TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

November 24, 2025

Laurie Gharis, Chief Clerk
Texas Commission on Environmental Quality
P.O. Box 13087, MC 105
Austin, Texas 78711-3087

Re: Backup Material for Executive Director's Response to Hearing Requests for
Freeport LNG Development LP
Air Quality Permit No. 100114 and N304
Docket No. 2025-1553-AIR

Dear Ms. Gharis:

Enclosed please find a copy of the following documents for inclusion in the background material for this permit application:

- The final draft permit, including any special conditions or provisions, for permit number 100114 and N304
- Maximum Allowable Emission Rate Table (MAERT)
- The summary of the technical review of the permit application
- The compliance summary of the applicant
- Air Quality Analysis Modeling Audit
- Second Modeling Audit
- Preliminary Determination Summary.

If you have any questions, please do not hesitate to call me at extension 5933 or email me at Katelyn.Ding@tceq.texas.gov.

Sincerely,

Katelyn Ding, Staff Attorney
Environmental Law Division

Enclosures

Special Conditions

Permit Numbers 100114 and N304

1. This permit covers only those sources of emissions listed in the attached table entitled "Emission Sources - Maximum Allowable Emission Rates" (MAERT), and those sources are limited to the emission limits on that table and other operating conditions specified in this permit. Also, this permit authorizes the emissions from planned maintenance, startup, and shutdown. **(TBD)**

2. Non-fugitive emissions from relief valves, safety valves, or rupture discs of gases containing volatile organic compounds (VOC) at a concentration of greater than 1 percent are not authorized by this permit unless authorized on the MAERT. Any releases directly to atmosphere from relief valves, safety valves, or rupture discs of gases containing VOC at a concentration greater than 1 weight percent are not consistent with good practice for minimizing emissions. **(TBD)**

Federal Applicability

3. These facilities shall comply with all applicable requirements of the U.S. Environmental Protection Agency (EPA) regulations on Standards of Performance for New Stationary Sources promulgated in Title 40 Code of Federal Regulations Part 60 (40 CFR Part 60):

   A. Subpart A, General Provisions.

   B. Subpart IIII: Standards of Performance for Stationary Compression Ignition Internal Combustion Engines.

4. These facilities shall comply with all applicable requirements of the EPA regulations on National Emission Standards for Hazardous Air Pollutants for Source Categories in 40 CFR Part 63:

   A. Subpart A, General Provisions.

   B. Subpart ZZZZ: National Emission Standard for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines.

Flare

5. The multi-point ground flare (MPGF), EPN LIQFLARE, shall be designed to comply with the following requirements, and to achieve at least 99% destruction efficiency for VOC. **(TBD)**

   A. The flare (EPN LIQFLARE) will be pressure-assisted.

   B. The flare shall be operated with a flame present at all times when in use. The pilot flame shall be continuously monitored by a thermocouple, flame-ionization rod, acoustical monitor, infrared monitor, or other equivalent technology. The time, date, and duration of any loss of pilot flame shall be recorded. If operating with dual, redundant pilot flames, the loss of one of the pilot flames is not considered a loss of pilot flame to the flare system. Each pilot flame monitoring device shall be accurate to within manufacturer's specifications, and shall be calibrated at a frequency in accordance with the manufacturer's specifications. **(02/18)**

   C. The flare shall be operated with no visible emissions except during periods not to exceed a total of five minutes during any two consecutive hours as determined and documented using 40 CFR Part 60, Appendix A, Test Method 22 or equivalent method. **(02/18)**

   D. The permit holder shall install a continuous, pressure and temperature compensated, flow monitor that provides a record of the vent stream flow to the flare in units of standard cubic feet. The flow monitor shall be installed in the vent stream such that the total vent stream to

flare is measured. Flow measurements shall be taken continuously and values shall be recorded on an average one hour basis.

The flow monitor shall be calibrated according to manufacturer's instructions, or shall have a calibration check by using a second calibrated flow measurement device, annually to meet the following accuracy (uncertainty) specifications: the flow monitor shall be +/- 5.0%, temperature sensor shall be +/- 2.0% at absolute temperature, and pressure sensor shall be +/- 5.0 mmHg.

The flow monitor shall operate at least 95% of the time when the flare is operational, averaged over a rolling twelve (12) month period.

E. The requirements of this condition are not applicable during emission events. Emission events are not authorized by this permit.

A composition analyzer or calorimeter provide a record of composition the flare shall be installed the meets the requirements in AMOC 70 and follows the QA/QC procedures in AMOC 70.

The calorimeter or composition analyzer shall operate at least 95% of the time when the flare is operational, averaged over a rolling twelve (12) month period.

F. Operations of the flare are subject to the requirements of the Alternate Means of Control Plan (AMOC 70). Where applicable the requirements of AMOC 70 shall supersede the requirements of this Special Condition. **(TBD)**

6. When gas conditioning a ship to accept liquefied natural gas, the gas stream must be redirected into the boil-off gas system, to the existing Terminal Flare (EPN FLR), or as authorized under Air Quality Permit 55464. Gas conditioning emissions may not be sent to the EPN LIQFLARE.

Fuel Gas

7. Combustion units are subject to the following requirements for fuel sulfur: **(TBD)**

A. Fuel for the flare pilots is limited to boil-off gas, pipeline quality natural gas, or a blend of these fuels.

B. Fuel gas streams specified in paragraph A shall have a total sulfur content not to exceed 1.5 grains per 100 dscf on a rolling 12-month average.

C. Compliance with the requirements of paragraph B of this Special Condition shall be verified through sampling of fuel gas at least semi-annually. Fuel gas streams identified in paragraph A may be sampled individually, or a representative sample of blended fuel gas may be taken from the fuel gas header.

For natural gas, tariff sheets documenting the sulfur content of the fuel may be retained in lieu of performing sampling.

Compliance Assurance Monitoring

8. The following requirements apply to capture systems for the flare (EPN LIQFLARE). **(TBD)**

A. The capture system shall be inspected in accordance with the site LDAR program required by these Special Conditions.

B. If there is a bypass for the control device, comply with either of the following requirements:

(1) Install a flow indicator that records and verifies zero flow at least once every fifteen minutes immediately downstream of each valve that if opened would allow a vent stream to bypass the control device and be emitted, either directly or indirectly, to the atmosphere; or

(2) Once a month, inspect the valves, verifying that the position of the valves and the condition of the car seals that prevent flow out the bypass.

A bypass does not include authorized analyzer vents, highpoint bleeder vents, low point drains, or rupture discs upstream of pressure relief valves if the pressure between the disc and relief valve is monitored and recorded at least weekly. A deviation shall be reported if the monitoring or inspections indicate bypass of the control device when it is required to be in service per this permit.

C. The date and results of each inspection performed shall be recorded. If the results of any inspection are not satisfactory, the deficiencies shall be recorded, and the permit holder shall promptly take necessary corrective action, recording each action with the date completed.

Emergency Engines

9. The following requirements apply to the emergency generators (EPNs LIQEG-1 through LIQEG-7 and LIQEAC-1 and LIQEAC-2) and the emergency firewater pumps (EPNs LIQFWP-1, LIQFWP-2, and LIQFWP-3): **(TBD)**

A. Fuel for each engine shall be limited to ultra-low sulfur diesel (ULSD) containing no more than 15 parts per million (ppm) total sulfur by weight total sulfur.

B. Each emergency firewater pump (EPNs LIQFWP-1, LIQFWP-2, and LIQFWP-3) shall be limited to 100 hours per year of maintenance checks, readiness testing, and non-emergency operation, as defined at 40 CFR § 63.6640(f).

C. Each emergency generator (EPNs LIQEG-1 through LIQEG-7 and LIQEAC-1 and LIQEAC-2) shall be limited to 50 hours per year of non-emergency operation, as defined at 40 CFR § 63.6640(f).

D. Each engine shall be equipped with a non-resettable hour meter.

E. The emergency generators (EPNs LIQEG-1, 2, 3, and 4 and LIQEAC-1) shall satisfy the Tier 4 exhaust emission standards specified at Appendix I to 40 CFR Part 1039.

F. Each firewater pump (EPNs LIQFWP-1, LIQFWP-2, and LIQFWP-3) and emergency generators (EPNs LIQEG-5 and LIQEG-6) shall satisfy the Tier 3 exhaust emission standards specified at Appendix I to 40 CFR Part 1039.

G. Compliance with the emission limits of paragraph E and F of this Special Condition shall be demonstrated by retaining a copy of the manufacturers' certificate of conformity.

Fugitives

Piping, Valves, Pumps, Agitators, and Compressors - Intensive Directed Maintenance – 28LAER

10. Except as may be provided for in the Special Conditions of this permit, the following requirements apply to the above-referenced equipment:

A. The requirements of paragraphs F and G shall not apply (1) where the VOC has an aggregate partial pressure or vapor pressure of less than 0.044 pounds per square inch, absolute (psia) at 68°F or (2) operating pressure is at least 5 kilopascals (0.725 psi) below ambient pressure. Equipment excluded from this condition shall be identified in a list or by one of the methods described below to be made readily available upon request.

The exempted components may be identified by one or more of the following methods:

- piping and instrumentation diagram (PID);
- a written or electronic database or electronic file;
- color coding;
- a form of weatherproof identification; or
- designation of exempted process unit boundaries.

B. Construction of new and reworked piping, valves, pump systems, and compressor systems shall conform to applicable American National Standards Institute (ANSI), American Petroleum Institute (API), American Society of Mechanical Engineers (ASME), or equivalent codes.

C. New and reworked underground process pipelines shall contain no buried valves such that fugitive emission monitoring is rendered impractical. New and reworked buried connectors shall be welded.

D. To the extent that good engineering practice will permit, new and reworked valves and piping connections shall be so located to be reasonably accessible for leak-checking during plant operation. Difficult-to-monitor and unsafe-to-monitor valves, as defined by Title 30 Texas Administrative Code Chapter 115 (30 TAC Chapter 115), shall be identified in a list to be made readily available upon request. The difficult-to-monitor and unsafe-to-monitor valves may be identified by one or more of the methods described in paragraph A above. If an unsafe to monitor component is not considered safe to monitor within a calendar year, then it shall be monitored as soon as possible during safe to monitor times. A difficult to monitor component for which quarterly monitoring is specified may instead be monitored annually.

E. New and reworked piping connections shall be welded or flanged. Screwed connections are permissible only on piping smaller than two-inch diameter. Gas or hydraulic testing of the new and reworked piping connections at no less than operating pressure shall be performed prior to returning the components to service or they shall be monitored for leaks using an approved gas analyzer within 15 days of the components being returned to service. Adjustments shall be made as necessary to obtain leak-free performance.

Connectors shall be inspected by visual, audible, and/or olfactory means at least weekly by operating personnel walk-through. In addition, all connectors shall be monitored by leak-checking for fugitive emissions at least quarterly using an approved gas analyzer with a directed maintenance program in accordance with items F thru J of this special condition.

In lieu of the monitoring frequency specified above, connectors may be monitored on a semiannual basis if the percent of connectors leaking for two consecutive quarterly monitoring periods is less than 0.5 percent.

Connectors may be monitored on an annual basis if the percent of connectors leaking for two consecutive semiannual monitoring periods is less than 0.5 percent.

If the percent of connectors leaking for any semiannual or annual monitoring period is 0.5 percent or greater, the facility shall revert to quarterly monitoring until the facility again qualifies for the alternative monitoring schedules previously outlined in this paragraph.

The percent of connectors leaking shall be determined using the following formula:

$$\frac{C_l + C_s}{C_t} \times 100 = C_p$$

Where:

C_l = the number of connectors found leaking by the end of the monitoring period, either by Method 21 or sight, sound, and smell.

C_s = the number of connectors for which repair has been delayed and are listed on the facility shutdown log.

C_t = the total number of connectors in the facility subject to the monitoring requirements, as of the last day of the monitoring period, not including non-accessible and unsafe-to-monitor connectors.

C_p = the percentage of leaking connectors for the monitoring period.

Each open-ended valve or line shall be equipped with an appropriately sized cap, blind flange, plug, or a second valve to seal the line. Except during sampling, both valves shall be closed. If the isolation of equipment for hot work or the removal of a component for repair or replacement results in an open ended line or valve, it is exempt from the requirement to install a cap, blind flange, plug, or second valve for 72 hours. If the repair or replacement is not completed within 72 hours, the permit holder must complete either of the following actions within that time period;

(1) a cap, blind flange, plug, or second valve must be installed on the line or valve; or

(2) The open-ended valve or line shall be monitored once for leaks above background for a plant or unit turnaround lasting up to 45 days with an approved gas analyzer and the results recorded. For all other situations, the open-ended valve or line shall be monitored once by the end of the 72 hours period following the creation of the open ended line and monthly thereafter with an approved gas analyzer and the results recorded. For turnarounds and all other situations, leaks are indicated by readings of 500 ppmv and must be repaired within 24 hours or a cap, blind flange, plug, or second valve must be installed on the line or valve.

F. Accessible valves shall be monitored by leak-checking for fugitive emissions at least quarterly using an approved gas analyzer with a directed maintenance program. Non accessible valves shall be monitored by leak-checking for fugitive emissions at least annually using an approved gas analyzer with a directed maintenance program. Sealless/leakless valves (including, but not limited to, welded bonnet bellows and diaphragm valves) and relief valves equipped with a rupture disc upstream or venting to a control device are not required to be monitored. For valves equipped with rupture discs, a pressure-sensing device shall be installed between the relief valve and rupture disc to monitor disc integrity. All leaking discs shall be replaced at the earliest opportunity but no later than the next process shutdown. A check of the reading of the pressure-sensing device to verify disc integrity shall be performed at least quarterly and recorded in the unit log or equivalent. Pressure-sensing devices that are continuously monitored with alarms are exempt from recordkeeping requirements specified in this paragraph.

The gas analyzer shall conform to requirements listed in Method 21 of 40 CFR part 60, appendix A. The gas analyzer shall be calibrated with methane. In addition, the response factor of the instrument for a specific VOC of interest shall be determined and meet the requirements of Section 8 of Method 21. If a mixture of VOCs is being monitored, the response factor shall be calculated for the average composition of the process fluid. A calculated average is not required when all of the compounds in the mixture have a response factor less than 10 using methane. If a response factor less than 10 cannot be achieved using methane, than the instrument may be calibrated with one of the VOC to be measured or any other VOC so long as the instrument has a response factor of less than 10 for each of the VOC to be measured.

A directed maintenance program shall consist of the repair and maintenance of components assisted simultaneously by the use of an approved gas analyzer such that a minimum concentration of leaking VOC is obtained for each component being maintained. Replaced components shall be re-monitored within 15 days of being placed back into VOC service.

G. All new and replacement pumps, compressors, and agitators shall be equipped with a shaft sealing system that prevents or detects emissions of VOC from the seal. These seal systems need not be monitored and may include (but are not limited to) dual pump seals with barrier fluid at higher pressure than process pressure, seals degassing to vent control systems kept in good working order, or seals equipped with an automatic seal failure detection and alarm system. Submerged pumps or sealless pumps (including, but not limited to, diaphragm, canned, or magnetic-driven pumps) may be used to satisfy the requirements of this condition and need not be monitored.

All other pump, compressor, and agitator seals shall be monitored with an approved gas analyzer at least quarterly.

H. Damaged or leaking valves, connectors, compressor seals, pump seals, and agitator seals found to be emitting VOC in excess of 500 parts per million by volume (ppmv) or found by visual inspection to be leaking (e.g., dripping process fluids) shall be tagged and replaced or repaired. A first attempt to repair the leak must be made within 5 days. Records of the first attempt to repair shall be maintained. A leaking component shall be repaired as soon as practicable, but no later than 15 days after the leak is found. If the repair of a component would require a unit shutdown that would create more emissions than the repair would eliminate, the repair may be delayed until the next scheduled shutdown. All leaking components which cannot be repaired until a scheduled shutdown shall be identified for such repair by tagging. A listing of all components that qualify for delay of repair shall be maintained on a delay of repair list. The cumulative daily emissions from all components on the delay of repair list shall be estimated by multiplying by 24 the mass emission rate for each component calculated in accordance with the instructions in 30 TAC 115.782 (c)(1)(B)(i)(II). The calculations of the cumulative daily emissions from all components on the delay of repair list shall be updated within ten days of when the latest leaking component is added to the delay of repair list. When the cumulative daily emission rate of all components on the delay of repair list times the number of days until the next scheduled unit shutdown is equal to or exceeds the total emissions from a unit shutdown as calculated in accordance with 30 TAC 115.782 (c)(1)(B)(i)(I), the TCEQ Regional Manager and any local programs shall be notified and may require early unit shutdown or other appropriate action based on the number and severity of tagged leaks awaiting shutdown. This notification shall be made within 15 days of making this determination.

I. Records of repairs shall include date of repairs, repair results, justification for delay of repairs, and corrective actions taken for all components. Records of instrument monitoring shall

indicate dates, times, test methods, and instrument readings. The instrument monitoring record shall include the time that monitoring took place for no less than 95% of the instrument readings recorded. Records of physical inspections shall be noted in the operator's log or equivalent.

J. Compliance with the requirements of this condition does not assure compliance with requirements of 30 TAC Chapter 115, an applicable New Source Performance Standard (NSPS), or an applicable National Emission Standard for Hazardous Air Pollutants (NESHAPS), and does not constitute approval of alternative standards for these regulations.

K. In lieu of the monitoring frequency specified in paragraph F, valves in gas and light liquid service may be monitored on a semiannual basis if the percent of valves leaking for two consecutive quarterly monitoring periods is less than 0.5 percent.

Valves in gas and light liquid service may be monitored on an annual basis if the percent of valves leaking for two consecutive semiannual monitoring periods is less than 0.5 percent.

If the percent of valves leaking for any semiannual or annual monitoring period is 0.5 percent or greater, the facility shall revert to quarterly monitoring until the facility again qualifies for the alternative monitoring schedules previously outlined in this paragraph.

L. The percent of valves leaking used in paragraph K shall be determined using the following formula:

$$\frac{(V_l + V_s)}{V_t} \times 100 = V_p$$

Where:

V_l = the number of valves found leaking by the end of the monitoring period, either by Method 21 or sight, sound, and smell.

V_s = the number of valves for which repair has been delayed and are listed on the facility shutdown log.

V_t = the total number of valves in the facility subject to the monitoring requirements, as of the last day of the monitoring period, not including non-accessible and unsafe to-monitor valves.

V_p = the percentage of leaking valves for the monitoring period.

M. Any component found to be leaking by physical inspection (i.e., sight, sound, or smell) shall be repaired or monitored with an approved gas analyzer within 15 days to determine whether the component is leaking in excess of 500 ppmv of VOC. If the component is found to be leaking in excess of 500 ppmv of VOC, it shall be subject to the repair and replacement requirements contained in this special condition.

11. The alternative screening procedure ("soap bubble test") as specified in 40 CFR 60, Appendix A-7, Method 21, Section 8.3.3 may be used for the purpose of verifying that the components are not leaking in lieu of the procedure specified in Special Condition No. 10.E, 10.F, or 10.G, or 10.H. **(06/20)**

12. All accessible connectors in gas/vapor and light liquid service shall be monitored quarterly with an approved gas analyzer in accordance with Items E, F, and H of Special Condition No. 10 that are applicable to monitoring of connectors. **(02/18)**

A. Connectors may be monitored on a semiannual basis if the percent of connectors leaking for two consecutive quarterly monitoring periods is less than 0.5 percent.

Connectors may be monitored on an annual basis if the percent of connectors leaking for two consecutive semiannual monitoring periods is less than 0.5 percent.

If the percent of connectors leaking for any semiannual or annual monitoring period is 0.5 percent or greater, the facility shall revert to quarterly monitoring until the facility again qualifies for the alternative monitoring schedules previously outlined in this paragraph.

B. The percent of connectors leaking used in paragraph A shall be determined using the following formula:

$$(Cl + Cs) \times 100/Ct = Cp$$

Where:

Cl = the number of connectors found leaking by the end of the monitoring period, either by Method 21 or sight, sound, and smell.

Cs = the number of connectors for which repair has been delayed and are listed on the facility shutdown log.

Ct = the total number of connectors in the facility subject to the monitoring requirements, as of the last day of the monitoring period, not including non-accessible and unsafe-to-monitor connectors.

Cp = the percentage of leaking connectors for the monitoring period.

Optical Gas Imaging

13. The following modifications to the 28LAER program specified in Special Condition Nos. 10 and 12 may be implemented. These modifications are specified in order for the permit holder to be allowed to implement an alternate work practice (AWP) as an alternative to the current Method 21 monitoring requirements specified in Special Condition Nos. 10 and 12. Prior to implementing this AWP, the permit holder shall notify the Houston Regional Office of their intent to use the alternative work practice in writing as described in 30 TAC §115.358 (g). **(08/19)**

A. In lieu of the Method 21 monitoring requirements of Special Condition Nos. 10 and 12, the permit holder may monitor components on a bi-monthly basis using an optical gas imaging camera (OGIC) meeting the requirements of 40 Code of Federal Regulations (CFR) §60.18(i)(1) as described in Attachment A of this permit. Components that would be considered inaccessible (e.g., insulated components), difficult-to-monitor (DTM), or unsafe-to-monitor (UTM) when using a Method 21 instrument will be monitored with the OGIC so long as such components are not considered DTM or UTM, as defined in Paragraph G of this condition, when using an OGIC.

B. All components described above must also be monitored annually using an approved gas analyzer conforming to the requirements listed in Method 21 of 40 CFR part 60, appendix A. Subsequent annual monitoring must be conducted every 12 months from the initial annual monitoring period. As an option, a facility may choose to space out the Method 21 monitoring of all components over a 12-month period, as long as all components are monitored on a set schedule every 12 months. Method 21 monitoring for components that are added to an area may be completed during the next scheduled annual Method 21 monitoring event for that area provided that the components are monitored within 12 months of being placed in

service. This requirement does not apply to components that would be considered DTM or UTM when using a Method 21 instrument. **(06/20)**

C. All OGIC operators shall meet the minimum training requirements in 30 Texas Administrative Code (TAC) §115.358(h) as specified in subparagraph 2.1.5 of Attachment A of this permit.

D. An OGIC daily verification check shall be performed prior to a monitoring survey as specified in 40 CFR 60.18 (i) (2) (i) through (iv). The daily OGIC verification check shall be conducted by each separate OGIC operator that will be performing imaging using the same OGIC for that day.

E. Bi-monthly monitoring using the OGIC will be performed following the procedures outlined in paragraph 2 and subparagraphs 2.1.1 through 2.1.6 of Attachment A of this permit.

F. When monitoring using the OGIC, components within the OGIC field of view will be observed for a minimum of three seconds. All emissions imaged by the optical gas imaging instrument are considered to be leaks and are subject to repair. All emissions visible to the naked eye are also considered to be leaks and are subject to repair.

G. When a leak is identified with the OGIC, an approved gas analyzer conforming to the requirements listed in Method 21 of 40 CFR part 60, appendix A will be used to monitor and record the concentration of the leak before repair. Repaired components will be remonitored to verify the success of the repair using an OGIC, an approved gas analyzer, or the soap bubble test described in Section 8.3.3 of Method 21. Scenarios where a leak is detected by the OGIC but a Method 21 approved gas analyzer reading is not required include: components that are considered DTM or UTM with a Method 21 instrument and components that are insulated and therefore not accessible for Method 21 instrument monitoring. A difficult-to-monitor component is a component that cannot be inspected without elevating the monitoring personnel more than two meters above a permanent support surface or that requires a permit for confined space entry as defined in 29 CFR §1910.146. An unsafe-to-monitor component is a component that the owner or operator determines is unsafe to monitor because monitoring personnel would be exposed to an immediate danger as a consequence of conducting the monitoring. **(06/20)**

H. The alternative monitoring schedule authorized in Subparagraph **Error! Reference source not found.** of Special Condition No. **Error! Reference source not found.** is not applicable.

I. The following records shall be kept for a period of at least 5 years and be made available to the TCEQ Executive Director or designated representative upon request:

(1) Records of the make, model, and manufacturer specifications of each OGIC used to demonstrate compliance with Subparagraph A of this condition.

(2) Records demonstrating compliance with Subparagraph C of this condition.

(3) The equipment, processes, and facilities for which the owner or operator chooses to use the alternative work practice.

(4) The detection sensitivity level selected from Table 1 to subpart A of 40 CFR 60.18 for the optical gas imaging instrument.

(5) The analysis to determine the piece of equipment in contact with the lowest mass fraction of chemicals that are detectable, as specified in paragraph (i)(2)(i)(A) of 40 CFR 60.18.

(6) The technical basis for the mass fraction of detectable chemicals used in the equation in paragraph (i)(2)(i)(B) of 40 CFR 60.18.

(7) Records of the daily OGIC verification check. Record the distance, per paragraph (i)(2)(iv)(B) of 40 CFR 60.18, and the flow meter reading, per paragraph (i)(2)(iv)(C) of 40 CFR 60.18, at which the gas was imaged during the daily OGIC verification check. Keep a video record of the daily instrument check for each configuration of the optical gas imaging instrument used during the leak survey (for example, the daily instrument check must be conducted for each lens used). The video record must include a time and date stamp for each daily instrument check. The video record must be kept for 5 years.

(8) Records of OGIC monitoring shall indicate dates, times, component areas monitored, results of imaging and the results of Method 21 monitoring for those components found leaking with the OGIC. In addition, a video record must be used to document the leak survey results. The video record must include a time and date stamp for each monitoring event. A video record can be used to meet the recordkeeping requirements if each piece of regulated equipment selected for this work practice can be identified in the video record. The video record must be kept for 5 years.

(9) The records of the annual Method 21 screening required in subparagraph B of this condition shall identify the equipment screened, the screening value measured by Method 21, the time and date of the screening, and calibration information required in Subparagraph **Error! Reference source not found.** of Special Condition No. 10**.**

(10) Records of repairs to fugitive components shall include date of repairs, repair results, justification for delay of repairs, and corrective actions taken for all components.

(11) Records of maintenance to the OGIC, as applicable, will be maintained by the OGIC owner/operator.

Maintenance, Startup, and Shutdown

14. This permit authorizes the planned maintenance, startup, and shutdown (MSS) activities summarized in the MSS Activity Summary (Special Condition No. 15). The performance of each planned MSS activity and the emissions associated with it shall be recorded and include at least the following information: **(TBD)**

    A. the process unit at which emissions from the MSS activity occurred, including the emission point number and common name of the process unit;

    B. the type of planned MSS activity and the reason for the planned activity;

    C. the common name and the facility identification number, if applicable, of the facilities at which the MSS activity and emissions occurred;

    D. the date and time of the MSS activity and its duration;

    E. the estimated quantity of each air contaminant, or mixture of air contaminants, emitted with the data and methods used to determine it. The emissions shall be estimated using the methods identified in the permit application, consistent with good engineering practice.

15. All MSS emissions shall be summed monthly and the rolling 12-month emissions shall be updated on a monthly basis. Planned startup and shutdown emissions due to the activities identified in this Special Condition are authorized from the facilities and temporary equipment and control devices identified in the Special Conditions of the permit. **(TBD)**

MSS Activity Summary

Facility	Activity	EPN
All facilities	Depressurize and drain equipment following shutdown	MSS-FUG1-3 MSS-FUG4
Train start-up and shut-down during turnaround, planned maintenance and/or repair	Venting to the LQF Flare	LIQFLARE

16. Process units and facilities shall be depressurized, emptied, degassed, and placed in service in accordance with the following requirements. **(TBD)**

A. The process equipment shall be depressurized to a control device or a controlled recovery system prior to venting to atmosphere, degassing, or draining liquid. Equipment that only contains material that is liquid with VOC partial pressure less than 0.50 psi at the normal process temperature and 95°F may be opened to atmosphere and drained in accordance with paragraph C of this special condition. The vapor pressure at 95°F may be used if the actual temperature of the liquid is verified to be less than 95°F and the temperature is recorded.

B. If mixed phase materials must be removed from process equipment, the cleared material shall be routed to a knockout drum or equivalent to allow for managed initial phase separation. If the VOC partial pressure is greater than 0.50 psi at either the normal process temperature or 95°F, any vents in the system must be routed to a control device or a controlled recovery system. The vapor pressure at 95°F may be used if the actual temperature of the liquid is verified to be less than 95°F and the temperature is recorded. Control must remain in place until degassing has been completed or the system is no longer vented to atmosphere.

C. All liquids from process equipment or storage vessels must be removed to the maximum extent practical prior to opening equipment to commence degassing and/or maintenance. Liquids must be drained into a closed vessel or closed liquid recovery system unless prevented by the physical configuration of the equipment. If it is necessary to drain liquid into an open pan or sump, the liquid must be covered or transferred to a covered vessel within one hour of being drained.

D. If the VOC partial pressure is greater than 0.50 psi at the normal process temperature or 95°F, facilities shall be degassed using good engineering practice to ensure air contaminants are removed from the system through the control device or controlled recovery system to the extent allowed by process equipment or storage vessel design. The vapor pressure at 95°F may be used if the actual temperature of the liquid is verified to be less than 95°F and the temperature is recorded. The facilities to be degassed shall not be vented directly to atmosphere, except as necessary to establish isolation of the work area or to monitor VOC concentration following controlled depressurization. The venting shall be minimized to the maximum extent practicable and actions taken recorded. The control device or recovery system utilized shall be recorded with the estimated emissions from controlled and uncontrolled degassing calculated using the methods that were used to determine allowable emissions for the permit application.

(1) The locations and/or identifiers where the purge gas or steam enters the process equipment or storage vessel and the exit points for the exhaust gases shall be

recorded (process flow diagrams [PFDs] or piping and instrumentation diagrams [P&IDs] may be used to demonstrate compliance with the requirement). If the process equipment is purged with a gas, two system volumes of purge gas must have passed through the control device or controlled recovery system before the vent stream may be sampled to verify acceptable VOC concentration prior to uncontrolled venting. The VOC sampling and analysis shall be performed using an instrument meeting the requirements of Special Condition No. 17. The sampling point shall be upstream of the inlet to the control device or controlled recovery system. The sample ports and the collection system must be designed and operated such that there is no air leakage into the sample probe or the collection system downstream of the process equipment or vessel being purged. If there is not a connection (such as a sample, vent, or drain valve) available from which a representative sample may be obtained, a sample may be taken upon entry into the system after degassing has been completed. The sample shall be taken from inside the vessel so as to minimize any air or dilution from the entry point. The facilities shall be degassed to a control device or controlled recovery system until the VOC concentration is less than 10,000 ppmv or 10 percent of the LEL. Documented site procedures used to de-inventory equipment to a control device for safety purposes (i.e., hot work or vessel entry procedures) that achieve at least the same level of purging may be used in lieu of the above.

17. Air contaminant concentration shall be measured using an instrument/detector meeting one set of requirements specified below. **(TBD)**

    A. VOC concentration shall be measured using an instrument meeting all the requirements specified in EPA Method 21 (40 CFR 60, Appendix A) with the following exceptions:

        (1) The instrument shall be calibrated within 24 hours of use with a calibration gas such that the response factor (RF) of the VOC (or mixture of VOCs) to be monitored shall be less than 2.0. The calibration gas and the gas to be measured, and its approximate (RF) shall be recorded. If the RF of the VOC (or mixture of VOCs) to be monitored is greater than 2.0, the VOC concentration shall be determined as follows:

            VOC Concentration = Concentration as read from the instrument*RF

            In no case should a calibration gas be used such that the RF of the VOC (or mixture of VOCs) to be monitored is greater than 5.0.

        (2) Sampling shall be performed as directed by this permit in lieu of section 8.3 of Method 21. During sampling, data recording shall not begin until after two times the instrument response time. The date and time shall be recorded, and VOC concentration shall be monitored for at least 5 minutes, recording VOC concentration each minute. As an alternative the VOC concentration may be monitored over a five-minute period with an instrument designed to continuously measure concentration and record the highest concentration read. The highest measured VOC concentration shall be recorded and shall not exceed the specified VOC concentration limit prior to uncontrolled venting.

    B. Colorimetric gas detector tubes may be used to determine air contaminant concentrations if they are used in accordance with the following requirements.

        (1) The air contaminant concentration measured as defined in (3) is less than 80 percent of the range of the tube and is at least 20 percent of the maximum range of the tube.

        (2) The tube is used in accordance with the manufacturer’s guidelines.

(3) At least 2 samples taken at least 5 minutes apart must satisfy the following prior to uncontrolled venting:

measured contaminant concentration (ppmv) < release concentration.

Where the release concentration is:

10,000*mole fraction of the total air contaminants present that can be detected by the tube.

The mole fraction may be estimated based on process knowledge. The release concentration and basis for its determination shall be recorded.

Records shall be maintained of the tube type, range, measured concentrations, and time the samples were taken.

C. Lower explosive limit measured with a lower explosive limit detector.

(1) The detector shall be calibrated within 30 days of use with a certified methane gas standard at 25% of the lower explosive limit (LEL) for methane. The LEL response shall be within 95% of that for methane. Records of the calibration date/time and calibration result (pass/fail) shall be maintained.

(2) A functionality test shall be performed on each detector within 24 hours of use with a certified gas standard at 25% of the LEL for methane. The LEL monitor shall read no lower than 90% of the calibration gas certified value. Records, including the date/time and test results, shall be maintained.

(3) A certified pentane gas standard equivalent to 25% of the LEL for pentane may be used for calibration and functionality tests.

18. Additional occurrences of MSS activities authorized by this permit may be authorized under permit by rule only if conducted in compliance with this permit's procedures, emission controls, monitoring, and recordkeeping requirements applicable to the activity. **(TBD)**

19. Control devices required by this permit for emissions from planned MSS activities are limited to the flare (EPN LIQFLARE). The flare shall meet all the requirements identified in AMOC 70 requirements. **(TBD)**

20. Planned maintenance, startup, and shutdown vent gas releases to the flare (EPN LIQFLARE) shall be limited to no more than 454.50 million standard cubic feet per year (MMscf/yr) based on a rolling 12-month total. **(TBD)**

21. Sections of the plant handling propane or mixed refrigerant undergoing shutdown or maintenance that requires breaking a line or opening a vessel shall be depressurized, emptied, degassed, and placed in service in accordance with the following requirements.

A. The facilities to be degassed shall not be vented directly to atmosphere, except as necessary to establish isolation of the work area or to monitor VOC concentration following controlled depressurization. The venting shall be minimized to the maximum extent practicable and actions taken recorded. The control device or recovery system utilized shall be recorded with the estimated emissions from controlled and uncontrolled degassing calculated using the methods that were used to determine allowable emissions for the permit application.

B. The locations and/or identifiers where the purge gas enters the process equipment or storage vessel and the exit points for the exhaust gases shall be documented; (process flow diagrams [PFDs] or piping and instrumentation diagrams [P&IDs] may be used to demonstrate compliance with the requirement). **(02/18)**

C. If the process equipment requires purging, it will be conducted using best management and good air pollution control practices.

Projected Actual Emissions

22. The construction of Trains 1-3 associated with the permit application PI-1 dated August 9, 2022, TCEQ NSR Project No. 346087, was determined to not be subject to major new source review through the use of projected actual emission rates for one or more facilities associated with the project. Actual emissions from the sources using a projected actual as listed in the table of this special condition shall be monitored as represented in the application and records maintained, and reports provided in accordance with 30 TAC §116.127. Records shall be maintained for five years from the resumption of regular operations. Records shall include the date of resumption of regular operations after the project change. **(TBD)**

FIN*	EPN	Permit No.	Pollutant	Baseline Actual Emissions (tpy)	Projected Actual Emissions (tpy)
FLR	FLR	NSR Permit No. 55464	NOX	3.10	22.50
			CO	17.83	77.93
			VOC	0.39	4.38
			SO_2	0.04	2.05
			H_2SO_4	0.00	0.16

A report is due to the Executive Director in any calendar year in which the actual emissions for the project exceed the total baseline actual emissions in the table above by 250 tpy for CO and 25 tpy for NOx netting significant emission rate, and a projected actual emission for any facility is exceeded in accordance with 116.127(c).

If netting is triggered during the project and a projected actual emission is exceeded, and actual emissions do not exceed the netting significant emission rate for the calendar year, the permit holder will maintain an emissions record for the calendar year and no report is required.

Netting and Offsets

23. This Nonattainment New Source Review permit is issued/approved based on the requirement that the permit holder offset the project emission increase for facilities authorized by this permit prior to the commencement of operation, through participation in the TCEQ Emission Banking and Trading (EBT) Program in accordance with the rules in 30 TAC Chapter 101, Subchapter H. **(TBD)**

A. The permit holder shall use 53.4 tons per year (tpy) of NO_X ECs from TCEQ credit certificate numbers 3991, 4044, 4050, 4051, 4052, 4053, 4054, and 4163 to offset the 41.02 tpy NO_X project emission increase for the facilities authorized by this permit at a ratio of 1.3 to 1.0.

B. The permit holder shall use 32.1 tpy of VOC credits to offset the 24.63 tpy VOC project emission increase for the facilities authorized by this permit at a ratio of 1.3 to 1.0.

(1) The permit holder shall use 32.1 tpy of VOC ECs from TCEQ credit certificate numbers 4028, 4029, 4030, 4031, 4032, 4033, 4034, 4035, 4036, and 4040 to offset the VOC project emission increase at a ratio of 1.3 to 1.0.

C. Prior to the start of operation of the flare gas recovery project (an emissions reduction project), the permit holder shall use 9.4 tpy of NOx credits to offset the 7.24 tpy NOx project emission increase for the facilities authorized by this permit at a ratio of 1.3 to 1.0.

D. Prior to the commencement of operation, the permit holder shall obtain approval from the TCEQ EBT Program for the credits being used and then submit a permit alteration or amendment request to the TCEQ Air Permits Division (and copy the TCEQ Regional Office) to identify approved credits by TCEQ credit certificate number.

Recordkeeping

24. The records required by these special conditions shall be maintained in either hard copy or electronic format and shall be maintained for at least five years. These records shall be made immediately available at the request of personnel from the TCEQ or any air pollution control agency with jurisdiction. **(TBD)**

Date: TBD

Attachment A

Permit Numbers 100114 and N304

General Optical Gas Imaging Camera Operational Procedures

Freeport LNG

1 OGIC SPECIFICATIONS

Freeport LNG will utilize a FLIR GF320 Optical Gas Imaging Camera (OGIC) for streams with predominantly high concentrations of hydrocarbons and a FLIR GF343 for streams with predominantly high concentrations of carbon dioxide, or other equivalent OGICs. The FLIR GF320 is designed to detect hydrocarbons (e.g., methane and VOCs, while FLIR GF343 is designed to detect carbon dioxide.

Freeport LNG will maintain records of the make, model, and manufacturer specifications of each OGIC instrument used under Freeport LNG's LDAR program.

2 OGIC MONITORING PROCEDURES

OGIC monitoring will be performed by appropriately trained personnel in accordance with the procedures summarized below.

A. On a daily basis, prior to beginning each OGIC monitoring event, monitoring personnel will complete an OGIC daily verification check in accordance with Section 2.1.1 of this Plan.

B. All components subject to the LDAR program and designated for OGIC monitoring will be monitored with the OGIC unless considered difficult-to-monitor or unsafe-to-monitor.

C. The distance between the OGIC and the components being surveyed shall not exceed the maximum distance (D_{Max}) established during the OGIC daily verification check. The operator will establish an optimized D_{Max} (i.e., as large as possible) during the survey, taking into account weather conditions, thermal background, viewing angle of components, and distance to monitored components.

D. Throughout the survey, monitoring personnel will endeavor to stay within a close distance to monitored components, if possible. If, based on the judgement of monitoring personnel, the distance to the monitored component is equal to or greater than 50% of D_{Max}, monitoring personnel will use a laser range finder or equivalent device to ensure compliance with the established D_{Max}. Monitoring personnel may perform an additional OGIC daily verification check to establish a new D_{Max}, as needed.

E. All visible emissions from fugitive components identified using the OGIC are considered leaks subject to repair requirements.

F. Monitoring personnel will qualitatively assess monitoring conditions throughout the survey and will follow the procedures identified in Section 2.1.2 if adverse monitoring conditions are encountered.

G. The procedures identified in Section 2.1.3 will be followed to ensure that adequate thermal background exists when viewing each component with the OGIC.

H. The procedures identified in Section 2.1.4 will be followed if interferences are encountered during the survey.

I. Monitoring personnel will meet the qualification and experience criteria outlined in Section 2.1.5 of this Plan.

J. The OGIC will be maintained as outlined in Section 2.1.6 of this Plan.

2.1.1 OGIC Daily Verification Check

An OGIC performance check will be performed on a daily basis prior to OGIC monitoring surveys, and at other times as needed, in accordance with the following procedure.

1. Start the OGIC according to the manufacturer's instructions, ensuring that all appropriate settings conform to the manufacturer' s instructions.

2. After the OGIC start-up process is completed and the OGIC is set to the intended settings, view the image produced by the OGIC to ensure that the image is normal. If the image is abnormal, perform a lens assessment and follow a proper lens cleaning procedure, if necessary.

3. Calculate the mass flow rate to be used in the daily instrument check by the following method (see Note 1):
    a. Determine the piece of equipment in contact with the lowest mass fraction of detectable chemicals, within the distance at or below the standard detection sensitivity level.
    b. Multiply the standard detection sensitivity level by the mass fraction of chemicals from the stream to determine the mass flow rate to be used in the daily instrument check using the following equation:

$$\mathbf{E_{DIC} = (E_{SDS}) \cdot \sum(X)}$$

Where:

E_{DIC} = Mass flow rate for the daily instrument check (grams per hour)
E_{SDS} = Standard detection sensitivity level from Table 1 to Subpart A, (grams per hour)
X = Mass fraction of detectable chemical(s) seen by the optical gas imaging instrument, within the operating distance at or below the E_{SDS}.

4. Prior to the beginning of the monitoring survey, test the OGIC as follows:
    a. Record ambient temperature as measured from an onsite temperature gauge or local weather station data reported via a public feed (e.g., weather.com).
    b. Record wind speed as measured from a handheld anemometer or similar device.
    c. Install a regulator on a gas cylinder containing a gas that is visible by the OGIC (e.g., methane). The regulator flow rate and gas cylinder composition shall be selected to represent the process stream(s) to be surveyed on that day. Place the cylinder in the area where the OGIC monitoring survey will take place or where similar environmental (wind, rain, etc.) conditions exist. If the wind speed increases noticeably during the monitoring survey, repeat the OGIC daily verification check. (See Note 2).
    d. Set up the OGIC at a distance from the outlet of the cylinder regulator.

e. Open the valve on the regulator to provide a mass flow rate that is no greater than the mass flow rate calculated in Step 3 while observing the gas flow through the OGIC.

f. Gradually increase the distance between the OGIC and the outlet of the cylinder regulator and view the emission with the OGIC at each distance interval. The maximum distance where the emission is viewed by the OGIC for a minimum duration of 10 seconds is D_{Max}. Upon establishing D_{Max}, the OGIC daily verification check is complete.

Notes:

1) The calculation described in Step 3 may be performed once for all streams at the facility based on the heat and material balance (HMB) and need not be repeated for the daily instrument check. The results of the calculation described in Step 3 will be maintained.
2) Monitoring personnel may use a single regulator/cylinder composition combination for all process streams to be monitored with the hydrocarbon OGIC as long as the combination provides a mass flow rate that is no greater than the maximum flow rate calculated in Step 3 for all process streams to be monitored.

2.1.2 OGIC Use in Adverse Conditions

2.1.2.1 Wind

Wind speed is recorded during the OGIC daily verification check. If the wind speed within the survey area(s) has a Beaufort number of five or higher, the survey will be postponed in those areas until the wind speed has decreased. A wind speed chart is presented in Table 5-1.

Table 5.1 Wind speed Chart

Beaufort number	Wind (km/h)	Wind (mph)	Wind classification	Wind effects on land	Wind effects on water
0	<1	<1	Calm	Smoke rises vertically	Water calm, mirror-like
1	1-5	1-3	Light air	Smoke drift indicates wind direction; still wind vanes	Scale-like ripples with no foam crests
2	6-11	4-7	Light breeze	Leaves rustle; wind felt on face; wind vanes moved by wind	Small wavelets; crests have a glassy appearance and do not break
3	12-19	8-12	Gentle breeze	Leaves and twigs constantly moving; light flags extended	Large wavelets; crests begin to break, scattered whitecaps
4	20-29	13-18	Moderate breeze	Dust and loose paper raised; small branches move	Small waves 1-4' becoming longer; many whitecaps
5	30-38	19-24	Fresh breeze	Small trees with leaves begin to Sway	Moderate, longer waves 4-8'; whitecaps common; some spray
6	39-50	25-31	Strong breeze	Larger tree branches moving; phone lines whistle	Larger waves 8-13 whitecaps common; more spray
7	51-61	32-38	Near gale	Whole trees moving; difficult to walk against wind	Sea heaps up; waves 13-20'; crests break; white foam streaking off breakers

Beaufort number	Wind (km/h)	Wind (mph)	Wind classification	Wind effects on land	Wind effects on water
8	62-74	39-46	Gale	Twigs break off trees; difficult to walk against wind	Moderately high waves, 13-20', with greater lengths; crests beginning to break into foam blown in white streaks
9	75-86	47-54	Strong gale	Slight damage to buildings; shingles and slates torn off roofs	High waves of 20'; rolling seas; dense streaks of foam; spray may reduce visibility
10	87-101	55-63	Storm	Trees uprooted; considerable structural damage to buildings	Very high waves, 20-30', with overhanging crests; sea white with blown foam
11	102-115	64-72	Violent storm	Widespread damage	Huge waves, 30-45', foam patches cover sea; air filled with spray; visibility reduced
12	>115	>72	Hurricane	Widespread damage	Huge waves, over 45' air filled with foam; sea all white with driving spray; little visibility

2.1.2.2 Rain

The OGIC may be used in light rain as long as the OGIC daily verification check is performed in the same rain conditions. If conditions change, additional OGIC daily verification checks will be conducted prior to the survey.

2.1.2.3 Temperature

Monitoring personnel will record the ambient temperature during the OGIC daily verification check and will confirm that the temperature is within the acceptable operating range of the OGIC. In the unlikely event that temperature within the survey area falls outside of the acceptable operating range of the OGIC, the survey will be postponed until acceptable operating conditions exist.

2.1.3 Thermal Background

The ability to easily identify fugitive emissions using an OGIC decreases as the thermal energy differential between the fugitive emission and background decreases. Monitoring personnel will view components within the field of view using multiple camera angles and will select an angle that provides an adequate thermal background. During the survey, monitoring personnel will continuously perform a qualitative analysis of the thermal properties of the background to ensure that adequate thermal background is present. If monitoring personnel identify an area where questionable thermal background is present that may reduce the detection capabilities of the OGIC, one or both of the following procedures will be followed.

1) An additional OGIC verification check will be performed in the area of question to verify that adequate thermal background is present.

2) A temporary background (e.g., a person or other background) will be inserted into the scene(s) to create an adequate thermal background when feasible to increase the thermal energy differential between the fugitive emission and the background.

2.1.4 Handling Interferences

Monitoring personnel will be knowledgeable of the process streams typically present at a LNG facility and specifically present at the site being surveyed and will be able to identify sources of potential interference, such as steam. If potential interference is identified, monitoring personnel will utilize alternate viewing angles to differentiate between the component and potential interference source. In addition, monitoring personnel may utilize a secondary confirmation instrument (e.g., handheld gas detector or bubbles) to confirm the presence of hydrocarbons in the emissions of interest.

2.1.5 OGIC Operator Training and Experience

OGIC monitoring will be performed by personnel that are trained in the proper operation of the OGIC to be used in the survey and that have prior experience using OGICs for the purposes of identifying fugitive emissions. All OGIC operators will meet the minimum training requirements of 30 TAC 115.358(h).

2.1.6 OGIC Maintenance

Maintenance of the OGIC will be performed in accordance with manufacturer's recommendations. Records of maintenance, as applicable, will be maintained by the OGIC owner/operator.

OGICs are not calibrated like a traditional Method 21 gas analyzer. However, performance is verified as previously described on at least a daily basis when used for monitoring. If the OGIC malfunctions, it will be sent to the manufacturer for repair or replacement.

Date: August 15, 2019

Emission Sources - Maximum Allowable Emission Rates

Permit Number 100114 and N304

This table lists the maximum allowable emission rates and all sources of air contaminants on the applicant's property covered by this permit. The emission rates shown are those derived from information submitted as part of the application for permit and are the maximum rates allowed for these facilities, sources, and related activities. Any proposed increase in emission rates may require an application for a modification of the facilities covered by this permit.

Air Contaminants Data

Emission Point No. (1)	Source Name (2)	Air Contaminant Name (3)	Emission Rates (4)	
			lbs/hour	TPY (5)
LIQFLARE	Liquefaction Flare (Before construction of flare gas recovery and Train 4) (7)	NO_x	80.10	47.43
		NO_x (MSS)	6674.08	
		CO	318.99	188.91
		CO (MSS)	26580.25	
		SO_2	0.71	0.34
		SO_2 (MSS)	13.38	
		VOC	6.26	19.55
		VOC (MSS)	3538.79	
LIQFLARE	Liquefaction Flare (Before construction of Train 4 and after construction of flare gas recovery) (7)	NO_x	40.16	40.19
		NO_x (MSS)	6,634.15	
		CO	159.95	160.07
		CO (MSS)	26421.21	
		SO_2	0.36	0.21
		SO_2 (MSS)	13.03	
		VOC	3.15	18.41
		VOC (MSS)	3535.68	
LIQFLARE	Liquefaction Flare (After construction of Train 4 and flare gas recovery) (7)	NO_x	53.47	42.61
		NO_x (MSS)	6647.46	
		CO	212.96	169.68
		CO (MSS)	26474.23	
		SO_2	0.47	0.25

Emission Sources - Maximum Allowable Emission Rates

Emission Point No. (1)	Source Name (2)	Air Contaminant Name (3)	Emission Rates (4)	
			lbs/hour	TPY (5)
		SO_2 (MSS)	13.15	
		VOC	4.19	18.79
		VOC (MSS)	3536.71	
LIQFWP-1	Fire Water Pump 1	NO_x	3.25	0.16
		CO	0.85	0.04
		PM	0.10	<0.01
		PM_{10}	0.10	<0.01
		$PM_{2.5}$	0.10	<0.01
		SO_2	0.01	<0.01
		H_2SO_4 (8)	<0.01	<0.01
		VOC	0.11	0.01
LIQFWP-2	Fire Water Pump 2	NO_x	3.25	0.16
		CO	0.85	0.04
		PM	0.10	<0.01
		PM_{10}	0.10	<0.01
		$PM_{2.5}$	0.10	<0.01
		SO_2	0.01	<0.01
		H_2SO_4 (8)	<0.01	<0.01
		VOC	0.11	0.01
LIQFWP-3	Fire Water Pump 3	NO_x	3.25	0.16
		CO	0.85	0.04
		PM	0.10	<0.01
		PM_{10}	0.10	<0.01
		$PM_{2.5}$	0.10	<0.01

Emission Sources - Maximum Allowable Emission Rates

Emission Point No. (1)	Source Name (2)	Air Contaminant Name (3)	Emission Rates (4)	
			lbs/hour	TPY (5)
		SO_2	0.01	<0.01
		H_2SO_4 (8)	<0.01	<0.01
		VOC	0.11	0.01
LIQEG-1	Emergency Generator 1 (DQFAH)	NO_x	1.38	0.03
		CO	2.00	0.05
		PM	0.05	<0.01
		PM_{10}	0.05	<0.01
		$PM_{2.5}$	0.05	<0.01
		SO_2	0.02	<0.01
		H_2SO_4 (8)	<0.01	<0.01
		VOC	0.13	<0.01
		NH_3	0.51	0.01
LIQEG-2	Emergency Generator 2 (DQFAH)	NO_x	1.38	0.03
		CO	2.00	0.05
		PM	0.05	<0.01
		PM_{10}	0.05	<0.01
		$PM_{2.5}$	0.05	<0.01
		SO_2	0.02	<0.01
		H_2SO_4 (8)	<0.01	<0.01
		VOC	0.13	<0.01
		NH_3	0.51	0.01
LIQEG-3	Emergency Generator 3 (DQFAH)	NO_x	1.38	0.03
		CO	2.00	0.05
		PM	0.05	<0.01

Emission Sources - Maximum Allowable Emission Rates

Emission Point No. (1)	Source Name (2)	Air Contaminant Name (3)	Emission Rates (4)	
			lbs/hour	TPY (5)
		PM_{10}	0.05	<0.01
		$PM_{2.5}$	0.05	<0.01
		SO_2	0.02	<0.01
		H_2SO_4	<0.01	<0.01
		VOC	0.13	<0.01
		NH_3	0.51	0.01
LIQEG-4	Emergency Generator 4 (DQFAH)	NO_x	1.38	0.03
		CO	2.00	0.05
		PM	0.05	<0.01
		PM_{10}	0.05	<0.01
		$PM_{2.5}$	0.05	<0.01
		SO_2	0.02	<0.01
		H_2SO_4 (8)	<0.01	<0.01
		VOC	0.13	<0.01
		NH_3	0.51	0.01
LIQEG-5	Emergency Generator – Guard House/Admin Area (DQDAA)	NO_x	3.50	0.09
		CO	0.79	0.02
		PM	0.04	<0.01
		PM_{10}	0.04	<0.01
		$PM_{2.5}$	0.04	<0.01
		SO_2	0.01	<0.01
		H_2SO_4 (8)	<0.01	<0.01
		VOC	0.05	<0.01
LIQEG-6	Emergency Generator – Dock 2	NO_x	2.64	0.07

Emission Sources - Maximum Allowable Emission Rates

Emission Point No. (1)	Source Name (2)	Air Contaminant Name (3)	Emission Rates (4)	
			lbs/hour	TPY (5)
	(DSGAD)	CO	0.18	<0.01
		PM	0.02	<0.01
		PM_{10}	0.02	<0.01
		$PM_{2.5}$	0.02	<0.01
		SO_2	<0.01	<0.01
		H_2SO_4 (8)	<0.01	<0.01
		VOC	0.02	<0.01
LIQEG-7	Train 4 - Emergency Generator 4 (DQFAH)	NO_x	1.38	0.03
		CO	2.00	0.05
		PM	0.05	<0.01
		PM_{10}	0.05	<0.01
		$PM_{2.5}$	0.05	<0.01
		SO_2	0.02	<0.01
		H_2SO_4 (8)	<0.01	<0.01
		VOC	0.13	<0.01
		NH_3	0.51	0.01
LIQEAC-1	Emergency Air Compressor (QSX15)	NO_x	1.87	0.05
		CO	1.73	0.04
		PM	0.10	<0.01
		PM_{10}	0.10	<0.01
		$PM_{2.5}$	0.10	<0.01
		SO_2	0.01	<0.01
		H_2SO_4 (8)	<0.01	<0.01
		VOC	0.10	<0.01

Emission Sources - Maximum Allowable Emission Rates

Emission Point No. (1)	Source Name (2)	Air Contaminant Name (3)	Emission Rates (4)	
			lbs/hour	TPY (5)
		NH_3	0.06	<0.01
LIQEAC-2	Train 4 - Emergency Air Compressor (QSX15)	NO_x	1.87	0.05
		CO	1.73	0.04
		PM	0.10	<0.01
		PM_{10}	0.10	<0.01
		$PM_{2.5}$	0.10	<0.01
		SO_2	0.01	<0.01
		H_2SO_4 (8)	<0.01	<0.01
		VOC	0.10	<0.01
		NH_3	0.06	<0.01
LEGT-1	Emergency Generator Tank 1	VOC	0.01	<0.01
LEGT-2	Emergency Generator Tank 2	VOC	0.01	<0.01
LEGT-3	Emergency Generator Tank 3	VOC	0.01	<0.01
LEGT-4	Emergency Generator Tank 4	VOC	0.01	<0.01
LEGT-5	Emergency Generator Tank 5	VOC	0.01	<0.01
LEGT-6	Emergency Generator Tank 6	VOC	0.01	<0.01
LEGT-7	Emergency Generator Tank 7 – Train 4	VOC	0.01	<0.01
LEACT-1	Backup Air Compressor Tank 1	VOC	0.01	<0.01
LEACT-2	Backup Air Compressor Tank 2 - Train 4	VOC	0.01	<0.01
LFWPT-1	Diesel Firewater Tank 1	VOC	0.01	<0.01
LFWPT-2	Diesel Firewater Tank 2	VOC	0.01	<0.01
LFWPT-3	Diesel Firewater Tank 3	VOC	0.01	<0.01
FUG-LIQ123	Fugitives Train 1 – Train 3 (6)	VOC	1.14	5.00
		VOC (9)	1.16	5.10

Emission Sources - Maximum Allowable Emission Rates

Emission Point No. (1)	Source Name (2)	Air Contaminant Name (3)	Emission Rates (4)	
			lbs/hour	TPY (5)
FUG-LIQ4	Fugitives Train 4 (6)	VOC	0.39	1.70
		VOC (9)	0.43	1.87
11K-30, 12K-30, 13K-30 14K-30 11K-31 12K-31 13K-31 14K-31 11K-32/11K-33 12K-32/12K-33 13K-32/13K-33 14K-32/14K-33	Propane Compressors Lube Oil Vent Propane Compressors Lube Oil Vent Propane Compressors Lube Oil Vent Propane Compressors Lube Oil Vent LP MR Compressors Lube Oil Vent LP MR Compressors Lube Oil Vent LP MR Compressors Lube Oil Vent LP MR Compressors Lube Oil Vent MP/HP MR Compressor Lube Oil Vents MP/HP MR Compressor Lube Oil Vents MP/HP MR Compressor Lube Oil Vents MP/HP MR Compressor Lube Oil Vents	PM	0.03	0.11
		PM_{10}	0.03	0.11
		$PM_{2.5}$	0.03	0.11
		VOC	<0.01	<0.01
MSS-FUG1-3	Fugitives - Train 1 - Train 3 Vessel Opening for Maintenance	VOC	29.27	0.04
MSS-FUG4	Fugitives - Train 4 Vessel Opening for Maintenance	VOC	29.27	0.01
ALL	All EPNs at the site	Individual HAP	---	<10
		Total HAPs	---	<25

(1) Emission point identification - either specific equipment designation or emission point number from plot plan.
(2) Specific point source name. For fugitive sources, use area name or fugitive source name.
(3) VOC - volatile organic compounds as defined in Title 30 Texas Administrative Code § 101.1
NO_x - total oxides of nitrogen
SO_2 - sulfur dioxide
PM - total particulate matter, suspended in the atmosphere, including PM_{10} and $PM_{2.5}$, as represented
PM_{10} - total particulate matter equal to or less than 10 microns in diameter, including $PM_{2.5}$, as represented
$PM_{2.5}$ - particulate matter equal to or less than 2.5 microns in diameter
CO - carbon monoxide
H_2SO_4 - sulfuric acid mist
NH3 - ammonia
(4) Planned startup and shutdown (SS) lbs/hour emissions for all pollutants are authorized even if not specifically identified as SS.
(5) Compliance with annual emission limits (tons per year) is based on a 12 month rolling period. Annual emission rates for each source include planned SS emissions.
(6) Emission rate is an estimate and is enforceable through compliance with the applicable special condition(s) and permit application representations.
(7) Only one Flare operating scenario is authorized at a time.
(8) Sulfuric acid mist is a subset of $PM_{2.5}$ emissions.
(9) Limit after the flare gas recovery has been installed.

Emission Sources - Maximum Allowable Emission Rates

Date: TBD

Permit Amendment
Source Analysis & Technical Review

Company	**Freeport LNG Development, L.P.**	Permit Numbers	**100114 and N304**
City	**Quintana**	Project Number	**346087**
County	**Brazoria**	Regulated Entity Number	**RN103196689**
Project Type	**Amendment**	Customer Reference Number	**CN601720345**
Project Reviewer	**Samuel Harris and Cara Hill**	Received Date	**August 9, 2022**
Site Name	**Freeport LNG Liquefaction Plant**		

Project Overview

Freeport LNG Development, L.P. (Freeport LNG) owns and operates a natural gas liquefaction plant in Quintana, Brazoria County, Texas. Freeport LNG submitted an amendment application requesting "as-built" changes and a flare gas recovery project. No Permit by Rule (PBR) or Standard Permit (SP) requires incorporation during this permitting action. Maintenance, startup, and shutdown (MSS) emissions are authorized under this permit.

Emission Summary

Air Contaminant	Current Allowable Emission Rates (tpy)	Proposed Allowable Emission Rates (tpy)	Change in Allowable Emission Rates (tpy)	Project Changes at Major Sources (Baseline Actual to Allowable)	Project Changes at Major Sources (Baseline Actual to Allowable)
				Train 1-3	Train 4
PM	0.23	0.23	0.00	0.11	0.03
PM_{10}	0.23	0.23	0.00	0.11	0.03
$PM_{2.5}$	0.23	0.23	0.00	0.11	0.03
VOC	11.66	27.31	15.65	53.13	3.73
NO_X	6.03	53.15	47.12	48.26	4.91
CO	10.73	208.61	197.88	189.30	19.32
SO_2	0.14	0.54	0.40	0.34	0.01
H_2SO_4	0.12	0.12	0.00	0.01	0.01
NH_3	0.07	0.07	0.00	N/A	N/A

Compliance History Evaluation - 30 TAC Chapter 60 Rules

A compliance history report was reviewed on:	September 10, 2022
Site rating & classification:	1.70 / Satisfactory
Company rating & classification:	5.42 / Satisfactory
Has the permit changed on the basis of the compliance history or rating?	No
Did the Regional Office have any comments? If so, explain.	No

Public Notice Information

Requirement	Date
Legislator letters mailed	8/17/2022
Date 1st notice published	08/31/2022

Requirement	Date
Publication Name: The Facts	
Pollutants: carbon monoxide, sulfuric acid, hazardous air pollutants, nitrogen oxides, organic compounds, ammonia, particulate matter including particulate matter with diameters of 10 microns or less and 2.5 microns or less and sulfur dioxide.	
Date 1st notice Alternate Language published	
Publication Name (Alternate Language): La Voz	
1st public notice tearsheet(s) received	09/08/2022
1st public notice affidavit(s) received	09/15/2022
1st public notice certification of sign posting/application availability received	10/05/2022
SB709 Notification mailed	10/18/2022 (re-notice 4/14/2025)
Date 2nd notice published	
Publication Name:	
Pollutants:	
Date 2nd notice published (Alternate Language)	
Publication Name (Alternate Language):	
2nd public notice tearsheet(s) received	
2nd public notice affidavit(s) received	
2nd public notice certification of sign posting/application availability received	

Public Interest

Number of comments received	1
Number of meeting requests received	0
Number of hearing requests received	1
Date meeting held	
Date response to comments filed with OCC	
Date of SOAH hearing	

Federal Rules Applicability

Subject to NSPS?	**Yes**
Subparts **A & IIII**	
Subject to NESHAP?	**No**
Subparts **N/A**	
Subject to NESHAP (MACT) for source categories?	**Yes**
Subparts **A & ZZZZ**	

Nonattainment review applicability:
The plant is located in Brazoria County, which is located in an area that is currently designated serious nonattainment for ozone as of September 23, 2019. Trains 1-3 and Train 4 will be reviewed retrospectively with the major source threshold of 25 tpy for NO_X and VOCs for a severe nonattainment area under the previous 1997 8-hour ozone standard. See the Project Scope section for a detailed explanation of the project aggregation determination. NNSR applies to VOC and NO_X for Trains 1-3.

Retrospective Train 1-3 review

	NO_x (tpy)	VOC (tpy)
Project increase	48.26	53.13
NNSR threshold	25	25

Retrospective Train 4 review

	NO_x (tpy)	VOC (tpy)
Project increase	4.91	3.73
NNSR threshold	25	25

Requirement

PSD review applicability:
The plant is located in Brazoria County, which is located in an area that is currently designated serious nonattainment for ozone as of September 23, 2019. Trains 1-3 and Train 4 will be reviewed retrospectively with the major source threshold of 25 tpy for NO_X and VOCs for a severe nonattainment area under the previous 1997 8-hour ozone standard. See the Project Scope section for a detailed explanation of the project aggregation determination. The project increases do not exceed the thresholds as shown below. PSD review is not applicable.

Retrospective Train 1-3 review

Project increase	48.26	189.30	6.43	6.43	6.43	0.43	0.01
PSD threshold	250	250	250	250	250	250	250

Retrospective Train 4 review

Project increase	4.91	19.32	6.57	6.57	6.57	0.01	0.01
PSD threshold	40	100	25	15	10	40	7

Title V Applicability - 30 TAC Chapter 122 Rules

Requirement

Title V applicability:
The site is subject to the Title V program because it is a major source. The facility currently operates under Site Operating Permit No. O-2878.

Periodic Monitoring (PM) applicability:
Periodic Monitoring is applicable because the site is a major source. The following provisions for monitoring are being included in the special conditions:

- Continuous monitoring of flow rate and Btu content of the waste gas for the flare
- 28LAER LDAR program or OGI monitoring for the fugitives
- Standard MSS monitoring.

Compliance Assurance Monitoring (CAM) applicability:
The site is subject to Title V permitting requirements. The flare is control devices used to achieve compliance with an applicable requirement of the permit, and control emissions sources with a pre-control emission rate in excess of an applicable major source threshold. CAM for the flare is addressed by continuous flow and composition monitoring. The capture system is required to be inspected annually in accordance with 40 CFR Part 60, Appendix A, Test Method 21 and the bypass monitored.

Process Description

The liquefaction process is based on the Air Products and Chemicals, Inc. (APCI) propane, precooled, mixed component refrigerant process. The APCI process uses two types of refrigeration cycles to precool and liquefy the natural gas feed. The natural gas feed is first precooled using propane refrigerant at four different descending pressure levels and their corresponding lower vaporization temperatures.

To convert the treated feed gas into LNG, the gas is first precooled with propane refrigerant, after which it is sent to the

main cryogenic heat exchanger (MCHE). At the MCHE, it is further cooled inside heat exchanger tubes by a lower temperature, mixed refrigerant flowing outside the tubes. As the feed gas flows up the tubes, it starts condensing by transferring heat to the liquid /vapor mixed refrigerant, which warms up and vaporizes as it flows down the outside of the tubes. Upon exiting the MCHE, the heated mixed refrigerant is then cooled by ambient air, compressed, and subsequently chilled by propane refrigerant in heat exchangers, where a portion of the refrigerant condenses.

After separating the vapor and liquid streams of mixed refrigerant, both streams are introduced into the MCHE tube bundles where they are further cooled by the mixed refrigerant. Then the liquefied mixed refrigerant streams exit the MCHE and are depressurized and admitted to the MCHE to provide cooling for the conversion of methane rich gas into LNG. The liquid mixed refrigerant stream is depressurized through a hydraulic turbine to increase the overall process efficiency. The high-pressure LNG exiting the MCHE is depressurized through a hydraulic turbine (expander) and delivered to any of the existing, authorized LNG storage tanks (i.e., Tanks 1, 2, and/or 3). The Liquefaction Plant has an LNG production capacity of approximately 870 billion standard cubic feet per year (BSCF/year) based on processing about 892 BSCF/year of incoming feed gas from its upstream pretreatment facility. Actual throughput and production capacity may vary from year to year.

The Liquefaction Plant emergency flare system consists of a flare header system and a pressure-assisted, multi-staged, multi-point ground flare (EPN LIQFLARE) located within an enclosed radiation fence. A common flare header will collect the hydrocarbon vapor streams vented from each of the four liquefaction trains. Each of the trains will have one cold drain drum that collects liquids from LNG and mixed refrigerant releases from certain parts of the liquefaction train. The cold drain drum prevents liquids from reaching the main flare header. The common flare header flows into the liquefaction ground flare knockout drum where any remaining liquids are separated before routing the vapor to the ground flare. Additionally, to minimize flaring, liquid hydrocarbons are removed prior to the common flare header via knock out facilities provided at each train and returned to the process.

The multi-point, pressure-assisted ground flare consists of multiple-stage headers that are normally closed but which will open depending on the pressure on the main flare header, providing a greater turndown capability while maintaining the requirement for smokeless flaring. The radiation fence, while allowing air inspiration for the proper combustion at the burner tips, also limits the radiation to the outside of the fence.

The flare is designed with 12 stages; each stage additively firing as the vent gas pressure to the flare increases. Two pilots are used for each stage for a total of 24 pilots; each pilot is rated at 69,000 British thermal units per hour (Btu/hr) of natural gas. As an emergency flare, this system is provided for the safe disposal of hydrocarbon releases from relief valves and other miscellaneous relief on the liquefaction equipment. The flare is also used to control potential releases to the atmosphere, such as during planned MSS events, as well as potential emissions from pressure relief valves, blowdown valves, pump seals, and gas analyzer vents.

The flare uses natural gas for pilot gas and as supplemental fuel and is designed to achieve a minimum destruction efficiency of 99% for compounds containing no more than three carbon atoms that contain no elements other than carbon and hydrogen; e.g., methane, ethane, ethylene, and propane, and 98% destruction efficiency of volatile organic compounds (VOCs) in the vapor emissions routed to it. Smokeless flaring is achieved over the operating range of the flare. The continuously burning pilots assure vent gas ignition, and the flare will be designed to provide good mixing with air and flame stability.

It is assumed that only one train will undergo a planned shutdown and startup for a major maintenance event in any 12-month rolling period. Additional minor maintenance activities are expected to occur throughout the year (e.g., equipment repairs, replacements, etc.). During these events, certain sections of the train will be blocked off and liquids will be drained and evacuated into the other trains or injected into the LNG product to the extent possible. The remaining vapors in the blocked off section will then be vented to the flare.

Project Scope
Freeport LNG has identified necessary changes to the permitted representation of the Liquefaction Plant to accurately reflect the “as-built” site units and current site operations. With this application, Freeport LNG proposes to update the following:

- Streams controlled by the flare (Emission Point Number [EPN] LIQFLARE), including those associated with valve and analyzer gas venting and proposed maintenance, start-up, and shutdown (MSS) events that have become known through actual operation of these facilities;
- Adjustment to fugitive emissions resulting from ground truthing of component counts and calculation methodology associated with fugitive components (EPNs FUG-LIQ123 and FUG-LIQ4); and
- Updates to miscellaneous representations presented with the previous permit applications.

Freeport LNG is simultaneously proposing a flare gas recovery project to be authorized with this application. The flare gas recovery project includes the following:

- Flare gas recovery project, which will reduce valve and analyzer gas vented to the flare; and
- Increased fugitive components associated with this project.

Federal Applicability

This amendment is a retrospective review of the original three trains, a retrospective review of the unconstructed Train 4, and authorization of a flare gas recovery project. Trains 1-3 were initially authorized in Permit No. 104840 issued July 16, 2014, and began construction on February 15, 2015. Train 4 was initially authorized in amended Permit No. 104840 issued April 25, 2018. Train 4 project was conservatively aggregated with the Trains 1-3 project at time it was authorized resulting in NNSR Review for the Pretreatment Trains 1-4. Train 4 has only performed limited construction activities to support additional geotechnical engineering and does not anticipate commencement of full scale construction until early 2023 with operations likely in 2027, approximately 7 years after commencement of operation of Train 3. Because of this, Train 4 has taken on the form of a true incremental project to the original three-train project.

Since the proposed changes included in this application, except for the flare gas recovery project, are considered retrospective changes associated with the initial authorization of each emission unit, emissions from Trains 1-3 will be reviewed as if the site were greenfield (i.e., in the context of being initially permitted at these levels). Emissions from Train 4 will be evaluated as a separate addition to the site. The proposed flare gas recovery project is being evaluated as a separate project.

As a result of the flare gas recovery project that will be implemented at the site, annual and hourly emissions from the flare will decrease. There will be small increases of VOC associated with additional fugitive components (EPNs FUG TREAT and FUG TRN4) installed as part of these projects; however, the flare gas recovery project will result in an overall decrease of VOC emissions due to the proposed decrease in VOC emissions from the flare.

Special Conditions

A summary of the draft changes to the permit requirements, including control, monitoring, recordkeeping and reporting requirements, is given below.

SC No.	Comment
1	Incorporates MAERT and limits scope of authorization to sources listed on MAERT.
2	Generic prohibition on releases from uncontrolled process vents, limits on permit holder's ability to claim affirmative defense under 30 TAC Chap. 101 for releases from pressure relief devices.
5	Updates to flare conditions to reference the AMOC monitoring requirements.
7	Updates to limit on fuel gas sulfur content
8	Updates to bypass monitoring
9	Removal of duplicative conditions and revised reference for Tier 4 emissions standards in 40 CFR Part 1039.102
14-20	Addition of MSS requirements
22	Projected actual emissions recordkeeping
23	Offset requirements
24	Records retention period.

Best Available Control Technology and Lowest Achievable Emission Rate Limitation
LAER applies to all sources VOC and NOx that were part of the original Trains 1-3 project.

EPN	Source Name	Best Available Control Technology and Lowest Achievable Emission Rate Limitation Description
LIQFLARE	Liquefaction Flare	Emissions from the Ground Flare are being updated to reflect certain maintenance activities that have become known through actual operation of these facilities and were not represented in previous applications and the proposed flare gas recovery project. The flare is a pressure assisted, multi-staged, multi-point ground flare. The flare is designed to achieve 99.5 DRE for all VOC compounds in the vapor emissions routed to it. The flare is used to control MSS activities for Trains 1-3, including the planned shutdown and startup of one train in any one year for major maintenance turnaround purposes. Freeport LNG will continue to use good combustion practices while operating the flare to limit NO_X emissions to meet LAER. NO_X emissions from the flare are based on TCEQ's factors for high-British thermal unit (Btu) streams, based on flare stream characteristics. The flare meets the design and operating requirements of the AMOC Permit AMOC71. The flare is equipped with a flow monitor and continuous emissions analyzer to ensure compliance with these requirements. Based on an updated query of the RBLC database, permits, and other regulatory requirements (such as the California Air Resources Board (CARB) determinations and California air district rules) for similar flare operations, the operating practices and compliance with applicable regulatory requirements continue to meet LAER.
LIQEG-1	Emergency Generator 1	LAER for NO_X is determined to be compliance with the U.S. EPA's Tier certification emission standards, application of SCRs, use of ultra-low sulfur diesel fuel (< 15 ppmv sulfur content), compliance with NSPS Subpart IIII, and limiting hours of operation to < 100 hr/yr of non-emergency operations. LAER for VOC is determined to be compliance with Tier certification standards, use of ultra-low sulfur diesel fuel (< 15 ppmv sulfur content), compliance with NSPS Subpart IIII, limit hours of operation to < 100 hr/yr of non-emergency operations.
LIQEG-2	Emergency Generator 2	
LIQEG-3	Emergency Generator 3	
LIQEG-4	Emergency Generator 4	
LIQEAC-1	Emergency Air Compressor	
LIQFWP-1	Fire Water Pump 1	LAER is determined to be compliance with Tier certification emission standards, use of ultra-low sulfur diesel fuel (< 15 ppmv sulfur content), compliance with NSPS Subpart IIII, and limiting hours of operation to < 100 hr/yr of non-emergency
LIQFWP-2	Fire Water Pump 2	
LIQFWP-3	Fire Water Pump 3	
LIQEG-5	Emergency Generator 5	

EPN	Source Name	Best Available Control Technology and Lowest Achievable Emission Rate Limitation Description
LIQEG-6	Emergency Generator 6	operations. LAER for VOC is determined to be compliance with Tier certification standards, use of ultra-low sulfur diesel fuel (< 15 ppmv sulfur content), compliance with NSPS Subpart IIII, limit hours of operation to < 100 hr/yr of non-emergency operations.
FUG-LIQ123	Fugitives Train 1	28LAER program requirements are considered more stringent, this program will be implemented for the Trains 1-3 fugitive components along with previously approved alternative work practice to the Method 21 monitoring requirements monitoring is performed on a bi-monthly basis using optical gas imaging (OGI) technology and on an annual basis using Method 21. Therefore, the use of the AWP is considered equivalent to the Method 21 LDAR requirements and is therefore, proposed as LAER for the Liquefaction Trains 1-3 fugitive emissions.
LFWPT-1	Diesel Firewater Tank 1	LAER for VOC is determined to be fixed roof tanks and good operating practices.
LFWPT-2	Diesel Firewater Tank 2	
LFWPT-3	Diesel Firewater Tank 3	
LEGT-1	Emergency Generator Tank 1	
LEGT-2	Emergency Generator Tank 2	
LEGT-3	Emergency Generator Tank 3	
LEGT-4	Emergency Generator Tank 4	
LEGT-5	Emergency Generator Tank 5	
LEGT-6	Emergency Generator Tank 6	
LEACT-1	Backup Air Compressor Tank 1	
11K-30	Propane Compressors Lube Oil Vent	The Trains 1-3 construction project includes lube oil vents associated with compressor systems. VOC emissions from these vents are under 0.00002 tons per year. Based on this insignificant level of emissions, LAER for VOC is proposed to be proper operation and maintenance of the associated compressors.
11K-31	LP MR Compressors Lube Oil Vent	
11K-32	MP MR Compressor Lube Oil Vents	
11K-33	HP MR Compressor Lube Oil Vents	
12K-30	Propane Compressors Lube Oil Vent	
12K-31	LP MR Compressors Lube Oil Vent	
12K-32	MP MR Compressor Lube Oil Vents	

EPN	Source Name	Best Available Control Technology and Lowest Achievable Emission Rate Limitation Description
12K-33	HP MR Compressor Lube Oil Vents	
13K-30	Propane Compressors Lube Oil Vent	
13K-31	LP MR Compressors Lube Oil Vent	
13K-32	MP MR Compressor Lube Oil Vents	
13K-33	HP MR Compressor Lube Oil Vents	
FUG - LIQ123	Fugitives - Train 1-Train 3	Emissions from piping components will achieve LAER through the use of the 28LAER LDAR requirements and an approved Optical Gas Imaging (OGI) monitoring alternative.
MSS-FUG1-3	Fugitives - Train 1- 3 Vessel Opening for Maintenance	LAER for the vessel opening is determined to be the following: minimizing of the number and duration of planned MSS events; MSS activities associated with large emissions from equipment containing materials with vapor pressures above 0.5 psia will be routed to the flare; Process equipment will only be opened for inspection and maintenance after purging to the flare to minimize VOC content down to 10,000 ppmv or 10% of the lower explosive level (LEL); and Use of knockout drums to separate liquids and vapors.
MSS-FUG4	Fugitives - Train 4 Vessel Opening for Maintenance	

Permits Incorporation

Permit by Rule (PBR) / Standard Permit / Permit Nos.	Description (include affected EPNs)	Action (Reference / Consolidate / Void)
N/A	N/A	N/A

Impacts Evaluation

Was modeling conducted? **Yes** Type of Modeling: **AERMOD**

Is the site within 3,000 feet of any school? **No**

Additional site/land use information:

Air dispersion modeling was performed by the applicant to evaluate total air emissions from the proposed project. Based on the results of the dispersion model, emissions from the site are not expected to result in a violation of any state or national ambient air quality standard. Emissions of non-criteria air contaminants are not expected to create adverse impacts to public health. The air dispersion modeling demonstration was audited by the TCEQ Air Dispersion Modeling Team and approved (memo dated March 24, 2024). A detailed description of the air dispersion modeling performed is contained in the Preliminary Determination Summary.

Project Reviewer	Date	Team Leader	Date
Cara Hill		Joel Stanford	

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Compliance History Report

Compliance History Report for CN601720345, RN103196689, Rating Year 2022 which includes Compliance History (CH) components from September 1, 2017, through August 31, 2022.

Customer, Respondent, or Owner/Operator: CN601720345, Freeport LNG Development, L.P. **Classification:** SATISFACTORY **Rating:** 6.44

Regulated Entity: RN103196689, FREEPORT LNG LIQUEFACTION PLANT **Classification:** SATISFACTORY **Rating:** 3.75

Complexity Points: 17 **Repeat Violator:** NO

CH Group: 14 - Other

Location: Corner of Lamar and Cortez Streets BRAZORIA, TX, BRAZORIA COUNTY

TCEQ Region: REGION 12 - HOUSTON

ID Number(s):

AIR OPERATING PERMITS PERMIT 2878
AIR OPERATING PERMITS ACCOUNT NUMBER BLA014N
AIR NEW SOURCE PERMITS PERMIT 55464
AIR NEW SOURCE PERMITS EPA PERMIT N304
AIR NEW SOURCE PERMITS PERMIT 100114
AIR NEW SOURCE PERMITS PERMIT AMOC70
AIR NEW SOURCE PERMITS ACCOUNT NUMBER BLA014N
AIR NEW SOURCE PERMITS AFS NUM 4803900729
WASTEWATER EPA ID TX0127566
WASTEWATER PERMIT WQ0005364000
AIR EMISSIONS INVENTORY ACCOUNT NUMBER BLA014N
INDUSTRIAL AND HAZARDOUS WASTE OTS REQUEST 42507
INDUSTRIAL AND HAZARDOUS WASTE SOLID WASTE REGISTRATION # (SWR) 98570
TAX RELIEF ID NUMBER 20118
TAX RELIEF ID NUMBER 20153
TAX RELIEF ID NUMBER 20393
TAX RELIEF ID NUMBER 19480
TAX RELIEF ID NUMBER 21936
TAX RELIEF ID NUMBER 22007
TAX RELIEF ID NUMBER 24497
TAX RELIEF ID NUMBER 24498
TAX RELIEF ID NUMBER 20123
TAX RELIEF ID NUMBER 20641
TAX RELIEF ID NUMBER 20769
TAX RELIEF ID NUMBER 20599
TAX RELIEF ID NUMBER 20802
TAX RELIEF ID NUMBER 21139
TAX RELIEF ID NUMBER 20938
TAX RELIEF ID NUMBER 20817
TAX RELIEF ID NUMBER 20623
TAX RELIEF ID NUMBER 20605
TAX RELIEF ID NUMBER 20815
TAX RELIEF ID NUMBER 21951
TAX RELIEF ID NUMBER 23286
TAX RELIEF ID NUMBER 23285
TAX RELIEF ID NUMBER 23287
TAX RELIEF ID NUMBER 23288
TAX RELIEF ID NUMBER 22516
TAX RELIEF ID NUMBER 24496

Compliance History Period: September 01, 2017 to August 31, 2022 **Rating Year:** 2022 **Rating Date:** 09/01/2022

Date Compliance History Report Prepared: November 20, 2025

Agency Decision Requiring Compliance History: Permit - Issuance, renewal, amendment, modification, denial, suspension, or revocation of a permit.

Component Period Selected: August 09, 2017 to August 09, 2022

TCEQ Staff Member to Contact for Additional Information Regarding This Compliance History.

Name: TCEQ Staff Member **Phone:** (512) 239-1000

Site and Owner/Operator History:

1) Has the site been in existence and/or operation for the full five year compliance period? YES
2) Has there been a (known) change in ownership/operator of the site during the compliance period? NO

Components (Multimedia) for the Site Are Listed in Sections A - J

A. Final Orders, court judgments, and consent decrees:

1 Effective Date: 12/14/2021 ADMINORDER 2021-0284-AIR-E (1660 Order-Agreed Order With Denial)

Classification: Moderate

Citation: 30 TAC Chapter 116, SubChapter B 116.115(c)
30 TAC Chapter 122, SubChapter B 122.143(4)
5C THSC Chapter 382 382.085(b)

Rqmt Prov: NSR Permit Special Condition 1 PERMIT

Description: Failure to prevent unauthorized emissions to the atmosphere during an emissions event that was discovered on October 21, 2020, TCEQ/STEERS Incident No. 344670. [Category A12.i.(6)]

2 Effective Date: 03/29/2022 ADMINORDER 2021-0917-AIR-E (1660 Order-Agreed Order With Denial)

Classification: Moderate

Citation: 30 TAC Chapter 116, SubChapter B 116.115(c)
30 TAC Chapter 122, SubChapter B 122.143(4)
5C THSC Chapter 382 382.085(b)

Rqmt Prov: General Term and Conditions OP
Special Conditions No. 1 PERMIT
Special Terms and Conditions No. 13 OP

Description: Failed to prevent unauthorized emissions. Specifically, the Respondent released 251.5 pounds ("lbs") of volatile organic compounds ("VOC"), 343.0 lbs of carbon monoxide, and 172.0 lbs of nitrogen oxides from the Liquefaction Flare, Emissions Point Number LIQFLARE, and 1,433.0 lbs of VOC as fugitive emissions, during an emission event (Incident No. 318780) that occurred on August 13, 2019 and lasted one hour and four minutes.

B. Criminal convictions:

N/A

C. Chronic excessive emissions events:

N/A

D. The approval dates of investigations (CCEDS Inv. Track. No.):

Item 1	October 23, 2017	(1779153)
Item 2	October 25, 2017	(1437661)
Item 3	November 13, 2017	(1437806)
Item 4	January 23, 2018	(1779169)
Item 5	April 24, 2018	(1779124)
Item 6	July 26, 2018	(1779139)
Item 7	January 23, 2019	(1779170)
Item 8	March 13, 2019	(1779159)
Item 9	April 18, 2019	(1779125)
Item 10	July 18, 2019	(1779140)
Item 11	August 12, 2019	(1517630)
Item 12	October 23, 2019	(1592445)
Item 13	October 24, 2019	(1779155)
Item 14	January 23, 2020	(1779171)
Item 15	April 22, 2020	(1779136)
Item 16	April 23, 2020	(1779132)
Item 17	July 23, 2020	(1779146)
Item 18	July 24, 2020	(1779141)
Item 19	October 22, 2020	(1779156)
Item 20	January 25, 2021	(1779172)
Item 21	April 19, 2021	(1779137)
Item 22	April 20, 2021	(1779127)
Item 23	July 30, 2021	(1779147)
Item 24	August 30, 2021	(1755072)
Item 25	September 29, 2021	(1686485)
Item 26	October 27, 2021	(1779157)
Item 27	November 17, 2021	(1643780)
Item 28	January 18, 2022	(1792661)
Item 29	April 07, 2022	(1815377)

Compliance History Report for CN601720345, RN103196689, Rating Year 2022 which includes Compliance History (CH) components from August 09, 2017, through August 09, 2022.

Item 30	May 20, 2022	(1796428)
Item 31	July 28, 2022	(1837088)

E. Written notices of violations (NOV) (CCEDS Inv. Track. No.):

A notice of violation represents a written allegation of a violation of a specific regulatory requirement from the commission to a regulated entity. A notice of violation is not a final enforcement action, nor proof that a violation has actually occurred.

N/A

F. Environmental audits:

G. Type of environmental management systems (EMSs):

N/A

H. Voluntary on-site compliance assessment dates:

N/A

I. Participation in a voluntary pollution reduction program:

N/A

J. Early compliance:

N/A

Sites Outside of Texas:

N/A

TCEQ Interoffice Memorandum

To: Cara Hill
Mechanical/Coatings Section

Thru: Chad Dumas, Team Leader
Air Dispersion Modeling Team (ADMT)

From: Justin Cherry, P.E.
ADMT

Date: May 4, 2023

Subject: Air Quality Analysis Audit – Freeport LNG Development, L.P. (RN103196689)

1. Project Identification Information

Permit Application Number: 100114
NSR Project Number: 346087
ADMT Project Number: 8493
County: Brazoria
Published Map: \\tceq4avmgisdata\GISWRK\APD\MODEL PROJECTS\8493\8493.pdf

Air Quality Analysis: Submitted by Atkins North America, Inc., October 2022, on behalf of Freeport LNG Development, L.P. Additional information was provided April 2023.

The site is located within an Air Pollution Watch List (APWL) area for nickel, vanadium, cobalt, and arsenic (APWL 1201).

2. Report Summary

The air quality analysis is acceptable for all review types and pollutants. The results are summarized below.

The proposed project is being evaluated as an as-built review to address necessary changes to the permitted representations of the liquefaction plant. The applicant evaluated the project from the beginning with the as-built changes incorporated.

A. Minor Source NSR and Air Toxics Analysis

Table 1. Project-Related Modeling Results for State Property Line

Pollutant	Averaging Time	GLCmax (µg/m^3)	De Minimis (µg/m^3)
SO_2	1-hr	0.99	20.42

Table 2. Modeling Results for Minor NSR De Minimis

Pollutant	Averaging Time	GLCmax (µg/m^3)	De Minimis (µg/m^3)
SO_2	1-hr	0.99	7.8
SO_2	3-hr	0.75	25

Pollutant	Averaging Time	GLCmax (µg/m^3)	De Minimis (µg/m^3)
NO_2	1-hr	14	7.5
NO_2	Annual	0.2	1
CO	1-hr	121	2000
CO	8-hr	79	500

The GLCmax are the maximum predicted concentrations associated with one year of meteorological data.

The justification for selecting the EPA's interim 1-hr NO_2 and 1-hr SO_2 De Minimis levels was based on the assumptions underlying EPA's development of the 1-hr NO_2 and 1-hr SO_2 De Minimis levels. As explained in EPA guidance memoranda[1,2], the EPA believes it is reasonable as an interim approach to use a De Minimis level that represents 4% of the 1-hr NO_2 and 1-hr SO_2 NAAQS.

Table 3. Total Concentrations for Minor NSR NAAQS (Concentrations > De Minimis)

Pollutant	Averaging Time	GLCmax (µg/m^3)	Background (µg/m^3)	Total Conc. = [Background + GLCmax] (µg/m^3)	Standard (µg/m^3)
NO_2	1-hr	120	25	145	188

The GLCmax is the maximum predicted concentration associated with one year of meteorological data.

A background concentration for NO_2 was obtained from the EPA AIRS monitor 480391607 located at 901 County Road 792, Freeport, Brazoria County. The three-year average (2019-2021) of the 98th percentile of the annual distribution of the daily maximum 1-hr concentrations was used for the 1-hr value. The use of the monitor is reasonable based on the applicant's review of land use and a quantitative review of emissions surrounding the area of the monitor site relative to the project site.

Table 4. Generic Modeling Results

EPN	1-hr GLCmax (µg/m^3 per lb/hr)	Annual GLCmax (µg/m^3 per lb/hr)
LIQFLARE	0.002	8×10^{-5}
FUG-LIQ123	35.05	2.01
FUG-LIQ4	15.94	0.56

[1] www.epa.gov/sites/production/files/2015-07/documents/appwso2.pdf
[2] www.tceq.texas.gov/assets/public/permitting/air/memos/guidance_1hr_no2naaqs.pdf

See Section 3 to see how the UIMs for EPNs FUG-LIQ123 and FUG-LIQ4 were developed.

Table 5. Minor NSR Project (Increases Only) Modeling Results for Health Effects

Pollutant	CAS#	Averaging Time	GLCmax (µg/m^3)	10% ESL (µg/m^3)
isobutane	75-28-5	1-hr	1.43	2300
isobutane	75-28-5	Annual	0.03	710
n-butane	106-97-8	1-hr	1.23	6600
n-butane	106-97-8	Annual	0.02	710
isopentane	78-78-4	1-hr	0.12	5900
isopentane	78-78-4	Annual	0.01	710
n-pentane	109-66-0	1-hr	0.06	5900
n-pentane	109-66-0	Annual	0.003	710
n-hexane	110-54-3	1-hr	0.01	560
n-hexane	110-54-3	Annual	0.001	20
n-octane	111-65-9	1-hr	0.0004	560
n-octane	111-65-9	Annual	0.00002	54
ethylene	74-85-1	1-hr	11.05	140
ethylene	74-85-1	Annual	0.58	3.4
methyl mercaptan	74-93-1	1-hr	0.001	0.19
methyl mercaptan	74-93-1	Annual	0.0001	0.1
mercaptan, not otherwise specified	NA	1-hr	0.002	1.8
mercaptan, not otherwise specified	NA	Annual	0.0001	0.18
benzene	71-43-2	1-hr	0.03	17
benzene	71-43-2	Annual	0.00002	0.45
xylene	1330-20-7	1-hr	0.0002	220

Pollutant	CAS#	Averaging Time	GLCmax (µg/m^3)	10% ESL (µg/m^3)
xylene	1330-20-7	Annual	0.00001	18

3. Model Used and Modeling Techniques

AERMOD (Version 21112) was used in a refined screening mode. Please note that the most recent version of AERMOD is Version 22112; however, this discrepancy does not change the overall conclusions.

For the health effects analysis, a unitized emission rate of 1 lb/hr was used to predict a generic short-term and long-term impact for each source (i.e. UIM). The generic impact was multiplied by the proposed pollutant specific emission rates to calculate a maximum predicted concentration for each source. The maximum predicted concentration for each source was summed to get a total predicted concentration for each pollutant. The total predicted concentrations were compared to 10 percent of their respective ESLs (step 3 of the MERA guidance). All applicable pollutants fell out by step 3 of the MERA guidance.

Please note for the fugitive sources (i.e. volume sources), the emissions were distributed between the volume sources based on component counts within each process area. A weighted UIM was calculated by multiplying each volume source's modeled UIM by its percent of total EPN emissions (See Tables 6 and 7 below). The weighted UIMs for each volume source located within each process area (i.e. EPNs FUG-LIQ123 and FUG-LIQ4) were summed to obtain the maximum adjusted UIM for each process area (See Tables 6 and 7). Please note for pipeline fugitives (Model IDs NtoSpipe and DockPipe) represent the worst-case piping location within each process area. For Model ID NtoSpipe, the worst-case location for 1-hr and annual averaging times was PPL17_29. For Model ID DockPipe, the worst-case hourly location was PPL18_139, and the worst-case annual location was PPL18_140.

Table 6. Volume Sources Emission Distribution (EPN FUG-LIQ123)

Model ID	Description	Percent of Total Emissions from EPN	Unit Emission Rate Maximum Modeled Concentration [(µg/m^3)/(lb/hr)]		Weighted Unit Emission Rate Maximum Modeled Concentration [(µg/m^3)/(lb/hr)]	
		(%)	1-hr	Annual	1-hr	Annual
TRAIN1A	Fugitives - Train 1	13.21%	12.71	0.52	1.68	0.07
TRAIN1B	Fugitives - Train 1	13.21%	15.79	0.58	2.09	0.08
TRAIN2A	Fugitives - Train 2	13.11%	12.37	0.53	1.62	0.07
TRAIN2B	Fugitives - Train 2	13.11%	15.18	0.54	1.99	0.07
TRAIN3A	Fugitives - Train 3	13.10%	12.18	0.53	1.60	0.07
TRAIN3B	Fugitives - Train 3	13.10%	14.88	0.52	1.95	0.07

Model ID	Description	Percent of Total Emissions from EPN (%)	Unit Emission Rate Maximum Modeled Concentration [(µg/m^3)/(lb/hr)] 1-hr	Unit Emission Rate Maximum Modeled Concentration [(µg/m^3)/(lb/hr)] Annual	Weighted Unit Emission Rate Maximum Modeled Concentration [(µg/m^3)/(lb/hr)] 1-hr	Weighted Unit Emission Rate Maximum Modeled Concentration [(µg/m^3)/(lb/hr)] Annual
LIQFLRA	Liquefaction Flare Fugitive	0.78%	89.64	3.96	0.70	0.03
LIQFLRB	Liquefaction Flare Fugitive	0.78%	97.38	4.47	0.76	0.03
LIQFLRC	Liquefaction Flare Fugitive	0.78%	107.05	5.16	0.84	0.04
HTRANA	Fuel Gas Heater and Analyzer Fugitives	0.78%	129.98	6.89	1.01	0.05
ETHPROPA	Ethylene and Propane Storage and Loading Fugitives	2.29%	134.44	8.23	3.08	0.19
ETHPROPB	Ethylene and Propane Storage and Loading Fugitives	2.29%	136.07	8.37	3.12	0.19
NtoSpipe (1-hr and annual = PPL17_29)	Pipeline Fugitives	0.24%	163.40	9.31	0.39	0.02
TANK18	TANK18	1.73%	72.98	2.68	1.26	0.05
REGAS18	REGAS18	0.69%	67.23	2.06	0.47	0.01
18HEATER	18Heater	0.69%	82.28	2.75	0.57	0.02
BOGA	BOG Compressors Fugitives	2.21%	117.51	11.09	2.60	0.24
BOGB	BOG Compressors Fugitives	2.21%	118.36	11.19	2.61	0.25
BOGC	BOG Compressors Fugitives	2.21%	116.01	10.44	2.56	0.23
BOG2425	BOG Drum Fugitives	0.53%	121.56	4.92	0.64	0.03

Model ID	Description	Percent of Total Emissions from EPN (%)	Unit Emission Rate Maximum Modeled Concentration [(µg/m^3)/(lb/hr)] 1-hr	Unit Emission Rate Maximum Modeled Concentration [(µg/m^3)/(lb/hr)] Annual	Weighted Unit Emission Rate Maximum Modeled Concentration [(µg/m^3)/(lb/hr)] 1-hr	Weighted Unit Emission Rate Maximum Modeled Concentration [(µg/m^3)/(lb/hr)] Annual
DOCK1A	Dock 1 (South) Fugitives	0.29%	89.38	5.88	0.26	0.02
DOCK1B	Dock 1 (South) Fugitives	0.29%	94.47	7.03	0.27	0.02
DOCK2A	Dock 2 (North) Fugitives	0.94%	118.93	5.82	1.12	0.05
DOCK2B	Dock 2 (North) Fugitives	0.94%	114.99	5.87	1.08	0.06
DockPipe (1-hr = PP18_139 Annual = PP18_140)	Pipeline Fugitives	0.50%	158.38	8.26	0.79	0.04
Total =		**100%**	**-**	**-**	**35.05**	**2.00**

Table 7. Volume Sources Emission Distribution (EPN FUG-LIQ4)

Model ID	Description	Percent of Total Emissions from EPN (%)	Unit Emission Rate Maximum Modeled Concentration [(µg/m^3)/(lb/hr)] 1-hr	Unit Emission Rate Maximum Modeled Concentration [(µg/m^3)/(lb/hr)] Annual	Weighted Unit Emission Rate Maximum Modeled Concentration [(µg/m^3)/(lb/hr)] 1-hr	Weighted Unit Emission Rate Maximum Modeled Concentration [(µg/m^3)/(lb/hr)] Annual
TRAIN4A	Fugitives - Train 4	50%	13.26	0.45	6.63	0.22
TRAIN4B	Fugitives - Train 4	50%	18.61	0.67	9.31	0.34
Total =		**100%**	**-**	**-**	**15.94**	**0.56**

The applicant conducted the 1-hr and annual NO_2 NAAQS analyses using the ARM2 model option following EPA guidance.

A. Land Use

Low roughness and elevated terrain were used in the modeling analysis. These selections are consistent with the AERSURFACE analysis, topographic map, DEMs, and aerial photography. The selection of low roughness is reasonable.

B. Meteorological Data

Surface Station and ID: Angleton, TX (Station #: 12976)
Upper Air Station and ID: Lake Charles, LA (Station #: 3937)
Meteorological Dataset: 2016
Profile Base Elevation: 7.3 meters

C. Receptor Grid

The grid modeled was sufficient in density and spatial coverage to capture representative maximum ground-level concentrations.

D. Building Wake Effects (Downwash)

Input data to Building Profile Input Program Prime (Version 04274) are consistent with the aerial photography, plot plan, and modeling report.

4. Modeling Emissions Inventory

The modeled emission point and volume source parameters and rates were consistent with the modeling report. The source characterizations used to represent the sources were appropriate.

The computation of the effective stack diameter for the flare is consistent with TCEQ modeling guidance.

For the 1-hr NO_2 de minimis and minor full NAAQS analyses, emissions from the emergency equipment (Model IDs LIQFWP1 thru LIQFWP3, LIQEG1 thru LIQEG7, LIQEAC1 thru LIQEAC2, EG_DOCK, EG_ADMIN, EG_1, FWP, Z_10, and Z_210) were modeled with an annual average emission rate, consistent with EPA guidance for evaluating intermittent emissions. The emissions for Model IDs LIQFWP1 thru LIQFWP3, EG_DOCK, EG_ADMIN, EG_1, FWP, Z_10, and Z_210 were represented to occur no more than 100 hours per year each. The emissions for Model IDs LIQEG1 thru LIQEG7 and LIQEAC1 thru LIQEAC2 were represented to occur no more than 50 hours per year each.

Since the project is located in the Houston-Galveston-Brazoria ozone non-attainment area, the emergency engines cannot be tested between the hours of 6:00 AM and 12:00 PM (Title 30 of the Texas Administrative Code Chapter § 117.2030(c) or 117.310(f), as applicable). For the 1-hr NO_2 de minimis and minor full NAAQS analyses, hour-of-day scalars were used for Model IDs LIQFWP1 thru LIQFWP3, LIQEG1 thru LIQEG7, LIQEAC1 thru LIQEAC2, EG_DOCK, EG_ADMIN, EG_1, FWP, Z_10, and Z_210 to represent the operational restrictions as noted above. The modeled emission rates were multiplied by 0 during the hours of 6 am to 12 pm. The applicant did not consider these operational limitations for any other applicable pollutant or averaging time being evaluated.

Please note that the operational limitations noted above were not applied to the applicable sources for the SO_2 and CO modeling. This is conservative.

Except as noted above, maximum allowable hourly emission rates were used for the short-term averaging time analyses, and annual average emission rates were used for the annual averaging time analyses.

TCEQ Interoffice Memorandum

To: Cara Hill
Mechanical/Coatings Section

Thru: Chad Dumas, Team Leader
Air Dispersion Modeling Team (ADMT)

From: Justin Cherry, P.E.
ADMT

Date: March 24, 2024

Subject: Second Air Quality Analysis Audit – Freeport LNG Development, L.P. (RN103196689)

1. Project Identification Information

Permit Application Number: 100114
NSR Project Number: 346087
ADMT Project Number: 9043
County: Brazoria
Published Map: \\tceq4avmgisdata\GISWRK\APD\MODEL PROJECTS\9043\9043.pdf

Air Quality Analysis: Submitted by Atkins North America, Inc., February 2024, on behalf of Freeport LNG Development, L.P. Supplemental information was provided March 2024.

The site is located within an Air Pollution Watch List (APWL) area for nickel, vanadium, cobalt, and arsenic (APWL 1201).

2. Report Summary

The air quality analysis (AQA) is acceptable for all review types and pollutants. The results are summarized below.

This is the second modeling audit for this NSR project number. The second modeling audit is being evaluated as an as-built review to address necessary changes to the permitted representations of the liquefaction plant, which only affected the health effects analysis. The applicant evaluated the project from the beginning with the as-built changes incorporated. Please note that the criteria pollutants impacts documented in Tables 1 thru 3 are based on the first audit and all documentation related to criteria pollutants are included for completeness. This memo represents a complete summary and supersedes the previous audit memo dated May 4, 2023 (WCC content ID 6539546).

A. Minor Source NSR and Air Toxics Analysis

Table 1. Project-Related Modeling Results for State Property Line

Pollutant	Averaging Time	GLCmax (µg/m^3)	De Minimis (µg/m^3)
SO_2	1-hr	0.99	20.42

Table 2. Modeling Results for Minor NSR De Minimis

Pollutant	Averaging Time	GLCmax (µg/m^3)	De Minimis (µg/m^3)
SO_2	1-hr	0.99	7.8
SO_2	3-hr	0.75	25
NO_2	1-hr	14	7.5
NO_2	Annual	0.2	1
CO	1-hr	121	2000
CO	8-hr	79	500

The GLCmax are the maximum predicted concentrations associated with one year of meteorological data.

The justification for selecting the EPA's interim 1-hr NO_2 and 1-hr SO_2 De Minimis levels was based on the assumptions underlying EPA's development of the 1-hr NO_2 and 1-hr SO_2 De Minimis levels. As explained in EPA guidance memoranda[1,2], the EPA believes it is reasonable as an interim approach to use a De Minimis level that represents 4% of the 1-hr NO_2 and 1-hr SO_2 NAAQS.

Table 3. Total Concentrations for Minor NSR NAAQS (Concentrations > De Minimis)

Pollutant	Averaging Time	GLCmax (µg/m^3)	Background (µg/m^3)	Total Conc. = [Background + GLCmax] (µg/m^3)	Standard (µg/m^3)
NO_2	1-hr	120	25	145	188

The GLCmax is the maximum predicted concentration associated with one year of meteorological data.

A background concentration for NO_2 was obtained from the EPA AIRS monitor 480391607 located at 901 County Road 792, Freeport, Brazoria County. The three-year average (2019-2021) of the 98th percentile of the annual distribution of the daily maximum 1-hr concentrations was used for the 1-hr value. The use of the monitor is reasonable based on the applicant's review of land use and a quantitative review of emissions surrounding the area of the monitor site relative to the project site.

[1] www.epa.gov/sites/production/files/2015-07/documents/appwso2.pdf

[2] www.tceq.texas.gov/assets/public/permitting/air/memos/guidance_1hr_no2naaqs.pdf

Table 4. Generic Modeling Results

EPN	1-hr GLCmax (µg/m^3 per lb/hr)	Annual GLCmax (µg/m^3 per lb/hr)
LIQFLARE	0.002	8 x 10^{-5}
FUG-LIQ123	35.05	2.01
FUG-LIQ4	15.94	0.56
MSS_FUG	186.00	10.06

See Section 3 to see how the UIMs for EPNs FUG-LIQ123 and FUG-LIQ4 were developed.

Table 5. Minor NSR Project (Increases Only) Modeling Results for Health Effects

Pollutant	CAS#	Averaging Time	GLCmax (µg/m^3)	10% ESL (µg/m^3)
isobutane	75-28-5	1-hr	19.71	2300
isobutane	75-28-5	Annual	0.03	710
n-butane	106-97-8	1-hr	1.23	6600
n-butane	106-97-8	Annual	0.02	710
isopentane	78-78-4	1-hr	2.41	5900
isopentane	78-78-4	Annual	0.01	710
n-pentane	109-66-0	1-hr	0.05	5900
n-pentane	109-66-0	Annual	0.003	710
n-hexane	110-54-3	1-hr	0.01	560
n-hexane	110-54-3	Annual	0.001	20
n-octane	111-65-9	1-hr	0.0004	560
n-octane	111-65-9	Annual	0.00002	54
ethylene	74-85-1	Annual	0.58	3.4
methyl mercaptan	74-93-1	1-hr	0.001	0.19
methyl mercaptan	74-93-1	Annual	0.0001	0.1
mercaptan, not otherwise specified	NA	1-hr	0.002	1.8

Pollutant	CAS#	Averaging Time	GLCmax (µg/m^3)	10% ESL (µg/m^3)
mercaptan, not otherwise specified	NA	Annual	0.0001	0.18
benzene	71-43-2	1-hr	0.03	17
benzene	71-43-2	Annual	0.00002	0.45
xylene	1330-20-7	1-hr	0.0002	220
xylene	1330-20-7	Annual	0.00001	18

Table 6. Minor NSR Site-wide Modeling Results for Health Effects

Pollutant	CAS#	Averaging Time	GLCmax (µg/m^3)	ESL (µg/m^3)
ethylene	74-85-1	1-hr	1116	1400

3. Model Used and Modeling Techniques

AERMOD (Version 21112) was used in a refined screening mode. Please note that the most recent version of AERMOD is Version 23132; however, the applicant relied on the older version for consistency with the previous audit. In addition, this discrepancy does not change the overall conclusions.

For the health effects analysis, a unitized emission rate of 1 lb/hr was used to predict a generic short-term and long-term impact for each source (i.e. UIM). The generic impact was multiplied by the proposed pollutant specific emission rates to calculate a maximum predicted concentration for each source. The maximum predicted concentration for each source was summed to get a total predicted concentration for each pollutant. The total predicted concentrations were compared to 10 percent of their respective ESLs (step 3 of the MERA guidance). All applicable pollutants fell out by step 3 of the MERA guidance except 1-hr ethylene. 1-hr ethylene was further evaluated at step 7 of the MERA guidance.

According to the applicant, Model ID MSS_FUG represents multiple EPNs (vessel openings of EPNs MSS-FUG1-3 and MSS-FUG4) and the modeled location represents the vessel opening closest to the property line for worst-case scenario.

Please note for the fugitive sources (i.e. volume sources), the emissions were distributed between the volume sources based on component counts within each process area. A weighted UIM was calculated by multiplying each volume source's modeled UIM by its percent of total EPN emissions (See Tables 7 and 8 below). The weighted UIMs for each volume source located within each process area (i.e. EPNs FUG-LIQ123 and FUG-LIQ4) were summed to obtain the maximum adjusted UIM for each process area (See Tables 7 and 8). Please note for pipeline fugitives (Model IDs NtoSpipe and DockPipe) represent the worst-case piping location within each process area. For Model ID NtoSpipe, the worst-case location for 1-hr and annual averaging times was PPL17_29. For Model ID DockPipe, the worst-case hourly location was PPL18_139, and the worst-case annual location was PPL18_140.

Table 7. Volume Sources Emission Distribution (EPN FUG-LIQ123)

Model ID	Description	Percent of Total Emissions from EPN	Unit Emission Rate Maximum Modeled Concentration [(µg/m^3)/(lb/hr)]		Weighted Unit Emission Rate Maximum Modeled Concentration [(µg/m^3)/(lb/hr)]	
		(%)	1-hr	Annual	1-hr	Annual
TRAIN1A	Fugitives - Train 1	13.21%	12.71	0.52	1.68	0.07
TRAIN1B	Fugitives - Train 1	13.21%	15.79	0.58	2.09	0.08
TRAIN2A	Fugitives - Train 2	13.11%	12.37	0.53	1.62	0.07
TRAIN2B	Fugitives - Train 2	13.11%	15.18	0.54	1.99	0.07
TRAIN3A	Fugitives - Train 3	13.10%	12.18	0.53	1.60	0.07
TRAIN3B	Fugitives - Train 3	13.10%	14.88	0.52	1.95	0.07
LIQFLRA	Liquefaction Flare Fugitive	0.78%	89.64	3.96	0.70	0.03
LIQFLRB	Liquefaction Flare Fugitive	0.78%	97.38	4.47	0.76	0.03
LIQFLRC	Liquefaction Flare Fugitive	0.78%	107.05	5.16	0.84	0.04
HTRANA	Fuel Gas Heater and Analyzer Fugitives	0.78%	129.98	6.89	1.01	0.05
ETHPROPA	Ethylene and Propane Storage and Loading Fugitives	2.29%	134.44	8.23	3.08	0.19
ETHPROPB	Ethylene and Propane Storage and Loading Fugitives	2.29%	136.07	8.37	3.12	0.19
NtoSpipe (1-hr and annual = PPL17_29)	Pipeline Fugitives	0.24%	163.40	9.31	0.39	0.02
TANK18	TANK18	1.73%	72.98	2.68	1.26	0.05

Model ID	Description	Percent of Total Emissions from EPN (%)	Unit Emission Rate Maximum Modeled Concentration [(µg/m³)/(lb/hr)] 1-hr	Unit Emission Rate Maximum Modeled Concentration [(µg/m³)/(lb/hr)] Annual	Weighted Unit Emission Rate Maximum Modeled Concentration [(µg/m³)/(lb/hr)] 1-hr	Weighted Unit Emission Rate Maximum Modeled Concentration [(µg/m³)/(lb/hr)] Annual
REGAS18	REGAS18	0.69%	67.23	2.06	0.47	0.01
18HEATER	18Heater	0.69%	82.28	2.75	0.57	0.02
BOGA	BOG Compressors Fugitives	2.21%	117.51	11.09	2.60	0.24
BOGB	BOG Compressors Fugitives	2.21%	118.36	11.19	2.61	0.25
BOGC	BOG Compressors Fugitives	2.21%	116.01	10.44	2.56	0.23
BOG2425	BOG Drum Fugitives	0.53%	121.56	4.92	0.64	0.03
DOCK1A	Dock 1 (South) Fugitives	0.29%	89.38	5.88	0.26	0.02
DOCK1B	Dock 1 (South) Fugitives	0.29%	94.47	7.03	0.27	0.02
DOCK2A	Dock 2 (North) Fugitives	0.94%	118.93	5.82	1.12	0.05
DOCK2B	Dock 2 (North) Fugitives	0.94%	114.99	5.87	1.08	0.06
DockPipe (1-hr = PP18_139 Annual = PP18_140)	Pipeline Fugitives	0.50%	158.38	8.26	0.79	0.04
Total =		**100%**	**-**	**-**	**35.05**	**2.00**

Table 8. Volume Sources Emission Distribution (EPN FUG-LIQ4)

Model ID	Description	Percent of Total Emissions from EPN (%)	Unit Emission Rate Maximum Modeled Concentration [(µg/m³)/(lb/hr)] 1-hr	Unit Emission Rate Maximum Modeled Concentration [(µg/m³)/(lb/hr)] Annual	Weighted Unit Emission Rate Maximum Modeled Concentration [(µg/m³)/(lb/hr)] 1-hr	Weighted Unit Emission Rate Maximum Modeled Concentration [(µg/m³)/(lb/hr)] Annual
TRAIN4A	Fugitives - Train 4	50%	13.26	0.45	6.63	0.22

Model ID	Description	Percent of Total Emissions from EPN (%)	Unit Emission Rate Maximum Modeled Concentration [(µg/m³)/(lb/hr)] 1-hr	Unit Emission Rate Maximum Modeled Concentration [(µg/m³)/(lb/hr)] Annual	Weighted Unit Emission Rate Maximum Modeled Concentration [(µg/m³)/(lb/hr)] 1-hr	Weighted Unit Emission Rate Maximum Modeled Concentration [(µg/m³)/(lb/hr)] Annual
TRAIN4B	Fugitives - Train 4	50%	18.61	0.67	9.31	0.34
Total =		**100%**	**-**	**-**	**15.94**	**0.56**

The applicant conducted the 1-hr and annual NO_2 NAAQS analyses using the ARM2 model option following EPA guidance.

A. Land Use

Low roughness and elevated terrain were used in the modeling analysis. These selections are consistent with the AERSURFACE analysis, topographic map, DEMs, and aerial photography. The selection of low roughness is reasonable.

B. Meteorological Data

Surface Station and ID: Angleton, TX (Station #: 12976)
Upper Air Station and ID: Lake Charles, LA (Station #: 3937)
Meteorological Dataset: 2016
Profile Base Elevation: 7.3 meters

C. Receptor Grid

The grid modeled was sufficient in density and spatial coverage to capture representative maximum ground-level concentrations.

D. Building Wake Effects (Downwash)

Input data to Building Profile Input Program Prime (Version 04274) are consistent with the aerial photography, plot plan, and modeling report.

4. Modeling Emissions Inventory

The modeled emission point and volume source parameters and rates were consistent with the modeling report. The source characterizations used to represent the sources were appropriate.

The computation of the effective stack diameter for the flare is consistent with TCEQ modeling guidance.

For the 1-hr NO_2 de minimis and minor full NAAQS analyses, emissions from the emergency equipment (Model IDs LIQFWP1 thru LIQFWP3, LIQEG1 thru LIQEG7, LIQEAC1 thru LIQEAC2, EG_DOCK, EG_ADMIN, EG_1, FWP, Z_10, and Z_210) were modeled with an annual average emission rate, consistent with EPA guidance for evaluating intermittent emissions. The emissions for Model IDs LIQFWP1 thru LIQFWP3, EG_DOCK, EG_ADMIN, EG_1, FWP, Z_10, and Z_210

were represented to occur no more than 100 hours per year each. The emissions for Model IDs LIQEG1 thru LIQEG7 and LIQEAC1 thru LIQEAC2 were represented to occur no more than 50 hours per year each.

Since the project is located in the Houston-Galveston-Brazoria ozone non-attainment area, the emergency engines cannot be tested between the hours of 6:00 AM and 12:00 PM (Title 30 of the Texas Administrative Code Chapter § 117.2030(c) or 117.310(f), as applicable). For the 1-hr NO_2 de minimis and minor full NAAQS analyses, hour-of-day scalars were used for Model IDs LIQFWP1 thru LIQFWP3, LIQEG1 thru LIQEG7, LIQEAC1 thru LIQEAC2, EG_DOCK, EG_ADMIN, EG_1, FWP, Z_10, and Z_210 to represent the operational restrictions as noted above. The modeled emission rates were multiplied by 0 during the hours of 6 am to 12 pm. The applicant did not consider these operational limitations for any other applicable pollutant or averaging time being evaluated.

Please note that the operational limitations noted above were not applied to the applicable sources for the SO_2 and CO modeling. This is conservative.

Except as noted above, maximum allowable hourly emission rates were used for the short-term averaging time analyses, and annual average emission rates were used for the annual averaging time analyses.

Preliminary Determination Summary

Freeport LNG Development, L.P.
Permit Numbers 100114 and N304

I. Applicant

Freeport LNG Development LP
1500 Lamar Street
Quintana, TX 77541-8113

II. Project Location

Freeport LNG Liquefaction Plant
1500 Lamar Street
Brazoria County
Quintana, Texas 77541

III. Project Description

Freeport LNG Development, L.P. (Freeport LNG) owns and operates a natural gas liquefaction plant in Quintana, Brazoria County, Texas. Freeport LNG submitted an amendment application requesting "as-built" changes and a flare gas recovery project. No Permit by Rule (PBR) or Standard Permit (SP) requires incorporation during this permitting action. Maintenance, startup, and shutdown (MSS) emissions are authorized under this permit.

IV. Emissions

Air Contaminant	Proposed Allowable Emission Rates (tpy)
VOC	27.31
NO_x	53.15
SO_2	0.54
CO	208.61
$PM/PM_{10}/PM_{2.5}$	0.23
H_2SO_4	0.12
NH_3	0.07

V. Federal Applicability

The following chart illustrates the annual project emissions for each pollutant and whether this pollutant triggers PSD or Nonattainment (NA) review.

Trains 1-3

Pollutant	Project Emissions (tpy)	Major Mod Trigger (tpy)	NA Triggered Y/N	PSD Triggered Y/N
VOC	53.13	25 for NA	Y	N

Pollutant	Project Emissions (tpy)	Major Mod Trigger (tpy)	NA Triggered Y/N	PSD Triggered Y/N
NO_x	48.26	25 for NA	Y	N
SO_2	0.34	250	N/A	N
CO	189.30	250	N/A	N
PM	0.11	250	N/A	N
PM_{10}	0.11	250	N/A	N
$PM_{2.5}$	0.11	250	N/A	N
H_2SO_4	0.01	250	N/A	N

Train 4

Pollutant	Project Emissions (tpy)	Major Mod Trigger (tpy)	NA Triggered Y/N	PSD Triggered Y/N
VOC	3.73	25 for NA	Y	N
NO_x	4.91	25 for NA	Y	N
SO_2	0.01	40	N/A	N
CO	19.32	100	N/A	N
PM	6.57	25	N/A	N
PM_{10}	6.57	15	N/A	N
$PM_{2.5}$	6.57	10	N/A	N
H_2SO_4	0.01	7	N/A	N

VI. Control Technology Review

LAER applies to all sources VOC and **NOx that were part of the original Trains 1-3 project.**

EPN	Source Name	Best Available Control Technology and Lowest Achievable Emission Rate Limitation Description
LIQFLARE	Liquefaction Flare	Emissions from the Ground Flare are being updated to reflect certain maintenance activities that have become known through actual operation of these facilities and were not represented in previous applications and the proposed flare gas recovery project. The flare is a pressure assisted, multi-staged, multi-point ground flare. The flare is designed to achieve 99.5 DRE for all VOC compounds in the vapor emissions routed to it. The flare is used to control MSS activities for Trains 1-3, including the planned shutdown and startup of one train in any one year for major maintenance turnaround purposes. Freeport LNG will continue to use good combustion practices while operating the flare to limit NO_X emissions to meet LAER. NO_X emissions from the flare are based on TCEQ's factors for high-British thermal unit (Btu) streams, based on flare stream characteristics. The flare meets the design and operating requirements of the AMOC Permit AMOC71. The flare is equipped with a flow monitor and continuous emissions analyzer to ensure compliance with these requirements. Based on an updated query of the RBLC database, permits, and other regulatory requirements (such as the California Air Resources Board (CARB) determinations and California air district rules) for similar flare operations, the operating practices and compliance with applicable regulatory requirements continue to meet LAER.
LIQEG-1	Emergency Generator 1	LAER for NO_X is determined to be compliance with the U.S. EPA's Tier certification emission standards, application of SCRs, use of ultra-low sulfur diesel fuel (< 15 ppmv sulfur content), compliance with NSPS Subpart IIII, and limiting hours of operation to < 100 hr/yr of non-emergency operations. LAER for VOC is determined to be compliance with Tier certification standards, use of ultra-low sulfur diesel fuel (< 15 ppmv sulfur content), compliance with NSPS Subpart IIII, limit hours of operation to < 100 hr/yr of non-emergency operations.
LIQEG-2	Emergency Generator 2	
LIQEG-3	Emergency Generator 3	
LIQEG-4	Emergency Generator 4	
LIQEAC-1	Emergency Air Compressor	
LIQFWP-1	Fire Water Pump 1	

EPN	Source Name	Best Available Control Technology and Lowest Achievable Emission Rate Limitation Description
LIQFWP-2	Fire Water Pump 2	LAER is determined to be compliance with Tier certification emission standards, use of ultra-low sulfur diesel fuel (< 15 ppmv sulfur content), compliance with NSPS Subpart IIII, and limiting hours of operation to < 100 hr/yr of non-emergency operations. LAER for VOC is determined to be compliance with Tier certification standards, use of ultra-low sulfur diesel fuel (< 15 ppmv sulfur content), compliance with NSPS Subpart IIII, limit hours of operation to < 100 hr/yr of non-emergency operations.
LIQFWP-3	Fire Water Pump 3	
LIQEG-5	Emergency Generator 5	
LIQEG-6	Emergency Generator 6	
FUG-LIQ123	Fugitives Train 1	28LAER program requirements are considered more stringent, this program will be implemented for the Trains 1-3 fugitive components along with previously approved alternative work practice to the Method 21 monitoring requirements monitoring is performed on a bi-monthly basis using optical gas imaging (OGI) technology and on an annual basis using Method 21. Therefore, the use of the AWP is considered equivalent to the Method 21 LDAR requirements and is therefore, proposed as LAER for the Liquefaction Trains 1-3 fugitive emissions.
LFWPT-1	Diesel Firewater Tank 1	LAER for VOC is determined to be fixed roof tanks and good operating practices.
LFWPT-2	Diesel Firewater Tank 2	
LFWPT-3	Diesel Firewater Tank 3	
LEGT-1	Emergency Generator Tank 1	
LEGT-2	Emergency Generator Tank 2	
LEGT-3	Emergency Generator Tank 3	
LEGT-4	Emergency Generator Tank 4	
LEGT-5	Emergency Generator Tank 5	
LEGT-6	Emergency Generator Tank 6	
LEACT-1	Backup Air Compressor Tank 1	

EPN	Source Name	Best Available Control Technology and Lowest Achievable Emission Rate Limitation Description
11K-30	Propane Compressors Lube Oil Vent	The Trains 1-3 construction project includes lube oil vents associated with compressor systems. VOC emissions from these vents are under 0.00002 tons per year. Based on this insignificant level of emissions, LAER for VOC is proposed to be proper operation and maintenance of the associated compressors.
11K-31	LP MR Compressors Lube Oil Vent	
11K-32	MP MR Compressor Lube Oil Vents	
11K-33	HP MR Compressor Lube Oil Vents	
12K-30	Propane Compressors Lube Oil Vent	
12K-31	LP MR Compressors Lube Oil Vent	
12K-32	MP MR Compressor Lube Oil Vents	
12K-33	HP MR Compressor Lube Oil Vents	
13K-30	Propane Compressors Lube Oil Vent	
13K-31	LP MR Compressors Lube Oil Vent	
13K-32	MP MR Compressor Lube Oil Vents	
13K-33	HP MR Compressor Lube Oil Vents	
FUG - LIQ123	Fugitives - Train 1-Train 3	Emissions from piping components will achieve LAER through the use of the 28LAER LDAR requirements and an approved Optical Gas Imaging (OGI) monitoring alternative.
MSS-FUG1-3	Fugitives - Train 1- 3 Vessel Opening for Maintenance	LAER for the vessel opening is determined to be the following: minimizing of the number and duration of planned MSS events; MSS activities associated with large emissions from equipment containing materials with vapor pressures above 0.5 psia will be routed to the flare; Process equipment will only be opened for inspection and maintenance after purging to the flare to minimize VOC content down to 10,000 ppmv or 10% of the lower explosive level (LEL); and Use of knockout drums to separate liquids and vapors.
MSS-FUG4	Fugitives - Train 4 Vessel Opening for Maintenance	

VII. Air Quality Analysis

The air quality analysis (AQA) is acceptable for all review types and pollutants. The results are summarized below.

A. Minor Source NSR and Air Toxics Analysis

Table 1. Project-Related Modeling Results for State Property Line

Pollutant	Averaging Time	GLCmax (µg/m^3)	De Minimis (µg/m^3)
SO_2	1-hr	0.99	20.42

Table 2. Modeling Results for Minor NSR De Minimis

Pollutant	Averaging Time	GLCmax (µg/m^3)	De Minimis (µg/m^3)
SO_2	1-hr	0.99	7.8
SO_2	3-hr	0.75	25
NO_2	1-hr	14	7.5
NO_2	Annual	0.2	1
CO	1-hr	121	2000
CO	8-hr	79	500

The GLCmax are the maximum predicted concentrations associated with one year of meteorological data.

The justification for selecting the EPA's interim 1-hr NO_2 and 1-hr SO_2 De Minimis levels was based on the assumptions underlying EPA's development of the 1-hr NO_2 and 1-hr SO_2 De Minimis levels. As explained in EPA guidance memoranda[1,2], the EPA believes it is reasonable as an interim approach to use a De Minimis level that represents 4% of the 1-hr NO_2 and 1-hr SO_2 NAAQS.

Table 3. Total Concentrations for Minor NSR NAAQS (Concentrations > De Minimis)

Pollutant	Averaging Time	GLCmax (µg/m^3)	Background (µg/m^3)	Total Conc. = [Background + GLCmax] (µg/m^3)	Standard (µg/m^3)
NO_2	1-hr	120	25	145	188

[1] www.epa.gov/sites/production/files/2015-07/documents/appwso2.pdf
[2] www.tceq.texas.gov/assets/public/permitting/air/memos/guidance_1hr_no2naaqs.pdf

The GLCmax is the maximum predicted concentration associated with one year of meteorological data.

A background concentration for NO_2 was obtained from the EPA AIRS monitor 480391607 located at 901 County Road 792, Freeport, Brazoria County. The three-year average (2019-2021) of the 98th percentile of the annual distribution of the daily maximum 1-hr concentrations was used for the 1-hr value. The use of the monitor is reasonable based on the applicant's review of land use and a quantitative review of emissions surrounding the area of the monitor site relative to the project site.

Table 4. Generic Modeling Results

EPN	1-hr GLCmax (µg/m^3 per lb/hr)	Annual GLCmax (µg/m^3 per lb/hr)
LIQFLARE	0.002	8 x 10^{-5}
FUG-LIQ123	35.05	2.01
FUG-LIQ4	15.94	0.56
MSS_FUG	186.00	10.06

See Section 3 to see how the UIMs for EPNs FUG-LIQ123 and FUG-LIQ4 were developed.

Table 5. Minor NSR Project (Increases Only) Modeling Results for Health Effects

Pollutant	CAS#	Averaging Time	GLCmax (µg/m^3)	10% ESL (µg/m^3)
isobutane	75-28-5	1-hr	19.71	2300
isobutane	75-28-5	Annual	0.03	710
n-butane	106-97-8	1-hr	1.23	6600
n-butane	106-97-8	Annual	0.02	710
isopentane	78-78-4	1-hr	2.41	5900
isopentane	78-78-4	Annual	0.01	710
n-pentane	109-66-0	1-hr	0.05	5900
n-pentane	109-66-0	Annual	0.003	710
n-hexane	110-54-3	1-hr	0.01	560
n-hexane	110-54-3	Annual	0.001	20

Pollutant	CAS#	Averaging Time	GLCmax (µg/m^3)	10% ESL (µg/m^3)
n-octane	111-65-9	1-hr	0.0004	560
n-octane	111-65-9	Annual	0.00002	54
ethylene	74-85-1	Annual	0.58	3.4
methyl mercaptan	74-93-1	1-hr	0.001	0.19
methyl mercaptan	74-93-1	Annual	0.0001	0.1
mercaptan, not otherwise specified	NA	1-hr	0.002	1.8
mercaptan, not otherwise specified	NA	Annual	0.0001	0.18
benzene	71-43-2	1-hr	0.03	17
benzene	71-43-2	Annual	0.00002	0.45
xylene	1330-20-7	1-hr	0.0002	220
xylene	1330-20-7	Annual	0.00001	18

Table 6. Minor NSR Site-wide Modeling Results for Health Effects

Pollutant	CAS#	Averaging Time	GLCmax (µg/m^3)	ESL (µg/m^3)
ethylene	74-85-1	1-hr	1116	1400

VIII. Offsets

The site is located in Brazoria County, which has been designated as a serious nonattainment area for ozone. For the Houston-Galveston-Brazoria nonattainment area, designated “severe” nonattainment under the 1997 8-hour ozone standard, the retroactive analysis of this project would require permit offsets at the rate of 1:3 to 1.0 for NO_X emissions.

When issued, the permit requires that the permit holder offset the project emission increase for facilities authorized by this permit prior to the commencement of operation, through participation in the TCEQ Emission Banking and Trading (EBT) Program in accordance with the rules in 30 TAC Chapter 101, Subchapter H.

The permit holder shall use 53.4 tons per year (tpy) of NO_X ECs from TCEQ credit certificate numbers 3991, 4044, 4050, 4051, 4052, 4053, 4054, and 4163 to offset the 41.02 tpy NO_X project emission increase for the facilities authorized by this permit at a ratio of 1.3 to 1.0.

The permit holder shall use 32.1 tpy of VOC credits to offset the 24.63 tpy VOC project emission increase for the facilities authorized by this permit at a ratio of 1.3 to 1.0.

Prior to the start of operation of the flare gas recovery project (an emissions reduction project), the permit holder shall use 9.4 tpy of NOx credits to offset the 7.24 tpy NOx project emission increase for the facilities authorized by this permit at a ratio of 1.3 to 1.0.

Prior to the commencement of operation, the permit holder is required to obtain approval from the TCEQ EBT Program for the credits being used and then submit a permit alteration or amendment request to the TCEQ Air Permits Division (and copy the TCEQ Regional Office) to identify approved credits by TCEQ credit certificate number.

IX. Alternative Site Analysis and Compliance Certification

The applicant has submitted the required demonstration relating to consideration of alternative sites and Clean Air Act compliance status for sites owned or operated by the applicant (or by any entity controlling, controlled by, or under common control with the applicant). The analysis demonstrated that the benefits of the proposed location and source configuration significantly outweigh the environmental and social costs of that location.

X. Conclusion

As described above, the applicant has demonstrated that the project meets all applicable rules, regulations and requirements of the Texas and Federal Clean Air Acts. The Executive Director's preliminary determination is that the permits should be issued.