



**Federal  
Regulatory  
Energy  
Commission**

**Office of  
Energy Projects**

**December 2005**

**Docket No. AD06-04-000**

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**DRAFT GUIDANCE FOR FILING  
RESOURCE REPORTS 11 & 13  
FOR LNG FACILITY  
APPLICATIONS**

FEDERAL ENERGY REGULATORY COMMISSION  
WASHINGTON, D.C. 20426

OFFICE OF ENERGY PROJECTS

**In Reply Refer To:**  
OEP/DG2E/LNGE  
Docket No. AD06-04-000

December 15, 2005

TO THE PARTY ADDRESSED:

The Office of Energy Projects of the Federal Energy Regulatory Commission (FERC or Commission) is issuing draft guidance for Resource Report 11: Reliability and Safety, and Resource Report 13: Engineering and Design Material for liquefied natural gas (LNG) facility applications. This draft guidance is intended to assist applicants by identifying the specific information and level of detail required for filing these resource reports as specified by Title 18 of the Code of Federal Regulations, § 380.12 (m) and (o). Filings that are complete facilitate staff review as well as ensure that all areas of the proposed design are safe and reliable.

This document addresses recent initiatives, as well as several requests for specific guidance, including:

- the level of detail, including a requirement for a hazard design review, necessary for the front-end engineering design submitted to the FERC;
- LNG spill containment sizing and design criteria for impoundments, sumps, sub-dikes, troughs or trenches;
- design spills to be used in the calculation of thermal and flammable vapor exclusion zones; and
- the waterway suitability assessment and the U.S. Coast Guard's Navigation and Inspection Circular 05-05.

In order to allow input from the public and the engineering community, a technical conference on the required information for Resource Reports 11 and 13 will be held in the first quarter of 2006. Details of that conference will be issued at a later date. Comments may also be submitted by mail or electronically by referencing the above docket number. If you have any questions on this material, please contact Chris Zerby at 202-502-6111.

Sincerely,

Richard R. Hoffmann, Director  
Division of Gas – Environment and  
Engineering

FEDERAL ENERGY REGULATORY COMMISSION

# Guidance for Filing Resource Reports 11 & 13 for LNG Facility Applications

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## ACRONYMS AND ABBREVIATIONS

CEII	Critical Energy Infrastructure Information
CFR	Code of Federal Regulations
Coast Guard	U.S. Coast Guard
Commission	Federal Energy Regulatory Commission
ESD	emergency shutdown
FEED	front-end engineering design
FERC	Federal Energy Regulatory Commission
LNG	liquefied natural gas
LOI	Letter of Intent
NFPA 59A	National Fire Protection Association 59A: Standard for the Production, Storage, and Handling of Liquefied Natural Gas
NVIC	Navigation and Vessel Inspection Circular 05-05
P&IDs	pipng and instrumentation diagrams
Plan	Emergency Response Plan
WSA	waterway suitability assessment

# The Purpose of This Document

This document is intended to assist applicants by identifying the specific information and level of detail required for filing resource reports 11 and 13 for LNG facility applications as required by Title 18 of the Code of Federal Regulations (CFR) § 380.12. Filings that are complete facilitate staff review as well as ensure that all areas of the proposed design are safe and reliable.

## 11.1. General Issues

Resource Report 11 addresses the potential hazard from failure of facility components resulting from accidents or natural catastrophes, how these events would affect safety and reliability, and what procedures and design features have been used to reduce potential hazards.

Information for the items below, including the results of calculations and modeling, should be provided in the public content of Resource Report 11 showing how the facility satisfies the requirements. Supporting information (e.g., modeling runs, calculations, drawings, etc.) should be placed in an appendix to Resource Report 11 and, if necessary, may be labeled Critical Energy Infrastructure Information (CEII).

## 11.2. Facility Exclusion Zones

11.2.1. Impoundment sizing criteria and dimensions.

11.2.1.1. Provide plot plan drawings of impoundments with cross-sections showing elevations.

11.2.1.2. For purposes of sizing the impoundments, 10 minutes of a full pipe rupture should be considered. This will ensure that impoundments are sized for a catastrophic failure, while recognizing that less conservative spill scenarios are appropriate to calculate flammable vapor exclusion zones.

11.2.2. Design spills for liquefied natural gas (LNG) storage tanks, marine transfer lines, sendout, and process areas in accordance with Table 2.2.3.5 in the 2001 version of National Fire Protection Association 59A: Standard for the Production, Storage, and Handling of Liquefied Natural Gas (NFPA 59A).

11.2.2.1. The spill rate for vaporization, process, or LNG transfer areas may be assumed to be a single accidental leakage source rather than a full pipe rupture.

11.2.2.2. In giving recognition to the integrity of all-welded transfer piping, the determination of the single accidental leakage source should be based on an evaluation of all small diameter attachments to the transfer piping for instrumentation, pressure relief, recirculation, etc, and any flanges that may be used at valves or other equipment, in order to determine the largest spill rate. Applicants should clearly indicate which lines have been chosen as the accidental leakage source for hazard analysis and provide justification why this line is more appropriate than larger lines.

11.2.3. Thermal radiation and flammable vapor exclusion analysis.

11.2.3.1. Provide meteorological data supporting the wind speed, atmospheric temperature, and humidity used in all hazard analyses. Also, provide the source of the weather data.

11.2.3.2. Provide plot plans clearly delineating the entire facility property line as well as the thermal radiation and flammable vapor dispersion exclusion zones. Sufficient data and drawings corroborating the applicant's exclusion zone calculations should be included.

11.2.3.3. Provide flammable vapor dispersion calculations which are supported by the following:

- (a) drawings indicating the size and location of the line proposed from the design spill;
- (b) plan, profile, and cross-section drawings showing the dimensions and configuration of the proposed containment system;
- (c) source strength calculations;
- (d) DEGADIS program output and results; and
- (e) a drawing clearly delineating the property line and the resulting exclusion zone.

## 11.3. Agency Coordination

11.3.1. Section 311 (d) of the Energy Policy Act of 2005, requires that any Federal Energy Regulatory Commission (FERC or Commission) Order include a requirement that an Emergency Response Plan (Plan) be developed by the LNG terminal operator in consultation with the U.S. Coast Guard (Coast Guard) and State and local agencies; and

that the plan be approved by the Commission prior to any final approval to begin construction. Further, the Plan must include a cost-sharing plan describing any direct cost reimbursements that the applicant agrees to provide to any State and local agencies with the responsibility for security and safety: (a) at the LNG terminal; and (b) in proximity to vessels that serve the facility.

- 11.3.1.1. Describe the progress to date in developing the Plan and cost-sharing plan, including all contacts and communications with the appropriate agencies.
- 11.3.1.2. Identify the current schedule for any future actions, studies or meetings to develop the Plan.
- 11.3.2. The applicant should contact the state fire marshal at the start of or before beginning the pre-filing process. Contact information for the appropriate state fire marshall may be obtained from Elizabeth Tucker, Director of the National Association of State Fire Marshals at 202.737.1226 or [etucker@firemarshals.org](mailto:etucker@firemarshals.org).
- 11.3.3. Identify all active military installations which may be impacted by the operation of the proposed facility or by LNG vessel transit. Also provide contact information for all such installations.

## 11.4. Marine Issues

- 11.4.1. Marine safety and security issues should be presented in Resource Report 11 and should include the results of models and simulations. Any supporting information (e.g. modeling runs, calculations, drawings, etc.) should be placed in an appendix to Resource Report 11 and, if necessary, may be labeled CEII.
- 11.4.2. Contact with the Coast Guard to discuss specific Coast Guard requirements must begin *prior* to Pre-Filing.
- 11.4.3. Provide copies of the Letter of Intent (LOI) submitted to the Coast Guard. The LOI should be submitted to Coast Guard Captain of the Port at the initiation of the FERC's Pre-Filing Process.
- 11.4.4. Submit a preliminary waterway suitability assessment to the Coast Guard in accordance with the Coast Guard's Navigation and Vessel Inspection Circular 05-05 (NVIC). The Coast Guard's June 14, 2005 NVIC may be accessed on the Web at <http://www.uscg.mil/hq/g-m/nvic/NVIC%2005-05.doc.pdf>. The purpose of the NVIC is to provide Coast Guard Captains of the Port/Federal Maritime Security

Coordinators, members of the LNG industry, and port stakeholders with guidance on assessing the suitability of a waterway for LNG marine traffic.

- 11.4.5. Provide an analysis that addresses current commercial and recreational waterway traffic and the impact of LNG vessels (address and analyze vessel traffic congestion issues).
- 11.4.6. Simulation and modeling studies should take into account various scenarios that include: tides, currents, winds, ice, passing vessels direction, passing vessels sizes, and LNG vessel sizes. Depending on the dock or waterway configuration, simulation and modeling may need to address:
  - (a) LNG vessel berthing and unberthing maneuvers;
  - (b) tug requirements;
  - (c) passing vessel alliding with moored LNG vessel or berth due to loss of steering or propulsion;
  - (d) hydrodynamic effect of slips on passing vessels; and
  - (e) hydrodynamic effect of passing ships on moored LNG ships.

## 13.1. Applicability

This report is required for construction of new LNG facilities, expansions of existing LNG facilities, or the recommissioning of existing LNG facilities.

## 13.2. General Recommendations

- 13.2.1. Provide a technical summary of the proposed facility.
- 13.2.2. A hazard design review of the front-end engineering design (FEED) should be conducted during pre-filing and the resulting recommendations should be identified and incorporated into Resource Report 13 filed 90 days before the application is filed at the Commission.
  - 13.2.2.1. The design review should include commissioning, start-up, operation, and maintenance considerations.
  - 13.2.2.2. Provide a copy of the hazard design review with the application. The result of all recommendations from the hazard design review should be included in all drawings and design details.
  - 13.2.2.3. Note that a final hazard and operability review will be required of the final design. This information will be incorporated into the inspection and design review manual created by FERC staff for the project.
- 13.2.3. The content of all drawings, diagrams, text, and tables should be legible and each page should be clearly identified.
- 13.2.4. The spine of each volume of Resource Report 13 should be labeled with an index or table of contents to facilitate locating information. Tabs should likewise be labeled or numbered to correspond to the table of contents.
- 13.2.5. A master index of the entire Resource Report 13 filing should be included in each volume.

## 13.3. Engineering and Design Material

This section provides guidance on the type of information and the level of detail required for each of the 15 items required by the Code of Federal Regulations to be included in Resource Report 13.

- 13.3.1. **Requirement of 18 CFR 380.12(o) (1):** Provide a detailed plot plan showing the location of all major components to be installed, including compression, pretreatment, liquefaction, storage, transfer piping, vaporization, truck loading/unloading, vent stacks, pumps, and auxiliary or appurtenant service facilities.
- 13.3.1.1. Provide a plot plan showing the overall layout of the plant, property lines, and roads.
- 13.3.1.2. Provide unit plot plans for each process area or system showing the locations of all equipment. These plots plans should also depict troughs, dikes, and sumps. Each area and piece of equipment should be clearly labeled. The unit plot plans should be detailed enough to allow for measurement of distances between various components with a reasonable degree of accuracy. Specifically, the smallest scale used should be 1-inch to 100-feet (1:1200). In addition to all major equipment, the unit plot plans should include:
- (a) marine berth and trestle details, mooring arrangement, and unloading platform;
  - (b) major utility systems such as potable or fire water and instrument or utility air;
  - (c) pipe racks and buildings including those buildings that will be occupied; and
  - (d) clearly labeled facility entrances.
- 13.3.1.3. The plot plan should show the safe spacing of all equipment and buildings as required by NFPA 59A.
- 13.3.2. **Requirement of 18 CFR 380.12(o) (2):** Provide a detailed layout of the fire protection system showing the location of fire water pumps, piping, hydrants, hose reels, dry chemical systems, high expansion foam systems, and auxiliary or appurtenant service facilities.

13.3.2.1. The drawings should clearly show the location of all hazard control equipment with each system on a separate plot plan. These should include the following information:

- (a) Provide Piping and Instrumentation Diagrams (P&IDs) of the complete fire water system.
- (b) Coverage areas for each system should be clearly depicted.
- (c) The plan drawings should show the fire water supply, the sizing of the firewater mains, and how they are arranged in either a loop or grid system throughout the site. Isolation valves to allow water flow in case a portion of the system is damaged should be shown. They should also show monitors, hydrants, hose stations and post indicator valves.
- (d) For dry chemical, carbon dioxide, and other fire suppression systems and foam systems, the capacity of each unit should be indicated on the drawings. Details on foam replenishment, whether used for vapor suppression or fire fighting, and use of foam fences should be provided.
- (e) If proposed, any backup systems and secondary pumps (e.g., for coverage of the top of the tank) should also be shown.

13.3.2.2. Provide a tabulated list or matrix of all dry chemical and foam hazard control equipment, both fixed and wheeled. The list or matrix should detail the following information for each individual piece of equipment:

- (a) location and/or area to be covered;
- (b) type of system;
- (c) size;
- (d) discharge conditions;
- (e) tag number; and
- (f) activation capabilities.

13.3.2.3. Along with the fire water drawings, the applicant should submit a tabulated list or matrix of all fire water equipment, deluge systems, sprinklers, monitors, hydrants, hose stations. The list or matrix should detail the following information for each individual piece of equipment:

- (a) location and/or area to be covered;

- (b) type of equipment;
- (c) size;
- (d) discharge conditions;
- (e) tag number; and
- (f) activation capabilities.

- 13.3.2.4. Provide the source (firewater tank, pond, ocean, wells, city, etc.) and the estimated maximum flows for all water supplies, the required pressure and the maximum total water flow for the design fire scenario.
- 13.3.2.5. Provide specifications and operating conditions for the pumps, or fire water supply system, backup pumps and jockey pumps.
- 13.3.2.6. Provide the preliminary fire protection evaluation according to NFPA 59A (2001), §9.1.2. This evaluation should support the types of hazard control systems chosen, general locations, and sizing.

13.3.3. **Requirement of 18 CFR 380.12(o) (3):** Provide a layout of the hazard detection system showing the location of combustible-gas detectors, fire detectors, heat detectors, smoke or combustion product detectors, and low temperature detectors. Identify those detectors that activate automatic shutdowns and the equipment that would shut down. Include all safety provisions incorporated in the plant design, including automatic and manually activated emergency shutdown systems.

- 13.3.3.1. As with hazard control equipment, the drawings should clearly show the location and coverage areas of all hazard detection equipment with each system on a separate plot plan.
- 13.3.3.2. Along with the drawings, the applicant should submit a tabulated list or matrix of all hazard detection equipment, including:
  - (a) location and equipment or area monitored;
  - (b) type;
  - (c) tag number;
  - (d) activation points for alarm and shutdown including dual actuation or voting systems; and
  - (e) automatic activation of hazard control equipment such as dry chemical or high expansion foam systems and delay settings.

- 13.3.3.3. Provide a description of hazard detection equipment and vendor information if available.
- 13.3.3.4. Provide alarm set points and indicate which alarms cause local equipment or plant-wide shutdowns. This can be shown on the cause and effect diagram.
- 13.3.4. **Requirement of 18 CFR 380.12(o) (4):** Provide a detailed layout of the spill containment system showing the location of impoundments, sumps, sub-dikes, channels, and water removal systems.
  - 13.3.4.1. Provide a plot plan delineating the equipment served by each containment system. Troughs should be clearly shown. For clarity, it may be necessary to provide separate drawings for each process area. Also include the following:
    - (a) dimensions and cross-sections of each system; and
    - (b) arrows showing direction of spill flow into sumps or impoundments.
  - 13.3.4.2. LNG drainage systems or troughs should be as narrow as practical. Lengthy distances from potential spill locations to their sumps should be avoided. Where lengthy distances are unavoidable, the control of vapors produced in channels or trenches leading to these sumps should be incorporated into the design. A number of vapor control options are available including: vapor fencing; fixed high expansion foam generators; reduced trench lengths and/or surface area; and additional sumps at intermediate locations along transfer piping.
  - 13.3.4.3. Material of construction for sumps, impoundments, and troughs should be indicated either on the drawing or indicated by reference. Provide material properties such as thermal conductivity, density, and heat capacity of the materials of construction.
  - 13.3.4.4. Provide total capacity of impoundments. Capacity should consider volume occupied by equipment.
  - 13.3.4.5. Provide details of the water removal system including sumps, pumps, culverts, etc.
- 13.3.5. **Requirement of 18 CFR 380.12(o) (5):** Provide manufacturer's specifications, drawings, and literature on the fail-safe shut-off valve for each loading area at a marine terminal (if applicable).
  - 13.3.5.1. Information should include means of actuating shut-off valves whether manual, fire, emergency shutdown (ESD), or loss of power or air.
  - 13.3.5.2. Provide basis for valve closure time.

- 13.3.6. **Requirement of 18 CFR 380.12(o) (6):** Provide a detailed layout of the fuel gas system showing all taps with process components.
- 13.3.6.1. Reference the specific P&IDs depicting the fuel gas system.
- 13.3.7. **Requirement of 18 CFR 380.12(o) (7):** Provide copies of company, engineering firm, or consultant studies of a conceptual nature that show the engineering planning or design approach to the construction of new facilities or plants.
- 13.3.7.1. Provide the basis of design used to develop the FEED.
- 13.3.7.2. Provide conclusions from the preliminary hazard design review.
- 13.3.7.3. Provide studies that support a design decision such as selecting a specific type of equipment where other alternatives were available. For example, studies supporting the choice of ambient vaporizers versus submerged combustion; twin 30-inch-diameter transfer lines versus one 42-inch-diameter; full containment versus single containment LNG storage tanks, and so on.
- 13.3.7.4. Provide studies that were used to develop unique design features that differ from currently operating facilities.
- 13.3.7.5. Provide the design basis and calculations for storage tank relief devices as well as vent or flare systems.
- 13.3.7.6. Provide the design basis and typical calculations for sizing of hazard control systems (This should be a part of the fire protection analysis required by NFPA 59A).
- 13.3.7.7. Provide information confirming that LNG storage tanks and critical equipment (cryogenic transfer piping; marine/cargo unloading platforms; primary and emergency electrical power; boil-off gas compression; and control systems) would adequately withstand conditions from potential wind, storm surge, flooding, and similar hurricane events. Provide the historical or scientific basis for wind, storm surge, and flooding conditions used as design criteria.
- 13.3.8. **Requirement of 18 CFR 380.12(o) (8):** Provide engineering information on major process components related to the first six items above, which include (as applicable) function, capacity, type, manufacturer, drive system (horsepower, voltage), operating pressure, and temperature.
- 13.3.8.1. Provide engineering specifications in the form of process data sheets for major equipment.

- 13.3.8.2. Provide project-specific data packages from vendors for all major equipment including tanks, vessels, pumps, compressors, blowers, turbines, vaporizers, piping, valves, etc. The data should include:
  - (a) applicable codes for design and fabrication;
  - (b) dimensions of equipment;
  - (c) equipment maximum allowable working pressure and temperature;
  - (d) equipment materials of construction and corrosion allowance; and
  - (e) performance curves.
- 13.3.8.3. Provide piping specifications.
- 13.3.8.4. Provide preliminary layout and elevation of major process equipment.
- 13.3.8.5. Provide drawings of pipe rack layouts and typical piping support systems.
- 13.3.9. **Requirement of 18 CFR 380.12(o) (9):** Provide manuals and preliminary drawings for LNG storage tank(s).
  - 13.3.9.1. This information should include the following drawings:
    - (a) overall tank drawing with dimensions and design data;
    - (b) foundations;
    - (c) insulation systems;
    - (d) corner thermal protection;
    - (e) piping penetrations and schedule of openings;
    - (f) piping support structure;
    - (g) roof spill containment;
    - (h) top and bottom fill piping;
    - (i) in-tank pump column support arrangement;
    - (j) relief valve and discharge orientation; and
    - (k) Provide schematic elevation section of tank dike and the tank, at the minimum distance between the outer tank wall and dike, showing the

maximum liquid height, height of top of dike and distance from inside top of dike to inner tank wall.

- 13.3.9.2. Provide LNG tank specifications.
  - 13.3.9.3. Provide the calculations for tank relief devices.
  - 13.3.9.4. Provide startup and cool-down requirements used to design the tank piping system as provided by the vendor.
  - 13.3.9.5. Provide preliminary design of tank level indicator system, fill flow rate measurement system, tank tilt and settlement measurement system for hydrostatic testing, and rotational and translational movement measurement system for the inner tank.
  - 13.3.9.6. Provide a list of all tank penetrations with sizing.
  - 13.3.9.7. Include an assessment of potential for rollover in LNG containers.
- 13.3.10. **Requirement of 18 CFR 380.12(o) (10):** Provide up-to-date piping and instrumentation diagrams (P&ID's). Include a description of the instrumentation and control philosophy, type of instrumentation (pneumatic, electronic), use of computer technology, and control room display and operation. Also, provide an overall schematic diagram of the entire process flow system, including maps, materials, and energy balances.
- 13.3.10.1. The process flow diagrams should be provided in 11"x17" format and should be clearly legible at that scale. The diagrams should include stream designations keyed to the material and energy balance.
  - 13.3.10.2. P&ID's should be submitted in 11"x17" format and should be clearly legible at that scale. Provide them in both hard copy and electronically. In addition, the P&ID's should have the following format:
    - (a) Process lines should be in black and white.
    - (b) Major process lines should be clearly distinguishable.
  - 13.3.10.3. The P&ID's should include the following information:
    - (a) all process equipment including spare items with tag numbers;
    - (b) all cooldown, recycle, vent and drain and vent piping;
    - (c) all process and utility lines;

- (d) valve and instrument tag numbers. Automatic valves should show fail safe position;
  - (e) pressure relief valve set points as well as inlet and outlet size;
  - (f) piping identification (line service code, line number, line size, line class, etc.). Piping specification breaks should be shown; and
  - (g) instrumentation for control, recording, indication, alarm, shutdown, and interlock;
- 13.3.10.4. Provide a description of the overall control philosophy identifying the following:
- (a) the basic process control system;
  - (b) safety instrumented systems; and
  - (c) ESD systems.
- 13.3.10.5. Provide the the cause and effect diagrams for the proposed ESD system.
- 13.3.11. **Requirement of 18 CFR 380.12(o) (11):** Provide engineering information on the plant's electrical power generation system, distribution system, emergency power system, uninterruptible power system, and battery backup system.
- 13.3.11.1. Provide a description of the electrical supply, distribution, back-up supply, and uninterruptible power supply systems.
- 13.3.11.2. Provide a plot plan showing the area electrical classification.
- 13.3.11.3. Provide single-line drawings.
- 13.3.11.4. Provide a list of transformers;
- 13.3.11.5. Provide hazard area classification.
- 13.3.11.6. Indicate which equipment is covered by each power generation system. List the size and output for all power systems (e.g. voltage, power).
- 13.3.11.7. Provide a list of anticipated power requirements for operating modes.
- 13.3.12. **Requirement of 18 CFR 380.12(o) (12):** Identify all codes and standards under which the plant (and marine terminal, if applicable) will be designed, and any special considerations or safety provisions that were applied to the design of plant components.

- 13.3.12.1. Include applicable codes from the National Fire Protection Association, American Petroleum Institute, American Society Of Mechanical Engineers, American Society of Civil Engineers, National Electrical Code, ISA, Center for Chemical Process Safety, etc.
- 13.3.13. **Requirement of 18 CFR 380.12(o) (13):** Provide a list of all permits or approvals from local, state, Federal, or Native American groups or Indian agencies required prior to and during construction of the plant, and the status of each, including the date filed, the date issued, and any known obstacles to approval. Include a description of data records required for submission to such agencies and transcripts of any public hearings by such agencies. Also provide copies of any correspondence relating to the actions by all, or any, of these agencies regarding all required approvals.
- 13.3.13.1. This section may reference Resource Report 1.
- 13.3.14. **Requirement of 18 CFR 380.12(o) (14):** Identify how each applicable requirement will comply with 49 CFR Part 193 and the National Fire Protection Association 59A LNG Standards. For new facilities, the siting requirements of 49 CFR part 193, subpart B, must be given special attention. If applicable, vapor dispersion calculations from LNG spills over water should also be presented to ensure compliance with the U.S. Coast Guard's LNG regulations in 33 CFR part 127.
- 13.3.14.1. Provide tabulated lists of 49 CFR 193 and NFPA 59A requirements indicating how each has been satisfied. The specific location of relevant supporting information/calculations contained in the application should also be provided.
- 13.3.15. **Requirement of 18 CFR 380.12(o) (15):** Provide seismic information specified in Data Requirements for the Seismic Review of LNG facilities (NBSIR 84-2833, available from FERC staff) for facilities that would be located in zone 2, 3, or 4 of the Uniform Building Code Seismic “Map of the United States.”
- 13.3.15.1. This requirement had been superceded by basic seismic criteria.
- 13.3.15.2. Refer to NFPA 59A §4.1.3, §10.3.7, and Appendix B. This report may reference geological studies found in other resource reports included with the application.