
ENVIRONMENTAL ASSESSMENT REPORT

Name of Applicant: Floridian Natural Gas Company LLC (FGS)

Date Filed: September 4, 2013

Docket No: CP13-541-000 – Amendment

Type: Section 157 and Section 7(c)

Cost: Not Mentioned

Facilities:

On September 4, 2013, Floridian Natural Gas Storage Company, LLC (FGS) filed an abbreviated application to amend the authorization granted on August 29, 2008, by the Federal Energy Regulatory Commission (FERC or Commission) pursuant to Section 7(c) of the Natural Gas Act and Part 157 of the Commission's regulations in the Order in Docket No. CP08-13-000 (Order 1) and then amended by the Commission in Docket No. CP12-100-000 (Order 2) on August 31, 2012. Order 1 authorized FGS to construct, own, and operate a new liquefied natural gas (LNG) storage facility and ancillary facilities to be located near Indiantown in Martin County, Florida. Order 2 authorized FGS to redeliver natural gas in its liquefied state to transporting vehicles provided by FGS' customers in the normal course of business. To date, no construction has commenced on the FGS LNG facility.

Order 1 authorized two 4 billion cubic feet (Bcf) full containment tanks, systems for liquefaction; vapor handling and revaporization; natural gas liquid (NGL) storage vessels; one metering and regulating station; one 4-mile-long, 12-inch-diameter receiving pipeline; one 4-mile-long, 24-inch-diameter sendout pipeline; and one truck loading station. In addition, in Order 1, FGS was authorized to complete the LNG Project in two phases, Phases 1 and 2. In this proposed Project Amendment, FGS currently proposes to modify only Phase 1 facilities, by changing the 4 Bcf full containment tank to a 1 Bcf single containment tank and reducing the associated vaporization capacity proportionately, from the original 400 million cubic feet (MMcf) per day to 100 MMcf per day. In addition, Order 1 authorized a vapor handling system using five 1,700-horsepower (hp) reciprocating boil-off gas compressors and five 650-hp reciprocating tail gas compressors. In the current amendment, FGS is proposing to revise the vapor handling system to one 1,622-hp boil-off gas compressor and one 400-hp tail gas compressor. Construction activities for Phase 1 are expected to take approximately 22 months.

Environmental Impact -- Conclusions:

Categorical Exclusion

Deficiency Letter Required

Environment Not Involved

EA/EIS Required

Environment Complete

No NOI Required

NOI Required

Environmental Considerations or Comments:

See the attached Environmental Assessment.

Prepared by:
Kandilarya Barakat

Date:
6/10/2015

Approved by Branch Chief:

Date:



**Federal Energy
Regulatory
Commission**

**Office of
Energy Projects**

June 2015

Floridian Natural Gas Company, LLC

FERC Docket No. CP13-541-000

FLORIDIAN NATURAL GAS AMENDMENT PROJECT

Environmental Assessment

A. PROPOSED ACTION

1. Introduction

On September 4, 2013, Floridian Natural Gas Storage Company, LLC (FGS) filed an abbreviated application to amend the authorization granted on August 29, 2008 by the Federal Energy Regulatory Commission (FERC or Commission) pursuant to Section 7(c) of the Natural Gas Act and Part 157 of the Commission's regulations for a Certificate of Public Convenience and Necessity (Certificate) in the Order in Docket No. CP08-13-000¹ (Order 1). FGS' authorization was then amended by the Commission in Docket No. CP12-100-000² (Order 2) on August 31, 2012. Order 1 authorized FGS to construct, own, and operate a new liquefied natural gas (LNG) storage facility and ancillary facilities to be located near Indiantown in Martin County, Florida (referred to as the LNG Project). Order 2 authorized truck loading of LNG on a non-emergency basis and did not require any modifications to the previously authorized truck loading facilities approved under Order 1. All modifications in FGS' current amendment would be located on the previously authorized site in Martin County, Florida (referred to as the Project Amendment). To date, no construction has commenced on the authorized FGS LNG Project facility.

Order 1 authorized two 4 billion cubic feet (Bcf) full containment tanks; systems for liquefaction; vapor handling and revaporization; natural gas liquid (NGL) storage vessels; one metering and regulating station; one 4-mile-long, 12-inch-diameter receiving pipeline; one 4-mile-long, 24-inch-diameter sendout pipeline; and one truck loading station. In addition, in Order 1, FGS was authorized to complete the LNG Project in two phases, Phases 1 and 2. In this Project Amendment, FGS currently proposes to modify only Phase 1 facilities, by changing the 4 Bcf full containment tank to a 1 Bcf single containment tank (Tank 1) and reducing the associated vaporization capacity proportionately, from the original 400 million cubic feet (MMcf) per day to 100 MMcf per day. In addition, Order 1 authorized a vapor handling system using five 1,700-horsepower (hp) reciprocating boil-off gas compressors and five 650-hp reciprocating tail gas compressors. In the current amendment, FGS is proposing to revise the vapor handling system to one 1,622-hp boil-off gas compressor and one 400-hp tail gas compressor. Construction activities for Phase 1 are expected to take approximately 22 months.

The purpose of this environmental assessment (EA) is to address the potential environmental impacts on the proposed amendment project in compliance with the requirements of the National Environmental Policy Act of 1969 (NEPA), the Council on Environmental Quality regulations for implementing NEPA (Title 40 of the Code of Federal Regulations [CFR], Parts 1500-1508) and the FERC's implementing regulations

¹ Floridian Natural Gas Storage Company, LLC, 124 FERC ¶ 61,214 (2008)

² Floridian Natural Gas Storage Company, LLC, 140 FERC ¶ 61,167 (2012)

(18 CFR 380). We³ prepared this EA to analyze the environmental impacts of the proposed action, assess reasonable alternatives to the proposed action that would avoid or minimize adverse effects on the environment, and identify specific mitigation measures, as necessary, to reduce impacts. This EA will be used by the Commission in its decision-making process. The U.S. Department of Transportation (DOT) is a cooperating agency in the preparation of this EA.

2. Background

On July 11, 2008, the Commission issued a Final Environmental Impact Statement (FEIS) for the FGS LNG Project under Docket No. CP08-13-000. The FEIS was prepared to satisfy the requirements of the National Environmental Policy Act. The FEIS concluded that the proposed LNG Project, with the appropriate mitigation measures as recommended, would have limited adverse environmental impact.

On June 20, 2014, FGS filed a letter stating that Gerdau, the current owner of the FGS LNG Project site that was authorized in Order 1 intends to perform certain work on the site. Before FGS obtained its Certificate in Order 1 and continuing to the present, FGS has had an exclusive option to purchase the project site from Gerdau. The property has remained under Gerdau's control. Gerdau as the current and long-time owner has been engaged in remediation on the property, a SuperFund site. Gerdau has advised FGS that, in an effort to bring a close to those remediation efforts and confirm that there were no outstanding SuperFund issues, it would begin in the summer of 2014 to remove the remaining foundations of the steel mill formerly on the site. The work to be done would prepare the property for any future use and would be necessary for Gerdau to close on the sale of the property.

Also stated in the letter, Gerdau has been communicating with the Florida Department of Environmental Protection (FDEP) and the U.S. Environmental Protection Agency (EPA) on the final phase of remediation for groundwater at the LNG Project site. In addition, Gerdau is making progress in finalizing the new institutional controls with the FDEP and EPA. When they are finalized they would become integral to the final remedy for the groundwater contamination on the small southwest corner of the property. In the future, Gerdau is planning to remove few remaining foundations from the original steel mill plant. No major issues are expected to arise from this work but it is beneficial to prepare it for the future when FGS decides to commence construction of the approved project as stated in Order 1. On April 27, 2015, FGS filed a letter under Order 1 stating that the Declaration of Restrictive Covenants (Declaration) by Gerdau to FDEP has been approved by the EPA, a third party beneficiary under the Declaration, executed by Gerdau and FDEP, and recorded with Martin County, Florida. FGS filed a copy of the executed and recorded Declaration with the letter. In addition, the letter stated that Gerdau advised FGS that the demolition work would commence the first week of May 2015 and would be concluded by the end of June 2015. FGS would notify FERC when the work is completed.

³ "We," "us," and "our" refer to the environmental staff of the Office of Energy Projects (OEP).

3. Proposed Action/Purpose and Need

FGS states in its application that the proposed amendment is an adaptation to a changed natural gas market. FGS states that the smaller modified Phase 1 facilities, with a shorter construction period, can meet FGS' customers volume and time requirements. FGS remains in active negotiations of commercial arrangements with additional customers, and has received expressions of interest from multiple sections in Florida.

Under Section 7(c) of the Natural Gas Act, the Commission determines whether interstate natural gas transportation facilities are in the public convenience and necessity and, if so, grants a Certificate to construct and operate them. The Commission bases its decisions on technical competence, financing, rates, market demand, gas supply, environmental impact, long-term feasibility, and other issues concerning a proposed project. The scope of this EA discusses the environmental impacts of constructing and operating FGS' proposed amended facilities.

4. Permits and Approval

FGS stated that it renewed federal and state permits since the issuance of the FEIS and that the previously-issued clearance letters from the U.S. Fish and Wildlife Service (FWS) dated March 21, 2007 and April 30, 2008, and from the Florida State Historic Preservation Officer (SHPO) dated June 25, 2007, are still valid for the proposed amendment. FERC staff contacted the FWS and confirmed that since the Project Amendment involves minor changes to the design both letters are still valid from the FWS. All of the federal and state permits have been updated to reflect the revised footprint as necessary since the issuance of the FEIS.

Under 49 United States Code 60101, the U.S. Department of Transportation (DOT) has prescribed the minimum federal safety standards for LNG facilities. Those standards are codified in 49 CFR 193 and apply to the siting, design, construction, operation, maintenance, and security of LNG facilities. The National Fire Protection Association (NFPA) Standard 59A, "*Standard for the Production, Storage, and Handling of Liquefied Natural Gas*," is incorporated into these requirements by reference, with regulatory preemption in the event of a conflict. The DOT does not issue a permit or license but, as a cooperating agency, assists FERC staff in evaluating whether an applicant's proposed design would meet the DOT requirements. DOT staff has reviewed FERC staff's analysis and provided comments on our conclusions regarding compliance with Part 193 regulations.

B. ENVIRONMENTAL ANALYSIS

The FEIS is incorporated by reference for the purposes of our review. FGS would implement the Commission's 2013 version *Upland Erosion Control, Revegetation and Maintenance Plan* (Plan) and the *Wetland and Waterbody Construction and Mitigation*

Procedures (Procedures), for the construction of the proposed amendment. We conclude that all of the modified facilities associated with this amendment should comply with and be constructed in accordance with the environmental conditions and authorizations granted in Order 1 and Order 2.⁴ To ensure this occurs, **we recommend that:**

- **Prior to initial site preparation, FGS should file with the Secretary of the Commission (Secretary) for review and written approval by the Director of the Office of Energy Projects (OEP), certification that the conditions from the August 29, 2008 and August 31, 2012 Orders (Docket Numbers CP08-13-000 and CP12-100-000) would be incorporated in the design for FGS' amendment.**

Based on our review of the previously authorized facilities, and because the proposed facility modifications reduce the size of the Phase 1 storage tank and its associated vaporization equipment, the Phase 1 facilities as modified would reduce the footprint of overall impacts when compared to those of the originally certificated facilities. We have determined that FGS' proposed Project Amendment would not result in any additional impact or significant impact on the following resources discussed in the FEIS:

- vegetation, fish, and wildlife (including migratory birds);
- threatened and endangered species;
- water resources, including surface waters and groundwater;
- cultural resources;
- socioeconomics;
- soils; and
- land use.

Because these resources would not be impacted by the Project Amendment, we are not addressing them further in this analysis. This EA discusses impacts on geological resources, air quality and noise, reliability and safety, and alternatives to the proposal.

In addition, the proposed facility modifications would reduce the construction workforce from a peak of 450 to 300 to an average from 270 to 200. In addition, the construction timetable would be reduced from 36 months to 22 months. The permanent staff to operate the LNG Project, as modified, remains the same as originally estimated. FGS would employ three shifts daily during the project operation, with approximately 20 employees at the largest shift.

⁴ We note that conditions 42, 45, 47, and 68 in the Appendix to Order 1 would not be applicable to the amended Phase 1 facilities due to the proposed project modifications.

1. Geological Resources

The FEIS for the facility incorporated FGS' site Seismicity Study for the project, prepared by Golder Associates (Revision 3 dated March 2008), which satisfied both NFPA 59-A (2001) and NFPA 59-A (2006) seismic criteria requirements. In August 2010, the DOT adopted NFPA 59-A (2006) for its seismic criteria requirements for LNG storage tanks and associated safety systems. Therefore, the 2008 FEIS is still valid and does not need to be updated. Table 1 provides a timeline summary of the applicable regulations and information filed by FGS regarding LNG design requirements.

The Project Amendment to the application has revised the design of one of the two LNG tanks to a smaller single-containment steel tank surrounded by a 30-foot-high mechanical stabilized earth secondary containment structure. An update to the Geotechnical Investigation was prepared by Golder Associates (dated October 2013) which presents Geotechnical Design Recommendation for the single containment tank and the mechanically stabilized earth secondary containment structure.

Document or Regulation	Date
NFPA 59-A (2001)	2001
FGS' Original Geotechnical Analysis	July 2007
FGS - Site Seismicity Study (Revision 3)	March 2008
The Commission's 2008 FEIS for the LNG Project	July 2008
DOT adopted NFPA 59-A (2006) in 49 CFR 193	Adopted in August 2010
FGS' updated Geotechnical Investigation with Design Recommendations	October 2013 (filed with FERC August 5, 2014)

Geologic Conditions, Resources, and Hazards

The Project Amendment is located within the Atlantic Coastal Plain geomorphic province which is characterized by relatively low topographic relief and is underlain by unconsolidated sediments and sedimentary rock.

The LNG Project site is relatively level with grade elevations varying between 33 and 38 feet about sea level (National Geodetic Vertical Datum of 1929). A steel manufacturing facility (now abandoned) was previously located on the site. The facility has been closed for many years and was the subject of a remedial action under the EPA-supervised Superfund program. There continues to be some groundwater remediation on-going at the site. A lined and capped containment facility (land vault) for contaminated soils is adjacent to the site. Many large shallow foundations and building remains exist on the site from the abandoned facility.

The project site is underlain by a mix of sand, shell, limestone, and clay. From ground level to a depth of approximately 5 to 10 feet, the site geology is dominated by various soils, including Urban Land, Lawnwood fine sand, Myakka fine sand, Waveland sand, Immokalee sand. Below the surficial soil horizons are the Plio-Pliocene-aged sands, sandy limestone, clay, and shell beds present to a depth below ground level of 135 feet to 175 feet. The upper six feet of these sediments is a dense hardpan layer. These sediments are representative of the Pamlico sand, Calooshatchee Marl, and the Tamiami, Anastasia and Fort Thompson Formations. The Plio-Pliocene sediments unconformably overlie the dense, phosphatic clays of the Miocene-aged Hawthorn Group.

The Hawthorn Group sediments extend from between 175 feet and 763 feet below the ground surface. The Hawthorn Group is a complicated unit consisting of interbedded and intermixed carbonate and siliciclastic sediments containing varying percentages of phosphate grains. The upper portion of the Group is typically well indurated and contains primarily interbedded sands and clays. The lower portion of the Group is more indurated and contains primarily carbonates. The exact composition of the Hawthorn Group is of importance to the project structures due to the overall compressibility of this formation. Lying below the Hawthorn Group and Suwanee Limestone sediments at depths of approximately 700 to 900 feet below the ground surface is the Eocene-aged Ocala Limestone. Below the Ocala Limestone, the Avon Park Formation extends to a depth of approximately 1,900 feet below the ground surface, and below the Avon Park Formation the Oldsmar Formation extends to depth of approximately 3,500 feet below the ground surface.

Mineral Resources

Florida has a variety of non-fuel minerals and isolated pockets of fossil fuel resources. Important non-fuel minerals include heavy minerals (i.e., ilmenite, rutile, zircon, and leucosene), phosphate rock, sand and gravel, and peat (FDEP, 2014). According to McClellan and Eades (1997), Martin County does not possess mineral resources in economic quantities; state mapping does not show any mines within 0.25 mile of the project area (FDEP, 1996). Therefore, the project would not affect extractive resources.

Geologic Hazards

Geologic hazards are naturally occurring physical conditions that are capable of producing property damage and loss of life. Typically, these potential hazards could include seismic related issues such as ground rupture due to faulting, strong ground shaking, liquefaction, subsidence, floods, and karst terrain. These conditions are discussed below. Golder Associates, Inc. (2007) conducted a detailed geotechnical site investigation and site-specific seismic hazard analysis for the LNG Project. The findings and conclusions regarding geological hazards, foundation design requirements, and seismic design are summarized below.

Seismicity and Faulting

Generally, there are no known major fault systems beneath the Florida Platform and there is no evidence of major active faulting or deformation in Florida during the Holocene Epoch. No faults are known to be active in Pleistocene time in Martin County. Therefore, the potential for surface faulting at the site is considered extremely remote. The site is located in area of low seismicity and is assigned Seismic Zone 0 based on the Uniform Building Code's Seismic Risk Map (International Conference of Building Officials 1997). Therefore, seismicity is generally not considered a controlling factor in the facility design.

FGS conducted a site-specific hazard evaluation of the LNG facility. The site specific evaluation determined that the peak ground acceleration including site effects is 0.067 gravity (g) for a 2 percent probability in 50 years which is extremely low compared to other locations in the United States.

Hurricanes, Tsunamis and Associated Coastal Processes

The LNG Project site is located inland from Atlantic Ocean by more than 30 miles and is at elevation ranging between 33 and 38 feet. Along the Gulf and Atlantic coasts, the potential wave run-up due to hurricane storm surge is far greater than any potential tsunami wave run-ups. The distance of the site and its elevation above sea level indicate therefore a negligible probability of significant impacts from tsunamis, hurricane storm surge, or associated coastal processes at the site.

Although the facility is located inland it is still subject to hurricane force winds. The facility would be designed to satisfy 49 CFR Part 193.2067. The LNG tanks would be designed to withstand sustained winds of 150 miles per hour and the remaining LNG facilities would be to withstand winds of 130 miles per hour.

Seiches

The site is approximately 8 miles to the east of Lake Okeechobee. The normal water elevation of the lake is approximately 14 feet above mean sea level. The distance of the site from Lake Okeechobee, the elevation of the site above the lake level, and the low probability of strong earthquake ground motions indicate a negligible probability of significant site impacts from seiches.

Soil Liquefaction, Lateral Spreading and Seismic Settlement

Liquefaction is a phenomenon in which the strength and stiffness of a soil is reduced by earthquake shaking or other rapid loading. Liquefaction occurs in saturated soils in which the space between individual soil particles is completely filled with water. When liquefaction occurs, the strength of the soil decreases and its ability to support structural foundations is reduced. Because the project site has medium to very dense

soils and the safe shutdown earthquake (SSE) design ground motions are very low, liquefaction in soils below the LNG tank foundations and at other portions has a negligible probability of occurring. Because liquefaction is not expected to occur during the SSE, liquefaction induced settlements or lateral spreading ground movements are not expected at the site. Also, because of the low level of SSE shaking, and the medium to very dense soils at the site, significant seismic compaction settlements are not expected at the site.

Subsidence

The two most significant geologic hazards at the site are associated with the potential for sinkhole activity or subsidence. Subsidence hazards involve either the sudden collapse of the ground to form a depression or the slow subsidence or consolidation of the sediments near the Earth's surface. Based on published information indicating a lack of active sinkholes in vicinity of the site, and the fact that clayey silt of the Hawthorn Formation was encountered at depth in all borings, sinkhole potential at the site is considered low. Anticipated subsidence and settlements associated with consolidation of clays within the Hawthorn Group are considered manageable through surcharging and engineering improvements of the subsurface soils.

Foundation Conditions and Proposed Foundations

The measured shear wave velocity of the soil profile at the site increases nonlinearly from approximately 260 feet per second (fps) from the ground surface to about 1,000 fps at a depth 100 feet below the ground surface. The weighted shear wave velocity in the upper 100 feet of the soil profile is about 750 fps. This characterizes the soil profile as Site Classification D (stiff soil) in accordance with provisions of the 2006 International Building Code and American Society of Civil Engineers ASCE 7-05.

The site would be cleared, grubbed, and stripped of vegetation and existing foundations would be broken up and removed. Surficial soils would be stripped and engineering fill recompacted to a depth determined during detailed design. Surcharging was proposed for the construction of the LNG tanks (Golder, 2007) to reduce post-construction settlements. However, due to the smaller height and loading of the proposed Tank 1 under the Project Amendment (2,700 pound per square foot (psf) versus 5,700 psf), calculated settlements (Golder, 2013) are now acceptable and no surcharging is proposed for Tank 1. Surcharging would still be required for the authorized Tank 2 when it is constructed.

The major equipment and foundations (including the LNG tank) are proposed to be supported by shallow reinforced concrete mat foundations. The proposed single containment LNG tank would be supported on a 186-foot-diameter ring wall foundation while the authorized full containment tank would be supported on mat foundation (300 feet diameter), 3-to 4-feet-thick at the edge and taper to 2-feet-thick at the center. Both of the LNG tank foundations would have the following settlement tolerances:

- tilting settlement of less than 6 inches;
- out of plane settlement of the outer tank shell of less than 1.25 inches in a 100-foot arc length;
- center to edge dishing settlements of less than 6 inches; and
- after connections to the tank are made, a total settlement of less than 1 inch.

Mitigation Measures and Conditions

The design of the facility is currently at the Front End Engineering Design (FEED) level of completion. FGS has proposed a feasible design and it has committed to conducting a significant amount of detailed design work for the LNG facility if the Project Amendment is authorized by the Commission. Information regarding the development of the final design, as detailed below, would need to be reviewed by FERC staff in order to ensure that the final design addresses the requirements identified in the FEED. Further, the timing of the production of this information should occur as indicated below. Therefore, **we recommend:**

- **FGS should file the following information, stamped and sealed by the professional engineer-of-record, with the Secretary:**
 - a. **site preparation drawings and specifications prior to site preparation;**
 - b. **LNG tank and foundation design drawings and calculations prior to construction of the LNG tanks;**
 - c. **LNG liquefaction facility structures and foundation design drawings and calculations prior to construction of foundations; and**
 - d. **quality control procedures to be used for civil/structural design and construction prior to construction of foundations.**

In addition, FGS should file in its Implementation Plan, the schedule for producing this information.

2. Air Quality and Noise

Air Quality

As stated earlier, Order 1 authorized FGS to construct, own, and operate a new natural gas storage facility and ancillary facilities near Indiantown in Martin County, Florida. Martin County is classified as an attainment area for all criteria pollutants. Adjacent Counties, such as St. Lucie, Okeechobee, and Palm Beach Counties are also classified as attainment areas for all criteria pollutants.

This section summarizes the changes in air emissions associated with FGS proposed modifications to the natural gas storage tank and vaporization systems Certificated in Docket No. CP08-13-000 on August 29, 2008. Table 2 summarized the changes in operational emissions due to the proposed modifications.

Emission Units	Certificated		Proposed	
	Capacity	Number of Units/ Hours of Operation (hrs/yr)	Capacity	Number of Units/ Hours of Operation (hrs/yr)
003 – Emergency Fire Water Pump	298 kW	1-Unit 250 (hrs/yr)	298 kW	1-Unit 100 (hrs/yr)
004 – Emergency Generator	3,500 kW (2) 3,000 kW (2)	4-Units 250 (hrs/yr)	300 kW	1-Unit 100 (hrs/yr)
005 – Amine System Heaters	10 MMBtu	2-Units 7,560 (hrs/yr)	Eliminated from Design	Eliminated from Design
006 – Water Ethylene Glycol (WEG) Heater	98 MMBtu/hr	8-Units 1,040 (hrs/yr)	65 MMBtu/hr	5-Units 1,040 (hrs/yr)
007 – Regeneration Gas Heaters	6.8 MMBtu/hr	2-Units 7,560 (hrs/yr)	9.1 MMBtu/hr	4-Units 8,400 (hrs/yr)
008 – Amine System Vents	NA	2-Units 5,760 (hrs/yr)	NA	4-Units 8,400 (hrs/yr)

kW - kilowatt
MMBtu – million British thermal units
NA – Not Applicable

In addition to the changes described in table 2, two new air emission sources have been added to the facility design, an emergency flare and fuel gas heater. Under normal operations the flare would produce emissions from pilot burner operation and from flaring of tank boil-off vapors when the boil off gas compressor is shut down for routine maintenance. The fuel gas heater would heat the gas supplied to the vaporizer heater and the rest of the LNG facility. Table 3 summarizes the operational emissions of the new emission sources.

Emission Units	Certificated		Proposed	
	Capacity	Number of Units/ Hours of Operation (hrs/yr)	Capacity	Number of Units/ Hours of Operation (hrs/yr)
009-System Flares	NA	NA	0.39 MMBtu/hr Pilot	8,760 - Pilot
010-Fuel Gas Heaters	NA	NA	0.33 MMBtu/hr	4-Units 2,000 (hrs/yr)

Table 4 provides a summary of the overall emission changes as a result of the proposed modifications to the project. Detailed emission estimates are provided within the revised FDEP Minor Sources Air Construction Permit Application. As shown in table 4, the proposed changes would result in a decrease or no change in emissions of all

pollutants except volatile organic compounds (VOCs) and greenhouse gases (GHGs). The minor increases in VOC and GHG would not result in any change in regulatory applicability or regulatory requirements. As stated in the FEIS for Docket No. CP08-13-000, the project would remain a minor source under Prevention of Significant Deterioration (PSD) review for all pollutants including GHGs emissions.

Pollutant	Certificated Potential to Emit tons per year (TPY)	Potential to Emit (TPY)	Net Change (TPY)
SO ₂	4	2	-2
PM(Total)	7	4	-3
PM (Filterable)	3	3	0
PM (Condensable)	3	2	-1
NO _x	60	26	-34
CO	48	26	-22
VOC	46	54	8
GHG	68,515	69,350	835
HAPs	0.14	0.05	-0.09
SO ₂ : sulfur dioxide, PM: particulate matter, NO _x : nitrogen oxides, CO: carbon monoxide, HAPs: hazardous air pollutants.			

The proposed changes would result in a reduction of emissions for all pollutants except for VOC which has a slight increase from 46 to 50 tons per year (TPY). The project is not subject to PSD, Non-attainment New Source Review, or National Emission Standards for Hazardous Air Pollutants regulations. On March 18, 2014, FGS filed a revised application of the proposed emissions with the FDEP to revise its current air permit.

Based on the attainment status of the area, the emission reduction associated with the proposed modification, the slight increase in VOC emissions would not be significant; therefore, the Project Amendment would not have a significant impact on air quality.

Noise

The operational noise associated with the proposed amendment would result in less noise impact since the boil off gas, tail gas blending, and air compressors have been revised in-footprint. The operational noise of the storage facility that was addressed in the FEIS and the operational noise due to the modification are presented in table 5.

Table 5 Estimated Operational Noise Due to Modifications						
Nearby Noise Sensitive Areas (NSA) ¹	Distance and Direction of NSA to LNG Facility	Existing Ambient Noise L _{dn} ³ (dBA)	Estimated Noise L _{dn} (dBA)	Total Estimated Noise Plus Ambient L _{dn} (dBA)	Estimated Noise due to proposed modification L _{dn} (dBA)	Total Estimated Noise due to modification Plus Ambient L _{dn} (dBA)
Northwestern Property Boundary (Site 1)	--	65	56.2	65.5	40.1	65
Northwestern Property Boundary (Site 2)	--	64	49.1	64.1	50.9	64
Northwestern Property Boundary (Site 3)	--	46	64.5	64.6	64.5	65
Northwestern Property Boundary (Site 4)	---	52	68.1	68.2	58.7	60
NSA # 1 (Site 5)	2,450 southeast	51	48.8	53	46.3	52.2
NSA # 2 (Site 6)	6,500 east	50	38.7	50.3	36.5	50.1
1: Noise sensitive areas that were stated in the noise section of the FEIS (issued July 2008). 2: The ambient noise that was stated in the noise section of the FEIS (issued July 2008). 3: Day-night average sound level 4: decibels on the A-weighted scale						

As shown in table 5, the proposed modification would result in a slight decrease in the total noise. However, to ensure that the operation of the proposed LNG facility does not exceed the levels analyzed in the FEIS and in this EA, **we recommend that:**

- FGS should make all reasonable efforts to assure its predicted noise levels from the LNG facility (including proposed amendment facilities) are not exceeded at nearby noise sensitive areas and file noise surveys showing this with the Secretary no later than 60 days after placing the LNG facility in service. However, if the noise attributable to the operation of the LNG storage facility (including proposed amendment facilities) at full load exceeds a day-night average sound level of 55 decibels on the A-weighted scale at any nearby noise sensitive areas, FGS should file a report on what changes are needed and should install additional noise controls to meet the level within 1 year of the in-service date. FGS should confirm compliance with this requirement by filing a second noise survey with the Secretary no later than 60 days after it installs the additional noise controls.**

Based on the noise reduction anticipated with the proposed Project Amendment and the mitigation measure in the above recommendation, we conclude that the proposed modification would not result in a significant effect on the noise environment.

3. Reliability and Safety

As stated previously in Section A., FGS is amending its previously-approved project in Docket Nos. CP08-13-000 and CP12-100-000. In this amendment, FGS proposes to modify the following major Phase 1 project components:

- LNG Storage Tank 1 - 288,360-barrel (1 Bcf) single containment LNG storage tank with bottom withdrawal and external LNG pumps. The Phase 1 storage tank would be double wall steel with an external mechanically stabilized earth berm. The storage tank is being modified from one 4-Bcf full containment tank with internal and external LNG pumps.
- LNG Pumps - one external 865-gallon-per-minute (gpm) LNG sendout pump and one external 600-gpm LNG truck loading pump within the mechanically stabilized earth berm. The LNG pumps are being modified from three (one backup) internal 2,100-gpm (1,800-gpm sendout plus 300-gpm truck loading) primary LNG pumps and three (one backup) 1,800-gpm external booster pumps.
- LNG Vaporization System – one 100-MMcf per day shell and tube vaporizer using a water-ethylene-glycol loop as the intermediate heat transfer fluid. The proposed vaporizer would be within the mechanically stabilized earth berm. The vaporization system is being modified from two 200-MMcf per day shell and tube vaporizers.
- Boiloff Vapor Handling System – one 1,622-hp reciprocating boil-off gas compressor and one 400-hp reciprocating tail gas compressor. The vapor handling system is being modified from five 1,700-hp reciprocating boil-off compressors coupled with five 650-hp reciprocating tail gas compressors.

FGS also proposes to: add a heavy ends heater; add a tail gas aftercooler; reduce the refrigerant storage vessel capacity; reduce the firewater system capacity; reduce the amine storage tank capacity; remove the instrument air nitrogen backup system; remove the natural gas liquids (NGL) storage system; reconfigure the vent stack separator (S-3003) to a flare knockout drum; and replace the elevated vent with a flare stack.

Only the components modified by FGS' amendment were analyzed by FERC staff in the following EA sections.

Introduction

Operation of the amendment poses a potential hazard that could affect the public safety if strict design and operational measures to control potential accidents are not applied. The primary concerns are those events that could lead to an LNG spill that may result in an off-site hazard. The principal hazards associated with the amendment would result from loss of containment, vapor dispersion characteristics, and flammability of LNG. A loss of containment from the LNG process piping or storage tank would result in the formation of flammable vapor at the release location as well as from any LNG that pooled. Releases occurring in the presence of an ignition source would most likely result in a fire located at the source of the vapor. A spill 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.

As part of the review required for a FERC authorization, Commission staff must assess whether the proposed modified facilities address these hazards through appropriate design, construction, operation, and maintenance of the facility, as well, as with safety systems to detect and control potential hazards. The “Technical Review of the Preliminary Engineering Design” discussion below provides our review of the proposed facility design in this regard. In addition to such design features, siting of the facility with regard to potential off-site consequences can be further used to minimize impacts to public safety. As discussed in the “Siting Requirements” discussion below, DOT regulations in 49 CFR 193, Subpart B require a siting analysis be performed by FGS.

Technical Review of the Preliminary Engineering Design

As part of its application, FGS provided a front-end-engineering-design (FEED) for the modified components of the amendment. During our review process, we analyzed the information filed by FGS to determine the extent that layers of protection or safeguards to enhance the safety, operability, and reliability of the facility are included in the FEED.

The design would use process control valves and instrumentation to safely operate and monitor the amendment facilities. A distributed control system and operations personnel would oversee operations of the amendment and previously approved facilities. Hazard detection and control equipment would be installed to detect and mitigate process upsets. Prior to commencing operations, FGS would have to prepare emergency procedures manuals, as required by 49 CFR Part 193.2509. The emergency response procedures would incorporate the modified components of the amendment and the previously approved project facilities. A firewater system would incorporate the modified components and provide sufficient firewater coverage.

The modified components of the amendment would be secured within the fenced area of the previously approved facility. Therefore, no changes should be needed to the previous lighting and camera systems. Additionally, no changes should be needed to the facility security provisions, such as patrols and operator oversight.

We conclude that the use of appropriate control systems; remotely-operated control and isolation valves; emergency shutdown systems; pressure relief valves; spill containment; site security measures; and hazard detection and control equipment would mitigate the potential for a process upset to develop into an event that could damage the facility, injure operating staff, or impact the safety of the off-site public.

If the Commission authorizes FGS' proposal, the next phase of the amendment would include final selection of equipment manufacturers, process conditions, and resolution of safety-related issues. We do not expect that the detailed design information to be developed would result in changes to the basis of design, operating conditions, major equipment selections, equipment design conditions, or safety system designs which were presented as part of FGS' FEED. To ensure the final installation would be consistent with the safety and operability characteristics identified in the FEED, information, **we are recommending that the following measures should apply to the amendment. Information pertaining to these specific recommendations should be filed with the Secretary for review and written approval by the Director of OEP either: prior to initial site preparation; prior to construction of final design; prior to commissioning; prior to introduction of hazardous fluids; 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, will be subject to public disclosure. All information should be filed **a minimum of 30 days** before approval to proceed is requested.

- **Prior to initial site preparation**, FGS should file the quality assurance and quality control procedures for construction activities.
- **Prior to initial site preparation**, FGS should file an overall project schedule, which includes the proposed stages of the commissioning plan.

- **Prior to initial site preparation, FGS should file a plot plan of the final design showing all major equipment, structures, buildings, and impoundment systems.**
- **The final design should include change logs that list of the hazard and explain any changes made from the Front-End Engineering Design provided in FGS' application and filings. A list of all changes with an explanation for the design alteration should be provided and all changes should be clearly indicated on all diagrams and drawings.**
- **The final design should provide up-to-date Process Flow Diagrams (PFDs) with heat and material balances and Piping & Instrument Diagrams (P&IDs). The PFDs should include heat and material balances. The P&IDs should include the following information:**
 - a. equipment tag number, name, size, duty, capacity, and design conditions;
 - b. equipment insulation type and thickness;
 - c. storage tank pipe penetration size and nozzle schedule;
 - d. piping with line number, piping class specification, size, and insulation type and thickness;
 - e. piping specification breaks and insulation limits;
 - f. all control and manual valves numbered;
 - g. valve high pressure side and cryogenic ball valve internal and external vent locations;
 - h. relief valves with set points; and
 - i. drawing revision number and date.
- **The final design should include a list of all car-sealed and locked valves consistent with the P&IDs.**
- **The final design should provide an up-to-date complete equipment list, process and mechanical data sheets, and specifications.**
- **The final design should include the sizing basis and capacity for the vent stacks and the pressure and vacuum relief valves for major process equipment, vessels, and storage tanks.**
- **The final design should specify that for hazardous fluids, piping and piping nipples 2 inches or less in diameter are to be no less than schedule 160 for carbon steel and no less than schedule 80 for stainless steel, and are designed to withstand external loads, including vibrational loads in the vicinity of rotating equipment and operator live loads in areas accessible by operators.**

- The **final design** should include details of how process seals or isolations installed at the interface between a flammable fluid system and an electrical conduit or wiring system.
- The **final design** should provide electrical area classification drawings.
- The **final design** should provide spill containment system drawings with dimensions and slopes of curbing, trenches, and impoundments.
- The **final design** should include a drawing showing the location of the emergency shutdown (ESD) buttons. ESD buttons should be easily accessible, conspicuously labeled and located in an area which would be accessible during an emergency.
- The **final design** should include a plan for clean-out, dry-out, purging, and tightness testing. This plan should address the requirements of the American Gas Association's Purging Principles and Practice required by 49 CFR 193, and should provide justification if not using an inert or non-flammable gas for cleanout, dry-out, purging, and tightness testing.
- The **final design** should provide the procedures for pressure/leak tests which address the requirements of ASME VIII and ASME B31.3.
- **Prior to commissioning**, FGS should file plans and detailed procedures for: testing the integrity of onsite mechanical installation; functional tests; introduction of hazardous fluids; operational tests; and placing the equipment into service.
- **Prior to commissioning**, FGS should label piping with fluid service and direction of flow in the field in addition to the pipe labeling requirements of NFPA 59A.
- **Prior to commissioning**, FGS should maintain a detailed training log to demonstrate that operating staff has completed the required training.
- **Prior to introduction of hazardous fluids**, FGS should complete a firewater pump acceptance test and firewater monitor and hydrant coverage test. The actual coverage area from each monitor and hydrant should be shown on facility plot plan(s).

- **Prior to introduction of hazardous fluids**, FGS should complete all pertinent tests (Factory Acceptance Tests, Site Acceptance Tests, Site Integration Tests) associated with the Distributed Control System and the Safety Instrumented System that demonstrates full functionality and operability of the system.
- **Prior to commencement of service**, FGS should develop procedures for offsite contractors' responsibilities, restrictions, and limitations and for supervision of these contractors by FGS staff.

In addition, we recommend that the following measures should apply throughout the life of the facility:

- The facility should be subject to regular FERC staff technical reviews and site inspections on at least a biennial basis or more frequently as circumstances indicate. Prior to each FERC staff technical review and site inspection, FGS should respond to a specific data request, including information relating to possible design and operating conditions that may have been imposed by other agencies or organizations. Up-to-date detailed piping and instrumentation diagrams reflecting facility modifications and provision of other pertinent information not included in the semi-annual reports described below, including facility events that have taken place since the previously submitted semi-annual report, should be submitted.
- Semi-annual operational reports should be filed with the Secretary to identify changes in facility design and operating conditions, abnormal operating experiences, activities (including trucking, quantity and composition of feed gas and trucked LNG, liquefied and vaporized quantities, boil-off/flash gas, etc.), plant modifications, including future plans and progress thereof. Abnormalities should include, but not be limited to: trucking problems, storage tank stratification or rollover, geysering, storage tank pressure excursions, cold spots on the storage tanks, storage tank vibrations and/or vibrations in associated cryogenic piping, storage tank settlement, significant equipment or instrumentation malfunctions or failures, non-scheduled maintenance or repair (and reasons therefore), relative movement of storage tank inner vessels, hazardous fluids releases, fires involving hazardous fluids and/or from other sources, negative pressure (vacuum) within a storage tank and higher than predicted boil-off rates. Adverse weather conditions and the effect on the facility also should be reported. Reports should be submitted within 45 days after each period ending June 30 and December 31. In addition to the above items, a section

entitled "Significant Plant Modifications Proposed for the Next 12 Months (dates)" also should be included in the semi-annual operational reports. Such information would provide FERC staff with early notice of anticipated future construction/maintenance projects at the LNG facility.

- **Significant non-scheduled events, including safety-related incidents (e.g., hazardous fluid releases, fires, explosions, mechanical failures, unusual over pressurization, and major injuries) and security-related incidents (e.g., attempts to enter site, suspicious activities) should be reported to FERC staff. In the event an abnormality is of significant magnitude to threaten public or employee safety, cause significant property damage, or interrupt service, notification should be made immediately, without unduly interfering with any necessary or appropriate emergency repair, alarm, or other emergency procedure. In all instances, notification should be made to FERC staff within 24 hours. This notification practice should be incorporated into the LNG facility's emergency plan. Examples of reportable hazardous fluids related incidents include:**
 - a. **fire;**
 - b. **explosion;**
 - c. **estimated property damage of \$50,000 or more;**
 - d. **death or personal injury necessitating in-patient hospitalization;**
 - e. **release of hazardous fluids for five minutes or more;**
 - f. **unintended movement or abnormal loading by environmental causes, such as an earthquake, landslide, or flood, that impairs the serviceability, structural integrity, or reliability of an LNG facility that contains, controls, or processes hazardous fluids;**
 - g. **any crack or other material defect that impairs the structural integrity or reliability of an LNG facility that contains, controls, or processes hazardous fluids;**
 - h. **any malfunction or operating error that causes the pressure of a pipeline or facility that contains or processes hazardous fluids to rise above its maximum allowable operating pressure (or working pressure for LNG facilities) plus the build-up allowed for operation of pressure limiting or control devices;**
 - i. **a leak in a facility that contains or processes hazardous fluids that constitutes an emergency;**
 - j. **inner tank leakage, ineffective insulation, or frost heave that impairs the structural integrity of an LNG storage tank;**
 - k. **any safety-related condition that could lead to an imminent hazard and cause (either directly or indirectly by remedial action of the operator), for purposes other than abandonment, a 20 percent reduction in operating pressure or shutdown of operation of a pipeline or a facility that contains or processes hazardous fluids;**

- l. safety-related incidents to hazardous material transportations occurring at or en route to and from the LNG facility; or**
- m. an event that is significant in the judgment of the operator and/or management even though it did not meet the above criteria or the guidelines set forth in an LNG facility’s incident management plan.**

In the event of an incident, the Director of OEP has delegated authority to take whatever steps are necessary to ensure operational reliability and to protect human life, health, property or the environment, including authority to direct the LNG facility to cease operations. Following the initial company notification, FERC staff would determine the need for a separate follow-up report or follow-up in the upcoming semi-annual operational report. All company follow-up reports should include investigation results and recommendations to minimize a reoccurrence of the incident.

Based on our analysis and recommendations presented above, we conclude that the FEED presented by FGS would include acceptable layers of protection or safeguards which would reduce the risk of a potentially hazardous scenario from developing into an event that could impact the off-site public

Siting Requirements

On August 29, 2008, the Commission granted a Certificate under Section 7(c) of the Natural Gas Act for FGS’ original proposed LNG facility (Docket No. CP08-13-000). This decision was based in part on the Commission’s adoption of the findings and conclusions of the FEIS, which stated that staff believed the proposed facility would comply with the federal safety standards contained in Title 49, CFR, Part 193. In an October 8, 2010 letter to FGS, we requested additional information from FGS with respect to DOT’s July 7 and 16, 2010 written interpretations concerning the flammable vapor-gas exclusion zone requirements contained in Title 49, CFR, Part 193.2059.⁵ DOT’s interpretations applied to any LNG facility “that is not yet in existence or under construction.” [Accession No. 20101008-3035]

The Commission’s regulations under 18 CFR 380.12(o)(14) require FGS to identify how the proposed design would meet the siting requirements of 49 CFR 193, Subpart B. These standards require that an operator or governmental authority exercise control over the activities that can occur within an “exclusion zone,” defined as the area around an LNG facility that could be exposed to specified levels of thermal radiation or flammable vapor in the event of a release of LNG or ignition of natural gas. As part of our NEPA review, we use this information from the applicant, developed to comply with

⁵ October 8, 2010 Letter from Jeff C. Wright, Director, Office of Energy Projects to Bradley Williams, Floridian Natural Gas Storage Company, LLC. Filed in Docket Number CP08-13-000 on October 8, 2010, Accession Number 20101008-3035.

DOT's regulations, to assess whether or not a facility would have a public safety impact. As a cooperating agency, DOT assists FERC staff in evaluating whether an applicant's proposed siting meets the DOT requirements. If a facility is constructed and becomes operational, the facility would be subject to DOT's inspection program. Final determination of whether a facility is in compliance with the requirements of 49 CFR 193 would be made by DOT staff during those inspections.

Certain mathematical models must be used to calculate the dimensions of these exclusion zones. The 2001 edition of NFPA 59A, an industry consensus standard for the production, storage, and handling of LNG facilities, is incorporated into the Part 193 requirements by reference, with regulatory preemption in the event of conflict. The following sections of Part 193 specifically address siting requirements for LNG transfer systems:

- Part 193.2051, Scope, states that each LNG facility designed, replaced, relocated or significantly altered after March 31, 2000, must be provided with siting requirements in accordance with subpart B and NFPA 59A. In the event of a conflict with NFPA 59A, the regulatory requirements in Part 193 prevail.
- Part 193.2057, Thermal Radiation Protection, requires that each LNG transfer system have thermal exclusion zones in accordance with section 2.2.3.2 of NFPA 59A.
- Part 193.2059, Flammable Vapor-Gas Dispersion Protection, requires that each LNG transfer system have a dispersion exclusion zone in accordance with sections 2.2.3.3 and 2.2.3.4 of NFPA 59A.

For the following LNG facilities that are proposed for the amendment, we identified the applicable LNG siting requirements from Part 193 and NFPA 59A:

- One 288,360-barrel single containment LNG storage tank - Parts 193.2057 and 2059 require the establishment of thermal radiation and flammable vapor exclusion zones for LNG tanks. NFPA 59A Section 2.2.3.2 specifies four thermal radiation exclusion zones based on the design spill and the impounding area. Sections 2.2.3.3 and 2.2.3.4 specify a flammable vapor exclusion zone for the design spill which is determined in Section 2.2.3.5.
- One 865-gpm LNG sendout pump - Parts 193.2057 and 2059 require thermal radiation and flammable vapor exclusion zones. NFPA 59A Section 2.2.3.2 specifies the thermal radiation exclusion zone and Section 2.2.3.4 specifies the flammable vapor exclusion zone based on the design spill in a process area.

- One 600-gpm LNG truck loading pump - Same requirements as for LNG sendout pump.
- One 100-MMcf per day shell-and-tube vaporizer - Same requirements as for LNG pumps.

FERC staff notes that, if approved, both the previously approved project and the amendment modified components would ultimately be reviewed and analyzed as a whole by DOT and FERC. The entire facility would need to comply with DOT's regulations in 49 CFR 193 and any additional requirements imposed by FERC.

Impoundment Systems and Design Spills

In order to ensure that impoundments are sized for a catastrophic failure, we recommend that impoundments be sized based on the greatest flow capacity from a single transfer pipe for 10 minutes, while recognizing that different spill scenarios are used for the single accidental leakage sources for calculation of Part 193 exclusion zones. Design spills are used to determine the thermal radiation and vapor dispersion distances for these exclusion zones. In accordance with the adopted portions of NFPA 59A in 49 CFR Part 193, the basis for the design spill for impounding areas serving only vaporization, process, or LNG transfer areas is the flow from any single accidental leakage source.

Impoundment Sizing

FGS proposes to install a mechanically stabilized earth berm around the LNG tank. The structure would have a height of 30 feet high and would enclose an area of approximately 276 feet by 276 feet around the LNG storage tank. The structure's volumetric capacity would exceed 110 percent of the LNG tank's maximum liquid capacity. Rainwater collected by the dike would drain into the sub-impoundment system and be pumped out in accordance with 49 CFR 193.2173. This barrier would confine LNG from the proposed facilities on the project property in the event of any hypothetical catastrophic event.

The proposed storage tank, LNG pumps, LNG vaporizer and associated transfer piping would all be within the mechanically stabilized earth, thereby confining all LNG spills within the mechanically stabilized earth. The mechanically stabilized earth would have sub-impoundment system designed to collect all LNG spills from the proposed amendment facilities.

FGS reconfigured the mechanically stabilized earth sub-impoundment system to limit the heat flux on the storage tank during a sub-impoundment fire while maintaining

adequate volume to contain the tank withdrawal line design spill. The new sub-impoundment design has three identical triangular sumps at the southeast, southwest and northwest corners inside the mechanically stabilized earth wall, which are connected by trenches. The trenches have a trapezoidal cross section to increase impoundment volume while limiting the flame base width.

The sub-impoundment system is partitioned by weirs located at the corner sumps and in the trench sections, such that the spill proceeds from the southeast sump near the tank penetrations, through the southwest sump, to the northwest sump, with each section filling sequentially. The sub-impoundment is segmented, where a small spill would fill only a small portion of the overall system, while only a tank withdrawal line design spill would nearly fill the entire sub-impoundment system. The total capacity of sub-impoundment system would be approximately 400,000 gallons which would contain the 306,540-gallon tank withdrawal line design spill.

The sub-impoundment system has been configured to direct storm water to the three sumps, which would each be served by a dedicated sump pump. The trenches are sloped at a one percent grade towards the sumps, with an inflection point at the midpoint of each trench. The trench weirs would be equipped with a drainage passage to allow storm water to flow to the sump. Each sump pump system would be sized to handle 50 percent of the total required discharge rate, or 350 gpm per pump.

Design Spills

Design spills are used in the determination of the hazard calculations required by Part 193. Since the amendment's modified equipment all use the same sub-impoundment system within the mechanically stabilized earth, the following LNG release scenario would be the maximum bounding case:

- A 60-minute, 5,109-gpm LNG release from a guillotine rupture of one of the four 8-inch-diameter bottom-penetration LNG storage tank withdrawal lines.

In a letter to the FERC staff, dated August 6, 2013, DOT requested that LNG facility applicants contact the Office of Pipeline Safety's Engineering and Research Division regarding the Part 193 siting requirements.⁶ Specifically, the letter stated that DOT required a technical review of the applicant's design spill criteria for single accidental leakage sources on a case-by-case basis to determine compliance with Part 193.

⁶ August 6, 2013 Letter from Kenneth Lee, Director of Engineering and Research Division, Office of Pipeline Safety to Terry Turpin, LNG Engineering and Compliance Branch, Office of Energy Projects. Filed in Docket Number CP08-13-000 on August 13, 2013, Accession Number 20130813-4013.

In response, FGS provided DOT with its design spill criteria and identified leakage scenarios for the proposed facility equipment. DOT reviewed the data and methodology FGS used to determine the design spills. On July 18, 2014, DOT provided a letter to the FERC staff stating that DOT had no objection to the FGS methodology for determining a single accidental leakage source to establish the siting for its proposed LNG storage facilities.⁷ We note that DOT reviewed multiple design spills from the entire FGS facility, where this EA discusses only the modified portions of the facility proposed in the amendment.

DOT's conclusions on the candidate design spills used in the siting calculations required by Part 193 was based on preliminary design information which may be revised as the engineering design progresses. If FGS' design or operation of the proposed facility differs from the details provided in the documents on which DOT based its review, then the facility may not comply with the siting requirements of Part 193. As a result, **we are recommending that:**

- **FGS should certify that the final design is consistent with the information provided to DOT as described in the design spill determination letter dated July 18, 2014 (Accession Number 20140722-4005). In the event that any modifications to the design alters the candidate design spills on which the Title 49 CFR 193 siting analysis was based, FGS should consult with DOT on any actions necessary to comply with Part 193.**

As design spills vary depending on the hazard (vapor dispersion or radiant heat), the specific design spills used for the FGS siting analysis are discussed under "Vapor Dispersion Analysis" and "Thermal Radiation Analysis."

Vapor Dispersion Analysis

In performing the vapor dispersion analysis required by 49 CFR 193.2059, FGS submitted LNG vapor dispersion modeling using PHAST version 7.01 and GexCon's computational fluid dynamics modeling software FLACS, version 9.1. FGS submitted multiple scenarios for the entire facility; however, for this proposal, we are only analyzing those related to the proposed modified components of the amendment. The modified components consist of the LNG storage tank, LNG pumps, and vaporizer. Since the amendment's modified components all use the same sub-impoundment system within the mechanically stabilized earth, the design spill from the LNG storage tank would be the maximum bounding case.

⁷ July 18, 2014 Letter "Re: Floridian Natural Gas Storage Company, LLC, FERC Docket CP13-541-000, Design Spill Determination" from Kenneth Lee to Lauren H. O'Donnell. Filed in Docket Number CP13-541-000 on July 22, 2014, Accession Number 20140722-4005.

FGS used the following conditions, corresponding to the requirements established in Part 193.2059, for the vapor dispersion calculations: ambient temperature of 85 °F, relative humidity of 50 percent, wind speeds from 1 to 2 meter per second, a Pasquill-Gifford Atmospheric Stability Class of “F”, and a ground surface roughness of 0.03 meter. FGS used a guillotine scenario of one of the four 8-inch-diameter bottom-penetration LNG tank withdrawal lines to produce the longest downwind vapor dispersion. Several wind directions were simulated in FLACS to determine the direction of the largest vapor cloud.

The results of these FLACS simulations show the vapor dispersion clouds would remain within FGS’ property. However, due to the geometry along the southwest property line, the results show the vapor dispersion clouds and associated exclusion zones may slightly extend onto adjacent property not owned by FGS. The property is a 5-acre contaminated soil vault owned by Gerdau that is subject to EPA deed restrictions.

In order to address this, FGS provided DOT with documentation for the vault’s future land use and a purchase agreement, dated April 7, 2007, between FGS and Gerdau. Staff of the DOT has reviewed the documentation and have indicated that once the *Option Agreement Restrictions on Use of Vault* is exercised, the restrictions therein would satisfy the exclusion zone requirements of 49 CFR 193.2059 and 193.2057.

Thermal Radiation Analysis

An LNG pool fire could cause high levels of thermal radiation (i.e., heat from a fire) if a large quantity of LNG spills in the presence of an ignition source. Part 193, requires the use of the LNGFIREIII computer program model developed by the Gas Research Institute to determine the extent of the thermal radiation distances. Part 193 stipulates that the wind speed, ambient temperature, and relative humidity that produce the maximum exclusion distances must be used, except for conditions that occur less than 5 percent of the time based on recorded data for the area.

A design spill from the amendment’s proposed LNG storage tank would be contained in the sub-impoundment system within the mechanically stabilized earth. For the analysis, FGS used the following atmospheric conditions: temperature of 66.0 °F, a relative humidity of 50 percent, a Pasquill-Gifford Atmospheric Stability Class of “F”, and a wind speed of 18.7 miles per hour. Based on the 60-minute spill from one of the four 8-inch-diameter bottom-penetration LNG storage tank withdrawal lines, the 1,600-British thermal units per hour per square foot (Btu/hr/ft²) thermal radiation exclusion zone would remain well within the facility property.

FGS also analyzed the thermal radiation from a full-tank rupture where the entire mechanically stabilized earth contained LNG. Using the same atmospheric conditions,

the 1,600-Btu/hr/ft² thermal radiation exclusion zone would either remain within the facility property or extend onto the adjacent soil vault.

As previously stated in the “Vapor Dispersion Analysis” discussion above, DOT concurred that the documentation provided regarding the land use agreement between FGS and Gerdau would ensure that operation of these facilities would comply with the exclusion zone requirements of Part 193.2057.

Tank Overpressure Analysis

As adopted by Part 193, section 2.1.1 of NFPA 59A (2001) requires an evaluation of potential incidents and safety measures incorporated in the design or operation of the facility be considered. Consequently, a vapor cloud explosion (VCE) should be evaluated from a release of flammable material into a confined congested area. The refrigerants which would be used in the liquefaction process streams have a higher reactivity than LNG, and in some circumstances may produce damaging overpressures when ignited. In order to evaluate this hazard, FGS used PHAST Version 7.0 to perform an explosion overpressure analysis. The Baker-Strehlow-Tang (BST) model was used as inputs in the PHAST overpressure analysis. The BST methodology requires the selection of the maximum flame speed based on the combined effects of confinement, congestion and fuel reactivity.

The effect of overpressures on the LNG storage tank was analyzed since the proposed storage tank was modified from a concrete full containment tank to double wall steel tank. To address the potential for cascading damage from a VCE, FGS evaluated the maximum overpressure resulting from ignition of a mixed refrigerant loop (MRL) vapor cloud on the proposed LNG storage tank. FGS provided a VCE analysis to evaluate the overpressure experienced by the LNG storage tank and to determine if the LNG storage tank external blast loading rate would be exceeded. To assess the impact of VCE on the LNG storage tank, FGS used FLACS to determine the vapor dispersion from the MRL design spill scenario. The vapor dispersion results were used as input into the BST overpressure calculation. These results were used to perform a detailed analysis of the effects of overpressure on the LNG storage tank. The analysis confirmed that small deflections would occur to the storage tank; however, no permanent distortion of the tank would result from the short (12 millisecond) impulse load represented by the prescribed blast scenario.

Emergency Response and Evacuation Planning

Prior to commencing operations, FGS would have to prepare emergency action plan, as required by 49 CFR Part 193.2509, that provide for: (a) responding to controllable emergencies and recognizing an uncontrollable emergency; (b) taking action

to minimize harm to the public including the possible need to evacuate the public; and (c) coordination and cooperation with appropriate local officials. Specifically, Section 193.2509(b)(3) requires “Coordinating with appropriate local officials in preparation of an emergency evacuation plan...” To aid in the preparation of emergency response procedures, FGS would coordinate with the State Fire Marshal’s office, Indiantown Fire Department, and Martin County Emergency Services Department, Martin County Fire & Rescue, and the Indiantown Sheriff’s Department. FGS has stated that it would provide for installation of safety systems and specific gas detection equipment on the Martin County emergency service providers’ vehicles.

Security Issues

FGS described the proposed facility’s preliminary security plan and stated that final plans would be developed as part of the emergency response procedures in accordance with 49 CFR Part 193.2903. FGS stated that the final plans would be developed with the input of appropriate agencies including the State Fire Marshal’s office, Indiantown Fire Department, and Martin County Emergency Services Department, Martin County Fire Marshal, Martin County Fire Rescue, and the Indiantown Sheriff’s Department.

Conclusion on Facility Reliability and Safety

Based on our technical review of the preliminary engineering design, as well as our suggested mitigation measures, we conclude that sufficient layers of safeguards would be included in the facility designs to mitigate the potential for an incident that could damage the facility, injure operating staff, or impact the safety of the off-site public. Based on our consultation with DOT staff, the vapor dispersion and thermal radiation exclusion zones for the proposed equipment appear to meet the requirements specified by Part 193. In addition, as previously stated above under “Design Spills,” DOT concurred that the documentation provided regarding operation of these facilities would comply with the exclusion zone requirements of Part 193. As a result, we conclude that the siting of the proposed Project Amendment would not have a significant impact on public safety.

The principal hazards associated with the substances involved in the liquefaction, storage, and vaporization of LNG result from cryogenic and flashing liquid releases; flammable vapor dispersion; vapor cloud ignition; pool fires; overpressures, and toxicity. As part of the NEPA review, Commission staff must assess whether the proposed facilities would be able to operate safely and securely to minimize potential public safety impacts. Based on our technical review of the preliminary engineering designs, as well as our suggested mitigation measures, we conclude that sufficient layers of safeguards would be included in the amended facility designs to mitigate the potential for an incident

that could impact the safety of the off-site public. The FEED and specifications submitted for the proposed facilities to date are preliminary, but would serve as the basis for any detailed design to follow. If authorization is granted by the Commission, the next phase of the project would include development of the final design. We do not expect that the detailed design information to be developed would result in changes to the basis of design, operating conditions, major equipment selections, equipment design conditions, or safety system designs which were presented as part of FGS' FEED. However, we are recommending that the final design be provided for further staff review to ensure it would be consistent with the safety and operability characteristics identified in the FEED. In addition, we are recommending that the facility, during construction and operation, be subject to regular FERC staff technical reviews and site inspections on at least a biennial basis.

Siting of the facility with regard to potential off-site consequences from these hazards is also required by DOT's regulations in 49 CFR 193, Subpart B. As part of its application to FERC, FGS identified how its proposed design would comply with DOT's Part 193 siting requirements. We used this information to assess whether or not a facility would have a public safety impact and DOT, as a cooperating agency, assisted in this evaluation. As provided, FGS' siting analysis indicates that the siting of the proposed facility would not have a significant impact on public safety. If this proposed amendment is approved and becomes operational, the facility would also be subject to DOT's inspection program under 49 CFR 193. Final determination of whether a facility is in compliance with the requirements of Part 193 would be made by DOT staff during those inspections.

Again, we note that if approved, both the previously approved project and the amendment's modified components would ultimately be reviewed and analyzed as a whole by DOT and FERC. The entire facility would need to comply with DOT's regulations in 49 CFR 193 and any additional requirements imposed by FERC.

4. Cumulative Impacts

Cumulative impacts have been addressed in the FEIS for Docket No. CP08-13-000. The proposed amendment would not change the cumulative impacts analysis in this EA.

C. ALTERNATIVES

If the proposal is not authorized (No-Action Alternative) then FGS would not be able to construct the Project Amendment. Given that the facility changes in the proposed amendment would not affect any environmentally sensitive areas, no other site alternatives were identified.

D. STAFF CONCLUSIONS AND RECOMMENDATIONS

We conclude that approval of the proposed amendment would not constitute a major federal action significantly affecting the quality of the human environment. This finding is based on the above environmental analysis, FGS' application and supplements, and implementation of FGS' proposed and our recommended mitigation measures. We recommend that the Commission Order contain a finding of no significant impact and that the following mitigation measures be included as conditions of any Certificate the Commission may issue.

1. FGS shall follow the construction procedures and mitigation measures described in its application, supplemental filings (including responses to staff data requests), and as identified in this EA, unless modified by the Order. FGS 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 the OEP **before using that modification.**
2. For the LNG facility, 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. **Prior to initial site preparation**, FGS shall file with the Secretary for review and written approval by the Director of OEP, certification that the conditions from Orders 1 and 2 (Docket No. CP08-13-000 and CP12-100-000) will be incorporated in the design for FGS' amendment.
4. FGS must receive written authorization from the Director of OEP **prior to introducing hazardous fluids** into the FGS' amendment facilities. Instrumentation and controls, hazard detection, hazard control, and security components/systems necessary for the safe introduction of such fluids shall be installed and functional.

5. FGS shall file the following information, stamped and sealed by the professional engineer-of-record, with the Secretary:
 - a. site preparation drawings and specifications **prior to site preparation;**
 - b. LNG tank and foundation design drawings and calculations **prior to construction of the LNG tanks;**
 - c. LNG Liquefaction facility structures and foundation design drawings and calculations **prior to construction of foundations;** and
 - d. quality control procedures to be used for civil/structural design and construction **prior to construction of foundations.**

In addition, FGS shall file in its Implementation Plan, the schedule for producing this information.

6. FGS shall make all reasonable efforts to assure its predicted noise levels from the LNG facility (including proposed amendment facilities) are not exceeded at nearby noise sensitive areas and file noise surveys showing this with the Secretary **no later than 60 days after placing the LNG facility in service.** However, if the noise attributable to the operation of the LNG facility (including proposed amendment facilities) at full load exceeds a day-night average sound level of 55 decibels on the A-weighted scale at any nearby noise sensitive areas, FGS shall file a report on what changes are needed and shall install additional noise controls to meet the level **within 1 year of the in-service date.** FGS shall confirm compliance with this requirement by filing a second noise survey with the Secretary **no later than 60 days after it installs the additional noise controls.**

Conditions 7 through 28 shall apply to the Project Amendment prior to initial site preparation; prior to construction of final design; prior to commissioning; prior to introduction of hazardous fluids; or prior to commencement of service. Information pertaining to the specific engineering conditions below shall be filed with the Secretary for review and written approval by the Director of OEP either: prior to initial site preparation; prior to construction of final design; prior to commissioning; prior to introduction of hazardous fluids; 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, shall 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, will be subject to public disclosure. All information shall be filed a minimum of 30 days before approval to proceed is requested.

7. **Prior to initial site preparation**, FGS shall file the quality assurance and quality control procedures for construction activities.
8. **Prior to initial site preparation**, FGS shall file an overall project schedule, which includes the proposed stages of the commissioning plan.
9. **Prior to initial site preparation**, FGS shall file a plot plan of the final design showing all major equipment, structures, buildings, and impoundment systems.
10. The **final design** shall include change logs that list of the hazard and explain any changes made from the Front-End Engineering Design provided in FGS' application and filings. A list of all changes with an explanation for the design alteration shall be provided and all changes shall be clearly indicated on all diagrams and drawings.
11. The **final design** shall provide up-to-date Process Flow Diagrams (PFDs) with heat and material balances and P&IDs. The PFDs shall include heat and material balances. The P&IDs shall include the following information:
 - a. equipment tag number, name, size, duty, capacity, and design conditions;
 - b. equipment insulation type and thickness;
 - c. storage tank pipe penetration size and nozzle schedule;
 - d. piping with line number, piping class specification, size, and insulation type and thickness;
 - e. piping specification breaks and insulation limits;
 - f. all control and manual valves numbered;
 - g. valve high pressure side and cryogenic ball valve internal and external vent locations;
 - h. relief valves with set points; and
 - i. drawing revision number and date.
12. The **final design** shall include a list of all car-sealed and locked valves consistent with the P&IDs.
13. The **final design** shall provide an up-to-date complete equipment list, process and mechanical data sheets, and specifications.

14. The **final design** shall include the sizing basis and capacity for the vent stacks and the pressure and vacuum relief valves for major process equipment, vessels, and storage tanks.
15. The **final design** shall specify that for hazardous fluids, piping and piping nipples 2 inches or less in diameter are to be no less than schedule 160 for carbon steel and no less than schedule 80 for stainless steel, and are designed to withstand external loads, including vibrational loads in the vicinity of rotating equipment and operator live loads in areas accessible by operators.
16. The **final design** shall include details of how process seals or isolations installed at the interface between a flammable fluid system and an electrical conduit or wiring system.
17. The **final design** shall provide electrical area classification drawings.
18. The **final design** shall provide spill containment system drawings with dimensions and slopes of curbing, trenches, and impoundments.
19. The **final design** shall include a drawing showing the location of the emergency shutdown (ESD) buttons. ESD buttons shall be easily accessible, conspicuously labeled and located in an area which would be accessible during an emergency.
20. The **final design** shall include a plan for clean-out, dry-out, purging, and tightness testing. This plan shall address the requirements of the American Gas Association's Purging Principles and Practice required by 49 CFR 193, and shall provide justification if not using an inert or non-flammable gas for cleanout, dry-out, purging, and tightness testing.
21. The **final design** shall provide the procedures for pressure/leak tests which address the requirements of ASME VIII and ASME B31.3.
22. FGS shall certify that the **final design** is consistent with the information provided to DOT as described in the design spill determination letter dated July 18, 2014 (Accession Number 20140722-4005). In the event that any modifications to the design alters the candidate design spills on which the Title 49 CFR 193 siting analysis was based, FGS shall consult with DOT on any actions necessary to comply with Part 193.

23. **Prior to commissioning**, FGS shall file plans and detailed procedures for: testing the integrity of onsite mechanical installation; functional tests; introduction of hazardous fluids; operational tests; and placing the equipment into service.
24. **Prior to commissioning**, FGS shall label piping with fluid service and direction of flow in the field in addition to the pipe labeling requirements of NFPA 59A.
25. **Prior to commissioning**, FGS shall maintain a detailed training log to demonstrate that operating staff has completed the required training.
26. **Prior to introduction of hazardous fluids**, FGS shall complete a firewater pump acceptance test and firewater monitor and hydrant coverage test. The actual coverage area from each monitor and hydrant shall be shown on facility plot plan(s).
27. **Prior to introduction of hazardous fluids**, FGS shall complete all pertinent tests (Factory Acceptance Tests, Site Acceptance Tests, Site Integration Tests) associated with the Distributed Control System and the Safety Instrumented System that demonstrates full functionality and operability of the system.
28. **Prior to commencement of service**, FGS shall develop procedures for offsite contractors' responsibilities, restrictions, and limitations and for supervision of these contractors by FGS staff.

Conditions 29 through 31 apply throughout the life of the facility:

29. The facility shall be subject to regular FERC staff technical reviews and site inspections on at least a **biennial basis** or more frequently as circumstances indicate. Prior to each FERC staff technical review and site inspection, FGS shall respond to a specific data request, including information relating to possible design and operating conditions that may have been imposed by other agencies or organizations. Up-to-date detailed piping and instrumentation diagrams reflecting facility modifications and provision of other pertinent information not included in the semi-annual reports described below, including facility events that have taken place since the previously submitted semi-annual report, shall be submitted.
30. Semi-annual operational reports shall be filed with the Secretary to identify changes in facility design and operating conditions, abnormal operating experiences, activities (including trucking, quantity and composition of feed

gas and trucked LNG, liquefied and vaporized quantities, boil-off/flash gas, etc.), plant modifications, including future plans and progress thereof. Abnormalities shall include, but not be limited to: trucking problems, storage tank stratification or rollover, geysering, storage tank pressure excursions, cold spots on the storage tanks, storage tank vibrations and/or vibrations in associated cryogenic piping, storage tank settlement, significant equipment or instrumentation malfunctions or failures, non-scheduled maintenance or repair (and reasons therefore), relative movement of storage tank inner vessels, hazardous fluids releases, fires involving hazardous fluids and/or from other sources, negative pressure (vacuum) within a storage tank and higher than predicted boil-off rates. Adverse weather conditions and the effect on the facility also shall be reported. Reports shall be submitted **within 45 days after each period ending June 30 and December 31**. In addition to the above items, a section entitled "Significant Plant Modifications Proposed for the Next 12 Months (dates)" also shall be included in the semi-annual operational reports. Such information would provide FERC staff with early notice of anticipated future construction/maintenance projects at the LNG facility.

31. Significant non-scheduled events, including safety-related incidents (e.g., hazardous fluid releases, fires, explosions, mechanical failures, unusual over pressurization, and major injuries) and security-related incidents (e.g., attempts to enter site, suspicious activities) shall be reported to FERC staff. In the event an abnormality is of significant magnitude to threaten public or employee safety, cause significant property damage, or interrupt service, notification shall be made **immediately**, without unduly interfering with any necessary or appropriate emergency repair, alarm, or other emergency procedure. In all instances, notification shall be made to FERC staff **within 24 hours**. This notification practice shall be incorporated into the LNG facility's emergency plan. Examples of reportable hazardous fluids related incidents include:

- a. fire;
- b. explosion;
- c. estimated property damage of \$50,000 or more;
- d. death or personal injury necessitating in-patient hospitalization;
- e. release of hazardous fluids for five minutes or more;
- f. unintended movement or abnormal loading by environmental causes, such as an earthquake, landslide, or flood, that impairs the serviceability, structural integrity, or reliability of an LNG facility that contains, controls, or processes hazardous fluids;

- g. any crack or other material defect that impairs the structural integrity or reliability of an LNG facility that contains, controls, or processes hazardous fluids;
- h. any malfunction or operating error that causes the pressure of a pipeline or facility that contains or processes hazardous fluids to rise above its maximum allowable operating pressure (or working pressure for LNG facilities) plus the build-up allowed for operation of pressure limiting or control devices;
- i. a leak in a facility that contains or processes hazardous fluids that constitutes an emergency;
- j. inner tank leakage, ineffective insulation, or frost heave that impairs the structural integrity of an LNG storage tank;
- k. any safety-related condition that could lead to an imminent hazard and cause (either directly or indirectly by remedial action of the operator), for purposes other than abandonment, a 20 percent reduction in operating pressure or shutdown of operation of a pipeline or a facility that contains or processes hazardous fluids;
- l. safety-related incidents to hazardous material transportations occurring at or en route to and from the LNG facility; or
- m. an event that is significant in the judgment of the operator and/or management even though it did not meet the above criteria or the guidelines set forth in an LNG facility's incident management plan.

In the event of an incident, the Director of OEP has delegated authority to take whatever steps are necessary to ensure operational reliability and to protect human life, health, property or the environment, including authority to direct the LNG facility to cease operations. Following the initial company notification, FERC staff would determine the need for a separate follow-up report or follow-up in the upcoming semi-annual operational report. All company follow-up reports shall include investigation results and recommendations to minimize a reoccurrence of the incident.

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4. Golder Associates. Site Seismicity Study, Floridian Natural Gas Storage Project, Martin County, Florida. Revision 1, September 12, 2007.
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7. Golder Associates. March 2008. Response to Geotechnical Information Request, Filed March 17, 2008, CP08-13.
8. Golder Associates. October 2013. Geotechnical Evaluation of Tank 1, Water Tank (#36), and Mechanically Stabilized Earth Wall. Filed August 5, 2014.
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