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July 15, 2024

Texas Commission on Environmental Quality
Air Permits Initial Review Team (APIRT) M161
12100 Park 35 Circle
Building C, Third Floor, Room 300 W
Austin, TX 78753

via STEERS

**Subject: Air Quality Standard Permit for Electric Generating Units
Homestead Power LLC
Homestead Power Plant
New Ulm, Austin County, Texas
Customer No.: TBD Regulated Entity No.: TBD**

APIRT:

POWER Engineers, Inc., on behalf of Homestead Power LLC, hereby submits in the State of Texas Environmental Electronic Reporting System (STEERS) the enclosed registration application to use the Texas Commission on Environmental Quality's (TCEQ's) Air Quality Standard Permit for Electric Generating Units to authorize construction and operation of a proposed electric generating plant near New Ulm in Austin County, Texas. The plant will include one natural gas-fired simple cycle combustion turbine and ancillary equipment.

The registration application includes all required forms and technical documentation. Note that a base registration fee payment of \$900 will be made to the TCEQ through the ePay system. Additionally, a payment of \$500 will be made through the ePay system so to authorize the TCEQ staff to conduct an expedited review of the registration application.

If you require additional information, please do not hesitate to contact Chris Pollak by email at cpollak@nightpeak.energy or 617-775-3343 or myself at the contact information below.

Sincerely,

A handwritten signature in blue ink that reads "Larry Moon". The signature is written in a cursive style.

Larry Moon, P.E.

Project Manager

Phone: 512-879-6619

larry.moon@powereng.com

Attachments

c:

- » Mr. Joseph Doby, Air Section Manager, TCEQ Region 12, Houston, w/attachments
- » Mr. Chris Pollak, Director of EPC, Nightpeak Energy LLC, w/attachments
- » Mr. Greg Blue, Director of Development, Nightpeak Energy LLC, w/attachments
- » Ms. Shruti Ramaker, Director of Environmental and Permitting
- » Mr. Paris Hays, CEO, Nightpeak Energy LLC, w/attachments

July 2024

STANDARD PERMIT REGISTRATION FOR ELECTRIC GENERATING UNIT

*Homestead Power LLC
Homestead Power Plant
New Ulm, Austin County, Texas*

Submitted To:
*Texas Commission on Environmental Quality
Air Division
via
State of Texas Environmental Electric Reporting System (STEERS)*

PROJECT NUMBER:
0252449.01.01



TABLE OF CONTENTS

1.0	INTRODUCTION	1
2.0	PROCESS DESCRIPTION	2
2.1	Combustion Turbine Generator.....	2
2.2	SCR System.....	3
2.3	Turbine Lube Oil Recirculation Systems, Generator Seal Oil Systems, and Hydraulic Oil Systems.....	3
2.4	Fugitive Emissions.....	3
2.5	Maintenance, Startup, and Shutdown Activities.....	3
2.6	Diesel-fired Emergency Internal Combustion Engines.....	4
2.7	Storage Tanks.....	4
2.8	Natural Gas Dewpoint Heater.....	5
2.9	Inherently Low Emitting Maintenance Activities.....	5
3.0	STATE REGULATORY REQUIREMENTS	9
3.1	30 TAC §116.610 Applicability.....	9
3.2	30 TAC §116.615. General Conditions.....	11
4.0	COMPLIANCE WITH REQUIREMENTS OF THE EGU STANDARD PERMIT	15

APPENDICES

APPENDIX A	TCEQ FORMS
APPENDIX B	EMISSIONS CALCULATION

1.0 INTRODUCTION

Homestead Power LLC (Homestead Power) proposes to construct and operate a new electric generating station, the Homestead Power Plant (Plant), comprised of a simple-cycle combustion turbine generator (CTG) and ancillary equipment at a greenfield site in Austin County. Construction and operation of the electric generating unit (EGU) can be authorized under the Air Quality Standard Permit for Electric Generating Units (EGU Standard Permit) issued by the Texas Commission on Environmental Quality (TCEQ) per Subchapter F in Chapter 116 of Title 30 of the Texas Administrative Code (TAC). Accordingly, Homestead Power is submitting this application to the TCEQ to register the applicability of the EGU Standard Permit to the proposed EGU.

Emissions associated with the proposed combustion turbine, including normal operation emissions, maintenance, start up and shutdown (MSS) emissions, fugitive emissions, and emissions from ancillary equipment are documented in this registration application. Emissions from the ancillary equipment are documented in this application for the purpose of calculating a sitewide potential to emit to demonstrate that Federal Major Source permitting under the Prevention of Significant Deterioration (PSD) and New Source Review (NSR) regulations is not triggered as well as establish federally enforceable limits.

The Plant will operate as a merchant power plant, which means the combustion turbine will be dispatched when electric market conditions are favorable. Since it is not possible to know in advance what the specific electric demand will be on a given day, there is also no way to precisely know how many times a turbine will be called upon to start up or how long it will be tasked to run. Although annual emission estimates are based upon 125 MSS operating hours and 2,850 turbine operating hours, market conditions could require scenarios with more turbine startups and fewer operating hours or scenarios with more operating hours and fewer turbine startups while meeting annual emission representations.

The site will not be a Major Source for PSD applicability purposes and will therefore not trigger PSD permitting. Homestead Energy is submitting a TCEQ Form APD-CERT to make enforceable annual emission limits to ensure PSD permitting will not be triggered.

The information included in this submittal demonstrates how the facility will comply with the general requirements for Standard Permits as specified in 30 TAC Sections (§§) 116.610 and 116.615 and the specific requirements of the EGU Standard Permit. Appendix A contains the TCEQ Form PI-1S, Form APD-CERT, Table 1(a), and TCEQ Core Data Form. Emission calculations and a sitewide emissions summary are included in Appendix B.

2.0 PROCESS DESCRIPTION

As described in Section 1.0, Homestead Power’s proposed Plant will be a new approximately 260 megawatts (MW) natural gas-fired simple cycle CTG near New Ulm, Austin County, Texas. The air emission sources associated with Homestead Power Plant are shown in Table 1.

TABLE 1 EMISSION SOURCE SUMMARY

DESCRIPTION	FIN/EPN
COMBUSTION TURBINE 1 (SIMPLE CYCLE)	CT-1
LUBE OIL VENT	CT-LOV1
GENERATOR SEAL OIL VENT	GEN-SOV-1
HYDRAULIC OIL VENT	HYDOV-1
NATURAL GAS, LUBE OIL, SEAL OIL, AND HYDRAULIC FLUID COMPONENT FUGITIVES	VOC-FUG
ULSD COMPONENT FUGITIVES	ULSDFUG
AMMONIA COMPONENT FUGITIVES	NH3-FUG
EMERGENCY GENERATOR	EGEN1
EMERGENCY FIREWATER PUMP	FWP1
EMERGENCY GENERATOR DIESEL TANK	EGEN1-TK
EMERGENCY FIREWATER PUMP DIESEL TANK	FWP1-TK
FUEL GAS HEATER	FG-HTR
SF6 LEAKS	FUG-SF6
INHERENTLY LOW EMITTING ACTIVITIES FUGITIVES	CT-MSS

2.1 Combustion Turbine Generator

The Plant will be comprised of one natural gas-fired simple-cycle CTG and ancillary equipment. The turbine model that will be installed at the Plant will either be a General Electric (GE) 7F.04, a Mitsubishi Heavy Industries (MHI) 501 GAC, or a Siemens SGT6-5000F; nominally rated at approximately 260-MW output. The emission calculations provided are based on a SGT6-5000F turbine, if an alternative model is selected, a new application will be prepared documenting compliance with the EGU Standard Permit.

Filtered ambient air is drawn into the compressor section of the CTG. Natural gas is mixed with the compressed inlet air and combusted in the combustor section of the units. The hot combustion gases expand across the turbine blades of the turbine section of the units, causing rotation of the turbine shaft. The shaft drives the compressor section of the units as well as dedicated electric generators that produce electricity. The hot exhaust will then pass through a selective catalytic reduction (SCR) system to reduce nitrogen oxide (NO_x) emissions before exiting through a stack (EPN: CT-1). A process flow diagram is included at the end of this section. Emission calculations are found in Tables B-1 and B-2.

2.2 SCR System

An SCR system will be used to reduce emissions of NO_x. The SCR bed will be placed downstream of the turbine outlet. The optimal operating temperature range of the SCR catalyst ranges from 400 to 800 degrees Fahrenheit. An air tempering system will be used to reduce the stack temperature to the optimal range for the SCR. An ammonia (NH₃) injection grid will evenly distribute vaporized NH₃ into the mixed exhaust stream upstream of the SCR catalyst bed. The SCR catalyst will be optimized to use the NH₃ to convert the NO_x in the exhaust stream into nitrogen, oxygen, and water vapor, with a limited amount of NH₃ slip. The use of SCR will allow the simple cycle turbine to meet the 0.14 pound of NO_x per megawatt-hour emission certification requirement in the EGU Standard Permit.

2.3 Turbine Lube Oil Recirculation Systems, Generator Seal Oil Systems, and Hydraulic Oil Systems

The turbine will include a closed-loop lube oil recirculation system to lubricate the moving parts of the turbine and generator. Additionally, the turbine will include a hydraulic fluid service. The lube oil system includes a main lube oil storage tank, a deaerator tank, and a surge tank. Oil vapor (constituting volatile organic compound [VOC]) and oil mist (constituting particulate matter) emissions will be generated by oil vaporization resulting from heating of lube oil in the turbines and subsequent condensation of droplets when the vapor is cooled in the cooler zones of the storage reservoir compartment. Lube oil mist emissions from the reservoir compartment will be controlled by a mist eliminator exhausted through a dedicated reservoir vent (EPN: CT-LOV1). Similarly, VOC and particulate matter emissions have been quantified for the generator seal oil system (EPN: GEN-SOV-1) and hydraulic oil system (EPN: HYDOV-1). Emission calculations are found in Table B-3.

2.4 Fugitive Emissions

The Plant will have piping in natural gas, lube oil, seal oil, hydraulic oil, diesel, and NH₃ service. Potential fugitive emissions from piping components (valves, flanges, connectors, pumps, open-ended lines, and relief valves) are calculated based on a count of components and emissions factors associated with the liquid or gas/vapor service of the components. The fugitive emission sources are defined by their service as following EPNs:

- » VOC-FUG: addresses fugitive emissions of equipment components in natural gas, lube oil, seal oil, and hydraulic oil service
- » ULSD-FUG: addresses fugitive emissions of equipment components in ultra-low sulfur diesel (ULSD) service
- » NH₃-FUG: addresses fugitive emissions of equipment components in NH₃ service

Emission calculations are found in Tables B-4 through B-6.

2.5 Maintenance, Startup, and Shutdown Activities

Startup and shutdown of the turbine will be part of the regularly scheduled operations at the proposed Plant. Startup and shutdown periods for the turbine will be defined by monitored operating conditions. The startup period will begin when an initial flame detection signal is

recorded in the Plant's data acquisition and handling system and ends when the startup load ramping is complete, the SCR catalyst reaches operating temperature, and emissions have been controlled in a steady state to meet the normal operations emission limits.

The shutdown period begins when a shutdown signal is initiated in the gas turbine controller and ends when a flame detection signal is no longer recorded in the Plant's data acquisition and handling system. The duration of a startup for a GE 7F.04, a MHI 501 GAC, or a Siemens SGT6-5000F can vary; however, for the purpose of calculating MSS emissions, the average duration of a startup and shutdown was assumed to be 34.4 and 19.4 minutes, respectively. Because startups and shutdowns for these turbine models can occur rapidly, it is possible to start up and shutdown a turbine in a 60-minute period. Therefore, the calculated maximum hourly startup emission rate is based upon a startup and a shutdown in a 60-minute period.

During startup and shutdown periods, NO_x, carbon monoxide, VOC, and NH₃ are emitted at higher levels than during normal operating conditions. During startup, higher NO_x emissions occur during the transition period before the SCR catalyst bed reaches the optimal temperature operating range. During startup and shutdown, higher carbon monoxide and VOC emissions will result due to incomplete combustion because of the low firing levels. Higher NH₃ emissions may occur during startup while the SCR is coming into service. The maximum one-hour emissions resulting from startups and shutdowns have been identified in Table 1(a).

2.6 Diesel-fired Emergency Internal Combustion Engines

Homestead Power is proposing to have two emergency diesel-fired internal combustion (IC) engines. The engines will be limited 100 hour per year of operation or less in non-emergency operating modes due to the engines' emergency classification status. The engines will not be constrained by an operating limit for legitimate emergency operating modes.

One emergency diesel-fired IC engine will power an approximately 1,380-kilowatt (kW) emergency standby generator (EPN: EGEN1). As required by regulation, the engine will only fire ULSD with a maximum sulfur content of 15 parts per million weight. At a minimum, the engine will be a United States Environmental Protection Agency-certified Tier 2 engine which is approved by regulation for emergency service operations.

The other emergency diesel-fired IC engine powers an approximately 288-kW emergency fire water pump (EPN: FWP1). As required by regulation, the engine will only fire ULSD with a maximum sulfur content of 15 parts per million weight. At a minimum, the engine will comply with the emission limitations in 40 Code of Federal Regulations (CFR) Part 60, Subpart IIII, Table 4 which is approved by regulation for stationary firewater pump engines.

Emission calculations are found in Tables B-7 through B-8.

2.7 Storage Tanks

Homestead Power is proposing to have two fixed-roof diesel storage tanks (EPNs: EGEN1-TK and FWP1-TK). Each tank will provide ULSD fuel to one of the two emergency IC engines. Each tank is anticipated to be approximately a 12-barrel (500-gallon) white, horizontal, fixed-roof tank.

One 20,000-gallon NH₃ solution storage tank will be located at the site. An aqueous NH₃ solution containing 19 percent NH₃ will be delivered by tanker truck, which will use vapor balance to

capture emissions during filling of the storage tanks. The NH₃ storage tank will maintain working pressure sufficient to prevent working and breathing loss emissions to the atmosphere.

Emission calculations and reference data are found in Tables B-9 through B-13.

2.8 Natural Gas Dewpoint Heater

Pipeline quality natural gas will be delivered to the site via pipeline where it is metered and piped to the natural gas-fired units. To prevent liquid droplets from entering the gas turbine, the natural gas fuel to the gas turbine will be indirectly heated in a small, natural-gas fired dewpoint heater (EPN: FG-HTR). The dewpoint heater will be permitted to operate up to 2,975 hours per year.

Emission calculations are found in Table B-14.

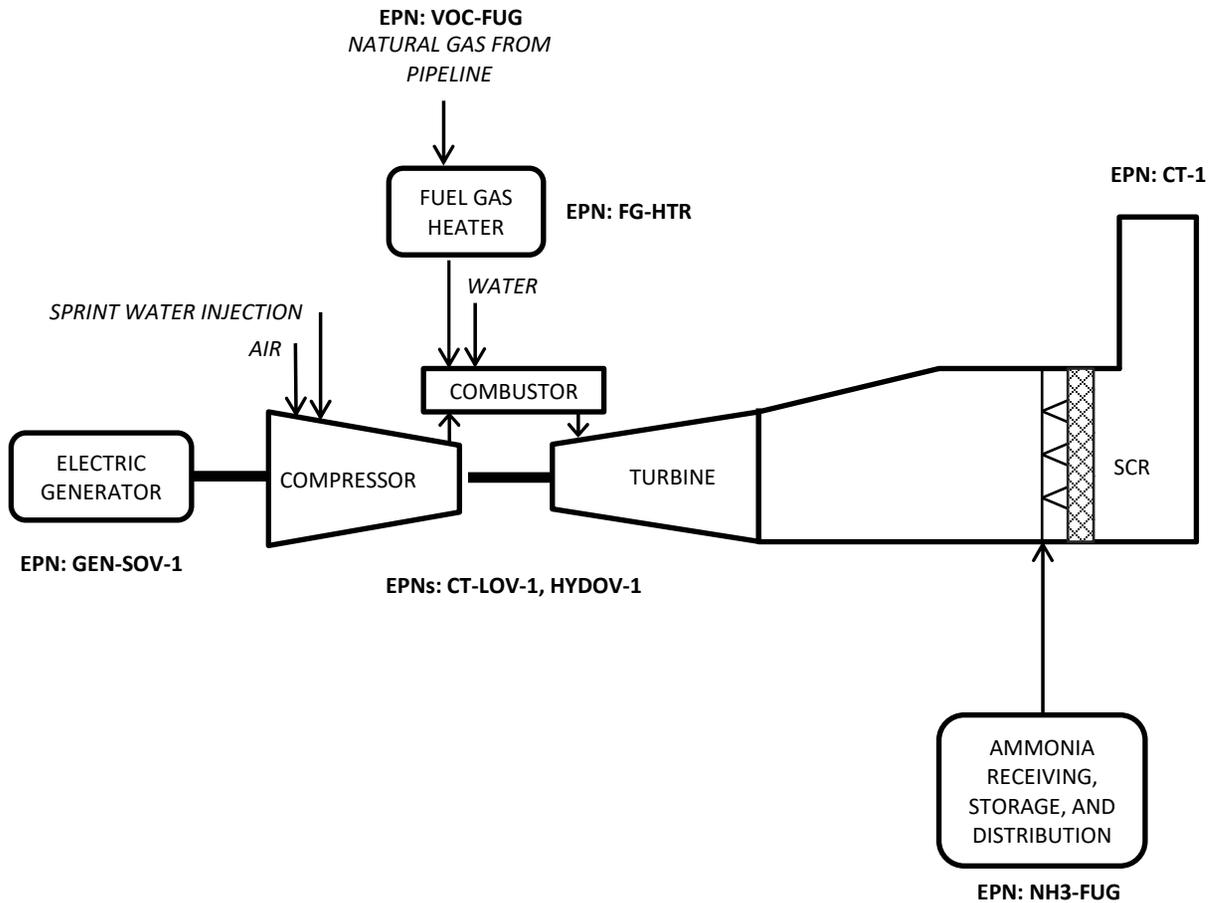
2.9 Inherently Low Emitting Maintenance Activities

Several maintenance-related activities associated with the EGU are expected to result in inherently low emissions such that it will be unnecessary to require burdensome compliance recordkeeping for these activities. The TCEQ has recognized and included these maintenance activities in numerous NSR permits issued for EGUs. Homestead Power has quantified maximum emissions resulting from the following maintenance activities related to the proposed EGUs to be authorized in this Standard Permit registration:

- » Turbine washing (while units are on-line)
- » Air intake filter maintenance
- » Catalyst handling/maintenance
- » NH₃ equipment maintenance
- » Fuel gas venting
- » Analytical equipment maintenance

These inherently low emitting maintenance activities (EPN: CT-MSS) are summarized in Table B-15. Specific calculations for these activities are found in Tables B-16 through B-21.

Process Flow Diagram



Homestead Power Plant		PROCESS FLOW DIAGRAM	
Standard Permit Application		Project No: 0252449.01.01	
	Drawn by:	K. Martin	Date: 06/10/24
	Checked by:	L. Moon	Sheet: 1 of 1

Plot Plan



HOMESTEAD
POWER LLC

HOMESTEAD
POWER PLANT

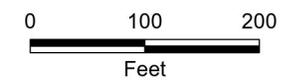
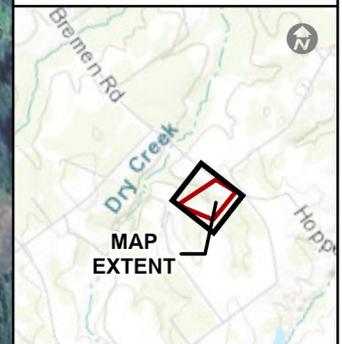
PLOT PLAN

AUSTIN COUNTY,
TEXAS

Legend

- EPN Location
- Proposed Structure
- Facility Boundary
- Fugitive Area**
- CT-MSS
- NH3-FUG
- VOC-FUG
- ULSD-FUG

Aerial Source:
Google Earth Pro Basemap



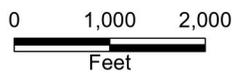
Area Map



HOMESTEAD POWER
 29.922343°, -96.405701°

Legend

-  Facility Boundary
-  3000 Foot Radius



HOMESTEAD POWER LLC

**HOMESTEAD
 POWER PLANT**

AREA MAP

**AUSTIN COUNTY,
 TEXAS**



Date: 6/21/2024

3.0 STATE REGULATORY REQUIREMENTS

The following discussion presents the requirements of 30 TAC §§ 116.610 and 116.615 and explains how Homestead Power will comply with each of the requirements.

3.1 30 TAC §116.610 Applicability

(a) Under the TCAA, §382.051, a project that meets the requirements for a standard permit listed in this subchapter or issued by the commission is hereby entitled to the standard permit, provided the following conditions listed in this section are met. For the purposes of this subchapter, project means the construction or modification of a facility, or a group of facilities submitted under the same registration:

- (1) Any project that results in a net increase in emissions of air contaminants from the project other than carbon dioxide, water, nitrogen, methane, ethane, hydrogen, oxygen, or those for which a national ambient air quality standard has been established must meet the emission limitations of §106.261 of this title (relating to Facilities (Emission Limitations)), unless otherwise specified by a particular standard permit.

Per section (3)(A) of the EGU Standard Permit, units that meet the conditions of the Standard Permit do not have to meet § 116.610(a)(1).

- (2) Construction or operation of the project must be commenced prior to the effective date of a revision to this subchapter under which the project would no longer meet the requirements for a standard permit.

There is no pending revision to this subchapter, and construction of the Project will commence prior to any revision of the Standard Permit.

- (3) The proposed project must comply with the applicable provisions of the Federal Clean Air Act (FCAA), §111 (concerning New Source Performance Standards) as listed under 40 Code of Federal Regulations (CFR) Part 60, promulgated by the United States Environmental Protection Agency.

The combustion turbine will be subject to New Source Performance Standard (NSPS) in 40 CFR Part 60, Subpart KKKK (Standards of Performance for Stationary Combustion Turbines) and will comply with all applicable requirements. The combustion turbine will also be subject to the NSPS Subpart TTTTa (New Source Performance Standards for Greenhouse Gas Emissions From New, Modified, and Reconstructed Fossil Fuel-Fired Electric Generating Units; Emission Guidelines for Greenhouse Gas Emissions From Existing Fossil Fuel-Fired Electric Generating Units; and Repeal of the Affordable Clean Energy Rule) standard for Intermediate Load Subcategory (Capacity Factor 20% to 40%) which has a 12 operating month rolling average limit of 1,170 pounds carbon dioxide per megawatt-hour-gross. The demonstration of compliance with the Subpart TTTTa limit for the GE 7F.04, MHI 501 GAC, and Siemens SGT6-5000F combustion turbines is provided in Table B-0 in Appendix B of this registration. The combustion turbine will comply with the 12 operating month rolling average limit of 1,170 pounds carbon dioxide per megawatt-hour-gross. The emergency generator and the emergency fire pump engine will be subject to the requirements of NSPS Subpart IIII (Standards of Performance for Stationary Compression Ignition Internal Combustion Engines). The emergency engine

will meet Subpart IIII requirements by being certified as a Tier 2 engine meeting the requirements of 40 CFR 1039, Appendix I, Table 2. The emergency fire pump engine will meet the requirements of 40 CFR 60, Subpart IIII, Table 4.

- (4) The proposed project must comply with the applicable provisions of FCAA, §112 (concerning Hazardous Air Pollutants) as listed under 40 CFR 61, promulgated by the EPA;

There are no Subparts under 40 CFR Part 61 that are applicable to facilities affected by this registration.

- (5) The proposed project must comply with the applicable maximum achievable control technology standards as listed under 40 CFR Part 63, promulgated by the EPA under FCAA, §112 or as listed under Chapter 113, Subchapter C of this title (relating to National Emissions Standards for Hazardous Air Pollutants for Source Categories (FCAA, §112, 40 CFR 63)).

The proposed combustion turbine is not subject to the Maximum Achievable Control Technology (MACT) in 40 CFR Part 63, Subpart YYYY (National Emission Standards for Hazardous Air Pollutants for Stationary Combustion Turbines) because it is not located at a major source of hazardous air pollutants. The proposed emergency generator and emergency fire pump engine will be subject to MACT Subpart ZZZZ (National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines). Pursuant to 40 CFR 63.6590(c)(1), the emergency generator and emergency fire pump engine will meet MACT Subpart ZZZZ requirements by complying with NSPS Subpart IIII requirements.

- (6) If subject to Chapter 101, Subchapter H, Division 3 of this title (relating to Mass Emissions Cap and Trade Program) the proposed facility, group of facilities, or account must obtain allocations to operate.

The Plant is located in Austin County, which is not subject to Chapter 101, Subchapter H, Division 3.

- (b) Any project that constitutes a new major stationary source or major modification as defined in §116.12 of this title (relating to Nonattainment and Prevention of Significant Deterioration Review Definitions) because of emissions of air contaminants other than greenhouse gases is subject to the requirements of §116.110 of this title (relating to Applicability) rather than this subchapter. Notwithstanding any provision in any specific standard permit to the contrary, any project that constitutes a new major stationary source or major modification which is subject to Subchapter B, Division 6 of this chapter (relating to Prevention of Significant Deterioration Review) due solely to emissions of greenhouse gases may use a standard permit under this chapter for air contaminants that are not greenhouse gases.

Austin County is currently classified as attainment/unclassifiable for the 2008 eight-hour ozone National Ambient Air Quality Standard and the 2015 eight-hour ozone National Ambient Air Quality Standard. Therefore, Nonattainment New Source Review does not potentially apply to the project.

The PSD Major source threshold for a simple cycle power plant is 250 TPY of a PSD-regulated pollutant pursuant to 40 CFR §52.21(b)(1)(i)(b). The Plant will not be a Major

source for PSD applicability purposes; therefore, PSD review will not be triggered by this project.

With this application, Homestead Power has submitted a Form APD-CERT to make the proposed annual emission limits enforceable to ensure PSD and NSR permitting will not be triggered.

- (c) Persons may not circumvent by artificial limitations the requirements of §116.110 of this title.

Homestead Power will not circumvent the requirements of §116.110.

- (d) Any project involving a proposed affected source (as defined in §116.15(1) of this title (relating to Section 112(g) Definitions)) shall comply with all applicable requirements under Subchapter E of this chapter (relating to Hazardous Air Pollutants: Regulations Governing Constructed or Reconstructed Major Sources (FCAA, §112(g), 40 CFR Part 63)). Affected sources subject to Subchapter E of this chapter may use a standard permit under this subchapter only if the terms and conditions of the specific standard permit meet the requirements of Subchapter E of this chapter.

The Project will not involve an affected source that is subject to Subchapter E.

3.2 30 TAC §116.615. General Conditions.

The following general conditions are applicable to holders of standard permits but will not necessarily be specifically stated within the standard permit document.

- (1) Protection of public health and welfare. The emissions from the facility, including dockside vessel emissions, must comply with all applicable rules and regulations of the commission adopted under Texas Health and Safety Code, Chapter 382, and with intent of the TCAA, including protection of health and property of the public.
- (2) Standard permit representations. All representations with regard to construction plans, operating procedures, and maximum emission rates in any registration for a standard permit become conditions upon which the facility or changes thereto, must be constructed and operated. It is unlawful for any person to vary from such representations if the change will affect that person's right to claim a standard permit under this section. Any change in condition such that a person is no longer eligible to claim a standard permit under this section requires proper authorization under §116.110 of this title (relating to Applicability). Any changes in representations are subject to the following requirements:
 - (A) For the addition of a new facility, the owner or operator shall submit a new registration incorporating existing facilities with a fee, in accordance with §116.611 and §116.614 of this title, (relating to Registration to use a Standard Permit and Standard Permit Fees) prior to commencing construction. If the applicable standard permit requires public notice, construction of the new facility or facilities may not commence until the new registration has been issued by the executive director.

- (B) For any change in the method of control of emissions, a change in the character of the emissions, or an increase in the discharge of the various emissions, the owner or operator shall submit written notification to the executive director describing the change(s), along with the designated fee, no later than 30 days after the change.
 - (C) For any other change to the representations, the owner or operator shall submit written notification to the executive director describing the change(s) no later than 30 days after the change.
 - (D) Any facility registered under a standard permit which contains conditions or procedures for addressing changes to the registered facility which differ from subparagraphs (A) - (C) of this paragraph shall comply with the applicable requirements of the standard permit in place of subparagraphs (A) - (C) of this paragraph.
- (3) Standard permit in lieu of permit amendment. All changes authorized by standard permit to a facility previously permitted under §116.110 of this title (relating to Applicability) shall be administratively incorporated into that facility's permit at such time as the permit is amended or renewed.
- (4) Construction progress. Start of construction, construction interruptions exceeding 45 days, and completion of construction shall be reported to the appropriate regional office not later than 15 working days after occurrence of the event, except where a different time period is specified for a particular standard permit.
- (5) Start-up notification.
- (A) The appropriate air program regional office of the commission and any other air pollution control program having jurisdiction shall be notified prior to the commencement of operations of the facilities authorized by a standard permit in such a manner that a representative of the executive director may be present.
 - (B) For phased construction, which may involve a series of units commencing operations at different times, the owner or operator of the facility shall provide separate notification for the commencement of operations for each unit.
 - (C) Prior to beginning operations of the facilities authorized by the permit, the permit holder shall identify to the Office of Permitting, Remediation, and Registration the source or sources of allowances to be utilized for compliance with Chapter 101, Subchapter H, Division 3 of this title (relating to Mass Emissions Cap and Trade Program).
 - (D) A particular standard permit may modify start-up notification requirements.
- (6) Sampling requirements. If sampling of stacks or process vents is required, the standard permit holder shall contact the Office of Air Quality and any other air pollution control program having jurisdiction prior to sampling to obtain the proper data forms and procedures. All sampling and testing procedures must be approved by the executive director and coordinated with the regional

representatives of the commission. The standard permit holder is also responsible for providing sampling facilities and conducting the sampling operations or contracting with an independent sampling consultant.

- (7) Equivalency of methods. The standard permit holder shall demonstrate or other justify the equivalency of emission control methods, sampling or other emission testing methods, and monitoring methods proposed as alternatives to methods indicated in the conditions of the standard permit. Alternative methods must be applied for in writing and must be reviewed and approved by the executive director prior to their use in fulfilling any requirements of the standard permit.
- (8) Recordkeeping. A copy of the standard permit along with information and data sufficient to demonstrate applicability of and compliance with the standard permit shall be maintained in a file at the plant site and made available at the request of representatives of the executive director, the EPA, or any air pollution control program having jurisdiction. For facilities that normally operate unattended, this information shall be maintained at the nearest staffed location within Texas specified by the standard permit holder in the standard permit registration. This information must include, but is not limited to, production records and operating hours. Additional recordkeeping requirements may be specified in the conditions of the standard permit. Information and data sufficient to demonstrate applicability of and compliance with the standard permit must be retained for at least two years following the date that the information or data is obtained. The copy of the standard permit must be maintained as a permanent record.
- (9) Maintenance of emission control. The facilities covered by the standard permit may not be operated unless all air pollution emission capture and abatement equipment is maintained in good working order and operating properly during normal facility operations. Notification for emissions events and scheduled maintenance shall be made in accordance with §101.201 and §101.211 of this title (relating to Emissions Event Reporting and Recordkeeping Requirements; and Scheduled Maintenance, Startup, and Shutdown Reporting and Recordkeeping).
- (10) Compliance with rules. Registration of a standard permit by a standard permit applicant constitutes an acknowledgment and agreement that the holder will comply with all rules, regulations, and orders of the commission issued in conformity with the TCAA and the conditions precedent to the claiming of the standard permit. If more than one state or federal rule or regulation or permit condition is applicable, the most stringent limit or condition shall govern. Acceptance includes consent to the entrance of commission employees and designated representatives of any air pollution control program having jurisdiction into the permitted premises at reasonable times to investigate conditions relating to the emission or concentration of air contaminants, including compliance with the standard permit.
- (11) Distance limitations, setbacks, and buffer zones. Notwithstanding any requirement in any standard permit, if a standard permit for a facility requires a distance, setback, or buffer from other property or structures as a condition of the permit, the determination of whether the distance, setback, or buffer is satisfied shall be made on the basis of conditions existing at the earlier of:

- (A) the date new construction, expansion, or modification of a facility begins;
or
- (B) the date any application or notice of intent is first filed with the
commission to obtain approval for the construction or operation of the
facility.

Homestead Power will adhere to these General Conditions and will operate the CTG in compliance with the above subparagraphs.

4.0 COMPLIANCE WITH REQUIREMENTS OF THE EGU STANDARD PERMIT

The following discussion presents the requirements of the EGU Standard Permit and explains how Homestead Power will comply with each of the requirements.

Air Quality Standard Permit for Electric Generating Units

Effective Date May 16, 2007

This standard permit authorizes electric generating units that generate electricity for use by the owner or operator and/or generate electricity to be sold to the electric grid, and that meet all of the conditions listed below.

- (1) Applicability
 - (A) This standard permit may be used to authorize electric generating units installed or modified after the effective date of this standard permit and that meet the requirements of this standard permit.

This Standard Permit is being used to authorize one EGU that meets the requirements of the Standard Permit.

- (B) This standard permit may not be used to authorize boilers. Boilers may be authorized under the Air Quality Standard Permit for Boilers; 30 TAC § 106.183, Boilers, Heaters, and Other Combustion Devices; or a permit issued under the requirements of 30 TAC Chapter 116.

The unit is a combustion turbine, not a boiler; therefore, the Standard Permit may be used.

- (2) Definitions
 - (A) East Texas Region - All counties traversed by or east of Interstate Highway 35 or Interstate Highway 37, including Bosque, Coryell, Hood, Parker, Somervell and Midlothian Counties.
 - (B) Installed - a generating unit is installed on the site when it begins generating electricity.
 - (C) West Texas Region - Includes all of the state not contained in the East Texas Region.
 - (D) Renewable fuel - fuel produced or derived from animal or plant products, byproducts or wastes, or other renewable biomass sources, excluding fossil fuels. Renewable fuels may include, but are not limited to, ethanol, biodiesel, and biogas fuels.

This section contains no requirements.

- (3) Administrative Requirements
 - (A) Electric generating units shall be registered in accordance with 30 TAC § 116.611, Registration to Use a Standard Permit, using a current Form PI-

1S. Units that meet the conditions of this standard permit do not have to meet 30 TAC § 116.610(a)(1), Applicability.

A completed Form PI-1S is included in this registration package.

- (B) Registration applications shall comply with 30 TAC § 116.614, Standard Permit Fees, for any single unit or multiple units at a site with a total generating capacity of 1 megawatt (MW) or greater. The fee for units or multiple units with a total generating capacity of less than 1 MW at a site shall be \$100.00. The fee shall be waived for units or multiple units with a total generating capacity of less than 1 MW at a site that have certified nitrogen oxides (NO_x) emissions that are less than 10 percent of the standards required by this standard permit.

A registration fee of \$900 has been submitted to the TCEQ, along with a \$500 expedited permitting fee.

- (C) No owner or operator of an electric generating unit shall begin construction and/or operation without first obtaining written approval from the executive director.

Homestead Power will not begin construction until after receiving written approval from the TCEQ Executive Director.

- (D) Records shall be maintained and provided upon request to the Texas Commission on Environmental Quality (TCEQ) for the following:
 - (i) Hours of operation of the unit;
 - (ii) Maintenance records, maintenance schedules, and/or testing reports for the unit to document re-certification of emission rates as required by subsection (4)(G) below; and
 - (iii) Records to document compliance with the fuel sulfur limits in subsection (4)(C).

Homestead Power will maintain the applicable records.

- (E) Electric generators powered by gas turbines must meet the applicable conditions, including testing and performance standards, of Title 40 Code of Federal Regulations (CFR) Part 60, Subpart GG, Standards of Performance for Stationary Gas Turbines, and applicable requirements of 40 CFR Part 60 Subpart KKKK, Standards of Performance for Stationary Combustion Turbines.

The combustion turbine will meet the requirements of 40 CFR Part 60, NSPS KKKK.

- (F) Compliance with this standard permit does not exempt the owner or operator from complying with any applicable requirements of 30 TAC Chapter 117, Control of Air Pollution from Nitrogen Compounds, or 30 TAC Chapter 114, Control of Air Pollution from Motor Vehicles.

Homestead Power will comply with the applicable requirements of 30 TAC Chapter 114, Chapter 117, Subchapter E, Division 1, Utility Electric Generation In East and Central

Texas does not apply to Austin County. Chapter 117, Subchapter E, Division 3, Water Heaters, Small Boilers and Process Heaters does not apply to the emission sources included in this registration. The Fuel Gas Heater is not a “process heater” as defined in Rule 117.10(40)

(4) General Requirements

- (A) Emissions of NO_x from the electric generating unit shall be certified by the manufacturer or by the owner or operator in pounds of pollutant per megawatt hour (lb/MWh). This certification must be displayed on the name plate of the unit or on a label attached to the unit. Test results from U.S. Environmental Protection Agency (EPA) reference methods, California Air Resources Board methods, or equivalent alternative testing methods approved by the executive director used to verify this certification shall be provided upon request to the TCEQ. The unit must operate on the same fuel(s) for which the unit was certified.

The emission certification will be displayed on the unit and test results will be provided to the TCEQ upon request. The unit will burn natural gas.

- (B) Electric generating units that use combined heat and power (CHP) may take credit for the heat recovered from the exhaust of the combustion unit to meet the emission standards in subsections (4)(D), (4)(E), and (4)(F). Credit shall be at the rate of one MWh for each 3.4 million British Thermal Units of heat recovered. The following requirements must be met to take credit for CHP for units not sold and certified as an integrated package by the manufacturer:
- (i) The owner or operator must provide as part of the application documentation of the heat recovered, electric output, efficiency of the generator alone, efficiency of the generator including CHP, and the use for the non-electric output, and
 - (ii) The heat recovered must equal at least 20 percent of the total energy output of the CHP unit.

The Plant will not use combined heat and power.

- (C) Fuels combusted in these electric generating units are limited to:
- (i) Natural gas containing no more than ten grains total sulfur per 100 dry standard cubic feet;
 - (ii) Landfill gas, digester gas, stranded oilfield gas, or gaseous renewable fuel containing no more than 30 grains total sulfur per 100 dry standard cubic feet; or
 - (iii) Liquid fuels (including liquid renewable fuel) not containing waste oils or solvents and containing less than 0.05 percent by weight sulfur.

The fuel combusted will be natural gas containing no more than 1.0 grain of total sulfur per 100 dry standard cubic feet.

- (D) Except as provided in subsections (4)(F) and (4)(H), NO_x emissions for units 10 MW or less shall meet the following limitations based upon the date the unit is installed and the region in which it operates:

East Texas Region:

- (i) Units installed prior to January 1, 2005, and
 - (a) operating more than 300 hours per year - 0.47 lb/MWh;
 - (b) operating 300 hours or less per year - 1.65 lb/MWh;
- (ii) Units installed on or after January 1, 2005, and
 - (a) operating more than 300 hours per year, with a capacity greater than 250 kilowatts (kW) - 0.14 lb/MWh;
 - (b) operating 300 hours or less per year - 0.47 lb/MWh; or
 - (c) any unit with a capacity of 250 kW or less - 0.47 lb/MWh.

West Texas Region:

- (i) Units operating more than 300 hours per year - 3.11 lb/MWh;
- (ii) Units operating 300 hours or less per year - 21 lb/MWh. Units certified to comply with applicable Tier 1, 2, or 3 emission standards in 40 CFR Part 89, Control of Emissions from New and In-Use Nonroad Compression-Ignition Engines, are deemed to satisfy this emission limit.

This section does not apply as the unit is rated greater than 10 MW in output capacity.

- (E) Except as provided in subsections (4)(F) and (4)(H), NO_x emissions for units greater than 10 MW shall meet the following limitations:
- (i) Units operating more than 300 hours per year - 0.14 lb/MWh;
 - (ii) Units operating 300 hours or less per year - 0.38 lb/MWh.

The unit will operate more than 300 hours per year and will meet the NO_x emission limitation of 0.14 lb/MWh when the units are operating at 80 percent rated load and greater.

- (F) Electric generating units firing any gaseous or liquid fuel that is at least 75 percent landfill gas, digester gas, stranded oil field gas, or renewable fuel content by volume, shall meet a NO_x emission limit of 1.90 lb/MWh. Units in West Texas with a capacity of 10 MW or less that fire at least 75 percent landfill gas, digester gas, stranded oilfield gases, or gaseous or liquid renewable fuel by volume, must comply with the applicable West Texas NO_x limit in subsection (4)(D).

This section does not apply as the unit fires natural gas.

- (G) To ensure continuing compliance with the emissions limitations, the owner or operator shall re-certify unit every 16,000 hours of operation, but no less frequently than every three years. Re-certification may be accomplished by following a maintenance schedule that the manufacturer certifies will ensure continued compliance with the required NO_x standard or by third party testing of the unit using appropriate EPA reference methods, California Air Resources Board methods, or equivalent alternative testing methods approved by the executive director to demonstrate that the unit still meets the required emission standards. After re-certification, the unit must operate on the same fuel(s) for which the unit was re-certified.

Homestead Power will meet the recertification requirements of this paragraph.

- (H) The NO_x emission limits in subsections (4)(D)-(4)(F) are subject to the following exceptions:
- (i) The hourly NO_x emission limits do not apply at times when the ambient air temperature at the location of the unit is less than 0 degrees Fahrenheit.

Homestead Power is aware that the hourly NO_x emission limit will not apply when the local ambient temperature is less than 0 degrees Fahrenheit.

- (ii) At times when a unit is operating at less than 80% of rated load, an alternative NO_x emission standard for that unit may be determined by multiplying the applicable emission standard in subsections (4)(D)-(4)(F) by the rated load of the EGU (in MW), to produce an allowable hourly mass NO_x emission rate. In order to use this alternative standard, an owner or operator must maintain records that demonstrate compliance with the alternative emission standard, and make such records available to the TCEQ or any local air pollution control agency with jurisdiction upon request.

Homestead Power will maintain the appropriate records if choosing to demonstrate compliance with the alternative NO_x emission standard. The NO_x mass emissions during startup and shutdown of the turbine are presented in in the emission calculations in Appendix B and are not considered subject to the lb/MWh normal operating limits because the units are in startup mode and not generating electricity for a portion of that time.

APPENDIX A TCEQ FORMS

- » Form PI-1S – Registration for Air Standard Permit
- » Form APD-CERT – Certification of Emission Limits
- » Core Data Form
- » Emission Source Summary
- » Table 1(a) – Emission Point Summary

Form PI-1S
Registrations for Air Standard Permit
(Page 1)
Texas Commission on Environmental Quality

I. Registrant Information
A. Company or Other Legal Customer Name: Homestead Power LLC
B. Company Official Contact Information (<input checked="" type="checkbox"/> Mr. <input type="checkbox"/> Mrs. <input type="checkbox"/> Ms. <input type="checkbox"/> Other:)
Name: Paris Hays
Title: Chief Executive Officer
Mailing Address: 1423 Broadway, PMB 144
City: Oakland
State: CA
ZIP Code: 94607
Telephone No.: 310-922-8381
Fax No.:
Email Address: phays@nightpeak.energy
<i>All permit correspondence will be sent via email.</i>
C. Technical Contact Information (<input checked="" type="checkbox"/> Mr. <input type="checkbox"/> Mrs. <input type="checkbox"/> Ms. <input type="checkbox"/> Other:)
Name: Christopher Pollak
Title: Director of EPC
Company Name: Nightpeak Energy LLC
Mailing Address: 1111 Broadway, 3rd Floor
City: Oakland
State: CA
ZIP Code: 94607
Telephone No.: 617-775-3343
Fax No.:
Email Address: cpollak@nightpeak.energy
II. Facility and Site Information
A. Name and Type of Facility
Facility Name: Homestead Power Plant
Type of Facility: <input checked="" type="checkbox"/> Permanent <input type="checkbox"/> Temporary

Form PI-1S
Registrations for Air Standard Permit
(Page 2)
Texas Commission on Environmental Quality

II. Facility and Site Information (continued)
For portable units, please provide the serial number of the equipment being authorized below.
Serial No(s):
B. Facility Location Information
Street Address: N/A
If there is no street address, provide written driving directions to the site and provide the closest city or town, county, and ZIP code for the site (attach description if additional space is needed).
Exit Hwy 159 near Nelsonville, Texas. Take Skalak Rd. for approximately 4.7 miles until you reach the intersection
of Skalak, Hoppe Sister, and New Bremen Rd. Head right on New Bremen Rd. for approximately 0.3 miles.
Homestead Power Plant can be accessed by turning left.
City: New Ulm
County: Austin
ZIP Code: 78950
C. Core Data Form (required for Standard Permits 6006, 6007, and 6013).
Is the Core Data Form (TCEQ Form 10400) attached? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Customer Reference Number (CN): TBD
Regulated Entity Number (RN): TBD
D. TCEQ Account Identification Number (if known): TBD
E. Type of Action
<input checked="" type="checkbox"/> Initial Application <input type="checkbox"/> Change to Registration <input type="checkbox"/> Renewal <input type="checkbox"/> Renewal Certification
For Change to Registration, Renewal, or Renewal Certification actions provide the following:
Registration Number:
Expiration Date:
F. Standard Permit Claimed: 6005 - Electric Generating Unit
G. Previous Standard Exemption or PBR Registration Number:
Is this authorization for a change to an existing facility previously authorized under a standard exemption or PBR? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
If "Yes," enter previous standard exemption number(s) and PBR registration number(s) and associated effective date in the spaces provided below.

Form PI-1S
Registrations for Air Standard Permit
(Page 3)
Texas Commission on Environmental Quality

II. Facility and Site Information (continued)
H. Other Facilities at this Site Authorized by Standard Exemption, PBR, or Standard Permit
Are there any other facilities at this site that are authorized by an Air Standard Exemption, PBR, or Standard Permit? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
If "Yes," enter standard exemption number(s), PBR registration number(s), and Standard Permit registration number(s), and associated effective date in the spaces provided below.
Standard Exemption, PBR Registration, and Standard Permit Registration Number(s) and Effective Date(s)
I. Other Air Preconstruction Permits
Are there any other air preconstruction permits at this site? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
If "Yes," enter permit number(s) in the spaces provided below.
J. Affected Air Preconstruction Permits
Does the standard permit directly affect any permitted facility? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
If "Yes," enter permit number(s) in the spaces provided below.
K. Federal Operating Permit (FOP) Requirements
Is this facility located at a site that is required to obtain a FOP pursuant to 30 TAC Chapter 122? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> To Be Determined
Check the requirements of 30 TAC Chapter 122 that will be triggered if this standard permit is approved (check all that apply).
<input checked="" type="checkbox"/> Initial Application for a FOP <input type="checkbox"/> Significant Revision for a SOP <input type="checkbox"/> Minor Revision for a SOP
<input type="checkbox"/> Operational Flexibility/Off Permit Notification for a SOP <input type="checkbox"/> Revision for a GOP
<input type="checkbox"/> To be Determined <input type="checkbox"/> None
Identify the type(s) of FOP issued and/or FOP application(s) submitted/pending for the site. (check all that apply)
<input type="checkbox"/> SOP <input type="checkbox"/> GOP <input type="checkbox"/> GOP application/revision (submitted or under APD review) <input checked="" type="checkbox"/> N/A
<input type="checkbox"/> SOP application/revision (submitted or under APD review)

Form PI-1S
Registrations for Air Standard Permit
(Page 4)
Texas Commission on Environmental Quality

III. Fee Information (go to www.tceq.texas.gov/epay to pay online)	
A.	Fee Amount: \$900, plus additional \$500 for expedited permitting
B.	Voucher number from ePay: Fees to be paid via STEERS after upload to STEERS
IV. Public Notice (if applicable)	
A.	Responsible Person (<input type="checkbox"/> Mr. <input type="checkbox"/> Mrs. <input type="checkbox"/> Ms. <input type="checkbox"/> Other:) _____
	Name:
	Title:
	Company:
	Mailing Address:
	City:
	State:
	ZIP Code:
	Telephone No.:
	Fax No.:
	Email Address:
B.	Technical Contact (<input type="checkbox"/> Mr. <input type="checkbox"/> Mrs. <input type="checkbox"/> Ms. <input type="checkbox"/> Other:) _____
	Name:
	Title:
	Company:
	Mailing Address:
	City:
	State:
	ZIP Code:
	Telephone No.:
	Fax No.:
	Email Address:
C.	Bilingual Notice
	Is a bilingual program required by the Texas Education Code in the School District? <input type="checkbox"/> Yes <input type="checkbox"/> No
	Are the children who attend either the elementary school or the middle school closest to your facility eligible to be enrolled in a bilingual program provided by the district? <input type="checkbox"/> Yes <input type="checkbox"/> No

Form PI-1S
Registrations for Air Standard Permit
(Page 5)
Texas Commission on Environmental Quality

IV. Public Notice (<i>continued</i>) (if applicable) (<i>continued</i>)	
If "Yes," list which language(s) are required by the bilingual program below?	
D. Small Business Classification and Alternate Public Notice	
Does this company (including parent companies and subsidiary companies) have fewer than 100 employees or less than \$6 million in annual gross receipts?	<input type="checkbox"/> Yes <input type="checkbox"/> No
Is the site a major source under 30 TAC Chapter 122, Federal Operating Permit Program?	<input type="checkbox"/> Yes <input type="checkbox"/> No
Are the site emissions of any individual regulated air contaminant equal to or greater than 50 tpy?	<input type="checkbox"/> Yes <input type="checkbox"/> No
Are the site emissions of all regulated air contaminant combined equal to or greater than 75 tpy?	<input type="checkbox"/> Yes <input type="checkbox"/> No
V. Renewal Certification Option	
A. Does the permitted facility emit an air contaminant on the Air Pollutant Watch List, and is the permitted facility located in an area on the watch list?	<input type="checkbox"/> Yes <input type="checkbox"/> No
B. For facilities participating in the Houston/Galveston/Brazoria area (HGB) cap and trade program for highly reactive VOCs (HRVOCs), do the HRVOCs need to be speciated on the maximum allowable emission rates table (MAERT)?	<input type="checkbox"/> Yes <input type="checkbox"/> No
C. Does the company and/or site have an unsatisfactory compliance history?	<input type="checkbox"/> Yes <input type="checkbox"/> No
D. Are there any applications currently under review for this standard permit registration?	<input type="checkbox"/> Yes <input type="checkbox"/> No
E. Are scheduled maintenance, startup, or shutdown emissions required to be included in the standard permit registration at this time?	<input type="checkbox"/> Yes <input type="checkbox"/> No
F. Are any of the following actions being requested at the time of renewal:	<input type="checkbox"/> Yes <input type="checkbox"/> No
1. Are there any facilities that have been permanently shutdown that are proposed to be removed from the standard permit registration?	<input type="checkbox"/> Yes <input type="checkbox"/> No
2. Do changes need to be made to the standard permit registration in order to remain in compliance?	<input type="checkbox"/> Yes <input type="checkbox"/> No
3. Are sources or facilities that have always been present and represented, but never identified in the standard permit registration, proposed to be included with this renewal?	<input type="checkbox"/> Yes <input type="checkbox"/> No
4. Are there any changes to the current emission rates table being proposed?	<input type="checkbox"/> Yes <input type="checkbox"/> No
<i>Note: If answers to all of the questions in Section V. Renewal Certification Option are "No," use the certification option and skip to Section VII. of this form. If the answers to any of the questions in Section V. Renewal Certification Option are "Yes," the certification option cannot be used.</i>	
*If notice is applicable and comments are received in response to the public notice, the application does not qualify for the renewal certification option.	

Form PI-1S
Registrations for Air Standard Permit
(Page 6)
Texas Commission on Environmental Quality

VI. Technical Information Including State and Federal Regulatory Requirements	
<p>Place a check next to the appropriate box to indicate what you have included in your submittal. <i>Note: Any technical or essential information needed to confirm that facilities are meeting the requirements of the standard permit must be provided. Not providing key information could result in an automatic deficiency and voiding of the project.</i></p>	
<p>A. Standard Permit requirements (Checklists are optional; however, your review will go faster if you provide applicable checklists.)</p>	
Did you demonstrate that the general requirements in 30 TAC Sections 116.610 and 116.615 are met?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Did you demonstrate that the individual requirements of the specific standard permit are met?	
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
B. Confidential Information (All pages properly marked "CONFIDENTIAL").	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
C. Process Flow Diagram.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
D. Process Description.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
E. Maximum Emissions Data and Calculations.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
F. Plot Plan.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
G. Projected Start Of Construction Date, Start Of Operation Date, and Length of Time at Site:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Projected Start of Construction (provide date): 12/31/2025	
Projected Start of Operation (provide date): 12/31/2026	
Length of Time at the Site: Permanent	
VII. Delinquent Fees and Penalties	
<p>This form will not be processed until all delinquent fees and/or penalties owed to the TCEQ or the Office of the Attorney General on behalf of the TCEQ are paid in accordance with the Delinquent Fee and Penalty Protocol. For more information regarding Delinquent Fees and Penalties, go to the TCEQ website at: www.tceq.texas.gov/agency/financial/fees/delin/index.html.</p>	

Form PI-1S
Registrations for Air Standard Permit
(Page 7)
Texas Commission on Environmental Quality

VIII. Signature Requirements
The signature below confirms that I have knowledge of the facts included in this application and that these facts are true and correct to the best of my knowledge and belief. I further state that to the best of my knowledge and belief, the project for which application is made will not in any way violate any provision of the Texas Water Code (TWC), Chapter 7; the Texas Health and Safety Code, Chapter 382, the Texas Clean Air Act (TCAA) the air quality rules of the Texas Commission on Environmental Quality; or any local governmental ordinance or resolution enacted pursuant to the TCAA. I further state that I understand my signature indicates that this application meets all applicable nonattainment, prevention of significant deterioration, or major source of hazardous air pollutant permitting requirements. The signature further signifies awareness that intentionally or knowingly making or causing to be made false material statements or representations in the application is a criminal offense subject to criminal penalties.
Name (printed): Paris Hays
Signature (original signature required): Via STEERS
Date: Via STEERS
IX. Copies of the Registration
The PI-1S application must be submitted through ePermits. No additional copies need to be sent to the Regional Office or local Air Pollution Control Program(s). The link to ePermits can be found here: www3.tceq.texas.gov/steers/ .

Texas Commission on Environmental Quality
Form APD – CERT
Certification of Emission Limits
(Page 1)

I. Company and Site Information	
A.	Company Name: Homestead Power LLC
B.	Responsible Official Name: Paris Hays
	Responsible Official's Title: Chief Executive Officer
	Mailing Address: 1423 Broadway, PMB 144
	City: Oakland
	County: Alameda
	State: CA
	ZIP Code: 94607
	Telephone: 310-922-8381
	Fax:
	Email Address: phays@nightpeak.energy
C.	Site Name: Bulldog Power Plant
	Street Address: <i>(if different from above)</i> N/A
	If "NO" street address describe the physical location with driving directions:
	Exit Hwy 159 near Nelsonville, Texas. Take Skalak Rd. for approximately 4.7 miles until you reach the intersection of
	Skalak, Hoppe Sister, and New Bremen Rd. Head right on New Bremen Rd. for approximately 0.3 miles. Turn left.
	City or nearest city: New Ulm
	County: Austin
	ZIP Code: 78950
D.	TCEQ Account Identification Number <i>(leave blank if unknown):</i>
E.	TCEQ Customer Reference Number <i>(leave blank if unknown):</i>
	TCEQ Regulated Entity Number <i>(leave blank if unknown):</i>
F.	Does the site have a Title V Permit? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
G.	Title V Permit Number:
H.	Is this a small business? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
II. Attach the Following Documentations	
A.	Copies of a previously completed Form PI-7 and all supporting documentation <i>(if applicable)</i> .
B.	A list of each source of air emissions at the site.
C.	A summary of the certified emission rates.
D.	A process description.

Texas Commission on Environmental Quality
Form APD – CERT
Certification of Emission Limits
(Page 2)

III. Maintain Records On Site to Demonstrate Continuing Compliance and Make the Records Available on Request

The emission rates listed on the certification shall reflect the certified emissions for the stationary sources at the site. The records demonstrating compliance with this certification must comply with applicable rules and must be maintained at the site or, for sites that normally operate unattended, at an office within Texas having day-to-day operational control of the site. Records must be kept for at least five years and must be made available upon request. For more information regarding records for permits by rule, see 30 TAC § 106.8, Recordkeeping.

IV. Purpose of this Certification (*choose and complete all that are appropriate*)

This certification is intended to establish emission rates below state and federal rule thresholds and triggers for:

- 30 TAC § 106.4 for Permits by Rule
- Permit by Rule Number:
- HRVOC Emissions Cap and Trade Program
- Emissions Banking and Trading Program (other than HRVOC)
- 30 TAC Chapter 115 for Volatile Organic Compounds
- 30 TAC Chapter 117 for Nitrogen Oxides
- 40 CFR Part 60, Subpart:
- 40 CFR Part 61, Subpart:
- 40 CFR Part 63, Subpart:
- Title V Permit Major Source Applicability
- Other: Standard Permit 6005 - Electric Generating Unit

Texas Commission on Environmental Quality
Form APD – CERT
Certification of Emission Limits
(Page 3)

V. Certification by Responsible Official

All representations in this certification of emissions are conditions upon which the stationary source shall operate. This certification reflects the maximum emission rates for the operation of this facility. The facility will operate in compliance with all regulations of the Texas Commission on Environmental Quality and with Federal U.S. Environmental Protection Agency regulations governing air pollution. It shall be unlawful for any person to vary from such representation unless the certification is first revised. The signature below indicates that, based on information and belief formed after reasonable inquiry, the statements, and information contained in the attached documents are true, accurate, and complete.

Name: Paris Hays

Title: Chief Executive Officer

Original Signature Required: Via STEERS

Date: Via STEERS

Reminder: The original of this certification must be sent to the TCEQ through ePermits. A copy must also be maintained on site or, for sites that normally operate unattended, at an office within Texas having day-to-day operational control of the site.

Texas Commission on Environmental Quality
 Form APD-CERT
 Certification of Emission Limits
 Attach additional pages if needed.
 (Page 4)

VI. Emission Rate Data							Maximum Certified Emission Rates		
FIN	Facility Name	EPN	Point Name	Authorization Type	Authorization Date	Registration Number (if applicable)	Air Contaminant Name	Pounds/Hour	Tons/Year
CT-1	Combustion Turbine 1	CT-1	Combustion Turbine 1	Standard Permit 6005	TBD	TBD	Normal Operating Emissions		
							NO _x	32.68	---
							CO	124.20	---
							VOC	31.34	---
							PM	18.48	---
							PM ₁₀	18.48	---
							PM _{2.5}	18.48	---
							SO ₂	6.21	---
							H ₂ SO ₄	2.85	---
							(NH ₄) ₂ SO ₄	3.84	---
							NH ₃	30.18	---
							MSS Emissions		
							NO _x	212.21	---
							CO	2,344.73	---
							VOC	91.50	---
							PM	18.48	---
							PM ₁₀	18.48	---
							PM _{2.5}	18.48	---
							SO ₂	6.21	---
							H ₂ SO ₄	2.85	---
							(NH ₄) ₂ SO ₄	3.84	---
							NH ₃	114.47	---
							Combined Normal and MSS Emissions		
							NO _x	---	57.79
							CO	---	248.08
							VOC	---	48.42
							PM	---	26.33
PM ₁₀	---	26.33							
PM _{2.5}	---	26.33							
SO ₂	---	8.84							
H ₂ SO ₄	---	4.06							
(NH ₄) ₂ SO ₄	---	5.47							
NH ₃	---	48.27							
CT-LOV1	Combustion Turbine 1 Lube Oil Vent	CT-LOV1	Combustion Turbine 1 Lube Oil Vent	Standard Permit 6005	TBD	TBD	VOC	0.03	0.13
							PM	0.03	0.13
							PM ₁₀	0.03	0.13
							PM _{2.5}	0.03	0.13
GEN-SOV1	Generator 1 Seal Oil Vent	GEN-SOV-1	Generator 1 Seal Oil Vent	Standard Permit 6005	TBD	TBD	VOC	0.03	0.13
							PM	0.03	0.13
							PM ₁₀	0.03	0.13
							PM _{2.5}	0.03	0.13
HYDOV-1	Unit 1 Hydraulic Oil Vent	HYDOV-1	Unit 1 Hydraulic Oil Vent	Standard Permit 6005	TBD	TBD	VOC	0.03	0.13
							PM	0.03	0.13
							PM ₁₀	0.03	0.13
							PM _{2.5}	0.03	0.13
VOC-FUG	VOC Fugitives	VOC-FUG	VOC Fugitives	Standard Permit 6005	TBD	TBD	VOC	0.09	0.38
NH3-FUG	Ammonia Fugitives	NH3-FUG	Ammonia Fugitives	Standard Permit 6005	TBD	TBD	NH ₃	0.77	3.39
ULSDFUG	ULSD Component Fugitives	ULSDFUG	ULSD Component Fugitives	Standard Permit 6005	TBD	TBD	VOC	0.01	0.03
EGEN1	Emergency Generator 1	EGEN1	Emergency Generator 1	Standard Permit 6005	TBD	TBD	NO _x	19.46	0.97
							CO	10.64	0.53
							VOC	19.46	0.97
							PM	0.61	0.03
							PM ₁₀	0.61	0.03
							PM _{2.5}	0.61	0.03
							SO ₂	0.02	0.00
FWP1	Firewater Pump 1	FWP1	Firewater Pump 1	Standard Permit 6005	TBD	TBD	NO _x	2.01	0.10
							CO	1.76	0.09
							VOC	2.01	0.10
							PM	0.10	0.01
							PM ₁₀	0.10	0.01
							PM _{2.5}	0.10	0.01
							SO ₂	0.00	0.00
EGEN1-TK	Emergency Generator 1 Diesel Tank	EGEN1-TK	Emergency Generator 1 Diesel Tank	Standard Permit 6005	TBD	TBD	VOC	0.03	0.00
							VOC	0.03	0.00
FWP1-TK	Firewater Pump 1 Diesel Tank	FWP1-TK	Firewater Pump 1 Diesel Tank	Standard Permit 6005	TBD	TBD	VOC	0.03	0.00
							VOC	0.03	0.00
FG-HTR	Dewpoint Heater	FG-HTR	Dewpoint Heater	Standard Permit 6005	TBD	TBD	NO _x	0.04	0.06
							CO	0.13	0.20
							VOC	0.03	0.04
							PM	0.01	0.01
							PM ₁₀	0.02	0.03
							PM _{2.5}	0.02	0.03
							SO ₂	0.00	0.01
							VOC	0.42	0.003
							PM	2.792	0.119
							PM ₁₀	2.79	0.12
PM _{2.5}	2.79	0.12							
NH ₃	0.00	<0.01							

Emissions Totals:	Pounds/Hour	Tons/Year
NO _x	266.40	58.92
CO	2481.46	248.90
VOC	145.00	50.35
PM	40.56	26.90
PM ₁₀	40.56	26.91
PM _{2.5}	40.56	26.91
SO ₂	12.44	8.85
H ₂ SO ₄	5.70	4.06
(NH ₄) ₂ SO ₄	7.68	5.47
NH ₃	145.42	51.66



TCEQ Core Data Form

For detailed instructions on completing this form, please read the Core Data Form Instructions or call 512-239-5175.

SECTION I: General Information

1. Reason for Submission (If other is checked please describe in space provided.)		
<input checked="" type="checkbox"/> New Permit, Registration or Authorization (Core Data Form should be submitted with the program application.)		
<input type="checkbox"/> Renewal (Core Data Form should be submitted with the renewal form)	<input type="checkbox"/> Other	
2. Customer Reference Number (if issued)	Follow this link to search for CN or RN numbers in Central Registry**	3. Regulated Entity Reference Number (if issued)
CN		RN

SECTION II: Customer Information

4. General Customer Information		5. Effective Date for Customer Information Updates (mm/dd/yyyy)		7/15/2024	
<input checked="" type="checkbox"/> New Customer <input type="checkbox"/> Update to Customer Information <input type="checkbox"/> Change in Regulated Entity Ownership <input type="checkbox"/> Change in Legal Name (Verifiable with the Texas Secretary of State or Texas Comptroller of Public Accounts)					
<i>The Customer Name submitted here may be updated automatically based on what is current and active with the Texas Secretary of State (SOS) or Texas Comptroller of Public Accounts (CPA).</i>					
6. Customer Legal Name (If an individual, print last name first: eg: Doe, John)				<i>If new Customer, enter previous Customer below:</i>	
Homestead Power LLC					
7. TX SOS/CPA Filing Number		8. TX State Tax ID (11 digits)		9. Federal Tax ID	10. DUNS Number (if applicable)
0804949152		32088570059		(9 digits) 92-2714103	
11. Type of Customer:		<input checked="" type="checkbox"/> Corporation		<input type="checkbox"/> Individual	Partnership: <input type="checkbox"/> General <input type="checkbox"/> Limited
Government: <input type="checkbox"/> City <input type="checkbox"/> County <input type="checkbox"/> Federal <input type="checkbox"/> Local <input type="checkbox"/> State <input type="checkbox"/> Other		<input type="checkbox"/> Sole Proprietorship		<input type="checkbox"/> Other:	
12. Number of Employees				13. Independently Owned and Operated?	
<input checked="" type="checkbox"/> 0-20 <input type="checkbox"/> 21-100 <input type="checkbox"/> 101-250 <input type="checkbox"/> 251-500 <input type="checkbox"/> 501 and higher				<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
14. Customer Role (Proposed or Actual) – as it relates to the Regulated Entity listed on this form. Please check one of the following					
<input type="checkbox"/> Owner <input type="checkbox"/> Operator <input checked="" type="checkbox"/> Owner & Operator <input type="checkbox"/> Other: <input type="checkbox"/> Occupational Licensee <input type="checkbox"/> Responsible Party <input type="checkbox"/> VCP/BSA Applicant					
15. Mailing Address:		1423 Broadway			
		PMB 144			
City		Oakland	State	CA	ZIP
				94612	ZIP + 4
16. Country Mailing Information (if outside USA)			17. E-Mail Address (if applicable)		
			land@nightpeak.energy		
18. Telephone Number		19. Extension or Code		20. Fax Number (if applicable)	

SECTION III: Regulated Entity Information**21. General Regulated Entity Information** (If 'New Regulated Entity' is selected, a new permit application is also required.)
 New Regulated Entity
 Update to Regulated Entity Name
 Update to Regulated Entity Information

The Regulated Entity Name submitted may be updated, in order to meet TCEQ Core Data Standards (removal of organizational endings such as Inc, LP, or LLC).

22. Regulated Entity Name (Enter name of the site where the regulated action is taking place.)

Homestead Power Plant

23. Street Address of the Regulated Entity:(No PO Boxes)

City

State

ZIP

ZIP + 4

24. County

Austin

If no Street Address is provided, fields 25-28 are required.

25. Description to Physical Location:

Exit Hwy 159 near Nelsonville, Texas

Take Skalak Rd. for approximately 4.7 miles until you reach the intersection of Skalak, Hoppe Sister, and New Bremen Rds.

Head right on and New Bremen Rd. for approximately 0.3 miles.

Homestead Power Plant can be accessed by turning left.

26. Nearest City

State

Nearest ZIP Code

New Ulm

TX

78950

Latitude/Longitude are required and may be added/updated to meet TCEQ Core Data Standards. (Geocoding of the Physical Address may be used to supply coordinates where none have been provided or to gain accuracy).

27. Latitude (N) In Decimal:**28. Longitude (W) In Decimal:**

Degrees

Minutes

Seconds

Degrees

Minutes

Seconds

29

55

20

-96

24

21

29. Primary SIC Code**30. Secondary SIC Code****31. Primary NAICS Code****32. Secondary NAICS Code**

(4 digits)

(4 digits)

(5 or 6 digits)

(5 or 6 digits)

4911

221112

33. What is the Primary Business of this entity? (Do not repeat the SIC or NAICS description.)

Electricity Generation

34. Mailing Address:

1423 Broadway

PMB 144

City

Oakland

State

CA

ZIP

94612

ZIP + 4

35. E-Mail Address:

land@nightpeak.energy

36. Telephone Number**37. Extension or Code****38. Fax Number** (if applicable)

(855) 644-4875

() -

39. TCEQ Programs and ID Numbers Check all Programs and write in the permits/registration numbers that will be affected by the updates submitted on this form. See the Core Data Form instructions for additional guidance.

<input type="checkbox"/> Dam Safety	<input type="checkbox"/> Districts	<input type="checkbox"/> Edwards Aquifer	<input checked="" type="checkbox"/> Emissions Inventory Air	<input type="checkbox"/> Industrial Hazardous Waste
<input type="checkbox"/> Municipal Solid Waste	<input checked="" type="checkbox"/> New Source Review Air	<input type="checkbox"/> OSSF	<input type="checkbox"/> Petroleum Storage Tank	<input type="checkbox"/> PWS
<input type="checkbox"/> Sludge	<input type="checkbox"/> Storm Water	<input checked="" type="checkbox"/> Title V Air	<input type="checkbox"/> Tires	<input type="checkbox"/> Used Oil
<input type="checkbox"/> Voluntary Cleanup	<input type="checkbox"/> Wastewater	<input type="checkbox"/> Wastewater Agriculture	<input type="checkbox"/> Water Rights	<input type="checkbox"/> Other:

SECTION IV: Preparer Information

40. Name:	Larry Moon, P.E.	41. Title:	Project Manager
42. Telephone Number	43. Ext./Code	44. Fax Number	45. E-Mail Address
(512) 879-6619		() -	larry.moon@powereng.com

SECTION V: Authorized Signature

46. By my signature below, I certify, to the best of my knowledge, that the information provided in this form is true and complete, and that I have signature authority to submit this form on behalf of the entity specified in Section II, Field 6 and/or as required for the updates to the ID numbers identified in field 39.

Company:	Nightpeak Energy LLC	Job Title:	Chief Executive Office
Name (In Print):	Paris Hays	Phone:	(310) 922- 8381
Signature:	Via STEERS	Date:	Via STEERS

Table A-1
Emission Source Summary
Homestead Power Plant

Description	Name	FIN	EPN
Combustion Turbine 1 (Simple Cycle)	Combustion Turbine 1	CT-1	CT-1
Lube Oil Vent	Combustion Turbine 1 Lube Oil Vent	CT-LOV1	CT-LOV1
Generator Seal Oil Vent	Generator 1 Seal Oil Vent	GEN-SOV1	GEN-SOV-1
Hydraulic Oil Vent	Unit 1 Hydraulic Oil Vent	HYDOV-1	HYDOV-1
Natural Gas, Lube Oil, Seal Oil, and Hydraulic Fluid Component Fugitives	VOC Fugitives	VOC-FUG	VOC-FUG
ULSD Component Fugitives	ULSD Component Fugitives	ULSDFUG	ULSDFUG
Ammonia Component Fugitives	Ammonia Component Fugitives	NH3-FUG	NH3-FUG
Emergency Generator	Emergency Generator 1	EGEN1	EGEN1
Emergency Firewater Pump	Firewater Pump 1	FWP1	FWP1
Emergency Generator Diesel Tank	Emergency Generator 1 Diesel Tank	EGEN1-TK	EGEN1-TK
Emergency Firewater Pump Diesel Tank	Firewater Pump 1 Diesel Tank	FWP1-TK	FWP1-TK
Fuel Gas Heater	Dewpoint Heater	FG-HTR	FG-HTR
Inherently Low Emitting Activities Fugitives	ILE Turbine Maintenance	CT-MSS	CT-MSS

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY
Table 1(a) Emission Point Summary

Date	Permit No.:	Regulated Entity No.:	Area Name:	Customer Reference No.:
07/15/2024	TBD	TBD	Homestead Power Plant	TBD

Review of applications and issuance of permits will be expedited by supplying all necessary information requested on this Tab

EPN	FIN	Name	Component or Air Contaminant Name	Air Contaminant Emission Rate lb/hr	Air Contaminant Emission Rate TPY
CT-1	CT-1	Combustion Turbine 1	Normal Operating Emissions		
			NO _x	32.68	---
			CO	124.20	---
			VOC	31.34	---
			PM	18.48	---
			PM ₁₀	18.48	---
			PM _{2.5}	18.48	---
			SO ₂	6.21	---
			H ₂ SO ₄	2.85	---
			(NH ₄) ₂ SO ₄	3.84	---
			NH ₃	30.18	---
			MSS Emissions		
			NO _x	212.21	---
			CO	2,344.73	---
			VOC	91.50	---
			PM	18.48	---
			PM ₁₀	18.48	---
			PM _{2.5}	18.48	---
			SO ₂	6.21	---
			H ₂ SO ₄	2.85	---
			(NH ₄) ₂ SO ₄	3.84	---
			NH ₃	114.47	---
			Combined Normal and MSS Emissions		
			NO _x	---	57.79
			CO	---	248.08
			VOC	---	48.42
			PM	---	26.33
			PM ₁₀	---	26.33
			PM _{2.5}	---	26.33
			SO ₂	---	8.84
			H ₂ SO ₄	---	4.06
			(NH ₄) ₂ SO ₄	---	5.47
			NH ₃	---	48.27

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY
Table 1(a) Emission Point Summary

Date	Permit No.:	Regulated Entity No.:	Area Name:	Customer Reference No.:
07/15/2024	TBD	TBD	Homestead Power Plant	TBD

Review of applications and issuance of permits will be expedited by supplying all necessary information requested on this Tab

EPN	FIN	Name	Component or Air Contaminant Name	Air Contaminant Emission Rate lb/hr	Air Contaminant Emission Rate TPY
CT-LOV1	CT-LOV1	Combustion Turbine 1 Lube Oil Vent	VOC	0.03	0.13
			PM	0.03	0.13
			PM ₁₀	0.03	0.13
			PM _{2.5}	0.03	0.13
GEN-SOV-1	GEN-SOV1	Generator 1 Seal Oil Vent	VOC	0.03	0.13
			PM	0.03	0.13
			PM ₁₀	0.03	0.13
			PM _{2.5}	0.03	0.13
HYDOV-1	HYDOV-1	Unit 1 Hydraulic Oil Vent	VOC	0.03	0.13
			PM	0.03	0.13
			PM ₁₀	0.03	0.13
			PM _{2.5}	0.03	0.13
VOC-FUG	VOC-FUG	VOC Fugitives	VOC	0.09	0.38
NH3-FUG	NH3-FUG	Ammonia Fugitives	NH ₃	0.77	3.39
ULSDFUG	ULSDFUG	ULSD Component Fugitives	VOC	0.01	0.03
EGEN1	EGEN1	Emergency Generator 1	NO _x	19.46	0.97
			CO	10.64	0.53
			VOC	19.46	0.97
			PM	0.61	0.03
			PM ₁₀	0.61	0.03
			PM _{2.5}	0.61	0.03
			SO ₂	0.02	0.00
FWP1	FWP1	Firewater Pump 1	NO _x	2.01	0.10
			CO	1.76	0.09
			VOC	2.01	0.10
			PM	0.10	0.01
			PM ₁₀	0.10	0.01
			PM _{2.5}	0.10	0.01
			SO ₂	0.00	0.00
EGEN1-TK	EGEN1-TK	Emergency Generator 1 Diesel Tank	VOC	0.03	0.00
FWP1-TK	FWP1-TK	Firewater Pump 1 Diesel Tank	VOC	0.03	0.00
FG-HTR	FG-HTR	Dewpoint Heater	NO _x	0.04	0.06
			CO	0.13	0.20
			VOC	0.03	0.04
			PM	0.01	0.01
			PM ₁₀	0.02	0.03
			PM _{2.5}	0.02	0.03
			SO ₂	0.00	0.01
CT-MSS	CT-MSS	ILE Turbine Maintenance	VOC	0.42	0.003
			PM	2.792	0.119
			PM ₁₀	2.79	0.12
			PM _{2.5}	2.79	0.12
			NH ₃	0.00	<0.01

EPN = Emission Point
 FIN = Facility Identification Number

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY
Table 1(a) Emission Point Summary

Date	Permit No.:	Regulated Entity No.:	Area Name:	Customer Reference No.:
07/15/2024	TBD	TBD	Homestead Power Plant	TBD

Review of applications and issuance of permits will be expedited by supplying all necessary information requested on this Table.

EPN	FIN	Name	UTM Coordinates of Emission Point Zone	UTM Coordinates of Emission East (Meters)	UTM Coordinates of Emission North (Meters)	Emission Point Discharge Parameters Building Height (ft)	Emission Point Discharge Parameters Height Above Ground (ft)	Stack Exit Data Diameter (ft)	Stack Exit Data Velocity (FPS)	Stack Exit Data Temperature (°F)	Fugitives Length (ft)	Fugitives Width (ft)	Fugitives Axis Degrees
CT-1	CT-1	Combustion Turbine 1	15	234,881	3,217,669		80.0	15.0	52.4	850			
CT-LOV1	CT-LOV1	Combustion Turbine 1 Lube Oil Vent	15	234,881	3,217,669		20.0	0.003	0.003	115			
GEN-SOV-1	GEN-SOV1	Generator 1 Seal Oil Vent	15	234,881	3,217,669		20.0	0.003	0.003	115			
HYDOV-1	HYDOV-1	Unit 1 Hydraulic Oil Vent	15	234,881	3,217,669		20.0	0.003	0.003	115			
VOC-FUG	VOC-FUG	VOC Fugitives	15	234,881	3,217,669						715.0	155.0	0.0
ULSDFUG	ULSDFUG	ULSD Component Fugitives	15	234,881	3,217,669						715.0	155.0	0.0
NH3-FUG	NH3-FUG	Ammonia Component Fugitives	15	234,881	3,217,669						715.0	155.0	0.0
EGEN1	EGEN1	Emergency Generator 1	15	234,881	3,217,669			5.0	133.8	892			
FWP1	FWP1	Firewater Pump 1	15	234,881	3,217,669			5.0	83.6	846			
EGEN1-TK	EGEN1-TK	Emergency Generator 1 Diesel Tank	15	234,881	3,217,669		4.0						
FWP1-TK	FWP1-TK	Firewater Pump 1 Diesel Tank	15	234,881	3,217,669		4.0						
FG-HTR	FG-HTR	Dewpoint Heater	15	234,881	3,217,669		20.0	1.7	13.6	250			
CT-MSS	CT-MSS	ILE Turbine Maintenance	15	234,881	3,217,669						730.0	155.0	0.0

EPN = Emission Point Number

FIN = Facility Identification Number

APPENDIX B EMISSIONS CALCULATION

Table B-0
GHG Emission Calculations - Calculation of Design Heat Rate and Output Limits for Combustion Turbine
Homestead Power Plant

Simple Cycle Turbine

Gross Output Basis				
	M501GAC	GE 7FA.04	SGT6-5000F	
Fuel:	Natural Gas	Natural Gas	Natural Gas	
ISO Base Rating:	283	201	260	MW
ISO Gross Heat Rate:	9,469	9,362	8,530	Btu/kWh (HHV)
CTG Degradation Margin:	3.0%	3.0%	3.0%	
Adjusted Base Heat Rate with Compliance Margins:	9,753	9,643	8,786	Btu/kWh (HHV)

EPN	Base Heat Rate (Btu/kWhr)	Electrical Output Basis	Heat Input Required to Produce MW (MMBtu/MWhr)	Pollutant	Emission Factor (lb/MMBtu) ^{1, 2}	lb GHG/MWhr	Global Warming Potential ³	lb CO ₂ e/MWhr ⁴
CT-1 (M501GAC)	9,753	Gross	9.75	CO ₂	118.86	1,159.27	1	1,159.27
				CH ₄	2.2E-03	2.15E-02	25	5.38E-01
				N ₂ O	2.2E-04	2.15E-03	298	6.41E-01
Total:						1,159.3		1,160.5
CT-1 (GE 7FA.04)	9,643	Gross	9.64	CO ₂	118.86	1,146.12	1	1,146.12
				CH ₄	2.2E-03	2.13E-02	25	5.31E-01
				N ₂ O	2.2E-04	2.13E-03	298	6.34E-01
Total:						1,146.1		1,147.3
CT-1 (SGT6-5000F)	8,786	Gross	8.786	CO ₂	118.86	1,044.27	1	1,044.27
				CH ₄	2.2E-03	1.94E-02	25	4.84E-01
				N ₂ O	2.2E-04	1.94E-03	298	5.77E-01
Total:						1,044.3		1,045.3
NSPS Subpart TTTT a 12 Operating Month Rolling Average Limit for Intermediate Load Subcategory (Capacity Factor 20% - 40%)								1,170

Notes

1. CH₄ and N₂O GHG factors based on Table C-2 of 40 CFR 98 Mandatory Greenhouse Gas Reporting.
2. CO₂ emissions based on 40 CFR Part 75, Appendix G, Equation G-4
3. Global Warming Potential factors based on Table A-1 of 40 CFR 98 Mandatory Greenhouse Gas Reporting.
4. Example calculation: GHG emissions (lbs) x Global Warming Potential / 1 MW = lb CO₂e/MWhr

**Table B-1
Combustion Turbine Emissions
Homestead Power Plant**

<u>Parameter</u>	<u>Units</u>	
Operating Parameters		
Nominal CT Load	MW	260
CT Heat Input	MMBtu/hr	2,218
Annual Operating Hours	hrs/yr	2850
Typical SU Duration	min	34.4
Typical SD Duration	min	19.4
Max Hourly SUSD Events	events/hr	2
Annual SUSD Events	events/yr	125
Fuel Sulfur Content	gr S/100 dscf	1
Fuel Heat Content	Btu/scf	1020
Oxidation of SO ₂	%	30%
Maximum Emissions From Normal Operation, 100% Percent Load		
NO _x basis, 24-hr average	ppmvd @ 15% O ₂	4
NO _x , 24-hr average	lb/hr	32.68
NO _x , 24-hr average	lb/MW	0.126
CO basis, 3-hr average	ppmvd @ 15% O ₂	25
CO, 3-hr average	lb/hr	124.20
VOC basis, 3-hr average (as C ₃ H ₈)	ppmvd @ 15% O ₂	4
VOC, 3-hr average	lb/hr	31.34
NH ₃ basis, 24-hr average	ppmvd @ 15% O ₂	10
NH ₃ , 24-hr average	lb/hr	30.18
SO ₂	lb/hr	6.21
H ₂ SO ₄	lb/hr	2.85
(NH ₄) ₂ SO ₄	lb/hr	3.84
PM, from combustion	lb/hr	14.64
PM, total	lb/hr	18.48
Annual Average Emissions From Normal Operation, 100% Percent Load		
NO _x basis, annual average	ppmvd @ 15% O ₂	4
NO _x , annual average	lb/hr	32.68
CO basis, annual average	ppmvd @ 15% O ₂	15
CO, annual average	lb/hr	74.52
VOC basis, annual average (as C ₃ H ₈)	ppmvd @ 15% O ₂	4
VOC, annual average	lb/hr	31.34
NH ₃ basis, annual average	ppmvd @ 15% O ₂	10
NH ₃ , annual average	lb/hr	30.18
SO ₂ , annual average	lb/hr	6.21
H ₂ SO ₄ , annual average	lb/hr	2.85
(NH ₄) ₂ SO ₄ , annual average	lb/hr	3.84
PM, from combustion	lb/hr	14.64
PM, total, annual average	lb/hr	18.48

**Table B-1
Combustion Turbine Emissions
Homestead Power Plant**

SUSD Emissions, Prorated Hourly Rates

NOx SUSD	lbs/event	76.8
NOx, prorated	lb/hr	212.21
CO SUSD	lbs/event	1061
CO, prorated	lb/hr	2344.73
VOC SUSD	lbs/event	91.5
VOC, prorated	lb/hr	239.20
NH3 SUSD	lbs/event	30.18
NH3, prorated	lb/hr	114.47

Notes:

ppm, lb/MMBtu emissions factors and annual average lb/hr rates are represented as basis for calculation only and are not represented as emission limits.

Table B-2
Gas Turbine Emission Summary
Homestead Power Plant

Approximate Total Annual Turbine Operating Hours

2850

Approximate Startup, Shutdown, Maintenance Hours ¹

125

Pollutant	Normal Emissions (lbs/hr)	Annual Average Routine Emissions (lbs/hr)	Startup/Shutdown Emissions (lbs/hr)	Annual Emissions Per Turbine (tons/yr)
NO _x	32.68	32.68	212.21	57.79
CO	124.20	74.52	2344.73	248.08
VOC	31.34	31.34	91.50	48.42
PM/PM ₁₀ /PM _{2.5}	18.48	18.48	18.48	26.33
SO ₂	6.21	6.21	6.21	8.84
H ₂ SO ₄	2.85	2.85	2.85	4.06
(NH ₄) ₂ SO ₄	3.84	3.84	3.84	5.47
NH ₃	30.18	30.18	114.47	48.27

Notes:

1. The estimated number of annual hours in startup/shutdown is an estimate and it is not intended to be a limit.

Table B-3
Oil System Vent Emissions
Homestead Power Plant

Notes:

- 1 - The heating of recirculating lube oil in the gas turbine housing generates oil vapor and oil condensate droplets in the oil reservoir compartments. Lube oil mist emissions in each reservoir are controlled by a mist eliminator.
- 2 - Unloading, storage, and heated recirculation of lube oil in gas turbine reservoirs will emit less than 0.1 gallon per day of oil per turbine mist eliminator vent, based on estimated oil consumption. The calculated hourly emissions are based on the daily emission rate divided by 24 hours per day.
- 3 - Lube oil mist will be generated and the corresponding mist eliminator fan will be operated concurrently with turbine operation, including during startup and shutdown, plus additional time after turbine operation. When the gas turbine does not operate for extended periods such that lube oil is cooled to near-ambient temperatures, mist eliminators may be shut down. During this time, vapor breathing and filling losses may occur from each oil reservoir. These latter losses are significantly less than the emission rates calculated on this sheet.

Example Calculation:

Hourly ER (lb/hr) = daily volumetric emission rate (gal/day) x density (lb/gal) x (day/24 hr)

$$\text{lb/hr} = \frac{\text{X gal}}{\text{day}} \times \frac{\text{X lb}}{\text{gal}} \times \frac{\text{day}}{24 \text{ hr}}$$

Annual ER (tpy) = daily volumetric emission rate (gal/day) x density (lb/gal) x days of operation (days/yr) x (ton/2000 lb)

$$\text{tpy} = \frac{\text{X gal}}{\text{day}} \times \frac{\text{X lb}}{\text{gal}} \times \frac{\text{X day}}{\text{yr}} \times \frac{\text{ton}}{2000 \text{ lb}}$$

Calculation of Emissions:

EPN	Description	Pollutant	Maximum Annual No. of Days of Operation (days/yr)	Daily Volumetric Emission Rate Per Mist Eliminator Vent (gal/day/vent)	Approx. Density (lb/gal)	No. of Mist Eliminator Vents	Daily Emission Rate (lb/day)	Hourly Emission Rate (lb/hr)	Annual Emission Rate (tpy)
CT-LOV1	Combustion Turbine 1 Lube Oil	VOC	365	0.10	7.26	1	0.73	0.03	0.13
		PM	365	0.10	7.26	1	0.73	0.03	0.13
GEN-SOV-1	Generator 1 Seal Oil	VOC	365	0.10	7.26	1	0.73	0.03	0.13
		PM	365	0.10	7.26	1	0.73	0.03	0.13
HYDOV-1	Unit 1 Hydraulic Oil	VOC	365	0.10	7.26	1	0.73	0.03	0.13
		PM	365	0.10	7.26	1	0.73	0.03	0.13

**Table B-4
Plantwide VOC Fugitive Emissions
Homestead Power Plant**

Natural Gas Service Fugitives

EPN	Pollutant	Source Type	Fluid State	Count	Oil & Gas Production Emission Factor	VOC	
						(lb/hr)	(tpy)
VOC-FUG	VOC	Valves ¹	Gas/Vapor	83	0.00992	0.03	0.14
		Flanges ¹	Gas/Vapor	183	0.00086	0.006	0.03
		Relief Valves ¹	Gas/Vapor	4	0.0194	0.0031	0.01
		Sampling Connections ¹	Gas/Vapor	2	0.00441	0.0004	0.00
		Compressors ¹	Gas/Vapor	2	0.0194	0.0016	0.0068
Totals:						0.04	0.19

Lube Oil, Seal Oil, and Hydraulic Oil Service Fugitives

EPN	Pollutant	Source Type	Fluid State	Count	Refinery Emission Factor	VOC	
						(lb/hr)	(tpy)
VOC-FUG	VOC	Valves ²	Heavy Liquid	238	0.00051	0.00	0.02
		Flanges ²	Heavy Liquid	524	0.00055	0.012	0.05
		Relief Valves ²	Heavy Liquid	1	0.35	0.0140	0.06
		Sampling Connections ²	Heavy Liquid	1	0.033	0.0013	0.01
		Pumps ²	Heavy Liquid	6	0.0460	0.0110	0.05
Totals:						0.04	0.19

VOC-FUG	VOC	Total VOC Fugitives				0.09	0.38
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Note 1: Includes fugitive components in natural gas service.

Note 2: Includes fugitive components from CT and generator lube, seal, and hydraulic oil service.

Calculation Procedure

Short-Term Emission Rate = Count X Emission Factor

Annual Emission Rate = Count X Emission Factor X 8,760 hours/year / 2,000 lbs/ton

Note

Based on "gas" factors for Oil & Gas Production Operations in TCEQ "Air Permit

Guidance for Chemical Sources: Equipment Leak Fugitives". October, 2000. VOC emissions

were estimated based on a non-methane, non-ethane weight fraction of natural gas of

4.0%

Table B-5
Plantwide Ammonia Fugitive Emissions
Homestead Power Plant

Estimated Fugitive Ammonia Emission Rates							
EPN	Pollutant	Source Type	Fluid State	Estimated Count	SOCMI w/o C ₂	NH ₃ (lb/hr)	NH ₃ (tpy)
NH3-FUG	NH3	Valves	Light Liquid	51	0.0035	0.18	0.77
			Gas/Vapor	22	0.0089	0.19	0.84
	NH3	Relief Valves	Gas/Vapor	1	0.2293	0.17	0.75
	NH3	Flanges	Light Liquid	111	0.0005	0.06	0.24
			Gas/Vapor	48	0.0029	0.14	0.60
	NH3	Pumps	Light Liquid	1	0.0386	0.04	0.17
						0.77	3.39

Calculation Procedure

Short-Term Emission Rate = Count X Emission Factor

Annual Emission Rate = Count X Emission Factor X 8,760 hours/year / 2,000 lbs/ton

Note

Based on SOCMI w/o C₂ factors and AVO control efficiencies in TCEQ "Air Permit Technical Guidance for Chemical Sources, Fugitive Guidance", October June 2018.

Table B-6
Fuel Delivery System (Diesel) Emission Calculations
Homestead Power Plant

EPN	Equipment/Service	Equipment (Counts)	Factor ¹ (kg/hr-component)	Factor (lb/hr-component)	Emission Rate	
					lb/hr	tpy
ULSDFUG	Valves	40	8.4E-06	1.9E-05	0.0007	0.003
	Flanges	60	3.9E-07	8.6E-07	0.0001	0.000
	Compressors	0	3.2E-05	7.1E-05	0.0000	0.000
	Relief Valves	0	3.2E-05	7.1E-05	0.0000	0.000
	Open-Ended Lines	20	1.4E-04	3.1E-04	0.0062	0.027
Total					0.0070	0.031

¹ EPA-453/R-95-017, November 1995, Table 2-4, Oil and Gas Operation Average Emission Factors for heavy oil

**Table B-7
Diesel-Fired Emergency Generator - Emission Calculations
Homestead Power Plant**

Assumptions:

Max Daily Operating Schedule	1	hours/day
Annual Operating Schedule	100	hours/year
Power Rating	1,849	bhp
Fuel Consumption	101	gal/hr
Density of No. 2 Fuel Oil:	7.67	lb/gal
Max Fuel Consumption	775.7	lb fuel/hr
Heating Value of No. 2 Fuel Oil:	0.138	MMBtu/gal
Max Heat Input:	13.95	MMBtu/hr
Maximum Sulfur Content (S)	15.00	ppmw

Calculations:

Emission Rate = Emission Factor * Power rating * hours of operation / averaging period

EPN	Pollutant	Emission Factor g/HP-hr	Units	Max Hourly Emission Rate lb/hr	Max. Annual Emission Rate ton/yr
EGEN1	NO _x ¹	4.77	g/HP-hr	19.46	0.97
	CO ¹	2.61	g/HP-hr	10.64	0.53
	VOC ²	4.77	g/HP-hr	19.46	0.97
	PM/PM ₁₀ ¹	0.149	g/HP-hr	0.61	0.03
	SO ₂ ²	Mass Balance		0.0233	0.0012

Sample Calculations:

NO _x lb/hr = 4.77439848174128 g/HP-hr * 1,849 bhp * lb/453.6g =	19.46 lb/hr
CO lb/hr = 2.61099916970226 g/HP-hr * 1,849 bhp * lb/453.6g =	10.64 lb/hr
VOC lb/hr = 4.77439848174128 g/HP-hr * 1,849 bhp * lb/453.6g =	19.46 lb/hr
PM lb/hr = 0.149199952554415 g/HP-hr * 1,849 bhp * lb/453.6g =	0.61 lb/hr
SO ₂ lb/hr = 776 lb fuel/hr * 15 lb S/1,000,000 lb fuel * lbmol S/32 lb S * 64 lb SO ₂ /lbmol SO ₂	
SO ₂ lb/hr =	0.023 lb/hr

Notes:

1. Tier 2 Exhaust Emission Standards, Appendix I to Part §1039
2. Calculated based on maximum fuel sulfur content and max fuel consumption.

**Table B-8
Diesel-Fired Fire Water Pump - Emission Calculations
Homestead Power Plant**

Assumptions:

Max Daily Operating Schedule	1	hours/day
Annual Operating Schedule	100	hours/year
Power Rating	305	bhp
Fuel Consumption	16	gal/hr
Density of No. 2 Fuel Oil:	7.67	lb/gal
Max Fuel Consumption	121.2	lb fuel/hr
Heating Value of No. 2 Fuel Oil:	0.138	MMBtu/gal
Max Heat Input:	2.18	MMBtu/hr
Maximum Sulfur Content (S)	15.00	ppmw

Calculations:

Emission Rate = Emission Factor * Power rating * hours of operation / averaging period

EPN	Pollutant	Emission Factor g/HP-hr	Units	Max Hourly Emission Rate lb/hr	Max. Annual Emission Rate ton/yr
FWP1	NO _x ¹	2.98	g/HP-hr	2.01	0.10
	CO ¹	2.61	g/HP-hr	1.76	0.09
	VOC ¹	2.98	g/HP-hr	2.01	0.10
	PM/PM ₁₀ ¹	0.149	g/HP-hr	0.10	0.01
	SO ₂ ²	Mass Balance		0.0036	0.0002

Sample Calculations:

$$\begin{aligned} \text{NO}_x \text{ lb/hr} &= 2.9839990510883 \text{ g/HP-hr} * 305 \text{ bhp} * \text{lb}/453.6\text{g} = && 2.01 \text{ lb/hr} \\ \text{CO lb/hr} &= 2.61099916970226 \text{ g/HP-hr} * 305 \text{ bhp} * \text{lb}/453.6\text{g} = && 1.76 \text{ lb/hr} \\ \text{VOC lb/hr} &= 2.9839990510883 \text{ g/HP-hr} * 305 \text{ bhp} * \text{lb}/453.6\text{g} = && 2.01 \text{ lb/hr} \\ \text{PM lb/hr} &= 0.149199952554415 \text{ g/HP-hr} * 305 \text{ bhp} * \text{lb}/453.6\text{g} = && 0.10 \text{ lb/hr} \\ \text{SO}_2 \text{ lb/hr} &= 121 \text{ lb fuel/hr} * 15 \text{ lb S}/1,000,000 \text{ lb fuel} * \text{lbmol S}/32 \text{ lb S} * 64 \text{ lb SO}_2/\text{lbmol SO}_2 \\ \text{SO}_2 \text{ lb/hr} &= && 0.004 \text{ lb/hr} \end{aligned}$$

Notes:

1. NSPS IIII exhaust standards for stationary fire pump engines, Table 4
2. Calculated based on maximum fuel sulfur content and max fuel consumption.

**Table B-9
Storage Tank Emissions Summary
Homestead Power Plant**

EPN	Description	Tank Contents	Fixed Roof Type	Pollutant	Hourly Emission Rate¹ (lb/hr)	Annual Emission Rate¹ (tpy)
EGEN1-TK	Emergency Generator 1 Diesel Tank	No. 2 Fuel Oil (Diesel)	Horizontal	VOC	0.03	3.85E-04
FWP1-TK	Firewater Pump 1 Diesel Tank	No. 2 Fuel Oil (Diesel)	Horizontal	VOC	0.03	3.85E-04
Total VOC Emissions from Storage Tanks					0.06	7.70E-04

¹ See Tables B-10 through B-13 for additional tank, product, and met data and for complete tank calculations.

**Table B-10
Emissions from Fixed Roof Tanks
Homestead Power Plant**

[1] Reference 1: AP-42, Fifth Edition, Volume 1, Chapter 7.1 Organic Liquid Storage Tanks - June 2020

Total Loss from a Fixed Roof Tank (Equation 1-1):

$$L_T = L_S + L_W$$

where: L_T = total routine loss
 L_S = standing loss
 L_W = working loss

Standing Loss from a Fixed Roof Tank (Equation 1-2):

$$L_S = n_d V_v W_v K_E K_S$$

where: L_S = standing loss

n_d = number of days

V_v = vapor space volume = $(\pi/4) \cdot D^2 \cdot H_{VO}$

D = tank diameter

H_{VO} = vapor space outage

W_v = vapor density = $(M_v \cdot P_{VA}) / (R \cdot T_v)$

M_v = vapor molecular weight

P_{VA} = vapor pressure at average daily liquid surface temperature = $\exp [A - (B / T_{LA})]$ for petroleum liquids or $\log P_{VA} = A - (B / (T_{LA} + C))$

R = ideal gas constant = 10.731 (psia ft³) / (lb-mole °R)

T_v = average vapor temperature = $((2.2 \cdot (H_t / D) + 1.1) \cdot T_{AA} + (0.8 \cdot T_B) + (0.021 \cdot \alpha_R \cdot I) + (0.013 \cdot (H_t / D) \cdot \alpha_S \cdot I)) / ((2.2 \cdot (H_t / D)) + 1.9)$

H_t = tank shell height (H_t / D assumed = 0.5 for horizontal tanks)

T_{AA} = average daily ambient temperature = $(T_{AX} + T_{AN}) / 2$

T_B = liquid bulk temperature = $T_{AA} + 0.003 \cdot \alpha_S \cdot I$

α_R = tank roof surface solar absorptance

I = average daily total solar insolation factor

α_S = tank shell surface solar absorptance

K_E = vapor space expansion factor = $\Delta T_v / T_{LA} + (\Delta P_v - \Delta P_B) / (P_A - P_{VA}) > 0$

ΔT_v = average daily vapor temperature range = $(1 - (0.8 / (2.2 \cdot (H_t / D) + 1.9))) \cdot \Delta T_A + ((0.042 \cdot \alpha_R \cdot I + 0.026 \cdot (H_t / D) \cdot \alpha_S \cdot I) / (2.2 \cdot (H_t / D) + 1.9))$

ΔT_A = average daily ambient temperature range = $T_{AX} - T_{AN}$

T_{AX} = average daily maximum ambient temperature

T_{AN} = average daily minimum ambient temperature

T_{LA} = average daily average liquid surface temperature = $(0.5 - (0.8 / (4.4 \cdot (H_t / D) + 3.8))) \cdot T_{AA} + (0.5 + (0.8 / (4.4 \cdot (H_t / D) + 3.8))) \cdot T_B + (0.021 \cdot \alpha_R \cdot I + 0.013 \cdot (H_t / D) \cdot \alpha_S \cdot I) / (4.4 \cdot (H_t / D) + 3.8)$

ΔP_v = average daily vapor pressure range = $P_{VX} - P_{VN}$

P_{VX} = vapor pressure at T_{LX}

T_{LX} = daily maximum liquid surface temperature = $T_{LA} + 0.25 \cdot \Delta T_v$

P_{VN} = vapor pressure at T_{LN}

T_{LN} = daily minimum liquid surface temperature = $T_{LA} - 0.25 \cdot \Delta T_v$

ΔP_B = breather vent pressure setting range = $P_{BP} - P_{BV}$

P_{BP} = breather vent pressure setting

P_{BV} = breather vent vacuum setting

P_A = atmospheric pressure

K_S = vented vapor saturation factor = $1 / (1 + (0.053 \cdot P_{VA} \cdot H_{VO}))$

**Table B-10
Emissions from Fixed Roof Tanks
Homestead Power Plant**

Working Loss from a Fixed Roof Tank (Equation 1-29):

$$L_W = V_O K_N K_P W_P K_B$$

where: L_W = working loss

V_O = net working loss throughput = $5.614 \cdot Q$

Q = net throughput

K_N = working loss turnover factor

For annual turnovers (N) > 36, = $(180 + N) / 6 N$

For annual turnovers (N) ≤ 36, = 1

$$N = (5.614 \cdot Q / (\pi / 4 \cdot D^2)) / (H_{LX} - H_{LN})$$

H_{LX} = maximum liquid height = $(H_S - 1)$ for VFR or $(\pi / 4 \cdot D)$ for HFR

H_{LN} = minimum liquid height = (1) for VFR or (0) for HFR

K_P = working loss product factor

For crude oils, = 0.75

For all other organic liquids, = 1

K_B = vent setting correction factor = $((P_1 + P_A) / K_N) - P_{VA}) / (P_{BP} + P_A - P_{VA})$

If $K_N \cdot (P_{BP} + P_A) / (P_1 + P_A) > 1$, otherwise = 1

P_1 = pressure of the vapor space at normal operating conditions = 0 for atmospheric tank

[2] Reference 2: TCEQ Air Permit Reviewer Reference Guide APDG 6250 - Estimating Short Term Emission Rates from Tanks - February 2018

Maximum Short-Term Emission Rate (APDG 6250) (Equation 1):

$$L_{MAX} = (M_v \cdot P_{VAM}) / (R \cdot T_{LM}) \cdot F_{RM}$$

where: L_{MAX} = maximum short term emission rate

M_v = vapor molecular weight

P_{VAM} = vapor pressure of tank contents at the worst case temperature

R = ideal gas constant = 80.273 (psia gal)/(lb-mole °R)

T_{LM} = worst case liquid surface temp = the higher of hourly calculation temp from the Met Data Sheet or T_{LX}

F_{RM} = maximum filling rate

**Table B-10
Emissions from Fixed Roof Tanks
Homestead Power Plant**

Date	Emission Point ID	Product	Data to be entered for calculation:				Data Looked up on Product Data Sheet:					Data Looked up on Met Data Sheet:					
			Net Throughput Q (bbbl)	Number of Days n _d (days)	Vapor Balance and/or Flash?	Capture Efficiency (%)	Vapor Molecular Weight M _v (lb/lb-mol)	Calculation Type	Antoine's A (unitless)	Antoine's B (°R or °C)	Antoine's C (°C)	Working Loss Product Factor K _p (unitless)	Month for Met Data	Daily Ambient Minimum Temperature T _{AM} (°F)	Daily Ambient Maximum Temperature T _{AX} (°F)	Solar Insolation Factor I (BTU/ ft ² day)	Atmospheric Pressure Pa (psia)
Hourly	EGEN1-TK	No. 2 Fuel Oil (Diesel)			No	0.00%	130.00	RVP+S	12.10	8907.00	0.00	1.00	Maximum	75.1	93.4	1,930	14.65
Annual	EGEN1-TK	No. 2 Fuel Oil (Diesel)	1,029	365	No	0.00%	130.00	RVP+S	12.10	8907.00	0.00	1.00	Annual	60.1	79.0	1,404	14.65
Hourly	FWP1-TK	No. 2 Fuel Oil (Diesel)			No	0.00%	130.00	RVP+S	12.10	8907.00	0.00	1.00	Maximum	75.1	93.4	1,930	14.65
Annual	FWP1-TK	No. 2 Fuel Oil (Diesel)	1,029	365	No	0.00%	130.00	RVP+S	12.10	8907.00	0.00	1.00	Annual	60.1	79.0	1,404	14.65

**Table B-10
Emissions from Fixed Roof Tanks
Homestead Power Plant**

Date	Emission Point ID	Roof Type	Maximum Filling Rate F_{RM} (gal/hr)	Data Looked up on Tank Data Sheet:							Tank Emissions Calculation								
				Tank Roof Solar Absorptance α_s (unitless)	Tank Shell Solar Absorptance α_c (unitless)	VFR Diameter D (ft)	VFR Shell Height H_s (ft)	HFR Diameter D (ft)	Breather Vent Pressure P_{BP} (psig)	Breather Vent Vacuum P_{BV} (psig)	Vapor Space Outage H_{VO} (ft)	HFR Effective Diameter D_e (ft)	Vapor Space Volume V_v (ft ³)	Daily Avg. Ambient Temp. T_{AA} (°R)	Liquid Bulk Temp. T_b (°R)	Daily Avg. Liquid Surface Temp. T_{LA} (°R)	True Vapor Pressure @ T_{LA} P_{VA} (psia)	Average Vapor Temp. T_v (°R)	Vapor Density W_v (lb/ft ³)
				[1] Table 7.1-6	[1] Table 7.1-6					[1] Eq. 1-16		[1] Eq. 1-3	[1] Eq. 1-30	[1] Eq. 1-31	[1] Eq. 1-27	[1] Eq. 1-25, 26	[1] Eq. 1-32	[1] Eq. 1-22	
Hourly	EGEN1-TK	HFR	500	0.17	0.17			4.0	0.03	-0.03	1.57	5.5	38	543.9	544.9	546.0	0.01	547.2	0.0003
Annual	EGEN1-TK	HFR		0.17	0.17			4.0	0.03	-0.03	1.57	5.5	38	529.2	529.9	530.8	0.01	531.6	0.0002
Hourly	FWP1-TK	HFR	500	0.17	0.17			4.0	0.03	-0.03	1.57	5.5	38	543.9	544.9	546.0	0.01	547.2	0.0003
Annual	FWP1-TK	HFR		0.17	0.17			4.0	0.03	-0.03	1.57	5.5	38	529.2	529.9	530.8	0.01	531.6	0.0002

**Table B-10
Emissions from Fixed Roof Tanks
Homestead Power Plant**

Date	Emission Point ID	Tank Emissions Calculation																		Tank Short Term Emissions Calculation					
		Daily Ambient Temp. Range ΔT_a (°R)	Daily Vapor Temp. Range ΔT_v (°R)	Daily Max. Liquid Surface Temp. T_{Ls} (°R)	Daily Min. Liquid Surface Temp. T_{Ln} (°R)	True Vapor Pressure @ T_{Ls} P_{Vg} (psia)	True Vapor Pressure @ T_{Ln} P_{Vn} (psia)	Daily Vapor Pressure Range ΔP_v (psia)	Breather Vent Setting Range ΔP_s (psia)	Vapor Space Expansion Factor K_e (unitless)	Vented Vapor Saturation Factor K_s (unitless)	Standing Storage Loss L_s (ton)	Net Working Loss Throughput V_0 (ft ³)	Maximum Liquid Height H_{Lx} (ft)	Minimum Liquid Height H_{Lx} (ft)	Turnovers N (unitless)	Working Loss Factor K_u (unitless)	Vent Setting Correction Factor K_c (unitless)	Working Loss L_w (ton)	Total Loss L_T (ton)	Worst Case Liquid Surface Temp. T_{Lw} (°R)	True Vapor Pressure @ T_{Lw} P_{Vlw} (psia)	Hourly Standing Storage Loss L_s (lb/hr)	Maximum Short Term Emission Rate L_{su} (lb/hr)	
Hourly	EGEN1-TK	[1] Eq. 1-11	[1] Eq. 1-6	[1] Eq. 1-17	[1] Eq. 1-17	[1] Eq. 1-25.2	[1] Eq. 1-25.2	[1] Eq. 1-9	[1] Eq. 1-10	[1] Eq. 1-5	[1] Eq. 1-21	[1] Eq. 1-2	[1] Eq. 1-39	[1] Eq. 1-37	[1] Eq. 1-37	[1] Eq. 1-35	[1] Eq. 1-35	[1] Eq. 1-40, 41	[1] Eq. 1-35	[1] Eq. 1-1	[2] Eq. 1	[1] Eq. 1-25.2b	[1] Eq. 1-2	[2] Eq. 1	
Hourly	EGEN1-TK	18.3	19.4	550.9	541.2	0.02	0.01	0.00	0.06	0.0318	0.9988														
Annual	EGEN1-TK	18.9	18.2	535.3	526.2	0.01	0.01	0.00	0.06	0.0304	0.9992	4.42E-05	5,774	3.1	0.0	76.6	0.5584	1.0000	3.41E-04	3.85E-04		554.7	0.02	0.00	0.03
Hourly	FWP1-TK	18.3	19.4	550.9	541.2	0.02	0.01	0.00	0.06	0.0318	0.9988														
Annual	FWP1-TK	18.9	18.2	535.3	526.2	0.01	0.01	0.00	0.06	0.0304	0.9992	4.42E-05	5,774	3.1	0.0	76.6	0.5584	1.0000	3.41E-04	3.85E-04		554.7	0.02	0.00	0.03

**Table B-11
Tank Data
Homestead Power Plant**

[1] Reference 1: AP-42, Fifth Edition, Volume 1, Chapter 7.1 Organic Liquid Storage Tanks - June 2020

Effective Tank Diameter (Equation 1-14):

$$D_E = ((L * D) / (\pi / 4))^{0.5}$$

where: D_E = effective tank diameter

L = length of horizontal tank

D = diameter of a vertical cross-section of the horizontal tank

VFR Vapor Space Outage (Equation 1-16):

$$H_{VO} = H_S - H_L + H_{RO}$$

where: H_{VO} = vapor space outage

H_S = tank shell height

H_L = liquid height = $0.5 * H_S$

H_{RO} = roof outage

HFR Vapor Space Outage (Equation 1-15):

$$H_{VO} = (\pi / 4) * D / 2$$

where: H_{VO} = vapor space outage

Roof Outage (Equation 1-17, 18, 19, 20):

$$H_{RO} = H_R / 3$$

where: H_{RO} = roof outage

H_R for cone roof = $0.0625 * D / 2$

H_R for dome roof = $0.268 * D / 2$

Data to be Entered for All Tanks								Calculated for All Tanks		Data to be Entered for Fixed Roof Tanks							Calculated for Fixed Roof Tanks			
Tank ID	Roof Type	Working Capacity (bbl)	Maximum Filling Rate F_{RM} (gal/hr)	Tank Roof Paint Color & Shade	Tank Roof Paint Condition	Tank Shell Paint Color & Shade	Tank Shell Paint Condition	Tank Roof Solar Absorptance α_s (unitless)	Tank Shell Solar Absorptance α_s (unitless)	VFR Diameter D (ft)	VFR Shell Height H_S (ft)	VFR Roof Type	HFR Diameter D (ft)	HFR Shell Length (ft)	Breather Vent Pressure P_{BP} (psig)	Breather Vent Vacuum P_{BV} (psig)	Average Liquid Height H_L (ft)	Roof Outage H_{RO} (ft)	Vapor Space Outage H_{VO} (ft)	HFR Effective Diameter D_E (ft)
								[1] Table 7.1-6	[1] Table 7.1-6								$H_L/2$ (VFR)	[1] Eq. 1-17, 18, 19, 20	[1] Eq. 1-15, 16	[1] Eq. 1-14
EGEN1-TK	HFR	12	500	White	New	White	New	0.17	0.17				4	6	0.03	-0.03	0.00	0.00	1.57	5.53
FWP1-TK	HFR	12	500	White	New	White	New	0.17	0.17				4	6	0.03	-0.03	0.00	0.00	1.57	5.53

**Table B-12
Meteorological Data
Homestead Power Plant**

[1] Reference 1: AP-42, Fifth Edition, Volume 1, Chapter 7.1 Organic Liquid Storage Tanks - June 2020

Select Location:	Houston, TX
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Location	Month	Days / Month	Month Code	Daily Ambient Minimum Temperature TAN (°F)	Daily Ambient Maximum Temperature TAX (°F)	Solar Insolation Factor I (BTU/ ft2 day)	Average Wind Speed v (mph)	Atmospheric Pressure Pa (psia)
Houston, TX	JAN	31	1	43.8	62.6	832.0	7.8	14.7
Houston, TX	FEB	29	2	47.0	66.4	1,022.0	8.3	14.7
Houston, TX	MAR	31	3	52.7	72.3	1,333.0	8.5	14.7
Houston, TX	APR	30	4	59.6	78.7	1,635.0	8.9	14.7
Houston, TX	MAY	31	5	67.9	85.9	1,828.0	8.1	14.7
Houston, TX	JUN	30	6	73.4	90.7	1,915.0	6.7	14.7
Houston, TX	JUL	31	7	75.1	93.1	1,930.0	5.8	14.7
Houston, TX	AUG	31	8	74.7	93.4	1,804.0	5.6	14.7
Houston, TX	SEP	30	9	69.9	88.9	1,567.0	6.0	14.7
Houston, TX	OCT	31	10	61.0	81.2	1,288.0	6.7	14.7
Houston, TX	NOV	30	11	51.2	71.2	930.0	7.2	14.7
Houston, TX	DEC	31	12	44.9	64.1	767.0	7.6	14.7
Houston, TX	YEAR	365	Annual	60.1	79.0	1,404.0	7.4	14.7
			Maximum	75.1	93.4	1,930	8.9	14.7
			Hourly	95.0	95.0	1,930	8.9	14.7

**Table B-13
Product Data
Homestead Power Plant**

[1] Reference 1: AP-42, Fifth Edition, Volume 1, Chapter 7.1 Organic Liquid Storage Tanks - June 2020
 [2] Reference 2: Manual of Petroleum Measurement Standards, Chapter 19.4 - November 2013

Conversion of RVP to Antoine Coefficients (Figure 7.1-16):

$$A = 12.82 - 0.9672 \cdot \ln(\text{RVP})$$

$$B = 7261 - 1216 \cdot \ln(\text{RVP})$$

where: RVP = stock Reid vapor pressure (psi)
 ln = natural logarithm function

Conversion of RVP+S to Antoine Coefficients (Figure 7.1-15):

$$A = 15.64 - 1.854 \cdot S^{0.5} - (0.8742 - 0.3280 \cdot S^{0.5}) \cdot \ln(\text{RVP})$$

$$B = 8742 - 1042 \cdot S^{0.5} - (1049 - 179.4 \cdot S^{0.5}) \cdot \ln(\text{RVP})$$

where: RVP = stock Reid vapor pressure (psi)
 ln = natural logarithm function
 S = stock ASTM-D86 distillation slope at 10 volume percent evaporation (%F/vol%)

Calculation of Working Loss Product Factor K_p (Equation 1-35):

$K_p = 0.75$ for crude oils
 $K_p = 1$ for all other organic liquids
 (used with fixed roof tanks)

Calculation of Product Factor K_c (Equation 2-3):

$K_c = 0.4$ for crude oils
 $K_c = 1$ for all other organic liquids
 (used with floating roof tanks)

Data to be Entered for All Products														Calculated Product Properties							
Product Code	CAS No.	Classification	Vapor Molecular Weight M_v (lb/lb-mol)	Liquid Density W_L (lb/gal)	Calculation Type	RVP (psia)	S-Value (unitless)	Antoine's A ₁ (unitless)	Antoine's B ₁ (°R or °C)	Antoine's C ₁ (°C)	Antoine's Temperature Range T_{min} (°R)	Antoine's Temperature Range T_{max} (°R)	Liquid Molecular Weight M_L (lb/lb-mol)	Reference	Other Names	Antoine's A (unitless)	Antoine's B (°R or °C)	Antoine's C (°C)	Product Factor K_c (unitless)	Working Loss Product Factor K_p (unitless)	
No. 2 Fuel Oil (Diesel)	N/A	VOC	130.00	7.10	RVP+S								(if different from vapor) 188.00	[1] Table 7.1-2		[1] Figure 7.1-15, 16	12.1	8,907.0	0.0	[1] Eq. 2-3	[1] Eq. 1-35

**Table B-14
Natural Gas Fired Fuel Gas Heater Emission Calculations
Homestead Power Plant**

Assumptions:

Maximum Natural Gas Firing Rate	3.63	MMBtu/hr
Hourly Fuel Gas Consumption	4,930	scf/hr
Annual Fuel Gas Consumption	14,666,750	scf/yr
Hours of Operation	2,975	hours/yr

Calculations:

EPN	Pollutant	Emission Factor (lb/MMBtu)	Emission Factor (lb/10 ⁶ scf)	Max. Hourly Emission Rate (lb/hr)	Max. Annual Emission Rate (tpy)
FG-HTR	NO _x ¹	0.0110	N/A	0.04	0.06
	CO ¹	0.0370	N/A	0.13	0.20
	VOC ¹	0.0080	N/A	0.03	0.04
	Filterable PM ²	N/A	1.9000	0.01	0.01
	PM ₁₀ /PM _{2.5} ¹	0.0048	N/A	0.02	0.03
	SO ₂ ¹	0.0010	N/A	0.004	0.005

¹ Ultra Low NOx Burner Performance Data

² Emission factor based on AP-42, Table 1.4-2, PM (filterable)

Sample Calculations:

NO_x lb/hr = 0.0110 lb/MMBtu * 3.63 MMBtu/hr = 0.04 lb/hr
 NO_x tpy = 0.04 lb/hr * 2,975 hr/yr / 2,000 lb/ton = 0.06 tpy
 CO lb/hr = 0.0370 lb/MMBtu * 3.63 MMBtu/hr = 0.13 lb/hr
 CO tpy = 0.13 lb/hr * 2,975 hr/yr / 2,000 lb/ton = 0.20 tpy
 VOC lb/hr = 0.0080 lb/MMBtu * 3.63 MMBtu/hr = 0.03 lb/hr
 VOC tpy = 0.03 lb/hr * 2,975 hr/yr / 2,000 lb/ton = 0.04 tpy
 PM lb/hr = 1.9 lb/10⁶ scf * 1,000,000 * 4,930 scf/hr = 0.01 lb/hr
 PM tpy = 0.01 lb/hr * 2,975 hr/yr / 2,000 lb/ton = 0.01 tpy
 PM₁₀/PM_{2.5} lb/hr = 0.0048 lb/MMBtu * 3.63 MMBtu/hr = 0.02 lb/hr
 PM₁₀/PM_{2.5} tpy = 0.02 lb/hr * 2,975 hr/yr / 2,000 lb/ton = 0.03 tpy
 SO₂ lb/hr = 0.0010 lb/MMBtu * 3.63 MMBtu/hr = 0.00 lb/hr
 SO₂ tpy = 0.00 lb/hr * 2,975 hr/yr / 2,000 lb/ton = 0.01 tpy

HAP Calculations:

Pollutant	Emission Factor ¹ (lb/10 ⁶ scf)	Max. Hourly Emission Rate (lb/hr)	Max. Annual Emission Rate ² (tpy)
2-Methylnaphthalene	2.4E-05	1.18E-07	1.76E-07
3-Methylcholanthrene	1.8E-06	8.87E-09	1.32E-08
7,12-Dimethylbenz(a)anthracene	1.6E-05	7.89E-08	1.17E-07
Acenaphthene	1.8E-06	8.87E-09	1.32E-08
Acenaphthylene	1.8E-06	8.87E-09	1.32E-08
Anthracene	2.4E-06	1.18E-08	1.76E-08
Benz(a)anthracene	1.8E-06	8.87E-09	1.32E-08
Benzene	2.1E-03	1.04E-05	1.54E-05
Benzo(a)pyrene	1.2E-06	5.92E-09	8.80E-09
Benzo(b)fluoranthene	1.8E-06	8.87E-09	1.32E-08
Benzo(g,h,i)perylene	1.2E-06	5.92E-09	8.80E-09
Benzo(k)fluoranthene	1.8E-06	8.87E-09	1.32E-08
Chrysene	1.8E-06	8.87E-09	1.32E-08
Dibenzo(a,h)anthracene	1.2E-06	5.92E-09	8.80E-09
Dichlorobenzene	1.2E-03	5.92E-06	8.80E-06
Fluoranthene	3.0E-06	1.48E-08	2.20E-08
Fluorene	2.8E-06	1.38E-08	2.05E-08
Formaldehyde	7.5E-02	3.70E-04	5.50E-04
Hexane	1.8E+00	8.87E-03	1.32E-02
Indeno(1,2,3-cd)pyrene	1.8E-06	8.87E-09	1.32E-08
Naphthalene	6.1E-04	3.01E-06	4.47E-06
Phenanthrene	1.7E-05	8.38E-08	1.25E-07
Pyrene	5.0E-06	2.47E-08	3.67E-08
Toluene	3.4E-03	1.68E-05	2.49E-05
Arsenic	2.0E-04	9.86E-07	1.47E-06
Beryllium	1.2E-05	5.92E-08	8.80E-08
Cadmium	1.1E-03	5.42E-06	8.07E-06
Chromium	1.4E-03	6.90E-06	1.03E-05
Cobalt	8.4E-05	4.14E-07	6.16E-07
Manganese	3.8E-04	1.87E-06	2.79E-06
Mercury	2.6E-04	1.28E-06	1.91E-06
Nickel	2.1E-03	1.04E-05	1.54E-05
Selenium	2.4E-05	1.18E-07	1.76E-07
Total HAPs		0.01	0.01

¹ Based on AP-42, Table 1.4-3, emission factors for HAPs from natural gas combustion.

² Assumes 8,760 annual hours of operation.

HAP Sample Calculations:

Max. Hourly Emission Rate (lb/hr) = Emission Factor (lb/10⁶ scf) x Hourly Fuel Gas Consumption (scf/hr)
 Max. Annual Emission Rate (tpy) = Emission Factor (lb/10⁶ scf) x Annual Fuel Gas Consumption (scf/yr) / 2,000 lb/ton

Table B-15
Inherently Low Emitting Maintenance Activities
Homestead Power Plant

EPN	Activity	Calc. Table	Estimated Emissions (lb/hr)					Estimated Emissions (TPY)				
			VOC	PM	PM ₁₀	PM _{2.5}	NH ₃	VOC	PM	PM ₁₀	PM _{2.5}	NH ₃
CT-MSS	Turbine Washing, Unit On-Line	B-7		0.326	0.326	0.326			0.059	0.059	0.059	
	Air Intake Filter Maintenance	B-8		0.006	0.003	4.08E-04			0.000	0.000	0.000	
	Catalyst Handling/Maintenance Annual	B-9		2.461	2.461	2.461			0.059	0.059	0.059	
	Ammonia Equipment Maintenance	B-10					0.004					2.15E-05
	Fuel Gas Venting	B-11		0.422					2.53E-03			
	Analytical Equipment	B-12		1.35E-03					3.18E-04			
Totals =			0.423	2.792	2.789	2.787	3.58E-03	0.003	0.119	0.119	0.118	2.15E-05

¹ See Tables B-16 through B-21 for additional calculations on each activity

**Table B-16
Online Turbine Washing (MSS) Calculations
Homestead Power Plant**

Activity Description:

On-line turbine water washes are used to maintain gross accumulation of air borne contaminants between off-line water washes and compressor maintenance. Volume of deionized water is approximately 12 gpm and water is burned off before getting to latter stages of the compressor (compressor exit temperatures are in the 600+ F range). PM emissions result from residual dust material (on the blade) being released through the unit exhaust during the wash.

	Per Unit		
Total Turbine Blade Surface Area	12,000	ft ²	
% of blade covered by dust	5%	---	
Depth of blade dust	2.5	microns	9.84E-05 in
Flue Dust Density	66.16	lb/ft ³	
Duration of Event	30	minutes	
# of Events per year	365	Daily	
Blade Dust Calculation			
Surface Area Covered by Dust	600	ft ²	(Total Blade Surface Area) * (% of blade covered by dust)
Dust Volume	4.92E-03	ft ³	(Dust Surface Area)*((Depth of Dust/12))
Dust (PM)	0.3256	lb/event	(Dust Volume)*(Flue Dust Density)
PM hourly	0.3256	lb/hr	
PM annual	0.0594	tpy	

Notes: 1. Flue Dust Density based on the average of representations at:

http://www.powderandbulk.com/resources/bulk_density/material_bulk_density_chart_f.htm

54 lb/ft³

http://www.simetric.co.uk/si_materials.htm

90.48 lb/ft³

http://www.asiinstr.com/technical/Material_Bulk_Density_Chart_F.htm

54 lb/ft³

2. Surface area of turbine blades based on assumption of 19 rows of 4' blades.

3. Calculation assumes no TDS in demineralized water.

Calculation Basis: Electric Utility MSS Workgroup.

**Table B-17
Particulate Filter Changeout (MSS) Emission Calculations
Homestead Power Plant**

Activity description:

Particulate matter may be released to the atmosphere during planned filter changes on the combustion units.

Particulate collects on the filter during unit operation and may become airborne during filter handling.

The emission calculations below represent the worst case emissions that could occur on a "per filter change" basis.

E		Emission Factor (lb PM/ton)	0.0174	Source/Notes/Assumptions
E		Emission Factor (lb PM10/ton)	0.00822	
E		Emission Factor (lb PM2.5/ton)	0.001244	
$E = k * (0.0032) * \frac{(U / 5)^{1.3}}{(M / 2)^{1.4}} (lb / ton)$				Based on U.S. EPA AP-42, 13.2.4 "Aggregate Handling and Storage Piles" (Equation 1).
U	Mean Wind Speed (mph)		10.98	The mean wind speed is from the average windspeed for the Houston, Texas in TANKS 4.09d.
M	Material Moisture Content (%)		1	Estimate based on process knowledge
K (PM)	PM Particle Size Multiplier		0.74	Particle size multiplier taken from AP-42, Chapter 13.2.4.
K (PM ₁₀)	PM ₁₀ Particle Size Multiplier		0.35	Particle size multiplier taken from AP-42, Chapter 13.2.4.
K (PM _{2.5})	PM _{2.5} Particle Size Multiplier		0.05	Particle size multiplier taken from AP-42, Chapter 13.2.4.
CE	Control Efficiency		0%	Assumed control efficiency

-	Filter Surface Area (ft ²)		32,000	
-	Assumed dust thickness before filter casing is opened (mm)		1	
-	Assumed dust thickness before filter casing is opened (ft)		0.003281	
-	Assumed dust density (lb/ft ³)		75	
-	Activity Throughput (lb/activity)		7874.02	Throughput based on volume of accumulated dust on filter material.
-	Activity Throughput (ton/activity)		3.937	
-	Hourly Throughput (ton/hr)		0.3281	Assumed hourly throughput.
-	Annual Throughput (tons/yr)		7.874	Assumed annual throughput.

Emission Summary		Source/Notes/Assumptions	
Frequency Routine Maintenance (activity/hr)		1	Assume maximum = 1 activity at any time.
Frequency Routine Maintenance (activity/yr)		2	Two filter changes per year
Duration Routine Maintenance (hours/activity)		12	Assumed length of each activity

	Misc Filter Changeout
PM (lb/hr)	5.70E-03
PM (tpy)	1.37E-04
PM10 (lb/hr)	2.70E-03
PM10 (tpy)	6.47E-05
PM2.5 (lb/hr)	4.08E-04
PM2.5 (tpy)	9.80E-06

Calculation Basis: Electric Utility MSS Workgroup.

**Table B-18
Catalyst Handling and Maintenance (MSS) Emission Calculations
Homestead Power Plant**

Activity Description:

The emission calculations below represent the worst case emissions that could occur during routine maintenance or a unit turnaround. Normal maintenance consists of removing catalyst from the SCR and cleaning with vacuum truck. No additional emissions expected associated with total changeout of catalyst (after cleaning of old catalyst).

Assumed surface area of SCR grid (ft ²)	4800	
Assumed dust thickness (mm)	10	
Assumed dust thickness (ft)	0.03281	
Assumed dust density (lb/ft ³)	75	
Activity Throughput (lb/activity)	11811.02	
Control Efficiency	99.00%	Assumed control efficiency of fabric filter
Total Emissions per activity (lb/activity)	118.11	As PM10

Emission Summary		Source/Notes/Assumptions
Frequency Routine Maintenance Activity (activity/hour)	1	Estimate
Frequency Routine Maintenance Activity (activity/yr)	1	Once per year
Duration Routine Maintenance (hours/activity)	48	Estimate

Catalyst Maintenance	
PM10 (lb/hr)	2.4606
PM10 (tpy)	0.05906

Calculation Basis: Simple fabric filter calculation.

**Table B-19
Small Equipment Fugitive Component Repair and Replacement (Aqueous Ammonia System)
Homestead Power Plant**

The emission calculations below represent the worst case emissions that could occur during routine maintenance or a unit turnaround.

Step 1. Equipment Opening Maintenance Vapor Space Calculation

L_o	Opening Loss (lb/activity)	0.00358	Source/Notes/Assumptions
$L_o = M_v \left(\frac{PV}{RT} \right)$			Based on the Ideal Gas Law with modification for NH3 molecular weight.
P	Vapor Pressure of Material (psia)	14.70	Since the vapor pressure of aqueous ammonia is greater than 14.7 the pressure prior to venting was used.
V	Vapor space volume (feet ³)	0.08522	Based on worst case equipment: 10 feet of 2 inch pipe
T	Average daily temperature (°R)	555.00	95 °F per TCEQ Guidance.
R	Gas constant (psia ft ³ per lb-mole °R)	10.73	
M _v	Vapor molecular weight (lb/lb-mole)	17	Molecular weight for ammonia.

Emission Summary		Source/Notes/Assumptions
Total Emissions per activity (lb/activity)	0.00358	Assume 100% of vapor is NH3
Frequency Routine Maintenance Activity (activity/hour)	1	Based on process knowledge and historical information.
Frequency Routine Maintenance Activity (activity/yr)	12	Conservative Estimate
Duration Routine Maintenance (hours/activity)	1	Assumes all venting emissions occur in the first hour.

Total NH3 Emissions	
(lb/hr)	(tpy)
0.00358	2.15E-05

Calculation Basis: Electric Utility MSS Workgroup. Applicable section utilized for small volume.

**Table B-20
Gaseous Fuel Venting During Turbine Shutdown/Maintenance &
Small Equipment and Fugitive Component Repair/Replacement
Homestead Power Plant**

Piping Description					Initial Conditions				Final Conditions				Emissions		
Location	Diameter (in)		Length (ft)	Number of Events		Max Hourly Volume ¹ (ft ³)	Annual Volume ¹ (ft ³)	Press. (psig)	Temp. (°F)	Press. (psig)	Temp. (°F)	Max Hourly Volume ² (scf)	Annual Volume ² (scf)	VOC Hourly (lb/hr)	VOC Annual (tpy)
	nom.	act.		per hour	per year										
Fuel Line	12	11.25	60	1	12	41	497	50	50	0	68	191	2,288	0.42	0.002
Small Equipment	---	---	---	1	12	0.7	8.0	50	50	0	68	3	37	0.007	4.02E-05
													Total:	0.42	0.003

1. Initial volume is calculated by multiplying the cross-sectional area by the length of pipe using the following formula:

$$V_i = \pi * [(diameter\ in\ inches/12)/2]^2 * length\ in\ feet = ft^3$$

2. Final volume calculated using ideal gas law $[(PV/ZT)_i = (PV/ZT)_f]$. $V_f = V_i (P_i/P_f) (T_f/T_i) (Z_i/Z_f)$, where Z is estimated using the following equation:

$$Z = 0.9994 - 0.0002P + 3E-08P^2$$

3. Additional Assumptions:

Nat Gas MW 16.80 lb/lbmol
VOC Content of Nat Gas 5.00% by Wt

Example calculation:

191 scf	lbmole	16.8 lb Nat Gas	0.05 lb VOC	=	0.42 lb/hr
hr	385.5 scf	lbmole Nat Gas	lb Nat Gas		

Calculation Basis: Electric Utility MSS Workgroup.

**Table B-21
Inspection, Repair, Replacement, Adjusting, Testing, and Calibration of Analytical Equipment, Process Instruments
Including Sight Glasses, Meters, Gauges
Homestead Power Plant**

The emission calculations below represent the worst case emissions that could occur during routine maintenance or a unit turnaround.

Step 1. Clingage Loss Calculation

L _c	Clingage Loss (lb/activity)	0.00135	Source/Notes/Assumptions
$L_c = A_s \times T_f \times D$			
A _s	Surface Area (feet)	0.31	Based on an average size of the equipment.
T _f	Clingage Film Thickness (feet)	8.33E-05	95 °F per TCEQ Guidance.
D	Density of Material (lb/feet ³)	52.46	Based on API Power Regression Analysis for a material with a vapor pressure of 0.15 psia.

Step 2. Splash Loading Loss Calculation

L _l	Equipment Draining Loading Loss (lb/10 ³ gal loaded)	0.493	Source/Notes/Assumptions
$L_l = 12.46 \left(\frac{SPM_v}{T} \right)$			
S	Loading Loss Factor	1.45	Per U.S. EPA AP-42 Table 5.2-1, based on splash loading per TCEQ Guidance.
P	Vapor Pressure of Liquid Loaded (psia)	0.15	Based on representative material.
M _v	Vapor molecular weight (lb/lb-mole)	103	Molecular Weight based on API Power Regression Analysis for a material with a vapor pressure of 0.15 psia.
T	Average daily temperature (°R)	555.00	95 °F per TCEQ Guidance.

L _D	Equipment Draining Loading loss (lb/activity)	1.11E-07	Source/Notes/Assumptions
$L_D = L_l V_t$			
L _l	Loading Loss (lb/10 ³ gal loaded)	0.493	See calculation above.
V _t	Volume of liquid drained (gallon/activity)	0.0002	Assumed to be 1% of total volume (0.02244 gallons) is left in the equipment and drained to pan/enclosed drain.

Step 3. Evaporative Loss Calculation

L _E	Evaporation Loss (lb/activity)	0.000386	Source/Notes/Assumptions
$L_E = 7920 * A \left(\frac{P_a M_w}{RT} \right) \frac{D_{i,a}}{Z_2 - Z_1} \ln \left[\frac{1}{(1 - y_{c1})} \right] * t$			
A	Vessel opening area (m ²)	0.07	Area for a 5 gal bucket (~11.75 in. dia.)
P _a	Atmospheric Pressure (Pa)	101,325	
M _w	Molecular weight (kg/kgmol)	103	Molecular Weight based on API Power Regression Analysis for a material with a vapor pressure of 0.15 psia.
R	Universal Gas Constant (J/°K-kgmol)	8314	
T	Temperature (°K)	308	95 °F per TCEQ Guidance.
D _{i,a}	Diffusivity of component through air (m ² /s)	6.28E-06	Assumed diffusivity of diesel fuel
Z ₂ -Z ₁	Empty vapor space above liquid level in vessel (m)	0.37	Assumed 5 gal bucket (14.5 in)
y _{c1}	Volume fraction of component in air	0.010	
t	Time that material sits in pan before removed by vacuum truck (hr)	0.25	Based on past experience.

Emission Summary		Source/Notes/Assumptions
Total Emissions per activity (lb/activity)	0.00174	Summation of Steps 1 through 3.
Frequency Routine Maintenance Activity (activity/hour)	1	Based on process knowledge and historical information.
Frequency Routine Maintenance Activity (activity/yr)	365	Based on process knowledge and historical information.

Total VOC Emissions	
(lb/hr)	(tpy)
0.00135	3.18E-04

Calculation Basis: Electric Utility MSS Workgroup.

**Table B-22
 Sitewide Annual Emissions Summary
 Homestead Power Plant**

<i>Sources under the Standard Permit</i>		NO _x	CO	VOC	PM	PM ₁₀	PM _{2.5}	SO ₂	H ₂ SO ₄	(NH ₄) ₂ SO ₄	NH ₃
EPN	Name										
CT-1	Combustion Turbine 1	57.79	248.08	48.42	26.33	26.33	26.33	8.84	4.06	5.47	48.27
CT-LOV1	Combustion Turbine 1 Lube Oil Vent	---	---	0.13	0.13	0.13	0.13	---	---	---	---
GEN-SOV-1	Generator 1 Seal Oil Vent	---	---	0.13	0.13	0.13	0.13	---	---	---	---
HYDOV-1	Unit 1 Hydraulic Oil Vent	---	---	0.13	0.13	0.13	0.13	---	---	---	---
VOC-FUG	VOC Fugitives	---	---	0.38	---	---	---	---	---	---	---
NH3-FUG	Ammonia Component Fugitives	---	---	---	---	---	---	---	---	---	3.39
CT-MSS	ILE Turbine Maintenance	---	---	0.00	0.12	0.12	0.12	---	---	---	0.00
EGEN1	Emergency Generator 1	0.97	0.53	0.97	0.03	0.03	0.03	0.0012	---	---	---
FWP1	Firewater Pump 1	0.10	0.09	0.10	0.01	0.01	0.01	0.0002	---	---	---
ULSDFUG	ULSD Component Fugitives	---	---	0.03	---	---	---	---	---	---	---
EGEN1-TK	Emergency Generator 1 Diesel Tank	---	---	0.0004	---	---	---	---	---	---	---
FWP1-TK	Firewater Pump 1 Diesel Tank	---	---	0.0004	---	---	---	---	---	---	---
FG-HTR	Dewpoint Heater	0.06	0.20	0.04	0.01	0.03	0.03	0.0053964	---	---	---
Total Emissions (tons per year)		58.92	248.90	50.35	26.90	26.91	26.91	8.85	4.06	5.47	51.66