4.3 WATER QUALITY

Section 4.3 presents the existing environment and impacts analysis of water quality issues associated with any action by the California State Lands Commission (CSLC) to grant a new offshore lease to Tesoro Refining and Marketing Company, LLC (Tesoro) for the Amorco Marine Oil Terminal (Amorco Terminal) to continue to operate in the southeastern Carquinez Strait. The environmental setting provides information on existing water and sediment quality in the San Francisco Bay/Estuary (San Francisco Bay) and, in more detail, for the local area (Suisun Bay and Carquinez Strait) as well as the immediate vicinity of the Amorco Terminal. Also included is a summary of laws and regulations that may affect water resources. This is followed by an analysis of the potential Project impacts. Water quality issues associated with renewing the Amorco Terminal lease include the chronic water quality impacts of continuing operations and those related to an oil spill. Operational impacts to water quality could come from the release of segregated ballast water, runoff of contaminants on the pier, the leaching of contaminants from anti-fouling paints or sacrificial anodes from ships visiting the Amorco Terminal, the re-suspension of sediments by ship propellers and bow thrusters or by maintenance dredging, and the disposal of dredged sediments. An oil spill could have wide-ranging effects on water quality in San Francisco Bay.

4.3.1 ENVIRONMENTAL SETTING

4.3.1.1 San Francisco Bay

Introduction

San Francisco Bay/Estuary is the largest estuary on the West Coast of the contiguous United States and covers an area of 450 square miles (1,166 square kilometers). The majority of the San Francisco Bay is roughly parallel to the coastline in a north-to-south orientation, approximately 5 miles inland from the coastline. Several bridges span the San Francisco Bay, connecting the urban areas along the coastline. These bridges also serve as dividing lines for the subregions of the San Francisco Bay. South San Francisco Bay is the large body south of the Bay Bridge, and the Central Bay is a relatively smaller body between the Bay Bridge and the Richmond-San Rafael Bridge. San Pablo Bay is the large body north of the Richmond-San Rafael Bridge. From San Pablo Bay, the San Francisco Bay/Estuary extends eastward, through the Carquinez Strait and Suisun Bay, to the delta of the Sacramento and San Joaquin Rivers (Delta). The South Bay is a semi-enclosed embayment with numerous small, local freshwater inflows. The Central Bay is strongly influenced by the ocean, and San Pablo Bay and Suisun Bay are strongly influenced by freshwater flows from the Sacramento and San Joaquin Rivers, through the Delta, which drains approximately 40 percent of California’s rainwater (Thompson et al. 2000). Figure 4.3-1 shows the surface water features of the San Francisco Bay.

The San Francisco Bay is a highly industrialized and urbanized estuary with a long history of human impacts. Many contaminants in the water, sediments, and biota in various parts of the estuary have been detected at concentrations exceeding guidelines. The various embayments have been listed as impaired pursuant to Section 303(d) of the Clean Water Act (CWA). Suisun Bay and Carquinez Strait are identified as impaired for multiple contaminants, including pesticides, dioxins/furans, mercury, nonindigenous aquatic species, nickel, polychlorinated biphenyls (PCBs), and selenium (SFBRWQCB 2013). Suisun Bay receives contaminant inputs from upstream agricultural, urban, industrial, and current and historical mining sources (San Francisco Estuary Institute [SFEI] 2010). Noted potential sources of pollutants in the Carquinez Strait include atmospheric deposition; ballast water; and industrial, municipal, and agricultural point sources (SFBRWQCB 2013).

Water quality in the San Francisco Bay is affected by many factors, including:

- geographic configuration of the San Francisco Bay/Estuary,
- tidal exchange with the ocean,
- freshwater inflows,
- industrial and municipal wastewater discharges,
- dredging and dredge material disposal,
- runoff from highly urbanized areas,
- agricultural and pasture land drainage from much of central California,
- marine vessel discharges,
- historic mining activities,
- leaks and spills, and
- atmospheric deposition.

Regulatory objectives and criteria to evaluate water and sediment quality in San Francisco Bay are discussed below. Bathymetry, tidal flows, and circulation within the San Francisco Bay are discussed in the physical processes section, followed by a discussion of the various sources of contaminants. Finally, general information on contaminant levels in the water and sediments of the San Francisco Bay is presented.

Regulatory Objectives and Criteria for San Francisco Bay/Estuary

To protect beneficial uses, the San Francisco Bay Regional Water Quality Control Board (SFBRWQCB) has established water quality objectives (WQOs) for waters covered by the San Francisco Bay Water Quality Control Plan (Basin Plan). Basin Plans are implemented primarily within the National Pollutant Discharge Elimination System (NPDES) to regulate waste discharges. The Basin Plan includes the San Francisco Bay region and portions of the San Joaquin Delta.

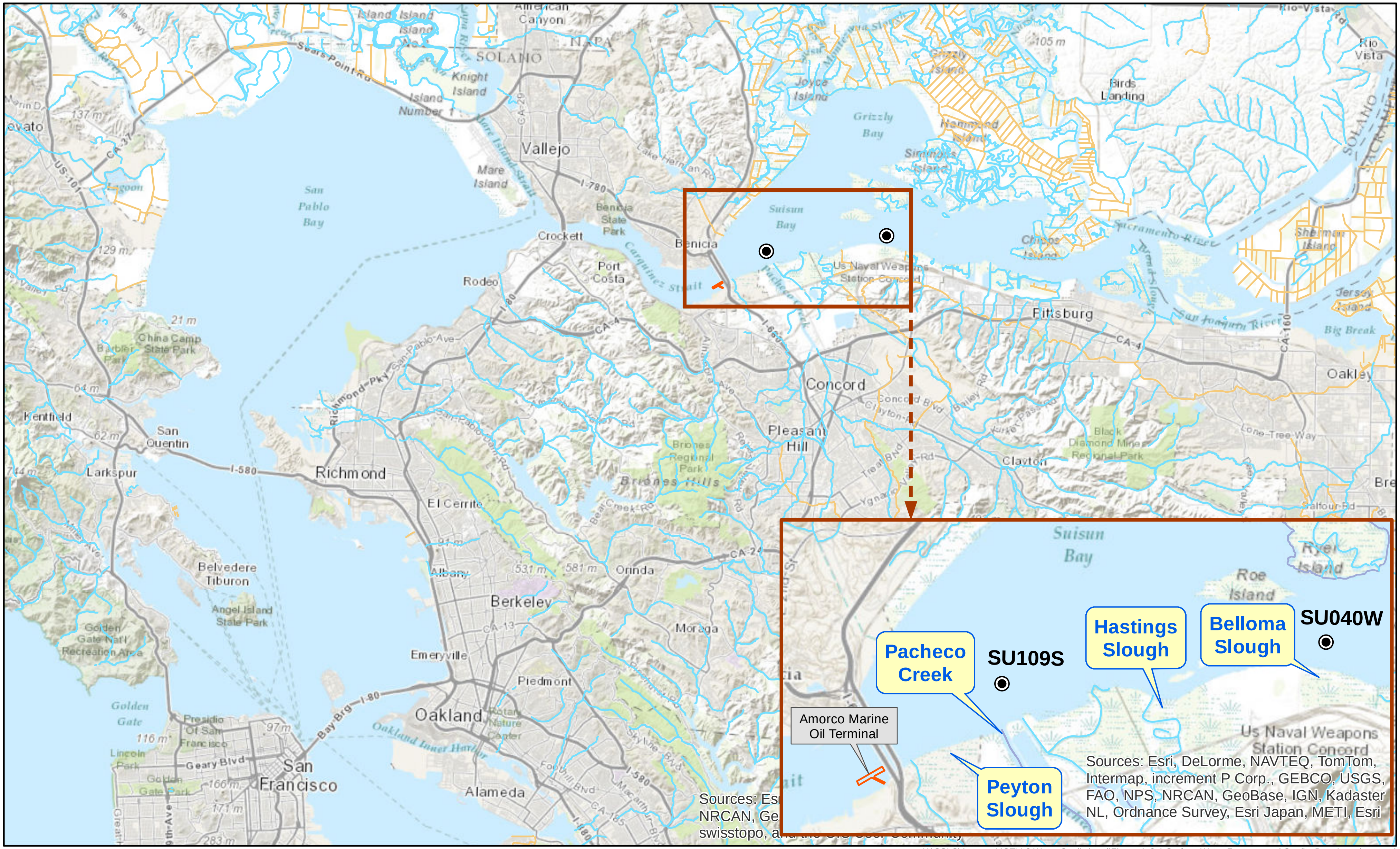

Figure 4.3-1
Surface Water Features and Quality Data Locations
California State Lands Commission
Amorco Marine Oil Terminal Lease Consideration Project

TRC

7/17/2013

- Water and Sediment Quality Data Locations
- Stream / River
- Canal / Ditch
- CSLC Lease Boundary

N

1:300,000

1 inch = 5 miles

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The 2013 version of the Basin Plan and associated amendments were approved by the State Water Resources Control Board (SWRCB), Office of Administrative Law, and U.S. Environmental Protection Agency (USEPA) on June 29, 2013. Resolution R2-2007-0042 amended the Basin Plan to adopt a site-specific objective for copper for the San Francisco Bay Basin. This amendment contained non-regulatory provisions for control of copper-based marine anti-fouling coatings. The SWRCB relies on the authority of the California Department of Pesticide Regulation to regulate the pesticidal use of copper in anti-fouling paints to obtain WQOs (SFBRWQCB, 2013). Table 4.3-1 lists the narrative objectives for San Francisco Bay waters. Water quality criteria for priority toxic pollutants for California inland surface waters, enclosed bays, and estuaries were established by the California Toxics Rule (USEPA 2001). Table 4.3-2 shows the California Toxics Rule criteria for saltwater (applicable to Suisun Bay).

Table 4.3-1: Selected Water Quality Objectives from the San Francisco Bay Basin Plan

Parameter	Basin Plan Water Quality Objective
Bioaccumulation	Controllable water quality factors shall not cause a detrimental increase in concentrations of toxic substances found in bottom sediments or aquatic life.
Biostimulatory Substances	Waters shall not contain biostimulatory substances in concentrations that promote aquatic growths to the extent that such growths cause nuisance or adversely affect beneficial uses.
Color	Waters shall be free of coloration that causes nuisance or adversely affects beneficial uses.
Dissolved Oxygen	For all tidal waters, a minimum of 5.0 milligrams per liter (mg/L) objective is applied for waters downstream of the Carquinez Bridge and 7.0 mg/L for waters upstream of the Carquinez Bridge.
Floating Material	Waters shall not contain floating material, including solids, liquids, foams, and scum, in concentrations that cause nuisance or adversely affect beneficial uses.
Oil and Grease	Water shall not contain oils, greases, waxes, or other materials in concentrations that result in a visible film or coating on the surface of the water or on objects in the water, that cause nuisance, or that otherwise adversely affect beneficial uses.
Population and Community Ecology	All waters shall be maintained free of toxic substances in concentrations that are lethal to or that produce significant alterations in population or community ecology or receiving-water biota.
pH	The pH shall not be depressed below 6.5 nor raised above 8.5.
Salinity	Controllable water quality factors shall not increase the total dissolved solids or salinity of waters of the State so as to adversely affect beneficial uses, particularly fish migration and estuarine habitat.

Parameter	Basin Plan Water Quality Objective
Sediment	The suspended sediment load and suspended sediment discharge rate of surface waters shall not be altered in such a manner as to cause nuisance or adversely affect beneficial uses. Controllable water quality factors shall not cause a detrimental increase in the concentration of toxic pollutants in sediments or aquatic life.
Settleable Material	Waters shall not contain substances in concentrations that result in the deposition of material that cause nuisance or adversely affect beneficial uses.
Suspended Materials	Waters shall not contain suspended material in concentrations that cause nuisance or adversely affect beneficial uses.
Sulfide	All water shall be free from dissolved sulfide concentrations above natural backgrounds levels.
Taste and Odors	Waters shall not contain taste- or odor-producing substances in concentrations that impart undesirable tastes or odors to fish flesh or other edible products of aquatic origin, that cause nuisance, or that adversely affect beneficial uses.
Temperature	Temperature objectives for enclosed bays and estuaries are as specified in the *Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays of California.* The temperature of any cold or warm freshwater habitat shall not be increased by more than 5 degrees Fahrenheit (ºF) above natural receiving-water temperature.
Toxicity	All waters shall be maintained free of toxic substances in concentrations that are lethal to or that produce other detrimental responses in aquatic organisms.
Turbidity	Waters shall be free of changes in turbidity that cause nuisance or adversely affect beneficial uses. Increases from normal background light penetration or turbidity relatable to waste discharge shall not be greater than 10 percent in areas where natural turbidity is greater than 50 Nephelometric Turbidity Units.
Un-Ionized Ammonia	The discharge of wastes shall not cause receiving waters to contain concentrations of un-ionized ammonia in excess of the following limits: Annual median of 0.025 mg/L as nitrogen and Central Bay and upstream maximum of 0.16 mg/L as nitrogen.

Source: SFBRWQCB 2013

Table 4.3-2: California Toxics Rule Toxic Materials Concentrations for Saltwater

Constituent	Criterion Maximum Concentration (µg/L[a])	Criterion Continuous Concentration (µg/L)
Arsenic	69	36
Cadmium	42	9.3
Chromium (Hexavalent)	1,100	50
Copper	4.8	3.1
Lead	210	8.1
Mercury[b]	2.1	0.025
Nickel	74	8.2
Selenium	290	71
Silver	1.9	--[c]
Zinc	90	81
Cyanide	1	1
Pentachlorophenol	13	7.9
Aldrin	1.3	--
gamma-BHC	0.16	--
Chlordane	0.09	0.004
4,4-DDT[4]	0.13	0.001
Dieldrin	0.71	0.0019
alpha-Endosulfan	0.034	0.0087
beta-Endosulfan	0.034	0.0087
Endrin	0.037	0.0023
Heptachlor	0.053	0.0036
Heptachlor Epoxide	0.053	0.0036
PCB[5]-1242	--	0.03
PCB-1254	--	0.03
PCB-1221	--	0.03
PCB-1232	--	0.03
PCB-1248	--	0.03
PCB-1260	--	0.03
PCB-1016	--	0.03
Toxaphene	0.21	0.0002

Source: USEPA 2001
[a]µg/L = micrograms per liter
[b]National Toxics Rule 1997
[c]Not available

Currently, no quantitative sediment objectives are established for the project area. In 2009, the SWRCB adopted the following Narrative Sediment Quality Objectives for the San Francisco Bay: Pollutants in sediments shall not be present: (1) in quantities that are toxic to benthic communities in bays and estuaries; (2) at levels that will bioaccumulate in aquatic life to levels that are harmful to human health; and (3) at levels that alone or in combination are toxic to wildlife and resident finfish by direct exposure or bioaccumulate in aquatic life at levels that are harmful to wildlife or resident finfish by indirect exposure.

The National Oceanic and Atmospheric Administration (NOAA) has published effects-based sediment quality values for evaluating the potential for contaminants in sediment to cause adverse biological effects (Long and Morgan 1990, Long et al. 1995). These values are commonly used as guidelines to evaluate sediment contaminant concentrations. These values are referred to as Effects Range-Low (ER-L) and Effects Range-Medium (ER-M) (Long and Morgan 1990, Long et al. 1995). This tool for comparing sediment quality was developed for NOAA based on tests of toxicity of sediments to benthic organisms. In these tests, toxicity effects were rarely seen below the ER-L. Therefore, at chemical concentrations below the ER-L, effects are unlikely. Effects were usually seen above the ER-M. Thus, the ER-M is the concentration at and above which effects are probable. Table 4.3-3 presents these sediment toxicity criteria.

Table 4.3-3: Sediment Effects Guideline Values

Parameter		Effects Range-Low (ER-L)	Effects Range-Median (ER-M)
Metals (mg/kg)	Antimony	2.0	2.5
	Arsenic	8.2	70
	Cadmium	1.2	9.6
	Chromium	81	370
	Copper	34	270
	Lead	46.7	218
	Mercury	0.15	0.71
	Nickel	20.9	51.6
	Silver	1	3.7
	Zinc	150	410
Organics (µg/Kg)	Total PAH	4,022	44,792
	Total DDT	1.58	46.1
	Total PCB	22.7	180

Abbreviations: ER-L=Concentration at lower 10th percentile at which adverse biological effects were observed or predicted; ER-M=Concentration at which adverse biological effects were observed or predicted in 50 percent of test organisms; mg/kg=milligrams per kilogram; µg/kg=micrograms per kilogram; PAH=polycyclic aromatic hydrocarbons; DDT=dichlorodiphenyltrichloroethane; PCB=polychlorinated biphenyls
Source: Long and Morgan 1990, Long et al. 1995

Physical Processes in San Francisco Bay

San Francisco Bay is characterized by complex bathymetry, with broad, shallow embayments that are incised by deeper channels; channel constrictions between the embayments; and connection to the Pacific Ocean through a deep, narrow entrance at the Golden Gate. Water depths in the San Francisco Bay range from zero in the shallowest areas to greater than 330 feet (100 meters) at the Golden Gate. The deeper portions of the San Francisco Bay are along the west side of the Central Bay. The strong tidal currents in the Central Bay create significant sand dunes that have heights of 7 to 10 feet along the bottom. Much of the San Francisco Bay is relatively shallow, with approximately half the surface area having water depths less than 7 feet (2 meters) below mean lower low water (MLLW) when intertidal mudflats are included in the definition of the surface area (Conomos et al. 1985).

Water quality of the San Francisco Bay is greatly affected by tidal exchange with the Pacific Ocean through the Golden Gate. The average tide range for the San Francisco Bay Area is approximately 5 feet of elevation change. Given the large surface area of the San Francisco Bay, this results in extremely large volumes (50×10^9 cubic feet, or 1 million acre-feet) of water flowing into and out of the San Francisco Bay every six hours with the change of tides. The bathymetry of the San Francisco Bay directs the flow of the flooding tide into the South Bay and San Pablo Bay, and large eddies are created in the Central Bay by the tidal exchange. Waters from the Pacific Ocean are generally saltier and cooler than waters in San Francisco Bay, and the higher relative density of the ocean waters directs the tidal exchange to primarily the deeper waters of the San Francisco Bay.

San Francisco Bay, especially the northern reach of San Pablo Bay, Carquinez Strait, Suisun Bay, and the Delta, is also strongly influenced by freshwater flows. The Sacramento and San Joaquin Rivers are the largest sources of fresh water, contributing on average 19.3 and 3.4 million acre-feet per year, respectively. The volume and timing of these freshwater inflows vary dramatically from year to year depending on the amount of rain and snowfall. The highest inflows usually occur between November and May. This fresh water is generally warmer, and with its low salinity, is less dense than seawater. Summers are generally dry with little rain or runoff.

Circulation and mixing are relatively complicated in San Francisco Bay because of the complex geometry and variable amount of freshwater flow during the year. The circulation of water in the San Francisco Bay is driven primarily by tides, and to a lesser extent, by wind-induced currents and estuarine circulation. Although tides contribute greatly to the dispersion of material in the San Francisco Bay, tidal motion is oscillatory and, therefore, does not contribute significantly to the net transport of material out of the Bay (Davis 1982). Freshwater flows into the San Francisco Bay from the Delta result in estuarine circulation that is driven by the density difference between freshwater and saline ocean water. Vertical stratification of water-quality parameters such as temperature and salinity also varies substantially depending on the location and the volume of freshwater flows.

Net volume transport out of the San Francisco Bay is equivalent to the freshwater flows in (including publicly owned treatment works and industrial discharges), plus ocean water introduced by tides. During the winter, the water residence time is approximately two weeks for the northern reaches of the San Francisco Bay and approximately two months in southern portions of the Bay. During the summer, residence time is two months for the northern reaches and five months in southern portions (Conomos 1979).

Sources of Pollutants to San Francisco Bay

The largest sources of pollutant input to San Francisco Bay are nonpoint discharges, including urban and non-urban runoff, and inputs from rivers. Point discharges from industrial and municipal facilities also contribute, as well as impacts from sediment dredging, marinas and marine vessels, and atmospheric deposition of particulates.

Urban runoff is the water from urban areas that flows into the San Francisco Bay from local streams and storm drains. It includes stormwater, excess irrigation flows, and wash water for multiple activities (e.g., car washing). Sources of pollutants in urban runoff are extremely varied and include commercial, industrial, and residential land uses, as well as pollutants from managed open space areas such as parks, cemeteries, planted road dividers, and construction sites. Human activities in these areas, such as the application of pesticides and fertilizers to gardens and landscaping, operation of motor vehicles, and construction of roads and buildings, all contribute pollutants to urban runoff. A study of contaminant loads from stormwater to the San Francisco Bay indicated that residential areas appeared to be a large contributor to the metals found to be contaminating water quality (Davis et al. 2000). Commercial and industrial areas also generate substantial loads of phosphate, cadmium, lead, zinc, and other contaminants.

Non-urban sources of nonpoint pollution include agricultural lands, forests, pastures, and natural range, from which contaminants are transported to the San Francisco Bay by rainfall runoff, excess irrigation return flows, and subsurface agricultural drainage. Pollutants of concern in non-urban runoff include dissolved and suspended solids/salts/metals, nitrogen/sulfur/phosphorous compounds, and synthetic organic pollutants (particularly pesticides).

The Sacramento and San Joaquin Rivers are the major rivers that discharge into the San Francisco Bay. These rivers receive drainage from almost 40 percent of the land area of California, draining California’s major agricultural region, the Central Valley. Contaminant loading from rivers is considered to be significant for mercury, PCBs, dioxins, polycyclic aromatic hydrocarbons (PAHs), and commercial pesticides, and possibly may be significant for, copper, selenium, and nickel (Davis et al. 2007).

In addition to nonpoint discharges, the San Francisco Bay receives point discharges from industrial and municipal facilities. Municipal discharges are the largest, with total permitted dry-weather flow of 565 million gallons per day (SFBRWQCB 2013). The average dry-weather flow is less than this maximum permitted amount. The major industrial dischargers are oil refineries. Every year, an average of 6 million cubic yards (cy) of sediments are dredged from shipping channels and related navigation facilities throughout San Francisco Bay. Historically, the majority (80 percent) of dredged material was disposed at three designated sites in the San Francisco Bay: the Alcatraz Island site (which historically received up to 4 million cy of sediment per year from Central Bay and South Bay dredging projects); the Carquinez Strait site (1 to 2 million cy); and the San Pablo Bay site (up to 0.5 million cy).

The Long-term Management Strategy (LTMS) for the Placement of Dredged Materials in the San Francisco Bay region was adopted in 2000 to reduce in-Bay disposal of dredged material and to maximize the beneficial reuse of dredged material. The LTMS Management Plan aimed to reduce in-Bay disposal using four three-year “step-down” periods, by the end of which, in-Bay disposal of dredged material would be reduced to approximately 1.25 million cy per year.

Marinas and marine vessels are also sources of pollutants in the San Francisco Bay. Discharge of untreated sewage and greywater (wastewater generated from domestic activities such as laundry, dishwashing, and bathing) from commercial and recreational vessels is prohibited within the San Francisco Bay; however, an unknown amount of waste is believed to be illegally discharged. This type of effluent contributes to coliform bacteria, biochemical oxygen-demanding substances, nutrients, oil and grease, and suspended solids. Other common pollutants from marinas and marine vessels include lead from fuel and ballast material, arsenic in paint pigment, pesticides and wood preservatives, zinc from anodes, and copper and zinc biocides in anti-fouling paint. Additionally, discharge of ballast water from large commercial vessels has been known to introduce nonindigenous aquatic species into the San Francisco Bay, and has disturbed the indigenous aquatic communities. This is discussed further in Section 4.2, Biological Resources. Accidental spills of petroleum products from ships are generally small and result from operator errors, handling accidents at terminals, and damage to ships. Tanker accidents have resulted in major oil spills in the San Francisco Bay.

Contaminants in the atmosphere deposit traces on land and water surfaces. Deposits to the water are a direct source, while deposits to the land result in discharges to the San Francisco Bay in stormwater runoff. Major sources of atmospheric contamination include fuels and particulates from vehicles and other sources; building materials and products; windblown dust; and construction, manufacturing, and industrial facilities (BCDC 2003). Direct atmospheric deposition may be a significant pathway for loading of dioxins, PAHs, PCBs, and mercury (Davis et al. 2000).

Water and Sediment Quality in San Francisco Bay

The San Francisco Estuary Institute Regional Monitoring Program for Trace Substances (RMP) began in 1993 and is sponsored by multiple local, State, and federal agencies and companies through their discharge or San Francisco Bay use permits. The RMP monitors water and sediment quality at 25 sites located throughout the San Francisco Bay (Thompson et al. 2000).

Water and sediment samples are collected from five hydrogeographic regions of the San Francisco Bay: Suisun Bay, San Pablo Bay, Central Bay, South Bay, and Lower South Bay. Typically, in any given year, a substantial number of sampled locations will have water and/or sediments that exceed regulatory objectives or criteria for one or more metals. Organic contaminants which frequently exceed criteria in San Francisco Bay in RMP samples include DDT (dichlorodiphenyltrichloroethane) in water samples and PAHs and PCBs in sediment samples. RMP data for the Project vicinity are presented in Section 4.3.1.2.

Sea Level Rise

The impacts of climate change are expected to alter the San Francisco Bay ecosystem by inundating or eroding shoreline areas. Long-duration tide gauges indicate that sea level in the San Francisco Bay has risen at a rate of approximately 7 inches over a century (CEC 2003). Recent projections by Rahmstorf (2007) and Chao et al. (2008) indicate that sea level could rise quickly. By 2050, sea level could be between 11 and 18 inches higher than in 2000, and by 2100, sea level could be between 23 and 55 inches higher than in 2000 (Cal-EPA 2010). The San Francisco Bay Conservation and Development Commission's (BCDC) estimate of long-term global sea-level rise is 16 inches over 50 years (BCDC 2009).

4.3.1.2 Project Area (Carquinez Strait and Suisun Bay)

Physical Characteristics of Carquinez Strait and Suisun Bay

The Project is located within the Carquinez Strait adjacent to Suisun Bay, which are influenced by flows from the Sacramento and San Joaquin Rivers. The response to high river discharge is nearly instantaneous in the Project area, and includes rapid dilution of surface salinity and a large increase in total suspended solids (turbidity), especially during the first large pulse of river flow each year (Cloern et al. 1999).

The Carquinez Strait is a deep (mean depth 29 feet), narrow, 12-mile-long waterbody that joins San Pablo Bay with Suisun Bay. The narrow restriction results in strong currents, and most of the bottom is sandy and relatively smooth. Average current velocities measured at the Amorco Terminal in July 2013 were 1.7 knots (87.5 centimeters per second). Carquinez Strait waters are generally turbid from high suspended sediment loads, which are estimated to range from 0.26 to 26 million metric tons per year (McKee et al. 2002). The Carquinez Strait is also characterized by a variable salinity regime resulting from fluctuations in freshwater flow from the Sacramento-San Joaquin River system (USACE et al. 1998). Water in the Carquinez Strait is stratified into a two-layer flow, known as gravitational circulation, with lighter freshwater moving seaward in the top layer and heavier saltwater moving upstream on the bottom (SFEP 1999). During extremely high outflows, however, waters in the Strait are completely fresh (SFEP 1999; Schoellhamer and Burau 1998).

Suisun Bay is a shallow embayment between Chipps Island, at the western boundary of the Delta, and the Benicia-Martinez Bridge. Suisun Bay covers approximately 36 square miles, has a mean depth of 14 feet, and highly variable salinity levels (USACE et al. 1998). Fresh water from the Sacramento and San Joaquin Rivers usually meets saltwater from the ocean in the vicinity of Suisun Bay. The bottom of Suisun Bay is predominantly fine silt and clay, crossed by channels scoured by tidal and riverine flows. The surficial sediments around these channels change according to season (USACE et al. 1998). High riverine flows winnow the fine sediment of Suisun Bay and transport it downstream through Carquinez Strait and into San Pablo Bay. As riverine flows decrease, fine sediment again settles in Suisun Bay.

A biologically significant area of high particle concentration, known as the entrapment zone, is located in Suisun Bay. Increasing river flows push the entrapment zone seaward and decreasing river flows allow the entrapment zone to move landward (Schoellhamer and Burau 1998). The entrapment zone is an area of high productivity where nutrients and organisms accumulate, and is considered to be important to many aquatic species in the Suisun Bay. The entrapment zone tends to exist where the surface salinity is between 1 and 6 ppt (Schoellhamer and Burau 1998).

The amount of Delta runoff significantly affects water column characteristics in the Project area and results in a significant variance in water quality conditions from year to year.

The San Francisco Bay Basin Plan designates beneficial uses for waterbodies covered by the plan (SFBRWQCB 2013). Designated beneficial uses for waters in the Project area (Carquinez Strait and Suisun Bay) include: Industrial service supply, industrial process supply, commercial and sport fishing, estuarine habitat, fish migration, preservation of rare and endangered species, fish spawning, wildlife habitat, water contact recreation, and non-contact water recreation (SFBRWQCB 2013).

The Project area, including both Carquinez Strait and Suisun Bay, is identified as impaired, pursuant to CWA Section 303(d), for chlordane, DDT, diazinon, dieldrin, dioxins, exotic species, furan compounds, mercury, PCBs, and selenium (SWRCB 2006). Additionally, Suisun Bay also is on the 303(d) list for nickel.

Table 4.3-4 shows the most recent RMP water quality sampling results available for sampling station SU040W located in Suisun Bay, the nearest sampling point relative to the Project site. The table includes only constituents that have a marine quality objective identified in the Basin Plan. RMP station locations for water quality and sediment quality are represented on Figure 4.3-1.

Table 4.3-4: Water Sampling Results from Suisun Bay

Constituent	2010 RMP Data[a]		Marine Water Quality Objectives[b]	
	Result (Total)	Result (Dissolved)	4-day Average	1-hour Average
Concentration in Micrograms per Liter				
Arsenic	2.06	1.77	36	69
Cadmium	0.049	0.044	9.3	42
Copper	2.72	1.94	6.0[3]	9.4[c]
Lead	0.132	ND[d]	8.1	210
Mercury	0.002	0.0	0.03[e]	2.1
Nickel	1.6	0.86	8.2	74
Selenium	0.083	0.077	5	20
Silver	0.002	0.002	--[f]	1.9
Zinc	1.08	0.19	81	90

[a]Source: Regional Monitoring Program (RMP) data from Sampling Station SU040W in Suisun Bay (SFEI 2010)
[b]Source: Water Quality Control Plan (SFBRWQCB 2013). Water Quality Objectives (WQOs) are dissolved concentrations for waters with salinity between 1 part per thousand (ppt) and 10 ppt
[c]Copper objectives are applicable specifically to Suisun Bay and Carquinez Strait
[d]ND = Not detected.
[e]Marine WQOs for mercury in San Francisco Bay apply. The WQO for the protection of aquatic organisms and wildlife is shown.
[f] -- = Not available

Sediment Quality in Carquinez Strait and Suisun Bay

San Francisco Bay sediments have been influenced by natural and anthropogenic influxes of toxic chemicals over time. Sediments in the San Francisco Bay are both sources and sinks of pollutants. The overall influx of pollutants can cause increases in sediment pollutant levels. These pollutants are not distributed evenly in the San Francisco Bay, and localized areas are highly contaminated. Under the Bay Protection and Toxic Cleanup Program (BPTCP) in 1999, the SFBRWQCB completed a detailed assessment of the levels of pollutants in sediment throughout the San Francisco Bay, and the risks and benefits of cleaning or otherwise managing existing “hot spots.” The BPTCP has identified sediment “toxic hot spots” where sediment dredging could result in the degradation of water quality in the San Francisco Bay. The Final Regional Toxic Hot Spot Cleanup Plan summarizes the situation in the San Francisco Bay, and identifies sites of concern and candidate toxic hot spots (SFBRWQCB 1999). The Project is not within any known toxic hot spots identified by the SFBRWQCB.

To evaluate whether sediments have elevated levels of toxic chemicals, the SFBRWQCB performed a statistical analysis of available sediment analytical data. The results of this study are reported in Gandesbery et al. (1999). The objective of the study was to determine what the SFBRWQCB should consider as ambient levels of PAHs, PCBs, metals, and pesticides in the San Francisco Bay. These ambient concentrations provide a relative measure of comparing sediment contaminant concentrations within the San Francisco Bay. Table 4.3-5 shows the most recent RMP sediment quality results collected from sampling in Suisun Bay compared to San Francisco Bay ambient sediment concentrations from Gandesbery et al. and ER-L and ER-M toxicity thresholds (Long and Morgan 1990, Long et al. 1995). (Data are from sampling station SU109S, the closest sampling point in relation to the Project site [see Figure 4.3-1], in 2010.)

Table 4.3-5: Sediment Sampling Results from Suisun Bay

Constituent	2010 RMP[a] Data (total)	San Francisco Bay Ambient Sediment Concentrations[b]		Environmental Toxicology Thresholds[c]	
		Sandy (<40% fines)	Muddy (>40% fines)	ER-L[d]	ER-M[e]
Concentration in Milligrams per Kilogram					
Arsenic	6.35	13.5	15.3	8.2	70
Cadmium	0.079	0.25	0.33	1.2	9.60
Copper	18.191	31.7	68.1	34	270
Lead	5.515	20.3	43.2	46.7	218
Mercury	0.074	0.25	0.43	0.15	0.71
Nickel	74.051	92.9	112	20.9	51.6
Selenium	0.076	0.59	0.64	--[f]	--
Silver	0.028	0.31	0.58	1	3.7
Zinc	59.296	97.8	158	150	410
Total PCBs[g]	0.00018	0.00059	0.0148	0.0227	0.18
Total DDTs[h]	0.00018	0.0028	0.007	0.0058	0.0461
Total PAHs[i]	0.0757	0.211	3.39	4.022	44.792

[a]Source: Sampling Station SU109S in Suisun Bay (SFEI 2010)
[b]Source: Gandesbery et al. 1999
[c]Source: Long and Morgan 1990, Long et al. 1995
[d]ER-L=Effects Range Low
[e]ER-M=Effects Range Median
[f]-- = Not available
[g]PCBs= Polychlorinated Biphenyls
[h]DDT=dichlorodiphenyltrichloroethane
[i]PAHs=Polycyclic aromatic hydrocarbons

Concentrations of contaminants at sampling station SU109S in Suisun Bay were below the San Francisco Bay ambient concentrations for all the contaminants reviewed. A comparison of environmental toxicity thresholds ER-L and ER-M show that ambient metal and organic compound concentrations in sediment exceed the ER-L concentration for arsenic and mercury. Ambient sediment concentrations exceed the ER-L and ER-M thresholds for nickel; similarly, the 2010 RMP sample concentration for nickel exceeds the ER-L and ER-M values.

Site-specific Conditions

The Amorco Terminal has been used primarily for petroleum industry-related operations for more than 100 years. The Amorco Terminal was originally developed in 1904 as a small refinery and has operated as a refinery (until the late 1920s), petroleum shipping/receiving terminal, and/or storage facility. The Golden Eagle Refinery (Refinery), of which the Amorco Terminal is a part, currently processes an average crude oil volume of approximately 157,300 barrels per day. The Amorco Terminal receives crude oil by tanker or pipelines for the production of gasoline and diesel fuels.

Water depths range from approximately 20 feet and 50 feet landward and seaward, respectively, of the Amorco Terminal wharf (Treadwell and Rollo 2010). Onshore, the soil and groundwater is impacted with fuel oxygenates, including methyl tert-butyl ether and tert-butyl alcohol. Contaminants were first detected in soil and at the Amorco Terminal in 2005. Previous remedial investigations have concluded that the apparent source of contamination was an underground leak emanating from plumbing associated with an aboveground storage tank located within the Amorco Tank Farm (Earth Tech 2008). A groundwater treatment system was been installed to extract groundwater at the source area and to contain the impacted groundwater (Earth Tech 2008) and is still operational.

In general, groundwater flow beneath the site conforms to regional hydrogeology and flows generally west from the upland areas to the low-lying tidal flats along the Carquinez Strait. However, groundwater flow is affected by the complex topography and geology of the site, and flow may vary based on fractures, deformation, and weathering patterns in the subsurface (Earth Tech 2008).

4.3.2 REGULATORY SETTING

Federal and State laws that may be relevant to the Project are identified in Table 4.0-1 and in more detail below, along with regional and local laws, regulations, and policies.

San Francisco Bay Basin Water Quality Control Plan 2013

The Basin Plan (2013) is the primary policy document that guides the SFBRWQCB. The Porter-Cologne Water Quality Act (see above) requires the development and periodic review of Water Quality Control Plans (Basin Plans) that designate beneficial uses of

California's major rivers and groundwater basins and establish numerical WQOs for those waters. The SFBRWQCB is actively working toward numerical sediment objectives that will ensure the protection of all current and potential beneficial uses. In January 2004, amendments to the Basin Plan were adopted that included application of California Toxic Rule water quality criteria and definitions in lieu of Basin Plan Water Quality Objectives, update of Basin Plan provisions relating to implementation of water quality standards, and several non-regulatory updates. The Basin Plan applies to point and nonpoint sources of waste discharge to the San Francisco Bay, but not to vessel wastes or the control of dredge material disposal or discharge. The Basin Plan includes the San Francisco Bay region and portions of the San Joaquin Delta. The 2013 version of the Basin Plan and associated amendments were approved on June 29, 2013.

NPDES Permitting

The WQOs are achieved primarily through effluent limitations embodied in the NPDES permitting program. The SFBRWQCB has NPDES permit authority on any facility or activity that discharges waste into the San Francisco Bay. Effluent limits are contained within the NPDES permit; the discharge of process wastewater containing constituents in excess of the limits stated within the NPDES permit is prohibited.

There are two types of industrial NPDES permits: Individual and general. A general permit is developed to cover multiple facilities with specific categories. The general NPDES permit regulates certain classes of activities under the Industrial Activities General Permit adopted by the SWRCB on April 17, 1997 (WQO 97-03-DWQ NPDES Permit No. CAS000001). SWRCB Order No. 97-03-DWQ is expired and its replacement is currently undergoing public review with adoption scheduled for early 2014. An individual permit is unique to each facility. The limitations and requirements in an individual permit are based on the facility's operations, type and amount of discharge and receiving stream. The Refinery, which includes the onshore Amorco Tank Farm, is subject to site-specific Waste Discharge Requirements under NPDES individual permit No. CA0004961, Order No. R2-2010-0084. To comply with a NPDES permit, facility operators are required to submit a Notice of Intent, develop a Storm Water Pollution Prevention Plan (SWPPP), conduct stormwater monitoring, and submit annual stormwater reports by July 1 of each year.

Tesoro is required under R2-2010-0084, Special Provision 4.c to address elevated levels of total suspended solids in stormwater runoff. To comply with this special provision, Tesoro's SWPPP includes measures (e.g., rip-rap, soil removal, or installation of hay bales) and an implementation schedule to minimize solids in stormwater runoff. Most of Tesoro's stormwater runoff is collected and controlled through a series of ponds and canals. This runoff, combined with treated process wastewater, is referred to in the NPDES permit as discharge E-001. Two other stormwater discharges, E-003 and E-004, are also controlled and identified under the NPDES permit. Prior to release, these two discharges are directed through passive treatment processes consisting of settling storage ponds and launderer systems. (Launderers are L-shaped overflow pipes that draw water from below the surface, thereby allowing any potential oil contamination to remain in the holding pond or ditch and be skimmed off and removed.) An E-002 discharge does not currently exist at the Refinery. Other permitted stormwater outfalls include eight with the designation E-005 and one designated as E-006. The stormwater from the Amorco Terminal is discharged from E-001.

Long-term Management Strategy for Dredging 2001

The San Francisco Bay LTMS is a cooperative effort of the USEPA, USACE, RWQCB, and BCDC to develop an economically and environmentally sound approach to dredging and dredged material disposal in the San Francisco Bay Area. The LTMS established an interagency Dredged Material Management Office (DMMO), which serves as a central regulatory location for dredging permit applications. The purpose of the DMMO is to review sediment quality sampling plans, analyze the results of sediment quality sampling, and make suitability determinations for material proposed for disposal in the San Francisco Bay Area.

The major goals of the LTMS are to: (1) maintain, in an economically and environmentally sound manner, those channels necessary for navigation in the San Francisco Bay/Estuary while eliminating unnecessary dredging activities; (2) conduct dredged material disposal in the most environmentally sound manner; (3) maximize the re-use of dredged material as a resource; and (4) establish a cooperative permitting framework for dredging and disposal of dredged materials.

San Francisco Bay Plan 2008

The San Francisco Bay Plan (Plan) (BCDC 2008) addresses the expected impacts of climate change in San Francisco Bay. Sea-level rise risk assessments are required when planning shoreline areas or designing larger shoreline projects. If sea-level rises and storms that are expected to occur during the life of the project would result in public safety risks, the project must be designed to address flood levels expected by mid-century. If it is likely that the project will remain in place longer than mid-century, the applicant must have a plan to address the flood risks expected at the end of the century. Risk assessments are not required for repairs of existing facilities, interim projects, small projects that do not increase risks to public safety, and infill projects within existing urbanized areas. Risk assessments are only required within the BCDC's jurisdiction, which includes San Francisco Bay, the 100-foot shoreline band, salt ponds, managed wetlands, and certain other waterways and marshes. The Plan specifies that "pipelines and piers may be built over marshes." Policies within the Plan indicate that "pipeline terminal and distribution facilities near the San Francisco Bay should generally be located in industrial areas" and that "marine terminals should also be shared as much as possible among industries and port uses."

4.3.3 IMPACT ANALYSIS

4.3.3.1 Significance Criteria

For the purposes of this analysis, an impact was considered to be significant and to require mitigation if it would degrade water quality in any of the following ways:

- Violate water quality standards, objectives, or criteria
- Violate waste discharge requirements
- Increase contaminant levels in the water column or sediment, so as to potentially cause harm to marine organisms
- Create long-term chemical or physical changes in the receiving environment of the site, area, or region so as to impair beneficial uses of the receiving water
- Create or contribute to runoff that would increase contamination or cause physical or chemical changes in receiving waters so as to impair beneficial uses or potentially cause harm to marine organisms

4.3.3.2 Assessment Methodology

Impacts of the proposed Project to San Francisco Bay/Estuary were assessed by comparing existing conditions to potential changes from ongoing Project operation. Where existing site-specific or nearby water quality data were available or modeled, and where published WQOs were available, impacts were quantified to the extent feasible.

4.3.3.3 Impacts Analysis and Mitigation Measures

The following subsections describe the Project's potential impacts on water quality. Where impacts are determined to be significant, feasible mitigation measures (MMs) are described that would reduce or avoid the impact.

Proposed Project

Impact Water Quality (WQ)-1: Degrade water quality as a result of maintenance dredging. (Less than significant.)

Water quality impacts from dredging activities are two-fold: (1) suspension of bottom sediments and associated water quality changes in the water column (LFR 2004), and (2) associated release of contaminants deposited within disturbed sediments (Eggleton and Thomas 2004). Water quality effects of dredging activities include: Increases in turbidity and suspended solids; changes in salinity, temperature, and pH; reduced dissolved oxygen (DO); and releases of heavy metals and organic contaminants sorbed to the sediment matrix (Connor et al. 2004).

The ship berthing area north of the Amorco Terminal is dredged periodically on an as-needed basis to maintain a depth of approximately 48 feet below MLLW. Bathymetric surveys are performed quarterly to determine when maintenance dredging is required. As discussed in Section 4.3.1.2, the Project area is subject to high-velocity tidal currents in the Carquinez Strait, which tend to keep the bottom clean and relatively smooth, reducing the frequency of maintenance dredging required (Tesoro 2002). The last dredging event at the Amorco Terminal was performed in 2005 and involved the removal of 500 cubic yards of dredged material. Maintenance dredging is scheduled sufficiently in advance to ensure compliance with applicable permits and to conduct appropriate assessments prior to execution.

During dredging activities, bottom sediments are temporarily suspended in the water column, potentially causing increases in turbidity. High turbidity results in low levels of transmitted light and can negatively affect functioning of light-dependent organisms such as phytoplankton. Turbidity changes induced by dredging would only result in adverse environmental effects when the turbidity generated is significantly larger than the natural variation of turbidity and sedimentation rates in the area (Orpin et al. 2004). For maintenance dredging, the extent of these environmental affects is local and temporary, generally only lasting as long as dredging operations are taking place (IADC and CEDA 1998)

In the San Francisco Bay tidal currents, wind-waves, circulation, and weather activities re-suspend sediments in shallow areas and transport suspended particles to other locations (Schoellhamer 2002). As discussed in Section 4.3.1.2, the Carquinez Strait is a narrow, tidally influenced body with high average current velocities throughout the year, and is turbid from high suspended sediment loads. Studies of suspended sediment concentrations within San Pablo Bay indicate that natural processes have a substantially greater influence on turbidity within San Pablo Bay than observed dredging operations (Schoellhamer 2002). The Bay Basin Plan WQOs specify that Bay waters shall be free of changes in turbidity that cause nuisance or adversely affect beneficial uses (SFBRWQCB 2013). The occasional and temporary increased levels of turbidity caused by Project dredging activities are expected to less than those created by natural processes, resulting in a minor to negligible environmental impact.

Dredging can temporarily reduce DO concentrations in the water column. Reduced DO concentrations would be expected to be localized and short term, with minimal impacts (U.S. Navy, 1990). In general, DO issues are less likely in well-oxygenated waters such as those of San Francisco Bay, which generally range from 9 to 10 milligrams per liter (mg/L) during periods of high river flow, 7 to 9 mg/L during moderate river flow, and 6 to 9 mg/L during the late summer months when flows are lowest (SFEI 1994). The reduction of DO during dredging is expected to be minimal (1 to 2 mg/L) and transitory in surface waters, but can be more acute in bottom waters, with an estimated reduction of up to 6 mg/L for four to eight minutes (USACE et al. 1998). Most estuarine organisms are capable of tolerating reduced DO conditions for short periods (U.S. Navy 1990). The narrative Basin Plan WQO for DO states that tidal waters downstream of the Carquinez Bridge shall not be depressed below 5 mg/L. Dredging activities are generally not expected to reduce the DO concentration below the WQO, except possibly for very short periods; therefore, DO issues in San Francisco Bay due to dredging impacts are likely limited.

Dredging and dredged material disposal can release sediment-associated metals and other pollutants by desorption and dispersion within the resulting sediment plume (Eggleton and Thomas 2004, LFR 2004). Bottom sediments often contain high concentrations of settled contaminants. Disturbing sediments through activities such as dredging can reintroduce these compounds into ecosystems, increasing concentrations in water and aquatic life. Contaminated sediments are not distributed evenly in the San Francisco Bay, but tend to be present in localized areas. Trace metals, pesticides, and numerous organic contaminants are monitored for Bay sediments through the RMP. Table 4.3-5, which presents the RMP sediment results for Suisun Bay, shows that sediments near the Project area are below ambient concentrations. The sediment sampling results for Suisun Bay exceed the ER-L and ER-M for nickel; however, the ambient Bay concentration also exceeds these thresholds. Pollutant concentrations in sediments tend to be highest in harbors, harbor entrances, marinas, and industrial waterways, and lowest in the central portions of the embayments. As indicated in Section 4.3.1.2, no known toxic hot spots are located near the Project area.

Dredged material disposal in San Francisco Bay is regulated by the DMMO. This interagency group evaluates the physical and chemical characteristics of the dredged sediments to make sure that they are compatible for in-water disposal in the San Francisco Bay. As part of the DMMO dredging permit requirements, proposed dredging locations are required to be sampled and tested to determine the existence and extent of any contamination and to determine suitability for disposal. Future Project dredged sediment disposal would be managed in accordance with the LTMS for Placement of Dredged Material in the San Francisco Bay Region (USACE et al. 2001). Because the effects of dredging and dredged material disposal on water quality are transitory and because sediment composition is evaluated by the DMMO before a dredging permit is issued, the impacts of Project maintenance dredging on water quality are determined to be less than significant.

Mitigation Measure: No mitigation required.

Impact WQ-2: Degrade water quality as a result of sediment disturbance from vessel maneuvers. (Less than significant.)

Amorco Terminal operations can affect water quality if vessels maneuvering in the immediate vicinity of the wharf erode or disturb bottom sediments. During operations, a ship's propeller generates a turbulent continuous stream of fast moving water flow known as propeller wash, which can impinge directly on the seabed by eroding sediments and potentially damaging benthic communities.

Between 2008 and 2012, an average of 69 tankers visited the Amorco Terminal per year. These vessels are assisted by tugs in berthing and unberthing operations. The number of tugs used in docking or maneuvering of vessels depends on the size of the vessel and environmental conditions. Tankers are more likely to create turbulence that can erode bottom sediments because the large propellers on these ships are closer to the seafloor as they travel through San Francisco Bay. The propeller wash from tugs is nearer the surface so it has less of an erosion effect on bottom sediments. Tesoro performs annual hydrographic surveys of the seafloor surrounding the Amorco Terminal, and sediments appear to be hydrodynamically stable (Tesoro 2002).

The transit of deep-draft vessels through San Francisco Bay to the Amorco Terminal can also re-suspend sediments and benthic biota in the water column where bottom depths are near that of the vessel draft. Depending on the depth of propeller wash scour, re-suspension could cause a brief, localized depression in DO concentrations. However, as discussed in Impact WR-1, this increase in turbidity would disperse rapidly with the strong tidal currents in the area, and be rapidly mitigated by tidal mixing with San Francisco Bay waters of high DO concentration.

Overall, because the effects of vessel maneuvers on water quality are expected to be localized and transitory, and managed during berthing and unberthing by the use of tugs, impacts from propeller wash are considered to be less than significant.

Mitigation Measure: No mitigation required.

Impact WQ-3: Degrade water quality by the discharge of segregated ballast water. (Significant and unavoidable.)

Ballast water is used to stabilize large vessels, including tankers and barges, and is taken up to compensate for the vessel lightering as crude oil and other cargo is delivered. Although a large proportion (over 80 percent) of voyages to California waters retain all ballast water on board, vessels do discharge ballast water for either operational or safety purposes (CSLC 2013e). Segregated ballast water is kept in tanks that are separated from oily cargo. Non-segregated ballast water is considered a hazardous waste in California and cannot be discharged into the San Francisco Bay or coastal waters. Vessels may discharge properly managed, segregated ballast water from segregated ballast tanks into San Francisco Bay as they take on product from the Amorco Terminal. The discharged ballast water has the potential to contain a variety of harmful substances, most notably nonindigenous aquatic species.

As discussed in Section 2.0, vessels take on, discharge, and redistribute ballast water during cargo loading and unloading. Ships routinely take on ballast water after cargo is unloaded in one port, and later discharge the ballast water when cargo is loaded at another port. This exchange of ballast water from one port to another may result in the transport of numerous organisms from one region to another. The introduction of nonindigenous aquatic species via ballast water (and vessel biofouling, discussed in Impact WQ-5) has impacted the aquatic communities of the San Francisco Bay Estuary. The problems of nonindigenous aquatic species introductions are discussed in detail in Section 4.2, Biological Resources. Ballast water is a major ship-based introduction vector and is one of the primary vectors by which nonindigenous aquatic species enter the coastal waters of California (CSLC 2013e). Vessels that discharge ballast water to the marine environment are required to conform to ballast water management measures promulgated by State and federal regulations. Section 2.3.3 provides additional information regarding ballast water regulations. The U.S. Coast Guard (USCG), USEPA, and CSLC administer ballast water laws, regulations, and/or permits.

The USCG regulates ballast water through the National Invasive Species Act. In 2004, the USCG issued final mandatory ballast water management regulations that required any vessel with ballast water entering United States waters from outside the United States Exclusive Economic Zone to either conduct mid-ocean ballast water exchange, retain the vessel's ballast water onboard, or use an alternative control method approved by the USCG. In 2012, the USCG amended its regulations on ballast water management by establishing a standard for the allowable concentration of living organisms in ballast water discharged from ships in waters of the United States. USCG also amended its regulations for engineering equipment by establishing an approval process for ballast water management systems.

Ballast water discharges from non-recreational vessels greater than 79 feet or equal in length are further regulated by the USEPA, through the NPDES Vessel General Permit (VGP), which is written to include existing USCG management and ballast water exchange requirements. Effective December 19, 2013, the VGP will contain new numeric limits for the concentration of living organisms in discharged for most vessels. As required by the VGP, all owner/operators of vessels equipped with ballast water tanks must maintain a ballast water management plan. The best management practices (BMP) for ballast water designated in the VGP include: Restricting discharges to only those essential to the operation of the vessel, removal of sediment from ballast tanks in mid-ocean or at dry-dock, avoiding ballast water uptake in areas of known pathogens, conducting mid-ocean ballast exchanges, and retaining all ballast water on board while in United States waters.

To inhibit the introduction and spread of nonindigenous aquatic species in California, the Coastal Ecosystems Protection Act of 2006 (Senate Bill [SB] 497; refer to Section 4.2, Biological Resources, for a description of this regulation) established performance standards for the discharge of ballast water, which are administered by the CSLC. Per regulations, vessels have four options to comply with California's performance standards, including: (1) retention of all ballast water on board, (2) use of an alternative ballast water management method, such as potable water, (3) discharge to an approved shore-based ballast water reception and treatment facility, and (4) treatment of all ballast prior to discharge by a shipboard ballast water treatment system. The performance standards regulations will be implemented gradually based on a vessel's ballast water capacity and year of construction. In a recent study, the CSLC determined that there are no the shipboard ballast water treatment systems currently available to meet all of California's performance standards for the discharge of ballast water (CSLC 2013e). Mid-ocean exchange of ballast water is considered an interim measure to reduce the introduction of nonindigenous aquatic species until effective treatment technologies are developed (Falkner 2003).

Although ballast water discharges are conducted in accordance with effective management practices and are administered by State and federal regulations, risk of nonindigenous aquatic species introduction to San Francisco Bay cannot be completely eliminated. The discharge of ballast water containing harmful organisms could impair the beneficial uses of the Project area and significantly degrade water quality.

Mitigation Measure:

MM WQ-3: Advise vessels of applicable standards and regulations (also see WQ-5). Tesoro shall advise both agents and representatives of shipping companies having control over vessels that have informed Tesoro of plans to call at the Amorco Terminal about the Coastal Ecosystems Protection Act of 2006 and associated implementing regulations.

Impact WQ-4: Degrade water quality as a result of discharge of cooling water, sanitary wastewater, bilge water, non-segregated ballast water, or other liquid wastes. (Less than significant.)

In addition to segregated ballast water, a vessel berthing at the Amorco Terminal may discharge cooling water from the ships' operating systems. Cooling water flows through the main engines and auxiliary equipment operating during the time the ships are berthed.

The SWRCB has adopted a Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays and Estuaries of California (Thermal Plan), which contains WQOs for coastal and interstate surface waters as well as enclosed bays and estuaries. The Thermal Plan specifies that no discharge to enclosed bays shall cause a surface-water temperature rise greater than 4°F above the natural temperature of the receiving waters at any time or place (SWRCB 1998). The volume of these cooling water flows is small compared to the tidal flow past the Amorco Terminal. Cooling water discharges on water quality would be less than significant, as the increase in water temperature would be quickly absorbed by the ambient temperature, and would not be expected to exceed the limitation in the Thermal Plan.

The California Clean Coast Act (SB 771) of 2005 prohibits the discharge of hazardous wastes, other wastes, or oily bilge water into California waters, and also prohibits the discharge of greywater and sewage from vessels with sufficient holding-tank capacity or from vessels capable of transferring wastewater to onshore facilities. The California Clean Coast Act requires that all vessels visiting California in 2006 submit a report describing their capability to store greywater and sewage, and providing information on their marine sanitation devices to the CSLC. Any discharges must also comply with the VGP and specific discharge limits for contaminants identified in the VGP. Non-segregated ballast water is considered a hazardous waste in California, and discharge is prohibited. Vessels are not allowed to offload trash, and additionally, no hull cleaning occurs at the Amorco Terminal.

The Amorco Terminal has the ability to receive oily ballast water or bilge water, which can be conveyed onshore via piping to tankage dedicated to the handling of ballast and residue liquids. The oily waste can be subsequently treated in the Refinery's Wastewater Treatment Plant (WWTP). Although this capability exists, ship operators and Tesoro typically cooperate to minimize the amount of oily ballast and/or bilge water sent to the WWTP, and the Amorco Terminal will typically receive such water only during emergency situations. Disposal of these wastes is the responsibility of the ship and is handled by a contract disposal service. Therefore, except for the unlikely case of a spill during transfer, none of these wastes would have any impact on water quality in the Project area.

Mitigation Measure: No mitigation required.

Impact WQ-5: Degrade water quality as a result of vessel biofouling. (Significant and unavoidable.)

Vessel biofouling occurs when organisms attach to the hull and other wetted surfaces of a vessel. When vessels move from port to port, biofouling communities are transported along with their "host" structure. Biofouling organisms can be introduced into these new areas when they reproduce, drop off, or are knocked off of the vessel.

Within California, up to 60 percent of the established nonindigenous aquatic species are considered to have been introduced through vessel biofouling (Ruiz et al. 2011). Even vessels that may be well maintained and that have little to no biofouling present on the hull can still represent a potential for nonindigenous aquatic species impact through biofouling of certain niches in the vessel. The effects of vessel biofouling are further discussed in Section 4.2, Biological Resources. As indicated in Section 4.2, Impact BIO-7, biofouling by commercial ships has been identified as one of the most important mechanisms for marine nonindigenous aquatic species introductions in North America .

According to Section 502 of the CWA, invasive species meet the definition of "pollutant" because they are "biological materials…discharged into water," and they impair or threaten to impair the full range of designated beneficial uses of waterbodies in the San Francisco Bay. The San Francisco Bay/Estuary is one of the most invaded estuaries in the world (Molnar et al. 2008). The San Francisco Bay has approximately 85 nonindigenous aquatic species currently in its waters, 66 percent of which are considered harmful (Molnar et. al. 2008). Both Suisun Bay and the Carquinez Strait are identified as impaired for invasive species.

The CSLC regulates vessel biofouling under the Marine Invasive Species Act of 2003 (MISA). In 2008, the CSLC initiated the requirement of annual submittal of the Hull Husbandry Reporting Form for vessels operating in State waters. In an effort to reduce introductions of nonindigenous aquatic species via vessel biofouling, data reported in the Husbandry Reporting Forms have been used in conjunction with CSLC-sponsored research to develop biofouling management requirements. The CSLC will propose new regulations to further vessel biofouling management standards, requiring vessels of 300 gross registered tons or greater to maintain a vessel-specific biofouling management plan, biofouling management logbook, and use anti-fouling systems to prevent or reduce organism attachment to vessel structures. Tesoro has no control over, ownership of, or authority to direct vessels that berth at the Amorco Terminal; therefore, details regarding how calling vessels manage biofouling cannot be provided as part of the Project (see Section 2.0, Project Description). The vessels would be governed by the applicable CSLC requirements for biofouling management, which would reduce the potential impact of aquatic species invasion from biofouling. Under MM WQ-5 (below) and MM BIO-7a, Tesoro would ensure that vessels seeking to call at the Amorco Terminal are advised of the MISA and are complying as required by the CSLC.

While regulations and provisions have been helpful in reducing the potential of new nonindigenous aquatic species introductions from hull fouling, existing standards and measures are not completely effective. The introduction of additional harmful organisms may impair several of the Project area's beneficial uses. Therefore, the introduction of new nonindigenous aquatic species via vessel biofouling as a result of continued Amorco Terminal operation could pose potential significant and unavoidable adverse impacts to water quality.

Mitigation Measure:

MM WQ-5: Ensure vessels regarding compliance with applicable regulations and standards (also see MM BIO-7a). Tesoro shall prepare, and maintain current, a fact sheet and provide it to all vessels calling at the Amorco Terminal to ensure that they are informed of applicable regulations and standards associated with the prevention of biofouling. Prior to allowing berthing at the Terminal, Tesoro will confirm with vessels that they are in compliance with the Marine Invasive

Species Act (MISA), including completion of MISA-required paperwork. Tesoro shall ensure that all vessels submit required reporting forms, as applicable for each vessel prior to the vessel's entry into San Francisco Bay or in the alternative, at least 24 hours prior to the vessel's arrival at the Amorco Terminal.

Impact WQ-6: Degrade water quality due to anti-fouling paints used on vessel hulls. (Significant and unavoidable.)

Marine anti-fouling paints or coatings are used to reduce nuisance algal and marine growth on ships. Biofouling can significantly affect the drag of the vessel through the water, reducing its fuel economy. (Refer to Impacts WQ-5 and CUM-BIO-4 for discussions on the environmental impacts associated with biofouling.) Anti-fouling coatings incorporate biocides such as copper, sodium chloride, and zinc as the active ingredients. The International Convention on the Control of Harmful Anti-fouling Systems on Ships went into force in January 2008. It prohibits and restricts application, re-application, installation, or use of harmful anti-fouling paints on ships, especially those containing harmful organotins, such as tributyltin (TBT). Ninety percent of biocide-based coatings on oil tankers entering California's waters are copper-based, and approximately 8 percent use biocide-free coatings (CSLC 2009). Biocide-free coatings generally contain silicon, which increases the slickness of the hull, so biofouling organisms fall off as the vessel travels at speed.

The VGP requires certain management practices, and places technology-based and water-quality based limits on hull leachates. No coatings may contain materials banned from use in the United States. When coatings are reapplied, biocides with the lowest release rate must be used, and the application of organotins is explicitly prohibited as discussed above. Vessels that are currently coated with TBT must have it removed or overcoated. Because of the restrictions on the use of biocides that leach into seawater, tankers arriving at the Amorco Terminal during the upcoming lease term would not represent a significant ongoing source for biocides in the Amorco Terminal's waters.

As a best management practice, Tesoro shall require representatives of vessels berthing at the Amorco Terminal to provide documentation certifying that their vessel is in compliance with the 2001 International Maritime Organization Convention on the Control of Harmful Anti-fouling Systems on Ships and other applicable regulations. Adherence to this resolution would help minimize local water quality impacts.

The concentration of copper and zinc in water and sediment in the vicinity of the Project are below the WQOs, ambient sediment concentrations, and the ER-L and ER-M (see Tables 4.3-2, 4.3-4, and 4.3-5). Suisun Bay and the Carquinez Strait are listed as impaired waterbodies on the CWA 303(d) list; however, copper and zinc are not among the identified contaminants of impairment. Although the continued vessel traffic in the Carquinez Strait and Suisun Bay is unlikely to cause a measurable increase in copper or zinc concentrations above WQOs or ambient levels, some leaching will always occur. Although the use of anti-fouling paint containing TBT was discontinued in 2008, there is still potential that vessels with old applications of TBT on their hulls could visit the Amorco Terminal. The use of these substances on vessels associated with the Amorco Terminal is considered to be a significant adverse impact to water quality that cannot be mitigated to less than significant.

Mitigation Measure:

MM WQ-6: Inform Vessels calling at the Amorco Terminal of the ban on Tributyl Tin (TBT). Tesoro shall prepare, and maintain current, a fact sheet and provide it to all vessels calling at the Amorco Terminal to ensure that they are informed of the requirements of the 2008 International Maritime Organization prohibition of TBT applications to vessel hulls. Prior to allowing berthing at the Terminal, Tesoro will confirm with vessels that they are in compliance with the Marine Invasive Species Act (MISA), including completion of MISA-required paperwork. Tesoro shall ensure that all vessels submit required reporting forms, as applicable for each vessel prior to the vessel's entry into San Francisco Bay or in the alternative, at least 24 hours prior to the vessel's arrival at the Amorco Terminal.

Impact WQ-7: Degrade water quality as a result of cathodic protection on vessels. (Less than significant.)

Tankers and barges calling at the Amorco Terminal are made of steel that requires cathodic protection. Many of these vessels have a coal tar-epoxy coating on their hull that insulates them from saltwater. Tankers often use an impressed current system for cathodic protection. Barges typically use sacrificial zinc anodes for cathodic protection. The slow leaching of zinc anodes may increase the concentration of zinc in the waters at the Amorco Terminal, but due to the slow rate of exchange of the anodes to seawater, it is considered to be negligible in comparison to ambient zinc in the marine environment. Water and sediment quality with regard to zinc is further discussed in Impact WQ-6. The impact of cathodic protection on water quality is considered less than significant.

Mitigation Measure: No mitigation required.

Impact WQ-8: Degrade water quality as a result of stormwater runoff from the wharf. (Potentially significant.)

Stormwater runoff from the Amorco Terminal may contribute pollutants to the San Francisco Bay. As described in Section 2.3.2, a drip pan or catch basin provides stormwater and surface liquid containment at the unloading manifold area of the Amorco Terminal. All transfer areas (e.g., work areas around risers, loading arms, hydraulic systems) are protected by berms. Stormwater and incidental spills are collected and drained to a recovery tank (also known as the slops tank) located under the transfer berth on the east end of the wharf. The tank is double-walled and has a 500-gallon capacity. The slops tank is equipped with a sump pump that is automatically activated as the level in the tank rises. There is an auxiliary pump in case the primary sump pump fails. The slops tank is protected from overflow by level-control instrumentation, including visual and audible high-level alarms. Testing of the slops tank overfill system is performed monthly and documented appropriately.

Collected runoff from the Amorco Terminal is combined with process waters and pumped to the Refinery WWTP for full treatment, and is ultimately discharged to Suisun Bay via permitted outfall E-001. Activities at the Amorco Terminal are subject to NPDES Permit CA0004961, Waste Discharge Requirements Order No. R2-2010-0084 issued by the SFBRWQCB. Pursuant to its NPDES permit, Tesoro has prepared a SWPPP, which includes the onshore operations at Amorco Terminal. The SWPPP does not specifically address the potential for pollutant input from the wharf (Tesoro 2011).

On non-bermed areas of the wharf, there is potential for contaminants to accumulate on surfaces from routine vehicle use, maintenance activities, and daily operations. Project activities require the transport and handling of hazardous materials such as fuels, oils, and waste products for operation and maintenance of facility equipment. Hazardous materials that accumulate on surfaces of the Amorco wharf would likely flow into the San Francisco Bay during storm events. However, the potential for adverse effects is less than significant with the combination of compliance to regulations regarding the management of hazardous materials and the existing secondary containment facilities in place at the Amorco Terminal.

Mitigation Measure:

MM WQ-8: Amend existing Stormwater Pollution Prevention Plan (SWPPP). Tesoro shall append the existing SWPPP to include specific Best Management Practices (BMPs) to protect stormwater runoff from the wharf area. BMPs shall be designed to reduce the input of contaminant to the San Francisco Bay and prevent leaks and spills during routine activities.

Impact WQ-9: Degrade water quality as a result of oil leaks and spills during unloading. (Significant and unavoidable.)

Accidental releases of petroleum products during loading and unloading operations at the Amorco Terminal could contaminate the surrounding surface water with floating product. Petroleum products present in Bay waters would likely exceed the Basin Plan water quality objective for oil and grease, which comprises any visible film or coating on the surface of the water or on objects in the water that cause nuisance or that otherwise adversely affect beneficial uses.

Accidental oil spills directly to the San Francisco Bay could occur during unloading operations. When introduced in the marine environment, the oil goes through a variety of transformations involving physical, chemical and biological processes. Physical and chemical processes, which begin soon after petroleum is spilled into surface waters, include evaporation, spreading, emulsification, dissolution, sea-air exchange, and sedimentation. Chemical oxidation of some of the components of petroleum is also induced in the presence of sunlight. The degraded products of these processes include floating tar lumps, dissolved and particulate hydrocarbon materials in the water column, and materials deposited into bottom sediments and the shoreline. Biological processes are generally slower than physical or chemical processes, and include degradation by microorganisms and uptake by large organisms and subsequent metabolism.

Release scenarios at the Amorco Terminal are presented in Impact OS-1 in Section 4.1, Operational Safety/Risk of Accidents. The consequences of a spill on water quality would depend on the size of the spill, the effectiveness of the response effort, and the biological, shoreline, water resources affected by the spill. A small spill of 1 gallon or less would result in an impact that can be mitigated, while a large spill of 1,000 barrels (42,000 gallons) most likely would result in a significant, adverse impact that would have residual effects after cleanup. The impacts of spills between 1 gallon and 1,000 barrels (42,000 gallons) depend on the effectiveness of response efforts and the resources impacted. As discussed in Section 4.1, Operational Safety/Risk of Accidents (refer to Impact OS-1), the probability of a release greater than 1,000 barrels at the Amorco Terminal is approximately 0.01, or one release approximately every 73 years, which is longer than the proposed lease extension of 30 years.

Oil spill trajectory modeling has been performed to evaluate the extent of impacts from a reasonable worst-case discharge of 22,178 barrels at the wharf. As indicated in Section 4.1, Operational Safety/Risk of Accidents, Impact OS-1, the maximum most probable discharge is 1,200 barrels. The figures in Appendix B show the worst-case spill modeled for both summer and winter conditions. The greatest shoreline impact occurs during the winter season, with impacts to the northern reaches of Honker, Suisun, and Grizzly Bays, and further propagation outside of the Carquinez Strait into San Pablo Bay.

Tesoro's Oil Spill Response Plan (OSRP) and Manual, last updated in November 2012, provides spill prevention measures and protocol in the event of an accidental release. All exposed piping, valves, and flanges are inspected during loading/unloading operations to check for leaks. Drip pans are placed beneath areas with high potential for leaks, such as hose and pipe connections. The drip pans discharge directly to the slops tank installed beneath the wharf. As described in Impact WQ-8, the 500-gallon slops tank is constructed of steel, double-walled and internally coated. An electronic gauging system is provided to determine the level in the tank, and a high alarm will sound if the tank is overfilled. The sump pump for the tank is activated automatically when the volume in the tank reaches a programed level. An auxiliary pump is installed in case the primary pump fails. Incidental spills collected in the slops tank are pumped onshore via the 20-inch diameter crude oil pipeline or 4-inch slops pipeline to the Refinery's WWTS.

As described in Section 2.6.4 and Section 4.1.1.4, the Amorco Terminal has oil spill-response equipment available in the event of a release into the San Francisco Bay. The Amorco wharf has two boom reels, one on the east and one on the west end of the wharf. Each reel contains 1,200 feet of 8-inch by 24-inch containment boom with universal connections. Tesoro has employed Bay Area Ship Services to ensure that a minimum of 600-foot boom can be deployed within approximately 30 minutes to contain a spill. Tesoro also contracts with Marine Spill Response Corporation to serve as the primary spill-response contactor. The containment and cleanup capability at the Amorco Terminal is further detailed in Section 4.1, Operational Safety/Risk of Accidents.

The Amorco Terminal is subject to regulations promulgated by the USEPA that require the preparation of a Spill Prevention Control and Countermeasure Plan (SPCCP) and regulations adopted by both the USEPA and the California Department of Fish and Wildlife's (CDFW) Office of Spill Prevention and Response (OSPR) covering the development and maintenance of oil spill response and contingency plans. Plans have been prepared in accordance with these regulatory requirements for the Amorco Terminal. In addition, Tesoro has a Wharf Operations Manual governing Amorco Terminal operations, including spill prevention. The OSPR also requires a Certificate of Financial Responsibility to demonstrate that it has adequate financial resources to pay cleanup and damage costs arising from an oil spill. Contingency planning and response measures for oil releases as discussed in Section 4.1, Operational Safety/Risk of Accidents, would be implemented, per regulations, to minimize this impact to the extent feasible and practicable.

Tesoro has contingency planning and response measures for oil releases in place, including a SPCCP (2012), Amorco Marine Oil Terminal OSRP (2012), and SWPPP (2011). Additionally, the CSLC has developed the Marine Oil Terminal Engineering and Maintenance Standards (MOTEMS), which apply to all existing and new marine oil terminals in California. MOTEMS includes criteria for inspection, structural analysis and design, mooring and berthing, geotechnical considerations, fire, piping, mechanical, and electrical systems. Refer to Section 4.1, Operational Safety/Risk of Accidents, for a more comprehensive discussion on MOTEMS and spill-prevention practices.

As discussed above, operational protocols proposed by Tesoro are designed to minimize the potential for accidental releases, and existing improvements include the use of secondary containment for all anticipated Amorco Terminal drips and small releases. However, even strict adherence to these protocols and spill response measures cannot guarantee that no contaminants would ever be released. The probability of a serious spill occurring would be minimized to the extent feasible with mitigation measures OS-1a, OS-1b, and OS-1c, but the risk cannot be eliminated. Consequences of a spill would depend on the spill conditions and could range from relatively small spills that can be contained during first-response efforts with rapid clean up and no significant impacts, to spills that are larger or difficult to clean up with significant residual impacts after mitigation. Even with the implementation of contingency planning and response measures for oil spills, a spill could spread over a large area and impact water quality to the San Francisco Bay. In such a case, impacts to water quality would be significant and unavoidable.

Mitigation Measure: No additional mitigation measures available.

Impact WQ-10: Degrade water quality due to oil releases from vessels in transit in the San Francisco Bay or along the outer coast. (Significant and unavoidable.)

The fate and water quality impacts of oil spills associated with vessel transit in the San Francisco Bay or along the outer coastline are similar to the effects described in Impact WQ-9. However, a larger oil spill is more likely from accidents associated with vessels in transit than from a spill during the controlled conditions of unloading at the Amorco Terminal. Most tanker spills/accidents that occur in transit are larger spills that cannot be quickly contained, and would result in significant and unavoidable impacts.

As presented in Impact OS-4 in Section 4.1, Operational Safety/Risk of Accidents, the probability of a release in the San Francisco Bay from a tank vessel transiting to the Amorco Terminal is equivalent to one spill ever 10,400 years. Modeling results presented in Impact OS-4 and in Appendix B, indicate that if a release occurs, probabilities of exceeding the level of concern (approximately 50 gallons present in 1 square nautical mile, as pre-defined in the modeling program) range from 75 to 100 percent along the shoreline east and west of the Carquinez Bridge in both summer and winter, with higher probabilities of exeedance extending into San Pablo Bay and Suisun Bay during winter months.

All tanker companies operating within California waters must demonstrate by signed contract to the USCG and CDFW that they have the necessary response assets to respond to a worst-case release as defined under federal and State regulations. While

Tesoro does not have legal responsibility for tankers it does not own, it does have responsibility to participate in improving general response capabilities.

Mitigation Measure: No additional mitigation measures available.

Alternative 1: No Project

Impact WQ-11: Degrade water quality during decommissioning of the Amorco Terminal. (Less than significant.)

This alternative would eliminate the water quality impacts associated with operations at Amorco Terminal. Under the No Project Alternative, the lease would not be renewed and the existing wharf would be decommissioned, with all of its components abandoned in place or removed. The effects on water quality during decommissioning, such as sediment disturbance or risk of leaks from construction equipment, would result in temporary, adverse, but less than significant impacts on water quality.

Mitigation Measure: No mitigation is required.

Impact WQ-12: Degrade water quality due to accidental spills from rail cars, trucks, and/or pipelines. (Significant and unavoidable.)

This alternative assumes that the Amoco lease would not be extended. Golden Eagle Refinery operations would be more dependent on crude oil receipts through various non-marine sources to meet regional refining demands. Land-based transportation options for crude transfer could include rail cars and trucks, and pipeline connections to other Bay Area marine terminals. An uncontained spill or substantial leak from land-based transport may result in a significant impact to water quality. A subsurface pipeline release of crude oil could also migrate upward through preferential soil pathways and appear at the surface, where it would pool and eventually flow downgradient in the direction of Suisun Bay and Carquinez Strait.

Tesoro would implement contingency planning and response measures for oil releases discussed in Impact WQ-8 and Section 4.1, Operational Safety/Risk of Accidents. These measures would provide protection against spills to the extent feasible. However, even with the implementation of contingency planning and response measures, an oil release during transfer, particularly from a pipeline, could spread over a large area and impact water quality. In such a case, impacts would be significant and unavoidable.

Should this alternative be selected, mitigation measures would be determined during a separate environmental review under the California Environmental Quality Act (CEQA).

Impact WQ-13: Degrade water quality due to stormwater runoff during construction. (Less than significant.)

Pipeline and rail delivery may require construction of new pipelines and/or new rail lines. During construction, lubricants, fuels, and other chemicals used for construction machinery could be spilled during normal usage or during refueling. Spilled material could run off into nearby watercourses or storm drains resulting in a significant, adverse impact. Project construction activities would involve trenching, grading, and excavation. Such soil-disturbing activities could cause erosion. If eroded soil were to come in contact with stormwater, runoff may have increased levels of turbidity, and subsequently, additional sedimentation could potentially occur in nearby waterbodies.

Runoff of sediment and contaminants during construction activities would be minimized through compliance with the State General Permit for Discharges of Stormwater Associated with Construction Activity (Water Quality Order 2009-0009-DWQ) and a project-specific SWPPP. Standard stormwater BMPs, such as erosion controls, soil barriers, sedimentation basins, site contouring, and others, would be used during construction activities to minimize runoff of soils and associated contaminants. As a result of BMP implementation, and stormwater management, construction would not be expected to notably degrade stormwater quality or receiving-water quality, and potential impacts would be less than significant.

Mitigation Measure: No mitigation required.

Alternative 2: Restricted Lease Taking Amorco Out of Service for Oil Transport

Impact WQ-14: Degrade water quality due to accidental spills from rail cars, trucks, and/or pipelines. (Significant and unavoidable.)

Refer to Impact WQ-12. Should this alternative be selected, mitigation measures would be determined during a separate environmental review under the California Environmental Quality Act (CEQA).

Impact WQ-15: Degrade water quality due to stormwater runoff during construction. (Less than significant.)

Refer to Impact WQ-13.

Mitigation Measure: No mitigation required.

Cumulative Impact Analysis

Impact CUM-WQ-1 Cause contaminant impacts on San Francisco Bay water quality. (Significant and unavoidable).

The water quality of the San Francisco Bay/Estuary has been degraded by inputs of pollutants from a variety of sources, including point sources such as municipal wastewater and industrial discharges and nonpoint sources such as urban and agricultural runoff, riverine inputs, dredging and dredge material disposal, marine vessel inputs, and inputs from air pollutants, spills, and accidents. In general, stormwater runoff is responsible for the greatest mass loadings of most contaminants (Davis et al*.* 2000).

The sources of contaminants to the San Francisco Bay and the levels of contamination are discussed in detail in Section 4.3.1. The identified stressors or pollutants in Suisun Bay and Carquinez Strait, according to the CWA 303(d) list include: Pesticides, dioxins/furans, mercury, nonindigenous aquatic species , nickel, PCBs, and selenium. Any contribution of these contaminants from Amorco Terminal operations could result in a significant, adverse cumulative impact.

Of this list, only nonindigenous aquatic species have been identified as potentially degrading water quality due to Amorco Terminal operations. As discussed above in Impacts WQ-3 and WQ-5, nonindigenous aquatic species can be introduced in ballast water and via vessel biofouling. Further, as discussed in MM WQ-3, Tesoro will not allow the discharge of non-segregated ballast water received at the Amorco Terminal to San Francisco Bay. Non-segregated ballast water is considered a hazardous waste California and cannot be discharged into the San Francisco Bay or coastal waters. In the event of an emergency, non-segregated ballast water can be pumped onshore to tankage for holding, treating, and isolation prior to treatment in the Refinery WWTP. Finally, as discussed in MM WQ-5 and MM BIO-7a, Tesoro would ensure that vessels calling at the Amorco Terminal are informed of applicable regulations and standards associated with the prevention of vessel biofouling, and prior to allowing berthing at the Amorco Terminal, Tesoro would confirm with vessels that they are in compliance with MISA. Although vessels that call at the Amorco Terminal are required to comply with federal and State regulations, compliance with the current standards is not enough to ensure full mitigation of this impact. Thus significant cumulative impacts would occur even with implementation of mitigation measures.

Though no contaminants associated with anti-fouling paints are on the 303(d) list for Suisun Bay or Carquinez Strait, anti-fouling paints are a significant concern for water quality in the San Francisco Bay. As discussed in Impact WQ-6, tankers visiting the Amorco Terminal may contribute to water contamination through use of anti-fouling paints, which contain copper, sodium chloride, and zinc, all of which are highly toxic to aquatic species. Although, TBT was phased out in 2008, vessels with old applications of

TBT on their hulls could still visit the Amorco Terminal. MM WQ-6 requires all vessels that visit the Amorco Terminal to comply with the 2001 International Maritime Organization Convention on the Control of Harmful Anti-fouling Systems on Ships and other applicable regulations. However, due to the high toxicity of these biocides, any contribution from the vessels calling at Amorco Terminal would be cumulatively significant.

Mitigation Measure: No additional mitigation measures available.

Impact CUM WQ-2: Cause re-suspension of sediment. (Less than significant.)

Dredging activities and propeller wash are likely to disturb seafloor sediments. However, increases in water-column turbidity would be temporary and localized, and unlikely to compound increases in turbidity that may arise from other projects in the region. If sediments are contaminated by legacy pollutants, their disturbance can lead to increases in contaminant concentrations within the water column. The effects of dredging and dredged material disposal on water quality are regulated and subject to acquisition of a dredging permit prior to dredging. Potential cumulative impacts to water quality from the disturbance of contaminated sediments can be fully eliminated by testing for and confirming the absence of elevated pollutant concentrations within sediments prior to conducting the work.

Mitigation Measure: No mitigation required.

Impact CUM-WQ-3 Degrade water quality due to releases from vessels in transit in the San Francisco Bay or along the outer coast. (Significant and unavoidable.)

As discussed in Impact WQ-10, a major oil spill from a vessel in transit in the san Francisco Bay or along the outer coast would have a significant, adverse impact on water quality. The incremental effects of such a vessel transiting to or from the Amorco Terminal would also be cumulatively significant. Section 4.1, Operational Safety/Risk of Accidents, Impact CUM-OS-1, presents a discussion of cumulative oil spill risk. Impacts would be minimized to the extent feasible with mitigation measures OS-4a and OS-4b (refer to Section 4.1, Operational Safety/Risk of Accidents), but the risk cannot be eliminated.

Mitigation Measure: No additional mitigation measures available.

4.3.4 SUMMARY OF FINDINGS

Table 4.3-6 includes a summary of anticipated impacts to water quality and associated mitigation measures.

Table 4.3-6: Summary of Water Quality Impacts and Mitigation Measures

Impact	Mitigation Measure(s)
Proposed Project	
WQ-1: Degrade water quality as a result of maintenance dredging	No mitigation required.
WQ-2: Degrade water quality as a result of sediment disturbance from vessel maneuvers	No mitigation required.
WQ-3: Degrade water quality by the discharge of ballast water	WQ-3: Advise vessels of applicable regulations and standards.
WQ-4: Degrade water quality as a result of discharge of cooling water, sanitary wastewater, bilge water, or other liquid wastes	No mitigation required.
WQ-5: Degrade water quality as a result of vessel biofouling	WQ-5: Advise vessels of applicable regulations and standards (also see Mitigation Measure BIO-7a).
WQ-6: Degrade water quality due to anti-fouling paints used on vessel hulls	WQ-6: Inform Vessels calling at the Amorco Terminal of the ban on TBT.
WQ-7: Degrade water quality as a result of cathodic protection on vessels	No mitigation required.
WQ-8: Degrade water quality as a result of stormwater runoff from the wharf	WQ-8: Amend existing SWPPP.
WQ-9: Degrade water quality as a result of oil leaks and spills during unloading	No additional mitigation measures available. (Refer to MMs OS-1a, OS-1b, and OS-1c.)
WQ-10: Degrade water quality due to releases from vessels in transit in the San Francisco Bay or along the outer coast	No additional mitigation measures available. (Refer to MMs OS-4a and OS-4b.)
Alternative 1: No Project	
WQ-11: Degrade water quality during decommissioning of the Amorco Terminal	No mitigation required.
WQ-12: Degrade water quality due to accidental spills from rail cars, trucks, and/or pipelines	Should this alternative be selected, mitigation measures would be determined during a separate environmental review under CEQA.
WQ-13: Degrade water quality due to stormwater runoff during construction	No mitigation required.

Impact	Mitigation Measure(s)
Alternative 2: Restricted Lease Taking Amorco Out of Service for Oil Transport	
WQ-14: Degrade water quality due to accidental spills from rail cars, trucks, and/or pipelines	Should this alternative be selected, mitigation measures would be determined during a separate environmental review under CEQA.
WQ-15: Degrade water quality due to stormwater runoff during construction	No mitigation required.
Cumulative Impacts	
CUM WQ-1: Cause contaminant impacts on San Francisco Bay water quality	No additional mitigation measures available. (refer to MMs WQ-3, WQ-5, and WQ-6.)
CUM WQ-2: Cause re-suspension of sediment	No mitigation required.
CUM WQ-3: Degrade water quality due to oil releases from vessels in transit in the San Francisco Bay or along the outer coast	No additional mitigation measures available. (Refer to MMs OS-4a and OS-4b.)