

## CALIFORNIA ENERGY COMMISSION

1516 NINTH STREET  
SACRAMENTO, CA 95814-5512  
www.energy.ca.gov



September 7, 2005

Via Electronic Filing

The Honorable Magalie Roman Salas  
Secretary  
Federal Energy Regulatory Commission  
888 First Street, N.E.  
Washington, D.C. 20426

***Re: Long Beach LNG Import Project, Docket No. CP04-58-000, et al.***

Dear Ms. Salas:

On January 26, 2004, Sound Energy Solutions filed an application for construction of a terminal for importation of liquefied natural gas (LNG) to be located in Long Beach, California. The Energy Policy Act of 2005, which was enacted on August 8, 2005, specifies in Section 311(d) that the Governor of a state where a proposed LNG terminal would be located shall designate a state agency to consult with the Federal Energy Regulatory Commission regarding applications and that this state agency may prepare a safety advisory report that addresses state and local safety considerations. For proposed facilities for which applications had already been filed as of the date of enactment, such reports are due within 30 days of the date of enactment, which is today, September 7, 2005.

The Governor of California has designated the California Energy Commission as the agency responsible for preparation of a safety advisory report for the proposed Long Beach LNG terminal. Therefore, enclosed for filing in the above-mentioned proceeding, please find an electronic copy of the safety advisory report for the proposed LNG terminal. If you have any questions in this matter, please do not hesitate to contact me at [Bblevins@energy.state.ca.us](mailto:Bblevins@energy.state.ca.us) or David Maul, my manager of Natural Gas and Special Projects at [dmaul@energy.state.ca.us](mailto:dmaul@energy.state.ca.us).

Thank you for your assistance in this matter.

Sincerely,

A large, stylized handwritten signature in black ink, consisting of several loops and a long horizontal stroke at the end.

B. B. BLEVINS  
Executive Director

cc: Parties of Record

# SAFETY ADVISORY REPORT

## ON THE PROPOSED SOUND ENERGY SOLUTIONS LIQUEFIED NATURAL GAS TERMINAL AT THE PORT OF LONG BEACH, CALIFORNIA

*Prepared by the Staff of the  
California Energy Commission*

*B.B. Blevins, Executive Director*

**STAFF PAPER**



Arnold  
Schwarzenegger,  
Governor

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# ***Safety Advisory Report on the Proposed Sound Energy Solutions Liquefied Natural Gas Terminal at the Port Of Long Beach***

## ***Introduction***

This Safety Advisory Report on the proposed Sound Energy Solutions (SES) liquefied natural gas (LNG) terminal in the Port of Long Beach has been prepared to respond to the recently passed Energy Policy Act of 2005 (Act). Section 311(d) of the Act allows states with a pending onshore LNG terminal application to identify safety issues and concerns regarding the terminal in an advisory report filed with the Federal Energy Regulatory Commission (FERC), which in turn, must respond specifically to the issues raised in the advisory report. The Act specifies that the report must be completed within 30 days of passage of the Act. The Governor of the State of California has designated the California Energy Commission (Energy Commission) as the state agency for the purpose of consulting with the FERC regarding the pending application by SES to site a LNG terminal at the Port of Long Beach. The Energy Commission, in consultation with state and local agencies, has prepared the following Safety Advisory Report within the expedited timeframe dictated by the Act.

This report has been prepared with the cooperation of and input from the following additional state and local agencies: California Air Resources Board (CARB), California Coastal Commission (CCC), California Public Utilities Commission (CPUC), California State Lands Commission, Division of Oil, Gas, and Geothermal Resources, and the City and Port of Long Beach. As such, this report presents a comprehensive state and local agency perspective on this project, as directed by the Act.

The FERC has not yet issued its draft environmental impact statement (DEIS) and the Port of Long Beach has not issued its draft environmental impact report (DEIR), and neither is expected to do so prior to the September 7, 2005 time deadline for filing this advisory report. Therefore, considering the very expedited schedule for filing this safety advisory report and the fact that the state and local agencies have not had the benefit of reviewing the DEIS and DEIR concerning the proposed LNG facilities at the Port of Long Beach, each of the state and local agencies in California, whether or not they contributed to this advisory report, reserves its right to file additional joint or separate comments and/or evidence in this proceeding concerning safety or environmental matters. In addition, each of the state and local agencies in California, whether or not they contributed to this advisory report, reserve their right to file additional joint or separate comments and/or evidence with state and local entities (e.g., the CCC<sup>1</sup>) that retain their jurisdiction over review and

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<sup>1</sup> The California Energy Commission also has not yet had an opportunity to review the application materials filed with FERC as “critical energy infrastructure information.” The Energy Commission

decision making concerning the SES proposed project application. The state hopes that the FERC's analysis and reports will satisfactorily address all of the issues raised in this Safety Advisory Report.

## ***Safety Considerations for SES's Proposed LNG Facilities at the Port of Long Beach***

In Section 311(d) of the Act, Congress provided that the safety advisory report on state and local safety considerations shall include the following six factors for the location of LNG facilities: "(1) the kind and use of the facility; (2) the existing and projected population and demographic characteristics of the location; (3) the existing and proposed land use near the location; (4) the natural and physical aspects of the location; (5) the emergency response capabilities near the facility location; and (6) the need to encourage remote siting."

California has been actively involved in the review of LNG projects proposed for the state from both a policy and permitting perspective. First and foremost, any project to be built in the state must meet all applicable safety standards and environmental regulations. The state has established an LNG Interagency Permitting Working Group, chaired by the Energy Commission, to develop close communication among federal, state, and local agencies potentially involved in permitting an LNG facility in California. The Working Group has met frequently over the last three years to develop and disseminate information on LNG issues, to identify key issues of concern to the state, and to understand each group member's respective role and concerns regarding the construction and operation of potential LNG facilities in California. In addition, the Working Group has invited numerous stakeholder groups to address safety and environmental issues relating to siting LNG facilities in the state.

Staffs of federal, state, and local agencies participating in the Working Group include CARB; the Energy Commission; the CPUC; the California Department of Fish and Game, including the Department's Office of Spill Prevention and Response; the CCC; the Department of Conservation; the Department of General Services; the Office of Emergency Services; the Electricity Oversight Board; the U.S. Coast Guard (USCG); the U.S. Marine Corps; the U.S. Environmental Protection Agency (EPA); the San Francisco Bay Conservation and Development Commission; the State Lands Commission; the Governor's Office of Planning and Research; the Port of Long Beach; Ventura County; and the City of Oxnard.

Many of these agencies have provided comments to various agencies charged with oversight of onshore and offshore LNG terminals proposed in California. Several agencies have direct permitting authority. The State Lands Commission is the state's

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intends to formally request access to such materials if agreement can be reached on the terms of a nondisclosure agreement for such materials.

lead agency for the two offshore LNG projects, and the Port of Long Beach is the state's lead agency for the SES onshore LNG project. The concerns and comments of the agencies collectively address the six criteria identified in Section 311(d) and are reflected in the discussions below.

## 1. The Kind and Use of the Facility

SES proposes to construct and operate an LNG import, storage, and vaporization terminal on a 25-acre site on a portion of Pier T, designated Berth T-126, on Terminal Island within the Port of Long Beach, Los Angeles County, California. The import terminal would deliver an average of 700 million standard cubic feet per day (MMscfd) of natural gas with a peak capacity of 1 billion standard cubic feet per day (Bscfd) to the existing Southern California Gas Company (SoCalGas) pipeline system via a new 2.3-mile-long, 36-inch-diameter natural gas pipeline that would be constructed and operated by the City of Long Beach or another operator. In addition, a portion of the LNG would be distributed via trailer trucks to LNG vehicle fueling stations throughout Southern California to fuel LNG-powered vehicles. Up to 10,000 million British thermal units (MMBtu) per day of ethane (C<sub>2</sub>) recovered from the LNG would be vaporized and distributed via a new 4.6-mile-long, 10-inch-diameter pipeline that would be constructed and operated by ConocoPhillips. Power to the LNG terminal would be supplied via 0.8 mile of electric distribution lines and a new substation that would be constructed and operated by Southern California Edison (SCE). The proposed LNG terminal and associated facilities are described below:

The LNG terminal facilities would include:

- A 1,100-foot-long LNG ship berth and unloading facility with unloading arms, mooring and breasting dolphins, and a fendering system capable of unloading one ship at a time.
- Two LNG storage tanks, each with a gross volume of 160,000 cubic meters (1,006,000 barrels).
- Twenty electric-powered booster pumps.
- Four shell and tube vaporizers using a primary, closed-loop water system.
- Three boil-off gas compressors, a condensing system, a natural gas liquids (NGL) recovery system, and an export C<sub>2</sub> heater.
- An LNG trailer truck loading facility with a small LNG storage tank.
- A natural gas meter station and odorization system.
- Utilities, buildings, and service facilities.
- Associated hazard detection, control, and prevention systems; cryogenic piping; and insulation, electrical, and instrumentation systems.

The proposed ship berth and unloading facility would be designed to handle ships

with a capacity ranging from 75,000 cubic meters and an overall length of 844 feet to a capacity of 208,000 cubic meters and an overall length of 1,115 feet. The typical ship size would be between 125,000 and 165,000 cubic meters. LNG vessels of this size would typically have a total length of 950 to 1,000 feet, a beam (width) of about 150 feet, and a loaded draft of about 40 feet. The facility would be capable of mooring and unloading one LNG ship at a time. SES anticipates that up to 120 ships per year, or a tanker vessel every three days, would unload LNG at the proposed facility.

The ships would enter the area through Queens Gate, a 1,200-foot-wide opening into San Pedro Bay between the Long Beach and Middle breakwaters. To access Pier T, the vessels would travel northwest within the Long Beach Main Channel into the Middle Harbor. Pier T is located within the West Basin of the Middle Harbor.

SES's proposal includes on-board ship pumps running on LNG boil-off gas or residual fuel oil to deliver the LNG to the LNG storage tanks. However, the Port of Long Beach would require SES to use an electrical shore-side power source rather than on-board auxiliary engines while at the LNG ship berth (referred to as cold-ironing). A total of four marine unloading arms would be installed on the unloading platform, three for liquid delivery to the storage tanks and one for use in vapor return to the ship. Space would also be provided for potential future installation of a fifth arm, which would increase unloading capacity and flexibility. It would take approximately 12 to 14 hours to unload one LNG ship of typical size.

### **LNG Storage Tanks**

LNG unloaded from the ships would be stored in two 160,000 cubic meter (1,006,000 barrel) full containment storage tanks at a normal pressure of 1 to 3 pounds per square inch gauge (psig). Each tank would have a primary 9 percent nickel-steel inner container and a secondary pre-stressed concrete outer container wall, a reinforced concrete outer container bottom, a reinforced concrete domed roof, and an aluminum insulated support deck suspended from the outer container roof over the inner container. The double-walled tanks are designed, and would be constructed, so that both the primary container and the secondary container could independently contain the stored LNG. The primary container would contain the cryogenic liquid under normal operating conditions. The secondary container is capable of containing the cryogenic liquid and of controlling vapor resulting from product release from the inner container. The diameter of the outer containers would be approximately 255 feet and the height to the top of the storage tank domes would be approximately 176 feet.

The space between the inner container and the outer container would be insulated to allow the LNG to be stored at a temperature of -260°F while maintaining the outer container at near ambient temperature. The insulation under the inner container's bottom would consist of a cellular glass block. The outer concrete container above the approximately 15-foot-high thermal corner protection system would be lined on

the inside with carbon steel plates. This carbon steel liner would serve as a barrier to moisture migration from the atmosphere reaching the insulation inside the outer container. This liner would also form a barrier that prevents vapor from escaping from inside the tank during normal operations. All piping into and out of the tank would enter from the top of the tank (i.e., there would be no penetration through the side or bottom of the tank).

Natural gas is a mixture of hydrocarbon compounds, principally methane. It also contains small amounts of heavier hydrocarbons, such as ethane ( $C_2$ ), propane ( $C_3$ ) and butane ( $C_4$ ) that have a higher heating value than methane. A portion of these components may need to be removed from the LNG that would be stored on the terminal site in order for the natural gas to meet the gas quality specifications of SoCalGas as well as the specifications for LNG vehicle fuel established by the CARB. The components that are removed are called natural gas liquids (NGL). Accordingly, LNG that does not meet the required specifications would be routed through an NGL recovery unit. The NGL recovery facilities consist of a demethanizer extraction column to extract the heavier hydrocarbons from the methane and a deethanizer extraction column to separate the  $C_2$  and propane and heavier hydrocarbons ( $C_{3+}$ ). As originally proposed, the  $C_2$  and  $C_{3+}$  would be stored in two separate atmospheric storage tanks located within the LNG terminal site. The  $C_2$  and  $C_{3+}$  would then be pumped from the storage tanks to the truck loading facilities via export pumps for distribution to consumers via trucks.

SES reached an agreement with ConocoPhillips to route some of the NGL via a pipeline from the LNG terminal site to ConocoPhillips's Los Angeles Refinery at Carson. The  $C_2$  extracted from the LNG in the NGL recovery unit would be used as fuel gas within the terminal and/or vaporized and transported via the proposed  $C_2$  pipeline and subsequently used as fuel gas or feedstock. The amount of  $C_2$  available for send out would depend on the Btu content of the cargoes but would not exceed 10,000 MMBtu per day, which is the amount that can be handled at the refinery without requiring any new processing or storage facilities. The  $C_{3+}$  extracted from the LNG in the NGL recovery unit would be used as a fuel gas within the LNG terminal, primarily to fire the water heaters.

A portion of the LNG from the NGL recovery system would also be sent to the LNG trailer truck loading facility where it would be further processed and recondensed to produce vehicle fuel grade LNG.

### **Safety Issues and Concerns**

The FERC should specifically address the following engineering issues relating to the kind, use, and design of the facility:

- The seismic criteria (return periods) and response spectrum to be used for the design of the pier/wharf structure. The selection of return periods should be clearly justified.

- The highest wind speed used for the analysis and design of the structure (and moorings), with justification.
- The effects of passing vessel traffic on the moored LNG tank vessel(s) and the associated loads on the mooring system.
- Analysis conducted of individual issues and with combined loads, with appropriate references.

Please note that LNG tanker capacity is typically given in cubic meters. However, deadweight tonnage (DWT) or displacement would provide a better metric for determining structural loads on the wharf. The FERC should use DWT in the engineering discussions related to wharf-vessel interaction(s).

Pursuant to the State CEQA Guidelines, Section 15165, the EIS must address the entire project, including, but not limited to, 1) the project-related portions of the interconnection facilities (transmission line routes, tie-in locations, etc.) to be built by SoCalGas and 2) the identification and clean-up of any potential contamination that may exist in the area formerly included in the naval shipyard.

The FERC should evaluate the use of tankers up to 200,000 cubic meters at the facility, including structural accommodations and transit and unloading times. Consideration should be given to requiring that the project use only new tankers in the delivery of LNG to the Port of Long Beach.

The various certificate programs (International Organization for Standardization or ISO, USCG Qual Ship 21) that exist to provide additional safety assurances for LNG carriers and import terminals should be evaluated and a determination made as to whether the SES project should obtain these certifications.

## **2. Existing and Projected Population and Demographic Characteristics of the Long Beach Location**

The proposed facility would be located in a high-density urban area serving as a major industrial zone, a nationally ranked port, and a major tourist destination. As illustrated in Figure 1, within one mile of the proposed LNG terminal there is no residential population, but there is an average daytime worker population of approximately 2,000 in addition to fully staffed public safety facilities operating 24 hours per day seven days a week. The Gerald Desmond Bridge, one of three bridges that allow access to Terminal Island, is also less than one mile from the site. The bridge carries approximately 53,000 vehicles per day.



A demographic profile of population within two, three, and five miles follows in Table 1 and is illustrated in Attachment A.

**Table 1: 2005 Demographic Profile of Area Within 2, 3 & 5 Miles of Proposed LNG Terminal**

	2 Mile Radius	3 Mile Radius	5 Mile Radius
Total Population	7,743	85,124	408,860
Total Households	3,033	29,246	136,051
Median Household Income	\$26,547	\$27,037	\$37,150
Majority Ethnic Group	Hispanic 55.4%	Hispanic 65.2%	Hispanic 54.4%
Total Businesses	893	3,822	11,235
Total Employees	16,085	44,037	113,855

Sources: U.S. Census, ESRI, InfoUSA

As part of its ongoing redevelopment efforts, downtown Long Beach is currently experiencing a residential building boom. More than 3,000 new housing units have either been recently completed, are currently under construction, or are in the planning stages. These units plus others that are being proposed will likely add at least 8,000 new residents to the downtown area by 2010. All of this new development is approximately two miles from the proposed LNG site.

The area within three miles of the site contains all of the Port of Long Beach, more than half of the Port of Los Angeles, all of greater downtown Long Beach, and a large part of the Los Angeles neighborhood of Wilmington, in addition to extensive industrial, warehouse, and transportation development and infrastructure. This area includes over 85,000 residents and at least 44,000 workers. A majority of residents within this area is Hispanic and tends to be low income. Drawn to the relatively affordable housing in the area around the ports, these residents are already subjected to many of the adverse impacts associated with living near a major port complex, not the least of which is poor air quality.

More than 400,000 people live within five miles of the project site. This area contains a large proportion of the total population of Long Beach, and most of the communities of San Pedro, Wilmington, and Harbor City, all of which are districts of Los Angeles. In addition to containing the entire ports of Los Angeles and Long Beach, this area includes a number of major oil refineries, chemical plants, and millions of square feet of industrial and warehouse space. Three major freeways and the Alameda rail corridor emanate from this area, which employs over 110,000 workers. In the next 20 years major increases in population, employment and cargo volume are predicted for this area.

## **Safety Issues and Concerns**

First and foremost, the state is concerned with the safety of a LNG terminal sited in an urban setting. The following hypothetical events could impact public safety and are constructed from publicly available materials including Sandia's *Guidance on Risk Analysis and Safety Implications of a Large Liquefied Natural Gas (LNG) Over Water*<sup>2</sup> and Richard Clark's *LNG Facilities in Urban Areas*.<sup>3</sup>

### **Intentional Acts**

**Hijacking:** As the LNG ship is brought into the port, it will be designated as a high-risk vessel by the USCG. That designation will require the vessel to be anchored outside of the breakwater to await a possible boarding team from the USCG. During this time period the ship will be unescorted and will not have any armed guards, making it the most vulnerable to a possible hijacking either by individuals on the ship or possible terrorists approaching the ship from a small craft. The waiting time for the USCG could be a short duration of 20-30 minutes up to several hours long. If the ship were to be hijacked, it could be navigated into a highly populated zone in the city such as the Queen Mary complex and crashed into a cruise ship, causing a fire or release of gas. It is also possible that the vessel could be hijacked at sea anywhere along its route and could enter coastal waters under terrorist control. Any modeling and development of security measures should consider all possible hijackings.

**Small Boat Attack (USS Cole):** While the ship is in transit into the port as well as while it is docked at the terminal, there is a constant risk of attack using a small boat filled with explosives to ram into the side of the ship to cause a release of gas and a fire. The risk to the ship increases during the transit from Queens Gate to the final berthing location due to the pleasure boat traffic in the area. The ship will also be moving very slowly (approximately 6 knots) and would make an easy and very large target. In addition to a small boat attack, the hijacking of either a cruise ship or a Catalina Express ferry to be used to crash into the LNG ship is a risk when the ship is coming through Queens Gate.

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<sup>2</sup> Sandia National Laboratories, December 2004, *Guidance on Risk Analysis and Safety Implications of a Large Liquefied Natural Gas (LNG) Spill Over Water*, Sandia National Laboratories Publication No. SAND2004-6258.

<sup>3</sup> Good Harbor Consulting, Inc., *LNG Facilities in Urban Areas, A Security Risk Management Analysis for Attorney General Patrick Lynch, Rhode Island*, May 2005.

**Rocket Propelled Grenade / Standoff Weapon Attack:** The LNG ships, as well as the storage tanks at the terminal, are vulnerable to attack by a rocket propelled grenade (RPG) or another type of standoff weapon that could be fired from either another vessel in the area, the breakwater or different locations on land. An attack of this nature could cause a release of gas and could also possibly provide an ignition source for a pool fire caused by LNG spilling from the storage tanks.

**Aircraft Attack:** There is a risk of ships or the LNG terminal coming under attack from either small or large aircraft for several reasons: (1) the ships and terminal would be located in close proximity to several international airports; (2) the take-off route from the Long Beach Airport runs down the Los Angeles River and over the port; and (3) numerous flight schools use the area over the port and ocean to train student pilots. Due to the response time required to scramble military aircraft to assist with an errant small plane, the Long Beach Police Department may be required to attempt to mitigate the risk of attack by providing its own air cover for the ship while it is in transit.

**Underwater Diver / Mine Attack:** It would be difficult for a diver to approach and attach explosives with enough accuracy to do sufficient damage to the vessel in transit due to the speed of the vessel and the amount of explosives required to breach its hull. The ship would be much more vulnerable to an attack by a diver while it is sitting at an anchorage outside of the breakwater waiting for a boarding party or while it is docked at the terminal. A mine attack is also possible while the ship is in transit in the port. In order to mitigate these risks, the police department may need to provide divers to search the piers prior to the arrival of an LNG ship into the port as well as periodic searches of the hull of the LNG ship itself.

**Sabotage:** Because a shipping company employee is a trusted agent of the ship and has free reign of the ship, an act of sabotage involving an employee is also a risk. Because of the design of the ships, it would be very difficult for one person to be able to cause a release of LNG without being quickly discovered by other members of the ship's crew. Nonetheless, the most vulnerable point for the vessel is while it is sitting at the outer anchorage waiting for a boarding party from the USCG or as the vessel is transiting into the port.

### **Unintentional Events**

**Collision:** The ship is also vulnerable to a collision with another ship while in the shipping lanes as it transits into the port, as well as a collision with the breakwater or another fixed object. This risk rises as the ship is being turned in the West Basin to be docked. If the ship were to be struck by another large vessel or object, a release of gas could also occur.

These worst-case scenarios could result in different types of releases of LNG

and different types of fires, all of which could impact the public. The different types of events that then could impact the public include the following:

**Pool Fire:** If LNG spills near an ignition source, the evaporating liquid in a combustible gas-air concentration will burn above the LNG pool. The resulting “pool fire” would spread as the LNG pool expanded away from its source and continued to evaporate. A pool fire is intense, burning much hotter and more rapidly than oil or gasoline fires. Because a LNG pool fire is so hot, its thermal radiation may injure people and damage property some distance from the fire itself. Many experts agree that a large pool fire, especially on water, is the most serious LNG hazard.

**Jet Fire:** If compressed or liquefied gases are released from storage tanks or pipelines, the materials discharging through the hole will form a gas jet that entrains and mixes with the ambient air. If the material encounters an ignition source, such as a welder’s torch, while it is in the flammable range, a jet fire may occur. Jet fires usually occur during unloading or transfer operations due to a pressure increase when pumping. Such fires could cause severe damage but most likely would be localized around the LNG facility.

**Flash Fire:** When LNG is released into the atmosphere, a vapor cloud forms and disperses. If the resultant vapor cloud is ignited before the cloud is diluted below its lower flammability level, a flash fire may occur. The combustion normally occurs within portions of the vapor cloud, rather than the entire cloud. A flash fire could potentially burn back to the release point, resulting in a pool or jet fire. It is unlikely for a pool or jet fire to explode when unconfined because it is open to the air and can be dispersed.

**Explosions:** A flash fire can occur if LNG is released into the atmosphere and ignited. If ignited in open (unconfined) areas, pure methane is not known to explode. However, if some of the vapor cloud is confined, methane fires can produce damaging overpressures. Confinement can be provided by spaces within the ship or nearby structures, such as an onshore building or another ship. Areas congested with equipment and structures might also facilitate an explosion if a vapor cloud is ignited within such an area. For example, if a vapor cloud infiltrates a chemical process plant in an area with various vessels, structures, and piping and the cloud ignites, the portion of the cloud within that congested area may generate an explosion.

**Thermal Radiation Levels on Population and Structures:** The extent to which people are injured by exposure to thermal radiation depends on both the incident heat flux and exposure time. A variety of data are available for estimating effects on people, including data from experiments with humans and animals and review of historical data. Like effects of thermal radiation on people, effects on structures also depend on incident heat flux and the exposure time. With structures, effects also depend strongly on the construction materials (e.g., wood,

steel, concrete).

### ***LNG Safety***

A number of studies and reports have been published about LNG tanker safety, with varying conclusions regarding the likelihood and consequences of a large LNG marine spill. In order to provide the federal government and general public with a clearer picture of the risks associated with LNG tankers, the Department of Energy (DOE) tasked Sandia National Laboratories (Sandia) to perform an independent review of these studies and reports and then develop its own conclusion about the risks associated with LNG tankers. Sandia was also tasked with developing guidance on a risk-based approach to assess and quantify potential threats to an LNG ship, to review the potential hazards and consequences of a large spill from an LNG ship, and review risk management strategies that could be implemented to reduce both the potential for, and the risks of, an LNG spillover on water.

The Sandia Report states that risk identification and risk management should be conducted in cooperation with appropriate stakeholders, including public safety officials and elected officials. These considerations should include site-specific conditions, available intelligence, threat assessments, safety and security operations, and available resources. It also determines that this approach should be performance-based and include identification of hazards and risks, protection required for public safety and property and risk prevention and mitigation strategies.

In light of the above, a threshold question that needs to be addressed in reviewing the SES proposal is whether or not an LNG facility should be located in an area of high population density, and, if so, how close to a highly populated area an LNG facility should be located, and what mitigation measures are required to diminish any dangers to the local population in the event of a catastrophe at the facility. In light of the possibility of an accident caused by human error, an earthquake, or a deliberate attack by terrorists, the questions concerning the safety of the citizens and businesses located in the vicinity of the proposed LNG facilities must be very carefully reviewed.

Section 311(d) of the Act lists six factors for the location of LNG facilities. These factors mirror the six factors for the location of LNG facilities in the Pipeline Safety Act of 1979, which amended the Natural Gas Pipeline Safety Act. See 49 U.S.C. § 60103(a). The fifth factor in Section 311(d), which involves emergency response capabilities, is a shorter paraphrase of the fifth factor in 49 U.S.C. § 60103(a). The other five factors in Section 311(d) and 49 U.S.C. § 60103(a) contain the same wording: “(1) the kind and use of the facility; (2) the existing and projected population and demographic characteristics of the location; (3) the existing and proposed land use near the location; (4) the natural and physical aspects of the location; ... and (6) the need to encourage remote siting.”

Congress’s decision to repeat these six factors therefore makes the legislative

history of the Pipeline Safety Act of 1979 still relevant. That legislative history made clear that Congress requires a high level of scrutiny of the safety risks when LNG facilities are located in densely populated areas. As Representative Dingell, one of the primary sponsors of the 1979 Act, stated: “Clearly, the location of volatile LNG facilities in an area of high density must be very carefully analyzed.” See 125 Cong. Rec. H 24904 (September 17, 1979) (Statement of Rep. Dingell).<sup>4</sup> On the day the House passed the Pipeline Safety Act of 1979, Representatives Murphy and Markey reaffirmed Representative Dingell’s previous statement that “the location of LNG facilities in high dense urban areas must be carefully analyzed.” See 125 Cong. Rec. H 32753 (November 15, 1979) (Statements of Reps. Murphy and Markey). Consequently, the safety risks associated with the siting of the proposed LNG facilities in the vicinity of the densely populated cities of Long Beach and Los Angeles, California must be very thoroughly evaluated.

To that end, the FERC should identify existing and planned land uses within one mile, two miles, three miles, and five miles of the site, using the information provided above. The EIS should discuss the effects of project construction on those land uses, the project’s operational compatibility with existing and planned land uses, and zoning requirements. Final locations of the proposed pipeline should be provided. The document should address any issues regarding proximity to the Long Beach Airport and other airports in the region. Sensitive receptors (schools, residences, etc.) within the entire five mile radius should be identified. The FERC should explain whether the thermal radiation and flammable vapor cloud exclusion zones will be under the legal control of the applicant. Also, given the high percentage of low-income and minority populations in close proximity to the site, the FERC should identify whether an environmental justice population exists by providing appropriate demographic information. The information in Table 1 above provides a good starting point. There should be adequate notification of affected groups to encourage their participation in the public review process. Table 1 should also be used to identify the affected communities that would be subject to an environmental justice review for air quality, public health, and hazardous materials.

The high density of residents and workers in close proximity to the LNG project demands that the most advanced and thorough modeling of projected impacts be undertaken. Therefore, the state is requesting that the FERC address each item listed below.

The EIS document should identify scenarios of possible releases of LNG at the terminal and the LNG truck loading facilities, and of natural gas from the pipeline. The FERC should also examine the safety issues raised by sending up to 45 LNG-loaded trucks each day from the Port of Long Beach through the Los Angeles

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<sup>4</sup> Representatives Markey and Dingell were the two primary sponsors of the LNG safety standards provisions in the Pipeline Safety Act of 1979. See 125 Cong. Rec. H 24901 (September 17, 1979) (Statement of Rep. Markey); 125 Cong. Rec. H 24903 (September 17, 1979) (Statement of Rep. Johnson).

metropolitan area, and into other parts of California. The analyses should identify the hazard footprints at such locations and the means to deal with the relationship of such footprints to the land uses surrounding or in proximity to the proposed terminal.

Hazard assessments should include worst-case scenarios (including those identified above) for the tanker and marine terminal facilities that could result from terrorist sabotage activities, human error, earthquakes, and equipment/systems breakdowns. The FERC should assess the hazards and risk of: (1) an LNG spill/release resulting from a collision of an LNG tanker (use current and projected tanker sizes) entering the harbor with other ship traffic transiting offshore, and/or with structures within the harbor area; (2) terrorist sabotage activities to marine terminal and/or LNG tanker (e.g. 747 hitting terminal, terrorist hijacking of tanker, terrorist bombing of tanker); and (3) an LNG spill or release from pipelines and storage tanks at or originating from the terminal facility (e.g., explosion of pipeline, accident during transfer operations, release from storage tank).

The scenarios and impact analyses should include: (1) an on-water rapid phase transition/flameless explosions; (2) instantaneous LNG pool fire; (3) fire from LNG flammable vapor clouds; (4) potential danger of asphyxiation from LNG vapor clouds; and (5) freezing impacts to humans, natural resources, and equipment in immediate vicinity of the LNG release, etc. These scenarios should be calculated in accordance with any applicable federal, state, and/or local government regulations.

Project proponents typically go through very involved analyses of risk to eliminate or reduce potential safety hazards. SES should detail this process to the FERC and Port of Long Beach, along with an explanation of why this process should be included in the EIS. Documenting the internal safety evaluations will help address concerns of the public regarding thoroughness of safety evaluations.

Terrorist risk is an issue of particular concern to the public. The FERC should identify all terrorist activities which, based on world history and projected future scenarios, could cause a release of LNG at the terminal. The state requests that the FERC consult with insurance companies in this regard. All such scenarios should be modeled.

Although documents prepared pursuant to the National Environmental Policy Act (NEPA) attempt to be as concise as possible, we urge expansion of the safety discussion to reflect the public's serious concerns over this issue. Until recently, only limited information on terrorism has been included in FERC environmental documents for proposed LNG terminal projects. Even if probabilities cannot be quantified or identified, the EIS should provide as much information as possible on terrorism risk. Please refer to the *Health and Safety Issues Final Report* for the Mare Island, California, LNG import facility as an example of useful descriptions of qualitative risk evaluations.

Many parameters must be examined in detail before one can conclude there would be or would not be a significant public safety risk. These parameters include

chemical composition of the vapor cloud or plume; physical attributes of the plume, including buoyancy, mixing rate, temperature, and density; normal or most likely meteorological conditions at the proposed site, including temperature, wind speed, and direction, inversion layers, and pollution levels; adverse meteorological conditions based on historical records; and alternative engineering designs to mitigate potential impacts. These analyses involve many postulated conditions. The recommended LNG vapor cloud study needs to consider a variety of meteorological conditions, including marine inversions. Based on the results of these analyses, measures should be identified that could mitigate potentially unacceptable consequences.

Specifically, the analysis of the source term associated with a potential perpetrated release from a tanker should include a range including full release of all contents to loss of the smallest tank. It should include a range of release rates ranging from five to 30 minutes.

Air dispersion modeling must account for dense gas behavior and include a range of winds and stability including winds ranging from one to 15 meters per second and stability classes ranging from A through F. The modeling for the tankers should reflect the concentration of NGLs present in expected LNG deliveries and the modeling for the storage tanks should reflect the different concentrations of the stored gases.

Analysis of potential impacts should include both potential delayed detonation and combustion of the released material without ignition during the initial release. The explosive behavior of NGL vapor clouds should be evaluated. Upper bound estimates of both injury and fatality associated with worst case potential perpetrated release scenarios must be provided.

The state is concerned that the commonly used 5 KW/m<sup>2</sup> thermal radiation flux criterion does not adequately protect the public. Instead, the FERC should model the distance to the “no observable adverse affect level,” considering both the worst-case intensity and duration of exposure, and the sensitivity of different populations that would be potentially exposed to an LNG fire at the Port of Long Beach. This is the approach that California uses in the licensing of power plants. At a minimum, the FERC should use a 1.5 KW/m<sup>2</sup> thermal radiation flux level, in addition to any additional thermal radiation flux levels that would identify effects and response times to individuals located closer to heat radiated from an LNG fire. The FERC should also analyze the distance at which thermal radiation would impair self rescue and require specially trained personnel and special emergency response equipment.

The analysis of a perpetrated release from a tanker must address the complex interaction of the LNG pool with land in the port and flow of waters in the port during tidal changes. The LNG will move with waters in the port and may impinge on the shore over a considerable area, posing the risk of increased impact. Existing models have serious limitations for estimating the potential impact of a release under such

conditions. It will be necessary to develop a modeling protocol in cooperation with stakeholders and experts to ensure that accurate results are obtained from such analyses.

The modeling assessment must identify and consider all locations within the port that may contain hazardous materials and assess whether a release of LNG and a subsequent fire could trigger cascading effects if the LNG fire were to encounter these sources. The FERC should model an LNG release using both current and future port densities, and current modeling approaches (e.g., models presented in the Sandia and ABS reports). Any differences should be compared and explained. The FERC should identify the nearest ignition source to the proposed LNG terminal and the effects of ignition on LNG plume travel, fire potential, and emergency response time and effectiveness.

The expected increasing ship traffic and dependency on imports received at the Port of Long Beach could increase both the potential for and repercussions of a release of LNG at the port.

The EIS should discuss the extent of legal liability for losses due to LNG spills.

The document should identify the locations of downstream natural gas pipelines needed to connect the proposed project to the state's natural gas system and address public safety issues associated with these types of facilities.

### **3. Existing and Proposed Land Uses near the Location**

The proposed LNG terminal site is located on the eastern end of Terminal Island, within the Port of Long Beach, in an area known as Pier T. The site was formerly occupied by part of the Long Beach Naval Shipyard, which was built on harbor fill around 1940. Currently, the immediately adjacent uses include terminals used by Fremont Forest Products, the Weyerhaeuser Company, Pacific Coast Recycling, and BP Oil. Most of the rest of Pier T is occupied by the Hanjin Shipping Company mega terminal. Within one mile of the proposed site there are several vulnerable facilities including: fire stations, Boeing Sea Launch, Maritime Preposition Ships, and the Defense Logistics Agency Fuel Facility, which provides jet fuel to critical military installations in the Southwest United States, as well as to Navy ships in the area. Other uses within one mile are shown in Figure 1, with the red line depicting the one-mile radius around the proposed terminal.

The Port of Long Beach is home to multiple facilities dealing with hazardous chemicals in addition to the LNG and NGLs processing (e.g., propane and ethane) associated with the LNG project. The presence of the NGLs increases the risk of an accident and the severity of the consequences. Any release and subsequent fire could impact these other facilities and result in cascading and far more extensive damage than what would occur from a release of LNG alone.

The Port of Long Beach is a major transportation and trade center, providing shipping terminals for nearly one-third of the waterborne trade moving along the West Coast. Nearly \$96 billion in trade moved through the Port of Long Beach in 2003, representing approximately 26 percent of the cargo containers moving through all West Coast ports. Trade through the port generates 1.4 million trade-related jobs throughout the nation; 320,000 jobs or one in 22 regional jobs in a five-county region consisting of Los Angeles, Orange, San Bernardino, Riverside and Ventura counties; and 30,000 Long Beach jobs or one in eight local jobs. These jobs are on the docks, in the shipping industry, in land and rail transportation, importing and exporting, manufacturing, and distribution and sales, in addition to construction of terminals and port improvements.

The Port of Long Beach is one of the world's busiest seaports, a leading gateway for trade between the United States and Asia. To provide a perspective, Long Beach is the second busiest port in the United States, it is the world's 12<sup>th</sup> busiest container cargo port, and, if combined, the ports of Long Beach and Los Angeles would be world's third busiest port complex, after Hong Kong and Singapore.

Almost all of the Port of Long Beach, including the H.M.S. Queen Mary tourist attraction, lies within the two-mile radius of the proposed facility. The Port of Long Beach is home to 4,445 public and private sector employees. The Queen Mary Seaport has about 2,500 visitors on weekdays and 4,000 on weekends. Adjacent to the Queen Mary is a Carnival Cruises terminal with 5,000 visitors when docked, and a terminal for Catalina Express boats that provides daily transportation to Catalina Island.

Located just northeast of the site is the Harbor Department Administration Building, which includes the Harbor Fire Department headquarters. The southwest corner of downtown Long Beach also falls within two miles of the proposed facility. This area of downtown includes the Greater Los Angeles World Trade Center, the Long Beach Federal Building, the Los Angeles County Courthouse, the City of Long Beach Public Safety Building (Police Headquarters), Fire Station 1, and City Hall, plus the tourist area of Rainbow Harbor including the Aquarium of the Pacific. Eighty high-rise office buildings and residential high-rise buildings, in addition to hotels and the Long Beach Convention and Entertainment Center, are also within this zone.

### **Marine Petroleum Infrastructure Area**

The SES project would be located in an area of marine petroleum infrastructure of critical importance to the state. The area within three miles of the site contains all of the Port of Long Beach, more than half of the Port of Los Angeles, and all of the greater downtown of Long Beach. The combined ports of Long Beach and Los Angeles contain several marine terminals that provide critical petroleum infrastructure services for California. Approximately 60 percent of the imported crude oil and 80 percent of imported refined petroleum products that come to California are handled by marine terminals located in the Los Angeles Basin. There are several operational petroleum marine terminals in close proximity to the proposed SES

tanker berth.

Crude oil imports into the Los Angeles Basin are expected to increase between 84 and 135 million barrels over the next 20 years.<sup>5</sup> The increased quantity of crude oil imports into the Los Angeles Basin represents an average annual rate increase of between 1.5 and 2.2 percent. Imports of refined petroleum products into the Los Angeles Basin are expected to increase between 2.4 and 4.6 billion gallons (57 to 110 million barrels) over the same period of time.<sup>6</sup> The increased quantity of refined petroleum products into the Los Angeles Basin represents an average annual rate increase of between 5.9 and 8.3 percent. Assuming the average size of the marine tankers used to transport the crude oil and refined petroleum products remain similar to today, these average rates of increased imports can be considered as surrogates for increased visits of marine petroleum tankers to San Pedro Harbor over the next 20 years.

Sandia, in its report “*Guidance on Risk Analysis and Safety Implication of a Large Liquefied Natural Gas (LNG) Spill over Water*,” suggested that risk management responses should be based on hazard zones. These zones differ depending on whether an accidental spill or an intentional spill is considered. The following petroleum facilities in San Pedro Harbor would be located within the Zone 3 security distance (1.6 km) for an intentional release:

- 100 percent of the crude oil marine terminals.
- 45 percent of the total volume of gasoline and blending components transferred through the marine terminals.
- 44 percent of the total volume of diesel and jet fuel transferred through the marine terminals.
- 81 percent of the total volume of fuel oil and bunker fuel transferred through marine terminals.
- The entire Valero Wilmington refinery.

### **Safety Issues and Concerns**

Security zones around an LNG vessel would reduce the time available for petroleum tanker (and other vessel) movements. Separate from the Sandia report distances discussed above, the USCG has promulgated security zone regulations<sup>7</sup> for movement of liquefied hazardous gas tank vessels (including LNG tankers) in the

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<sup>5</sup> California Energy Commission, April 2005, *An Assessment of California's Petroleum Infrastructure Needs*, Staff Report, pp 14-15, Table 3, page 31, California Energy Commission, publication CEC-600-2005-009.

<sup>6</sup> California Energy Commission, April 2005, *An Assessment of California's Petroleum Infrastructure Needs*, Staff Report, pp 15-18, Table 3, page 31, California Energy Commission, publication CEC-600-2005-009.

<sup>7</sup> Code of Federal Regulations, July 1, 2004 Edition, Volume 33, Chapter 1, Section 165.1151, page 755.

Regulated Navigation Area<sup>8</sup> of San Pedro Harbor. Current regulations specify that entry into or remaining in these security zones is prohibited within specified geographic areas while liquefied hazardous gas tank vessels are moored or in transit within the Regulated Navigation Area of the San Pedro Harbor. While these tank vessels are transiting to or from Pier T126, the security zone extends 1,000 yards ahead and 500 yards on each side and astern of the vessel. While the liquefied hazardous gas tank vessel is moored or in the process of mooring, the security zone extends in a 500-yard radius around the vessel on the shore and all waters. Note that the USCG is currently evaluating what distances should be established around LNG tankers while they are in transit and in port.

The expected frequency of LNG tankers and the scope of the security zones would decrease the operational availability of the San Pedro Harbor waters for other marine vessels, namely petroleum tank vessels. SES representatives have estimated that the proposed LNG terminal at Pier T126 in the Port of Long Beach will receive an average of 120 LNG tank vessels per year. SES representatives have also indicated that the transit time between Queens Gate (Long Beach Harbor entrance) and Pier T126 for the LNG tankers is approximately 50 minutes each way. As noted, LNG tankers would require up to 14 hours to discharge their cargos of LNG.<sup>9</sup>

While the LNG tank vessel is moored at Pier T126, the 500-yard radius security zone should not prevent the movement of other petroleum tank vessels to and from their respective known berth locations within the Regulated Navigation Area of the San Pedro Harbor.

With regard to the potential effects of the LNG tank vessel transit security zones, the state has calculated that the time available for marine vessels to operate in the ship channel between the Long Beach Harbor entrance and the vicinity of Pier T126 would be diminished by a minimum of 12,000 minutes or 200 hours per year. Although this quantity represents only 2.3 percent of the time available during a year, the marine vessel activity in the San Pedro Harbor is forecast to continue growing absent the presence of a LNG terminal.

In the case of a catastrophic release of LNG, if the petroleum facilities located in the wider Sandia Zone 3 distances (1.6 km) were unavailable for several days to a week wholesale gasoline and petroleum product prices in Southern California would rapidly increase. Petroleum infrastructure marine terminals located outside of Zone 3 would not be available to receive additional imports of refined petroleum products due to lack of sufficient spare capacity. In addition, the other petroleum infrastructure marine terminals located outside Zone 3 would not be able to import additional supplies of crude oil because they lack sufficient storage tank capacity,

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<sup>8</sup>.Code of Federal Regulations, July 1, 2004 Edition, Volume 33, Chapter 1, Section 165.1152, page 756.

<sup>9</sup> Comments provided by Thomas Giles, Chief Operating Officer of Sound Energy Solutions, during the United States Coast Guard public meeting held in Long Beach, California on July 11, 2005.

are not configured appropriately, and are not connected by pipeline to the Southern California refineries.

There is no precedent on the West Coast for such a large temporary loss of crude oil and refined petroleum product supply on a temporary basis, although we are now seeing impacts from hurricane Katrina that could be used as a basis for evaluation of a supply disruption on the West Coast. By comparison, significant refinery outages of less than 10 percent of statewide capacity have resulted in wholesale price spikes of approximately 50 cents per gallon for gasoline for periods of time in excess of four weeks. The wholesale price spike associated with a temporary loss of the petroleum infrastructure marine terminals in Zone 3 would be much greater. Not only would there be a decreased ability to import refined petroleum products, but the marine terminals that are used to import crude oil would also be temporarily out of service. Local refineries would reduce output as crude oil inventories decline or completely shut down if the marine terminals remained closed for an extended period of time.

The U. S. Department of Defense has indicated that the construction and operation of the LNG terminal would have the potential to interrupt fuel deliveries to/from the Defense Logistics Agency Fuel Facility and could impact critical operations. This facility serves as a fuel supply depot for military bases in the U.S. Southwest. Although not a direct safety issue, the FERC should evaluate the impacts on the supply depot from normal LNG tanker operations and any indirect safety impacts due to a possible impairment of military operations. More directly, the FERC should evaluate the impacts of a sizable accidental release of LNG on the supply depot, assuming that fuel is being actively unloaded from full fuel tankers, and the cascading safety impacts on the Port of Long Beach and downstream military operations. While outside the scope of this report, the state suggests that the FERC contact the Defense Logistics Agency, Defense Energy Support Center, to discuss additional potential impacts on military operations if the LNG terminal is built and operated.

Decreased availability of operational time within the San Pedro Harbor would increase marine vessel congestion, potentially increasing costs and delaying scheduled deliveries of crude oil and refined petroleum products. The FERC should explain what steps, if any, could be taken to avoid or reduce the potential impacts of decreased availability of operational time within the San Pedro Harbor. Although there has been no attempt here to quantify the potential economic impacts on the nation's and state's petroleum infrastructure since that topic is outside the scope of this report, the state requests that the FERC address this issue due to the extreme importance of petroleum fuel operations in the Port of Long Beach and its value to the U.S. Southwest and California.

The Department of Homeland Security (DHS) periodically changes the threat alert status for the United States or specific geographic areas of the country. The EIS should identify any changes in geographic scope of security zones for LNG tank vessel operations for other land-based LNG terminal operations in the United States

over the last three years. Specifically, have any existing security zones been enlarged as a direct result of elevated threat levels posted by the DHS? Further, have there been any other operational restrictions for marine vessels, including petroleum tank vessels, over this same period of time during periods of elevated threat levels? If so, the FERC should explain how elevated threat levels posted by the DHS could further reduce or restrict availability of operational time within the San Pedro Harbor.

An LNG facility at the Port of Long Beach would supply natural gas to Southern California load centers. LNG fires impacting the terminal and natural gas pipelines could seriously impact the availability of natural gas for critical operations. An interruption in gas could endanger public health and safety in a wider area. Repercussions from any reduced availability should be evaluated in the EIS.

The FERC should evaluate the air emissions associated with proposed LNG vessel traffic, including LNG tanker and support vessels off the coast of California and at the port, and during construction and ongoing operation of the import terminal and re-gasification facility. Any feasible measures to avoid, reduce, or eliminate project-related air emissions should be evaluated.

### **Non-Attainment Area for Certain Air Pollutants**

The SES project would be located in the South Coast air district in a non-attainment area for certain air pollutants. The South Coast Air Quality Management District is considered a non-attainment area for ozone (both 1-hour and 8-hour standards), for particulate matter (PM<sub>10</sub> and PM<sub>2.5</sub>) and for carbon monoxide. The Port of Long Beach is a significant contributor of air emissions. These air emissions are of particular concern to the health and safety of local residents. The EIS should identify criteria pollutant emissions from terminal construction and operation (e.g., vaporization or flare emissions), pipeline operation (e.g., new compressors), and LNG tanker and support vessel operations. SES has proposed using a portion of the delivered LNG rather than diesel as a vehicle fuel, creating an air emission reduction. The FERC should identify the potential air emission reductions and potential benefit to public health and safety based on the current and future emission standards for diesel-fueled vehicles. In addition, chronic (long-term) non-cancer hazard and cancer risk, and acute (short-term) non-cancer hazard resulting from exposure to non-criteria pollutants resulting from terminal construction and operation should be evaluated.

## **4. Natural and Physical Aspects of the Location**

The Port of Long Beach is almost entirely manmade, from the deep-water channels to the immense landfills. Terminal Island is a landfill area with significant liquefaction potential and a surface elevation at or below sea level. According to the soil profile in the City of Long Beach Seismic Safety Element, the entire port area is characterized by predominately man-made fill areas consisting of hydraulic fills,

assorted man-made fills, and soils of questionable origin, generally composed of fine sand and silt. Terminal Island is also in a flood zone area (Zone AE, a special flood hazard area inundated by 100-year floods) with particular susceptibility to tsunamis and seismically induced flooding. The Newport-Inglewood Fault Zone is located only a few miles northeast of this proposed LNG site. Furthermore, this entire port area has historically experienced large-scale subsidence.

Expanding upon the above, there are potential earthquake hazards at the proposed SES LNG Long Beach site. These are acknowledged in SES Resource Report No. 6, in which the SES consultant lists 27 local faults “potentially having a significant contribution to the ground-motion hazard at the LNG terminal site.” Compounding the earthquake-related risks at the SES LNG site, the California Department of Conservation, Division of Mines and Geology, “Official Map, Seismic Hazard Zones, Long Beach Quadrangle,” [within which the Port of Long Beach and most of the City of Long Beach are situated], dated March 25, 1999, identifies the proposed site as located within a “liquefaction zone,” “an area where historic occurrence of liquefaction, or local geological, geotechnical and groundwater conditions indicate a potential for permanent ground displacement such that investigation as outlined in Public Resources Code §2693(c) would be required.”

History illustrates the seriousness and immediacy of the earthquake risk: California DOC DMG Open File Report 98-19, “Seismic Hazard Evaluation of the Long Beach 7.5-Minute Quadrangle, Los Angeles County, California” reports: “In the Long Beach Quadrangle, numerous effects attributed to liquefaction were noted following the 1933 Long Beach earthquake including numerous leaks in gas lines, water mains broken, roads cracked, and displaced pavement.... During the 1994 Northridge Earthquake significant damage occurred to facilities [in the Port of Los Angeles, near the southwestern corner of the Long Beach Quadrangle] ... Features that developed at these localities, such as lateral spreading, settlement, and sand boils, manifested liquefaction.” Such effects could have potentially catastrophic fire-related consequences at a LNG terminal site holding an intense concentration of potentially flammable material.

According to SES in Section 6.3 of its Resource Report No. 6 attached to its application (“SES RR No.6”): “The LNG terminal site is located in a region of high seismic activity, which is concentrated to the northwest, north and southeast of the site.” (SES RR No. 6, p. 6). As an example of a historical earthquake within about 21 km of the site, SES referred to the “1933 Long Beach earthquake, a magnitude 6.4 event generated by the Newport-Inglewood fault approximately 13 miles (21 km) from the site.” See SES RR No.6, p.6.

In SES’s Resource Report No.6, pp. 8-9, SES has identified “[o]nly those [earthquake] faults potentially having a significant contribution to the ground-motion hazard at the LNG terminal site,” yet SES listed 27 faults in its Table 6-3, as described in Table 2:

**Table 2: Summary of Fault Parameters**

Fault Name	Abbreviation	Type	M <sub>max</sub> (M <sub>w</sub> )	Distance Mi (km)
THUMS-Huntington Beach	THUMS - HB	R-RL	7.0	1.4 (2.2)
Palos Verdes – PV & San Pedro Shelf Segments	PVF	RL-R	7.0-7.4	2.5 (4)
Newport-Inglewood – Onshore	NIF	RL	7.0-7.2	4.4 (7)
Palos Verdes-Santa Monica Bay	PVF-SMB	RL	6.6	11.3 (18)
Puente Hills Thrust—Santa Fe Springs & Coyote Hills segments	PHT-SFS CH	R	7.1	10.6 (17)
Puente Hills Thrust—Los Angeles segment	PHT-LA	R	6.9	15 (24)
Elysian Park Thrust	EPT	R	6.6	18.1 (29)
Newport-Inglewood – Offshore	NIOF	RL	7.0	21.9 (35)
Santa Monica	SantaMon	LL-RO	6.6	23.8 (38)
Whittier-Elsinore-Whittier segment	WEWhittier	RL	6.9	19.4 (31)
Hollywood	Hollywd	LL-RO	6.6	24.4 (39)
Raymond	Raymond	LL-RO	6.5	25 (40)
Verdugo	Verdugo	R	6.7	26.3 (42)
Sierra Madre	SierraMa	R	7.4	30 (48)
Northridge	Northrdg	R	6.9	35 (56)
San Fernando	SanFern	R	6.7	35.6 (57)
Cucamonga	Cucamong	R	7.0	36.3 (58)
Whittier-Elsinore-Glen Ivy segment	WEGlenIvy	RL	6.9	38.1 (61)
Santa Susana	SantaSus	R	6.8	40.6 (65)
Whittier-Elsinore-Temecula segment	WETemecula	RL	7.0	46.9 (75)
San Andreas-Mojave segment	SAMojave	RL	7.5	50.6 (81)
San Jacinto-San Bernardino segment	SJSanBer	RL	6.75	52.5 (84)
San Andreas-San Bernardino segment	SASanBer	RL	7.25	54.4 (87)
San Jacinto-San Jacinto segment	SJ SanJac	RL	7.0	56.3 (90)
San Jacinto-Anza segment	SJAnza	RL	7.4	74.4 (119)
San Andreas-Coachella Valley segment	SACoache	RL	7.5	100 (160)
San Andreas-Carrizo segment	SACarriz	RL	7.75	106.3 (170)

SES further recognized in its Resource Report No.6 that there was a significant risk of liquefaction at its proposed site for its LNG facilities at the Port of Long Beach. As SES stated in this Resource Report:

According to the Maps of Seismic Hazard Zones prepared by the California Department of Conservation, Division of Mines and Geology (now known as the California Geological Survey), the Project, including the pipeline and electric distribution line routes, is located within a liquefaction hazard zone (CDMG, 1998).

The combination of high seismicity, shallow groundwater conditions and weak hydraulic fills with predominantly sandy and silty soils result in a significant potential for liquefaction at the LNG terminal site. Liquefaction-induced hazards at the site include post-earthquake settlements in the hydraulic fill area, and shaking-induced lateral deformations and potential instability of the existing waterfront structures (Appendix 6-1, URS, 2003b). See SES RR No.6, p. 11.

The site is in the middle of a subsidence zone caused by oil extraction. Subsidence is up to 27 feet in the area and is 18 feet on the proposed site. The subsidence has split the underlying land into man-made “fault blocks.” The site sits on one of these blocks that is barely wider than the site. The subsidence zone is supported by constant, pressurized water injection.

The site is subject to tsunamis. A nearby fault could produce a major tsunami with virtually no warning. Pacific Rim quakes can also bring large tsunamis to the area.

The proposed project is located within the Wilmington oil field, one of the larger oil fields in California. Based on the Division of Oil, Gas, and Geothermal Resources’ (DOGGR) initial review, there are plugged and abandoned wells within close proximity to the project boundaries.

### **Safety Issues and Concerns**

The natural physical aspects of the proposed location must be carefully examined, particularly given the seismicity of the area and the potential for liquefaction of the landfill at the Port.

California Coastal Act Section 30253 requires new development to (1) minimize risks to life and property in areas of high geologic, flood, and fire hazard and (2) 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 or cliffs.

California Coastal Act Section 30232 requires an applicant to protect against the spillage of crude oil, gas, petroleum products, and other hazardous substances and to provide effective containment and cleanup facilities and procedures for accidental spills that do occur.

The FERC should provide historic information on wave conditions and flooding, including frequency of various wave and flooding conditions and extreme conditions that have been recorded or anecdotally identified. If site-specific information is not available, then extrapolate from information known from the general project area.

The FERC should identify safe building elevations based on wave conditions, historic shoreline trends and the Intergovernmental Panel on Climate Change projections for changes in eustatic sea level, combined with local changes in higher high water or mean sea levels.

The FERC should provide historic and prehistoric records of tsunamis within the general region of the proposed project and evaluate the site relative to recent State Office of Emergency Service and National Oceanic and Atmospheric Administration (NOAA) maps of tsunami risk zones.

Based on the above, the EIS should identify feasible measures to avoid, reduce, or eliminate potential adverse impacts (e.g., develop a Tsunami Response Plan that would include an employee education program, posting of evacuation routes, etc.).

The FERC should prepare sufficient information to satisfy California Geological Survey Note 48 “Checklist for the Review of Geologic/Seismic Reports for California Public Schools, Hospitals, and Essential Services Building.” This checklist provides detailed guidance on preparing materials for review of essential services buildings. The California Coastal Commission will evaluate the proposed LNG facility as a critical structure(s) equivalent to an “essential services building.” In particular, the FERC should:

- Evaluate liquefaction hazards and develop mitigation measures, (per “Recommended Procedures for Implementation of DMG Special Publication 117, Guidelines for Analyzing and Mitigating Liquefaction in California; published by the Southern California Earthquake Center and the University of Southern California).
- Evaluate fault rupture hazards by conducting a fault and earthquake study (per guidelines of the California State Board for Geologists & Geophysicists) and develop appropriate structural setbacks from any active fault traces identified.
- Develop seismic design criteria for the Upper Bound Earthquake (UBE), defined by the California Building Code as “the motion having a 10 percent probability of being exceeded in a 100-year period or maximum level of motion which may ever be expected at the site within the known geological framework.”

An analysis of the likelihood of ground rupture, seismic shaking, mass wasting and slope stability, liquefaction, subsidence, and expansion or collapse of soil structures at the project site should be provided, with an explanation of how design standards of the LNG storage tanks will ensure their integrity during severe earthquakes.

In view of the high seismic activity in this area and the potential for liquefaction at the Port of Long Beach, SES has proposed certain design and mitigation measures. In reviewing SES's proposal in this regard, the following questions, among others, need to be addressed:

- Will the measures that SES has proposed to solidify the foundation be sufficient in the event of a major earthquake and subsequent liquefaction of the ground? What is the confidence interval associated with that assessment?
- Have these techniques to solidify the foundation ever been put to the test in real world circumstances? If so, what were the outcomes?
- Even in cases of non-critical failure, such as pipeline rupture, how long would it take to make the LNG facility's systems functional again? What are best- and worst-case scenarios for earthquake-related supply disruption?

Any plugged or abandoned wells should be properly located and plotted on the project map to determine their exact location to proposed construction.

Building LNG facilities over or in the proximity of plugged and abandoned wells should be avoided. If this is not possible, it may be necessary to re plug wells to current DOGGR standards. Improperly plugged wells, or wells not plugged to current standards, can create a hazardous condition if they leak natural gas or oil. Also, DOGGR is authorized to order the reabandonment of previously plugged wells when construction over or in the proximity of wells could result in a hazard (Section 3208.1 of the Public Resources Code). If reabandonment is necessary, the cost is the responsibility of the landowner.

## **5. Emergency Response Capabilities near the Facility**

Public safety is the overriding consideration in any decision related to the proposed LNG facility. With that in mind, the following provides the potential impacts to emergency services associated with a LNG facility in the Port of Long Beach.

### **Resource Needs for Firefighting**

It is important that identification of specific required capabilities on-site or in the local community, that are in place — or more importantly not in place — be made to manage consequences of an LNG release. Based on the sum of previously described risk management scenarios, the Long Beach Fire Department has made a preliminary assessment of the resources needed to implement response strategies.

#### ***Training***

- **Firefighting Training:** According to Texas A & M University, the study committee identified that sending firefighters occasionally to train on LNG fires was inadequate. A scheduled allotment of individuals, who should attend throughout the year for the life of the terminal's existence, should be identified. LNG presents unique firefighting issues the fire service does not routinely face. Currently, the West Coast lacks any type of LNG training facilities.
- **Dive Training:** As in Everett, Massachusetts, a qualified dive team will need to “clear” the dock and surrounding structures as the ship arrives in Port. This staffing-intensive operation will require continued training of dive personnel and dive masters.
- **Hazardous Material Training:** Within the day-to-day operations of a LNG terminal, situations exist that go beyond the scope and expertise of a basic firefighter. It would be reasonable to expect the proprietors of the facility to provide consistent hazardous materials and confined space training.

#### ***Equipment***

- **Fireboats capable of mitigating a large LNG spill on water:** Currently in the United States tugboats, which are used to maneuver the LNG tankers dockside, are

being used jointly as fireboats. The Long Beach Fire Department believes that tugboat operators lack the qualifications associated with professional firefighting. In the event of a large LNG pool fire, the tugs may be tied to the tanker as the event takes place. Their usefulness for firefighting will be called into question. Based on fire prediction models, close proximity firefighting with regard to the tanker will be prohibitive. Firefighting efforts will be directed at covering exposure from the radiated heat, thus mitigating the problem. Additionally, if the fireboats were utilized every time a LNG tanker came to port, maintenance costs for the increased activity of the boats would need to be addressed.

- Dive Team: All equipment necessary to perform the operation of searching for explosive devices as necessary. This equipment would consist of normal diving equipment (e.g., dry suits, scuba gear, PPE, etc.) and the necessary tools to perform searches, such as communication systems, infrared systems, and any other ancillary equipment that would provide a safe working condition.
- Dive Boat and a brick and mortar station to house the boat: This includes dive personnel and support staff.
- Dry Chemical: According to the book “Liquefied Natural Gas in California,” water is ineffective in fighting LNG fire because it provides a heat source for vaporization. Therefore, an ample supply of dry chemical is needed to extinguish any fire.
- Fire Apparatus: An agreed upon number of fire apparatus that are equipped with the appropriate dry chemical agent that would be put into service should there be a spill in the terminal. Though the terminal will have built-in fire-extinguishing systems, it is important to have back-up equipment in case of a system failure.
- Suppression Material: A sufficient supply of dry chemical and foam on scene to replenish any used product should it be put to use.
- Staffing: A full time fire prevention LNG inspector and a full time fire prevention plan checker for the duration of the construction and build-out.
- Three brick and mortar fire stations: Levels as low as 4,000 Btu/hr/ft<sup>2</sup> can cause buildings to ignite after prolonged exposure. The Sandia report also states that levels as low as 7000 Btu/hr/ft<sup>2</sup> can cause buildings to ignite after just a short exposure. It also appears that the maximum exposure for firefighters to operate for long periods of time, even in PPE, is approximately 2,500 Btu/hr/ft<sup>2</sup>. In this case, both Fire Stations 15, 20 and 24 are in areas that would be exposed to radiant heat flux that exceed the above levels.
- Currently, Fire Station 24 is on the proposed LNG site.

### **Resource Needs for Security Response**

As part of the risk assessment for a LNG terminal in the Port of Long Beach, it is important to identify the mitigation measures for each of the risks to the safety and security of an LNG terminal, ship, and, more importantly, the citizens of Long Beach. Based on the risks to the security and safety involving a LNG ship and terminal in

the City of Long Beach, the following resources have been identified by the Long Beach Police Department:

### ***Equipment***

- **Boats:** The Police Department will require a minimum of three boats capable of transiting rough seas in order to enforce a security zone around the LNG ships. One boat is required to act as a command and control vessel. This boat would be capable of supporting a long-term critical incident. The additional two boats would be required to act as fast interceptor boats capable of speeds over 65 MPH in order to stop any small vessels from attempting to breach the security zone around the LNG vessel. Each of these boats will require radio and electronic packages for navigation and communication. Additionally, personnel to staff the boats and maintenance, operations and replacement costs must be considered.
- **Staffing:** Personnel, equipment and training costs to secure vulnerable points on land as well as monitor the breakwater. In addition, personnel may be needed to provide an armed boarding party for the LNG ship if requested or required to do so by the USCG. The exact number of police officers and security officers needed to do this task has not yet been determined.
- **Helicopter:** Replacement and maintenance costs associated with the use of the police helicopter and staffing required to provide air coverage for the LNG ship's transit into the port complex.
- **Weapons:** Weapons systems and training required by boat crews and helicopter crews to stop a small vessel containing terrorists intent on crashing into the LNG ship.
- **Docking:** Additional dock space for the police department boats as well as a possible launch ramp next to a police department boathouse to allow the quick deployment and recovery of the interceptor boats when not being used to protect the LNG ships.
- **Boathouse:** Relocation of the police department boathouse within the harbor, possibly to Pier J, in order to ensure the police department resources are not destroyed and staff not injured by an LNG incident at the terminal or as the ship transits within 50-100 feet of the current police department boathouse and docks.

### **Safety Issues and Concerns**

At this time, the resources outlined above are preliminary. In order to fully assess the emergency response capabilities and required resources, the owners of the proposed LNG facility and/or the FERC should provide a comprehensive report which should include an analysis of "reasonable worst-case scenarios" using risk and hazard analysis (including intentional acts or terrorist attacks). The consequences should be described in terms of impacts on surrounding infrastructure, communities, and terminals. Each security risk should be weighed

and any mitigation methods, as well as the resources necessary to carry out the mitigation methods, should be clearly identified. This assessment will allow gaps in resources to be identified and rectified in order to allow the police and fire departments to continue to provide protection to the Port of Long Beach as well as the LNG ships and terminal. While there are limitations in existing data and current-modeling capabilities for analyzing LNG spills over water, existing tools, if applied as identified in the Guidance section of the Waterway Suitability Assessment, can be used to identify and mitigate hazards to protect both public life and property.

Once that assessment is complete, the City of Long Beach would contract with an outside consultant to work with the fire and police departments to establish standards of protection and implement the recommendations required to maintain the mitigation capability of any incident related to an LNG facility. In addition to identifying resources, the total fiscal impact to the City of Long Beach of any LNG facility should be identified and full reimbursement for all additional service, security and fire protection must be included in any model developed for the delivery of LNG in the proposed project.

In conducting the above, the FERC should identify the international, federal, state, and local agencies (e.g. International Maritime Organization, USCG, U.S. Department of Transportation Office of Pipeline Safety, State Lands Commission, CPUC, California State Fire Marshal, State Water Resources Board, local fire and police departments, etc.) that govern the design and operation of the proposed LNG import terminal and the LNG tankers offloading at the terminal. Each agency's regulations and responsibilities to prevent and protect against hazardous spills/releases should be identified.

The FERC should identify the maritime security measures that will be in place to prevent sabotage of LNG tankers and cargo (e.g. inspection of security and tanker loading at port of origin; advance 96-hour notice of arrival of LNG tankers; advance notification of local police, fire, and emergency agencies; boarding of LNG tanker for inspection before entering port; tug escort requirements, etc.). The security measures proposed for the facility must address plausible scenarios involving a paramilitary attack on the facility from water surface, underwater, and land.

The FERC should assess navigation hazards offshore the Los Angeles/Long Beach harbors, identify ship offloading hazards at the terminal, and identify measures to prevent or reduce the impacts of an LNG spill/release (e.g. use of double hulled tankers with separated sealed tanks, traffic lanes, hazard points during ship offloading at the marine terminal, shut-off valves, operational procedures, etc.). Mitigation measures should reference applicable international, federal, state, and local regulations, as well as company initiatives.

Operating safety is largely controlled by the operations plan (O-Plan) submitted after the EIS is finalized. O-Plans are not made available to the public for security

reasons. Please consider providing a generic overview of the O-Plan or, at a minimum, include the O-Plan's table of contents.

The EIS should identify and evaluate measures to mitigate the spread of LNG spills on water (e.g., floating berms around a spill at sea or a tanker at berth).

## **6. Need to Encourage Remote Siting**

In promulgating the 1979 amendments to the Natural Gas Pipeline Safety Act, Congress included the need to encourage remote siting as a factor for safety standards for the location of LNG facilities. See 49 U.S.C. § 60103(a). The legislative history of these amendments makes clear that Congress intended that these standards “would require remote siting to the maximum extent possible.” 125 Cong. Rec. H 24901 (September 17, 1979) (Statement of Rep. Markey). This factor was repeated in the Act, instead of a more qualified sixth factor, which was proposed in the House Energy Bill, but rejected by the Conference Committee. Any review of the SES proposal must consider whether the site has been located remotely “to the maximum extent possible.”

The California Coastal Act governing the scope of the California Coastal Commission's jurisdiction states, in part, “Where feasible, new hazardous industrial development shall be located away from existing developed areas.” California Public Resources Code (“PRC”), § 30250(b); and, further, “New development shall: (1) Minimize risks to life and property in areas of high geologic, flood, and fire hazard.” PRC, § 30253(1) 10 Coastal Zone Management Act Of 1972, as amended through P.L. 104-150, The Coastal Zone Protection Act of 1996.

The pending SES application states that “[s]ince SES did not identify any significant environmental or technological advantage with offshore technologies or any significant environmental issues with the proposed onshore site, no offshore technologies or sites were evaluated” as part of SES's process of choosing the Long Beach site. SES App., Vol. III, Resource Report No. 10, p. 42.

The applicant's process using this type of test does not appear to be consistent with either the congressional test of “maximum extent possible” or the California Legislature's direction. The analysis by the FERC needs to more fully address how the SES project can conform to both sets of direction.

### **Advantages to Siting in Urban Areas like the Terminal Island Location**

#### ***Close Proximity to Urban Infrastructure and Employment***

The project applicant, SES, has stated that an industrial port is considered the proper place to site an LNG facility. The locational advantages involve convenient transportation of LNG fuel from the tankers to adjacent storage facilities throughout

the port and Wilmington areas as well as a readily available source of fuel for industrial vehicles and equipment.

The project applicant has projected port employment from this LNG facility to be approximately 1,000 construction jobs over a 36-month period and 61 full-time jobs for LNG operations (including 28 truck drivers). The vicinity of the proposed location also provides a significant pool of qualified workers, thereby reducing the need for long commutes or relocation of workers from other areas.

LNG storage in a non-urban site could increase transportation and storage costs. In addition, the infrastructure to support the operation, such as pipelines, and highways may need to be constructed, adding to costs. Depending on the remote area, there could be significant environmental impacts due to the disruption and improvements necessary to support a new facility.

The availability of LNG fuel is an advantage. With the inclusion of a fueling station, the fuel will be immediately accessible to users within the local area.

### **Disadvantages to Proposed Terminal Island Location and Reasons For Remote Siting**

#### ***Catastrophic Accident Potential***

The placement of an LNG facility should be evaluated in the full context of its potentially hazardous factors, both natural and man-made. The City of Long Beach is potentially both a military and terrorist target due to the port operations and oil production/storage facilities and national economic importance valued at over \$1 billion a day.

Many experts agree that a LNG pool fire, especially on the water, is the most serious LNG hazard due to thermal effects. Such pool fires are intense, burning more hotly and rapidly than oil or gasoline fires. Large pool fires cannot be extinguished. All LNG materials must be consumed before the pool fire goes out. Because LNG pool fires are so intensely hot, their thermal radiation may injure people and property at a distance from the actual fire location. The distance at which any member of the public could be continuously exposed without injury should be the minimum distance considered in remote siting. The potential for cascading events must be considered in deriving this distance.

A major LNG incident at this proposed port location could result in damage to both people and property over an area that could include downtown Long Beach as well as residential neighborhoods north of the port. In the event of a major accident, deaths and serious injury could reach into the thousands for port employees and nearby residents. Both the port and downtown Long Beach might sustain long-term economic damage that could seriously cripple the nation's import capacity (at present, approximately 40 percent of all imports to this country enter through the

Long Beach and Los Angeles ports).

### ***Terrorist Target***

LNG facilities could be vulnerable to terrorist attack due to the large size and easy visibility of the storage infrastructure.

The following comes from *LNG Facilities in Urban Areas, A Security Risk Management Analysis for Rhode Island Attorney General Patrick Lynch*:

“While there is no adequate way in which to determine the probability of a terrorist attack on the proposed urban LNG facility [Keyspan LNG facility] and inland waterway transit routing, there are adequate grounds to judge that such an attack would be consistent with terrorists’ demonstrated intent and capability. There is also a basis to judge that likely enhanced security measures would not significantly reduce the risk. While there are some differences among experts about the conditions needed to generate a catastrophic explosion and about the precise extent of the resulting damage, there is [sic] significant grounds to conclude that a high risk exists of catastrophic damage from the types of attacks terrorists are capable of mounting.”

In the event a LNG tanker is attacked, a one-mile fire and thermal radiation radius could disrupt a significant amount of oil infrastructure in and near the port. Damage to the infrastructure would affect production and injection facilities, but would be repairable in two to four years. The fire could cause additional fires, explosions, and secondary fires in the oil field from oil and gas production in and around pipelines and wells. The fire would be confined mostly to equipment and employees operated by Tidelands Oil Production Company, a contractor of the City of Long Beach. Net revenue loss for the state, Port of Long Beach, City of Long Beach and other individual working interest owners (not including any expenditure for repairs) would be between \$120 million to \$240 million. If Tidelands Oil Production Company, a contractor to the City of Long Beach, chose not to rebuild, the long-term net revenue loss to stakeholders would increase into the billions. Additionally, though not a part of the oil operations, oil being shipped from ships to the dock in the port at the BP terminal could be destroyed causing fires and oil spills in the ocean.

Siting an LNG storage facility in a non-urban setting would reduce the incentive for a terrorist attack. Terrorist targets have been chosen by factors involving population density of an area and/or specific congregation points, as evidenced by the World Trade Center in New York and the public transportation facilities in Spain and Britain.

## **Safety Issues and Concerns**

Any review of the SES proposal must assess whether the site has been located remotely “to the maximum extent possible” and must consider the level at which no member of the public would sustain injury if continuously exposed to an LNG fire in this assessment.

The FERC must address why a more remote onshore location could not be developed using the Act, Natural Gas Pipeline Safety Act, and the California Coastal Act as guidelines for evaluation. This analysis must include a comparative safety analysis of potential impacts associated with the proposed facility as compared to with more remote types of facilities. This same analysis must also consider whether or not offshore sites could be developed as alternatives to the SES project. The SES application identifies two proposed offshore projects in Southern California, the BHP Billiton proposal near Cabrillo Port, and the Crystal Energy proposal at Platform Grace offshore of Oxnard. Whether or not such offshore projects are potential alternatives to the SES proposal should be part of this review. Both offshore projects have filed applications to the USCG for authority to construct and operate offshore LNG facilities and considerable information is available on these alternatives.

## ***Summary***

Consideration of an LNG facility within the City of Long Beach is a complex issue requiring a detailed and thorough analysis. To date, that analysis has not been published and the foundational information for such an analysis has not been made public. Placement of such a facility in a densely populated high-impact area must not occur until a comprehensive risk, economic, and fiscal impact assessment is complete. At a minimum, the assessment must address:

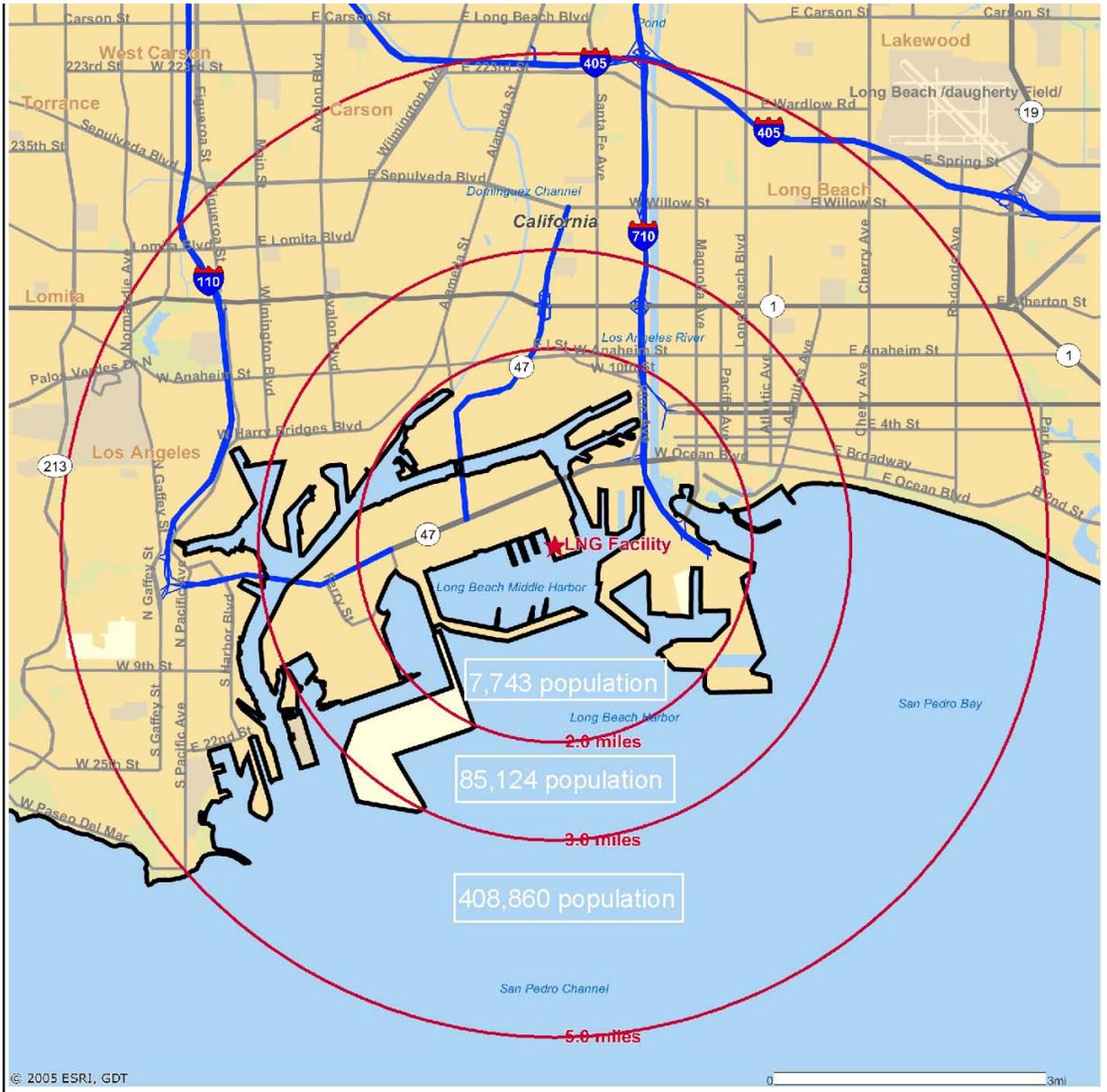
- Impacts to the surrounding population, economy, and transportation network in the event of a catastrophic event.
- Impacts to existing port operations and surrounding terminal operations during arrival and departure of LNG tanker vessels.
- The ability of the USCG to provide the required waterway security, and if not funded to do so, the impact on local police and fire resources.
- Impacts to air traffic within the flight path above the proposed LNG facility.
- Reasonable worst-case scenarios using risk and hazard analyses (including terrorist attacks).
- A comprehensive waterborne, landside and air security plan developed in consultation with the City of Long Beach.
- Standards for protection and implementation of the recommendations by the City of Long Beach fire and police departments to mitigate any incident related to an LNG facility.

## FERC Safety Advisory Report—POLB

- Identification of the complete fiscal impact to the City of Long Beach resulting from any LNG facility, including cost recovery.
- Impacts to the U. S. Navy, and the U.S. Department of Defense resulting from the proposed LNG facility.
- An assessment of the homeland security threat.

## Attachment A Proposed LNG Terminal Vicinity Map

Prepared by City of Long Beach Advance Planning; Latitude: 33.7546 August 17, 2005 Longitude: -118.223



## CERTIFICATE OF SERVICE

I hereby certify that I have this day served the foregoing document by U.S. mail, first class postage prepaid, upon each person designated on the official service list compiled by the Secretary in this proceeding.

Dated at Sacramento, CA this 7<sup>th</sup> day of September, 2005



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Lynn Tien-Tran  
California Energy Commission, MS-14  
1516 Ninth Street  
Sacramento, CA 95814  
(916) 654-3951