4.0 ENVIRONMENTAL IMPACT ANALYSIS

INTRODUCTION TO ENVIRONMENTAL ANALYSIS

Section 4 of this Environmental Impact Report (EIR) examines the potential environmental impacts of the proposed Revised PRC 421 Recommissioning Project (Project) identified by the California State Lands Commission (CSLC) as Lead Agency under the California Environmental Quality Act (CEQA). This Section includes analyses of environmental issue areas listed below:

- 4.1 - Geological Resources;
- 4.2 - Safety;
- 4.3 - Hazardous Materials;
- 4.4 - Air Quality and Greenhouse Gases;
- 4.5 - Hydrology, Water Resources, and Water Quality;
- 4.6 - Marine Biological Resources;
- 4.7 - Terrestrial Biological Resources;
- 4.8 - Land Use, Planning, and Recreation;
- 4.9 - Public Services;
- 4.10 - Transportation and Circulation;
- 4.11 - Noise;
- 4.12 - Aesthetic/Visual Resources;
- 4.13 - Cultural, Historical, and Paleontological Resources;
- 4.14 - Energy and Mineral Resources; and
- 4.15 - Socioeconomics and Environmental Justice.

Each environmental issue area analyzed in this EIR provides background information and describes the environmental setting (baseline conditions) to help the reader understand the conditions that exist currently, prior to Project implementation, and the relationship between those existing conditions and potential Project-related impacts. In addition, each section describes the approach to analysis that results in a determination whether an impact is "significant" or "less than significant." Finally, individual sections recommend mitigation measures (MMs) to reduce significant impacts. Throughout Section 4, both impacts and the corresponding MMs are identified by a **bold letter-number designation** (e.g., Impact **TBIO-1** and **MM TBIO-1a**)**.**

Based on an initial review and analysis, it is likely that the Project would have a less than significant impact, or no impact, on the environmental issue areas identified below. The primary reasons for these determinations are as follows:

- Agricultural Resources. Activities for Recommissioning PRC 421 are located on sand, shale bedrock and artificial fill and therefore would not impact soils used for agricultural purposes. The Line 96 Modification Project EIR (Santa Barbara County 2011) fully analyzed agricultural resources along the pipeline route to Las Flores Canyon (LFC) as part of the construction and operation of the new pipeline and is incorporated by reference in Section 4.8, Land Use, Planning and Recreation of this EIR.
- Population and Housing. The Project would not require a change in the number of employees and would require only short-term construction activity for removal of Pier 421-1 infrastructure and repair and upgrade of existing facilities at Pier 421-2. The Project would neither induce substantial population growth in the area nor displace any people or housing units.
- Utilities and Service Systems. The Project would not result in additional demand for water, wastewater treatment, or solid waste disposal services in excess of current capacities.

ASSESSMENT METHODOLOGY

Environmental Baseline

The analysis of each issue area begins with an examination of the existing physical setting or baseline conditions as determined pursuant to section 15125, subdivision (a) of the State CEQA Guidelines that may be affected by the Project. The effects of the Project are defined as changes to the environmental setting that are attributable to Project components or operation.

The baseline conditions for the Project include operation of the Line 96 pipeline, which connects the Ellwood Onshore Facility (EOF) to the Plains All American Pipeline, L.P. (PAAPLP) Coastal Pipeline west of LFC. This EIR relies upon, updates, and under the guidance provided in State CEQA Guidelines section 15150 hereby incorporates by reference the findings of the Line 96 Modification Project EIR (Santa Barbara County 2011) regarding potential impacts and MMs associated with use of that pipeline.

Significance Criteria

Significance criteria are identified for each environmental issue area; these criteria serve as benchmarks for determining if a component action will result in a significant adverse environmental impact when evaluated against the baseline. According to State CEQA Guidelines section 15382, a significant effect on the environment means “a substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project….”

Impact Analysis

Impacts are classified as according to one of the following five categories:

- **Significant and Unavoidable** – significant adverse impact that remains significant after mitigation;
- **Less than Significant with Mitigation** – significant adverse impact that can be eliminated or reduced below an issue area's significance criteria;
- **Less than Significant** – adverse impact that does not meet or exceed an issue area's significance criteria;
- **Beneficial** – beneficial impact; or
- **No Impact** – the Project would not result in any impact to the resource area considered.

A determination will be made, based on the analysis of any impact within each affected environmental issue area and compliance with any recommended MM, of the level of impact remaining in comparison to pertinent significance criteria. If the impact remains significant, at or above the significance criteria, it is deemed to be "significant and unavoidable." If a significant adverse impact could be reduced to a less than significant level with application of identified mitigation, then it is "less than significant with mitigation." If an action creates an adverse impact above the baseline condition, but such impact does not meet or exceed the pertinent significance criteria, it is determined to be "less than significant." An action that provides an improvement to an environmental issue area in comparison to baseline conditions is recognized as a "beneficial" impact.

Formulation of Mitigation Measures and Mitigation Monitoring Program

When significant impacts are identified, feasible MMs are formulated to eliminate or reduce the severity of impacts and focus on the protection of sensitive resources. The effectiveness of a MM is subsequently determined by evaluating the impact remaining after its application. Impacts which still meet or exceed the impact significance criteria after mitigation are considered residual impacts that remain significant. Implementation of more than one MM may be needed to reduce an impact below a level of significance. The MMs recommended in this document are identified in the impact sections and presented in a Mitigation Monitoring Program (MMP), provided in Section 7.

If any MMs are ultimately incorporated as part of a project's design, they are no longer considered MMs under CEQA. If they eliminate or reduce a potentially significant impact to a level below the significance criteria, they eliminate the potential for that significant impact since the "measure" is now a component of the action. Such measures incorporated into the project design have the same status as any "applicant proposed

measures." The CSLC's standard practice is to include all measures to eliminate or reduce the environmental impacts of a proposed project, whether applicant-proposed or recommended mitigation, in the MMP.

Timing of Project Elements

This EIR addresses the impacts of both recommissioning of Pier 421-2, including construction and operation, as well as abandonment of Pier 421-1. Because Venoco proposes submittal of applications for abandonment of Pier 421-1 after production has commenced at Pier 421-2, the CSLC staff anticipates that actual abandonment of Pier 421-1 will trail construction and initiation of production at Pier 421-2 by approximately 1 year. The impact analysis reflects this assumption.

Cumulative Impacts Analysis

Each issue area in Section 4 presents the cumulative impact scenario, the focus of which is to identify the potential impacts of the Project that might not be significant when considered alone, but that might contribute to a significant impact when viewed in conjunction with the other projects.

Impacts of Alternatives

Section 5 describes the alternatives to the Project and includes the impact analysis for each alternative scenario being considered to the Project. A summary of collective impacts of each alternative in comparison with the impacts of the Project is included within the Executive Summary and Section 6.4.

FEDERAL AND STATE REGULATIONS

Each of the issue areas is considered in terms of the Federal, State, regional, and local laws, regulations, and policies that apply to the issue area. Federal and State laws, regulations and policies, including a summary of each, are provided below in Table 4.0-1, organized by issues area. Applicable regional and local laws, regulations, and policies are summarized in each of the sections.

Table 4.0-1 Major U.S. and State Laws, Regulations, and Policies Potentially Applicable to the Project

4.0 MULTIPLE ENVIRONMENTAL ISSUES		
U.S.	Coastal Zone Management Act (CZMA) (42 USC 4321 et seq.)	The CZMA recognizes a national interest in coastal zone resources and in the importance of balancing competing uses of those resources, giving full consideration to aesthetic, cultural and historic, ecological, recreational, and other values as well as the needs for compatible economic development. Pursuant to the CZMA, coastal states develop and implement comprehensive coastal management programs (CMPs) that describe uses subject to the CMP, authorities and enforceable policies, and coastal zone boundaries, among other elements. The CZMA also gives state coastal management agencies regulatory control ("federal consistency" review authority) over federal activities and federally licensed, permitted or assisted activities, if the activity affects coastal resources; such activities include military projects at coastal locations and outer continental shelf oil and gas leasing, exploration and development. The California Coastal Commission (CCC) and San Francisco Bay Conservation and Development Commission (BCDC) coordinate California's federally approved CMPs and federal consistency reviews within their respective jurisdictions.
CA	California Environmental Quality Act (CEQA) (Pub. Resources Code, § 21000 et seq.)	CEQA requires state and local agencies to identify the significant environmental impacts of their actions and to avoid or mitigate those impacts, if feasible. A public agency must comply with CEQA when it undertakes an activity defined by CEQA as a "project" that must receive some discretionary approval (i.e., the agency has the authority to deny the requested permit or approval) which may cause either a direct physical change in the environment or a reasonably foreseeable indirect change in the environment.
CA	California State Lands Commission (CSLC) Public Trust Doctrine	All tidelands and submerged lands, granted or ungranted, as well as navigable lakes and waterways, are subject to the protections of the Common Law Public Trust. The CSLC has jurisdiction and management authority over all ungranted tidelands, submerged lands, and the beds of navigable lakes and waterways, as well as certain residual and review authority for tidelands and submerged lands legislatively granted in trust to local jurisdictions (Pub. Resources Code, §§ 6301, 6306). As general background, the State of California acquired sovereign ownership of all tidelands and submerged lands and beds of navigable lakes and waterways upon its admission to the U.S. in 1850. The State holds these lands for the benefit of all people of the State for statewide Public Trust purposes, which include but are not limited to waterborne commerce, navigation, fisheries, water-related recreation, habitat preservation and open space. On tidal waterways, the State's sovereign fee ownership extends landward to the mean high tide line, except for areas of fill or artificial accretion. The CSLC's jurisdiction also includes a 3-nautical-mile-wide section of tidal and submerged land adjacent to the coast and offshore islands, including bays, estuaries, and lagoons; the waters and underlying beds of more than 120 rivers, lakes, streams, and sloughs; and 1.3 million acres of "school lands" granted to the State by the Federal government to support public education. The CSLC also has leasing jurisdiction, subject to certain conditions, over mineral extraction from State property owned and managed by other State agencies (Pub. Resources Code, § 68910, subd. (b)), and is responsible for implementing a variety of State regulations for activities affecting these State Trust Lands, including implementing CEQA.

Table 4.0-1 Major U.S. and State Laws, Regulations, and Policies Potentially Applicable to the Project (continued)

CA	California Coastal Act (Coastal Act) of 1976 (Pub. Resources Code, § 30000 et seq.) CCC Federal Consistency Program	Pursuant to the Coastal Act, the CCC, in partnership with coastal cities and counties, plans and regulates the use of land and water in the coastal zone. The Coastal Act includes specific policies (see Chapter 3) that address issues such as shoreline public access and recreation, lower cost visitor accommodations, terrestrial and marine habitat protection, visual resources, landform alteration, agricultural lands, commercial fisheries, industrial uses, water quality, offshore oil and gas development, transportation, development design, power plants, ports, and public works. Development activities in the coastal zone generally require a coastal permit from either the CCC or the local government: (1) the CCC retains jurisdiction over the immediate shoreline areas below the mean high tide line and offshore areas to the 3 nautical mile State water limit; and (2) following certification of county- and municipality-developed Local Coastal Programs, the CCC has delegated permit authority to many local governments for the portions of their jurisdictions within the coastal zone. The CCC also implements the CZMA as it applies to federal activities (e.g., development projects, permits, and licenses) in the coastal zone by reviewing specified federal actions for consistency with the enforceable policies of Chapter 3 of the Coastal Act.
4.1 GEOLOGICAL RESOURCES		
U.S.	The International Building Code (IBC)	The IBC sets design standards to accommodate a “maximum considered earthquake” or MCE, based on a project’s regional location, site characteristics, and other factors.
CA	California Building Code (CBC) (Cal. Code Regs., tit. 23)	The State of California provides a minimum standard for building design through the CBC, which is based on the IBC, but has been modified for conditions unique to California. The CBC is selectively adopted by local jurisdictions, based on local conditions. Relevant CBC sections include the following: Chapter 16 contains specific requirements for seismic safety; Chapter 18 regulates excavation, foundations, and retaining walls; Chapter 33 contains specific requirements pertaining to site demolition, excavation, and construction to protect people and property from hazards associated with excavation cave-ins and falling debris or construction materials; Chapter 70 regulates grading activities, including drainage and erosion control; and Construction activities are subject to occupational safety standards for excavation, shoring, and trenching, as specified in CBC section A33 and California Division of Occupational Safety and Health regulations (Cal. Code Regs., tit. 8).
CA	Alquist-Priolo Earth-quake Fault Zoning Act (Pub. Resources Code, §§ 2621-2630)	This Act requires that "sufficiently active" and "well-defined" earthquake fault zones be delineated by the State Geologist. The criteria most commonly used to estimate fault activity in California are described in this act, which addresses only surface fault-rupture hazards. Legislative guidelines to determine fault activity status are based on the age of the youngest geologic unit offset by the fault. This legislation prohibits the construction of buildings used for human occupancy on active and potentially active surface faults. However, only those potentially active faults that have a relatively high potential for ground rupture are identified as fault zones. Therefore, not all potentially active faults are zoned under the Alquist-Priolo Earthquake Fault Zone, as designated by the State of California.
CA	California Seismic Hazards Mapping Act (Pub. Resources Code, § 2690 and following as Division 2, Chapter 7.8)	These regulations were promulgated for the purpose of promoting public safety by protecting against the effects of strong ground shaking, liquefaction, landslides, other ground failures, or other hazards caused by earthquakes. Special Publication 117, *Guidelines for Evaluating and Mitigating Seismic Hazards in California* (California Division of Mines and Geology [CDMG] 1997), constitutes the guidelines for evaluating seismic hazards other than surface fault-rupture, and for recommending MMs as required by Public Resources Code section 2695, subdivision (a). To date the California Geological Survey (CGS) has not zoned offshore California under the Seismic Hazard Mapping Act.

Table 4.0-1 Major U.S. and State Laws, Regulations, and Policies Potentially Applicable to the Project (continued)

CA	Public Resources Code, Division 6, Parts 1 and 2	The CSLC issues and administers oil and gas leases covering tide and submerged lands in accordance with Division 6, Parts 1 and 2 of the Public Resources Code and Title 2 of the California Code of Regulations. Relevant provisions of the Public Resources Code include the following: section 6829 includes provisions for specifying methods of operation and standard requirements for conducting operations properly; the prevention of waste, the protection of the safety and health of the workers; and the liability of the lessee for personal injuries and property damage; section 6829.2 includes provisions for the possible arresting or amelioration of land subsidence; and sections 6873.2 and 6873.5 include provisions for carrying out the requirements of CEQA.
CA	California Code of Regulations, Title 2	The CSLC issues and administers oil and gas leases covering tide and submerged lands in accordance with Division 6, Parts 1 and 2 of the Public Resources Code and Title 2 of the California Code of Regulations. Relevant provisions of the California Code of Regulations include the following. Article 3.2 pertains to oil and gas drilling regulations. Article 3.3 pertains to oil and gas production operations on tide and submerged lands under the jurisdiction of CSLC, and is applicable to operations conducted from mobile rigs, fixed offshore structures and upland locations serving these leases. Provisions in this article include administrative prevention and elimination of any contamination or pollution of the ocean and tidelands, prevention of waste, for the protection of human health, regulations on wellhead equipment, subsurface safety valves, surface safety valves, remedial and well maintenance work, supervision and training, anomalous casing annulus pressure, subsurface injection, conversion of a well to fluid injection (requires prior approval of CSLC), waste disposal, pressure relief valves, personal protective equipment, and pipeline inspections. Article 3.4 pertains to oil and gas drilling and production to operations on State oil and gas leases located on State tide and submerged lands under the jurisdiction of the CSLC, and is applicable to operations conducted from mobile rigs, fixed offshore structures and upland locations serving these leases. The article includes provisions for administration, prohibitions of pollution and contamination, suspension of operations and corrective action, disposal of drill cuttings and drilling muds, oil spill contingency plan requirements, pollution control and removal equipment, critical operations and curtailment plans, and pollution reports to the USCG and State OES. Article 3.5, which pertains to disposal of royalty oil, gas, or other hydrocarbons, sets forth the procedures whereby the CSLC may enter into agreements for the disposition and sale of oil, gas, or other hydrocarbons. Article 3.6 (Cal. Code Regs., tit. 2, §§ 2170-2175) includes (1) requirements for operators to prepare an operations manual describing equipment and procedures which the operator employs or will employ to protect public health and safety and the environment, and (2) provisions for development and maintenance of emergency response plans that include natural disaster response planning.
CA	Coastal Act Chapter 3 Policies (see also under Multiple Environmental Issues)	With respect to geological resources, Coastal Act section 30253 requires, in part, that: New development shall: (a) Minimize risks to life and property in areas of high geologic, flood, and fire hazard; and (b) Assure stability and structural integrity, and neither create nor contribute significantly to erosion, geologic instability, or destruction of the site or surrounding area or in any way require the construction of protective devices that would substantially alter natural landforms along bluffs and cliffs. Section 30243 also states in part that the long-term productivity of soils and timberlands shall be protected.

Table 4.0-1 Major U.S. and State Laws, Regulations, and Policies Potentially Applicable to the Project (continued)

4.2 SAFETY		
U.S.	Oil Pollution Act (OPA) of 1990	The OPA of 1990 includes provisions to expand prevention and preparedness activities, improve response capabilities, provide funding for natural resource damage assessments, ensure that shippers and oil companies pay the costs of spills that do occur, and establish an expanded research and development program. Pursuant to a Memorandum of Understanding (MOU) established to divide areas of responsibility, the USCG is responsible for tank vessels and marine terminals, the U.S. Environmental Protection Agency (EPA) for tank farms, and the Research and Special Programs Administration (RSPA) for pipelines; each of these agencies has developed regulations for its area of responsibility. In addition, the Secretary of Interior is responsible for spill prevention, oil-spill contingency plans, oil-spill containment and clean-up equipment, financial responsibility certification, and civil penalties for offshore facilities and associated pipelines in all Federal and State Waters. The U.S. Department of Homeland Security was designated by the USCG as the lead agency for offshore oil spill response, which includes responsibility for coordination of Federal responses to marine emergencies. All facilities and vessels that have the potential to release oil into navigable waters are required by the OPA to have up-to-date oil spill response plans and to have submitted them to the appropriate Federal agency for review and approval. Of particular importance in the OPA is the requirement for facilities and vessels to demonstrate that they have sufficient response equipment under contract to respond to and clean up a worst-case spill.
U.S.	Hazardous Liquid Pipeline Safety Act of 1979	Hazardous liquid pipelines are under the jurisdiction of the U.S. Department of Transportation (DOT). This Act includes requirements for accident reporting, design, and construction requirements, and prescribes minimum requirements for hydrostatic testing, compliance dates, test pressures, and duration; test medium; and records. It also specifies minimum requirements for operating and maintaining steel pipeline systems.
U.S.	40 CFR Parts 109, 110, 112, 113, and 114	The Spill Prevention Countermeasures and Control (SPCC) plans covered in these regulatory programs apply to oil storage and transportation facilities and terminals, tank farms, bulk plants, oil refineries, and production facilities, as well as bulk oil consumers (e.g., apartment houses, office buildings, schools, hospitals, government facilities). These regulations include minimum criteria for developing oil-removal contingency plans, prohibit discharge of oil such that applicable water quality standards would be violated, and address oil spill prevention and preparation of SPCC plans. They also establish financial liability limits and provide civil penalties for violations of the oil spill regulations.
CA	California Code of Regulations, Title 2, Division 3, Chapter 1	CSLC regulations contained in the California Code of Regulations, Title 2, Division 3, Chapter 1, Article 3 pertain to oil and gas leases, exploration permits, and operating requirements, as described below. Article 3.2 pertains to oil and gas drilling regulations. Article 3.3 pertains to oil and gas production operations on tide and submerged lands under the jurisdiction of CSLC, and is applicable to operations conducted from mobile rigs, fixed offshore structures and upland locations serving these leases. Provisions in this article include administrative prevention and elimination of any contamination or pollution of the ocean and tidelands, prevention of waste, for the protection of human health, regulations on wellhead equipment, subsurface safety valves, surface safety valves, remedial and well maintenance work, supervision and training, anomalous casing annulus pressure, subsurface injection, conversion of a well to fluid injection (requires prior approval of CSLC), waste disposal, pressure relief valves, personal protective equipment, and pipeline inspections. Article 3.4 pertains to oil and gas drilling and production to operations on State oil and gas leases located on State

Table 4.0-1 Major U.S. and State Laws, Regulations, and Policies Potentially Applicable to the Project (continued)

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CA	California Public Resources Code, Division 6, Parts 1 and 2	The CSLC issues and administers oil and gas leases covering tide and submerged lands in accordance with the provisions of Division 6, Parts 1 and 2 of the California Public Resources Code, including the following sections: Public Resources Code section 6829 includes provisions for specifying methods of operation and standard requirements for conducting operations properly; the prevention of waste, the protection of the safety and health of the workers; and the liability of the lessee for personal injuries and property damage; Section 6829.2 includes provisions for the possible arresting or amelioration of land subsidence; and Sections 6873.2 and 6873.5 include provisions for carrying out the requirements of CEQA.
CA	Lempert-Keene-Seastrand Oil Spill Prevention and Response Act (OSPRA; Gov. Code, § 8670.1 et seq., Pub. Resources Code, § 8750 et seq., and Rev. & Tax. Code, § 46001 et seq.)	The OSPRA and its implementing regulations seek to protect State waters from oil pollution and to plan for the effective and immediate response, removal, abatement, and cleanup in the event of an oil spill. The Act requires applicable operators to prepare and implement marine oil spill contingency plans and to demonstrate financial responsibility, and requires immediate cleanup of spills, following the approved contingency plans, and fully mitigating impacts on wildlife. The Act assigns primary authority to the Office of Spill Prevention and Response (OSPR) division within the California Department of Fish and Wildlife (CDFW) to direct prevention, removal, abatement, response, containment, and cleanup efforts with regard to all aspects of any oil spill in the marine waters of the State; the CSLC is also provided with authority for oil spill prevention from and inspection of marine facilities. Notification is required to the Governor's State Office of Emergency Services (OES), which in turn notifies the response agencies, of all oil spills in the marine environment, regardless of size. The Act also created the Oil Spill Prevention and Administration Fund and the Oil Spill Response Trust Fund. Pipeline operators pay fees into the first of these funds for pipelines transporting oil into the State across, under, or through marine waters.
CA	Coastal Act Chapter 3 Policies (see also under Multiple Environmental Issues)	Section 30232 of the Coastal Act addresses hazardous materials spills and states that "Protection against the spillage of crude oil, gas, petroleum products, or hazardous substances shall be provided in relation to any development or transportation of such materials. Effective containment and cleanup facilities and procedures shall be provided for accidental spills that do occur."
CA	Elder California Pipeline Safety Act of 1981 (Gov. Code, § 51010-51018) &	The California Pipeline Safety Act gives regulatory jurisdiction to the California State Fire Marshal (CSFM) for the safety of all intrastate hazardous liquid pipelines and all interstate pipelines used for the transportation of hazardous or highly volatile liquid substances. The law establishes the governing rules for interstate pipelines to be the Federal Hazardous Liquid Pipeline Safety Act and Federal pipeline safety regulations. Government Code sections 51010 through 51018 provide specific safety requirements that are more stringent than the Federal rules, including periodic

Table 4.0-1 Major U.S. and State Laws, Regulations, and Policies Potentially Applicable to the Project (continued)

	California Code of Regulations, Title 19, Public Safety	hydrostatic testing of pipelines, pipeline leak detection, and a requirement that all leaks be reported. Under California Code of Regulations, Title 19, Public Safety, the CSFM develops regulations relating to fire and life safety. These regulations have been prepared and adopted to establish minimum standards for the prevention of fire and for protection of life and property against fire, explosion, and panic. The CSFM also adopts and administers the regulations and standards considered necessary under the California Health and Safety Code to protect life and property, including California Health and Safety Code sections 13160 (Portable Fire Extinguishers) and 13195 (Automatic Fire Extinguishers Systems).
CA	Oil Pipeline Environmental Responsibility Act (Assembly Bill [AB] 1868)	This Act requires every pipeline corporation qualifying as a public utility and transporting crude oil in a public utility oil pipeline system to be held strictly liable for any damages incurred by "any injured party which arise out of, or caused by, the discharge or leaking of crude oil or any fraction thereof...." The law applies only to public utility pipelines for which construction would be completed after January 1, 1996, or that part of an existing utility pipeline that is being relocated after the above date and is more than 3 miles in length.
4.3 HAZARDOUS MATERIALS		
U.S.	Resource Conservation and Recovery Act (RCRA) (42 USC 6901 et seq.)	The RCRA authorizes the U.S. EPA to control hazardous waste from "cradle-to-grave," which encompasses its generation, transportation, treatment, storage, and disposal. RCRA's Federal Hazardous and Solid Waste Amendments from 1984 include waste minimization and phasing out land disposal of hazardous waste as well as corrective action for releases. The Department of Toxic Substances Control is the lead State agency for corrective action associated with RCRA facility investigations and remediation.
U.S.	California Toxics Rule (40 CFR 131)	In 2000, the U.S. EPA promulgated numeric water quality criteria for priority toxic pollutants and other water quality standards provisions to be applied to waters in the State of California. U.S. EPA promulgated this rule based on the Administrator's determination that the numeric criteria are necessary in the State of California to protect human health and the environment. (Under CWA section 303(c)(2)(B), the U.S. EPA requires states to adopt numeric water quality criteria for priority toxic pollutants for which the U.S. EPA has issued criteria guidance, and the presence or discharge of which could reasonably be expected to interfere with maintaining designated uses.) These criteria have been adopted by the State; together with State-adopted designated uses, they satisfy CWA requirements for the establishment of water quality standards for California inland surface waters, enclosed bays, and estuaries.
U.S.	National Oil and Hazardous Substances Pollution Contingency Plan (NCP) (40 CFR 300)	Authorized under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), 42 USC 9605, as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), Pub. L. 99 through 499; and by CWA section 311(d), as amended by the Oil Pollution Act of 1990 (OPA), Pub. L. 101 through 380. The NCP outlines requirements for responding to both oil spills and releases of hazardous substances. It specifies compliance, but does not require the preparation of a written plan. It also provides a comprehensive system for reporting, spill containment, and cleanup. The USCG and the U.S. EPA co-chair the National Response Team. In accordance with 40 CFR 300.175, the USCG has responsibility for oversight of regional response for oil spills in "coastal zones," as described in 40 CFR 300.120.
U.S.	Toxic Substances Control Act (TSCA) (15 USC 2601–2692)	The TSCA authorizes the U.S. EPA to require reporting, record-keeping, testing requirements, and restrictions related to chemical substances and/or mixtures. It also addresses production, importation, use, and disposal of specific chemicals, such as polychlorinated biphenyls (PCBs), asbestos-containing materials, lead-based paint, and petroleum.

Table 4.0-1 Major U.S. and State Laws, Regulations, and Policies Potentially Applicable to the Project (continued)

CA	NPDES Storm Water Permits Associated with Construction and Industrial Activities	The Central Coast RWQCB oversees on-site treatment of "California Designated, Non-Hazardous Waste" and enforces water quality thresholds and standards set forth in the Basin Plan. Venoco would be required to obtain a General Construction Activities Storm Water Permit under the NPDES program, and develop and implement a Storm Water Pollution Prevention Plan (SWPPP) that includes best management practices (BMPs) to control erosion, siltation, turbidity, and other contaminants associated with construction activities. The SWPPP would include BMPs to control or prevent the release of non-storm water discharges, such as crude oil, in storm water runoff. Additional information is provided in Section 4.5, Hydrology, Water Resources, and Water Quality.
CA	Other	California Health and Safety Code Regulations, Titles 22 and 26: regulates the management of hazardous materials - See above under Section 4.2, Safety Lempert-Keene-Seastrand Oil Spill Prevention and Response Act – See above under Section 4.2, Safety. Coastal Act section 30232 – See above under Section 4.2, Safety. California Seismic Hazards Mapping Act and Seismic Hazards Mapping – See above under Section 4.1, Geological Resources. Hazardous Waste Control Act (Cal. Code Regs., tit. 26) defines requirements for proper management of hazardous materials. Porter-Cologne Water Quality Control Act – See under Section 4.5, Hydrology, Water Resources, and Water Quality.
4.4 AIR QUALITY AND GREENHOUSE GASES		
U.S.	Federal Clean Air Act (FCAA) (42 USC 7401 et seq.)	The FCAA requires the U.S. EPA to identify National Ambient Air Quality Standards (NAAQS) to protect public health and welfare. National standards are established for ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulate matter (PM_{10} and $PM_{2.5}$), and lead (Pb). In 2007, the U.S. Supreme Court ruled that carbon dioxide (CO_2) is an air pollutant as defined under the FCAA, and that the U.S. EPA has authority to regulate GHG emissions. Pursuant to the 1990 FCAA Amendments, U.S. EPA classifies air basins (or portions thereof) as in "attainment" or "nonattainment" for each criteria air pollutant, based on whether or not the NAAQS are achieved. The classification is determined by comparing monitoring data with State and Federal standards. An area is classified as in "attainment" for a pollutant if the pollutant concentration is lower than the standard. An area is classified as in "nonattainment" for a pollutant if the pollutant concentration exceeds the standard. An area is designated "unclassified" for a pollutant if there are not enough data available for comparisons.
CA	California Clean Air Act of 1988 (CCAA) (AB 2595)	The CCAA requires all air districts in the State to endeavor to achieve and maintain State ambient air quality standards for O_3, CO, SO_2, NO_2, and PM; attainment plans for areas that did not demonstrate attainment of State standards until after 1997 must specify emission reduction strategies and meet milestones to implement emission controls and achieve more healthful air quality. California's ambient air standards are generally stricter than national standards for the same pollutants; the State has also established standards for sulfates, hydrogen sulfide (H_2S), vinyl chloride, and visibility-reducing particles. CARB sets air quality standards for the State at levels to protect public health and welfare with an adequate margin of safety. The CAAQS describe adverse conditions; that is, pollution levels must be below these standards before a basin can attain the standard. Air quality is considered in "attainment" if pollutant levels are continuously below or equal to the standards and violate the standards no more than once each year. The 1992 CCAA Amendments divide O_3 nonattainment areas into four categories of pollutant levels (moderate, serious, severe, and extreme) to which progressively more stringent requirements apply.

Table 4.0-1 Major U.S. and State Laws, Regulations, and Policies Potentially Applicable to the Project (continued)

CA	California Global Warming Solutions Act of 2006 (AB 32)	Under AB 32, CARB is responsible for monitoring and reducing GHG emissions in the State and for establishing a statewide GHG emissions cap for 2020 that is based on 1990 emissions levels. CARB (2009) has adopted the AB 32 Climate Change Scoping Plan (Scoping Plan), which contains the main strategies for California to implement to reduce CO_2 equivalent (CO_2e) emissions by 169 million metric tons (MMT) from the State's projected 2020 emissions level of 596 MMT CO_2e under a business-as-usual scenario. The Scoping Plan breaks down the amount of GHG emissions reductions the CARB recommends for each emissions sector of the State's GHG inventory, but does not directly discuss GHG emissions generated by construction activities.
CA	Coastal Act Chapter 3 Policies (see also under Multiple Environmental Issues)	Coastal Act section 30253, subdivision (c) requires that new development shall Be consistent with requirements imposed by an air pollution control district or the State Air Resources Board as to each particular development.
CA	Other	Pursuant to SB 97, the State Office of Planning and Research prepared guidelines for the feasible mitigation of GHG emissions or the effects of GHG emissions, which were adopted by the Natural Resources Agency in 2009 and became effective in March 2010. These amendments to the State CEQA Guidelines establish a framework to address global climate change impacts in the CEQA process, and include revisions to the CEQA Environmental Checklist Form (Appendix G of the Guidelines) and the Energy Conservation Appendix (Appendix F of the Guidelines). A new section was also added to the State CEQA Guidelines (§ 15064.4) that provides an approach to assessing impacts from GHGs. SB 375 (effective January 1, 2009) requires CARB to develop regional reduction targets for GHG emissions, and prompted the creation of regional land use and transportation plans to reduce emissions from passenger vehicle use throughout the State. The targets apply to the regions covered by California's 18 metropolitan planning organizations (MPOs). The 18 MPOs are required to develop regional land use and transportation plans and demonstrate an ability to attain the proposed reduction targets by 2020 and 2035. Executive Order S-01-07 set forth a low carbon fuel standard for California; the carbon intensity of California's transportation fuels is to be reduced by at least 10 percent by 2020. Executive Order S-3-05 established statewide GHG emission targets of reducing emissions to 2000 levels by 2010, to 1990 levels by 2020, and to 80 percent below the 1990 level by 2050. Under California's Diesel Fuel Regulations, diesel fuel used in motor vehicles, except harbor craft, has been limited to 500 parts per million (ppm) sulfur since 1993. The sulfur limit was reduced to 15 ppm beginning September 1, 2006, and harbor craft were included starting in 2009. CARB's Heavy Duty Diesel Truck Idling Rule (Cal. Code Regs., tit. 13, § 2485) prohibits heavy-duty diesel trucks from idling for longer than 5 minutes at a time. Truck idling for longer than 5 minutes while queuing is allowed, however, provided the queue is located beyond 100 feet (30 meters) from any homes or schools. The Statewide Portable Equipment Registration Program (PERP) establishes a uniform program to regulate portable engines/engine-driven equipment units. Once registered in the PERP, engines and equipment units may operate throughout California without the need to obtain individual permits from local air districts.

Table 4.0-1 Major U.S. and State Laws, Regulations, and Policies Potentially Applicable to the Project (continued)

4.5 HYDROLOGY, WATER RESOURCES, AND WATER QUALITY		
U.S.	Clean Water Act (CWA) (33 USC 1251 et seq.)	The CWA is a comprehensive piece of legislation that generally includes reference to the Federal Water Pollution Control Act of 1972, and its substantial supplementation by the CWA of 1977. Both Acts were subsequently amended in 1981, 1987, and 1993. Overall, the CWA seeks to protect the nation's water from pollution by setting water quality standards for surface water and by limiting the discharge of effluents into waters of the U.S. These water quality standards are promulgated by the U.S. EPA and enforced in California by the SWRCB and nine Regional Water Quality Control Boards (RWQCBs). The CWA also provides for development of municipal and industrial wastewater treatment standards and a permitting system to control wastewater discharges to surface waters. Under CWA section 404, the USACE has primary Federal responsibility for administering regulations that concern waters of the U.S. wetlands, which are defined as those areas that are inundated or saturated by surface or groundwater at a frequency and duration that are sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions.
U.S.	National Pollutant Discharge Elimination System (NPDES)	The CWA also established the basic structure for regulating discharges of pollutants into the waters of the U.S. through the NPDES, which specifies minimum standards for the quality of discharged waters. It required states to establish standards specific to water bodies and designate the types of pollutants to be regulated, including total suspended solids and oil. Under NPDES, all point sources that discharge directly into waterways are required to obtain a permit regulating their discharge. NPDES permits fall under the jurisdiction of the SWRCB or RWQCBs when the discharge occurs within the 3 nautical mile territorial limit.
U.S.	Marine Protection, Research, and Sanctuary Act	In 1972, this Act established the National Marine Sanctuary Program, which is administered by the National Oceanic and Atmospheric Administration (NOAA). Channel Islands National Marine Sanctuary (CINMS) is located within the Project study area. The primary goal of establishing and maintaining National Marine Sanctuaries is the protection of the natural and cultural resources contained within their boundaries. Designated in 1980, the CINMS surrounds the four northern Channel Islands out to a distance of six nm. Sanctuary regulations prohibit exploring for, developing, and producing hydrocarbons within the CINMS, except pursuant to leases executed prior to March 30, 1981, and except the laying of pipeline, provided specified oil spill contingency equipment is available at the site of such operations. In 2003, regulations went into effect that restrict fishing and other extractive uses in 10 marine reserves and two conservation areas within the CINMS (CDFW 2001, CINMS 2001, and CDFW 2002).
U.S.	Rivers and Harbors Act (33 USC 401)	This Act governs specified activities in "navigable waters" (waters subject to the ebb and flow of the tide or that are presently used, have been used in the past, or may be susceptible for use to transport interstate or foreign commerce). Specifically, it limits the construction of structures and the discharge of fill into navigable waters of the U.S. Under section 10 of the Rivers and Harbors Act, the building of any wharf, pier, jetty, or other structure is prohibited without Congressional approval, and excavation or fill within navigable waters requires approval from the USACE.
U.S.	Other	Oil Pollution Act – See above under Section 4.2, Safety. The Marine Plastic Pollution Research and Control Act prohibits the discharge of plastic, garbage, and floating wood scraps within 3 nm of land. Beyond 3 nm, garbage must be ground to less than one inch, but discharge of plastic and floating wood scraps is still restricted. This Act requires manned offshore platforms, drilling rigs, and support vessels operating under a Federal oil and gas lease to develop waste management plans.

Table 4.0-1 Major U.S. and State Laws, Regulations, and Policies Potentially Applicable to the Project (continued)

CA	Porter-Cologne Water Quality Control Act (Cal. Water Code, § 13000 et seq.) (Porter-Cologne)	Porter-Cologne is the principal law governing water quality in California. The Act established the SWRCB and nine RWQCBs who have primary responsibility for protecting State water quality and the beneficial uses of State waters. Porter-Cologne also implements many provisions of the Federal CWA, such as the National Pollutant Discharge Elimination System (NPDES) permitting program. Pursuant to the CWA § 401, applicants for a Federal license or permit for activities that may result in any discharge to waters of the U. S. must seek a Water Quality Certification (Certification) from the State in which the discharge originates. Such Certification is based on a finding that the discharge will meet water quality standards and other appropriate requirements of State law. In California, RWQCBs issue or deny certification for discharges within their jurisdiction. The SWRCB has this responsibility where projects or activities affect waters in more than one RWQCB's jurisdiction. If the SWRCB or a RWQCB imposes a condition on its Certification, those conditions must be included in the Federal permit or license. Statewide Water Quality Control Plans include: individual RWQCB Basin Plans; the California Ocean Plan; the San Francisco Bay/Sacramento-San Joaquin Delta Estuary Water Quality Control Plan (Bay-Delta Plan); the Water Quality Control Plan for Enclosed Bays and Estuaries of California; and the Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays and Estuaries of California (Thermal Plan). These Plans contain enforceable standards for the various waters they address. For example: Basin Plan. Porter-Cologne (§ 13240) requires each RWQCB to formulate and adopt a Basin Plan for all areas within the Region. Each RWQCB must establish water quality objectives to ensure the reasonable protection of beneficial uses and a program of implementation for achieving water quality objectives within the basin plans. 40 CFR 131 requires each State to adopt water quality standards by designating water uses to be protected and adopting water quality criteria that protect the designated uses. In California, the beneficial uses and water quality objectives are the State's water quality standards. The California Ocean Plan establishes water quality objectives for California's ocean waters and provides the basis for regulation of wastes discharged into the State's ocean and coastal waters. For example, the Ocean Plan incorporates the State water quality standards that apply to all NPDES permits for discharges to ocean waters.
CA	Other California Water Code sections	Section 13142.5 of the California Water Code provides marine water quality policies stating that wastewater discharges shall be treated to protect present and future beneficial uses, and, where feasible, to restore past beneficial uses of the receiving waters. The highest priority is given to improving or eliminating discharges that adversely affect wetlands, estuaries, and other biologically sensitive sites; areas important for water contact sports; areas that produce shellfish for human consumption; and ocean areas subject to massive waste discharge. Section 13170.2 of the California Water Code directs the SWRCB to formulate and adopt a water quality control plan for the ocean waters of California. The SWRCB first adopted this plan, known as the California Ocean Plan, in 1972. The California Water Code also requires a review of the plan at least every three years to ensure that current standards are adequate and are not allowing degradation to indigenous marine species or posing a threat to human health. The amendments to the Ocean Plan are reviewed and approved by the U.S. EPA under the CWA. The Ocean Plan establishes water quality objectives for California's ocean waters and provides the basis for regulation of wastes discharged into the State's coastal waters. The plan applies to point and non-point sources. In addition, the Ocean Plan identifies applicable beneficial uses of marine waters and sets narrative and numerical water quality objectives to protect beneficial uses.

Table 4.0-1 Major U.S. and State Laws, Regulations, and Policies Potentially Applicable to the Project (continued)

CA	Coastal Act Chapter 3 Policies (see also under Multiple Environmental Issues)	Section 30231 states The biological productivity and the quality of coastal waters, streams, wetlands, estuaries, and lakes appropriate to maintain optimum populations of marine organisms and for the protection of human health shall be maintained and, where feasible, restored through, among other means, minimizing adverse effects of waste water discharges and entrainment, controlling runoff, preventing depletion of ground water supplies and substantial interference with surface water flow, encouraging waste water reclamation, maintaining natural vegetation buffer areas that protect riparian habitats, and minimizing alteration of natural streams. See also: Section 30233 (Diking, filling or dredging; continued movement of sediment and nutrients); and Section 30235 (Construction altering natural shoreline), which states in part …Existing marine structures causing water stagnation contributing to pollution problems and fish kills should be phased out or upgraded where feasible.
4.6 MARINE BIOLOGICAL RESOURCES & 4.7 TERRESTRIAL BIOLOGICAL RESOURCES		
U.S.	Endangered Species Act (ESA) (7 USC 136, 16 USC 1531 et seq.)	The ESA, which is administered in California by the U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS), provides protection to species listed as threatened or endangered, or proposed for listing as threatened or endangered. Section 9 prohibits the "take" of any member of a listed species. · Take is defined as "...to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." · Harass is "an intentional or negligent act or omission that creates the likelihood of injury to a listed species by annoying it to such an extent as to significantly disrupt normal behavior patterns that include, but are not limited to, breeding, feeding, or sheltering." · Harm is defined as "...significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns such as breeding, feeding, or sheltering." When applicants are proposing projects with a Federal nexus that "may affect" a federally listed or proposed species, the Federal agency is required to consult with the USFWS or NMFS, as appropriate, under Section 7, which provides that each Federal agency must ensure that any actions authorized, funded, or carried out by the agency are not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of areas determined to be critical habitat.
U.S.	Magnuson-Stevens Fishery Conservation and Management Act (MSA) (16 USC 1801 et seq.)	The MSA is the primary law governing marine fisheries management in U.S. Federal waters. The MSA was first enacted in 1976 and amended in 1996. Amendments to the 1996 MSA require the identification of Essential Fish Habitat (EFH) for federally managed species and the implementation of measures to conserve and enhance this habitat. Any project requiring Federal authorization, such as a USACE permit, is required to complete and submit an EFH Assessment with the application and either show that no significant impacts to the essential habitat of managed species are expected or identify mitigations to reduce those impacts. Under the MSA, Congress defined EFH as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity" (16 USC 1802(10)). The EFH provisions of the MSA offer resource managers a means to heighten consideration of fish habitat in resource management. Pursuant to section 305(b)(2), Federal agencies shall consult with the NMFS regarding any action they authorize, fund, or undertake that might adversely affect EFH.
U.S.	Marine Mammal Protection Act	The MMPA is designed to protect and conserve marine mammals and their habitats. It prohibits takes of all marine mammals in the U.S. (including territorial seas) with few exceptions. The NMFS may issue a take permit under

Table 4.0-1 Major U.S. and State Laws, Regulations, and Policies Potentially Applicable to the Project (continued)

	(MMPA) (16 USC 1361 et seq.)	section 104 if the activities are consistent with the purposes of the MMPA and applicable regulations at 50 CFR, Part 216. The NMFS must also find that the manner of taking is "humane" as defined in the MMPA. If lethal taking of a marine mammal is requested, the applicant must demonstrate that using a non-lethal method is not feasible.
U.S.	Migratory Bird Treaty Act (MBTA) and Executive Order 13186	The MBTA governs the taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts and nest, and requires harvests to be limited to levels that prevent overuse. Further, the MBTA prohibits the take, possession, import, export, transport, selling, purchase, barter, or offering for sale, purchase, or barter, of any migratory bird, their eggs, parts, and nests, except as authorized under a valid permit (50 CFR 21.11).
U.S.	Fish and Wildlife Coordination Act of 1958	The Fish and Wildlife Coordination Act requires that whenever a body of water is proposed to be controlled or modified, the lead agency must consult the State and Federal agencies responsible for fish and wildlife management (e.g., USFWS, CDFW, and NOAA). This Act allows for recommendations addressing adverse impacts associated with a proposed project, and for mitigating or compensating for impacts on fish and wildlife.
U.S.	Protection of Wetlands (Executive Order 11990)	Under this EO each Federal agency must provide leadership and take action to minimize the destruction, loss or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands. Each agency, to the extent permitted by law, must avoid undertaking or providing assistance for new construction located in wetlands unless the head of the agency finds: there is no practical alternative to such construction; the proposed action includes all practical measures to minimize harm to wetlands that may result from such use. In making this finding the head of the agency may take into account economic, environmental and other pertinent factors (Section 2(a)). Each agency must also provide opportunity for early public review of any plans or proposals for new construction in wetlands (Section 2(b)).
U.S.	Invasive Species (Executive Order 13112)	This EO addresses the prevention of the introduction of invasive species and provides for their control and minimization of the economic, ecological, and human health impacts the invasive species causes. The EO establishes the Invasive Species Council, which is responsible for the preparation and issuance of the National Invasive Species Management Plan, which details and recommends performance-oriented goals and objectives and specific measures of success for Federal Agencies.
CA	California Endangered Species Act (CESA) (Fish & G. Code, § 2050 et seq.)	The CESA provides for the protection of rare, threatened, and endangered plants and animals, as recognized by the CDFW, and prohibits the taking of such species without its authorization. Furthermore, the CESA provides protection for those species that are designated as candidates for threatened or endangered listings. Under the CESA, the CDFW has the responsibility for maintaining a list of threatened species and endangered species (Fish & G. Code, § 2070). The CDFW also maintains a list of candidate species, which are species that the CDFW has formally noticed as under review for addition to the threatened or endangered species lists. The CDFW also maintains lists of Species of Special Concern that serve as watch lists. Pursuant to the requirements of the CESA, an agency reviewing a proposed project within its jurisdiction must determine whether any State-listed endangered or threatened species may be present in the project site and determine whether the project will have a potentially significant impact on such species. In addition, the CDFW encourages informal consultation on any proposed project that may affect a candidate species. The CESA also requires a permit to take a State-listed species through incidental or otherwise lawful activities (§ 2081, subd. (b)).

Table 4.0-1 Major U.S. and State Laws, Regulations, and Policies Potentially Applicable to the Project (continued)

CA	California Native Plant Protection Act (Fish & G. Code, § 1900 et seq.)	This Act is intended to preserve, protect, and enhance endangered or rare native plants in California. This Act includes provisions that prohibit the taking of listed rare or endangered plants from the wild and a salvage requirement for landowners. The Act directs the CDFW to establish criteria for determining what native plants are rare or endangered. Under section 1901, a species is endangered when its prospects for survival and reproduction are in immediate jeopardy from one or more causes. A species is rare when, although not threatened with immediate extinction, it is in such small numbers throughout its range that it may become endangered.
CA	Coastal Act Chapter 3 Policies (see also under Multiple Environmental Issues)	Section 30231. "The biological productivity and the quality of coastal waters, streams, wetlands, estuaries, and lakes appropriate to maintain optimum populations of marine organisms and for the protection of human health shall be maintained and, where feasible, restored through, among other means, minimizing adverse effects of waste water discharges and entrainment, controlling runoff, preventing depletion of ground water supplies and substantial interference with surface water flow, encouraging waste water reclamation, maintaining natural vegetation buffer areas that protect riparian habitats, and minimizing alteration of natural streams." Section 30232. "Protection against the spillage of crude oil, gas, petroleum products, or hazardous substances shall be provided in relation to any development or transportation of such materials. Effective containment and cleanup facilities and procedures shall be provided for accidental spills that do occur." Section 30233, which applies in part to development activities within or affecting wetlands and other sensitive areas among other requirements, identifies eight allowable uses, requires that the proposed project be the least environmentally damaging feasible alternative, and where applicable, requires feasible and appropriate mitigation. Section 30240 states: (a) Environmentally sensitive habitat areas shall be protected against any significant disruption of habitat values, and only uses dependent on those resources shall be allowed within those areas. (b) Development in areas adjacent to environmentally sensitive habitat areas and parks and recreation areas shall be sited and designed to prevent impacts which would significantly degrade those areas, and shall be compatible with the continuance of those habitat and recreation areas.
CA	Other	Lempert-Keene-Seastrand Oil Spill Prevention and Response Act – See above under Section 4.2, Safety. The California Species Preservation Act (Fish & G. Code, §§ 900-903) provides for the protection and enhancement of the amphibians, birds, fish, mammals, and reptiles of California. Fish and Game Code sections 3503 & 3503.5 prohibit the taking and possession of native birds' nests and eggs from all forms of needless take. These regulations also provide that it is unlawful to take, possess, or destroy any birds in the orders Falconiformes or Strigiformes (birds-of-prey) or to take, possess, or destroy the nests or eggs of any such bird except as otherwise provided by this Code or any regulation adopted pursuant thereto. Fish and Game Code sections 3511 (birds), 4700 (mammals), 5050 (reptiles and amphibians), & 5515 (fish) designate certain species as "fully protected." Fully protected species, or parts thereof, may not be taken or possessed at any time without permission by the CDFW. Fish and Game Code section 3513 does not include statutory or regulatory mechanism for obtaining an incidental take permit for the loss of non-game, migratory birds.

Table 4.0-1 Major U.S. and State Laws, Regulations, and Policies Potentially Applicable to the Project (continued)

4.8 LAND USE, PLANNING, AND RECREATION		
See above under Multiple Environmental Issues for laws, regulations, and policies related to land use and planning.		
CA	Coastal Act Chapter 3 Policies (see also under Multiple Environmental Issues)	Section 30220. Coastal areas suited for water-oriented recreational activities that cannot readily be provided at inland water areas shall be protected for such uses. Section 30221. Oceanfront land suitable for recreational use shall be protected for recreational use and development unless present and foreseeable future demand for public or commercial recreational activities that could be accommodated on the property is already adequately provided for in the area. Section 30222. The use of private lands suitable for visitor-serving commercial recreational facilities designed to enhance public opportunities for coastal recreation shall have priority over private residential, general industrial, or general commercial development, but not over agriculture or coastal-dependent industry. Section 30223. Upland areas necessary to support coastal recreational uses shall be reserved for such uses, where feasible. Section 30224. Increased recreational boating use of coastal waters shall be encouraged, in accordance with this division, by developing dry storage areas, increasing public launching facilities, providing additional berthing space in existing harbors, limiting non-water-dependent land uses that congest access corridors and preclude boating support facilities, providing harbors of refuge, and by providing for new boating facilities in natural harbors, new protected water areas, and in areas dredged from dry land.
4.9 PUBLIC SERVICES		
U.S.	Code of Federal Regulations, Title 29	· Under 29 CFR 1910.38, whenever an Occupational Safety and Health Administration (OSHA) standard requires one, an employer must have an Emergency Action Plan that must be in writing, kept in the workplace, and available to employees for review. An employer with 10 or fewer employees may communicate the plan orally to employees. Minimum elements of an emergency action plan are: o Procedures for reporting a fire or other emergency; o Procedures for emergency evacuation, including type of evacuation and exit route assignments; o Procedures to be followed by employees who remain to operate critical plant operations before they evacuate; o Procedures to account for all employees after evacuation; o Procedures to be followed by employees performing rescue or medical duties; and o The name or job title of every employee who may be contacted by employees who need more information about the plan or an explanation of their duties under the plan. · Under 29 CFR 1910.39, an employer must have a Fire Prevention Plan (FPP). A FPP must be in writing, be kept in the workplace, and be made available to employees for review; an employer with 10 or fewer employees may communicate the plan orally to employees. Minimum elements of a FPP are: o A list of all major fire hazards, proper hazardous material handling and storage procedures, potential ignition sources and their control, and the type of fire protection equipment necessary to control each major hazard; o Procedures to control accumulations of flammable and combustible waste materials; o Procedures for regular maintenance of safeguards installed on heat-producing equipment to prevent the accidental ignition of combustible materials;

Table 4.0-1 Major U.S. and State Laws, Regulations, and Policies Potentially Applicable to the Project (continued)

		o The name or job title of employees responsible for maintaining equipment to prevent or control sources of ignition or fires; and o The name or job title of employees responsible for the control of fuel source hazards. o An employer must inform employees upon initial assignment to a job of the fire hazards to which they are exposed and must also review with each employee those parts of the FPP necessary for self-protection. Under 29 CFR 1910.155, Subpart L, Fire Protection, employers are required to place and keep in proper working order fire safety equipment within facilities.
CA	Other	See above under Section 4.2, Safety.
4.10 TRANSPORTATION AND CIRCULATION		
CA	Caltrans	Caltrans is responsible for the design, construction, maintenance, and operation of the California State Highway System and the portion of the Interstate Highway System within State boundaries. Chapter 2, Article 3 of the Vehicle Code defines the powers and duties of the California Highway Patrol, which has enforcement responsibilities for the vehicle operation and highway use in the State.
4.11 NOISE		
U.S.	Noise Control Act (42 USC 4910)	The Noise Control Act required the U.S. EPA to establish noise emission criteria, as well as noise testing methods (40 CFR Chapter 1, Subpart Q). These criteria generally apply to interstate rail carriers and to some types of construction and transportation equipment. The U.S. EPA published a guideline (U.S. EPA 1974) containing recommendations for acceptable noise level limits affecting residential land use of 55 dBA L_{dn} for outdoors and 45 dBA L_{dn} for indoors.
U.S.	Department of Housing and Urban Development Environmental Standards (24 CFR Part 51)	The Department of Housing and Urban Development Environmental Standards forth the following exterior noise standards for new home construction (for interior noise levels, a goal of 45 dBA is set forth and attenuation requirements are geared to achieve that goal): 65 L_{dn} or less – Acceptable 65 L_{dn} and < 75 L_{dn} – Normally unacceptable, appropriate sound attenuation measures must be provided > 75 L_{dn} – Unacceptable
U.S.	NTIS 550\9-74-004, 1974	In response to a Federal mandate, the U.S. EPA provided guidance in NTIS 550\9-74-004, 1974 (“Information on Levels of Environmental Noise Requisite to Protect Health and Welfare with an Adequate Margin of Safety”), commonly referenced as the “Levels Document” that establishes an L_{dn} of 55 dBA as the requisite level, with an adequate margin of safety, for areas of outdoor uses including residences and recreation areas. The U.S. EPA recommendations contain a factor of safety and do not consider technical or economic feasibility (i.e., the document identifies safe levels of environmental noise exposure without consideration for achieving these levels or other potentially relevant considerations), and therefore should not be construed as standards or regulations.
CA	California Administrative Code, Title 4	The California Administrative Code, Title 4, which applies to airports operating under permit from the Caltrans Division of Aeronautics, defines a noise-impacted zone as any residential or other noise-sensitive use with CNEL 65 and above. The California Administrative Code, Title 2, establishes CNEL 45 as the maximum allowable indoor noise level resulting from exterior noise sources for multi-family residences.

Table 4.0-1 Major U.S. and State Laws, Regulations, and Policies Potentially Applicable to the Project (continued)

CA	Land Use Compatibility Guidelines from the now defunct California Office of Noise Control	State regulations for limiting population exposure to physically and/or psychologically significant noise levels include established guidelines and ordinances for roadway and aviation noise under Caltrans as well as the now defunct California Office of Noise Control. The California Office of Noise Control land use compatibility guidelines provided the following: An exterior noise level of 60 to 65 dBA Community Noise Equivalent Level (CNEL) is considered "normally acceptable" for residences. A noise level of 70 dBA CNEL is considered to be "conditionally acceptable" (i.e., the upper limit of "normally acceptable" noise levels for sensitive uses such as schools, libraries, hospitals, nursing homes, churches, parks, offices, and commercial/professional businesses). A noise level of greater than 75 dBA CNEL is considered "clearly unacceptable" for residences.
4.12 AESTHETICS/VISUAL RESOURCES		
CA	Coastal Act Chapter 3 Policies (see also under Multiple Environmental Issues)	The Coastal Act is concerned with protecting the public viewshed, including views from public areas, such as roads, beaches, coastal trails, and access ways. Section 30251 states: *Permitted development shall be sited and designed to protect views to and along the ocean and scenic coastal areas, to minimize the alteration of natural landforms, to be visually compatible with the character of the surrounding area, and, where feasible, to restore and enhance visual quality in visually degraded areas.*
4.13 CULTURAL, HISTORICAL, AND PALEONTOLOGICAL RESOURCES		
U.S.	Archaeological and Historic Preservation Act (AHPA)	The AHPA provides for the preservation of historical and archaeological data that might be irreparably lost or destroyed as a result of (1) flooding, the building of access roads, the erection of workmen's communities, the relocation of railroads and highways, and other alterations of terrain caused by the construction of a dam by an agency of the U.S. or by any private person or corporation holding a license issued by any such agency; or (2) any alteration of the terrain caused as a result of a Federal construction project or federally licensed project, activity, or program. This Act requires Federal agencies to notify the Secretary of the Interior when they find that any federally permitted activity or program may cause irreparable loss or destruction of significant scientific, prehistoric, historical, or archaeological data. The AHPA built upon the national policy, set out in the Historic Sites Act of 1935, "...to provide for the preservation of historic American sites, buildings, objects, and antiquities of national significance...."
U.S.	Archaeological Resources Protection Act (ARPA)	The ARPA states that archaeological resources on public or Indian lands are an accessible and irreplaceable part of the nation's heritage and: Establishes protection for archaeological resources to prevent loss and destruction due to uncontrolled excavations and pillaging; Encourages increased cooperation and exchange of information between government authorities, the professional archaeological community, and private individuals having collections of archaeological resources prior to the enactment of this Act; Establishes permit procedures to permit excavation or removal of archaeological resources (and associated activities) located on public or Indian land; and Defines excavation, removal, damage, or other alteration or defacing of archaeological resources as a "prohibited act" and provides for criminal and monetary rewards to be paid to individuals furnishing information leading to the

Table 4.0-1 Major U.S. and State Laws, Regulations, and Policies Potentially Applicable to the Project (continued)

		finding of a civil violation or conviction of a criminal violator. ARPA has both enforcement and permitting components. The enforcement provision provides for the imposition of both criminal and civil penalties against violators of the Act. The ARPA's permitting component allows for recovery of certain artifacts consistent with the standards and requirements of the NPS's Federal Archeology Program.
U.S.	National Historic Preservation Act (NHPA) (16 USC 470 et seq.)	This applies only to Federal undertakings. Archaeological resources are protected through the NHPA, as amended, and its implementing regulation, Protection of Historic Properties (36 CFR 800), the AHPA, and the ARPA. This Act presents a general policy of supporting and encouraging the preservation of prehistoric and historic resources for present and future generations by directing Federal agencies to assume responsibility for considering the historic resources in their activities. The State implements the NHPA through its statewide comprehensive cultural resource surveys and preservation programs coordinated by the California Office of Historic Preservation (OHP) in the State Department of Parks and Recreation, which also advises Federal agencies regarding potential effects on historic properties. The OHP also maintains the California Historic Resources Inventory. The State Historic Preservation Officer (SHPO) is an appointed official who implements historic preservation programs within the State's jurisdictions. Under the NHPA, historic properties include "any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places" (16 U.S.C. 470w [5]).
U.S.	Omnibus Public Land Management Act of 2009 - Public Law 111-11 (123 Stat. 991)	Public Law 111-011 at title VI, subtitle D lays out statutory requirements for Paleontological Resources Preservation (PRP). PRP provides definitions but requires the definition of some terms, and uses other terms and concepts that need further definition or details to clarify intent or enforcement. PRP identifies management requirements, collection requirements, curation requirements, need for both criminal and civil penalties, rewards and forfeiture, and the need for confidentiality of some significant resource locations. PRP at section 6310 also states that "As soon as practical after the date of enactment of this Act, the Secretary shall issue such regulations as are appropriate to carry out this subtitle, providing opportunities for public notice and comment."
CA	California Environmental Quality Act (CEQA) *(see Multiple Environmental Issues)*	As the CEQA lead agency, the CSLC is responsible for complying with all provisions of the CEQA and State CEQA Guidelines that relate to "historical resources." A historical resource includes: (1) a resource listed in, or eligible for listing in, the California Register of Historic Resources (CRHR); (2) a resource included in a local register of historical or identified as significant in an historical resource surveys; and (3) any resource that a lead agency determines to be historically significant for the purposes of CEQA, when supported by substantial evidence in light of the whole record. The CRHR was created to identify resources deemed worthy of preservation on a State level and was modeled closely after the National Register. The criteria, which are nearly identical to those of the National Register but focus on resources of statewide significance (see State CEQA Guidelines § 15064.5, subdivision (a)(3)), are defined as any resource that meets any of the following criteria: (1) Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage; (2) Is associated with lives of persons important in our past; (3) Embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values; or (4) Has yielded, or may be likely to yield, information important in prehistory or history. Properties listed, or formally designated as eligible for listing, on the National Register are automatically listed on the CRHR, as are certain State Landmarks and Points of Interest. A lead agency is not precluded from determining that the resource may be an historical resource as defined in Public Resources Code sections 5020.1, subdivision (j), or 5024.1 (State

Table 4.0-1 Major U.S. and State Laws, Regulations, and Policies Potentially Applicable to the Project (continued)

		CEQA Guidelines § 15064.5, subdivision (a)(4)).
CA	Coastal Act Chapter 3 Policies (see also under Multiple Environmental Issues)	Coastal Act Section 30244 states: Where development would adversely impact archaeological or paleontological resources as identified by the State Historic Preservation Officer, reasonable mitigation measures shall be required. (See also Coastal Act, under Multiple Environmental Issues)
CA	California Public Resources Code section 5097.5	Section 5097.5 of the California Public Resources Code prohibits excavation or removal of any "vertebrate paleontological site or historical feature, situated on public lands, except with the express permission of the public agency having jurisdiction over such lands." Penal Code section 623 spells out regulations for the protection of caves, including their natural, cultural, and paleontological contents. It specifies that no "material" (including all or any part of any paleontological item) will be removed from any natural geologically formed cavity or cave.
CA	Health and Safety Code section 7050.5	This code states that if human remains are exposed during construction, no further disturbance shall occur until the County Coroner has made the necessary findings as to origin and disposition pursuant to Public Resources Code section 5097.998. The Coroner has 24 hours to notify the Native American Heritage Commission (NAHC) if the remains are determined to be of Native American descent. The NAHC will contact most likely descendants, who may recommend how to proceed.
4.14 ENERGY AND MINERAL RESOURCES		
U.S.	CFR, Titles 10, 18, and 30	10 CFR addresses energy consumption and the establishment of the Department of Energy. 18 CFR addresses the Federal Energy Regulatory Commission (FERC). 30 CFR establishes the Bureau of Ocean Energy Management (BOEM, formerly the MMS), which manages energy resources in the Federal OCS.
CA	Surface Mining and Reclamation Act (SMARA) (Pub. Resources Code, §§ 2710-2796).	The California Department of Conservation is the primary agency with regard to mineral resource protection. The Department is charged with conserving earth resources (Pub. Resources Code, §§ 600-690) and has five program divisions: California Geological Survey; Division of Oil, Gas, and Geothermal Resources; Division of Land Resource Protection; State Mining and Geology Board (SMGB); and Office of Mine Reclamation. The SMGB develops policy direction regarding the development and conservation of mineral resources and reclamation of mined lands. In accordance with SMARA, the California Geological Survey classifies the regional significance of mineral resources and assists in the designation of lands containing significant aggregate resources. Mineral Resource Zones (MRZs) have been designated to indicate the significance of mineral deposits. The MRZ categories are: MRZ-1: Areas where adequate information indicates that no significant mineral deposits are present or where it is judged that little likelihood exists for their presence. MRZ-2: Areas where adequate information indicates significant mineral deposits are present, or where it is judged that a high likelihood exists for their presence. MRZ-3: Areas containing mineral deposits the significance of which cannot be evaluated from available data. MRZ-4: Areas where available information is inadequate for assignment to any other MRZ.
CA	Coastal Act Chapter 3 Policies (see also under Multiple	Section 30254 states: New or expanded public works facilities shall be designed and limited to accommodate needs generated by development or uses permitted consistent with the provisions of this division; provided, however, that it is the intent of the Legislature that State Highway Route 1 in rural areas of the coastal zone remain a scenic two-lane

Table 4.0-1 Major U.S. and State Laws, Regulations, and Policies Potentially Applicable to the Project (continued)

	Environmental Issues)	road. Special districts shall not be formed or expanded except where assessment for, and provision of, the service would not induce new development inconsistent with this division. Where existing or planned public works facilities can accommodate only a limited amount of new development, services to coastal-dependent land use, essential public services and basic industries vital to the economic health of the region, state, or nation, public recreation, commercial recreation, and visitor-serving land uses shall not be precluded by other development. Section 30254.5 states in part: Notwithstanding any other provision of law, the commission may not impose any term or condition on the development of any sewage treatment plant which is applicable to any future development that the commission finds can be accommodated by that plant consistent with this division….
CA	Other	Public Resources Code section 6801 (Oil and Gas and Mineral Leases) Warren-Alquist Act, adopted in 1974 to encourage conservation of non-renewable energy resources.
4.15 SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE		
U.S.	Executive Order 12898	On February 11, 1994, President Clinton issued an "Executive Order on Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations" (Executive Order 12898). This Executive Order was designed to focus attention on environmental and human health conditions in areas of high minority populations and low-income communities, and promote non-discrimination in programs and projects substantially affecting human health and the environment (White House 1994). The Executive Order requires Federal agencies (as well as State agencies receiving Federal funds) to identify and address any disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority and/or low-income populations.
CA	CSLC	The CSLC has developed and adopted an Environmental Justice Policy to ensure equity and fairness in its own processes and procedures. The CSLC adopted and amended the Environmental Justice Policy on October 1, 2002, to ensure consideration of environmental justice as part of CSLC processes, decisions, and programs. The policy stresses equitable treatment of all members of the public and commits to consider environmental justice in its processes, decision-making, and regulatory affairs. It is implemented, in part, through identification of, and communication with, relevant populations that could be adversely and disproportionately affected by CSLC projects or programs, and by ensuring that a range of reasonable alternatives is identified that would minimize or eliminate environmental issues affecting such populations. This discussion is provided in this document consistent with and in furtherance of the CSLC's Environmental Justice Policy. The staff of the CSLC is required to report back to the Commission on how environmental justice is integrated into its programs, processes, and activities (CSLC 2002).

Abbreviations used in this table include (see also List of Abbreviations and Acronyms following the Table of Contents): AB = Assembly Bill; Caltrans = California Dept. of Transportation; CARB = California Air Resources Board; CCC = California Coastal Commission; CDFW = California Dept. of Fish and Wildlife; CDP = Coastal Development Permit; CEQA = California Environmental Quality Act; CFR = Code of Federal Regulations; CSLC = California State Lands Commission; CWA = Clean Water Act; CZMA = Coastal Zone Management Act; LCP = Local Coastal Program; MPA = Marine Protected Area; NMFS = National Marine Fisheries Service; NPS = National Park Service; RWQCB = Regional Water Quality Control Board; SB = Senate Bill; SWRCB = State Water Resources Control Board; USACE = U.S. Army Corps of Engineers; USC = U.S. Code; USCG = U.S. Coast Guard; U.S. EPA = U.S. Environmental Protection Agency; USFWS = U.S. Fish and Wildlife Service.

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4.1 GEOLOGICAL RESOURCES

This section of the Environmental Impact Report (EIR) discusses potential geological issues that may be associated with the Project. Specifically, this section focuses on the potential for structural instability of Project facilities given impacts on the Project from (1) seismic hazards including earthquakes, faulting, surface rupture, ground shaking, liquefaction, subsidence, and tsunamis, and (2) coastal processes including erosion, scour, coastal bluff instability and landslides. In addition, this section includes a summary of the existing geologic condition of the reservoir from which the State Oil and Gas Lease PRC 421 (PRC 421) wells have historically extracted oil. The information presented below outlines the environmental setting, regulatory setting, significance criteria, the potential for impacts to the facilities from various geological events, and the significance of these impacts. This section also presents projects identified in the cumulative impacts analysis.

This analysis is based on a review of publicly available information on the soils, stratigraphy, and geologic structures present in the study area vicinity. It does not include design-level engineering geology or geotechnical investigations, subsurface explorations, or any laboratory testing of any media, as these analyses are not required by the California Environmental Quality Act (CEQA). This document incorporates by reference the conclusions of the Line 96 Modification Project EIR (Santa Barbara County 2011) regarding geological resources associated with operation of the Line 96 pipeline to the Plains All American Pipeline, L.P. (PAAPLP) Coastal Pipeline west of Las Flores Canyon (LFC), and summarizes these where appropriate.

4.1.1 Environmental Setting

Study Area Location and Description

The primary Project study area comprises the immediate onshore and near-shore areas of the Ellwood coast that would be subject to direct impacts from geologic and structural hazards as a result of Project implementation. This area includes existing PRC 421 facilities, the access road, and the pipeline route along the access road, coastal bluff, golf course easement, and tie-in at the Ellwood Onshore Facility (EOF). The secondary Project study area includes the Gaviota Coast and is only discussed in environmental issue areas where the potential exists for impacts that are different from those identified in the certified Line 96 Modification Project EIR (refer to Section 4.1.4 below). In addition, the environmental setting includes the current pressure regime of the Vaqueros Reservoir, located in the Ellwood Oil Field, and a discussion of other wells that historically produced from the same reservoir. Figure 4.1-1 shows a schematic diagram of the Ellwood Oil Field in relation to other oil fields located along the coast in the Project vicinity.

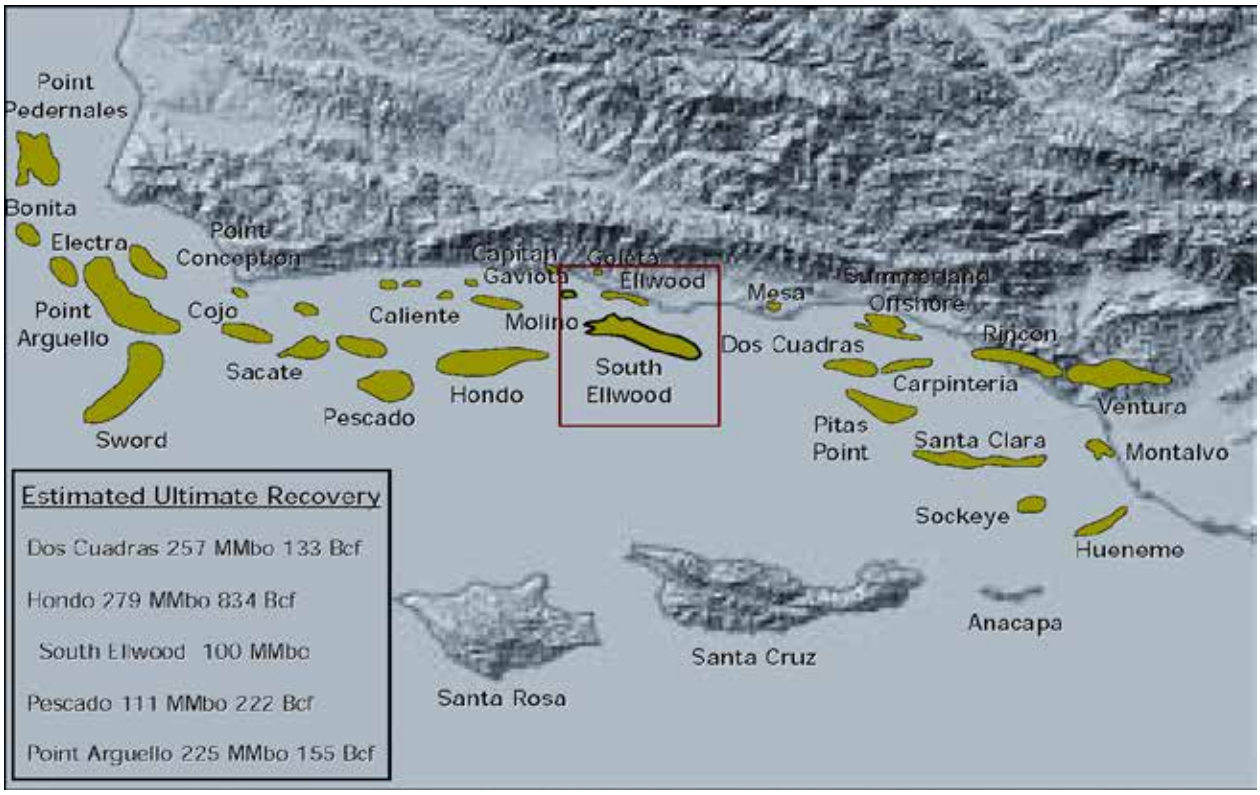


FIGURE 4.1-1. MAJOR OIL AND GAS FIELDS OF THE SANTA BARBARA CHANNEL

Source: From Venoco, Inc., presentation titled "Revitalizing South Ellwood Field, Offshore California" (West Coast Petroleum Technology Transfer Conference [PTTC] 2001).

Physiography

The PRC 421 piers are located beneath a coastal bluff that rises approximately 80 feet above mean sea level (msl). The existing access road intersects the bluff at its base (i.e., below 20 feet above msl) to the northwest of the piers near the EOF, and traverses the bluff nearly 20 feet above msl in the direction of the piers to the southeast. To the northeast, a north-south trending canyon is incised into the bluff where Bell Canyon Creek discharges into the ocean. Another small east-west trending gully exists along the bluff above the access road and piers. Accumulations of beach sand deposits exist at the base of the bluff in the surf zone (U.S. Geological Service [USGS] 1995).

The local physiography consists of a wave-cut platform with an associated sea cliff. The cliff marks the locations of older marine terraces which have been uplifted, and the beach marks the modern wave-cut platform. Bell Canyon Creek and the other incision along the sea cliff mark the locations of eroded gullies and/or fault scarps.

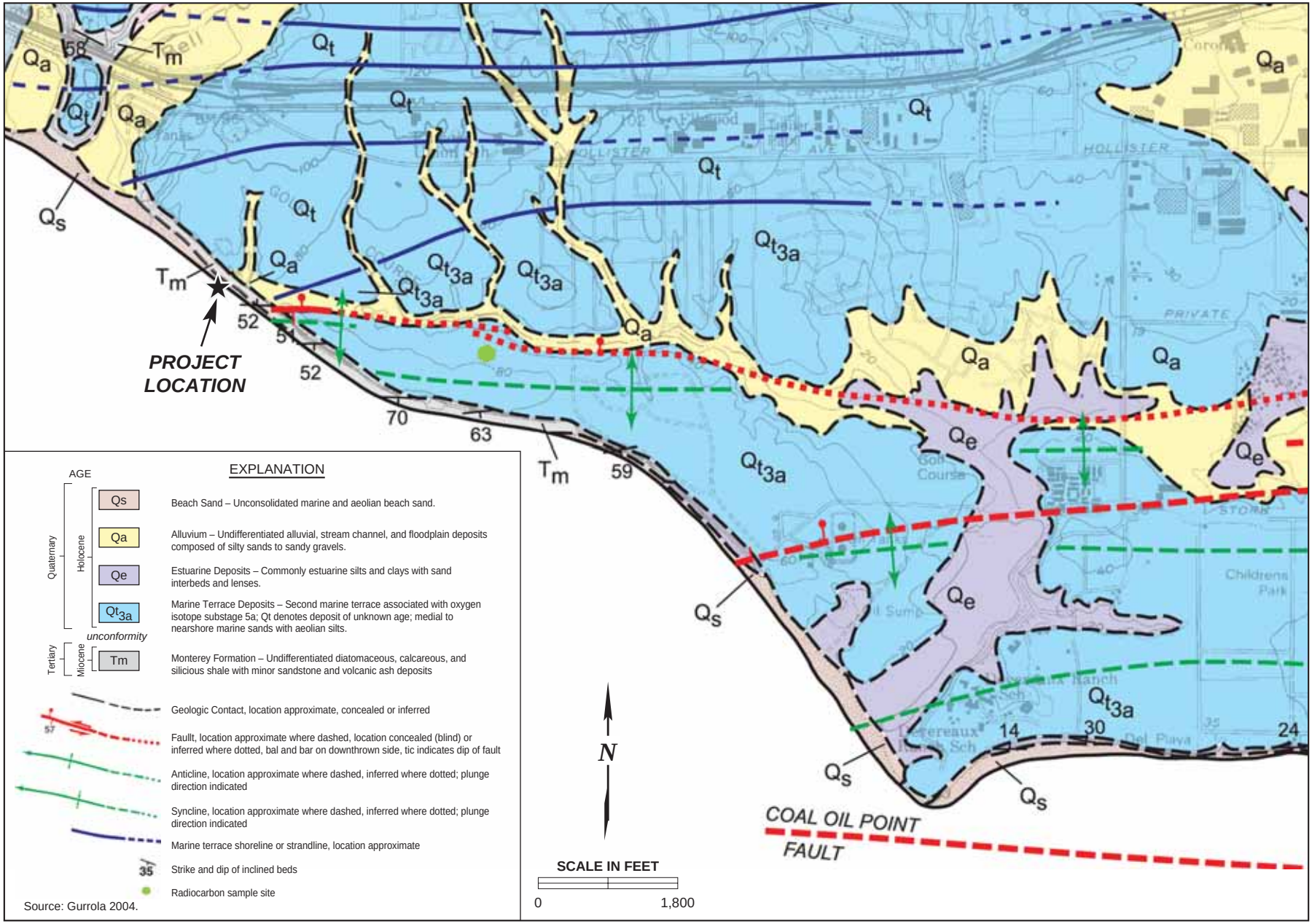
Stratigraphy

The geologic strata exposed onshore in the Project vicinity include (Gurrola 2004) (Figure 4.1-2):

- *Quaternary Beach Sand* (Qs)–unconsolidated marine and wind transported beach sand. This unit is exposed along the beach in the surf zone.
- *Quaternary Alluvium* (Qa)–undifferentiated alluvial, stream channel, and floodplain deposits composed of silty sands to sandy gravels. This unit is exposed along Bell Canyon Creek and an unnamed incision near the golf course.
- *Quaternary Marine Terrace Deposits* (Qt and Qt3a)–marine terrace deposits composed of medial to near-shore marine sands and wind transported silts. Based on Gurrola's mapping, there is a sequence of marine terrace deposits. There are also several ancient shorelines, as depicted in Figure 4.1-2 (shown as blue lines), that trend generally east-west across the Project study area. The typical thickness of these deposits is less than 100 feet (City of Goleta 2003).
- *Tertiary Monterey Formation* (Tm)–undifferentiated diatomaceous, calcareous, and silicious shale with minor sandstone and volcanic ash deposits. This unit is exposed along the coastal bluff beneath units Qt and Qt3a. The formation averages approximately 1,000 feet in thickness, and is impregnated with tar. Where exposed, Monterey Formation is usually white and stained with limonite, and the weaker portions are easily eroded by both marine and non-marine processes including wave action, wind erosion and erosion due to rainfall (City of Goleta 2003). The stratigraphy of the offshore area along the continental shelf generally consists of shale deposits overlying the Monterey Formation (PTTC 2001).

In addition to the units exposed at the surface, another unit, the *Tertiary Vaqueros Formation* (Tvq), exists in the subsurface beneath the study area. This unit consists of sandstone with siltstone and shale interbeds and is located approximately 3,000 feet below the ground surface (City of Goleta 2003).

A combination of organic-rich rocks (i.e., containing oil and gas), such as those formed in a marine environment, combined with folds and faults, allows for oil and gas to become trapped in the subsurface. Within the Vaqueros Formation, an oil and gas reservoir exists which has been folded and faulted. The Vaqueros is folded into two anticlines. The oil and gas rises to and accumulates at the top of the axes (the top of the center of the folds) of the anticlines. One of the axes of the anticlines (to the southeast – referred to as the eastern high) is higher than the other (the western high), and this corresponds to the location of the PRC 421 wells.



Source: Gurrola 2004.

amec

Geology in the Project Area

FIGURE 4.1-2

Structure

The Project is located in a tectonically active area. Folds consisting of anticlines (concave down), and synclines (concave up) whose axes trend east-west are shown in Figure 4.1-2 as green dashed lines. Thrust faults (i.e., reverse faults) also trend east-west in the area, and the main faults consist of the More Ranch Fault Zone, Coal Oil Point Fault, and Lavigia Fault (not exposed at the surface in the study area). The folding and faulting in the study area are characteristic of compressional forces caused by tectonic plates moving toward one another (Gurrola 2004).

A study was conducted on the More Ranch faults located just southeast of the Project site, where one of the segments is exposed in the sea cliff at Ellwood Beach. The study results show that the fault deforms the first emergent marine terrace, and is expressed at the surface as a north-facing fold scarp approximately 5 meters high. Additionally, the sea cliff exposure reveals the fault as a south-dipping reverse fault that offsets the Miocene Monterey Formation and wave-cut platform. A channel fill whose upstream reach is Devereux Creek is also exposed along the fold scarp in the sea cliff, and has been truncated by coastal erosion (Keller and Gurrola 2000).

Soils and Soil-Related Hazards

Surface soils in the Project area are generally found at the top of the coastal bluff, and were formed in alluvium derived from sedimentary rock. The soils are generally fine sandy loams over dense, very low permeable clay subsoil. The depth to the clay subsoil is approximately 30 inches. Below the bluff, no soils are formed due to active coastal processes.

The soils in the Project vicinity consist of Goleta Loam with 0 to 2 percent slopes (exposed at EOF and Bell Canyon Creek), Milpitas-Positas Fine Sandy Loams with 9 to 15 percent slopes and 30 to 50 percent slopes, eroded (exposed at EOF and Sandpiper Golf Course), and Diablo Clay with 2 to 9 percent slopes and 9 to 15 percent slopes (exposed southeast of the golf course). The Diablo series soils are well-drained, formed in soft shale and mudstone, with slight to moderate erosion hazards. Goleta Loam is formed on broad floodplains and the hazard of erosion is slight. Milpitas series soils consist of moderately well-drained soils on terraces formed in mixed alluvial deposits, runoff is rapid, and the erosion hazard potential is high (U.S. Department of Agriculture [USDA] 1981). According to a map of compressible soils, none of the soils within the Project study area are compressible (City of Goleta 2006a). However, the City of Goleta (2003) indicated that some of the soil types present at the Project area (Diablo and Milpitas) could have high expansion potential whereas Santa Barbara County has classified the Project study area as having a low to moderate potential of having problems associated with expansive soils (Moore and Taber 1979). Both of these classifications are based on the fact that smectites (a clay mineral group) are present in

the study area soils. The origin, type, and stability of fill soils used to construct the Project access road along the toe of the bluff are unknown.

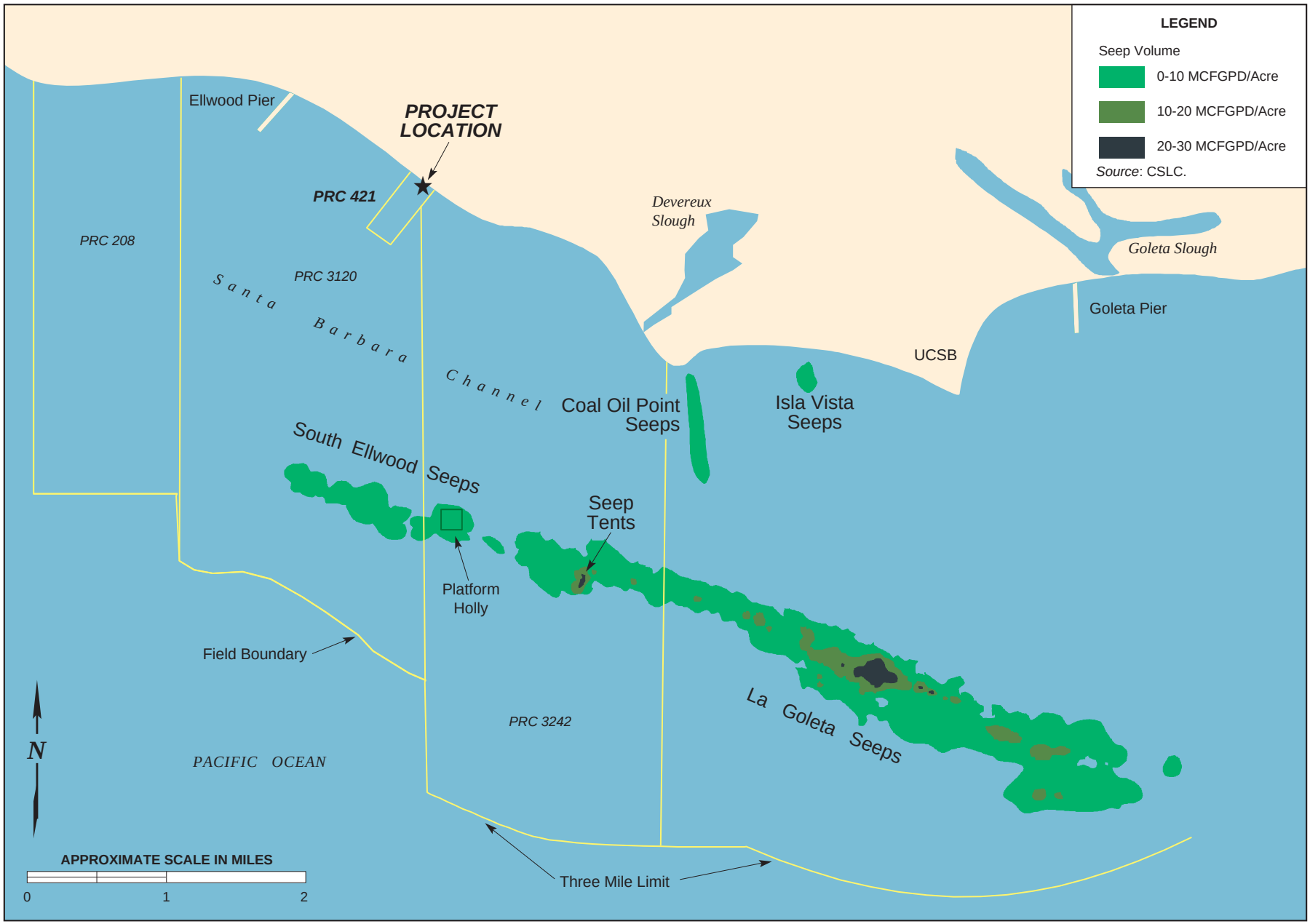
The presence of expansive soils does not by itself constitute a geologic hazard. The hazard arises when clay minerals with expansive potential exist in an environment where they are constantly subjected to periods of wetness and periods of dryness. Buildings and structures developed in these areas can then be damaged due to shrinking and swelling of the clay minerals in the soil beneath the foundations.

The study area includes both onshore and surf zone areas. The structures located in the surf zone (i.e., piers and causeways) are in a constant state of saturation; therefore, the risk of damage to the foundations of the piers and causeways caused by expansive soils is minimal, as these soils would not be expected to undergo wetting and drying periods. The onshore areas of the Project located above the high water line could undergo wetting and drying periods, and could include expansive soils.

Natural Oil Seeps

Prolific natural marine hydrocarbon seepage in the Project vicinity occurs offshore in the Santa Barbara Channel (Figure 4.1-3) (University of California Santa Barbara [UCSB] 2006; Quigley et al. 1999a; Hornafius et al. 1999). Natural oil and gas have been released from submarine seeps in the Channel for thousands of years. The seeps emit both liquid and gaseous hydrocarbon phases, with gas predominating. The most active gas seeps form visible boils where they intersect the sea surface. Based on the mapping of the seep locations and comparison with other data, the oil and gas are thought to migrate upward through the overlying cap rock (Sisquoc Formation) along fractures on the axis of the South Ellwood anticline and the Coal Oil Point fold complex. The seep locations follow linear trends that mirror the axes of the folds, suggesting that the release of oil and gas along seeps in the Channel is controlled by geologic structure (Bartsch et al. 1999). Seepage is most intense at submarine fault conduits and at structural closures along anticline axes (Quigley et al. 1999a; Hornafius et al. 1999).

Evidence of the natural oil seeps can be directly observed on the beach at the study area. Black tar ball deposits exist and are mixed in with the sand on the beach. Because the natural oil seeps originate offshore, the source of the seeps is not the Vaqueros Formation, the reservoir for the PRC 421 wells. This conclusion is supported by multiple lines of study including seep location, seep discharge, variations of seep emissions through time, and by geochemical analyses performed on oil samples from offshore platforms and beach tar balls. Based on the laboratory analysis, the beach tar ball geochemistry is most similar to oil samples collected from Platform Holly, which produces from the Monterey Formation (Lorenson et al. 2004). Therefore, the tar balls are considered to originate offshore, from where they travel onshore via wave action and other coastal processes.



Hydrocarbon Seeps in the Project Area

FIGURE 4.1-3

Faulting and Seismicity

Regional Seismicity

The Santa Barbara/Goleta area is located in the Western Transverse Ranges, which is a seismically active region of Southern California. The North Branch of the More Ranch Fault trends roughly east-west to northwest-southeast less than 0.25 mile south of the Project study area (Gurrola 2004). The Santa Barbara County General Plan Safety Element classifies the More Ranch Fault Zone as *active*, which the California Geological Survey (CGS), formerly the California Division of Mines and Geology (CDMG), defines as those along which movement has occurred within the last 11,000 years. *Potentially active* faults have displayed evidence of movement during the past 1.6 million years. *Inactive* faults demonstrate no evidence of movement in the same timeframe (CDMG 1994). However, the More Ranch Fault Zone has not been zoned as *active* by the State of California (Jennings 1994; CDMG 1999), or through the creation of an Alquist-Priolo special studies zone (City of Goleta 2003). The North Branch of the More Ranch Fault has deformed a 45,000-year old marine terrace deposit, and is therefore considered *potentially active* (Gurrola 2004).

The reverse Lavigia Fault is located beneath the Project area, but is buried in the Project vicinity. This fault is believed to act as a trap for oil and gas in the Vaqueros Reservoir at depth and is classified as *potentially active* (Keller and Gurrola 2000).

Ground motion in the Project vicinity is generally the result of sudden movements of large blocks of the earth's crust along *active* faults, which result in an earthquake. Southern California is recognized as one of the most seismically active areas in the U.S. having been subjected to over 50 major earthquakes of magnitude 6 or greater since 1796. Earthquakes of magnitude 7.8 or greater occur at the rate of about two or three per 1,000 years, corresponding to a 6 to 9 percent probability in 30 years.

The Santa Barbara/Goleta area has experienced numerous seismic events over the last two centuries, including a few historic large-scale (magnitude greater than 6.0) events, such as the 1812 earthquake, which had a probable Richter magnitude of 7.1 (Toppozada et al. 1981) and likely occurred either offshore, on the San Cayetano Fault to the east (Dolan and Rockwell 2001), or on the Santa Ynez River Fault to the northwest (Santa Barbara County 2004; UCSB 2004; Sylvester and Darrow 1979). Other destructive earthquakes struck the Santa Barbara/Goleta area in 1857 (San Andreas Fault, magnitude 8.4), in 1925 (Santa Barbara vicinity, possibly the More Ranch or Mesa Fault, magnitude 6.3), in 1927 (offshore Point Arguello, magnitude 7.3), and in 1978 (offshore North Channel Fault, magnitude 5.9). A magnitude 4.4 earthquake was centered near the Project site in Isla Vista in 2004 (USGS 2004).

Movement along active and potentially active faults, either onshore or offshore near the Project area, including the San Andreas Fault, Santa Ynez/Santa Ynez River Fault

Zone, More Ranch Fault Zone, Lavigia Fault, and several others could induce seismic shaking. The Project location is classified as an area where shaking from earthquakes will occur 1 to 2 times per century, and those events will exceed 20 percent of the force of gravity. At this level, significant damage to older buildings is expected to result (Southern California Earthquake Center [SCEC] 1995).

Additional geologic hazards associated with seismicity include surface rupture, liquefaction, subsidence, and tsunamis. These hazards which also have the potential to affect the Project are described in detail below.

Surface Rupture and Other Types of Seismic Ground Failure

Surface ruptures comprise the displacement and cracking of the ground surface along a fault trace. Surface ruptures are visible instances of horizontal or vertical displacement, or a combination of the two, typically confined to a narrow zone along the fault. Developments near the More Ranch faults, which would include the Project, would have the most significant potential to be affected by surface rupture (City of Goleta 2003).

Differential settlement is a process whereby soils settle non-uniformly, potentially resulting in stress and damage to pipelines or other overlying structures. Such movement can occur in the absence of seismically induced ground failure, due to improper grading and soil compaction or discontinuity of naturally occurring soils; however, strong ground shaking often greatly exacerbates soil conditions already prone to differential settlement, resulting in distress to overlying structures. Elongated structures, such as pipelines, are especially prone to damage as a result of differential settlement.

Lateral spreading is a type of seismically induced ground failure that occurs when cracks and fissures form on an unsupported slope, resulting in lateral propagation and failure of slope material in a downslope direction. This type of failure is common in unconsolidated river or stream bank deposits, where lateral stream scour creates oversteepened banks in unconsolidated silts and sands.

Liquefaction

Liquefaction is a form of earthquake-induced ground failure that occurs primarily in relatively shallow, loose, granular, water-saturated soils. Liquefaction is defined as the transformation of a granular material from a solid state into a liquefied state as a consequence of increased pore pressure, which results in the loss of grain-to-grain contact. Unconsolidated silts, sands, and silty sands are most susceptible to liquefaction. While almost any saturated granular soil can develop increased pore water pressures when shaken, these excess pore water pressures can lead to liquefaction if the intensity and duration of earthquake shaking are great enough. During recent large earthquakes where liquefaction occurred, structures that appeared to be most

vulnerable to liquefaction included buildings with shallow foundations, railways, buried structures, retaining walls, port structures, utility poles, and towers.

Santa Barbara County identifies the Project study area as having moderate liquefaction hazard (Moore and Taber 1979). According to the City of Goleta, there is no historical evidence of structures being damaged by liquefaction in the city or adjacent unincorporated portions of Santa Barbara County (City of Goleta 2003). However, areas of beach sand could have a high liquefaction potential, due to unconsolidated sand layers below the water table at shallow depths. During ground shaking, loose saturated soils and beach sands can undergo liquefaction, and differential settlement of buildings and structures can occur. In addition, as noted above, the types of soils used in construction of the Project access road are unknown. Portions of this access road appear to be saturated due to inflow from springs in the bluff which may increase the potential for liquefaction of these fill soils of unknown origin.

Subsidence

Subsidence is a type of ground failure, defined as settlement or compression of subsurface soils following the loss of interstitial materials such as water or gas. Subsidence can also result from wetting of collapsible soils, typically loose deposits of silt or sand. Subsidence can occur over a broad region or in localized areas, and can occur gradually over time or as a sudden collapse. The loss of interstitial material can result from shaking of the soil mass during an earthquake, or it can result from other non-seismic factors such as the extraction of oil and gas reserves. Because the Vaqueros Reservoir is thought to naturally repressurize due to influx of groundwater into the reservoir rock, subsidence is not expected to occur in the study area as a result of the Project.

Tsunamis

Tsunamis are large ocean waves generated by large-scale, short duration submarine earthquakes, volcanic activity, and submarine landslides. A seismic event on any moderate offshore fault could result in a tsunami in the Project vicinity. A major earthquake that occurred off the coast of Point Arguello in 1927 initiated a tsunami, which was recorded on tsunami gages as far away as Hawaii and reached heights of 6 feet above msl along the coast. Another historical tsunami may have resulted from an 1812 earthquake that was generated along a fault in the Santa Barbara Channel (Keller and Gurrola 2000). Tsunamis affecting the Project area can also be generated by distant earthquakes, such as the one that occurred in March 2011 in Japan. A significant tsunami in the area could affect areas as high as 40 feet above msl; areas most susceptible to the effects of a tsunami would be along the oceanfront (Santa Barbara County 2001).

The stream discharge area of Bell Canyon Creek and the beach area to the southeast of the Project site are designated as potential tsunami runup areas. The runup area was calculated by the University of Southern California using a tsunami model and potential earthquake sources. The calculated runup area of Bell Canyon Creek includes the area occupied by the EOF (City of Goleta 2006a).

Coastal Process Hazards

Erosion and Scour

Erosion of exposed soils and rocks along the coastal bluff, and in gullies and creeks, naturally occurs as a result of physical weathering and ongoing coastal processes. Active erosion caused by water and wind action is evident along the sea cliff where outcrops expose old filled channels and fault planes (Keller and Gurrola 2000). Scour can be considered an aggressive form of water erosion where soil or sediment particles are removed from gullies, creeks, and the sea cliff exposed to wave action. Erosion and scour, while ongoing and naturally occurring in a beach environment, can be affected by human-induced changes including changes to topography, addition of structures, roads, and artificial fill, or other disturbances to the existing natural setting. In areas of increased erosion, deeper incision of gullies and creeks can occur, which causes accumulation of sediments downstream where slopes are less steep and sediments can settle out of the water column. In areas of increased scour, a net increase in removal of mass including soil, sediment (beach sand), and bedrock can occur.

The Project is located within the active wave-cut platform along the coast of the Pacific Ocean. Historical wave-cut platforms and ancient shorelines exist at the top of the coastal bluff, and are marked by emergent marine terraces. The terrace deposits record a geologic history of ongoing coastal erosion processes that have created the sequence of marine terraces. Accumulation and removal of soil (or beach sand) are transient features, and in a wave-cut platform environment, there is an overall net removal of soil, rock, and beach sand. This area has been continually eroded and scoured through time as waves have cut into the existing soil and rock to form the wave-cut platform and coastal bluff. This continual cutting into the sea cliff by waves will continue to erode the coastal bluff over time. This process would be expected to continue for the foreseeable future (on the order of thousands of years).

The southwest-facing shoreline of the beach in the Project area is subject to direct wave energy which causes off-shore migration of sediments. Sediment removal is greatest in the winter when wave action increases in response to tidal variation (see Section 4.5, Hydrology, Water Resources and Water Quality). Beach width ranges from 35 meters to 90 meters and is subject to seasonal variation and long-term weather patterns including El Niño and the Pacific Decadal Oscillation. A 65-year study of beach width (1938–2003) in the Project area found that beach width was the lowest during 1983 and 1998,

following El Niño events (Revell and Griggs 2003). The maximum beach width was observed in 2001 and 2003. The seasonal change in beach width also exposes the pier structures and tops of the caissons to greater level of wave action during winter months.

As mentioned previously, the soils in the Project vicinity are classified as having moderate to high erosion potentials. Because these soils are formed on the terraces at the top of the bluff and along Bell Canyon Creek, there is a potential for these soils to erode. Erosion of the terrace soils could result in downstream sedimentation at the mouth of Bell Canyon on the beach. Any eroded soil or sediment particles from the discharge area at Bell Canyon Creek are likely transported away by wave action and scour processes.

As noted in Section 2.1.1, Project History, Venoco made several repairs to PRC 421 structures in 2001, including to the existing access road between the two PRC 421 piers which was severely eroded. During the initial repair project, approximately 200 tons of rip-rap rock was placed within the gaps of the existing beachside mixed timber and rock revetment to allow for vehicle access to the piers. This repair included only reinforcement of the existing revetment, and did not include seaward encroachment. The access road also was graded, compacted, and topped with at least 3 inches of road base gravel. Float rock was installed beneath the road base in areas where poor subsurface drainage had been observed.

In 2004, additional repair was needed when a large section of the original outer caisson wall of Pier 421-1 sheared off during a storm. According to the 2006 Mitigated Negative Declaration (MND), the damage resulted from increased wave action on the structure (City of Goleta 2006b).

In September 2010, CSLC inspectors noted that significant new damage to Pier 421-2 had occurred during the previous year and the lower portion of the original caisson wall at the southwest corner was fully exposed to storms and ocean waves. Emergency permits for repair of the caisson wall were issued by the City of Goleta (10-120-EMP), California Coastal Commission (CCC) (E-10-013-G), and U.S. Army Corps of Engineers (USACE) (2010-959-JWM), and repairs were completed in July 2011.

Coastal Bluff Instability and Landslides

Because the Project study area includes a coastal bluff, the potential exists for slope failure and landslides to impact the Project. The stability of slopes is affected by a number of factors including gravity, rock and soil type, amount of water present, and amount of vegetation present. The Santa Barbara County Seismic and Safety Element and the City of Goleta General Plan/ Coastal Land Use Plan (GP/CLUP) Safety Element have classified the Project area as having a high potential for slope instability (Moore and Taber 1979; City of Goleta 2006).

Failure of the bank below the access road during the winter of 2000/2001 occurred in areas where previously buried pipelines were exposed beneath the access road. During the road repair project, some of the pipelines were removed and the bank failure areas were back-filled. In addition, a French drain and wooden dam were installed to divert water flow around the perimeter of the Pier 421-2 approach area and to relieve hydraulic pressure on the access road. The diverted water is directed onto the beach.

Previous measures to prevent slope undercutting and destabilization included placement of a 12-foot-wide limit to the access road repairs, minimizing cut and fill volumes during access road repairs, and best management practices (BMPs) designed to prevent additional soil erosion during the road repair activities. It appears that the temporary vibrations generated during pile driving in 2001 did not result in further destabilization of the road or slope.

During the well repair projects in 2001 and 2004, issues with a broken sprinkler head and a damaged water line occurred in association with the golf course at the top of the sea cliff. These issues caused saturation of soil in some areas of the slope and access road. Saturation of the soil in the slope can contribute to slope failure and landslides.

4.1.2 Regulatory Setting

Many Federal and State laws and regulations govern security of oil and gas production and transport facilities, and emergency response/contingency planning. These laws address, among other things, design and construction standards, operational standards, and spill prevention and cleanup. The primary Federal and State laws, regulations, and policies that pertain to the Project are summarized in Table 4.0-1, while local laws, regulations, and policies are summarized below.

Local

City of Goleta General Plan, Coastal Land Use Plan, and Ordinances

Development in the city is subject to and must conform with the city's GP/CLUP and unified zoning code, both of which include regulations applicable to inland and coastal areas, and Venoco would need to obtain all applicable permits with the City for construction of Project components. Because the City's GP/CLUP has not yet been certified by the CCC, Venoco would also need to obtain a Coastal Development Permit (CDP) from the CCC.

Santa Barbara County Fire Department (SBCFD)

The SBCFD is the Certified Unified Program Agency (CUPA), a consolidation of six state environmental regulatory programs under one authority, responsible for administering state environmental programs in Santa Barbara County. The SBCFD Fire

Prevention Division (FPD) Site Mitigation Unit coordinates with the Regional Water Quality Control Board (RWQCB) for sites involving both groundwater and solvent contamination and provides regulatory oversight for the assessment and remediation of all unauthorized material releases other than petroleum releases from underground storage tanks and crude oil releases.

System Safety and Reliability Review Committee (SSRRC) and Safety Inspection, Maintenance and Quality Assurance Plan (SIMQAP)

The Santa Barbara County Board of Supervisors originally established the SSRRC—a committee of County departments plus the Santa Barbara County Air Pollution Control District (APCD)—in 1985 to identify and require correction of possible design and operational hazards for oil and gas projects prior to construction and startup of the project and for project modifications. The goal of the SSRRC is to substantially reduce the risks of project-related hazards that may result in loss of life and injury and damage to property and the natural environment. The SSRRC has delegated authority to review the technical design of facilities, as well as to review and approve the SIMQAP. The purpose and scope of the SIMQAP is to identify procedures that will be used during the operation of a facility and to insure that all equipment will function as designed. The SIMQAP identifies items to be inspected, maintained or tested, defines the procedure for such inspection, maintenance, or testing, and establishes the frequency of inspection, maintenance or testing. SIMQAP audits are conducted on facilities to ensure compliance, and are conducted annually at the EOF. For some projects, the City of Goleta contracts with the County Energy Division for energy related planning services, which includes SSRRC project review; however, the County Energy Division is not currently providing energy planning services for the PRC 421 Project.

4.1.3 Significance Criteria

Impacts are considered significant if any of the following conditions apply:

- Ground motion due to a seismic event that could include surface rupture, liquefaction, subsidence, landslides or tsunami and damage to structural components;
- Substantial soil erosion or the loss of topsoil;
- Unstable soils which result from Project implementation and cause landslide, slope failure, lateral spreading, subsidence, liquefaction or collapse;
- Damage of structural components as a result of soil expansion;
- Soil settling that could substantially damage structural components of the wells;
- Deterioration of structural components of PRC 421 due to corrosion, weathering, fatigue, or erosion that could reduce structural stability;

- Damage to petroleum pipelines and/or valves along the pipelines from any of the above conditions that could release crude oil into the environment; or
- Erosion-induced siltation of nearby waterways as a result of ground disturbing activities.

4.1.4 Impact Analysis and Mitigation

The Project was evaluated to identify potential geologic hazards that could result in impacts to people or structures over the Project's production horizon. A qualitative evaluation of potential Project impacts was conducted based on the site-specific information described in Section 4.1.1, Environmental Setting.

Project-related geologic impacts would be confined primarily to the Project study area and would be associated with seismic hazards; seismically induced hazards including earthquakes, ground shaking, slope failure and landslides, and tsunamis; and coastal-process-related hazards including erosion and coastal bluff instability. Potential geologic impacts associated with the Line 96 pipeline (e.g., seismically related potential for pipeline rupture) within the secondary study area were fully addressed and considered as part of the certified Line 96 Modification Project EIR (Santa Barbara County 2011) and are incorporated by reference.

As Pier 421-1 would be decommissioned upon operation of the Project and all related infrastructure would be removed, it would be exposed to potential geologic impacts only during the initial operating phases of Pier 421-1 (e.g., 1 year) and potential impacts are considered in this context. In general, given the limited time that Pier 421-1 would remain in place and the lack of any active oil production activity at this pier and caisson, geologic impacts would be less than significant. Project implementation is not anticipated to result in substantial soil erosion or loss of topsoil when compared to the overriding coastal processes of the Pacific Ocean. Removal of Pier 421-1 would result in some additional sand being exposed to wave action, but this would represent resumption of a natural condition.

Table 4.1-1, located at the end of Section 4.1.4, provides a summary of impacts associated with geological resources impacts and recommended mitigation measures (MMs) to address these impacts.

Impact GEO-1: Seismic and Seismically Induced Hazards

Seismic activity along the More Ranch Fault Zone or other regional faults could produce fault rupture, seismic ground shaking, liquefaction, or other seismically induced ground failure that could expose Pier 421-2 facilities, including the pier, caisson and pipeline, to damage during the Project life; Pier 421-1 would be exposed to seismic hazards for approximately 1 year before decommissioning is completed (Less than Significant with Mitigation).

Impact Discussion

The Project is located in an area that is subject to seismic and seismically induced hazards, such as earthquakes, surface rupture, ground shaking, slope failure and landslides, liquefaction, subsidence, and large wave events. If movement were to occur along the active North Branch More Ranch Fault, people or structures in the study area could be exposed to seismic hazards. Given the study area's proximity to this fault segment (less than 0.25 mile away), the potential exists for surface rupture, ground shaking, slope failure and landslides to impact the Project site. Any one of these hazards or a combination of these hazards could occur during the life of the Project, and can neither be accurately predicted nor avoided in the Santa Barbara/Goleta region.

Because the Project is also located along the coast, movement along an offshore fault in the Santa Barbara Channel or in more distant faults could result in a large wave event at the study area. Santa Barbara County has indicated that the wave height in the area could reach as high as 40 feet, which could overtop the piers and access road and potentially compromise the structural integrity of the Pier 421-1 or 421-2 caissons (see also, Section 4.2, Safety; Impacts S-2 and S-3).

Pier 421-1 would remain in place for an estimated further 1 year after commencement of production at Pier 421-2. During this period, this pier and caissons could be exposed to damage from seismic events, including both earthshaking and tsunamis. Although the seaward caisson face at Pier 421-1 was upgraded in 2001, potential exists for damage to the pier during this interim 1 year. Such impacts would be considered less than significant as the pier is proposed for removal and active oil production equipment and facilities would not be exposed to damage. Full removal of Pier 421-1 would eliminate seismic impacts to this facility.

Based on the engineering design information for existing Pier 421-2 infrastructure, the Project design may be inadequate to sustain the effects of seismic loading, which could result in damage to structural components during a seismic event. While the Project includes major upgrades to the caissons at Pier 412-2, including drilling pilings and installation of sheet piles walls on all sides, some existing structures at Pier 421-2 that would be recommissioned as part of this Project were constructed in 1928. Repairs to portions of the structures in the surf zone were conducted in 2001 and 2011; these included installation of a seaward-facing sheet pile walls at the caissons at Piers 421-1 and 421-2, replacing decking and pilings at both piers and placing rock revetment at gaps in the aging timber bulkhead seawall. The design of these repairs and the Project include an assumption that subsurface conditions for the repair were accurately characterized by one soil boring that was completed approximately 80 feet north of the structure in the access road as part of the 2001 repair project.

Based on a review of engineering plans associated with those repairs and the current Project, it does not appear that the previous engineering designs or current Project specification included analysis of seismic loading. Although Pier 421-2 would be greatly strengthened by proposed caisson improvements, the Project infrastructure would be at risk of being damaged in a seismic event. A seismic event could also damage sections of the pipeline connecting Pier 421-2 to Line 96 as well as Line 96 itself. Therefore, impacts to Project facilities resulting from seismicity or seismically induced hazards are considered to be less than significant with mitigation.

Mitigation Measures

In addition to the MMs described below, MM GEO-4c Seismic Inspection from the Line 96 Modification Project EIR (described in Appendix H) would ensure protection of the Line 96 pipeline from seismic events during Project operation.

MM GEO-1a. Include Seismic Loading Evaluation. Venoco shall have the caisson at Pier 421-2 evaluated to ensure its ability to withstand effects of dynamic earth pressures, seismic overturning and base shear, and to support Project facilities through the production life of the facility. Results of the evaluation, together with any redesign plans determined to be necessary to ensure the ability of the caisson to withstand effects of dynamic earth pressures, seismic overturning and base sheer, and to support Project facilities through the production life shall be reviewed and certified by a professional engineer and submitted to California State Lands Commission staff for approval. Prior to recommencement of production, and subject to receipt of all necessary approvals and permits to undertake the work, Venoco shall construct the necessary improvements to meet the criteria of this mitigation measure.

MM GEO-1b. Field-Verify Subsurface Condition Assumptions. Venoco shall establish a procedure to field-verify that the subsurface conditions used in the design of the past repairs and proposed improvements at the 421-2 caisson are representative of actual conditions to be encountered. The procedure established by Venoco for field-verification shall be submitted to California State Lands Commission (CSLC) staff for approval prior to implementation. If the field conditions encountered require a design modification of past repairs and proposed improvements, then the revised design plans shall be reviewed and certified by a registered professional civil/structural engineer, and shall be submitted to the CSLC staff for approval. Prior to recommencement of production, and subject to receipt of all necessary approvals and permits to undertake the work, Venoco shall construct the necessary improvements to meet the criteria of this mitigation measure.

MM GEO-1c. Seismic Inspection. Venoco shall inspect the structures, including Pier 421-2, pipeline, and associated infrastructure following any seismic event in the region (for these purposes defined as Santa Barbara County and offshore waters of the Santa Barbara Channel and Channel Islands) that exceeds a Richter magnitude of 4.0 (see also Appendix H, MM GEO-4c

Seismic Inspection). Venoco shall report the findings of such inspection to the California State Lands Commission staff and City of Goleta staff. Venoco shall not reinstate operations of the pipeline within the City of Goleta until authorized by the City of Goleta.

MM GEO-1d. Tsunami Preparedness. In the event that a tsunami warning is issued for an area that includes PRC 421, Venoco shall cease production activities at PRC 421 as quickly as possible within the constraints of operations and safety. When the tsunami warning is lifted, Venoco shall conduct a thorough inspection of Pier 421-2, pipeline, and associated infrastructure before resuming production. Venoco shall report the findings of such inspections to the California State Lands Commission and City of Goleta staffs.

Rationale for Mitigation

Based on the local geologic environment, which includes seismic and seismically induced hazards, Pier 421-2 should be designed to account for seismic loading. Because the structural components of Pier 421-2 are located in the surf zone, the potential for a large wave event also exists; therefore, wave loading would also be included in the design (see Section 4.2, Safety; MM S-2a). Seismic inspections and any necessary improvements would test the effectiveness of the design and ensure that the design is adequate for the Project life.

Evaluation of subsurface conditions is necessary to ensure that previous assumptions are sufficient since the design must rely on existing subsurface conditions in the vicinity of the structures. Regular inspections of Project facilities, such as the pipeline from Pier 421-2 to the tie-in at the EOF after seismic events, would permit timely repairs. Cessation of operation during tsunami threat warnings would avoid or minimize potential for spills during a large wave event.

Implementation of MMs GEO-1a through GEO-1d would reduce impacts associated with damage from seismicity and tsunamis to Project facilities to less than significant. See also Section 4.2, Safety, for a discussion of accidental release of oil.

Impact GEO-2: Landslide and Slope Failure

The Project would be located on a geologic unit or soil that is unstable, which could create potentially significant damage to the project access road and pipeline from a landslide or slope failure (Less than Significant with Mitigation).

Impact Discussion

The Project is located within an active wave-cut platform beneath a coastal bluff. All components of the Project (e.g., access road, coastal cliff, Pier 421-2) are located on soil units or fill that overlie the Monterey Formation. The Monterey Formation is visibly eroded and weathered on the face of the cliff where it is exposed to wave action and

other physical and chemical weathering processes. The Monterey Formation and the soils that overlie it in this area are considered to be geologically unstable, and have the potential for slope failure or landslide. The potential instability of the coastal bluff increases when saturated with water, which may occur due to the presence of several springs along the bluff face. Saturation has also occurred from past sprinkler leaks from the Sandpiper Golf Course that reached the bluff. The existing rock revetment reduces, but does not eliminate, the potential for slope failure. The pipeline that is buried beneath the access road is partially protected from wave-caused erosion by the existing rock revetment, if the revetment is properly maintained (see Impact S-2). However, if the coastal bluff experiences slope failure, the pipeline in the access road may be damaged. Although the Project includes measures to ensure the integrity of this section of pipe (including hydrotesting, internal plastic coating, and enhanced cathodic protection), the pipeline may still be damaged or broken during slope failure or landslide. Further, the Line 96 pipeline from the EOF to the connection with the PAAPLP Coastal Pipeline traverses several steep hillsides, including those underlain by the highly unstable Rincon Shale Formation.

Therefore, the impact to the Project area that could result from unstable soils or rocks is considered less than significant with mitigation. A detailed geologic impacts evaluation for the Line 96 pipeline, with MMs to reduce the risk of failure related to unstable slopes, was conducted as part of the Line 96 Modification Project EIR (Santa Barbara County 2011) and is incorporated by reference (refer to Appendix H).

Mitigation Measures

MM GEO-2a. Monitor Coastal Bluff and Access Road. Venoco shall monitor the coastal bluff and access road weekly for signs of water saturation, including during and/or heavy rains, or after a sprinkler line leak from the Sandpiper Golf Course. If saturation is apparent, the source of the water infiltration shall be evaluated and, diverted (if possible) or removed. Venoco shall provide written weekly statements regarding bluff and access road stability and saturation conditions to the City of Goleta. If saturation is apparent, Venoco shall immediately report such finding to the City of Goleta. Within 24 hours of such a finding, Venoco shall identify the source of water infiltration and shall divert or remove the water source within 24 hours, and shall provide a written report with photo documentation to the City within one week of the action. If native habitats could be impacted as a result of related activities, Venoco shall coordinate the activities with the Project Biologist and implement MM TBIO-1b Project Biological Monitors and MM TBIO-1c Restoration Plan/Restoration.

MM GEO-2b. Maintain Existing Seawall and Rock Revetment. Venoco shall inspect the existing seawall and rock revetment weekly for signs of erosion or need for repairs. If eroded areas are observed, these shall immediately be filled in, and any areas in need of repair or addition of rip-rap shall be repaired consistent with applicable permit requirements. Venoco shall provide written weekly reports regarding existing seawall and rock revetment stability to the

City of Goleta. If erosion is observed, Venoco shall immediately report such finding to the City of Goleta. Within 24 hours of such a finding, Venoco shall repair the erosion and shall provide a written report with photo documentation to the City within one week of the action. Venoco shall coordinate the activities with the Project Biologist and implement MM TBIO-1b Project Biological Monitors and MM TBIO-1c Restoration Plan/Restoration.

MM GEO-2c. Inspect and Repair Access Road and Pipeline after Landslide Events. Venoco shall monitor the access road and pipeline after bluff failure or landslide events and shall repair any damaged areas or add rip-rap consistent with applicable permit requirements. In addition to clearing the road of debris, Venoco shall test or inspect the pipeline immediately after any major slope failure to determine if pipeline damage has occurred and shall implement repairs to this infrastructure. If damage is observed, Venoco shall immediately report such finding to the City of Goleta. Within 24 hours of such a finding, Venoco shall repair the erosion and shall provide a written report with photo documentation to the City within one week of the action. Venoco shall coordinate the activities with the Project Biologist and implement MM TBIO-1b Project Biological Monitors and MM TBIO-1c Restoration Plan/Restoration.

Rationale for Mitigation

Because water-saturated soils have been observed along the coastal bluff in the past, and because saturation could cause the slope to fail, routine monitoring for water saturated soils is necessary to mitigate the risks associated with a potential slope failures or landslides. The seawall and revetment must also be maintained since these structures provide added stability to the base of the bluff, which reduces the potential for slope failure. Although the potential for major bluff failures to occur over the Project life is unknown, in the event of such a failure, inspection and any required repair of the road and pipeline would be necessary to prevent potential releases of oil. Implementation of MMs GEO-2a through GEO-2c would reduce this impact to less than significant.

Impact GEO-3: Soil Settlement and Liquefaction

The recommissioning of PRC 421 could potentially expose Project facilities such as the caisson and proposed pipeline to soil settlement or liquefaction that could damage these facilities, particularly the pipeline (Less than Significant with Mitigation).

Impact Discussion

Soils beneath the structural components of the caissons and wells at PRC 421 are composed of beach sands on the active wave-cut platform, which are underlain by Monterey Formation bedrock. Because the structural design did not include placing foundations of any portions of the structures in the beach sand, settlement of the beach

sand beneath the structure would not be anticipated to result in settlement problems beneath the pier.

Other portions of the Project, including the access road, seawall, and revetment, may have been constructed on beach sand and may consist of fill soils of unknown origin. The subsurface conditions of the beach sand, including potential for saturated unconsolidated sands are not known. One soil boring was drilled through the access road during the caisson wall repair for Pier 421-1 in 2004. However, the subsurface conditions were not logged for the first 20 feet below the surface of the road. Therefore, the potential for settlement and liquefaction of these soils must be assumed until evaluated. If settlement or liquefaction of the fill or soils beneath the access road were to occur, the pipeline in the access road could be damaged and an oil spill could potentially occur. Impacts related to settlement beneath these structural components are considered less than significant with mitigation.

Mitigation Measures

MM GEO-3. Perform Subsurface Evaluation. An evaluation of soils within and beneath the Pier 421-2 caisson, seawall, revetment, and access road shall be performed to ascertain if the soil is fit for purpose. The evaluation shall be performed by a California-registered Geotechnical Engineer, and shall propose maintenance and repair procedures as needed to ensure these areas remain fit for purpose for the life of the Project. The conclusions and recommendations shall be incorporated into Project engineering design components, as applicable, and submitted to the California State Lands Commission, City of Goleta, and California Coastal Commission staffs for review and approval prior to issuance of permits for construction clearance.

Rationale for Mitigation

Because the previous subsurface evaluation did not assess the conditions within the upper 20 feet of the ground surface, a subsurface evaluation is needed to address the potential for settlement and/or liquefaction. The findings would be incorporated into the engineering design to improve the ability of the Project infrastructure to withstand expected localized conditions. If MM GEO-3 is implemented, the potential for damage to Project infrastructure would be reduced to less than significant.

Impact GEO-4: Corrosion, Weathering, and Erosion

Corrosion, weathering, fatigue, or erosion could cause deterioration of structural components of PRC 421 (Less than Significant with Mitigation).

Impact Discussion

The Project is located in a naturally corrosive and erosive environment. Weathering of soils, rocks, and structures is active where there is constant action by wind and waves.

Previous deterioration of the existing structures has been documented, and resulted in emergency repairs in 2001, 2004, and 2011. During those repairs, corrosion of structural components was noted. The Project design plans indicate that corrosion protection will be included as part of the upgrades to the existing structural components, including the steel piles and exposed metal. However, the design plans do not include the corrosion protection specifications. Based on the record of emergency repairs, corrosion-related impacts to Project structures require mitigation and would be less than significant with mitigation.

Because the geologic environment is highly conducive to physical weathering, the potential exists for impacts associated with weathering of the caisson wall to occur. Further, pipeline and valves associated with the Project may be exposed to cyclic and continual wave action in the surf zone and could experience fatigue as a result (see Impact S-2).

With regard to erosion, the Project design plans indicate that the sheet piles will be founded four inches into the underlying bedrock (Monterey Formation). Based on the continual erosion that occurs at the wave-cut platform on which Pier 421-2 is located, there is a potential for the sheet pile foundations to be eroded at the base.

Issues Related to Sea Level Rise

Sea levels have risen between 4 and 10 inches during the past century and are projected to be affected by climate change in the future. Global average sea level rose at an average rate of 0.07 inch per year from 1961 through 2003 and at an average rate of about 0.12 inch per year from 1993 to 2003 (Intergovernmental Panel on Climate Change [IPCC] 2007). Whether this faster rate for 1993 to 2003 reflects decadal variation or an increase in the longer-term trend is unclear. The IPCC (2007) predicts that sea level rise for the next century could range between 0.59 and 1.94 feet. However, a range of projections exists for sea level rise and sea level rise could be much greater depending on the rate and extent of polar ice sheet melting. Ice-sheet disintegration is a complex phenomenon and still involves many uncertainties which are reflected in the lack of published literature regarding the issue. Because of this lack of consensus, sea level estimates do not include the full effects of changes in ice sheet flow. For example, complete melting of the Greenland ice sheet could contribute approximately 23 additional feet to average global sea level rise (IPCC 2007).

The National Research Council (2012) has also projected sea-level rise for California, Oregon, and Washington, taking into account both global and regional factors. For the California coast south of Cape Mendocino, the NRC projects that, relative to 2000, sea level will rise 2 to 12 inches (4 to 30 centimeters [cm]) by 2030, 5 to 24 inches (12 to 61 cm) by 2050, and 17 to 66 inches (42 to 167 cm) by 2100. These projections are close to global sea-level rise projections. However, for the Washington, Oregon, and California coasts north of Cape Mendocino, sea level is projected to change between -2

inches (–4 cm, sea-level fall) and +9 inches (23 cm) by 2030, –1 inch (-3 cm) and +19 inches (48 cm) by 2050, and 4 to 56 inches (10 to 143 cm) by 2100.

Higher water levels result in greater wave energy reaching higher on the shoreline and directly onto the face of cliffs. According to the best available models, a 4.6-foot increase in sea level by 2100 would cause the coastline of Santa Barbara County to recede by an average of 178 feet (California Climate Change Center 2009). Sea level rise of these higher magnitudes could potentially affect the Project because the loss of beaches would likely result in greater wave force on Pier 421-2, resulting in increased weathering and corrosion. If sea level rise and resultant beach erosion were to occur at much greater rates than currently forecast, Venoco could potentially request construction of seawalls, groins, or beach nourishment projects to protect PRC 421 infrastructure and other coastal oil infrastructure such as the EOF. Coastal protection structures are documented to often have adverse effects on beaches and sand supply, whereas beach nourishment projects can be expensive and require repeat applications of sand (Titus 1991). However, due to the limited Project lifetime, such protective structures are highly unlikely to be needed or requested.

Mitigation Measures

MM GEO-4a. Corrosion Protection Design Specifications. The corrosion protection design specifications shall be included on the design drawings. Once included, the revised design plans shall be reviewed and certified by a registered corrosion engineer or qualified mechanical or electrical engineer, and submitted to the California State Lands Commission staff for approval. Prior to commencement of production, and subject to receipt of all necessary approvals and permits to undertake the work, Venoco shall construct all corrosion protection improvements specified in the approved plans. If corrosion protection is required for the Project, with the exception of the caisson walls which are just beyond the City limits, all design plans shall be submitted to the City of Goleta for review and approval.

MM GEO-4b. Check Overall Structural Stability against Wind and Wave Action. The Project design shall include evaluation of cyclic wind and wave action on structural components. Once included, revised design plans shall be reviewed and certified by a professional civil/structural engineer then submitted to the California State Lands Commission staff for approval. These revised design plans shall identify any additional construction required as part of the Project. Prior to commencement of production, and subject to receipt of all necessary approvals and permits to undertake the work, Venoco shall construct all structural improvements specified in the approved plans. Venoco shall submit the design plans to the City of Goleta, for review and approval for any part of the Project within City limits.

MM GEO-4c. Evaluate Embedment of Concrete Panels and Lean Concrete Backfill. Venoco shall include in the Project design an evaluation of the potential depth of scour and erosion during the lifetime of the Project within the

Monterey Formation in the area of Pier 421-2. Venoco shall ensure that the concrete shoring panels and lean concrete backfill shall be embedded into the Monterey Formation to a depth greater than the maximum potential scour depth. Venoco shall submit all plans to the City of Goleta for work within City limits and California State Lands Commission staffs.

MM GEO-4d. Inspect Structures During and/or After Storm Events. Venoco shall conduct inspections of the structural components including the pier, caisson, causeway, seawall and revetment during and after major storm events. Venoco shall immediately report inspection results to the California State Lands Commission and the City of Goleta staffs and conduct repairs accordingly and per agency authorization.

Rationale for Mitigation

The Project would be located in an environment that could cause deterioration of structural components if the components are not appropriately designed. Therefore, incorporating these hazards into the structural design should anticipate and prevent potential deterioration. Additionally, once construction is complete, routine inspections of Project facilities conducted during and after major storm events would ensure that the structural components have not deteriorated and provide opportunities for repairs to be conducted immediately following the detection of any deterioration. With implementation of MMs GEO-4a through GEO-4d, impacts are anticipated to be less than significant.

Impact GEO-5: Erosion-Induced Siltation

Erosion-induced siltation could occur during ground disturbing activities (Less than Significant).

Impact Discussion

Erosion-induced siltation may occur along nearby waterways from ground-disturbing activities during Project construction, such as trenching for electrical cable installation, and during the decommissioning and removal of Pier 421-1. In compliance with the Clean Water Act (CWA) Section 402, Venoco would obtain a National Pollutant Discharge Elimination System (NPDES) storm water discharge permit and develop a Storm Water Pollution Prevention Plan (SWPPP) prior to Project construction; separate permits would be required for the future decommissioning and removal of PRC 421 infrastructure. The SWPPP includes erosion and sedimentation control measures and monitoring specific to the activities being performed at the construction site. Based on implementation of these measures, impacts related to erosion-induced siltation during construction activities would be less than significant.

Mitigation Measures

None required.

Table 4.1-1. Summary of Geological Resources Impacts and Mitigation Measures

Impact	Mitigation Measures
GEO-1: Seismic and Seismically Induced Hazards	**GEO-1a.** Include Seismic Loading Evaluation. **GEO-1b.** Field-Verify Subsurface Condition Assumptions. **GEO-1c.** Seismic Inspection. **GEO-1d.** Tsunami Preparedness.
GEO-2: Landslides and Slope Failure	**GEO-2a.** Monitor Coastal Bluff and Access Road. **GEO-2b.** Maintain Existing Seawall and Rock Revetment. **GEO-2c.** Inspect and Repair Access Road and Pipeline after Landslide Events.
GEO-3: Soil Settlement and Liquefaction	**GEO-3.** Perform Subsurface Evaluation.
GEO-4: Corrosion, Weathering, and Erosion	**GEO-4a.** Corrosion Protection Design Specifications. **GEO-4b.** Check Overall Structural Stability Against Wind and Wave Action. **GEO-4c.** Evaluate Embedment of Concrete Panels and Lean Concrete Backfill. **GEO-4d.** Inspect Structures During and/or After Storm Events.
GEO-5: Erosion-Induced Siltation	None Required.

4.1.5 Cumulative Impacts Analysis

With regard to geologic hazards, Project implementation is not anticipated to add to the cumulative impacts of other projects in the area. Because geologic hazards such as seismicity and seismically induced hazards exist in the region that includes the study area, implementation of the Project and other projects would not increase the likelihood of such events.

Structural development of individual projects is subject to California Building Code requirements and would be completed in accordance with recommendations by a licensed civil/structural engineer and the City of Goleta Planning and Environmental Review Department or its designee. Therefore, impacts associated with projects in the Project vicinity would generally be site-specific and less than significant. Impacts to human health associated with oil spills are addressed in Section 4.3, Hazardous Materials. Therefore, cumulative impacts with regard to geological resources are expected to be less than significant.

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4.2 SAFETY

This section addresses potential upset conditions during Project construction and operation that could result in release of oil or hazardous materials, fire, explosion or other conditions that could be hazardous to the public and environment. Detailed analyses of impacts of upset conditions on specific resources are addressed in their respective sections (e.g., Section 4.6, Marine Biological Resources). Potential safety effects of the Project are based on a change from existing conditions. Significance criteria are used to assess the significance of the impacts, and whether mitigation measures (MMs) can be applied to reduce the level of significance.

Assembly of information presented in this section involved a review of PRC 421 production facilities by licensed structural and petroleum facility engineers to address the adequacy and ability of these facilities to operate safely throughout the life of the Project. The assessment of the physical integrity of primary existing and proposed facility components serves as the basis for analyzing the potential hazards of resuming production from State Oil and Gas Lease PRC 421 (PRC 421). The engineering assessments incorporate existing conditions and facility improvements implemented by Venoco since 1997 and further improvements proposed as part of this Project. The facility engineering assessment is provided as a technical report in Appendix C.

This section relies upon information contained in the South Ellwood Field Emergency Action Plan (EAP), the California Department of Fish and Wildlife (CDFW) Office of Spill Prevention and Response (OSPR) Area Contingency Plan for Region 4, Los Angeles/Long Beach, and Venoco's EAP and Fire Prevention and Preparedness Plan. This document incorporates by reference the conclusions of the Line 96 Modification Project Environmental Impact Report (EIR) (Santa Barbara County 2011) regarding impacts to safety associated with operation of the Line 96 pipeline extension to the Plains All American Pipeline, L.P. (PAAPLP) Coastal Pipeline west of Las Flores Canyon (LFC), and summarizes these where appropriate. Where this document relies upon MMs contained in the Line 96 Modification Project EIR to address Project impacts, these are summarized to allow report reviewers to understand their relationship to the Project.

4.2.1 Environmental Setting

Study Area Location and Description

The primary Project study area comprises the immediate onshore and near-shore areas of the Ellwood coast that would be subject to direct impacts from safety hazards as a result of Project implementation. This area includes existing PRC 421 facilities, access road, and the pipeline route along the access road, coastal bluff, golf course easement, and tie-in at the existing Ellwood Onshore Facility (EOF), as well as areas up and down coast that may be subject to the effects of an oil spill, a 2-mile reach of coast that

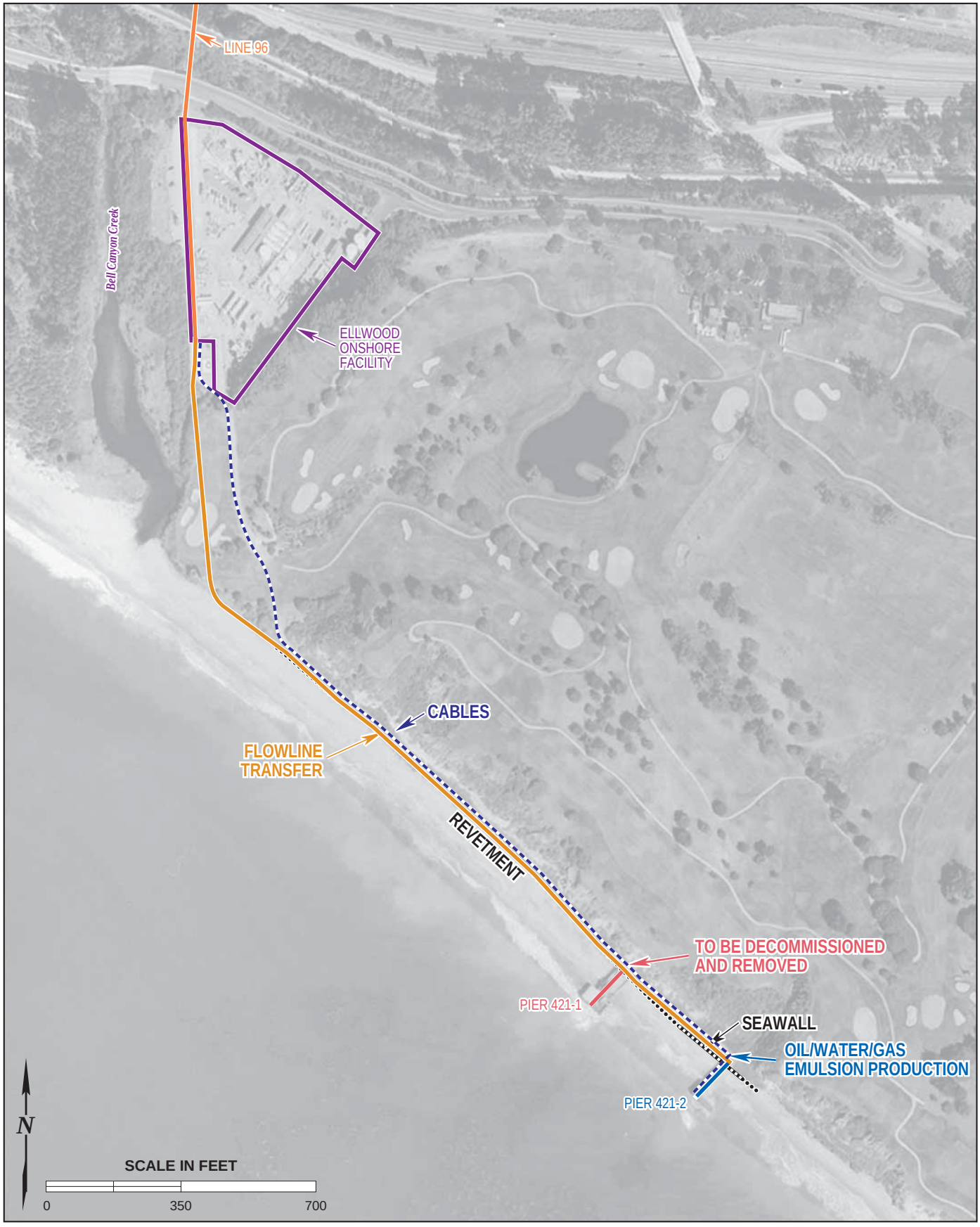
extends roughly from Coal Oil Point west to the Tecolote Creek estuary. The secondary Project study area includes the Gaviota Coast and is only discussed in environmental issue areas where potential exists for impacts that are different from those identified in the certified Line 96 Modification Project EIR.

Existing Conditions

The Project would use a number of existing facilities integral to historic PRC 421 operations and involve upgrades to some of these facilities, new construction, and use of, but not substantial alteration to components of the EOF (Figure 4.2-1). Most of the existing facilities at PRC 421 were originally constructed in the late 1920s or early 1930s. As a result, the age of these facilities and their ability to support continued oil and gas production safely has been a focus of agency attention and public concern regarding the safety and potential impacts of recommissioning PRC 421 (see comments on the Notice of Preparation [NOP] in Appendix B).

Project piers and caissons were subject to structural engineering review in 2000 (Thomas and Beers 2000). That report assessed the condition of the existing caissons and noted that construction plans were unavailable to fully identify construction characteristics and provide support for detailed structural engineering review. The report also disclosed that corrosion had collapsed the upper reaches of the seaward-facing portions of both caisson walls in the early 1980s and that both seaward-facing walls had been subject to major repairs completed in approximately 1985. The report concluded although it was “impossible to know for certain if the caisson islands have adequate structural integrity” that the caissons have survived 50 years of inclement weather and that the repairs completed in 1985 appear to be in good condition and that it appeared likely that sound engineering and design had been used in these caissons along with “robust” construction. As discussed below, four years after completing this assessment, major portions of the previously repaired seaward-facing wall on Pier 421-1 collapsed during a severe weather event.

Since Venoco’s acquisition of the lease, both PRC 421 and some Ellwood area facilities have undergone rigorous inspection and review by regulatory agencies, and Venoco has implemented a series of upgrades and improvements. These improvements have been designed to repair degraded or failing facility components and to correct potential safety deficiencies. In particular, major improvements were performed on the Project piers in 2004 and 2011 incorporating the detailed engineering recommendations of the Thomas and Beers report.



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Project Facilities and Functions [Revised]

FIGURE 4.2-1

The Project would use the EOF for processing of the oil/gas/water emulsion produced at Pier 421-2 as well as support functions (control-room functions, security, and power) and create an additional source of crude oil throughput in the Line 96 pipeline; however, physical change to the EOF would be limited to the installation of the power cable, the connecting pipe and tie-in to the 6-inch pipeline from Platform Holly, the multiphase flow meter, and the process monitoring equipment. This equipment would be used for operations through the life of production.

Sensitive Receptors and Populations in the Project Area

A variety of land uses exist in the immediate vicinity of the Project site that could be affected by upset conditions including areas of recreational, commercial, and residential development. As a result, a number of populations could be impacted by potential upset conditions, including patrons and employees at the Sandpiper Golf Course and the Bacara Resort and populations living in Ellwood and Santa Barbara Shores neighborhoods along Hollister Avenue east of the site. In addition, users of the local beaches, trails, and ocean could also be impacted. (Refer to the Line 96 Modification Project EIR for additional details on population densities and distances from the approved pipeline route.) Further, the shoreline in the Project vicinity includes sensitive resources and habitats that could be affected by Project activities, including biological, cultural, historic, and archaeological resources (see resource-specific sections for a discussion of impacts from upset conditions). Sensitive sites in the area are identified in the Area Contingency Plan (ACP) for the Los Angeles/Long Beach region (ACP 4). The ACP contains site-specific resources, response considerations (e.g., seasonal factors, access points, and hazards), as well as protective strategies and logistics (CDFW and U.S. Coast Guard [USCG] 2011; accessed January 10, 2014).

Historical Activity and Relation to Project

As discussed in Section 2.0, Project Description, the Project area has been used for oil and gas production since 1928. Currently, Federal, State, and local lands are used for onshore and offshore oil and gas production. There are 23 existing platforms offshore Southern California (one of which is used for processing only) on the Federal Outer Continental Shelf (OCS) and 20 fields in State tidelands (Bureau of Ocean Energy Management [BOEM)] 2011; CSLC 2010).

In addition, within the immediate Project vicinity, the Ellwood Marine Terminal (EMT) discontinued operation in 2012 when the Line 96 pipeline to the west of LFC became available. This facility is proposed to be decommissioned and removed prior to or within 180 days of January 1, 2016, as per the lease agreement with University of California, Santa Barbara (UCSB) (see Section 1, Introduction). Additional oil production and processing facilities in the Ellwood area include Platform Holly located approximately 1 mile south of the Project site and the EOF, located northwest of the PRC 421 facilities.

Operational and abandonment practices associated with early oil and gas development were less protective of the environment than modern practices and requirements; consequently, present conditions may have unknown or unquantified oil-related contamination as a result of this earlier development. Further, the adequacy of the abandonment of production wells in the area is also an issue of concern, with at least 21 of the 72 wells drilled into the reservoir from offshore piers having potential deficiencies in their abandonment procedures when compared to modern standards (CSLC 2006).

As described in Section 2.1.1, Project History, PRC 421 was shut-in in 1994 in response to a leak in the 6-inch line, which delivered oil to the old Line 96 that runs from the EOF to the EMT. Since the facilities were shut-in, additional problems have occurred, including methane and oil leaks at Piers 421-1 and 421-2, as well as the partial collapse of the Pier 421-1 caisson. These issues and activities at PRC 421 relevant to this safety analysis are described below:

- *1994 Pipeline Leak* – A release of 170 barrels was caused by a leak in the 6-inch line that connected Pier 421-1 to the old Line 96. The pipeline is presently out of service; Venoco proposes to use it as an outer "casing" for the internal liner and the new 3-inch flowline that would be inserted into the 6-inch line. The proposed repair of the damaged portions of this pipeline and removal of 90 degree bends, along with installation of a new leak detection and automated shut-off (on the well) on the existing pipeline would, in part, serve to resolve the conditions that led to the release.
- *Methane Leak in 2000 and Repairs* – As noted previously, detection of the leak during inspection triggered a series of repairs and upgrades to PRC 421 facilities, which included the wellhead, well casings, and installation of surface and subsurface safety valves. Prior to implementing these repairs, both piers were largely reconstructed, the seawall was strengthened by the addition of riprap, and the access road was resurfaced and upgraded. Historic production equipment was removed from the piers.
- *Pier 421-1 Damage, 2004* – The seaward-facing wall of the caisson at Pier 421-1 partially collapsed into the surf during severe winter storms in 2004. In response, Venoco instituted emergency repairs to the caisson wall.
- *Pier 421-2 Repairs, 2011* – The seaward-facing wall of the caisson at Pier 421-2 was also observed to be damaged during routine CSLC staff inspection in 2010. Based on this damage and the potential for leakage of oil from the pier, emergency permits were obtained and repairs similar to those performed on Pier 421-1 in 2004 were performed for Pier 421-2 in 2011. The structural integrity of, and any needed improvements to, the caisson at 421-2 is an important concern addressed in this EIR.

According to the South Ellwood Field EAP, none of the Ellwood area oil production facilities, including the PRC 421 facilities (which, other than depressurization activities in 2001 to relieve well-head pressure, have been idle since 1994), has had a reportable spill reaching marine waters in 19 years (Venoco 2013).

Vaqueros Reservoir Repressurization

A number of events and observations indicate that the Vaqueros Reservoir has been repressurizing and continues to repressurize. The repressurization of the Vaqueros Reservoir is a concern because at least 21 offshore wells in the area were not properly plugged and abandoned to current standards in the 1930s, 1940s, and 1950s. These abandonment deficiencies make these wells more likely to leak oil as pressure increases in the reservoir. This section discusses the evidence of repressurization, the potential cause of repressurization, and concerns created by old abandoned wells, in which creates the risk of potential offshore oil releases.

Evidence of Repressurization

The empirical evidence demonstrates that reservoir pressures have risen, as shown by the controlled release of nearly 17,000 barrels of pure oil from PRC 421-2 in 2001 while undertaking emergency repairs (see Section 2.1.1). More specifically, following the discovery of gas leaks, by the Santa Barbara County Air Pollution Control District (APCD), from PRC 421, Venoco sought to recap the shut-in wells, but could not do so safely without first relieving surface wellhead pressure observed by operating personnel. After receiving authorization from the proper authorities, Venoco installed a temporary pipeline at Well 421-2, which when opened flowed upwards or in excess of 17,000 barrels of nearly pure oil over the next 10 months. This free-flow of oil confirmed that repressurization in the Vaqueros Reservoir was substantial and raised concern and the realization that nearby poorly abandoned wells could leak under similar and prolonged elevated reservoir pressures. The gradual increase in bottomhole pressure (reflective of the reservoir pressure) has been displayed in the measurements of fluid rise in Well 421-2 between the years of 1987-2000 (Figure 4.2-2).[1] The original reservoir pressure was 1,525 pounds per square inch (psi) at the time development began in the 1930's, which is equivalent to a pressure gradient of 0.46 psi per foot. Years of oil, gas and water production from the field since that time caused significant reservoir pressure decline (CSLC 2006). In 1987, fluid level measurements in well PRC 421-2 estimated the reservoir pressure at that time to be approximately 690 psi. The Vaqueros Formation had for many years, prior to 1987, been subject to reservoir fluid withdrawals by a significant number of wells, both onshore and offshore, which, with the

[1] An estimate of formation pressure can be made by using the height of the fluid column in a static well and the density of that fluid, by multiplying the column height (in feet) by the pressure gradient derived from the density (in psi per foot).

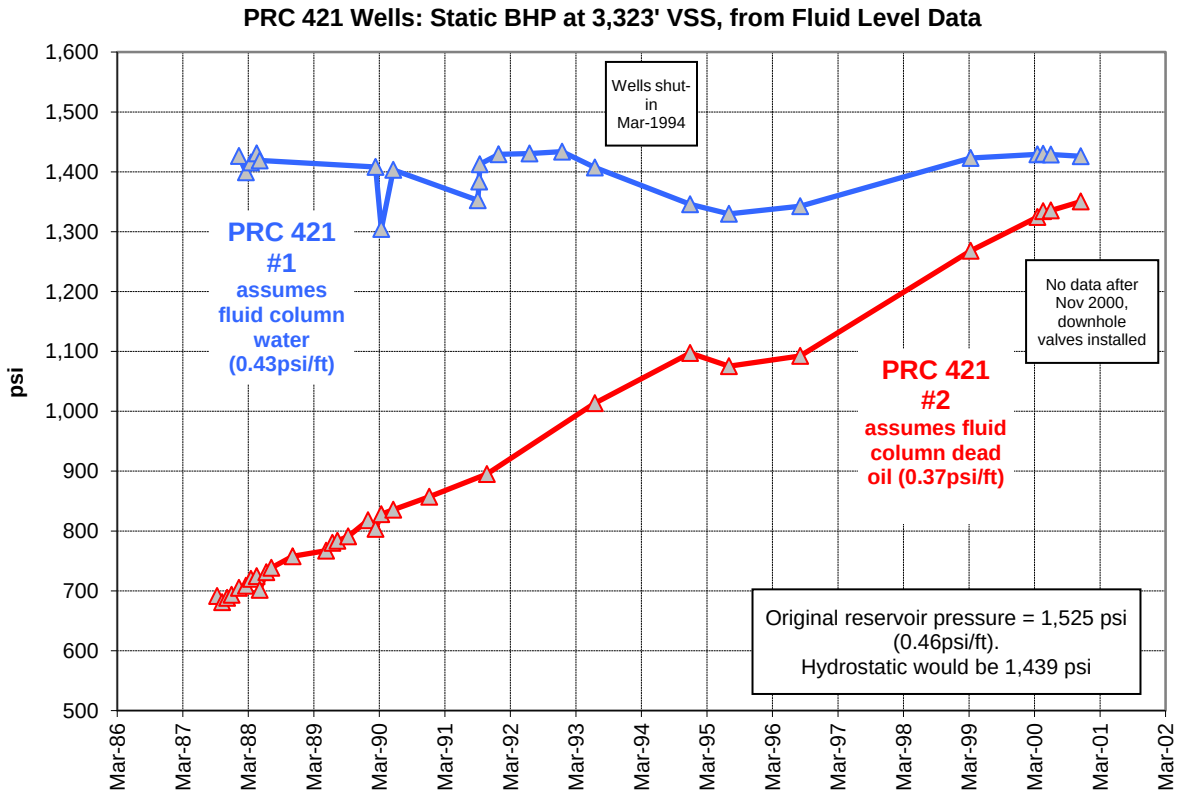


FIGURE 4.2-2. REPRESSURIZATION OF VAQUEROS RESERVOIR, 1987-2000*

* This graph represents bottom hole pressures measurements for Well 421-2 and 421-1 from August 1987 through November 2000. The bottomhole pressure readings were determined from measurement instruments that record fluid rise inside the wellbore. A higher fluid level in the wellbore indicates a greater pressure at the bottom of the well at reservoir depth. Since 1987 the graph shows that the bottomhole pressure increased approximately from 690 pounds per square inch (psi) to approximately 1100 psi by 1994, when the well was shut in because of a pipeline leak, to approximately 1350 psi in 2000.

exception of the PRC 421 wells, have since been plugged and abandoned (see Figure 4.2-3). The rate of reservoir fluid withdrawals from these wells over a great period of time exceeded the rate of aquifer influx, which has been and continues to be the source of reservoir pressure. The aquifer only began to replenish the void after production from the formation began to decline during the 1970's and eventually ceased in 1994. As production ceased, the natural influx into the aquifer slowly re-filled the reservoir thereby increasing the reservoir pressure. Continued and prolonged shut in of production from abandoned wells in the field allowed influx of aquifer water to gradually increase and restore reservoir pressure close to its original pressure. Fluid level measurements since 1987 have shown this to be the case, and by the year 2000, these measurements estimated a reservoir pressure of approximately 1,350 psi. The pressure near the well is a direct reflection of the increase in reservoir pressure in the surrounding formation. The rate of increase in pressure from the year 1987 to 1994 was

55 psi per year. During the time period Well 421-2 was shut in, the pressure continued to increase at a slightly higher rate of climb, approximately 62 psi per year, from 1996 to 2000 (see Figure 4.2-2). No fluid measurements were recorded after the 2000 year as the well was equipped with new surface equipment and mechanical shut off valves for safety, which prevented further fluid level measurements.

The Commission's Mineral Resources Management Division staff has evaluated fluid level measurement data from Well 421-2 during the period from August 1987 through October 2000 and believes that pressures have continued to climb above the 1350 psi measurement and will reach a pressure very close to original reservoir pressure. It is important to highlight that during the period that the wells were abandoned, reservoir pressures were low and the sealing effectiveness of the plugs were subject only to these low pressures. This means that the sealing adequacy of the plugs placed in the older abandoned wells, now subject to higher pressure conditions, will be increasingly tested. The risks of leakage cannot be quantified; however, the relative risk can be reduced if the reservoir pressure that has risen over time can be reduced by resuming withdrawals from Well 421-2.

If production from Well 421-2 is resumed, oil in the reservoir that has accumulated near this well will be withdrawn and prevented from leaking through nearby, poorly abandoned, wells. While the degree of repressurization of the formation may be speculative, the risk of significant offshore oil leaks, in the absence of the Project, reinforces the findings in the EIR that the Project is an environmentally superior option.

Engineers with Venoco and the CSLC identified two possible sources of repressurization: Aquifer influx (natural groundwater movement), or water influx from onshore water injection Well WD-1.

Aquifer Influx

Substantial evidence exists that supports the basis of aquifer influx (natural groundwater movement) being the source of the original Vaqueros reservoir pressure state, as well as the cause of its present repressurization. First, geologic data from exploratory and developmental drilling showed that oil accumulation lies on the surface of an extensive aquifer. Second, an active water drive was suspected early in the field's development, as most initial wells flowed and many experienced rapid water encroachment. Finally, evidence of pressure support from aquifer influx, as well as gravity segregation, can be seen in the production performance of Well 421-2 (CSLC 2006). Gravity segregation refers to the tendency of fluids (water and oil in this case) to stratify into different layers because of gravitational forces. In gravity segregation, the heaviest fluid (water) settles near the bottom of the reservoir and the lightest fluid (oil) rises to the top.

Well 421-2, after initially flowing at more than 1,000 BOPD, experienced a steep decline from 1930 to 1940. The water flow rate increased steadily during that time; however,

between the early 1940s to mid-1960s, its oil production rate held steady at 20 to 30 BOPD, with about 90 percent water cut. Then the oil rate increased, gradually but steadily, to nearly 60 BOPD in 2000. The increase in production began more than a decade prior to commencement of injection into Well WD-1. The production performance of Well 421-2 appears to be unaffected by the onset of injection in Well WD-1. Instead, the gradual increase in oil rate of Well 421-2 appears to be the result of the well's position at the crest of the Vaqueros Reservoir, the elimination of competing wells in the field, and the combined effect of both natural aquifer influx and produced water re-injection into the adjacent Well 421-1, which was used for disposing water that was produced with the oil from Well 421-2. By the mid-1960s and extending into the early 1970s, most producing wells in the eastern part of the field were plugged and abandoned due to production levels that were not economically viable. At the same time, injection into the reservoir was initiated for the first time. From the 1930s through the 1960s, most produced water from the Ellwood Oil Field was disposed of in the ocean. Well 421-1 was converted from a producer to an injector in the early 1970s, and the injection of water from this well appears to have increased the oil production rate in Well 421-2 by at least 10 BOPD. Thus, natural aquifer influx and gravity segregation appear to have caused both the repressurization in this portion of the Vaqueros Reservoir and the improvement of the oil production rate from Well 421-2 (CSLC 2006).

Injection Well WD-1

Injection Well WD-1 disposes of produced water from Platform Holly; it is drilled into a down-structure portion of the Vaqueros Reservoir. The well is located onshore, at the EOF, about 2,500 feet northwest of PRC 421. The well location was chosen because geologic data indicated that the Vaqueros Reservoir in that area selected for water injection is isolated from the oil-bearing part of the reservoir (the Ellwood Oil Field) by an east-west trending, high-angle reverse fault known as the La Vigia fault. Geologic data further suggest that Well WD-1 does not penetrate an area of the Vaqueros Reservoir that would affect the pressure at Well 421-2. Previous drilling showed that the La Vigia Fault acts as a barrier to oil migration. Oil is trapped in the sands on the south side of the fault, while no oil is found to the north of the fault (CSLC 2006).

In late 2004, Venoco submitted to the Commission a design for a pressure fall-off test of the onshore water disposal well (WD-1), and a simultaneous build up test in Well 421-2. These tests were designed to detect possible pressure connectivity between the producer and disposal wells. The test was not performed because: 1) the disposal well was needed for continuous service of produced water from Platform Holly; and 2) a pressure build up test in Well 421-2 would require temporary production of the well, for which Venoco had neither the permits nor the approvals to undertake the temporary production.

An examination of cumulative production and injection data for the Ellwood Oil Field also indicates that the volume of water injected into Well WD-1 has been insufficient to cause an increase in pressure throughout the Vaqueros Reservoir, even if the La Vigia did not exist. Cumulative liquid production from the Vaqueros Reservoir is approximately 252 million barrels, which includes 104 million barrels of oil and 148 million barrels of water. Cumulative water injection in the field, including injected water into Well WD-1, is only 97 million barrels. This leaves a net void of 155 million barrels of liquid for the Ellwood Oil Field, and if natural gas withdrawals from the reservoir were included in this calculation, the net voidage would be even greater. In a reservoir with no other sources of water or other liquid entering the formation, this can only result in a decrease in reservoir pressure. The presence of the isolating La Vigia fault, coupled with the imbalance of injection to withdrawal volumes, makes Well WD-1 an unlikely premise as the cause of Well 421-2 pressurization (CSLC 2006).

Repressurization Monitoring

Static reservoir measurements record the reservoir pressure condition of a nonoperational well at the moment the pressure instrument reaches reservoir depth. This is a single measurement and is a record of the reservoir pressure at that point in time. Static measurements are usually taken when it is believed the reservoir pressure at that location has reached a state of equilibrium. These measurements are useful for identifying the pressure state of a reservoir and to determine the level of depletion a reservoir has experienced at different times during its operating life. This single point pressure measurement method is not, however, a method for evaluating a dynamically changing reservoir, which is the condition of the Vaqueros reservoir in the Ellwood Field. The pressure in the Vaqueros Formation has been in a state of flux over the past 25 years (see Figure 4.2-2). To evaluate a dynamic and changing pressure environment within a reservoir, it is necessary to record the trend of pressure changes from within wells in the reservoir. It is also necessary that pressure changes are recorded at extreme well conditions. In order to utilize recorded data effectively from a producing well, such as Well 421-2, a pressure increase trend must be developed, beginning at its lowest possible recorded pressure. Reservoir pressure recordings in a dynamic environment are only effectively recorded after a well has produced for a period of time where the reservoir has been significantly depressurized at reservoir depth. Depressurization can only occur through continuous withdrawal of reservoir fluids, until the producing reservoir pressures have reached a constant state. It is not possible to record this information without first producing the well to achieve a constant producing pressure at the bottom of the well. Under the Project, the electric submersible pump (ESP) will allow for producing pressure data and rate data that will be made available to the Commission on a regular basis, allowing for a detailed reservoir analysis of the Vaqueros Formation.

The Vaqueros pressure cannot be monitored as long as production at PRC 421 is shut-in. PRC wells 421-1 and 421-2 are the only remaining wells where measurements can be made. Section 2.4.5 of the Project Description provides a reservoir pressure monitoring program through the life of the Project. Because Venoco has no obligation under its lease to perform pressure testing or pressure monitoring without approval of a Project to return PRC 421 to production, the CSLC does not have any current mechanism by which to collect pressure data in the absence of the Project.

Gas leaks at PRC 421 were detected in 2000 from monitoring by the Santa Barbara County APCD. APCD's testing and monitoring, however, does not provide any information regarding the pressure within the reservoir, only whether there is a presence of volatile organic compounds around the wells, which could signify the presence of a leak. CSLC staff acknowledges the concern about leakage at Well 421-2, but believes that the current absence of leakage at Well 421-2 is not a reliable indicator that the reservoir is not repressurizing for the following reasons:

- installation of a subsurface safety valve occurred when Well 421-2 was shut-in pursuant to the direction and oversight of Commission and Division of Oil and Gas, and Geothermal Resources (DOGGR) staffs; and
- the risk of a leak from this well has been mitigated by the modern method by which the well was closed and the addition of the subsurface safety valve.

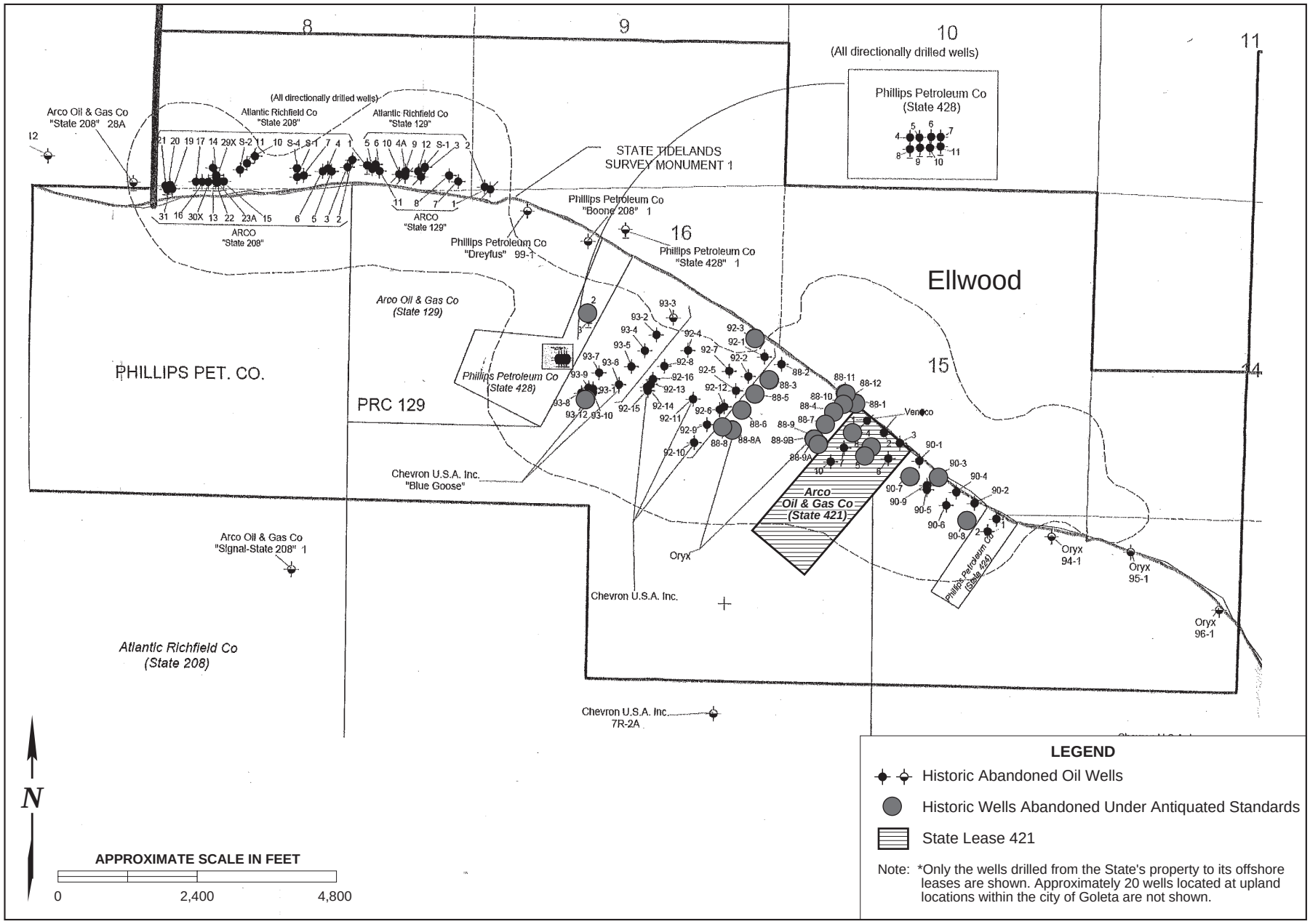
In the event that the APCD detects a leak through its testing at Well 421-2, CSLC staff would be notified. CSLC staff believes the greater environmental risk, as identified in the EIR, is that the older wells abandoned throughout the field, some of which were abandoned many decades ago (see Figures 4.2-3 and 4.2-4), will leak oil and gas as the reservoir repressurizes.

Repressurization and Abandoned Wells

According to a review conducted by the CSLC's Mineral Resources Management Division in 2001, at least 21 of the offshore wells drilled into the Vaqueros Reservoir from piers had potential deficiencies in their historic abandonment procedures, which could make them more likely to leak. Figures 4.2-3 and 4.2-4 provide maps of the locations of these wells, which only depict these offshore wells, and do not include approximately 20 wells located at upland locations now within the City of Goleta. All of these wells are currently abandoned, and PRC 421 is the only active lease remaining.

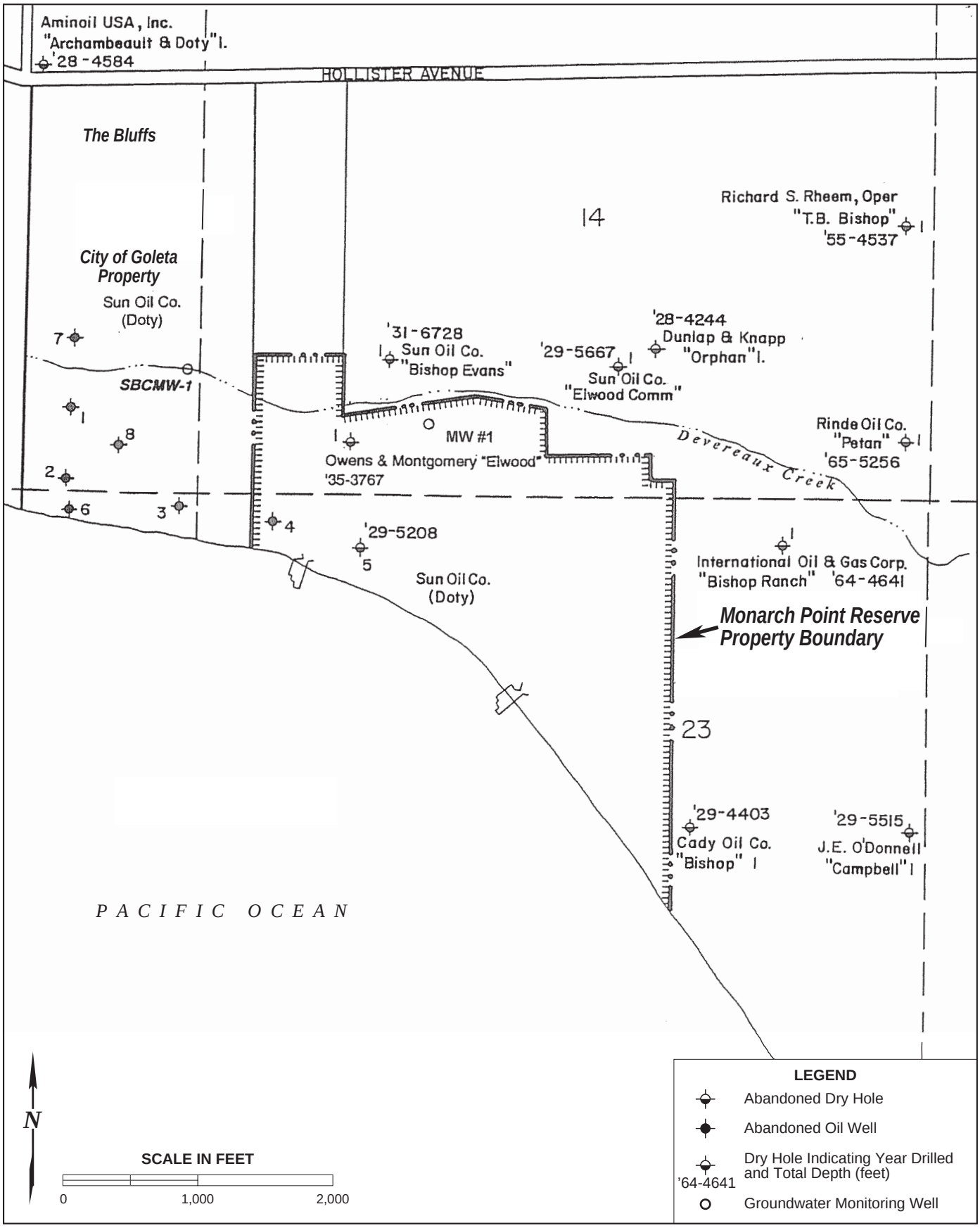
The potential concern for most of the wells is the inadequate volume of cement in the casing shoe plugs and/or surface plugs.[2] Most wells have shoe plugs less than 100 feet

[2] A shoe plug consists of a concrete plug at the bottom of a string of open casing. A surface plug is placed from the surface down to a variable depth in the well bore, typically 50 feet in modern operations.



Historic Well Locations in the Project Vicinity*

FIGURE 4.2-3



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Detailed Well Descriptions in the Project Vicinity

FIGURE 4.2-4

long, some wells have shoe plugs of only a few feet, and some have no shoe plug at all. Like the shoe plugs, the surface plugs do not meet current standards and practices. Some wells have no surface plugs; wells with surface plugs average only 30 feet in length. Re-abandoning these wells could present significant problems, since many of them had their inner/production strings cut and recovered, and the well casings were cut off at or below the mud line, making it very difficult to locate the wells and re-entry to an appropriate depth nearly impossible.

Summary

Pursuant to State CEQA Guidelines section 15144, while an agency cannot foresee the unforeseeable, it must use its best efforts to find out and disclose all that it reasonably can. As such, the CSLC staff is concerned that any build-up of pressure within the Vaqueros Reservoir could potentially cause unintentional oil releases into the coastal environment. The increased pressure in the reservoir could force a leak from historic abandoned wells in offshore areas of the reservoir or possibly lead to additional release of oil from a natural seep. Given current conditions – PRC 421 is shut-in and all other wells that once tapped the reservoir have been abandoned – there is no active well penetrating the reservoir into which pressure-testing equipment can be inserted. Consequently, there is no existing mechanism to conduct pressure testing of the reservoir to determine the extent of possible pressure build-up. The potential impacts of repressurization cannot be adequately determined until the Commission has sufficient data to evaluate. The pressure data that would be collected by the Project are integral to assessing the future risks of pressurization of the formation and the determination of any future risks and responses. Long-term risks and responses to repressurization will be dealt with when the lease is quitclaimed or terminated.

Existing Facility Conditions

Existing facilities at PRC 421 have undergone structural improvements, repairs, and removal of historic structures. The present conditions of these facilities, as they relate to Project safety, are summarized in Table 4.2-1.

Hazards, conditions, or features that have the potential to be the source of a release, fire, or explosion, are also noted. Figure 4.2-5 shows the piers in their existing condition, and Figure 4.2-6 shows the conditions of the existing caisson walls of each pier.

Existing Facility Hazards

Sands within and possibly beneath both caissons at Piers 421-1 and 421-2 may contain unknown quantities of residual oil and oil-containing materials, although no contamination was discovered during repair work and associated excavation at Pier 421-1 in 2004 or at Pier 421-2 in 2011. In their current condition, portions of either

Table 4.2-1. Summary of Area Facility Conditions

Facility	Condition
Used by Project	
Pier 421-1 (Pier and Caisson)	In 2000, the pier was reinforced, the well casing and wellheads were repaired, and subsurface safety valves were installed. In 2004, a new seaward-facing wall was installed on the caisson. Venoco has developed and is implementing a monitoring plan to identify and respond to leaks from the PRC 421 piers. The pier is fenced and patrolled twice daily by private security.
Pier 421-2 (Pier and Caisson)	In 2000, the pier was reinforced and upgraded and new subsurface safety valves were installed. In 2011, a new seaward-facing caisson wall was built. Venoco has developed and implemented a monitoring plan to identify and respond to leaks. This facility may have similar source and quantity of contaminated material as that found in Pier 421-1. The pier is fenced and patrolled twice daily by private security.
6-inch Pipeline	In 1994, 170 barrels of oil were released near the coastal bluffs. The line is currently out of service and is not suitable for modern "pigging" maintenance due to the presence of two 90 degree bends.
Access Road and Seawall	The access road was rebuilt and resurfaced during 2000 repair activity to permit use by heavy construction equipment. The seawall was expanded and reinforced by the addition of new riprap; however, there is a gap in the seawall between Piers 421-1 and 421-2 where a timber bulkhead provides the only protection for the access road. Security patrols along the access road are conducted by Venoco.
EOF	The EOF includes multiple redundant monitoring and safety systems with a control room that is staffed 24 hours per day, 7 days per week. Existing safety systems include onsite fire fighting capabilities, and personnel trained to respond to fires and other emergencies. Substantial upgrades to the EOF have been implemented to comply with the 1999 Santa Barbara County APCD Abatement Order and conclusions of the 2000 quantitative risk assessment and Safety audit (Santa Barbara County 2006).
Line 96 Pipeline from the EOF to the PAAPLP Coastal Pipeline	The Line 96 pipeline began operation in 2012. Standard regulatory conditions for pipelines and MMs in certified Line 96 Modification Project EIR (Santa Barbara County 2011) include pressure testing, pigging, and other methods to ensure safe operation consistent with industry and regulatory standards.
Other Area Ellwood Oil Facilities	
EMT	Not a part of Project. Operation was discontinued upon completion of the Line 96 pipeline in 2012; abandonment planning is underway.
Old Line 96 that runs from the EOF to the EMT	The old Line 96 that runs from the EOF to the EMT ceased operation in 2012 and will be removed or abandoned in place now that the Line 96 pipeline from the EOF to the PAAPLP Coastal Pipeline is in operation.
Historic Abandoned Oil Wells	There are many offshore oil wells that were drilled into the Vaqueros Reservoir from historic piers that are no long present in the area (see Figure 4.13-1 depicting the historic piers); however, the old wells remain in place and abandoned by historic abandonment practices.

caisson have the potential to deteriorate and release oil and oil-related contaminants, despite the repairs conducted in 2004 and 2011.

Hazards and hazardous conditions associated with Project implementation would potentially affect both the EOF and the Line 96 pipeline extension because the quantity of oil and gas processed at the EOF and the total crude oil throughput in the pipeline would increase. The Project would not modify the existing oil and gas processing

Figure 4.2-2a
Pier 421-1

Figure 4.2-2b
Pier 421-2 (shown under repair as of April 2011)
(Photo: Bruce Reitherman)

Figure 4.2-3a
Pier 421-1 Caisson Wall (facing ocean)

Figure 4.2-3b
Pier 421-2 Caisson Wall (facing ocean, shown under repair as of April 2011)
(Photo: John Storrer)

systems at the EOF or increase the quantity of oil processed beyond the processing limits for Platform Holly alone. Therefore, the Project would not generate significant changes in the operation of the EOF. The Line 96 pipeline was evaluated in a certified EIR, which contains proposed MMs that are required to be implemented as part of project construction and operation.

A 1999 Abatement Order by the Santa Barbara County Air Pollution Control District (APCD) required a series of audits, improvements, and other actions to address releases of gas containing hydrogen sulfide (H_2S) at Ellwood area facilities (Santa Barbara County APCD 1999). Although the Abatement Order notes PRC 421 as being included in the Ellwood facilities (i.e., EOF, EMT, and the old Line 96 pipeline from the EOF to the EMT), there were no specific references to PRC 421 in the Abatement Order; additionally, the oil produced at PRC 421 is light "sweet" crude oil, typically low in H_2S. The Abatement Order led to the preparation of a quantitative risk assessment (QRA) of these facilities (Arthur D. Little [ADL] 2000). The conclusions of the QRA are incorporated in this EIR both as background for issues affecting the Project and for use in assessing the risk associated with certain Project alternatives (see Section 5.0 for the alternatives analysis).

The Ellwood area oil production facilities have hazards and risks associated with them related to the crude oil produced from Platform Holly, for which crude oil production includes H_2S or "sour gas." Crude oil with little or no sulfur content is referred to as "sweet" crude. Figure 4.2-7 is a simplified diagram presenting existing hazards and risks associated with the Ellwood area oil production facilities that would be affected by the Project. These are the baseline conditions against which Project effects are compared.

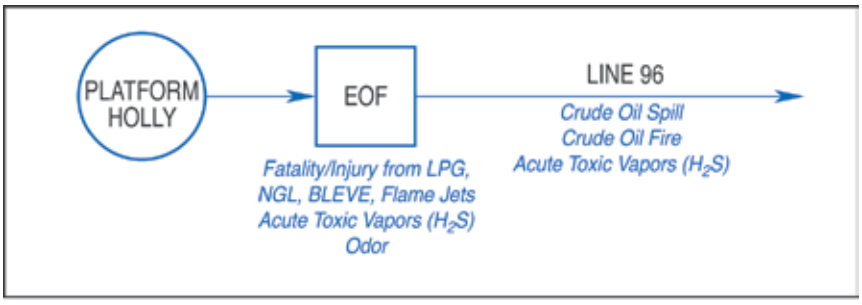


FIGURE 4.2-7. BASELINE HAZARDS/RISKS FROM ELLWOOD OIL PRODUCTION FACILITIES

Information about hazards and risks was obtained from CSLC (2009), ADL (2000), and Santa Barbara County (2011). Project-related hazards and risks associated with Ellwood facility components are summarized below (see the Line 96 Modification Project EIR for a full discussion of hazards associated with Line 96). Existing hazards associated with operation of Platform Holly are not addressed here as the Project would not require use of those facilities.

- **EOF** – The Project would require use of the EOF for separation and processing of oil, gas, and water, reinjection of water, control-room and security support, and electrical power (from the substation).
- **Line 96 Pipeline from the EOF to the PAAPLP Coastal Pipeline** – The Line 96 Modification Project EIR projected a failure rate for the approved pipeline of a large spill once every 140 years, and a small spill once every 31 years. These rates would not be expected to change substantially with the addition of Project oil, and the Project's use of the pipeline would occur during its first decades of operation, when risks of pipeline spills and accidents are at their lowest levels.

Crude Oil Characteristics

Crude oil characteristics can vary significantly by origin and (after exposure to the surface) weathering. At the wellhead, crude oil is typically a mixture of water, hydrocarbons (liquid and gases), and solids. The crude oil produced from PRC 421 is "sweet" crude, referring to its low sulfur content. Table 4.2-2 provides the crude oil properties of oil produced from PRC 421 (Ellwood Field), compared to other crude oils produced from the South Ellwood Field (Platform Holly).

Table 4.2-2. Crude Oil Characteristics, PRC 421 and the South Ellwood Field

	PRC 421	Holly[a]	EOF[a]
API Gravity	35	22.4	22.4
Sulfur Content, percent by weight	<0.6%	4.1%	4.1%
H_2S Concentration, (parts per million by weight (ppmw)	$\leq$10[a]	200	65

[a] Venoco 2013.

The natural gas content of oil produced at PRC 421 is known to be low, and the gas that is produced would have an H_2S content of approximately 10 parts per million (ppm). The low gas content of this oil was confirmed during previous production under emergency permit by Venoco in 2001 when approximately 17,000 barrels of oil produced from 421-2 contained no detectable amounts of gas (Venoco 2007). The Emergency Response Planning Guidelines (ERPG), which are used to develop thresholds for injuries and fatalities, identify 30 ppm of H_2S as the level at which nearly all individuals could be exposed for up to one hour without experiencing irreversible or serious health effects (American Industrial Hygiene Association 2006). Therefore, the crude oil produced by the Project would not be a source of acute toxic impacts to human receptors, if released. This distinguishes the characteristics of oil produced from PRC 421 from that currently produced at Platform Holly.

Crude oil released into the environment can pose a range of hazards, depending on the specific properties of the crude oil, location, and condition under which it is released, and the sensitivity and physical characteristics of the receiving environment and local

receptors. Crude oil can be toxic to biota, as well as cause physical harm or death to animals following contact with oil. See Section 4.5, Hydrology, Water Quality, and Water Resources, for discussion of effects of oil on water quality, and Section 4.6, Marine Biological Resources, for more discussion about the effects of oil on biota.

Rapid response to a crude oil release is critical. Because crude oil contains a mixture of constituents, as the lighter or more volatile fractions dissipate, the remaining material is thicker and tends to be more persistent in the environment if it is not contained and removed at the early stages of a response. Crude oil spilled in the marine environment typically forms an emulsion that incorporates sand and debris as it weathers, which causes it to sink after a period of time and is difficult to recover. This is especially true of oil in the surf zone, which is a high-energy area.

Crude oil can ignite, which could result in a crude oil fire. As noted in the EMT Lease Renewal EIR, the likelihood of an explosion related to a crude oil spill and fire related to crude oil produced from Platform Holly is “virtually non-existent;” therefore, the EMT analysis did not conduct further analysis on explosions (CSLC 2009; ADL 2000). However, the Platform Holly crude oil is heavier than PRC 421 crude oil. The PRC 421 crude oil (35 API) has higher potential of explosion than Platform Holly crude oil due to the presence of higher light ends. A more recent risk assessment was conducted for the Keystone XL pipeline, which included a wide range of historical analyses of pipeline accidents (U.S. Department of State 2013). That assessment concluded that explosions from newer pipelines carrying single-phase crude oil (as Line 96 does) present an extremely low risk of explosion or fire.

Environmental Hazards

The Project site is situated in a dynamic environment, with naturally occurring conditions that may affect safety conditions. These are ocean/wind conditions, coastal processes, seismicity, and subsurface pressure in the Ellwood Oil Field. See Section 4.1, Geologic Resources, for a complete discussion of geologic processes that may impact Project safety conditions; specifically erosion, seismicity, tsunamis, and subsurface pressure.

Prevailing winds in the coastal region are from the west/northwest during the day, with an average speed of 7 to 12 miles per hour. Evening winds blow from the east, as the air over the Pacific Ocean cools and creates a low pressure zone. Ocean conditions are summarized below, and are described in more detail in the EMT Lease Renewal EIR (CSLC 2009). These data are based on historic conditions in the Project area, and it is uncertain to what degree, if any, these would evolve or change due to the effects of global warming over the Project production horizon.

Although located in the relatively sheltered surf zone of the Santa Barbara Channel, the Project site is subject to periodic high winter surf conditions (Table 4.2-3). Heavy winter

Table 4.2-3. Ocean and Wind Conditions

Weather Elements	Annual Average	Monthly Maximum
Wind > 33 Knots – Percent Frequency	1.3	2.2
Wave Height > 9 feet – Percent Frequency	6.4	10.6
Visibility < 2 nautical miles – Percent Frequency	6.3	8.7
Precipitation (inches)	16.8	5.8
Temperature > 69°F – Percent Frequency	1.7	4.2
Mean Temperature (°F)	58.8	62.8
Temperature < 33 °F – Percent Frequency	0	0.1
Mean Relative Humidity (percent)	82.0	86.0
Overcast or Obscured – Percent Frequency	31.4	50.6
Mean Cloud Cover (8ths)	4.5	5.4
Prevailing Wind Direction	NW	N/A

Sources: USCG 2002; CSLC 2009.

storms can generate wave heights in excess of 10 feet leading to scouring of all or most of the sand from beaches at the Project site and exposing primary Project facilities, such as the caissons, piers, and seawall to battering from heavy surf. When combined with winter high tides, which can reach the toe of the seawall, such high surf conditions may pose a hazard to Project facilities.

Security, Prevention, and Response Capabilities for the Ellwood Facilities

Venoco has existing security, accident prevention, and response capabilities that address the PRC 421 facilities. Preventive measures, plans, response equipment, and the programs required to implement a response (e.g., health and safety training, drills and exercises, and equipment inspection) contribute to Venoco's ability to prevent or respond to upset conditions. Most of these measures and programs are governed by agency and industry requirements and standards (see Section 4.2.2, Regulatory Setting), as well as corporate policies, to avoid or reduce harm to the public and the environment. Although these safeguards provide a level of confidence in the safety of operations, and an ability to respond to emergencies, they cannot reduce the potential for accidents or harm to zero. Existing security, prevention, and response capabilities in place that encompass PRC 421 facilities are listed in Table 4.2-4.

For releases of oil at the Ellwood facilities, Venoco has response equipment, vessels, personnel, and/or supplies located at the EOF and onboard Platform Holly. As required by various regulations, contingency plan implementation requires personnel training, equipment testing and inspections, and scheduled and unscheduled drills and exercises to maintain readiness. According to records provided of response drills and exercises held for the Ellwood facilities since 1999, 10 drills were held, of which nine were for H_2S

Table 4.2-4. Security, Prevention and Response Plans and Capabilities In Place for PRC 421 Facilities

Measure	Purpose
Controlled Access	Each caisson has an 8-foot-high chain link fence that remains locked to prohibit entry to the equipment on the piers. EOF staff provides security.
Security Patrol	A private security firm patrols the PRC 421 facility area twice daily.
Emergency Action Plan (EAP)	Emergency plan for the South Ellwood facilities provides information and procedures for emergency shutdown, evaluation, and response to emergency conditions at the South Ellwood Field. The plan includes procedures for responding to and managing an oil spill emergency, and contains response checklists, roles and responsibilities of response personnel, inventories and locations of response equipment, supplies, and personnel (Venoco and contracted).
Spill Prevention Countermeasures and Control (SPCC) Plan	Description of systems (equipment, containment, related components) at PRC 421 used to prevent and manage releases of oil.
Fire Prevention and Preparedness Plan, South Ellwood Facilities	Fire prevention and response. This plan specifically addresses the EOF and EMT. PRC 421 facilities are not specifically addressed in this plan.
Mitigations from City of Goleta (2006) MND	Site-specific plans resulting from Pier 421-1 repair and subsequent monitoring for leakage which were completed in early 2007: · Emergency Response Plan · Prevention and Control Plan · Removal Action Plan

releases or H_2S-related drills at the EOF, and one was an unannounced oil spill drill at the EMT, initiated by OSPR. None of the drills specifically addressed PRC 421; however, a response to an event at the PRC 421 facilities would be similar to the response to an event at the EOF facilities or formerly conducted at the EMT (with the exception being the low likelihood for H_2S drills due to the low H_2S content of PRC 421 oil). According to the records provided, some included written evaluations by Santa Barbara County, providing specific recommendations (Venoco 1999-2004).

The EAP includes descriptive information of and response procedures for PRC 421 (referred to as the "Beachfront Lease"), lists the historical components, and notes that they will be replaced. Similarly, the Spill Prevention Countermeasures and Control (SPCC) Plan would need to be updated as it lists a potential release volume of 900 barrels; however, the source of the volume noted was the crude oil storage tank on Pier 421-1, which has been removed. On-water containment procedures in the EAP include booming strategies for a release from the piers.

The EOF has engineered fire protection systems and procedures (contained in the Fire Prevention and Preparedness Plan) to prevent, detect, and manage a fire. According to the Fire Prevention and Preparedness Plan, Venoco personnel are trained and

equipped to initiate a response to a fire at the incipient stage[3] and to control the site in preparation for the arrival of the SBCFD. In its existing form, the Fire Prevention and Preparedness Plan does not specifically provide procedures or other information for the PRC 421 facilities (Venoco 2003).

The Line 96 pipeline includes a number of measures related to response planning and capabilities to address an oil spill. These measures are intended primarily to ensure timely shut down of oil flows through the pipeline should a rupture occur and require capabilities for active response to potential oil spills, particularly those that threaten environmentally sensitive areas (e.g., creeks, shoreline). The specific measures have been set forth in a revised Safety Inspection, Maintenance and Quality Assurance Plan (SIMQAP), Oil Spill Contingency Plan (OSCP), and EAP which were completed and approved prior to commencing operation of the new pipeline in 2012.

4.2.2 Regulatory Setting

The primary Federal and State laws, regulations, and policies that address security of oil and gas production and transport facilities, emergency response/contingency planning, design and construction standards, operational standards, and spill prevention and cleanup that pertain to the Project, are summarized in Table 4.0-1, while local laws, regulations, and policies are summarized below.

Local

System Safety and Reliability Review Committee (SSRRC) and Safety Inspection, Maintenance and Quality Assurance Plan (SIMQAP)

The Santa Barbara County Board of Supervisors originally established the SSRRC—a committee of County departments plus the Santa Barbara County APCD—in 1985 to identify and require correction of possible design and operational hazards for oil and gas projects prior to construction and startup of the project and for project modifications. The SSRRC has authority to review the technical design of facilities, as well as to review and approve the SIMQAP. The purpose and scope of the SIMQAP is to identify procedures that will be used during the operation of a facility and to insure that all equipment will function as designed. The SIMQAP identifies items to be inspected, maintained or tested, defines the procedure for such inspection, maintenance, or testing, and establishes the frequency of inspection, maintenance or testing. SIMQAP audits are conducted annually at the EOF. The City of Goleta contracts with the County Energy Division for energy related planning services, which includes SSRRC project

[3] As defined by the Occupational Safety and Health Administration (OSHA) (29 Code of Federal Regulations [CFR] 1910.155[c][26]), an incipient stage fire is in its initial or beginning stage, and can be controlled or extinguished by portable fire extinguishers, class II standpipe or small hose systems without the need for protective clothing or breathing apparatus.

review; however, the County Energy Division is not currently providing energy planning services for the PRC 421 Project.

City of Goleta Safety Element

The objective of the City's Safety Element is to minimize risk associated with the operation of Venoco's Ellwood area facilities and other oil and gas operations. As part of this objective and its adopted policies, the city has defined unacceptable risk as involving new development as well as modifications to existing development if those modifications increase risk. Several city policies address how to minimize or avoid risk from H_2S and pipeline operations and set forth the requirements for preparation of QRA. Pipeline policies address construction, location, operation, and safety, as well as the location of sensitive receptors near pipelines.

Santa Barbara County Public Safety Thresholds and Safety Element

The county has established thresholds for classifying the significance of public safety impacts, particularly public exposure to acute risks from activities with significant amounts of hazardous materials. The county defines acute risk as being the "chance of fatality or serious injury due to a single, short-term, involuntary exposure to the release of hazardous gas, liquid, or solid, or to a fire or explosion." The thresholds are designed for use in EIRs as significance criteria. The county's Safety Element automatically requires some types of facilities, such as sour gas pipelines and processing facilities, to perform a QRA to calculate risk and apply the criteria. These criteria were applied for analyses related to the EOF which handles sour natural gas oil that contains higher concentrations of H_2S, which is an acutely hazardous material. Findings from the QRA that was performed for the EOF are discussed where appropriate below (see also Section 4.4, Air Quality and Greenhouse Gases).

4.2.3 Significance Criteria

A safety impact is considered significant if any of the following apply:

- There is a potential for fire, explosion, releases of flammable/toxic materials and/or oil, or other accidents resulting from Project operations that could cause injury or death to members of the public;
- Operations would increase the probability or volume of oil spills into the environment, and existing or proposed emergency response capabilities are not adequate to effectively mitigate Project spills and other accidents; or
- Project operations are not consistent with Federal, State or local regulations. Conformance with regulations does not necessarily mean that there are no significant impacts.

4.2.4 Impact Analysis and Mitigation

This section evaluates Project construction and operational activities to identify potential impacts and their severity with respect to the stated significance criteria. Activities and conditions that, under upset conditions, could lead to a release of oil or hazardous materials, fire, or explosion were identified based on a review of available materials, site visits, independent engineering and structural analyses, and professional judgment. Impacts were compared against baseline conditions and the significance criteria established in the State CEQA Guidelines and the EMT Lease Renewal EIR (CSLC 2009) to determine the severity of the impact. Where relevant, a quantitative estimate of frequency or probability is used. Where applicable, MMs have been developed to avoid or reduce impacts. Baseline conditions for Ellwood area oil facilities were derived from the EMT Lease Renewal EIR and other available reports, which were defined earlier in this section.

Construction and operational impacts related to a release of hazardous materials are also discussed in Section 4.3, Hazardous Materials. Best management practices (BMPs) include monitors to direct public access during construction, installation of temporary fencing as needed, removal of equipment or other hazards from the beach and other publicly accessible areas at the end of each day of construction, posting of warning signs, measures to prevent release of fuel during refueling, etc. (see Appendix F). The Line 96 Modification Project EIR proposed mitigations that are incorporated by reference into this document (Appendix H) that reduce the potential for crude oil releases, and therefore the opportunity for crude oil fires.

Table 4.2-5, located at the end of Section 4.2.4, provides a summary of safety-related impacts and recommended MMs to address these impacts.

Impact S-1: Release of Oil During Cleanup of 6-inch Pipeline

Residual oil could be encountered and released during clean-up of the 6-inch pipeline (Less than Significant).

Impact Discussion

Prior to installation of the internal liner and 3-inch flowline within the 6-inch line that connects Pier 421-2 to the tie-in at the EOF, a release of oil could occur. The 6-inch line was the source of the 1994 leak; therefore, residual oil could be encountered within or surrounding the pipeline during construction. If residual oil is encountered, it could be controlled and removed to prevent further contamination or migration. BMPs would include safety procedures for use of equipment in the presence of hydrocarbons, which would reduce the potential for ignition if vapors are present (see Appendix F). As noted previously, access to the construction area would be controlled to maintain safety and

prevent public contact with construction-generated materials or equipment. Therefore, this impact would be adverse but less than significant.

Mitigation Measures

None required.

Rationale for Mitigation

Although no mitigation is required, BMPs, as discussed above, which establish Project construction equipment operation and maintenance procedures, are designed to prevent releases, and would also be protective of the public during the construction process to avoid potential contact with hazardous materials and the introduction of ignition sources. Such measures would include removal of equipment and construction materials from the beach at night, use of tape or orange plastic construction fencing around construction areas and the presence of monitors to direct the public around construction activity (see Appendix F).

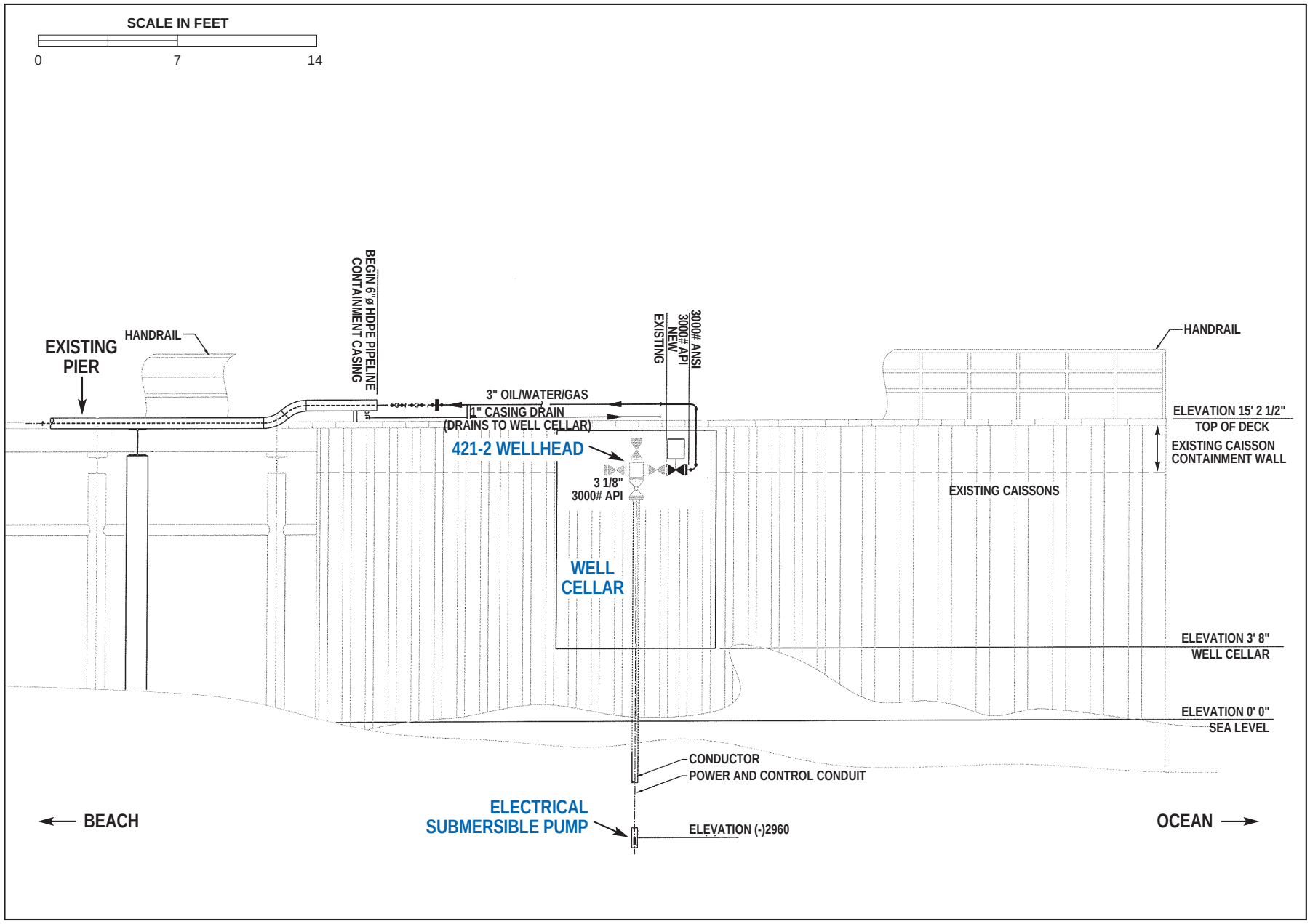
Impact S-2: Exposure of the Public and Environment to Safety Hazards Due to Collapse of the Pier 421-1 or 421-2 Caisson

The Project would prolong the use of the aging caisson on Pier 421-2, which could collapse and lead to the release of hazardous materials and oil from within the caisson or from Project-related pipelines (Less than Significant with Mitigation).

Impact Discussion

The caisson at Pier 421-1 would remain in place for an estimated 1 year after resumption of production at Pier 421-2. Although the seaward-facing wall of the caisson at Pier 421-1 was repaired in 2004, some potential exists for collapse of this structure during its limited remaining life. Although no active oil production facilities would be located on Pier 421-1, a collapse could release contaminated materials (e.g., sand, concrete) into the surf zone as discussed below for Pier 421-2. Abandonment and decommissioning of Pier 421-1 would eliminate this potential hazard.

The proposed well design and layout at Pier 421-2 is shown in Figure 4.2-8. Critical features include the ESP, which would be at a depth of about 2,960 feet below sea level, the subsurface safety valve (SSSV) located above the ESP, the well cellar within the caisson, the wellhead and casing, the surface safety valve (SSV), and the oil discharge line with High and Low pressure sensing switches. This system would pump crude oil emulsion to the surface and deliver it directly to the EOF for processing. Safety features included in this system are the pressure sensing switches for the oil discharge line and the safety valves (SSSV and SSV), which require power to remain open. In the



Cross-Section of Proposed Layout for Pier 421-2

FIGURE 4.2-8

event that the pressure sensing switches report high or low pressure, or any alarm forces a shutdown of the well, the safety valves will automatically close, which prevents oil from being conveyed to the surface; the safety valves would also shut if there were a loss of power. The well cellar within the caisson has a volume of approximately 213 barrels (8,946 gallons). It is believed to have sand and other materials packed around it, but its actual condition and construction are unknown. The well cellar houses the wellhead and casing and, in the event of leakage, would serve as containment within the caisson, with some improvements likely required to permit these facilities to provide complete containment (see MM S-4b below). The wall surrounding the caisson deck is higher than the deck itself and would in its present state impede oil movement, but is not specifically designed as secondary containment.

The wellhead was repaired in 2000-2001. Venoco proposes to equip the wellhead with current safety equipment to adhere to design criteria specified in American Petroleum Institute (API) Recommended Practice (RP) 14C, *Safety Analysis Function Evaluation (SAFE) of Offshore Petroleum Production Systems*, and incorporated in 30 CFR 250.168.

AMEC engineers conducted an engineering review of the facilities to evaluate the appropriateness and adequacy of the Project with respect to safe operations for the Project duration. The conclusions of that review are:

- The Project design uses proven technologies and is consistent with industry standards.
- Installation of an ESP is advantageous because it protects the equipment from external forces (wave action) and avoids creating a noise source on the surface.
- The 3-inch flowline would be equipped with high- and low-pressure switches for leak detection which would be important if the 6-inch line casing were compromised.

As discussed above, a preliminary review of the structural integrity of Project caissons and the seawall was conducted by a licensed structural engineer to determine the current structural stability of key Project facilities and to analyze the potential for the facilities to endure two decades of operation (Thomas and Beers 2000). This review was conducted prior to the emergency repairs on Pier 421-2, so improvements to the seaward-facing caisson in 2011 were not taken into account. The review of the structural integrity of Project facilities consisted of:

- A visual inspection of all facilities by a licensed structural engineer;
- A review and analysis of structural diagrams of Project facilities from the 2006 Negative Declaration (ND) and other engineering diagrams and relevant documents which address design standards and construction issues for marine structures such as seawalls;

- Communication and information exchanges with CSLC engineering staff regarding improvements at the Pier 421-1 and 421-2 caissons; and
- A review of a previous structural engineering report on the Project piers and caissons (Thomas and Beers 2000).

No as-built plans were provided by Venoco for the seawall and older portions of the caissons and no load calculations are available for the new walls; therefore, the stability of the piers, caissons, and seawall at that time is impossible to fully ascertain. The lack of as-built plans was also referenced in the Thomas and Beers (2000) structural engineering report.

Installation of new caisson walls in 2011 substantially improved the structural integrity of the seaward-facing side of Pier 421-2.

Although the structural stability of the caissons was a concern at the time of the engineering report, improvements have since been made and additional improvements will be made as part of the Project. The seaward facing walls, as well as portions of the east and west facing walls, of both caissons have undergone major repairs in 2004 and 2011, and the integrity of these structures has been substantially improved. Additionally, the Project includes repairs to the north wall of the Pier 421-2 caisson, as well as the remaining un-repaired portions of the east and west walls.

The aging caisson on Pier 421-2 has been subject to more than 75 years of weathering and corrosion associated with exposure to the surf zone of a marine environment. Visual inspections of these facilities have revealed no major stress lines or cracks, but the sides and rear of the caisson showed signs of wear and stress that would be anticipated under such circumstances. This includes a number of smaller cracks and irregularities, one of which appeared to very slowly seep oily or sulfurous fluid. In addition, no as-built plans for this aging facility are available to assist in determining probable structural stability for the life of Project operation. Further, review of the design previously proposed for Pier 421-2 indicates that earthquake loading appears to not have been considered in the design of this structure. Finally, as noted in the structural engineering report, the seaward-facing walls of the two caissons at PRC 421 have suffered a total of three substantial collapses in the last 25 years (Thomas and Beers 2000; CSLC 2010).

Although the caisson on Pier 421-2 has degraded, the seaward-facing wall of the structure, as well of portions of the east- and west-facing walls, have been substantially reinforced through repairs conducted in 2011. The Project includes repair of the walls

that were not repaired in 2011. However, the Project description provided by Venoco (Appendix G) does not currently include information about how the design of these repairs accounts for design wave loading conditions including hydrodynamic loading, overturning, and base shear, as well as the maximum credible earthquake according to the current CBC. An engineering analysis of the Project design has not been conducted; however, the analysis conducted for the previous Draft EIR (CSLC 2005) remains generally applicable to the Project and would be supplemented through the implementation of MM S-2a.

The extent and quality of repairs made following the caisson's collapse in the 1980s are not clearly documented as no engineering plans for these repairs are available. Under these circumstances, based on the lack of definitive engineering information, the partial collapse of the aging caisson on Pier 421-1 could occur during its remaining 1 year of existence. Further, Pier 421-2 could also collapse during the life of Project operation, particularly associated with sustained high winter surf, seismic activity, or in a low-probability large wave event. The risk of collapse would also be increased incrementally over the project life by sea level rise associated with global climate change. Such a collapse could result in release of unknown quantities of sand contaminated with hydrocarbons into the marine environment from either Pier 421-1 or 421-2, as well as small quantities of oil associated with production at Pier 421-2. This impact would be considered less than significant with mitigation.

Mitigation Measures

MM S-2a. Design Review/Wave Loading Evaluation. Prior to implementing caisson repairs at Pier 421-2, Venoco shall develop design improvement plans that account for design wave loading conditions including hydrodynamic loading, overturning, and base shear, as well as the maximum credible earthquake according to the current California Building Code; these improvements shall be sufficient to support Project facilities through the production life. The revised design plans shall be reviewed and certified by a professional civil/structural engineer and shall be submitted to the California State Lands Commission staff for approval. Caisson repair shall be performed in accordance with approved design plans prior to recommencement of production at Pier 421-2.

MM S-2b. Post Storm Inspection, Monitoring and Cleanup. Venoco shall amend the existing monitoring program to include regular monitoring and inspection of both caissons during the winter storm season. Damage to caissons shall be reported to California State Lands Commission staff and cleanup and removal of any debris immediately initiated (see also MM S-4e).

Rationale for Mitigation

The existing repaired seaward-facing walls on the caissons of Piers 421-1 and 421-2 have improved the integrity of these structures and appear adequate to protect the

seaward-facing side of these structures from severe winter storm damage; however, data are unavailable to demonstrate the ability of the structures to withstand damage from low-probability, high-magnitude events, such as the maximum probable design waves and earthquakes. For Pier 421-2, MM S-2a would require provision of such data as well as review and approval of the planned reinforcement of the non-seaward-facing walls of this caisson, which have not been subject to any recent improvement. These improvements include construction of walls similar to those built for the seaward-facing walls of the caissons for all non-seaward-facing walls of the caissons to address the potential for failure of these non-seaward-facing walls from both high-magnitude, low-frequency events (i.e., design wave events and earthquakes) and from more typical severe winter storms. MM S-2b would improve existing monitoring protocols to ensure regular winter storm season monitoring and response. Full implementation of these measures would reduce Impact S-2 to less than significant.

Impact S-3: Exposure of the Public and Environment to Safety Hazards Due to Collapse of or Damage to the Existing Timber Bulkhead or Rip-Rap Seawall

The Project would prolong the use of the existing causeway and supporting, aging timber bulkhead and rip-rap seawall, which would be exposed to high winter surf and large wave events over the Project's life, leading to possible erosion or collapse and the potential for release of hazardous materials and oil from within the causeway or Project-related pipelines (Less than Significant with Mitigation).

Impact Discussion

The stability of the existing seawall is difficult to assess because as-built plans are also not available for this structure. In addition, based on previous environmental review of past seawall improvements, it is unknown if seawall construction followed standard Santa Barbara County construction practices for such structures (e.g., if the seawall was keyed into bedrock underlying the beach sand to prevent undercutting) (Santa Barbara County 2001).

This seawall is faced with generally large 1- to 3-ton boulders consistent with standard seawall construction practices in Santa Barbara County. The use of large 1- to 3-ton boulders should provide adequate protection and prevent remobilization of these rocks during larger storm events; however, several gaps exist in the rip-rap portions of this seawall, and minor areas have been repaired with smaller sized rock that could become remobilized during high surf events.

This segment of the wall is partially shielded from some wave action by the caissons and pilings at Piers 421-1 and 421-2; however, some level of existing protection would be lost through the removal of Pier 421-1. For example, an unquantifiable large storm event and associated major wave action could result in total failure of the wall. This is

The Project's existing timber and rock seawall appears generally intact along most of its reach, although the eastern end (outside of critical pipeline areas) has suffered some wave damage.

The existing aging timber bulkhead seawall has been reinforced through much of its length with a rip-rap boulder revetment, although some gaps in this protection exist.

evidenced by the fact that major unmaintained portions of this historic seawall have suffered collapse and substantial damage over the last decade along other portions of the Ellwood Coast (AMEC 2006). Frequency and intensity of strong wave impact on this bulkhead and seawall could be increased by sea level rise related to climate change; however, the Project's production life would minimize such effects. Collapse of this segment of the seawall in a high-surf or low-probability, large-wave event could undermine the Project access road and expose the proposed oil, produced water and gas pipeline and power cables to wave action, creating impacts related to the accidental release of oil into the marine and terrestrial environment that would be less than significant with mitigation.

Further, visual observations of the seawall at the east end of the Project site, between Piers 421-1 and 421-2, reveal that in this area, the seawall consists of the original timber bulkhead, which has not been reinforced with rip-rap and thus should be considered as marginally stable.

Mitigation Measures

MM S-3. Design Review by Civil/Structural Engineer. Prior to construction on the Project and subject to receipt of all necessary approvals and permits to undertake the work, Venoco shall complete the following:

- Venoco shall retain a licensed civil/structural engineer to review seawall design and recommend improvements to the Project seawall to permit it to support Project access road, pipelines, and power cables through the production life.
- These potential design improvements, including a maintenance and repair plan to ensure fitness for purpose, shall account for anticipated winter surf conditions and for a design wave event.

- West of Pier 421-1, improvements to the seawall may include use of additional appropriately sized (i.e., 1- to 3-ton boulders) rip-rap if needed to fill in small gaps in the wall.

Between Piers 421-1 and 421-2 and east of 421-2, to the maximum extent feasible, any needed seawall improvements shall consist of minor repairs to and strengthening of the existing timber bulkhead, unless seawall design review indicates that such improvements would be insufficient to protect the pipeline and power cables over the life of the Project.

Rationale for Mitigation

The existing seawall appears adequate to protect Project facilities over most of its length. However, portions of the seawall may require repair and upgrade to ensure that damage to pipelines and other facilities does not occur during winter surf or a design wave event. However, consistent with the intent of City of Goleta policies to minimize new coastal protection structures, MM S-3 would permit only focused repair of minor gaps in the Project seawall, but not the extension of rip-rap into new areas solely protected by the aging timber bulkhead. These areas would be subject to limited repair and strengthening of the aging bulkhead as needed, through repairs to the existing timber bulkhead. The relatively intact condition of this portion of the timber bulkhead and the fact that it is partially shielded from direct wave action by Pier 421-2, seem to support lesser improvements to this segment. This would be confirmed as part of design review. Repair of the timber seawall would also provide protection for the proposed extension of the 6-inch line from Pier 421-2 to the EOF in the event of partial collapse of this timber bulkhead. If design review determines that additional rip-rap is necessary to protect aging timber bulkhead between Piers 421-1 and 421-2, such improvements would be subject to appropriate permits from the City of Goleta.

Full implementation of these measures would reduce Impact S-3 to less than significant.

Impact S-4: Potential for Release of Oil or Hazardous Materials from Pier 421-2

Project operations could result in the release of oil or hazardous materials from Project facilities, including the 421-2 well and caisson, drilling and separation equipment (Significant and Unavoidable).

Impact Discussion

Because of Well 421-2's shoreline location, a release of oil during production into the marine environment or nearby sensitive habitats is a significant concern. The potential for oil to be released and enter the marine environment is a function of the potential frequency of a release over the life of the Project, and the ability of the released volume to exceed or otherwise breach the containment within the pier and caisson.

Spill frequency can be estimated for operations for which there are data to support calculations. Oil spill occurrence rates for offshore oil spills from production platforms are based on years of data collected for activities on the OCS (Anderson and LaBelle 2000). However, unlike the well-established statistics for OCS platform and pipeline operations and tank vessel transit operations, past and proposed PRC 421 operations are somewhat anomalous. A spill frequency estimate was not calculated due to: (1) low PRC 421 throughput relative to spill volume data collected for OCS spill occurrence rates,[4] and (2) applicability of the OCS data to PRC 421 operations. For this analysis, the release of a worst-case discharge was assumed, regardless of likelihood. A reasonable worst-case discharge of oil from Pier 421-2 would involve an uncontrolled release of oil as follows:

- Shutdown of the ESP delayed 5 minutes, assuming a maximum flow rate of approximately 0.35 barrel per minute between the wellhead and the separation vessel (1.7 barrels);[5] or
- Wellhead drilling and production and well workovers could lead to a failure along the casing leading to a blowout, which, if it occurred below the caisson on Pier 421-2, could release oil into sub-surface areas and eventually the ocean. As discussed below, the amount of oil released from such a spill would be roughly equivalent to that from a delayed shut down of the ESP (1.7 barrels).

Based on these assumptions, the maximum spill volume, which is the maximum amount that could spill during peak instantaneous production of 500 barrels of oil per day (BOPD), is estimated to be 1.7 barrels; the potential spill volume based on average production of 150 BOPD would be 0.5 barrels. See Impact S-5 below for the maximum spill volume for the 3-inch flowline. The containment capacity of the well cellar within the caisson is 213 barrels. Because the caisson deck wall is not specifically designed to act as containment, no containment capacity is assumed for the caisson deck. However, the well casing has adequate capacity to contain the entire volume of oil that could be released; no oil is expected to be released to the shore or marine waters.

Production at PRC 421 would use a submersible pump. The risk of a blowout would be minimized due to the relatively low pressures of this system (978 pounds per square inch gauge [psig]) when compared to the ability of the safety systems at PRC 421 to control the pressure and the rating of 3,000 psig for the well casing. However, the wells could produce releases at the wellhead due to failures associated with the piping, fittings, or safety valves. A release could also be produced during a workover in the event that operations encounter a gas pocket or pressurized zone during drilling. In addition, sub-surface damage to the well casing and liner could result in accidental

[4] Spill occurrence rates are a function of historic volumes of oil handled (the "exposure variable"), and address only spills of 1,000 barrels or more.

[5] Derived from flow curves provided by Venoco of estimated maximum instantaneous production of 500 BOPD (2013).

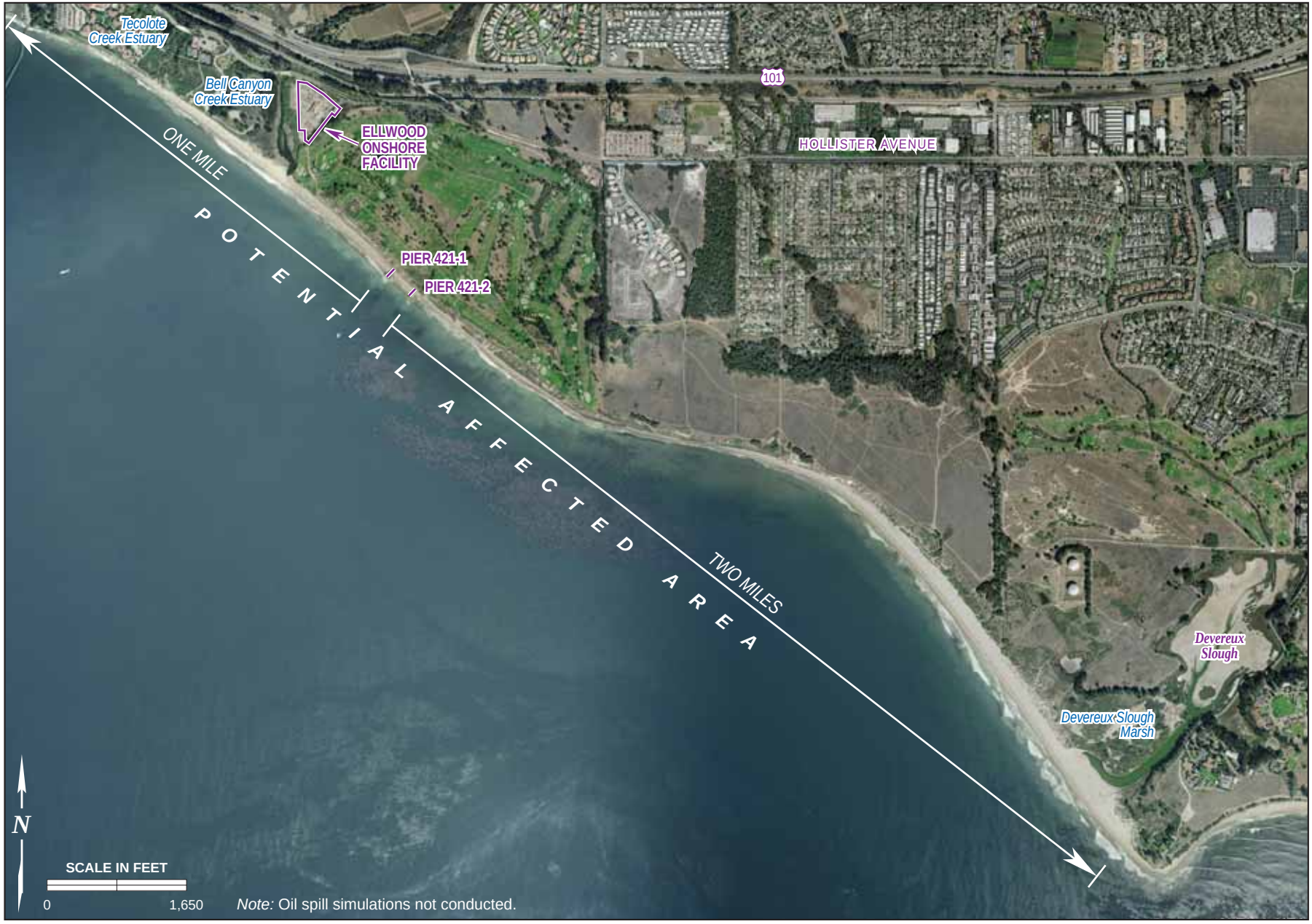
release of oil. Such damage, while very unlikely, could occur from several sources such as corrosion, aging of the casing, and seismic damage. If such a failure occurred near the surface, and the pump continued to run for five minutes prior to shutdown, a relatively small quantity of oil contained in the casing (estimated 1.7 barrels) could reach the surface. In addition, the slight potential exists under these circumstances that artesian pressure present in Well 421-2 could force the rotors in the ESP to spin, slowly releasing oil into the casing and environment, until repairs were affected. However, only a small proportion of blowouts release significant volumes of oil, and as discussed above, minimal gas production is anticipated to be associated with this Project.

Well workovers are also a possible source of blowouts. The Hydrocarbon Leak and Ignition Database (1992) estimates well workovers are performed every 7 years. As such, the potential exists for the Project to require two or more workovers during its productive life. Blowouts have the potential to occur in sub-surface areas hundreds to thousands of feet below the caisson deck. These blowouts would not be contained by the well cellar or caisson deck and would therefore be released directly to the sub-surface areas and potentially into the ocean. Blowouts that occur at the wellhead or the caisson deck could be contained by the well cellar and caisson deck; however, larger blowouts could directly affect the ocean. There have been four blowouts from Pacific OCS oil/gas projects since 1992; two of which occurred in the years 2000 and 2004 from Platform Gail, which is currently operated by Venoco. Neither resulted in release of significant volumes of oil into the ocean; however, both were due, at least in part, to human error (D. Dusette, Santa Barbara County, pers. comm. 2007).

Over the Project life, oil produced from extracted products would range from 85 to 11 percent by volume, as the fraction of produced water increases over time. Therefore, the oil portion of the product available for release from Pier 421-2 would decline over the Project life. This analysis uses the maximum volume of oil.

The location of the well at the water line and surf zone affects the possible movement and dispersion of any released oil; under most conditions a release would reach shore. Because of the location of the facility at the water line, and the low estimated release volumes, spill simulations were not conducted. Instead, for the purposes of evaluating the potential impacts of released oil from the Project and considering the site's exposure to winter storm conditions, based on predominant ocean currents (see Sections 4.5, Hydrology, Water Resources, and Water Quality and 4.6, Marine Biological Resources), oil released to marine waters is assumed to be transported approximately 1 mile northwest of the site and 2 miles to the southeast, as shown in Figure 4.2-9.

Although there are sensitive locations throughout the Project area, two down–coast sensitive sites identified in the ACP would be immediately vulnerable if an oil spill occurred at PRC 421: Bell Canyon Creek (Site 4-640-A) and Devereux Slough estuaries



Estimated Oil Spill Coverage in Project Area

FIGURE 4.2-9

(Site 4-645-A). Excerpts of the ACP entries for these sites are included in Figures 4.2-10 and 4.2-11. In addition, rocky intertidal habitat and kelp beds exist within 0.5 mile east of the site and an additional estuary associated with Tecolote Creek exists 0.25 mile west of the site.

Although predominant currents would generally prevent oil from drifting westward from PRC 421 more than 1 mile, in the event an oil slick drifted farther westward three other sensitive sites identified in the ACP: Naples, Eagle Canyon Creek, and Tecolote Creek, could also experience adverse impacts. Although they are not included in the 2011 ACP as they were designated in 2012, Naples MPA and Campus Point MPA would also be vulnerable to adverse impacts in the event oil reached these sensitive habitats.

Venoco maintains a response capability at Ellwood based on discharges estimated for the South Ellwood Field. The worst-case discharge planning volume for this field is ~~3,000~~ 30,811 barrels, and Venoco has response resources capable of handling a ~~3,000~~ 30,811 barrel shoreline clean-up (Venoco ~~2005~~2014). On-water containment and recovery would be conducted by Clean Seas, an oil spill response organization~~, and o~~. Clean Seas has demonstrated its ability to meet the OSPR daily recovery capability standards for the Santa Barbara Channel of 19,531 barrels per day within 12 hours, 35,156 barrels per day within 36 hours, and 66,406 barrels per day within 60 hours. Onshore oil spill response and clean-up would be conducted by ~~Advanced Cleanup Technologies Inc. (ACTI)~~ NRC Environmental Services, a contractor. Both Clean Seas and ~~ACTI~~ NRC Environmental Services maintain equipment lists and certifications as required by State and Federal regulations (Venoco ~~2005~~2014). The oil spill contingency plan is implemented, in part, by conducting drills to test and improve the response capabilities over time.

Oil dispersants are one potential method to respond to in-water oil spills. Depending on the size, location, weather conditions, and type of oil spilled, differing combinations of droplet size, concentration, and rate of application are administered. Once dispersants are applied, dispersed oil laterally spreads while dropping down the water column between 3 and 30 feet. As a result, dispersant use is limited to waters deeper than 30 feet to avoid possible sea floor contamination, which would likely limit its utility to respond to spills from Pier 421-2 (see Appendix E for more details on dispersant use).

Aside from booming strategies for an on-water release, most procedures contained in the Ellwood emergency plans are not specific to PRC 421. Recent emergency drills have focused on H_2S and similar emergencies at the EOF and EMT (Venoco 1999-2004). Because Venoco has not been producing from the PRC 421 lease area since 1994, the current EAP for South Elwood does not contain any response procedures for response to a release at PRC 421 and thus would need to be updated to address a release associated with recommissioned production.

SITE DESCRIPTION

Bell Canyon Creek is a moderate sized creek with a well developed lagoon just west of Sandpiper Golf Course; the sand berm which develops during summer is usually relatively low and the lagoon is subject to wash over especially during high tides. The creek flow during winter is usually enough to breach the berm. The beaches to the east and west are of fine- to medium-grained sand, and often have very high volumes of debris (mostly wood and kelp) especially after rains. The Venoco oil facility lies less than 1/4 mile inland.

SEASONAL AND SPECIAL RESOURCE CONCERNS

Whenever the lagoon mouth is open or subject to high tide wash over, wetland biota are at risk.

RESOURCES OF PRIMARY CONCERN

Wetland biota including Tidewater goby and possibly Steelhead trout; plus waterfowl and marsh vegetation.

Waterfowl, seabirds (including Brown pelicans) and various shorebirds.

Sea otters have been known to pass through the area.

CULTURAL, HISTORIC, AND ARCHEOLOGICAL SENSITIVITIES

Cultural, historical, and archeological sites are known to exist in the area; however, the exact locations of these sites must be ascertained by contacting the Native American Heritage Commission at (916) 653-4082, the State Office of Historical Preservation at (916) 653-6624, and/or the Central Coast Archeological Information Center at (805) 893-2474.

Source: Area Contingency Plan October 2005.

amec

Area Contingency Plan Summary:
Bell Canyon Creek

FIGURE
4.2-10

SITE DESCRIPTION

Devereaux Slough lies just north of Coal Oil Point. This 45-acre slough contains freshwater emergent vegetation, salt marsh, tidal flats and sand dune habitats. The mouth is generally cut off from the ocean by a well developed sand berm except during heavy rainfall. East and west of the slough are extensive medium-grained sand beaches backed by vegetated dunes. Large surf and strong winds are common, especially in winter. The slough is part of the larger Coal Oil Point natural reserve, managed by the University of California at Santa Barbara.

SEASONAL AND SPECIAL RESOURCE CONCERNS

Whenever the slough is open to the ocean, typically only during heavy rainfall, wetlands biota are at risk.

RESOURCES OF PRIMARY CONCERN

Western snowy plovers (all year), California lest terns (April through September), American coot, American wigeon, Black-crowned night heron, Canvasback, Green winged teal (March through July), Mallard, Pintail, and Red-breasted merganser.

Sea otters have been known to pass through the area.
California spiny lobster

Tidewater goby (August through November).

Eelgrass, Surfgrass.

CULTURAL, HISTORIC, AND ARCHEOLOGICAL SENSITIVITIES

Cultural, historical, and archeological sites are known to exist in the area; however, the exact locations of these sites must be ascertained by contacting the Native American Heritage Commission at (916) 653-4082, the State Office of Historical Preservation at (916) 653-6624, and/or the Central Coast Archeological Information Center at (805) 893-2474.

Source: Area Contingency Plan October 2005.

amec

**Area Contingency Plan Summary:
Devereux Slough**

**FIGURE
4.2-11**

Crude oil is ignitable and can cause a fire. Design features incorporated into the Project include regulatory and industry standards for safety and fire prevention, which reduce the probability of a fire significantly. Coupled with the absence of ignition sources available to ignite released oil, the likelihood of a fire is remote.

Impact Summary

Because of safeguards designed into the system, there is a low probability for a release of oil from the production process at Pier 421-2 (i.e., loss of power would shut in the valves and would prevent oil from reaching the surface under non-routine conditions). Containment capacity in the well cellar, in the event oil is released, is adequate to contain expected volumes of oil given design capacity and pumping rates. However, the well cellar is an old structure of unknown condition, and its ability to fully contain spills is unknown. Sands and materials enclosed in the caisson could be contaminated by leakage produced by the Project if the cellar is not adequately sealed. As discussed below, the cellar would require improvements to ensure its condition and suitability to prevent additional migration of oil from Pier 421-2. Because the caisson deck wall is not specifically designed as containment, it would also require improvements and no containment capacity is assumed as part of the impact analysis for the caisson deck. Although remote, the potential also exists for a well blowout to occur below the well cellar and caisson, with an associated potential for release into the marine environment. Such a blowout could occur during routine operations due to human error or during the estimated one to two well workovers that may occur over the life of the Project.

Venoco currently maintains response capability adequate to respond to the likely spill volumes at PRC 421, although site-specific procedures would need immediate revision and drills to test new procedures and equipment.

A release of oil to marine waters would be a significant impact. However, the Project design incorporates safety features that would substantially reduce the potential for a release. The short operating period also contributes to a low potential for release. Further, containment provided by the caisson is adequate to capture maximum spill volumes, should the spill occur on the caisson deck.

The public could also face potentially hazardous conditions if leaks of hydrocarbons and sulfur compounds occurred from the sides of the caisson structures, as happened recently from the side of Pier 421-1 and the seaward side of Pier 421-2. MM S-2a requires that the repairs and improvements being made to the caisson walls as part of the Project would meet design standards that would ensure the integrity of this structure during the Project life. These repairs would minimize the risk of direct public exposure to potential leaks, and restricted access to the pier and equipment would limit public exposure to hazardous conditions. However, because of the remote potential for blowouts or other failures to occur, with subsequent release of oil into the marine

environment; no matter how low the probability, this impact would be significant and unavoidable.

Mitigation Measures

MM S-4a. **Containment.** As the primary containment at Pier 421-2, the well cellar shall be tested by Venoco to determine whether it is leaking, and coated with a rubber type liner or other sealant to prevent migration from the cellar walls or bottom to surrounding areas. If the well cellar is leaking, an engineering evaluation shall be performed to determine the best method to achieve containment; which may include replacement with a double wall cellar or retrofit with a membrane coating capable of containing oil and preventing migration. The revised design, which includes these improvements, shall be reviewed and certified by a registered engineer and submitted to the California State Lands Commission staff for approval, and Venoco shall construct all approved improvements prior to recommencing production.

MM S-4b. **Response Drills and Planning.** Venoco shall revise its existing Oil Spill Contingency Plan (OSCP) to include site-specific procedures for response to a release from Pier 421-2, in accordance with applicable State and Federal regulations. The revised OSCP shall be submitted to the City of Goleta, county of Santa Barbara, California Department of Fish and Wildlife Office of Spill Prevention and Response, California Coastal Commission, and California State Lands Commission (CSLC) staffs for review and approval prior to issuance of the Land Use Permit. Venoco shall demonstrate spill response capability by responding to at least two surprise drills each year – one at Pier 421-2 and one along the pipeline route. A tabletop exercise shall be conducted within six months of operation to test and improve upon the revised procedures. The Venoco shall prepare and submit a critique and recommendations of Venoco's OSCP, regarding Pier 421-2, to CSLC staff and shall demonstrate the effectiveness of Venoco's oil spill response plan. Any recommended adjustments to the frequency of drills required to improve the effectiveness of the measure, in consideration of all other Ellwood oil spill response drill operations by Venoco, and a timetable for implementation of drill schedules may be considered by CSLC staff. In addition, Venoco shall participate in the Santa Barbara County Area Oil and Gas Industry Emergency Response Plan (P-4 Plan).

MM S-4c. **Casing Pressure Testing.** Prior to initiating active pumping, Venoco shall perform pressure testing on the well casing to ensure that the casing meets required operating specifications. The exact pressure shall be determined by the reviewing agencies. If the casing does not meet required test pressure as reviewed and approved by the California Department of Conservation's Division of Oil, Gas, and Geothermal Resources (DOGGR), Venoco shall implement casing repairs and improvements subject to review and approval by the DOGGR and California State Lands Commission staffs.

MM S-4d. **Regular Facility Inspections.** As part of its daily facility inspections, Venoco shall check the caisson at Pier 421-2 for signs of oily or sulfurous

leaks. If leaks are detected, Venoco shall report this occurrence to the City of Goleta, Santa Barbara County Office of Emergency Management, California Coastal Commission, and California Department of Fish and Wildlife Office of Spill Prevention and Response, and California State Lands Commission staffs, and in coordination with these agencies, take immediate steps to clean up or repair such leaks and prevent public exposure to any hazards.

MM S-4e. Quantitative Risk Assessment (QRA) and Implementation of QRA-Recommended Measures. Prior to issuance of land use permits, Venoco shall prepare a QRA to determine long-term risk of upset potential for the PRC 421 facilities. The QRA should assume the best estimate for the duration of the project. The QRA shall identify any deficient facilities with potential for creation of hazards associated with production from PRC 421 and processing of oil/gas/water at the Ellwood Onshore Facility and identify any improvements needed to reduce such hazards to acceptable levels. The QRA shall be submitted to the California State Lands Commission, City of Goleta, Santa Barbara County Fire Department Fire Protection Division staffs for review and comment prior to approval. Subsequent to approval, Venoco shall implement any modifications to facilities or processes recommended in the QRA.

Rationale for Mitigation

The MMs are intended to improve prevention of releases by providing for additional containment and response planning to reduce the potential for spilled oil to be uncontrolled. Facility-specific response drills are intended to refine existing plans and procedures to address operation of PRC 421. The purpose of the QRA is to ensure that all facilities associated with PRC 421 can effectively and safely produce process and transport this resumed production and to assure that any deficiencies are rectified.

Residual Impacts

Although there is a low probability of an oil release to marine waters, and the application of MMs would further reduce the potential for and effects of released oil on the environment, under the thresholds of significance *any* release of oil to the marine environment would be considered significant.

Impact S-5: Potential for Release of Oil or Hazardous Materials from the Crude Oil Flowline

Project operations could result in the release of oil or hazardous materials from the crude oil flowline as oil is transported from Well 421-2 to the tie-in at the EOF (Less than Significant with Mitigation).

Impact Discussion

Produced oil/gas/water emulsion would be transferred from Pier 421-2 to the tie-in at the EOF via a 3-inch diameter flowline. The 3-inch flow-line would be contained within

the existing 6-inch line that would be repaired, cleaned, extended, lined, and fitted with cathodic protection (external) and a leak detection system. Figure 4.2-12 illustrates a cross-section of the flowline within the pipeline.

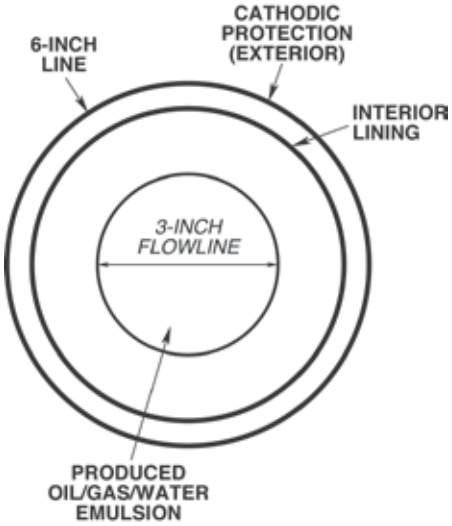


FIGURE 4.2-12. FLOWLINE CROSS-SECTION DIAGRAM

The leak detection system would consist of high- and low-pressure sensing switches that would be installed in the new 3-inch flowline. Within 15 seconds of a change in pressure (high or low), the subsurface and safety valves would be shut, which would stop flow of oil into the flowline. The 6-inch line would serve as a protective conduit and would not have pressure switches.

A flow safety valve at the tie-in at the EOF would prevent backflow into the flowline, which limits the emulsion available for release. The 6-inch line would act as secondary containment if there were a leak or break in the flowline.

The volume of oil/gas/water emulsion that would be contained in the 3-inch flowline, between the valve at Pier 421-2 and the tie-in at the EOF, is approximately 756 gallons. An additional volume resulting from the time to shut off the flow (conservatively using 5 minutes instead of 15 seconds) is approximately 75 gallons, assuming a flow rate of 15 gallons per minute based on projected pumping rates. Therefore, the total volume of emulsion available for release from the flowline is 831 gallons (20 barrels). Based upon a 2,150 foot length from Pier 421-2 to the EOF where the tie-in to the EOF occurs (1,800 feet of existing pipeline and 350 feet of new pipeline), it is estimated that the 6-inch line could contain approximately 2,082 gallons (50 barrels) of emulsion in the event of a spill. Therefore, the containment capacity of the 6-inch line would be more than sufficient to contain the maximum projected spill from the 3-inch flowline.

As described above, the design of the 3-inch flowline provides a system of detecting leaks, shutting down flow, and containing released emulsion within the 6-inch line, which would be tested and lined prior to operation. Therefore the likelihood of an uncontained release is low.

Although the 6-inch line is located within a road and area known to contain sub-surface oil facilities such as pipelines, there is some potential for accidental damage to occur to this oil line during trenching or other unanticipated future construction activities. A catastrophic break (e.g., from construction equipment) could potentially cause a release of the entire contents of the line, although such damage would be detected by the leak detection system, the well would be automatically shut in, and an alarm would sound at the EOF. Because of the proximity of the pipeline to the surf zone, Bell Canyon Creek, and other nearby sensitive resources, however, a release from the flowline is of particular concern, even though the volume is relatively low and spills to land are typically contained more readily than spills to water. This impact would be less than significant with mitigation.

Mitigation Measures

MM S-5a. Install Pipeline Warning Markers. Venoco shall modify Project design to include installation of several pipeline markers with reflective warning tape along the 6-inch line to identify the pipeline route and associated excavation hazards. Venoco shall submit the modified Project design to the City of Goleta for review and approval prior to issuance of the Land Use Permit.

MM S-5b. Develop Emergency Action Plan (EAP)/Update South Ellwood Field EAP. Venoco shall develop and incorporate into the EAP updated descriptions of the pipeline and flowline, detection systems, emergency shutdown, and response procedures specific to the new system prior to the initiation of operation. Venoco shall update the existing South Ellwood Field EAP to include descriptions of the new flowline interconnection with Platform Holly production within the EOF and other EOF modifications such as the programmable logic controller cabinet, variable speed drive facility, and transformer. Venoco shall submit the EAPs to the City of Goleta and Santa Barbara County Office of Emergency Management for review and approval prior to recommissioning start-up. The City of Goleta and Santa Barbara County Office of Emergency Management shall coordinate updates ~~notice for these revisions shall be provided to the current plan holders within two months of initiating operations~~ of the EAPs with the operator on a regular basis or as conditions change that warrant review of emergency response protocols.

MM S-5c. Safety, Inspection, and Maintenance of Oil and Gas Pipelines. Venoco shall prepare a Safety Inspection, Maintenance, and Quality Assurance Program (SIMQAP) or similar mechanism for Project-related pipelines to ensure adequate ongoing inspection, maintenance, and other operating procedures. Any such mechanism shall be subject to approval by the City of Goleta prior to commencement of pipeline operations and provide for

systematic updates as appropriate. Requirements shall be commensurate with the level and anticipated duration of the risk. The City of Goleta and Venoco would update the SIMQAP or similar mechanism biennially or sooner if conditions change that warrant review of the program.

Rationale for Mitigation

MMs S-5a would reduce the potential for release by alerting future workers in the area to the pipeline location, while updates to emergency plans and procedures, as required under MM S-5b, would provide responders with better information to manage emergency conditions. Implementation of MM S-5c would ensure pipelines are regularly inspected and maintained, and that such measures are consistent with City requirements.

With the implementation of the above measures, Impact S-5 would be reduced to less than significant.

Impact S-6: Increased Amount of Oil or Hazardous Materials Potentially Released from Oil Transfer in Line 96

Project implementation would increase throughput in the Line 96 pipeline, and therefore increase the amount of oil or hazardous materials potentially released (Significant and Unavoidable).

Impact Discussion

The Project includes transporting processed oil from the EOF to the PAAPLP Coastal Pipeline via the Line 96 pipeline. This pipeline was analyzed in the Line 96 Modification Project EIR (Santa Barbara County 2011), which is also incorporated by reference. The Project would not require physical modification to Line 96 or changes in its operations. Although risks from oil transportation by pipeline are the lowest of any form of crude oil transportation, pipeline transportation of oil still has the potential to result in impacts through an accidental spill. As the Line 96 pipeline from the EOF along the Gaviota Coast to is equipped with the most modern cathodic protection and internal inspection ("smart pigging") capabilities, it has a lower failure rate than older pipelines. In addition, eight mainline block valves and check valves were installed along this pipeline to limit the volume of oil spilled in the event of a rupture (refer to Figure 4.2-7). However, a risk of a crude oil release to the environment would exist, including a release from the pipeline into Gaviota Coast drainages and perennial streams, which could also subsequently reach the marine environment. Figure 4.2-13 shows the elevation profile of the Line 96 pipeline, including automatic and manual check valves.

The largest drain-down locations (i.e., where the potential exists for largest oil spill) along the pipeline would be located at Llagas Canyon and near the entrance to the ExxonMobil LFC facility at Corral Canyon. Estimated worst-case drain-down volumes in

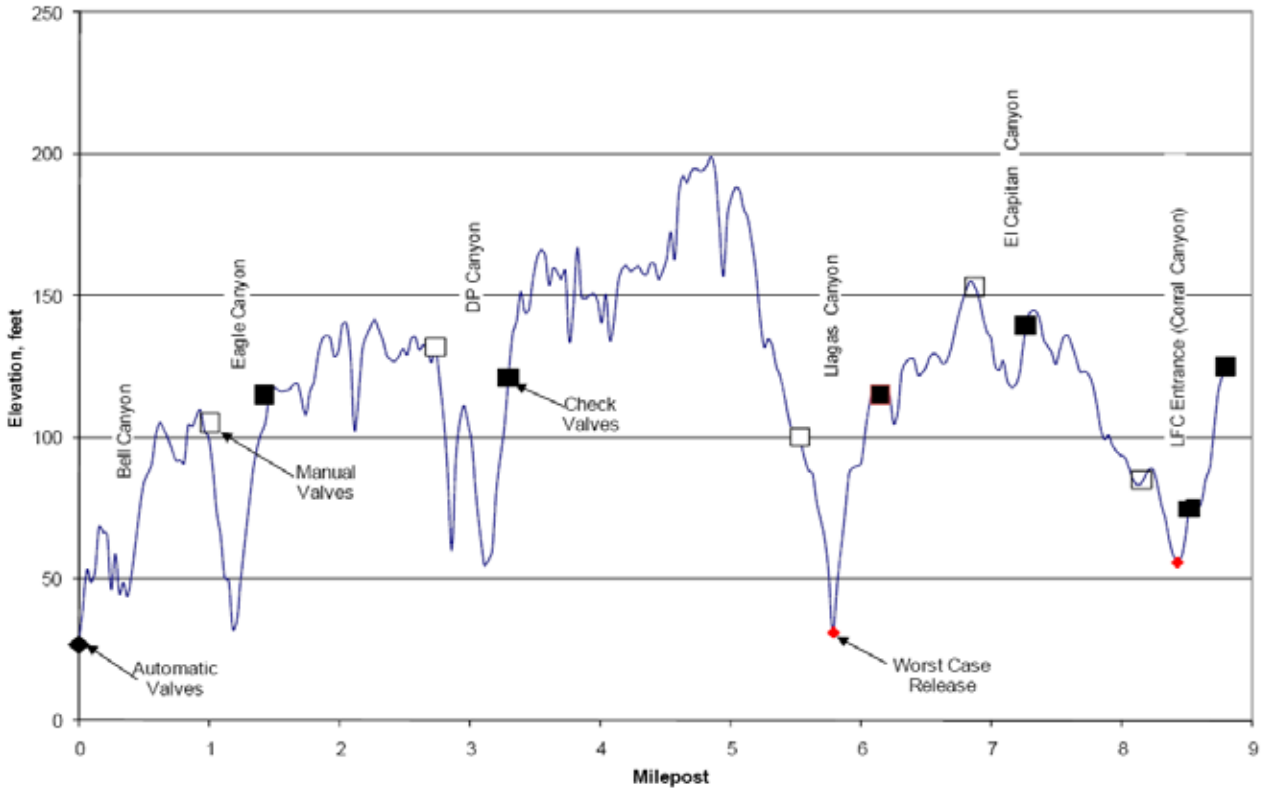


FIGURE 4.2-13. ELEVATION PROFILE OF LINE 96 PIPELINE

Source: Santa Barbara County 2011

the event of a large pipeline rupture range from about 40 barrels at Dos Pueblos Canyon east, to 60 barrels at Bell Canyon, Eagle Canyon, and Dos Pueblos Canyon west, to 194 barrels at Corral Canyon and 237 barrels at Llagas Canyon. However, potential spill volumes would be reduced further as result of additional automatic valves installed around low points are in the onshore Line 96 pipeline located both upstream and downstream. With the automatic valves, spill volumes for Llagas Creek would be reduced to 60 barrels and Corral Canyon would be reduced to 52 barrels (Ellwood Pipeline Company 2011).[6] Pipeline safety is affected by several factors, including both the length and the duration of service of the pipeline. Information on historical risks from pipeline operations, including the size and number of spills and the causes of such spills, are available from a number of sources, two of which are noted below.

Information on the number and causes of pipeline spills greater than 50 barrels in size is available from the U.S. Department of Transportation/Office of Pipeline Safety (DOT/OPS). These data were obtained for spills from 1968 to 2000 (information from

[6] The Line 96 Modification Project EIR required MM HM-3 to reduce spill capacity of pipeline. A portion of this potential spill material (approximately 3.61 percent) would be associated with PRC 421, as the pipeline would convey product from both Platform Holly (4,000 barrels per day [bpd]) and PRC 421 (150 bpd).

pre-1985 is less reliable in the DOT/OPS data). Information is available from the OPS for crude-oil pipelines, as well as for all liquid pipelines (DOT/OPS 1990). Since 1985, crude oil has comprised 42 to 51 percent of the liquid spilled from pipelines, and petroleum products have made up 47 to 55 percent of the total volume spilled. Pipeline corrosion ranks as the most frequent cause of spills, an estimated 39 percent of all failures since 1985. The number of spills caused by corrosion has remained in the same range since 1985, and there has been no downward trend in the number of spills caused by corrosion since that time. Third-party impacts rank as the second highest cause of pipeline spills, accounting for 30 percent of all failures.

The California State Fire Marshal (CSFM) publication, *Hazardous Liquid Pipeline Risk Assessment* (CSFM 1993), analyzed leak information for the 7,800 miles of liquid pipelines within California for the years 1981 through 1990. The CSFM report presented a set of hazardous liquid pipeline incident rates for all pipelines and uses. A review of the CSFM report shows that the following pipeline design and operation parameters can have a significant effect on pipeline spill rates:

- Pipeline age;
- Pipeline diameter;
- Pipe specification;
- Pipe type;
- Normal operating temperature;
- Supervisory Control and Data Acquisition (SCADA) leak detection system;
- Cathodic protection system;
- Coating type; and
- Internal inspection.

The study found that external corrosion was the major cause of pipeline leaks, causing approximately 59 percent of spills, followed by internal corrosion and third-party damage at 20 percent. Operator error and weld failure were also mentioned as minor causes of pipeline failure. Older pipelines and those that operate at higher temperatures had significantly higher spill rates. Crude oil had the highest spill rate primarily due to the transportation of crude oil at elevated temperatures, which increases the rate of external corrosion. This is because faster corrosion rates occur at elevated temperatures when metal comes in contact with soil moisture.

To prevent these potential problems, the design of the Line 96 pipeline addresses the issues which most commonly affect the rate of accidental pipeline releases. Venoco subscribes to the Underground Service Alert "one call" system that provides a single toll-free number for contractors and individuals to call prior to digging near the pipeline. Upon notification that a contractor or property owner is intending to dig near the pipeline, the horizontal location of the pipeline would be marked. Marking will be provided within 48 hours of the request. Additionally a warning tape with the pipeline

name is buried approximately 18 inches above the pipeline. The pipeline is new and incorporates all modern safety standards including advanced pipeline coatings, cathodic corrosion protection, emergency flow control and shut-off valves, a new SCADA monitoring system with continuous monitoring provided from the EOF (see Appendix H, HM-3 for detailed description of pipeline safety features). These measures directly address many of the historic causes of pipeline failure raised in past studies, particularly the CSFM study of California pipeline safety.

Further, internal inspection, required hydrostatic testing, and frequent pipeline corridor visual inspection by a line rider further reduces the potential for undetected corrosion and third-party damage to the pipeline. Operator training and redundant safety systems decrease the frequency of this already minor source of pipeline leaks. Finally, the pipeline would only transport oil produced at PRC 421 for its productive life (see Section 4.2.5 for analysis of cumulative pipeline safety issues).

There is a low probability for a release of oil from the production process at Pier 421-2 because safeguards designed into the system (i.e., loss of power would shut in the valves) would prevent oil from reaching the surface under non-routine conditions. However, because of the remote potential for blowouts or other failures to occur at Pier 421-2 or pipeline failure along the Line 96 pipeline, with subsequent release of oil into the marine environment; no matter how low the probability, this impact would be significant and unavoidable.

Mitigation Measures

MM HM-3 (Automated Block Valves and an Additional Check Valve on the Proposed Pipeline) from the certified Line 96 Modification Project EIR (Santa Barbara County 2011) is incorporated by reference (see Appendix H for details).

Rationale for Mitigation

Spill volumes for Llagas Creek would be reduced to 60 barrels with an automatic valve and check valve located upstream and downstream, respectively. Spill volumes around Corral Canyon would be reduced to 52 barrels with an automatic valve and check valve located upstream and downstream, respectively. The proposed mainline valve at the EOF would also effectively reduce potential spill volumes into Bell Creek.

Residual Impacts

After mitigation, this impact would remain significant and unavoidable because there would still be a risk of oil release to the environment.

Impact S-7: Increased Processing of Oil and Gas at the EOF

Project implementation would increase processing of oil and gas at the EOF, and therefore increase potential risks related to safety and potential release of hazardous materials (Significant and Unavoidable).

Impact Discussion

The Project includes transporting the oil/gas/water emulsion produced at Pier 421-2 to the EOF for processing. The EOF is already equipped with the oil-water separation, treatment, and discharge of produced water systems necessary to treat oil produced from Pier 421-2. Although existing EOF throughput levels would increase, no modifications of existing systems at the EOF would be necessary, beyond ~~the~~ those discussed in Section 2.3.4, including control system improvements ~~that would be implemented as part of the Project~~, a new interconnection with Platform Holly, a programmable logic controller cabinet, variable speed drive package, transformer, and various pressure sensors and gauges. The throughput would increase under the Project by up to 150 BOPD but would remain well below the EOF's current permitted level of 13,000 BOPD.

Figure 4.2-14 shows the changes to baseline hazards and risks posed by the Project. The impacts of these changes as they relate to Pier 421-2 structures and other Project-related infrastructure are discussed below.

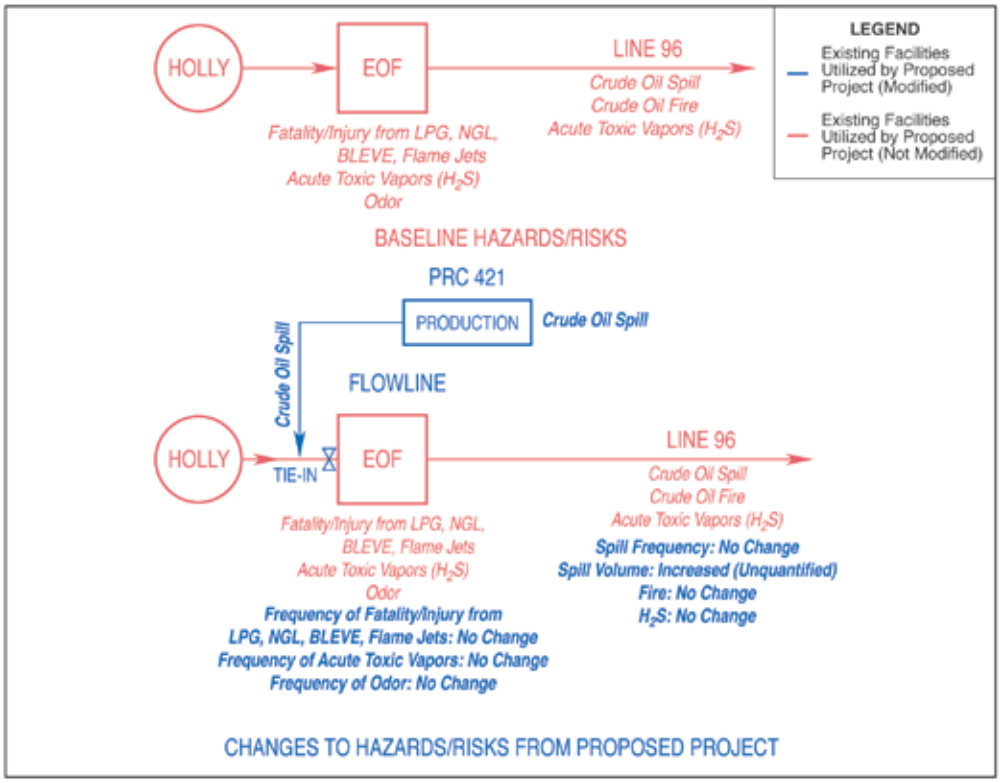


FIGURE 4.2-14.
BASELINE AND CHANGES TO HAZARDS/RISKS

The addition of new equipment on the EOF site, including the programmable logic controller cabinet, variable speed drive facility, and transformer, would introduce potential new safety risks at the EOF (e.g., the transformer may create a fire hazard at a new location in the EOF). These risks would be reduced by updating the South Ellwood Field EAP to address these changes, as required in MM S-5b.

As noted previously, a QRA was conducted for the EOF in 2000, resulting in a set of MMs designed to bring EOF operations in compliance with Santa Barbara County Environmental Thresholds for Public Safety (ADL 2000). The analysis evaluated the facility's operations at permitted (maximum) levels.

Prior to mitigation, the study found the main risk to the population was the separation and storage of liquefied petroleum gas (LPG) and natural gas liquids (NGLs). The QRA further concluded that the toxic risk (i.e., from H2S) from the facility would be considered acceptable based on the County's Environmental Risk Threshold for Public Safety (ADL 2000). Platform Holly was found to produce an acceptable level of risk, in part because no large quantities of flammable gas liquids are stored at the facility. At present capacity (below permitted capacity), the facility's risk profile is within the County's and City's risk thresholds for public safety.

The largest vessels at the EOF that contain crude oil are the two crude oil storage tanks, which have a capacity of 2,000 barrels each and the 1,500 barrel heater treaters. Additional vessels with liquid inventory include the 3,000 barrel produced water tank, and the 2,000 barrel reaction and oxidation tanks in the H_2S removal unit. A failure of the tank/vessel or a rupture of piping or one of the smaller, connected vessels/systems could cause a release of the contents to the containment/sump system, which could be released to the ocean outfall if appropriate procedures and methods are not followed. The QRA prepared for the EOF estimated the frequency of such a spill at less than one occurrence per million years. The containment at the EOF exceeds the combined capacity of crude oil storage.

PRC 421 production would enter three process streams at the EOF: crude oil processing, gas sweetening, and produced-water disposal.

- Crude oil processing – Pier 421-2 oil/gas/water emulsion would be commingled with crude oil from Platform Holly, and would be processed together at the EOF.
- Gas sweetening – Because of its low sulfur content, Pier 421-2 gas is not sour; however, it would be commingled with production from Platform Holly, then the combined PRC 421/Holly gas stream would be processed in the gas sweetening system at the EOF.

- Produced-water disposal – Separated water from the commingled crude oil would be injected into well WD-1 at the EOF, which is used for disposal of Platform Holly's produced water.

The addition of projected PRC 421 flow volumes would not cause EOF throughput to approach the limits of its permitted capacity, which is lower than its design capacity. In addition, oil produced from PRC 421 does not have constituents or concentrations of constituents that would fall outside of EOF processing system design basis or capacity. Therefore, PRC 421 production is suitable for handling and processing at the EOF.

The EOF includes a total storage capacity of 4,000 barrels, which is not enough storage to accommodate a full day of production from PRC 421 and Platform Holly. Additionally, no other oil storage facilities are available for this production. Therefore, oil produced from PRC 421 would be blended with the Platform Holly oil and continuously transported through Line 96 to the PAAPLP Coastal Pipeline located west of LFC, except for use of the limited storage facilities currently available at the EOF. If, for any reason, the PAAPLP Coastal Pipeline system downstream of the EOF or processing equipment within the EOF were not operating, the Applicant would need to curtail production from Platform Holly and PRC 421 within less than a day. Production from PRC 421 could be shut down within 5 minutes. The maximum amount of oil produced in 5 minutes, based on the maximum instantaneous production rate of 500 BOPD, would be 1.7 barrels. This amount of oil could be accommodated along with that from Platform Holly in the existing storage facilities. Since current throughput at the EOF is 5,000 BOPD (less than 39 percent of its permitted capacity given current design), the increase in existing flows of 150 BOPD reducing to 50 BOPD after 2 years due to addition of PRC 421 production is unlikely to burden existing processing facilities.

Based on the descriptions above and defined throughput levels, the introduction of oil/gas/water emulsion produced at Pier 421-2 would not have adverse effects on the safe operation of the EOF processing systems. The EOF would continue to operate well below its permitted capacity, and therefore maintain an acceptable risk profile in accordance with the County's and City's environmental risk thresholds for public safety. However, additional processing at the EOF would incrementally increase the risk of a hazardous material release and subsequent release of oil into the marine environment; no matter how low the probability, this impact would be significant and unavoidable.

Mitigation Measures

~~Although this impact is significant and unavoidable, the~~ The EOF operates under an approved EAP and OSCP for the South Ellwood Field; however, the EAP would be updated, as specified in MM S-5b, to include information about the new flowline connection and new equipment that would be present on the site as part of the

proposed Project.~~and there is no additional feasible mitigation available that would substantially reduce the risk of release from the EOF.~~

Residual Impacts

This impact would remain significant because there would still be a risk of oil release to the environment, and no mitigation can completely remove that risk.

Impact S-8: Increased Risk of Fire

Project implementation would include production and transport of oil and gas from PRC 421 to the EOF, increase processing of oil and gas at the EOF, and increase transport of oil and gas to market, therefore increasing potential risks related to fire (Less than Significant with Mitigation).

Impact Discussion

A spill of crude oil from the PRC 421 production equipment, pipelines, or EOF facilities could produce public health concerns as a result of fires that may arise if the oil or the oil vapors reach an ignition source and the oil burns. Flammable vapors that may emanate from crude oil include propane, butane, pentane, light ends (ethane and lighter), naphtha, and H_2S. As it emerges from the wellhead, crude oil is a heterogeneous mixture of solids, liquids, and gases. This mixture in addition to hydrocarbons includes sediments, water and water vapor, salts, and acid gases, including H_2S and carbon dioxide. Most of the light ends (e.g., the propane, butanes) are removed from the crude oil during processing at the EOF. However, several events would have to occur before a hazardous consequence would occur. For example, a sizeable oil leak would need to occur, followed by ignition and subsequent fire, and then members of the public would need to be present within the fire zone to be affected, or fire or burning oil would need to escape PRC 421 related facilities and damage adjacent areas or structures.

A fire at the pier, along the 3-inch flowline or at the EOF, however unlikely, would be a significant impact; the pier is located on the beach, often surrounded by water and is not near public buildings, the public may be exposed to this hazard during use of the beach adjacent to the pier. The flowline borders the beach, as well as coastal bluff scrub habitats above and to the north; the EOF and a portion of the flowline border Bell Canyon Creek to the west. The public may experience impacts at one of the neighboring properties, including Bacara Resort and Spa, the Sandpiper Golf Course, and the Bluffs residential development on the Ellwood Mesa. However, with the exception of Sandpiper Golf Course, all of these uses are 2,000 to 4,000 feet away from production, transport and processing facilities. Based on an older QRA prepared for the EOF (SBCFD 2000), crude oil fires could produce serious injury impacts from thermal exposure at a distance of 150 feet; in the case of PRC 421, this distance may be

greater than 150 feet due to the lighter oil produced at PRC 421 (35 American Petroleum Institute [API] gravity) versus Platform Holly (22.4 API gravity). However, the relative increase in volume of PRC production is less than 3 percent of ongoing production from Platform Holly and such production would be commingled with that from Platform Holly during processing, resulting in a small incremental increase in volatility and associated fire hazard after processing. Further, while recreationalists using the beach and golf course could be exposed to a low level of potential hazard from a fire at PRC 421 or the EOF or a subsequent wildfire, there are no homes or other structures immediately proximate PRC 421. Although the piers, access road, and EOF are only accessible from Hollister Avenue, a dead-end road, limiting access for emergency vehicles, substantial firefighting capabilities are present at the EOF along with regular inspections and monitoring of all facilities. Therefore, incremental increases in flammability associated with PRC 421 production would not result in substantial impacts. When combined with the conditional probability of ignition, which would be low given the few ignition sources in the area, and the conditional probability of persons being near the PRC 421 piers or EOF at the time of the spill, risk of exposure to a crude oil fire would be low, but not zero, because there would still be a risk of injury to Venoco employees and the public in recreational areas in the immediate vicinity of PRC 421.

For the Line 96 pipeline route, residential areas and the Ellwood School are located within the injury hazard zones, both thermal and toxic. As mentioned above, the conditional probability of the released crude oil igniting is relatively small. Therefore, risks of thermal impacts from a crude oil fire are low. However, there would still be a risk of injury due to the location of residences and public areas near the pipeline route, and the potential for injuries from toxic vapors resulting from a spill of crude oil.

Although the risk of fire resulting from Project operations is small, even given the relatively lighter oil produced at PRC 421, due to the potential consequences of fire at PRC 421, the EOF, and along the Line 96 pipeline route, this impact is significant. With implementation of the measures below, the impact is less than significant with mitigation.

Mitigation Measures

In addition to the MM below, MM S-4e would require a QRA be prepared for the PRC 421 facilities and any change in use for other facilities (i.e., the EOF, Line 96), and recommendations in the approved QRA be implemented prior to Project operation.

MM S-8. **Fire Prevention and Suppression.** Venoco shall revise the existing Fire Prevention and Preparedness Plan to incorporate the new equipment and operations at PRC 421, and submit to the City of Goleta, Santa Barbara County Fire Department, California Coastal Commission, California Department of Transportation, and California State Lands Commission staffs for review and approval. The plan shall be revised and provided to the

agencies for review prior to commencing operations, and the plan shall be formally updated and circulated within one month of receiving comments from the aforementioned agencies.

Residual Impacts

Implementation of the appropriate safety measures, including fire prevention and suppression capabilities, would reduce but not eliminate the risk of fire and related injury.

Impact S-9: Repressurization Monitoring

Project implementation would include repressurization monitoring, which would be used to obtain necessary information to assess the risk of an accidental release of oil from improperly abandoned offshore oil wells (Beneficial).

Impact Discussion

Currently, the PRC 421 wells are shut-in with no way to assess the current pressure of Vaqueros Reservoir. Because there is a risk of release of oil from improperly abandoned wells, there is no current means to assess such a risk due to reservoir pressurization, which could have a significant and unavoidable impact (see Vaqueros Reservoir Repressurization discussion above under Section 4.2.1). Once Well 421-2 starts to produce as part of the Project, it will provide the opportunity for CSLC reservoir engineers to monitor the reservoir pressure and better understand the potential for leakage from the old abandoned wells; therefore, would be a beneficial impact.

Table 4.2-5. Summary of Project Safety Impacts and Mitigation Measures

Impact	Mitigation Measures
S-1: Release of Oil During Cleanup of 6-inch Pipeline	No additional mitigation is required beyond implementation of BMPs, as proposed.
S-2: Exposure of the Public and Environment to Safety Hazards Due to Collapse of the 421-2 Caisson	**S-2a.** Design Review / Wave Loading Evaluation.
	S-2b. Post Storm Inspection, Monitoring and Cleanup.
S-3: Exposure of the Public and Environment to Safety Hazards Due to Collapse of or Damage to the Existing Timber Bulkhead or Rip-Rap Seawall	**S-3**. Design Review by Civil/Structural Engineer.
S-4: Potential for Release of Oil or Hazardous Materials from Pier 421-2	**S-4a.** Containment. **S-4b.** Response Drills and Planning. **S-4c**. Casing Pressure Testing. **S-4d**. Regular Facility Inspections. **S-4e.** Quantitative Risk Assessment (QRA) and Implementation of QRA-Recommended Measures.
S-5: Potential for Release of Oil or Hazardous Materials From the Crude Oil Flowline	**S-5a**. Install Pipeline Warning Markers. **S-5b.** Develop Emergency Action Plan (EAP)/ Update of South Ellwood Field EAP. **S-5c.** Safety, Inspection, and Maintenance of Oil

Table 4.2-5. Summary of Project Safety Impacts and Mitigation Measures

Impact	Mitigation Measures
	and Gas Pipelines.
S-6: Increased Potential for Release of Oil or Hazardous Materials or Fire from Oil Transfer in Line 96	MM HM-3 from the Line 96 Modification Project EIR would apply.
S-7: Increased Processing of Oil and Gas at the EOF	**S-5b.** Develop Emergency Action Plan (EAP)/ Update of South Ellwood Field EAP. ~~None applicable.~~
S-8: Increased Risk of Fire	**S-8.** Fire Prevention and Suppression.
S-9 Repressurization Monitoring	None required.

4.2.5 Cumulative Impacts Analysis

This section summarizes other proposed or ongoing projects in an effort to assess whether the Project's incremental impacts are cumulatively considerable. The projects are listed in Table 3-3 in Section 3, Cumulative Impacts Methodology. The Project may have cumulatively considerable impacts related to oil spill risk; therefore, this discussion focuses on the oil production projects described in Section 3 because of their potential to increase the risks of oil spills affecting the same areas of coast as the Project.

Projects which could produce an increased risk of oil spill that could impact the same coastal areas as the Project include the following:

- Carpinteria Field Redevelopment Project/Carone Petroleum Corporation, Signal Hill Inc., and Pacific Operators Offshore LLC (POOL);
- Carpinteria Onshore Project/Venoco; ~~and~~
- South Ellwood Field Project/Venoco; and
- Development of 36 non-producing Federal Leases/Various Applicants.

All of these projects would exacerbate the potential oil spill risk of the Project, which has been identified as significant and unavoidable.

Residential projects in the area would have no direct impact on the Project risks. However, some of the projects are residential developments near the Project area. These would increase the populations that could be exposed to a crude oil spill. Potential exposure in the event of a spill could be along the Line 96 pipeline route and in the nearshore coastal areas. Recreation would be expected to increase with the increase in populations living nearby (CSLC 2009). As noted previously, the Project does not contribute to acute safety risks because of the low H_2S content of the crude oil produced at PRC 421.

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4.3 HAZARDOUS MATERIALS

This section addresses the handling, storage, and disposal of hazardous materials and the potential for the Project to release hazardous materials (i.e., petroleum products, solvents, pesticides, herbicides, polychlorinated biphenyls (PCBs), paints, metals, asbestos, and otherwise regulated chemical materials) during resumption of production at State Oil and Gas Lease PRC 421 (PRC 421), including the construction and operation activities at Pier 421-2 and decommissioning and removal of Pier 421-1. This analysis also briefly discusses area resources that could be affected by the operation of secondary Project components (existing facilities not proposed for modification) such as the operation of the Line 96 pipeline and the Ellwood Onshore Facility (EOF). For a full discussion of potential impacts related to the Line 96 pipeline, see the Line 96 Modification Project EIR (Santa Barbara County 2011). Potential impacts resulting from releases of oil-related materials, such as contaminated sediment or a crude oil spill, are also analyzed in other sections of this Environmental Impact Report (EIR), including Section 4.5, Hydrology, Water Resources, and Water Quality. Section 4.2, Safety, evaluates the potential for upset conditions that could result in a release of oil and hazardous materials. Potential impacts associated with a release of hazardous materials by the Project are based on a change from existing conditions. Significance criteria are used to assess the significance of the impacts, and whether mitigation measures (MMs) can be applied to reduce the level of significance.

This section incorporates data from Santa Barbara County 01-ND-34 and City of Goleta 06-ND-001 along with follow up hazardous materials studies associated with those negative declarations (NDs). This document incorporates by reference the conclusions of the Line 96 Modification Project EIR regarding impacts related to hazardous materials associated with operation of the Line 96 pipeline to the Plains All American Pipeline, LP (PAAPLP) Coastal Pipeline west of Las Flores Canyon (LFC), and summarizes these where appropriate.

4.3.1 Environmental Setting

The environmental setting presented in this section represents the baseline conditions existing at the time the Notice of Preparation (NOP) was released (March 16, 2013). The baseline conditions include the existing configuration of the Project site, existing operations, and present environment. Risks associated with a potential release of hazardous materials are then evaluated in relation to the baseline conditions.

Study Area Location and Description

The study area boundary for the Project is described in Section 1.4.1, Study Area Boundary; the area for this hazardous materials analysis includes the immediate on-shore and near-shore areas of the Ellwood coast that would be subject to direct impacts

from a release of hazardous materials. This area generally includes the existing PRC 421 facilities, access road, and tie-in at the existing EOF.

The study area includes, from southeast to northwest: Pier 421-2 (southeastern boundary), Pier 421-1 (approximately 325 feet northwest of Pier 421-2), a portion of the gravel access road (from Pier 421-2 extending northwestward, approximately 1,300 feet along the beach), and the remaining portion of the access road (to EOF [northwestern boundary] extending northwest, approximately 500 feet across the Sandpiper Golf Course). Each steel-pile pier contains sand-filled concrete caissons that are approximately 67 feet long and 42 feet wide. These portions of the study area are depicted on Figure 4.3-1 (shown in blue).

Baseline Conditions for Hazardous Materials Analysis

The baseline conditions are defined in Section 1.4.2, Baseline and Future Conditions. For the hazardous materials analysis, baseline conditions include the current configuration of Piers 421-1 and 421-2, infrastructure, access road, and no current oil production from PRC 421. Additionally, baseline conditions include any potential existing hazardous materials contamination within the study area boundary in soil, sediment, groundwater, or surface water.

Documentation of Existing Contamination within the Study Area Boundary

The potential for unknown historical releases of hazardous materials to the study area can be evaluated by reviewing historical records covering the study area and nearby properties. Such a review typically focuses on previous industrial or commercial uses of properties where use, handling, or storage of hazardous materials could be assumed. Given that oil and gas development has been prevalent in the area since the 1920s, debris and contamination associated with such development can be found in the Ellwood area. Further, the Project site has been used for oil and gas production since 1928 and contamination from previous production activities is likely to be present onsite.

Several environmental databases were reviewed during this analysis to evaluate the potential presence of a known historical release in the study area (see Table 4.3-1). Based on this review, the study area was listed on the following databases:

- **Federal Resource Conservation and Recovery Act (RCRA) Small Quantity Generator (SQG) database.** RCRA SQGs are facilities that generate between 220 and 2,200 pounds (lbs) of hazardous waste per month, or in a one-month timeframe. The study area was listed as Handler identification: CAD981576846, and was last updated July 30, 1997. No additional information was noted on the listing with respect to dates, quantities, or types of hazardous materials.

amec

Hazardous Materials Baseline Conditions [Revised]

FIGURE 4.3-1

Table 4.3-1. Databases Reviewed for Hazardous Material Analysis

Federal Database	California Database
U.S. Environmental Protection Agency (EPA) RCRA hazardous waste generators	California Environmental Protection Agency (CalEPA) Cal-Sites Database (Cal-Sites)
RCRA Corrective Action Sites (CORRACTS) Treatment, Storage, and Disposal (TSD) facilities	California Department of Toxic Substances Control (DTSC) EnviroStor Database (ENVIROSTOR)
RCRA non-CORRACTS TSD facilities list	DTSC Hazardous Waste Tracking System (HWTS) Reports
Comprehensive Environmental Resource Conservation and Liability Information System (CERCLIS) listing	CalEPA Cortese Hazardous Waste and Substances Site List (Cortese)
CERCLIS No Further Remedial Action Plan (NFRAP)	State Water Resources Control Board (SWRCB) Underground Storage Tank Database (UST)
National Priority List (NPL)	SWRCB List of Historical UST Sites (HIST UST)
Delisted NPL	SWRCB GeoTracker Leaking UST List (LUST)
Emergency Response Notification System (ERNS) list	SWRCB Spills, Leaks, Investigations, and Cleanups List (SLIC)
	DTSC Deed Restriction Listing (DEED)
	DTSC Voluntary Cleanup Program Properties List (VCP)

- **Federal ERNS List through the National Response Center.** The National Response Center provides all oil and chemical spill data reported to the Center since 1990. The study area was listed as Incident Report #741971 dated November 20, 2004, which indicates that a caller reported an unknown dark black sheen on ocean water at Pier 421-1. The reported size of the sheen was 50 feet by 3 feet. No other information on how the apparent release occurred, or how it was remediated, was reported.

- **DTSC Hazardous Waste Tracking System (HWTS).** The HWTS generates reports on hazardous waste shipments for generators, transporters, and treatment, storage, and disposal facilities (TSDFs). The study area was listed on the HWTS as U.S. EPA identification: CAD981576846, under the name of Venoco, Inc., North American Industry Classification System 211111 and Standard Industrial Classification 1311. The status was shown to be active, and the record was entered April 10, 1987 (the facility was owned by ARCO at this time). The record entry in its database appears to be based solely on the study area's U.S. EPA identification number, which reflects the study area's inclusion on the Federal SQG database as described above.

Database Entries for Adjacent Properties

The EOF was also reported on several databases. The listings primarily consisted of small oil spills or releases of natural gas. The largest spill reported was 10 barrels crude

oil to soil in 1995. The release apparently resulted from a valve crack at a storage tank. Additionally, the EOF was listed on the SWRCB GeoTracker database as a facility with underground storage tanks.

Additional Releases at the Project Site

March 1994 – A 6-inch pipeline leak occurred and resulted in a release to soil of approximately 170 barrels (7,140 gallons) beneath the 12th green of the Sandpiper Golf Course near the coastal bluffs. This release impacted surface and subsurface soils at the golf course.

November 22, 2000 – An oil leak was induced during a routine fluid-level check at Pier 421-2, and an oil leak and sludge were noted in association with a storage tank in secondary containment on Pier 421-1. The sludge was tested by a hazardous waste bioassay technique, and was found to be toxic (note that determination of hazardous waste includes four characteristics: toxic, flammable, corrosive, or reactive, and that if a substance is found to be characteristic of one of the four types, then it is considered a hazardous substance, and subject to regulation under the RCRA). The toxic sludge and associated liquids were removed from the storage tank and disposed of properly. This leak apparently did not impact soil, sediment, groundwater, or surface water.

November 27, 2000 – An oil leak occurred during fluid-level check on Pier 421-2, and resulted in the release of approximately 15 gallons. The oil was contained in a drum in secondary containment. This leak apparently did not impact soil, sediment, groundwater, or surface water.

2001 – During emergency repairs to PRC 421 facilities, petroleum-hydrocarbon-contaminated sediment was encountered in three of the five holes dug across the width of Pier 421-2. The contaminated sediment was encountered at a depth of approximately 15 feet, and the contamination appeared to extend to approximately 20 feet below the surface of the top of the sediment. Laboratory testing of the contaminated sediment indicated the presence of several hundred to less than 2,000 parts per million (ppm) diesel- and lube-oil-range petroleum hydrocarbons. Approximately 143 tons of the contaminated sediment was excavated from the area near the holes completed for installation of soldier pile structural sections. The excavated material was transported to an asphalt recycling plant (Santa Barbara County 2001).

January 19, 2004 – A large section of the outer caisson wall of Pier 421-1 sheared off and fell into the surf below. Large pieces of concrete debris and rebar fell to the base of the caisson. Based on the long history of oil and gas production at both PRC 421 wells, it was assumed that fill and sediment inside the caissons at both piers are likely contaminated with petroleum-related constituents. Therefore, it was also noted that the 2004 caisson wall repair was conducted in part to prevent contaminated fill and sediment materials from being released.

During wall repair activities, two leaks were found in the old caisson wall. These leaks were reported by a member of the public, and may correspond to the Federal ERNS listing noted earlier in this section. The leaks were noted as containing both a lighter oily substance and a black tar-like substance, both of which were released to the ocean. The leaks from the wall continued for a period of time during the repair project, and were estimated to reach up to one quart per day. Absorbent pads and booms, and a topical sealant were used in an attempt to minimize the leaks, but those efforts appeared to be unsuccessful. Once the new caisson wall was constructed, concrete was poured between the new and old walls, which could provide a more effective seal for the leak areas on the old wall.

Following completion of the new caisson wall, samples of the leaking substance and a "shale mud/sand" were tested. The shale mud/sand sample included concentrations of total petroleum hydrocarbons (TPH) in the range of 100 to 200 milligrams per kilogram (mg/kg). Risk to human health or the environment cannot be quantified based on the analytical data obtained. However, concentrations in the 100 to 200 mg/kg range for TPH are well below 1,000 mg/kg, which is a commonly used screening value for TPH in soil and a generally accepted regulatory guideline.

The laboratory analysis of the leaking substance that was released from the old caisson wall was found to have a heavier API gravity than would be expected from the oil produced at PRC 421. PRC 421 wells are anticipated to have an API gravity of approximately 35, while the leaking substance was found to be much heavier at 17.8. The source of the leaking fluid remains unknown; however, it was noted in the MND that the substance may not have originated from PRC 421 (City of Goleta 2006a). Alternately, the substance may have been PRC 421 reservoir oil that had partially volatized or decomposed, resulting in a heavier API gravity.

April 1, 2005 – A dark substance was found to be leaking from the east side of the old caisson wall at 421-1 during a California State Lands Commission (CSLC) staff inspection after completion of the caisson wall repair. During subsequent inspections, the leaking substance appeared, based on visual and olfactory evidence, to not be a petroleum release; no oily or slick texture was visible, and an anaerobic sulfurous odor was noted.

August 21, 2006 – Two slow leaks were reported on the east wall of the outer caisson by a member of the public. The area around the leak was described as whitish in color and smelled of sulfur. Santa Barbara County Energy Division staff sampled the fluid during a site visit in response to the reported chemical leak. The fluid did not appear to contain hydrocarbon material, and the source of the leaks remains unknown (City of Goleta 2006a).

Natural Seeps – Prolific natural hydrocarbon seepage occurs offshore of Coal Oil Point in the Santa Barbara Channel, just southeast of the Project site. The seeps emit both liquid and gaseous hydrocarbon phases, with gas predominating. Such hydrocarbon seepage affects ocean and beach sediment chemistry and provides a natural source of petroleum pollution. On a regional scale, the Coal Oil Point seeps represent a significant source of gaseous hydrocarbons and residual asphaltic hydrocarbons, or beach tar. The natural seeps are discussed further in Section 4.1, Geological Resources.

Study Area Receptors

For this analysis, receptors are located in areas in the Project vicinity that have the potential to be adversely affected by the release of hazardous materials as a result of implementation of the Project or its alternatives (see Section 5.0 for the alternatives analysis). If a release of hazardous materials were to occur, the most likely receptors would be located within the study area or its immediate vicinity. Those receptors could include occupants at the Sandpiper Golf Course, personnel at the EOF, beach recreational users, construction personnel, and ecological receptors associated with the upland and near-shore environments near the piers and the access road, including those in sensitive areas, such as wetlands, and surface waters of nearby creeks or the ocean. Additional information on receptors and the environments in Project vicinity is provided in Section 4.2, Safety; Section 4.5, Hydrology, Water Resources, and Water Quality; Section 4.6, Marine Biological Resources; and Section 4.7, Terrestrial Biological Resources.

4.3.2 Regulatory Setting

Regulations applicable to the Project are intended to regulate hazardous materials and hazardous wastes, as well as to manage sites contaminated by hazardous substances. These regulations are also designed to limit the risk of upset during the use, transport, handling, storage, and disposal of hazardous materials. The Project would be subject to numerous Federal, State, and local laws, regulations, and policies. Federal and State laws that may be relevant to the Project are identified in Table 4.0-1. Local laws, regulations, and policies are discussed below.

Local

Santa Barbara County Fire Department (SBCFD)

As noted in Sections 4.1, Geological Resources, and 4.2, Safety, the SBCFD, which is the Certified Unified Program Agency (CUPA) responsible for administering state environmental programs within the county of Santa Barbara, is the overseeing agency for implementing local regulations in the event of a hazardous waste or petroleum spill. The SBCFD may also maintain additional records for the study area from the Site Mitigation Unit, CUPA, and Current Release Information files.

Santa Barbara County Air Pollution Control District (APCD) Rule 325 – Crude Oil Production and Separation

This local regulation applies to equipment used in the production, gathering, storage, processing, and separation of crude oil and natural gas prior to custody transfer. This rule includes provisions for storage tanks, emissions control for produced gas, and requirements for recordkeeping, test methods, inspections, and compliance schedules.

4.3.3 Significance Criteria

The significance criteria for this hazardous materials analysis were developed by considering study-area-specific potential impacts. A hazardous materials impact would be significant if it:

- Creates a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials; or
- Is located on a site included on a list of hazardous materials sites compiled pursuant to Government Code section 65962.5, and as a result would create a significant hazard to the public or the environment.

4.3.4 Impact Analysis and Mitigation

The Project was evaluated for the presence of hazardous substances that, if present in large quantities in existing structures planned for construction/renovation, or known to exist in study area media (soil, sediment, groundwater, or surface water), could result in impacts to human health or the environment. A qualitative evaluation of potential Project impacts was made based on the site-specific information obtained and described in Section 4.3.1, Environmental Setting. Impacts and related MMs related to oil spills and subsequent cleanup activities are addressed in Sections 4.4, Hydrology, Water Resources and Water Quality, 4.5, Biological Resources, 4.1, Geological Resources, 4.2, Safety, and 4.12, Aesthetics/Visual Resources. Because impacts from oil spills are specific to the resource areas listed above, these impacts are not included in this section. Table 4.3-2, located at the end of Section 4.3.4, provides a summary of safety-related impacts and recommended MMs to address these impacts.

Impact HAZ-1: Exposure of Public or Environment to Hazardous Materials

The Project would create a potential hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials during construction and/or project operation (Less than Significant with Mitigation).

Impact Discussion

During the construction phase of the Project, existing petroleum-contaminated soil or sediment could be encountered during soil disturbance activities, including trenching

along the pipeline corridor and caisson repair at Pier 421-2. Contaminated soil may also be encountered during pier and caisson removal at Pier 421-1, which would be performed separately following recommissioning of Pier 421-2; decommissioning and removal is expected to occur approximately 1 year following recommissioning of Pier 421-2.

Disturbance of existing contaminated soil or sediment could result in a release of hazardous materials, which could adversely affect human or ecological receptors. Several spills have been documented at the site during its 70-year history of oil production. In addition, during construction of recent improvements, soils contaminated with hydrocarbons were discovered beneath Pier 421-1 and removed from the site. Open excavations in contaminated areas can increase the potential for erosion, sedimentation, turbidity, and generation of contaminated water by (1) collection of storm water in the open area during storm events, or (2) groundwater influx in areas where the excavation intersects shallow groundwater.

The Project would potentially result in the release of contaminated sediment from the caisson at Pier 421-2 into the environment. The Project includes repairs to all three non-seaward-facing walls of this caisson. These reinforcements would include construction of walls similar to the one built on the seaward facing side of the Pier 421-2 caisson in 2011. This would include installation of steel piles in 25-foot-deep holes drilled around the caisson and concrete panels between the steel piles. Concrete slurry will then be poured between the new panels and the old caisson walls. Exposure of caisson sediment through opening of the caisson structure at Pier 421-2 during construction is not intended as part of the Project; however, construction activities could result in an accidental release of contaminated sediment into the environment.

The only trenching included as part of the Project would be a shallow trench (30 inches deep by 12 inches wide) for the installation of electric cables over a 1-day period. Additionally, the Project has included a technique for upgrades to the existing 6-inch line by in-situ enhancements including addition of a new internal liner of the pipeline. The pipeline would be accessed at the location near the 1994 oil release. Further Project details are described in Section 2.2, Proposed Project.

Decommissioning and removal of Pier 421-1 and associated infrastructure, which would occur following recommissioning of Pier 421-2, also presents the risk of exposing contaminated sediment to the marine environment. The caisson at Pier 421-1 currently contains sediment that may contain hazardous materials, and removal of this structure could result in mobilization of this material into the marine environment. Structures to be removed as part of the decommissioning and removal of Pier 421-1 and underlying sand would be tested for the presence of hazardous materials, and any contaminated sand would be remediated; however, accidental release of contaminated sediment may still occur. During the construction phase for the Project and subsequent

decommissioning and removal of Pier 421-1, other pollutants typically associated with construction activities, such as sediment, concrete curing compounds, sealants, paints (among others) could be released. The potential for and consequences of upset conditions during operations are addressed in Section 4.2, Safety. This impact would be less than significant with mitigation.

Mitigation Measures

Impacts from potential hazardous materials releases during Project construction and operation and during decommissioning and removal of Pier 421-1 would be reduced with implementation of MM WQ-1a from Section 4.5, Hydrology, Water Resources and Water Quality, as well as:

MM HAZ-1a. Proper Personnel Training. Personnel working during the Project's construction, operation, and Pier 421-1 decommissioning and removal phases shall be adequately trained per the requirements included in Venoco's Emergency Action Plan, Oil Spill Contingency Plan, Fire Prevention and Preparedness Plan, Spill Prevention, Control and Countermeasures Plan and other relevant plans. These plans include specific training requirements such that personnel that have the potential to come into contact with contaminated media and/or hazardous materials understand safe work practices, Best Management Practices, and waste management practices, so that a release of hazardous materials can be avoided, controlled, or minimized. Project construction and field personnel shall also be trained to identify possible indicators of a hazardous release, such as hydrocarbon or solvent odors, stained soils, and oily sheens on standing water.

MM HAZ-1b. Conduct a Phase I Environmental Site Assessment (ESA). To gain a better understanding of the study area and its potential to have additional, previously unknown releases of hazardous materials or other environmental concerns, Venoco shall perform a Phase I ESA on the study area prior to issuance of land use permits, which shall incorporate information from Santa Barbara County Fire Department Fire Protection Division (FPD) records and files. The results of this study shall be provided to the City of Goleta, FPD, and California State Lands Commission staffs. Conclusions of the Phase I ESA, including any recommendation of a Phase II and subsequent investigation, shall be followed. Any subsequent work plans for soil and groundwater sampling shall be submitted to FPD for review and incorporated into the current and ongoing assessment under their Site Mitigation Unit Site #371.

MM HAZ-1c. Soil Sampling. During construction activities at Pier 421-2 and during Pier 421-1 decommissioning and removal, all soil materials removed shall be presumed to be contaminated and handled accordingly. The soil materials removed from the caisson will be sampled, profiled, and disposed of or recycled according to regulatory requirements. During all other Project construction activities, ~~Venoco~~ a City of Goleta Soils Inspector/Monitor shall continually visually monitor the soils disturbed within the construction areas to

determine if there is any evidence of undiscovered contamination. The City of Goleta shall hire the Soils Inspector/Monitor, paid for by Venoco, to inspect soil disturbance activities within the City's jurisdiction during all phases of the Project to ensure that any hazardous materials and/or contaminated soils encountered are properly contained and removed. Soil samples may be taken, subject to the direction of the Soils Inspector/Monitor. Any soil suspected of contamination shall be contained on site in appropriate storage container, sampled, profiled, and disposed of or recycled according to regulatory requirements. All soils removed shall be handled in accordance with MM HAZ-1d. All soil sampling results shall be provided to the California State Lands Commission and City of Goleta staffs immediately upon receiving results.

MM HAZ-1d. Removal Action Plan. If sediment within the Project construction and 421-1 decommissioning areas and surrounding soils is determined to contain total petroleum hydrocarbons or other contaminants above California Ocean Plan thresholds and if such sediments may be exposed, prior to commencing construction activities, Venoco shall prepare a Removal Action Plan for the safe removal of contaminated materials from the structures and surrounding area. The action plan shall be circulated to the City of Goleta, Santa Barbara County Fire Department Fire Protection Division, California State Lands Commission (CSLC) staffs for review and comment. Final approval of the plan shall be under the purview of the California Department of Fish and Wildlife Office of Spill Prevention and Response (OSPR) and/or CSLC staffs. Upon approval, sediments shall be removed from construction areas and disposed of in accordance with procedures described in the Removal Action Plan. However, if OSPR and/or CSLC staffs determine that removal of some contaminated sediments would impair the integrity of Pier 421-2 (includes the well, caisson supporting the well, and the causeway leading to the caisson) (either through complete removal of the soil filling the caisson or having to dig underneath), Venoco shall prepare a Decommissioning Plan to remove those remaining contaminated sediments at such time that Pier 421-2 is decommissioned. All other contaminated sediments whose removal would not threaten the integrity of Pier 421-2 would be removed upon approval of the Plan as described above.

MM HAZ-1e. Performance Security. The permittee shall provide to the California State Lands Commission (CSLC) and the City of Goleta, or maintain if already provided, performance securities and agreements for work that would need to be performed at the end of the Project's life. The security and agreement provided to CSLC would cover decommissioning and abandonment of the Well 421-1 and Pier 421-2. The performance security total shall be the estimated amount for the decommissioning/abandonment work. The performance security shall be provided to the CSLC and agreements signed, prior to return to production of the PRC 421 well. The security and agreement provided to the City of Goleta would cover decommissioning and abandonment of the portions of the Project located within the City's jurisdiction, including, but not limited to, the piers, the sea wall supporting the access road, the access road, and the onshore pipelines and cables and ancillary facilities. The performance security

total shall be the estimated amount for the decommissioning/abandonment work, less any amount contributed toward overlapping infrastructure that is covered in the securities and agreements with the CSLC. The performance security shall be provided to the City of Goleta and agreements signed prior to the issuance of the Land Use Permit.

Rationale for Mitigation

Based on past operations, the potential exists for contaminated media to exist within the Project construction areas. Therefore, pre-Project planning, contingency planning, and personnel training would be needed to control, prevent, or eliminate future releases of hazardous materials during Project implementation. Proper personnel training will ensure that Project personnel are prepared for emergency response in the event of a release of hazardous materials, and will be trained in the identification, proper handling, and disposal of such materials. The purpose of a Phase I ESA is to identify environmental concerns that may be associated with a property. Identification of such concerns helps to evaluate the nature, extent, and magnitude of potential contamination at a site, and to identify what media (e.g., soil, sediment, groundwater, or surface water) may have been contaminated. The conclusions of the Phase I may include recommendation of subsequent investigation (Phase II), in which the extent and nature of contamination will be identified. Sampling of sediment in the proposed construction areas will determine whether contamination is present prior to ground disturbance activities. If contamination is present, a Removal Action Plan will define requirements for proper cleanup and disposal, thereby minimizing risk to the public and environment. Additionally, avoiding construction activities during high tides and use of a silt curtain would reduce the probability and severity of a release of hazardous materials into the marine environment. Full implementation of these measures would reduce Impact HAZ-1 to less than significant.

Impact HAZ-2: Release of Contaminated Sediment from the Caisson on Pier 421-2 during Operation of the Project

Contaminated sediment contained within the caisson structures could infiltrate to the surrounding environment (Less than Significant with Mitigation).

Impact Discussion

The Project would extend the use of the aging caisson structure on Pier 421-2. Although the seaward-facing wall has been reconstructed and the remaining walls would be repaired as part of the Project, these walls are subject to weathering, corrosion, and fatigue (see Impact GEO-4) and the potential exists for possibly contaminated sediment contained within the caissons to infiltrate to the surrounding environment. Potential mechanisms and pathways for release of contamination from the caisson are not fully understood; however, potential pathways may include percolation from water infiltration and leakage through the sides and bottom of the caisson wall. The potential for collapse

of the caisson structures is discussed in Section 4.2, Safety (see Impact S-2). This impact would be less than significant with mitigation.

Mitigation Measures

MMs listed in Sections 4.1, Geological Resources, and 4.2, Safety, would reduce the potential for contamination to leak or infiltrate from the caisson structure at Pier 421-2. In particular, MM GEO-4a, Corrosion Protection Design Specification, MM GEO-4d, Inspect Structures During and/or After Storm Events, and MM S-2a, Design Review/ Wave Loading Evaluation, shall be employed to ensure the integrity of the structure. Results from the Phase I and any subsequent Phase II ESAs described in MM HAZ-1b would provide information on the nature and extent of any pre-existing contamination from past site operations.

Rationale for Mitigation

Contaminated sediment may be contained within the caisson structure on Pier 421-2, which is aged and subject to erosion. Although exposure of caisson sediments at Pier 421-2 is not proposed, the potential exists for contamination to leak or infiltrate from the caisson. MMs discussed above will increase the likelihood that any contaminants will be detected and decrease the potential for a release of contaminated sediment. MM GEO-4a, Corrosion Protection Design Specification, and MM S-2a, Design Review/Wave Loading Evaluation, will ensure the structural integrity of the caisson on Pier 421-2 through design specification and repair. Inspections of the caisson structure, as discussed in MM GEO-4d, Inspect Structures During and/or After Storm Events, will lessen the potential for release of caisson media through cracks in the structure. Information obtained from implementation of MM HAZ-1b would provide data for evaluating the potential for pre-existing contamination to infiltrate to the surrounding environment. Full implementation of these measures would reduce Impact HAZ-2 to less than significant.

Table 4.3-2. Summary of Hazardous Materials Impacts and Mitigation Measures

Impact	Mitigation Measures
HAZ-1: Exposure of Public or Environment to Hazardous Materials	**HAZ-1a.** Proper Personnel Training. **HAZ-1b.** Conduct Phase I Environmental Site Assessment. **HAZ-1c.** Soil Sampling. **HAZ-1d.** Removal Action Plan. **HAZ-1e**. Performance Security. **WQ-1a**. Avoidance of High Tides and Silt Curtain.
HAZ-2: Release of Contaminated Sediment from the Caisson on Pier 421-2 during Operation of the Project	**GEO-4a.** Corrosion Protection Design Specification. **GEO-4d.** Inspect Structures During and/or After Storm Events. **S-2a.** Design Review/ Wave Loading Evaluation. **HAZ-1b.** Conduct Phase I Environmental Site Assessment.

4.3.5 Cumulative Impacts Analysis

Given that MMs are used to control, prevent, or eliminate the release of hazardous materials at the study area, implementation of the Project is not anticipated to add to the cumulative effects of implementation of other projects in the area. In addition, the Project and other nearby projects where the use, handling, or disposal of hazardous materials is anticipated are all subject to regulatory standards that must be achieved during construction and operation. Similar to the Project, all future projects in the area would be evaluated on a project-by-project basis and would incorporate measures to reduce any potential impacts from releases of hazardous materials. Mitigation for future projects would be expected to be consistent with applicable standards, regulations, and permits to reduce any potential impacts from releases of hazardous materials. Incorporation of these requirements in other projects would be expected to reduce impacts to less than significant levels. Therefore, the Project is not anticipated to make a contribution to cumulative impacts from the release of hazardous materials. Cumulative impacts from a potential future oil spill are addressed in Section 4.5, Hydrology, Water Resource, and Water Quality, and Section 4.2, Safety.

4.4 AIR QUALITY AND GREENHOUSE GASES

This section summarizes the local climate, current air quality conditions, and regulatory setting related to air quality in the Project area. Air quality impacts associated with the Project and cumulative impacts are also discussed. As necessary, mitigation measures (MMs) are provided to reduce the significance of potential impacts. Information contained in this section was derived from Venoco, Inc.'s (Venoco's) Lease 421 Recommissioning Plan Project Description (May 2013), emission inventories for Venoco facilities affecting the ambient air quality in the region, including the Ellwood Onshore Facility (EOF) and Platform Holly, from the California Air Resources Board (CARB), and the Santa Barbara County Air Pollution Control District (APCD). Emission inventories for these facilities have been compiled based on actual operating data and on the potential to emit (emissions at permitted operational limits) for each facility.

This document incorporates by reference, and refines and summarizes where appropriate, the conclusions of the Line 96 Modification Project Environmental Impact Report (EIR) (Santa Barbara County 2011) regarding Project impacts to air quality associated with operation of the Line 96 pipeline to the Plains All American Pipeline, L.P. (PAAPLP) Coastal Pipeline west of Las Flores Canyon (LFC). This document also incorporates data from Santa Barbara County 01-ND-34 and City of Goleta 06-MND-01.

4.4.1 Environmental Setting

The primary study area covers the Ellwood Coast and South Coast Air Basin. The secondary, more global, study area is that affected by greenhouse gas (GHG) emissions.

Regional Overview

The climate of Santa Barbara County is classified as Mediterranean, characterized by warm, dry summers and mild winters with moderate precipitation. Temperatures are milder near the coastline than inland, with average daily summer highs of 70 degrees Fahrenheit (°F) and average daily winter lows of 40°F. Inland areas experience a wider range of temperatures, from an average summer high in the 80s and 90s to an average winter low in the 30s. Most precipitation occurs during November through April, with an annual rainfall range of 10 to 18 inches along the coast and slightly more in higher elevations. Prevailing winds in the coastal region are from the west/northwest during the day, with an average speed of 7 to 12 miles per hour. Evening winds blow from the east, as the air over the Pacific Ocean cools and creates a low pressure zone. Topography plays a significant role in affecting the direction and speed of winds. Year round, light onshore winds hamper the dispersion of primary pollutants, and the orientation of the inland mountain ranges interrupt air circulation patterns. Pollutants become trapped, creating ideal conditions for the production of secondary pollutants in the coastal zones.

Several types of inversions are common to the area, particularly during May to October. During spring and summer, marine inversions occur when cool air from over the ocean intrudes under warmer air that lies over the land. In summer, the high pressure systems can cause the air mass to sink, creating a subsidence inversion. In winter, weak surface inversions occur, caused by cooling of air in contact with the cold surface of the earth.

Air Quality

Air quality is defined by ambient air concentrations of specific pollutants which have been determined to be of concern with respect to the health and welfare of the general public. The pollutants of concern are: carbon monoxide (CO), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), ozone (O_3), particulate matter (PM_{10} and $PM_{2.5}$), sulfates, lead (Pb), H_2S, vinyl chloride, and visibility reducing particles. Ambient air quality standards have been established by the CARB for each of these pollutants and by the U.S. Environmental Protection Agency (U.S. EPA) for CO, SO_2, NO_2, O_3, PM_{10}, $PM_{2.5}$, and Pb. The California Ambient Air Quality Standards (CAAQS) and the National Ambient Air Quality Standards (NAAQS) are summarized in Table 4.4-1.

Air quality at a given location can be described by the concentration of various pollutants in the atmosphere. Units of concentration are generally expressed in parts per million (ppm) or micrograms per cubic meter ($\mu g/m^3$). The significance of a pollutant concentration is determined by comparing the concentration to an appropriate national and/or State ambient air quality standard. These standards represent the allowable atmospheric concentrations at which the public health and welfare are protected and include a reasonable margin of safety to protect the more sensitive individuals in the population.

Criteria Pollutants and Air Monitoring. Criteria air pollutants are defined as pollutants for which the Federal and State governments have established ambient air quality standards, or criteria, for outdoor concentrations to protect public health. The Federal and State standards have been set at levels above which concentrations generally could be harmful to human health and welfare. These standards are designed to protect the most sensitive persons from illness or discomfort, with a margin of safety. Ambient air quality for the Project area from 2010 to 2012 is summarized in Table 4.4-2.

Santa Barbara County is classified as being in attainment or unclassified for all criteria pollutants with the exception of the California standards for PM_{10} and the 8-hour standard for ozone, as shown in Table 4.4-3. Monitoring is performed to demonstrate attainment or nonattainment of national and State ambient air quality standards. Criteria air pollutants of concern for Santa Barbara County are described below.

Table 4.4-1. Ambient Air Quality Standards for Criteria Pollutants

Pollutant	Averaging Time	California Standards [a, c]	National Standards [b]	
			Primary [d]	Secondary [c, e]
O_3	1-hour [b] 8-hour [a]	0.09 ppm (180 µg/m^3) 0.07 ppm (137 µg/m^3)	NS 0.075 ppm (147 µg/m^3)	NS 0.075 ppm (147 µg/m^3)
CO	8-hour 1-hour	9.0 ppm (10 mg/m^3) 20.0 ppm (23 mg/m^3)	9.0 ppm (10 mg/m^3) 35 ppm (40 mg/m^3)	NS NS
NO_2	Annual Avg. 1-hour	0.030 ppm (57 µg/m^3) 0.18 ppm	0.053 ppm (100 µg/m^3) 0.1 ppm (188 µg/m^3)	0.053 ppm (100 µg/m^3) NS
Sulfur Dioxide, SO_2	Annual Avg. 24-hour 3-hour 1-hour	NS 0.04 ppm (105 µg/m^3) NS 0.25 ppm (655 µg/m^3)	NS NS NS 0.075 ppm (196 µg/m^3)	NS NS 0.5 ppm (1,300 µg/m^3) NS
PM_{10}	Ann. Arith. Mean 24-hour	20 µg/m^3 50 µg/m^3	NS 150 µg/m^3	NS 150 µg/m^3
$PM_{2.5}$	Ann. Arith. Mean 24-hour	12 µg/m^3 NS	12 µg/m^3 35 µg/m^3	12 µg/m^3 35 µg/m^3
Sulfates (SO_4 [b])	24-hour	25 µg/m^3	NS	NS
Pb [f]	30-day Avg. Calendar Qtr. 3-month Avg.	1.5 µg/m^3 NS NS	NS 1.5 µg/m^3 0.15 µg/m^3	NS 1.5 µg/m^3 0.15 µg/m^3
H_2S	1-hour	0.03 ppm (42 µg/m^3)	NS	NS
Vinyl Chloride [f]	24-hour	0.010 ppm (26 µg/m^3)	NS	NS
Visibility Reducing Particles	1 Observation	Insufficient amount to reduce the prevailing visibility[g] to less than 10 miles when the relative humidity is less than 70 percent (California only).		

Notes: ppm = parts per million by volume (micromoles of pollutant per mole of gas) mg/m^3 = microgram/cubic meter; mm = millimeter; NS = No Standard; Avg. = Average; Ann. Arith. Mean = Annual Arithmetic Mean.

[a] California standards for O_3, CO, SO_2 (1-hour), NO_2, $PM_{2.5}$ and PM_{10} are values that are not to be exceeded. SO_4^{-2}, Pb, H_2S, Vinyl Chloride, and visibility-reducing particles standards are not to be equaled or exceeded. Sulfates are pollutants that include SO_4^{-2} ion in their molecule. CA 8-hr O_3 standard is effective as of May 17, 2006.

[b] National Standards, other than O_3 and those based on annual averages or annual arithmetic means are not to be exceeded more than once a year. The O_3 Standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above the standard is equal to or less than one. National 1-hour O_3 standard was revoked on June 30, 2005.

[c] Concentration expressed first in units in which it was promulgated. Equivalent units in parentheses are based upon reference temperature of 25°C and a reference pressure of 760 millimeters (mm) of mercury (1,013.2 millibar).

[d] National Primary Standards: The levels of air quality necessary, with an adequate margin of safety, to protect the public health. Each state must attain the primary standards no later than three years after that state's implementation plan is approved by the U.S. EPA.

[e] National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant. Each state must attain the secondary standards within a "reasonable time" after the implementation plan is approved by the U.S. EPA.

[f] The CARB has identified Pb and vinyl chloride as 'toxic air contaminants' with no threshold level of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.

[g] Prevailing visibility is defined as the greatest visibility, which is attained or surpassed around at least half of the horizon circle, but not necessarily in continuous sectors.

Source: CARB 2011.

Table 4.4-2. Ambient Air Quality Summary for Project Area (2010 through 2012) and Attainment Status of Santa Barbara County (2012)

			Maximum Observed Concentration (# of Days Standard was Exceeded)[a]	
Pollutant		**Year**	**Goleta - Fairview**	**Santa Barbara**
O_3, ppm	1-hour 8-hour	2010	0.072 (0) 0.065 (0)	0.075 (0) 0.062 (0)
	1-hour 8-hour	2011	0.091 (0) 0.076 (1 day)	0.089 (0) 0.077 (1 day)
	1-hour 8-hour	2012	0.065 (0) 0.056 (0)	0.071 (0) 0.058 (0)
CO, ppm	8-hour	2010	0.56 (0)	1.07 (0)
	8-hour	2011	0.57 (0)	1.89 (0)
	8-hour	2012	0.65 (0)	[b] (0)
NO_2, ppm	1-hour Annual Average	2010	0.044 (0) 0.006	0.090 (0) 0.009
	1-hour Annual Average	2011	0.052 (0) 0.006	0.049 (0) 0.010
	1-hour Annual Average	2012	0.041 (0) [b] (0)	0.048 (0) [b] (0)
SO_2	No data available (monitoring station does not monitor this pollutant)			
$PM_{2.5}$, µg/m^3	24-hour Ann. Arith. Mean	2010	23.6 (0) 8.2	17.4 (0) [b]
	24-hour Ann. Arith. Mean	2011	18.4 (0) 8.4	[b] [b]
	24-hour Ann. Arith. Mean	2012	29.0 (0) 9.0	[b] [b]
PM_{10}, µg/m^3	24-hour Ann. Arith. Mean	2010	45.2 (0) [b]	57.6 (3 days) [b]
	24-hour Ann. Arith. Mean	2011	70.0 (2 days) [b]	69.4 (3 days) 25.0
	24-hour Ann. Arith. Mean	2012	48.0 (0) 18.8	59.2 (2 days) [b]

Attainment Status													
1-hour O_3 [c]		**8-hour O_3**		**CO**		**NO_2**		**SO_2**		**$PM_{2.5}$**		**PM_{10}**	
CA	**Fed**	**CA**	**Fed**	**CA**	**Fed**	**CA**	**Fed**	**CA**	**Fed**	**CA**	**Fed**	**CA**	**Fed**
A	N/A	**N**	U/A	A	U/A	A	U/A	A	U/A	U	U/A	**N**	U/A

Notes: The values are provided in the units promulgated by the U.S. EPA.
CA = California State Standards; A = Attainment of Standards; N = Nonattainment; U = Unclassified; U/A = Unclassified/Attainment, NA = not applicable. Ann. Arith. Mean = Annual Arithmetic Mean.

[a] Number or percent of exceedances of the most restrictive standard (usually, the State Standard).

[b] Insufficient data available to determine value.

[c] National 1-hour O_3 standard was revoked on June 30, 2005, with all applicable designations.

Source: CARB 2013; Santa Barbara County APCD 2013.

Ozone (O_3). The most widespread air quality problem in the State, O_3, is a colorless gas with a pungent, irritating odor. O_3 is not emitted directly into the atmosphere; it is formed primarily when reactive organic compounds (ROCs) and nitrous oxide (NO_x) react in the presence of sunlight. O_3 may pose its worst health threat to those who already suffer from respiratory diseases; however, it also harms healthy people. The health effects of O_3 can include reduced lung function, aggravated existing respiratory illness, and irritated eye, nose, and throat tissues. Chronic exposure can cause permanent damage to the alveoli of the lungs.

Sulfur Dioxide (SO_2). SO_2 is a colorless gas. At high concentrations, it has a pungent, irritating odor. In the atmosphere, it reacts with oxidants or particles to form sulfates and sulfuric acid particles in equilibrium, both of which are more hazardous than the original SO_2. The main sources of SO_2 are fuel burning and metal ore processing. Sulfur is an impurity in fossil fuels (especially coal) and in many ores. Santa Barbara County has been in attainment with the California and national SO_2 standards for the last 10 years.

Lead (Pb). Pb in the atmosphere occurs as PM. The combustion of leaded gasoline is the primary source of Pb emissions in the South Coast Air Basin. Other sources of Pb include the manufacturing of batteries, paint, ink, ceramics, and ammunition and secondary Pb smelters. With the phase-out of leaded gasoline, secondary Pb smelters, battery recycling, and manufacturing facilities are becoming Pb emission sources of greater concern. Prolonged exposure to atmospheric Pb poses a serious threat to human health. Health effects associated with exposure to Pb include gastrointestinal disturbances, anemia, kidney disease, and in severe cases, neuromuscular and neurological dysfunction. Of particular concern are low-level Pb exposures during infancy and childhood. Such exposures are associated with decrements in neurobehavioral performance (including intelligence quotient performance, psychomotor performance, and reaction time) and growth. The county is in attainment with the NAAQS and the CAAQS for Pb.

Nitrogen Dioxide (NO_2). NO_2 is a by-product of fuel combustion that absorbs blue light, resulting in a brownish-red cast to the atmosphere and reduced visibility, and that contributes to the formation of PM_{10}. The principal form of nitrogen oxide (NO) produced by combustion is nitric acid, but NO reacts quickly to form NO_2 and NO_x (a mixture of NO and NO_2). NO_2 acts as an acute irritant, but is only potentially irritating at atmospheric concentrations. There is some indication of a relationship between NO_2 and chronic pulmonary fibrosis, while some increase in bronchitis in children (2 to 3 years old) has been observed at concentrations below 0.3 ppm. Santa Barbara County is in attainment of the California and national 1-hour and 8-hour NO_2 standards.

Carbon Monoxide (CO). Automobiles and other types of motor vehicles are the main source of CO pollution in Santa Barbara County. CO gas is colorless and odorless, which adds to its danger. CO concentrations typically peak nearest a source, such as

roadways, and decrease rapidly as distance from the source increases. In high concentrations, CO can cause physiological and pathological changes, and ultimately death, by incapacitating the red blood cells and interfering with their ability to carry oxygen to body tissues. The symptoms of excessive exposure – headaches, fatigue, slow reflexes, and dizziness – also can occur in healthy people. Santa Barbara County is in attainment of the California and national one-hour and eight-hour CO standards.

Fine Particulate Matter (PM_{10} and $PM_{2.5}$). PM_{10} and $PM_{2.5}$ consist of extremely small suspended particles or droplets that are 10 and 2.5 micrometers or smaller, respectively, in diameter that can lodge in the lungs and contribute to respiratory problems. PM_{10} and $PM_{2.5}$ arise from such sources as road dust, diesel soot, combustion products, abrasion of tires and brakes, demolition operations, and windstorms. They also are formed in the atmosphere from NO_2 and SO_2 reactions with ammonia. PM_{10} and $PM_{2.5}$ scatter light and significantly reduce visibility. PM_{10} and $PM_{2.5}$ pose a serious health hazard, alone or in combination with other pollutants. More than half of the smallest particles inhaled would be deposited in the lungs and can cause permanent lung damage. Fine particulates also can have a damaging effect on health by interfering with the body's mechanism for clearing the respiratory tract or by acting as a carrier of an absorbed toxic substance. Santa Barbara County is in exceedance of the California annual arithmetic mean and 24-hour PM_{10} standards (see Table 4.4-3). Santa Barbara County is Unclassified for the recently added State $PM_{2.5}$ Standard.

Hydrogen Sulfide (H_2S). H_2S is an odorous, toxic, gaseous compound that can be detected by humans at very low concentrations. Concentrations detectable by smell (this can vary from 0.5 parts per billion [ppb] detected by 2 percent of the population to 40 ppb, qualified as annoying by 50 percent of the population) are significantly lower than concentrations that could affect human health (2 ppm [2,000 ppb] can cause headaches and increased airway resistance in asthmatics; inhalation of 600 ppm is lethal). The gas is produced during the decay of organic material and is also found naturally in petroleum and natural gas. The county is in attainment of the H_2S standard.

Toxic Air Contaminants (TACs). TACs are compounds that are known or suspected to cause short-term (acute) and/or long-term (chronic non-carcinogenic or carcinogenic) adverse health effects. Vulnerable subpopulations are those with preexisting respiratory or cardiovascular disease, especially the elderly, while increased hospital admissions and morbidity from respiratory disease have been associated with PM exposure in adults and children. PM exposure is also associated with an increased risk of lung cancer in epidemiological studies (CARB 2005). Sources of TACs within Santa Barbara County include industrial processes, gasoline stations, paint/solvent operations, and fossil fuel combustion. In 1998, CARB identified diesel particulate matter (DPM) as a TAC based on its potential to cause cancer, premature deaths, and other health problems. DPM is a by-product of the diesel fuel combustion process that is emitted in exhaust from construction heavy equipment, trucks, marine vessels, and other sources.

Regional Emissions

Emissions within the County are estimated annually by the APCD. Table 4.4-3 lists the estimated emissions by source category.

Table 4.4-3. Emission Inventory for Santa Barbara County

Emission Sources [a]		CO (MT/yr)	ROC (MT/yr)	NO_x (MT/yr)	SO_2 (MT/yr)	PM_{10} (MT/yr)
Onshore	Stationary	1,551	3,244	2,843	552	554
	Area-Wide	9,433	3,051	333	8	10,584
	Mobile	82,532	5,039	11,047	305	572
	Natural	11,404	47,378	8,707	0	1,843
	Total Onshore	**103,369**	**58,712**	**22,930**	**865**	**13,553**
Offshore	Stationary	N/A	303	213	N/A	N/A
	Mobile	N/A	914	18,017	N/A	N/A
	Natural	N/A	2,004	0	N/A	N/A
	Total Offshore	N/A	**3,221**	**18,230**	-	-
All Sources		-	**61,933**	**41,160**	-	-

Notes: MT/yr = metric tons per year.

ROC and NOx from 2010 Clean Air Plan and reflect the year 2007; CO, SO_2 and PM10 are no longer included in the Clean Air Plan inventory and are from the 2002 Clean Air Plan Update Emissions Inventory representing 1999.

[a] Petroleum activities are a part of Stationary Sources.

Source: Santa Barbara County APCD 2002, 2011a.

Odor Issues Associated with Oil and Gas Production Facilities and PRC 421

Oil production facilities typically produce odors that can be objectionable to the public, and of particular concern is H_2S. Other Ellwood area oil facilities, including the Ellwood Marine Terminal (EMT) and barges which are not part of the Project, have historically produced odors that have generated complaints from the public. Approximately 50 complaints regarding odors from the EMT were received from 2005 to 2011, a frequency of approximately eight complaints per year. The EOF has also generated complaints and has been the subject of an abatement order from APCD. There were two occurrences of odor complaints associated with EOF operations in 2007. One complaint occurred on October 29, 2007, and the exact source of the release was not confirmed, although a low-level H_2S alarm near the edge of the Venoco's property line was triggered. The other complaint occurred on November 14, 2007, and was attributed to gas released from a water settling tank (T-201) and an oil shipping tank (T-202). An H_2S leak on February 11, 2010, also resulted in odor complaints, and was due to a tank valve that was left open during maintenance on a compressor in the gas plant. Automated systems shut down gas operations at Platform Holly and the EOF, until APCD authorized restart later in the day. On May 31, 2010, the 16-inch main Lo-Cat solution line came apart which resulted in the immediate shutdown of the Lo-Cat process. The Lo-Cat process uses a non-hazardous chelated iron solution to convert

H_2S from the Platform Holly gas stream to elemental sulfur. The location of the leak was the LoCat Unit, upstream of where the solution contacts the platform gas. As such, no platform gas was released to the atmosphere. The leak caused some of the solution to spray on to the fence, frontage road and some shrubbery. One fence line odor sensor was activated at <1 ppm (City of Goleta 2011).

Some odor events could be attributed to natural gas seeps (a documented phenomenon caused by the leaking of oil and gas from the sea-floor) near Platform Holly and offshore of the Ellwood Coast. Off Coal Oil Point, portions of these seeps are captured by a large subsea metal pyramid "tent" installed in the 1980s. However, natural seeps also occur in other locations off of Coal Oil Point where they are not captured but escape into the atmosphere, and create odors if H_2S is present in the gas.

As noted in Section 4.2, Safety, "sweet" crude oil, with low sulfur content (below 0.6 percent) and low H_2S content, is produced from PRC 421 (the H_2S content in PRC 421 gas is approximately 10 ppm, below levels at which H_2S is considered to be a potential source of injury to humans [see Section 4.2, Safety, for a complete discussion]). Crude produced from the South Ellwood Field (Platform Holly) contains much higher concentrations of sulfur and H_2S (see Table 4.2-2). The crude oil that would be produced by the Project and transported through Line 96 would not be a source of acute toxic impacts to human receptors if released and is not expected to be a source of odors that would be a nuisance to the public.

Greenhouse Gases (GHGs) and Global Climate Change

Global climate change is a change in the average weather of the earth which can be measured by wind patterns, storms, precipitation, and temperature. Scientific consensus has identified that the human-related emission of GHGs above natural levels is a significant contributor to global climate change. GHGs are any gases that absorb infrared radiation in the atmosphere, including water vapor, carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), fluorocarbons, and O_3. GHGs lead to the trapping and buildup of heat in the atmosphere near the earth's surface, known as the Greenhouse Effect. The atmosphere and the oceans are reaching their capacity to absorb CO_2 and other GHGs without significantly changing the earth's climate. The increase in GHGs in the earth's climate is projected to substantially affect a wide range of issues and resources, including sea level rise, flooding, water supply, agricultural and forestry resources, and energy demand. California's Climate Change Portal (www.climatechange.ca.gov) states:

> Climate change is expected to have significant, widespread impacts on California's economy and environment. California's unique and valuable natural treasures - hundreds of miles of coastline, high value forestry and agriculture, snow-melt fed fresh water supply, vast snow and water fueled recreational opportunities, as well as other natural wonders - are especially at risk.

In addition, the Intergovernmental Panel on Climate Change (IPCC), in the section of its Fifth Assessment Report by Working Group II, "Climate Change 2014: Impacts, Adaptation, and Vulnerability," (IPCC 2014; released March 31, 2014) specific to North America (Chapter 26), stated in part:

> **North American ecosystems are under increasing stress from rising temperatures, CO_2 concentrations, and sea-levels, and are particularly vulnerable to climate extremes (*very high confidence*).** Climate stresses occur alongside other anthropogenic influences on ecosystems, including land-use changes, non-native species, and pollution, and in many cases will exacerbate these pressures (*very high confidence*). [26.4.1; 26.4.3]. Evidence since the Fourth Assessment Report (IPCC 2007) highlights increased ecosystem vulnerability to multiple and interacting climate stresses in forest ecosystems, through wildfire activity, regional drought, high temperatures, and infestations (*medium confidence*) [26.4.2.1; Box 26-2]; and in coastal zones due to increasing temperatures, ocean acidification, coral reef bleaching, increased sediment load in run-off, sea level rise, storms, and storm surges (*high confidence*) [26.4.3.1].

California has already been affected by climate change: sea level rise, increased average temperatures, more extreme hot days and increased heat waves, fewer shifts in the water cycle, and increased frequency and intensity of wildfires. Higher sea levels can result in increased coastal erosion (which may have a secondary effect such as uncovering hazards such as occurred in March 2014 along the Santa Barbara coastline), more frequent flooding from storm surges, increased property damage, and reduced waterfront public access options. Other projected climate change impacts in California include: decreases in the water quality of surface water bodies, groundwater, and coastal waters; decline in aquatic ecosystem health; lowered profitability for water-intensive crops; changes in species and habitat distribution; and impacts to fisheries (California Regional Assessment Group 2002). These effects are expected to increase with rising GHG levels in the atmosphere.

Fossil fuel combustion represents the vast majority of the anthropogenic GHG emissions, with CO_2 being the primary GHG. In 2010, total U.S. GHG emissions were 6,822 million metric tons[7] (MMT) of carbon equivalents, of which 84 percent were CO_2 emissions; approximately 33 percent of these GHG emissions were associated with electricity generation, and approximately 26 percent were associated with transportation (EPA 2012). About half of the electricity in the U.S. is generated from coal, producing a U.S. GHG emissions rate of about 1,363 pounds per megawatt hour (lbs/MWh); this rate is lower for western states, primarily due to the increased use of hydroelectric and natural gas. The California Independent Service Operator area (which includes some generation outside of California) has a GHG emission rate of about 687 lbs/MWh due to the contribution of hydroelectric, nuclear and renewable sources.

[7] A metric ton, or tonne, is a unit of weight equivalent to 1,000 kilograms (2,205 pounds) versus an Imperial unit ton which is the equivalent of 2,000 pounds (907 kilograms).

The majority of California's GHG emissions (81%) are CO_2 produced from fossil fuel combustion (CARB 2008). In 2012, California's gross GHG emissions totaled 458.68 MMT of CO_2 equivalents ($MMTCO_2e$), with the transportation sector the largest category (167.38 $MMTCO_2e$, 36%) followed by electrical power generation (95.09 $MMTCO_2e$, 21%), industry (89.16 $MMTCO_2e$, 19%), commercial/residential (42.28 $MMTCO_2e$, 9%), and agriculture (37.86 $MMTCO_2e$, 8%) (CARB 2014; www.arb.ca.gov/cc/inventory/data/tables/ghg_inventory_scopingplan_00-12_2014-03-24.pdf.[8]

According to the IPCC, the concentration of CO_2, the primary GHG, has increased from approximately 280 parts per million (ppm) in pre-industrial times to well over 380 ppm. The current rate of increase in CO_2 concentrations is about 1.9 ppm/year; present CO_2 concentrations are higher than any time in at least the last 650,000 years. To meet the statewide GHG reduction target for 2020, requiring California to reduce its total statewide GHG emissions to the level they were in 1990 (Health & Saf. Code, § 38550), and the 2050 goal of 80 percent below 1990 levels (Executive Order S-3-05), not only must projects contribute to slowing the increase in GHG emissions, but, ultimately, projects should contribute to reducing the State's output of GHGs. To reach California's GHG reduction targets, it is estimated that per capita emissions will need to be reduced by slightly less than 5 percent per year during the 2020 to 2030 period, with continued reductions required through midcentury.

In its 2008 "Report on Climate Change: Evaluating and Addressing Greenhouse Gas Emissions from Projects Subject to the California Environmental Quality Act," the California Air Pollution Control Officers Association (CAPCOA) stated:

> [w]hile it may be true that many GHG sources are individually too small to make any noticeable difference to climate change, it is also true that the countless small sources around the globe combine to produce a very substantial portion of total GHG emissions (CAPCOA 2008).

The global warming potential (GWP), or potential of a gas or aerosol to trap heat in the atmosphere, of different GHGs varies since GHGs absorb different amounts of heat. A common reference gas, CO_2, is used to relate the amount of heat absorbed to the amount of the gas emissions, referred to as CO_2 equivalent (CO_2e). CO_2e is the amount of GHG emitted multiplied by the GWP. The GWP of CO_2 is therefore defined as 1. Methane has a GWP of 21; therefore, 1 pound of methane produce 21 pounds of CO_2e. Table 4.4-4 shows a range of gases with their associated GWP, their estimated lifetime in the atmosphere, and the range in GWP over 20, 100, and 500 years.

GHG emissions are generally classified as direct and indirect. Direct emissions are associated with the production of GHG emissions in the immediate Project area, and include combustion of natural gas, combustion of fuel in engines and construction

[8] Not all GHG sources are included, so the components do not add up to the total.

Table 4.4-4. Global Warming Potential of Various Gases

Gas	Life in Atmosphere (years)	20-year GWP (avg)	100-year GWP (avg)	500-year GWP (avg)
Carbon dioxide	50-200	1	1	1
Methane	12	21	56	6.5
Nitrous oxide	120	310	280	170
HFC-23	264	11,700	9,100	9,800
HFC-125	32.6	2,800	4,600	920
HFC-134a	14.6	1,300	3,400	420
HFC-143a	48.3	3,800	5,000	1,400
HFC-152a	1.5	140	460	42
HFC-227ea	36.5	2,900	4,300	950
HFC-236fa	209	6,300	5,100	4,700
HFC-4310mee	17.1	1,300	3,000	400
CF4	50,000	6,500	4,400	10,000
C2F6	10,000	9,200	6,200	14,000
C4F10	2,600	7,000	4,800	10,100
C6F14	3,200	7,400	5,000	10,700
SF6	3,200	23,900	16,300	34,900

Source: EPA 2007.
GWP = Global Warming Potential; avg = average; CF = chlorfluorocarbon; HFC = hydroflourocarbon.

vehicles, and fugitive emissions from valves and connections of equipment used during Project implementation or throughout the Project life. Indirect emissions include emissions from vehicles (both gasoline and diesel).

4.4.2 Regulatory Setting

A summary of the Federal and State regulatory setting for air quality is provided in Table 4.0-1, while the local regulatory setting is discussed below.

Local

Santa Barbara County Air Pollution Control District (APCD)

As directed by the Federal and State Clean Air Acts, local air districts are required to prepare plans with strategies for attaining and maintaining State and Federal O_3 standards. To ultimately achieve the air quality standards, the rules and regulations limit emissions and permissible impacts from activities within the local air districts. Some rules also specify emission controls and control technologies for each type of emitting source. The regulations also include requirements for obtaining an Authority to Construct (ATC) permit and a Permit to Operate (PTO).

The Santa Barbara County APCD is the agency with jurisdiction over air quality attainment in the County. The Project would be permitted as a stationary source, and all aspects of the Project and alternatives occurring in the County must obtain an APCD permit, if applicable. Increases in emissions of any non-attainment pollutant or its pre-

cursor from a new or modified project that exceed thresholds identified in APCD Rule 802.E are required to be mitigated. Specific APCD permit requirements such as Best Available Control Technology (BACT) would be addressed in the APCD permit process.

City of Goleta Climate Action Plan

The City of Goleta Climate Action Plan was developed as a response to the statewide reduction goal outlined in Assembly Bill (AB) 32, also known as the Global Warming Solutions Act of 2006 (Health & Saf. Code, § 38500 et seq.). The Scoping Plan for AB 32, developed and implemented by the CARB, identifies specific measures to achieve these reductions and recommends that local governments establish GHG reduction targets for both their municipal operations and the community that are consistent with those of the State. The City's Climate Action Plan meets the requirements of AB 32 and Executive Order S-3-05. In order to reduce above GHG emissions, the Climate Action Plan includes reduction measures of GHG sources for building energy, water consumption, on-road and off-road transportation, and solid waste.

4.4.3 Significance Criteria

Construction Thresholds

Emissions from construction activities are generally short-term and temporary. Neither the City of Goleta nor the APCD have daily or quarterly quantifiable emission thresholds established for short-term construction emissions. Pursuant to APCD Rule 202, construction emissions of any criteria pollutant (except CO) that has the potential to exceed 25 tons per year in a 12-month period would require that the owner of the stationary source provide offsets, per Rule 804. In the absence of adopted thresholds, 25 tons per year is used as the significance threshold for construction emissions of ROG and NO_x. PM_{10} emissions should be estimated and standard MMs implemented, as required in the Santa Barbara County APCD (2005) Air Quality Attainment Plan.

Operational Thresholds

PRC 421 has not been operational and has not produced emissions since 1994 when the facility was temporarily shut in to complete emergency repairs and clean-up, following the discovery a leak in the PRC 421 6-inch line. Therefore, for the purposes of this analysis, impacts to air quality from operations are compared to the existing physical environmental baseline which is zero emissions. The APCD guidelines only contain a peak daily emission threshold for criteria pollutants. Operations at Pier 421-2 would not result in substantial increase in peak daily emissions. However, the Project would result in greater annual emissions. Therefore, to address potential long-term air quality impacts, Project emissions were compared to an annual emission threshold. Impacts are considered to be to be significant if operation of the Project would:

- Emit from all Project sources, both stationary and mobile, more than the daily trigger for offsets or Air Quality Impact Analysis set in the APCD New Source Review Rule for pollutants (i.e., 240 lbs/day for ROC or NOx; 80 lbs/day for PM_{10}. (CO, is an attainment pollutant and doesn't have a daily operational threshold);
- Emit more than 25 tons per year of any one criteria pollutant;
- Emit more than 25 pounds per day of NOx or ROC from motor vehicle trips only;
- Cause or contribute to a violation of any CAAQS or NAAQS (except ozone);
- Exceed APCD Board-adopted health risk public notification thresholds; or
- Not be consistent with the adopted Federal and State air quality plans for Santa Barbara County.

Cumulative impacts would be deemed significant if the Project is found to have an individually significant air quality impact.

Greenhouse Gas Thresholds

The SBCAPCD does not currently have a formally adopted GHG threshold; however, CSLC staff recommend that Project-generated GHG impacts would be potentially significant if any net Project-related increase in CO_2e, occurred annually (i.e., a zero emissions threshold for GHG emissions above baseline). The zero emissions threshold assures that the Project would not contribute to any net increase in GHG emissions over the current facility baseline, and would not impede further progress in meeting the AB 32 mandated reductions and the S-3-05 Executive Order goal of an 80 percent reduction by 2050.

4.4.4 Impact Analysis and Mitigation

The analysis of air quality impacts follows guidance provided by the Santa Barbara County APCD Scope and Content of Air Quality Sections in Environmental Documents (2011) and the State CEQA Guidelines. Air quality impacts associated with recommissioning Pier 421-2 and decommissioning and removal of Pier 421-1 are expected as a result of Project construction and operations. Project construction emissions would include particulate and combustion emissions associated with trenching for the purpose of installing new power cables and repairing the existing 6-inch line, and combustion of fossil fuels from travel on access roads, operation of the drill rig during installation of the electric submersible pump (ESP), and operation of other construction equipment during repairs to the caisson wall. Decommissioning and removal of Pier 421-1 approximately 1 year after PRC 421 recommissioning would also result in particulate and combustion emissions from operation of construction equipment and earthwork related to demolition and removal of the pier and caisson.

Emissions from the Project, including decommissioning and removal of Pier 421-1, were estimated using emission factors and equipment estimates from Venoco Inc.'s Recommissioning Plan for Lease PRC 421 (May 2013). Operational emissions from primary Project components would consist primarily of fugitive emissions from valves, piping components, well heads, well cellars, and processing equipment at the EOF. Operational emissions from secondary Project components would consist primarily of fugitive emissions related to pipeline transport. Operational emissions from oil transportation were calculated using emissions factors from the Line 96 Modification Project EIR and those provided by Santa Barbara County APCD. Table 4.4-8, located at the end of Section 4.4.4, provides a summary of air quality-related impacts and recommended MMs to address these impacts.

Impact AQ-1: Increase in Emissions from Construction

Project construction could potentially result in increased emissions at the Project site (Less than Significant).

Impact Discussion

Project construction would generate temporary air pollutant emission from a variety of activities, including trenching, heavy construction equipment use, construction worker trips, hauling of demolition material, delivery of building materials and equipment, and future removal of existing structures, including from decommissioning and removal of Pier 421-1. Table 4.4-5 shows the estimated emissions associated with Project construction and following decommissioning and removal of Pier 421-1. The equipment list was taken from Venoco's Lease 421 Recommissioning Plan (May 2013).

Table 4.4-5. Estimated Project Construction Emissions

	Emission Source	NO_x tons	ROC tons	CO tons	SO_2 tons	PM_{10} tons
2014	On-site Construction Emissions	6.36	0.74	3.06	0.007	0.28
	Construction Traffic Emissions	<0.01	0.00	0.03	0.00	0.06
	Total	*6.36*	*0.74*	*3.06*	0.007	*0.34*
	Significance Thresholds (tons/year)	25	25	25	25	25
	Are Thresholds Exceeded?	No	No	No	No	No
2015	On-site Construction Emissions	0.064	0.01	0.05	0.00	0.0075
	Construction Traffic Emissions	0.002	0.00	0.005	0.00	0.105
	Total	*0.066*	*0.01*	*0.06*	*0.00*	*0.112*
	Significance Thresholds (tons/year)	25	25	25	25	25
	Are Thresholds Exceeded?	No	No	No	No	No

Note: Calculations include emissions from construction equipment and vehicles traveling to and from the site, including 10 trucks bringing supplies, 10 trucks hauling material to the recycling facility in Ventura, and 40 worker trips per day (this is a conservative estimate relative to the 12 workers that are estimated to be needed for Project construction). Additionally, emissions from 40 haul trips for decommissioning and removal activities in 2015 are included. Recommissioning activities in 2014 are assumed to occur over 90 days, and decommissioning activities in 2015 are assumed to occur over 30 days.

Construction would occur over an estimated 90 days, 8 hours per day, 5 days per week, with decommissioning and removal of Pier 421-1 requiring 30 days and occurring 1 year after PRC 421 recommissioning. Project emissions (including from Pier 421-1 decommissioning/removal) are included in the following analysis. Assumptions are shown in the table and footnotes. As indicated in Table 4.4-5, Project construction would generate emissions due to construction equipment use and traffic associated with construction workers, equipment/supply deliveries, and demolition debris hauling. Over the Project life, including emissions from both Project construction in 2014 and Pier 421-1 decommissioning and removal in 2015, worst-case emissions from construction activities are estimated at 6.426 tons for NO_x, 0.75 tons for ROC, 3.12 tons for CO, 0.007 tons for SO_2, and 0.452 tons for PM_{10}.

As stated above, neither the City of Goleta nor the APCD have established thresholds of significance for construction emissions, but the APCD generally considers emissions of any criteria pollutant that exceed 25 tons per year to be significant. The emissions from Project construction would be well below this level and therefore, impacts to air quality from construction emissions would less than significant. Nevertheless, mitigation is required by APCD policy for all construction activities to minimize emissions of ozone precursors, fugitive dust, and particulate emissions from diesel exhaust.

Mitigation Measures

The estimated emissions presented in the table are shown without mitigation applied. The following MMs should be incorporated into the construction phase of the Project, to reduce impacts as much as feasible.

MM AQ-1a. Prohibit Unnecessary Truck Idling. The construction contractor shall limit unnecessary truck idling on site in excess of five minutes.

MM AQ-1b. Use of Diesel Emission Reduction Measures. The construction **contractor** shall implement the following measures, as feasible.

- Diesel construction equipment meeting the California Air Resources Board (CARB) Tier 1 emission standards for off-road heavy-duty diesel engines shall be used. Equipment meeting CARB Tier 2 or higher emission standards should be used to the maximum extent feasible.
- Diesel powered equipment should be replaced by electric equipment whenever feasible.
- If feasible, diesel construction equipment shall be equipped with selective catalytic reduction systems, diesel oxidation catalysts and diesel particulate filters as certified and/or verified by the U.S. Environmental Protection Agency (EPA) or California.
- Catalytic converters shall be installed on gasoline-powered equipment, if feasible.
- All construction equipment shall be maintained in tune per the manufacturer's specifications.

- The engine size of construction equipment shall be the minimum practical size.
- The number of construction equipment operating simultaneously shall be minimized through efficient management practices to ensure that the smallest practical number is operating at any one time.
- Construction worker trips should be minimized by requiring carpooling and by providing for lunch onsite.

MM AQ-1c. Maintain Construction Equipment. All construction equipment shall be properly maintained according to manufacturers' specifications.

MM AQ-1d. Compliance with State Portable Air Toxics Control Measure. Any portable diesel engines greater than 50 horsepower used in construction shall comply with the State Portable Air Toxics Control Measure and be certified to Tier 1, 2, or 3 non-road engine standards.

MM AQ-1e. Establish On-Site Equipment Staging Area and Worker Parking Lots. The staging area and worker parking lots shall be restricted to either paved surfaces or soil stabilized unpaved surfaces only.

MM AQ-1f. Fugitive Dust Management. Venoco shall implement the following measures in accordance with requirements of the Santa Barbara Air Pollution Control District.

- During construction, use water trucks or sprinkler systems to keep all areas of vehicle movement damp enough to prevent dust from leaving the site. At a minimum, this should include wetting down such areas in the late morning and after work is completed for the day. Increased watering frequency should be required whenever the wind speed exceeds 15 mph. Reclaimed water should be used whenever possible. However, reclaimed water should not be used in or around crops for human consumption.
- Minimize amount of disturbed area and reduce on site vehicle speeds to 15 miles per hour or less.
- If importation, exportation and stockpiling of fill material is involved, soil stockpiled for more than two days shall be covered, kept moist, or treated with soil binders to prevent dust generation. Trucks transporting fill material to and from the site shall be tarped from the point of origin.
- Gravel pads shall be installed at all access points to prevent tracking of mud onto public roads.
- After clearing, grading, earth moving or excavation is completed, treat the disturbed area by watering, or revegetating, or by spreading soil binders until the area is paved or otherwise developed so that dust generation will not occur.
- The contractor shall designate a person or persons to monitor the dust control program and to order increased watering, as necessary, to prevent transport of dust offsite. Their duties shall include holiday and weekend periods when work may not be in progress. The name and telephone number of such persons shall be provided to the Air Pollution Control

District prior to land use clearance for map recordation and land use clearance for finish grading of the structure.

Rationale for Mitigation

Construction emissions would be reduced by idling time restrictions, using emission reduction technologies, maintaining equipment in proper working order, compliance with State measures calling for non-road engine standards certifications, fugitive dust control measures, and reducing activity on unpaved surfaces. Particulate filters can reduce NO_x emissions by 1.6 to 18 percent, and PM emissions by 20 to 62.9 percent. Combined use of diesel particulate filters/catalysts are available for certain models of engines and certain model years that can reduce diesel particulate emissions by 25 percent for Level 1 particulate controls, by 50 percent for Level 2 particulate controls (which includes alternative fuels), and by 85 percent for Level 3 particulate controls. Certain diesel particulate catalysts can also reduce NO_x emissions by 25 percent. Use of alternative diesel fuel would reduce NO_x and PM emissions by 14 and 63 percent, respectively, compared to use of conventional diesel (CARB 2001). Full implementation of these measures would ensure Impact AQ-1 remains less than significant.

Impact AQ-2: Increase in Emissions from Operations

The Project would increase fugitive emissions from facilities at Pier 421-2, the EOF, and the pipeline used to transport produced oil (Less than Significant).

Impact Discussion

Project operational emissions would consist primarily of fugitive emissions from piping components, well heads and well cellars at Pier 421-2, as well as valves and other components located along the pipelines used to transport the oil (Table 4.4-6). NO_x is not a pollutant associated with fugitive emissions from component leak paths and therefore would not be emitted from these sources; however NO_x operational emissions from the EOF are currently 10 tons/year and would increase by 0.38 tons/year with increased EOF operations for processing PRC 421 oil (see Appendix D). This would still be below the 25 ton/year threshold for NO_x.

Peak daily emissions are estimated to be well below daily thresholds of significance for all criteria pollutants, and would be less than significant. These emissions would also not reach the annual threshold of significance of 25 tons per year.

Table 4.4-6. Estimated Operational Emissions

	Pounds/Day					Tons/Year				
	NO_x	ROC	CO	SO_x	PM_{10}	NOx	ROC	CO	SO_x	PM_{10}
Fugitive Emissions from Pier[1]	N/A	2.096	-	-	-	N/A ~~0.583~~	0.383	-	-	-
Line 96 Pipeline Increased Throughput[2]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Increased EOF Processing[3]	N/A ~~3.794~~	18.925	20.827	1.795	0.645	N/A ~~0.692~~	3.454	3.801	0.328	0.118
Total	*N/A ~~3.794~~*	*21.021*	*20.827*	*1.795*	*0.645*	*N/A ~~1.275~~*	*3.837*	*3.801*	*0.328*	*0.118*
Significance Thresholds	55	55	NA	NA	80	25	25	25	25	25
Thresholds Exceeded?	No	No	NA	NA	No	No	No	NA	NA	No

[1] Refer to Appendix D for calculations of fugitive emissions.
[2] Because the Line 96 Modification Project EIR (Santa Barbara County 2011) proposes to keep the pipeline full at all times, the 3.6% increase in Project throughput would not be expected to increase fugitive pipeline emissions.
[3] Based on increase of 150 barrels of oil per day (BOPD) from current operations at EOF as described in the Line 96 Modification Project Final EIR (Santa Barbara County 2011). Assumes increase in fugitive emissions would be linear with increased volume, which likely produces conservatively high estimates.

Mitigation Measures

None required.

Impact AQ-3: Odor Emissions from Operation

The Project could potentially result in increased nuisance odor events (Less than Significant).

Impact Discussion

Releases of odorous compounds such as H_2S or petroleum gases could create nuisance odors affecting adjacent areas used for recreation, and residential areas within 0.6 mile and a school within 0.8 mile of the Project site. The potential for increased odors from the introduction of PRC 421 crude oil into the Line 96 pipeline would be minimal because the PRC 421 oil would represent only 3.61 percent of the total oil transported through the pipeline, most of which is from Platform Holly, which produces approximately 4,000 barrels of oil per day (BOPD) (City of Goleta 2013).[9] Odor nuisance due to increased venting resulting from mixing oils of different vapor pressures is expected to minimally add to existing odors from oil well operation. Potential oil spills could create objectionable odors due to evaporation of odorous compounds from the spilled oil surface. However, oil produced from the PRC 421 is sweet and low in sulfur

[9] Estimate is based on an estimated instantaneous production from PRC 421 not exceeding 500 BOPD and an average 150 BOPD for the first 2 years, dropping to 50 BOPD after this initial period.

content, thus odors from the Project due to H_2S are anticipated to be minimal. Any increase in odorous compounds releases would be a significant impact as it would violate APCD Rule 303.

Mitigation Measures

None required.

Impact AQ-4: Project Would Result in a Net Increase in GHG Emissions

Project oil and gas production and drilling and construction would increase GHG emissions. (Less than Significant with Mitigation)

The Project would generate emissions of GHGs that are known to contribute to global climate change. The majority of Project GHG emissions would be CO_2, and Project construction would directly contribute approximately 78 metric tons of CO_2e to the atmosphere (Appendix D). Operational GHG emissions from the Project would be limited to fugitive emissions from valves and fittings, and indirect emissions related to electricity consumption for pumping of produced oil (Table 4.4-7).

The Project would also contribute to current supplies of oil and gas in California. Based on 421 production estimates of 150 BOPD in the first month, a linear rate of decline from 150 to 50 BOPD in the first 2 years, and leveling off at 50 BOPD over the next 18 years, approximately 402,000 barrels would be produced over the Project lifetime.

Table 4.4-7. Estimated GHG Emissions from Project Operation

	Estimated GHG Emissions (metric tons CO_2e[1] per year)
Fugitive Emissions from Line 96 related to additional PRC 421 oil[2]	2.1
Fugitive Emissions from Pier 421-2[3]	8.0
Indirect Emissions from Electricity Consumption for Oil Pumping[4]	157.3
Total	*167.4*

[1] CO_2 equivalents, which provide a summary of all GHGs, taking into account their relative global warming potential. Refer to Appendix D for details.

[2] Because the Line 96 pipeline is typically filled with oil (and thus producing fugitive emissions through leak paths), additional PRC 421 production would have little effect on fugitive emissions from the pipelines. However, for a conservative analysis the Project's proportional share of fugitive emissions from the pipelines has been included.

[3] Fugitive emissions for Pier 421-2 operation was calculated based on the number of valves and connections estimated by Venoco to be required, and factors for leakage of valve and connections from SBCAPCD permitting of the EOF.

[4] GHG emissions from pipeline transportation were estimated based on the projected electricity consumption of 2.94 gigawatt-hours per year identified in the Line 96 Modification Project EIR (Santa Barbara County 2011), and correspond to pipeline transportation to the tie-in with the PAAPLP Coastal Pipeline. The number presented is the Project share of pipeline transport at the average monthly output expected during the highest production rates at the commencement of production (i.e., 150 BOPD for a maximum of 3.61 percent of total transport in the first year).

As discussed in Section 4.14, Energy and Mineral Resources, California's oil refineries processed approximately 618,999,000 barrels of crude oil into a variety of products in

2012. The total amount of oil produced over the production period of the Project represents less than 0.01 percent (approximately 0.0003 percent at peak year production) when compared to California supplies in 2012 (618,999,000 barrels). This is a nominal amount of production compared to California's existing oil and gas supplies and would incrementally contribute to the current supply of oil and gas.

Based on CO_2 emission factors from the U.S. EPA (2013), end uses of the estimated total oil produced from the Project (402,000 barrels) could potentially produce a total of approximately 190,545 tons (0.17 $MMTCO_2e$). See Appendix D for CO_2 emissions by oil product per barrel. Lifetime emissions from the refined oil produced from PRC 421 represent less than 0.04 percent of the 451.6 $MMTCO_2e$ GHG emissions produced in California in 2010 (CARB 2013). This is a gross estimate of GHG emissions from the eventual use of refined oil generated by the Project. Determining the exact products yielded and emission comparisons from oil produced from PRC 421 is speculative and subject to change depending on the refineries processing the oil, the CO_2 emissions from varying fuel products, and the varying sources consuming such products. As provided above, this Project would incrementally contribute to the current demand and consumption for oil and gas; however, it is too speculative at this time to conclude the Project would have any overall net changes in GHG emissions from the end use of such products. The CSLC has no control over the ultimate end products that may be produced from the oil from recommissioning PRC 421 and no authority to regulate GHG emissions from the use of such products.

Presently there are no State or Federal thresholds for GHG emissions. Subsequent to the adoption of AB 32, there was little regulatory guidance with regard to analyzing GHG emission impacts in CEQA-compliant documents. The State Office of Planning and Research promulgated new regulations on March 18, 2010, amending the State CEQA Guidelines to address evaluation of GHG emissions in CEQA documents. Although the new regulations do not require lead agencies to adopt significance thresholds with respect to GHG emissions, they do require lead agencies to determine the significance of such emissions-based data. Currently the Santa Barbara County APCD is proposing updates to their Environmental Review Guidelines to include guidance for evaluating the significance of the impacts of GHG emissions from new or modified stationary sources; however, as of the publication of this EIR there are no County thresholds for GHG emissions from projects. Until such time the Santa Barbara County APCD establishes GHG thresholds, the threshold of "zero net increase" for GHG emissions recommended by CSLC staff would require mitigation and would be less than significant with implementation of MM AQ-4.

Mitigation Measures

The production of GHG emissions from Project construction would be reduced by the implementation of MM AQ-1a through MM AQ-1e. GHG emissions from Project operations would be mitigated by the following MM:

MM AQ-4 Greenhouse Gas Monitoring and Reduction Strategies. The Applicant shall be required to quantify and report annually the greenhouse gas (GHG) emissions associated with Project operations using methodologies prescribed for the California Climate Action Registry General Reporting Protocol, the California Air Resources Board (CARB) Compendium of Emission Factors and Methods to Support Mandatory Reporting of Greenhouse Gas Emissions (CCAR 2009, CARB 2007c) and the U.S. Environmental Protection Agency (EPA) Mandatory Reporting of Greenhouse Gases annual reports. Copies shall be provided to the California State Lands Commission (CSLC) and Santa Barbara County Air Pollution Control District (APCD) staffs, including a reporting of all mitigation measures applied. In addition, Venoco shall prepare and submit a GHG emission reduction program to CSLC staff for review and approval prior to ~~issuance of the Land Use Permit~~commencement of construction. Venoco shall ~~implement the approved GHG emission reduction program~~ detail specific measures to reduce net GHG emissions to zero on an annual basis over the life of the Project. Annual updates shall specify any changes in such measures required to meet targeted reductions. The following measures, or their equivalent, shall be used individually or in combination to achieve such reductions:

- On-site increased equipment efficiencies or operational modifications such as using more efficient de-watering systems at the EOF or other measures to reduce the need for crude heating;
- Implementation of off-site GHG reduction programs in Santa Barbara County as approved by the APCD; and/or
- Purchase of "credits" ~~from a source~~ or offsets through existing adopted plan or mitigation program such as CARB's Cap-and-Trade program or Climate Action Reserve, the City of Goleta's Climate Action Plan, or other equivalent approved or certified program that is verified by the CSLC staff or CARB.

Rationale for Mitigation

This measure implements the requirements of Section 15126.4, subdivision (a), of the State CEQA Guidelines regarding GHG emissions. Consistent with these Guidelines, this measure would allow for:

- Funding of measures in an existing adopted plan or mitigation program designed to reduce GHG emissions. These Plans include CARB's Cap-and-Trade program or Climate Action Reserve, the City of Goleta's Climate Action Plan or other equivalent approved or certified program.

- Reductions in emissions resulting from the Project through implementation of project features such as improvements in efficiency.
- Annual monitoring and reporting of GHG emissions and required reduction measures.

MM AQ-4 requires the annual quantification of GHG emissions (already required by State mandatory GHG reporting programs pursuant to Cal. Code Regs., tit. 17, § 95101 and AB 32 California cap-and-trade programs under AB 32 [Cal. Code Regs., tit. 17, § 95802]) to determine the level of reductions needed each year. This EIR estimates a reasonable worst-case level of GHG emissions during the peak year of operations (with peak gas and crude production levels as described in Section 2, Project Description). Most years, GHG emissions would be less than that tabulated in this document.

The GHG emissions increases are estimated to be above the threshold applied in this evaluation. If emissions levels exceed thresholds, implementation of reduction measures is required to reduce these emissions to levels below the thresholds. As the future operational characteristics of the processes cannot be exactly defined, GHG emission reduction requirements would be determined each year. For example, the crude oil/emulsion mix from the PRC 421 will vary over its productive life and will require varying levels of heating during processing.

Although there is uncertainty with the absence of APCD regulatory requirements to control GHG emissions and the exact levels of efficiency improvements that could be implemented at the EOF, the emissions reductions that may be needed are not substantial and could be achieved with onsite operational efficiency improvements. For example, GHG reductions could be achieved by using high efficiency emulsion heaters to replace the existing heater treaters. Reductions of more than 200 MT CO_2e could be achieved depending on the heater design. In the absence of other onsite measures, the Applicant could also obtain off-site offsets or aid off-site GHG reduction projects to reduce GHG emissions to the zero threshold through reductions in emissions at other facilities, or by purchasing “credits” from the California Climate Action Reserve or California’s Cap-and-Trade Program.

The incorporation of State accredited programs, such as Climate Action Reserve and Cap-and-Trade and local adopted GHG reduction programs listed under the City of Goleta Climate Action Plan, provide several options for the Project GHG reduction program to achieve targets. The Applicant may choose to incorporate the following State-accredited programs or local GHG reduction strategies into the GHG reduction program:

- The Cap-and-Trade program administrated by CARB is a statewide initiative to achieve the requirements set by AB 32. It establishes market-based GHG regulation, establishing a price on carbon emissions, and sets a firm annual cap

on these emissions. Subsequently the cap will decline three percent per year. Further details on the Cap-and-Trade program may be found at http://www.arb.ca.gov/cc/capandtrade/capandtrade.htm.

- The Climate Action Reserve establishes standards for carbon offset projects, oversees independent third-party verification bodies, issues carbon credits generated from projects and tracks the transaction of credits in a transparent, publicly-accessible system. Further information may be found at http://www.climateactionreserve.org/.
- The City of Goleta Climate Action Plan identifies various measures to effectively meet GHG reduction targets outlined in AB 32. These include a number of City-aided outreach programs that may be selected for the funding of off-site mitigation projects. The City of Goleta Climate Action Plan is available online at http://www.projectgoleta.com/wp-content/uploads/2014/06/COG-Final-Climate-Action-Plan.pdf

Therefore, impacts would be less than significant with mitigation.

Table 4.4-8. Summary of Air Quality Impacts and Mitigation Measures

Impact	Mitigation Measures
AQ-1: Increase in Emissions from Construction	**AQ-1a.** Prohibit Unnecessary Truck Idling. **AQ-1b.** Use of Diesel Emission Reduction Measures. **AQ-1c.** Maintain Construction Equipment. **AQ-1d.** Compliance with State Portable Air Toxics Control Measure. **AQ-1e.** Establish On-Site Equipment Staging Area and Worker Parking Lots. **AQ-1f.** Fugitive Dust Management
AQ-2: Increase in Emissions from Operation	None required.
AQ-3: Odor Emissions from Operation	None required.
AQ-4: Project Would Result in a Net Increase in GHG Emissions	**AQ-4.** Greenhouse Gas Monitoring and Reduction Strategies. **AQ-1a.** Prohibit Unnecessary Truck Idling. **AQ-1b.** Use of Diesel Emission Reduction Measures. **AQ-1c.** Maintain Construction Equipment. **AQ-1d.** Compliance with State Portable Air Toxics Control Measure. **AQ-1e.** Establish On-Site Equipment Staging Area and Worker Parking Lots.

4.4.5 Cumulative Impacts Analysis

Project impacts were assessed in conjunction with the projects identified in Table 3-3.

Impact AQ-5: Project Would Contribute to Cumulative Air Quality Impacts

The Project would contribute to the cumulative increase in emissions in Santa Barbara County, which is currently in non-attainment for the State Ambient Air Quality Standards for ozone and PM_{10} (Less than Significant).

Impact Discussion

The Project would contribute to the cumulative increase in emissions in Santa Barbara County, which is currently in non-attainment with California O_3 and PM_{10} standards. However, because Project operational emissions would be limited to fugitive emissions from pipeline valves and joints, this contribution would not be significant. Two coastal oil development projects proposed in Santa Barbara County (see Section 3, Cumulative Impacts Methodology)—the Venoco Carpinteria Onshore project and Carpinteria Field Redevelopment Project (located about 25 miles and 21 miles southeast of the Project site, respectively)—are individually likely to have significant air quality impacts, along with other residential, commercial, institutional, or recreational projects in the Project area. For example, nearby residential projects could have significant air quality impacts associated with new vehicle trips and any wood-burning (rather than gas-burning) fireplaces. Because the Project would have a negligible contribution to these cumulative impacts, this impact is less than significant. Project operations would also contribute to the cumulative increase in GHG emissions, which would be less than significant with implementation of MM AQ-4 requiring no net increase of GHG emissions. The end uses of the estimated total oil produced from the Project would also cumulatively contribute to GHG emissions. Lifetime emissions from the refined oil produced from PRC 421 represent less than 0.04 percent of the 451.6 $MMTCO_2e$ GHG emissions produced in California in 2010 (CARB 2013). Based on the demand of oil based products, this contribution would come from other sources if not produced from PRC 421.

Mitigation Measures

None required.

4.5 HYDROLOGY, WATER RESOURCES, AND WATER QUALITY

This section addresses potential impacts on marine and freshwater hydrology, water resources, and water quality resulting from recommissioning State Oil and Gas Lease PRC 421 (PRC 421). The environmental setting focuses on the most relevant characteristics of existing marine and onshore water resources in the Project vicinity. Offshore currents, wave action and marine and freshwater quality are important in understanding the effects of a possible accidental release of oil or other hazardous materials on these resources. The impact analysis evaluates the potential effects of the Project, including cumulative impacts, and identifies potential mitigation measures (MMs). This section does not address water use as the Project would only have one-time limited fresh water use for pipeline flushing. This section relies on information from various sources including the National Oceanic and Atmospheric Administration (NOAA), State Water Resources Control Board (SWRCB), Central Coast Regional Water Quality Control Board (RWQCB), Santa Barbara County, and Scripps Institution of Oceanography.

4.5.1 Environmental Setting

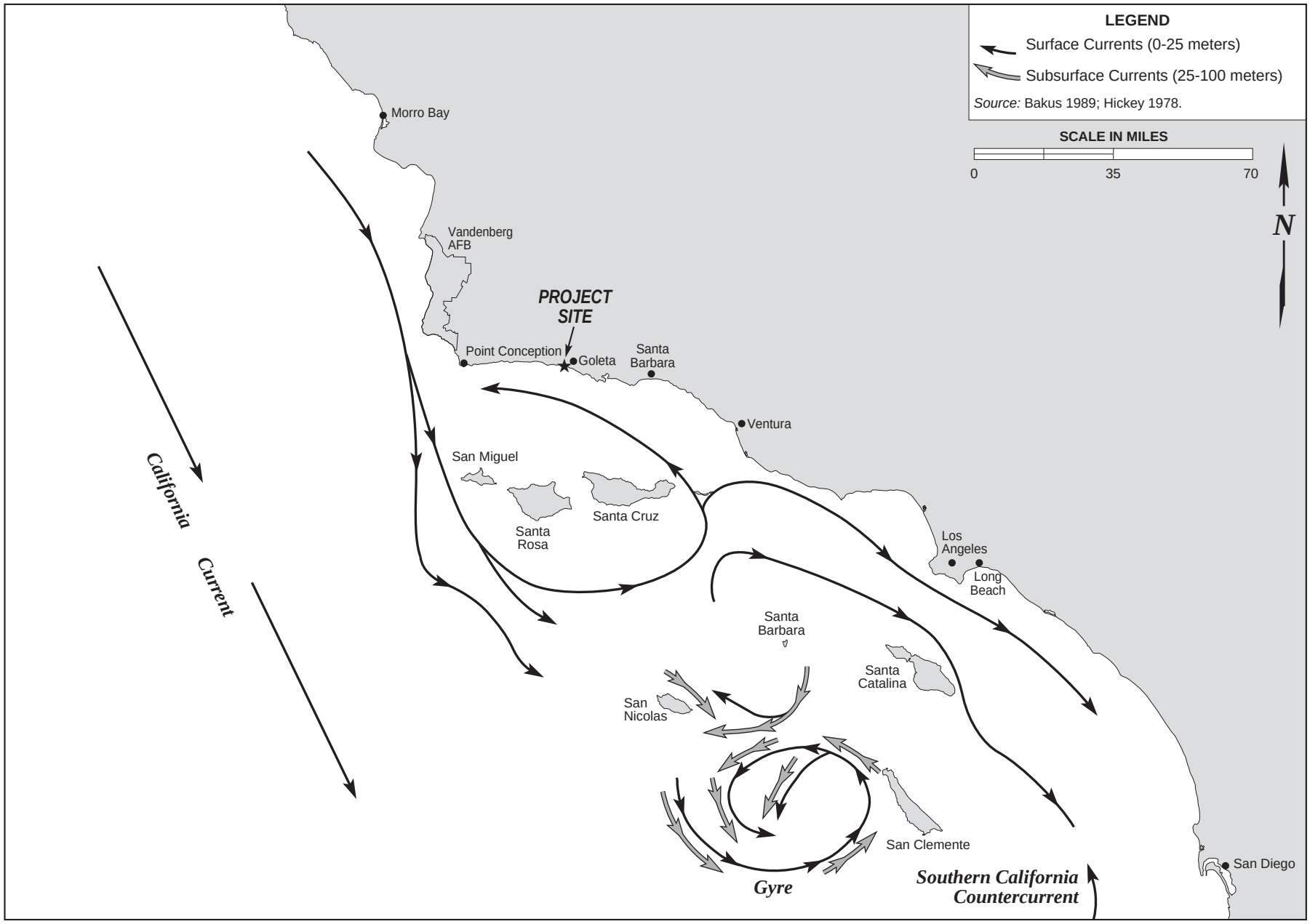
The primary study area for marine and freshwater hydrology, water resources, and water quality includes the nearshore marine environment in the Project vicinity, Bell Canyon and Tecolote Creeks to the northwest, and Devereux Creek to the southeast. The secondary study area includes the waters of the Santa Barbara Channel, the greater Southern California Bight, and the drainages that are located along the Line 96 pipeline to Las Flores Canyon (LFC).

Marine Environment

Regional Oceanographic Processes

The Project site is located along the landward edge of Santa Barbara Channel, near the western edge of the City of Goleta, along an area known as the Ellwood Coast. Major currents in the Project vicinity include the California Current, which dominates, and the Southern California countercurrent that flows northward along the continental shelf (Figure 4.5-1).

The California Current is an eastern-boundary current that flows south, carrying cool, nutrient-rich water from the sub-arctic region of the Pacific (DiGiacamo et al. 1995). Waters in the California Current are characterized by seasonably stable, low salinity (32 to 34 parts per thousand [ppt]), low temperature (55 to 68 °Fahrenheit [°F]), and high nutrient concentrations.



Ocean Current System in the Project Vicinity

FIGURE 4.5-1

The Southern California countercurrent carries warm, saline, and less oxygenated waters from Baja California into the Channel. Typically, winds blow from the northwest, parallel to the central California coast. The Southern California countercurrent is strongest when these winds relax between the months of December and February. When the winds gain strength between March and June, the Southern California countercurrent relaxes and surface water near the coast is transported offshore and down the coast and replaced by cooler, nutrient-rich seawater from underneath. This process is referred to as upwelling.

Surface and Subsurface Flows in the Santa Barbara Channel

The mean flows of surface waters within the Channel are counter-clockwise and monthly average flows reach 3 knots (nautical miles [nm] per hour) during most of the year (Winnant et al. 1999). However, currents and surface transport are highly complex within the Channel and are affected by periodic winds, coastal promontories, and subsurface bathymetric features. Subsurface currents are important in determining the fate of oil and other contaminants that may be released. Average monthly current profiles in the Channel are often strongly sheared and rotate in a counter-clockwise direction as depth increases. Average flow speed of subsurface flows increases with depth throughout the majority of the year. The exception is during the late fall when the surface flows intensify and become comparable to the speed of subsurface flows (CSLC 2009; NOAA 2005).

Local Wave Action

Waves generated on the surface of the ocean develop from a mixture of remotely generated ocean swells and local winds. Due to the presence of the Channel Islands off the coast, the Santa Barbara Channel is comparatively sheltered from swells generated outside the Channel; consequently, wave heights within the Channel are typically low, generally ranging from three to six feet throughout most of the year. Waves are typically larger during winter storms that encroach on the California coastline from the west, although the coastline is sheltered from North Pacific swells by Point Conception (CSLC 2009). However, large swells from winter and fall storms occasionally penetrate into the Channel and create high surf conditions along the coast. For example, El Niño conditions in 1983 generated very large surf, which combined with exceptionally high tides to cause extensive damage along normally calm sections of the coastline within the Channel. More recently, storms in the winter of 2005 to 2006 generated very high surf along the Goleta coast, with wave heights exceeding 15 feet at exposed point breaks (NOAA 2005).

Waves land on the mainland shore of the Channel at a slightly oblique angle, generally from the west. This drives a long-shore current toward the east within the surf zone (Hickey 1993). As a result, the net transport of particulates suspended in the water

column near shore is toward the east, in contrast to the typically westward transport that is observed farther offshore.

Marine Water Quality

Marine water quality is affected by a number of factors including oceanographic processes, contaminant discharge, erosion, and freshwater inflow. Petroleum development activities, commercial and recreational vessels, natural hydrocarbon seeps, river runoff, municipal wastewater outfalls, and minor industrial outfalls contribute to the increased presence of nutrients, trace metals, synthetic organic contaminants, and pathogens in ocean waters and sediments.

The presence and transport of nutrients, trace metals, and other contaminants in marine water affect and are affected by five seawater properties: temperature, salinity, turbidity, alkalinity, and dissolved oxygen. Vertical profiles of water quality properties measured in the Channel between 1999 and 2001 are displayed in Figure 4.5-2.

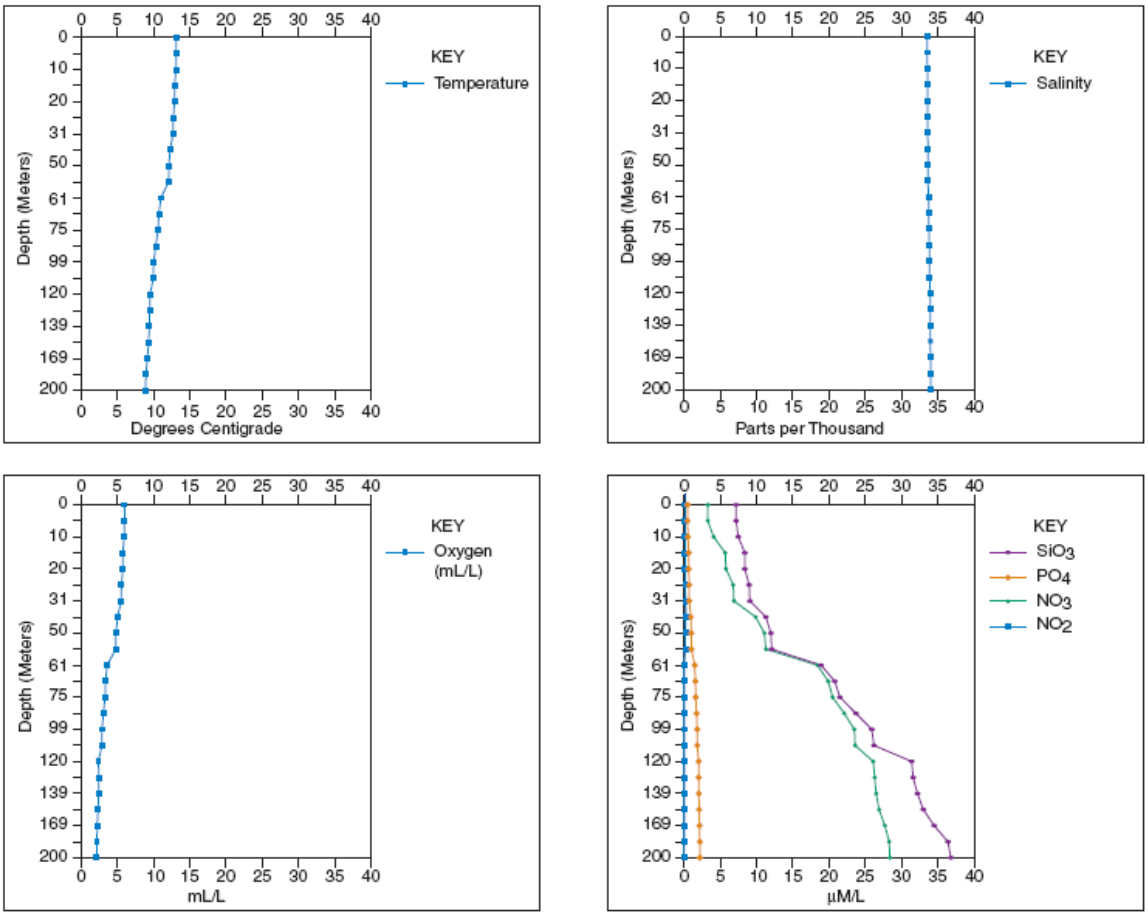


FIGURE 4.5-2. VERTICAL PROFILES OF WATER QUALITY PROPERTIES IN THE SANTA BARBARA CHANNEL

Source: Scripps Institution of Oceanography 2000.

The vertical density structure or stratification (determined by temperature and salinity at increasing depths within the water column) determines the amount of vertical mixing that occurs within the water column. Highly stratified waters inhibit vertical mixing of water, nutrients, and contaminants. Therefore, a contaminant introduced by a point source (e.g., a leak in a pipeline at a specific depth) would remain within the water column and would not rapidly rise to the ocean surface or sink into the bottom sediments. In the winter and spring, the Channel is characterized by cold, high nutrient surface water, and a shallow thermocline (i.e., highly stratified). In the summer and fall the Channel is characterized by warm, low nutrient surface water, and a deep thermocline (i.e., highly mixed) (Santa Barbara Long-Term Ecological Research Program 2003).

Within the mixed surface waters, dissolved oxygen levels are uniformly high and near saturation. This layer is known as the euphotic zone due to the penetration of light in this zone. Correspondingly, nitrate and phosphate are depleted in the surface mixed layer due to uptake by primary production (phytoplankton blooms) in the euphotic zone. Wind-driven upwelling, which periodically replenishes surface waters with nutrient-rich water from below, is an important feature of the Channel and is largely responsible for its productive fishery. The presence of nutrient-rich water (high levels of nitrates and phosphates) near the sea surface significantly enhances primary productivity. Below the surface, oxygen concentrations steadily decrease with depth due to losses from respiration and decomposition (CSLC 2009). Turbidity in the euphotic zone is determined by the concentration of suspended particulate matter (PM) near the sea surface. Turbidity is increased in coastal waters as a result of storm runoff, sediment re-suspension, discharge of wastewater, and phytoplankton blooms.

Trace Metals

Ambient trace metal concentrations in the water column typically occur at levels below the detection limit of standard analytical methods. Therefore, to measure such contaminants in seawater, resident California mussels (*Mytilus californianus*) are used as indicator organisms to indirectly monitor water quality. Mussels accumulate contaminants directly from the seawater and ingested food. Measuring the level of concentrated contaminants in mussels in samples over specific periods of time provides a measure of the concentration of contaminants in the water column over time.

The State Mussel Watch Program (run by the SWRCB) has been monitoring the concentration of contaminants in mussels since 1971 and provides a long-term indication of the ambient level of trace metals along the California coast. The objective of this program is to examine trends in trace metals along the coast of California and identify areas where spikes in certain metals occur (SWRCB 2004). Trace metal concentrations at the nearest sampling location to the Project site, Santa Barbara

Harbor, were higher than the average concentration of trace metals at all sampling locations in the Channel with the exception of silver, arsenic, nickel, and selenium.

Petroleum Hydrocarbons

Petroleum hydrocarbons are organic contaminants that enter the ocean both naturally and as the result of human error (i.e., oil spills). The principal sources of petroleum hydrocarbons in the Channel include:

- Urban runoff of road material, auto exhaust, lubricating oils, gasoline, diesel fuel, and tire particles;
- Produced-water discharges;
- Atmospheric deposition from the combustion of fossil fuels;
- Vessel leaks, spills, and exhaust;
- Leaching of creosote from wooden pilings;
- Oil and grease contained in municipal sewage effluent; and
- Natural oil seeps.

Natural seeps found along the coasts of Santa Barbara and Ventura counties discharge significant quantities of oil and tar to the near-shore waters of the Channel. Studies conducted in the late 1970s found that between 16,000 and 240,000 barrels of oil enter the Channel annually from natural seeps. Further, the Western States Petroleum Association estimates 150 to 170 barrels of oil seep from the sea floor near Coal Oil Point (approximately 5 miles southeast of the Project area) each day (Helix 2006). Consequently, the intertidal zone at Goleta, particularly along the Ellwood Coast in the Project vicinity, frequently experiences naturally occurring oil and tar from the Coal Oil Point Seep.

Generally, oil entering the ocean naturally through seeps does not severely degrade open ocean water quality. Oil spills cause the most degradation to water quality during and for a few weeks after each spill. Most components of crude oil are not soluble in seawater and float on the sea surface; therefore, impacts to the water column are limited. In addition, aromatic hydrocarbons, such as benzene and toluene, which are considered the most toxic to marine life, evaporate quickly after a spill. Other weathering processes, such as spreading, dissolution, dispersion, emulsification, photochemical oxidation, and microbial degradation, decrease the volume of the oil slick and increase the viscosity (thickness) of the spilled oil. Consequently, mortality of marine organisms resulting from the physical effects of smothering and coating is the greatest concern. However, toxicological effects from exposure to aromatic hydrocarbons can be significant if unweathered oil reaches the shoreline, particularly in

areas with rocky shorelines, enclosed embayments, estuaries, and wetlands. These impacts are discussed further in Section 4.6, Marine Biological Resources.

Aquatic Environment

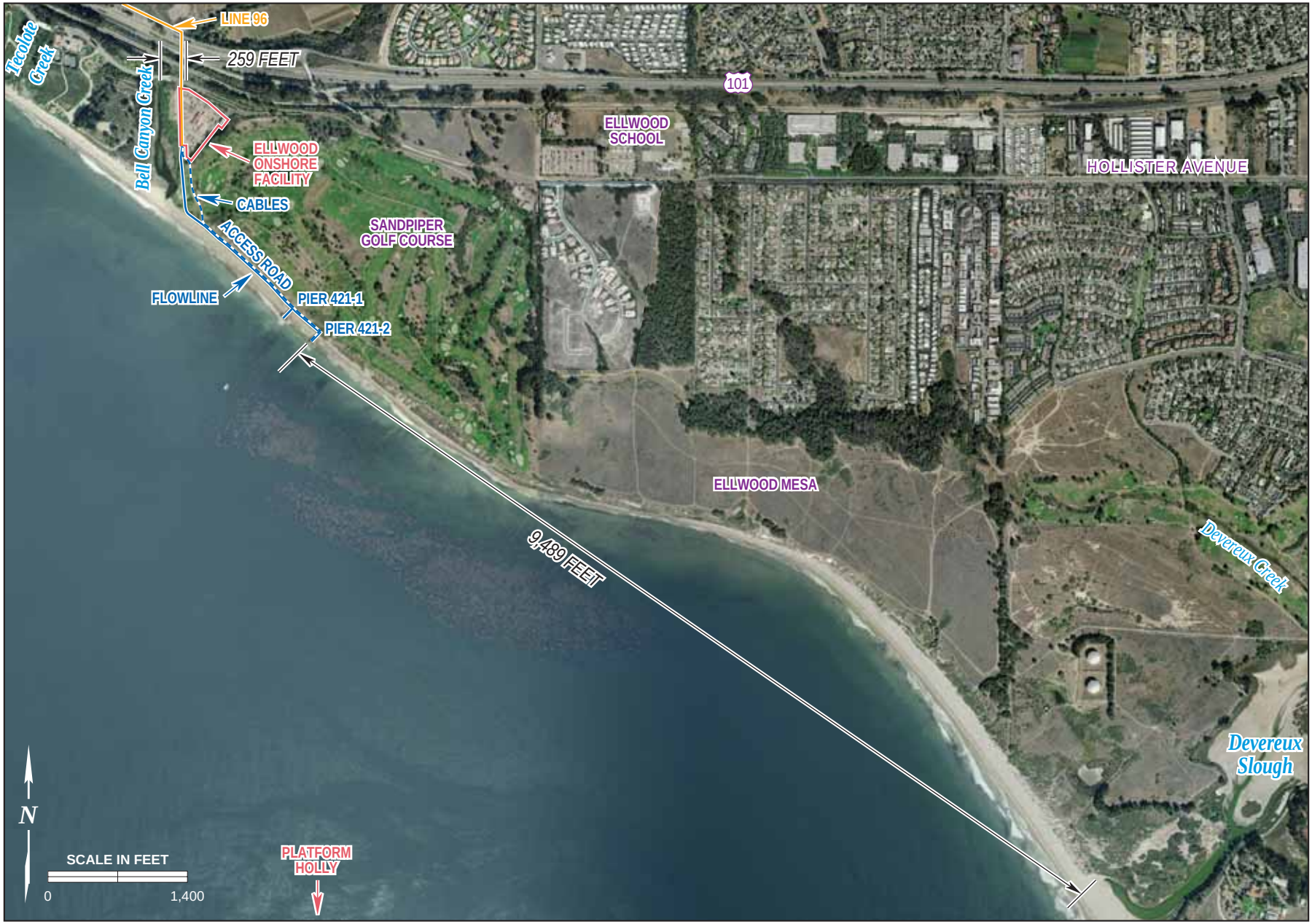
Surface Water

Primary Project components are situated in the surf zone, near shore areas and on low-lying coastal areas immediately inland from the beach. The nearest drainages to the Project area are Bell Canyon and Tecolote Creeks to the northwest and Devereux Creek to the southeast. Bell Canyon and Tecolote Creeks drain primarily rural and agricultural areas northwest of the urban areas of the City of Goleta and discharge into lagoons at the west of the Project site. Devereux Creek drains a largely urbanized watershed, which encompasses the western portions of the City of Goleta, and empties into the Devereux Slough located approximately 1.8 miles southeast of the Project area. Runoff from the inland portions of the Project site could potentially drain into Bell Canyon Creek (Figure 4.5-3).

Four wetlands are located near the Project site: Bell Canyon Creek and three wetland areas that are supported by seeps located along the toe of the bluff adjacent to the Project access road. The largest (approximately 5,440 square feet) and most diverse of the three seep-related wetlands is located east of the access road terminus and Well 421-2. The dominant species in all of these seep-related wetland areas is saltgrass (*Distichlis spicata*), and the surface waters present in at least the larger seep-related wetland are sufficient to support breeding populations of Pacific tree frogs (*Pseudacris regilla*) and western toads (*Anaxyrus boreas*), and as habitat for avian species.

Water Quality

The SWRCB (2010) has listed Bell Canyon Creek as impaired for nitrates under their 303d listing program. Water quality sampling was performed during storm events in Bell Canyon, Tecolote, and Devereux Creeks as part of the countywide “Project Clean Water” program until 2002. The most recent Project Clean Water quality analysis report that includes data for these creeks is for rain year 2001 to 2002. During this rain year, both Bell Canyon and Devereux Creeks exceeded the maximum contaminant standards for copper, mercury, and zinc. Tecolote Creek also exceeded the standard for copper and zinc, but not mercury. In addition, Bell Canyon and Tecolote Creeks exceeded the maximum diazinon standard and Devereux and Tecolote Creeks exceeded the maximum standard for chlorpyrifos. Tecolote Creek also exceeded the maximum standard for malathion. Oil and grease, and total petroleum hydrocarbon (TPH), were not detected in any of the samples for either of these creeks (Santa Barbara County 2002).



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Surface Water Resources [Revised]

FIGURE 4.5-3

Water quality data collected during two prior rain years (1999 to 2000 and 2000 to 2001) were similar to 2001 to 2002 data. During the 2000-2001 rain year, both Bell Canyon and Devereux Creeks exceeded the standard for copper, mercury and zinc, while Tecolote Creek only exceeded the standard for copper and zinc. Similarly, all three creeks exceeded the standard for diazinon. In addition, Bell Canyon and Tecolote Creeks exceeded the standard for chloropyrifos. Tecolote Creek also exceeded the standard for malathion. Oil and grease and TPH were not detected in any of the samples for these creeks (Santa Barbara County 2001). Water quality sampling during the 1999 to 2000 rain year detected oil and grease and TPH during one sampling event of Bell Canyon Creek. In addition, all three creeks exceeded the standard for copper, lead, and zinc. Bell Canyon Creek also exceeded the standards for arsenic, chromium, diazinon and malathion (Santa Barbara County 2000).

Groundwater

The Project area is adjacent to the West Subbasin of the Goleta Groundwater Basin. This underground reservoir is considered hydrologically separate from the North and Central Subbasins of the Goleta Groundwater Basin. Available storage in the West Basin is estimated to be 7,000 acre-feet (af). Based on the most recent analysis, the West Subbasin is in a state of surplus. However, water in this subbasin is considered poor quality and low yield, but is classified as beneficial use drinking water by the RWQCB under the *Water Quality Control Plan for the Central Coastal Region* (Central Coast Basin Plan) (Santa Barbara County 2005).

4.5.2 Regulatory Setting

Federal and State laws, regulations, and policies related to this issue area are discussed in Table 4.0-1;e local laws, regulations, and policies are discussed below.

Local

Santa Barbara County Fire Department (SBCFD)

As noted in Sections 4.1, Geological Resources, and 4.2, Safety, the SBCFD is the overseeing agency for implementing local regulations in the event of a hazardous waste or petroleum spill.

Project Clean Water

The Santa Barbara County Water Agency, Project Clean Water was established to reduce or eliminate discharges of pollution into creeks, rivers, ponds, or ocean waters, through implementation of National Pollutant Discharge Elimination System (NPDES) permit requirements and applicable regulations. This agency completes storm water sampling at select locations throughout the county. The County Water Agency is

currently in the process of adopting provisions of the Storm Water Phase II Final Rule, which requires the operator of a regulated small municipal separate storm sewer system (MS4) to obtain NPDES permit coverage because discharges of storm water from such systems are considered point sources.

City of Goleta General Plan/Coastal Land Use Plan (GP/CLUP)

The City of Goleta adopted its GP/CLUP in November 2006. Included as part of its plan are the policies of the California Coastal Act. GP/CLUP policies relevant to the Project are described below:

- Land Use Policy 10.4(b) – If resumption of production is considered for approval for PRC 421, on-pier processing of the oil at a site within the tidal zone should not be approved unless it is demonstrated that there is no feasible and less environmentally damaging alternative to processing on the pier. The development of new processing facilities over the ocean would result in an increased level of risk of environmental damage.
- Policy CE 2 – Preserve, restore, and enhance the physical and biological integrity of Goleta's creeks and natural drainages and their associated riparian and creekside habitats.
- Conservation Guiding Principle 5 – Protect water quality and the biological diversity of Goleta Slough and Devereux Slough.
- Conservation Guiding Principle 9 – Manage water resources at the watershed level cooperatively with other agencies to maintain high groundwater and surface water quality and to protect marine aquatic habitats.
- Policy CE 6 – Preserve and protect the biological integrity of marine habitats and resources within and adjacent to Goleta.
- Policy CE 10 – Manage groundwater and surface water resources to promote water quality and quantity adequate to support natural ecosystem processes and functions.

4.5.3 Significance Criteria

Impacts to water quality would be considered significant if:

- Contaminant concentrations within the Channel Islands National Marine Sanctuary (CINMS) or within Santa Barbara Channel coastal wetlands measurably increase relative to background concentrations;
- Water quality objectives contained in the Central Coast Basin Plan are violated;
- Water quality objectives contained in the *California Ocean Plan* are violated;
- Water quality criteria in the Proposed California Toxics Rule are violated;

- Project operations or discharges that change background levels of chemical and physical constituents or elevate turbidity producing long-term changes in the receiving environment of the site, area, or region, thereby impairing the beneficial uses of the receiving water occur; or
- Contaminant levels in the water column are increased to levels with the potential to cause harm to marine organisms even if the levels do not exceed formal objectives in the Central Coast Basin Plan or *California Ocean Plan*.

4.5.4 Impacts Analysis and Mitigation

Erosion and sedimentation from short-term construction activities, including trenching for installation of two electrical cables and repair of the 6-inch line beneath the existing access road, could adversely affect surface water quality in Bell Canyon Creek. However, impacts would be reduced through the employment of standard erosion and sediment control Best Management Practices (BMPs) that would be outlined in the Erosion and Sediment Control Plan, required by the City of Goleta Grading Ordinance, including watering of disturbed soils, silt fences, and temporary sediment barriers. In addition, Venoco would be required to develop a Storm Water Pollution Prevention Plan (SWPPP) for construction activities and obtain a General Construction Permit from the SWRCB, which would prevent contaminated runoff from the construction site, which could contain trace metals or small amounts of petroleum hydrocarbons, from entering Bell Canyon Creek. Further, as construction would last for approximately 45 days; impacts to surface water quality would be short-term and less than significant.

However, the Project would incrementally increase the potential for an accidental release of limited amounts of crude oil to the marine environment. Analyses of risk presented in Section 4.2, Safety, indicate the limited possibility of a release of crude oil into the marine environment, including a potential for undetected slow leaks. In addition, resuming production and prolonging the life of the aging caisson on Pier 421-2 could increase the potential for a release of contaminated sediment to affect water quality (see Section 4.3, Hazardous Materials).

Table 4.5-1, located at the end of Section 4.5.4, provides a summary of water-related impacts and recommended MMs to address these impacts.

Impact WQ-1: Temporary Construction Impacts to Marine Water Quality

Short-term construction activities along the access road and seawall, and in the surf zone could adversely affect marine water quality (Less than Significant with Mitigation).

Impact Discussion

With completion of the recent emergency repairs to the seaward-facing wall of the caisson at Pier 421-2, construction activities on the beach and within the surf zone would be limited, but may include use of vehicles and other construction equipment on the beach for seawall repair, pipeline construction support, and Pier 421-2 improvements. Additionally, decommissioning activities at Pier 421-1—which would include grading and excavation to remove the caisson, pier and piles—and reinforcement of the seawall along the access road would disturb material in and adjacent to the surf zone.

Potential environmental concern associated with excavation within the surf zone is that potentially contaminated sediments would be exposed or contaminants would be mobilized through pore water movement to the biologically active zone or overlying water column. While disturbance of sediment can increase turbidity (suspended sediments) in the water column, these effects would be temporary (for the duration of any construction activities) and confined to the immediate Project vicinity. Further, activity would occur within the active surf zone, a naturally turbid area within the ocean environment. Proposed construction activities would disturb sand along the surf zone; however, these sediments would be expected to settle rapidly and would not create extensive turbidity plumes. Therefore, the potential increase in suspended sediments during construction would result in a less than significant temporary impact**.**

In addition to potential turbidity, construction activities on the beach and within the surf zone could release contaminated mud and sand from the caissons and underlying soil to the ocean. Repair activities conducted on the Well 421-1 caissons detected two leaks in the caisson wall which were sampled for contaminants. Results of chemical analyses performed on mud and sand within the caisson revealed the presence of TPH at levels of 100 to 200 parts per million (ppm). Tests for benzene, toluene, ethylbenzene, xylenes, and short-chain hydrocarbons resulted in non-detectable results. In addition, hydrocarbons were detected in the soil surrounding the piers at a depth of 15 feet below ground. Further, analytical sampling conducted in October 2006 on water from the caissons detected trace amounts of arsenic, mercury, and selenium; all amounts were below water quality threshold levels. The potential release of hydrocarbon contaminated sand from subsurface soil and rock soil into the surf zone is would be subject to feasible mitigation as discussed below, and would be less than significant with mitigation.

Mitigation Measures

In addition to the implementation of MM HAZ-1a through HAZ-1d, the following MMs would apply.

MM WQ-1a. Avoidance of High Tides and Silt Curtain. Venoco shall schedule in-water construction efforts to avoid times of high tides (defined herein as tides greater than +5 feet as predicted by the National Oceanic and Atmospheric Administration). Prior to implementation of any in-water construction, affected sediments shall be tested for the presence of hydrocarbons and trace metals. Any potentially contaminated sediment which may be disturbed during caisson repairs would be contained within the Project area for off-site disposal at an appropriate waste facility, and disposed of according to State and Federal regulation. Regardless of the presence of contaminated sediment, Venoco shall install measures to reduce siltation of the nearshore marine environment during in-water construction, potentially including but not limited to a silt curtain, installation of sheet piling, and/ or soil removal techniques such as hydro-displacement and weighted floating. Venoco shall prepare a plan to monitor the performance of the adopted measure and identify thresholds for localized turbidity to ensure that they are performing as expected and not impairing water quality. If it is found that turbidity threshold values are being repeatedly exceeded, construction activities shall be temporarily halted until a better capture solution is implemented. Additionally, in order to protect spawning endangered species, monitoring should occur to ensure that a turbidity plume from construction in the marine environment does not reach the mouth of Bell Creek or Tecolote Creek and that turbidity in the lagoon does not increase as a result of construction activities. If a plume reaches the mouth of the lagoon, construction should be halted until turbidity returns to normal levels.

MM WQ-1b. Water Quality Certification. Venoco shall complete and implement a Spill Prevention, Control and Countermeasures (SPCC) Plan and implement any additional MMs mandated by the State Water Resources Control Board (SWRCB) through the Section 401 water quality certification process.

Rationale for Mitigation

Implementation of the MMs above would reduce potential water quality impacts to below State thresholds. Removal of contaminated sediments from construction zones prior to implementing the decommissioning and removal of Pier 421-1 and any additional required in-water construction activities (if possible without impairing the integrity of Pier 421-2) would prevent the release of petroleum hydrocarbons resulting from Project activities. Removal of contaminated sub-soil mobilized during drilling would prevent it from reaching the surf zone. Erection of a silt curtain would reduce the dispersion of contaminated sediments from the soils surrounding the piers into the water column and prevent elevated turbidity levels within the active surf zone. Full implementation of these measures would reduce Impact WQ-1 to less than significant.

Impact WQ-2: Temporary Construction Impacts to Wetlands

Short-term construction activities along the access road and could adversely affect water quality in adjacent wetlands (Less than Significant with Mitigation).

Impact Discussion

Construction activities along the access road may temporarily affect three small wetlands located between the access road and the Sandpiper Golf Course. Such activities include excavation and installation of subsurface cables for power and system control between the Ellwood Onshore Facility (EOF) and Pier 421-2, and extending and upgrading the existing 6-inch line to accommodate one internal 3-inch flowline from Pier 421-2 to the tie-in at the EOF. These activities may result in a disturbance to wetland habitats and associated plant and wildlife species due to trenching, deposition of spoils, and operation of heavy equipment. Additionally, decommissioning and removal of Pier 421-1 would include construction activities that may impact wetlands along the access road when heavy construction machinery is used to remove the well, pier, and caisson at Pier 421-1. Since a wetland delineation has not yet been performed for the Project area, additional wetlands may be present that could be impacted by Project activities.

All wetland areas would be protected with temporary construction fencing to prevent entrance into these areas during construction activities; however, the potential for the Project, including subsequent decommissioning and removal of Pier 421-1, to disturb wetlands would remain. This impact would be less than significant with mitigation.

Mitigation Measures

In addition to the implementation of MM TBIO-1a, TBIO-1b, TBIO-1d, and TBIO-1e described in Section 4.7 Terrestrial Biological Resources, the following MM would apply.

MM WQ-2. Wetland Delineation, Avoidance and Minimization. Venoco shall engage a qualified biologist to conduct a Wetland Delineation and prepare a Wetland Delineation Report, subject to approval and permitting by the City of Goleta, California Department of Fish and Wildlife, Army Corps of Engineers, and California Coastal Commission, to determine the precise location of all wetlands within and in the vicinity of the Project, including the access road, the flow line, the cables, sea wall bulkheads, and riprap sea-walls. The Report shall be reviewed and approved prior to City issuance of the Land Use Permit. Prior to commencement of construction, all wetland areas located within and adjacent to the Project area will be flagged for fencing by a qualified wetland scientist. If wetlands identified in the Wetland Delineation Report cannot be avoided, the Applicant shall consult with appropriate agencies including the City of Goleta, California Department of Fish and Wildlife, California Coastal Commission, and the Regional Water Quality Control Board to design measures to minimize impacts to the wetland and appropriate restoration standards and methods, if necessary following construction.

Rationale for Mitigation

Implementation of MMs WQ-2, TBIO-1a, TBIO-1b, TBIO-1d, and TBIO-1e would reduce short-term construction-related impacts to wetlands by protecting biologically sensitive areas in the immediate Project area, providing for construction supervision, and requiring restoration and enhancement of impacted habitats. After implementation of these MMs, impacts to wetlands from short-term construction activities would be mitigated to a less than significant level.

Impact WQ-3: Oil Spill Impacts to Surface and Marine Water Quality

Accidental discharge of petroleum hydrocarbons into the surf zone from Pier 421-2 and flowline would adversely affect surface or marine water quality (Significant and Unavoidable).

Impact Discussion

Upon Project implementation, oil would be produced at Well 421-2 (which is located in the surf zone) and sent to the EOF via pipeline for processing. Transportation of oil that has been processed at the EOF would be via the Line 96 onshore pipeline, connecting to the Plains All American Pipeline, L.P. (PAAPLP) west of Las Flores Canyon (LFC). The Project thus presents three possible sources of oil spill to marine or surface waters: from Well 421-2, from the flowline to the EOF, and from Line 96.

An accidental release of oil during production at Pier 421-2 could occur from a well casing blow out or from potential wave or seismic damage to the Project caisson, seawall, or pipeline. The maximum amount of oil which could potentially be released during a worst-case oil spill from Well 421-2 is 1.7 barrels (see Section 4.2, Safety).

The current PRC 421 flowline is located approximately 200 feet east of Bell Canyon Creek. Proposed safety measures for the pipeline include repairing a deteriorated section and pressure testing the existing 6-inch line, and inserting an internal liner and a 3-inch flowline within the existing pipeline. In the event of a leak in the 3-inch flowline, the oil/gas/water emulsion would be contained within the 6-inch line. Upon detection of liquid in the 6-inch line the well pump would be completely shut in. It is estimated that shut in would be complete within 15 seconds of leak detection. A leak detection sensor would also be provided within the 6-inch line and if a leak were detected shut in would also automatically occur. The potential exists, however slight, for oil to be released from the pipeline during the 15-second interval prior to shut in of the pump, in the time before the leak is detected. The amount of oil potentially released to the environment during this period of time is dependent on the size of the leak in the pipeline.

The transport of PRC 421 oil approximately 8.5 miles through the Line 96 pipeline would also present a risk of oil release with impacts to in-stream water quality for multiple creeks along the Gaviota Coast. Although pipelines are generally the safest method

available for the transportation of crude oil, spills could potentially occur through accidental damage to the pipeline caused by natural (e.g., seismic activity, flooding) or man-made causes (e.g., construction activity, valve failure). However, because the pipeline would be new and would include all of the most recent safety features, the likelihood of a potential spill is low (see Section 4.2, Safety). The Line 96 pipeline incorporates mainline block valves that limit the volume of oil that could potentially be spilled to 60 barrels from Llagas Creek and 52 barrels from Corral Canyon.

A spill from the Pier 421-2, from the flowline, or from Line 96 could release limited amounts of petroleum hydrocarbons into the marine environment within Santa Barbara Channel. Devereux Creek and its mouth (Devereux Slough) are located approximately 1 mile southeast of the Project site. Devereux Slough is part of the University of California Reserve System and is a protected wetland which provides habitat and nesting area for numerous shorebirds and migrating birds (see Section 4.6, Marine Biological Resources and Section 4.7, Terrestrial Biological Resources). Even a limited crude oil spill between 0.5 to 1.7 barrels from PRC 421 could introduce petroleum hydrocarbon contaminants above background concentrations into the slough (see Section 4.2, Safety) and impact the aquatic environment. Therefore, a large crude oil spill into marine or surface water resources near the Project site could exceed stated significance thresholds (California Toxics Rule, Ocean Plan, and Basin Plan) and would be significant.

Spilled oil results in impacts to marine water quality as addressed in the *California Ocean Plan* (Table 4.5-1). Surface slicks limit equilibrium exchange of gases at the ocean-atmosphere interface. This reduces near-surface oxygen concentrations, particularly with the increased biochemical oxygen demand of crude-oil emulsions. As the seawater-oil emulsion mixes into the water column, turbidity would increase and toxic hydrocarbons would be released into the water column and seafloor sediments. Weathering can widely disperse tar balls, which may eventually be ingested by pelagic and benthic biota, with adverse effects. Although a surface slick can disperse within a few hours of a spill in harsh sea conditions, lingering effects could persist for much longer periods. For example, it took approximately two years for mussel tissue burdens of aromatic hydrocarbons to return to background levels after the Exxon Valdez Oil Spill (Boehm et al. 1995). Although this spill was several orders of magnitude larger than any spill possible under implementation of the Project, monitoring results indicate the potential for long-term effects. The increased potential for accidental discharges of petroleum hydrocarbons into marine waters is considered a significant impact because the Project would increase the likelihood of an oil spill at the Project site and because such a spill could result in tangible damage to marine water quality in excess of concentrations identified in regulatory criteria.

Oil from a surface spill would disperse and weathering would, in turn, affect the long-term persistence and toxicity of oil. Further, the soluble and more toxic components of crude oil (e.g., benzenes and other lower molecular weight aromatic compounds), would

volatilize and dissipate naturally from the environment. Consequently, the toxicity of a potential spill may be reduced somewhat by natural weathering processes during dispersion. However, insoluble oil fractions could potentially settle in bottom sediments or get trapped by aquatic vegetation and affect water quality for several years. This is more likely to occur in Devereux Slough than Bell Canyon Creek as the current flows from west to east and Bell Canyon Creek is located west of the Project. Further, oil spills to Bell Canyon Creek would be near the mouth of the creek and spilled oil would likely disperse quickly into the Pacific Ocean, particularly in winter months when seasonal storms wash natural sand berms from the Bell Canyon Creek into the ocean and water levels are higher; whereas spills within the Santa Barbara Channel and those that flush out of Bell Canyon Creek are likely to flow towards Devereux Slough.

Venoco currently maintains two plans that deal with oil spills: an Emergency Action Plan (EAP) and the South Ellwood Field Oil Spill Contingency Plan (OSCP). The EAP details actions to occur following a spill, including directions on spill containment and logistical details such as site access, staging areas, and boat launching locations (Venoco 2011a). The OSCP addresses inspection and maintenance, training and drills, notification procedures, and provides general oil spill response and cleanup techniques for various terrains, including for creeks and rivers (Venoco 2011b). OSCP appendices contain maps and listings of potentially affected sensitive resources such as plant and wildlife habitats, creeks and drainages, beaches, sloughs, marshes, etc., in the surrounding area. Implementation of the above plans would reduce impacts associated with larger oil spills. Nonetheless, impacts would be significant and unavoidable.

Mitigation Measures

In addition to the implementation of MMs described in Section 4.2, Safety, Section 4.6, Marine Biological Resources, and Section 4.7, Terrestrial Biological Resources, the following MMs would apply:

MM WQ-3a. Pipeline Monitoring. In addition to the installed safety measures on the pipeline from Pier 421-2 to the EOF tie-in (e.g., low-pressure alarm system and automatic shut-in), Venoco staff shall conduct daily visual monitoring of the access road above the pipeline and soils adjacent to the access road. Staff shall inspect for obvious indicators of a small leak such as petroleum smells and any seepage of oil or visible sheen in soils adjacent to the roadway. If any indicators are present, Venoco shall (1) notify City of Goleta and California State Lands Commission (CSLC) staffs within 24 hours, (2) conduct further investigations to determine the source of the indicator, and (3) repair the pipeline as necessary upon City and CSLC staff approval.

MM WQ-3b. Storm Water Pollution Prevention Plan (SWPPP). A site-specific SWPPP shall be prepared for construction activities and the existing Ellwood area SWPPP shall be updated to include the Project and submitted to the Regional Water Quality Control Board (RWQCB), Central Coast Region, and

City of Goleta to prevent adverse impacts to nearby waterways associated with oil spills and contaminated storm water releases not covered under the Emergency Action Plan (EAP), which only applies to "significant events." This plan shall include site-specific diagrams illustrating primary surface drainage features (e.g., Bell Canyon Creek, Devereux Creek and Devereux Slough, and proposed spill containment, delineation of drainage features) and a description of Best Management Practices (BMPs), including spill containment equipment and procedures tailored for the Project site.

The Project also incorporates by reference MMs contained in the certified Line 96 Modification Project EIR, including MM BIO-3, which required preparation of an OSCP to address sensitive biological resources along the pipeline alignment, and MM HM-3, which required block valves on the Line 96 pipeline to be capable of remote actuation.

Rationale for Mitigation

Implementation of these MMs would reduce the probability of an oil spill and the resulting consequences to the surface or marine waters. The identified measures would enhance planning and preparedness to respond to the oil spill and would reduce both the potential oil spill size and the potential for oil spills. The measures would also increase the effectiveness of an oil spill cleanup effort.

Regular monitoring of the soils adjacent to the access road above pipeline would reveal potential pipeline damage from third-party incidents or natural disasters and would help identify potential hairline fractures and leaks that may not be detected by installed leak detection systems. Regular monitoring would also encourage regular maintenance of the pipeline to prevent spills. Implementation of the SWPPP would minimize potential impacts of small spills and contaminated storm water releases by providing site-specific information and management practices regarding protection of nearby water resources. Incorporation of measures from the Line 96 Modification Project EIR would reduce the likelihood and volume of an accidental oil release from the Line 96 pipeline.

Residual Impacts

Marine water quality impacts associated with accidental oil spills are categorized as significant because the proposed MMs would not be completely effective in reducing the significant risk of a spill, nor would they adequately eliminate the significant effect of a spill on marine resources. A large spill (see definition in Section 4.2, Safety) would violate many water quality regulations and have a deleterious effect on the marine environment and biota. It would generate visible surface sheens, significantly reduce the penetration of natural light, reduce dissolved oxygen, degrade indigenous biota, and result in hydrocarbon contamination within the water column and marine sediments. The duration and area of the impact would be largely dictated by the size and location of the

spill, and the various physical conditions of the sea at the time of the spill. Impacts would last from days to weeks and extend for tens of miles.

Mitigation of water quality impacts from a major marine oil spill is largely a function of the efficacy of the spill response measures. The effectiveness of spill cleanup measures is dependent on the response time, availability and type of equipment, size of the spill, and the weather and sea state during the spill. Only some of these aspects are within the control of the spill response team. In addition, many oil spill response measures, such as dispersants, have impacts of their own.

With the natural flushing processes of Bell Canyon Creek and implementation of the SPCC Plan, safety measures for the pipeline, and the above MMs, impacts to surface water quality in Bell Canyon Creek would be less than significant. However, implementation of the OSCP, EAP, and other MMs would not reduce impacts of a large oil spill to a less than significant level, particularly in Devereux Slough where insoluble oil fractions could potentially be trapped in sediments for years or in creeks and drainages present along the Line 96 pipeline route between the EOF and LFC. These impacts are considered significant.

Under the regulatory-based significance criteria described in Section 4.5.3, Significance Criteria, even small oil spills could potentially be significant. Many regulations and guidelines establish limits based on the presence of a visible sheen on the ocean surface. This criterion is reflected in the static sheen test for free oil identified in the NPDES General Permit, U.S. Coast Guard (USCG) regulations, and the aesthetic criterion C.1 in the Ocean Plan Standards (see Table 4.5-1). Therefore, even with the imposition of the MMs, this impact remains significant and unavoidable.

Table 4.5-1. Summary of Hydrology and Water Quality Impacts and Mitigation Measures

Impact	Mitigation Measures
WQ-1: Temporary Construction Impacts to Marine Water Quality	**HAZ-1a.** Proper Personnel Training. **HAZ-1b.** Conduct Phase I ESA. **HAZ-1c.** Soil Sampling. **HAZ-1d.** Removal Action Plan. **WQ-1a.** Avoid High Tides and Silt Curtain. **WQ-1b.** Water Quality Certification.
WQ-2: Temporary Construction Impacts to Wetlands	**WQ-2.** Wetland Delineation, Avoidance and Minimization **TBIO-1a.** Locate Power Cables and Pipeline Outside Wetland Areas. **TBIO-1b.** Project and Biological Monitors. **TBIO-1d.** Protect Stockpiles of Excavated Material. **TBIO-1e.** Maintain Equipment.
WQ-3: Oil Spill Impacts to Surface and Marine Water Quality	**WQ-3a.** Pipeline Monitoring. **WQ-3b.** Storm Water Pollution Prevention Plan. All MMs described in Sections ~~4.3~~ 4.2, Safety, 4.6, Biological Resources, and 4.7 Terrestrial Biological Resources and MM BIO-3 and MMHM-3 from the Line 96 Modification Project EIR would apply.

4.5.5 Cumulative Impacts Analysis

Impact WQ-4: Cumulative Impacts to Marine Water Quality

Potential oil spills occurring as a result of recommissioning of PRC 421 could result in contributions to cumulative water quality impacts on the waters of the Santa Barbara Channel (Significant and Unavoidable).

Potential Project-related oil spills could contribute to cumulative water quality impacts offshore the Project site. Projects which could produce an increased risk of oil spill that could impact the same coastal areas as the Project are listed in Table 3-2 in Section 3, Cumulative Impacts Methodology. The Carpinteria Offshore Field Redevelopment, South Ellwood Field Project, and Carpinteria Onshore Projects would involve increased offshore/near-shore drilling and associated crude oil transportation, which would also increase the risks of oil spills and result in water quality impacts from the discharge of produced water into the marine environment. Any development of the undeveloped outer continental shelf (OCS) leases would result in additional exploratory drilling, increases in vessel traffic and potential oil spills to the marine environment that would have a cumulative effect alongside the Project. All of these projects would exacerbate an already significant and unavoidable impact associated with the Project's risks of spills to the marine environment.

Mitigation Measures

Each of these projects must meet regulatory requirements designed to reduce the probability and consequences of accidental releases to the environment. However, even the best-designed and implemented MMs, such as safe design of the facilities, oil spill contingency plans, training and drills, and availability of oil spill cleanup means, cannot eliminate all risk of an oil spill.

Rationale for Mitigation

Implementing regulatory requirements with industry BMPs can lower the risk and consequences of an accidental oil spill.

Residual Impacts

The Project's contribution to cumulative impacts would remain significant and unavoidable.