Testimony of

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Hearing on Safety and Security of Liquefied Natural Gas

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My name is J. Mark Robinson and I'm Director of the Office of Energy Projects (OEP) at the Federal Energy Regulatory Commission (FERC or Commission). I am here as a staff witness and do not speak on behalf of any Commissioner. Our office is responsible for non-federal hydroelectric licensing, administration, and safety; siting of electric transmission lines; certification of interstate natural gas pipelines and storage facilities; and, more significantly for today's session, authorization and oversight over the construction, operation, and safety of on-shore and near-shore Liquefied Natural Gas (LNG) terminals. We also share security responsibilities for these facilities with the U.S. Coast Guard (Coast Guard), which has primary responsibility under the Maritime Transportation Security Act of 2002.

I want to thank you for this opportunity to speak today and specifically to address how through our extensive design review process we ensure the safety and security of LNG import facilities and the related LNG shipping. Also, I will describe how we include environmental impact review, along with extensive opportunity for public and agency input, into our overall assessment process.

Overall, the safety record of the industry is exemplary. LNG terminals in the United States have never had an LNG safety-related incident that harmed the public or the environment. Similarly, no shipping incidents have occurred worldwide that resulted in a significant loss of cargo during the almost 50 years of LNG transport. I will first describe the measures we use to provide for safe and secure LNG import terminal siting, construction and operation. Then, I will briefly address the measures taken to ensure the continuing safe history of LNG shipping.

Safety, Security and Siting of LNG Import Terminals

Be assured that consideration of public safety is the Commission's highest priority when fulfilling its Congressional mandate under the Natural Gas Act to regulate facilities for the importation of natural gas. The Commission has been proactive in addressing safety concerns and rigorously applies high safety standards to these projects. When projects meet our safety standards and are found to be in the public interest, the Commission will approve them. If a proposed project falls short of these standards, the Commission will reject it, as was done with the proposed Keyspan LNG Terminal Project in Providence, Rhode Island.

The excellent safety record of the LNG import facilities in the United States extends over the past 35 years. The siting and oversight of LNG facilities are governed by a comprehensive scheme of federal regulation that guarantees that the FERC and other federal agencies work together to ensure public safety. The FERC's LNG project review process works to address all siting and operational issues with the full participation of the federal and state agencies, and the public. Once in operation, FERC oversight and inspection are on-going programs for the life of the facility.

Approvals and Authorizations Required

The Energy Policy Act of 2005 in Section 311 confirms that FERC has exclusive authority to approve or deny an application for the siting, construction, expansion, or operation of an LNG terminal onshore and in state waters. This siting authority is exercised, however, in concert with a number of other federal authorities such as the Coast Guard, the U.S. Army Corps of Engineers (COE), and state approvals under the

Coastal Zone Management Act, Clean Air Act and Clean Water Act (Federal Water Pollution Control Act). An example of this is our close work with the Coast Guard, which must issue a Letter of Recommendation (LOR) for LNG tankers to make deliveries to a terminal. A terminal operator must obtain an LOR from the Coast Guard before it would be allowed to accept tanker deliveries. Similarly, the state must issue the permits noted above for a project to move forward. Also, the U.S. Army Corps of Engineers must issue approvals under the Rivers and Harbors Act and Section 404 of the Federal Clean Water Act before construction can begin.

The FERC's Overall Assessment Process

Every aspect of our engineering and siting review and our coordination with the Coast Guard and the DOT is geared toward assuring that a facility will operate safely and securely and in an environmentally sound manner. This review is broken into three distinct phases: pre-authorization review; pre-construction review; and pre-operation review.

Pre-Authorization Review -- During the pre-authorization phase, Commission staff addresses the safety and security and environmental aspects of an LNG import terminal by reviewing the site and facility designs and ensuring that the proposal meets the federal safety standards including design and operational features for safety and reliability. FERC regulations require that from the early stages of project development, potential applicants meet with FERC staff to describe the proposal and solicit guidance on required design features. This early meeting provides an opportunity for FERC staff to offer suggestions related to the environmental, engineering and safety features of the proposal and review conceptual designs.

When ready, a terminal applicant applies to begin the pre-filing process and submits a request to the Director of OEP which demonstrates that the proper contacts with appropriate federal state and local agencies and others have been made and sufficient project details are developed in accordance with the FERC regulations. The FERC's pre-filing regulations were promulgated in compliance with the Energy Policy Act of 2005 in Title 18 of the Code of Federal Regulations (CFR), Section 157.21. The FERC's pre-filing process is designed to be interactive and offers a significant number of opportunities for the public and agencies to get information about a project and to provide their views and concerns to the Commission. These opportunities for public involvement include open houses sponsored by the applicant, scoping meetings held by the FERC staff, interagency meetings to address all permitting issues, availability of the complete record via the Commission website, public site visits, and comment meetings where interested persons provide comments to the Commission including electronic filing options.

All of the information developed by the FERC and agency staffs concerning environmental, safety, and engineering issues is presented in a detailed independent environmental impact statement (EIS) which is released in draft for a 45-day comment period. This draft EIS includes staff's analysis of all issues raised during the scoping and EIS preparation process. When the staff completes its review and analysis of all comments received on the draft EIS, it publishes a final EIS. The record in the proceeding is the ready for consideration by the Commission.

When pre-filing begins, we make sure that DOT and the Coast Guard are aware of new projects or proposed expansions. For example, we require that the applicant file its

Letter of Intent (LOI) to operate LNG tankers to a proposed LNG terminal with the Coast Guard at this point. These activities occur over at least a six-month time span during the mandatory pre-filing period required by the Energy Policy Act of 2005.

Based on input from FERC staff, the project sponsors continue to develop the front-end-engineering-design (FEED) to be filed as part of the formal application for the proposed LNG facility. The design information, which must be contained in the formal application, is extensive and is specified by 18 CFR § 380.12 (m) and (o). In order to ensure that the filings are complete, FERC publicly issued "Draft Guidance For Filing Resource Reports 11 (Reliability and Safety) & 13 (Engineering and Design) For LNG Facility Applications" in December 2005. This document clarified the level of detail required for the engineering submittal so FERC staff can adequately assess the safety, operability, and reliability of the proposed design. We provided specific guidance and clarification as follows:

a. the level of detail, including a requirement for a hazard design review, necessary for the FEED submitted to the FERC;

b. LNG spill containment sizing and design criteria for impoundments, sumps, sub-dikes, troughs or trenches;

c. design spills to be used in the calculation of thermal and flammable vapor exclusion zones; and

d. use of the Coast Guard's Navigation and Vessel Inspection Circular 05-05 and the waterway suitability assessment process.

The level of detail required to be submitted in the proposed design will require the project sponsor to perform substantial front-end engineering of the complete facility. The

design information is required to be site-specific and developed to the extent that further detailed design will not result in changes to the siting considerations, basis of design, operating conditions, major equipment selections, equipment design conditions, or safety system designs considered by the FERC during the review process. The required information must include all features necessary for commissioning, start-up, operation and maintenance of the facility, including details of the utility, safety, fire protection and security systems. Novel designs require additional detail for proof of concept.

A complete FEED submittal will include up-to-date piping and instrumentation diagrams (P&IDs). Information on these drawings allows FERC staff to begin assessing the feasibility of the proposed design. Adequate P&IDs will include:

- equipment duty, capacity and design conditions;
- piping class specifications;
- vent, drain, cooldown and recycle piping;
- isolation flanges, blinds and insulating flanges;
- control valves and operator types (indicating valve fail position);
- control loops including software connections;
- alarm and shutdown set points;
- shutdown interlocks;
- relief valve set points; and
- relief valve inlet and outlet piping size.

Once an application is formally made to the Commission, FERC staff performs a detailed review of the information supporting the proposed LNG facility design. Since the enactment of the Energy Policy Act of 2005, no later than 30 days after the

application filing, the agency designated by the Governor of the state where the terminal is proposed may file an advisory report on state and local safety considerations. Before issuing an order authorizing an applicant to site, construct, expand, or operate an LNG terminal, the Commission shall review and respond specifically to the issues raised.

During the analysis of the application, FERC staff compiles pertinent technical information to assess the design of the LNG facility. Although operability and reliability of the proposed design are considered, our primary focus is on the safety features that must be built into the system. This review is performed prior to any Commission approval and evaluates the safety of:

- the LNG transfer systems;
- storage tanks and process vessels;
- pumps and vaporizers;
- pressure relief, vent and disposal systems;
- instrumentation and controls;
- spill containment systems;
- hazard detection and control systems; and
- emergency shutdown systems.

Each LNG import terminal must have an extensive array of hazard detection devices to provide an early warning for the presence of combustible gases, fires, or spills of LNG and activate emergency shut-down systems. Using the submitted design, FERC staff assesses the conceptual hazard detection system, which typically consists of combustible-gas detectors, fire detectors, heat detectors, smoke or combustion product

detectors, and low temperature detectors. Typically, each facility will have over 100 of these detectors.

Use of these active systems to shut down equipment automatically, and other passive safety protections, such as spill containment systems, are reviewed to ensure that appropriate safety provisions are incorporated in the plant design. A detailed layout of the passive spill containment system showing the location of impoundments, sumps, sub-dikes, channels, and water removal systems is evaluated to allow FERC staff to assess the feasibility of the location, design configuration, dimensions, capacity and materials of construction for this system. In accordance with Title 49 of the Code of Federal Regulations, § 193.2181, these spill containment systems must accommodate 110 percent of an LNG tank's maximum liquid capacity.

Active hazard control systems consisting of strategically placed dry chemical extinguishers; carbon dioxide or nitrogen snuffing equipment; high expansion foam systems; and fire-water systems throughout the terminal are evaluated in accordance with federal regulations and a project-specific fire protection evaluation. A detailed layout of the fire water system showing the location of fire water pumps, piping, hydrants, hose reels, and auxiliary or appurtenant service facilities is reviewed for adequacy.

In addition, each storage or process area containing LNG must be surrounded by an impoundment structure to contain and limit potential spills associated with that equipment. Based on the size and location of these impoundments, the project sponsor must establish exclusion zones so that the effects from potential LNG pool fires, as well as flammable vapors from an LNG spill which does not ignite, do not pose a hazard to the off-site public.

The calculation methods and acceptable criteria for the LNG facility exclusion zones are specified by the U.S. federal safety standards in Title 49 CFR § 193.2057 and 193.2059. In accordance with these regulations, the calculations are based on design spills specified by the National Fire Protection Association's 59A Standard (2001 version). The 59A Standard presents various design spills depending on the: type of equipment served by the impoundment; the type of tank; and the location/size of any penetrations into the tank. Exclusions zones are centered on the site impoundments and are based on both the downwind distance flammable vapors may travel and the distance to specified radiant heat flux levels.

For a spill which does not ignite, the distance from a design spill into an impoundment to the furthest edge of a flammable vapor cloud (*i.e.* 2.5% concentration of gas in air) must not extend beyond any plant property line which can be built upon. In the event of an ignited spill, the distance from the pool to the 10,000-, 3,000-, and 1,600 BTU/ft^2-hr thermal flux levels must be considered. The regulations require that a radiant heat flux of 10,000 BTU/ft^2-hr not cross any plant property line that can be built upon. A radiant heat flux of 3,000 BTU/ft^2-hr may not reach certain buildings (*e.g.* assembly, educational, health care, or residential structures) located outside of the facility property line. In addition, a radiant heat flux of 1,600 BTU/ft^2-hr may not reach any outdoor assembly areas of 50 or more persons outside of the facility property line. For exclusion zone areas associated with the 3,000-, and 1,600-BTU/ft^2-hr radiant heat flux levels, the operator must be able legally to control land uses within any portion of these zones extending beyond the terminal site to prevent damaging effects of an LNG pool fire from impacting public safety.

During the project review required prior to any Commission decision, FERC staff will verify the applicant's exclusion zone calculations in order to ensure compliance with the siting standards contained in 49 CFR 193, and place the results in the EIS.

Further, during the pre-authorization phase and beyond the cryogenic design review, each application for an LNG facility is subject to a detailed review by the FERC staff of numerous other studies and reports that applicants are required to complete. These include:

- seismic analyses;
- fire protection evaluations;
- threat and vulnerability assessments; and
- preliminary operation and maintenance procedures.

The information used for the pre-authorization review is gathered from the application, data requests, and a Cryogenic Design Technical Conference held with the applicant's design team. This meeting allows FERC staff and company engineers to discuss specific engineering-related issues. Representatives from the Coast Guard and DOT, as well as state and local fire marshals, are invited to attend. Although the Coast Guard is generally in attendance to address facility issues, the issues specifically related to LNG vessel transit are more specifically dealt with during the Coast Guard's separate waterway suitability assessment (WSA) process.

The staff's conclusions and recommendations on the proposed design, including all safety measures, are presented in the Safety section of the publicly-released FERC EIS. Ultimately, these recommendations have appeared as conditions if a Commission Order authorizing the project is issued. In addition to design considerations, the Order

may also contain other LNG-specific standard conditions that pertain to the safe operation and security of the facility. If the Commission decides that a project would be safe, is in the public interest, and authorizes it, continued review would occur during the pre-construction phase.

Pre-Construction Review -- If a project sponsor receives a Commission Order and decides to pursue the project, it will engage the services of an engineering, procurement, and construction (EPC) firm to commence detailed engineering of the facility. This process results in a "final design" that usually contains further development or minor refinements to the approved FEED on file with the FERC. For these modifications, the FERC Order requires the project sponsor to request approval for the change, justify it relative to site-specific conditions, explain how that modification provides an equal or greater level of protection than the original measure; and receive approval from the Director of OEP before implementing that modification. For more significant changes, the project sponsor would be required to file an amendment or a new application, initiating another extensive review at the Commission.

The final design will typically include hundreds of pages of detailed engineering drawings and specifications for every area and piece of equipment in the facility including the marine platform, transfer lines, tanks, sumps, pumps, compressors, vaporizers, and blowers. Only after FERC staff has reviewed the final design for a particular facility component to ensure it complies with all the safety conditions of the Order and that it conforms to the approved design on file, will authorization to construct that component be granted. We review large-scale issues such as the facility's final plot plan and location of equipment, tanks, and impoundments to verify that all exclusion

zones remain in compliance with siting regulations. These final review checks will also confirm that the number, location, type, and size of hazard detection and hazard control equipment match or improve upon the approved design and that redundancy, fault detection, and fault alarm monitoring exist in all potentially hazardous areas and enclosures.

Prior to entering the detailed design phase, we require project sponsors to perform a hazard and operability study of the initial design. This study is intended to identify potential process deviations that could occur during operation and lead to personnel injury or equipment damage. The analysis proceeds by systematically identifying possible causes for operational deviations and the consequences of these deviations at numerous locations in the regasification process. Areas of concern typically include equipment failures, human failure, external events, siting issues, previous incidents, and safeguard or control failures. These causes and consequences are in turn used to evaluate the inherent safeguards in the design and to identify suitable design modifications as required. Examples of the additional safeguards that are required are: detection systems, prevention systems, procedural safeguards, active and passive safety equipment, emergency response procedures, and secondary containment.

During the pre-construction phase, FERC staff will review this study as well as review all piping and instrumentation diagrams, including every valve and thermocouple, to make sure that the overall safety of the final design provides an equal or greater level of protection as the original design approved by the FERC.

Furthermore, the design of some facility components such as the foundation of the LNG tanks will be reviewed by geotechnical experts who determine if the foundation

structure is capable of safely supporting the load of a full LNG tank, even during seismic events.

In accordance with the Energy Policy Act of 2005, Commission Orders authorizing an LNG import terminal require the project sponsor to develop an Emergency Response Plan (ERP) in consultation with the Coast Guard and state and local agencies. Prior to any construction at the facility, this plan, which must also include cost-sharing provisions for safety and security, must be approved by the Commission. The ERP must include written procedures for responding to: emergencies within the LNG terminal; emergencies that could affect the public adjacent to an LNG terminal; and emergencies that could affect the public along the LNG vessel transit route. The ERP must be approved by the Commission prior to any final approval to begin construction at the terminal site.

Commission engineering staff reviews each ERP to ensure that the appropriate state and local agencies have been involved in preparing the plan, that the local Coast Guard Marine Safety Office has been consulted and concurs, and that the following topics are completely addressed:

- Structure of the incident management organization of the LNG terminal; and name, title, organization, and phone number of all required agency contacts;
- Procedures for responding to emergencies within the LNG terminal - identification of the types and locations of specific emergency incidents that may reasonably be expected to occur at the LNG terminal due to operating malfunctions, structural collapse, personnel error, forces of nature and activities adjacent to the terminal;

- Procedures for emergency evacuation adjacent to the LNG terminal and along LNG vessel transit route; detailed procedures for recognizing an uncontrollable emergency and taking action to minimize harm to terminal personnel and the public; procedures for the prompt notification of appropriate officials and emergency response agencies based on the level and severity of potential incidents; and the sequence of such notifications;
- Plans for initial and continuing training of plant operators and local responders; and provisions for annual emergency response drills by terminal emergency personnel, first responders, and appropriate federal, state and local officials and emergency response agencies; and
- Documentation that the required consultation with the Coast Guard and state and local agencies has been completed through correspondence with consulting agencies, and minutes or notes of coordination meetings.

In addition, both the Energy Policy Act of 2005 and Commission Orders authorizing LNG terminals require that the ERP include a cost-sharing plan identifying the mechanisms for funding all project-specific security costs and safety/emergency management costs that would be imposed on state and local agencies. The cost-sharing plan must specify what the LNG terminal operator will provide to cover the cost of the state and local resources required to manage the security of the LNG terminal and LNG vessel, and the state and local resources required for safety and emergency management, including:

- Direct reimbursement for any per-transit security and/or emergency management costs (for example, overtime for police or fire department personnel);

- Capital costs associated with security/emergency management equipment and personnel base (for example, patrol boats, fire fighting equipment); and
- Annual costs for providing specialized training for local fire departments, mutual aid departments, and emergency response personnel; and for conducting exercises.

To assist our review of the cost-sharing plan, we request the LNG terminal operator to include a letter of commitment with agency acknowledgement for each state and local agency designated to receive resources.

FERC and other federal agencies work with state and local entities, as well as the general public, to ensure that all public interest considerations are carefully studied and weighed before a facility is permitted and allowed to begin construction and operate, and that public safety and the environment are given high priority. No construction may commence until the Director of OEP finds that all safety requirements have been met.

Pre-Operation Review -- Once construction of the project has been authorized to begin, in addition to the terminal operator and vendor quality control inspections which occur continuously, Commission staff inspects each site at least once every eight weeks to ensure that project construction is consistent with the designs approved during the pre-authorization and pre-construction review phases.

During these inspections, Commission staff physically examines the entire site to verify the ongoing construction activities in each area. Staff confirms that the locations of individual process equipment under construction are in accordance with the approved site design, ensuring that the safe distances required between property lines, equipment, and facilities are being maintained. Staff verifies that all site activity and equipment

under construction comply with the conditions of the Order that are applicable for that phase of the project. Commission engineers also meet with the owner's project design engineers to discuss any modifications or design refinements that may result from the detailed design phase of development - for example, adjustments considered necessary as a result of equipment vendor specifications or other insights realized during construction.

In addition, staff reviews both the owner's and the EPC firm's quality assurance plans to verify that rigorous and stringent quality control inspections are being conducted by both parties during all phases of the construction process. Inspections must apply to equipment and components being fabricated at manufacturing sites, material and equipment received at the construction site, specific assembly or fabrication methods employed during construction, and also the continuous verification of the precision and quality of all structural work carried out during the construction process.

Staff reviews all of the non-conformance reports generated by the project's quality control inspectors and how these incidents have been satisfactorily resolved. These deviations from the intended quality of work are evaluated by FERC staff to ensure that the final quality of the work will meet or exceed design requirements. Problems of significant magnitude are required to be reported to the Commission within 24 hours.

During the later stages of the construction period, FERC staff monitors the EPC contractors' efforts to commission (*i.e.*, test and start-up) the various process systems and equipment throughout the terminal in preparation for the commencement of commercial operations. Commission staff is actively involved in the commissioning phase to verify that the final, constructed facility complies with the design authorized by the Commission Order, and that the project sponsor has complied with all conditions. This review

includes verification that all of the cryogenic design recommendations in the Order applicable to the facility's pre-construction and construction phases have been fulfilled. Multiple on-site inspections are performed to confirm the construction and location of all plant equipment, process systems, and safety systems, including:

- Verifying LNG spill control structures for completion of walls, piping, correct slope, size, materials used, sump pumps, and instrumentation for cold detection shutoff, and confirmation that proper materials have been used to complete containment;
- Checking critical instrumentation against the piping and instrumentation diagrams with the actual piping, valves, and controls; and the instrument readouts, controls, and alarm/shutdown functions in the plant control room;
- Confirming that all required hazard detection devices (combustible gas, fire, smoke, low temperature) have been installed, including an examination of the cause and effect diagrams and instrument locations for appropriate redundancy and "alarm" and "shutdown" conditions. The physical inspection also evaluates detector location and orientation for blind spots that may require additional hazard detection devices;
- Confirming that all dry chemical, carbon dioxide, or other fire extinguishing units/bottles have been installed. The devices are checked to confirm proper weight and areas have been covered;
- Confirming that all critical pressure relief valves have been installed, have proper discharge orientation, and vent collection systems are operable;

- Confirming that the entire firewater system is in place, including monitors, hydrants, pumps, screens, deluge and water supply, and has been tested for operation;
- Checking each LNG storage tank's equipment including elevation bench marks, rotational devices, liquid level gauges, pressure and vacuum relief valves, and discretionary relief valves for proper installation and confirming that all permanent covers have been installed. After cool-down, the fill lines and tank penetrations are inspected for presence of excessive low temperature conditions;
- Checking critical, required alarms and shutdowns, including set points (*e.g.*, tank foundation temperatures, send-out temperature shutdown set points) within the plant's control room and satellite control centers;
- Confirming that all temporary construction structures have been removed and the facility complies with National Electrical Code Division requirements; and
- Confirming that the plant's emergency shutdown system has been tested and is fully operational, including that all required systems have been tied into it.

Prior to operation, each LNG tank is hydrostatically tested to gauge the tank's ability to handle expected loads. During the hydrostatic test, the FERC Order will require the project sponsor to include a reliable measurement system to monitor any deflections in the tank foundation or structure during the hydraulic test. At a minimum, this system must include as many monitoring points as is necessary so that sag, warping, tilt, and settlements can be monitored. Tolerances for sag, tilt, and shell warping must meet or exceed the limits specified by the tank manufacturer. In this manner, the strength of the tank is thoroughly examined under loads similar to what will be experienced in actual

operation. The final design review will ensure that adequate plans for such testing are in place for all facility components.

As part of the pre-commission inspection, FERC staff also reviews the Start-up Manual, Safety Plan Manual, and Operations and Maintenance Manuals applicable to the installation. This review includes verifying that the terminal staff has received the necessary training to operate the plant or new systems, if an existing plant is being expanded. We confirm that the plant has employed the required staffing with a level and function appropriate for the facility.

FERC staff confirms that all plant security systems are in place (personnel, cameras, and other equipment), and that the Facility Security Plan is current. This review also includes confirming that all spare equipment that was authorized is on site and properly installed.

FERC staff also checks the entire facility site to ensure that all recommended environmental mitigation measures including erosion and sediment controls are in place, are being properly maintained, and that the company is making prudent steps to ensure that the site is properly stabilized for the operational life of the facility (*e.g.*, installation of shore line stabilization mats and rip rap).

Prior to operation, FERC staff also reviews the facility security to ensure compliance with the authorized design. Principal concerns are compliance with the DOT regulations, as well as sufficient levels of security provided by surveillance cameras; intrusion detection systems; security fencing; and on-site access control plans.

Only after all of the above-identified inspections and reviews have been successfully completed would FERC staff recommend that the terminal is ready for

operations. The Director of OEP must issue a letter to the company that authorizes commencement of service from the facility.

Prior to operation, the terminal must also satisfy other federal agency requirements. For example, the facility must have a Facility Security Plan approved by the Coast Guard and a Vessel Transit Management Plan prepared by the Coast Guard and port stakeholders.

FERC oversight continues after an LNG import terminal project commences commercial operations. In fact, the Office of Energy Projects was reorganized to specifically create a Compliance Branch that is dedicated to ensuring that all FERC requirements, including safety and security measures, are complied with throughout the life of the project. Each LNG facility under FERC jurisdiction is required to file semi-annual reports to summarize plant operations, maintenance activity and abnormal events for the previous six months. LNG facilities are also required to report significant, non-scheduled events, including safety-related incidents (*e.g.*, LNG or natural gas vapor releases, fires, explosions, mechanical failures, unusual over-pressurization, major injuries) and security-related incidents (*e.g.*, attempts to enter site, suspicious activities near the plant site or around the marine terminal), as soon as possible but no later than within 24 hours. In addition, FERC staff conducts annual on-site inspections and technical reviews of each import terminal throughout its entire operational life. The inspection reviews the integrity of all plant equipment, operation and maintenance activities, safety and security systems, any unusual operational incidents, and non-routine maintenance activities during the previous year. Ultimately, the Director of the Office of

Energy Projects has the authority to take whatever measures are necessary to protect life, health, property or the environment.

We are proud of our track record working with DOT, the Coast Guard, state agencies, and with all interested stakeholders on these projects, and we are committed to continuing the LNG industry's outstanding safety record.

The Safe History of LNG Shipping

In addition to ensuring safe and secure terminal sites, FERC coordinates closely with the Coast Guard to ensure the safety and security of the LNG vessel transit to the import facility. Under our pre-filing regulations, applicants are required to certify that they have submitted a Letter of Intent and preliminary WSA with the Coast Guard when initiating the pre-filing process. The WSA is reviewed by the Coast Guard and members of the local Area Maritime Security Committee. The Coast Guard generally convenes a working group consisting of members of the local Area Maritime Security Committee, federal agencies, state and local law enforcement, state and local firefighters, maritime and security professionals, and key port stakeholders throughout the port area.

Under Coast Guard supervision, this group, through a series of focused meetings, brings together its viewpoints to form a consensus on appropriate measures and mitigation needed to manage responsibly the safety and security risks posed by LNG marine traffic. At these meetings, FERC staff serves as the LNG technical advisor to the working group, provides insight from our participation in other waterways, and assists in identifying credible hazard scenarios. The group's detailed recommendations from the meetings are presented to the Coast Guard to assist in the Captain of the Port's review of the applicant's WSA. Based on its review, the Captain of the Port will make a

preliminary determination on the suitability of the waterway and present it to the FERC in a Waterway Suitability Report (WSR).

The WSR filed with the Commission, preliminarily determines whether the waterway is suitable for LNG vessel transits, from both a safety and security perspective, and identifies additional resources that may be required. The results of this analysis are incorporated into the draft EIS and released for public comment. The 45-day comment period usually includes a public meeting near the proposed facility and along the pipeline route. In this manner, after public comment has been received and the final EIS is published, the Commission has a complete record on the suitability of the waterway and potential resource requirements prior to deciding whether to approve a particular LNG import terminal.

Since the beginning of commercial operations in 1959, LNG carriers have made over 46,000 voyages worldwide without a significant release of cargo or a major accident involving an LNG carrier. In no instance has an LNG cargo tank been breached either by an accidental or intentional event.

Any LNG carriers used to import LNG to the United States must be constructed and operated in accordance with the International Maritime Organization's (IMO) *Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk*, the *International Convention for the Safety of Life at Sea*, as well as 46 CFR Part 154, which contain the United States safety standards for vessels carrying bulk liquefied natural gas. Foreign flag LNG carriers are required to possess a valid IMO Certificate of Fitness and a Coast Guard Certificate of Compliance.

LNG carriers are well-built, robust vessels employing double-hull construction, with the inner and outer hulls separated by about 10 feet. The LNG cargo tanks are further separated from the inner hull by a layer of insulation approximately one-foot thick. As required by the IMO conventions and design standards, hold spaces and insulation areas on an LNG carrier are equipped with gas detection and low temperature alarms. These devices monitor for leaks of LNG into the insulation between primary and secondary LNG cargo tank barriers. In addition, hazard detection systems are also provided to monitor the hull structure adjacent to the cargo tank, compressor rooms, motor rooms, cargo control rooms, enclosed spaces in the cargo area, specific ventilation hoods and gas ducts, and air locks.

Even in the few instances worldwide where there have been incidents, the integrity of LNG vessel construction and safety systems has been demonstrated. One of the more significant incidents involved the *El Paso Paul Kayser* which grounded on a rock in the Strait of Gibraltar during a loaded voyage from Algeria to the United States in June 1979. Extensive bottom damage to the outer hull and the ballast tanks resulted; however, the cargo tanks were not damaged, and no cargo was released.

There have been a few other instances where LNG ships have grounded. In 1980, the *LNG Taurus* grounded near the entrance to Taboata Harbor, Japan. The grounding resulted in extensive bottom damage, but the cargo tanks were not affected and no cargo was released. The ship was refloated and the cargo was unloaded. In 2004, the *Tenaga Lima* was grounded on rocks, due to a strong current while proceeding to open sea East of Mopko, South Korea. The ship's shell plating was torn open and fractured over an approximate area of 20- by 80-feet. Internal breaches allowed water to enter the

insulation space between the primary and secondary membranes. However, the ship was refloated, repaired, and returned to service. Although damage was incurred when these LNG ships were grounded, their cargo tanks were never penetrated and no LNG was released.

In another incident, the *Norman Lady* was struck by the nuclear submarine *USS Oklahoma City* while the submarine was rising to periscope depth near the Strait of Gibraltar in November 2002. The LNG carrier sustained only minor damage to the outer layer of its double hull but no damage to its cargo tanks.

More recently, the *Khannur* had a cargo tank overfill into the ship's vapor handling system during unloading at Everett, Massachusetts, in 2001. Approximately 100 gallons of LNG were vented onto the protective carbon-steel decking over the cargo tank dome resulting in several cracks. After inspection by the Coast Guard, the *Khannur* was allowed to discharge its cargo. In 2002, the *Mostaefa Ben Boulaid* had LNG spill onto its deck during loading operations in Algeria. The spill, which was believed to be caused by overflow, caused brittle fracturing of the carbon steelwork. The ship was required to discharge its cargo and proceed to dock for repairs. Although all these incidents resulted in an LNG release, there were no injuries in any of these incidents.

The most recent incident occurred in 2006 when the *Golar Freeze* moved away from its docking berth during unloading in Savannah, Georgia. The powered emergency release couplings on the unloading arms activated as designed, and transfer operations were shut down, preventing release of significant amounts of LNG or any structural or environmental damage.

After inspection and onsite clearance by FERC staff and the Coast Guard, the arms were reactivated and transfer operations resumed without incident.

The low number of LNG tanker incidents can be attributed to the careful handling of the tankers, as well as safety and security procedures used in the ports. The transit of an LNG vessel through a waterway is strictly controlled by the Coast Guard to prevent accidental or intentional incidents that could damage the vessel or endanger the public. Entry into a port typically involves Coast Guard requirements such as:

- 96 hours advance notification of arrival and the vessel crew manifest;
- Coast Guard boarding of the LNG Vessel for an inspection of the ship safety system;
- Moving safety/security zones around the LNG vessel;
- Armed and unarmed escorts;
- Tug escort to assist with turning and mooring operations;
- Safety and security zones around the terminal dock while the vessel is berthed;
- Accompaniment by a state-licensed pilot; and
- Inspection of the dock safety systems before commencing cargo transfer.

With these operational measures, the transit of LNG carriers has been demonstrated to be safe along the waterway from the berthing area to the territorial sea.

Although the history of LNG shipping has been remarkably safe, the projected increase of LNG imports into the U.S. has resulted in calls for continued research on the theoretical impact of a major spill. On March 21, 2007, the Government Accountability Office (GAO) issued Report No GAO-07-316: "Public Safety Consequences of a Terrorist Attack on a Tanker Carrying Liquefied Natural Gas Need Clarification." I am

encouraged that this report reached many of the same conclusions on LNG hazards which we have published in each FERC environmental impact statement. The findings of the GAO expert panel concur with FERC staff's assessment of the potential public safety consequences of a terrorist attack on an LNG tanker regarding:

- unconfined vapor cloud explosions;
- freeze burns;
- asphyxiation; and
- rapid phase transitions (RPTs).

These phenomena do not pose a significant hazard to the on-shore public during a large-scale LNG spill. Natural gas vapors (primarily methane) can detonate if contained within a confined space, such as a building or structure, and ignited. However, unconfined methane-air mixtures have been ignited but not detonated in experiments. Although the addition of heavier hydrocarbons influences the tendency of an unconfined vapor cloud to detonate, the possibility for detonation of a large unconfined vapor cloud is unrealistic due to precise timing, necessary mixing, and required amount of initiating explosives.

Similarly, the public is not at risk from freeze burns or asphyxiation. Clouds from an LNG spill would be continuously mixing with the warmer air surrounding the spill site. Dispersion modeling estimates that the majority of the cloud would be within 25 degrees Fahrenheit of the surrounding atmospheric temperature, with colder temperatures closest to the spill source and away from the public. In addition, the majority of the cloud would be below concentrations which could result in oxygen deprivation effects,

including asphyxiation, with the highest methane concentrations closest to the spill source.

The report also focused on potential impacts from RPTs. Our project-specific EISs include a discussion of this issue. While RPTs can occur during a spill on water, impacts would be limited to the area within the pool and would be unlikely to affect the public. The overpressure events observed during experimentation have been relatively small, estimated to be equivalent to several pounds of TNT. Although such an event is not expected to cause significant damage to an LNG vessel, it could increase the rate of LNG pool spreading and the LNG vaporization rate for a spill on water.

FERC staff also concur with the GAO report on the potential for a boiling liquid expanding vapor explosion (BLEVE). While it may be theoretically possible, the low storage pressure, use of insulation, and installation of relief valves on both onshore LNG storage tanks and LNG carriers render the possibility of a BLEVE unlikely for LNG as it is normally transported and stored.

The report further states that the most likely public safety impact from an LNG spill would be from heat associated with a pool fire. FERC staff has also analyzed this issue in the course of project specific reviews and has reached that same conclusion. In its 2004 report, Sandia considered scenarios likely to breach an LNG cargo tank. Events ranged from accidental collisions, groundings, rammings, sabotage, hijackings, attacks with small missiles and rockets, and attacks with bulk explosives. These types of events which could potentially lead to a large LNG spill would likely be accompanied by a number of ignition sources. Surrounding impacts would be from an LNG pool fire, and

subsequent radiant heat hazards, rather than the formation of a large unconfined vapor cloud. Each of our EISs describes those potential impacts on the local waterway.

As stated in the 2004 Sandia report, the most significant impacts to public safety and property exist within approximately 500 meters (1,640 feet) of a spill due to thermal hazards from a fire, with lower public health and safety impacts beyond 1,600 meters (approximately 1 mile). We believe the Sandia report and FERC's site-specific analysis are a reasonable and conservative basis to examine potential impacts from an LNG tanker fire.

The GAO study reports four experts thought the Sandia distance calculations were "too conservative"; four thought "not conservative enough"; seven thought "about right." Although the report characterizes this as disagreement, the majority of the panel (11 of 15) responded that the calculations were either accurate or overly conservative.

In each EIS, FERC staff includes site-specific modeling done with the methodology developed for FERC by ABS Consulting. In areas of uncertainty due to the lack of large-scale field data, the FERC model uses conservative assumptions (i.e., resulting in longer hazard distances). These conservative assumptions concern: calculation of the pool spread; determination of the pool fire flame height; and use of a higher surface emissive power. Our results have been in agreement with the Sandia guidance zones of concern, and support the conservative nature of the calculations.

Cascading failure of the LNG storage tanks, addressed by Sandia in its previous examination of currently operating LNG carriers, was another topic of disagreement among the experts. Sandia stated that the events would not likely involve more than two or three cargo tanks. As stated in the 2004 Sandia report, the nominal hole size of an

intentional breaching scenario would be no more than 5- to 7-m^2, which is the appropriate range we use in the FERC staff EIS for calculating potential hazards from spills. For a breach of a 7 m^2 in a single tank, the fire duration would be approximately 10 minutes. Whereas smaller hole sizes could result in fires lasting over 1 hour. While the expected fire duration from cascading tank failure would increase, the overall fire hazard was not expected by Sandia to increase by more than 20 to 30 percent. GAO recommended that further study of this issue could be undertaken by Sandia. We concur that further study on cascading mechanisms may clarify if the subsequent failure of the fourth and fifth cargo tanks would occur over time with the most probable consequence of further extending the duration of the fire.

Related to cascading failure mechanisms are the effects such an event may have on a pool fire (i.e., whether it would increase the duration of the event, increase the size of the pool fire, or lower the radiant heat due to increased smoke generation). Current knowledge of the physical properties associated with an LNG spill are based on small-scale (<35 meter diameter pool) tests. How the data collected from small-scale pool fires can be extrapolated to the potentially large-scale cargo releases is a subject of much debate among the modeling community. Quantifying the physical properties of large-scale LNG spill should be a priority. This will allow analysts to refine the consequence models and generate more consistent results. Sandia currently has this effort underway with the Advanced LNG Pool Fire Testing Program.

Initial experimental results are expected in a few months, and the large-scale experiments are planned to be complete by August 2008. The initial results of these experiments will determine better correlations for the flame height and mass fire behavior

which could be expected during larger fires. The large-scale tests will result in better data on vapor production rates, smoke generation, and surface emissive power. In a separate effort, Sandia is also applying its threat analysis and spill probability methodology to LNG tankers larger than those previously studied. The research is designed to provide an estimation of the sizes of breaches, including hole size, spill volume, and number of tanks breached, for membrane-designed ship classes ranging from 216,000 m^3 to 267,000 m^3. These are representative of LNG ships that are currently being designed, constructed and proposed for use at LNG facilities in the United States. Presently, each Order issued by the Commission requires the applicant to prove that staff's modeling of hazards for those large tankers is accurate. They must do this and get approval from the Director of OEP prior to accepting the larger size ships.

We will use this new data to enhance our modeling capabilities for determining possible consequence areas resulting from a successful intentional attack on an LNG tanker. FERC staff has always committed to modify our analyses, when appropriate, as new data and improved modeling technologies are developed.

I believe that this research is beneficial and necessary and will provide more exact information and technical details. Removing the uncertainty inherent in modeling phenomena will result in more accurate models. However, in current areas of uncertainty, we have made conservative assumptions. FERC staff believes the refined models will likely show smaller consequence areas. FERC, and along with it, the Coast Guard and DOT have a competent understanding of the risks and how to mitigate them effectively to ensure public safety.

Commission Review Process for the Broadwater LNG Project

Broadwater filed formal applications on January 30, 2006, to construct and operate an LNG import, storage, and regasification facility and a new offshore natural gas pipeline to connect to the existing interstate natural gas transmission system. Broadwater's proposal involves a floating storage and regasification unit (FSRU) that would transport up to 1.25 billion cubic feet per day (bcfd) of imported natural gas to the region that includes Long Island, New York City, and Connecticut. The Project would include a total LNG storage capacity of 350,000 cubic meters (approximately 8 bcf).

The proposed FSRU would be an offshore structure and would be regulated as a facility. For the purposes of the cryogenic design and technical review, the FSRU is essentially characterized as an LNG carrier with vaporization equipment onboard that would be moored at a fixed location. FERC and Coast Guard staff are evaluating the proposed facility on multiple equivalent design standards, including appropriate portions of 49 CFR 193 and NFPA 59A.

On November 4, 2004, Broadwater filed a request with FERC to implement the Commission's pre-filing process for the Broadwater LNG Project. At that time, Broadwater was in the preliminary design stage of the Project and no formal application had been filed with FERC. The purpose of the pre-filing process is to encourage early involvement of interested stakeholders, facilitate interagency cooperation, and identify and resolve issues before an application is filed with FERC. On November 29, 2004, FERC granted Broadwater's request.

On November 9, 2004, Broadwater submitted an LOI to the Coast Guard. The LOI initiated the Coast Guard's review of the safety and security of the proposed Project

as a part of its preparation of an LOR that would be issued for the Project by the Captain of the Port of Long Island Sound.

The proposed facility would incorporate design and engineering components of an LNG import facility and an offshore marine facility, as well as features similar to an LNG carrier. As a result, FERC and Coast Guard technical staff have shared the review of the facility by contributing their specific areas of expertise. In August 2005, FERC sent a letter to the Coast Guard requesting assistance in the analysis of the Broadwater Project. As stated in that letter, FERC would be the lead agency in conducting a cryogenic design review of the proposed facilities. The Coast Guard would review matters relating to the FSRU engineering and safety standards, as well as navigation safety and waterway suitability assessment for the carriers transporting LNG. Specifically, FERC staff would analyze the front-end engineering design for the LNG pumps and vaporization systems, process piping systems and vessels, process instrumentation and controls, process electrical systems, and other equipment normally reviewed for an onshore terminal. The Coast Guard staff would be responsible for assessing the design basis for the FSRU (including evaluating the standards and codes), oversight of the structural design review, and oversight of the mooring system design assessments by any contracted third-party reviewers. Both FERC and Coast Guard staff would jointly review items such as the general arrangement and equipment layout, storage tank design and construction, pressure relief and venting systems, emergency shutdown systems, spill control systems, and hazard detection and control systems.

As Broadwater's proposed FSRU would be similar to an LNG carrier, detailed design and construction of the facility would take place in a shipyard. Consequently,

FERC and Coast Guard staff have agreed that the review of this facility should use a process that is largely reliant on the procedures established by the Coast Guard for the review of deepwater ports. This process employs the Certifying Entity (CE) framework provided in Navigation and Inspection Circular 03-05 *Guidance for Oversight of Post-Licensing Activities Associated with Development of Deepwater Ports*. The CE would assist FERC and the Coast Guard staff in reviewing the appropriate codes and standards, the detailed design basis that would be used for the project, and the procedures for construction inspections of the FSRU, should the project be authorized by the Commission. After the extensive FERC Staff review of input during the pre-filing process, as well as FERC Staff review of comments received on the formal applications filed January 30, 2006, and after, Commission Staff issued the draft environmental impact statement (DEIS) on November 17, 2006. The DEIS included recommendations that Broadwater engage a qualified Certifying Entity for an independent review of the codes and standards development, detailed design, fabrication, installation, and operation of the proposed FSRU; and that Broadwater should maintain class for the life of the proposed facility.

In review of the proposed Broadwater FSRU so far, FERC staff have performed site specific thermal radiation and vapor dispersion modeling to calculate distances associated with different hazard scenarios associated with the FSRU. The calculated radiant heat distances reported in the DEIS do not impact any population centers due to the facility's distance from land. A similar analysis was used by the Coast Guard, along with the Sandia study, in its waterway suitability review and is reported in the WSR filed with the Commission on September 21, 2006. Based on their review, the Coast Guard

proposed a combined safety and security zone around the FSRU centered on the yoke mooring tower.

Public Outreach

Broadwater conducted a series of open houses on Long Island and in Connecticut in November and December 2004 and in April 2005 on Long Island. The purpose of the open houses was to inform agencies and the general public about LNG and the proposed Project, and to provide them an opportunity to ask questions and express their concerns. FERC and the Coast Guard participated in these open houses and provided information to the public on the joint review process of the Project.

On February 10, 2005, FERC formally introduced the pre-filing process to various Project stakeholders by issuing a notice of pre-filing process review for the Broadwater Project. This pre-filing notice was sent to approximately 2,200 interested parties, including federal, state, and local officials; agency representatives; conservation organizations; and local libraries and newspapers. On August 11, 2005, FERC issued its Notice of Intent to Prepare an Environmental Impact Statement for the Broadwater LNG Project, Request for Comments on Environmental Issues, and Notice of Joint Public Scoping Meetings (NOI). On August 16, 2005, the Coast Guard issued its Notice, Request for Comments; Letter of Recommendation, Proposed Broadwater Project, Long Island Sound in the Federal Register.

FERC's NOI was sent to interested parties, including many of the same interested parties as the Pre-filing Notice, as well as individuals and organizations who provided comments on the Pre-filing Notice. All of the notices issued by FERC and the Coast Guard encouraged Project stakeholders and interested parties to provide input on

environmental and safety and security issues that should be addressed during the Project review process. Both the NOI and the Coast Guard notice specifically requested comments by October 7, 2005; however, both FERC and the Coast Guard accepted comments throughout the time this DEIS was being prepared. FERC received more than 4,200 comment letters in response to the Pre-filing Notice and the NOI. Although many comment letters addressed specific environmental concerns, the majority expressed opposition to the Project with either general comments or without stating specific environmental issues of concern.

The Coast Guard received more than 2,300 letters from concerned parties. The majority of those letters expressed concerns about health and safety, security, public access, and industrialization of the Sound.

FERC and the Coast Guard conducted joint public scoping meetings at two locations on Long Island (Stony Brook and Wading River) and two locations in Connecticut (East Lyme and Branford) in September 2005. These meetings were held to provide the general public with an opportunity to learn more about the proposed Project and to participate in the analysis of the Project by commenting on issues to be included in the EIS and in the safety and security analysis.

In addition to the public notice and scoping process discussed above, FERC conducted agency consultations, participated in several interagency meetings and conference calls, and met with concerned agencies and non-governmental organizations to identify issues that should be addressed in this EIS. The Coast Guard participated at many of these meetings; coordinated with FERC's LNG engineering group to review safety and reliability issues of Project design; conducted a Ports and Waterways Safety

Assessment (PAWSA) workshop in May 2005; conducted a Harbor Safety Working Group meeting for the Broadwater LNG Safety Risk Assessment in December 2005; and established a subcommittee of the Area Maritime Security Committee to provide input to the Coast Guard's review of potential risks to maritime security. In addition, FERC and the Coast Guard have coordinated regularly throughout the review process.

On November 17, 2006, Commission Staff issued the DEIS on the proposed project. The DEIS was mailed to over 5,000 stakeholders including the agencies, individuals, and organizations who commented during the scoping process. The DEIS represents staff's preliminary findings, which are a result of two years of information-gathering. In developing the DEIS, staff carefully reviewed the potential impacts to each resource, consulted with the public, regional experts, resource agencies and technical literature. The DEIS recommended 79 highly detailed conditions to mitigate the environmental impact and assure public safety.

In January 2007, the Commission held joint public hearings with the Army Corps of Engineers and the Coast Guard, in Connecticut and New York to solicit public comment on the DEIS. Again, two meetings were held in New York (Smithtown and Shoreham) and two meetings were held in Connecticut (New London and Branford). Public participation in the meetings was very high. In January 2007, Commission staff also conducted a meeting with the Connecticut Long Island Sound LNG Task Force, their technical experts, and other state agencies and officials regarding the proposal.

To date, thousands of comment letters have been received. Although the 60-day comment period for the DEIS expired on January 23, 2007, Staff continues to accept comments. Staff will review all comments received, then prepare a final EIS that will

include responses to the comments received. The Commission will only take a position when the record is complete.

As stipulated by the Energy Policy Act of 2005, the governor of New York designated the New York State Department of Public Service (NYSDPS) as the state agency that FERC should consult with on safety and siting matters for the Broadwater Project. NYSDPS submitted its February 28, 2006 Safety Advisory Report to FERC. In the report, NYSDPS addressed state and local considerations for the Project and provided comments from the NYSDOS, the New York State Emergency Management Office, the New York State Department of Transportation, and the New York State Office of Homeland Security, as well as the comments of several local governmental entities (Suffolk County, the Town of Huntington, the Town of Riverhead, and the Village of Poquott).

The Energy Policy Act of 2005 stipulates that, before the Commission may issue an order authorizing an LNG terminal, it must "review and respond specifically" to the safety matters raised by the state agency designated as the lead for the state and local safety matters. Appendix A of the DEIS presented FERC's response to the NYSDPS advisory report for the Broadwater Project.

Issues Raised

Next, I will discuss the principal issues that were raised during the process to date. From FERC's perspective, public safety is always the greatest concern when reviewing a proposed LNG project. The people who have commented on the Broadwater LNG Project have also identified public safety as the top issue. The Coast Guard WSR found that with the adoption and implementation of additional measures needed to responsibly

manage the safety and security risks, the waters of Block Island Sound, Rhode Island Sound and Long Island Sound can be made suitable for LNG vessel traffic and the operation of the proposed terminal. FERC Staff's DEIS adopted the WSR and included it as an appendix.

Other primary issues of concern include potential limitations or modifications to public use of Long Island Sound. For example, the Coast Guard safety and security zone around the FSRU would exclude public access. It is the concern of many that operation of the Project would disrupt and conflict with traditional uses of Long Island Sound including commercial and recreational fishing, and boating.

Other use conflicts may occur as LNG carriers enter and exit the Sound through a natural deepwater channel called the Race. The Race is about 3.5 miles wide and extends from the southwestern tip of Fishers Island to Little Gull Island. Within that area, a shipping channel for deep draft vessels approximately 1.4 miles wide separates the Race Rock Lighthouse on the north (off the southwestern tip of Fishers Island) and Valiant Rock on the south. Most large commercial vessels enter and exit the Sound through this channel.

Because the carriers would also have moving safety and security zones around them, the concern is that the activities of other waterway users would be disrupted. However, LNG carrier transits would occur a total of about 4 to 6 times per week. Passage of the carrier and its zone past a fixed point would take about 15 minutes. At the most constricted point, the Race, the Coast Guard determined that there would be room available for use by other vessels when LNG carriers are passing through.

Commentors, including the Environmental Protection Agency (EPA), expressed concerns over air quality impacts. The EPA is a cooperating agency in the review of the Broadwater project. In a comment letter on the DEIS, the EPA suggested that the draft General Conformity determination in the DEIS lacked some critical information. We acknowledged this on page 3-171 of the DEIS and included a condition requiring that Broadwater provide the information. Broadwater has provided additional data that is currently under review by EPA and FERC staff. A formal draft General Conformity determination will be issued once all of the information has been reviewed and determined complete.

Visual impacts have been a concern from our initial review of the Project. Broadwater prepared a visual resource assessment, based on New York state guidelines. It has been reviewed and modified based on input from the New York State Department of Environmental Conservation, NYSDOS, and FERC. The terminal would be completely obscured from all coastal vantage points by haze or fog about 20 percent of the time. The greatest potential visual effect would occur on a clear day from a point on the nearest shoreline, which is more than 9 miles from the terminal, of the FSRU with a berthed LNG carrier. Due to the distance from the shore, the FSRU would be visible but would appear to be about the size of a small paper clip held at arm's length.

Concerns about the aquatic environment of Long Island Sound were also expressed. Most impacts to Long Island Sound would occur within the approximately 75-foot-wide corridor on either side of the proposed offshore pipeline. However, the construction techniques associated with the pipeline would affect even greater areas as construction barges and sea floor trenching would require anchors and cables that would

disturb the sediments and benthic organisms. In response, we have included a recommendation that Broadwater develop alternative procedures or use less damaging equipment to substantially reduce these impacts.

In total, the draft EIS included 79 site-specific measures designed to avoid or minimize the project's environmental impacts and concluded that the project would result in limited adverse environmental impact. As previously stated, there has been substantial public comment on the draft EIS. The next step will be review each comment received on the draft EIS, prepare specific responses, and revise or enhance our analysis as appropriate. At that point we will issue a final EIS.

Conclusion

In conclusion, LNG is a commodity which has been and will continue to be transported safely in the United States. The U.S. Coast Guard, the U.S. DOT and FERC are committed to ensuring that safety. As a matter of policy, the Commission is committed to continually raising the bar on energy infrastructure safety. As new safety measures, improved monitoring equipment, and enhanced safety and security protocols are developed, the Commission will ensure that LNG remains a safe and secure fuel source for the country.

This concludes my testimony. I will be happy to answer any questions you may have.