the barge. Tension would be applied to the active leg of the pipeline (floating/submerged section) by the barge's reaction anchors and rigging brake to remove a band of somastic and cement weight coating. The pipeline would then be cut and hoisted onto a materials barge for transportation to shore to be offloaded and trucked to off-site disposal or recycling facilities. This process would be repeated until the offshore section of the pipeline is completely removed (see Figure A2-13 in Appendix A). Divers operating from the derrick barge or from a second support barge or vessel would work ahead of the recovery operation to expose the pipeline if buried. An airlift or other excavation device would be used to uncover the pipeline. To assist with lightening the pipeline during this removal process, the pipeline may need to be voided of water. If this is necessary, the open end of the pipeline would remain on the deck of the barge or would be sealed before being placed back in the ocean so it doesn't refill with water. Voiding would require that the

Table 2-2. Offshore Fuel Oil Submarine Pipeline Removal Options

	pipeline be left intact to the beach, at a minimum, or into the EPS facility, preferably, so the water inside the pipeline can be collected onshore and properly disposed. This would impact the decommissioning schedule since the offshore segment of the pipeline must be voided and removed before removal operations can occur in the surf zone and beach segments, and probably the onshore segment (at least removal of the pipeline).
Option 2 – Seafloor-Based Removal	Seafloor-based removal may be used to remove the pipeline or possibly used in tandem with the reverse pipe lay method, depending on if sections of the pipeline are exposed on the seafloor. Engineered plans and calculations for this removal method would be provided by a California licensed engineer and included with the CWP. Under this method, the pipeline would be excavated in short sections, probably 150 feet or less, which would depend on the limits of the diver's dive umbilical, the operating radius of the crane boom with the excavation tool, and the size of the derrick barge and crane. The first pipeline section would be uncovered, with the support of a crane, using a large airlift (12-inch-diameter or larger steel or steel and plastic pipe) or a Toyo submersible pump-type dredging system. Bell holes would be excavated at predetermined intervals (cut points) along the excavated section of the pipeline to provide divers with circumferential access to cut and remove bands of somastic and cement weight coating at each cut point. An oxy-arc or guillotine saw would be used to cut the bands of coating. Both methods are handheld or hand-applied, and neither produces appreciable noise nor substantial waste or byproduct. Once, or as, the bands of coating are removed, divers would cut the pipeline into sections using the preferred cutting method. Slings would be applied to each section and hoisted to the surface by the derrick barge crane and placed on the materials barge or support boat for transportation to shore to be offloaded and trucked to off-site disposal or recycling facilities. This process would be repeated one section at a time, probably starting with the offshore end and working shoreward, until the offshore section of the pipeline is completely removed (see Figure A2-14 in Appendix A).

2.5.4.3 Mooring and Buoy System Components

All remaining components of the tanker berth's seven-point mooring system, single-point mooring, fuel oil submarine pipeline marker buoy, and navigation buoy would be removed in their entirety, transported off-site, and recycled at appropriate facilities. A derrick barge or deck barge with a four-point mooring system, crane, and pull winch would likely be used to recover the mooring system components. A dive team would work from the barge deck, and a tugboat would remain onsite to tend the barge and set and recover its anchors. All anchorages would be set in accordance with the anchor coordinates established on the anchor pre-plot that would be part of the approved CWP.

If the remains of a mooring leg are buried under the seafloor, additional effort would be required to locate and possibly expose and remove these components. In this case, the use of mooring buoy or anchor coordinates from previous surveys would be helpful to position a diver with a handheld magnetometer at the chain or anchor's approximate location to locate the ferrous metal below the seafloor.

Once a buried target is identified as a mooring system component, its recovery would depend on the type of component and its disposition. If the target is a buried anchor chain, then additional excavation may be required to locate and expose the bitter end of the chain. Once the end of the anchor chain is located, divers would attach a pull wire to the chain and deck crews would pull it to the surface with a pull winch located on the deck of the derrick barge. Alternatively, if a chain is located (and not the bitter end), divers would be employed to cut the chain with oxy-arc underwater cutting equipment. Once a cut to the chain is made, one of the cut ends would be attached to a buoy while the other would be attached to a pull winch, located on the deck of the support vessel, to extract the first chain segment from the seafloor. This chain segment would either lead to the bitter end of the chain or to an anchor. If it leads to an anchor, the anchor would be recovered. Once this first chain segment is recovered, the support vessel would return to the buoyed end of the other chain segment, recover the end to the surface, and extract the chain segment from the seafloor. Excavation, if required, would be performed via hand jetting (using divers with portable high-pressure jetting equipment) or the likely preferred method of airlifting (suspending a 12-inch-diameter steel airlift operated by the support vessel crane under the direction of a diver) (see Figure A2-15 and Figure A2-16 in Appendix A).

2.5.4.4 Seafloor Debris

All seafloor debris associated with the tanker berth and decommissioning operations would be removed. Potential debris targets would be identified in the pre-and post-decommissioning seafloor debris surveys and inspected by divers to determine their identity. All debris items associated with the tanker berth operations, and any introduced during Project operations, would be recovered and transported off-site for recycling or disposal. The quantity of seafloor debris, if any, is unknown at this time.

2.6 PRELIMINARY DECOMMISSIONING SCHEDULE

Decommissioning is scheduled to occur in 2016 and 2017, with an estimated 2018 completion date. The following is a summary of the tentative Project milestones:

- Receive All Regulatory Agency Permits .... June 2016
- CWP Submitted .... July 2016
- MCP Submitted .... July 2016
- CWP Approved .... August 2016
- Offshore Segment Decommissioning Starts .... September 2016
- Onshore Segment Decommissioning Starts .... September 2016
- Beach Segment Decommissioning Starts .... September 2017
- Surf Zone Segment Decommissioning Starts .... September 2017
- Complete Decommissioning Work .... January 2018
- Complete Post-Decommissioning Reporting .... February 2018

A preliminary decommissioning schedule is provided as Table A1-1 in Appendix A. The schedule is based on a 5-day, 12-hour/day work week; however, additional hours, including 24-hour operations, may be required to complete these activities and to maintain the Project schedule (e.g., to work with the tide schedule). Additional time was not built into the schedule to account for possible inclement weather, unworkable tide conditions, or additional work that may be created due other unforeseen conditions.

If the reverse pipe lay method is used to recover the fuel oil submarine pipeline in the offshore segment, the pipeline may need to be voided of water. Voiding would need to occur before removal of the surf zone, beach, and preferably onshore segments are removed so the displaced water can be captured in the EPS facility and disposed off-site. In this case, offshore decommissioning work must be completed before work in the other segments can occur. The onshore and offshore segments are currently scheduled to be decommissioned in fall/winter 2016, which may accommodate this scenario. Once the water is removed from the fuel oil submarine pipeline, the onshore work may be started, and the beach and surf zone segments would be removed in fall/winter 2017.

2.7 SHORE BASE

The decommissioning contractor, once selected, shall establish a shore base to support offshore operations and serve as a local embarkation point for offshore crews and equipment. Oceanside Harbor, the most likely local embarkation point, is approximately 6 miles from the offshore worksite and has historically been the point of embarkation for offshore crews working at the EPS MOT tanker berth. Alternative shore base locations are the Port of Los Angeles, Port of Long Beach, or San Diego Bay.

2.8 MANPOWER AND EQUIPMENT ESTIMATES

Table A2-1 in Appendix A provides personnel and equipment estimates, which are based on the anticipated duration of projected tasks and are subject to change.

2.9 PROJECT WORK AREAS

The onshore and beach segments include staging areas for the placement of materials and equipment, temporary storage of riprap and sand, temporary truck parking during loading operations, and equipment movement. These Project work areas, as well as ingress and egress routes, are shown in Figure A2-17 in Appendix A. The offshore Project safety and survey boundary in which Project vessels would operate during decommissioning activities is identified in Figure A1-1 in Appendix A.

2.10 MATERIAL IMPORT/EXPORT AND ASSOCIATED TRUCK TRIPS

Table A1-2 in Appendix A summarizes the projected areas, volumes, and weights of the recovered debris and decommissioned MOT components set for recycling or disposal.