Freeport LNG Development, L.P.

Docket Nos. CP03-75-003, CP03-75-004, CP05-361-001, and CP05-361-002

FREEPORT LNG
EXPORT PROJECT and
BOG/TRUCK PROJECT

Environmental Assessment

Cooperating Agency:
U.S. Department of Energy
DOE/EA – 1650
DOE Docket No. FE-08-70-LNG

MARCH 2009

FEDERAL ENERGY REGULATORY COMMISSION
WASHINGTON, D.C. 20426

OFFICE OF ENERGY PROJECTS

In Reply Refer To:
OEP/DG2E/Gas 2
Freeport LNG Development, L.P.
Docket Nos. CP03-75-003, CP03-75-004
CP05-361-001 and CP05-361-002
§375.308(x)

TO THE PARTY ADDRESSED:

The staff of the Federal Energy Regulatory Commission (FERC or Commission) and the Department of Energy (DOE), Office of Fossil Fuels, have prepared an environmental assessment (EA) on the liquefied natural gas (LNG) facilities proposed by Freeport LNG Development, L.P. (Freeport LNG) in the above-referenced docket.

The EA was prepared to satisfy the requirements of the National Environmental Policy Act (NEPA). The DOE is a cooperating agency for the development of the EA. A cooperating agency has jurisdiction by law or special expertise with respect to potential environmental impacts associated with the proposal and is involved in the NEPA analysis. The FERC staff concludes that approval of the proposed projects, with appropriate mitigating measures, would not constitute a major federal action significantly affecting the quality of the human environment.

In order to operate its facility for the LNG Export Project, Freeport LNG proposes equipment modification at the Phase I unloading dock to allow shore to ship LNG transfer. This would include converting one[1] of the four existing unloading arms on the Phase I unloading dock to a loading line to transfer export-bound LNG from the terminal's storage tanks to awaiting ships. The conversion would involve minor changes involving a check valve and a control valve. The check valve would be replaced with a short spool. At any given time, the terminal would operate either in the export mode or the currently authorized import mode, but not in both modes simultaneously, such that ships visiting the terminal to load LNG for export would operate instead of, not in addition to, ships delivering LNG for domestic use only.

Freeport LNG also applied to DOE on August 1, 2008 in Docket No. FE-08-70-LNG to export on a short-term or spot market basis up to 24 Bcf of previously imported

[1] Freeport LNG's LNG Transfer System Startup/Operation Procedure (Document No. FLNG-REC-101XXX [Revision 1 – 09-04-08]) identifies the arm as LA-1A.

LNG cumulatively over a two-year period from the United States (U.S.) to the United Kingdom, Belgium, Spain, France, Italy, Japan, South Korea, India, China, and/or Taiwan.

Freeport LNG also proposes to construct and operate a boil-off gas (BOG) liquefaction system and a LNG truck delivery system at the company's existing import terminal.[2] These facilities would allow Freeport LNG to 1) liquefy about 5 million cubic feet per day of BOG and return it to the LNG storage tanks and 2) receive the delivery of LNG by truck in order to keep the tanks in the necessary cryogenic state. The BOG liquefaction plant would also act as a back-up to the existing BOG takeaway pipeline compression. The location of BOG liquefaction facilities would consist of:

- One BOG liquefaction heat exchanger;
- One BOG liquefaction expander-compressor;
- Two BOG liquefaction compression lube oil filters;
- Three BOG refrigeration compressor units (approximately 1,380 horsepower (hp) each);
- Natural gas piping, 4, 6, 8, and 12-inch-diameter aboveground piping; and
- LNG piping, 4-inch-diameter aboveground piping.

Freeport LNG is proposing certain facility modifications to enable it to undertake LNG truck unloading activities in the event that the BOG liquefaction facilities are not available. The truck unloading facilities would require the installation of a single 4-inch-diameter inlet connection and valves on one of the existing LNG transfer lines and a 25 hp portable electric pump, if needed. The LNG truck would be connected to the valve via a 3-inch-diameter hose during unloading of the LNG. Freeport LNG would use these facilities to transfer the LNG from the trucks to the existing tanks. Freeport LNG anticipates that it would receive 5 to 6 truck deliveries per day, totaling 66,000 gallons or 4.96 million standard cubic feet (MMscf) of LNG during the periods when delivery by truck would be required. The proposed LNG truck delivery system is expected to operate for about 60-90 days, generating traffic of about 540 trucks annually.

The EA has been placed in the public files of the FERC. A limited number of copies of the EA are available for distribution and public inspection at:

[2] During routine terminal operations, ambient heat in the LNG storage tanks and piping causes small amount of LNG to evaporate. The vaporizing LNG is referred to as BOG or boil-off gas. The BOG increases the storage tank pressure until a point where it must be transferred, flared, or re-liquefied.

Federal Energy Regulatory Commission
Public Reference Room
888 First Street, N.E., Room 2A
Washington, DC 20426
(202) 502-8371

Copies of the EA have been mailed to federal, state, and local agencies; public interest groups; interested individuals and affected landowners; Native American tribes; newspapers and libraries; and parties to this proceeding.

Any person wishing to comment on the EA may do so. To ensure consideration prior to a Commission decision on the proposal, it is important that we receive your comments before the date specified below.

You can make a difference by providing us with your specific comments or concerns about the Sabine Export Project. Your comments should focus on the potential environmental effects, reasonable alternatives, and measures to avoid or lessen environmental impacts. The more specific your comments, the more useful they will be. To ensure that your comments are timely and properly recorded, please send in your comments so that they will be received in Washington, DC on or before April 13, 2009.

For your convenience, there are three methods in which you can use to submit your comments to the Commission. In all instances please reference the project docket numbers CP03-75-003, CP03-75-004, CP05-361-001, and CP05-361-002 with your submission. The docket number can be found on the front of this notice. The Commission encourages electronic filing of comments and has dedicated eFiling expert staff available to assist you at 202-502-8258 or efiling@ferc.gov.

(1) You may file your comments electronically by using the Quick Comment feature, which is located on the Commission's internet website at http://www.ferc.gov under the link to Documents and Filings. A Quick Comment is an easy method for interested persons to submit text-only comments on a project;

(2) You may file your comments electronically by using the eFiling feature, which is located on the Commission's internet website at http://www.ferc.gov under the link to Documents and Filings. eFiling involves preparing your submission in the same manner as you would if filing on paper, and then saving the file on your computer's hard drive. You will attach that file as your submission. New eFiling users must first create an account by clicking on "Sign up" or "eRegister." You will be asked to select the type of filing you are making. A comment on a particular project is considered a "Comment on a Filing;" or

(3) You may file your comments via mail to the Commission by sending an original and two copies of your letter to:

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First St., NE, Room 1A
Washington, D.C. 20426;

Label one copy of the comments for the attention of Gas Branch 2, PJ11.2.

Comments will be considered by the Commission but will not serve to make the commentor a party to the proceeding. Any person seeking to become a party to the proceeding must file a motion to intervene pursuant to Rule 214 of the Commission's Rules of Practice and Procedures (18 CFR 385.214).[3] Only intervenors have the right to seek rehearing of the Commission's decision.

Affected landowners and parties with environmental concerns may be granted intervenor status upon showing good cause by stating that they have a clear and direct interest in this proceeding which would not be adequately represented by any other parties. **You do not need intervenor status to have your comments considered.**

Additional information about the project is available from the Commission's Office of External Affairs, at **1-866-208-FERC** or on the FERC Internet website (www.ferc.gov) using the eLibrary link. Click on the eLibrary link, click on "General Search" and enter the docket number excluding the last three digits in the Docket Number field. Be sure you have selected an appropriate date range. For assistance, please contact FERC Online Support at FercOnlineSupport@ferc.gov or toll free at 1-866-208-3676, or for TTY, contact (202)502-8659. The eLibrary link also provides access to the texts of formal documents issued by the Commission, such as orders, notices, and rulemakings.

In addition, the Commission now offers a free service called eSubscription which allows you to keep track of all formal issuances and submittals in specific dockets. This can reduce the amount of time you spend researching proceedings by automatically providing you with notification of these filings, document summaries and direct links to the documents. Go to www.ferc.gov/esubscribenow.htm.

Kimberly D. Bose,
Secretary

3 Interventions may also be filed electronically via the Internet in lieu of paper. See the previous discussion on filing comments electronically.

ENVIRONMENTAL ASSESSMENT
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EXPORT PROJECT and BOG/TRUCK PROJECT

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ACRONYMS AND ABBREVIATIONS

Bcf	billion cubic feet
BMP	Best Management Practices
BOG	boil-off gas
BWE	ballast water exchange
CAA	Clean Air Act
CEII	critical energy infrastructure information
CFR	Code of Federal Regulations
CH_4	methane
CO	carbon monoxide
COE	U.S. Army Corps of Engineers
Commission	Federal Energy Regulatory Commission
CO_2	carbon dioxide
dBA	decibels on the A-weighted scale
DOE	Department of Energy
EA	Environmental Assessment
EFH	Essential Fish Habitat
EPA	U.S. Environmental Protection Agency
°F	degrees Fahrenheit
FEED	front end engineering design
FERC	Federal Energy Regulatory Commission
FM	Farm to Market
Freeport LNG	Freeport LNG Development, L.P.
FWS	U.S. Fish and Wildlife Service
GHG	greenhouse gas
gph	gallons per hour
GWP	global warming potential
HAPs	Hazardous Air Pollutants
HAZOP	Hazard and Operability
hp	horsepower
ICW	Intracoastal Waterway
IPCC	Intergovernmental Panel on climate Change
L_{dn}	day-night sound level
L_{eq}	equivalent sound level
LNG	liquefied natural gas
LOI	Letter of Intent
m^3	cubic meters
MMscf	million standard cubic feet
NAAQS	National Ambient Air Quality Standards
NAISA	National Aquatic Invasive Species Act of 2003
NANPCA	Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990
NEMW	Northeast Midwest Institute
NEPA	National Environmental Policy Act of 1969
NESHAPs	National Emission Standards for Hazardous Air Pollutants
NGA	Natural Gas Act of 1938, as amended
NISA	National Invasive Species Act of 1996

NM	nautical miles
NMFS	National Marine Fisheries Service
NNSR	Non-attainment New Source Review
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent to Prepare an Environmental Assessment for the Proposed Freeport LNG Export and BOG Liquefaction and Truck Delivery Facilities Projects and Request for Comments on Environmental Issues
N_2O	nitrous oxide
NO_2	nitrogen dioxide
NO_x	nitrogen oxides
NSA	noise sensitive area
NSPS	New Source Performance Standards
O_3	ozone
OEP	Office of Energy Projects
Pb	lead
Plan	Upland Erosion Control, Revegetation, and Maintenance Plan
PM	particulate matter
$PM_{2.5}$	particulate matter less than 2.5 microns in diameter
PM_{10}	particulate matter less than 10 microns in diameter
ppt	parts per thousand
PSD	Prevention of Significant Deterioration
psig	pounds per square inch gauge
RPT	rapid phase transition
Sandia Report	*Guidance on Risk Analysis and Safety Implications of a Large Liquefied Natural Gas (LNG) Spill Over Water*
Secretary	Secretary of the Commission
SHPO	State Historic Preservation Officer
SIP	state implementation plan
SO_2	sulfur dioxide
SPCC Plan	Spill Prevention, Containment and Countermeasure Plan
SWPPP	Stormwater Pollution Prevention Plan
TAC	Texas Administrative Code
TCEQ	Texas Commission on Environmental Quality
Title V	Title V Operating Permits
tpy	tons per year
TNT	trinitrotoluene
U.S.	United States
USCG	U.S. Coast Guard
VOC	volatile organic compounds

1.0 PROPOSED ACTION

1.1 INTRODUCTION

On November 19, 2008, Freeport LNG Development, L.P. (Freeport LNG) filed in Docket Nos. CP03-75-003 and CP05-361-001 its application to the Federal Energy Regulatory Commission (Commission or FERC) pursuant to Section 3(a) of the Natural Gas Act (NGA) and Part 157 of the Commission's regulations to export liquefied natural gas (LNG) from the company's existing import terminal near Freeport, Texas. This portion of the project is referred to as the Export Project. Exporting LNG would involve offloading LNG from incoming ships, storing the LNG in the terminal's on-shore storage tanks, and returning the LNG to other ships for international delivery when market conditions are favorable.

On December 9, 2008, Freeport LNG also filed in Docket Nos. CP03-75-004 and CP05-361-002 its application to the FERC pursuant to Section 3(a) of the NGA and Part 157 of the Commission's regulations to construct and operate a boil-off gas (BOG) liquefaction system and a LNG truck delivery system at the company's existing import terminal.[4] These two principal project elements are hereinafter collectively referred to as the BOG/Truck Project. These facilities would allow Freeport LNG to 1) liquefy about 5 million cubic feet per day of BOG and return it to the LNG storage tanks and 2) receive the delivery of LNG by truck in order to keep the tanks in the necessary cryogenic state.

Freeport LNG's existing terminal facilities are those identified as Phase I facilities. FERC gave its initial authorization on June 18, 2004 in Docket No. CP03-75-000. On August 17, 2005, in Docket No. CP03-75-002, FERC approved a Phase I facility modification consisting of an increase in the diameter of the terminal's send-out pipeline. On May 26, 2005, Freeport LNG submitted an application to FERC to expand the terminal's send-out capacity from 1.5 to 4.0 billion cubic feet per day (Bcf/d) (Phase II). FERC approval was granted on September 26, 2006 in Docket No. CP05-361-000. Pending more favorable market conditions, construction of the Phase II facilities has not been initiated although all necessary authorizations have been secured.

Freeport LNG applied to the Department of Energy, Office of Fossil Energy (DOE) on August 1, 2008 in Docket No. FE-08-70-LNG to export on a short-term or spot market basis up to 24 Bcf of previously imported LNG cumulatively over a two-year period from the United States (U.S.) to the United Kingdom, Belgium, Spain, France, Italy, Japan, South Korea, India, China, and/or Taiwan.

[4] During routine terminal operations, ambient heat in the LNG storage tanks and piping causes small amount of LNG to evaporate. The vaporizing LNG is referred to as BOG or boil-off gas. The BOG increases the storage tank pressure until a point where it must be transferred, flared, or re-liquefied.

The FERC's National Environmental Policy Act (NEPA) analysis and impact determination for the Phase I facilities is contained in the *Final Environmental Impact Statement (FEIS) - Freeport LNG Project*, issued on May 28, 2004 (FERC, 2004). Additionally, in conjunction with the previously-referenced increase in the diameter of Freeport LNG's sendout pipeline, FERC prepared *Environmental Assessment (EA) - Modification of Authorized Send-out Pipeline Diameter – Freeport LNG Project* in April 2005 (FERC, 2005). The FERC's NEPA analysis and impact determination for the Phase II facilities is contained in *Environmental Assessment – Freeport LNG Phase II Project* issued on June 21, 2006 (FERC, 2006a). The Phase I FEIS and Phase II EA provide much of the environmental baseline information for this EA. However, updated information, including that derived from recent agency consultations, is discussed where applicable.

The baseline environmental conditions described in this EA are those existing solely with respect to the current Phase I facilities. However, where Phase II environmental analyses and agency consultation provide pertinent and contemporary information that applies to the terminal area as a whole, these sources are duly noted and utilized. This EA will address the environmental impacts of the construction and operation of the Freeport LNG Export Project and BOG/Truck Project collective called the Freeport Projects proposed by Freeport LNG in Brazoria County, Texas. The Commission will use this EA in its decision-making process to determine whether to authorize the Freeport Projects. DOE, as a cooperating agency, will use this EA to meet its NEPA obligations for its responsibilities under Section 3 of the NGA.

1.2 PROPOSED FACILITIES

Since the Freeport LNG Terminal already includes all required plant components to facilitate the Export Project other than the valve modifications, no land disturbance would be required. The land that would be disturbed for the BOG/Truck Project would be within the footprint of the existing LNG facility, as discussed below. Table 1.2-1 provides the total acreage that would be disturbed by construction for the Freeport Projects, including acreage for each facility component, and an indication of any overlapping footprint for facility components.

1.2.1 Export Project

For the Export Project, Freeport LNG proposes equipment modification at the Phase I unloading dock to allow shore to ship LNG transfer. This would include

converting one[5] of the four existing unloading arms on the Phase I unloading dock to a loading line to transfer export-bound LNG from the terminal's storage tanks to awaiting ships. The conversion would involve minor changes involving a check valve and a control valve. The check valve would be replaced with a short spool. This conversion would be completed in a matter of weeks. The 114-foot-long by 92-foot-wide (0.24 acre) concrete platform of the Phase I unloading dock would serve as the staging and construction workspace for the equipment replacement. Construction access would be provided by the permanent on-site access road that runs along the terminal's southeastern perimeter and currently serves the dock area. Figure 1.2-1 shows the location of the proposed modification at the Phase I unloading dock.

TABLE 1.2-1
Land Acreage Requirements for Proposed Freeport Projects Facilities

Facility Component	Temporary Workspace[1,2] (acres)	Permanent Facility Footprint [2] (acres)
Export Project		
Check Valve Replacement on Unloading Arm LA-1A	0.24[3]	<0.01[4]
BOG Liquefaction		
Expander- Compressor (x1) & Associated Equipment	0.06[5]	0.06[5]
Lube-oil Filters (x2) & Heat Exchanger (x1)	0.02[6]	0.02[6]
Refrigeration Compressor Units (x3)	0.13[7]	0.13[7]
Aboveground piping (4-inch, 6- inch, 8-inch, and 12-inch natural gas; 4-inch LNG)	0.06[8]	0.06[8]
LNG Truck Delivery System		
Unloading Station (includes Trailer Containment Area)	0.04[9]	0.04[9]
TOTAL	**0.55**	**0.32**

[1] Includes construction lay-down areas and permanent facility footprints
[2] All temporary workspace and permanent facility footprints are within the previously authorized permanent footprint of the existing Phase I LNG terminal
[3] Based on 114-foot-long x 92-foot-wide concrete platform of existing Phase I unloading dock – equipment lay-down and valve replacement would take place on a small portion of this platform in the vicinity of Unloading Arm LA-1A
[4] Based on "footprint" equivalent of spool piece on Unloading Arm LA-1A
[5] Based on 90-foot-long x 31-foot-wide workspace and footprint area
[6] Based on 35-foot-long x 30-foot-wide workspace and footprint area
[7] Based on 106-foot-long x 54-foot-wide workspace and footprint area in which the three units would be positioned in parallel on concrete skids
[8] Based on 210-foot-long x 12-foot-wide existing pipe rack in which new aboveground lines would be located
[9] Based on 80-foot-long x 24-foot-wide workspace and footprint area

[5] Freeport LNG's LNG Transfer System Startup/Operation Procedure (Document No. FLNG-REC-101XXX [Revision 1 – 09-04-08]) identifies the arm as LA-1A.

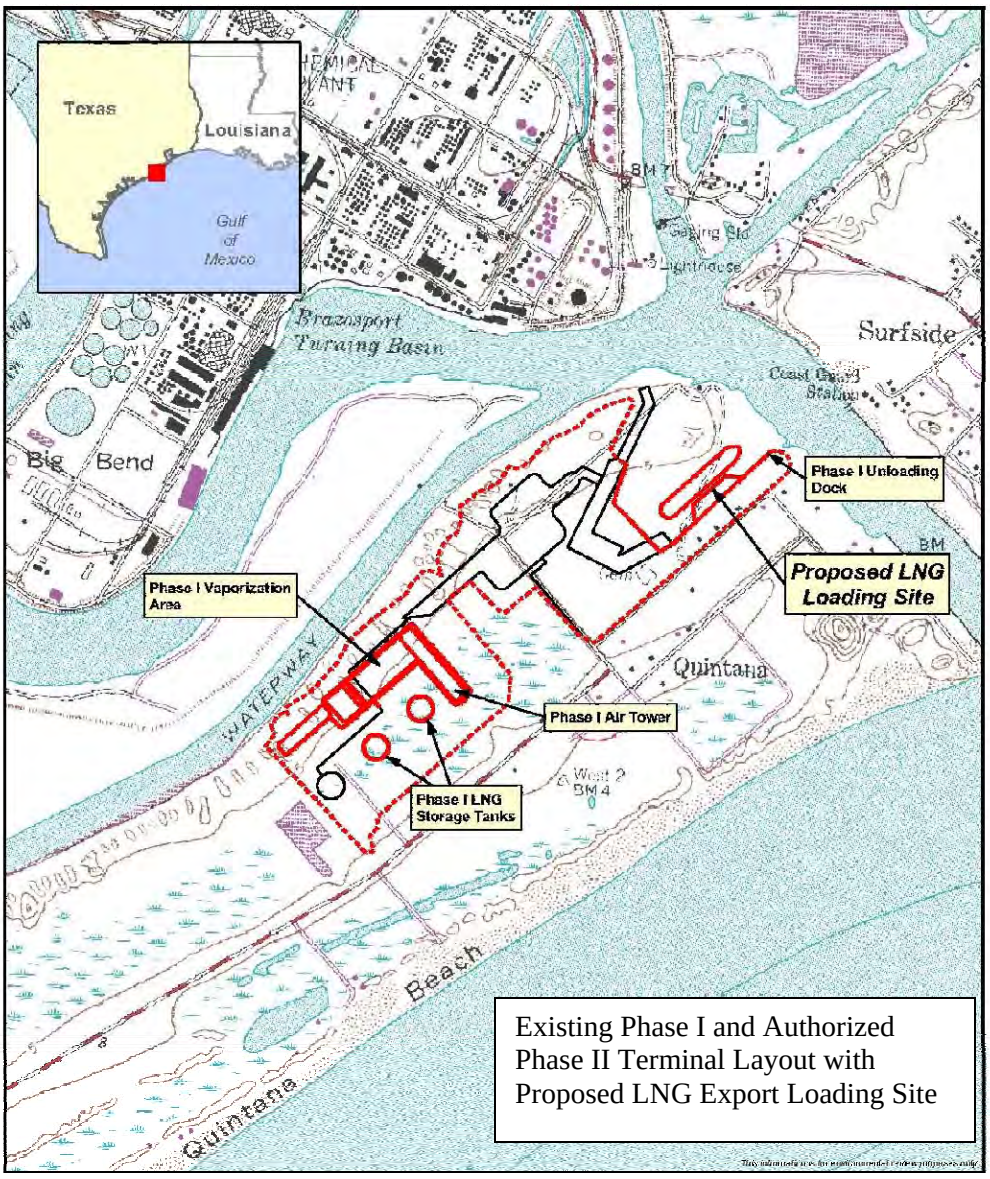

Figure 1.2-1 General Location Map of the Authorized Freeport LNG Terminal and Proposed LNG Export Loading Site

At any given time, the terminal would operate either in the export mode or the currently authorized import mode, but not in both modes simultaneously, such that ships visiting the terminal to load LNG for export would operate instead of, not in addition to, ships delivering LNG for domestic use only. Therefore, any environmental impacts associated with the export operation would not represent a cumulative addition to the overall environmental impacts associated with the current Phase I facility import operation.

Freeport LNG could see a total of 16 annual ship visits to meet the purpose of the Export Project. Eight of the annual ship visits under the export mode would involve carriers delivering LNG cargoes to the terminal for temporary storage of LNG (rather than delivery for domestic use) prior to exporting, while the other eight visits would involve carriers arriving to export the LNG away from the terminal for international delivery. These visits would be covered by existing U.S. Coast Guard authorization for ship operations at the terminal (USCG, 2008a). A standard-sized LNG vessel carries about 3.0 Bcf of LNG, so eight full cargoes account for the 24 Bcf of LNG stated in Freeport LNG's application for DOE export authorization.

It is anticipated that each visiting ship would spend more time at dock during on-loading of LNG for export than during off-loading of LNG for on-shore storage or consumptive use. Ships bringing LNG for offloading typically remain at the dock for 24 hours, while ships receiving LNG from the terminal would likely remain at the dock for 48 hours. The environmental impacts associated with the changes in shipping patterns are discussed in section 2 of this EA.

1.2.2 BOG Liquefaction

Under the existing Phase I facility design, BOG is compressed and combined with the main volume of re-gasified LNG that enters the terminal's send-out transmission pipeline for domestic delivery. The proposed BOG Liquefaction Project would enable BOG to be converted back into liquid form and retained within the terminal's LNG processing and storage system to maintain cryogenic conditions. The BOG liquefaction plant would also act as a back-up to the existing BOG takeaway pipeline compression. The location of BOG liquefaction facilities are presented in Figure 1.2-2 and would consist of:

- One BOG liquefaction heat exchanger;
- One BOG liquefaction expander-compressor;
- Two BOG liquefaction compression lube oil filters;
- Three BOG refrigeration compressor units (approximately 1,380 horsepower (hp) each);
- Natural gas piping, 4, 6, 8, and 12-inch-diameter aboveground piping; and
- LNG piping, 4-inch-diameter aboveground piping.

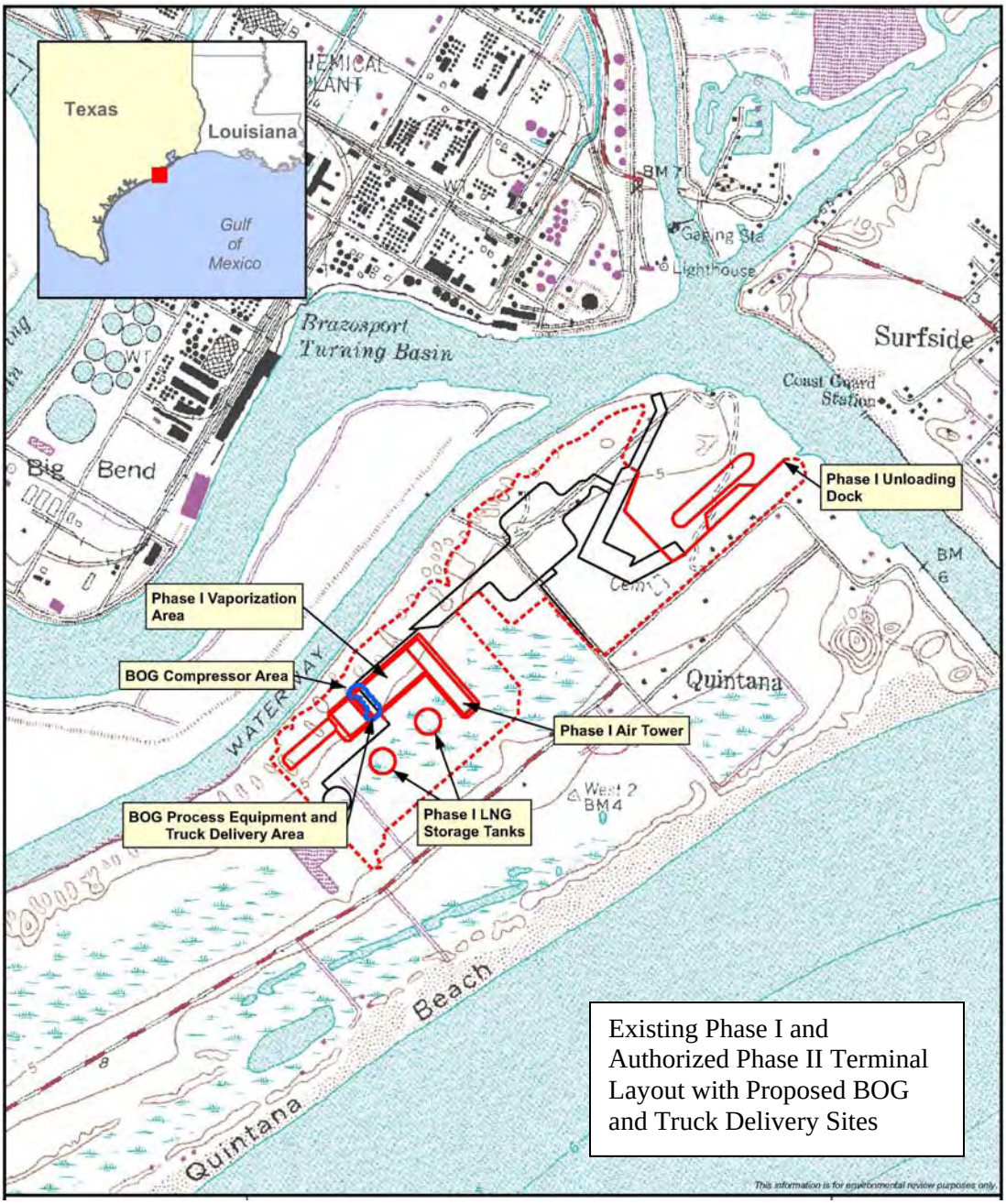

Figure 1.2-2 General Location Map of the Authorized Freeport LNG Terminal and Proposed BOG and Truck Delivery Sites

These facilities would allow Freeport LNG to liquefy about 5 million cubic feet per day of BOG and return it to the LNG storage tanks in order to keep the tanks in the necessary cryogenic state.

The refrigeration to liquefy the BOG is provided by the expander refrigeration loop, using BOG as the refrigerant gas. The refrigerant BOG is compressed to a high pressure (up to 1,150 pounds per square inch gauge [psig]), then expanded through an expander–compressor producing the required refrigeration. The BOG for processing is re-liquefied in the liquefaction heat exchanger by heat exchange with the refrigerant BOG. The liquefied BOG is then routed back to the storage tanks at approximately 2 psig and -265 degrees Fahrenheit (°F).

The BOG liquefaction system has two major process controls: a pressure controller and a temperature controller. The pressure controller controls the BOG liquefaction compression suction pressure by controlling the flow into the system through opening and closing of the expander vanes. The temperature controller controls the flow of BOG gas to be liquefied based upon the expander inlet temperature.

The BOG liquefaction plant would require the installation of associated electrical, control, lighting instrumentation, and communication systems. These would be integrated into the corresponding Phase I systems. In addition, 11 combustible gas detectors, 8 flame detectors, and 3 low temperature detectors would be added to the Phase I hazard detection system.

1.2.3 Truck Facility

In addition, Freeport LNG is proposing certain facility modifications to enable it to undertake LNG truck unloading activities in the event that the BOG liquefaction facilities are not available. The minor facility modifications needed to accept LNG truck deliveries would involve construction of an unloading station in the vicinity of the proposed heat exchanger and expander/compressor for the BOG liquefaction system (see Figure 1.2-2). LNG would be trucked in from an existing commercial LNG supplier (Clean Energy Fuels Corporation) located 40 miles north of Houston and the unloading station would be accessed off an existing site road.

The truck unloading facilities would require the installation of a single 4-inch-diameter inlet connection and valves on one of the existing LNG transfer lines and a 25 hp portable electric pump, if needed. The LNG truck would be connected to the valve via a 3-inch-diameter hose during unloading of the LNG. Freeport LNG would use these facilities to transfer the LNG from the trucks to the existing tanks. Any inadvertent releases during transfer would be channeled through the trough to the existing sump. Each delivery truck can carry up to 11,000 gallons of LNG. Freeport LNG anticipates

that it would receive 5 to 6 truck deliveries per day, totaling 66,000 gallons or 4.96 million standard cubic feet (MMscf) of LNG during the periods when delivery by truck would be required. The LNG transfer would take 45 minutes at a rate of 245 gallons per minute for each truck. The proposed LNG truck delivery system is expected to operate for about 60-90 days, generating traffic of about 540 trucks annually.

If approved, Freeport LNG proposes to commence construction of the proposed facilities in spring of 2009.

1.3 PROJECT PURPOSE AND NEED

Freeport LNG is seeking to diversify its LNG supply base to maintain plant operation and export stock. Freeport LNG indicated that the purpose of the Export Project is to provide greater latitude to acquire LNG for maintenance and operation of the existing Phase I facilities during periods when LNG deliveries may not otherwise be available. Freeport LNG indicated that the Export Project would benefit U.S. gas consumers by helping to ensure continued operation and availability of U.S. energy infrastructure at times when global market forces may not support LNG deliveries to the U.S. Additionally, granting of the authorization would increase the likelihood that imported LNG supplies are available for delivery to U.S. markets when demand rematerializes.

Freeport LNG states that the BOG/Truck Project would provide Freeport LNG's customers with an additional service option and further would enable Freeport LNG to acquire LNG for facility maintenance and operation during those periods when deliveries may otherwise be inadequate to maintain the terminal in a state of readiness. If the terminal is allowed to lose its current cryogenic state, subsequent start-up and re-cooling would take at least several weeks and import opportunities may be lost.

DOE, through the Office of Fossil Energy, must meet its obligation under Section 3 of the NGA, to authorize the import and export of natural gas, including LNG. The purpose and need for DOE action is to respond to the August 1, 2008, application filed with DOE's Office of Fossil Energy (Docket Number FE-08-70-LNG) by Freeport LNG. For this reason, DOE is a cooperating agency in the preparation of this EA.

DOE proposes to grant, subject to review under Section 3 of the NGA, blanket authorization to Freeport LNG, to export LNG that previously had been imported from foreign sources on their own behalf or as agent for others on a short-term or spot market basis from existing facilities on Quintana Island, Texas in an amount up to the equivalent of 24 Bcf of natural gas to the United Kingdom, Belgium, Spain, France, Italy, Japan, South Korea, India, China, and/or Taiwan over a two-year period commencing on the date of the authorization.

1.4 CONSTRUCTION, OPERATION, AND MAINTENANCE PROCEDURES

The equipment installation as described below would not require any construction workspace beyond the operational footprint of the Phase I terminal. Freeport LNG would use open space adjacent to the proposed facility pads for equipment and material lay down. The acreage and configuration of the terminal's operational footprint would remain unchanged after the new facilities have been installed. Construction and operational access would be provided by the on-site road system that serves the existing Phase I facilities.

1.4.1 Export Facilities

The equipment modification to allow LNG loading onto ships involves the replacement of a check valve with a spool. The spool would be located in lieu of the current check valve on the fabricated concrete platform of the Phase I unloading dock, with no consequential loss of open space. This equipment replacement is similar in scope and magnitude to many other activities that would take place during routine operational maintenance of the terminal.

The 114-foot-long by 92-foot-wide (0.24 acre) concrete platform of the Phase I unloading dock would serve as the staging and construction workspace for the equipment replacement. The spool would be delivered to the terminal by truck, either as a prefabricated unit or in individual component form for on-site prefabrication, while the replaced valve may be stored on site for possible future use. Removal of the existing valve and installation of the spool would involve vertical positioning with a small crane or hoist. Once positioned, the spool would be bolted in place.

During operation of the Export facilities, the LNG vessel calling on the existing terminal would discharge ballast water during LNG loading operations. All ballast water operations would be conducted in compliance with guidance provided under 33 Code of Federal Regulations (CFR), Part 151, Vessels Carrying Oil, Noxious Liquid Substances, Garbage, Municipal or Commercial Waste, and Ballast Water, as well as the U.S. Coast Guard's Navigation and Vessel Inspection Circular 07-04, Change 1, dated October 29, 2004 (see section 2.2 of this EA).

1.4.2 BOG Liquefaction and Truck Facilities

The BOG liquefaction system would be wholly located within the existing operational footprint of the Phase I vaporization area. This area is located in the northwest sector of the terminal site and is fringed by an electrical substation to the west, two LNG storage tanks to the south, and unloading lines and other equipment to the east.

The Intra-Coastal Waterway is located about 280 feet to the north. The BOG liquefaction system would be located at the west end of the Phase I vaporization area, with the compressor units near the northern perimeter and the heat exchanger near the southern perimeter (see Figure 1.2-2). The whole system would lie within the vaporization area's secondary containment berm.

The LNG truck unloading station would be wholly located within the existing operational footprint of the Phase I terminal, in the proposed BOG heat exchanger and expander/compressor area. The facility itself would consist of a short road spur to the valve connection.

The compressor unit pad is about 106-foot-long x 54-foot-wide (0.13 acre) and would be located in an open, unpaved area between existing process equipment. This area would be paved and curbed as part of the BOG Liquefaction Project. In addition to the three compressor units, the BOG liquefaction compression lube oil filters, lube oil day tanks, and glycol water make-up tanks would be located here. The proposed BOG heat exchanger and expander/compressor area would be located in an open paved area between existing process equipment. The linear distance between the compressor unit area to the north and the heat exchanger area to the south is approximately 270 feet. Aboveground non-cryogenic and cryogenic piping to link the compressor units, heat exchanger, and expander/compressor would be installed and tied into the Phase I system within this intervening space.

The BOG liquefaction heat exchanger, BOG liquefaction expander-compressor; BOG liquefaction compression units, and BOG liquefaction compression lube oil filter would be skid mounted. The majority of interconnecting pipe would be pre-fabricated off-site and brought to the terminal site by truck. The concrete pads for the skid-mounted equipment would be laid in existing graveled, paved, or otherwise maintained open areas. Freeport LNG anticipates no or only minimal ground disturbance, with any excavation being restricted to the removal of loose surface material to provide a stable base for the concrete.

If ground disturbance is required for construction of the proposed BOG liquefaction and truck unloading systems, Freeport LNG would comply with applicable sections of the FERC's Upland Erosion Control, Revegetation, and Maintenance Plan (Plan) and Freeport LNG's established Best Management Practices (BMPs). Irrespective of ground disturbance, some potential exists for spills of hazardous materials, such as fuel for equipment and vehicles, during construction; also, storm water runoff from the construction workspace could carry any unconfined debris or materials. To address these concerns, Freeport LNG would perform all work in accordance with the facility's existing Spill Prevention, Containment and Countermeasure Plan (SPCC Plan) and Stormwater Pollution Prevention Plan (SWPPP).

1.5 FUTURE PLANS AND ABANDONMENT

Currently, there are no future plans for additional development or abandonment of facilities located within the Freeport LNG facility. If market conditions change and result in increased availability of imported LNG for cryogenic maintenance of the terminal facilities, use of the BOG liquefaction and LNG truck delivery systems may become discontinued.

1.6 STATUS OF OTHER PERMITS AND AUTHORIZATIONS

As the lead federal agency for the Freeport Projects, the FERC is required to comply with Section 7 of the Endangered Species Act, the Magnuson-Stevens Fishery Conservation and Management Act, Section 106 of the National Historic Preservation Act, and Section 307 of the Coastal Zone Management Act. At the federal level, required permits and approval authority outside of the FERC's jurisdiction include compliance with the Clean Water Act, the Rivers and Harbors Act, the Clean Air Act, and U.S. Coast Guard regulations relating to LNG waterfront facilities. DOE is a cooperating agency for this Project and would use this EA to meet its NEPA obligations under Section 3 of the NGA. The current status of these reviews and approvals is summarized in Table 1.6-1.

TABLE 1.6-1
Permits, Approvals, and Consultations

Agency	Permit/Consultation	Status
Federal		
Federal Energy Regulatory Commission	Section 3 Application – Natural Gas Act	Pending
U.S. Department of Energy	Authorization to Export LNG	Pending
U.S. Army Corps of Engineers (COE)	Section 404 – Clean Water Act	No permit required
	Section 10 – Rivers and Harbors Act	
U.S. Fish and Wildlife Service (FWS)	Section 7 Consultation – Endangered Species Act	No additional consultation required [a/]
		Clearance received October 27, 2008 [b/]
National Marine Fisheries Service (NMFS)	Section 7 Consultation – Endangered Species Act	No additional consultation required [a/]
	Marine Mammal Protection Act	Clearance received November 12, 2008 [b/]
	Magnuson – Stevens Fishery Conservation and Management Act	
U.S. Coast Guard	Waterways Suitability Assessment	No new WSA required
Texas		
Texas Rail Road Commission	Coastal Management Plan Consistency Determination	Not applicable
	Section 401 Water Quality Certificate	Not applicable
Texas Commission on Environmental Quality (TCEQ) Air Permits Division	30 TAC [c/] Chapter 116 and 122 – permits to construct and operate	Anticipated February, 2009
	General Conformity Determination	November 2008 [b]
Texas Parks and Wildlife	Sensitive Species/Habitats Consultation	Clearance received December 3, 2008 [a/]
		Verbal clearance October 24, 2008 [b/]
Texas State Historic Preservation Office	Section 106- National Historic Preservation Act	No additional consultation required

a/ applies to BOG/Truck Project
b/ applies to Export Project
c/ Texas Administrative Code

NON-JURISDICTIONAL FACILITIES

There are no non-jurisdictional facilities associated with the Freeport Projects.

1.7 PUBLIC REVIEW AND COMMENTS

On January 12, 2009 the FERC issued a Notice of Intent to Prepare an Environmental Assessment for the Proposed Freeport LNG Export and BOG Liquefaction and Truck Delivery Facilities Projects and Request for Comments on Environmental Issues (NOI). This NOI was sent to interested parties including federal, state, and local officials; agency representatives; conservation organizations; local libraries and newspapers; and property owners in the Project area. Issuance of the NOI established a closing date of February 11, 2009 for receiving comments. By letter dated January 29, 2009 DOE informed FERC that it would participate as a cooperating agency in the production of the EA for the Freeport Projects.

We received one letter from the Alabama-Coushatta Tribe of Texas expressing no concerns with regard to impact to religious, cultural, or historical assets of the Tribe in conjunction with the project. We also received five comment letters from individuals on the NOI raising issues including improper notification to the residents and City of Quintana; hazards to wetlands, vegetation and wildlife, and threatened and endangered species; air quality and noise issues caused by the proposed trucking of LNG to the site through the city streets; damage to city roads from previous and continued construction and truck traffic; impacts on tourism traffic; and public safety from the transportation of LNG, especially during inclement weather or fog. These issues are addressed in the appropriate sections of the EA (see section 2). The NOI also outlined how to become an intervenor in the proceeding.[6] We[7] received four requests for intervenor status.

Commentors expressed concern that Freeport LNG did not give proper notice of the proposed projects to residents, property owners, and the City of Quintana. However, Freeport LNG has indicated that it sent notification letters to Quintana City Hall as well as to all residents within a half-mile of the project facilities, per the Commission's regulations. Freeport LNG also indicated that it published a notice of the projects in The Facts newspaper, which services Quintana residents. In addition, the NOI issued by the Commission was sent to interested parties, as indicated above. Therefore, we believe that proper project notification was supplied to interested stakeholders.

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6 An intervenor has the right to receive copies of case-related FERC documents and filings by other intervenors and must also provide copies of its filings to all the other intervenors. Further an intervenor has certain legal standing with respect to any hearing held by the Commission and with respect to any court reviews of Commission decisions.

7 'We,' 'us,' and 'our' refer to the environmental staff of the FERC's Office of Energy Projects (OEP).

2.0 ENVIRONMENTAL ANALYSIS

The environmental analysis in this document incorporates by reference the environmental analyses conducted for the Phase I (Docket Nos. CP03-75-000 and CP03-75-001) and Phase II (Docket No. CP05-396-000) facilities for the Freeport LNG terminal. Therefore, discussion in this EA only focuses on changes in environmental impact that would be associated with the Export Project and the BOG/Truck Project facilities.

2.1 GEOLOGY AND SOILS

Construction and operation of the Freeport Projects would occur within the footprint of the authorized facility and would not alter geological impacts or result in increased susceptibility to geological hazards. Construction of the Export Project would not disturb ground surfaces and so would not affect soils. Construction of the BOG/Truck Project would involve, at the most, superficial excavation and grading of previously disturbed open ground within the operational footprint of the Phase I terminal. This would not result in any changes to existing soil type. As discussed in section 1.4.2, if ground disturbances are required, Freeport LNG would comply with the FERC Plan and Freeport LNG's BMPs. Because of this, we believe the proposed Freeport Projects would not affect geology or soils.

2.2 WATER RESOURCES

The proposed BOG/Truck Project does not involve any construction or operational activities that would impact groundwater, either incidentally through subsurface disturbance or directly through well water withdrawal. Implementation of Freeport LNG's established BMPs and SPCC Plan is designed to reduce or eliminate potential adverse impacts to groundwater resources arising from spills or leaks of hazardous materials, including fuel for construction vehicles and equipment. In addition, the BOG/Truck Project facilities are located in a wider area that is surrounded by a secondary containment berm, which is designed to confine any major product spills or releases and prevent migration into local waterbodies. Therefore, we believe that no new waterbodies, protected watersheds, groundwater resources, or public or private wells would be affected by the BOG/Truck Project.

The location of the Export Project (replacement of a check valve with a spool on transfer arm LA-1A) is on the 114-foot-long by 92-foot-wide concrete platform of the Phase I unloading dock. The platform is located on the south side of the terminal's berthing area, which has been dredged to a depth of minus 45 feet Mean Sea Level to accommodate visiting LNG ships. Although the concrete platform is located over water

adjacent to the berthing area's south bank, no construction activities would take place in the water itself or would involve shoreline disturbance that could impact surface water through erosion or sediment deposition. As mentioned above, implementation of Freeport LNG's established BMPs and SPCC Plan would reduce or eliminate potential adverse impacts to groundwater resources arising from spills or leaks of hazardous materials, including fuel for construction vehicles and equipment. Therefore we believe that no new waterbodies, protected watersheds, groundwater resources, or public or private wells would be affected by the Export Project.

Construction and operation of the Freeport Projects would result in no new environmental impacts on water resources with the exception of the discharge of ballast water at the terminal during loading of the LNG carriers, as discussed below.

2.2.1 Ballast and Cooling Water Withdrawals

The Freeport LNG terminal is designed to accommodate up to 200 LNG vessels in a single year, ranging in size from 88,000 to 217,000 cubic meters (m^3). These sized vessels would have the capacity to discharge about 12 to 15 million gallons of ballast water at an average rate of 720,000 gallons per hour (gph) and a maximum rate of 1,400,000 gph over 10 to 16 hours. Ballast water for LNG carriers would be withdrawn and discharged at a screened "sea-chest" located about 7 to 10 feet from the bottom of the ship keel. A typical screen might consist of a strainer plat or grate with 1-inch-wide by 10- to 12-inch-long slots. The mesh screen prevents large fish from entering the tanks, but small fish, larvae, and eggs could be impinged or entrained during ballast water intake.

In addition, engine cooling water is expected to be withdrawn while at dock to cool the ship's boilers. Cooling water would be withdrawn from surrounding seawater at the berthing dock, through the same sea-chest system as ballast water. Cooling water would be used on a "flow-through" basis and discharged back to the surrounding seawater at the dock. Freeport LNG estimates that between 20 and 57 million gallons of cooling water would be required for each ship, withdrawn at rates of between 1,100,000 and 2,600,000 gph over 18 to 22 hours.

The ballast and cooling water uptakes for individual ships delivering LNG for future export would be no different in volume, rate, or duration to the currently authorized uptakes associated with Phase I and Phase II import operations. However, given that the anticipated number of ships offloading LNG at the terminal would be significantly less under the export operation mode than the import operation mode (8 as opposed to 185), the collective volume of water uptake would be significantly reduced under the export operation mode. As such, the impingement and entrainment of fish and other aquatic biota is likely to show a resultant reduction. Moreover, ship visits to

Freeport LNG's terminal comprise only a small percentage of the approximately 3,000 annual ship visits to the Port of Freeport (Port Freeport, 2008), many of which involve utilization of the same ballast water uptake and cooling water flow-through procedures described above. In fact, these same procedures are commonly utilized at all U.S. ports, under the jurisdiction and scrutiny of the U.S. Coast Guard.

2.2.2 Ballast Water Requirements

Ballast water is collected and carried by LNG carrier ships to provide balance, stability, and trim during transport. Ballast water is typically pumped into ballast tanks when LNG cargo has been delivered to a port and the ship is departing with less cargo weight. Ballast water can be collected when a ship is already carrying cargo and needs additional weight, or when a ship has no cargo. Ballast water can be exchanged at any time, but is typically discharged at port upon loading and then purged or exchanged once the vessel is underway. Ballast water from the export operations would be exchanged at mid-ocean locations in accordance with applicable regulations. These U.S. laws, regulations, and policy documents include:

- *Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990* (NANPCA) that established a broad federal program "to prevent introduction of and to control the spread of introduced aquatic nuisance species…" The FWS, U.S. Coast Guard., U.S. Environmental Protection Agency (EPA), COE, and National Oceanic and Atmospheric Administration (NOAA) all were assigned responsibilities.
- *National Invasive Species Act of 1996* (NISA) that reauthorized and amended the NANPCA 1990 because "Nonindigenous invasive species have become established throughout the waters of the U.S. and are causing economic and ecological degradation to the affected near shore regions." The Secretary of Transportation was charged with developing national guidelines to prevent import of invasive species from ballast water of commercial vessels, primarily through mid-ocean ballast water exchange (BWE), unless the exchange threatens the safety or stability of the vessel, its crew, or its passengers (Northeast Midwest Institute [NEMW], 2007).
- *National Aquatic Invasive Species Act of 2003* (NAISA), amended in 2005 and again in 2007, established a mandatory National Ballast Water Management Program. The primary requirements established under NAISA are: 1) all ships operating in U.S. waters are required to have on board an Aquatic Invasive Species Management Plan, 2) the U.S. Coast Guard was made responsible for the development of standards for mid-ocean BWE and ballast water treatment for vessels operating outside of the exclusive economic zone, and 3)

implementing the best management practices and available technology related to ballast water treatment (NEMW, 2007).

- *National Ballast Water Management Program*, originally established by NANPCA 1990 and further amended by NISA 1996 and NAISA 2003, that made the ballast water management program mandatory, including BWE with reporting to the U.S. Coast Guard.
- *Shipboard Technology Evaluation Program*, a program authorized under the U.S. Coast Guard Ballast Water Management Program and designed to facilitate the development of "effective ballast water treatment technologies, through experimental systems, thus creating more options for vessel owners seeking alternatives to ballast water exchange."
- *Navigation and Vessel Inspection Circular 07-04, Change 1, Ballast Water Management for the Control of Aquatic Nuisance Species in the Waters of the United States* a program developed by the U.S. Coast Guard for the management and enforcement of ballast water discharge into U.S. ports and harbors (33 CFR 151, 69 Federal Register 44952, July 28, 2004) (USCG, 2004).

Currently, the only approved ballast water treatment strategy is mandatory BWE for all vessels traveling beyond the U.S. exclusive economic zone. Correctly executed BWE can replace up to 99 percent of the volume of the initial coast water ballast water uptake with ocean water, thereby removing over 90 percent of coastal zooplankton within the ballast tanks (Minton et al., 2005; Ruiz and Smith, 2005).

Freeport LNG states that all ballast water would be discharged in accordance with federal oversight and regulations. Under these requirements, to the maximum extent practicable and as safety considerations allow, vessels must implement strategies to prevent the unintentional introduction and spread of exotic aquatic nuisance species in U.S. waters. These strategies include retaining ballast water on board, minimizing uptake or discharge at certain times or locations, and exchanging ballast water from coastal sources with mid-ocean seawater at least 200 nautical miles (NM) from any coast, prior to release at port.

2.2.3 Potential Impacts to Water Quality from Ballast Water

Impacts to water quality from ballast water could include those associated with the standard water quality parameters (e.g., temperature, salinity, pH and dissolved oxygen) or those introduced from anthropogenic contaminants. Ballast water discharged into the Freeport marine berth likely would be composed of open ocean water retrieved during BWE and may be similar or different from that which occurs within the berth. Because

ballast water is stored in the ship's hull below the water line, water temperatures are not expected to deviate much from ambient temperatures of the marine berth. The pH of the ballast water (reflective of open water conditions) may be slightly higher to that of freshwater estuaries, but this slight variation would not be expected to have any impact on marine organisms.

The most noticeable difference in the water quality from ballast water would likely be salinity and dissolved oxygen. Salinity in the Freeport LNG berth and the Freeport Harbor Channel is dynamic and exhibits a wide fluctuation dependent on numerous factors but predominantly tidal direction and amplitude, wind direction and speed, Brazos River discharge, rainfall, and currents within the Intracoastal Waterway (ICW). The salinity levels fluctuate from below 5 parts per thousand (ppt) to 35 ppt or more.

Since water becomes denser with increased salinity, it is common to observe lower salinities at the surface and higher salinities along the bottom of the water column. This stratification is often accentuated in estuaries with deep channels that extend into the open ocean. This phenomenon is commonly referred to as a saltwater wedge. A transient salt water wedge typically occurs up and down the Freeport Harbor Channel and into the ICW depending on tidal direction and amplitude, wind direction, discharge rate, currents, and other factors. Typically during summer, salinities in the Freeport LNG berth area will mimic seawater since denser saltwater from the Gulf of Mexico lies at the deeper berth area and channel and is generally overridden by less dense freshwater flows.

Mixing at the intersection of the Freeport Harbor Channel, the ICW, and the Freeport LNG berthing basin aids in ameliorating the effects of varying salinity on marine and coastal species. All the aquatic species that occur in the area near the Freeport LNG berthing basin are euryhaline and are accustomed to the ever fluctuating salinities referenced in the preceding paragraph. The aquatic species that occur in this area are capable of either adjusting osmotically or avoiding osmotic stress by swimming to areas with more suitable salinity, which in the case of the aforementioned intersection (Freeport Harbor Channel, ICW, and Freeport LNG Berth area) is generally not far away. Discharge of ballast water from vessels that take on or exchange ballast water offshore would not have an osmotic impact as the organisms that would encounter this marine water as they are accustomed to fluctuating salinity levels.

Dissolved oxygen is a critical component for the respiration of aquatic marine organisms and can be influenced by water temperature, water depth, phytoplankton, wind, and current. Typical water column profiles indicate a decrease in dissolved oxygen with an increase in depth. Some factors that influence this stratification include sunlight attenuation for photosynthetic organisms that can produce oxygen, and wind, wave, and current action that results in mixing. Water collected within the ballast tanks of a ship would lack these influences and could suppress dissolved oxygen, resulting in ballast

water discharges that would have lower levels of dissolved oxygen than would be found at the water surface. Since the ballast water would be discharged near the bottom of the marine berth where the dissolved oxygen levels are already suppressed, these impacts should not be significant. The maximum ballast water discharge from an individual ship would represent a minor influence on the system as a whole during a single ballast water discharge event.

In addition to their potential presence in ballast water, exotic species could arrive on the hulls and exterior equipment (e.g., anchors and anchor chains) of LNG ships. However, the Port of Freeport receives ships from various countries around the world, including Brazil, Columbia, Costa Rica, Guatemala, Honduras, India, and Mexico (Port Freeport, 2008). The Port of Freeport has been operating internationally for more than 80 years, indicating a high potential for the historical exposure of local waters to aquatic organisms with diverse global origins. Consequently, the local biotic community has likely adapted to a regular influx of exogenous organisms, the introduction of which, in many cases, would likely have predated existing regulations designed to prevent their spread.

As mentioned above, the U.S. Coast Guard has established mandatory requirements to rinse anchors and anchor chains during retrieval to remove organisms and sediments at their place of origin, to remove fouling organisms from the ship's hull, piping, and tanks on a regular basis, and to dispose of any resultant waste material in accordance with local, state, and federal regulations (see Title 33 CFR, Subpart D [*Ballast Water Management for Control of Non-Indigenous Species in Waters of the United States*], Part 151-2035 and USCG [2004]).

Based on the above-described combination of historic amelioration and contemporary regulatory oversight, the introduction of non-indigenous organisms via attachment to a ship's exterior structures is not likely to alter the local biotic community significantly.

2.2.4 Fisheries and Essential Fish Habitat

Fishery resources in the vicinity of the Project are classified as warmwater marine or estuarine. In 1996, new habitat conservation provisions were added to the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) that mandated the identification of Essential Fish Habitat (EFH) for managed species. EFH is defined as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity" (16 U.S. Code. 1802(10)). According to the Gulf of Mexico Fishery Management Council (GMFMC, 1998), all estuaries and estuarine habitats in the northern Gulf of Mexico are considered EFH. This includes the berthing dock area at Freeport LNG's terminal site. Six aquatic species are listed by the Gulf of Mexico

Fishery Management Council as managed fishery species that may occur within the Brazos River estuary, of which four species were identified by the National Marine Fisheries Service (NMFS) during consultation for Phase I of the Freeport LNG Project (red drum, *Sciaenops ocellatus*; Spanish mackerel, *Scomberomorus maculates*; brown shrimp, *Farfantepenaeus aztecus*; and white shrimp, *Penaeus setiferus*).

Estuarine aquatic species are adapted to living in a dynamic environment supporting both freshwater near the source of the freshwater (0.5 ppt) and open seawater conditions (30 to 40 ppt) (Patillo et al., 1995). Based on this research, the addition of ballast water would not affect a change in the salinity ranges that would be outside of the tolerable ranges for EFH species that may occur in the vicinity of LNG terminal area. NMFS concurred in a November 12, 2008 email that no further consultation with NMFS would be required under the Magnuson-Stevens Act (NMFS, 2008a).

2.2.5 Marine Mammals and Sea Turtles

A number of marine mammals (whales and dolphins) are commonly observed in the Gulf of Mexico, with some species having with a greater affinity to coastal, inshore waters, while others are more commonly observed offshore in deeper, pelagic waters. Many species are also commonly observed in shipping channels in Texas and Louisiana, the most common and prolific being the bottlenose dolphin (*Tursiops truncatus*).

Five of the world's seven sea turtle species have been recorded in the Gulf of Mexico: green Sea (*Chelonia mydas*), hawksbill (*Eretmochelys imbricata*), Kemp's ridley (*Lepidochelys kempii*), leatherback (*Dermochelys coriacea*) and loggerhead (*Caretta caretta*). All five species are federally- and state-listed as threatened or endangered.

There would be no overall increase in LNG ships as a result of the Freeport Projects. As part of previous authorizations for the Freeport LNG terminal, LNG carriers traveling to and from the LNG terminal would use established, well-traveled shipping lanes, thus reducing the potential for collisions as vessel traffic has helped to deter these species from using these areas. In addition, Freeport LNG has provided LNG ship captains with NMFS's "*Vessel Strike Avoidance Measures and Reporting for Mariners"* that outlines measures to avoid collisions with marine mammals and sea turtles.

Freeport LNG has consulted with NMFS regarding potential Project impacts to marine mammals and sea turtles. Because the Project would not substantially change previous reviews conducted for the Freeport LNG terminal, NMFS has determined in a November 12, 2008 email that reinitiation of consultation would not be necessary (NMFS, 2008b).

2.3 WETLANDS

A commentor expressed concern that the Freeport Projects could impact wetlands in the area. However, there would be no impacts on wetlands associated with Freeport Projects activities because all modifications would take place within the existing disturbed Terminal I facilities and use existing upland facility roads. Implementation of Freeport LNG's SPCC Plan and BMPs would prevent the movement of water or materials off of the site and into any nearby wetlands. In addition, no permit or modification to an existing permit under Section 10 of the Rivers and Harbors Act and/or Section 404 of the Clean Water Act, would be required. We believe that the Freeport Projects would not significantly impact wetlands.

2.4 VEGETATION AND WILDLIFE

A commentor expressed concern that the Freeport Projects would affect vegetation and wildlife in the area. There would be no new impacts on vegetation and wildlife associated with the Export Project because all modifications would take place on the existing man-made jetties that have been previously authorized and disturbed of habitat. The anticipated reduction of LNG tanker traffic associated with the Export facilities would actually serve to minimize the opportunity for disruption to aquatic species that could come in contact with the LNG tanker during transit or while at port.

The BOG/Truck Project would not affect vegetation within the existing terminal site, as disturbances within the existing terminal site would be limited to the graveled, paved, or otherwise maintained open spaces. Ground nesting birds, such as killdeer and plover, could potentially use the existing graveled or open areas for nesting. However, we believe that current use of the facility would discourage nesting activities in the project area and would serve to minimize potential encounters with nests or nesting birds.

LNG truck traffic would have the potential to injure or kill wildlife encountered during transit along local roadways. The estimated daily truck traffic generation from the LNG truck delivery system is projected to be 5 to 6 trucks per day, operating for about 60-90 days, and generating traffic of about 540 trucks annually. The area roadways are already subject to traffic, so it is anticipated that wildlife in the area would be accustomed to encountering vehicles. We believe that the minor increase in traffic predicted from the BOG/Truck Project would not be a significant increase to roadway use and would not significantly increase the number of truck-wildlife encounters. Given that the immediate Project area is already greatly disturbed by development and that significant amounts of similar habitats remain in the Project region, we believe that the long-term impact of the Freeport Projects on wildlife habitat would be minor.

2.5 ENDANGERED, THREATENED, AND OTHER SPECIES OF CONCERN

A commentor expressed concern that the Freeport Projects would affect threatened and endangered species in the area. No new federally or state-listed species have potential to occur in Brazoria County since consultation was completed for the Phase I and Phase II projects. Given the limited scope of the Freeport Projects and the existing "no effect" or "not likely to adversely affect" determinations for Phase I and II, we believe that the Freeport Projects would have no effect on listed species. Freeport LNG has consulted with the U.S. Fish and Wildlife Service and NMFS (see Table 1.6-1) which have confirmed that there is no need to reinitiate consultation and that the Project, as proposed, would have no effect on federally-listed threatened or endangered species (FWS, 2008; NMFS, 2008b).

2.6 LAND USE, RECREATION, AND VISUAL RESOURCES

The authorized Freeport LNG terminal facilities are located entirely on private land. Construction of the proposed Freeport Projects would take place within the existing facilities. Construction of the Export Project, BOG liquefaction facility, and truck unloading facility would result in no new impact on land use, residences, recreational resources, or visual resources. Minor increases in construction-related traffic related to the delivery of construction equipment and materials would occur for the two to three month construction period. We believe that the impact on local traffic patterns during construction activities would be similar to past construction use and would result in only a short-term disturbance to local traffic patterns.

Operation of the Export Project would result in a reduction of the number of ship from about 185 ships originally anticipated for the current import mode to about 16 ship visits under the proposed export mode. However, the average time a ship spends at dock for LNG loading would be greater than for LNG unloading (48 hours as opposed to 24 hours). For those residents bordering Freeport Harbor Channel, the main impact of the terminal operating in export mode would be a significant reduction in the number of observable LNG ships transiting the channel, while those residents with the Phase I unloading dock in their view shed could see individual ships at dock for slightly longer periods, but at a much lower frequency than originally predicted. However, we believe that the decrease in total ship traffic would serve to lessen any environmental impacts on residential, recreational, or visual resources for the communities neighboring the terminal and Freeport Harbor Channel.

The BOG liquefaction and LNG truck delivery system would not change the industrial nature of the terminal site, nor would they alter the outward appearance of the facility to the extent of resulting in visual impacts. For the truck unloading facility, commentors expressed concern that operation of the truck unloading facility would

present an unfair burden to the citizens of Quintana in the form of truck damage to roads, noise and air pollution from truck traffic, and public hazards associated with LNG transport by truck, especially during inclement weather or fog. Impacts associated with noise and air quality and public safety are discussed in sections 2.9 and 2.10, respectively.

LNG trucks would originate in Willis, Texas and travel to the City of Quintana via major expressways where possible. These trucks would enter the City of Quintana via Farm to Market (FM) 1495 through County Road 723, also known as Lamar Street or Quintana Road. County Road 723 is a two lane (one lane each direction) local road and does not provide through movement. FM 1495 is a two-lane road from County Road 723 to a common intersection of Old Quintana Rd/FM 1495 and is four-lane facility north of Old Quintana Rd.

Based on Texas Department of Transportation 2006 traffic counts, the volume of traffic on FM 1495 traveling south at the Old Quintana Rd/FM 1495 intersection is about 1600 vehicles per day; and 4500 vehicles per day traveling north at that intersection. The estimated truck traffic generation from the LNG truck delivery system is projected to be 5 to 6 trucks per day, operating for about 60-90 days, and generating traffic of about 540 trucks annually. This amount of daily truck traffic is the equivalent of 10-12 passenger car traffic and would add less than 1 percent to the existing daily traffic volumes on the project area roadway system. This would be a minor increase to the baseline traffic for the area. Therefore, we believe that increases in LNG truck delivery would not result in a significant impact on local roads and traffic. Since the amount of additional traffic, both daily and annually, generated by the proposed LNG truck delivery system is not significant, it is unlikely to deteriorate the traffic conditions in the project area.

A commentor indicated that tourism traffic during summer months and holidays could result in much larger levels of traffic congestion and potential hazards to the public from the truck traffic. Tourism in the area includes bird watching, beach access, camping, fishing, and the use of numerous parks and bird sanctuaries (Quintana, 2009). Freeport LNG indicated that the majority of the truck activity would be expected during the late Spring and Summer months. However, the LNG truck delivery system is not proposed for constant operation and would only be employed during BOG liquefaction system maintenance or down time (about 60-90 days per year); therefore, there appears to be some leeway, to an extent, in scheduling system maintenance to avoid the busier times/events during the summer tourism months. Freeport LNG has indicated that it would try to coordinate the schedule for LNG truck deliveries with the Quintana City Council in order to alleviate any associated burdens on traffic during anticipated times of heavy traffic on the Island, such as immediately prior to holiday weekends. With proper communication with the city regarding scheduled truck deliveries, we believe that the

truck delivery system would not result in a significant impact on local traffic patterns or tourism.

Commentors indicated that Freeport LNG had originally promised to repair the roads after completion of construction, but it has not, to date, consulted with Brazoria County or repaired road damage resulting from Phase I construction. As the road to the terminal site is the main road through town, construction damage to roadways could result in a significant disturbance to local residences. In addition, commentors indicated that Freeport LNG had agreed to repair or replace a culvert that crosses an inlet to a tidal lake from the Intracoastal Waterway, but that the repairs had not been completed. Freeport LNG provided correspondence with Brazoria County and the County Engineering Office indicating that Freeport LNG is in the process of funding its agreed-upon portion of the costs for replacement of the culvert with a bridge. Correspondence from Brazoria County indicated that engineers are working to design the bridge and construction is scheduled for the Fall of 2009, after the 2009 hurricane season.

We agree that Freeport LNG should be responsible for repairing any damages related to its construction or operation activities. Freeport LNG indicated that construction contractors for Phase I construction were required to obtain a Heavy Load Permit from the County. As part of the permitting process, Freeport LNG was required to agree to pay Brazoria County for all damages caused by its use of County Road 723. No damage to County Road 723 from Phase I construction was identified by Brazoria County. A similar Heavy Load Permit would be required for the LNG supplier for the Truck Project. Since a mechanism is in place to ensure that Freeport LNG is responsible for any damages to County Road 723 that may result from truck transportation, we believe that the truck delivery system would not result in a significant impact on roadway conditions.

We believe that with these measures, construction and operation of the Freeport Projects would not result in significant impacts to land use, residences, transportation, recreational resources, or visual resources.

2.7 COASTAL ZONE MANAGEMENT AREA

The Texas Coastal Management Program is administered by the Coastal Coordination Council of the Texas General Land Office. A Coastal Use Permit from the Texas Railroad Commission is required for certain projects in the Coastal Zone, including but not limited to dredge and fill work, bulkhead construction, shoreline maintenance, and other development projects. The Freeport LNG terminal is located entirely within the Coastal Zone. The purpose of the Coastal Use Permit process is to make certain that any activity affecting the Coastal Zone is performed in accordance with

guidelines established in the Texas Coastal Management Program in order to comply with the Coastal Zone Management Act.

Freeport LNG has notified the Texas Railroad Commission of the proposed modifications and requested their comment and recommendations as to any permit requirements that may be associated with the Freeport Projects. We believe that an amendment to the Texas Railroad Commission Permit 23078 would not be required since activities would occur within the existing footprint of the facilities authorized under Permit 23078. However, to ensure that the Freeport Projects are consistent with the Texas Coastal Management Program, we recommend that:

- **Freeport LNG should not begin construction of the Freeport LNG Export and BOG/Truck Projects until it files with the Secretary of the Commission (Secretary) correspondence from the Texas Railroad Commission confirming that no additional permits are required for compliance or that the Projects are consistent with the Coastal Zone Management Act.**

2.8 CULTURAL RESOURCES

Section 106 of the National Historic Preservation Act, as amended, requires the Commission to take into account the effects of its undertakings (including the issuance of Certificates) on properties listed or eligible for listing on the National Register of Historic Places, and to afford the Advisory Council on Historic Preservation an opportunity to comment on the undertaking. Freeport LNG completed cultural resource surveys for the previously approved Phase I Project, the geographic area of which includes the construction and operational footprints for the Freeport Projects. No sites that are listed or are eligible for listing on the National Register of Historic Places were identified at the terminal site. State Historic Preservation Office (SHPO) no effect concurrence for the Phase I Project was obtained on October 20, 2004. The proposed project construction would not require any construction workspace or extension of the operational footprint beyond that already surveyed and cleared for the Phase I facility.

Freeport LNG has initiated consultation with the SHPO to confirm that the proposed modifications would not require any additional surveys or consultations. However, we believe that no historic properties would be affected by the proposed modifications.

2.9 AIR QUALITY AND NOISE

2.9.1 Air Quality

The proposed Freeport Projects would result in air emissions through both short-term construction activities and long-term operation of export, BOG liquefaction, and truck unloading facilities. Emissions associated with construction activities generally include fugitive dust from soil disruption and combustion emissions from construction equipment and would be minor and temporary. Emissions associated with operation of the Export Project would include combustion emissions from flaring BOG that could not be accommodated during unloading of an LNG ship or from displacement of LNG vapors during loading of an LNG ship tank, emissions from LNG ship traffic in the channel, and emissions from the tug boats assisting LNG ships. Operating emissions associated with the BOG/Truck Project would include combustion emissions from the three proposed natural gas-fired compressors rated at 1,380 hp each and from the combustion of diesel fuel for the LNG trucks during truck transportation. The truck unloading pump would be electric-driven and therefore, there would be no air emissions associated with truck unloading activities.

Air emission sources in Texas are regulated at the federal level by the Clean Air Act (CAA) of 1970, as amended in 1977 and 1990, and at the state level by the Texas Commission on Environmental Quality (TCEQ). The federal regulations established as a result of the CAA that are potentially applicable to the compressor station are as follows:

- National Ambient Air Quality Standards (NAAQS);
- Prevention of Significant Deterioration Review (PSD)/Non-attainment New Source Review (NNSR);
- New Source Performance Standards (NSPS);
- National Emission Standards for Hazardous Air Pollutants (NESHAPs);
- Title V Operating Permits (Title V); and
- General Conformity.

The CAA designates six (6) criteria pollutants for which standards (NAAQS) are promulgated to protect public health and welfare. They include nitrogen oxides (NO_x), including nitrogen dioxide (NO_2); carbon monoxide (CO); particulate matter (PM), including particulate matter less than 10 microns in diameter (PM_{10}) and particulate matter less than 2.5 microns in diameter ($PM_{2.5}$); sulfur dioxide (SO_2); ozone (O_3); and lead (Pb). The NAAQS are codified in 40 CFR Part 50. Areas of the country in violation of NAAQS are designated as non-attainment areas and new sources to be located in or near these areas may be subject to more stringent air permitting requirements. The proposed Freeport Projects would be located in Brazoria County, Texas which is currently designated attainment for all criteria pollutants except ozone. Brazoria County

is included in the eight-county Houston-Galveston-Brazoria "severe" ozone nonattainment area under the current 8-hour ozone standard.

Separate procedures have been established for federal pre-construction review of certain large proposed projects in attainment areas versus non-attainment areas. Federal pre-construction review for affected sources located in non-attainment areas is commonly referred to as NNSR. Federal pre-construction review for affected sources located in attainment areas is called PSD. The review process is intended to prevent the new source from causing existing air quality to deteriorate beyond acceptable levels.

PSD regulations (40 CFR 52.21) define a major source as any source with a potential to emit any single listed pollutant in amounts equal to or greater than 250 tons per year (tpy) for this source category. Modifications to existing major sources have lower emission thresholds, called "significant emission increases"; amounts over these thresholds trigger PSD review. Potential to emit is determined on an annual basis after the application of air pollution control equipment and any federally enforceable limitations such as a permit condition limiting hours of operation. The Phase I and Phase II facilities are currently permitted under Air Quality Permit No. 55464. The Export Project facilities and the BOG liquefaction facilities associated with the BOG/Truck Project would be operated in an "either/or" mode from the normal import/send-out mode. Freeport LNG has requested through their air quality permit amendment application that flaring emissions from the export operations and emissions from operation of the natural gas-fired compressor due to the BOG liquefaction facilities be rolled into the overall air emissions cap for the Phase I facilities. Therefore, there would be no increase in emissions than previously permitted. The LNG vessel and tug emissions associated with the Export Project are not considered stationary sources and therefore are not subject to PSD or NNSR permitting.

Table A shows the preliminary operating emission estimates resulting from the Export and BOG/Truck Projects. The natural gas-fired compressors for the BOG/Truck Project were assumed to operate continuously year-round at full operating capacity. However, these compressors would most likely be used occasionally and at less that full operating capacity. Therefore, actual emissions would most likely be less than those presented in table 2.9.1.-1.

TABLE 2.9.1-1
Operating Emissions for the Export and BOG/Truck Projects

Emission Source	$PM_{10/2.5}$ Annual (tpy)	SO_2 Annual (tpy)	NO_x Annual (tpy)	CO Annual (tpy)	VOC Annual (tpy)
Export Project					
Flare	0.0	0.06	6.21	35.59	1.02
Vessels/Tugs	1.81	36.27	6.27	0.46	0.16
Export Project Total Emissions	**1.81**	**36.33**	**12.48**	**36.05**	**1.18**
BOG/Truck Project					
3 Natural Gas-fired Compressors	1.4	0.08	8.0	80.0	2.0
LNG Trucks	0.005	0.001	0.17	0.04	0.009
BOG/Truck Project Total Emissions	**1.405**	**0.081**	**8.17**	**80.04**	**2.009**
Freeport Projects Total Emissions	**3.215**	**36.411**	**20.65**	**111.09**	**3.189**

NSPS, codified in Title 40 CFR 60, establish pollutant emission limits and monitoring, reporting, and recordkeeping requirements for various emission sources based on source type and size. On January 18, 2008, EPA promulgated a new NSPS Subpart JJJJ (Standards of Performance for Stationary Spark Ignition Internal Combustion Engines). The applicability of Subpart JJJJ regulations would be based upon the manufacturer date, hp, fuel, and usage. Freeport LNG would comply with all applicable requirements of Subpart JJJJ based on manufacturer date and engine size, in accordance with the schedule specified in the rule.

NESHAPs Part 61 and Part 63 regulate the emissions of Hazardous Air Pollutants (HAPs) from existing and new sources. The proposed Freeport Projects are not expected to operate any processes that are regulated by Part 61. Part 63 establishes standards for major sources of HAPs. The major source threshold is 10 tpy for any single HAP or 25 tpy for all combined HAP emissions. The existing Phase I and Phase II facilities are not considered a major source of HAPs and the proposed Freeport Projects are not anticipated to be major, particularly under the "either/or" operating mode. Therefore, the Freeport Projects would not be subject to Title 40 CFR Part 63.

Title V of the CAA requires states to establish an air operating permit program and the requirements of Title V are outlined in Title 40 CFR Part 70. A facility is considered a minor source under Title V if it has the potential to emit less than 100 tpy for each criteria pollutant, less than 10 tpy for each individual HAP, and less than 25 tpy for all HAPs combined. The existing Phase I and Phase II facilities previously triggered the Title V program requirements and a final operating permit was issued on February 21, 2007. Freeport LNG would submit a revision to the existing operating permit to the TCEQ to incorporate the changes associated with the Freeport Projects.

The EPA promulgated the General Conformity Rule on November 30, 1993 to implement the conformity provision of Title I, Section 176(c)(1) of the CAA. Section

176(c)(1) requires that the federal government not engage, support, or provide financial assistance for licensing or permitting, or approve any activity not conforming to, an approved CAA implementation plan.

The General Conformity Rule is codified in Title 40 CFR Part 51, Subpart W and Part 93, Subpart B, Determining Conformity of General Federal Actions to State or Federal Implementation Plans. A conformity determination must be conducted by the lead federal agency if a federal action's construction and operational activities is likely to result in generating direct and indirect emissions that would exceed the conformity threshold levels (*de minimis*) of the pollutant(s) for which an air basin is in non-attainment or maintenance. According to the conformity regulations, emissions from sources that are major for any criteria pollutant with respect to the NNSR or PSD permitting/licensing are exempt and are deemed to have conformed.

Section 176(c)(1) of the CAA (Title 40 CFR 51.853), states that a federal agency cannot approve or support any activity that does not conform to an approved state implementation plan (SIP). Conforming activities or actions should not, through additional air pollutant emissions:

- cause or contribute to new violations of the NAAQS in any area;
- increase the frequency or severity of any existing violation of any NAAQS; or,
- delay timely attainment of any NAAQS or interim emission reductions.

As noted earlier, the proposed Projects would be located in a "severe" ozone non-attainment area. The relevant General Conformity pollutant thresholds are 25 tpy of volatile organic compounds (VOC) or NO_x. The proposed flare emissions associated with the Export Project and the natural gas-fired compressor emissions from the BOG/Truck Project would be authorized under Freeport LNG's New Source Review permit and therefore are not subject to general conformity. Emissions of NO_x and VOC from construction and all other operating activities for the Freeport Projects were evaluated and are presented in table 2.9.1-2. As shown in table 2.9.1-2, emissions from the Freeport Projects alone would be below the General Conformity applicability thresholds. Also, the emissions from the Freeport Projects would be less than those previously evaluated under General Conformity for the Phase I and Phase II facilities. Because the terminal would operate under either the export mode or the import mode, but never both simultaneously, emissions from the Freeport Projects would not be additive with the estimated emissions from the Phase I and Phase II facilities. Therefore, the proposed Freeport Projects' operations would also comply with the previously evaluated General Conformity Rules and would be in conformity with the applicable Texas SIP and a new General conformity Determination is not required.

TABLE 2.9.1-2
Construction and Operating Emissions Potentially Subject to General Conformity

	NOx (tpy)	VOC (tpy)
Construction		
Construction – Equipment (Export and BOG/Truck Projects)	0.0004	0.00005
Construction – Vehicles (Export and BOG/Truck Projects)	0.1011	0.0534
Operation		
LNG Truck Transport (BOG/Truck Project)	0.1704	0.0093
LNG Vessels (Export Project)	4.97	0.1
Tugs (Export Project)	1.3	0.06
Total Emissions	**6.54**	**0.22**
General Conformity Thresholds	25	25

Climate change is the shift in the average weather, or trend, that a region experiences and cannot be represented by single annual events or individual anomalies. Global climate can be affected by many factors, including solar variation, volcanic activity, ocean current cycles, variations in Earth orbit, orientation of Earth's rotational axis, and changes in atmospheric composition due to greenhouse gas (GHG) emissions. Ongoing scientific research has indicated that Earth's atmosphere is warming. Through complex interactions on a regional and global scale, GHG emissions cause a net warming effect of the atmosphere, making surface temperatures suitable for life on earth. GHG levels have varied for millennia, with corresponding variations in climatic conditions, however, recent industrialization and burning of fossil carbon sources have caused carbon dioxide (CO_2) concentrations to increase dramatically, and are likely to contribute to overall climatic changes, typically refereed to as global warming. The principle GHGs are methane (CH_4), CO_2, nitrous oxide (N_2O), and various fluorinated gases. According to the Intergovernmental Panel on climate Change (IPCC): "Most of the observed increase in global average temperatures since the mid-20th century is very likely due to the observed increase in anthropogenic [human-caused] greenhouse gas concentrations" (IPCC, 2007a, pg10).

As with any fossil-fuel fired project or activity, the project would contribute GHG emissions. No fluorinated gases would be emitted by the Project. Construction related emissions were estimated for CO_2. Operational related emissions were estimated for methane leaks and CO_2. There are no federal regulations at this time limiting the emissions of CO_2. Methane emissions are limited by valve and pipe leak standards.

Emissions of GHGs are typically estimated as carbon equivalents, or carbon dioxide equivalents. GHGs are ranked by their global warming potential (GWP). The GWP is a ratio relative to CO_2 which is based on the properties of the GHGs ability to absorb solar radiation as well as the residence time within the atmosphere. Thus CO_2 has a GWP of 1. Methane has a GWP of approximately 25 (IPCC, 2007b, 212).

Emissions of GHG pollutants associated with both the construction and operation of the Freeport Projects, including all direct and indirect emission sources were

calculated. In addition, GHG emissions were converted to total CO_2 equivalent emissions based on the GWP of each pollutant. A summary of GHG emissions from construction and operation of the Project is provided in table 2.9.1-3.

TABLE 2.9.1-3
Summary of GHG Emissions

Source	CO_2 equivalent Emissions (tpy)
Construction – Equipment (Export and BOG/Truck Projects)	0.05
Construction – Vehicles (Export and BOG/Truck Projects)	57.03
Operational - LNG Truck Transport (BOG/Truck Project)	36.47
Operational – Flare (Export Project)	12,549
Operational – 3 Compressors (BOG/Truck Project)	204,046
Methane Leaks (BOG/Truck Project)	89.75
Total Emissions	**216,778**

According to IPCC data, the range of uncertainty in global CO_2 emissions from fossil fuel combustion and cement production is ±1,212 million tons per year of CO_2 (IPCC, 2007a, pg 2). The estimated CO_2 emissions resulting from construction and operation of the Freeport Projects is a negligible amount within the range of uncertainty in the IPCC's estimate of the total global CO_2 emissions from fossil fuel combustion and cement production. Although it is possible to estimate the Project's incremental contribution to global CO_2 emissions, it is not possible to determine whether or how the project's relatively small incremental contribution would translate into physical effects on the environment. Additionally, specific levels of significance have not yet been established. Therefore, climate change analysis for the purpose of this document is limited to accounting and disclosing of factors that contribute to climate change.

2.9.2 Noise

Construction and operation of the Freeport Projects may affect overall noise levels in the Project area. The ambient sound level of a region is defined by the total noise generated within the specific environment and is usually comprised of natural and artificial sounds. At any location, both the magnitude and frequency of environmental noise may vary considerably over the course of a day and throughout the week. This variation is caused in part by changing weather conditions and the effect of seasonal vegetative cover.

Two measurements used by some federal agencies to relate the time-varying quality of environmental noise to its known effects on people are the equivalent sound level (L_{eq}) and the day-night sound level (L_{dn}). The L_{eq} is an A-weighted sound level containing the same sound energy as the instantaneous sound levels measured over a

specific time period. Noise levels are perceived differently, depending on length of exposure and time of day. The L_{dn} takes into account the duration and time the noise is encountered. Late night and early morning (10 p.m. to 7 a.m.) noise exposures are penalized +10 decibels, to account for people's greater sensitivity to sound during the nighttime hours.

In 1974, the EPA published its *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety*. This document provides information for state and local governments to use in developing their own ambient noise standards. The EPA has indicated that an L_{dn} of 55 decibels on the A-weighted scale (dBA) protects the public from indoor and outdoor activity interference. We have adopted this criterion and use it to evaluate the potential noise impact from operation of the LNG facilities at the nearest noise sensitive areas (NSAs). No county or state noise regulations have been identified.

Noise from construction activities associated with the Export Project would be temporary and intermittent because the construction equipment would typically be operated only during daytime hours (typically 7 a.m. to 7 p.m.) on an as-needed basis. Noise levels would be similar to that of regular construction activities, and are not anticipated to be significant. Noise from construction activities associated with the BOG/Truck Project would also be temporary and intermittent because the construction equipment would typically be operated only during daytime hours.

Operation of the Export Project would result in a decrease in LNG ship traffic from that associated with the Phase I and Phase II facilities and therefore would not be considered significant. There would be no additional stationary noise sources associated with the Export Project.

Operational noise sources associated The Bog/Truck Project would include the three natural gas-fired compressors packages and a turbo expander package. In an effort to mitigate noise impacts at nearby NSAs, Freeport LNG would implement an engine exhaust silencer system for each compressor engine and a noise wall at least 20 feet tall around the west, south, and east sides of the compressors. Existing and projected noise levels due to the BOG/Truck Project operation were evaluated at the nearest NSAs based upon the proposed equipment and noise mitigation measures. The results of this analysis are summarized in table 2.9.2-1. As shown in table 2.9.2-1, the proposed BOG/Truck Project would not exceed our noise criterion of 55 dBA L_{dn}. Therefore, operation of the BOG/Truck Project is not anticipated to be significant.

TABLE 2.9.2-1
Estimated Future Noise Contribution

Closest NSAs	Approximate Distance and Direction of NSA	Measured Existing Level L_{dn} (dBA)	Estimated L_{dn} of BOG Project (dBA)	Estimated L_{dn} of the Station + Ambient L_{dn} (dBA)	Potential Increase above Ambient (dBA)
NSA #1	2,500 feet Southwest	60.9	53.4	61.6	0.7
NSA #2	1,760 feet South	65.1	52.3	65.3	0.2
NSA #3	2,010 feet Southeast	62.4	44.4	62.5	0.1
Measured existing noise levels were conducted on September 18-19, 2002.					

We received several comment letters with concerns regarding noise associated with LNG truck traffic that would exceed 60 dBA. Outside of the LNG facility property, the LNG trucks would travel on county, state, or federal roads and would generate noise similar to other trucks traveling along those roads. There are no state or federal regulations limiting noise levels due to vehicle travel along those roads. Due to the constantly moving nature of vehicle travel, noise levels generating during LNG trucks passing residences or NSAs would be short in duration (lasting minutes at the most) and would be infrequent. Therefore, noise impacts due to LNG truck traffic are not anticipated to be significant.

2.10 RELIABILITY AND SAFETY

2.10.1 LNG Hazards

LNG's principal hazards result from its cryogenic temperature (-260°F), flammability, and vapor dispersion characteristics. As a liquid, LNG will neither burn nor explode. Although it can cause freeze burns and, depending on the length of exposure, more serious injury or death, its extremely cold state does not present a significant hazard to the public, which rarely, if ever, comes in contact with it as a liquid. As a cryogenic liquid, LNG will quickly cool materials it contacts, causing extreme thermal stress in materials not specifically designed for ultra-cold conditions. Such thermal stresses could subsequently subject the material to brittleness, fracture, or other loss of tensile strength. These hazards, however, are not substantially different from the hazards associated with the storage and transportation of liquid oxygen (-296°F) or several other cryogenic gases that have been routinely produced and transported in the United States.

LNG vaporizes rapidly when exposed to ambient heat sources such as water or soil. When released from its containment vessel and/or transfer system, LNG will generally produce 620 to 630 standard cubic feet of natural gas for each cubic foot of liquid. A large quantity of LNG spilled without ignition would form a vapor cloud that

would travel with the prevailing wind until it either dispersed below the flammable limits or encountered an ignition source. If a large quantity of LNG is spilled in the presence of an ignition source, the resulting pool fire would produce high levels of radiant heat in the area surrounding the LNG pool.

A rapid phase transition (RPT) can occur when a portion of LNG spilled onto water changes from liquid to gas, virtually instantaneously. Unlike an explosion that releases energy and combustion products from a chemical reaction, an RPT is the result of heat transferred to the liquid inducing a change to the vapor state. The rapid expansion from the liquid to vapor state can cause locally large overpressures. RPTs have been observed during LNG test spills onto water. In some test cases, the events were strong enough to damage test equipment in the immediate vicinity of the LNG release point. The sizes of the overpressure events have been generally small and are estimated to be equivalent to several pounds of trinitrotoluene (TNT). The RPT may increase the rate of LNG pool spreading and the LNG vaporization rate for a spill on water.

Methane vapors, the primary component of natural gas, are colorless, odorless, and tasteless, and are classified as a simple asphyxiant. Methane vapors may cause extreme health hazards, including death, if inhaled in significant quantities within a limited time. Although very cold methane vapors could cause freeze burns, any cloud resulting from an LNG spill would be continuously mixing with the warmer air surrounding the spill site. Dispersion modeling indicates the majority of the cloud would generally be within 25°F of the surrounding atmospheric temperature, with colder temperatures closest to the spill source. In addition, this modeling estimates that most of the cloud would be below concentrations resulting in oxygen deprivation effects, including asphyxiation, with the highest methane concentrations closest to the spill source. Therefore, asphyxiation and freezing normally represent a negligible risk to the public from LNG facilities.

Although LNG will not burn, methane vapors in a 5 to 15 percent mixture by volume with air are flammable. Once a flammable vapor-air mixture from an LNG spill has been ignited, the flame front will propagate back to the spill site if the vapor concentration along this path is sufficiently high to support the combustion process. Combustible materials within the flammable portion of the cloud may be within the flame and could be ignited. However, any events leading to a containment failure would most likely be accompanied by a number of ignition sources. The result would be an LNG pool fire, and subsequent radiant heat hazards, rather than the formation of a large unconfined vapor cloud.

Although LNG is not explosive as it is normally transported and stored, natural gas vapors (primarily methane) can explode if contained within a confined space, such as a building or structure, and ignited. Occasionally, various parties have expressed the

energy content of an LNG storage tank in equivalent tons of TNT as an implied measure of its explosive potential. However, such a simplistic analogy fails to consider that explosive forces are not just a function of the total energy content but also of the rate of energy release. For a detonation to occur, the rate of energy release must be nearly instantaneous, such as with a TNT charge initiated by a blasting cap. Unlike TNT or other explosives, which inherently contain an oxidizer, an unconfined vapor cloud must be mixed with oxygen within the flammability range of the fuel for combustion to occur. For a large unconfined vapor cloud, the flammability range tends to exist at the mixing zone at the edges of the cloud. When ignited, flame speeds of about 20 to 25 meters per second (66 to 82 feet per second) and local over pressures up to 0.2 psig have been estimated for unconfined methane-rich vapor clouds. These are well below the flame speeds and over-pressures associated with detonation.

The potential for unconfined LNG vapor cloud detonations was investigated by the USCG in the late 1970s at the Naval Weapons Center at China Lake, California. These experiments, as well as other subsequent tests, are mentioned in Appendix C of the Sandia National Laboratories report entitled, *Guidance on Risk Analysis and Safety Implications of a Large Liquefied Natural Gas (LNG) Spill Over Water*, December 2004 (Sandia Report). Using methane, the primary component of natural gas, several experiments were conducted to determine if unconfined vapor clouds would detonate. The tests indicated unconfined methane-air mixtures could be ignited, but no test produced unconfined detonation. There is no evidence suggesting that methane-air mixtures will detonate in unconfined open areas.

Further tests were conducted in the late 1970s to examine the level of sensitivity of an unconfined cloud to the presence of heavier hydrocarbons such as ethane and propane. As stated in section 5 of Appendix C of the Sandia Report, detonation sensitivity is affected by the level of refinement of natural gas stored as LNG. The series of tests on ambient-temperature fuel mixtures of methane-ethane and methane-propane indicated that the addition of heavier hydrocarbons influenced the tendency of an unconfined vapor cloud to detonate. Less processed product with greater amounts of heavier hydrocarbons is more sensitive to detonation. During these experiments, all successful detonations were initiated with an explosive charge in well mixed vapor clouds at correct stoichiometric proportions. These are not representative of conditions that would be expected during a large scale LNG spill. The precise timing, necessary mixing, and required amount of initiating explosives render the possibility for detonation of a large unconfined vapor cloud as unrealistic. Detonation of the unconfined natural gas cloud is extremely difficult to achieve and is generally considered by scientists and researchers to be very unlikely to occur during an LNG spill.

Consequently, the primary hazards to the public from an LNG spill either on land or water would be from dispersion of the flammable vapors or from radiant heat generated by a pool fire.

2.10.2 Export Project

Existing plant and safety systems, control processes, and safety devices would be used to manage flow rates, BOG, and overall ship loading operations. LNG would follow the same flow path through the transfer lines from the LNG storage tanks to the LNG ship as during unloading operations. Vapor generated during ship loading would be managed similarly by directing it to the terminal's vapor recovery system and the BOG compressor. Alternatively, the vapor would be directed to the pipeline compressor for sendout from the facility.

As part of its application, Freeport LNG provided the following documents: procedures for LNG loading operations, process and instrumentation diagrams for the modified portions of the plant, and a process hazard analysis. The procedures to berth and connect an LNG ship for loading would follow the same protocol used for LNG ship unloading. These procedures include isolating the transfer arms and associated piping not selected for operations, connecting the transfer arms to be used during operations, and starting the vapor handling equipment that would be used to manage BOG generated from the LNG ship. Once these steps have been completed, Freeport LNG would cool down the transfer lines and load LNG onto the ship using the existing LNG storage tank in-tank pumps. At full capacity, LNG would be loaded at a rate of 26,400 gallons per minute (6,000 cubic meters per hour) through the one transfer arm.

The process hazard analysis, conducted by Freeport LNG, identified and resolved potential concerns associated with the proposed modifications and the operational processes that would be used to load LNG onto a ship. A technical review by FERC staff did not identify additional issues relating to the reliability, operability, and safety of the proposed modifications or loading operations. These modifications and loading operations would be required to comply with the requirements of Title 49 CFR Part 193 and Title 33 CFR Part 127. Furthermore, the proposed modifications would not affect the design spill volumes that were used to determine the required LNG impoundment capacities and exclusion zones for the existing Freeport LNG terminal. The thermal and flammable vapor exclusion zones considered under Dockets CP03-75-000 and CP05-361-000 would therefore remain unchanged. We believe the proposed modifications would continue to comply with siting regulations in Title 49 CFR Part 193, Subpart B.

2.10.2.1 LNG Carrier Safety

The Freeport LNG terminal is located on the west bank of the Freeport Harbor Channel approximately 1 mile northwest from the shoreline of the Gulf of Mexico. LNG carriers exporting LNG from this terminal would use the same transit routes used for LNG imports, which were described in the Freeport LNG Project Final Environmental Impact Statement and Phase II Project Environmental Assessment under Dockets CP03-75-000 and CP05-361-000, respectively.

LNG carriers having capacities up to 217,000 m^3 (Q-flex class vessels) are currently authorized to transit through the Freeport Harbor Channel up to the terminal as indicated in the December 10, 2007 letter issued by the Coast Guard COTP Galveston (USCG, 2007). The existing terminal is authorized to receive up to 200 LNG vessels each year as described in the Letter of Recommendation issued by the Coast Guard on January 13, 2004. Freeport LNG indicated that approximately 16 annual LNG vessel visits would be expected for export operations, which would be significantly less than the authorized 200 LNG vessels per year.

The Coast Guard reviewed briefs on the physical changes to be made to the facility; changes to the Operations Manual, Emergency Manual, and Facility Security Plan; and the proposed addendum to the Waterway Suitability Assessment. On November 5, 2008, the Coast Guard determined that the waterway impacts associated with the proposed export operations at the terminal would not change or exceed those envisioned in the original EIS, EA, and Waterway Suitability Assessment. In addition, the Coast Guard determined that a revised Letter of Intent (LOI) would not be required (USCG, 2008a). [8] The export operations proposed for the terminal would therefore not require additional measures beyond those currently used to responsibly manage the maritime safety and security risks associated with LNG marine traffic.

2.10.3 BOG Liquefaction Project

2.10.3.1 Engineering Design and Technical Review

Freeport LNG conducted a hazard identification review to identify areas of concern that would need to be addressed prior to commissioning, or in some cases, as part of the detailed design. Fluid phases, compositions, temperatures, and pressures do not exceed presently established design minimums and maximums. Freeport LNG

[8] We note that on December 22, 2008, the Coast Guard published a Navigation and Vessel Inspection Circular Guidance related to Waterfront Liquefied Natural Gas Facilities (NVIC 05-08) (USCG, 2008b). This guidance supersedes the 2005 NVIC 05-05 for assessing the suitability of waterways for LNG marine traffic, but does not fundamentally change the risk-based decision making process used to determine suitability.

identified a few minor concerns during this review and determined a course of action to resolve them.

As part of its application and in response to FERC staff's data requests, Freeport LNG provided the front end engineering design (FEED) for the project. The FERC technical review of the FEED focuses on the engineering design and safety concepts, as well as the projected operational reliability of the proposed facilities. The principle areas of coverage include materials in cryogenic environments; insulation systems; cryogenic safety; thermodynamics; heat transfer; instrumentation; cryogenic processes; and other relevant safety systems. All proposed facilities would be required to comply with Title 49 CFR Part 193.

As a result of this technical review, a number of concerns were identified by FERC staff relating to the reliability, operability, and safety of the proposed design. In response to staff's questions, Freeport LNG provided written responses prior to and following a technical discussion held on January 30, 2009. Based on this discussion, Freeport LNG agreed to add a pressure transmitter to continuously monitor and record the pressure in the truck unloading line. In addition, Freeport LNG agreed to provide a piping connection that would allow the truck unloading hose to be drained and depressurized before disconnection. A total of 11 of Freeport LNG's filed responses indicated that certain features would be included or considered in the final design in order to address issues raised in the information request. As a result, **we recommend that**:

- **Documentation and information should be provided during <u>final design</u> regarding the statements made by Freeport LNG in filings on January 14, January 22, and February 4, 2009, which indicate that certain features would be included or considered in the final design. The final design should specifically address response number 7 in the January 14 filing; response numbers 15, 16, 31, 34, and 35 in the January 22 filing; and response numbers 25, 26, 30 and Attachment 1 in the February 4 filing using management of change procedures.**

The FEED and specifications submitted for the proposed facilities are considered to be preliminary but would be the basis for any detailed design to follow. A significant amount of the design involving final selection of equipment manufacturers, process conditions, and resolution of some safety related issues would be completed in the next phase of project development if authorization is granted by the Commission. This information would need to be submitted to the FERC staff for review and approval. In addition, several areas of concern related to the LNG facility design and construction details have been noted and require additional consideration and/or action on behalf of the company. Follow up on those items requiring additional action should be documented in reports to be filed with the FERC. As a result, **we recommend that:**

The following measures should apply to the Freeport LNG design and construction details for the proposed modifications. Information pertaining to these specific recommendations should be filed with the Secretary for review and approval by the Director of OEP either: prior to initial site preparation; prior to construction of final design; prior to commissioning; or prior to commencement of service as indicated by each specific condition. Specific engineering, vulnerability, or detailed design information meeting the criteria specified in Order No. 683 (Docket No. RM06-24-000), including security information, should be submitted as critical energy infrastructure information (CEII) pursuant to 18 CFR 388.112. See Critical Energy Infrastructure Information, Order No. 683, 71 Fed. Reg. 58,273 (October 3, 2006). FERC Stats. & Regs. ¶ 31,228 (2006). Information pertaining to items such as: offsite emergency response; procedures for public notification and evacuation; and construction and operating reporting requirements would be subject to public disclosure. This information should be submitted a minimum of 30 days before approval to proceed is required.

1. **Complete plan drawings and a list of the hazard detection equipment shall be filed <u>prior to initial site preparation</u>. The list shall include the instrument tag number, type and location, alarm locations, and shutdown functions of the proposed hazard detection equipment. Plan drawings shall clearly show the location of all detection equipment.**

2. **Complete plan drawings and a list of the fixed and wheeled dry-chemical, fire extinguishing, and other hazard control equipment shall be filed <u>prior to initial site preparation</u>. The list shall include the equipment tag number, type, size, equipment covered, and automatic and manual remote signals initiating discharge of the units. Plan drawings shall clearly show the planned location of all fixed and wheeled extinguishers.**

3. **Facility plans showing the proposed location of, and area covered by, each monitor, hydrant, deluge system, hose, and sprinkler, as well as piping and instrumentation diagrams, of the fire water system shall be filed <u>prior to initial site preparation</u>.**

4. **The <u>final design</u> of the fixed and wheeled dry-chemical, fire extinguishing hazard control equipment shall identify manufacturer and model.**

5. **The <u>final design</u> shall include a Hazard and Operability (HAZOP) review of the completed design. A copy of the review and a list of the recommendations and results shall be filed.**

6. **Progress on construction of the project shall be reported in <u>monthly</u> reports filed with the Secretary. Details shall include a summary of activities, projected schedule for completion, problems encountered and remedial**

actions taken. Problems of significant magnitude shall be reported to the FERC within 24 hours.

2.10.3.2 Siting Requirements

The proposed equipment would be located in an existing spill containment area, and the unloading valve on each truck would be positioned over an existing LNG spill collection trough. Potential LNG spills from the truck itself would be directed by new curbing to the existing trough, which drains to the process area sump.

The existing spill containment system is designed to contain an LNG spill rate of 44,028 gallons per minute for 10 minutes. The design spill rate of 16,105 gallons per minute into the process area sump was determined, during final design of the Phase I facilities, to have acceptable thermal radiation and vapor dispersion distances. The proposed liquefaction system can produce a maximum LNG flow of only 66 gallons per minute and the truck unloading facilities can produce a maximum LNG flow of only 308 gallons per minute. These lower flow rates would not create longer thermal radiation or vapor dispersion distances from the process area sump. As a result, we believe the proposed facilities would comply with the siting regulations in Title 49 CFR Part 193, Subpart B.

2.10.4 LNG Truck Safety

As discussed in section 2.6, LNG would be trucked to the Freeport terminal by Clean Energy Fuels Corporation (Clean Energy). Clean Energy, a commercial LNG supplier located approximately 40 miles north of Houston, employs highly trained drivers to operate its fleet of LNG trucks. The Clean Energy trucks would travel on existing public roads to deliver LNG to the Freeport LNG terminal, accessing Quintana Island via Farm to Market Route 1495 and entering the terminal site via County Road 723. This is the same route previously taken by large trucks during construction of the terminal.

2.10.4.1 LNG Truck Accident History

Comments were received concerning potential public safety hazards associated with LNG truck traffic, especially during inclement weather or high traffic periods. While the history of LNG trucking has been free of major incidents, the possibility of an LNG truck accident over the duration of the project cannot be discounted. Unlike conventional gasoline or oil tank trailers, LNG trailers are of a double-shell construction: an inner tank constructed of a cryogenic alloy to contain the LNG; an outer tank of carbon steel; and an evacuated annular space containing perlite insulation. Stiffening rings are incorporated in the outer shell to improve its structural strength and prevent its collapse. A typical 11,000-gallon tanker has a length of 42 feet, an inner tank diameter of

7 feet 4 inches, and an outer tank diameter of 8 feet. LNG trailer design must comply with the requirements of Title 49 CFR Part 173. Drivers must meet the training requirements in Title 49 CFR Part 172.

The LNG trucks have a relatively high center of gravity compared to other petroleum trucks due to the low density of LNG and the large tank diameter. This feature increases the truck's susceptibility to over turning accidents in some situations. However, the double-shell construction provides additional damage protection to minimize the potential for a major shell failure and product release.

In New England, the transportation of LNG by truck from the Distrigas LNG import terminal in Everett, Massachusetts began in 1971. Approximately 285,000 LNG trucks were loaded at the facility through the end of calendar year 2007 and were driven to receiving terminals an average distance of 70 miles away. In 1979, the DOT sponsored a study to quantitatively evaluate the risks associated with LNG trucking from the Distrigas LNG terminal. The final report was entitled "Assessment of Risks and Risk Control Options Associated with Liquefied Natural Gas Trucking Operations from the Distrigas Terminal, Everett, Massachusetts" (Little, 1979).

The study included an evaluation of all known LNG truck accidents in the United States from 1970 through 1977, alternatives to LNG trucking, and risk control options. While the study found the risks associated with the LNG trucking operations may be fairly low, it presented a number of options which could reduce risk levels even further. It was estimated that the accident rate per mile could be reduced by 60 percent if these recommendations were followed. Table 4.12.6-2 summarizes LNG truck accidents from 1970 through 1977 and 1978 through 2002. The accident rate of the second period decreased by approximately 80 percent compared with the first period.

TABLE 2.10-1
LNG Truck Accident Summary

Years	Number of Accidents	Miles Traveled (millions)	Accidents Per Year	Accidents Per Million Miles
1970-1977	13	26	1.6	0.5
1978-2002 a/	8	81	0.3	0.1

a/ Information for 1978-1994 was published in the Granite State LNG Project FEIS in July 1997. Information through 2002 was published in the Weaver's Cove LNG Project FEIS in May 2005.

Rollovers, which accounted for 76 percent (16) of the accidents over the 33-year period, are attributed to the relatively high center of gravity. Only four of the accidents resulted in a loss of product because of the additional damage protection provided by the double-shell construction. Three were relatively minor leaks from fittings or valves damaged in the accident. In the only accident involving tank damage, 20 percent of the cargo was spilled. None of these releases resulted in an ignition of vapors and subsequent fire.

In September 2005, an LNG truck fire occurred in a parking lot in Nevada following a repair attempt on a valve assembly. The valve started leaking LNG during the repair, and eventually the vapors ignited, causing a localized fire at the rear of the trailer. The fire was allowed to burn itself out. No injuries were reported.

In some areas of the country, restrictions on LNG trucking have been imposed by local authorities: curfews when children are arriving or leaving school; routing to avoid congested main streets; avoiding certain bridges where a preferred alternative exists; parking restrictions; and prohibition from tunnels. Restrictions on LNG trucking on Quintana Island have not been established.

If an LNG truck accident were to occur along the truck route, the potential hazard would depend on the severity of the accident and whether the cargo tank or associated valves sustained damage. This in turn would determine if the evacuation of nearby residences or businesses would be necessary. Commentors indicated that only one bridge connects Quintana Island to the mainland, and only one main road traverses the island. Due to the complications this may present for the potential evacuation of an area near the truck route, **we recommend that**:

- **Freeport LNG should update its Emergency Response Plan to address a potential LNG truck accident at any location along the truck route on Quintana Island and to coordinate procedures with state, county, and local emergency planning groups; fire departments; state and local law enforcement; and appropriate federal agencies. The updates to the Emergency Response Plan should be prepared in consultation with appropriate agencies and filed with the Secretary for review and written approval by the Director of OEP <u>prior to initial site preparation</u>.**

One commentor noted that fog events typically occur on Quintana Island during the spring, fall, and winter months. If Freeport LNG is required to bring in LNG by trucks, it anticipates that the bulk of this activity would occur during the late spring and summer months when fog is less likely to occur and less likely to affect visibility.

From the historical data, LNG truck accidents have resulted in only minor spills. The 37 years of operation in New England without a public fatality supports the relative safety of this mode of transportation. Therefore, we believe the trucking of LNG to the Freeport LNG facility would not result in a significant risk to the public.

2.11 CUMULATIVE IMPACTS

Cumulative impact results when impacts associated with a proposed project are superimposed on, or added to, impacts associated with past, present, or reasonably foreseeable future projects within the area affected by the Project. Although the individual impacts of the separate projects may be minor, the effects from the projects taken together could be significant.

Existing environmental conditions in the project area reflect changes based on past projects and activities. For example, much of the coastal marsh and barrier island systems in southern Texas have been disturbed by previous industrial development and activities associated with the development of Port Freeport (dredged material disposal).

Table 2.11-1 provides a list of present or reasonably foreseeable future projects or activities that may cumulatively impact resources that have been identified as potentially being affected by construction and operation of the Freeport Projects. Projects and activities included in this analysis are primarily those located in the vicinity of the Project. More distant projects are not assessed because their impact would generally be localized and therefore would not contribute significantly to cumulative impacts in the Project area.

2.11.1 Wildlife and Vegetation

When projects are constructed at or near the same time, the combination of construction activities could have a cumulative impact on vegetation and wildlife living in the immediate area. Clearing and grading and other construction activities associated with other area projects could result in the removal of vegetation, alteration of wildlife habitat, displacement of wildlife, and other secondary effects such as increased population stress, predation, forest fragmentation, and establishment of invasive plant species. However, as discussed in section 2.4, the potential habitat disturbed by the Freeport Projects would be limited to graveled and disturbed sites at the existing Freeport terminal and to truck encounters during truck transit on existing public roads and would not represent a significant impact on vegetation or wildlife. We do not anticipate a cumulative impact on wildlife or vegetation because of the Freeport Projects.

2.11.2 Water and Aquatic Resources

We determined that the potential affects on water and aquatic resources associated with the Freeport Projects are limited to ballast water and cooling water use for the LNG vessels. The ballast and cooling water uptakes for individual ships delivering LNG for future export would be no different in volume, rate, or duration to the currently

authorized uptakes associated with Phase I and Phase II import operations, as well as other shipping operations currently utilizing the Port of Freeport. However, given that the anticipated number of ships offloading LNG at the terminal would be significantly less under the export operation mode than the import operation mode (8 as opposed to 185), the collective volume of water uptake would be significantly reduced under the export operation mode. As such, the impingement and entrainment of fish and other aquatic biota is likely to show a resultant reduction. Cumulatively, this could serve to minimize impacts on water and aquatic resources in the general project area.

TABLE 2.11-1
Existing or Proposed Activities in the Project Area

Activity/Project	Description	Primary Environmental Impact					
		Water Resources	Wildlife/Vegetation	Aquatic Resources	Recreation	Transportation	Air Quality/Noise
Present Projects or Activities							
Chemical Manufacturing	Chemical manufacturing, storage, and transportation	✓				✓	✓
Oil/Gas Pipelines/Facilities	Oil and gas processing, storage and transportation	✓	✓	✓	✓	✓	✓
Dredging	Maintenance dredging of Freeport Harbor Channel and ICW	✓	✓	✓	✓		
Recreation	Fishing, boating, and bird watching	✓	✓		✓	✓	
Shipping	Commercial traffic on the Freeport Harbor Channel and Gulf Intracoastal Waterway	✓		✓		✓	
Reasonably Foreseeable Future Projects or Activities							
DOW Chemical Complex Expansion	Expansion of existing DOW chemical complex	✓		✓		✓	✓
Port Freeport	Expansion of public docks, including multimodal facility, container cargo facility, and cruise terminal	✓	✓	✓		✓	✓
Freeport Harbor Channel Widening and Deepening Project	Widening of the Freeport Harbor Channel and increasing depth of channel to 60 feet	✓	✓	✓		✓	

2.11.3 Recreation

Fishing, boating, and bird watching activities occur throughout the coastal marsh in the vicinity of the Freeport Projects. The Freeport Projects could affect recreation, primarily during the period of active construction or truck transport. The presence and movement of construction equipment, materials, and workers may be temporarily

disruptive to users of the local recreation areas including Quintana Island, particularly if more than one project is under construction at any one time in the Project area. However, we believe that the duration and scope of potential disturbances associated with the Freeport Projects would not lead to a cumulative impact on recreational activities in the project area.

2.11.4 Transportation

Due to the limited number of roads to the Freeport terminal, the addition of workers' cars and construction vehicles could contribute to increased traffic congestion during construction of the Freeport Projects. Operation of the LNG truck facility could also contribute to traffic congestion. If other large construction projects were concurrently undertaken near the Freeport terminal and also required the use of the same roadways, cumulative impacts on traffic could be expected during peak periods of construction or during operation of the LNG trucking facilities. However, there are no current plans for a major construction project near the Freeport terminal. As mentioned in section 2.6, tourism traffic during summer months and holidays could also result in greater traffic congestion. The estimated traffic generation from the LNG truck delivery system is projected to be 5 to 6 trucks per day, operating for about 60-90 days, and generating traffic of about 540 trucks annually. This amount of daily truck traffic would add less than 1 percent to the existing daily traffic volumes on the project area roadway system. This would be a minor increase to the baseline traffic for the area. Potential cumulative impacts from construction and operation of the Freeport Projects on traffic on Quintana Island are therefore expected to be minimal.

Road maintenance activities in the Project area could include repaving, clearing road shoulders, and similar activities by others. If these activities occur at the same time and place as the Freeport Projects, cumulative impacts could occur. Access to homes and businesses would be maintained during construction and operation. Potential cumulative impacts on transportation systems are expected to be temporary and short term.

2.11.5 Air Quality and Noise

If specific projects were constructed or operated at the same time and place as the Freeport Projects, cumulative impacts on air quality and noise could occur. However, the projects listed in table 2.11-1 would be subject to the appropriate air quality and noise regulations and permitting associated with each facility or project, similar to those described in section 2.9 of this EA. Because of this, we believe that the Freeport Projects would not significantly contribute to air quality and noise impacts for the region.

3.0 ALTERNATIVES

We reviewed several alternatives to the proposed Freeport Projects, including the no-action alternative, postponed action alternative, systems alternatives, and site alternatives.

The no-action action alternative would not address the need for the Project. The no-action alternative could result in Freeport LNG's terminal facility losing its operational capacity to respond rapidly, efficiently, and profitably when future market conditions support the importation of LNG for domestic use. Loss of cryogenic status, potentially resulting from insufficient supplies of LNG being delivered at the Freeport LNG terminal, would cause a start-up lag of at least several weeks and could render the facility economically unviable. The Freeport Projects would allow Freeport LNG to maintain cryogenic operations of its facilities by providing alternative sources of LNG (i.e., liquefied BOG and/or domestically-produced LNG) and an alternative incentive to deliver LNG cargoes (i.e., the export option) even when market conditions may not support delivery of LNG into U.S. markets.

The postponed action alternative, similarly, would limit Freeport LNG's options to maintain efficient operation of the terminal by eliminating the option to acquire LNG to maintain the plant at cryogenic temperatures. During those periods when U.S. market conditions do not support the import of LNG, the LNG terminal may be allowed to warm up, requiring re-cooling of the plant in conjunction with the next imported LNG cargo. Conversely, if the LNG terminal were maintained at optimal operating temperatures, Freeport LNG would have to purchase LNG at global LNG prices that are significantly higher than current natural gas prices.

System alternatives are alternatives to the proposed action that would make use of or modify other existing or proposed systems to meet the stated objectives of the proposed project. A system alternative would make it unnecessary to construct all or part of the proposed project, although some modifications or additions to another existing system may be required to increase its capacity, or another entirely new system may need to be constructed. Such modifications or additions would result in environmental impacts that could be less than, similar to, or greater than those associated with the proposed project. The Export Project and BOG/Truck Project could, in theory, be system alternatives to each other, since they both serve to maintain cryogenic operations of the facility. However, both projects meet the project goal through slightly different mechanisms and result in complementary factors allowing Freeport LNG to maintain the operational viability of the terminal. We have not identified any additional system alternatives that could result in less environmental impacts than the proposed Freeport Projects.

Regarding site alternatives, the site for the Phase I unloading dock represents the only viable site for the proposed equipment modification for the Export Project. Therefore, no site alternative has been identified that would allow for the export to ships. The BOG liquefaction equipment and LNG truck delivery sites were selected by Freeport LNG on the basis of compatibility with the existing plant equipment layout, ease of functional integration, and availability of open space. All the facilities occur within the existing operational footprint of the Phase I terminal, where environmental impacts are not significantly different from one location to another. Therefore, no alternative sites were identified for the BOG/Truck Project. Because discharge of ballast water within the marine berth would be necessary and in compliance with all applicable guidelines and regulations, there is no feasible alternative for the discharge of ballast water.

4.0 STAFF'S CONCLUSIONS AND RECOMMENDATIONS

We conclude that approval of this proposal would not constitute a major federal action significantly affecting the quality of the human environment. This finding is based on the above Environmental Assessment; and Freeport LNG's applications and supplemental filings. We recommend that the Commission Order contain a finding of no significant impact and include the mitigation measures listed below as conditions to any Certificate the Commission may issue.

1. Freeport LNG shall follow the construction procedures and mitigation measures described in its application(s) and supplement filings (including responses to staff data requests) and as identified in the Environmental Assessment unless modified by the Order. Freeport LNG must:

    a. request any modification to these procedures, measures, or conditions in a filing with the Secretary;
    b. justify each modification relative to site-specific conditions;
    c. explain how that modification provides an equal or greater level of environmental protection than the original measure; and
    d. receive approval in writing from the Director of OEP before using that modification.

2. The Director of OEP has delegated authority to take all steps necessary to ensure the protection of life, health, property and the environment during construction and operation of the project. This authority shall include:

    a. stop-work authority and authority to cease operation; and
    b. the design and implementation of any additional measures deemed necessary to assure continued compliance with the intent of the conditions of the Order.

3. **Within 60 days of the acceptance of this authorization and before construction begins**, Freeport LNG shall file an Implementation Plan with the Secretary for review and written approval by the Director of OEP. Freeport LNG must file revisions to the plan as schedule changes. The plan shall identify:

    a. how Freeport LNG will implement the construction procedures and mitigation measures, if any, described in its application (including responses to staff data requests), identified in the EA, and required by the Order;
    b. the training and instructions Freeport LNG will give to all personal involved with construction; and

c. provide a Gantt or PERT chart (or similar project scheduling diagram) and dates for start and completion of project.

4. Beginning with the filing of its initial Implementation Plan, Freeport LNG shall file updated status reports with the Secretary on a biweekly basis until all construction and restoration activities are complete. On request, these status reports will also be provided to other federal and state agencies with permitting responsibilities. Status reports shall include:

   a. an update on Freeport LNG's efforts to obtain the necessary federal authorizations;
   b. the construction status of the Freeport LNG Export and BOG/Truck Projects and work planned for the following reporting period;
   c. a listing of all problems encountered and each instance of noncompliance observed by the environmental inspector(s) during the reporting period (both for the conditions imposed by the Commission and any environmental conditions/permit requirements imposed by other federal, state, or local agencies);
   d. a description of the corrective actions implemented in response to all instances of noncompliance, and their cost;
   e. the effectiveness of all corrective actions implemented;
   f. a description of any landowner/resident complaints which may relate to compliance with the requirements of the Order, and the measures taken to satisfy their concerns; and
   g. copies of any correspondence received by Freeport LNG from other federal, state, or local permitting agencies concerning instances of noncompliance, and Freeport LNG's response.

5. Freeport LNG shall not begin construction of the Freeport LNG Export and BOG/Truck Projects until it files with the Secretary correspondence from the Texas Railroad Commission confirming that no additional permits are required for compliance or that the Projects are consistent with the Coastal Zone Management Act.

The following measures shall apply to the Freeport LNG design and construction details for the proposed modifications. Information pertaining to these specific recommendations should be filed with the Secretary for review and approval by the Director of OEP either: prior to initial site preparation; prior to construction of final design; prior to commissioning; or prior to commencement of service as indicated by each specific condition. Specific engineering, vulnerability, or detailed design information meeting the criteria specified in Order No. 683 (Docket No.

RM06-24-000), including security information, should be submitted as critical energy infrastructure information (CEII) pursuant to 18 CFR 388.112. See Critical Energy Infrastructure Information, Order No. 683, 71 Fed. Reg. 58,273 (October 3, 2006). FERC Stats. & Regs. ¶ 31,228 (2006). Information pertaining to items such as: offsite emergency response; procedures for public notification and evacuation; and construction and operating reporting requirements would be subject to public disclosure. This information should be submitted a minimum of 30 days before approval to proceed is required.

6. Complete plan drawings and a list of the hazard detection equipment shall be filed **prior to initial site preparation**. The list shall include the instrument tag number, type and location, alarm locations, and shutdown functions of the proposed hazard detection equipment. Plan drawings shall clearly show the location of all detection equipment.

7. Complete plan drawings and a list of the fixed and wheeled dry-chemical, fire extinguishing, and other hazard control equipment shall be filed **prior to initial site preparation**. The list shall include the equipment tag number, type, size, equipment covered, and automatic and manual remote signals initiating discharge of the units. Plan drawings shall clearly show the planned location of all fixed and wheeled extinguishers.

8. Facility plans showing the proposed location of, and area covered by, each monitor, hydrant, deluge system, hose, and sprinkler, as well as piping and instrumentation diagrams, of the fire water system shall be filed **prior to initial site preparation**.

9. The **final design** of the fixed and wheeled dry-chemical, fire extinguishing hazard control equipment shall identify manufacturer and model.

10. The **final design** shall include a HAZOP review of the completed design. A copy of the review and a list of the recommendations and results shall be filed.

11. Documentation and information shall be provided **during final design** regarding the statements made by Freeport LNG in filings on January 14, January 22, and February 4, 2009, which indicate that certain features would be included or considered in the final design. The final design shall specifically address response number 7 in the January 14 filing; response numbers 15, 16, 31, 34, and 35 in the January 22 filing; and response numbers 25, 26, 30 and Attachment 1 in the February 4 filing using management of change procedures.

12. Progress on construction of the project shall be reported in **monthly** reports filed with the Secretary. Details shall include a summary of activities, projected schedule for completion, problems encountered and remedial actions taken. Problems of significant magnitude shall be reported to the FERC **within 24 hours**.

13. Freeport LNG shall update its Emergency Response Plan to address a potential LNG truck accident at any location along the truck route on Quintana Island and to coordinate procedures with state, county, and local emergency planning groups; fire departments; state and local law enforcement; and appropriate federal agencies. The updates to the Emergency Response Plan shall be prepared in consultation with appropriate agencies and filed with the Secretary for review and written approval by the Director of OEP **prior to initial site preparation**.

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