Sabine Pass Liquefaction, LLC

Sabine Pass LNG, L.P.

Liquefaction Project

Second Draft Resource Report 1 — General Project Description

Docket No. PF10-24-000

November 2010

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APPENDICES

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ACRONYMS AND ABBREVIATIONS

AEO 2010	Annual Energy Outlook 2010
ARI	Advanced Resources International, Inc.
ARI Report	*U.S. Natural Gas Resources and Productive Capacity* report
Bcf/d	billion cubic feet per day
BOG	boil-off gas
CTPL	Creole Trail Pipeline, L.P.
CFR	Code of Federal Regulations
CI	Chief Inspector
CMMS	computerized maintenance management system
EI	Environmental Inspector
EIA	U.S. Energy Information Administration
EU	European Union
FERC	Federal Energy Regulatory Commission
GTG-5	LM2500+ gas turbine generator
LNG	liquefied natural gas
LPDES	Louisiana Pollution Discharge Elimination System
m^3	cubic meters
MIT	Massachusetts Institute of Technology
MIT Study	The Future of Natural Gas report
MMBtu	million British thermal units
MSL	mean sea level
mtpa	million metric tonnes of LNG per annum
NATO	North Atlantic Treaty Organization
NCI	Navigant Consulting, Inc.
NCI Report	*Market Analysis for Sabine Pass LNG Export Project* report
O&M	operations and maintenance
PCB	polychlorinated biphenyls
Plan	FERC's *Upland Erosion Control, Revegetation, and Maintenance Plan*
Potential Gas Committee	Potential Gas Committee of the Colorado School of Mines
Procedures	FERC's *Wetland and Waterbody Construction and Mitigation Procedures*
Project	Liquefaction Project
Sabine Pass	Sabine Pass Liquefaction, LLC and Sabine Pass LNG, L.P.
SPLNG Terminal	Sabine Pass LNG Import Terminal
SH	State Highway
Tcf	trillion cubic feet
U.S.	United States

RESOURCE REPORT 1—GENERAL PROJECT DESCRIPTION	
Filing Requirement	**Location in Environmental Report**
(i) Describe and provide location maps of all jurisdictional facilities, including all aboveground facilities associated with the project (such as: meter stations, pig launchers/receivers, valves), to be constructed, modified, abandoned, replaced, or removed, including related construction and operational support activities and areas such as maintenance bases, staging areas, communications towers, power lines, and new access roads (roads to be built or modified). As relevant, the report must describe the length and diameter of the pipeline, the types of aboveground facilities that would be installed, and associated land requirements. It must also identify other companies that must construct jurisdictional facilities related to the project, where the facilities would be located, and where they are in the Commission's approval process. (§ 380.12(c)(1))	Sections 1.2 and 1.4 Figures 1.2-1, 1.2-2, and 1.4-1 Appendix 1A
(ii) Identify and describe all nonjurisdictional facilities, including auxiliary facilities, that will be built in association with the project, including facilities to be built by other companies. (§ 380.12(c)(2)) • Provide the following information: (A) A brief description of each facility, including as appropriate: Ownership, land requirements, gas consumption, megawatt size, construction status, and an update of the latest status of Federal, state, and local permits/approvals; (B) The length and diameter of any interconnecting pipeline; (C) Current 1:24,000/1:25,000 scale topographic maps showing the location of the facilities; (D) Correspondence with the appropriate State Historic Preservation Officer (SHPO) or duly authorized Tribal Historic Preservation Officer (THPO) for tribal lands regarding whether properties eligible for listing on the National Register of Historic Places (NRHP) would be affected; (E) Correspondence with the U.S. Fish and Wildlife Service (and National Marine Fisheries Service, if appropriate) regarding potential impacts of the proposed facility on federally listed threatened and endangered species; and (F) For facilities within a designated coastal zone management area, a consistency determination or evidence that the owner has requested a consistency determination from the state's coastal zone management program. • Address each of the following factors and indicate which ones, if any, appear to indicate the need for the Commission to do an environmental review of project-related nonjurisdictional facilities. (A) Whether or not the regulated activity comprises ``merely a link'' in a corridor type project (e.g., a transportation or utility transmission project). (B) Whether there are aspects of the nonjurisdictional facility in the immediate vicinity of the regulated activity which uniquely determine the location and configuration of the regulated activity.	Section 1.11

RESOURCE REPORT 1—GENERAL PROJECT DESCRIPTION	
Filing Requirement	**Location in Environmental Report**
(C) The extent to which the entire project will be within the Commission's jurisdiction. (D) The extent of cumulative Federal control and responsibility.	
• Provide the following maps and photos: (§ 380.12(c)(3)) (i) Current, original United States Geological Survey (USGS) 7.5-minute series topographic maps or maps of equivalent detail; covering at least a 0.5-mile-wide corridor centered on the pipeline, with integer mileposts identified, showing the location of rights-of-way, new access roads, other linear construction areas, compressor stations, and pipe storage areas. Show nonlinear construction areas on maps at a scale of 1:3,600 or larger keyed graphically and by milepost to the right-of-way maps. (ii) Original aerial images or photographs or photo-based alignment sheets based on these sources, not more than 1 year old (unless older ones accurately depict current land use and development) and with a scale of 1:6,000 or larger, showing the proposed pipeline route and location of major aboveground facilities, covering at least a 0.5 mile-wide corridor, and including mileposts. Older images/ photographs/alignment sheets should be modified to show any residences not depicted in the original. Alternative formats (e.g., blue-line prints of acceptable resolution) need prior approval by the environmental staff of the Office of Pipeline Regulation. (iii) (iii) In addition to the copy required under Sec. 157.6(a)(2) of this chapter, applicant should send two additional copies of topographic maps and aerial images/photographs directly to the environmental staff of the Office of Pipeline Regulation.	Appendix 1A
• When new or additional compression is proposed, include large scale (1:3,600 or greater) plot plans of each compressor station. The plot plan should reference a readily identifiable point(s) on the USGS maps required in paragraph (c)(3) of this section. The maps and plot plans must identify the location of the nearest noisesensitive areas (schools, hospitals, or residences) within 1 mile of the compressor station, existing and proposed compressor and auxiliary buildings, access roads, and the limits of areas that would be permanently disturbed. (§ 380.12(c)(4))	Not Applicable
• (i) Identify facilities to be abandoned, and state how they would be abandoned, how the site would be restored, who would own the site or right-of-way after abandonment, and who would be responsible for any facilities abandoned in place. • (ii) When the right-of-way or the easement would be abandoned, identify whether landowners were given the opportunity to request that the facilities on their property, including foundations and below ground components, be removed. Identify any landowners whose preferences the company does not intend to honor, and the reasons therefore. (§ 380.12(c)(5))	Section 1.8.2

RESOURCE REPORT 1—GENERAL PROJECT DESCRIPTION	
Filing Requirement	**Location in Environmental Report**
• Describe and identify by milepost, proposed construction and restoration methods to be used in areas of rugged topography, residential areas, active croplands, sites where the pipeline would be located parallel to and under roads, and sites where explosives are likely to be used. (§ 380.12(c)(6))	Section 1.6
• Unless provided in response to Resource Report 5, describe estimated workforce requirements, including the number of pipeline construction spreads, average workforce requirements for each construction spread and meter or compressor station, estimated duration of construction from initial clearing to final restoration, and number of personnel to be hired to operate the proposed project. (§ 380.12(c)(7))	Section 1.3.2
• Describe reasonably foreseeable plans for future expansion of facilities, including additional land requirements and the compatibility of those plans with the current proposal. (§ 380.12(c)(8))	Section 1.8.1
• Describe all authorizations required to complete the proposed action and the status of applications for such authorizations. Identify environmental mitigation requirements specified in any permit or proposed in any permit application to the extent not specified elsewhere in this section. (§ 380.12(c)(9))	Section 1.9
• Provide the names and mailing addresses of all affected landowners and certify that all affected landowners will be notified as required in Sec. 157.6(d). (§ 380.12(c)(10))	Appendix 1C

1.0 PROJECT DESCRIPTION

1.1 INTRODUCTION

Resource Report 1 provides a general project description of the natural gas liquefaction and export plant ("Liquefaction Project" or "Project") proposed by Sabine Pass Liquefaction, LLC and Sabine Pass LNG, L.P. (collectively referred to as "Sabine Pass"), to be located at the existing Sabine Pass liquefied natural gas ("LNG") Import Terminal in Cameron Parish, Louisiana ("SPLNG Terminal"). When completed, the Liquefaction Project will be capable of processing an average of approximately 2.6 billion cubic feet per day ("Bcf/d") of pipeline quality natural gas (including fuel and inerts) from the Creole Trail Pipeline, which interconnects with the SPLNG Terminal. Sabine Pass will liquefy the natural gas, store the LNG, and export approximately 16 million metric tonnes of LNG per annum ("mtpa")[1] via LNG carriers.

The Liquefaction Project will be located within areas that have been evaluated and assessed in conjunction with the Federal Energy Regulatory Commission's ("FERC" or "Commission") review and approval of the SPLNG Terminal in Docket Nos.:

- CP04-47-000, CP04-38-000, CP04-39-000, CP04-40-000 (Sabine Pass LNG and Pipeline Project, November 2004 – Final Environmental Impact Statement ["FEIS"]). Review of a 853-acre leased site for construction and operation of the SPLNG Terminal and associated facilities, including a marine terminal, two berths capable of unloading 300 LNG ships per year, three LNG storage tanks, and send-away pipeline, to allow for the import, storage, and regasification of LNG;
- CP05-396-000 (Sabine Pass LNG Terminal Phase II Project, May 2006 – Environmental Assessment ["Phase II EA"]). Review of increasing ship traffic from 300 to 400 LNG ships per year, installation of three additional LNG tanks, ambient air vaporization trains, and associated facilities on approximately 72 acres within the SPLNG Terminal leased site; and
- CP04-47-001, CP05-396-001 (Sabine Pass LNG Export Project, February 2009 – Environmental Assessment ["Export EA"]). Review of the modification of certain existing facilities within the SPLNG Terminal leased site to allow for the export of LNG.

All facilities in the above approved dockets have been constructed and are in operation with the exception of the sixth LNG tank approved in Docket CP05-396-000. The Liquefaction Project will involve converting approximately 191.2 acres of the leased site for construction and operation of four liquefaction trains. Construction will also involve re-disturbance of 64.77 acres of previously disturbed land within the SPLNG Terminal. The liquefaction trains will be constructed in two stages: Liquefaction Trains 1 and 2 in Stage 1, and Liquefaction Trains 3 and 4 in Stage 2. The sixth LNG tank (S-106) that was authorized under CP05-396-000 will be constructed in Stage 2 of the Liquefaction Project.

[1] mtpa is a rating that accounts for fuel, planned and unplanned shutdowns, production variations due to temperature, LNG composition changes, boil off, and other factors over a calendar year. Sixteen mtpa of LNG is approximately equivalent to 2.2 Bcf/d of vaporized natural gas.

This Resource Report 1 describes the facilities associated with the Liquefaction Project, the purpose and need for the Project, land requirements, construction procedures, operation procedures, Project schedule, compliance with regulations and codes, and permits that will be obtained. Resource Reports 2 through 9 describe the resources at the SPLNG site, the potential impacts on those resources from construction and operation of the Project, and measures proposed to mitigate those impacts. Resource Report 10 describes the "No Action" alternative as well as possible system and facility siting alternatives. Resource Report 11 describe the design, construction, operation, and maintenance measures to maximize Project reliability and minimize potential hazards to the public from failure of Project components as a result of accidents or natural catastrophes. Resource Report 12, pertaining to polychlorinated biphenyls ("PCB"), is not applicable, as the Project does not involve the removal, replacement, or abandonment of PCB-contaminated facilities. Resource Report 13 provides a detailed description of the liquefaction facilities, as well as detailed engineering and design information, and is not available to the public.

1.2 PROPOSED FACILITIES

Sabine Pass is proposing to add liquefaction capability to the existing SPLNG Terminal in Cameron Parish, Louisiana. Figure 1.2-1 depicts an artist's rendering of the existing SPLNG Terminal and the proposed Liquefaction Project facilities layout. All proposed Project facilities will be constructed and operated within the existing, leased 853-acre terminal site. Land requirements are discussed further in Section 1.5.

All Project components will be sited, constructed, operated, and maintained in accordance with applicable federal and state regulations. The Project will include the following components and will be constructed in two stages: Liquefaction Trains 1 and 2 would be built in Stage 1, commencing in January 2012; Liquefaction Trains 3 and 4 would be built in Stage 2 when commercially feasible, but probably no sooner than 2014.

1.2.1 Liquefaction Project Stage 1

1.2.1.1 LNG Trains 1 and 2

Stage 1 of the Liquefaction Project will include two (2) ConocoPhillips Optimized Cascade^{SM} LNG Process Trains (LNG Trains 1 and 2), each capable of a liquefaction capacity of approximately 4.0 mtpa. Each LNG Train contains the following equipment:

- Gas treatment facilities to remove solids, CO_2, sulfur, water, and mercury;
- Six LM2500+ G4 gas turbine-driven refrigerant compressors, each rated at 34.7 MW, using water injection for emissions control;
- Ethylene cold box, methane cold box, and core and kettle heat exchangers for cooling and liquefying the natural gas. (The sizes and duties of these units are proprietary to the process, and are considered Privileged and Confidential.)

Figure 1.2-1 Liquefaction Project, Artist Impression Aerial View

- Waste heat recovery systems for regenerating the gas driers and amine system;
- Approximately 160 induced draft air coolers, each powered by 40 hp fans, for cooling the refrigerants;
- Associated fire and gas detection and safety systems;
- Associated control systems and electrical infrastructure;
- Utility connections and distribution systems as required;
- Piping, pipe racks, foundations, and structures within the LNG train battery limits;
- Interconnections to existing facilities;
- New and remodeled buildings to accommodate increased equipment, facilities, and operations and maintenance ("O&M") personnel required to operate the liquefaction trains; and
- Additional new utilities and support infrastructure, and modifications to the existing SPLNG Terminal to accommodate LNG Trains 1 and 2, as required.

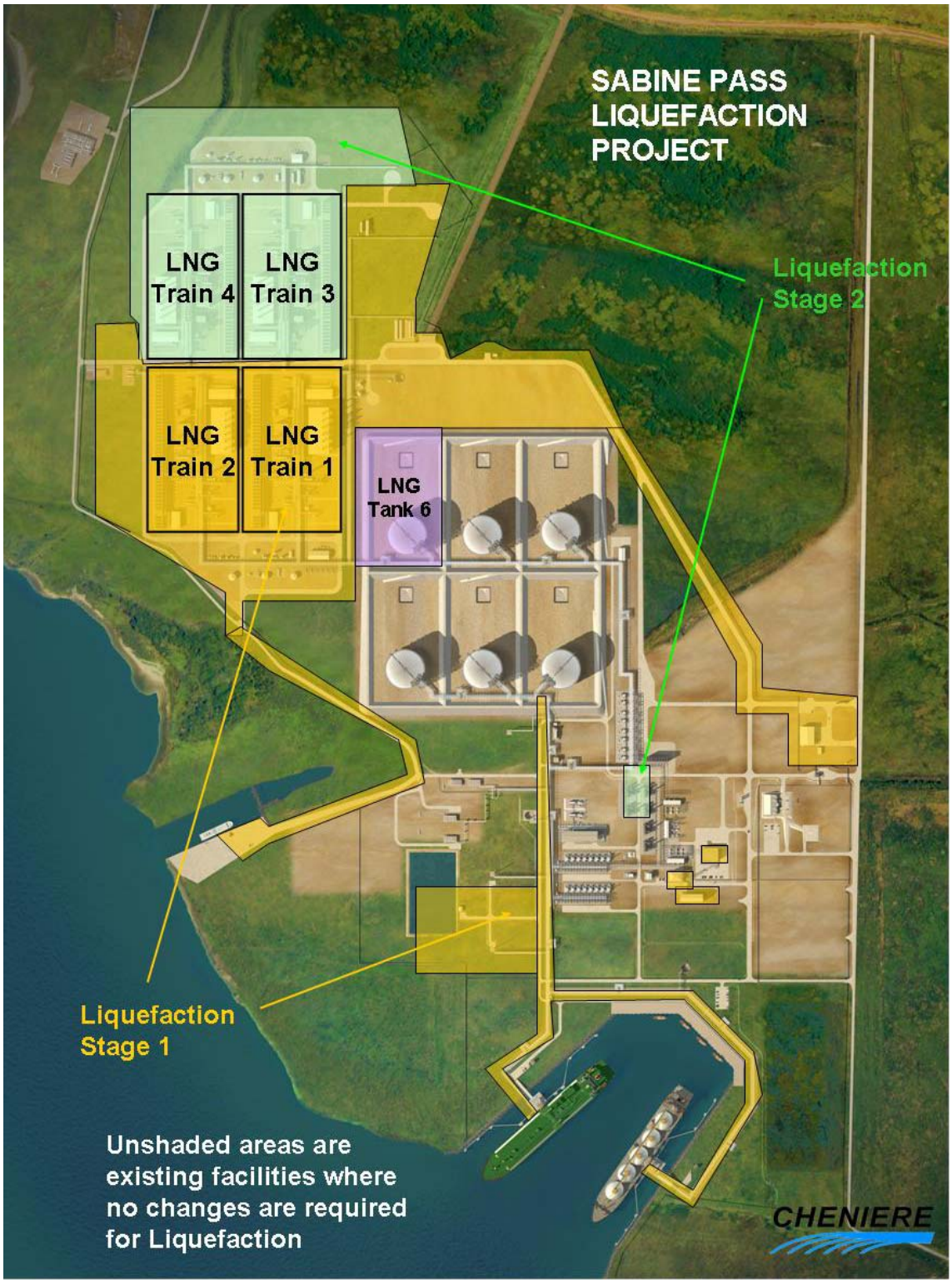

Figure 1.2-2 Liquefaction Stage 1 and Stage 2, Artist Impression – Plan View

1.2.1.2 Other Infrastructure and Modifications, Stage 1

New utilities and support infrastructure required for Stage 1 of the Liquefaction Project includes:

- Impoundments for the liquefaction trains;
- Two storage tanks for propane refrigerant (each approximately 203,000 gallons);
- Two storage tanks for ethylene refrigerant (each approximately 79,300 gallons);
- One storage tank for amine make up (approximately 41,600 gallons) ;
- New wet flare and dry flare protecting LNG Trains 1 and 2;
- Addition of marine loading flare;
- Five (5) recycle boil-off gas ("BOG") compressors, each rated approximately 1.1 MW;
- One instrument air compressor package, capable of providing approximately 5.35 mmscf/d;
- A new fresh water supply line capable of supplying up to 2200 gpm will be installed from the local public utility. The fresh water will be used to supply both the Service Water and Demineralized Water Systems.
- One demineralized water tank (approximately 1,240,000 gallons).

1.2.1.3 Modifications to Existing SPLNG Facilities, Stage 1

Modifications required to the SPLNG Terminal facilities include:

- Replacement of ten (10) existing in-tank LNG pumps from about 1000 m^3/hr to 1600 m^3/hr capacity to increase flow capacity and facilitate loading of LNG carriers;
- Piping modifications on the existing LNG tanks and jetty piping to increase flow capacity and facilitate loading of LNG carriers;
- Improvements to Lighthouse Road and plant roads to service the new facilities;
- Expansion to security and perimeter access control systems;
- Expansion to telecom, IT, CCTV, and other systems;
- Expansions to existing DCS systems;
- Modifications to existing SPLNG Terminal buildings including:
    - Control Building modifications to add systems for the liquefaction trains and other new facilities; and
    - Maintenance/Warehouse Building modifications to convert it to maintenance functions only.

1.2.1.4 New Buildings, Stage 1

New buildings that will be built for the Liquefaction Project include:

- Warehouse to store spare parts and consumables;
- Waste and materials storage building for chemicals, lubricants, and other hazardous substances;
- Building for lockers, canteen, offices, etc.; and
- Remote I/O buildings, operator shelter, and substations as required.

1.2.1.5 Marine Terminal and LNG Transfer Lines

No additional marine facilities are required for the proposed Liquefaction Project. The check valve currently installed in the LNG unloading lines will be modified to simplify loading and unloading operations. The unloading and loading rate is proposed to be increased to 14,000 m^3/hour. The rate will be increased by replacement of ten (10) of the existing fifteen (15) in-tank pumps in the LNG storage tanks and by additional modifications to LNG transfer lines located on shore. Also, the existing 16 inch vapor return line will be replaced with a 36 inch line to handle the increased vapor flow when loading an LNG Tanker at 14,000 m^3/hr.

No modifications will be required for the LNG loading arms, berthing equipment, basin, or other portions of the marine terminal.

1.2.1.6 LNG Storage

The Liquefaction Project will utilize the existing LNG storage tanks that have been constructed as part of the SPLNG Terminal. Although six LNG storage tanks have been authorized at the SPLNG Terminal (three in Docket CP04-47-000 and three in Docket CP05-396-000), only five have been constructed. The sixth LNG storage tank (S-106) will be constructed to handle the additional storage requirements related to development of Stage 2 of the proposed Project. The sixth LNG storage tank as described in previous dockets is a single containment, top entry tank with a nominal working volume of approximately 160,000 m^3. Because the sixth LNG storage tank has been previously authorized, it is not addressed further in these resource reports.

1.2.1.7 LNG Vaporization/Natural Gas Sendout

Except for the required tie-ins to the existing SPLNG Terminal facilities, no impacts or modifications will occur to the existing LNG vaporization facilities. Modifications to make the Creole Trail Pipeline flow bi-directionally will be required and will be permitted under Creole Trail Pipeline, L.P.'s ("Creole Trail") Blanket Certificate Authorization issued in Docket No. CP05-358 -000 or through an amendment to Creole Trail's NGA Section 7(c) certificate authorization issued in Docket No. CP05-357-000.

1.2.1.8 LNG Impoundments

LNG Tank S-106, previously authorized under FERC Docket CP05-396-000, will be surrounded by an individual impoundment consisting of an earthen dike, sized to contain 110 percent of the gross capacity of the LNG tank. This is described in more detail in Docket No. CP05-396-000. The liquefaction area will also have an impoundment sized to accommodate a 10 minute spill from the largest LNG lines in the area.

1.2.2 Liquefaction Project Stage 2

1.2.2.1 LNG Trains 3 and 4

Stage 2 of the Liquefaction Project will include an additional two (2) ConocoPhillips Optimized Cascade[SM] LNG Process Trains (LNG Trains 3 and 4), each capable of a liquefaction capacity of approximately 4.0 mtpa. These LNG Trains will be essentially identical to LNG Trains 1 and 2, as described in Section **Error! Reference source not found.** above.

1.2.2.2 Other Infrastructure and Modifications, Stage 2

Additional utilities and support infrastructure required for Stage 2 of the Liquefaction Project include:

- New LM2500+ gas turbine generators ("GTG") capable of generating approximately 27 MW of electrical power. At least one (1) GTG will be installed as part of Stage 2 of the Liquefaction Project. A second GTG may also be added during Stage 2 to increase reliability of the electrical system by having two spare GTGs available.
- Transformers, and other electrical accessories to supplement existing onsite power generation. Additional wet flare and dry flare protecting LNG Trains 3 and 4,
- Increase to demineralized water systems to handle the additional gas turbine drivers for the refrigerant compressors;,
- Additional interconnecting pipe racks, roads, and other infrastructure
- Modifications and additions to existing utilities and infrastructure to accommodate LNG Trains 3 and 4

1.3 PURPOSE AND NEED

Sabine Pass' Liquefaction Project has been proposed due to the improved outlook for domestic natural gas production, owing to drilling productivity gains that have enabled rapid growth in supplies from unconventional, and particularly shale, gas-bearing formations in the United States ("U.S."). Improvements in drilling and extraction technologies have coincided with rapid diffusion in the natural gas industry's understanding of the unconventional resource base and best practices in drilling and resource development. These changes have rendered obsolete once prominent fears of declining future

domestic natural gas production. The export of natural gas as LNG would provide a market solution to allow the further deliberate development of these emerging sources of domestic natural gas and would result in the following benefits, all of which are consistent with the public interest:

- Stimulate the Louisiana state, regional and national economies through job creation, increased economic activity and tax revenues, including the direct creation of approximately 3,000 engineering and construction jobs during the course of the project and, indirectly, 30,000-50,000 permanent jobs in the exploration and production sector;
- Promote domestic production of petroleum and reduced reliance on foreign sources of oil by encouraging drilling wells where there is a significant amount of natural gas associated with the crude oil;
- Further the President's National Export Initiative,[2] by improving U.S. balance of payments through the exportation of approximately 2 Bcf/d of natural gas valued at approximately $5 billion and the displacement of $1.7 billion in NGL imports;
- Raise domestic natural gas productive capacity and promote stability in domestic natural gas pricing;
- Promote liberalization of global natural gas trade through fostering of a global, liquid, natural gas market;
- Advance national security and the security of U.S. allies through diversification of global natural gas supplies; and
- Increase economic trade and ties with foreign nations including neighboring countries in the Americas and displacing environmentally damaging fuels in those countries.

1.3.1 Analysis of Domestic Need for Gas to be Exported

In support of its proposal to export domestic natural gas supplies as LNG, Sabine Pass commissioned reports by Advanced Resources International, Inc. ("ARI") and Navigant Consulting, Inc. ("NCI")[3] to assess domestic need for the natural gas to be exported from the Liquefaction Project. The ARI report, *U.S. Natural Gas Resources and Productive Capacity* ("ARI Report"), was commissioned to evaluate the scope of natural gas resources in the U.S. and their potential for future recovery. The NCI report, *Market Analysis for Sabine Pass LNG Export Project* ("NCI Report"), was commissioned to evaluate the market

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2 *See* Executive Order No. 13,534, 75 Federal Register 12,433 (March 16, 2010), *available at* http://www.whitehouse.gov/the-press-office/executive-order-national-export-initiative ("A critical component of stimulating economic growth in the U.S. is ensuring that U.S. businesses can actively participate in international markets by increasing their exports of goods, services, and agricultural products. Improved export performance will, in turn, create good high-paying jobs.").

3 To be provided in next version of Resource Report 1.

price impact of LNG exports from the SPLNG Terminal under several future U.S. demand scenarios.[4] Both the ARI Report and the NCI Report, as well as publicly available information, indicate that the U.S. has significant natural gas resources available at prices that are sufficient to meet projected domestic needs here in the U.S.

1.3.1.1 Supply of Natural Gas in the U.S.

Domestic gas production has been on an upward trend in recent years as rapid growth in supply from unconventional basins has more than outweighed declines in conventional onshore and offshore formations. Since 2005, when horizontal drilling began in earnest in the Barnett Shale formation in north-central Texas, U.S. dry gas production has grown 16.1%, to 20.96 trillion cubic feet ("Tcf") (57.4 Bcf/d) in 2009, representing the highest U.S. production levels since 1973.[5]

Preliminary data point to continued growth in domestic production in 2010 despite a significant drop in U.S. natural gas drilling activity from peak levels in 2008.[6] The U.S. Energy Information Administration ("EIA") estimates U.S. dry gas production totaled 59.3 Bcf/d in May 2010, a 1.69 Bcf/d increase compared to May 2009 dry production of 57.4 Bcf/d.[7] Increased drilling productivity in certain prolific shale formations, particularly the Marcellus and Haynesville shales, have enabled domestic production to continue expanding despite a reduction in industry upstream development.

The robust potential for future U.S. natural gas supply has been reflected in other recent industry evaluations. The Potential Gas Committee of the Colorado School of Mines ("Potential Gas Committee") in June 2009 raised its estimates of the U.S. technically recoverable gas resource base by 515 Tcf (+39%) to 1,836 Tcf at year-end 2008.[8] Including 238 Tcf of established proved domestic natural gas reserves, the Potential Gas Committee determined that the U.S. possesses future available gas supply of 2,074 Tcf,[9]

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4 ARI is a geological and engineering consulting firm which specializes in unconventional hydrocarbon geology, and has played an instrumental role over the last three decades in advancing the industry's understanding of the domestic unconventional resource base. NCI is an international consultant to the energy and utility industry.

5 See EIA, *Natural Gas Gross Withdrawals and Production* (July 29, 2010), http://www.eia.gov/dnav/ng/ng_prod_sum_dcu_NUS_a.htm.

6 There were 992 rigs drilling for natural gas in the U.S. as of the week ended August 13, 2010, 28% below peak drilling levels of 1,606 rigs for the week ended September 12, 2008. Baker Hughes, *North America Rotary Rig Count* (Aug. 13, 2010), http://files.shareholder.com/downloads/BHI/913806705x0x395656/B435AB0E-C2DF-48FA-9982-912C127B7AA5/U.S._Rig_Report_081310revised.xls). Baker Hughes, *North America Rotary Rig Count* (Sept. 12, 2010).

7 *See* EIA, *U.S. Dry Natural Gas Production* (July 29, 2010), http://www.eia.gov/dnav/ng/hist/n9070us2m.htm.

8 *See* Press Release, Potential Gas Committee, Potential Gas Committee Reports Unprecedented Increase In Magnitude of U.S. Natural Gas Resource Base (June 18, 2009), http://www.aga.org/NR/rdonlyres/65B2FD7E-A208-4687-9B4B-6EC079DA673D/0/0906PGCPRESS.PDF.

9 *Id*. at 2.

the highest resource evaluation in the group's 44-year history and over 90 years of domestic market needs, based on 2009 consumption levels.[10]

In its recently published study, The Future of Natural Gas, the Massachusetts Institute of Technology ("MIT") ("MIT Study") estimates that the U.S. has a mean recoverable resource base of approximately 2,100 Tcf.[11] This estimate includes 650 Tcf of recoverable shale resources, "approximately 400 Tcf [of which] could be economically developed with a gas price at or below $6/million British thermal units ("MMBtu") at the well-head."[12] According to the MIT Study's mean resource estimate, U.S. gas production will rise by 40% between 2005 and 2050.

In addition, the ARI Report provides an independent analysis of the unconventional natural gas resource base in the U.S. to supplement publicly available information on conventional onshore and offshore gas resources. ARI estimates that the U.S. possesses technically recoverable natural gas resources totaling 2,585 Tcf, including 2,286 Tcf in the Lower 48 state region and 299 Tcf in Alaska.[13] Of this total, 246 Tcf represent proved natural gas reserves and 2,238 Tcf comprise undiscovered or inferred resources.[14] Unconventional gas-bearing formations account for 53% (or 1,373 Tcf) of technically recoverable domestic gas resources and include 700 Tcf of recoverable reserves from shale formations (567 Tcf from tight sandstones and 106 Tcf from coalbed formations).[15]

The ARI Report notes that assessments of the domestic natural gas resource base are not static and have expanded over time due to improvements in oilfield service technologies such as horizontal drilling, multi-well pad drilling, and improved fracturing and stimulation of tight gas formations.[16] ARI projects that technology gains will continue to drive down production costs and augment recoverable natural gas reserves in the future. Remaining recoverable domestic shale gas resources, for example, are projected to increase 18.9% by 2035 to 853 Tcf from their assessment of 711 Tcf at the start of 2009.[17]

The ARI Report also examines the market impact of its unconventional gas forecast in the context of the EIA's latest Reference Case in its Annual Energy Outlook 2010 ("AEO 2010") for the U.S. natural gas market through 2035.[18] Using the AEO 2010 reference natural gas case outputs and, holding all other

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[10] U.S. natural gas demand totaled 22.8 Tcf in 2009. EIA, *Natural Gas Consumption by End Use* (July 29, 2010), http://www.eia.gov/dnav/ng/ng_cons_sum_dcu_nus_a.htm.

[11] MIT Energy Initiative, MIT, *The Future of Natural Gas*, at 9 (2010) [hereinafter *"MIT Report"*], *http://web.mit.edu/mitei/research/studies/naturalgas.html*.

[12] *Id*. at xii.

[13] ARI Report at 8.

[14] *Id.*

[15] *Id.*

[16] *See id.* at 9.

[17] *Id. at 9, 35-38.*

[18] *See* EIA, DOE, *Annual Energy Outlook 2010*, Table 117 (May 11, 2010) [hereinafter *"AEO 2010"*], http://www.eia.doe.gov/oiaf/aeo/supplement/suptab_117.xls.

variables constant, ARI used its Technology Model for Unconventional Gas Supply to re-assess the outlook for domestic unconventional gas productive capacity given EIA's projected track for future U.S. natural gas prices.[19] This substitution is appropriate given that EIA historically has underestimated the future contributions of unconventional gas, and particularly shale gas, to domestic markets.[20] These underestimation issues remain a concern in EIA's AEO 2010 forecast, which appears 4.5 Bcf/d too conservative in its estimate of current U.S. shale gas production.[21]

Assuming the same natural gas price outlook as generated by AEO 2010, ARI estimates U.S. unconventional gas productive capacity would grow to 69.0 Bcf/d in 2035 from 36.3 Bcf/d in 2010.[22] Natural gas produced from shales would account for 26.9 Bcf/d, or 82.3% of the 32.7 Bcf/d in projected growth in domestic productive capacity from unconventional geologic formations over the 25-year timeframe.[23] ARI subsequently merged its findings with the AEO 2010's projections for conventional domestic dry production, including the estimated start of a 4.5 Bcf/d pipeline from Alaska's North Slope to the Lower 48 states in 2024, and concluded that U.S. dry natural gas productive capacity would grow to 92.7 Bcf/d in 2035 from 58.6 Bcf/d in 2010, given the future market price track presented in the AEO 2010 report.[24] This growth in domestic productive capacity would well exceed expectations for future U.S. demand, projected by EIA in AEO 2010 to grow to 68.1 Bcf/d in 2035 from 64.7 Bcf/d in 2010.[25] Under the modified supply case presented by ARI, domestic natural gas productive capacity would exceed projected U.S. demand by 11.0 Bcf/d in 2015, 19.9 Bcf/d in 2025, and 28.7 Bcf/d in 2035.[26]

The ARI Report and the publicly available information demonstrate that the U.S. has sufficient natural gas resources available at modest prices to meet projected domestic demand over the next 20 or more years. Further, the ARI Report establishes that the availability of new natural gas reserves is likely to continue expanding into the future as new unconventional formations are discovered and the oil and gas industry continues to improve drilling and extraction techniques.

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19 *AEO 2010* estimates U.S. natural gas prices will rise from $4.50/MMBtu to $6.64/MMBtu through 2020, while long-term prices are projected to increase from $6.74/MMBtu to $8.88/MMBtu between 2021 and 2035. *See id.* at Table 13, http://www.eia.doe.gov/oiaf/aeo/excel/aeotab_13.xls.

20 Navigant Consulting Inc., *North American Natural Gas Supply* Assessment, at 5-6 (July 4, 2008), http://www.cleanskies.org/pdf/navigant-natural-gas-supply-0708.pdf.

21 *AEO 2010* projects U.S. shale gas production of 2.75 Tcf (7.5 Bcf/d) in 2010. *See AEO 2010*, at Table 14, http://www.eia.doe.gov/oiaf/aeo/excel/aeotab_14.xls. However, ARI notes that preliminary U.S. shale gas production totals 12.2 Bcf/d in 2010. *ARI Report* at 6.

22 *ARI Report* at 23.

23 *Id.* at 27.

24 *Id.* at 23-24.

25 *Id.* at 24.

26 *Id.*

1.3.1.2 Natural Gas Demand

The outlook for natural gas demand in the U.S. has dimmed considerably over the last decade as a consequence of persistent market price volatility, as well as structural changes afoot in the domestic economy. In its 1999 study on the U.S.'s natural gas market, the National Petroleum Council estimated that domestic consumption of natural gas would grow to 29.0 Tcf (79.5 Bcf/d) in 2010, a 31.8% increase from 22.0 Tcf (60.2 Bcf/d) of domestic demand in 1998.27 Instead, the EIA, in its most recent short-term market assessment, predicts U.S. natural gas consumption of 23.68 Tcf (64.9 Bcf/d) in 2010, or growth of only 7.6% from the 1998 benchmark.[28] U.S. demand in 2009 of 22.81 Tcf in fact was 2.2% lower than the 23.33 Tcf consumed at the start of the decade, according to EIA data.[29] Moreover, the 29 Tcf domestic natural gas market once envisioned by the National Petroleum Council has been indefinitely delayed based on evolving market conditions. The AEO 2010 predicts long-term annual gas demand growth of only 0.2%, with the domestic market expected to reach 24.86 Tcf (68.1 Bcf/d) in 2035.[30] Structural factors have contributed to these more conservative estimates of future demand growth. The composition of U.S. economic activity in time has gravitated toward less energy-dependent activities such as services and health care at the expense of manufacturing-based activity. Furthermore, improved technology and efficiency standards have lead to sharp reductions in energy usage in consumer products that directly, or through reduced electricity usage, indirectly impact U.S. natural gas consumption. According to Department of Energy Secretary Stephen Chu, "… the improvement in the efficiency of refrigerators alone since the 1970s is responsible for energy savings today greater than all non-hydro renewable power generation. During that time, the inflation adjusted cost of refrigerators dropped by about half while energy consumption was simultaneously reduced by more than 75 percent."[31] Dr. Chu further noted that appliance standards issued in the last 16 months alone will further reduce energy use and save American consumers more than $250 billion over the next 20 years.[32] This same trend of increased efficiency through technology gains is evident in industrial applications of natural gas. The new generation of combined-cycle natural gas power plants, for example, consume much less natural gas per unit of electricity output than their older steam-based counterparts. The result of these trends is that meeting the future economic needs of the U.S. economy will require relatively less natural gas, and energy in general, than in the past.

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[27] National Petroleum Council, *Meeting the Challenges of the Nation's Growing Natural Gas* Demand, Vol. 1. Summary Report, at 33 (Dec. 1999), http://www.npc.org/.

[28] *See* EIA, *Short Term Energy Outlook*, at 4 (Aug 10, 2010), http://www.eia.doe.gov/emeu/steo/pub/steo_full.pdf.

[29] EIA, *Natural Gas Consumption by End Use*, http://www.eia.gov/dnav/ng/ng_cons_sum_dcu_nus_a.htm.

[30] *See AEO 2010*, at Table 13, http://www.eia.doe.gov/oiaf/aeo/excel/aeotab_13.xls.

[31] Hearing on National Energy Policies Before the Subcomm. on Energy and Water Development of the S. Comm. on Appropriations, 111th Cong. 2-3 (2010) (testimony of Hon. Steven Chu, Secretary, Dep't of Energy).

[32] *Id*. at 3.

1.3.1.3 Supply-Demand Balance Demonstrates the Lack of Regional/National Need

It is evident from the current supply/demand balance of natural gas in the U.S. that the request for authorization to site, construct, and operate the Liquefaction Project is in the public interest. U.S. natural gas production has been steadily increasing in recent years while domestic demand since 2008 has experienced a significant retrenchment owing to the global recession. Robust supply and a dimmed outlook for market growth have led to historically low prices, prompting domestic producers to slow drilling, defer completions of recently drilled wells and reduce plans for future investments in natural gas producing basins.[33] Market price volatility during this period also has forced the periodic shut-in of actively producing wells in marginal gas-producing fields, suggesting that domestic natural gas productive capacity has exceeded the ability of the U.S. market to absorb incremental supplies.[34] It stands to reason that the ability to export domestic gas as LNG would greatly expand the market scope and access for domestic natural gas producers and thus serve to encourage domestic production at times when U.S. market prices might not otherwise do so. Such production would be available to supply domestic markets and thereby serve to moderate U.S. gas price volatility and keep prices to U.S. natural consumers at reasonable levels.

1.3.2 Other Public Interest Considerations

1.3.2.1 Benefits to U.S., Regional and Local Economies

The Liquefaction Project will stimulate the national, regional and local economies through job creation, increased economic activity and tax revenues both directly and indirectly. Because of their expertise and location, U.S. suppliers will be in an excellent position to supply most of the technology, equipment and material needed to construct the Liquefaction Project. The manufacturing and supply of the required materials would result in an investment of over $700 million for Stage 1, and an additional $600 million for Stage 2, which equates to a potential of $1.3 billion in U.S. sourced materials for the Liquefaction Project as a whole. Moreover, the national economy would benefit indirectly from the Project's role in supporting the exploration and production chain for natural gas extraction. This indirect stimulus will have a profound multiplier effect due to the wages, taxes and lease payments involved in the natural gas supply chain. Additionally, the Liquefaction Project will further the President's National Export Initiative. The National Export Initiative is designed to reduce barriers to trade and promote U.S. exports. The goal is to double U.S. exports over the next five years to create jobs and boost the economy. In this regard, the Liquefaction Project would help to reduce barriers to trade and promote U.S. businesses with the goal of increasing exports, thereby creating jobs and boosting the economy.

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[33] Three of the four articles on the cover of the August 4, 2010 edition of *Gas Daily* concern the impact on producers and production of the current over supply situation: "Chesapeake lays it down until prices pass $6"; "Prices prompt Petrohawk to trim shale spending" and "Analysts ponder long-term impact of low prices." Platts, Gas Daily, Aug. 4, 2010, at 1.

[34] "A third of wells on Wyoming state land shut due to low prices", Platts Gas Daily, October 27, 2009 page 1. Also, "Encana Shuts in Gas Wells on Low Prices" Natural Gas Intelligence, Jun. 22, 2009.

The Louisiana state and local economies would benefit from an immediate boost during the construction and operation of the Liquefaction Project. Given the magnitude of the economic benefits associated with the construction and operation of the Sabine Pass Liquefaction Project, the Project has received significant support from a board spectrum of local, state and federal office-holders in the state of Louisiana, including the entire congressional delegation from the state. In this regard, the need for LNG export facilities in the U.S., and in Louisiana in particular, has been recognized by U.S. Senator Mary Landrieu:

> *The United States is currently experiencing a natural gas revolution that will open up new markets here at home and abroad…. In northwest Louisiana alone, the Haynesville Shale reserve has 251 trillion cubic feet of recoverable natural gas, almost 11 times the amount consumed by Americans last year. Accessing this growing supply of natural gas and building the means to deliver it to consumers will stabilize prices and allow the U.S. to become a major exporter of natural gas. This project by Cheniere Energy at Sabine Pass is a key piece of that puzzle. The result will be more jobs for Louisianians, a stronger economy and more secure energy future of America.*[35]

1.3.2.2 Direct Benefits

The Liquefaction Project would provide a stable source of income and employment to the Louisiana and Gulf Coast communities. Approximately 3,000 jobs would be created directly through the design, engineering and construction of the Liquefaction Project, which translates into approximately $1 billion in wages to U.S. workers over a six year period.[36] A rough estimate of the craft labor to be paid over the Project duration is $760 million, with a peak of about 2,500 craft workers on site during Stage 1 construction ($400 million in payroll), and 2,200 workers during Stage 2 construction ($360 million in payroll). In addition, Sabine Pass Project staff and contractor management staff will peak at about 200 people, with staff wages in the range of $125 million for Stage 1 of the Project and 175 people with staff wages in the range of $110 million for Stage 2 of the Project. Sabine Pass estimates that approximately 170 to 250 full-time positions will be required to maintain and operate the Liquefaction Project.

Southeast Louisiana and southwest Texas in particular will benefit from added jobs, as the bulk of the construction workforce will come from those areas. The Liquefaction Project would provide a lifeline to the southwest Louisiana area, particularly Cameron Parish, which was decimated by Hurricanes Ike and Rita and has yet to fully recover. Once constructed and operational, the state and local economies would derive significant tax revenues from the Liquefaction Project, including tax revenues on natural gas liquids, increased gas production, labor, pipeline and other infrastructure construction.

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35 Press Release, U.S. Senator Mary Landrieu, Landrieu Welcomes Changes to Sabine Pass to Allow Exportation of Natural Gas (June 4, 2010), http://landrieu.senate.gov/mediacenter/pressreleases/06-04-2010-2.cfm.

36 Estimated construction work force numbers and payroll have been provided by Sabine Pass's engineering, procurement and construction contractor, Bechtel Corporation, and include current staff working on the Liquefaction Project for front end engineering and design.

1.3.2.3 Indirect Benefits

The Liquefaction Project potentially will play a significant role in contributing to the growth of natural gas production in the U.S. The natural gas supply chain has very significant multiplier effects on the U.S. economy due to the large number of industry jobs paid at high wage rates, and to frequently robust lease payments made to landowners in association with natural gas production. The expenditures associated with the Liquefaction Project and increased gas production resulting from the ability to export domestic supplies would ripple through the U.S. economy and generate even more economic activity as businesses and workers spend money. In this regard, there will be significant employment and income impacts on local businesses such as restaurants, service companies, retailers and hotels, while the additional U.S. natural gas productive capacity which LNG exports would create would ripple through multiple gas producing states. The Liquefaction Project also may spur the creation of new value-added businesses associated with the liquefaction and export processes.

1.3.3 Reduction in the U.S. Trade Deficit

Allowing for the exportation of LNG from the U.S. also will have a beneficial impact for the U.S. on the balance of payments between the U.S. and the rest of the world by reducing the overall U.S. trade deficit. According to the U.S. Department of Commerce, Bureau of Economic Analysis, in 2009 the total U.S. trade deficit was $380.7 billion (comprised of approximately $1.5 trillion in exports minus approximately $1.9 trillion in imports).[37] Significantly, of that $380.7 billion deficit, more than half (over $204 billion) was the direct result of a negative balance of trade in petroleum products (including crude oil, natural gas, fuel oil and other petroleum-based distillates such as kerosene).[38] Given the substantial impact the U.S.'s negative trade balance in petroleum products has on its overall trade deficit and balance of payments, granting Sabine Pass's request to construct the Liquefaction Project for the export LNG would have a significant positive impact on reducing that deficit.

1.3.4 Geopolitical Benefits

The export of domestically-produced LNG would promote liberalization of the global gas trade through fostering of a global, liquid, natural gas market; and will advance national security interests as well as the security interests of U.S. allies through the diversification of global natural gas supplies. The current natural gas trade has developed regionally with three primary markets: North America, Europe and Asia. There is substantial trade within these markets, but little trade between the markets. The pricing structure within each market is significantly different. In North America, natural gas is traded in a highly liquid and competitive market and the price is very transparent. The European and Asian markets are dominated by natural gas prices linked to the price of crude oil. LNG contracts also are indexed to crude oil. By introducing market-based price structures, Sabine Pass increases the potential for global decoupling of oil parity pricing. This would provide significant benefits worldwide because, as stated in the MIT Study,

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[37] *See* BEA, U.S. Dep't of Commerce, *U.S. Int'l Trade in Goods and Services*, Feb. 10, 2010, at 11, http://www.bea.gov/newsreleases/international/trade/2010/pdf/trad1209.pdf.

[38] *See Id.*

"[a]n interconnected delivery system combined with price competition are essential feature of a "liquid" market."[39] The Sabine Pass Liquefaction Project can serve as a catalyst for this interconnection.

Natural gas is poised to grow as an energy source globally. Energy and security have historically been linked and this relationship is likely to tighten. On April 8, 2010, in addressing the North Atlantic Treaty Organization ("NATO"), the President said lack of international energy security was a 21st century asymmetric threat for all to address.[40] He suggested that the European Union ("EU") make an effort collectively within the EU and reiterated that diversity in sources of energy supply was a good thing for everyone. He also pledged cooperation and support with regard to that issue. Energy security is not a new issue for NATO. Its economic committee has, for years, had regular briefings on the topic as well as on industrial planning and energy security. The U.S. government and NATO have stressed that planning in response to terrorism is an area where energy security is an integral part. The U.S. government has expressed concerns over structural difficulties that inhibit an EU common position on energy security cooperation. Exports of U.S. natural gas could provide the catalyst that helps assure energy security within NATO. Exports of U.S. natural gas would play a significant role in reducing the stranglehold of Eurasian/MidEastern price cartels on the U.S. NATO allies, and also on the majority of U.S. trading partners worldwide.

As a related matter, a global, liquid natural gas market is beneficial to U.S. and global economic interests and, at the same time, advances security interests through diversity of supply and resilience to disruptions.[41] To this end, the importance of the Liquefaction Project has been recognized by multiple European utilities that are interested in this Project because of the pricing structure of U.S. natural gas markets and the security and diversity of supply offered by those markets. The gas supply in Europe is restricted to a small group of countries. The entrance of the U.S. into the global LNG market as a supplier would help to diversify the global gas market. Further, the U.S. provides a stable trading partner for the European utilities. This has important security implications because "[t]he U.S., with its unique international security responsibilities, can be constrained in pursuing collective action if its allies are limited by energy security vulnerabilities."[42]

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39 *MIT Report*, *supra* note [13], at 70.

40 Press Release, The White House, Press Gaggle by Nat'l Security Advisor General Jim Jones and NSC Chief of Staff Denis McDonough Aboard Air Force One (Apr. 9, 2010), http://www.whitehouse.gov/the-press-office/press-gaggle-national-security-advisor-general-jim-jones-and-nsc-chief-staff-denis-.

41 *MIT Report*, *supra* note [13], at xv ("Greater international market liquidity would be beneficial to U.S. interests. U.S. prices for natural gas would be lower than under current regional markets, leading to more gas use in the U.S. Greater market liquidity would also contribute to security by enhancing diversity of global supply and resilience to supply disruptions for the U.S. and its allies. These factors moderate security concerns about import dependence"). *See also id.* at xvii ("For reasons of both economy and global security, the U.S. should pursue policies that encourage an efficient integrated global gas market with transparency and diversity of supply, and governed by economic considerations").

42 *MIT Report*, *supra* note [13], at 71.

1.4 LOCATION AND DESCRIPTION OF PROJECT

All proposed Project facilities will be located entirely within the 853-acre site previously leased in conjunction with the development of the existing SPLNG Terminal. The locations of the proposed facilities are depicted in Figure 1.4-1. A topographic map and aerial photography of the Project are included in Appendix 1A.

Figure 1.4-1 General Location Map

1.4.1 Liquefaction Facilities (LNG Train)

The LNG Trains, the major component of the proposed Project, will be located west and northwest of the existing LNG tanks, in an area impacted previously by placement of dredged material. The LNG trains will consist of the individual components listed in Section 1.2.

1.4.2 Additional Facilities

All buildings, building modifications, and infrastructure will be constructed within the existing SPLNG Terminal facility boundary.

1.5 LAND REQUIREMENTS

Approximately 255.97 acres of the 853-acre of the SPLNG Terminal site will be affected by construction of the Liquefaction Project, of which 191.2 acres will be permanently converted for operation of the Project. Table 1.5-1 lists the land requirements for the Liquefaction Project.

TABLE 1.5-1
Land Requirements for the Liquefaction Project

Facility	Land Impacted by Construction[1] (acres)	Land Impacted During Operation[2] (acres)
Liquefaction Project[3]	191.2	191.2
Staging Areas[4]	64.77	0.0
Total	255.97	191.2

[1] Construction area includes the entire construction footprint, including all temporary and permanent construction areas.
[2] Operational area includes only permanent Project facility.
[3] Includes all areas of the site which will undergo soil improvement, including 12.84 acres for the sixth LNG tank (Tank S-106), approved in Docket CP05-396-000 et al.
[4] Existing staging areas that were previously approved and have been converted to industrial land use as part of operation of the SPLNG Terminal.

1.6 CONSTRUCTION SCHEDULE AND PROCEDURES

1.6.1 Project Schedule

Sabine Pass is seeking FERC authorization to site, construct, and operate the Liquefaction Project no later than December 2011, and anticipates requesting authorization to commence construction in January 2012. Assuming limited delays, the optimum overall Project duration from starting engineering design, permitting, and commercial activities to start up of the LNG Train 1 is approximately 55 months. Construction and start up of the LNG Train 2 will be completed about 6 to 9 months later in order to take advantage of the transition of craft and other resources between the two phases. Sabine Pass expects the LNG Train 1 to be complete and ready for export in the second quarter of 2015; and LNG Train 2 by early 2016. Construction of Stage 2 (LNG Trains 3 and 4) would start when commercially feasible, but probably no sooner than 2014.

1.6.2 Construction Procedures

All Project components will be sited, constructed, operated, and maintained in accordance with all applicable federal and state regulations. Sabine Pass will implement and adhere to the FERC's *Upland*

Erosion Control, Revegetation, and Maintenance Plan (Plan) and the *Wetland and Waterbody Construction and Mitigation Procedures* (Procedures)[43]. Wetland areas that will be temporarily or permanently impacted during construction and operation of the Project will be mitigated as agreed upon with the state and federal resource and regulatory agencies. Most affected wetlands are previously disturbed and within a dredge material placement area. Wetland impacts and mitigation will be addressed in a Project wetland mitigation plan, which will be developed in consultation with appropriate federal and state agencies.

Sabine Pass will employ a tracking system to ensure that relevant clearances and permits are received prior to requesting approval to begin construction from the FERC. For purposes of quality assurance and compliance with mitigation measures, other applicable regulatory requirements, and Project specifications, Sabine Pass will be represented on site by a Chief Inspector (CI). One or more craft inspectors and one or more Environmental Inspectors (EIs) will assist the CI. All Sabine Pass inspectors will have access to the relevant compliance specifications and other documents contained in the construction contracts. The EI's duties will be fully consistent with those contained in paragraph III.B (Responsibilities of the Environmental Inspector) of the Plan to ensure that the environmental conditions associated with other permits or authorizations are satisfied. The EI(s) will have authority to stop work or require other corrective action(s) to achieve environmental compliance. In addition to monitoring compliance, the EI's duties will include training Project personnel about environmental requirements and reporting compliance status to the contractors, Sabine Pass, the FERC, and other agencies, as required.

Sabine Pass will develop an environmental training program tailored to the construction of the Liquefaction Project. The program will be designed to ensure that:

- Qualified environmental training personnel provide thorough and well-focused training sessions regarding the environmental requirements applicable to the trainees' activities;
- All individuals receive environmental training before they begin work;
- Adequate training records are kept; and
- Refresher training is provided as needed to maintain high awareness of environmental requirements.

1.6.3 Temporary Construction Facilities

The Liquefaction Project will involve modifications to the existing SPLNG Terminal facilities, and the construction of new process units. The main construction offices will be located in areas previously improved and utilized during construction of the SPLNG Terminal in order to maximize the use of existing infrastructure and developed access. To maintain control of the site, this area will be used to provide common office areas for all contractors and parking areas outside the boundaries of the process

[43] Available on the FERC website at: http://www.ferc.gov/industries/gas/enviro/guidelines.asp.

and construction areas. All contractor personnel will be required to access the Project through a turnstile area and swipe an electronic card key. The main construction offices and temporary facilities in this area can be mobilized without significant preparation work. Support / satellite offices, warehousing, lunchrooms, temporary access roads, parking lots, and material laydown storage will be erected as necessary to support craft labor.

Additional temporary facilities, primarily laydown areas and support / satellite areas, will be located around the new process units. The entire area making up the Phase 1 and Phase 2 process units and adjacent laydown areas will require significant site improvements including clearing and grubbing, soil stabilization, backfill and grading activities that must be performed prior to mobilization of permanent plant construction. The permanent site grading for drainage will be directed to an outfall on the western perimeter of the site and will be completed to assure proper drainage during construction and operation. A water run-off plan to control sediment and silt will be implemented during construction. Site preparation will involve an area of approximately 191.2 acres, and will include the installation of required construction power, communications and water.

Because major equipment will be delivered primarily by barge, improvements to the existing construction dock will be implemented to allow heavy roll-on / roll-off. Upgrading and extending the existing SPLNG Terminal access roads will be performed to support heavy haul to the new construction areas.

1.6.4 Site Fill Material Requirements

The process facilities for the Liquefaction Project will be west and northwest of the LNG storage tanks. Part of the Process Area is in relatively good soil which will require clearing, grubbing, and rough grading. The remaining portion of the Process Area will be located in an existing dredged material placement area where soils will require considerable improvement and stabilization to provide a load bearing surface for construction. The techniques to be used to improve the soils will be similar to those used for construction of the existing SPLNG Terminal facilities. Various stabilizers used include Portland cement, fly ash, and other admixtures. Appropriate geogrids, geotextiles, and aggregates, where needed (imported gravel and crushed stone), will be used to level and finish the Liquefaction Project areas. Materials for site improvement, such as gravel and stone surfacing, will be imported via barge or trucks.

The LNG liquefaction area will be filled approximately 3 feet above existing ground surface. It is expected that the total settlement as a result of placing fill of this thickness in the Project area will be approximately 17 inches, with about 25 percent of the predicted total settlement occurring during fill placement. The balance of the settlement will occur at a decreasing rate over a period of about 30 to 50 years. Numerous settlement observation points will be identified prior to fill placement. The settlement of these points will be monitored at various times during and following fill placement to verify the predicted amount of settlement.

The clay fill and sand are readily available from nearby suppliers in the general area. The gravel and stone surfacing is routinely imported into the Lake Charles and Sabine Pass Channel areas via barge. These existing sources will be used to obtain material for the Project.

1.6.5 Liquefaction Facilities (LNG Trains)

Prior to commencing construction of the Project components, it will be necessary to construct access roads to the process areas, and complete cut and fill to rough grade in the required areas in order to prepare the site for construction. Additional activities during the site-works phase of construction will include: (1) cutting necessary drainage ditches to allow proper surface water run off, (2) cutting and backfilling for placement of any temporary construction facilities such as parking lots, office areas, and lay-down areas, (3) installation of perimeter fencing and temporary construction fencing, and (4) cut and fill for any roads within the Project site boundaries.

The site-works portion of the Project, as discussed above, need not be completed prior to commencement of subsequent activities. The primary critical path activity is the erection of the Phillips Optimized Cascade^{SM} LNG Trains. Therefore, the execution strategy will be structured to prevent slowing construction in this area.

The foundations for equipment, buildings, and pipe racks will be installed on precast piles that will be delivered to the site by barge to the construction dock. Piles will be installed in a manner to efficiently complete piling operations on a schedule that will best support the subsequent construction operations. After pile driving is complete, pile caps will be installed at the top of each pile. These will consist of formwork, rebar installation, and pouring of concrete. Horizontal pipe support racks will be installed after the pile caps. Pipe installation on the pipe racks will be implemented from multiple directions after installation of the pipe racks. Pipe spool fabrication will be done in a covered area on or off-site. Structural steel membranes will be prefabricated off-site and erected upon arrival.

The majority of the straight run pipe will be field fabricated prior to placement on the pipe racks. Pipe expansion loops will be pre-fabricated in a shop, transported to position, and then erected with the straight run piping. Pipe will also be painted to the maximum extent at the shops, after shop welds have been tested in accordance with the applicable codes. Pipe spool size will be as large as can be practically trucked to site to minimize site work and the number of deliveries.

Wherever practical, large equipment will arrive at site in preassembled packages that will facilitate final hook-up and testing. All equipment will be designed, fabricated, and tested by highly qualified specialist suppliers at their respective facilities, and shipped to site only after the necessary inspections have taken place and the equipment is released. The larger equipment, such as the cold boxes, acid gas absorber and stripper columns, and the refrigerant compressors, will be offloaded at the construction dock on multi-wheel transport crawlers, and transported to their foundations. Other material and equipment will be shipped to site by truck.

Installation of the equipment will proceed at the same time as the installation of the pipe on the pipe rack. The target is to have all equipment installed prior to the erection progress of the pipe rack arriving at the main process areas. This will allow a seamless tie in at this location. The shop, warehouse, and control building erection will progress as the pipe-rack installation is occurring.

When construction is approximately 70% complete, the focus will shift from construction by area to completion by systems. The civil and structural work will be substantially complete, the equipment set, and most of the large bore piping installed. The Project schedule will be driven by the mechanical completion and pre-commissioning requirements. The system completion and turnover packages will be defined and scoped by engineering, and assembled by the construction team. A turnover coordinator will prepare the systems completion and turnover packages which will include the following documentation:

- Marked-up drawings to show the limit of the system and the location of blinds;
- Line list by system with pressure testing documentation;
- List of equipment including motors with data sheets and inspection reports;
- Marked-up Single Line Diagrams with inspection/test reports for electrical equipment;
- Cable reports;
- Instrument Index with data sheets and calibration sheets;
- Loop Diagrams;
- Any applicable vendor documentation/drawings;
- Turnover Exception Lists; and
- Detailed Punchlist.

As the piping installation, hydrotesting, pneumatic testing, and equipment erection work is completed and the density of craft personnel and construction equipment is reduced within each of the areas, the balance of the painting and insulation work will be completed. The pipe racks will be completed first followed by the process and utility areas. After the installation of the equipment and piping has been completed, the final road paving, site grading, landscaping and cleanup will be done. The temporary construction facilities will be demobilized on a progressive basis when they are no longer needed.

Construction of other necessary facilities and other buildings, as well as foundations and major utility equipment will commence once construction of the LNG Trains has begun. Emphasis will be placed on coordinating the arrival of the major equipment with the completion and curing of the respective foundation so that the equipment can be placed on its foundation when it arrives. This will avoid double handling and intermediate storage on site.

The buildings are independent sites and will be constructed simultaneously with the liquefaction facilities, so that electrical and instrument contractors can install their equipment according to their respective schedules.

1.6.6 Site Access and Traffic

Construction traffic will access the site via Louisiana State Highway ("SH") 82. Once at the site, construction traffic will utilize Duck Blind Road, which parallels the western boundary of the SPLNG Terminal property, or Lighthouse Road, the SPLNG Terminal main entrance road, which parallels the eastern boundary of the property.

Material deliveries to the site will generate, on average, 10 to 12 deliveries via truck per day during construction, with a peak of 15 to 20 trips per day during the peak construction. A similar number of small, two-axle truck trips will also be expected. Material delivery vehicles will not exceed the load capacity of either the public roads or the SH 82 bridge. Heavy material delivery will occur via barge to the on-site construction dock, or alternately via SH 27 to SH 82 from Holly Beach, Louisiana. Peak construction traffic will generate more than 1,750 trips during the morning as well as the evening commuting hours.

1.6.7 Dredging Requirements

The SPLNG Terminal construction dock will be utilized for the Liquefaction Project to transport equipment and materials to the site. The construction dock is located along the Sabine Pass Channel, southeast of the proposed Liquefaction Project site. The construction dock was initially dredged to depths of -17 feet in 2005 for the construction of the SPLNG Terminal. In March 2009, sedimentation from the Sabine Pass Channel filled in the construction dock to depths of -9 feet; therefore, maintenance dredging was necessary and approximately 32,000 cubic yards ("cy") of material were removed. It is expected that prior to utilizing the construction dock for the Liquefaction Project, another maintenance dredge would be required to remove any sediment that has accumulated since the March 2009 maintenance dredge, and to restore the -17 foot contour of the construction dock. The maintenance dredge activities are authorized under Nationwide Permit 35, administered by the U.S. Army Corps of Engineers ("USACE") and Coastal Use Permit P20071705, issued by the Louisiana Department of Natural Resources ("LDNR").

1.6.8 Drainage of the Finished Site

Stormwater runoff will be directed north to three 30-inch drain pipes to be installed at the northwestern edge of the LNG Train construction area. These drain pipes will be buried and run westerly under Duck Blind Road and over the existing pipelines into the Sabine Pass Channel. Other areas will be graded to divert stormwater into existing drainages that also discharge to the Sabine Pass Channel. Undisturbed areas of the site will retain their natural drainage.

1.6.9 Sewer Collection and Disposal

Sanitary sewage from each building containing toilets will be collected and treated in a central sanitary treatment unit which will need to be expanded to accommodate the additional personnel. Lift stations will be installed to carry the waste to the central treatment unit. The treated sewage will be discharged with the facility stormwater. The existing Louisiana Pollution Discharge Elimination System ("LPDES") Permit to Discharge Water from Natural Gas Facilities (NGF-3) issued by the Louisiana Department of Environmental Quality will be updated to reflect the new facilities. The permit application will state the volume of the discharge, identify the receiving body of water (Sabine Pass Channel) and provide for analytical results as required by state law.

1.7 OPERATIONS AND MAINTENANCE

All personnel at the SPLNG Terminal have been trained as part of the operations of the existing LNG terminal. It is anticipated that from 170 to 250 additional permanent personnel will be required for the Liquefaction Project, and will be located at the Liquefaction facility. Personnel will be trained in LNG safety, cryogenic operations, and the proper operation of all equipment. Operators will meet all the training requirements of the U.S. Department of Transportation minimum federal safety standards specified in Title 49 of the Code of Federal Regulations ("CFR"), Parts 192 and 193. Safety procedures are discussed further in Resource Report 11.

1.7.1 Operations

Operating procedures will be developed for the new liquefaction facilities, and extensive training will be provided for operational personnel to ensure that they are familiar with and understand the importance of adherence to safe procedures. These procedures will provide functional requirement of the control and safeguarding systems, to include addressing safe start-up, normal shutdowns, emergency shutdowns, fire, gas and spills, etc., as well as routine operation and monitoring. Particular attention will be given to coordination with and involvement of appropriate local officials and other plant operators in the vicinity of the SPLNG Terminal.

1.7.2 Maintenance

Facility maintenance will be conducted in accordance with 49 CFR 193, Subpart G. Full-time terminal maintenance staff will conduct routine maintenance and minor overhauls. Major overhauls and other major maintenance will be handled by soliciting the services of trained contract personnel to perform the maintenance. All scheduled and unscheduled maintenance will be entered into a computerized maintenance management system ("CMMS"). All personnel, operations, maintenance, and others, will be trained on the use of CMMS. The CMMS will print out work orders every morning. These work orders will be distributed to the maintenance personnel during the morning meetings.

Scheduled maintenance, such as preventive and predictive maintenance of equipment, will be input into the system to automatically print out work orders either on a time basis or on hours of operation,

depending on the requirement. Scheduled maintenance will be performed on safety and environmental equipment, instrumentation, and any other equipment that will require maintenance on a routine basis. When a problem is detected that requires unscheduled maintenance attention, the person that detects the problem will enter it into the CMMS. If a problem requires immediate attention, the appropriate person will be notified.

1.8 FUTURE PLANS AND ABANDONMENT

1.8.1 Future Plans

Sabine Pass has no plans for further expansion. To the extent that expansion of the facilities is warranted in response to additional demand for liquefaction services, any new facilities would be designed to be compatible with the proposed facilities and Sabine Pass will obtain all necessary permits and approvals for those facilities.

1.8.2 Abandonment of Facilities

No facilities are proposed for abandonment or removal at this time.

1.9 PERMITS AND APPROVALS

Sabine Pass will obtain all necessary permits, clearances, and licenses relating to the construction and operation of the Liquefaction Project. Table 1.8-1 provides a list of permits that Sabine Pass will obtain or amend for the Liquefaction Project. Copies of approvals and correspondence with regulatory agencies and others are included in Appendix 1B. Sabine Pass will file any additional correspondence and approvals with the FERC upon receipt.

Sabine Pass will include copies of all relevant environmental permits and approvals in the construction bid packages and contracts. Construction contractor(s) employed by Sabine Pass will be required to be familiar with all permits and licenses obtained by Sabine Pass and comply with all federal, state, and local laws, ordinances, and regulations that apply to construction of the facility and to restoration of any areas temporarily disturbed during construction. Should other safety, design, and construction codes and regulations be enacted or adopted by governmental agencies having jurisdiction over the locations where the work is to be performed, the contractor(s) will be required to observe and abide by all provisions that are applicable.

TABLE 1.8-1
Permits and Consultations for the Liquefaction Project

Agency	Permit/Consultation	Date Submitted/ *Anticipated Submittal*	Date Received/ *Anticipated Receipt*
FEDERAL			
Federal Energy Regulatory Commission	Section 3 Application - Natural Gas Act	*February 2011*	*December 2011*
U.S. Army Corps of Engineers	Section 404 - Clean Water Act Permit	*February 2011*	*December 2011*
U.S. Fish and Wildlife Service (USFWS)	Section 7 Consultation - Endangered Species Act/ Migratory Bird Treaty Act	September 28, 2010	October 5, 2010
U.S. Coast Guard	Letter of Intent and Waterway Suitability Assessment	June 17, 2010	June 24, 2010
EPA Region VI	Clean Water Act Consultation	*February 2011*	*December 2011*
	Clean Air Act Consultation	*February 2011*	*December 2011*
NOAA Fisheries	Section 7 Consultation - Endangered Species Act	September 28, 2010	November 3, 2010
Federal Emergency Management, Region VI (FEMA)	Construction within a floodplain	*February 2011*	*December 2011*
STATE			
Louisiana Department of Environmental Quality (LDEQ)	Section 401 - Clean Water Act, Water Quality Certification	*February 2011*	*December 2011*
	Louisiana Pollutant Discharge Elimination System (LPDES) Construction Stormwater Permit	*December 2011*	*January 2012*
	Air Permit	*February 2011*	*December 2011*
Louisiana Department of Natural Resources, Coastal Management Division (LDNR)	Coastal Management Plan Consistency Determination	*February 2011*	*December 2011*
Louisiana Department of Wildlife and Fisheries (LDWF)	Sensitive Species/Habitats Consultation	June 17, 2010	July 15, 2010
Louisiana State Historic Preservation Office (SHPO)	Section 106 - National Historic Preservation Act	June 17, 2010	July 2, 2010

TABLE 1.8-1
Permits and Consultations for the Liquefaction Project

Agency	Permit/Consultation	Date Submitted/ *Anticipated Submittal*	Date Received/ *Anticipated Receipt*
LOCAL			
Cameron Parish	Building Permits	*February 2011*	*December 2011*
Cameron Parish Floodplain Administrator	Permit for Construction in a Zone "VE" or Variance as: functionally dependent use"	*February 2011*	*December 2011*
NATIVE AMERICAN GROUPS			
Caddo Indian Nation of Oklahoma	Consultation	*December 2010*	*February 2011*
Alabama-Coushatta Nation of Texas	Consultation	*December 2010*	*February 2011*
Coushatta Tribe of Louisiana	Consultation	*December 2010*	*February 2011*
Chitimacha Tribe	Consultation	*December 2010*	*February 2011*
Jena Band of Choctaw	Consultation	*December 2010*	*February 2011*
Tunica-Biloxi Tribe	Consultation	*December 2010*	*February 2011*

1.10 AFFECTED LANDOWNERS

The names and addresses of all landowners whose land is adjacent to the Liquefaction Project facilities are provided in Appendix 1C, as required in 18 CFR. §157.6(d) of the FERC's regulations. Further, in accordance with 18 CFR 157.21(f)(3) and 18 CFR §157.6(d)(2), Sabine Pass has sent letters to each of these entities and individuals regarding the Project. There are no landowners with residences within a 0.5 mile of the SPLNG Terminal site.

1.11 NONJURISDICTIONAL FACILITIES

1.11.1 Identified Nonjurisdictional Facilities

The liquefaction facilities will require an additional source of fresh water for the following processes:

- Feed source to the demineralized water system for injection into the gas turbines for nitrogen dioxide control, and for make up of the amine unit;
- Humidification equipment at the inlet to the gas turbine drivers; and
- Potable water for the additional operation and maintenance personnel.

Because the existing water line from Johnson Bayou is inadequate to meet the water requirements for the liquefaction facilities, a new water line will be installed from an existing water supply in Sabine Pass,

Texas to the liquefaction facility area. Appendix 1D provides the location and additional description of this water supply line.

1.11.2 Determination of the Need for FERC to Conduct an Environmental Review

Under certain circumstances, nonjurisdictional facilities may be subject to FERC's environmental review. In making this determination, the FERC requires applicants to address four factors that indicate the need for FERC to do an environmental review of project-related nonjurisdictional facilities. These factors include:

(1) Whether or not the regulated activity comprises "merely a link" in a corridor type project (such as a transportation or utility transmission project);

(2) Whether there are aspects of the nonjurisdictional facility in the immediate vicinity of the regulated activity which affect the location and configuration of the regulated activity;

(3) The extent to which the entire project will be within the FERC's jurisdiction; and

(4) The extent of cumulative federal control and responsibility.

The application of this procedure to the water supply pipeline follows:

With respect to factor (1), the water supply pipeline is a corridor type project, but it does comprise any kind of link in a corridor type project. Therefore, this factor does not support a review of the nonjurisdictional facility.

With respect to factor (2), the water supply pipeline does connect directly to the regulated activity but does not affect the configuration and location of the regulated activity. This factor does not support a review of the nonjurisdictional facility.

With respect to factor (3), the water supply pipeline is entirely outside of FERC's jurisdiction as the construction of this line is under the jurisdiction of the States of Texas and Louisiana regulatory agencies and the U.S. Army Corps of Engineers. Only the facilities that the water supplied by the water supply pipeline connect to at the Liquefaction Project are within the FERC's jurisdiction, and this factor weighs against inclusion of the nonjurisdictional facility in a review by FERC.

With respect to factor (4), the cumulative level of federal control and responsibility over the project, federal control is determined by the amount of federal financing, assistance, direction, regulation, or approval inherent in a project. The water supply pipeline will be developed by Sabine Pass, and no federal financing or guarantees will be granted to this party. Sabine Pass is an independent company and the non-jurisdictional facilities will be constructed by private companies under state and local regulatory jurisdiction. Some federal permits may be involved, but no federal lands are involved. Therefore, cumulative federal control is minimal and this factor does not warrant FERC environmental review.