

**Testimony of**

**Richard R. Hoffmann**  
**Director, Division of Gas – Environment & Engineering**  
**Office of Energy Projects**

**Federal Energy Regulatory Commission**  
**888 First Street, N.E.**  
**Washington, DC, 20426**  
**202-502-8870**

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**Hearing on**  
**Safety and Security of Liquefied**  
**Natural Gas and Impact on Port Operations**

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My name is Richard R. Hoffmann and I am the Director of the Division of Gas – Environment and Engineering, in 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 Division is responsible for the environmental review of interstate natural gas pipelines and storage facilities; and, more significantly for today’s session, the environmental and safety review and oversight over the construction, operation, and safety of onshore and near-shore liquefied natural gas (LNG) terminals. We also share security responsibilities for these facilities with the U.S. Department of Transportation (DOT) and 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. Next, I will briefly address the measures taken to ensure the continuing safety history of LNG shipping.

Last, I will describe the process to date for the pending AES Sparrows Point and will summarize the issues before the Commission.

### **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 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.

In the case of the Sparrows Point proposal, the State of Maryland Department of Natural Resources filed a Safety Advisory Report with the FERC on February 1, 2007. I will discuss that filing later in my testimony. 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 impoundments, 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. Exclusion 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<sup>2</sup>-hr thermal flux levels must be considered. The regulations require that a radiant heat flux of 10,000 BTU/ft<sup>2</sup>-hr not cross any plant property line that can be built upon. A

radiant heat flux of 3,000 BTU/ft<sup>2</sup>-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<sup>2</sup>-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<sup>2</sup>-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
- Operation and Maintenance manuals.

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 typical three-year 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 containment 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 P&IDs 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 LNG's outstanding operational performance.

### **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.

In summary, 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.

#### **Commission Review Process for the AES Sparrows Point Proposal**

The sponsors of the AES Sparrows Point proposal were required to follow the pre-filing requirements of the Energy Policy Act of 2005 and the Commission's pre-filing regulations issued on October 7, 2005. After initial consultation meetings with the Commission staff, AES filed its pre-filing request on March 24, 2006. The filing certified that the LOI and the preliminary WSA had been submitted with the Coast Guard on March 3, 2006. The pre-filing request was accepted by the Commission on April 3, 2006.

On April 24, 2006, the sponsors of the AES Sparrows Point proposal commenced a series of public open houses at locations in the vicinity of the proposed terminal and pipeline route to explain their proposal and to help identify issues that would need to be

addressed in the application. The first open house in Dundalk, Maryland near the terminal site was attended by Commission environmental and engineering staff to answer the public's questions about the review process and safety issues in general.

On May 16, 2006, the Commission issued its Notice of Intent to Prepare an Environmental Impact Statement and announced a series of local public scoping meetings to be conducted by Commission environmental staff. Public scoping meetings were conducted on June 5, 6, and 7, 2006, in Sparrows Point, Maryland; Downingtown, Pennsylvania; and Bel Air, Maryland, respectively. In addition, site visits were conducted along the proposed pipeline route on June 6 and 7, 2006, and at the proposed terminal site on July 26, 2006. These local scoping meetings and site visits provided still another forum for the public to identify their environmental and safety concerns with the proposal. At each meeting a court reporter transcribed all comments made which subsequently became part of the public file maintained by the Commission. Written comments were also solicited, and nearly 400 letters from the public, federal, state, and local officials have been received into the FERC record.

Following the open houses and public scoping meetings, AES commenced preparing and submitting drafts of the 13 environmental and engineering resource reports for Commission staff to review and provide comments. During this period, the follow-on WSA report was submitted to the Coast Guard on October 25, 2006.

AES filed its formal application on January 8, 2007. The proposed LNG terminal would be developed on 80 acres of a 175-acre land parcel located on the peninsula of Sparrows Point, east of the Port of Baltimore in Baltimore County, Maryland. The facility would consist of a marine terminal, three on-shore storage tanks, vaporization

equipment, and various support buildings and systems. The three full-containment storage tanks would each be 170-feet high and 270-feet in diameter with capacity to store 160,000 m<sup>3</sup> of LNG. In addition, an 87.6-mile-long, 30-inch-diameter pipeline would extend from the facility through Baltimore, Harford, and Cecil Counties, Maryland and Lancaster and Chester Counties, Pennsylvania to an interconnection near Eagle, Pennsylvania. The pipeline would have a planned capacity of 1.5 billion standard cubic feet of natural gas per day.

LNG would arrive at the AES terminal by ship and be offloaded to the storage tanks, vaporized to natural gas, and transported to consumers by the pipeline. Operating at full capacity would require offloading a ship every two to three days. The natural gas would be delivered to markets in the Mid-Atlantic Region and northern portions of the South Atlantic Region via the pipeline. In addition to the LNG facility, AES proposes to build a dredge material recycling facility on 5 acres of upland property adjacent to the LNG facility. During the 18- to 24-month construction phase, the project sponsors propose to dewater and process dredged sediment into a form suitable for shipping off-site. The application estimates that as much as 4.0-million cubic yards of dredged material would be generated for recycling.

As stipulated by the Energy Policy Act of 2005, the Maryland Governor's office filed the Maryland State Advisory Report on February 7, 2007. The advisory report, which highlights state and local concerns, includes comments compiled by the Maryland Department of Natural Resources (MDNR) intended to assist the FERC, the COE and the Coast Guard in review of safety and environmental concerns with the proposed project. Issues raised by the MDNR include the safety of the proposed project, as well as its

impacts to the state's environment and economy. Specifically, the MDNR expressed concerns about the requirements of remote siting; adequately addressing threats posed by adjacent land uses; providing for the safe evacuation of the public in the event of an emergency; addressing the significant environmental impacts associated with dredging, air emissions, and pipeline construction; and economic impacts to the commercial and recreational activities in the Port of Baltimore and in the Chesapeake Bay.

The application is currently under FERC staff review. On March 16, 2007, we sent questions to the applicant to address issues raised by FERC staff, the public and other agencies, including MDNR. The data request also included questions about environmental resources adjacent to the entire vessel transit route beginning at the U.S. territorial seas. AES filed a data response on April 5, 2007 and it is currently under review. We issued an additional data request on April 3, 2007 regarding engineering design issues. A response to that letter is pending. Once FERC staff has reviewed the filed data response, consulted with our cooperating agencies, and made a determination that we have adequate information to complete our analysis, a Notice of Schedule for Environmental Review (NSER) will be issued. The NSER will identify the our schedule for publishing the draft and final EISs. This notice will alert agencies issuing federal authorizations to complete the necessary reviews and issue their determinations within 90 days of issuance of the final EIS.

The next steps are for FERC staff to conduct a technical conference concerning the engineering design of the proposed facility. FERC staff will complete a comprehensive review of the proposed terminal design and safety features, as described earlier in my testimony. Once FERC staff has analyzed the data responses, collected

other information, consulted with the other agencies and completed its technical analysis, we will issue a draft EIS. The draft EIS can only be completed after we receive the WSR from the Coast Guard and must include an analysis of any environmental impacts of its recommended actions. Local public meetings on our draft EIS will be conducted near the proposed terminal site and pipeline route to solicit public comments. Written comments from all interested parties will also be accepted throughout the 45-day comment period.

**Issues Raised During Scoping** – Next, I will identify some of the principal issues that were raised during the pre-filing scoping process regarding each aspect of the project, including shipping and the construction and operation of both the terminal and the pipeline. Shipping issues focused mainly on the safety and security of the vessels during transit, including items such as spills, fires or terrorists targeting the tankers during transit; potential costs to the community to provide adequate safety and security measures; and potential impacts on nearby bridges (*i.e.*, whether bridges or channels need to be shut down during vessel transit). Other shipping issues relate to the potential economic impacts of the security zones on recreational and commercial boaters, fishermen and crabbers that use the river, as well as economic impacts affecting the revitalization of the Baltimore Harbor area and the Chesapeake Bay environmental recovery efforts. Specifically, commenters have expressed concerns over the potential dimensions and timing issues associated with the potential security zones around LNG vessels during transit, and what overall impact frequent LNG traffic would have on watercraft and others who use the Chesapeake Bay, Patapsco River, and Bear Creek. The commenters want to know the potential risks that would be encountered by the public during transit activities and what protective measures would be employed to protect the

public from these risks. As previously mentioned, the safety and security issues associated with LNG vessel transit are being closely reviewed by the Coast Guard with the Area Maritime Security Committee and port stakeholders.

Issues raised regarding the dock and terminal construction focused on the dredging and disposal of 3.5 to 4.0 million cubic yards of sediment from the proposed turning basin and channel. Concerns were raised that the area has been previously contaminated from the steel operations and other industrial uses in the area with PCBs, PAHs, metals, dioxins, tributyl tin, arsenic and mercury, as examples. Specifically, commenters were concerned that dredging activities would disturb contaminated sediments that have been buried for many years, creating a toxic health impact on living organisms in and connected to the Chesapeake Bay ecosystem. Comments were also made concerning the disposal options available for this amount of material, since contaminated material disposal sites are of limited availability in the area.

FERC staff is working closely with the COE to analyze impacts associated with dredging. Dredging issues would need to be approved by the COE for the Clean Water Act (CWA), Section 404 permit as well as the Maryland Department of the Environment for CWA Section 401. Currently, AES's proposal is to process the dredged material onsite for reuse as fill material in unspecified locations in Maryland. This proposal will be fully reviewed for inclusion in the FERC EIS.

Other issues raised regarding the operation of the LNG terminal included air quality, environmental justice, impacts to neighboring industrial facility operations, and property value impacts and safety/evacuation for the closest residential communities, specifically Turner Station which is located about 1.2 miles from the proposed terminal



across the Patapsco River. Commenters also were concerned about the U.S. Department of Housing and Urban Development (HUD) regulations regarding separation distances from LNG facilities and how the proposed project would affect future HUD funding.

Our air quality impacts analysis will analyze whether the proposal complies with the General Conformity Rule established under the Clean Air Act by the U.S. Environmental Protection Agency (EPA). Separate determinations of conformity must be made by the Maryland Department of the Environment (MDE), the Virginia Department of Environmental Quality (VADEQ), and the Pennsylvania Department of Environmental Protection (PADEP). FERC staff will be working with these agencies to complete the air quality review for the proposed project for inclusion in the EIS. Socioeconomic impacts, including environmental justice, property values and impacts on neighboring communities will also be analyzed in the EIS and released for public comment.

The pipeline route proposed is mostly adjacent to existing rights-of-way for roadways and other utilities. Commenters have expressed concerns regarding health and safety, impacts to nearby schools and historic districts, impacts on property values and other socioeconomic issues, impacts on septic systems and private wells, groundwater and surface water contamination, disturbances to wetlands and forested wildlife habitat, endangered species impacts, impacts to public lands and state parks, and disturbance to agricultural operations during construction of the proposed project. The MDNR also raised concerns about the proposed pipeline location within or near road/interstate rights-of-way and whether this would hinder future road expansion.

FERC staff will ensure that each issue identified is adequately addressed in the appropriate section of the draft EIS before it is released for public comment.

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