DRAFT REPORT

PERMIT AND EMISSIONS REVIEW

Denton Energy Center

B&V PROJECT NO. 195610
B&V FILE NO. 41.0000

PREPARED FOR

DENTON MUNICIPAL ELECTRIC

Denton Municipal Electric

NOVEMBER 2017

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Acronym List

µg/m^3	Micrograms per Cubic Meter
ATO	Authorization to Operate
BACT	Best Available Control Technology
CAA	Clean Air Act
CFR	Code of Federal Regulations
CO	Carbon Monoxide
CO_2e	Carbon Dioxide Equivalent
DEC	Denton Energy Center
DME	Denton Municipal Electric
EPA	Environmental Protection Agency
ESL	Effects Screening Levels
g/hp-h	Grams per Horsepower-Hour
GHG	Greenhouse Gas
GOP	General Operating Permit
H_2SO_4	Sulfuric Acid
kW	Kilowatt
LAER	Lowest Achievable Emissions Rate
lb/day	Pounds per Day
lb/h	Pound per Hour
mmBtu/h	Million British Thermal Units per Hour
MW	Megawatts
NAAQS	National Ambient Air Quality Standards
NA-NSR	Nonattainment New Source Review
NH_3	Ammonia
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxides
NSR	New Source Review
O_2	Oxygen
O_3	Ozone
Pb	Lead
PBR	Permit By Rule
PM	Particulate Matter

PM_{10}	PM Less Than 10 Microns
$PM_{2.5}$	PM Less Than 2.5 Microns
ppb	Parts per Billion
ppm	Parts per Million
ppmvd	Parts Per Million By Volume
PSD	Prevention Of Significant Deterioration
RACT	Reasonably Available Control Technology
RICE	Reciprocating Internal Combustion Engine
SCR	Selective Catalytic Reduction
SIP	State Implementation Plan
SO_2	Sulfur Dioxide
SOP	Site Operating Permit
TAC	Texas Administrative Code
TCEQ	Texas Commission On Environmental Quality
tpy	Tons per Year
VOCs	Volatile Organic Compounds

Executive Summary

In response to concerns from the surrounding community, Denton Municipal Electric contracted with Black & Veatch to perform an independent review of the previously submitted permit application and permit for the Denton Energy Center (DEC) (and for comparison purposes the Red Gate Power Plant [Red Gate]) and to provide additional background into the overall emissions process. It is Black & Veatch's opinion that the DEC permit is valid and was filed in accordance with the requirements of the Environmental Protection Agency and the Texas Commission on Environmental Quality (TCEQ). Additional details regarding this finding are as follows.

Red Gate was permitted as a baseload unit in an attainment area, subject to prevention of significant deterioration designation as a major source and permitting under New Source Review (NSR). The DEC was permitted as a peaking unit in an ozone nonattainment area, allowing designation as a minor source and permitting under a Standard Permit, which is not as rigorous as an NSR permit.

The information reviewed was obtained through the TCEQ, and based on past experience with submitting permit applications for numerous power generation facilities, the information presented in both the DEC and Red Gate applications appeared sufficient to warrant TCEQ to issue the permits. While there were some minor differences in regard to the emission profile between the two projects, Black & Veatch understands that the DEC includes an optional enhanced emissions control package that provides for lower emissions.

The air permit application for DEC used information provided directly from the engine supplier, Wärtsilä. If the permitted emission limits are not met, the facility is unable to obtain an operating permit and cannot run. Therefore, as typical for the industry, emissions guarantees as noted in the permit are make-good, with no provision for buy-down should the tested emissions not meet the permitted limits. As a result, Wärtsilä will need to keep tuning its equipment until the emission limits are met.

1.0 Introduction

Denton Municipal Electric (DME), owned by the city of Denton, is constructing the Denton Energy Center (DEC) Project to provide power from 12 reciprocating internal combustion engines (RICEs) manufactured by Wärtsilä. The DEC Project is located near Denton Enterprise Airport. Each engine, a Wärtsilä Model 18V50SG, is rated at a nominal 18.8 megawatts (MW). The RICE units will provide intermittent power to the grid by taking advantage of market conditions when electricity prices are high and using this revenue to subsidize electric rates to the surrounding community.

The DEC Project has submitted the necessary permit applications, and an air permit has been issued for the DEC. However, the surrounding community has recently expressed concern about the permitted emissions levels from the DEC. It should be noted that the county of Denton, which includes the city of Denton, is a nonattainment area for ozone under the National Ambient Air Quality Standards (NAAQS); the precursors to ozone formation are nitrogen oxides (NO_x) and volatile organic compounds (VOCs). The community raised concerns about the validity of the emissions rates for the DEC units because projects using similar Wärtsilä 18V50SG units had higher permitted emissions limits. One comparable project specifically referenced by the community is the Red Gate Power Plant (Red Gate) owned by South Texas Electric Cooperative.

In response to concerns from the surrounding community, DME contracted with Black & Veatch to perform an independent review of previously submitted applications and to provide additional background into the overall emissions process. The work scope assigned to Black & Veatch included the following tasks:

- Review air permit.
- Review differences in DEC and Red Gate submittals to the Texas Commission on Environmental Quality (TCEQ).
- Review Wärtsilä emissions information.
- Review emissions factors submitted for DEC and Red Gate.
- Explain emissions factor differences.
- Describe operational characteristics of Wärtsilä RICEs.
- Provide explanation for various regulatory requirements.
- Describe difference between major and minor sources.
- Evaluate and incorporate ambient air monitoring into air emissions test plan.

The following sections provide a detailed discussion for each individual topic.

2.0 Air Permit Application Review

In reviewing the air permit application for DEC and Red Gate, Black & Veatch verified the validity and reasonableness of information submitted to the TCEQ.

The DEC Project includes installation of new RICE units and ancillary equipment. The DEC was permitted as a peaking facility and was allowed to forego major New Source Review (NSR) because the facility would emit a nonsignificant amount of emissions per year. Therefore, the RICE units for this project were allowed to be constructed under the Standard Permit option through TCEQ. The Red Gate application had the capability of installing RICE units from several different vendors, some of which may have higher emissions than the Wärtsilä units; however, for comparison purposes, this review focused only on the Wärtsilä engines. The Red Gate application was subject to prevention of significant deterioration (PSD) review -- emissions were above the major PSD threshold because the facility was designed for continuous baseload operation and is located in an area classified as attainment for all pollutants. Because the annual emissions associated with the DEC Project were below the major PSD thresholds, the DEC Project did not require PSD review and was classified as a "minor" project and, thus, subject to a Standard Permit.

The emissions associated with both applications have been determined as part of this review. The emissions associated with the RICE units appear valid. Data include emissions from various operating loads (i.e., 100 percent down to 40 percent) as well as emissions during startup and shutdown. The emissions rates are in compliance with the applicable 40 Code of Federal Regulations (CFR) Part 60, Subpart JJJJ, which are as follows:[1]

- NO_X: 1 g/hp-h (82 ppmvd @ 15% O_2).
- CO: 2 g/hp-h (270 ppmvd @ 15% O_2).
- VOC: 0.7 g/hp-h (60 ppmvd @ 15% O_2).

The emergency diesel generator and emergency diesel fire pump are subject to 40 CFR Part 60, Subpart IIII. These were correctly outlined in both applications; however, the DEC permit will be modified to reflect omission of the fire pump in the final design. The calculated emissions were similar to those presented in the application except for the DEC RICE units. Specifically, the startup and shutdown emissions could not be re-created because the methodology to create these emissions was unknown.

In summary, a review of both the DEC and Red Gate applications did not find any discrepancies between information presented in the application and the requirements outlined in TCEQ regulations and guidance.

[1] CO = carbon monoxide, VOC = volatile organic compounds, g/hp-h = grams per horsepower-hour, ppmvd = parts per million by volume, O_2 = oxygen

3.0 Differences in DEC and Red Gate TCEQ Submittals

Both facilities are located at greenfield sites; i.e., they are not located at an existing facility. The DEC is located in an area that is nonattainment for ozone; therefore, the nonattainment new source review (NA-NSR) program would, apply for both NO_X and VOC emissions. All other pollutants at DEC and all pollutants at the Red Gate facility were to be reviewed under the PSD program. The differences between the NA-NSR and PSD programs are discussed in Section 8.0 of this document.

The Red Gate Project had the potential to install engines manufactured by several different vendors; however, this review focused on the Wärtsilä engine. Table 3-1 summarizes the proposed engines within each application.

Table 3-1 Main RICE Engine Comparison

PARAMETER	DEC	RED GATE
Model Number	18V50SG	18V50SG
Number of Engines	12	12
Control Technologies	• SCR system for NO_X emission control • Oxidation catalyst for CO and VOC emission	• SCR system for NO_X emission control • Oxidation catalyst for CO and VOC emission
Annual Operating Hour Limitation	3,200 hours per year	8,760 hours per year
Permit Type	Standard Permit – RICE Units PBR – Remaining Sources	NSR PSD Permit – Whole Project

SCR = selective catalytic reduction, PBR = permit by rule

Table 3-2 summarizes the ancillary equipment included in the application package. The DEC application assumed the RICE units would be operated in a manner that would result in cold, warm, and hot starts, where the temperature refers to the temperature of the catalyst. The DEC also has an electric heater to maintain a minimum engine temperature of approximately 150° F at all times. The engine then has the ability to achieve operating speed more quickly, allowing the exhaust to more rapidly heat and activate the catalyst. For the DEC, a cold start is defined as a startup that occurs within 2 days since the last shutdown. A warm start is when startup occurs within 12 hours since the last shutdown, and a hot start is when startup occurs within 6 hours since the last shutdown. During a cold or warm startup, part of the heat generated during combustion gets used to warm the metal/system, so the combustion is not as efficient, creating higher emissions. Therefore, the colder an engine is during startup, the higher the emissions will be upon startup. This effect can be compounded when considering the SCR. While the terms cold/warm/hot starts often refer to the engine, for the DEC, it is specifically in reference to the SCR catalyst. An SCR needs a minimum operating temperature to catalyze the reactions between NH_3

(ammonia) and NO_x, so despite the heaters maintaining an engine temperature of approximately 150° F, a start can still result in higher emissions.

Table 3-2 Ancillary Equipment Summary

EQUIPMENT	DEC	RED GATE
Dew Point Heater	6.0 mmBtu/h	Not Applicable
Emergency Fire Pump	175 hp (130.5 kW) [100 hours per year] (will be omitted in final permit)	150 hp (111.9 kW) [100 hours per year]
Emergency Generator	1,341 hp (1,000 kW) [100 hours per year]	670 hp (500 kW) [100 hours per year]
Storage Tanks	2 small	Not Applicable
Miscellaneous Comfort Heaters	Several [Total < 1 mmBtu/h, Individual < 0.5 mmBtu/h]	Not Applicable

mmBtu/h = million British thermal units per hour, kW = kilowatt

The main difference between the two applications is the method by which the project was able to obtain a permit from the TCEQ. The DEC application was able to use the standard permit option for the RICE units and the permit by rule (PBR) option for the ancillary equipment (refer to Section 8.0 for additional details). In summary, the DEC application was for a peaking plant, and the Red Gate application was for a baseload facility. Since the annual emissions associated with the DEC Project are below the major PSD thresholds, the DEC Project did not require PSD review. Because the DEC did not exceed the major PSD thresholds, the project was classified as a "minor" project and, thus, subject to the standard permit requirements.

3.1 PERMIT REVIEW

A review of the permitted emissions limits for both facilities was conducted. Table 3-3 summarizes these emissions limits. As shown in Table 3-3, the emissions limits are lower for the DEC facility except for particulate emissions. It should be noted that reductions aimed at certain emissions may increase other emissions.

Table 3-3 Comparison of Emission Limits for RICE Units

POLLUTANT	EMISSION LIMITS (lb/h)	
	DEC	RED GATE
CO	4.96	**5.95 (0.30 g/hp-h)**
NO_X	1.33	**4.66 (0.084 g/hp-h)**
PM	**3.17**	3.10
PM_{10}	**3.17**	3.10
$PM_{2.5}$	**3.17**	3.10
SO_2	0.09	**0.44**
VOC	2.07	**5.95 (0.30 g/hp-h)**
Lead	--	--
H_2SO_4	--	0.07
CO_2e	--	--
Hours of Operation, per RICE	3,200 (per year)	**8,760 (per year)**

lb/h = pounds per hour, PM = particulate matter, PM_{10} = PM less than 10 microns, $PM_{2.5}$ = PM less than 2.5 microns, SO_2 = sulfur dioxide, H_2SO_4 = sulfuric acid, CO_2e = carbon dioxide equivalent

4.0 Wärtsilä Emissions Information Review

The DEC RICE units will be provided with Wärtsilä's enhanced emissions control package, which is a more aggressive emissions control option provided by Wärtsilä for installations with strict emissions limits. Black & Veatch expects the enhanced emissions control package to provide improved emissions performance when compared to similar engines without the package. While the technical specifics of the enhanced emissions control package are proprietary to Wärtsilä, Black & Veatch expects the SCR catalyst to be the main difference between the enhanced emissions control package and other standard emissions packages by Wärtsilä.

The air permit application used emissions information provided directly from Wärtsilä. As typical for the industry, emissions guarantees are make-good, with no provision for buy-down should the tested emissions not meet the permitted limits.

5.0 Emissions Factors Submitted for DEC and Red Gate

The emissions calculations submitted with the permit application for each facility were also reviewed. Table 5-1 summarizes the emissions factors utilized to determine the emissions rates for each Wärtsilä engine. As represented in Table 5-1, the emissions factors utilized in the Red Gate application are higher for all pollutants except for PM and CO_2e. The higher emissions factors between the two facilities are noted by bold font.

Table 5-1 Comparison of Emissions Factors for RICE Units – Permit Application Documents

POLLUTANT	DEC		RED GATE	
	(g/hp-h)	(lb/mmBtu)	(g/hp-h)	(lb/mmBtu)
CO	0.089	0.032	**0.108**	**0.039**
NO_X	0.024	0.0086	**0.084**	**0.030**
PM	**0.060**	**0.021**	0.056	0.020
PM_{10}	**0.060**	**0.021**	0.056	0.020
$PM_{2.5}$	**0.060**	**0.021**	0.056	0.020
SO_2	0.0016	0.00059	**0.0078**	**0.0028**
VOC	0.037	0.013	**0.108**	**0.039**
Lead	--	--	--	--
H_2SO_4	0.00025	0.000090	**0.0012**	**0.00043**
CO_2e	**326.0**	117.1	324.2	117.1
Heat Input (mmBtu/h)	154.4		153.2	

6.0 Emissions Factor Differences

The primary difference in the NO_x, CO, and VOC emissions factors used at Red Gate and the DEC is likely due to the application of Wärtsilä's enhanced emissions control package. Information on the enhanced emissions control package is not available because of legal and proprietary reasons, so technical specifics on why the two facilities are capable of achieving different emissions factors cannot be provided. However, as typical for other various engines of similar design with differing emissions, one can speculate that the enhanced emissions control package likely uses different types and/or more SCR and oxidation catalyst.

The PM emissions factors are nearly identical, and this is logical because there should be little PM from combusting natural gas. Differences can be attributed to operational variations (e.g., ambient conditions), the natural gas being burned, and the application of more aggressive emissions controls to reduce certain pollutants, which as a consequence, may increase other pollutants. The trade-off in various pollutant levels is common for different permit applications because the site-specific conditions change the dynamics and impacts of controlling the different pollutants. These differences also explain the deviation in the SO_2 and H_2SO_4 emissions factors. While both permits have low absolute values, one is factors higher than the other because some veins of natural gas are more sour (have a higher H_2S content) than others, and the emission controls can convert sulfur compounds to forms that are measured as PM instead of SO_2 or H_2SO_4.

7.0 Operational Characteristics of Wärtsilä RICE

The Wärtsilä engines at the DEC are four-stroke, lean-burn units (4SLB). Four-stroke refers to the four separate cycles the piston completes as the crankshaft turns. Four-stroke engines have higher thermal efficiency and more complete combustion of fuel, providing lower VOC emissions than two-stroke engines. In a two-stroke engine, fuel and air are introduced into a crankcase by a pressure differential created by the piston's upward stroke (fuel/air are introduced into the bottom of the crankcase while the piston is in the upward position). When the piston goes into the downward stroke, the fuel/air mixture is compressed, and as the piston reaches the bottom of the downward stroke, an inlet port is revealed for the fuel/air to escape around the piston into the main cylinder. At this moment, it is possible for fuel/air to go around the piston to the other side of the cylinder and to the exhaust line (this creates VOC emissions). Most of the fuel/air, however, will be compressed as the piston travels back on its upward stroke, where it is ignited by a spark plug.

Four-stroke engines place all of the gas processes on one side of the piston, using valves to keep fuel/air mixtures from escaping the cylinder to the exhaust prior to combustion. The first stroke draws fuel/air into the cylinder as the piston creates a vacuum by moving from the upward to downward position. The second stroke compresses the fuel/air mixture as the piston moves upward. Once the fuel/air mixture is compressed, the spark plug ignites the mixture, combusting the fuel and causing the piston to go back down for the third stroke. As the piston goes back upward, the exhaust valve is opened and the combusted gases are released in the fourth stroke.

Lean burn refers to using excess air for complete combustion of the gas, or a leaner fuel/air ratio. Air provides oxygen for combustion, so the more air that is present, the more complete the fuel will burn. However, too much air will cause the fuel/air mixture to fail to ignite. Lean burn achieves better engine efficiency by reducing throttling losses and lowering VOC emissions rates because of more complete combustion. By using more air than is theoretically needed, lower temperatures are achieved in the combustion process, resulting in less thermal NO_X formation. For these reasons, 4SLB engines have become popular for installations that have tight emissions requirements.

Even with using four-stroke and lean burn, large reciprocating engines need to have an SCR system to meet regulatory emissions limits. An SCR operates by providing a catalyst that promotes chemical reactions between NH_3, which is injected into the ductwork upstream of the SCR, and NO_X. The products of the chemical reactions are water and nitrogen. There are several other secondary reactions that may occur; however, these may be mitigated through selection of the catalyst and operation of the SCR to minimize ammonia emissions (i.e., ammonia slip). The following are the predominant reactions:

$$4NO + 4NH_3 + O_2 \xrightarrow{catalyst} 4N_2 + 6H_2O$$

$$2NO_2 + 4NH_3 + O_2 \xrightarrow{catalyst} 3N_2 + 6H_2O$$

The reactions occur naturally at temperatures above 1,600° F, which is well above what the RICEs produce; therefore, catalyst is needed to facilitate the reactions. There is a minimum temperature in which the catalyst needs to be operating, typically around 600° F and above. The RICEs typically emit flue gas in the 700 to 800° F range, so the SCR should operate as designed.

There are likely significant differences in the SCR and oxidation catalysts provided by Wärtsilä for its standard and enhanced emissions control package, but specific technical information has not been provided. Therefore, the operational characteristics of the enhanced emissions control package cannot be explained at this time.

8.0 Regulatory Requirements

This section explains the various regulatory requirements that might apply to this project, including de minimis authorization, PBR, standard TCEQ permit, NSR permits, and Title V permits. Air quality permitting in Texas is under the jurisdiction of the TCEQ. The Environmental Protection Agency (EPA) has given the TCEQ authority to implement and enforce the federal Clean Air Act (CAA) provisions and state air regulations under its approved State Implementation Plan (SIP). The following paragraphs discuss the state requirements applicable to the proposed project.

The TCEQ allows different authorizations to be evaluated by division staff. The division has a pyramid approach to permitting, as presented on Figure 8-1, where de minimis requires the least effort and NSR requires the most rigorous permitting effort.

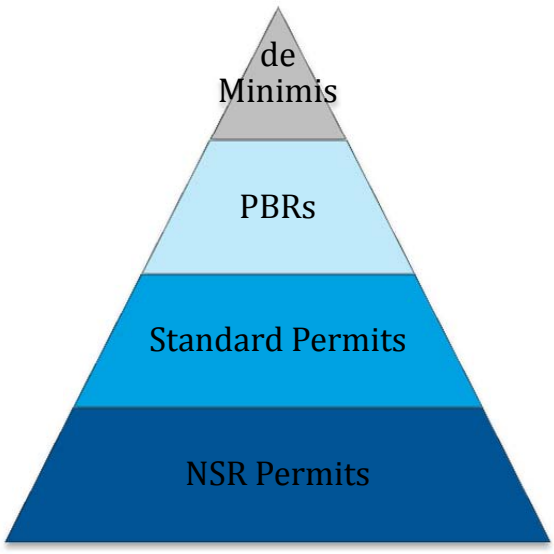

Figure 8-1 Permitting Authorizations

Anyone who plans to construct a new facility or to modify an existing facility that may emit air contaminants into the air must fulfill the following:

- Satisfy the criteria for a de minimis facility or source;
- Satisfy the conditions of a PBR;
- Satisfy the conditions of a standard permit; or
- Obtain an NSR permit.

8.1 DE MINIMIS

The requirements for a de minimis authorization are outlined in 30 Texas Administrative Code (TAC) Section 116.119(a). De minimis facilities and sources include very small additions to background concentrations of air contaminants that cause no discernable or unacceptable impact to public health and for which permitting would be an ineffective use of commission resources.

Facilities or sources that meet one or more of the following conditions are considered to be de minimis:

- Included on the TCEQ list of "De Minimis Facilities or Sources."
- Use of the following material at no more than the rate prescribed:
  - Cleaning and stripping solvents, 50 gallons per year.
  - Coatings (excluding plating materials), 100 gallons per year.
  - Dyes, 1,000 pounds per year.
  - Bleaches, 1,000 gallons per year.
  - Fragrances (excluding odorants), 250 gallons per year.
  - Water-based surfactants/detergents, 2,500 gallons per year.
- Facilities or sources located inside a building at a site which meet the following sitewide emissions rate caps (summarized in Table 8-1) based on the July 19, 2000, Effects Screening Levels (ESL) list without the addition of control devices, as defined in 30 TAC Section 101.1.
- Any individual facility, source, or group of facilities or sources which the executive director determines to be de minimis based upon:
  - Proximity to receptors.
  - Rate of emissions of air contaminants.
  - Engineering judgment and experience.
  - Determination that no adverse toxicological or health effects would occur off property.

The DEC Project had multiple pollutants (e.g., formaldehyde, methanol) that were above the thresholds listed in Table 8-1; therefore, the DEC Project was not allowed to obtain the de minimis authorization to construct the facility.

Table 8-1 TCEQ Sitewide Emissions Caps

ESL OF SUBSTANCE(S)	EMISSIONS RATE CAP FOR INDIVIDUAL SUBSTANCES, SITEWIDE		EMISSIONS CAP FOR MULTIPLE SUBSTANCES, SITEWIDE	
($\mu g/m^3$)	(lb/day)	(tpy)	(lb/day)	(tpy)
≥3500	5	0.9	10	2.4
1200-3499	3	0.5	6	1.3
400-1199	1	0.2	3	0.5
100-399	0.25	0.05	1	0.2

TCEQ Figure: 30 TAC
$\mu g/m^3$ = micrograms per cubic meter, lb/day = pounds per day, tpy = tons per year

8.2 PERMIT BY RULE

Facilities with emissions that do not meet de minimis criteria but will not make a significant contribution of air contaminants to the atmosphere may be permitted by rule. The commission has adopted PBRs in 30 TAC Section 106. Subchapter A of Section 106 contains general requirements applicable to all PBRs, including but not limited to, recordkeeping and emissions limitations. In addition to the general requirements contained in Subchapter A, many of the individual PBRs also contain specific conditions that must be met. When a PBR is claimed, applicable requirements of both the PBR and Subchapter A must be met. The TCEQ has a total of 108 project types that fall under the PBR. To qualify for a PBR, the total actual emissions from the facility shall not exceed those listed in Table 8-2.

The emissions associated with the DEC RICE units were above the emissions threshold for both PM and VOC; therefore, the DEC Project could not construct the RICE units using the PBR authorization. However, the DEC could use the PBR authorization for the ancillary sources.

Table 8-2 Permit by Rule Emissions Requirement

POLLUTANT	EMISSIONS REQUIREMENT (tpy)
CO	250
NO_X	250
PM	25
PM_{10}	15
$PM_{2.5}$	10
SO_2	25
VOC	25
Other*	25

*Any other air contaminant except for water, nitrogen, ethane, hydrogen, oxygen, and greenhouse gases.

8.3 STANDARD PERMITS

A standard permit authorizes the construction or modification of new or existing facilities that are similar in terms of operations, processes, and emissions. A standard permit provides an efficient mechanism for qualifying facilities to obtain authorization as an alternative to a case-specific air quality permit. If a facility cannot meet a PBR, the applicant should see if a standard permit can be claimed. A standard permit can never be used to authorize emissions that will trigger major NSR permitting under 30 TAC Section 116, and unlike PBRs, all standard permits (with the exception of the Pollution Control Standard Permit) require best available control technology (BACT) to be installed and operated. Tables 8-3 and 8-4 summarize the standard permits that are available.

Table 8-3 Standard Permits Contained in a Rule

CHAPTER	SECTION OR SUBCHAPTER
116	Subchapter F, Installation and/or Modification of Oil and Gas Facilities (Section 116.620)
321	Subchapter B, Concentrated Animal Feeding Operations (Section 321.43)
330	Subchapter U, Municipal Solid Waste Landfill Facilities and Transfer Stations
	Subchapter N, Landfill Mining (Section 330.607)
332	Subchapter A, Composting (Section 332.8)

Table 8-4 List of Standard Permits

PERMITS	
• Air Quality Pollution Control Projects	• Municipal Solid Waste Landfills
• Anhydrous Ammonia Storage and Distribution Operations	• Oil and Gas Handling and Production Facilities
• Animal Carcass Incinerators	• Peanut Handling Operations
• Boilers	• Permanent Hot Mix Asphalt Plants
• Concrete Batch Plants with Enhanced Controls	• Permanent Rock and Concrete Crushers
• Cotton Gin Facilities and Cotton Burr Tub Grinders	• Sawmills
• Dry Bulk Fertilizer Handling Operations	• Temporary Hot Mix Asphalt Plants
• Electric Generating Units	• Temporary Rock and Concrete Crushers
• Feedmills, Portable Augers, and Hay Grinders	• Temporary and Permanent Polyphosphate Blenders
• Grain Elevators/Grain Handling Operations and Portable Grain Augers	• Concrete Batch Plants

The RICE units portion of the DEC Project could not meet the requirements under the PBR and is not subject to a case-by-case NSR review (refer to Section 8.4); therefore, the RICE units were able to be constructed using authorization under the Standard Permit.

8.4 NEW SOURCE REVIEW PERMITS

If a facility is not de minimis and cannot meet a PBR or standard permit, then a case-by-case NSR permit must be authorized. These types of authorizations provide more flexibility to applicants because they can authorize more emissions, and unlike a PBR or standard permit, facility-specific information can be considered during the technical review, which includes a BACT and ambient air impacts review. NSR permits are subject to public notice and an opportunity for a contested case hearing.

Some NSR authorizations trigger major NSR permitting--either NA-NSR permitting or PSD permitting. A discussion on whether either major NSR program applies can be quite confusing as the NSR program applies to each new facility or modification to an existing facility. However, even though the NSR program applies to the DEC, it does not necessarily result in the project being "subject" to the particular program, as the TCEQ allows "minor" sources to be permitted under a de minimis, PBR, or Standard Permit option. The NSR program delineates how the review process is to proceed and if the project is, therefore, subject to the requirements within the particular NSR program. For example, a new facility located in an area designated as attainment would be required to proceed within the PSD program. The PSD program will outline the methodology to

determine if the project must meet the requirements in the PSD program. Generally, the requirements of the PSD program are to be met if the project is considered to be "major" within the PSD program. As such, not all projects that fall under the PSD program for review are actually "subject" to the requirements within the PSD program. Further descriptions of both NSR programs (NA-NSR and PSD) are provided below.

8.4.1 Nonattainment New Source Review

New major sources and major modifications in a designated nonattainment area are required to go through NA-NSR. Nonattainment reviews apply in areas that are not in compliance with the NAAQS. The EPA has designated nonattainment counties in Texas for ozone, PM_{10}, lead, and SO_2.

Nonattainment permitting is required if the source has emissions at or above the significant emissions rates for the specific county designated as nonattainment. If NA-NSR is triggered, the new emissions must be offset by actual emissions reductions achieved by other sources anywhere in the nonattainment area. The emissions reductions must be certified by the TCEQ. In addition to the offset requirement, nonattainment permits must include the lowest achievable emissions rate (LAER), rather than BACT. LAER is the most stringent emissions limit achieved in practice by a similar emissions source and is typically more stringent than BACT, as LAER does not need to account for the cost basis as BACT does.

According to the DEC application, the emissions associated with the DEC Project were not above the major NA-NSR thresholds; therefore, major NA-NSR review was not applicable.

8.4.2 Prevention of Significant Deterioration

Major sources and major modifications in an attainment area are subject to PSD review. A source that emits or has the potential to emit a federally regulated NSR pollutant at or above a significant emissions rate is considered major for all PSD pollutants. PSD review includes the following:

- A BACT analysis must be performed and the resulting emissions control technology must be installed.
- Air quality in the surrounding area must be assessed.

A BACT evaluation includes a review of the reasonably available control technology (RACT) via the RACT/BACT/LAER Clearinghouse. The BACT analysis is a five step process to identify all control technologies, eliminate technically infeasible options, rank the remaining control technologies by control effectiveness, evaluate most effective controls, and select the BACT. The analysis is based on the maximum degree of available reduction, taking into account energy, environmental, and economic impacts and other costs.

The assessment of existing air quality includes the following:

- A review of the current (pre-project) air quality.
- A demonstration that the new emissions will not cause or contribute to an exceedance of any applicable NAAQS or PSD increment.
- The evaluation of effects on visibility, soil and vegetation, and impacts to Class I areas.

The main purpose of the ambient air quality analysis is to demonstrate that new emissions from the proposed project will not cause or contribute to a violation of the NAAQS or a PSD increment, where PSD increment is the amount of pollution that is allowed to increase in a given area (the analysis is to prevent the air quality in a "clean" area from deteriorating). Class I areas are provided special protection because they are areas of national or regional scenic, recreational, or historic value.

The emissions associated with the DEC Project were not above the major NSR thresholds; therefore, major NSR review was not applicable.

8.5 TITLE V PERMITS

The previous sections summarize the different types of pre-construction permits, or NSR permits. This section describes the operating permits, or Title V permits. In Texas, there are two different types of Title V permits:

- Site Operating Permit.
- General Operating Permit.

8.5.1 Site Operating Permit

Site operating permits (SOPs) are Title V permits that contain requirements specific to an individual site and, thus, receive case-by-case reviews. The permits contain requirements that apply to the site as a whole as well as requirements that are specific to individual emissions units. All Title V SOPs are subject to the following:

- Public notice and the opportunity for a notice and comment hearing.
- Affected state review (if the site is within 50 miles of an affected state).
- EPA review.
- Public petition (a 60 day period that occurs after issuing the SOP).

SOPs must be renewed at least every 5 years.

8.5.2 General Operating Permit

General operating permits (GOPs) are issued to cover numerous similar sites and are analogous to PBRs and Standard Permits in the NSR program.

An owner or operator of a facility may obtain an authorization to operate (ATO) under a GOP. The ATO is not subject to individual public notice, affected state review, EPA review, or public petition, as these requirements are fulfilled by the TCEQ when the GOP is initially issued. The TCEQ requires the renewal of GOPs every 5 years. In addition, individual ATOs are required to be renewed every 5 years. Refer to Table 8-5.

Table 8-5 GOP Summary

GOPS CAN ONLY INCLUDE	GOPS CANNOT INCLUDE*
A site that is in compliance	A compliance plan or permit shield
PBRs/standard exemptions	A case-by-case NSR permit
Standard permits	Provisions specific to an individual site
*If any of these items need to be included in a Title V permit, an SOP would have to be obtained.	

According to the application, the DEC Project's emissions for all pollutants are below the major Title V limit of 100 tons per year. Because of this, the facility will need to obtain a GOP upon operation of the plant.

9.0 Major and Minor Sources Differences

A **major stationary source** is defined in 30 TAC Section 116.12(19) as the following:

Any station source that emits, or has the potential to emit, a threshold quantity of emissions or more of any air contaminant (including volatile organic compounds (VOCs)) for which a national ambient air quality standard has been issued, or greenhouse gases. The major source thresholds are identified in Table I of this section for nonattainment pollutants and the major source thresholds for prevention of significant deterioration pollutants are identified in 40 Code of Federal Regulations (CFR) §51.166(b)(1). For greenhouse gases, the major source thresholds are specified in §116.164 of this title (relating to Prevention of Significant Deterioration Applicability for Greenhouse Gases Sources). A source that emits, or has the potential to emit a federally regulated new source review pollutant at levels greater than those identified in 40 CFR §51.166(b)(1) is considered major for all prevention of significant deterioration pollutants. A major stationary source that is major for VOCs or nitrogen oxides is considered to be major for ozone. The fugitive emissions of a stationary source shall not be included in determining for any of the purposes of this definition whether it is a major stationary source, unless the source belongs to one of the categories of stationary sources listed in 40 CFR §51.165(a)(1)(iv)(C).

The major source thresholds identified in Table I of Section 116 are summarized in Table 9-1.

Table 9-1 Major Source/Major Modification Emissions Thresholds

POLLUTANT	DESIGNATION	MAJOR SOURCE (tpy)	SIGNIFICANT LEVEL (tpy)	OFFSET RATIO (minimum)
Ozone (VOC, NO_X)	I (marginal)	100	40	1.10 to 1
	II (moderate)	100	40	1.15 to 1
	III (serious)	50	25	1.20 to 1
	IV (severe)	25	25	1.30 to 1
CO	I (moderate)	100	100	1.00 to 1
	II (serious)	50	50	1.00 to 1
SO_2	--	100	40	1.00 to 1
PM_{10}	I (moderate)	100	15	1.00 to 1
	II (serious)	70	15	1.00 to 1
NO_X	--	100	40	1.00 to 1
Lead	--	100	0.6	1.00 to 1

Source: Table I, 30 TAC Section 116.12(20).

According to the definition above, for those pollutants subject to the PSD program, the major source thresholds are outlined in 40 CFR Section 51.166(b)(1), which states the following:

(i) Major stationary source means:

(a) Any of the following stationary sources of air pollutants which emits, or has the potential to emit, 100 tons per year or more of any regulated NSR pollutant: Fossil fuel-fired steam electric plants of more than 250 million British thermal units per hour heat input, coal cleaning plants (with thermal dryers), kraft pulp mills, portland cement plants, primary zinc smelters, iron and steel mill plants, primary aluminum ore reduction plants (with thermal dryers), primary copper smelters, municipal incinerators capable of charging more than 250 tons of refuse per day, hydrofluoric, sulfuric, and nitric acid plants, petroleum refineries, lime plants, phosphate rock processing plants, coke oven batteries, sulfur recovery plants, carbon black plants (furnace process), primary lead smelters, fuel conversion plants, sintering plants, secondary metal production plants, chemical process plants (which does not include ethanol production facilities that produce ethanol by natural fermentation included in NAICS codes 325193 or 312140), fossil-fuel boilers (or combinations thereof) totaling more than 250 million British thermal units per hour heat input, petroleum storage and transfer units with a total storage capacity exceeding 300,000 barrels, taconite ore processing plants, glass fiber processing plants, and charcoal production plants;

(b) Notwithstanding the stationary source size specified in paragraph (b)(1)(i)(a) of this section, any stationary source which emits, or has the potential to emit, 250 tons per year or more of a regulated NSR pollutant; or

(c) Any physical change that would occur at a stationary source not otherwise qualifying under paragraph (b)(1) of this section, as a major stationary source if the change would constitute a major stationary source by itself.

(ii) A major source that is major for volatile organic compounds or NO_X shall be considered major for ozone.

(iii) The fugitive emissions of a stationary source shall not be included in determining for any of the purposes of this section whether it is a major stationary source, unless the source belongs to one of the following categories of stationary sources:

(a) Coal cleaning plants (with thermal dryers);

(b) Kraft pulp mills;

(c) Portland cement plants;

(d) Primary zinc smelters;

(e) Iron and steel mills;

(f) Primary aluminum ore reduction plants;

(g) Primary copper smelters;

(h) Municipal incinerators capable of charging more than 250 tons of refuse per day;
(i) Hydrofluoric, sulfuric, or nitric acid plants;
(j) Petroleum refineries;
(k) Lime plants;
(l) Phosphate rock processing plants;
(m) Coke oven batteries;
(n) Sulfur recovery plants;
(o) Carbon black plants (furnace process);
(p) Primary lead smelters;
(q) Fuel conversion plants;
(r) Sintering plants;
(s) Secondary metal production plants;
(t) Chemical process plants—The term chemical processing plant shall not include ethanol production facilities that produce ethanol by natural fermentation included in NAICS codes 325193 or 312140;
(u) Fossil-fuel boilers (or combination thereof) totaling more than 250 million British thermal units per hour heat input;
(v) Petroleum storage and transfer units with a total storage capacity exceeding 300,000 barrels;
(w) Taconite ore processing plants;
(x) Glass fiber processing plants;
(y) Charcoal production plants;
(z) Fossil fuel-fired steam electric plants of more than 250 million British thermal units per hour heat input;
(aa) Any other stationary source category which, as of August 7, 1980, is being regulated under section 111 or 112 of the Act.

For greenhouse gases (GHGs), as described above and outlined in 30 TAC Section 116.164, PSD review is applicable under the following conditions:

(1) New source, major for non-GHGs. The stationary source is a new major stationary source for a federally regulated NSR pollutant that is not GHGs and will emit, or have the potential to emit, 75,000 tpy or more CO_2e; or
(2) Existing source, major for non-GHGs. The stationary source is an existing major stationary source for a federally regulated NSR pollutant that is not a GHG and will have a significant net emissions increase of a federally regulated NSR pollutant that is not a GHG, and a net emissions increase greater than zero tpy GHGs on a mass basis, and 75,000 tpy or more CO_2e.

(3) New source, major for GHGs Only. The new stationary source will emit, or has the potential to emit, greater than or equal to 100 tpy GHGs on a mass basis, if the source is listed on the named source category list in 40 CFR §51.166(b)(1)(i), or greater than or equal to 250 tpy GHGs on a mass basis, and 100,000 tpy or more CO_2e.

(4) GHGs major modification at an existing source that is a major stationary source for GHGs.

(A) The existing stationary source emits, or has the potential to emit, greater than or equal to 100 tpy GHGs on a mass basis, if the source is listed on the named source category list in 40 CFR Section 51.166(b)(1)(i), or greater than or equal to 250 tpy GHGs on a mass basis, and 100,000 tpy or more CO_2e; and

(B) The stationary source undertakes a physical change or change in the method of operation that will result in a net emissions increase greater than zero tpy GHGs on a mass basis and a net emissions increase of 75,000 tpy or more CO_2e.

(5) Existing source that is not major. The existing stationary source undertakes a physical change or change in the method of operation that will result in an emissions increase greater than or equal to 100 tpy GHGs on a mass basis, if the source is listed on the named source category list in 40 CFR §51.166(b)(1)(i), or greater than or equal to 250 tpy GHGs on a mass basis, and 100,000 tpy or more CO_2e.

A stationary source that is not major is considered to be a **minor stationary source**.

To determine if a stationary source is subject to the thresholds outlined in Table I of Section 116.12 or those outlined in 40 CFR Section 51.166(b)(1), one must determine the attainment status of the area surrounding the facility. Attainment status is determined by the compliance status with regard to the NAAQS. The attainment status for both facilities is summarized in Table 9-2. As shown in Table 9-2, the DEC Project is located in an area classified as attainment for all pollutants except for ozone; whereas, the Red Gate Project is located in an area classified as attainment for all pollutants. Because of this, the PSD program would apply for all pollutants for both projects except for NO_X and VOC emissions associated with the DEC Project. The NO_X and VOC emissions would be triggered for major source review under the NA-NSR program if their emissions are above those thresholds listed in Table I of Section 116.12(20).

Table 9-2 Attainment Status Summary

POLLUTANT	PRIMARY/SECONDARY	AVERAGING TIME	NAAQS LEVEL	ATTAINMENT/NONATTAINMENT STATUS	
				DEC (DENTON COUNTY)	RED GATE (HIDALGO COUNTY)
Carbon Monoxide (CO)	Primary	8 hours	9 ppm	Attainment/Unclassifiable	Attainment/Unclassifiable
		1 hour	35 ppm	Attainment/Unclassifiable	Attainment/Unclassifiable
Lead (Pb)	Primary and Secondary	Rolling 3 month average	0.15 µg/m^3	Attainment/Unclassifiable	Attainment/Unclassifiable
Nitrogen Dioxide (NO_2)	Primary	1 hour	100 ppb	Attainment/Unclassifiable	Attainment/Unclassifiable
	Primary and Secondary	1 year	53 ppb	Attainment/Unclassifiable	Attainment/Unclassifiable
Ozone (O_3)	Primary and Secondary	8 hours	0.070 ppm	Nonattainment: Serious †	Attainment/Unclassifiable
Particulate Matter ≤ 2.5 ($PM_{2.5}$)	Primary	1 year	12.0 µg/m^3	Attainment/Unclassifiable	Attainment/Unclassifiable
	Secondary	1 year	15.0 µg/m^3	Attainment/Unclassifiable	Attainment/Unclassifiable
	Primary and Secondary	24 hours	35 µg/m^3	Attainment/Unclassifiable	Attainment/Unclassifiable
Particulate Matter ≤ 10 (PM_{10})	Primary and Secondary	24 hours	150 µg/m^3	Attainment/Unclassifiable	Attainment/Unclassifiable
Sulfur Dioxide (SO_2)	Primary	1 hour	75 ppb	Attainment/Unclassifiable	Attainment/Unclassifiable
	Secondary	3 hours	0.5 ppm	Attainment/Unclassifiable	Attainment/Unclassifiable

†At the time of submittal, the area was classified as "Serious" nonattainment (for the 1997 NAAQS, which has since been revoked). The area is currently listed as "Moderate" nonattainment (for the 2008 NAAQS).

10.0 Air Emissions Testing Program

The Black & Veatch original scope of work for the DEC Project was to develop and execute the emissions testing program after construction was completed on the DEC. The testing program would demonstrate compliance with emissions limits and contractual guarantees. The test runs will be executed by a third-party contractor that specializes in EPA emissions tests and are accredited by the TCEQ and other governmental bodies for this testing. The test report will be developed by the third-party contractor and reviewed independently by Black & Veatch at the conclusion of the testing. The program will be overseen by a Black & Veatch professional that has experience with similar work and witnessed by a representative from the TCEQ for compliance with EPA procedure.

At the time of this report, a requisition for the emissions tests has not been fully developed and submitted to bidders for their formal quote. The specification, however, has been generally developed, and the testing program for emissions compliance would include the tests listed in Table 10-1. Additional tests may be performed at the discretion of DME to prove levels in meeting or exceeding the requirements of the TCEQ.

Table 10-1 Tests Required to Demonstrate Emissions Compliance

POLLUTANT	TEST METHOD	NUMBER OF TEST RUNS	TIME/RUN	PERCENT OF FULL LOAD TESTED
NO_X	EPA Method 7E	3	1 hour	100
CO	EPA Method 10	3	1 hour	100
VOC	EPA Method 18/25A	3	1 hour	100
SO_2	ASTM D6667	Daily Sample	N/A	100
PM_{10} and $PM_{2.5}$	EPA Method 5/202	3	3 hours	100
NH_3	CTM-027	3	1 hour	100

The contractor selected to execute the emissions tests will have extensive experience in testing units of similar technology. All bidders will also submit a quality assurance program to ensure that all calculations and reports have undergone a rigorous review process to eliminate errors. The Black & Veatch professional overseeing the work will also be a professional engineer with experience in testing units of similar technology.

To further address concerns regarding the emissions contribution from the DEC RICE units, DME has requested ambient air monitoring at the inlet to the RICE engines. By comparing the DEC RICE outlet emissions values to the ambient air concentrations, the contribution of pollution by the RICE units in relation to the existing ambient pollution can be better understood.

Ambient air monitors will be located by the inlet filters of the end RICE units (1 and 12) and the middle of the facility (by RICE 5 or 6). The data from these will be collected throughout the compliance testing program.