



U.S. Department  
of Transportation

**Pipeline and  
Hazardous Materials Safety  
Administration**

8701 S. Gessner, Suite 630  
Houston, TX 77074

**NOTICE OF PROBABLE VIOLATION  
PROPOSED CIVIL PENALTY  
and  
PROPOSED COMPLIANCE ORDER**

**CERTIFIED MAIL - RETURN RECEIPT REQUESTED**

February 21, 2017

Mr. Dennis Odum  
VP, Operations of the South and LNG Divisions  
Lake Charles LNG Company, LLC  
800 E. Sonterra Blvd  
San Antonio, TX 78258

**CPF 4-2017-3002**

Dear Mr. Odum:

On September 15 - 16, 2015, a representative of the Pipeline and Hazardous Materials Safety Administration (PHMSA), Office of Pipeline Safety (OPS), pursuant to Chapter 601 of 49 United States Code inspected your records and procedures in Lake Charles, Louisiana.

As a result of the inspection, it appears that you have committed probable violations of the Pipeline Safety Regulations, Title 49, Code of Federal Regulations. The items inspected and the probable violation(s) are:

- 1. §193.2629 External corrosion control, buried or submerged components**
  - (a) Each buried or submerged component that is subject to external corrosive attack must be protected from external corrosion by:**

**(2) The following means:**

**(ii) A cathodic protection system designed to protect components in their entirety in accordance with the requirements of §192.463 of this chapter and placed in operation before October 23, 1981, or within 1 year after the component is constructed or installed whichever is later.**

**§192.463 External corrosion control: Cathodic protection.**

**(a) Each cathodic protection system required by this subpart must provide a level of cathodic protection that complies with one or more of the applicable criteria contained in Appendix D of this part. If none of these criteria is applicable, the cathodic protection system must provide a level of cathodic protection at least equal to that provided by compliance with one or more of these criteria.**

**Appendix D - Criteria for Cathodic Protection and Determination of Measurements**

**I. Criteria for cathodic protection**

**(1) A negative (cathodic) voltage of at least 0.85 volt, with reference to a saturated copper-copper sulfate half cell. Determination of this voltage must be made with the protective current applied, and in accordance with sections II and IV of this appendix.**

**II. Interpretation of voltage measurement.**

**Voltage (IR) drops other than those across the structure electrolyte boundary must be considered for valid interpretation of the voltage measurement in paragraphs A(1) and (2) and paragraph B(1) of section I of the appendix.**

Lake Charles LNG failed to consider IR drop when interpreting cathodic protection readings from their annual survey to determine if the cathodic protection was adequate as required by §193.2629 and §192.463, Appendix D. During the inspection, the Operator stated that they were using the -0.85 volt criterion with current applied. This criterion requires that voltage (IR) drops other than those across the structure to electrolyte boundary be considered for valid interpretation of the voltage measurements. PHMSA requested information on how the Operator had considered IR drops in determining the adequacy of the readings, but the operator was unable to explain or provide additional information in the form of surveys, studies, or measurements to show how this requirement had been satisfied.

The -0.85 volt criterion at a minimum requires this potential at the pipe-to-soil interface. Readings taken on the surface of the ground above the pipe incorporate a voltage drop that if not considered, could result in the required cathodic protection potential at the pipe-to-soil interface being inadequate. Lake Charles LNG's records show only structure to soil readings with the cathodic protection current applied and the Operator did not account for the voltage (IR) drops in the cathodic protection circuit, particularly IR drop in the soil between the point of measurement on the surface of the ground and the pipe.

## 2. §193.2635 Monitoring corrosion control

**Corrosion protection provided as required by this subpart must be periodically monitored to give early recognition of ineffective corrosion protection including the following, as applicable:**

**(d) Each component that is protected from atmospheric corrosion must be inspected at intervals not exceeding 3 years.**

Lake Charles LNG failed to periodically inspect a portion of their aboveground piping to monitor for ineffective corrosion protection from atmospheric corrosion as required by §193.2635. During the PHMSA inspection, the Operator was asked to provide atmospheric corrosion inspection records for their aboveground piping, specifically the insulated stainless steel piping used to transport chilled or liquefied natural gas within the facility. Lake Charles LNG responded by stating that the stainless steel piping will not corrode and consequently did not require inspection for atmospheric corrosion. This assumption is also documented in the Lake Charles LNG's Technical Procedures Manual, Section 8.1 Component Identification, which shows that the Operator did not require atmospheric corrosion inspections of the stainless steel piping.

The Lake Charles LNG facility has a significant quantity of aboveground insulated stainless steel piping that has not been periodically inspected for atmospheric corrosion. The insulation generally consists of a fibrous material wrapped around the circumference of the pipe covered by aluminum sheathing held onto the piping by metal straps (Exhibit B, Photos 1 – 5). This covering, while necessary to help preserve the temperature of the chilled or liquefied natural gas, makes it difficult to visually inspect the piping for atmospheric corrosion. However, insulated piping is susceptible to a specific type of atmospheric corrosion called *Corrosion Under Insulation (CUI)* and must be periodically inspected for corrosion just as with other aboveground piping. *CUI* is recognized by industry as a serious damage mechanism that results from the presence of moisture trapped under insulation and can adversely affect the integrity of piping by providing an environment conducive to corrosion, particularly environments that contain chlorides or sulfides. The location of the Lake Charles LNG facility is in an environment that includes high humidity (making it likely that condensation will form on the pipe) and potential sources of chlorides (the nearby brackish or salt water in Calcasieu Lake and the Gulf of Mexico).

The justification provided by the Operator for concluding that the stainless steel piping will not corrode was primarily based on the argument that the operating temperature at the Lake Charles LNG facility is not within the range where stainless steel piping is susceptible to corrosion. The source referenced by the Operator for this conclusion was a study by the Norwegian University of Science and Technology titled "Pitting and Crevice Corrosion of Stainless Steel under Offshore Conditions"<sup>1</sup> authored by a graduate student at the Norwegian University of Science and Technology as a Master's thesis (see Exhibit B, Pitting and Crevice Corrosion of Stainless Steel under Offshore Conditions, Norwegian University of Science and Technology, Trondheim 2012). The Operator refers to Figure 2.5 in the document that shows the Critical Pitting Temperature (CPT) and the Crevice Corrosion Temperature (CCT) for various grades of *un-welded* stainless steel. Lake Charles argues that their operating temperatures range from -255 degrees F (-159 degrees C) to -50 degrees F (-46 degrees C) but the CPT and CCT for 304 Stainless Steel from Figure 2.5 are 4 degrees C and -16 degrees C, respectively, making their operating temperatures too low for corrosion to occur. When the PHMSA inspection was performed, the Lake Charles LNG facility was not operating and the piping was at atmospheric temperature, showing that the surface temperatures of the piping are not always within the range stated by the operator.

The conclusions of the thesis referenced by the Operator do not support the argument that corrosion of stainless steel can be predicted solely on the basis of operating temperature. In fact, the referenced research was initiated because offshore operators were experiencing corrosion of stainless steel piping under temperatures where existing charts and graphs indicated it wouldn't occur. The author states, "This study has shown that in order to be able to assess the possibility of pitting and crevice corrosion and probability of failure with respect to time due to pitting corrosion and coating degradation it is not enough to only consider temperature. It is shown that other parameters are probably as important as temperature." (Wika 73). The Operator also failed to consider the stated limitations of the study. Specifically, the document states, "Only the bulk of the pipe is considered, so welds, flanges and other places where localized corrosion is likely to occur are out of scope for this study" (Wika 3). It is apparent that the Operator selected excerpts from the referenced thesis to try and support their decision to not inspect the insulated stainless steel piping, but failed to use the findings in a manner consistent with the complete results of the research.

### **3. §193.2707 Operations and maintenance.**

**(a) Each operator shall utilize for operation or maintenance of components only those personnel who have demonstrated their capability to perform their assigned functions by-**

- (1) Successful completion of the training required by §§193.2713 and 193.2717;**
- (2) Experience related to the assigned operation or maintenance function; and,**
- (3) Acceptable performance on a proficiency test relevant to the assigned function.**

<sup>1</sup> Wika, Sandra Finsås (2012). Pitting and Crevice Corrosion of Stainless Steel under Offshore Conditions (Master's Thesis) Norwegian University of Science and Technology, Trondheim, 2012.

**§193.2713 Training, operations and maintenance.**

(a) Each operator shall provide and implement a written plan of initial training to instruct-

(1) All permanent maintenance, operating, and supervisory personnel-

(i) About the characteristics and hazards of LNG and other flammable fluids used or handled at the facility, including, with regard to LNG, low temperatures, flammability of mixtures with air, odorless vapor, boiloff characteristics, and reaction to water and water spray;

(ii) About the potential hazards involved in operating and maintenance activities; and,

(iii) To carry out aspects of the operating and maintenance procedures under §§193.2503 and 193.2605 that relate to their assigned functions; and

(2) All personnel-

(i) To carry out the emergency procedures under §193.2509 that relate to their assigned functions; and

(ii) To give first-aid; and,

(3) All operating and appropriate supervisory personnel-

(i) To understand detailed instructions on the facility operations, including controls, functions, and operating procedures; and

(ii) To understand the LNG transfer procedures provided under §193.2513.

(b) A written plan of continuing instruction must be conducted at intervals of not more than 2 years to keep all personnel current on the knowledge and skills they gained in the program of initial instruction.

**§193.2717 Training, fire protection.**

(a) All personnel involved in maintenance and operations of an LNG plant, including their immediate supervisors, must be trained according to a written plan of initial instruction, including plant fire drills, to:

(1) Know the potential causes and areas of fire;

(2) Know the types, sizes, and predictable consequences of fire; and

(3) Know and be able to perform their assigned fire control duties according to the procedures established under § 193.2509 and by proper use of equipment provided under § 193.2801.

(b) A written plan of continuing instruction, including plant fire drills, must be conducted at intervals of not more than 2 years to keep personnel current on the knowledge and skills they gained in the instruction under paragraph (a) of this section.

(c) Plant fire drills must provide personnel hands-on experience in carrying out their duties under the fire emergency procedures required by § 193.2509.

Lake Charles LNG failed meet the training requirements required by the regulations. Lake Charles LNG failed to provide records demonstrating that they had met all required initial and/or refresher training according to §193.2707 and the Operator's procedures as required by §193.2713 and §193.2717. In addition, the Operator failed to require refresher training on detailed operations for supervisors and the required training for security personnel was not in accordance with §193.2713.

Training records presented by Lake Charles LNG during the inspection did not show that personnel had completed the required training as required by §193.2707 and defined by the facility's training matrix, Lake Charles LNG Company, Table 1.1, Master Training Matrix, Initial and Refresher Training, Revised 02/01/2010. In addition, the Operator's records did not show that supervisors completed refresher training on detailed operations. Contract security personnel also have assigned duties as part of the facility's emergency response but there were no records showing that security personnel received training on the Operator's emergency procedures.

#### **4. §193.2801 Fire Protection**

**Each operator must provide and maintain fire protection at LNG plants according to sections 9.1 of NFPA 59A (incorporated by reference, see §193.2013). However, LNG plans existing on March 31, 2000 need not comply with provisions on emergency shutdown systems, water delivery systems, detection systems, and personnel qualification and training until September 12, 2005.**

#### **§193.2605 Maintenance procedures.**

**(a) Each operator shall determine and perform, consistent with generally accepted engineering practice, the periodic inspections or tests needed to meet the applicable requirements of this subpart and to verify that components meet the maintenance standards prescribed by this subpart.**

**(b) Each operator shall follow one or more manuals of written procedures for the maintenance of each component, including any required corrosion control. The procedure must include:**

**(1) The details of the inspections or tests determined under paragraph (a) of this section and their frequency of performance; and**

**(2) A description of other actions necessary to maintain the LNG plant according to the requirements of this subpart.**

**(c) Each operator shall include in the manual required by paragraph (b) of this section instructions enabling personnel who perform operation and maintenance activities to recognize conditions that potentially may be safety-related conditions that are subject to the reporting requirements of §191.23 of this subchapter.**

Lake Charles LNG failed to follow their procedures in performing and documenting verification of the annual inspection of their emergency shutdown system. The Operator has a comprehensive procedure for performing the annual inspection of their emergency shutdown system titled "*ESS II Shutdown System Procedure, Annual Inspection PM #860-74.*" This procedure includes sections for documenting the tests of the various components throughout the facility.

Documentation of the annual inspection performed on June 17, 2015 contained many blank fields that were intended to be initialed by testing personnel to confirm proper operation and there were no notes of explanation included with the documentation. Consequently, it cannot be determined from the documentation whether the un-initialed components failed the testing, were skipped during the testing, or could not be tested based on operating circumstances at the facility. The Operator must have complete documentation according to their procedures and should include

explanatory notes indicating any repairs or follow-up actions needed, why components weren't tested, and when they will be tested to comply with §193.2801 and their inspection procedures.

**5. §193.2911 Security lighting.**

**Where security warning systems are not provided for security monitoring under §193.2913, the area around the facilities listed under §193.2905(a) and each protective enclosure must be illuminated with a minimum in service lighting intensity of not less than 2.2 lux (0.2 ftc) between sunset and sunrise.**

The Lake Charles LNG inspection records for security lighting failed to show that the Operator was in compliance with the requirements of §193.2911. When PHMSA requested records for security inspections, Lake Charles LNG presented an inspection report performed by Project Technical Liaison Technical Associates, Inc. (PTL) dated 04/15/2005. The inspection document stated that PTL completed a review of the existing Trunkline LNG facility for compliance to the amended sections of code. The only reference to the inspection of security lighting is in the inspection section referring to NFPA 59A, 9.8.4 that states "*LNG facilities shall be illuminated in the vicinity of protective enclosures and in other areas as necessary to promote security of the facility.*" The comment in the PTL inspection states "*Light posts on the entire perimeter fencing are provided to identify suspected intrusion.*" There was nothing in the inspection record presented by Lake Charles LNG to confirm the presence of a security warning system or lighting with a minimum intensity of 2.2 lux.

Proposed Civil Penalty

Under 49 United States Code, § 60122, you are subject to a civil penalty not to exceed \$200,000 per violation per day the violation persists up to a maximum of \$2,000,000 for a related series of violations. For violations occurring prior to January 4, 2012, the maximum penalty may not exceed \$100,000 per violation per day, with a maximum penalty not to exceed \$1,000,000 for a related series of violations. Also, for LNG facilities, an additional penalty of not more than \$50,000 for each violation may be imposed. The Compliance Officer has reviewed the circumstances and supporting documentation involved in the above probable violation(s) and has recommended that you be preliminarily assessed a civil penalty of \$32,400 as follows for item 1.

<u>Item number</u>	<u>PENALTY</u>
1	\$32,400

Warning Items

With respect to items 4 and 5, we have reviewed the circumstances and supporting documents involved in this case and have decided not to conduct additional enforcement action or penalty assessment proceedings at this time. We advise you to promptly correct these item(s). Failure to do so may result in additional enforcement action.

Proposed Compliance Order

With respect to items **1, 2, and 3** pursuant to 49 United States Code § 60118, the Pipeline and Hazardous Materials Safety Administration proposes to issue a Compliance Order to Lake Charles LNG. Please refer to the *Proposed Compliance Order*, which is enclosed and made a part of this Notice.

Response to this Notice

Enclosed as part of this Notice is a document entitled *Response Options for Pipeline Operators in Compliance Proceedings*. Please refer to this document and note the response options. All material submitted in response to this enforcement action may be made publicly available. If you believe that any portion of your responsive material qualifies for confidential treatment under 5 U.S.C. 552(b), along with the complete original document you must provide a second copy of the document with the portions you believe qualify for confidential treatment redacted and an explanation of why you believe the redacted information qualifies for confidential treatment under 5 U.S.C. 552(b). If you do not respond within 30 days of receipt of this Notice, this constitutes a waiver of your right to contest the allegations in this Notice and authorizes the Associate Administrator for Pipeline Safety to find facts as alleged in this Notice without further notice to you and to issue a Final Order.

In your correspondence on this matter, please refer to **CPF 4-2017-3002** and for each document you submit, please provide a copy in electronic format whenever possible.

Sincerely,



R. M. Seeley  
Director, Southwest  
Pipeline and Hazardous Materials Safety Administration

Enclosures: *Proposed Compliance Order*  
*Response Options for Pipeline Operators in Compliance Proceedings*



## PROPOSED COMPLIANCE ORDER

Pursuant to 49 United States Code § 60118, the Pipeline and Hazardous Materials Safety Administration (PHMSA) proposes to issue to Lake Charles LNG a Compliance Order incorporating the following remedial requirements to ensure the compliance of Lake Charles LNG with the pipeline safety regulations:

1. In regard to Item Number 1 of the Notice pertaining to Lake Charles LNG's failure to consider IR drop when conducting an annual CP survey:

Survey the facility so that IR drop is considered in the readings and remediate any areas not meeting the criterion. Implement provisions to consider IR drop in determining the adequacy of all future readings in the form of procedures and interrupted surveys or other accepted means of consideration.

2. In regard to Item Number 2 of the Notice pertaining to Lake Charles LNG's failure to provide procedures demonstrating that atmospheric corrosion inspections are performed on a regular basis on above ground stain less steel insulated piping:

Develop procedures to inspect insulated above ground insulated stainless steel pipe for atmospheric corrosion at set intervals not to exceed every 3 years. Using the procedures, perform an atmospheric corrosion inspection of the insulated stainless steel piping.

3. In regard to Item Number 3 of the Notice pertaining to Lake Charles LNG's training records:

Review training records for all personnel and confirm that the required initial training and refresher training has been completed according to the requirements of §193.2707, §193.2713, §193.2717, and the Operator's training matrix. Ensure that supervisors complete refresher training on detailed operations and that contract Security personnel who have defined roles in the facility emergency response plan have received training in the emergency response plan and their roles. Develop records that clearly identify the employee's job title, the specific training required for that employee's job, and the dates the initial and refresher training was completed by each employee.

3. Lake Charles LNG must demonstrate within 180 days of receipt of this order that the requirements of this Compliance Order have been completed for Item Numbers 1, 2 and 3.

4. It is requested (not mandated) that Lake Charles LNG maintain documentation of the safety improvement costs associated with fulfilling this Compliance Order and submit the total to R. M. Seeley, Director, Southwest, Pipeline and Hazardous Materials Safety Administration. It is requested that these costs be reported in two categories: 1) total cost associated with preparation/revision of plans, procedures, studies and analyses, and 2) total cost associated with replacements, additions and other changes to pipeline infrastructure.