Review of LNG Facilities

Citizen’s Briefing- Robbinston, Maine
September 29, 2005
Who is FERC?

• Independent Regulatory Commission
• Five members
  - Appointed by the President
  - Confirmed by the Senate
What does FERC regulate?

- **Natural Gas**
  - Interstate gas pipeline construction and related environmental matters
  - Interstate transportation rates and services

- **Electric Power**
  - Interstate transmission rates and services
  - Wholesale energy rates and services
  - Corporate transactions and mergers
What does FERC regulate?

- **Oil Pipeline**
  - Interstate transportation rates and services of crude oil and petroleum products

- **Hydropower**
  - Licensing of nonfederal hydroelectric projects
  - License administration and compliance
  - Inspection, safety, and security at hydropower projects
Gas Program

Ø Evaluate applications for facilities to import, export transport, store or exchange natural gas
Ø Authorize the construction and operation of facilities for such services
Ø Approve abandonment of such facilities
Ø Conduct environmental reviews of proposals involving construction, modification, or abandonment
Ø Implement Pre-Filing Process
Ø Conduct inspections of LNG facilities and pipeline construction
How Are LNG Terminals Authorized?

- Public Involvement
- Technical Analysis
- Safety & Environmental Review
- Public Interest Determination
Who Gets Involved?

• Process is INCLUSIVE!!
  -- Federal, State, Local, Individuals
• Based on Due Process.
• Detailed Review Under NEPA and NGA.
• Mandatory Pre-Filing Process.
• Build Strong Partnerships With All Stakeholders/ Reach Out to Groups.
Safety?– How Important?

- Essential
- Cryogenic Design Review
- Interagency Cooperation
- Compliance
  - Design Standards & Review
- Inspection
- Monitor Operations
Existing, Proposed and Potential North American LNG Terminals

**US Jurisdiction**
- FERC
- US Coast Guard

**As of August 22, 2005**

**US pipeline approved; LNG terminal pending in Bahamas**

**These projects have been approved by the Mexican and Canadian authorities**

- **PROPOSED TO MARAD/COAST GUARD**
  - California Offshore: 1.0 Bcf/d (Galveston - BHP Billiton)
  - Louisiana Offshore: 1.0 Bcf/d (Main Pass McMoRan Exp.)
  - Gulf of Mexico: 2.9 Bcf/d (Pearl Crossing - ExxonMobil)
  - Gulf of Mexico: 1.5 Bcf/d (Beacon Point Clean Energy Terminal - Excelerate Energy)

- **POSSIBLE SITES IDENTIFIED BY PROJECT SPONSORS**
  - Coos Bay, OR: 0.13 Bcf/d (Energy Projects Development)
  - Somerset, MA: 0.65 Bcf/d (Somerset LNG)

- **CANADIAN APPROVED AND POTENTIAL TERMINALS**
  - St. John, NB: 1.0 Bcf/d (Canaport - Irving Oil)**
  - Point Tupper, NS: 1.0 Bcf/d (Bear Head LNG - Anadarko)**
  - Quebec City, QC: 0.5 Bcf/d (Project Ramaaska - Enbridge/Gaz Met/Gaz de France)
  - Riviere-du-Loup, QC: 0.5 Bcf/d (Galveston LNG - TransCanada/Shell/Gaz de France)
  - Kilmain BC: 0.5 Bcf/d (Galveston LNG - TransCanada/Petrol Canada)
  - Prince Rupert, BC: 1.0 Bcf/d (WestPac Terminals)

- **MEXICAN APPROVED AND POTENTIAL TERMINALS**
  - Altamira, Tamulipas: 0.7 Bcf/d (Shell/Total/Mitsui)**
  - Baja California: 1.0 Bcf/d (Chevron Texaco)**
  - Lázaro Cárdenas, MX: 0.5 Bcf/d (Tractebel/Repsol)
  - Puerto Libertad, MX: 1.3 Bcf/d (Sonora Pacific LNG)

- **Construction & Expansion Projects**
  - Everett, MA: 1.035 Bcf/d (Tractebel - DOMAC)
  - Cove Point, MD: 1.0 Bcf/d (Dominion - Cove Point LNG)
  - Elba Island, GA: 0.54 Bcf/d (El Paso - Southern LNG)
  - Lake Charles, LA: 1.0 Bcf/d (Southern Union - Trunkline LNG)
  - Gulf of Mexico: 0.5 Bcf/d (Gulf Gateway Energy Bridge - Excelerate Energy)

- **Projects Approved by FERC**
  - Lake Charles, LA: 1.1 Bcf/d (Southern Union - Trunkline LNG)
  - Hackberry, LA: 1.5 Bcf/d (Sempra Energy)
  - Bahamas: 0.84 Bcf/d (AES Design & Exp.)
  - Bahamas: 0.83 Bcf/d (Calypso Tractebel)
  - Freeport, TX: 1.0 Bcf/d (Cheniere LNG)
  - Elba Island, GA: 0.54 Bcf/d (El Paso - Southern LNG)
  - Corpus Christi, TX: 10.0 Bcf/d (Vista Del Sud - Excelerate Energy)
  - Gulf of Mexico: 0.5 Bcf/d (Cheniere/Freeport LNG Dev.)
  - Bahamas: 0.83 Bcf/d (Calypso Tractebel)*
  - Freeport, TX: 1.5 Bcf/d (Cheniere LNG)
  - Sabine, LA: 2.6 Bcf/d (Cheniere LNG)
  - Elba Island, GA: 0.54 Bcf/d (El Paso - Southern LNG)
  - Corpus Christi, TX: 1.0 Bcf/d (Vista Del Sud - Excelerate Energy)
  - Bahamas: 0.5 Bcf/d (Seafarer - El Paso/FPL)
  - Port Arthur, TX: 1.5 Bcf/d (Sempra)
  - Cove Point, MD: 0.8 Bcf/d (Dominion)
  - Bahamas: 0.83 Bcf/d (Calypso Tractebel)*
  - Freeport, TX: 1.5 Bcf/d (Cheniere LNG)
  - Sabine, TX: 1.0 Bcf/d (Cheniere/Freeport LNG Dev.)
  - Corpus Christi, TX: 1.0 Bcf/d (Ingleside Energy - Occidental Energy Ventures)
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  - Sabine, TX: 1.0 Bcf/d (Cheniere LNG - Expansion)

- **Projects Approved by MARAD/COAST GUARD**
  - Port Pelican: 1.6 Bcf/d (Chevron Texaco)
  - Louisiana Offshore: 1.0 Bcf/d (Gulf Landing - Shell)

- **Pending Projects**
  - Long Beach, CA: 0.7 Bcf/d (Mitsubishi/ConocoPhillips - Sound Energy Solutions)
  - Logan Township, NJ: 1.2 Bcf/d (Crown Landing LNG - BP)
  - California Offshore: 0.5 Bcf/d (Crystal Energy)
  - Louisiana Offshore: 1.0 Bcf/d (Main Pass McMoRan Exp.)
  - Gulf of Mexico: 1.0 Bcf/d (Compass Port - ConocoPhillips)
  - Gulf of Mexico: 1.5 Bcf/d (Beacon Point Clean Energy Terminal - Excelerate Energy)

- **Provisional Projects**
  - California Offshore: 0.5 Bcf/d (Crystal Energy)
  - Louisiana Offshore: 1.0 Bcf/d (Main Pass McMoRan Exp.)
  - Gulf of Mexico: 1.0 Bcf/d (Compass Port - ConocoPhillips)
  - Gulf of Mexico: 1.5 Bcf/d (Beacon Point Clean Energy Terminal - Excelerate Energy)

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FERC, DOT and the U.S. Coast Guard

Ø Interagency Agreement on LNG Safety and Security signed 2/04: FERC, DOT, USCG
Ø Need for guidance recognized as a result of surge in new LNG terminal development
Ø USCG worked with FERC staff to develop guidance that would meet both agencies’ needs
Ø Needed to address the USCG’s NEPA responsibilities
LNG Authorization Process
Mandatory Pre-Filing Review

Start of Pre-Filing Process
  Scoping Meeting / Site Visit
    Data Requests, Analysis & Agency Coordination
      Notice of Application
        Interventions & Protests
          Issue DEIS
            Public Meeting / Comments
              Issue FEIS
                Authorization / Denial

Safety & Engineering
  Cryogenic Design & Safety Review
    Technical Conference
      Waterway Suitability Assessment Review
        Waterway Suitability Report
          USCG Letter of Recommendation (issued independently)
Timeline for LNG Pre-Filing Process

**Applicant’s Activities**
- Submit PF letter
- Start PF Review
- Prepare Draft Resource Reports & Prepare Prelim. DEIS
- Review Draft Resource Reports & Prepare Prelim. DEIS
- Determine Application Complete
- Issue Draft EIS
- Issue Final EIS
- Issue Order

**FERC’s Activities**
- File At FERC
- Applicant’s Activities

(months)
Pre-Filing Process - Increased Public Involvement

Ø More interactive NEPA/permitting process, no shortcuts
Ø Earlier, more direct interaction between FERC, other agencies, landowners
Ø Time savings realized only if we are working together with stakeholders
Ø FERC/Agency staff are advocates of the Process, not the Project!
Ø Goal of “no surprises”
Pre-Filing Activities

Ø Identify affect parties
  • Landowners
  • Agencies
  • Others
Ø Issue scoping notice
Ø Facilitate
  • Issue Identification
  • Study needs
  • Issue resolution
Ø Examine alternatives
Ø Attend site visits and meetings
Ø Initiate preparation of NEPA document
Ø Review draft application

*FERC staff will be an advocate for the process, not the project*
Opportunities for Public Involvement

The FERC Process:
- Issue Notice of the Application
- Project Sponsor Sends Landowner Notification Package
- Issue Notice of Intent to Prepare the NEPA Document (i.e., scoping)
- Hold Scoping Meetings

Public Input:
- File an Intervention; register for e-subscription
- Contact the project sponsor w/questions, concerns; contact FERC
- Send letters expressing concerns about environmental impact
- Attend scoping meetings
Opportunities for Public Involvement

<table>
<thead>
<tr>
<th>The FERC Process:</th>
<th>Public Input:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ø Issue Notice of Availability of the DEIS</td>
<td>Ø File comments on the adequacy of DEIS</td>
</tr>
<tr>
<td>Ø Hold Public Meetings on DEIS</td>
<td>Ø Attend public meetings to give comments on DEIS</td>
</tr>
<tr>
<td>Ø Issue a Commission Order</td>
<td>Ø Interveners can file a request for Rehearing of a Commission Order</td>
</tr>
</tbody>
</table>
Environmental Report

Ø Required for all LNG projects
Ø 18 CFR 380.12 establishes minimum filing requirements
  • Use Appendix A checklist to avoid rejection
Ø Guidance Manual for Environmental Report Preparation provides more information
  • Designed to minimize data requests
13 Resource Reports

1. General Project Description
2. Water Use and Quality
3. Fish, Wildlife, and Vegetation
4. Cultural Resources
5. Socioeconomics
6. Geological Resources
7. Soils

1. Land Use, Recreation, and Aesthetics
2. Air and Noise Quality
3. Alternatives
4. Reliability and Safety
5. PCB Contamination (for pipelines)
6. LNG Engineering & Design Details
Purpose of USCG NVIC

Ø Provide guidance to LNG terminal applicants on information it must provide to the USCG to ensure that full consideration is given to safety and security of the port, the facility, and the vessels transporting the LNG.

Ø Provides guidance to USCG on fulfilling its commitment to FERC to provide input for EIS
FERC’s Role

Ø FERC will:

• Include in the DEIS a summary of the USCG’s report of the WSA
• Include in the EIS, as needed, conditions to address:
  • Completion of the WSA process
  • Annual review of the WSA
  • Applicant’s plan for funding of resources needed for safety and security
  • Evacuation plans
Applicant’s NVIC Role

- Submit an LOI and Preliminary WSA to the cognizant Coast Guard COTP/FMSC.
- Work with the USCG and Maritime Area Security Committees to refine WSA.
- Complete a Follow-on WSA and provide it the COTP/FMSC for review and validation.
Staff’s Engineering Review

**Onshore Facility Review**
- Cryogenic design and technical review
- Safety systems – detection and control
- Exclusion zone calculations
- Security and emergency plans

**Marine Safety Review**
- Coordination w/ US Coast Guard
- LNG vessel operations and controls
  - Cargo spill hazard analysis
Cryogenic Design Review

Initial preparation of *Cryogenic Design and Inspection Manual*

Ø Review design of:

- Marine Facilities
- Storage Tanks
- LNG Pumps
- LNG Vaporizers
- Compressors & Blowers
- Process Vessels

- Process Piping Systems
- Instrumentation & Controls
- Instrument Pneumatic System
- Electrical Systems
- Fuel Gas System
- Training, Operation & Emergency Procedures

Ø Compliance with DOT and NFPA safety requirements.
Ø Operational reliability.
Ø Seismic design review.
Safety Systems

• Pressure Relief and Vent Systems

Ø Locally Vented vs. Manifold
Ø Relief Valve Inspection and Test Frequency
Ø Piping Materials
Ø Questionable Relieving Capacity or Location
Ø Inappropriate Relief Valve Orientation/ Discharge
Safety Systems

- Spill Containment Systems
  - Storage Tank, Process Equipment, Transfer Areas, and Plant Piping
  - Impoundment Configuration
  - Sizing Criteria
  - Surface Material
  - Provisions for Water Drainage
Safety Systems

- Hazard Detection Systems
  - Direct/remote visual monitoring
  - Automatic detection
    - Combustible gas
    - Smoke
    - High Temperature
    - Low Temperature
  - Centralized alarm system
  - Emergency shut down system (ESD)
Safety Systems

- Hazard Control Systems
  - High Expansion Foam System
  - Portable Fire Extinguishers
  - Dry Chemical Extinguishers
  - Fireproofing
Safety Systems

• Fire Water Systems

Ø Firewater Sources
Ø System Layout / Design
Ø Coverage of Hydrants/Monitors
Ø Deluge protection
Safety Systems

- Emergency Shutdown System
  - Shutdown Event categories
  - Zone Identification
  - Equipment De-Energized
  - Automatic/Manual Actuation
  - Frequency of system testing
Exclusion Zone Calculations

- Compliance with 49 CFR Part 193 and NFPA 59A
- Basis for calculating flammable vapor dispersion and thermal radiation distances.
- LNGFIREIII & DEGADIS Models
Ø The 1,600 Btu/ft²-hr zone cannot impact outdoor assembly areas occupied by 50 or more people.

Ø The 3,000 Btu/ft²-hr zone cannot extend to offsite structures used for occupancies or residences.

Ø The 10,000 Btu/ft²-hr cannot cross a property line that can be built upon.
# Effects of Thermal Radiation on People and Structures

<table>
<thead>
<tr>
<th>Btu/ft(^2)-hr</th>
<th>kW/m(^2)</th>
<th>Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,600 seconds;</td>
<td>5.0</td>
<td>2nd degree burns in 30 seconds; Hazardous for persons located outdoors and unprotected.</td>
</tr>
<tr>
<td>3,000</td>
<td>9.5</td>
<td>Acceptable level for wooden structures.</td>
</tr>
<tr>
<td>4,000</td>
<td>12.5</td>
<td>Ignition of wooden structures.</td>
</tr>
<tr>
<td>10,000</td>
<td>31.3</td>
<td>Damage to process equipment.</td>
</tr>
<tr>
<td>12,000</td>
<td>37.5</td>
<td>Damage to steel structures.</td>
</tr>
</tbody>
</table>
Accidental breach scenario conclusions:
• groundings and low speed collisions - no cargo spill
• high speed collisions - 0.5 to 1.5 m$^2$ cargo tank hole

Intentional breach scenario conclusions:
• cargo tanks holes range from 2 to 12 m$^2$
• nominal tank hole size of 5 – 7 m$^2$
Sandia Report – Some Key Findings on Damage Scenarios

- Cascading damage due to brittle fracture from exposure to cryogenic liquid or fire-induced damage to foam insulation not likely to involve more than two or three cargo tanks.

- Cascading events are not expected to increase the overall fire hazard by more than 20 to 30 percent (1,920 to 2,080 meters) (6,300 to 6,825 feet), but will increase the expected fire duration.

- Rapid phase transitions are possible for large spills but the effects will be localized near the spill source and should not cause extensive structural damage.
Security & Emergency Plans

- Facility security plan
- Facility physical requirements
- Marine security
- Vehicle and personnel access control to/within the facility
- Control of restricted areas
- Monitoring & detection
- Continuity of security
- Inspections and drills
- Liaison with federal and local authorities
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