1

INTRODUCTION

1.1 Background

1.1.3 Overview of Crude Oil Demand and Supply in Southern California

Crude oil in California is used predominantly to make transportation fuels for consumers and businesses; no electricity in the state is generated using petroleum (CEC 2007a). As the California Energy Commission (CEC) states in the 2007 Integrated Energy Policy Report (IEPR) (CEC 2007a~~b~~), "Californians require mobility to conduct their everyday lives and attend to their business needs. For the most part, this mobility is achieved through use of a petroleum-fueled vehicle. Travel demand is essentially a fixed requirement for individual consumers of transportation goods and services in a state as physically expansive as California, where distances are large and most metropolitan areas are extensive and poorly served by public transit. Reducing public access to work, recreation, and other travel cannot be achieved without disruption and economic loss. Moreover, population growth translates directly into increases in aggregate travel demand."

Even as consumers demand mobility, California leads the nation in environmental policies and initiatives to reduce energy consumption and increase the use of alternative fuels. California Assembly Bill (AB) 1007 (Pavley, Chapter 371, Statutes of 2005) directed the CEC, in partnership with the California Air Resources Board (CARB), to develop a State Alternative Fuels Plan to increase the use of alternative fuels without adversely affecting air pollution, water pollution, and public health. Released in December 2007, the State Alternative Fuels Plan (CEC and CARB 2007) recommends a combination of regulations, incentives, and market investments to achieve increased penetration of alternative and non-petroleum fuels. The State Alternative Fuels Plan describes strategies, actions, and mechanisms to concurrently address multiple state policies (petroleum reduction, greenhouse gas (GHG) reduction, in-state biofuels production and use goals, and state air quality goals) in an integrated fashion. To accomplish the goal, the plan recommends multiple strategies which combine private capital investment, financial incentives, and technology advancement approaches.

However, even with full implementation of the State Alternative Fuels Plan, CEC found that "conventional petroleum fuels will be the main source of transportation energy for the foreseeable future…. California must address its petroleum infrastructure problems and act prudently to secure transportation fuels to meet the needs of our growing population" (CEC 2007a~~b~~). CEC stated further that "This should be viewed as a strategy to allow time for the market and consumer behavior to adjust to alternative fuels and transportation choices. During this transition, California must be innovative and aggressive in finding more ways to make increased efficiency, greater renewable fuel use, and smart land use planning the most desirable consumer options" (CEC 2007a~~b~~). Thus, the proposed Project would help meet California's stated needs for transportation energy facilities by providing critical infrastructure called for in the CEC's Integrated Energy Policy Reports since 2003 (see Section 1.1.3.3 for details).

Petroleum based fuels are and will continue to be a necessary part of California's energy portfolio. In the 2007 IEPR (CEC 2007a; CEC 2007b) the CEC recommends that California continue with improving critical petroleum product import infrastructure, particularly for crude oil, as well as related storage and onshore transportation facilities. The proposed Project directly addresses part of this stated need. Expanding petroleum related infrastructure is critical to meet California's transportation fuel needs, even with pursuing aggressive strategies to use alternative fuels and reduce demand for all transportation fuels (CEC 2007a; CEC 2007b).

The demand for crude oil in southern California is driven by consumer demand for transportation fuels: gasoline, diesel, and jet fuel. About 79 percent of California's refinery output in 2006 consisted of these fuels (the remainder of refinery output includes heavier and lighter components such as petroleum coke, refinery gases, asphalt, and tar) (CEC 2007c). Demand for transportation fuels is, in turn, a function of several factors, including population, income, vehicle purchasing and driving habits, fuel prices, rates of adoption of new technologies and alternative fuels, and GHG reduction rules and standards. In addition to supplying southern California's transportation fuel needs, the refineries operating in southern California also supply virtually 100 percent of transportation fuels for Nevada and 60 percent for Arizona (CEC 2007a).

In 2005, California refineries processed 674 million barrels (bbl) of crude oil (1.8 million barrels per day [bpd]). Crude oil from foreign imports made up the largest share of that amount (40.4 percent); California sources supplied 39.5 percent, and Alaska North Slope (ANS) supplied 20.2 percent (CEC 2007c). Within southern California, refineries processed 356 million bbl in 2005 (975 thousand bpd); 52 percent of this supply was from foreign imports, 34 percent was from California sources, and 14 percent was from ANS (Baker & O'Brien 2007). However, crude production from California and Alaska (as well as the rest of the U.S.) is decreasing. California crude production peaked in 1985 and has declined by 39 percent since 1986; Alaskan crude production peaked in 1988 and has declined 60 percent since that time (Figure 1-3). These declines are expected to continue, as shown in Figure 1-4 (Baker and O'Brien 2007; CEC 2007a; CEC 2007b; CEC 2007c).

With the decline in domestic production has come an increase in foreign imports, which arrive in the Los Angeles area after being transported via tanker vessels. Table 1-1 summarizes the five recognized size classes of tanker vessels in long-haul (i.e., trans-oceanic) service. Typically, the company that owns the vessel does not own the crude oil

it carries; companies involved in the business of transporting crude contract with ship owners to transport oil from producing regions to consuming regions.

In 2005, about 45 percent of foreign crude oil imports to southern California came from the Middle East (i.e., Saudi Arabia, Iraq, Yemen, Oman, and Kuwait), and another 46 percent came from Central and South America. About 7 percent came from West Africa, and about 2 percent came from Canada. The share of Middle Eastern imports has increased steadily in recent years, a trend that is expected to continue (Baker & O'Brien 2007). Middle East imports generally arrive in VLCCs and Suezmax vessels because larger vessels are more cost effective for longer voyages than smaller vessels. However, as no crude oil terminals in Southern California are capable of accommodating a fully loaded VLCC due to wharf and water depth restrictions, fully loaded VLCCs must currently offload crude oil onto smaller vessels to transfer to the receiving terminal, a process called lightering (described in detail below). Latin American and Canadian oil transported to southern California is generally carried via Aframax tankers, while crude originating in West Africa is usually shipped to southern California in Aframax and Suezmax vessels. Panamax vessels also carry crude oil into southern California; they mainly come from relatively close suppliers (e.g., Ecuador) and supply oil for the spot market.

The limited depths at existing berths force many larger vessels to be lightered offshore. This process consists of the large vessel ("lightered vessel") transferring a portion of its cargo to a smaller vessel ("lightering vessel"). The lightering vessel comes from the port empty, picks up cargo from the lightered vessel, returns to port to offload its cargo, then returns to the lightered vessel for another load; the lightered vessel may or may not come into port. In southern California, the transfer of cargo from the lightered to lightering vessel occurs approximately 25 to 100 miles (40 to 160 km) offshore; and for safety and stability, both vessels remain unanchored and moving under their own power while the transfer of cargo occurs. The lightering process results in a larger number of smaller vessels calling at San Pedro Bay than would be required if channel/berth depths allowed larger vessels to call at existing berths.

Currently five terminals close to Los Angeles (Figure 1-5 and Figure 1-6; Table 1-2) are capable of receiving crude oil: Berths 76-78, 84-87, and 121 in the Port of Long Beach, Berths 238-240 in the Port of Los Angeles, and an offshore mooring facility off the coast of El Segundo in Santa Monica Bay. Outside of these facilities, the nearest U.S. terminals capable of receiving crude oil tankers are at the Port of Hueneme (Ventura County) and the San Francisco Bay Area. However, the Port of Hueneme can accommodate only barges, not tanker vessels, and is primarily designed to receive crude oil from offshore platforms. Oil arriving into the San Francisco Bay Area is refined within the area, and refineries in the Bay Area supply products to northern California, northern Nevada, and Oregon, including approximately 35 percent of Oregon's refined products (CEC 2007a). In addition, the Bay Area petroleum import infrastructure is also at or near capacity, and the maximum depth at berth available to tanker vessels is 50 feet (CEC 2005). Crude oil pipelines currently transport California crude oil from the San Joaquin Valley to the San Francisco Bay area and the Los Angeles Basin, but no pipelines transport crude oil into California from neighboring states or from Mexico.

1.1.3.1 Oil Supply and Demand

As described above, Californians require mobility to conduct their everyday lives and attend to their business needs (CEC 2007a~~b~~). In the 2007 IEPR the CEC recommends that California continue with improving critical petroleum product import infrastructure, particularly for crude oil, as well as related storage and onshore transportation facilities (CEC 2007a; CEC 2007b; CEC 2007c). The proposed Project directly addresses part of this stated need.

In 1982, California received 61 percent of its crude oil supplies from in-state production, 33 percent from the Alaska North Slope (ANS), and 6 percent from foreign sources. By 2006, the situation had changed, with in-state production making up 39 percent of crude oil processed by California refineries, ANS representing 16 percent, and foreign sources contributing 45 percent (CEC 2007d). In addition, due to the limited refining capacity in California, the state must import ten percent of its refined blending components and finished gasoline and diesel to meet the growing demand (CEC 2007a~~b~~).

The determinants of consumer demand for transportation fuels include population growth, real income growth, vehicle miles traveled (VMT), market penetration of hybrid and alternative-fuel vehicles, and the number of on-road registered vehicles in California, among other elements. The California Department of Finance (DOF) predicts that California's population and real per capita income will ~~each~~ grow by a little over 1 percent per year. More than 37 million people live in California; the population is expected to grow to more than 44 million by 2020 and the population may increase to about 60 million residents by 2050 (~~about 30 percent between 2005 and 2030, an average of about 1 percent per year (~~CEC 2007a, CEC 2007b, CEC 2007c). From 2001 to 2005 the number of vehicles registered on California roads increased by about 3 percent per year. Among the types of on-road vehicles, growth was fastest for hybrid vehicles, nearly doubling every year; however, as of 2005 hybrids were still a small proportion, just 0.3 percent, of on-road registered vehicles (CEC 2007c). The CEC transportation fuel demand model projects that VMT and the number of on-road registered vehicles in California will continue to increase through 2030, even under conservative assumptions about greenhouse gas (GHG) regulations and high fuel prices. The CEC predicts that demand for on-road gasoline could decrease depending on GHG regulations and fuel prices; however, it predicts that demand for diesel and jet fuel will increase regardless of GHG regulations and fuel prices, resulting in a net increase in overall demand for transportation fuels within California (ranging from 0.51 percent per year with high fuel prices and GHG regulations, to 1.43 percent per year with low fuel prices and no GHG regulations; CEC 2007c). (Appendix D1 provides additional details about transportation fuel demand predictions, including how recent GHG regulations are incorporated into demand projections.)

With consumer demand for transportation fuels exceeding the capacity of refineries to produce those fuels – as stated above, the state currently imports ten percent of its refined blending components and finished gasoline and diesel to meet consumer demand (CEC 2007a~~b~~) – California's petroleum refineries continue to expand their distillation capacity (i.e., the amount of crude oil they are able to refine) as part of the normal process of doing business. This phenomenon, called "refinery capacity creep," occurs as refineries make process improvements in order to expand the capacity of their crude oil distillation equipment (provided the expansion meets environmental guidelines and

permitting requirements, and if it can be justified as having a sufficient economic return) (CEC 2007b). Refinery capacity creep is a worldwide phenomenon: refinery capacity creep worldwide has averaged 1.4 percent per year since 1996; in the U.S., it has averaged about 1.3 percent. Compared to the rest of the U.S. and the world, refinery capacity creep in California has been relatively low in recent years, averaging 0.5 percent per year since 1996 (CEC 2007b).

Since consumer demand for transportation fuels exceeds the capacity of refineries to produce them, both statewide and in southern California specifically, the demand for marine crude oil deliveries to southern California is essentially a function of two factors: the estimated rate of refinery distillation capacity increase (including refinery capacity creep as well as infrastructure improvement projects to increase refinery distillation capacity), and the estimated decline in California crude oil production. Baker & O'Brien (2007), consulting for PLAMT, have forecasted southern California's demand for marine deliveries of crude oil as a function of these two factors. Baker & O'Brien assume a relatively high refinery capacity creep in early years, with lower refinery capacity creep in later years (1.25 percent per year through 2021, 0.50 percent per year for 2022-2026, and no change after 2026). In addition, the Baker & O'Brien (2007) forecast takes into account an expected increase in refinery capacity in 2012 due to a planned refinery expansion. This represents an additional gain of 50,000 bpd of refinery capacity. Baker & O'Brien assume California production will decline at about 3.5 percent per year. Based on these assumptions, Baker & O'Brien estimate that by 2040, the demand for marine crude oil deliveries in southern California will increase by 677,000 bpd compared to 2004. Figure 1–7 provides a graphical summary of the Baker & O'Brien projection.

1.1.3.3 Inadequate Berthing Capacity

The growing demand for water-borne imports of crude oil will result in increased offloading activities in the San Pedro Bay Ports. Baker & O'Brien (2007) do not specifically address the shortage of petroleum import infrastructure that will be necessary to support the increased offloading; however, the CEC has addressed this issue in recent IEPRs (CEC 2007a, CEC 2007b, CEC 2007c, CEC 2003b) as well as in a 2005 report evaluating California's petroleum infrastructure (CEC 2005). These reports indicate that infrastructure expansion is required to accommodate the projected increases. These reports also point out the potential for supply disruptions and higher and more prolonged price spikes due to the shortage of petroleum import infrastructure that California faces as it attempts to accommodate the growing need to import foreign crude oil by marine tankers. (Appendix D2 of this SEIS/SEIR provides additional information related to the potential for price volatility for consumer transportation fuels.) Some applicable sections of these reports are quoted below:

> *"Unplanned outages at in-state refineries or pipeline facilities quickly tighten gasoline and diesel supplies, creating price spikes. California is not connected by pipeline to other domestic refining centers, and in-state refiners cannot readily procure gasoline, diesel, and other blending components when outages occur. Relying on imports of petroleum and finished product coming into the constrained import infrastructure creates a market conducive to extreme price volatility. This contributes to higher and more prolonged price spikes, as has been experienced in recent years." (CEC 2007a~~b~~)*

> *"The increasing load on the existing crude oil import facilities means that the diminishing spare import capacity could increase the risk of a significant fuel supply*

problem should one of the larger crude oil import terminals (such as Berth 121 in Long Beach) be temporarily out of commission for an extended period of time." (CEC 2007c)

"The crude oil import facilities of Southern California could not accommodate the large forecasted increase of imports and would require the construction of at least one large new crude oil import facility" (CEC 2007c).

"Existing marine infrastructure could be diminished as a result of continued pressure to remove petroleum facilities, especially in the Los Angeles Basin, and the requirements of new State Lands Commission standards for petroleum marine terminals." (CEC 2005)

"Over the next 20 years, California's infrastructure will require expansion in petroleum marine terminal capacity, marine storage, and the gathering pipelines that connect marine facilities and refineries to the main product pipelines. Most of the expansion in the marine terminal and marine storage capacity will be required in the Los Angeles Basin." (CEC 2005)

"Without increasing the fuel supply by importing additional crude oil and transportation fuels, California will not only continue to experience supply disruptions and price spikes, but also supply shortages and prolonged and elevated prices, for gasoline fuels." (CEC 2003b)

"The outlook for the next several years is that Very Large Crude Carrier (VLCC) (transporting one to two million barrels) use will need to double from an average of one to two ships per week due to greater reliance on foreign sources of crude oil. For this reason, additional infrastructure improvements for berthing facilities as well as crude oil storage tanks will need to be constructed." (CEC 2003a)

The CEC's latest reports underscore conclusions of earlier CEC reports as well (CEC 2003a, 2003b) in which the CEC linked fuel supply disruptions and price spikes to the lack of import infrastructure. Satisfying future demands will require major modifications to existing facilities and/or the construction of a new deep-water berth and tanks to receive the projected increase in imports. In doing so, supply disruptions and the associated retail transportation fuel price spikes that are projected by the CEC (e.g., CEC 2007a~~b~~) can be minimized.

Currently, there are no developed berths in California with sufficient water depth to accommodate a fully loaded VLCC vessel carrying 2 million or more bbl of cargo. The limited number of existing berths and the relatively shallow water depths at those berths are two major factors impacting future crude oil imports into southern California.

Furthermore, over the last three decades, the number of operating berths used to offload crude oil for refineries in southern California has declined dramatically. In 1978 there were 16 such berths, including eight at the Port, six at the Port of Long Beach, and two open-water crude oil unloading mooring locations outside the two harbors. At present there are only five: one at the Port, three at the Port of Long Beach, and one open-water mooring location. The existing berths and mooring location are shown in Figures 1-5 and 1-6, and key characteristics are summarized in Table 1-2.

1.1.3.4 Need for Increased Crude Oil Tank Capacity

Over the past 15 years approximately 6 million bbl of petroleum storage tank capacity has been removed from southern California (CEC 2007a~~b~~). CEC (2007a~~b~~) suggests that

even as California develops and implements its alternative fuels plans under AB 1007, the additional crude oil storage tank capacity necessary by 2020 to meet California's storage requirements ranges from 5 to 17 million bbl. This estimate does not include additional storage tank capacity needed for refined products, including alternative fuels, which CEC estimates as ranging from 5.4 million to 13.1 million bbl (CEC 2007a~~b~~).

The need for increased crude oil storage tank capacity is driven by several factors, including the need to reduce supply disruptions in consideration of longer ocean voyages for import tankers; the need to offload larger cargo volumes; and the need to accommodate multiple customers and types of crude oil. These factors are described below.

Additional Tanks to Reduce Supply Disruptions. The replacement crude oil for declining Alaska and California crude oil supplies will arrive on marine tankers from foreign crude sources that are increasingly distant from southern California refineries. The transit time to Los Angeles for Alaskan and South American crude oil is typically 7 to 10 days and is generally much more predictable than a longer transit. The average transit time from the Middle East is 38 days and much less predictable. With crude oil arriving on vessels whose arrival date is less predictable, refiners will need to be able to store larger volumes in order to minimize supply interruptions.

Additional Tanks to Offload Increasingly Larger Cargo Volumes. As more crude oil is imported from the Middle East and other foreign sources, larger tankers will arrive at southern California ports. As cargo volumes increase, it will become necessary to increase the capacity of the tanks used to store the cargo during and immediately after offloading.

Recent CEC reports support the need to construct additional crude oil tank capacity:

> *"Additional storage tank capacity necessary to meet California's product storage requirements by 2020 ranges from 5.4 million to 13.1 million barrels and the additional crude oil storage capacity needed ranges from five to 17 million barrels. California must prepare for this range of additional storage capacity even as it develops and implements its alternative fuels plans under AB 1007. Additional infrastructure will be necessary to meet California's transportation requirements, even with alternative fuels meeting a greater percentage of those requirements."* (CEC 2007a~~b~~)

> *"The outlook for the next several years is that VLCC use will need to double from an average of one to two ships per week due to greater reliance on foreign sources of crude oil. For this reason, additional infrastructure improvements for berthing facilities, as well as crude oil storage tanks will need to be constructed."* (CEC 2003a)

Supplies for Multiple Customers and Multiple Crude Types. Local refineries optimize their supply by looking for crude oil that matches the specifications that best fit their processing units. Furthermore, because customers use different types of crude oil and need to keep the specifications of the crude oil within certain ranges, extra tanks are needed to segregate incoming crude oil types even when tank capacities are not fully utilized. In addition, third-party tank facilities often use multiple tanks for the same type of crude, even when tank capacities are not fully utilized, in order to track ownership by

volume and to maintain accurate crude oil custody records. The practices of maintaining crude supplies within specified ranges and tracking crude oil custody will continue to contribute to the need for additional crude oil tanks in the near term.

1.2 Purposes of an EIS and EIR

1.3 Lead, Responsible, and Trustee Agencies

1.4 Scope and Content of the Draft SEIS/SEIR

1.5 Key Principles Guiding Preparation of this Draft SEIS/SEIR

1.6 Port of Los Angeles Environmental Initiatives

1.6.4 Aesthetic Mitigation Projects

For years 2003 through 2007, the Port is depositing $4 million per year into a community aesthetic mitigation account to mitigate the aesthetic impacts of Port operations on the neighboring communities of San Pedro and Wilmington consistent with the Berth 100 Amended Stipulated Judgment. All projects funded under this program shall comply with all applicable laws, rules, and regulations; be Port-related projects on Port land; or be projects not on Port land that have a demonstrable nexus or connection to the environmental, aesthetic, and/or public health impacts of the Port's operations and facilities. Proposed Projects to receive funding shall fall within the following categories, and shall be prioritized as follows:

- Open space and parks,
- Landscaping and beautification, or
- Educational, arts, and athletic facilities.

Proposed projects funded under this program shall be divided as evenly as possible between the San Pedro and Wilmington communities. Proposed projects must:

- Mitigate existing or future impacts of Port operations on surrounding communities,
- Be consistent with the State Tidelands Trust and the public trust doctrine,

- Be consistent with the Los Angeles City Charter, and
- Be consistent with the California Coastal Act, and consistent with any other applicable laws and regulations.

1.7 Availability of the Draft SEIS/SEIR

This page intentionally left blank.