

## CALIFORNIA COASTAL COMMISSION

45 FREMONT, SUITE 2000  
SAN FRANCISCO, CA 94105-2219  
VOICE AND TDD (415) 904-5200  
FAX (415) 904-5400



RECORD PACKET COPY

**Th4**

April 22, 2004

TO: Coastal Commissioners and Interested Parties

FROM: Al Wanger, Deputy Director  
Alison Dettmer, Manager, Energy and Ocean Resources Unit

RE: **California State Lands Commission Briefing Paper on Proposed Liquefied Natural Gas ("LNG") Import Terminals**

Attached is a short briefing paper prepared for the California State Lands Commission ("SLC") by SLC staff that summarizes recently proposed liquefied natural gas ("LNG") import terminal facilities to be sited in California. Over the past two years, a number of LNG project developers announced plans to build LNG import terminals along the West Coast, including onshore and offshore facilities in California. LNG, a liquid form of natural gas (cooled to -259°F), is 600 times smaller in volume than natural gas in its vapor state, and can be transported in insulated double-hulled ships. In most cases, the LNG is then re-gasified and distributed as natural gas through pipelines to consumers. LNG can also be used in its liquid form as alternative vehicle fuel.

This briefing paper focuses on SLC's leasing jurisdiction over LNG facilities and the status of each project's environmental review. It includes a summary of each pending project, general information on LNG and its properties, and maps of existing and proposed LNG facilities in the United States. The proposed BHP Billiton ("Cabrillo Port") and Crystal Energy LNG terminals will require submittal to the Coastal Commission of a consistency certification pursuant to the requirements of the federal Coastal Zone Management Act and an application for a coastal development permit. Sound Energy Solutions' proposed LNG facility within the Port of Long Beach will require the Coastal Commission's approval of a port master plan amendment. Based on current schedules, the Coastal Commission will consider these project proposals sometime in 2005.

The Commission staff is providing this briefing paper for information purposes only.

**LIQUEFIED NATURAL GAS (LNG) PROJECTS  
PENDING BEFORE THE  
CALIFORNIA STATE LANDS COMMISSION**

**State Lands Commission Staff Paper**

**April 16, 2004**

## **Introduction**

In September 2003 and February 2004, the California State Lands Commission received applications from BHP Billiton LNG International, Inc. and Crystal Energy, LLC for new pipeline Right-of-Way Leases associated with proposed liquefied natural gas (LNG) deepwater port projects in federal waters offshore California. A third company, Sound Energy Solutions, is proposing to construct an LNG terminal on lands that have been legislatively granted to the Port of Long Beach. Additionally, ChevronTexaco Corp. may submit an application to the Commission in late 2004 for an LNG terminal in State waters offshore Southern California. This staff report summarizes information related to these four proposed LNG projects.

## **California and Natural Gas**

According to the California Energy Commission (CEC) Staff Report, *Natural Gas Market Assessment* (Pub. No. 100-03-006, August 2003), California, the second largest natural gas consumer in the nation, consumed 2.2 trillion cubic feet (Tcf) of natural gas in 2003. By 2013, natural gas demand in the State is projected to reach 2.4 Tcf, in part as a result of the growing use of natural gas for electric generation. Compressed natural gas (CNG) and LNG are also used for transportation. California has imported natural gas from out of State to meet its needs since the 1940s. Today, imports represent approximately 85 percent of supply and are anticipated to rise to 88 percent by 2013.

In December 2003, the CEC adopted the *2003 Integrated Energy Policy Report* (Pub. No. 100-03-019), which serves as the foundation for energy policies and decisions affecting the State. State government entities are directed to carry out their duties and responsibilities based upon the information and analyses contained in the Report once it is adopted by the Governor. From this report, State energy policies related to natural gas, which were designed to ensure a reliable supply of natural gas sufficient to meet California's demand, can be summarized as follows:

1. The highest priority for balancing the State's energy demand with supply is to increase energy efficiency in the natural gas marketplace by, among other strategies, enforcing the State's building and appliance standards, funding conservation and energy efficiency programs, deploying cogeneration and distributed generation technologies, and replacing or upgrading older, less-efficient natural gas-fired power plants with modern electricity generators.
2. The second-highest priority for balancing the State's energy demand with supply is to reduce natural gas dependence by means such as implementing natural gas energy-efficiency and conservation programs and using renewable energy resources (wind, geothermal, biomass, solar).
3. The third-highest priority focuses on developing new natural gas infrastructure, including new sources of supplies, such as LNG.

### **Liquefied Natural Gas**

LNG is natural gas in its liquid form after being cooled to a temperature of minus 259°F. Since LNG is 600 times smaller in volume than natural gas in its normal vapor state, LNG can be transported in double-hull ships designed to handle low temperatures and insulated to limit the amount of LNG that boils off or evaporates (this boil-off gas is often used to fuel the ships). In many cases, the LNG is then re-gasified and distributed as natural gas to customers through pipelines. LNG can also be used in its liquid form as an alternative fuel for vehicles. Additional information is provided in Attachment 1 (modified from the CEC document entitled *Frequently Asked Questions About LNG*).

### **Previously Proposed LNG Facilities in California**

In the early 1970s, several companies proposed to build and operate LNG import facilities in California in or near Oxnard, Point Conception, and the Port of Los Angeles. Since the agencies involved in site approval could not agree on a preferred site, the State Legislature enacted the Liquefied Natural Gas Terminal Act of 1977 (formerly Public Utilities Code §§ 5550 et seq.); this Act has since expired. Under this Act, the California Public Utilities Commission (CPUC), with input from the California Coastal Commission (CCC) and the State Energy Resources Conservation and Development Commission (now the CEC), could approve an LNG terminal at a site "remote from human population in order to provide the maximum possible protection to the public against the possibility of an accident."

In May 1978, following analyses of siting criteria relative to population density, wind and wave conditions, earthquake faults, soil conditions, and other factors, the CCC adopted and transmitted to the CPUC a ranking of four (of 82 nominated) potential onshore LNG terminal sites—(1) Horno Canyon in Camp Pendleton, San Diego County; (2) Rattlesnake Canyon, San Luis Obispo County; (3) Little Cojo near Point Conception, Santa Barbara County; and (4) Deer Canyon, Ventura County.<sup>1</sup> In September 1978, the CCC found that the most appropriate site for an offshore LNG terminal appeared to be in international waters of the southeast part of Ventura Flats in the Santa Barbara Channel that could be linked to shore via a subsea gas pipeline to the Oxnard area.<sup>2</sup> The CPUC eventually approved an onshore site at Point Conception, contingent upon demonstration of earthquake safety, due to its remote location.

On November 27, 1978, the Commission issued a 30-year General Lease - Industrial Use, to Western LNG Terminal Associates beginning January 1, 1979 for the construction, operation and maintenance of a LNG receiving, storage and re-gasification terminal and all related marine facilities. However, the project proponents cancelled the proposed project when LNG became uneconomical, the LNG terminal was never built, and the Lease was quitclaimed back to the State, effective January 1, 2000.

---

<sup>1</sup> California Coastal Commission. 1978. *Final Report Evaluating and Ranking LNG Terminal Sites*.

<sup>2</sup> California Coastal Commission. 1978. *Offshore LNG Terminal Study*.

### **Current and Recently Proposed LNG Facilities: North America**

Currently, the United States has four LNG-receiving and regasification terminals; these are located in: Lake Charles, Louisiana; Elba Island, Georgia; Cove Point, Maryland; and Everett, Massachusetts; a fifth facility is located in Peñuelas, Puerto Rico. In November 2003, the Maritime Administration (MARAD) approved a license for Port Pelican, LLC (an affiliate of ChevronTexaco Corp.) to construct and operate the nation's first LNG deepwater port approximately 40 miles off the Louisiana coastline (Attachment 2). The port would consist of an LNG ship-receiving terminal, storage, and regasification facilities, with interconnecting pipelines to deliver natural gas into the interstate gas pipeline network. Additional projects are pending before the Federal Energy Regulatory Commission (FERC) and the U.S. Coast Guard (USCG)/MARAD (Attachment 3).

On the West coast, six LNG projects have recently been proposed in California, and several companies are proposing to construct and operate LNG import facilities in Baja California, Mexico. Four of the proposed California projects remain under consideration:

- separate proposals by BHP Billiton and Crystal Energy to build LNG facilities in federal waters offshore Ventura County that would connect with onshore pipelines in and near Oxnard, California;
- one at a to-be-determined location in State waters offshore Southern California; and
- one at the Port of Long Beach. (See discussion below and Attachments 4 & 5).<sup>3</sup>

### **Addressing Public Concerns**

Pursuant to a Memorandum of Agreement signed on December 5, 2003, the USCG, MARAD, and State Lands Commission are preparing a joint Environmental Impact Statement/Environmental Impact Report (EIS/EIR) in response to BHP Billiton's application to construct and operate an LNG deepwater port offshore Ventura County. To date, a third-party consultant managed by the Commission has been contracted to prepare the EIS/EIR, a Notice of Intent/Notice of Preparation (NOI/NOP) of an EIS/EIR was published in the State Clearinghouse and *Federal Register*, and oral and written comments were taken at public scoping meetings held in March 2004 and via mail and email. The joint EIS/EIR, as well as the EIS/EIR that will be prepared for the proposed Crystal Energy LNG deepwater port, will satisfy the requirements of both the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA).

In its environmental reviews for the joint EIS/EIRs, State Lands Commission and USCG staff will thoroughly research and independently analyze issues and concerns raised by agencies and the public. Opponents of LNG projects have focused particularly on health and safety issues. For example, they envision acts of terrorism, such as hijacking an

---

<sup>3</sup> In January 2003, Bechtel Enterprises suspended negotiations with the city of Vallejo to build an LNG terminal and regasification facility on Mare Island. In March 2004, Calpine Corp. withdrew its plans for an LNG terminal at Samoa Point, Eureka, based on feedback from the local community and public officials. Also in March 2004, Marathon Oil Corp. dropped plans to build an LNG terminal on Mexico's Pacific coast after the Mexican Government purchased the proposed site and removed it from consideration.

LNG tanker that would be detonated at Oxnard or Port Hueneme, igniting a vapor cloud that could demolish the area; concerns with the siting and operation of proposed new onshore pipelines have also been expressed. A January 2004 explosion at an LNG production plant in Algeria has intensified public concern (see CEC Fact Sheet, Attachment 6).<sup>4</sup> Attachment 7 presents a draft hazard and risk analysis process that will be a component of the EIS/EIR documentation to be prepared. Attachment 8 presents a diagram of the public review and agency decision-making process.

### **Commission's Role with Respect to the Proposed California LNG Terminals**

Three of the four LNG project proposals in California are offshore facilities that will be under the leasing jurisdiction of the Commission, where the Commission will act as the Lead Agency under the CEQA; for the onshore project, the Commission has review responsibilities as a Trustee Agency. These four projects are summarized below.

### **Commission as Lead Agency under the CEQA**

1. **BHP Billiton**. On September 3, 2003, BHP Billiton LNG International, Inc., a wholly-owned subsidiary of BHP Billiton Limited (Australia), submitted an application to the Commission for a pipeline Right-of-Way Lease associated with its proposed "Cabrillo Port" LNG Deepwater Port. The USCG is the lead agency under the Deepwater Port Act and the NEPA. As proposed, BHP Billiton would construct and operate a floating storage and re-gasification unit (FSRU) that would be moored approximately 13.9 miles offshore of the nearest point of land (near the Ventura/Los Angeles County border) in 2,900 feet of water. LNG from the Pacific basin would be delivered by tanker, offloaded onto the FSRU, and regasified. Natural gas in vapor form would then be delivered onshore via two new 21.1-mile-long, 24-inch-diameter natural gas pipelines laid on the ocean floor. The State lease application calls for the construction and operation of the portion of these two pipelines across State lands. These pipelines would come onshore at Ormond Beach in Oxnard. New pipeline loops would also be constructed to connect the offshore pipeline with the Southern California Gas Company (SoCalGas) intrastate pipeline system to distribute natural gas throughout Southern California. The facilities would be designed to deliver a peak of up to 1.5 billion cubic feet per day (Bcf/d), with an anticipated average rate of 0.6 to 0.9 Bcf/d. Pending receipt of all approvals, BHP Billiton estimates the proposed project will be operational by 2008, at a cost of approximately \$600 million. More detailed project information is provided on the Commission's website, <http://www.slc.ca.gov>, and a project website, <http://www.cabrilloport.ene.com>.
2. **Crystal Energy**. In February 2004, Crystal Energy, LLC submitted an application to the Commission for a pipeline Right-of-Way Lease associated with the company's proposal to convert and operate federal Platform Grace as an LNG terminal and re-gasification facility. The USCG is the lead agency under the Deepwater Port Act and

---

<sup>4</sup> The attached CEC Fact Sheet, dated March 22, 2004, has yet to be updated to reflect an April 14, 2004, story by the Mobile Register that the accident may have been associated with a release of an as yet to be identified "liquid gas" (both LNG and liquid petroleum gas were present in some quantities at the plant).

the NEPA. Crystal Energy has signed a long-term agreement with Venoco, Inc. (the platform operator) for use of the platform, which lies approximately 11 miles offshore Ventura County. As proposed, ships will deliver LNG to Platform Grace, where it will be offloaded, re-gasified, and delivered onshore via a new natural gas pipeline that will be laid on the ocean floor. The pipeline would reach landfall near the Mandalay Bay Power Generation Station in Oxnard, where it would connect into the SoCalGas pipeline system after construction of new onshore pipelines.

3. **ChevronTexaco**. In March 2004, ChevronTexaco Corp. informed Commission staff of its intention to submit an application, possibly in late 2004, for an LNG storage and re-gasification facility at a to-be-determined location in State waters offshore Southern California. No application has been submitted to date. Since this project would not meet the criteria for a federal deepwater port due to its location in State waters, the NEPA lead agency may be the FERC.

### **Commission as Trustee Agency under the CEQA**

4. **Sound Energy Solutions (SES)**. SES, a wholly owned subsidiary of Mitsubishi Corp., proposes to construct and operate a LNG receiving/re-gasification terminal at the Port of Long Beach, on lands that have been legislatively granted to the Port; therefore, the Commission is reviewing the proposed project as a Trustee Agency. As proposed, LNG would be shipped to California aboard LNG carriers, offloaded, and either distributed in liquid form for fuel distributors or re-gasified for delivery via a new pipeline to the local SoCalGas transmission system. SES has submitted State and federal applications to the Port of Long Beach and the FERC, which are preparing a joint EIS/EIR. The CPUC has claimed in a letter to the FERC that California has jurisdiction over LNG facilities within its borders, and that SES must submit an application to the CPUC for the proposed LNG terminal. In response, the FERC concluded, in an order issued on March 24, 2004, that regulatory authority for the siting and construction of LNG import terminals rests exclusively with the federal government. The State has until April 23 to seek a rehearing before the FERC on the decision; depending upon the outcome of the FERC rehearing, California could take the matter to federal appellate court. The FERC order does not apply to deepwater port projects, where the USCG is the designated federal lead agency.

### **Staff Activity**

As previously indicated, the Commission, USCG, and MARAD are preparing a joint EIS/EIR in connection with the State and federal applications received for the BHP Billiton Cabrillo Port LNG Deepwater Port project. Public scoping meetings and "open houses" for the proposed project were held in Oxnard on March 15, 2004 and in Malibu on March 16, 2004; the informal, open house format allowed meeting participants to review displays, maps, and literature and to meet agency staffs, members of the EIS/EIR project team, and personnel from BHP and SoCalGas, while the scoping meetings provided an opportunity for the public to provide oral and/or written comments. The public comment period closed on March 31. Staff currently anticipates releasing a



public draft EIS/EIR this summer, and bringing the EIR and State lease application for the Commission's consideration by the end of 2004.

The Commission, USCG, and MARAD will also prepare a joint EIS/EIR in connection with the State and federal applications received for Crystal Energy's proposed LNG deepwater port at Platform Grace. Crystal Energy's applications are not complete at this time, and a consultant has not yet been selected to prepare the EIS/EIR. A critical item that needs to be resolved before the consultant selection process can begin is the need for a revised Development and Production Plan for Platform Grace to be submitted to the Minerals Management Service. Staff currently anticipates bringing the EIR and State lease application for the Commission's consideration in Summer 2005.

In its Trustee Agency role, Commission staff submitted comments on the NOI/NOP for the proposed SES Port of Long Beach LNG Project, and will continue to monitor this Project and comment on its associated EIS/EIR as appropriate. The Commission's Marine Facility Division may have a significant role in the proposed land-based facilities due to the Commission's statutory mandates, pursuant to the Lempert-Keene-Seastrand Oil Spill Prevention and Response Act of 1990, to inspect or cause to be inspected all marine facilities and their associated equipment, and to monitor marine facilities operations and the effects on public health, safety, and the environment.

The Commission staff is also actively informing and coordinating with State and local agencies as a member of the State's LNG Interagency Permitting Working Group. This group, which meets monthly, has been established by the CEC to promote close communication among and support for agencies potentially involved in the permitting process of any LNG facility in California.



# Frequently Asked Questions About LNG\*

## What is LNG?

Liquefied natural gas, or LNG, is natural gas in its liquid form. When natural gas is cooled to -259° Fahrenheit (-161° Celsius), it becomes a clear, colorless, odorless liquid. LNG is neither corrosive nor toxic. It is mostly methane, with low concentrations of other hydrocarbons, water, carbon dioxide, nitrogen, oxygen, and some sulfur compounds. During the process known as *liquefaction*, natural gas is cooled below its boiling point, removing most of these compounds. The remaining natural gas is mostly methane, with only small amounts of other hydrocarbons. LNG weighs less than half the weight of water, so it will float if spilled on water.

## Where does LNG come from?

Most of the world's LNG supply comes from countries with large natural gas reserves. These countries include Algeria, Australia, Brunei, Indonesia, Libya, Malaysia, Nigeria, Oman, Qatar, and Trinidad and Tobago.

## What countries import LNG?

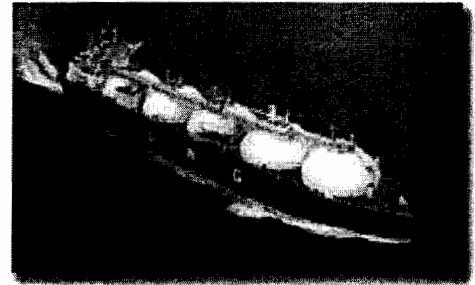
There are 40 LNG-receiving terminals located worldwide. Japan, South Korea, the United States, and a number of European countries import LNG.

## Where are LNG import terminals located in the United States?

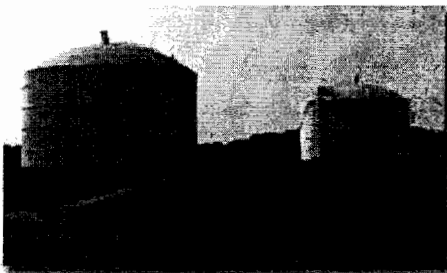
LNG terminals in the United States are located in Everett, Massachusetts; Cove Point, Maryland; Elba Island, Georgia; and Lake Charles, Louisiana. There is also a terminal in Peñuelas, Puerto Rico.

## How is LNG transported?

LNG is transported in double-hull ships specifically designed to handle the low temperature of LNG. These carriers are insulated to limit the amount of LNG that boils off or evaporates. This boil-off gas is sometimes used to supplement fuel for the carriers. LNG carriers are up to 1,000 feet long, and require a minimum water depth of 40 feet when fully loaded. There are currently 136 ships that transport more than 120 million metric tons of LNG every year. (Source: University of Houston IELE, *Introduction to LNG*)



LNG Vessel  
Photo courtesy of CH-IV International  
<http://www.ch-iv.com>



LNG Storage Tanks  
Cove Point Import Terminal, Maryland  
Photo courtesy of Dominion © 2003, [www.dom.com](http://www.dom.com)

## How is LNG stored?

At most terminals, when LNG is received, it is transferred to insulated storage tanks that are built specifically to hold LNG. These tanks can be found above or below ground and keep the liquid at a low temperature to minimize the amount of evaporation. If LNG vapors are not released, the pressure and temperature within the tank will continue to rise. LNG is characterized as a cryogen, a liquefied gas kept in its liquid state at very low temperatures. The temperature within the tank will remain constant if the pressure is kept constant by allowing the boil-off gas to escape from the tank. This is known as *auto-refrigeration*. The boil-off gas is collected and used as a fuel source in the facility or on the tanker that transports it. When natural gas is needed, the LNG is warmed to a point where it converts back to its gaseous state. This is accomplished using a regasification process involving heat exchangers.

## How is natural gas stored?

Natural gas may be stored in a number of ways. It is most commonly stored under ground, under pressure, in three types of facilities. The most commonly used facilities in California are depleted reservoirs in oil and/or gas fields, because they are more available. Aquifers and salt cavern formations are also used under certain conditions. The characteristics and economics of each type of storage site

\* Adapted from <http://www.energy.ca.gov/lng/faq.html> by Ecology and Environment, Inc. in association with a joint EIS/EIR being prepared for the U.S. Coast Guard and State Lands Commission for the proposed BHP Billiton LNG Deepwater Port.

will dictate its suitability for use. Two of the most important characteristics of an underground storage reservoir are its capability to hold natural gas for future use and its deliverability rate. The deliverability rate is determined by the withdrawal capacity of the associated valves and compressors and the total amount of gas in the reservoir. In other states, natural gas is also stored as LNG after the natural gas has been liquefied and placed in aboveground storage tanks. (Source: U.S. Department of Energy, Energy Information Administration)

### How is LNG used?

LNG is normally warmed to make natural gas to be used in heating and cooking, as well as electricity generation and other industrial uses. LNG can also be kept as a liquid to be used as an alternative transportation fuel.

### Why use LNG?

Natural gas is the cleanest burning fossil fuel. It produces fewer emissions and pollutants than either coal or oil. The North American supply basins are maturing, and as demand for natural gas increases in California and throughout the United States, alternative sources of natural gas are being investigated. Natural gas is available outside North America, but it is not accessible by pipelines. Natural gas can be imported to the United States from distant sources in the form of LNG. Because LNG occupies only a fraction (1/600) of the volume of natural gas, and takes up less space, it is more economical to transport across large distances and can be stored in larger quantities. LNG is a price-competitive source of energy that could help meet future economic needs in the United States.

### Is LNG flammable?

When cold LNG comes in contact with warmer air, it becomes a visible vapor cloud. As it continues to get warmer, the vapor cloud becomes lighter than air and rises. When LNG vapor mixes with air, it is flammable only if it is within 5% to 15% natural gas in air. If it is less than 5% natural gas in air, there is not enough natural gas in the air to burn. If it is more than 15% natural gas in air, there is too much gas in the air and not enough oxygen for it to burn.

### Is LNG explosive?

As a liquid, LNG is not explosive. LNG vapor will explode only if it is in an enclosed space and within the flammable range of 5% to 15% when mixed with air.

### What is a rapid-phase transition?

When enough LNG is spilled on water at a very fast rate, a rapid-phase transition, or RPT, occurs. Heat is transferred from the water to the LNG, causing the LNG to instantly convert from its liquid phase to its gaseous phase. A large amount of energy is released during this rapid transition between phases, and a physical explosion can occur. While there is no combustion, this physical explosion can be hazardous to any nearby person or buildings.



Photo courtesy of CH-IV International  
<http://www.ch-iv.com>

### What about security?

All LNG ships must comply with all pertinent local and international regulatory requirements, which include regulations and codes set forth by the International Maritime Organization (IMO), the U.S. Maritime Administration (MARAD), the U.S. Coast Guard, and the U.S. Department of Transportation (DOT), as well as the hosting port authority.

DOT regulations must be followed at onshore LNG facilities and marine terminals. The DOT Research and Special Programs Administration regulations include 49 *Code of Federal Regulations* 193, "Liquefied Natural Gas Facilities: Federal Safety Standards." These standards specify siting, design, construction, equipment, and fire protection requirements that apply to new LNG facilities and to existing facilities that have been replaced, relocated, or significantly altered.

Offshore marine terminals must follow regulations set by the Coast Guard. The Coast Guard monitors the safety of coastal waters around the United States and ensures the safety of ships while in U.S. waters and in port by preventing other ships from getting near LNG tankers. The Coast Guard works with local harbor authorities and LNG facility personnel to ensure that proper procedures are followed. The Coast Guard and MARAD are the Federal agencies responsible for siting offshore LNG facilities and are currently developing regulations.

## DEEPWATER PORT ACT FACT SHEET

### Deepwater Port Act of 1974

The Deepwater Port Act of 1974, as amended (the Act, 33 U.S. Code [U.S.C.] 1501 *et seq.*), regulates the location, ownership, construction, and operation of deepwater ports in waters beyond the territorial limits of the United States, and authorizes the Secretary of Transportation to license the ownership, construction, or operation of a deepwater port. The Secretary of Transportation has since delegated the authority to issue, transfer, amend, or reinstate a license for the construction and operation of a deepwater port to the Maritime Administration (MARAD). The Act also provides for the protection of marine and coastal environments from adverse effects of the development of such ports.

### Deepwater Ports

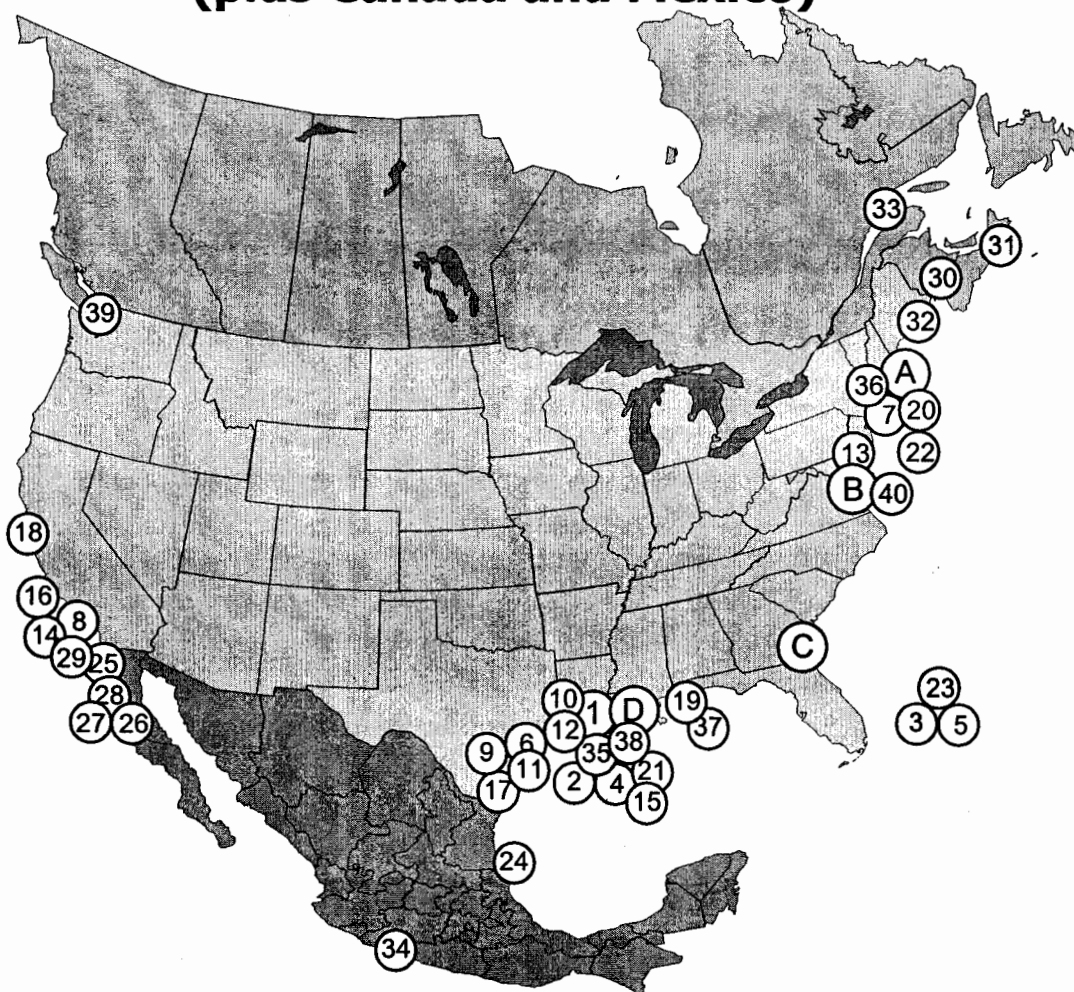
According to the Act, a deepwater port is a fixed or floating manmade structure other than a vessel, or a group of structures, located beyond the territorial sea and off the coast of the U.S., used or intended for use as a port or terminal for the transportation, storage, and further handling of oil or natural gas for transportation to any State. Deepwater ports must not interfere with international navigation or other reasonable uses of the high seas and the construction of the port must represent the best available technology in order to minimize adverse impacts on the marine environment.

### Issuing a License

A notice of each complete license application must be published in the *Federal Register*. The U.S. Coast Guard and MARAD (along with other Federal agencies) must evaluate the potential for each deepwater port to impact the natural and human environment, by complying with the National Environmental Policy Act (NEPA), during the application review process. The analysis must contain information regarding the effect on the marine environment, the effect on oceanographic currents and wave patterns, and the effect on alternate uses of the oceans and navigable waters, the potential danger to deepwater ports from waves and the weather, the effects on land-based developments effect on human health and welfare, and other considerations the Secretary deems necessary. The application review process must be completed in less than one year from the date of initial application.

To issue a license, MARAD must find that the applicant is financially responsible, can and will comply with applicable laws and regulations, and that the construction of the port is in the national interest.

# Existing and Proposed Lower-48 LNG Terminals (plus Canada and Mexico)



Attachment 3, Page 1

February 2004

Office of Energy Projects

## Existing Terminals with Approved Expansions

- A. Everett, MA : 1.035 Bcfd (Tractebel)
- B. Cove Point, MD : 1.0 Bcfd (Dominion)
- C. Elba Island, GA : 1.2 Bcfd (El Paso)
- D. Lake Charles, LA : 1.2 Bcfd (Southern Union)

## Approved Terminals

- 1. Hackberry, LA : 1.5 Bcfd, (Sempra Energy)
- 2. Port Pelican: 1.6 Bcfd, (Chevron Texaco)
- 3. Bahamas : 0.84 Bcfd, (AES Ocean Express)\*
- 4. Gulf of Mexico: 0.5 Bcfd, (El Paso Global)

## Proposed Terminals – FERC

- 5. Bahamas : 0.83 Bcfd, (Calypso Tractebel)
- 6. Freeport, TX : 1.5 Bcfd, (Cheniere / Freeport LNG Dev.)
- 7. Fall River, MA : 0.8 Bcfd, (Weaver's Cove Energy)
- 8. Long Beach, CA : 0.7 Bcfd, (SES/Mitsubishi)
- 9. Corpus Christi, TX : 2.6 Bcfd, (Cheniere LNG Partners)
- 10. Sabine, LA : 2.6 Bcfd (Cheniere LNG)
- 11. Corpus Christi, TX : 1.0 Bcfd (Vista Del Sol/ExxonMobil)
- 12. Sabine, TX : 1.0 Bcfd (Golden Pass/ExxonMobil)
- 13. Logan Township, NJ : 1.2 Bcfd (Crown Landing LNG – BP)

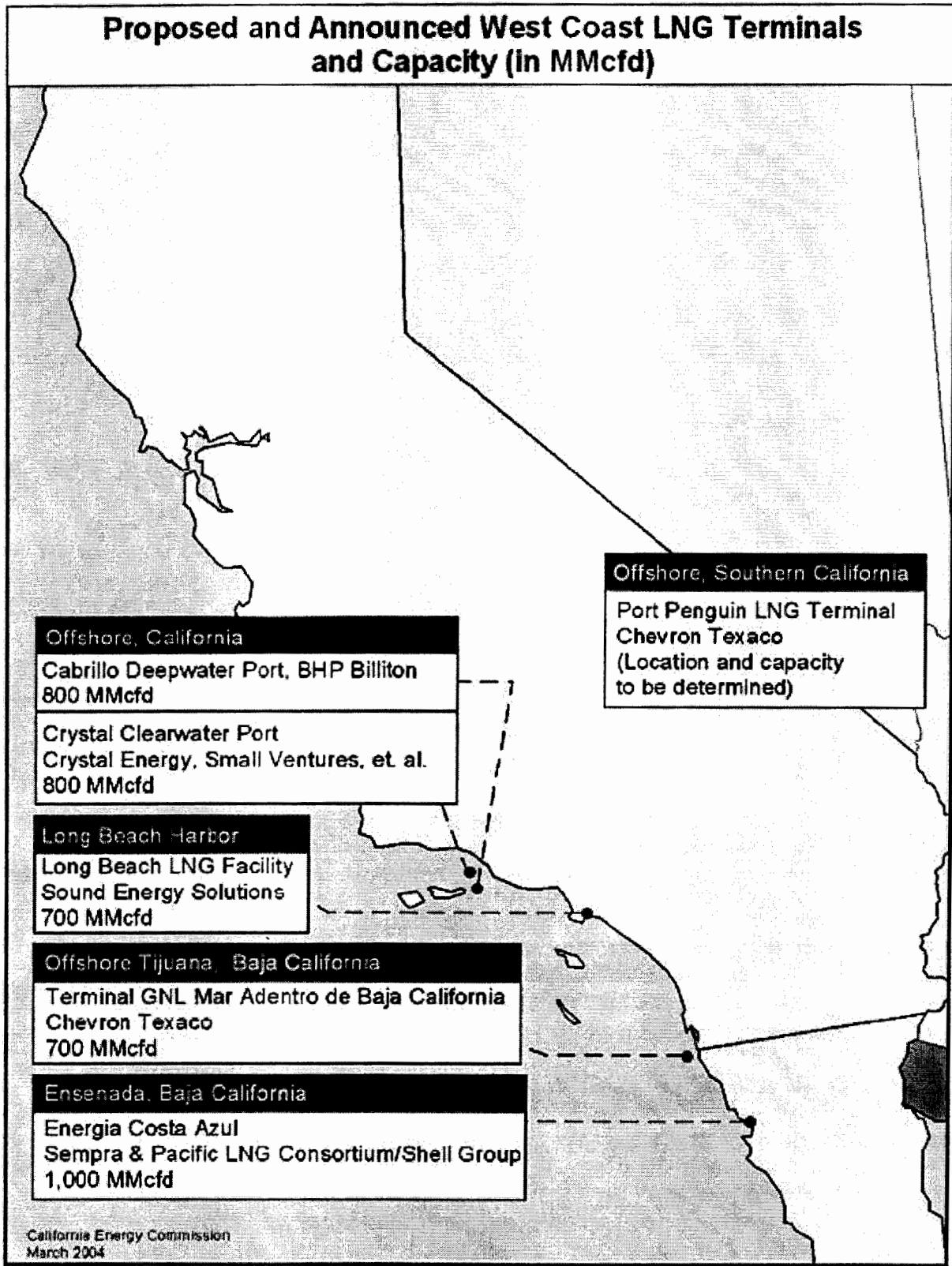
## Proposed Terminals – Coast Guard

- 14. California Offshore: 1.5 Bcfd, (Cabrillo Port – BHP Billiton)
- 15. Louisiana Offshore : 1.0 Bcfd (Gulf Landing – Shell)
- 16. So. California Offshore : 0.5 Bcfd, (Crystal Energy)

## Planned Terminals and Expansions

- 17. Brownsville, TX : n/a, (Cheniere LNG Partners)
- 18. Humboldt Bay, CA : 0.5 Bcfd, (Calpine)
- 19. Mobile Bay, AL: 1.0 Bcfd, (ExxonMobil)
- 20. Somerset, MA : 0.65 Bcfd (Somerset LNG)
- 21. Louisiana Offshore : 1.0 Bcfd (McMoRan Exp.)
- 22. Belmar, NJ Offshore : n/a (El Paso Global)
- 23. Bahamas : 0.5 Bcfd, (Seafarer - El Paso/FPL)
- 24. Altamira, Tamulipas : 1.12 Bcfd, (Shell)
- 25. Baja California, MX : 1.0 Bcfd, (Sempra & Shell)
- 26. Baja California : 0.6 Bcfd (Conoco-Phillips)
- 27. Baja California - Offshore : 1.4 Bcfd, (Chevron Texaco)
- 28. Baja California : 0.85 Bcfd, (Marathon)
- 29. California - Offshore : 0.5 Bcfd, (Chevron Texaco)
- 30. St. John, NB : 0.75 Bcfd, (Irving Oil & Chevron Canada)
- 31. Point Tupper, NS : 0.75 Bcfd (Access Northeast Energy)
- 32. Harpswell, ME : 0.5 Bcfd (Fairwinds LNG – CP & TCPL)
- 33. St. Lawrence, QC : n/a (TCPL and/or Gaz Met)
- 34. Lázaro Cárdenas, MX : 0.5 Bcfd (Tractebel)
- 35. Gulf of Mexico : 1.0 Bcfd (ExxonMobil)
- 36. Providence, RI : 0.5 Bcfd (Keyspan & BG LNG)
- 37. Mobile Bay, AL: 1.0 Bcfd (Cheniere LNG Partners)
- 38. Lake Charles, LA: 0.6 Bcfd (Southern Union)
- 39. Cherry Point, WA: 0.5 Bcfd (Cherry Point Energy LLC)
- 40. Cove Point, MD : 0.8 Bcfd (Dominion)

\*US pipeline approved; LNG terminal pending in Bahamas



From: [http://www.energy.ca.gov/lng/images/west\\_proposed\\_lng\\_terminals.jpg](http://www.energy.ca.gov/lng/images/west_proposed_lng_terminals.jpg)



LIQUEFIED NATURAL GAS PROJECTS ON THE WEST COAST (updated: 03/17/04)								
Project Name	Project Owner (with Web Link)	Project Location	Project Description	Capacities	Lead NEPA Agency: FERC/USGS  Docket #	Lead CEQA Agency	Projected On-line Date	Status/Comments
<b>Projects along Northern California Coastline</b>								
Samoa Point Energy Center  <b>Onshore</b>  <b>PROJECT WITHDRAWN</b>	Calpine Corporation <a href="http://www.calpine.com/">http://www.calpine.com/</a>	Samoa Peninsula in Humboldt Bay	Import facility to include one or two storage tanks and a 300 ft. LNG-carrier pier. Would be co-located with a 220-260 MW cogeneration power plant. The 150-mile natural gas pipeline (between Eureka and Red Bluff) would follow an existing gas pipeline route and would be connected to PG&E's mainline. Site has access to existing water and power infrastructure.	<b>Average:</b> 1,000 MMcf/d  <b>Peak:</b> N/A  <b>Storage:</b> 160,000m <sup>3</sup> to 320,000m <sup>3</sup>	FERC	Port of Humboldt Bay	TBD	Project withdrawn by applicant March 17, 2004.  <b>Possible LNG Sources:</b> Algeria, Indonesia, Qatar  <b>Approximate Project Cost:</b> \$750 million
<b>Projects along Southern California Coastline</b>								
Sound Energy Solutions LNG Import Terminal  <b>Onshore</b>	California LNG Project Corporation dba Sound Energy Solutions <a href="http://www.soundenergysolutions.com/">http://www.soundenergysolutions.com/</a>	Port of Long Beach  Approximately 25 acres at Pier T East, Berth 126	Import facility to include an LNG carrier berth, two full containment storage tanks, shell and tube vaporizers, metering and odorizing facilities, equipment for recovering natural gas liquids, LNG vehicle fuel truck-loading facility, and a new 2.3 mile natural gas pipeline connecting to an existing SoCal Gas pipeline.	<b>Average:</b> 700 MMcf/d  <b>Peak:</b> 1,000 MMcf/d  <b>Storage:</b> 320,000m <sup>3</sup>	FERC  CP04-58	Port of Long Beach	2008  (4 years to build from date of FERC approval)	<b>Possible LNG Sources:</b> Australia, Malaysia, Alaska  <b>Approximate Project Cost:</b> \$400 million  Application filed on 1/26/04.
Cabrillo Deepwater Port LNG Facility  <b>Offshore</b>	BHP Billiton <a href="http://lngsolutions.bhpbilliton.com/">http://lngsolutions.bhpbilliton.com/</a>	Offshore of Ventura County  Approximately 21 miles offshore from the City of Port Hueneme	Permanently moored import facility (floating storage & regasification unit, FSRU) to include three storage tanks, eight vaporizers, and an underwater, 21.1 mile pipeline that would connect to an existing SoCal Gas pipeline. Maximum water depth at the location of the planned mooring is about 2,900 feet.	<b>Average:</b> 800 MMcf/d  <b>Peak:</b> 1,500 MMcf/d  <b>Storage:</b> 320,000m <sup>3</sup>	USCG  16877  (See dms.dot.gov)	State Lands Commission	2008	<b>Possible LNG Sources:</b> Australia  <b>Approximate Project Cost:</b> \$550 million  Application filed on 1/27/04.
Crystal Clearwater Port Project  <b>Offshore</b>	Crystal Energy, Small Ventures, Others <a href="http://crystalenergyllc.com/index.html">http://crystalenergyllc.com/index.html</a>	Offshore of Ventura County  Approximately 11 miles offshore of the City of Oxnard in the Santa Barbara Channel	Import facility would use an existing, but reconfigured oil platform known as "Platform Grace." Reconfiguration would involve installing a cool-down tank, four LNG pumps, four vaporizers, and reinstalling and upgrading of the platform's power-production capability. The platform is located in 318 feet of water. A new subsea pipeline would transport the gas from the platform to the SoCal Gas onshore pipeline located near Camarillo, California. No additional on-site storage is expected. If on-site storage is required, Crystal Energy would contract for storage service from existing facilities.	<b>Average:</b> 800 MMcf/d  <b>Peak:</b> 1,250 MMcf/d  <b>Storage:</b> 0	USCG	State Lands Commission	2006	<b>Possible LNG Sources:</b> Alaska, Southeast Asia, Middle East - International "spot" market. MOU signed with Alaskan Gas line.  <b>Approximate Project Cost:</b> \$160 million  Application filed with US Coast Guard on 1/28/04. Application filed with State Lands Commission on 2/11/04.
Port Penguin LNG Facility  <b>TBD</b>	ChevronTexaco	TBD	TBD  The project is a gravity-based system similar to the GNL Mar Adentro de Baja California project. (See below.)	TBD	USCG	State Lands Commission	TBD	<b>Possible LNG Sources:</b> Unknown  <b>Approximate Project Cost:</b> Unknown  ChevronTexaco has discussed the project publicly but has not proposed a specific site.

Project Name	Project Owner (with Web Link)	Project Location	Project Description	Capacities	Lead NEPA Agency: FERC/USGS  Docket #	Lead CEQA Agency	Projected On-line Date	Status/Comments
<b>Projects along Baja California Coastline</b>								
Tijuana Regional Energy Center  <b>Onshore</b>  <b>PROJECT CANCELLED</b>	Marathon Oil Company  <a href="http://www.marathon.com/Our_Business/Marathon_Oil_Company/Integrated_Natural_Gas/Tijuana/Tijuana_Regional_Energy_Center/">http://www.marathon.com/Our_Business/Marathon_Oil_Company/Integrated_Natural_Gas/Tijuana/Tijuana_Regional_Energy_Center/</a>	Tijuana	An integrated infrastructure complex to include an LNG terminal with two full containment storage tanks, a 1,200-MW power plant, a 20-million gallon per day seawater desalination plant, wastewater treatment facilities (to augment existing processing capacity at the San Antonio de Los Buenos Treatment Plant), and natural gas pipeline infrastructure.  Electricity and LNG would be used locally as well as exported to Southern California.	<b>Average:</b> 750 MMcfd  <b>Peak:</b> 1,000 MMcfd  <b>Storage:</b> 320,000m <sup>3</sup>	N/A	N/A	2006	Cancelled on March 1, 2004, because site license revoked by local jurisdiction.  <b>Possible LNG Source:</b> Indonesia  <b>Approximate Project Cost:</b> \$900 million  Partners include Pertamina, Golar LNG Ltd, and Group GGS SA de CV.  Mexico's Energy Regulatory Commission (CRE) permit was issued on 5/8/03.
Energia Costa Azul LNG Receiving Terminal  <b>Onshore</b>	Sempra Energy LNG Corporation/Shell International Gas Ltd  <a href="http://www.sempira.com/index.htm">http://www.sempira.com/index.htm</a>	14 miles north of Ensenada	The project will include a receiving facility and related port infrastructure.  The site has more than 400 acres of undeveloped land, remote from residential areas.  LNG would be used to meet the growing energy demands in western Mexico with surplus exported to California and the Southwestern U.S.	<b>Average:</b> 1,000 MMcfd  <b>Peak:</b> 2,000 MMcfd with expansion  <b>Storage:</b> 320,000m <sup>3</sup>	N/A	N/A	2007	<b>Possible LNG Source:</b> Indonesia  <b>Approximate Project Cost:</b> \$669 million  CRE's permit and the City of Ensenada's land-use permit were issued in August, 2003. The SEMARNAT environmental permit was issued in April, 2002. In December, 2003, the Mexican federal court suspended the CRE and SEMARNAT permits, pending resolution of a procedural protest lodged against the SEMARNAT. In March 2004 the complaint was heard and rejected and the suspension was lifted. Construction will begin.
GNL Mar Adentro de Baja California  (Puerto Coronado)  <b>Offshore</b>	ChevronTexaco  <a href="http://www.chevrontexaco.com/gnlbaja/about/">http://www.chevrontexaco.com/gnlbaja/about/</a>	13 Km (8 mi) off the coast of Tijuana & approximately 600 meters east of South Coronado Island	Import facility, a gravity-based structure (GBS), including all utility systems required to support operations. Water depth at the proposed site is only 65 feet. A new underwater pipeline will be constructed to connect to Baja California's existing pipeline system.	<b>Average:</b> 700 MMcfd  <b>Peak:</b> 1,400 MMcfd  <b>Storage:</b> 250,000m <sup>3</sup>	N/A	N/A	2007	<b>Possible LNG Sources:</b> Western Australia  <b>Approximate Project Cost:</b> \$650 million  CRE accepted the offshore permit application in July, 2003.  An offshore <i>manifestacion de impacto ambiental</i> and risk study (EIA/EIS equivalent) was submitted October, 2003.  No land-use permit needed.





## **Algerian LNG Plant Explosion Fact Sheet prepared by California Energy Commission Staff**

**REVISED March 22, 2004**

### **Overview**

On January 19, 2004, in Skikda, Algeria, a steam boiler that was part of an LNG production plant exploded, leading to a fire that destroyed a portion of the LNG plant and causing loss of life, injury, and material damage outside the plant's boundaries.

Sonatrach, the government-owned oil company, owns the Skikda LNG liquefaction plant. The plant had six LNG-producing units called "trains," LNG storage tanks, and administration and operations buildings. The plant uses steam boilers to make high-pressure steam for its steam turbines. These turbines supply power to the plant's refrigerant compressors that are used to liquefy the natural gas. Fire destroyed three LNG trains, but did not damage any LNG storage tanks or the remaining, three trains.

### **Analysis of Causes**

The explosion was most likely accidental, not sabotage.

A board of inquiry was set up by the Minister of Energy and Mines (and Sonatrach president), Chakib Kheli, to determine the causes and to place responsibility. A report by the board of inquiry is expected by late April or late May. CAAT, the plant's insurer, also established an emergency committee with Sonatrach and a team of international experts to inspect the damage and follow the situation.

The LNG Safety Committee of the National Fire Protection Association saw photographs of Skikda plant while it was ablaze. The consensus of the committee members was that although the accident occurred in an LNG plant, LNG was not the fire's fuel source. An LNG fire would have been taller and less orange.

A first-hand account from someone returning from the Skikda accident reported physical evidence of an internal boiler explosion (i.e., badly distorted boiler tubes).

According to a February 17, 2004 interview with Minister Kheli, preliminary results suggest the boiler explosion was caused by a "liquid gas leak in one pipe," not by "the defective state of the boiler." On March 21, 2004, the Vice President of Sonatrach said the leak was most likely liquid propane gas.

### **Analysis of Impacts**



The destroyed LNG units will cost approximately \$800 million to replace. In the meantime, LNG liquefaction plants in Arzew and Bethioua, Algeria will produce more LNG to compensate for the loss of facilities in Skikda. Most of the plant's LNG was exported to France, Italy, Spain, and Greece. LNG deliveries to the U.S. will not be affected.

U.S. newspapers published in cities near proposed LNG receiving terminals are carrying the story, escalating local concerns about LNG hazards and public safety risks and fostering distrust of government and industry officials who attest to LNG's safety.

LNG import terminals revaporize LNG back into natural gas, they do not refrigerate natural gas into a liquid. Import terminals, therefore, do not require high-pressure steam boilers.

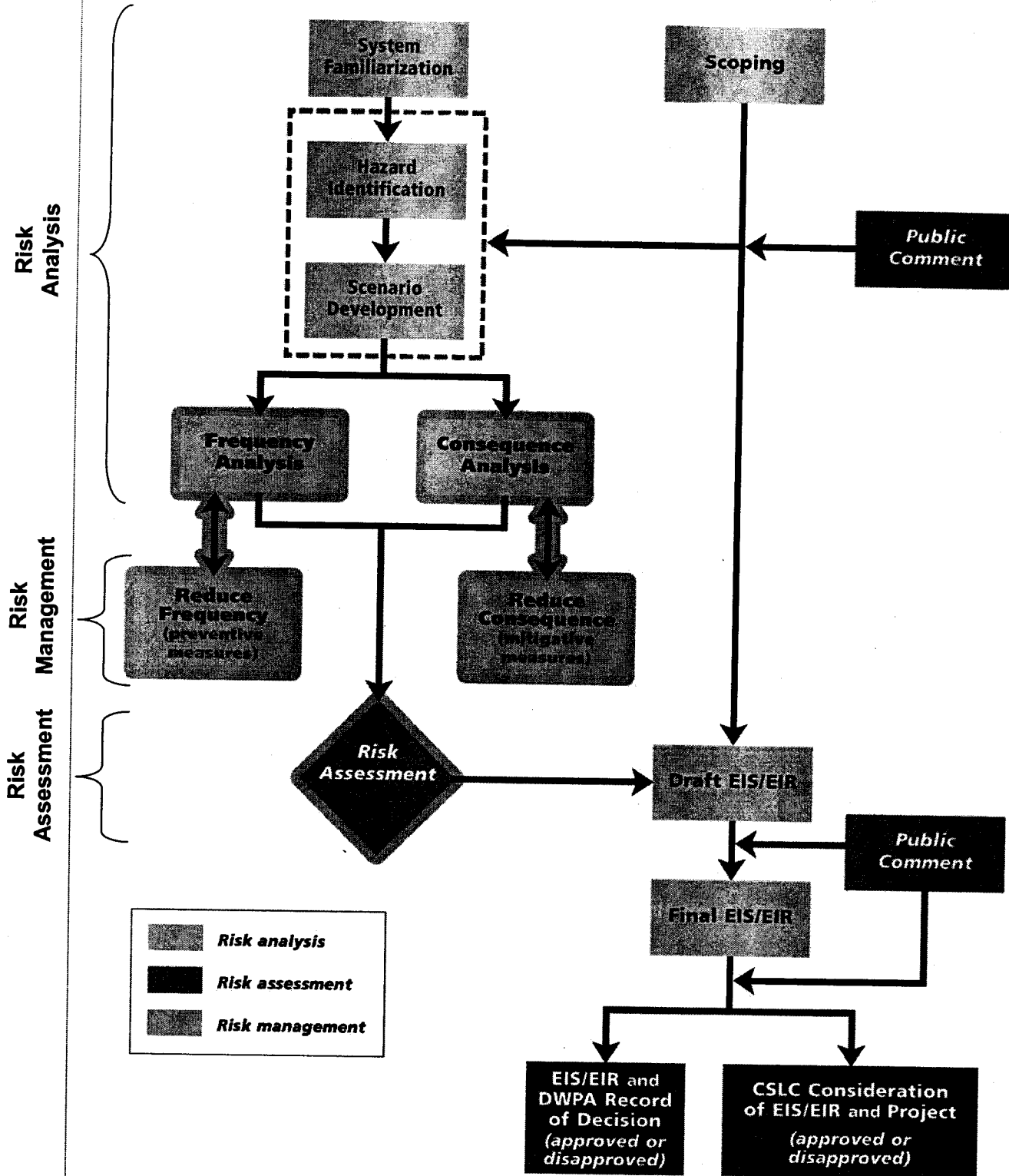
The only components common to both LNG liquefaction plants and import terminals are storage tanks and marine facilities supporting LNG carrier loading or unloading (e.g, pumps and piping).

## References

1. "Explosion Reported at Algeria's Skikda LNG Complex D BBC," Dow Jones & Company, *Morningstar*, January 19, 2004.
2. "Big Blast at Algeria's Key Refinery, 13 Killed," by Paul de BERNIERE, *Reuters*, January 19, 2004.
3. "Update (2): 13 Dead in Explosion at Algerian LNG Plant," Dow Jones & Company, *Morningstar*, January 19, 2004.
4. "Burst Boiler Likely Blame in Algeria Refinery Explosion," Dow Jones & Company, *Morningstar*, January 20, 2004.
5. "At Least 23 Dead in Algerian Refinery Blast," *Reuters*, January 20, 2004.
6. "800 Million Dollars for the Reconstruction of the Three Units of Skikda's LNG Plant," *Agence Algerienne d'Information*, January 21, 2004.
7. "The Board of Inquiry Installed After Explosion at Skikda's LNG Plant," *Agence Algerienne d'Information*, January 21, 2004.
8. "Skikda's LNG Plant Explosion: 27 Deaths and 74 Wounded Press Reported," *Agence Algerienne d'Information*, January 21, 2004.
9. "Skikda's LNG Plant Was Insured by the CAAT," *Agence Algerienne d'Information*, January 21, 2004.
10. "An Environmental Board of Inquiry Works at Skikda's LNG Plant," *Agence Algerienne d'Information*, January 21, 2004.
11. "Massive Blast Kills Dozens in Algeria," by Zohra Bensemra, *Reuters*, January 21, 2004.
12. "Algeria Blast Not Seen Hurting U.S. LNG Imports," *Reuters*, January 21, 2004.
13. "LNG blast in Algeria Resonates in Humboldt," by John Driscoll, *Eureka Times-Standard*, January 21, 2004.
14. "More Bodies Found at LNG Blast Scene," by Bill Finch, Ben Raines, and Lee Davidson, *Mobile Register*, January 21, 2004.
15. "Explosion at Sonatrach's Skikda LNG Export Plant," *LNGWM Alert by Poten & Partners*, January 22, 2004.
16. Personal communication with NFPA LNG Safety Committee member, Jim Lewis, Project Technical Liaison, Inc., January 26, 2004, and February 19, 2004.
17. Aftermath photo from Reuters / Yahoo News (Link to picture on Yahoo News has expired.)
18. "Skikda's LNG plant explosion is due to gas leak in one pipe," *Agence Algerienne d'Information*, February 17, 2004, [www.aai-online.com/english/lire.php?id=15164&idc=67](http://www.aai-online.com/english/lire.php?id=15164&idc=67)
19. "Algeria reveals results of probe into Skikda tragedy," **Gas Matters Online**, March 22, 2004, [www.gasmattersonline.com/news1\\_1.shtml](http://www.gasmattersonline.com/news1_1.shtml).

###

# Risk Assessment Process



# **Opportunities for Public Comment During the Environmental Review Process Under NEPA/CEQA and the Deepwater Port Act**

Attachment 8, Page 1



\* These dates reflect the current schedule but may change.

