Middletown Technology Center

A Data Center's Onsite Distributed Generation-Served Alternate-Source Power Project

Synthetic Minor Source Air Permit Application

Submitted to:
Delaware
Department of Natural Resources and Environmental Control

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GLOSSARY

lb/hr	pounds per hour
ppmdv	parts per million dry volume
ppmwv	parts per million wet volume
ppmdv @15% O_2	parts per million dry volume, referenced to 15 percent oxygen
ppmdv @7% O_2	parts per million dry volume, referenced to 7 percent oxygen
gr/bhp-hr	grams per brake horsepower hour
lb-mol/hr	pound moles per hour
SCFM	standard cubic feet per minute
ACFM	actual cubic feet per minute
Btu/lb	fuel heating value for fuels in British Thermal Units per pound
Btu/SCF	fuel heating value for gaseous fuels in British Thermal Units per standard cubic feet
Btu/gal	fuel heating value for liquid fuels in British Thermal Units per gallon
Btu/kW-hr	gas turbine heat rate in British Thermal Units per kilowatt hour
^oF	degrees Fahrenheit
lb/MMBtu	pounds per million British Thermal Units
ton/yr	tons per year
LHV	lower heating value of fuel
HHV	higher heating value of fuel
lb/MWh	pounds per Megawatt hour
MW	megawatts
MWh	megawatt hour
NOx	nitrogen oxides referenced as nitrogen dioxide
CO	carbon monoxide
VOC	volatile organic compounds as defined in N.J.A.C. 7:27-8
TSP	total suspended particulate
PM_{10}	particulate matter with an aerodynamic diameter less than to 10 microns in diameter
$PM_{2.5}$	fine particulate matter with an aerodynamic diameter less than 2.5 microns in diameter
SOx	sulfur oxides referenced as sulfur dioxide
HAP	hazardous air pollutants as defined in N.J.A.C. 7:27-8
CO_2	Carbon Dioxide
CO_2e	Carbon Dioxide equivalent
PSD	Prevention of Significant Deterioration
MNSR	Minor New Source Review
NSPS	New Source Performance Standards
NSR	New Source Review
NNSR	Non-Attainment New Source Review
NAAQS	National Ambient Air Quality Standards
RACT	Reasonably Available Control Technology
MACT	Maximum Achievable Control Technology
BACT	Best Available Control Technology
USEPA	United States Environmental Protection Agency
DNREC	Delaware Department of Natural Resources and Environmental Control

1.0 EXECUTIVE SUMMARY

1.1 Purpose of Application

Cirrus Delaware LLC ("Cirrus") is the owner of the Middletown Technology Center ("MTC") Project. Cirrus is planning to construct a 228,000 square foot facility in Middletown, New Castle County, Delaware. The MTC will include a data center and a power generation facility. The power generation facility will consist of five 10 MW and five 2.5 MW natural gas fired reciprocating engines. The engines will be controlled using Selective Catalytic Reduction ("SCR") and oxidation catalysts ("OxyCat") to control NO_x, CO, VOC and HAP emissions. The project will also contain a counter flow cooling tower.

The project with the requested fuel use limitations will result in potential emissions that classify the facility as a Synthetic Minor Source. The project's potential emissions for criteria pollutants, hazardous air pollutants ("HAP") and carbon dioxide equivalent ("CO_2e), with permit limitations, will be below major source thresholds and as such non-attainment, Prevention of Significant Deterioration ("PSD") and Title V Permitting will not be triggered for the project.

1.2 Scope of Air Permit Application

The specific regulatory requirements addressed in this application for the reciprocating engines are as follows:

- Delaware Regulatory Standards;
- Best Available Control Technology ("BACT") Analysis;
- New Source Performance Standards Compliance; and
- Non-Attainment/Prevention of Significant Deterioration ("PSD")Non Applicability Determination.

The following sections summarize the conclusions reached from the various regulatory applicability analyses contained in this air permit application for the reciprocating engines.

1.2.1 Demonstration of Best Available Control Technology

The use of a spark ignited, lean burn reciprocating internal combustion engines with SCR and oxidation catalyst results in emission levels of NO_x, CO, VOC and HAP which represent BACT. The 10 MW engines will meet emission levels of 0.06, 0.1 and 0.05 grams per kilowatt hour ("gr/kW-hr") for NO_x, CO and VOC, respectively. The 2.5 MW engines will meet emission levels of 0.08, 0.15 and 0.06 gr/kW-hr for NO_x, CO and VOC, respectively.

The reciprocating engines will employ good combustion practices and will fire clean burning natural gas, which results in the lowest Total Suspended Particulate ("TSP") and fine particulate ($PM_{2.5}$) emissions. The use of natural gas with trace amounts of sulfur result in the lowest emissions of Sulfur Dioxide ("SO_2") for any fossil fuel. The use of good combustion practices and natural gas result in emission levels of $PM_{2.5}$ and SO_2 that is representative of the best BACT technology. Additionally, the use of high-efficiency, reciprocating natural gas-driven, engine technology results in emission levels of CO_2e that are representative of BACT technology.

None of the 2.5 MW engines will be subject to a BACT Analysis because potential emissions running 8760 hr/yr would be below 5 ton/yr which trigger a BACT Analysis as per 7 DE Admin. Code 1125 Section 4.0. The 10 MW engines at 8760 hr/yr operation will have potential emissions for criteria

pollutants above 5 ton/yr which trigger a BACT Analysis. However, SCR controls and oxidation catalyst technology will be deployed on all the engines (both the 10 MW and 2.5 MW) to attain emission levels considered Lowest Achievable Emission Rates ("LAER") for reciprocating engine technology.

1.2.2 Demonstration of NSPS Compliance

The new reciprocating engines will be subject to and comply with the requirements of New Source Performance Standards ("NSPS") Subpart JJJJ- *Standards of Performance for Stationary Spark Ignition Internal Combustion Engines*.

1.2.3 Non-Attainment and PSD Non Applicability Determinations

The potential emissions from the proposed project will not result in any pollutant emissions exceeding the non-attainment significant emission rate. As such, the project is not subject to the non-attainment New Source Review ("NNSR") provisions of provisions of 7 DE Admin. Code1125.

The MTC project is a new source under the PSD regulations and not considered as one of the 28 named major source categories. As such the potential emissions from the proposed project "by itself" would have to be greater than the 250 ton/yr PSD Major Source Threshold in order to be subject to PSD review. The potential MTC project emissions are well below the 250 ton/yr Major Source Threshold and as such the project is not subject to PSD NSR review.

The potential emissions of CO_2e will be below 100,000 ton/yr and thus not subject to DNREC PSD review under the provisions of 7 DE Admin. Code1125.

The potential emissions for the MTC project as a Synthetic Minor Source for criteria pollutants, HAPs and CO_2e are shown in Tables 1-1, 1-2 and 1-3, respectively. The full potential emissions without any permit limitations for informational purposes for criteria pollutants, HAPs and CO_2e are shown in Tables 1-4, 1-5 and 1-6, respectively.

1.3 Project Environmental Benefits

Generating power with reciprocating engines will displace utility generated power that emits more pollutants on a lb/MWh basis than the MTC reciprocating engines equipped with SCR and oxidation catalyst. Table 1-7 shows the potential emission reductions that can be realized by displacing the utility generated power. As shown in Table 1-7, use of the reciprocating engines results in significant reductions in air emissions when compared to the 2014 average emission rates for generating units in the PJM Interconnect.

1.4 Jobs & Economic Benefits

Since there is no current facility of this type and scale in Delaware, this project is anticipated to create 117 entirely new direct, permanent, full-time jobs for Delaware, approximately 97 of which are newly created. Due to the specialization of skills needed for such a facility, it is estimated that 20 jobs may be relocated from out of state. The site will run 7 days/week, 3 shifts per day. Average annual wages and benefits are estimated to be $78,000 per year.

Positions will vary from managerial to skilled workers to run the technology center and power plant. Many of these positions can be filled with workers from within Delaware who can be trained. The project is envisioned in 2 equal phases completed 8 months to a year apart, subject to

occupancy. It is estimated that over 60% of the anticipated jobs will be required for phase 1.

In addition to the permanent jobs created, there is an anticipated construction period of 24 to 36 months, depending on phasing, during which it is conservatively estimated to create 750 jobs of all trades, with an estimated direct economic impact of $80 Million in wages and benefits and substantially more in indirect impacts.

Further, the presence of a Technology Center is likely to spin off ancillary businesses, such as fiber switching hubs, maintenance services, IT management & supplier services as well as hospitality and general economy services including restaurants, office supplies, electrical and mechanical supply, office supply and other consumer services for visiting construction & maintenance technicians, tenant's customers & representatives and clients visiting the center as part of its day-to-day operations.

Further, in an effort to create strategic partnerships with local educational institutions, such as St. Georges Technical High School in the New Castle County Vocational-Technical School District, Delaware Technical Community College and the University of Delaware, the Project will seek to provide employment and training opportunities for students.

During the construction phases(s) of the Project, employment and training opportunities for students within the Skilled Trades, provided by St. Georges Technical HS, such as Electrical, HVAC, Plumbing and Carpentry will be available.

These opportunities could be coupled with the current school curriculum and co-op program, whereby students would rotate through their normal 2-week work/school rotation. This would present a platform for students to continue their education and training through a formal Apprenticeship Program sponsored by the Delaware Department of Labor.

In addition, there will be opportunities for students from both Delaware Tech and the University of Delaware through internships/externships/employment, specifically in the following engineering fields:

- Architecture & CAD Design
- Electrical Engineering
- Mechanical Engineering
- Environmental Engineering
- Civil Engineering
- Structural Engineering
- Information Systems Engineering & Management
- Facilities Management & Maintenance

Moreover, this effort to employ current students and future graduates allows the State of Delaware to maintain and retain its greatest asset, its "Human Capital", thereby increasing the current tax base for the State of Delaware. From an economic development standpoint, the desire for the State of Delaware to retain and attract current and future wage earners has multiple positive effects on the local and surrounding economy.

The Middletown Technology Center (MTC) is estimated to be a $350 Million project. Approximately two thirds of the project cost will be for the data center and the other one-third will be for a natural gas-fired, highly efficient, distributed generation self-powering plant.

The demand for "cloud" storage is increasing annually by 10% to 25%, based on various industry

sources. The new facility will be state of the art and offer the most efficient and technologically advanced support for servers and services. For this reason alone, it is attractive to users in existing aging and less reliable and efficient infrastructure.

The project site is located along the main fiber optic "highway" that connects the major cities in the Mid-Atlantic region. The site is a day-trip commute from the major business centers on the East Coast, which is appealing to business users who will not want to relocate their staff to remote areas like The Carolinas or Midwest, where electricity is also cost-effective.

The Middletown site will be serviced by two independent and extremely reliable 138 kV transmission lines through an adjacent substation. These two transmission lines are critical to the MTC's need for an extremely stable and reliable power source. Except during peak electric demand times, these transmission lines will be the source of electricity for MTC.

Electricity costs are approximately ½ the operating cost of a data center. Most of the remaining costs are land rent and operations. Electric power costs in the main East Coast data hubs near New York City, northern New Jersey, Philadelphia, Washington, D.C. and northern Virginia are significantly higher than in the northern Delaware area.

The ability to self-generate electrical power, particularly during peak demand times, allows MTC to provide power at the lowest rates in the region. The ability to self-generate extremely reliable power when it is cost effective and to purchase power from the grid when it is more cost-effective creates the economic incentives to induce IT clients to lease in Delaware.

The opportunity created by having a reliable on site power source helps create the necessary advantage by delivering power at more than 20% less than the other established IT regions along the East Coast.

The data center will be the main customer for the power plant. When requested by the City of Middletown and their electric provider, Delaware Municipal Electric Cooperative, the plant periodically may be used to supply power to the local grid in order to shave peak demand, which will have financial benefits for the Town, its residents and the project. The Technology Center project currently is negotiating both buy and sell agreements with the local utility, Delaware Municipal Electric Cooperative.

Along with Delaware's attractive labor and land costs relative to these hubs, the Technology Center will be able to redefine the market pricing for both current storage users and for expansion users. The Middletown Technology Center will be built in two phases, which will only go to construction once they are preleased to at least one-half of each phase's capacity. It is expected that Phase 1 will be sufficiently leased by summer 2016 to begin construction.

1.5 Summary

The proposed MTC Project's air pollution control measures meet the technology requirements and emission limits that are representative of BACT/LAER for reciprocating engines. The proposed emissions from the reciprocating engines will comply with all applicable Delaware and New Source Performance Standards. Because the project's proposed potential emissions of all criteria pollutants are below non-attainment thresholds, NNSR is not required for this project. The potential emissions for the project are below PSD applicability thresholds and thus PSD NSR review is also not required.

Table 1-1
Middletown Technology Center
Total Plant Potential Emissions - Synthetic Minor

	10 MW Reciprocating Engines						2.5 MW Reciprocating Engines							
Pollutant	Engine 1 @ 3,300 hr/yr ton/yr	Engine 2 @ 3,300 hr/yr ton/yr	Engine 3 @ 3,300 hr/yr ton/yr	Engine 4 @ 3,300 hr/yr ton/yr	Engine 5 @ 3,300 hr/yr ton/yr	Cold Startup Emissions ton/yr	Engine 6 @ 3,300 hr/yr ton/yr	Engine 7 @ 3,300 hr/yr ton/yr	Engine 8 @ 3,300 hr/yr ton/yr	Engine 9 @ 3,300 hr/yr ton/yr	Engine 10 @ 3,300 hr/yr ton/yr	Cold Startup Emissions ton/yr	Cooling Tower ton/yr	Total Plant Potential Emissions ton/yr
NO_x	2.18	2.18	2.18	2.18	2.18	4.30	0.75	0.75	0.75	0.75	0.75	0.11		19.08
VOC	1.82	1.82	1.82	1.82	1.82	0.58	0.56	0.56	0.56	0.56	0.56	0.03		12.52
CO	3.78	3.78	3.78	3.78	3.78	5.41	1.33	1.33	1.33	1.33	1.33	0.14		31.12
TSP	3.30	3.30	3.30	3.30	3.30	0.00	0.83	0.83	0.83	0.83	0.83	0.00	1.75	22.38
PM_{10}	1.88	1.88	1.88	1.88	1.88	0.00	0.47	0.47	0.47	0.47	0.47	0.00	1.75	13.51
$PM_{2.5}$	1.88	1.88	1.88	1.88	1.88	0.00	0.47	0.47	0.47	0.47	0.47	0.00	1.05	12.81
SO_2	0.37	0.37	0.37	0.37	0.37	0.00	0.10	0.10	0.10	0.10	0.10	0.00		2.35
NH_3	0.73	0.73	0.73	0.73	0.73	0.00	0.06	0.06	0.06	0.06	0.06	0.00		3.95
Formaldehyde	1.38	1.38	1.38	1.38	1.38	0.82	0.25	0.25	0.25	0.25	0.25	0.02		9.00

Table 1-2
Middletown Technology Center
Total Potential HAP Emissions - Synthetic Minor

	10 MW Reciprocating Engines						2.5 MW Reciprocating Engines						Total
HAP Pollutant	Engine 1 @ 3,300 hr/yr ton/yr	Engine 2 @ 3,300 hr/yr ton/yr	Engine 3 @ 3,300 hr/yr ton/yr	Engine 4 @ 3,300 hr/yr ton/yr	Engine 5 @ 3,300 hr/yr ton/yr	Cold Startup Emissions ton/yr	Engine 6 @ 3,300 hr/yr ton/yr	Engine 7 @ 3,300 hr/yr ton/yr	Engine 8 @ 3,300 hr/yr ton/yr	Engine 9 @ 3,300 hr/yr ton/yr	Engine 10 @ 3,300 hr/yr ton/yr	Cold Startup Emissions ton/yr	Potential Emissions HAP ton/yr
Acetaldehyde	0.2290	0.2290	0.2290	0.2290	0.2290	0.1353	0.0292	0.0292	0.0292	0.0292	0.0292	0.0023	1.4286
Acrolein	0.1408	0.1408	0.1408	0.1408	0.1408	0.0832	0.0179	0.0179	0.0179	0.0179	0.0179	0.0014	0.8784
Benzene	0.0121	0.0121	0.0121	0.0121	0.0121	0.0071	0.0015	0.0015	0.0015	0.0015	0.0015	0.0001	0.0752
Benzo(a)pyrene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001
Benzo(b,k)fluoranthene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Biphenyl	0.0058	0.0058	0.0058	0.0058	0.0058	0.0034	0.0007	0.0007	0.0007	0.0007	0.0007	0.0001	0.0362
Butadiene (1,3-)	0.0073	0.0073	0.0073	0.0073	0.0073	0.0043	0.0009	0.0009	0.0009	0.0009	0.0009	0.0001	0.0456
Carbon tetrachloride	0.0010	0.0010	0.0010	0.0010	0.0010	0.0006	0.0001	0.0001	0.0001	0.0001	0.0001	0.0000	0.0063
Chlorobenzene	0.0008	0.0008	0.0008	0.0008	0.0008	0.0005	0.0001	0.0001	0.0001	0.0001	0.0001	0.0000	0.0052
Chloroform	0.0008	0.0008	0.0008	0.0008	0.0008	0.0005	0.0001	0.0001	0.0001	0.0001	0.0001	0.0000	0.0049
Chrysene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001
Dichloropropene (1,3-)	0.0007	0.0007	0.0007	0.0007	0.0007	0.0004	0.0001	0.0001	0.0001	0.0001	0.0001	0.0000	0.0045
Ethyl benzene	0.0011	0.0011	0.0011	0.0011	0.0011	0.0006	0.0001	0.0001	0.0001	0.0001	0.0001	0.0000	0.0068
Ethylene Dibromide	0.0012	0.0012	0.0012	0.0012	0.0012	0.0007	0.0002	0.0002	0.0002	0.0002	0.0002	0.0000	0.0076
Formaldehyde	1.3823	1.3823	1.3823	1.3823	1.3823	0.8168	0.2509	0.2509	0.2509	0.2509	0.2509	0.0197	9.0023
Hexane	0.0304	0.0304	0.0304	0.0304	0.0304	0.0180	0.0039	0.0039	0.0039	0.0039	0.0039	0.0003	0.1897
Methanol	0.0685	0.0685	0.0685	0.0685	0.0685	0.0405	0.0087	0.0087	0.0087	0.0087	0.0087	0.0007	0.4272
Methylene Chloride	0.0005	0.0005	0.0005	0.0005	0.0005	0.0003	0.0001	0.0001	0.0001	0.0001	0.0001	0.0000	0.0034
Naphthalene	0.0020	0.0020	0.0020	0.0020	0.0020	0.0012	0.0003	0.0003	0.0003	0.0003	0.0003	0.0000	0.0127
Phenol	0.0007	0.0007	0.0007	0.0007	0.0007	0.0004	0.0001	0.0001	0.0001	0.0001	0.0001	0.0000	0.0041
POM	0.0007	0.0007	0.0007	0.0007	0.0007	0.0004	0.0001	0.0001	0.0001	0.0001	0.0001	0.0000	0.0046
Styrene	0.0006	0.0006	0.0006	0.0006	0.0006	0.0004	0.0001	0.0001	0.0001	0.0001	0.0001	0.0000	0.0040
Tetrachloroethane (1,1,2,2-)	0.0011	0.0011	0.0011	0.0011	0.0011	0.0006	0.0001	0.0001	0.0001	0.0001	0.0001	0.0000	0.0068
Toluene	0.0112	0.0112	0.0112	0.0112	0.0112	0.0066	0.0014	0.0014	0.0014	0.0014	0.0014	0.0001	0.0697
Trichloroethane (1,1,2-)	0.0009	0.0009	0.0009	0.0009	0.0009	0.0005	0.0001	0.0001	0.0001	0.0001	0.0001	0.0000	0.0054
Trimethylpentane (2,2,4-)	0.0068	0.0068	0.0068	0.0068	0.0068	0.0040	0.0009	0.0009	0.0009	0.0009	0.0009	0.0001	0.0427
Vinyl Chloride	0.0004	0.0004	0.0004	0.0004	0.0004	0.0002	0.0001	0.0001	0.0001	0.0001	0.0001	0.0000	0.0025
Xylenes	0.0050	0.0050	0.0050	0.0050	0.0050	0.0030	0.0006	0.0006	0.0006	0.0006	0.0006	0.0001	0.0314
												Total HAP	12.31

Table 1-3
Middletown Technology Center
Greenhouse Gas Potential Emission Calculations - Synthetic Minor

Designation	Max Heat Input MMBtu/hr	Fuel[1] Use Per Year Amount	Units	Type	Default High Heat Values (HHV)[2] Nat Gas mmBtu/scf	Default Emission Factors (EF)[2] CO_2 kg/mmBtu	CH_4 kg/mmBtu	N_2O kg/mmBtu	Greenhouse Gases Emissions CO_2 MT/yr[3]	CH_4 MT/yr[4]	N_2O MT/yr[4]	CO_2e MT/yr[6]
Caterpillar G20CM34 Engine #1	83.0	259,786,421	scf	NG	0.001026	53.06	0.001	0.0001	14,142.7	0.267	0.027	14,157.3
Caterpillar G20CM34 Engine #2	83.0	259,786,421	scf	NG	0.001026	53.06	0.001	0.0001	14,142.7	0.267	0.027	14,157.3
Caterpillar G20CM34 Engine #3	83.0	259,786,421	scf	NG	0.001026	53.06	0.001	0.0001	14,142.7	0.267	0.027	14,157.3
Caterpillar G20CM34 Engine #4	83.0	259,786,421	scf	NG	0.001026	53.06	0.001	0.0001	14,142.7	0.267	0.027	14,157.3
Caterpillar G20CM34 Engine #5	83.0	259,786,421	scf	NG	0.001026	53.06	0.001	0.0001	14,142.7	0.267	0.027	14,157.3
Caterpillar G3520H Engine #6	21.2	69,512,035	scf	NG	0.001026	53.06	0.001	0.0001	3,784.2	0.071	0.007	3,788.1
Caterpillar G3520H Engine #7	21.2	69,512,035	scf	NG	0.001026	53.06	0.001	0.0001	3,784.2	0.071	0.007	3,788.1
Caterpillar G3520H Engine #8	21.2	69,512,035	scf	NG	0.001026	53.06	0.001	0.0001	3,784.2	0.071	0.007	3,788.1
Caterpillar G3520H Engine #9	21.2	69,512,035	scf	NG	0.001026	53.06	0.001	0.0001	3,784.2	0.071	0.007	3,788.1
Caterpillar G3520H Engine #10	21.2	69,512,035	scf	NG	0.001026	53.06	0.001	0.0001	3,784.2	0.071	0.007	3,788.1
Total (GHG)	**520.9**								**89,634.3**	**1.689**	**0.169**	
Global Warming Potential (GWP)[5]									1	25	298	
$MTCO_2e$[6]											**MT/yr**	**89,726.9**
$MTCO_2e$[7]											**ton/yr**	**98,907.0**

Notes:

1: Maximum potential fuel consumption data with fuel use limitations.

2: Default high heating values and default emission factors from Table C-1 in Subpart C of 40 CFR 98.30 for Tier 1 calculations.

3: CO_2 emissions in metric tons using Tier 1 Equation C-1 in 40 CFR 98.33(a)1: $CO_2 = 1 \times 10^{-3} * Fuel * HHV * EF$

4: CH_4 or N_2O emissions in metric tons using Tier 1 Equation C-8 in 40 CFR 98.33(c) 1: CH_4 or $N_2O = 1 \times 10^{-3} * Fuel * HHV * EF$

5: Global waming potential factors from Table A-1 in 40 CFR 98.2(b)4.

6: CO_2e emissions using Equation A-1 in 40 CFR 98.2(b)4: $CO_2e = \sum GHG_i \times GWP_i$ in Metric tons/yr.

7: CO_2e emissions in tons/yr. ton/yr = MT/yr * 1.1023 ton/MT

Table 1-4
Middletown Technology Center
Total Plant Potential Emissions

	10 MW Reciprocating Engines						2.5 MW Reciprocating Engines							
Pollutant	Engine 1 @ 8,760 hr/yr ton/yr	Engine 2 @ 8,760 hr/yr ton/yr	Engine 3 @ 8,760 hr/yr ton/yr	Engine 4 @ 8,760 hr/yr ton/yr	Engine 5 @ 8,760 hr/yr ton/yr	Cold Startup Emissions ton/yr	Engine 6 @ 8,760 hr/yr ton/yr	Engine 7 @ 8,760 hr/yr ton/yr	Engine 8 @ 8,760 hr/yr ton/yr	Engine 9 @ 8,760 hr/yr ton/yr	Engine 10 @ 8,760 hr/yr ton/yr	Cold Startup Emissions ton/yr	Cooling Tower ton/yr	Total Plant Potential Emissions ton/yr
NO_x	5.79	5.79	5.79	5.79	5.79	4.30	2.00	2.00	2.00	2.00	2.00	0.11		43.37
VOC	4.83	4.83	4.83	4.83	4.83	0.58	1.50	1.50	1.50	1.50	1.50	0.03		32.24
CO	10.04	10.04	10.04	10.04	10.04	5.41	3.53	3.53	3.53	3.53	3.53	0.14		73.41
TSP	8.76	8.76	8.76	8.76	8.76	0.00	2.19	2.19	2.19	2.19	2.19	0.00	1.75	56.50
PM_{10}	4.99	4.99	4.99	4.99	4.99	0.00	1.25	1.25	1.25	1.25	1.25	0.00	1.75	32.96
$PM_{2.5}$	4.99	4.99	4.99	4.99	4.99	0.00	1.25	1.25	1.25	1.25	1.25	0.00	1.05	32.26
SO_2	0.99	0.99	0.99	0.99	0.99	0.00	0.26	0.26	0.26	0.26	0.26	0.00		6.24
NH_3	1.93	1.93	1.93	1.93	1.93	0.00	0.17	0.17	0.17	0.17	0.17	0.00		10.48
Formaldehyde	3.67	3.67	3.67	3.67	3.67	0.82	0.67	0.67	0.67	0.67	0.67	0.02		22.51

Table 1-5
Middletown Technology Center
Total Potential HAP Emissions

	10 MW Reciprocating Engines						2.5 MW Reciprocating Engines						Total
HAP Pollutant	Engine 1 @ 8,760 hr/yr ton/yr	Engine 2 @ 8,760 hr/yr ton/yr	Engine 3 @ 8,760 hr/yr ton/yr	Engine 4 @ 8,760 hr/yr ton/yr	Engine 5 @ 8,760 hr/yr ton/yr	Cold Startup Emissions ton/yr	Engine 6 @ 8,760 hr/yr ton/yr	Engine 7 @ 8,760 hr/yr ton/yr	Engine 8 @ 8,760 hr/yr ton/yr	Engine 9 @ 8,760 hr/yr ton/yr	Engine 10 @ 8,760 hr/yr ton/yr	Cold Startup Emissions ton/yr	Potential Emissions HAP ton/yr
Acetaldehyde	0.6079	0.6079	0.6079	0.6079	0.6079	0.1353	0.0775	0.0775	0.0775	0.0775	0.0775	0.0023	3.5647
Acrolein	0.3738	0.3738	0.3738	0.3738	0.3738	0.0832	0.0476	0.0476	0.0476	0.0476	0.0476	0.0014	2.1917
Benzene	0.0320	0.0320	0.0320	0.0320	0.0320	0.0071	0.0041	0.0041	0.0041	0.0041	0.0041	0.0001	0.1876
Benzo(a)pyrene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0002
Benzo(b,k)fluoranthene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001
Biphenyl	0.0154	0.0154	0.0154	0.0154	0.0154	0.0034	0.0020	0.0020	0.0020	0.0020	0.0020	0.0001	0.0904
Butadiene (1,3-)	0.0194	0.0194	0.0194	0.0194	0.0194	0.0043	0.0025	0.0025	0.0025	0.0025	0.0025	0.0001	0.1138
Carbon tetrachloride	0.0027	0.0027	0.0027	0.0027	0.0027	0.0006	0.0003	0.0003	0.0003	0.0003	0.0003	0.0000	0.0156
Chlorobenzene	0.0022	0.0022	0.0022	0.0022	0.0022	0.0005	0.0003	0.0003	0.0003	0.0003	0.0003	0.0000	0.0130
Chloroform	0.0021	0.0021	0.0021	0.0021	0.0021	0.0005	0.0003	0.0003	0.0003	0.0003	0.0003	0.0000	0.0122
Chrysene	0.0001	0.0001	0.0001	0.0001	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0003
Dichloropropene (1,3-)	0.0019	0.0019	0.0019	0.0019	0.0019	0.0004	0.0002	0.0002	0.0002	0.0002	0.0002	0.0000	0.0113
Ethyl benzene	0.0029	0.0029	0.0029	0.0029	0.0029	0.0006	0.0004	0.0004	0.0004	0.0004	0.0004	0.0000	0.0169
Ethylene Dibromide	0.0032	0.0032	0.0032	0.0032	0.0032	0.0007	0.0004	0.0004	0.0004	0.0004	0.0004	0.0000	0.0189
Formaldehyde	3.6694	3.6694	3.6694	3.6694	3.6694	0.8168	0.6659	0.6659	0.6659	0.6659	0.6659	0.0197	22.5129
Hexane	0.0807	0.0807	0.0807	0.0807	0.0807	0.0180	0.0103	0.0103	0.0103	0.0103	0.0103	0.0003	0.4733
Methanol	0.1818	0.1818	0.1818	0.1818	0.1818	0.0405	0.0232	0.0232	0.0232	0.0232	0.0232	0.0007	1.0660
Methylene Chloride	0.0015	0.0015	0.0015	0.0015	0.0015	0.0003	0.0002	0.0002	0.0002	0.0002	0.0002	0.0000	0.0085
Naphthalene	0.0054	0.0054	0.0054	0.0054	0.0054	0.0012	0.0007	0.0007	0.0007	0.0007	0.0007	0.0000	0.0317
Phenol	0.0017	0.0017	0.0017	0.0017	0.0017	0.0004	0.0002	0.0002	0.0002	0.0002	0.0002	0.0000	0.0102
POM	0.0020	0.0020	0.0020	0.0020	0.0020	0.0004	0.0002	0.0002	0.0002	0.0002	0.0002	0.0000	0.0115
Styrene	0.0017	0.0017	0.0017	0.0017	0.0017	0.0004	0.0002	0.0002	0.0002	0.0002	0.0002	0.0000	0.0101
Tetrachloroethane (1,1,2,2-)	0.0029	0.0029	0.0029	0.0029	0.0029	0.0006	0.0004	0.0004	0.0004	0.0004	0.0004	0.0000	0.0171
Toluene	0.0297	0.0297	0.0297	0.0297	0.0297	0.0066	0.0038	0.0038	0.0038	0.0038	0.0038	0.0001	0.1740
Trichloroethane (1,1,2-)	0.0023	0.0023	0.0023	0.0023	0.0023	0.0005	0.0003	0.0003	0.0003	0.0003	0.0003	0.0000	0.0136
Trimethylpentane (2,2,4-)	0.0182	0.0182	0.0182	0.0182	0.0182	0.0040	0.0023	0.0023	0.0023	0.0023	0.0023	0.0001	0.1066
Vinyl Chloride	0.0011	0.0011	0.0011	0.0011	0.0011	0.0002	0.0001	0.0001	0.0001	0.0001	0.0001	0.0000	0.0064
Xylenes	0.0134	0.0134	0.0134	0.0134	0.0134	0.0030	0.0017	0.0017	0.0017	0.0017	0.0017	0.0001	0.0785
												Total HAP	30.76

Table 1-6
Middletown Technology Center
Greenhouse Gas Potential Emission Calculations

Designation	Max Heat Input MMBtu/hr	Fuel[1] Use Per Year Amount	Units	Type	Default High Heat Values (HHV)[2] Nat Gas mmBtu/scf	Default Emission Factors (EF)[2] CO_2 kg/mmBtu	CH_4 kg/mmBtu	N_2O kg/mmBtu	Greenhouse Gases Emissions CO_2 MT/yr[3]	CH_4 MT/yr[4]	N_2O MT/yr[4]	CO_2e MT/yr[6]
Caterpillar G20CM34 Engine #1	83.0	689,614,863	scf	NG	0.001026	53.06	0.001	0.0001	37,542.3	0.708	0.071	37,581.1
Caterpillar G20CM34 Engine #2	83.0	689,614,863	scf	NG	0.001026	53.06	0.001	0.0001	37,542.3	0.708	0.071	37,581.1
Caterpillar G20CM34 Engine #3	83.0	689,614,863	scf	NG	0.001026	53.06	0.001	0.0001	37,542.3	0.708	0.071	37,581.1
Caterpillar G20CM34 Engine #4	83.0	689,614,863	scf	NG	0.001026	53.06	0.001	0.0001	37,542.3	0.708	0.071	37,581.1
Caterpillar G20CM34 Engine #5	83.0	689,614,863	scf	NG	0.001026	53.06	0.001	0.0001	37,542.3	0.708	0.071	37,581.1
Caterpillar G3520H Engine #6	21.2	184,691,371	scf	NG	0.001026	53.06	0.001	0.0001	10,054.5	0.189	0.019	10,064.9
Caterpillar G3520H Engine #7	21.2	184,522,857	scf	NG	0.001026	53.06	0.001	0.0001	10,045.3	0.189	0.019	10,055.7
Caterpillar G3520H Engine #8	21.2	184,522,857	scf	NG	0.001026	53.06	0.001	0.0001	10,045.3	0.189	0.019	10,055.7
Caterpillar G3520H Engine #9	21.2	184,522,857	scf	NG	0.001026	53.06	0.001	0.0001	10,045.3	0.189	0.019	10,055.7
Caterpillar G3520H Engine #10	21.2	184,522,857	scf	NG	0.001026	53.06	0.001	0.0001	10,045.3	0.189	0.019	10,055.7
Total (GHG)	520.9								237,947.5	4.484	0.448	
Global Warming Potential (GWP)[5]									1	25	298	
$MTCO_2e$[6]											MT/yr	238,193.3
$MTCO_2e$[76]											ton/yr	262,563.2

Notes:

1: Maximum potential fuel consumption data.

2: Default high heating values and default emission factors from Table C-1 in Subpart C of 40 CFR 98.30 for Tier 1 calculations.

3: CO_2 emissions in metric tons using Tier 1 Equation C-1 in 40 CFR 98.33(a)1: $CO_2 = 1 \times 10^{-3} * Fuel * HHV * EF$

4: CH_4 or N_2O emissions in metric tons using Tier 1 Equation C-8 in 40 CFR 98.33(c) 1: CH_4 or $N_2O = 1 \times 10^{-3} * Fuel * HHV * EF$

5: Global waming potential factors from Table A-1 in 40 CFR 98.2(b)4.

6: CO_2e emissions using Equation A-1 in 40 CFR 98.2(b)4: $CO_2e = \sum GHG_i \times GWP_i$ in Metric tons/yr.

7: CO_2e emissions in tons/yr. ton/yr = MT/yr * 1.1023 ton/MT

Table 1-7
Middletown Technology Center
Project Environmental Benefits

		10 MW Engines	2.5 MW Engines
Annual Engine Power Output[1]	MWh	160,050	40,739

	Electrical Production			
Pollutant	PJM 2014 Average Emission Rate[2] lb/MWh	10 MW Engines Emission Rate[3] lb/MWh	2.5 MW Engines Emission Rate[4] lb/MWh	Emission Reductions Electrical[5] ton/yr
CO_2	1,108.00	992.09	1,228.44	6,823
SO_2	2.22	0.022	0.024	221
NO_x	0.9	0.13	0.18	76

Notes:

1: Potential electrical generation from 10 MW and 2.5 MW engines at permitted hours.

2: PJM Report. 2012-2014 CO2, SO_2 and NO_x Emission Rates (August 21, 2015).

3: lb/MWh emission rates for the 10 MW engines.

4: lb/MWh emission rates for the 2.5 MW engines.

5: Total potential emission reductions from new engines for displaced PJM Utility electricity. ((PJM - 10MW) * MWh) + ((PJM - 2.5MW) * MWh) / 2000 lb/ton

2.0 PROJECT DESCRIPTION

2.1 Site Description

The proposed MTC Project will be located in Middletown, New Castle County, Delaware. The technology center would be constructed on a portion of a 60-acre parcel of land within the Middletown Auto Park on the western side of the town. The site is not inhabited by endangered species nor does it contain habitat for endangered species.

Surrounding land uses include industrial lands, commercial and residential dwellings (located 800 yards to 1000 yards away). The project's site coordinates are at approximately 39° 26' 36" N and 75° 43'45"W. The location of the proposed MTC project is displayed in Figure 2-1.

2.2 Proposed Project Equipment

The MTC project will have the capability to provide up to 62.5 MW of electrical power. The Middletown Technology Center has a projected demand of 50 MW when completed. The other approximately 12.5 MW of capacity represents one 10 MW engine and one 2.5 MW engine that are redundant to the minimum required number to meet the 50 MW load of the facility. Those two engines are necessary from a reliability perspective to cover periods when one of the other 10 MW or 2.5 MW engines are out of service for maintenance or repairs. On occasion when requested by Delaware Municipal Electric Corporation ('DEMEC"), MTC may export power to DEMEC during periods of high electricity demand.

The project will contain five (5) Caterpillar C20CM34 and five (5) Caterpillar G3520H natural gas fired reciprocating engines. Air emissions from the engines will be controlled using a selective catalytic reduction (SCR) system for NO_x control and an oxidation catalyst system for CO, VOC and HAP control

The five Caterpillar C20CM34 engines are each rated at 10,000 kW (10 MW). The engines are spark ignited, four stroke, lean-burn engines with a maximum heat input of 83 MMBtu/hr-HHV. MTC is proposing to establish a fuel cap of 1,299 million cubic feet per year ($MMft^3/yr$) total for all five 10 MW engines. The fuel cap is based on 3,300 hr/yr full load equivalent hours (16,500 total engine hours or 160,050 MWh/yr) for all five engines. The actual hours of operation for each individual engine can vary up to a maximum of 8,760 hr/yr.

The five Caterpillar G3520H engines are each rated at 2,500 kW (2.5 MW). The engines are spark ignited, four stroke, lean-burn engines with a maximum heat input of 21.2 MMBtu/hr-HHV. MTC is proposing to establish a fuel cap of 348 million cubic feet per year ($MMft^3/yr$) total for all five 2.5 MW engines. The fuel cap is based on 3,300 hr/yr full load equivalent hours (16,500 total engine hours or 40,739 MWh/yr) for all five engines. The actual hours of operation for each individual engine can vary up to a maximum of 8,760 hr/yr.

The fuel use caps would ensure that NO_x and VOC emissions for the project would be below 25 ton/yr, individual HAPs less than 10 ton/yr, combined HAPs below 25 ton/yr and CO_2e below 100,000 ton/yr. Therefore, the potential emissions do not trigger non-attainment new source review or PSD review. The proposed fuel caps establish the project as a synthetic minor source of air emissions.

The facility will contain a 40,000 gpm counter flow cooling tower with a design drift rate of 0.001%.

2.3 Air Pollution Control Equipment

All the reciprocating engines will be equipped with a SCR system for NO_x control and an oxidation catalyst unit for CO, VOC and HAP control. The SCR system will utilize a urea in water solution or aqueous ammonia for injection into the SCR system. The 10 MW engine will meet emission levels of 0.06, 0.1 and 0.05 grams per kilowatt hour ("gr/kW-hr") for NO_x, CO and VOC, respectively. The 2.5 MW engine will meet emission levels of 0.08, 0.15 and 0.06 gr/kW-hr for NO_x, CO and VOC, respectively.

The SCR and oxidation catalyst systems will reduce emissions of NO_x by 95% and CO by 93% for both the 10 MW and 2.5 MW engines outside of startup and shutdown periods. The oxidation catalyst system for the 10 MW engines will reduce VOC and formaldehyde emissions by 50% and 80%, respectively, during normal operating temperatures. The oxidation catalyst system for the 2.5 MW engines will reduce VOC and formaldehyde emissions by 82% and 90%, respectively, at normal operating temperatures. The lower VOC and formaldehyde emission reduction efficiency for the 10 MW engines is due to the higher electrical efficiency of the engines when compared to the 2.5 MW engines, which results in lower exhaust temperature that in turn lowers the oxidation catalyst efficiency.

The SCR system will contain a urea injection or aqueous ammonia (less than 19% ammonia in water solution) system. Cirrus will maintain and operate the urea or ammonia injection system in accordance with manufacturer's recommendation. If anything abnormal occurs with the urea system and/or its storage system, the reciprocating engines would be shut down until all issues related to the injection and/or storage system are resolved.

The use of spark ignited, lean-burn, natural gas-driven, reciprocating internal combustion engines with SCR and an oxidation catalyst systems results in emission levels of NO_x, CO, VOC and HAP that are representative BACT/LAER emission levels. Section 4.0 of this application contains a discussion of BACT/LAER as pertaining to the proposed project.

2.4 Facility Operation

2.4.1 Normal Operation

The engines are being installed principally for emergency operation in the event of a failure in both power feeds from the Town of Middletown. Additionally, the operating philosophy is to run the engines to power the data center when it is economically advantageous to do so, which is expected to occur occasionally. The MTC has a projected demand of 50 MW when completed. On occasion and when requested by DEMEC, MTC may export power during periods of public utility grid system high electric demand. In order to provide operating flexibility in generating the required electrical output, MTC is proposing to establish fuel consumption caps. MTC is proposing to establish fuel caps of 1,299 $MMft^3/yr$ and 348 $MMft^3/yr$, total volume for the five 10 MW engines and the five 2.5 MW engines, respectively.

This operating philosophy is consistent with maximizing the beneficial use of the reciprocating engines which also provides the greatest environmental benefits. Table 2-1 contains the maximum hourly and annual natural gas consumption rates for the 10 MW engines and Table 2-2 for the 2.5 MW engines.

2.4.2 Startup, Shutdown and Testing Provisions

In order to address within this permit, increased emissions during startup, shutdown, and testing operations, we have allowed for these periods which are defined in the following sections.

2.4.2.1 Startup

Startup is defined as the period from initial firing of natural gas in the reciprocating engine until steady state operation and temperatures in the SCR and the oxidation catalyst systems reach proper operating values. This period is typically 30 minutes from a cold start. During a cold start, the emissions for the first 15 minutes essentially are uncontrolled, but at lower mass emissions because of lower exhaust flow. The following 15 minutes emission reductions ramp to steady state controlled emissions as the SCR and oxidation catalyst temperatures reach normal operating levels.

The number of cold starts has been estimated and the emissions for total cold starts have also been estimated. The estimated emissions are included in Tables 2-1 and 2-2 for the 10 MW and 2.5 MW engines, respectively.

2.4.2.2 Shutdown

Shutdown is defined as the period from initial lowering of the reciprocating engine below 10% load to the cessation of natural gas firing. This period is typically 30 minutes. Emissions from a shutdown on a lb/hr basis are not expected to be greater than those at full load steady state operation.

2.4.2.3 Shakedown Period

In addition to the periods described above, MTC is requesting a shakedown period that will extend from initial reciprocating engine firing after installation until 180 days after initial firing. The 180 days corresponds to the timeframe allowed in USEPA NSPS Subpart A for performing an initial performance test after initial operation.

The shakedown period will consist of the period of time when testing, adjustment, and calibration have been completed satisfactorily to demonstrate that reliable operation has been achieved; including but not limited to, pre-firing testing, initial firing, subsequent testing, calibration, burn-in, and load testing and control device testing.

For example, the SCR/catalytic oxidation catalyst vendors typically recommend running a new engine in a loaded condition for a period of not less than 100 hours, before the catalyst element is installed. This running period will allow the piston rings to seal, valves to seat properly, and most major problems associated with engine start up to be resolved. In addition, ammonia flow optimization, control instrumentation tuning, etc. may result in emissions being greater than permitted limits during the shakedown period. MTC will ensure that these periods will be minimized as much as possible. During this shakedown period, the permitted hourly emissions are not applicable.

MTC will ensure that these periods will be minimized as much as possible. During this shakedown period, the permitted hourly emissions are included in the calculations as applicable.

2.5 Source Emissions

2.5.1 Short Term Emissions

Worst case hourly emissions for NO_x, CO, TSP/PM_{10}/$PM_{2.5}$, VOC and formaldehyde were requested by Cirrus to ensure the use of the most advanced design available and provided by the reciprocating engine manufacturer/SCR/oxidation catalyst vendors. Emissions of SO_2 were based on the maximum natural gas firing rate for the reciprocating engines and sulfur content in natural gas of 1.0 grains/100 SCF. The hourly uncontrolled and controlled criteria pollutant emission rates for the 10 MW and 2.5 MW reciprocating engines are shown in Table 2-1 and Table 2-2, respectively.

The hourly uncontrolled and controlled HAP emission rates for the 10 MW and 2.5 MW reciprocating engines are shown in Table 2-3 and Table 2-4, respectively. The HAP emissions are based on AP-42 emission factors for natural gas 4-stroke lean-burn engines from AP-42 Table 3.2-2, except for formaldehyde which was provided directly by the engine manufacturer. Engine performance and emissions data for the 10 MW and 2.5 MW engines are contained in Appendix A.

The maximum hourly emissions from the cooling tower are shown in Table 2-5. The hourly emissions for TSP, PM_{10} and $PM_{2.5}$ are based on the maximum cooling tower circulation rate, drift rate and maximum Total Dissolved Solids ("TDS") of water used in the cooling system.

2.5.2 Annual Emissions

Potential annual emissions for the proposed project are based on the worst-case lb/hr emission rates discussed above and the maximum (worst-case emissions) annual operating scenario requested, by operating the reciprocating engine at full load for the maximum proposed natural gas fuel use caps for the 10 and 2.5 MW engines.

Annual CO_2e potential emissions were calculated using the procedures outlined in the Mandatory Greenhouse Gas Emissions regulation using default high heating values and default emission factors from Table C-1 in Subpart C of 40 CFR 98.30 for Tier 1 calculations. Metric tons of CO_2e developed, using this method, were converted to short tons for comparison to DNREC CO_2e applicability thresholds.

The annual uncontrolled and controlled criteria pollutant emission rates for the 10 and 2.5 MW reciprocating engines are shown in Table 2-1 and Table 2-2, respectively. The annual uncontrolled and controlled HAP emission rates for the 10 MW and 2.5 MW reciprocating engines are shown in Table 2-3 and Table 2-4, respectively.

The maximum annual emissions from the cooling tower are shown in Table 2-5. The annual emissions for TSP, PM_{10} and $PM_{2.5}$ are based on the maximum hourly emissions and 8760 hr/yr operation.

Emissions referenced in this document are as follows: all TSP is assumed to be equal to PM_{10} and equal to $PM_{2.5}$, NO_x emissions are referenced as NO_2, VOC emissions as CH_4, and SO_x emissions as SO_2.

2.6 Impact Analysis

Per Section 3.13.1 of DE Admin. Code 1125, "The owner or operator shall provide an analysis of the impairment to visibility, soils and vegetation that would occur as a result of the source or modification and general commercial, residential, industrial and other growth associated with the source or modification. The owner or operator need not provide an analysis of the impact on vegetation having no significant commercial or recreational value." Similarly, Section 3.12.2 of the same regulations requires the owner or operator shall provide an analysis of the air quality impact projected for the area as a result of general commercial, residential, industrial and other growth associated with the source or modification. Although this section is not applicable to the project because it does not trigger PSD review, the following sections provide that analysis for informational purposes.

2.6.1 Growth Impact Analyses

The Middletown Technology Center is proposed to be constructed in a portion of Middletown, Delaware zoned appropriately for the use. The property formerly was designated and developed for automobile sales. The property selected is located between two large commercial operations (Home Depot Store and an active Amazon distribution warehouse) and the Town of Middletown wastewater treatment plant. New employees hired by Middletown Technology Center likely will come from within New Castle County and Kent Counties in Delaware or Cecil County in Maryland. Some may come from the lower counties of Pennsylvania or southwestern counties of New Jersey. The site location is urbanizing, will make use of existing public infrastructure, and will spur development of other public infrastructure, such as high speed data lines. Given the existing degree of urbanization in the vicinity of the site, no appreciable additional population or services related growth is anticipated to result from construction of the proposed Middletown Technology Center.

Local air quality impacts associated with construction of the Middletown Technology Center will be minor and temporary. While not readily quantifiable, the temporary increase in air emissions from construction equipment emissions, vehicle-miles traveled in the area by construction vehicles, material delivery vehicles and construction worker vehicles are anticipated to be insignificant in comparison to vehicle emissions associated with the nearby State highway (Delaware Route 299) and nearby U.S Highway 301.

2.6.2 Impacts on Soils, Vegetation and Wildlife

Certain air pollutants in acute concentrations or chronic exposures can impact soils, vegetation, or wildlife resources. For instance, SO_2 and NO_x emissions can combine with atmospheric moisture and form acids. Those acids can contribute to soil and surface water acidification. The Middletown Technology Center equipment will combust pipeline-quality natural gas and employ state-of-the-art equipment and emissions controls to reduce the formation of NO_x and SO_2. Detrimental effects on soils, vegetation, and wildlife will be insignificant, based on the projected emissions rates and minimal potential air quality impacts. The emissions of those substances will be well within the limits established thorough Federal regulations that were intended to guard against environmental degradation.

Possibly the greatest potential impact to wildlife, as a whole, is degradation of the composition, structure, and habitat that can result from facility construction. The proposed facility will not result in a direct loss of trees or wildlife habitat. In fact, construction of the facility will result in significant increase of trees, plants, and other vegetation on the site. The site currently is almost 100% covered by formerly cleared land of farm fields that are remnants of the former site usage.

Releases of pollutants can affect wildlife through inhalation, exposure through skin, or ingestion. However, based on low emissions levels from this facility, natural dispersion of emissions, and mobility of wildlife, no direct impacts to regional wildlife resources are expected.

Most impacts to wildlife due to emissions from fuel combustion are indirect. For instance, increased acidification to soils and water due to high levels of SO_2 affects amphibians through skin absorption, as well as impacting breeding success, particularly those that breed in vernal pools and acidified ponds. However, the facility's low emissions of pollutants known to stress vegetation will result in impacts below known thresholds of injury. To the extent that energy produced by facility displaces energy production at existing facilities that produce significantly larger amounts of such emissions, the Middletown Technology Center emissions should reduce impacts to sensitive vegetation in the region. Therefore, no adverse impacts to wildlife due to operation of the facility are predicted.

Given the apparent absence of particularly sensitive soils or vegetation in the site area, air pollutant impacts below the National Ambient Air Quality Standards (NAAQS) should cause no adverse effects on soils or vegetation. At the national level, the primary Ambient Air Quality Standards (AAQS) have been established to protect the public health, while the secondary AAQS have been established to protect the public welfare, property, vegetation, and other ecological systems from any known or anticipated detrimental effects. Ambient concentrations of the criteria pollutants at levels below the NAAQS would not be expected to harm most types of soils, vegetation or wildlife.

In summary, based on the types of soils, vegetation, and wildlife onsite and in the local area, as well as the minimal emissions levels associated with plant operation, no impacts to soils, vegetation, or wildlife in the vicinity of the Middletown Technology Center are anticipated.

2.6.3 Visibility Impairment Potential

No visibility impairment at the local level is expected due to the types and quantities of emissions projected from the facility sources. The opacity of exhausts from the facility will be low and typically at or approaching zero, principally due to the low concentrations of particulates and the virtual absence of sulfur oxides associated with natural gas combustion. The contribution of emissions of VOC to potential haze formation in the area will be minimal given the low VOC emissions rate from the Middletown Technology Center.

Wet mechanical draft cooling towers transfer heat from facility processes to the atmosphere through the evaporation and dispersion of cooling water. Depending on the meteorological conditions, warm, moist air leaving a tower may become cooled to the point of saturation, causing the water to condense forming a visible plume. Based on the size of the cooling towers and the frequency of occurrence the magnitude of a visible plume is expected to be small, and not significantly noticeable beyond the Middletown Technology Center site.

Aesthetically, the site is separated from the closest residential community by existing large commercial structures, a wastewater treatment plant, an industrial park and a railroad used for freight service. The site design for the Middletown Technology Center includes visual screening devices (topography, berms and vegetation) to minimize the aesthetic impact of the facility on residents of Middletown. The facility is set-back a distance of approximately 1,500 feet from the closest highways (US 301). The proposed facility should not adversely affect aesthetic or visual qualities in the area.

2.6.4 Noise Impacts

The Middletown Technology Center will be designed with noise reduction controls including, but not limited to, mufflers, enclosed by buildings and, in some cases, sound limiting enclosures.

In addition, exterior noise attenuating landscaping will be considered to further reduce noise at and beyond the property boundary, if determined to be necessary. Noise levels will not exceed the allowable noise levels outlined in the Town of Middletown code.

2.6.5 Odor Impacts

The potential for odor impacts as a result of ammonia slip from the SCR control units will be evaluated. SCR controls will be incorporated into the reciprocating engine exhaust systems. The maximum allowable ammonia slip will be limited to 5 ppmvd @15% O_2. AERMOD will be used to model maximum projected 1-hour, 24-hour, and annual averaging time ambient air concentrations. The applicant anticipates, and will demonstrate, that the predicted, dispersed ammonia concentrations in the vicinity of Middletown Technology Center will be less than the odor threshold for ammonia of 3.5 mg/m3 (5 ppm) as published by Agency for Toxic Substances and Disease Registry (ATSDR).

Table 2-1
Middletown Technology Center
10 MW Reciprocating Engine Emission Calculations

Typical Engine Properties	Units	Engine #1	Engine #2	Engine #3	Engine #4	Engine #5	Totals
Engine Manufacturer		Caterpillar	Caterpillar	Caterpillar	Caterpillar	Caterpillar	Combined
Engine Model No.		G20CM34	G20CM34	G20CM34	G20CM34	G20CM34	All Engines
Engine Brake Power	bkW	10,000	10,000	10,000	10,000	10,000	
Electrical Power Output	ekW	9,700	9,700	9,700	9,700	9,700	
Annual Electrical Power Output	MWh/yr	32,010	32,010	32,010	32,010	32,010	160,050
Mechanical Power Output	bhp	13,410	13,410	13,410	13,410	13,410	
Maximum Heat Input	MMBtu/hr- LHV	74.8	74.8	74.8	74.8	74.8	
Maximum Heat Input	MMBtu/hr- HHV	83.0	83.0	83.0	83.0	83.0	
Annual Energy Consumption	MMBtu/yr- HHV	273,944.8	273,944.8	273,944.8	273,944.8	273,944.8	1,369,724
Natural Gas Heating Value	Btu/ft^3-LHV	950	950	950	950	950	
Natural Gas Heating Value	BTU/lb	22,975	22,975	22,975	22,975	22,975	
Hourly Natural Gas Consumption	SCFH	78,723	78,723	78,723	78,723	78,723	
Annual Operation	hr/yr	3,300	3,300	3,300	3,300	3,300	16,500
Annual Natural Gas Consumption	MMSCF/yr	260	260	260	260	260	1,299
Exhaust Gas Mass, wet	lb/hr	123,759	123,759	123,759	123,759	123,759	
Stack Temperature	deg F	604	604	604	604	604	
Stack Exhaust Gas Volume, actual wet	ACFM	57,177	57,177	57,177	57,177	57,177	
Natural Gas Sulfur Content	gr/100 SCF	1.0	1.0	1.0	1.0	1.0	
Cold Startups per year		240	240	240	240	240	1,200

Pollutant	Engine Emission Guarantees gr/kW-hr[(1)]	Controlled Emissions Guarantees gr/kW-hr[(2)]	Control Efficiency %	Engine Emissions w/o Cont. Per Engine lb/hr[(3)]	Engine Emissions w/ Control Per Engine lb/hr[(3)]	Engine 1 @ 3,300 hr/yr ton/yr[(5)]	Engine 2 @ 3,300 hr/yr ton/yr[(5)]	Engine 3 @ 3,300 hr/yr ton/yr[(5)]	Engine 4 @ 3,300 hr/yr ton/yr[(5)]	Engine 5 @ 3,300 hr/yr ton/yr[(5)]	Cold Startup Emissions ton/yr[(6)]	Total 10 MW Emissions ton/yr[(8)]
NO_x	1.21	0.06	95	26.68	1.32	2.18	2.18	2.18	2.18	2.18	4.30	15.21
VOC	0.1	0.05	50	2.20	1.10	1.82	1.82	1.82	1.82	1.82	0.58	9.67
CO	1.48	0.104	93	32.63	2.29	3.78	3.78	3.78	3.78	3.78	5.41	24.33
TSP[(4)]				2.00	2.00	3.30	3.30	3.30	3.30	3.30	0.00	16.50
PM_{10}[(4)]				1.14	1.14	1.88	1.88	1.88	1.88	1.88	0.00	9.41
$PM_{2.5}$[(4)]				1.14	1.14	1.88	1.88	1.88	1.88	1.88	0.00	9.41
SO_2[(7)]				0.22	0.22	0.37	0.37	0.37	0.37	0.37	0.00	1.86
NH_3		0.02			0.44	0.73	0.73	0.73	0.73	0.73		3.64
Formaldehyde	0.19	0.038	80	4.19	0.84	1.38	1.38	1.38	1.38	1.38	0.82	7.73

Notes:

1: Based on worst case emissions provided by Caterpillar for G20CM34 engine.

2: Emissions after control using SCR and Oxidation Catalyst.

3: lb/hr emissions based on vendor emission guarantees and maximum engine brake power output. lb/hr = gr/kW-hr x bkW / 453.59 gr/lb

4: TSP/PM_{10}/$PM_{2.5}$ based on lb/hr emissions provided by Caterpillar. Conservatively assumes that PM_{10} and $PM_{2.5}$ is equal to TSP.

5: tons/yr emissions with control based on worst case operating scenario of propsed annual operation in hr/yr. ton/yr = (lb/hr x hr/yr) / 2000 lb/ton

6: Emissions from cold startup. Uncontrolled emissions for 15 min. * 0.5 load average + 15 min. * 0.5 partial control + 30 minutes controlled * five engines.
ton/yr = (((lb/hr$_{un}$ * 0.25 * 0.5) + ((lb/hr$_{un}$ - lb/hr$_c$) * 0.25 * 0.5) + (lb/hr$_c$ * 0.5)) * No. Starts * 5 engines) / 2000 lb/ton.

7: Based on sulfur content in natural gas of 1.0 grains/100 SCF. Lb/hr = SCFH / gr/100 SCF * 7000 gr S/lb * 2 lb SO_2/lb S.

Table 2-2
Middletown Technology Center
2.5 MW Reciprocating Engine Emission Calculations

Typical Engine Properties	Units	Engine #6	Engine #7	Engine #8	Engine #9	Engine #10	Totals
Engine Manufacturer		Caterpillar	Caterpillar	Caterpillar	Caterpillar	Caterpillar	Combined
Engine Model No.		G3520H	G20CM34	G20CM34	G20CM34	G20CM34	All Engines
Electrical Power Output	ekW	2,469	2,469	2,469	2,469	2,469	
Annual Electrical Power Output	MWh/yr	8,148	8,148	8,148	8,148	8,148	40,739
Mechanical Power Output	bhp	3,448	3,448	3,448	3,448	3,448	
Maximum Heat Input	MMBtu/hr- LHV	19.1	19.1	19.1	19.1	19.1	
Maximum Heat Input	MMBtu/hr- HHV	21.2	21.2	21.2	21.2	21.2	
Annual Energy Consumption	MMBtu/yr- HHV	69,828	69,828	69,828	69,828	69,828	349,142
Natural Gas Heating Value	Btu/ft^3-LHV	905	905	905	905	905	
Hourly Natural Gas Consumption	SCFH	21,064	21,064	21,064	21,064	21,064	
Annual Operation	hr/yr	3,300	3,300	3,300	3,300	3,300	16,500
Annual Natural Gas Consumption	MMSCF/yr	70	70	70	70	70	348
Exhaust Gas Mass, wet	lb/hr	29,037	29,037	29,037	29,037	29,037	
Stack Temperature	deg F	735	735	735	735	735	
Stack Exhaust Gas Volume, actual wet	ACFM	15,152	15,152	15,152	15,152	15,152	
Natural Gas Sulfur Content	gr/100 SCF	1.0	1.0	1.0	1.0	1.0	
Cold Startups per year		18	18	18	18	18	90

Pollutant	Engine Emission Guarantees gr/bhp-hr[1]	Controlled Emissions Guarantees gr/bhp-hr[2]	Control Efficiency %	Engine Emissions W/o Cont. Per Engine lb/hr[3]	Engine Emissions W/ Control Per Engine lb/hr[3]	Engine 6 @ 3,300 hr/yr ton/yr[5]	Engine 7 @ 3,300 hr/yr ton/yr[5]	Engine 8 @ 3,300 hr/yr ton/yr[5]	Engine 9 @ 3,300 hr/yr ton/yr[5]	Engine 10 @ 3,300 hr/yr ton/yr[5]	Cold Startup Emissions ton/yr[6]	Total 2.5 MW Emissions ton/yr[8]
NO_x	1.18	0.06	95	8.97	0.46	0.75	0.75	0.75	0.75	0.75	0.11	3.87
VOC	0.25	0.05	82	1.90	0.34	0.56	0.56	0.56	0.56	0.56	0.03	2.85
CO	1.52	0.106	93	11.55	0.81	1.33	1.33	1.33	1.33	1.33	0.14	6.79
TSP[4]				0.50	0.50	0.83	0.83	0.83	0.83	0.83	0.00	4.13
PM_{10}[4]				0.29	0.29	0.47	0.47	0.47	0.47	0.47	0.00	2.35
$PM_{2.5}$[4]				0.29	0.29	0.47	0.47	0.47	0.47	0.47	0.00	2.35
SO_2[7]				0.06	0.06	0.10	0.10	0.10	0.10	0.10	0.00	0.50
NH_3					0.04	0.06	0.06	0.06	0.06	0.06		0.31
Formaldehyde	0.20	0.02	90	1.52	0.15	0.25	0.25	0.25	0.25	0.25	0.02	1.27

Notes:

1: Based on worst case emissions provided by Caterpillar for G20CM34 engine.

2: Emissions after control using SCR and Oxidation Catalyst.

3: lb/hr emissions based on vendor emission guarantees and maximum engine brake horsepower. lb/hr = gr/bhp-hr x bhp / 453.59 gr/lb.

4: TSP/PM_{10}/$PM_{2.5}$ based on lb/hr emissions provided by Caterpillar for 10 MW engine and ratioed based on MW rating. 2 lb/hr = lb/hr * 2.5MW/10MW.

5: tons/yr emissions with control based on worst case operating scenario of propsed annual operation in hr/yr. ton/yr = (lb/hr x hr/yr) / 2000 lb/ton

6: Emissions from cold startup. Uncontrolled emissions for 15 min. * 0.5 load average + 15 min. * 0.5 partial control + 30 minutes controlled * five engines.
ton/yr = (((lb/hr_{un} * 0.25 * 0.5) + ((lb/hr_{un} - lb/hr_c) * 0.25 * 0.5) + (lb/hr_c * 0.5)) * No. Starts * 5 engines) / 2000 lb/ton.

7: Based on sulfur content in natural gas of 1.0 grains/100 SCF. lb/hr = SCFH / gr/100 SCF / 7000 gr S/lb * 2 lb SO_2/lb S.

Table 2-3
Middletown Technology Center
10 MW Reciprocating Engine Potential HAP Emission Calculations

ENGINE PROPERTIES	Units	Engine #1	Engine #2	Engine #3	Engine #4	Engine #5
Fuel Fired		Nat Gas	Nat Gas	Nat Gas	Nat Gas	Nat Gas
Engine Rating	bkW	10000	10000	10000	10000	10000
Maximum Heat Input	MMBtu/hr (HHV)	83.01	83.01	83.01	83.01	83.01
Maximum Hours	hr/yr	3,300	3,300	3,300	3,300	3,300
Annual Fuel Consumption	MMSCF/yr	260	260	260	260	260
Oxidation Catalyst Destruction Efficiency	%	80	80	80	80	80
Cold Startup per year		240	240	240	240	240

	AP-42 Factor	Hourly Emissions per Engine		Engine 1 @ 3,300 hr/yr	Engine 2 @ 3,300 hr/yr	Engine 3 @ 3,300 hr/yr	Engine 4 @ 3,300 hr/yr	Engine 5 @ 3,300 hr/yr	Cold Startup Emissions	Total Potential HAP
	Natural Gas	W/o Control	W/Control							
HAP Pollutant	lb/MMBtu[1]	lb/hr[2]	lb/hr[3]	ton/yr[4]	ton/yr[4]	ton/yr[4]	ton/yr[4]	ton/yr[4]	ton/yr	ton/yr[5]
Acetaldehyde	8.36E-03	6.94E-01	1.39E-01	0.2290	0.2290	0.2290	0.2290	0.2290	0.1353	1.2804
Acrolein	5.14E-03	4.27E-01	8.53E-02	0.1408	0.1408	0.1408	0.1408	0.1408	0.0832	0.7872
Benzene	4.40E-04	3.65E-02	7.31E-03	0.0121	0.0121	0.0121	0.0121	0.0121	0.0071	0.0674
Benzo(a)pyrene	4.15E-07	3.45E-05	6.89E-06	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001
Benzo(b,k)fluoranthene	1.66E-07	1.38E-05	2.76E-06	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Biphenyl	2.12E-04	1.76E-02	3.52E-03	0.0058	0.0058	0.0058	0.0058	0.0058	0.0034	0.0325
Butadiene (1,3-)	2.67E-04	2.22E-02	4.43E-03	0.0073	0.0073	0.0073	0.0073	0.0073	0.0043	0.0409
Carbon tetrachloride	3.67E-05	3.05E-03	6.09E-04	0.0010	0.0010	0.0010	0.0010	0.0010	0.0006	0.0056
Chlorobenzene	3.04E-05	2.52E-03	5.05E-04	0.0008	0.0008	0.0008	0.0008	0.0008	0.0005	0.0047
Chloroform	2.85E-05	2.37E-03	4.73E-04	0.0008	0.0008	0.0008	0.0008	0.0008	0.0005	0.0044
Chrysene	6.93E-07	5.75E-05	1.15E-05	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001
Dichloropropene (1,3-)	2.64E-05	2.19E-03	4.38E-04	0.0007	0.0007	0.0007	0.0007	0.0007	0.0004	0.0040
Ethyl benzene	3.97E-05	3.30E-03	6.59E-04	0.0011	0.0011	0.0011	0.0011	0.0011	0.0006	0.0061
Ethylene Dibromide	4.43E-05	3.68E-03	7.36E-04	0.0012	0.0012	0.0012	0.0012	0.0012	0.0007	0.0068
Formaldehyde[6]	Mfg.	4.19E+00	8.38E-01	1.3823	1.3823	1.3823	1.3823	1.3823	0.8168	7.7283
Hexane	1.11E-03	9.21E-02	1.84E-02	0.0304	0.0304	0.0304	0.0304	0.0304	0.0180	0.1700
Methanol	2.50E-03	2.08E-01	4.15E-02	0.0685	0.0685	0.0685	0.0685	0.0685	0.0405	0.3829
Methylene Chloride	2.00E-05	1.66E-03	3.32E-04	0.0005	0.0005	0.0005	0.0005	0.0005	0.0003	0.0031
Naphthalene	7.44E-05	6.18E-03	1.24E-03	0.0020	0.0020	0.0020	0.0020	0.0020	0.0012	0.0114
Phenol	2.40E-05	1.99E-03	3.98E-04	0.0007	0.0007	0.0007	0.0007	0.0007	0.0004	0.0037
POM	2.69E-05	2.23E-03	4.47E-04	0.0007	0.0007	0.0007	0.0007	0.0007	0.0004	0.0041
Styrene	2.36E-05	1.96E-03	3.92E-04	0.0006	0.0006	0.0006	0.0006	0.0006	0.0004	0.0036
Tetrachloroethane (1,1,2,2-)	4.00E-05	3.32E-03	6.64E-04	0.0011	0.0011	0.0011	0.0011	0.0011	0.0006	0.0061
Toluene	4.08E-04	3.39E-02	6.77E-03	0.0112	0.0112	0.0112	0.0112	0.0112	0.0066	0.0625
Trichloroethane (1,1,2-)	3.18E-05	2.64E-03	5.28E-04	0.0009	0.0009	0.0009	0.0009	0.0009	0.0005	0.0049
Trimethylpentane (2,2,4-)	2.50E-04	2.08E-02	4.15E-03	0.0068	0.0068	0.0068	0.0068	0.0068	0.0040	0.0383
Vinyl Chloride	1.49E-05	1.24E-03	2.47E-04	0.0004	0.0004	0.0004	0.0004	0.0004	0.0002	0.0023
Xylenes	1.84E-04	1.53E-02	3.05E-03	0.0050	0.0050	0.0050	0.0050	0.0050	0.0030	0.0282
									Total HAPS	10.69

Notes:

1: AP-42 emissions factors for natural gas 4-stroke lean burn engine from AP-42 Table 3.2-2 in pounds per million Btu.

2: Hourly emissions in pounds per hour per engine without oxidation catalyst control. lb/hr = lb/MMBtu * MMBtu/hr (HHV)

3: Hourly emissions in pounds per hour per engine with oxidation catalyst control. lb/hr = lb/MMBtu * (1-(eff/100))* MMBtu/hr (HHV)

4: Annual potential emissions in tons per year per engine with oxidation catalyst control. ton/yr = lb/hr * hr/yr / 2000 lb/ton

5: Total annual potential emissions in tons per year for 5 reciprocating engines.

6: Formadehyde emissions based on Caterpillar data.

Table 2-4
Middletown Technology Center
2.5 MW Reciprocating Engine Potential HAP Emission Calculations

ENGINE PROPERTIES	Units	Engine #6	Engine #7	Engine #8	Engine #9	Engine #10
Fuel Fired		Nat Gas	Nat Gas	Nat Gas	Nat Gas	Nat Gas
Engine Rating	bkW	2500	2500	10000	10000	10000
Maximum Heat Input	MMBtu/hr (HHV)	21.16	21.16	21.16	21.16	21.16
Maximum Hours	hr/yr	3,300	3,300	3,300	3,300	3,300
Annual Fuel Consumption	MMSCF/yr	70	70	70	70	70
Oxidation Catalyst Destruction Efficiency	%	90	90	90	90	90
		18	18	18	18	18

	AP-42 Factor	Hourly Emissions per Engine		Engine 6 @ 3,300 hr/yr	Engine 7 @ 3,300 hr/yr	Engine 8 @ 3,300 hr/yr	Engine 9 @ 3,300 hr/yr	Engine 10 @ 3,300 hr/yr	Cold Startup Emissions	Total Potential HAP
	Natural Gas	W/o Control	W/Control							
HAP Pollutant	lb/MMBtu[1]	lb/hr[2]	lb/hr[3]	ton/yr[4]	ton/yr[4]	ton/yr[4]	ton/yr[4]	ton/yr[4]	ton/yr	ton/yr[5]
Acetaldehyde	8.36E-03	1.77E-01	1.77E-02	0.0292	0.0292	0.0292	0.0292	0.0292	0.0023	0.1482
Acrolein	5.14E-03	1.09E-01	1.09E-02	0.0179	0.0179	0.0179	0.0179	0.0179	0.0014	0.0911
Benzene	4.40E-04	9.31E-03	9.31E-04	0.0015	0.0015	0.0015	0.0015	0.0015	0.0001	0.0078
Benzo(a)pyrene	4.15E-07	8.78E-06	8.78E-07	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Benzo(b,k)fluoranthene	1.66E-07	3.51E-06	3.51E-07	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Biphenyl	2.12E-04	4.49E-03	4.49E-04	0.0007	0.0007	0.0007	0.0007	0.0007	0.0001	0.0038
Butadiene (1,3-)	2.67E-04	5.65E-03	5.65E-04	0.0009	0.0009	0.0009	0.0009	0.0009	0.0001	0.0047
Carbon tetrachloride	3.67E-05	7.77E-04	7.77E-05	0.0001	0.0001	0.0001	0.0001	0.0001	0.0000	0.0007
Chlorobenzene	3.04E-05	6.43E-04	6.43E-05	0.0001	0.0001	0.0001	0.0001	0.0001	0.0000	0.0005
Chloroform	2.85E-05	6.03E-04	6.03E-05	0.0001	0.0001	0.0001	0.0001	0.0001	0.0000	0.0005
Chrysene	6.93E-07	1.47E-05	1.47E-06	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Dichloropropene (1,3-)	2.64E-05	5.59E-04	5.59E-05	0.0001	0.0001	0.0001	0.0001	0.0001	0.0000	0.0005
Ethyl benzene	3.97E-05	8.40E-04	8.40E-05	0.0001	0.0001	0.0001	0.0001	0.0001	0.0000	0.0007
Ethylene Dibromide	4.43E-05	9.37E-04	9.37E-05	0.0002	0.0002	0.0002	0.0002	0.0002	0.0000	0.0008
Formaldehyde[6]	Mfg.	1.52E+00	1.52E-01	0.2509	0.2509	0.2509	0.2509	0.2509	0.0197	1.2739
Hexane	1.11E-03	2.35E-02	2.35E-03	0.0039	0.0039	0.0039	0.0039	0.0039	0.0003	0.0197
Methanol	2.50E-03	5.29E-02	5.29E-03	0.0087	0.0087	0.0087	0.0087	0.0087	0.0007	0.0443
Methylene Chloride	2.00E-05	4.23E-04	4.23E-05	0.0001	0.0001	0.0001	0.0001	0.0001	0.0000	0.0004
Naphthalene	7.44E-05	1.57E-03	1.57E-04	0.0003	0.0003	0.0003	0.0003	0.0003	0.0000	0.0013
Phenol	2.40E-05	5.08E-04	5.08E-05	0.0001	0.0001	0.0001	0.0001	0.0001	0.0000	0.0004
POM	2.69E-05	5.69E-04	5.69E-05	0.0001	0.0001	0.0001	0.0001	0.0001	0.0000	0.0005
Styrene	2.36E-05	4.99E-04	4.99E-05	0.0001	0.0001	0.0001	0.0001	0.0001	0.0000	0.0004
Tetrachloroethane (1,1,2,2-)	4.00E-05	8.46E-04	8.46E-05	0.0001	0.0001	0.0001	0.0001	0.0001	0.0000	0.0007
Toluene	4.08E-04	8.63E-03	8.63E-04	0.0014	0.0014	0.0014	0.0014	0.0014	0.0001	0.0072
Trichloroethane (1,1,2-)	3.18E-05	6.73E-04	6.73E-05	0.0001	0.0001	0.0001	0.0001	0.0001	0.0000	0.0006
Trimethylpentane (2,2,4-)	2.50E-04	5.29E-03	5.29E-04	0.0009	0.0009	0.0009	0.0009	0.0009	0.0001	0.0044
Vinyl Chloride	1.49E-05	3.15E-04	3.15E-05	0.0001	0.0001	0.0001	0.0001	0.0001	0.0000	0.0003
Xylenes	1.84E-04	3.89E-03	3.89E-04	0.0006	0.0006	0.0006	0.0006	0.0006	0.0001	0.0033
									Total HAPS	1.62

Notes:

1: AP-42 emissions factors for natural gas 4-stroke lean burn engine from AP-42 Table 3.2-2 in pounds per million Btu.

2: Hourly emissions in pounds per hour per engine without oxidation catalyst control. lb/hr = lb/MMBtu * MMBtu/hr (HHV)

3: Hourly emissions in pounds per hour per engine with oxidation catalyst control. lb/hr = lb/MMBtu * (1-(eff/100))* MMBtu/hr (HHV)

4: Annual potential emissions in tons per year per engine with oxidation catalyst control. ton/yr = lb/hr * hr/yr / 2000 lb/ton

5: Total annual potential emissions in tons per year for 5 reciprocating engines.

6: Formadehyde emissions based on Caterpillar data.

Table 2-5
Middletown Technology Center
Cooling Tower Emission Calculations

Parameter	Description	Value	Units
Q	Circulating Water Flow	40,000	gpm
% drift	Drift Rate	0.001	%
TDS	Toltal Dissolved Solids (TDS) Concentration	2000	ppm
ρ_{H2O}	Water Density	8.33	lb/gal
$E_{lb/hr}$ $(TSP/PM_{10})^{(1)}$	Hourly TSP/PM_{10} emissions	0.40	lb/hr
$F_{PM2.5}^{(2)}$	$PM_{2.5}$ Fraction	60	%
$E_{lb/hr}$ $(PM_{2.5})^{(3)}$	Hourly $PM_{2.5}$ emissions	0.24	lb/hr
$A_{hr/yr}^{(4)}$	Annual Operation	8760	hr/yr
$E_{ton/yr}$ $(TSP/PM_{10})^{(5)}$	Annual TSP/PM_{10} emissions	1.75	ton/yr
$E_{ton/yr}$ $(PM_{2.5})^{(6)}$	Annual $PM_{2.5}$ emissions	1.05	ton/yr

Notes:

1: Cooling tower particulate Emissions. $E = Q \times TDS/10^6 \times \% \text{ drift}/100 \times \rho_{H2O} \times 60$ minutes/hour

2: California Air Resources Board's CEIDARS database, $PM_{2.5}$ is 60% of PM_{10} from cooling towers

3: $PM_{2.5}$ hourly emissions. Elb/hr ($PM_{2.5}$ = Elb/hr (TSP/PM_{10}) * $FPM_{2.5}$ /100

4: Proposed cooling tower annual operation in hours/year.

5: Annual TSP/PM_{10} emissions. $E_{ton/yr}$ (TSP/PM_{10}) = $E_{lb/hr}$ (TSP/PM_{10}) * $A_{hr/yr}$ / 2000 lb/ton

6: Annual $PM_{2.5}$ emissions. $E_{ton/yr}$ $(PM_{2.5})$ = $E_{lb/hr}$ $(PM_{2.5})$ * $A_{hr/yr}$ / 2000 lb/ton

Figure 2-1
MTC Project
Middletown Delaware
Site Location Map

3.0 AIR QUALITY REGULATIONS

The Delaware Department of Natural Resources and Environmental Control ("DNREC") requires that new or modified air emission sources undergo pre-construction review in accordance with Title 7, Natural Resources and Environmental Control, DE Admin. Code 1102.

In order to receive an air permit, the applicant must conduct engineering and environmental analyses to demonstrate that the proposed project will comply with all applicable regulations. The major regulations with which the proposed project must comply with are:

- Delaware Air Quality Regulatory Standards;
- Best Available Control Technology ("BACT") Analysis;
- New Source Performance Standards Compliance; and
- Non-Attainment/PSD Non Applicability Determination.

The following sections discuss the state and federal regulations that are, or are potentially, applicable to the MTC Project. Table 3-1 summarizes the applicable emission standards along with the proposed emission limitations for the new reciprocating engines.

3.1 State Regulations

The state regulations that apply to the MTC Project are summarized in the following sections.

3.1.1 Particulate Emissions from Fuel-Burning Equipment 7 DE Admin. Code 1104

Section 1104.2.0 establishes emission limits for particulates. For fuel burning equipment the particulate emissions must be less than 0.3 lb/MMBtu determined as the maximum 2-hour average. The proposed TSP emission rates are 0.027 and 0.025 lb/MMBtu-LHV for the 10 MW and 2.5 MW engines, respectively. These proposed emission rates are well below the regulatory limit.

3.1.2 Particulate Emissions from Industrial Process Operations 7 DE Admin. Code 1105

Section 1105.2.0 limits the particulate emissions from industrial processes to 0.2 grains per standard cubic foot. This limit applies to the cooling tower. The TSP emissions from the cooling tower will be significantly lower than the 0.2 gr/SCF limit.

Section 1105.7.0 requires that the concentration of potentially hazardous particulates be listed. The cooling tower will not use and is not expected to emit any hazardous particulates.

3.1.3 Sulfur Dioxide Emissions from Fuel Burning Equipment 7 DE Admin. Code 1108

On and after July 1, 2016, no person shall offer for sale, sell, deliver, or purchase any fuel having a sulfur content greater than 1.0% by weight for "any other fuel" such as natural gas. The MTC project will use pipeline quality natural gas. Pipeline quality natural gas is typically limited to a maximum sulfur quantity of 20 grains/100 standard cubic feet (0.06 w/w%). Typical delivered natural gas has a sulfur content less than 1.0 gr/100 SCF (0.003 w/w%).

3.1.4 Visible Emissions
7 DE Admin. Code 1114

Smoke emissions from fuel combustion are subject to the requirements of 7 DE Admin. Code Section 1114.2.1. The rule requires that no person shall cause or allow the emission of visible air contaminants or smoke from a stationary or mobile source, the shade or appearance of which is greater than 20% opacity for an aggregate of more than three minutes in any one hour or more than 15 minutes in any 24 hour period. The facility will comply with the visible emission standard.

3.1.5 Requirements for Preconstruction Review
7 DE Admin. Code 1125

3.1.5.1 Prevention of Significant Deterioration ("PSD") New Source Review

Prevention of Significant Deterioration regulations require new major stationary sources and major modifications to stationary sources located in attainment and unclassified areas to:

- conduct a BACT analysis;
- demonstrate compliance with PSD air quality increments;
- demonstrate compliance with ambient air quality standards;
- determine project impacts on soils, vegetation, growth and visibility; and
- determine the need to conduct up to a 12 month pre-construction monitoring program.

The determination of whether or not a source is subject to PSD review, and to what extent the review must be conducted is based upon a comparison of source emissions and impacts to pollutant thresholds specified in the PSD regulations.

Under the PSD regulations, a source is classified as a major stationary source if:

- it falls into one of the 28 source categories identified in 40 CFR 52.21 and has the potential to emit of 100 tons per year or more of any regulated pollutant; or

- it is not identified in 40 CFR 52.21 as one of the 28 source categories but emits 250 tons per year or more of any regulated pollutant.

The MTC Project does not fall into any PSD Major Source category. In addition, the facility's potential to emit is less than 250 tons/yr. Therefore, the facility is considered a minor PSD source and has a 250 ton/yr major source threshold.

Therefore, in order to be subject to PSD requirements, the project would need to propose potential emission that is major by itself (i.e., 250 ton/yr increase). Table 3-2 shows the potential emissions from the proposed project compared to the 250 ton/yr PSD threshold. As shown in Table 3-2, the proposed potential emissions from the project are well below 250 ton/yr and therefore PSD NSR review is not required for this project.

7 DE Admin. Code 1125 requires PSD review if potential emissions of CO_2e exceed 100,000 ton/yr. If potential emissions of CO_2e exceed the threshold, a BACT analysis for CO_2e would be required and any other criteria pollutant above significant rates would also require a BACT analysis.

As shown in Table 1-3, the proposed potential emissions of CO_2e are below 100,000 ton/yr and thus not subject to BACT review. Because CO_2e potential emissions are below 100,000 ton/yr, no

other criteria pollutant is subject to BACT review as well.

3.1.5.2 Non-Attainment New Source Review ("NNSR")

7 DE Admin. Code 1125 establishes requirements for facilities that trigger Non-Attainment New Source Review ("NNSR"). The USEPA has designated New Castle County as meeting the National Ambient Air Quality Standards (NAAQS) for SO_2, NO_2, CO, $PM_{2.5}$ and Pb, while not meeting the NAAQS for ozone (O_3).

New Castle County has been classified as a severe ozone non-attainment area with a trigger of 25 ton/yr for NO_x and VOC. Table 3-2 presents the regulatory program applicability of each criteria pollutant based on the ambient air quality designations for the Middletown, New Castle County, Delaware area. Please note that NO_x is considered an ozone precursor in addition to having its own NAAQS.

As shown in Table 3-2, the proposed potential emissions of NO_x and VOC from the project are each below the 25 ton/yr NNSR trigger level. As such, the project does not trigger NNSR. However, potential emissions of several substances exceed five ton/yr and triggering the requirement for a Minor New Source Review ("MNSR") as outlined in 7 DE Admin. Code Section 1125 Section 4.0.

3.1.5.3 Minor New Source Review ("MNSR")

If a project does not trigger PSD or NNSR, then MNSR is required. 7 DE Admin. Code Section 1125 Section 4.0 MNSR requires that for any proposed new stationary source must be controlled by installing and operating emission control technology that limits emissions to the atmosphere, if it is not subject to NNSR or PSD NSR review (i.e., minor source) and has a potential to emit equal to or greater than five tons per year of:

- Volatile organic compounds (VOC's);
- Nitrogen oxides (NO_x);
- Sulfur dioxide (SO_2), sulfur trioxide (SO_3), or a combination of both [also termed sulfur oxides (SO_x)];
- Fine particulate matter ($PM_{2.5}$); or
- Any of the hazardous air pollutants (HAP's) listed in Section 112(b) of the federal Clean Air Act, in aggregate.

Section 4.0 of this application discusses the BACT analysis for the project as required by MNSR requirements.

3.1.6 Title V State Operating Permit Program 7 DE Admin. Code 1130

7 DE Admin. Code 1130 requires that a facility obtain a Title V Operating Permit if facility wide potential emissions are above major source thresholds. A major source is defined as any source with potential emissions of criteria pollutants greater than 100 ton/yr and for severe ozone nonattainment areas such as New Castle County, 25 ton/yr for NO_x and VOC.

For HAP a major Title V source is defined as a facility that emits or has the potential to emit, in the aggregate, 10 tons per year or more of any hazardous air pollutant that has been listed pursuant to section 112(b) (Hazardous Air Pollutants List) of the Act or 25 ton/yr or more of any combination of such hazardous air pollutants.

As shown in Table 3-2, the project potential emissions of criteria pollutants and HAPs are below the Title V Major Source Thresholds Therefore, the facility is classified as a minor source and a Title V Operating Permit is not required.

3.1.7 Control of Stationary Generator Emissions 7 DE Admin. Code 1144

7 DE Admin. Code 1144 establishes emission standards for new distributed generators. A new distributed generator Installed on or after January 1, 2012 is required to meet the following emission standards.

Pollutant	Emission Standards (lbs/MWh)
Nitrogen Oxides	0.6
Non-methane Hydrocarbons	0.3
Carbon Monoxide	2
Carbon Dioxide	1,650

The new reciprocating engines proposed emissions rates will be less than the required standards as shown in Table 3-1.

3.2 Federal Regulations

The federal regulations applicable to the new reciprocating engines are outlined below along with the determination of applicability.

3.2.1 40 CFR 60, Subpart A, Standards of Performance for New Stationary Sources

The new reciprocating engines are subject to the requirements of 40 CFR Part 60 concerning standards of performance for new stationary sources. The new reciprocating engine is subject to NSPS Subpart JJJJ, Standards of Performance for Stationary Spark Ignition Internal Combustion Engines.

Subpart A of 40 CFR Part 60 lists the general provisions of the standards which include notification and record-keeping requirements, performance tests, compliance with standards and maintenance requirements, monitoring and general control device requirements.

3.2.2 40 CFR 60 Subpart JJJJ, Standards of Performance for Stationary Spark Ignition Internal Combustion Engines

The provisions of NSPS Subpart JJJJ are applicable to the owner and operator of each stationary Spark Ignition ("SI") Internal Combustion Engine ("ICE") that commence construction after June 12, 2006, where the stationary SI ICE is manufactured on or after July 1, 2007, for engines with a maximum engine power greater than or equal to 500 HP.

The new engines must meet emission standards of NO_x of 1.0 g/kW-hr, CO of 0.5 g/kW-hr and VOC of 0.7 g/kW-hr. The owner or operator of a stationary SI internal combustion engine that is manufactured after July 1, 2008, must demonstrate compliance with the emission standards by

purchasing a certified engine for the same engine class and maximum engine power.

The owner and their operator must operate and maintain the certified stationary SI internal combustion engine and control device according to the manufacturer's emission-related written instructions, must keep records of conducted maintenance to demonstrate compliance, but no performance testing is required.

The proposed new engines will have emissions well below the NSPS Subpart JJJJ emissions standards as shown in Table 3-1. In accordance with Section 60.4243 of Subpart JJJJ, the non-certified engines and control devices must be operated and maintained according to the manufacturer's emission-related written instructions.

Subpart JJJJ also requires an initial performance test within one year of engine start up and to conduct subsequent performance stack tests after every 8,760 hours of engine operation or 3 years, whichever occurs first.

3.2.3 40 CFR 61, National Emission Standards for Hazardous Air Pollutants

Subparts A-Z and AA-FF of the regulation were reviewed. The engines do not fall under the applicability requirements of any of these subparts. The engines are therefore not subject to the requirements of these federal regulations.

3.2.4 40 CFR 63, National Emission Standards for Hazardous Air Pollutants for Source Categories

Because HAP emissions are below major source thresholds for the facility, the facility is classified as a minor area source. Because the engines are new they must meet the requirements of NSPS Subpart JJJJ, but is not subject to the MACT NESHAPS in Subpart ZZZZ- National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines, in accordance with 40 CFR 63.6590(c).

The new engines will comply with the RICE NESHAP and referenced NSPS through applicable emissions standards and maintenance requirements outlined in 40 CFR 60 Subpart JJJJ, as discussed in Section 3.2.2 of this application.

Table 3-1
Middletown Technology Center
Applicable Requirements For Proposed Reciprocating Engines

Pollutant	Applicable Requirement Citation	Units of Standard	Reciprocating Engines		
			SI RICE	Proposed Limits	
			Standard	10 MW	2.5 MW
NO_x	Regulation No. 1144	lb/MWh	0.6	0.132	0.185
	40 CFR 60.4233- NSPS Subpart JJJJ	gr/bhp-hr	1	0.045	0.060
CO	Regulation No. 1144	lb/MWh	2	0.23	0.33
	40 CFR 60.4233- NSPS Subpart JJJJ	gr/bhp-hr	2	0.078	0.106
VOC	Regulation No. 1144	lb/MWh	0.3	0.11	0.14
	40 CFR 60.4233- NSPS Subpart JJJJ	gr/bhp-hr	0.7	0.037	0.045
SO2	Regulation No. 1108	% S	1	0.060	0.060
TSP	Regulation No. 1104	lb/MMBtu	0.3	0.03	0.03
CO_2	Regulation No. 1144	lb/MWh	1,650	992	1,228
Opacity	Regulation No. 1114	%	20%(1)	20%	20%

Notes:

1: for an aggregate of more than three minutes in any one hour or more than 15 minutes in any 24 hour period.

Table 3-2
Middletown Technology Center
Criteria Pollutant Regulatory Program Applicability for Middletown, New Castle County

Pollutant	Air Quality Attainment Status	PSD Pollutant	Non-Attainmnet Pollutant	PSD Significant Increase Threshold ton/yr[(1)]	Title V Major Source Threshold ton/yr[(2)]	Non-Attainment Increase Threshold ton/yr[(2)]	Total Plant Potential Emissions ton/yr[(3)]	PSD Review Required Yes/No	Title V Major Source Triggered Yes/No	Non-Attainment Review Required Yes/No
NO_x (as O_3 precursor)	Non-Attainment		Yes			25	19.08			No
VOC (as O_3 precursor)	Non-Attainment		Yes		25	25	12.52		No	No
CO	Attainment	Yes		250	100		31.12	No	No	
NO_x	Attainment	Yes		250	100		19.08	No	No	
SO_x	Attainment	Yes		250	100		2.35	No	No	
TSP	Attainment	Yes		250	100		22.38	No	No	
PM_{10}	Attainment	Yes		250	100		21.68	No	No	
$PM_{2.5}$	Attainment	Yes		250	100		21.68	No	No	
Pb	Attainment	Yes		250	100		0.00	No	No	
CO_2e				100,000			98,907	No		
Total HAPs	NA				25		12.31		No	
Greatest Individual HAP	NA				10		9.00		No	

1: PSD applicability threshold for new sources not in one of the 28 named sources. Project "by itself" must be major.

2: New Castle County is classified as Severe Non-attainment area for ozone (NO_x and VOC as precursor) with 25 ton/yr non-attainment and Title V threshold.

3: Total potential emissions for the proposed project.

4.0 BACT ANALYSIS

4.1 BACT Approach

7 DE Admin. Code Section 1125 Section 4.0 MNSR requires that new sources be controlled by installing and operating emission control technology that limits emissions to the atmosphere by utilizing any one of the following options listed below.

- Emission control technology that meets the LAER requirements of 2.0 of 7 DE Admin. Code Section 1125, or
- Emission control technology that meets the BACT requirements of 3.0 of 7 DE Admin. Code Section 1125, or
- Emission control technology approved in advance by the Department for the source type being constructed (a listing and description of the approved technologies is available from the Department), or
- Emission control technology approved by the Department, on a case-by-case basis, pursuant to the following process.
    - Identify and evaluate air pollution control technologies that may be applied to the source. The control alternatives need not be limited to existing controls for the source category. Consider controls applied to similar type of sources, innovative control technologies, modification of the process or process equipment, other pollution prevention measures, and combinations of these measures.
    - List the control technologies in descending order of air pollution control effectiveness.
    - Either propose the most effective technology on the list for approval by the Department, or demonstrate, based on the technical feasibility, environmental, economic and energy impact assessments that the most effective technology is infeasible or unreasonable. This process for evaluation is repeated relative to each emission control technology on the list until an emission control technology is reached that is not eliminated.

4.2 BACT Applicability

The 10 MW engines up to 8,760 hr/yr operation will have potential emissions for NO_x and CO above 5 ton/yr which trigger a BACT Analysis. None of the 2.5 MW engines will be subject to a BACT Analysis because potential emissions running up to 8,760 hr/yr would be below 5 ton/yr for all criteria pollutants that could trigger a BACT Analysis as per 7 DE Admin. Code 1125 Section 4.0.

Tables 4-1 and 4-2 show the potential criteria emissions for the worst-case theoretical operation of running any one engine up to 8,760 hr/yr for the 10 and the 2.5 MW engines, respectively.

Please note that no engine is ever expected to be operate up to 8,760 hr/yr, but for permitting purposes under the fuel caps, any one 10 MW engine could run all year round operation and thus BACT applicability needs to be evaluated. As shown in Table 4-1, NO_x and CO potential emissions running up to 8,760 hr/yr are above the 5 ton/yr BACT analysis trigger level for the 10 MW engines.

As indicated in Table 4-2, for the 2.5 MW engines, no criteria pollutant is above BACT applicability level. Even though the 2.5 MW engines are not required by regulation to undergo a BACT analysis, the following BACT analysis will evaluate the use of BACT technology on both the 10 MW and 2.5 MW engines.

4.3 Control Technology Feasibility

4.3.1 NO_x Controls

Available post combustion control technologies for NO_x emission reduction from four stroke lean-burn reciprocating engines are listed below.

- Selective Catalytic Reduction (SCR);
- Non-Selective Catalytic Reduction (NSCR); and
- Catalytic Absorption.

Selective Catalytic Reduction

SCR systems are post-combustion active emission control technology systems. The system uses a catalyst bed and an injected liquid-reductant agent (ammonia or urea) to reduce NO_x and produce nitrogen (N_2) and water vapor (H_2O).

SCR systems have been used extensively on lean-burn natural gas-fired engines. SCR control can achieve up to 95% control of NO_x emissions and is generally considered as the Lowest Achievable Emission Reduction ("LAER") technology for the control of NO_x emissions from lean burn reciprocating engines

Non-Selective Catalytic Reduction (NSCR);

NSCR technology uses a three-way catalyst to obtain the reduction of NO_x to nitrogen and water. The exhaust is injected with a reagent (usually ammonia or urea) and passes over a catalyst to non-selectively transform NO_x, CO and VOCs to N_2, CO_2 and H_2O.

However, NSCR is only effective with low oxygen exhaust and is typically only applicable to rich burn engines.

Catalytic Absorption

Catalytic adsorption includes the use of a single catalyst and hydrogen regeneration to remove carbon monoxide and nitrogen oxides. A precious metal oxidation catalyst simultaneously oxidizes CO to CO_2 and NO to NO_2.

Catalytic adsorption technology typically has been used for control of NO_x emissions from combustion turbines and provides no greater NO_x control than SCR.

4.3.2 CO Controls

Available control technologies for CO emission reduction from four stroke lean-burn reciprocating engines are listed below.

- Oxidation Catalyst.
- Non-Selective Catalytic Reduction (NSCR); and
- Catalytic Absorption.

Oxidation Catalyst

Oxidation catalysts are used to destroy carbon monoxide (CO) and volatile organic compounds (VOC's including formaldehyde) from lean-burn reciprocating engines. The oxidation catalysts typically use precious metal catalyst. Oxidation catalyst systems have been used extensively on lean burner natural gas fired engines. Oxidation catalysts can achieve up to 93% control of CO emissions and is generally considered as the Lowest Achievable Emission Reduction ("LAER") technology for the control of CO emissions from lean-burn reciprocating engines.

NSCR and catalytic absorption technology was discussed previously for NOx control. NSCR is only used for rich burn engines and catalytic absorption does not provide greater CO control than oxidation catalysts.

4.4 Proposed BACT Limits

4.4.1 NO_x Controls

As previously mentioned, only the 10 MW engines will have potential emissions for NO_x above five ton/yr that trigger a BACT analysis as per 7 DE Admin. Code 1125 Section 4.0.

However, SCR control technology will be deployed on all the engines (both the 10 MW and 2.5 MW) to control emissions to levels considered LAER and BACT.

The SCR system will utilize either aqueous ammonia or urea in water solution for injection into the SCR system. The 10 MW engines will meet NO_x emission levels of 0.045 and 0.06 grams per brake horsepower hour ("gr/bhp-hr") for the 10 and 2.5 MW engines, respectively. The SCR catalyst is designed to remove 95% of uncontrolled NO_x emissions from both the 10 and 2.5 MW engines.

The EPA's RBLC Online database was searched for any LAER determinations for Large Internal combustion engines >500 HP (Process Type 17.130). The RBLC search results are shown in Table 4-5. One similar project consisting of 12- 18 MW Wartsila engines with SCR controls was identified. The permitted NO_x emission limit was 0.084 gr/bhp-hr. Another project permitted in Owatonna, Minnesota in August 21, 2015, (Owatonna Energy Station) consisting of the same Caterpillar G20CM34 engine being proposed for use in the MTC facility was permitted at 0.07 gr/bhp-hr.

The proposed NO_x emission limits for MTC are 0.045 and 0.06 gr/bhp-hr for the 10 and 2.5 MW engines, respectively. The proposed emission limits for the MTC are significantly lower than those found in the RBLC database and for the Owatonna Energy Station project. The Owatonna Energy Station project was designed for 92% NO_x control efficiency while the MTC project is being designed for 95% control efficiency.

Cirrus believes that the use of a spark ignited, lean burn reciprocating internal combustion engines with SCR technology results in emission levels of NO_x that are BACT/LAER.

Because LAER emission levels were selected as the "top technology" a case-by-case top down BACT/LAER analysis comparing different control technologies and efficiencies is not required..

4.4.2 CO Controls

As previously mentioned, only the 10 MW engines will have potential emissions for CO above the five ton/yr level that triggers a BACT Analysis as per 7 DE Admin. Code 1125 Section 4.0. However, oxidation catalyst control technology will be deployed on all the engines (both the 10 MW and 2.5 MW) to emission levels considered LAER and BACT.

The engines will meet CO emission levels of 0.078 and 0.106 gr/bhp-hr for the 10 and 2.5 MW engines, respectively. The oxidation catalyst is designed to remove 93% of uncontrolled CO emissions from both the 10 and 2.5 MW engines.

The EPA's RBLC Online database was searched for any LAER determinations for Large Internal combustion engines >500 HP (Process Type 17.130). The RBLC search results are shown in Table 4-5. One similar project consisting of 12- 18 MW Wartsila engines with oxidation catalyst controls was identified. The permitted CO emission limit was 0.3 gr/bhp-hr. Another project permitted in Owatonna, Minnesota in August 21, 2015, (Owatonna Energy Station) consisting of the same Caterpillar G20CM34 that will be used in the MTC facility was permitted at 0.12 gr/bhp-hr.

The proposed emission limits for MTC is 0.078 and 0.106 gr/bhp-hr for the 10 and 2.5 MW engines, respectively. The proposed CO emission limits for the MTC are significantly lower than those found in the RBLC database and for the Owatonna Energy Station project.

Cirrus believes that the use of a spark ignited, lean burn reciprocating internal combustion engines with oxidation catalyst technology results in emission levels of CO that are representative of BACT/LAER.

Because LAER emission levels were selected as the "top technology" a case-by-case top down BACT/LAER analysis comparing different control technologies and efficiencies is not required.

4.4.3 Other Pollutants

Although not required to conduct a BACT analysis for TSP/PM_{10}/$PM_{2.5}$, VOC, SO_2 and CO_2e, MTC believes that the employed engine efficiencies, fuels, combustion practices and air pollution control technologies are all representative of BACT/LAER. A brief discussion for each pollutant is as follows.

VOC and Formaldehyde

The use of good combustion practices and oxidation catalyst technology to control emissions of VOC and formaldehyde generally is accepted as BACT/LAER. The oxidation catalyst is being designed for 50 and 80% control efficiencies for VOC and formaldehyde, respectively for the 10 MW engines. For the 2.5 MW engines, the oxidation catalyst is being designed for 82 and 90% control efficiencies for VOC and formaldehyde, respectively.

TSP/PM_{10}/$PM_{2.5}$

The use of good combustion practices and pipeline quality natural gas as a fuel is considered to be BACT for TSP/PM_{10}/$PM_{2.5}$. The MTC reciprocating engines will use currently available

technologies applicable to maximizing combustion efficiency and will utilize the cleanest available fossil fuel, natural gas, to minimize TSP/PM_{10}/$PM_{2.5}$ air emissions. Add on particulate control devices have not been used to control TSP/PM_{10}/$PM_{2.5}$ emissions from natural gas fired reciprocating engines due to the inherently low emissions from these fuels.

SO_2

The use of pipeline quality natural gas as a fuel is considered to be BACT for SO_2 emissions from reciprocating engines. The MTC reciprocating engines will use the cleanest available fossil fuel, natural gas, to minimize SO_2 air emissions. Typically, natural gas contains trace amounts of sulfur as odorants to facilitate detect of gas leaks.

CO_2e

The available control options for controlling emissions of CO_2e from the reciprocating engines are as follows:

- Carbon capture and sequestration;
- Selection of the most efficient reciprocating engine that meets the project definition;
- Selection of low carbon fuel; and
- Good combustion/operating practices.

Add on control technology such as carbon capture and sequestration ("CCS") is generally considered technically infeasible for a small project of this size. CCS is typically only considered technically and economically feasible for large coal fired power plants that are located in areas of the country where the geologic conditions support long-term, underground storage of CO_2.

MTC has selected the Caterpillar G20CM34 10 MW engines and the G3520H 2.5 MW engines due to the high efficiency of those engines when converting the heat from natural gas firing into electrical power. The use of high efficiency engines results in lowest CO_2e emissions per amount of fuel combusted.

Within the spectrum of fossil fuels, the use of natural gas results is the lowest in carbon emissions when compared to coal and refined petroleum products. For instance, Combustion of natural gas should emit about 45 percent less CO_2 than combustion of coal and almost 30 percent less CO_2 than combustion of oil. . The exclusive use of pipeline natural gas to fuel the proposed engines reflects a component of BACT for GHG.

Good combustion and operating practices are also considered to be a control option by improving the fuel efficiency of the reciprocating engines. Good combustion practices also include proper maintenance and computer automation within manufacturer's specifications of the reciprocating engine operations.

MTC has selected the use of high efficiency engines, pipeline quality natural gas and good combustion and operating practices as BACT for minimizing the emissions of CO_2e from the reciprocating engines.

Table 4-1
Middletown Technology Center
10 MW Reciprocating Engine Emission Calculations

Typical Engine Properties	Units	
Engine Manufacturer		Caterpillar
Engine Model No.		G20CM34
Engine Brake Power	bkW	10,000
Electrical Power Output	ekW	9,700
Annual Electrical Power Output	MWh/yr	84,972
Mechanical Power Output	bhp	13,410
Maximum Heat Input	MMBtu/hr- LHV	74.8
Maximum Heat Input	MMBtu/hr- HHV	83.0
Annual Energy Consumption	MMBtu/yr- HHV	727,198.9
Natural Gas Heating Value	Btu/ft^3-LHV	950
Natural Gas Heating Value	BTU/lb	22,975
Hourly Natural Gas Consumption	SCFH	78,723
Annual Operation	hr/yr	8,760
Annual Natural Gas Consumption	MMSCF/yr	690
Exhaust Gas Mass, wet	lb/hr	123,759
Stack Temperature	deg F	604
Stack Exhaust Gas Volume, actual wet	ACFM	57,177
Natural Gas Sulfur Content	gr/100 SCF	1.0
Cold Startups per year		240

Pollutant	Engine Emission Guarantees gr/kW-hr[1]	Controlled Emissions Guarantees gr/kW-hr[2]	Control Efficiency %	Engine Emissions w/o Cont. Per Engine lb/hr[3]	Engine Emissions w/ Control Per Engine lb/hr[3]	8,760 hr/yr ton/yr[5]	Cold Startup Emissions ton/yr[6]	10 MW Emissions ton/yr
NO_x	1.21	0.06	95	26.68	1.32	5.79	0.86	6.65
VOC	0.1	0.05	50	2.20	1.10	4.83	0.12	4.94
CO	1.48	0.104	93	32.63	2.29	10.04	1.08	11.12
TSP[4]				2.00	2.00	8.76	0.00	8.76
PM_{10}[4]				1.14	1.14	4.99	0.00	4.99
$PM_{2.5}$[4]				1.14	1.14	4.99	0.00	4.99
SO_2[7]				0.22	0.22	0.99	0.00	0.99
NH_3		0.02			0.44	1.93		1.93
Formaldehyde	0.19	0.038	80	4.19	0.84	3.67	0.16	3.83

Notes:

1: Based on worst case emissions provided by Caterpillar for G20CM34 engine.

2: Emissions after control using SCR and Oxidation Catalyst.

3: lb/hr emissions based on vendor emission guarantees and maximum engine brake power output. lb/hr = gr/kW-hr x bkW / 453.59 gr/lb

4: TSP/PM_{10}/$PM_{2.5}$ based on lb/hr emissions provided by Caterpillar.

5: tons/yr emissions with control based on worst case operating scenario of propsed annual operation in hr/yr. ton/yr = (lb/hr x hr/yr) / 2000 lb/ton

6: Emissions from cold startup. Uncontrolled emissions for 15 min. * 0.5 load average + 15 min. * 0.5 partial control + 30 minutes controlled.
ton/yr = (((lb/hr_{un} * 0.25 * 0.5) + ((lb/hr_{un} - lb/hr_c) * 0.25 * 0.5) + (lb/hr_c * 0.5)) * No. Starts * 5 engines) / 2000 lb/ton.

7: Based on sulfur content in natural gas of 1.0 grains/100 SCF. Lb/hr = SCFH / gr/100 SCF / 7000 gr S/lb * 2 lb SO_2/lb S.

Table 4-2
Middletown Technology Center
2.5 MW Reciprocating Engine Emission Calculations

Typical Engine Properties	Units	
Engine Manufacturer		Caterpillar
Engine Model No.		G3520H
Electrical Power Output	ekW	2,469
Annual Electrical Power Output	MWh/yr	21,628
Mechanical Power Output	bhp	3,448
Maximum Heat Input	MMBtu/hr- LHV	19.1
Maximum Heat Input	MMBtu/hr- HHV	21.2
Annual Energy Consumption	MMBtu/yr- HHV	185,362
Natural Gas Heating Value	Btu/ft^3-LHV	905
Hourly Natural Gas Consumption	SCFH	21,064
Annual Operation	hr/yr	8,760
Annual Natural Gas Consumption	MMSCF/yr	185
Exhaust Gas Mass, wet	lb/hr	29,037
Stack Temperature	deg F	735
Stack Exhaust Gas Volume, actual wet	ACFM	15,152
Natural Gas Sulfur Content	gr/100 SCF	1.0
Cold Startups per year		18

Pollutant	Engine Emission Guarantees gr/bhp-hr[1]	Controlled Emissions Guarantees gr/bhp-hr[2]	Control Efficiency %	Engine Emissions W/o Cont. Per Engine lb/hr[3]	Engine Emissions W/ Control Per Engine lb/hr[3]	8,760 hr/yr ton/yr[5]	Cold Startup Emissions ton/yr[6]	2.5 MW Emissions ton/yr
NO_x	1.18	0.06	95	8.97	0.46	2.00	0.02	2.02
VOC	0.25	0.05	82	1.90	0.34	1.50	0.01	1.50
CO	1.52	0.106	93	11.55	0.81	3.53	0.03	3.56
TSP[4]				0.50	0.50	2.19	0.00	2.19
PM_{10}[4]				0.29	0.29	1.25	0.00	1.25
$PM_{2.5}$[4]				0.29	0.29	1.25	0.00	1.25
SO_2[7]				0.06	0.06	0.26	0.00	0.26
NH_3					0.04	0.17		0.17
Formaldehyde	0.20	0.02	90	1.52	0.15	0.67	0.00	0.67

Notes:

1: Based on worst case emissions provided by Caterpillar for G20CM34 engine.

2: Emissions after control using SCR and Oxidation Catalyst.

3: lb/hr emissions based on vendor emission guarantees and maximum engine brake horsepower. lb/hr = gr/bhp-hr x bhp / 453.59 gr/lb.

4: TSP/PM_{10}/$PM_{2.5}$ based on lb/hr emissions provided by Caterpillar for 10 MW engine and ratioed based on MW rating. 2 lb/hr = lb/hr * 2.5MW/10MW.

5: tons/yr emissions with control based on worst case operating scenario of propsed annual operation in hr/yr. ton/yr = (lb/hr x hr/yr) / 2000 lb/ton

6: Emissions from cold startup. Uncontrolled emissions for 15 min. * 0.5 load average + 15 min. * 0.5 partial control + 30 minutes controlled.
ton/yr = (((lb/hr_{un} * 0.25 * 0.5) + ((lb/hr_{un} - lb/hr_c) * 0.25 * 0.5) + (lb/hr_c * 0.5)) * No. Starts * 5 engines) / 2000 lb/ton.

7: Based on sulfur content in natural gas of 1.0 grains/100 SCF. lb/hr = SCFH / gr/100 SCF / 7000 gr S/lb * 2 lb SO_2/lb S.

Table 4-3
Middletown Technology Center
10 MW Reciprocating Engine Potential HAP Emission Calculations

ENGINE PROPERTIES	Units	Engine #1
Fuel Fired		Nat Gas
Engine Rating	bkW	10000
Maximum Heat Input	MMBtu/hr (HHV)	83.01
Maximum Hours	hr/yr	8,760
Annual Fuel Consumption	MMSCF/yr	260
Oxidation Catalyst Destruction Efficiency	%	80
Cold Startup per year		240

HAP Pollutant	AP-42 Factor Natural Gas lb/MMBtu[1]	Hourly Emissions per Engine W/o Control lb/hr[2]	Hourly Emissions per Engine W/Control lb/hr[3]	Engine 1 @ 8,760 hr/yr ton/yr[4]	Cold Startup Emissions ton/yr	Total Potential HAP ton/yr[5]
Acetaldehyde	8.36E-03	6.94E-01	1.39E-01	0.6079	0.1353	0.7433
Acrolein	5.14E-03	4.27E-01	8.53E-02	0.3738	0.0832	0.4570
Benzene	4.40E-04	3.65E-02	7.31E-03	0.0320	0.0071	0.0391
Benzo(a)pyrene	4.15E-07	3.45E-05	6.89E-06	0.0000	0.0000	0.0000
Benzo(b,k)fluoranthene	1.66E-07	1.38E-05	2.76E-06	0.0000	0.0000	0.0000
Biphenyl	2.12E-04	1.76E-02	3.52E-03	0.0154	0.0034	0.0188
Butadiene (1,3-)	2.67E-04	2.22E-02	4.43E-03	0.0194	0.0043	0.0237
Carbon tetrachloride	3.67E-05	3.05E-03	6.09E-04	0.0027	0.0006	0.0033
Chlorobenzene	3.04E-05	2.52E-03	5.05E-04	0.0022	0.0005	0.0027
Chloroform	2.85E-05	2.37E-03	4.73E-04	0.0021	0.0005	0.0025
Chrysene	6.93E-07	5.75E-05	1.15E-05	0.0001	0.0000	0.0001
Dichloropropene (1,3-)	2.64E-05	2.19E-03	4.38E-04	0.0019	0.0004	0.0023
Ethyl benzene	3.97E-05	3.30E-03	6.59E-04	0.0029	0.0006	0.0035
Ethylene Dibromide	4.43E-05	3.68E-03	7.36E-04	0.0032	0.0007	0.0039
Formaldehyde[6]	Mfg.	4.19E+00	8.38E-01	3.6694	0.8168	4.4862
Hexane	1.11E-03	9.21E-02	1.84E-02	0.0807	0.0180	0.0987
Methanol	2.50E-03	2.08E-01	4.15E-02	0.1818	0.0405	0.2223
Methylene Chloride	2.00E-05	1.66E-03	3.32E-04	0.0015	0.0003	0.0018
Naphthalene	7.44E-05	6.18E-03	1.24E-03	0.0054	0.0012	0.0066
Phenol	2.40E-05	1.99E-03	3.98E-04	0.0017	0.0004	0.0021
POM	2.69E-05	2.23E-03	4.47E-04	0.0020	0.0004	0.0024
Styrene	2.36E-05	1.96E-03	3.92E-04	0.0017	0.0004	0.0021
Tetrachloroethane (1,1,2,2-)	4.00E-05	3.32E-03	6.64E-04	0.0029	0.0006	0.0036
Toluene	4.08E-04	3.39E-02	6.77E-03	0.0297	0.0066	0.0363
Trichloroethane (1,1,2-)	3.18E-05	2.64E-03	5.28E-04	0.0023	0.0005	0.0028
Trimethylpentane (2,2,4-)	2.50E-04	2.08E-02	4.15E-03	0.0182	0.0040	0.0222
Vinyl Chloride	1.49E-05	1.24E-03	2.47E-04	0.0011	0.0002	0.0013
Xylenes	1.84E-04	1.53E-02	3.05E-03	0.0134	0.0030	0.0164
					Total HAPS	6.21

Notes:

1: AP-42 emissions factors for natural gas 4-stroke lean burn engine from AP-42 Table 3.2-2 in pounds per million Btu.

2: Hourly emissions in pounds per hour per engine without oxidation catalyst control. lb/hr = lb/MMBtu * MMBtu/hr (HHV)

3: Hourly emissions in pounds per hour per engine with oxidation catalyst control. lb/hr = lb/MMBtu * (1-(eff/100))* MMBtu/hr (HHV)

4: Annual potential emissions in tons per year per engine with oxidation catalyst control. ton/yr = lb/hr * hr/yr / 2000 lb/ton

5: Total annual potential emissions in tons per year for 5 reciprocating engines.

6: Formadehyde emissions based on Caterpillar data.

Table 4-4
Middletown Technology Center
2.5 MW Reciprocating Engine Potential HAP Emission Calculations

ENGINE PROPERTIES	Units	Engine #6
Fuel Fired		Nat Gas
Engine Rating	bkW	2500
Maximum Heat Input	MMBtu/hr (HHV)	21.16
Maximum Hours	hr/yr	8,760
Annual Fuel Consumption	MMSCF/yr	70
Oxidation Catalyst Destruction Efficiency	%	90
Cold Startup per year		18

HAP Pollutant	AP-42 Factor Natural Gas lb/MMBtu[1]	Hourly Emissions per Engine W/o Control lb/hr[2]	Hourly Emissions per Engine W/Control lb/hr[3]	8,760 hr/yr ton/yr[4]	Cold Startup Emissions ton/yr	Total Potential HAP ton/yr[5]
Acetaldehyde	8.36E-03	1.77E-01	1.77E-02	0.0775	0.0023	0.0798
Acrolein	5.14E-03	1.09E-01	1.09E-02	0.0476	0.0014	0.0490
Benzene	4.40E-04	9.31E-03	9.31E-04	0.0041	0.0001	0.0042
Benzo(a)pyrene	4.15E-07	8.78E-06	8.78E-07	0.0000	0.0000	0.0000
Benzo(b,k)fluoranthene	1.66E-07	3.51E-06	3.51E-07	0.0000	0.0000	0.0000
Biphenyl	2.12E-04	4.49E-03	4.49E-04	0.0020	0.0001	0.0020
Butadiene (1,3-)	2.67E-04	5.65E-03	5.65E-04	0.0025	0.0001	0.0025
Carbon tetrachloride	3.67E-05	7.77E-04	7.77E-05	0.0003	0.0000	0.0004
Chlorobenzene	3.04E-05	6.43E-04	6.43E-05	0.0003	0.0000	0.0003
Chloroform	2.85E-05	6.03E-04	6.03E-05	0.0003	0.0000	0.0003
Chrysene	6.93E-07	1.47E-05	1.47E-06	0.0000	0.0000	0.0000
Dichloropropene (1,3-)	2.64E-05	5.59E-04	5.59E-05	0.0002	0.0000	0.0003
Ethyl benzene	3.97E-05	8.40E-04	8.40E-05	0.0004	0.0000	0.0004
Ethylene Dibromide	4.43E-05	9.37E-04	9.37E-05	0.0004	0.0000	0.0004
Formaldehyde[6]	Mfg.	1.52E+00	1.52E-01	0.6659	0.0197	0.6856
Hexane	1.11E-03	2.35E-02	2.35E-03	0.0103	0.0003	0.0106
Methanol	2.50E-03	5.29E-02	5.29E-03	0.0232	0.0007	0.0239
Methylene Chloride	2.00E-05	4.23E-04	4.23E-05	0.0002	0.0000	0.0002
Naphthalene	7.44E-05	1.57E-03	1.57E-04	0.0007	0.0000	0.0007
Phenol	2.40E-05	5.08E-04	5.08E-05	0.0002	0.0000	0.0002
POM	2.69E-05	5.69E-04	5.69E-05	0.0002	0.0000	0.0003
Styrene	2.36E-05	4.99E-04	4.99E-05	0.0002	0.0000	0.0002
Tetrachloroethane (1,1,2,2-)	4.00E-05	8.46E-04	8.46E-05	0.0004	0.0000	0.0004
Toluene	4.08E-04	8.63E-03	8.63E-04	0.0038	0.0001	0.0039
Trichloroethane (1,1,2-)	3.18E-05	6.73E-04	6.73E-05	0.0003	0.0000	0.0003
Trimethylpentane (2,2,4-)	2.50E-04	5.29E-03	5.29E-04	0.0023	0.0001	0.0024
Vinyl Chloride	1.49E-05	3.15E-04	3.15E-05	0.0001	0.0000	0.0001
Xylenes	1.84E-04	3.89E-03	3.89E-04	0.0017	0.0001	0.0018
					Total HAPS	0.87

Notes:

1: AP-42 emissions factors for natural gas 4-stroke lean burn engine from AP-42 Table 3.2-2 in pounds per million Btu.

2: Hourly emissions in pounds per hour per engine without oxidation catalyst control. lb/hr = lb/MMBtu * MMBtu/hr (HHV)

3: Hourly emissions in pounds per hour per engine with oxidation catalyst control. lb/hr = lb/MMBtu * (1-(eff/100))* MMBtu/hr (HHV)

4: Annual potential emissions in tons per year per engine with oxidation catalyst control. ton/yr = lb/hr * hr/yr / 2000 lb/ton

5: Total annual potential emissions in tons per year for 5 reciprocating engines.

6: Formadehyde emissions based on Caterpillar data.

Table 4-5
Middletown Technology Center
RBLC Search - Process Type 17.13

RBLCID	FACILITY NAME	PRIMARY FUEL	THROUGHPUT	THROUGHPUT UNIT	PROCESS NOTES	POLLUTANT	CONTROL METHOD DESCRIPTION	EMISSION LIMIT	EMISSION LIMIT UNIT	CASE-BY-CASE BASIS
*PA-0287	WELLING COMPRESSOR STATION	NG	0			CO	Oxidation Catalyst - Miratech	0.12	G/B-HP-H	CASE-BY-CASE
*PA-0287	WELLING COMPRESSOR STATION	NG	0			CO	3-way catalyst, Johnson Matthey	0.26	G/B-HP-H	CASE-BY-CASE
*PA-0301	CARPENTER COMPRESSOR STATION	NG	0		Controlled by oxidation Catalyst, regulated by automatic air/fuel ratio controllers.	CO	Oxidation Catalyst	47	PPMVD	N/A
*PA-0301	CARPENTER COMPRESSOR STATION	NG	0		Controlled by Oxidation catalyst, regulated by an integrated automatic air/fuel ration controller.	CO	Oxidation catalyst	47	PPMVD	N/A
*PA-0302	CLERMONT COMPRESSOR STATION	NG	0		Spark Ignited 4 stroke Rich Burn Engine (7 units)	CO	NSCR	0.3	G/BHP-HR	N/A
*TX-0642	SINTON COMPRESSOR STATION	NG	1328	hp	1328 horsepower standby generator operating no more than 100 hours per year	CO		1.3	G/HP-H	BACT-PSD
*TX-0680	SONORA GAS PLANT	NG	1183	hp	(4) Caterpillar 3516 ultra-lean burn compressor engines at 1,183 hp each	CO	oxidation catalyst	0.252	G/HP-HR	BACT-PSD
*TX-0680	SONORA GAS PLANT	NG	1380	hp	(8) ultra-lean burn Caterpillar 3516 engines at 1,380 hp each	CO	oxidation catalyst	0.252	G/HP-HR	BACT-PSD
*MI-0412	HOLLAND BOARD OF PUBLIC WORKS	NG	1000	kW	A 1,000 kilowatts (kW) natural gas-fueled emergency engine manufactured in 2013.	CO	Oxidation catalyst and good combustion practices.	0.8	G/HP-H	BACT-PSD
*TX-0692	RED GATE POWER PLANT	NG	18	MW	12 - 18 MW Wartsila 18V50SG natural gas-fired engines, each with an associated electric generator	CO	oxidation catalyst	0.3	G/HP-HR	BACT-PSD
MD-0036	DOMINION	NG			CATERPILLAR MODEL #G2516LE; 770 KW (1,085 BHP)	CO	GOOD COMB PRACTICES; PROPER O&M PLAN;	1.5	G/B-HP-H	BACT-PSD
LA-0257	SABINE PASS LNG TERMINAL	NG	2012	hp		CO	Comply with 40 CFR 60 Subpart JJJJ	19.51	LB/H	BACT-PSD
*MI-0393	RAY COMPRESSOR STATION	NG	32	MMBTU/H	Five (5) natural gas fired spark ignition ICEs, Caterpillar G3616, 4735 hp lean burn engines with 2 way oxidation catalysts.	NOx	low emission design and good combustion practices	0.5	G/B-HP-H	BACT-PSD
*MI-0393	RAY COMPRESSOR STATION	NG	500	H/YR	This is an emergency generator which is limited to 500 hours per year of operation.	NOx		0.5	G/B-HP-H	BACT-PSD
*PA-0302	CLERMONT COMPRESSOR STATION	NG	0		Spark Ignited 4 stroke Rich Burn Engine (7 units)	NOx	NSCR	0.02	G/BHP-HR	N/A
CA-1192	AVENAL ENERGY PROJECT	NG	550	KW	UNIT IS 860 HP	NOx	SCR, OPERATIONAL LIMIT OF 50 HRS/YR	0.21	G/HP-H	BACT-PSD
MI-0390	WHITE PIGEON COMPRESSOR STATION	NG	0		4 NATURAL GAS FIRED, SPARK IGNITION, LEANBURN ENGINES WITH 2-WAY CATALYST. 3 CATERPILLAR G3616 AND 1 CATERPILLAR G3608	NOx		0.5	G/B-HP-H	BACT-PSD
MI-0390	WHITE PIGEON COMPRESSOR STATION	NG	0		ONE NATURAL GAS FIRED EMERGENCY GENERATOR. CATERPILLAR G3516BLF, 1818 HP.	NOx		0.5	G/B-HP-H	BACT-PSD
WY-0066	MEDICINE BOW IGL PLANT	NG	2889	HP	250 HOURS OF OPERATION	NOx	LIMITED OPERATING HOURS (250 HR/YR)	1	G/HP-H	BACT-PSD
WY-0066	MEDICINE BOW IGL PLANT	NG	2889	HP	LIMITED OPERATING HOURS (250 HR/YR)	NOx	LIMITED OPERATING HOURS (250 HR/YR)	1	G/HP-H	BACT-PSD
WY-0066	MEDICINE BOW IGL PLANT	NG	2889	HP	LIMITED OPERATING HOURS (250 HR/YR)	NOx	LIMITED OPERATING HOURS (250 HR/YR)	1	G/HP-H	BACT-PSD
*IN-0167	MAGNETATION LLC	NG	620	HP	EMERGENCY NATURAL GAS GENERATOR, IDENTIFIED AS EU017, EXHAUSTS TO STACK SV016.	NOx	USE OF NATURAL GAS AND GOOD COMBUSTION PRACTICES	0.5	G/HP-H	BACT-PSD
*IN-0167	MAGNETATION LLC	NG	300	HP	CONSISTING OF ONE (1) NATURAL GAS ENGINE, THE BACKUP JOCKEY FIRE WATER PUMP, IDENTIFIED AS EU018, EXHAUSTS TO STACK SV017	NOx	USE OF NATURAL GAS AND GOOD COMBUSTION PRACTICES	0.5	G/HP-YR	BACT-PSD
*TX-0642	SINTON COMPRESSOR STATION	NG	1328	hp	1328 horsepower standby generator operating no more than 100 hours per year	NOx		2	G/HP-H	BACT-PSD
*TX-0680	SONORA GAS PLANT	NG	1183	hp	(4) Caterpillar 3516 ultra-lean burn compressor engines at 1,183 hp each	NOx	ultra-lean burn technology	0.5	G/HP-HR	BACT-PSD
*TX-0680	SONORA GAS PLANT	NG	1380	hp	(8) ultra-lean burn Caterpillar 3516 engines at 1,380 hp each	NOx	ultra-lean burn technology	0.5	G/HP-HR	BACT-PSD
*MI-0412	HOLLAND BOARD OF PUBLIC WORKS	NG	1000	kW	A 1,000 kilowatts (kW) natural gas-fueled emergency engine manufactured in 2013.	NOx	Good combustion practices	2	G/HP-H	BACT-PSD
*TX-0692	RED GATE POWER PLANT	NG	18	MW	12 - 18 MW Wartsila 18V50SG natural gas-fired engines, each with an associated electric generator	NOx	Selective Catalytic Reduction (SCR)	0.084	G/HP-HR	BACT-PSD
*MI-0401	MIDLAND POWER STATION	NG	1200	kW output	This is a 1200kW (output) natural gas fired emergency generator. The engine was manufactured after 2009	NOx		0.5	G/HP-H	BACT-PSD
NJ-0073	TRIGEN	NG	90.08	%	TWO(2) DUAL FUEL COPPER BESSEMER ENGINES EACH RATED AT: POWER OUTPUT: 8386 BHP, ELECTRICAL OUTPUT: 6 MW .	NOx	THE TWO(2) DUAL FUEL ENGINES ARE EQUIPPED WITH CLEAN BURN TECHNOLOGY	2.3	G/B-HP-H	RACT
MD-0036	DOMINION	NG			CATERPILLAR MODEL #G2516LE; 770 KW (1,085 BHP); LIMIT ON OPERATIONS OF NO MORE THAN 200 HOURS DURING ANY CONSECUTIVE 12-MONTH PERIOD	NOx	GOOD COMB PRACTICES; PROPER O&M PLAN; LIMIT ON OPERATIONS<=200H DURING ANY CONSECUTIVE 12-MONTH PERIOD; EXCLUSIVE USE OF LOW SULFUR NG	2	G/B-HP-H	BACT-PSD
TX-0501	TEXSTAR GAS PROCESS FACILITY		875	HP		NOx		5.79	LB/H	BACT-PSD

5.0 AIR DISPERSION MODELING ASSESSMENT

A refined modeling analysis will be completed as part of the project. A complete modeling analysis report will be submitted to DNREC once it is completed.

Appendix A
Caterpillar G20CM34 10 MW Engine
Performance and Emission Data

CATERPILLAR®

Project: MTC 5 X G20CM34

PLANT PERFORMANCE REPORT

Rev. 1

Engine Data

Engine Model:		**G20CM34**
No of Engines:		**5**
Configuration:		Vee
No of Cylinders:		20
Brake Mean Effective Pressure (BMEP):	bar	21.86
Engine Speed:	rpm	720
Bore:	mm	340
Stroke:	mm	420
Stroke/Bore Ratio:		1.24

Site Performance Data:

Engine performance at the following site conditions of:

Altitude:	ft	**670**
Design Ambient Air Temp. (at Engine Inlet):	ºF (ºC)	91 (33)
Design Water Temp. at Aftercooler:	ºF (ºC)	102.5 (39)
Number of engine driven pumps:		1
Engine Rating @ ISO Conditions (25 ºC):	bkW	**10,000**
Engine Rating up to 36ºC Reference Ambient:	bkW	**10,000**
Engine Rating @ 36 ºC Max. Ambient:	bkW	**10,000**

Fuel Data

Fuel Type:		GAS
Average Fuel Lower Heating Valve:	BTU/ft^3	950
Fuel HHV (tender Appendix E)	Btu / lb	22975
Methane Number	MN	> 80

Site Design Data:

Min. Ambient Air Temperature:	ºF (ºC)	**-5 (-20)**
Summer Design Temperature	ºF (ºC)	**91 (33)**
Max. Ambient Air Temperature:	ºF (ºC)	**96 (36)**

Rating	**Units**	**100%**	**85%**	**75%**	**40%**	**Tolerance**
Engine Brake Power @ ISO Conditions	bkW	10,000	8,500	7,500	4,000	0%
Engine Brake Power up to 36 ºC Site Ambient	bkW	10,000	8,500	7,500	4,000	0%
Generator Efficiency @ **0.80 PF**, 60 Hz	%	97.0%	96.9%	96.8%	96.0%	0%
Guaranteed Power Output per generator set (note 8)	ekW	9,700	8,237	7,260	3,840	0%
Guaranteed Plant Output (@ gen. Terminals)	ekW	48,500	41,183	36,300	19,200	0%
Generator Set Performance @ 33 ºC Site Ambient						
Efficiency (@ flywheel, with pump, Summer design temp. 33ºC)	%	47.9	47.7	46.4	40.5	- 5%
Efficiency (@ gen terminals, Summer design temp. 33ºC)	%	46.5	46.2	44.9	38.9	- 5%
Nominal Heat Rate (@ gen terminals):	kJ/kWh	7,748	7,789	8,015	9,259	- 5%
Heat Rate (LHV basis)	BTU/kWh	7,344	7,383	7,597	8,776	- 5%
Heat Rate (HHV basis)	BTU/kWh	8,137	8,180	8,417	9,724	- 5%
Efficiency (@ flywheel, with pump, Summer design temp. 33ºC)	%	45.6	45.4	44.9	41.6	0%
Efficiency (@ gen terminals, Summer design temp. 33ºC)	%	44.3	44.0	43.4	40.0	0%
Guaranteed Heat Rate (@ gen. Terminals):	kJ/kWh	8,135	8,183	8,287	9,006	0%
(see Note 7) **Heat Rate (LHV basis)**	BTU/kWh	7,710	7,756	7,855	8,536	0%
Heat Rate (HHV basis)	BTU/kWh	8,543	8,594	8,703	9,458	0%
Lube Oil Consumption (Per Engine Basis):						
Lube Oil Consumption @ Site Conditions	g/ekWh	0.309				+/- 50%
(see Note 4)	kg/h	3.000				+/- 50%
Guaranteed Lube Oil Consumption	**kg/h**	4.500				0%
Net Plant Performance @ Site, Summer design temp.						
Expected Total Parasitics (note 10)	%	1.35%				0%
NET PLANT Output	ekW	47,845				0%
Heat Rate (NET PLANT):	**kJ/kWh**	8,246				0%
Net Plant Heat Rate (LHV basis)	**BTU/kWh**	7,816				0%
Net Plant Heat Rate (HHV basis)	**BTU/kWh**	8,660				0%
Fuel Consumption (HHV basis, gas acc. to App. E)	**lb/h**	18,035				0%
Emissions Rate Guarantee (Per Engine Basis):						
Nox	g/kWh	1.21	1.21	1.21	1.21	Note 9)
	g/bhp-h	0.90	0.90	0.90	0.90	"
CO	g/kWh	1.48	1.48	1.48	1.48	"
	g/bhp-h	1.10	1.10	1.10	1.10	"
SO2 (Based on Tender gas analisys)	g/kWh	0.07	0.07	0.07	0.07	"
	g/bhp-h	0.05	0.05	0.05	0.05	"
PM10	lb/h	1.14	1.14	1.14	1.14	"
PM2.5	lb/h	1.14	1.14	1.14	1.14	"
PM Total	lb/h	2.00	2.00	2.00	2.00	"
VOC	g/kWh	0.10	0.10	0.10	0.10	"
	g/bhp-h	0.074	0.074	0.074	0.074	"
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	"
Maximum Emissions Reductions (with SCR and Oxidation Catalysts)						"
NOx	%	95%	95%	95%	95%	"
CO	%	92%	92%	92%	92%	"
VOC (as NMNEHC)	%	50%	50%	50%	50%	"
Post-treatment Emissions Data (Per Engine Basis)						"
NOx	g/kWh	0.06	0.06	0.06	0.06	"
	g/bhp-h	0.05	0.05	0.05	0.05	"
CO	g/kWh	0.12	0.12	0.12	0.12	"
	g/bhp-h	0.09	0.09	0.09	0.09	"
SO2 (Based on Tender gas analisys)	g/kWh	0.07	0.07	0.07	0.07	"
	g/bhp-h	0.05	0.05	0.05	0.05	"
PM10	lb/h	1.14	1.14	1.14	1.14	"
PM2.5	lb/h	1.14	1.14	1.14	1.14	"
PM Total	lb/h	2.00	2.00	2.00	2.00	"
VOC (as NMNEHC, MW reference as CH4)	g/kWh	0.05	0.05	0.05	0.05	"
	g/bhp-hr	0.04	0.04	0.04	0.04	"
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	"

PLANT PERFORMANCE REPORT

Rev. 1

Definitions and Conditions

1) Fuel consumption according to ISO 3046/1.
2) Fuel consumption measured at site shall be corrected to reference conditions using calculations provided in ISO 3046.
3) Performance verification at site shall be performed according to the contractual site testing procedure.
4) Lube oil consumption will stabilize at the value indicated after a running-in period of 500 h.
6) Site Design Data is based on customer-provided (Tender) and publicly available data. Should actual site conditions deviate from that Caterpillar reserves the right to adjust the rating accordingly
7) Guaranteed Heat Rate shall be @ 100% load only. Partial load heat rates are indicative.
8) Guaranteed Power Output per generator set is measured at gen terminals, up to 36 degrees C site ambient.
9) Emissions are based on ISO 3046 reference conditions, on dry basis. Partial load emissions and reductions are indicative.
10) Expected Parasitic Load indicative only.

Manuel Vizcaya

From: Claudio Martino <Martino_Claudio@cat.com>
Sent: Friday, February 26, 2016 12:09 PM
To: Batten, Tom
Cc: Brier, Jeff; Manuel Vizcaya
Subject: RE: Message from KM_C454e

Dear all,

Good news! Another supplier (Safety Power) confirmed that we can reach 80% reduction if changing the formulation of the catalyst while using a little longer element. No need for extra layers. Please see our revised numbers:

G20CM34
Formaldehyde Emissions (indicative)

	Pre-treat.	Post-treat.
g/kWh	0.19	0.038
g/bhp-hr	0.14	0.028
lb/hr	4.28	0.856

Oxi-Cat Reduction rate 80%

Best Regards,

Claudio

Claudio Martino
Regional Sales Director
Caterpillar Energy Solutions
10203 Sam Houston Park Drive, Suite 400
Houston, TX, 77064, USA
phone: 713-895-1415
martino_claudio@cat.com

From: Claudio Martino/0C/Caterpillar
To: "Batten, Tom" <tbatten@concord-engineering.com>
Cc: "Brier, Jeff" <jbrier@concord-engineering.com>, "vizcayam@air-engineering.net" <vizcayam@air-engineering.net>
Date: 02/24/2016 09:37 AM
Subject: RE: Message from KM_C454e

Hi Tom,

Yes, I followed up with our project application engineers as well as with one supplier of oxidation catalysts (Miratech) and would like to provide the following update:

1) The high speed machines typically run at up to 200 F higher temperatures on the exhaust, when compared to our medium speed gensets. Therefore, the oxidation catalysts are more efficient with the 3520s than with our G20CM34s.

2) Because of our gensets's lower exhaust temperatures, the maximum reduction rate that our factory offers for formaldehydes is 50%.

3) I confirm the indicative formaldehyde emissions informed before (for Bowling Green Project), as follows:

Appendix B
Caterpillar G3520H 2.5 MW Engine
Performance and Emission Data

G3520H

GAS ENGINE TECHNICAL DATA

CATERPILLAR®

ENGINE SPEED (rpm):	1500	RATING STRATEGY:	HIGH RESPONSE
COMPRESSION RATIO:	12.1:1	APPLICATION:	GENSET
AFTERCOOLER TYPE:	SCAC	RATING LEVEL:	CONTINUOUS
AFTERCOOLER - STAGE 2 INLET (°F):	118	FUEL:	NAT GAS
AFTERCOOLER - STAGE 1 INLET (°F):	192	FUEL SYSTEM:	CAT LOW PRESSURE
JACKET WATER OUTLET (°F):	210		WITH AIR FUEL RATIO CONTROL
ASPIRATION:	TA	FUEL PRESSURE RANGE(psig):	2.0-5.0
COOLING SYSTEM:	JW+OC+1AC, 2AC+GB	FUEL METHANE NUMBER:	85
CONTROL SYSTEM:	ADEM4 W/ IM	FUEL LHV (Btu/scf):	905
EXHAUST MANIFOLD:	DRY	ALTITUDE CAPABILITY AT 77°F INLET AIR TEMP. (ft):	3609
COMBUSTION:	LOW EMISSION	POWER FACTOR:	0.8
NOx EMISSION LEVEL (g/bhp-hr NOx):	0.5	VOLTAGE(V):	4160-13800

RATING		NOTES	LOAD	100%	75%	50%
GENSET POWER	(WITH GEARBOX, WITHOUT FAN)	(1)(2)	ekW	2469	1852	1235
GENSET POWER	(WITH GEARBOX, WITHOUT FAN)	(1)(2)	kVA	3086	2315	1543
ENGINE POWER	(WITHOUT GEARBOX, WITHOUT FAN)	(2)	bhp	3448	2591	1742
GENERATOR EFFICIENCY		(1)	%	96.8	96.6	95.8
GENSET EFFICIENCY(@ 1.0 Power Factor)	(ISO 3046/1)	(3)(4)	%	43.1	42.1	39.9
THERMAL EFFICIENCY		(3)(5)	%	41.6	43.1	46.1
TOTAL EFFICIENCY (@ 1.0 Power Factor)		(3)(6)	%	84.7	85.2	86.0
ENGINE DATA						
GENSET FUEL CONSUMPTION	(ISO 3046/1)	(7)	Btu/ekW-hr	7970	8147	8595
GENSET FUEL CONSUMPTION	(NOMINAL)	(7)	Btu/ekW-hr	8245	8428	8891
ENGINE FUEL CONSUMPTION	(NOMINAL)	(7)	Btu/bhp-hr	5905	6023	6302
AIR FLOW (77°F, 14.7 psia)	(WET)	(8)	ft3/min	6648	4941	3319
AIR FLOW	(WET)	(8)	lb/hr	29478	21910	14717
FUEL FLOW (60ºF, 14.7 psia)			scfm	375	287	202
COMPRESSOR OUT PRESSURE			in Hg(abs)	147.9	112.4	78.3
COMPRESSOR OUT TEMPERATURE			°F	475	395	300
AFTERCOOLER AIR OUT TEMPERATURE			°F	129	124	121
INLET MAN. PRESSURE		(9)	in Hg(abs)	141.7	106.1	72.5
INLET MAN. TEMPERATURE	(MEASURED IN PLENUM)	(10)	°F	129	124	121
TIMING		(11)	°BTDC	22	20	16
EXHAUST TEMPERATURE - ENGINE OUTLET		(12)	°F	734	796	901
EXHAUST GAS FLOW (@engine outlet temp, 14.5 psia)	(WET)	(13)	ft3/min	15882	12440	9081
EXHAUST GAS MASS FLOW	(WET)	(13)	lb/hr	30505	22697	15270
MAX INLET RESTRICTION		(14)	in H2O	14.46	10.10	7.34
MAX EXHAUST RESTRICTION		(14)	in H2O	20.09	11.36	5.44
EMISSIONS DATA - ENGINE OUT						
NOx (as NO2)		(15)(16)	g/bhp-hr	0.50	0.50	0.50
CO		(15)(17)	g/bhp-hr	1.89	1.75	1.58
THC (mol. wt. of 15.84)		(15)(17)	g/bhp-hr	3.23	3.12	2.81
NMHC (mol. wt. of 15.84)		(15)(17)	g/bhp-hr	0.48	0.47	0.42
NMNEHC (VOCs) (mol. wt. of 15.84)		(15)(17)(18)	g/bhp-hr	0.39	0.37	0.34
HCHO (Formaldehyde)		(15)(17)	g/bhp-hr	0.26	0.25	0.24
CO2		(15)(17)	g/bhp-hr	414	421	439
EXHAUST OXYGEN		(15)(19)	% DRY	9.9	9.6	9.1
LAMBDA		(15)(19)		1.81	1.75	1.67
ENERGY BALANCE DATA						
LHV INPUT		(20)	Btu/min	339283	260108	182937
HEAT REJECTION TO JACKET WATER (JW)		(21)(30)	Btu/min	36590	31535	25857
HEAT REJECTION TO ATMOSPHERE		(22)	Btu/min	5303	4425	3554
HEAT REJECTION TO LUBE OIL (OC)		(23)(30)	Btu/min	10678	9578	8230
HEAT REJECTION TO EXHAUST (LHV TO 77°F)		(24)(25)	Btu/min	92858	75945	58166
HEAT REJECTION TO EXHAUST (LHV TO 248°F)		(24)	Btu/min	64384	54862	44301
HEAT REJECTION TO A/C - STAGE 1 (1AC)		(26)(30)	Btu/min	27170	14827	5301
HEAT REJECTION TO A/C - STAGE 2 (2AC)		(27)(31)	Btu/min	19626	13062	7107
HEAT REJECTION FROM GEARBOX (GB)		(28)(31)	Btu/min	1155	868	584
PUMP POWER		(29)	Btu/min	859	859	859

CONDITIONS AND DEFINITIONS

Engine rating obtained and presented in accordance with ISO 3046/1. (Standard reference conditions of 77°F, 29.60 in Hg barometric pressure.) No overload permitted at rating shown. Consult the altitude deration factor chart for applications that exceed the rated altitude or temperature.

Emission levels are at engine exhaust flange prior to any after treatment. Values are based on engine operating at steady state conditions, adjusted to the specified NOx level at 100% load. Tolerances specified are dependent upon fuel quality. Fuel methane number cannot vary more than ± 3.

For notes information consult page three.

FUEL USAGE GUIDE

CAT METHANE NUMBER	<50	50	60	70	75	85	100
SET POINT TIMING	-	16	16	16	16	22	22
DERATION FACTOR	0	0.65	0.80	0.90	1	1	1

ALTITUDE DERATION FACTORS AT RATED SPEED

INLET AIR TEMP °F	0	1000	2000	3000	4000	5000	6000	7000	8000	9000	10000	11000	12000
130	No Rating	No Rating	No Rating	No Rating	No Rating	No Rating	No Rating	No Rating	No Rating	No Rating	No Rating	No Rating	No Rating
120	No Rating	No Rating	No Rating	No Rating	No Rating	No Rating	No Rating	No Rating	No Rating	No Rating	No Rating	No Rating	No Rating
110	0.95	0.87	0.79	0.68	0.55	No Rating	No Rating	No Rating	No Rating	No Rating	No Rating	No Rating	No Rating
100	1	1	0.99	0.95	0.91	0.87	0.83	0.79	0.74	0.70	0.65	0.60	0.55
90	1	1	1	1	0.97	0.93	0.89	0.85	0.81	0.77	0.71	0.64	0.58
80	1	1	1	1	0.99	0.95	0.91	0.88	0.84	0.81	0.77	0.71	0.61
70	1	1	1	1	0.99	0.95	0.92	0.88	0.85	0.81	0.78	0.73	0.62
60	1	1	1	1	0.99	0.95	0.92	0.88	0.85	0.81	0.78	0.73	0.62
50	1	1	1	1	0.99	0.95	0.92	0.88	0.85	0.81	0.78	0.73	0.62

ALTITUDE (FEET ABOVE SEA LEVEL)

AFTERCOOLER HEAT REJECTION FACTORS (ACHRF)

INLET AIR TEMP °F	0	1000	2000	3000	4000	5000	6000	7000	8000	9000	10000	11000	12000
130	No Rating	No Rating	No Rating	No Rating	No Rating	No Rating	No Rating	No Rating	No Rating	No Rating	No Rating	No Rating	No Rating
120	No Rating	No Rating	No Rating	No Rating	No Rating	No Rating	No Rating	No Rating	No Rating	No Rating	No Rating	No Rating	No Rating
110	1.15	1.18	1.22	1.25	1.28	No Rating	No Rating	No Rating	No Rating	No Rating	No Rating	No Rating	No Rating
100	1.10	1.13	1.17	1.20	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22
90	1.05	1.08	1.12	1.15	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17
80	1	1.03	1.07	1.10	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.12
70	1	1	1.01	1.05	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07
60	1	1	1	1	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02
50	1	1	1	1	1	1	1	1	1	1	1	1	1

ALTITUDE (FEET ABOVE SEA LEVEL)

FUEL USAGE GUIDE:

This table shows the derate factor and full load set point timing required for a given fuel. Note that deration and set point timing reduction may be required as the methane number decreases. Methane number is a scale to measure detonation characteristics of various fuels. The methane number of a fuel is determined by using the Caterpillar methane number calculation program.

ALTITUDE DERATION FACTORS:

This table shows the deration required for various air inlet temperatures and altitudes. Use this information along with the fuel usage guide chart to help determine actual engine power for your site.

ACTUAL ENGINE RATING:

To determine the actual rating of the engine at site conditions, one must consider separately, limitations due to fuel characteristics and air system limitations. The Fuel Usage Guide deration establishes fuel limitations. The Altitude/Temperature deration factors and RPC (reference the Caterpillar Methane Program) establish air system limitations. RPC comes into play when the Altitude/Temperature deration is less than 1.0 (100%). Under this condition, add the two factors together. When the site conditions do not require an Altitude/ Temperature derate (factor is 1.0), it is assumed the turbocharger has sufficient capability to overcome the low fuel relative power, and RPC is ignored. To determine the actual power available, take the lowest rating between 1) and 2).

1) Fuel Usage Guide Deration
2) 1-((1-Altitude/Temperature Deration) + (1-RPC))

AFTERCOOLER HEAT REJECTION FACTORS(ACHRF):

To maintain a constant air inlet manifold temperature, as the inlet air temperature goes up, so must the heat rejection. As altitude increases, the turbocharger must work harder to overcome the lower atmospheric pressure. This increases the amount of heat that must be removed from the inlet air by the aftercooler. Use the aftercooler heat rejection factor (ACHRF) to adjust for inlet air temp and altitude conditions. See notes 30 and 31 for application of this factor in calculating the heat exchanger sizing criteria. Failure to properly account for these factors could result in detonation and cause the engine to shutdown or fail.

INLET AND EXHAUST RESTRICTIONS FOR ALTITUDE CAPABILITY:

The altitude derate chart is based on the maximum inlet and exhaust restrictions provided on page 1. Contact factory for restrictions over the specified values. Heavy Derates for higher restrictions will apply.

NOTES:

1. Generator efficiencies, power factor, and voltage are based on standard generator. [Genset Power (ekW) is calculated as: (Engine Power (bkW) - Gearbox Power (bkW)) x Generator Efficiency], [Genset Power (kVA) is calculated as: (Engine Power (bkW) - Gearbox Power (bkW)) x Generator Efficiency / Power Factor]
2. Rating is with two engine driven water pumps. Tolerance is (+)3, (-)0% of full load.
3. Efficiency represents a Closed Crankcase Ventilation (CCV) system installed on the engine.
4. ISO 3046/1 Genset efficiency tolerance is (+)0, (-)5% of full load % efficiency value based on a 1.0 power factor.
5. Thermal Efficiency is calculated based on energy recovery from the jacket water, lube oil, 1st stage aftercooler, and exhaust to 248ºF with engine operation at ISO 3046/1 Genset Efficiency, and assumes unburned fuel is converted in an oxidation catalyst.
6. Total efficiency is calculated as: Genset Efficiency + Thermal Efficiency. Tolerance is ±10% of full load data.
7. ISO 3046/1 Genset fuel consumption tolerance is (+)5, (-)0% of full load data. Nominal genset and engine fuel consumption tolerance is ± 1.5% of full load data.
8. Air flow value is on a 'wet' basis. Flow is a nominal value with a tolerance of ± 5 %.
9. Inlet manifold pressure is a nominal value with a tolerance of ± 5 %.
10. Inlet manifold temperature is a nominal value with a tolerance of ± 9°F.
11. Timing indicated is for use with the minimum fuel methane number specified. Consult the appropriate fuel usage guide for timing at other methane numbers.
12. Exhaust temperature is a nominal value with a tolerance of (+)63°F, (-)54°F.
13. Exhaust flow value is on a 'wet' basis. Flow is a nominal value with a tolerance of ± 6 %.
14. Inlet and Exhaust Restrictions are maximum allowed values at the corresponding loads. Increasing restrictions beyond what is specified will result in a significant engine derate.
15. Emissions data is at engine exhaust flange prior to any after treatment.
16. NOx tolerances are ± 18% of specified value.
17. CO, CO2, THC, NMHC, NMNEHC, and HCHO values are "Not to Exceed" levels. THC, NMHC, and NMNEHC do not include aldehydes. An oxidation catalyst may be required to meet Federal, State or local CO or HC requirements.
18. VOCs - Volatile organic compounds as defined in US EPA 40 CFR 60, subpart JJJJ
19. Exhaust Oxygen tolerance is ± 0.5; Lambda tolerance is ± 0.05. Lambda and Exhaust Oxygen level are the result of adjusting the engine to operate at the specified NOx level.
20. LHV rate tolerance is ± 1.5%.
21. Heat rejection to jacket water value displayed includes heat to jacket water alone. Value is based on treated water. Tolerance is ± 10% of full load data.
22. Heat rejection to atmosphere based on treated water. Tolerance is ± 50% of full load data.
23. Lube oil heat rate based on treated water. Tolerance is ± 20% of full load data.
24. Exhaust heat rate based on treated water. Tolerance is ± 10% of full load data.
25. Heat rejection to exhaust (LHV to 77°F) value shown includes unburned fuel and is not intended to be used for sizing or recovery calculations.
26. Heat rejection to A/C - Stage 1 based on treated water. Tolerance is ±5% of full load data.
27. Heat rejection to A/C - Stage 2 based on treated water. Tolerance is ±5% of full load data.
28. Heat rejection to Gearbox based on treated water. Tolerance is ±5% of full load data.
29. Pump power includes engine driven jacket water and aftercooler water pumps. Engine brake power includes effects of pump power.
30. Total Jacket Water Circuit heat rejection is calculated as: (JW x 1.1) + (OC x 1.2) + (1AC x 1.05) + [0.71 x (1AC + 2AC) x (ACHRF - 1) x 1.05]. Heat exchanger sizing criterion is maximum circuit heat rejection at site conditions, with applied tolerances. A cooling system safety factor may be multiplied by the total circuit heat rejection to provide additional margin.
31. Total Second Stage Aftercooler Circuit heat rejection is calculated as: (2AC x 1.05) + [(1AC + 2AC) x 0.29 x (ACHRF - 1) x 1.05] + (GB x 1.05). Heat exchanger sizing criterion is maximum circuit heat rejection at site conditions, with applied tolerances. A cooling system safety factor may be multiplied by the total circuit heat rejection to provide additional margin.

STEULER

- Specification Sheet -

SCR/Oxidation Catalyst System - For NOx/CO/VOC Reduction

Customer:	Concord Engineering	**Notes:**	
Attention:	Jeff Brier	**Ref. No:**	B60217-2
Job Ref:		**Date:**	02/17/16

Engine Mfg:	Caterpillar			**Model No:**	G3520H
EKW:	2,500	**Cycle:**	4	**RPM:**	1800
Fuel Type :	Pipeline Natural Gas	**Load:**	100%	**Hours/Year:**	8,300

SCR Model DeNOx-G3520H/3467 **Nbr Units:** 4 **SCR Controls: Closed Loop**

Item Description	English	Units	Metric	Units
Engine Output	**3,467**	BHP	**2,586**	BKW
Exhaust Gas Mass Flow	**28,896**	Lbs/Hour	**12,897**	Kg/Hour
Exhaust Gas Temperature	**742.0**	°F	**394.4**	°C
Exhaust Flow - Standard Units	**374,949**	SCFH	**10,617**	SCMH
Pre-Catalyst NOx Emissions	**1.18**	G/BHP-Hr	**1.58**	G/BKW-Hr
Pre-Catalyst NOx Emissions	**89**	PPMVD@15% O2	**89**	PPMVD@15% O2
Pre-Catalyst NOx Emissions	**9.02**	Lbs/Hour	**4.03**	Kg/Hour
Post-Catalyst NOx Emissions	**0.060**	G/BHP-Hr	**0.080**	G/BKW-Hr
Post-Catalyst NOx Emissions	**5**	PPMVD@15% O2	**5**	PPMVD@15% O2
Post-Catalyst NOx Emissions	**0.46**	Lbs/Hour	**0.20**	Kg/Hour
Percentage NOx Reduction	**94.9**	%	**94.9**	%
Pre-Catalyst CO Emissions	**1.52**	G/BHP-Hr	**2.04**	G/BKW-Hr
Pre-Catalyst CO Emissions	**182**	PPMVD@15% O2	**182**	PPMVD@15% O2
Pre-Catalyst CO Emissions	**11.62**	Lbs/Hour	**5.19**	Kg/Hour
Post-Catalyst CO Emissions	**0.080**	G/BHP-Hr	**0.107**	G/BKW-Hr
Post-Catalyst CO Emissions	**10**	PPMVD@15% O2	**10**	PPMVD@15% O2
Post-Catalyst CO Emissions	**0.61**	Lbs/Hour	**0.27**	Kg/Hour
Percentage CO Reduction	**94.7**	%	**94.7**	%
Pre-Catalyst NMEHC Emissions	**0.25**	G/BHP-Hr	**0.34**	G/BKW-Hr
Pre-Catalyst NMEHC Emissions	**54**	PPMVD@15% O2	**54**	PPMVD@15% O2
Pre-Catalyst NMEHC Emissions	**1.91**	Lbs/Hour	**0.85**	Kg/Hour
Post-Catalyst NMEHC Emissions	**0.045**	G/BHP-Hr	**0.060**	G/BKW-Hr
Post-Catalyst NMEHC Emissions	**10**	PPMVD@15% O2	**10**	PPMVD@15% O2
Post-Catalyst NMEHC Emissions	**0.34**	Lbs/Hour	**0.15**	Kg/Hour
Percentage NMEHC Reduction	**82.0**	%	**82.0**	%
Pre-Catalyst HCHO Emissions	**0.20**	G/BHP-Hr	**0.27**	G/BKW-Hr
Pre-Catalyst HCHO Emissions	**30**	PPMVD@15% O2	**30**	PPMVD@15% O2
Pre-Catalyst HCHO Emissions	**1.53**	Lbs/Hour	**0.68**	Kg/Hour
Post-Catalyst HCHO Emissions	**0.020**	G/BHP-Hr	**0.027**	G/BKW-Hr
Post-Catalyst HCHO Emissions	**3**	PPMVD@15% O2	**3**	PPMVD@15% O2
Post-Catalyst HCHO Emissions	**0.15**	Lbs/Hour	**0.07**	Kg/Hour
Percentage HCHO Reduction	**90.0**	%	**90.0**	%
Pressure Drop Across Catalyst/Mixer	**7.5**	In. WC	**18.8**	mbar
40%/60% Urea/H2O Consumption Rate	**2.1**	Gal/Hr	**7.8**	Liter/Hr
SCR Catalyst Volume	**40.00**	Cu.Ft	**1.133**	Cu.Meter
SCR Catalyst Configuration	**10x8x2x12**		**10x8x2x300**	
SCR Catalyst Space Velocity	**9,374**	$SCFH/FT^3$	**9,374**	$SCMH/M^3$
Oxidation Catalyst Volume	**13.33**	Cu.Ft	**0.378**	Cu.Meter
Oxidation Catalyst Configuration	**10x8x2x4**		**10x8x2x100**	
Oxidation Catalyst Space Velocity	**28,121**	$SCFH/FT^3$	**28,121**	$SCMH/M^3$

Appendix C
DNREC AQM Forms

DNREC – Air Quality Management Section
Application to Construct, Operate, or Modify Stationary Sources

Administrative Information

If you are using this form electronically, press F1 at any time for help
All Application Forms Should Be Mailed To:
Air Quality Management
Blue Hen Corporate Center
655 S. Bay Road, Suite 5 N
Dover, DE 19901

All Checks Should Be Made Payable To:
State of Delaware

For Department Use Only

Date Received Stamp | Assigned Permit Number

Company and Site Information

1.	Company Name: **Cirrus Delaware LLC**		
2.	Company Mailing Address: **5400 Limestone Road**		
	City: **Wilmington,**	State: **DE**	Zip Code: **19808**
3.	Site Name: **Middeletown Technology Center**		
4.	Site Mailing Address: **N/A** *(if different from above)*		
	City: **N/A**	State: **N/A**	Zip Code: **N/A**
5.	Physical Location of Site: **350 Auto Park Drive** *(if different from above)*		
	City: **Middletown**	State: **DE**	Zip Code: **19709**
6.	Air Quality Management Facility ID Number: **New Project**		
7.	Site NAICS Code): **221119** *(list all that apply*		
8.	Site SIC Code: : **4991** *(list all that apply)*		
9.	Site Location Coordinates: **39°26'36"N, 75°43'45"W**		
10.	Is the Facility New or Existing?	☒ NEW	☐ EXISTING
If the Facility is an Existing Facility, Complete the Rest of Question 10. If Not, Proceed to Question 11.			
10.1.	Does the Facility Have Active Air Permits?	☐ YES	☒ NO

Company and Site Information

11. Is this Application For a New Source or Modification of an Existing Source?
☒ New Source
☐ Modification of Existing Source
☐ Other (Specify):

If the application is for the modification of an existing source, complete the rest of Question 11. If not, proceed to Question 12.

11.1. Does the Source Have an Active Air Permit? ☐ YES ☒ NO

If the source has an active air permit, complete the rest of Question 11. If not, proceed to Question 12.

11.2. Permit Number of Existing Source:

12. Status of Source Being Applied For: ☐ Natural Minor Source ☒ Synthetic Minor Source ☐ Major Source

13. Facility Status: ☐ Natural Minor Facility ☐ Synthetic Minor Facility ☐ Major Facility

If the source is a Major Source, complete the rest of Question 13. If not, proceed to Question 14.

13.1. Responsible Official Name:

13.2. Responsible Official Title:

Contact Information

14. Name of Owner or Facility Manager: **John Ramagano**

15. Title of Owner or Facility Manager: **Partner**

16. Permit Contact Name: **Rick Beringer, P.E.**

17. Permit Contact Title: **Owner's Engineer of Record**

18. Permit Contact Telephone Number: **302-239-6634**

19. Permit Contact Fax Number: **302-239-8485**

20. Permit Contact E-Mail Address: **rberinger@duffnet.com**

Proposed Operating Schedule

21. Proposed Operating Schedule: **24** hours/day **7** days/week **52** weeks/year

21.1. Is There Any Additional Information Regarding the Operating Schedule? ☒ YES ☐ NO

If YES, complete the rest of Question 21. If NO, proceed to Question 22.

21.2. Describe the Additional Information: **See attached application**

Coastal Zone Information

22. Is the Facility Located in the Coastal Zone? ☐ YES ☒ NO

If the facility is located in the Coastal Zone complete the rest of Question 22. If not, proceed to Question 23.

22.1. Is a Coastal Zone Permit Required for Construction or Operation of the Source Being Applied for? ☐ YES ☐ NO

Attach a copy of the Coastal Zone Determination if it has not been previously submitted

If a Coastal Zone Permit is required complete the rest of Question 22. If not, proceed to Question 23.

22.2. Has a Coastal Zone Permit Been Issued? ☐ YES ☐ NO

Attach a copy of the Coastal Zone Permit if it has not been previously submitted

Local Zoning Information

23. Parcel Zoning: **C-3**

Attach Proof of Local Zoning if it has not been previously submitted

Application Information

24. Is the Appropriate Application Fee Attached? ☒ YES ☐ NO

25. Is the Advertising Fee Attached? ☒ YES ☐ NO

Attach the appropriate fees. Note that your Application will not be considered complete if the appropriate fees are not included.

26. Is a Cover Letter Describing the Process Attached? ☒ YES ☐ NO

Attach a brief cover letter describing your Application.

If the Facility is a New Facility complete Question 27. If not, proceed to Question 28.

27. Is a Copy of the Applicant Background Information Questionnaire on Record at the Department? ☐ YES ☒ NO

If NO, complete the rest of Question 27. If YES, process to Question 28.

27.1 Is a Copy of the Applicant Background Information Questionnaire Attached? ☒ YES ☐ NO

Attach a copy of the Applicant Background Information Questionnaire if applicable.

28. Check Which Application Forms are Attached:

☒ AQM-1	☐ AQM-3.4	☐ AQM-3.9	☐ AQM-3.14	☐ AQM-4.4	☒ AQM-4.9	☒ AQM-6
☐ AQM-2	☐ AQM-3.5	☐ AQM-3.10	☐ AQM-3.15	☐ AQM-4.5	☐ AQM-4.10	
☒ AQM-3.1	☐ AQM-3.6	☐ AQM-3.11	☐ AQM-4.1	☐ AQM-4.6	☐ AQM-4.11	
☐ AQM-3.2	☐ AQM-3.7	☐ AQM-3.12	☐ AQM-4.2	☐ AQM-4.7	☐ AQM-4.12	
☐ AQM-3.3	☐ AQM-3.8	☐ AQM-3.13	☐ AQM-4.3	☐ AQM-4.8	☒ AQM-5	

Application Information

29. Check Which Documents are Attached:

- ☐ Coastal Zone Determination
- ☐ Coastal Zone Permit
- ☐ Proof of Local Zoning
- ☐ Application Fee
- ☐ Advertising Fee
- ☐ Applicant Background Information Questionnaire
- ☐ Claim of Confidentiality
- ☐ Manufacturer Specification(s)
- ☐ Material Safety Data Sheets (MSDSs)
- ☐ Supporting Calculations
- ☐ Descriptive Cover Letter
- ☐ Other (Specify):

Confidentiality Information

30. Do You Consider Any of the Information Submitted With this Application Confidential? ☐ YES ☒ NO

If a Claim of Confidentiality is made it MUST meet the requirements of Section 6 of DNREC's Freedom of Information ("FOIA") Regulation at the time the Application is submitted.

Signature Block

I, the undersigned, hereby certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all of its attachments as to the truth, accuracy, and completeness of this information. I certify based on information and belief formed after reasonable inquiry, the statements and information in this document are true, accurate, and complete. By signing this form, I certify that I have not changed, altered, or deleted any portions of this application. I acknowledge that I cannot commence construction, alteration, modification or initiate operation until I receive written approval (i.e. permit, registration, or exemption letter) from the Department. I acknowledge that I may be required to perform testing of the equipment to receive construction or operation approval, and that if I do not receive approval to construct or operate that I may appeal the decision.

John Ramagano
Owner or Authorized Agent

3/8/2016
Date

John Ramagano
Signature of Owner or Authorized Agent

All Application Forms Should Be Mailed To:
Air Quality Management
Blue Hen Corporate Center
655 S. Bay Road, Suite 5 N
Dover, Delaware 19901

All Checks Should Be Made Payable To:
State of Delaware

Scott Lobdell: It will be the responsibility of the Sports Complex to control trash and make sure it doesn't affect the neighboring properties.

Moved by Mr. Faulkner and seconded by Mr. Chas to approve the Record Major Land Development Plan for the Delaware Sports Complex indoor and outdoor athletic fields at 955 Levels Road. Motion Carried Unanimously.

5-D. <u>Record Major Land Development and Subdivision Plan</u> for a proposed re-subdivision of five lots into a single parcel, and land development of a 228,000 square-foot technology center and associated power facility improvements, in a C-3 zoned area, along Auto Park Drive (Parcels D, E, F, K and L). Tax Parcel Nos: 23-010.00-045; 23-010.00-046; 23-010.00-047; 23-040.00-007 and 23-010.00-044.

Mark Dunkle, with Parkowski, Guerke and Swayze, representing property owner Mautom LLC, presented the Record Major Land Development and Subdivision Plan for the proposed Technology Center.

- The project will generate 100 to 125 permanent jobs with an annual wage of $78,000.
- The proposal complies with Middletown's Comprehensive Plan and Zoning Code.
- It complies with code requirements for the Record Plan.
- The Comprehensive Plan, the "roadmap" for growth and development, was certified and updated in 2012.
- This plan also meets the goal of the Comp Plan to provide Middletown residents with adequate access to employment.
- Another objective is to encourage investments in Middletown to increase the desirability for firms to locate in Middletown. The project amounts to about $250 million.
- The applicants have applied for a state infrastructure grant.
- Projects of this nature usually have a spin-off effect and generate additional economic activity.
- The project is located in the center of the Commercial/Manufacturing-Industrial zoned area, previously referred to as the Westown Employment Center.
- C-3 zoning designation is District Employment/Regional Retail.
- Planning and Zoning recommended approval on May 21, 2015; Preliminary Plan approval was received June 1, 2015. Record Plan approval is sought tonight. The plan has gone through the code approval process.

Steven Lewandowski with CABE Associates pointed out changes to the Record Plan based on the Preliminary Plan review.

- Comments from the Town's consulting engineers have been received and the site plan has been revised accordingly. Some of their comments regarded sidewalk access around the site; location of some of the ADA accessible parking spaces; identifying easements on the Record Plan. Twelve comments were addressed and the revised plan was forwarded to KCI for review. A letter was received from KCI acknowledging the revised plan was acceptable as submitted.
- On July 29, 2015, the Board of Adjustment granted approval for a parking variance.
- The Record Plan complies with the C-3 zoning requirements.

Mark Dunkle commented that the Record Plan doesn't present an electric power generation plant for approval but reserves the space for that facility. The Town's code allows businesses to generate electric power. Those regulations will guide the equipment selection that the developer proposes, as well as the Tariff, which regulates the buying and selling of electricity. That approval will come through separate, additional meetings. Mr. Dunkle read an excerpt from the Electric Regulations: "The co-generation facility or an on-site generation on the Town's system must apply for and be approved by the Town to operate as a parallel generator. The co-generator must meet federal qualifying standards." The applicant is required to go through the process with the Town.

The applicant will also apply for an air quality permit with DNREC. A public hearing will be held and public comments will be received. Air quality standards will be met.

This project proposes a 52.5 megawatt generation facility. Smyrna went on line in 2012 with a 50 megawatt natural gas fired facility. In Dover, a 309 megawatt facility is producing electricity, and will have their grand opening in October. Those are both commercial power plants. They are different in how they operate, but

- The townhouse section on the westerly side of the project will be relocated to the central portion of the development.
- About 3.08 acres located to the north of the site will be subdivided and become part of the project. The 3.08 acres is land-locked and also zoned R-3.
- A small clubhouse will be constructed for the age-restricted section. A separate clubhouse will be constructed for the market-rate units but will also be available for the age-restricted residents.
- 14 townhouse lots have been added to the plan. The previous lot count was 642 versus 656. The maximum density per the annexation agreement was 687 units.

In addition to the regular impact fees, the previously agreed upon parks and recreation fee of $400 per unit, and the DelDOT fees of $2,200 per single family lot and $1,100 per townhouse lot will also stay with the new plan.

Jason Faulkner asked if the stub road goes to the property line. Mr. Tolliver said the stub road is located in the same area as originally proposed in the Transportation Improvement Plan. The right of way goes to the tract boundary – the actual road stops before the wetland impact. There is sufficient right of way for the future tie-in.
Mr. Faulkner: Will the Town end up building the road when the next piece comes in?
Mayor Branner: The thought was the cost would be shared to make the connection to the property line when the next piece comes in. They would then build the road to Industrial Drive. A note can be added to the Record Plan requiring the connection.

Moved by Mr. McGhee and seconded by Mr. Stout to approve the Record Major Subdivision and Land Development Plan for the Preserve at Deep Creek as presented. Motion Carried Unanimously.

5-C. <u>955 Levels Road – Record Major Land Development Plan – Delaware Sports Complex</u>. Indoor and outdoor athletic fields, located on +/- 170 acres, in an AP zone. Tax Parcel No. 23-043.00-001.

Scott Lobdell, Van Cleef Engineering, stated the plan was presented to Council for Preliminary approval last month.

- The project is located on Levels Road, 1/2 mile from the intersection of Rt. 301.
- The site is located on both sides of the entrance to Levels Park; about 100 acres is on the right side and about 70 acres is on the left.
- The project proposes 20 outdoor soccer, lacrosse, multi-sport fields; 16 baseball fields; 2 indoor facilities with associated parking.
- The large indoor facility, about 160,000 square feet, will have office space, full indoor fields and hardcourt areas for basketball and volleyball; the smaller building is 75,000 square feet sized for an aquatic center – its use will be determined at the time it is ready to be built.
- The entrance proposed off Levels Road opposite St. Anne's was removed.
- They met with DelDOT regarding the existing park entrance and the proposed entrance off Levels Road. The improvements are in place on the plan to address traffic concerns at those entrances.
- The parking areas were reconfigured to accommodate the required landscape islands.
- Additional sidewalks were added to provide ADA access to the fields.

Mr. Reynolds: How far is the new entrance from the Rt. 301 intersection?
Scott Lobdell: 1400 feet.

Lee Rosenson, Springmill: Are any tennis or pickle ball courts are proposed?
Scott Lobdell pointed out the tennis court location (later phase). Pickle ball courts will probably be set up on the indoor hard courts.

Frank Bailey asked for clarification on the access locations for emergency vehicles.
Scott Lobdell pointed out the roads and access locations on the plan.

St. Anne's resident: Asked what measures will be taken to control trash – winds are very strong and blow in their direction.

Scott Lobdell: It will be the responsibility of the Sports Complex to control trash and make sure it doesn't affect the neighboring properties.

Moved by Mr. Faulkner and seconded by Mr. Chas to approve the Record Major Land Development Plan for the Delaware Sports Complex indoor and outdoor athletic fields at 955 Levels Road. Motion Carried Unanimously.

5-D. <u>Record Major Land Development and Subdivision Plan</u> for a proposed re-subdivision of five lots into a single parcel, and land development of a 228,000 square-foot technology center and associated power facility improvements, in a C-3 zoned area, along Auto Park Drive (Parcels D, E, F, K and L). Tax Parcel Nos: 23-010.00-045; 23-010.00-046; 23-010.00-047; 23-040.00-007 and 23-010.00-044.

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- The proposal complies with Middletown's Comprehensive Plan and Zoning Code.
- It complies with code requirements for the Record Plan.
- The Comprehensive Plan, the "roadmap" for growth and development, was certified and updated in 2012.
- This plan also meets the goal of the Comp Plan to provide Middletown residents with adequate access to employment.
- Another objective is to encourage investments in Middletown to increase the desirability for firms to locate in Middletown. The project amounts to about $250 million.
- The applicants have applied for a state infrastructure grant.
- Projects of this nature usually have a spin-off effect and generate additional economic activity.
- The project is located in the center of the Commercial/Manufacturing-Industrial zoned area, previously referred to as the Westown Employment Center.
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- The Record Plan complies with the C-3 zoning requirements.

Mark Dunkle commented that the Record Plan doesn't present an electric power generation plant for approval but reserves the space for that facility. The Town's code allows businesses to generate electric power. Those regulations will guide the equipment selection that the developer proposes, as well as the Tariff, which regulates the buying and selling of electricity. That approval will come through separate, additional meetings. Mr. Dunkle read an excerpt from the Electric Regulations: "The co-generation facility or an on-site generation on the Town's system must apply for and be approved by the Town to operate as a parallel generator. The co-generator must meet federal qualifying standards." The applicant is required to go through the process with the Town.

The applicant will also apply for an air quality permit with DNREC. A public hearing will be held and public comments will be received. Air quality standards will be met.

This project proposes a 52.5 megawatt generation facility. Smyrna went on line in 2012 with a 50 megawatt natural gas fired facility. In Dover, a 309 megawatt facility is producing electricity, and will have their grand opening in October. Those are both commercial power plants. They are different in how they operate, but

they both had to go to DNREC and satisfy the air quality emission standards. Both plants used the latest technology when they were built and this data center will use state of the art technology as well.

The technology center will be 12 football fields from the nearest residential development to the north; 10 to the northwest; 7 from the east and 12 from the south (Westown).

Alan Harris, Townsend: General comments included that the power plant is not necessary; it will only add pollutants; decrease property values; water and sewer rates will increase due to the project; a new well will have to be installed; a letter from Artesian says it will cost $3.5M for a new well and processing plant; the co-generation facility will use about 1.2 to 1.4 million gallons of water a day; the wastewater system has to be upgraded to handle the excess outflow.
Mayor Branner: This hearing is for land use approval. The technology center will pay for any upgrades, if necessary, to the Town's systems. Water and sewer rates increased due to operational costs – not because of this project. DNREC air permits will be applied for and complied with.

Mark Dunkle: A $7.5 million grant has been applied for through the state incentive program.

Morris Deputy: There are no planned improvements to the sewer plan as a result of this project. A 4" lateral will be required and the Town can accommodate that requirement.

New Castle resident: Commented that Delaware needs employment centers and investment in power generation; presented stats for neighboring states with natural gas power coming on line by 2017 – Pennsylvania 5,000mw; New Jersey 2,000mw; Maryland 2500mw; and only 309 mw in Delaware. Wind and solar are not reliable because weather conditions change. This proposed 52mw plant will use the same natural gas that is currently used in many homes for cooking and heating. The plant is half the size of the Smyrna plant. Developers would not request approval for new residential development if the plant is supposed to cause lower property values.

Pete Sullivan, Middletown: Asked if the timeline presented a month ago was available.
Mark Dunkle: This presentation represented the land use timeline and additional meetings.
Mayor Branner: The timeline is for land use approval tonight. A separate Tariff public hearing will be scheduled; however, it cannot be scheduled until all the requirements are known and DEMEC's agreements are prepared. Those meetings will be publicized.
Mark Dunkle said the next step would be the DNREC Air Permit Application.
P. Sullivan: Asked if quality of life is mentioned in the Comp. Plan -- he said if DNREC issues the air permit it doesn't mean the air will be safe.
Mayor Branner: Questions on the electric facility cannot be answered because all the information is not available yet. That information will be required when the developers apply for the air permit.
P. Sullivan: A conservative estimate for water is 1,000 gpm and if the flow of water was continuous all day, it comes to 1.4 mgd.
Mayor Branner: The co-generation plant generates only what they use and it does not run all day. Only 10% of what it uses goes to the wastewater treatment plant. There is more than enough excess capacity at the plant to meet all their needs and other future growth without making improvements to the existing plant.
P. Sullivan: It was mentioned earlier that this facility is the same as a hospital -- he doesn't know of any hospital that has a 50mw generator.
Mark Dunkle: This facility will have its own power generation like some hospitals do. Any facility that comes to the Town can ask permission to have their own power generation. The facility will have multiple smaller generators, not one 50mw generator. All of that detail will be presented at the Tariff hearing.
Mayor Branner said it will have five 10's and five 2.5 generators. They won't all be running at the same time.
P. Sullivan: The small generators that come on quickly cause more pollutants. How tall is the smoke stack? He has a petition of 500 signatures against the plant. The residents will get additional asthma attacks, heart attacks, cancer and premature deaths. The air permit from DNREC is a permit to pollute. The emission sensors in the state are from the 1990's.
M. Dunkle: The Town has a height limit of 50'. A perspective will be shown at the electric generation presentation. All rules and regulations in the state will be followed.
Mayor Branner: The plant in Smyrna is just less than 50 feet. All requirements from DNREC and the EPA will be met.
P Sullivan: DNREC can give a permit for this and then they can add on.

Mayor Branner: Any change other than what is approved tonight must come back to Council and go through the same process again, and it must be re-submitted to DNREC.
P. Sullivan: How reliable is the 138kV line? How many times does it go down? The new 138kV line will come from Townsend and run down Levels Road – the poles are twice as tall as regular poles.
Mayor Branner: The 138kV line has gone down once in about 15 years.
Jason Faulkner: The new 138kV line is for redundancy for the Town's system – it will be built whether or not this project goes through.
P. Sullivan: If there are two 138kV lines in Town, the center doesn't need back up.
Mayor Branner: The 138kV line has been planned for 6-1/2 years. It will give the Town redundancy in case one line goes down. If both lines go down, the data center needs to be at five 9's compliance to guarantee that they will not go down; that's where the co-generation comes in. That's a data center requirement.
P. Sullivan: Where will the ammonia be stored?
Mayor Branner: That has nothing to do with the land use approval – that's part of the EPA.

P. Sullivan: Will the land be sold or leased? Who are the principals of Cirrus?
Mayor Branner: That's a business decision – has nothing to do with the land use hearing.

Lynn Sullivan, St. Anne's: Has heard all the rhetoric before. Commented that in reference to this type of facility causing cancer, polluting the water and air, sending out microwaves and creating brain cancer, there are more pesticides on lawns than in the air. Any place in the world has cancer. People usually get hyped up because of the fear of the unknown. She asked if it would create noise.
Mayor Branner: Several people from the Town visited the plant in Smyrna. The turbines are in an enclosed, insulated building – it's very quiet. The residents about a half a mile away have confirmed that they didn't know the facility was there. The Town's noise ordinance will be met.

Jeff Bruette, business owner, Middletown: Expressed his opinion that the tech center doesn't comply with code. The plan PLUS approved is significantly different than the plan presented tonight.
Mark Dunkle: Connie Holland, Director of State Planning, on July 14, 2015, sent a letter confirming that the revised plan meets PLUS approval.
J. Bruette: Will the power plant have to come back for what they will build?
Mayor Branner: That will be part of the Tariff hearing. What is going to be built will be presented with the Tariff with the agreement with DEMEC. We will know all the specifics then.
J. Bruette: Read the following statement from a document: "The center is estimated to be a $250 million project. Approximately 2/3 of the project costs will be for the data center and the other 1/3 will be for a natural gas fired highly efficient combined heat and power plant." Will the power plant operate as a separate entity or can it only be used in conjunction with a data center?
Mayor Branner: It will be a facility that generates what it uses.
J. Bruette: The document also states: "Each has its own return on investment". It says, "The data center will be the main customer for the power plant. In unison with the City of Middletown and their electric provider, DEMEC, the plant may periodically be used to generate excess power to the grid in order to shave peak demand which will have beneficial financial benefits for the Town and project. The technology center is negotiating buy and sell agreements with the local utility DEMEC. The investment in the CHP plant will be backed in part by the power purchase agreements of DEMEC."
Mark Dunkle: The document is from the Infrastructure Grant Application. This will not be a commercial power plant; the power will be used for the data center or go to the Town – they are not selling power.
Mayor Branner: It's a net zero generation facility.
Jason Faulkner: They may make profit off it but they will not generate more power than they need – that's what net zero means. They will buy power from the grid and sometimes they will sell power through DEMEC only.
M. Dunkle: That will all be discussed at the Tariff hearing.
J. Bruette: Will the Town have another hearing for decision making authority?
Mayor Branner: Yes – at the Tariff hearing. It's the Town of Middletown's Electric Tariff. The approval tonight is on the condition that the Tariff hearing goes through, the DNREC permit, the EPA, and DEMEC agreements are all approved.
J. Bruette: Is there any plan for residential development that will be any closer than the football field's show on the map?
Jim Reynolds: No – there is no one living closer to this facility than me, which is about 8 football fields.
Mayor Branner: There is no residential coming in to be approved.

M. Dunkle: Entered the letter/email from Connie Holland regarding PLUS approval for the record.

Dave Wiesneski: Commented that the data center doesn't need the power plant.

Howie Lipinski, Middlesex Drive: Has been in the industry over 30 years. Commented that most of the illnesses mentioned come from liquid fuels and coal plants. Emission rates usually drop and offset some of the negative impact when new businesses use the best technology available. The new gas turbines and emission controls are better than they've ever been.

Rob Stout: How many of the proposed 100 to 125 jobs will stay local?
Mark Dunkle: The intention is that most of them will be local; the estimate was about 100 new jobs and about 25 employees will relocate from out of state.
R. Stout: Looking at a median income of $78,000 would be about $7.8 million of annual income revenue into the community.

Moved by Mr. Stout and seconded by Mr. Reynolds to approve the Record Major Land Development and Subdivision Plan for a proposed re-subdivision of five lots into a single parcel, and land development of a 228,000 square-foot technology center and associated power facility improvements, in a C-3 zoned area, with the condition that all permitting and licensing requirements are met from DNREC, the EPA and the Fire Marshal.
Rob Stout: I vote yes as it's consistent with the Town's Comprehensive Plan.
Robert McGhee: I vote yes because it's consistent with the Town's Comprehensive Plan and meets the Town's zoning requirements.
Jim Reynolds: I vote yes because as stated before, it's consistent with the Comprehensive Plan and meets all zoning requirements.
Jason Faulkner: I vote yes because it complies with our Comprehensive Plan, meets the zoning requirement and it will provide jobs in the Town of Middletown.
Drew Chas: I vote yes for the reasons stated previously. It's on par with the Comprehensive Plan; it meets the zoning code and will provide jobs for the Town.
Howard Young: I vote yes because it meets the Comprehensive Plan and was approved by the Zoning Commission.
Motion Carried Unanimously.

Mayor Branner: I do not get to vote because the vote is not tied. This is exactly the type of use we envisioned when we adopted our Comprehensive Plan. I would vote "yes" if the vote was tied.

5-E. <u>840 Middletown-Warwick Road – Levels Business Park – Bluegrass Investments, LLC – Minor Subdivision Plan</u> and lot line adjustment to convey 1.9948 acres from Parcel C to Parcel D and create Parcel F. Tax Parcel Nos. 23-065.00-002 and 23-065.00-003.

Garth Jones with Becker Morgan Group presented the plan proposing to subdivide Parcel D, consisting of 5.4 acres, create Parcel F, and add 2 acres from Parcel C-2 to create a new, larger Parcel D for Royal Farms.

Jason Faulkner commented that the lot line for Parcel D is also the 138kV pole line easement. If the property line is moved, the pole line will sit in the middle of Lot D.

Mr. Jones said the store and main area for fueling cars will be placed on the north side, the larger portion of Parcel D. The portion toward the south side of the pole line is for a separate diesel canopy. No structures will be in the easement but a travel aisle will go through the easement.

Council expressed concerns regarding the 138kv line being in the middle of the lot and a trucks driving through the utility easement to get to the diesel pumps.

Jason Faulkner suggested they try to fit the project on the existing parcel and leave the lot line alone. The 138kv line is the main electric feed into Town, and Council will not do anything to put it in danger.

After discussion, Mayor Branner suggested this plan be tabled and a land development and subdivision plan be presented together so Council has a clear idea of how and where the buildings will be placed on the lot.

Moved by Mr. McGhee and seconded by Mr. Faulkner to approve the Minor Subdivision Plan and lot line adjustment to convey 1.9948 acres from Parcel C to Parcel D and create Parcel F at 840 Middletown-Warwick Road.

Moved by Mr. McGhee and seconded by Mr. Faulkner to rescind the previous motion and table the Re-Subdivision Plan to a future date. Motion Carried Unanimously.

5-F. 211 E. Main Street – Conditional Use Permit Request for a daycare center and after school program in a C-2 zoned area. CU-10-15. Tax Parcel no. 23-006.00-456.

Pastor Charles Salako requested approval to use a portion of the building for a daycare center and after school program.

Tawana Ricks commented that they also want to offer a performing arts program to the community.

Planning and Zoning recommended unanimous approval.

Mr. Reynolds: How will the children access the playground?
Pastor Salako said they would use the corridor on the left side of the building to get to the playground.
Mr. Reynolds: Will busses be dropping kids off for after school care?
Ms. Ricks: The busses will pull into the parking lot and staff will get the children.

Moved by Mr. Faulkner and seconded by Mr. Young to grant approval for Conditional Use CU-10-15 for a daycare center and after school program at 211 E. Main Street. Motion Carried Unanimously.

5-G. 128 Patriot Drive, Unit 5 – Conditional Use Permit Request for office/warehouse space in an M-I zoned area. Tax Parcel No. 23-041.00-015.

Tabled. No representative.

5-H. Motion to Ratify a Resolution for equipment leasing with PNC Bank.

Morris Deputy: PNC requires approval from Council to enter into a new lease agreement for a bucket truck.

Moved by Mr. Faulkner and seconded by Mr. McGhee to ratify a Resolution for equipment leasing with PNC Bank. Motion Carried Unanimously.

5-I. Notice of application to the Edward Byrne Memorial Justice Assistance Grant (JAG) Program FY 2015, local solicitation to be used for police equipment.

Captain Iglio: The MPD is requesting $10,750 in assistance from the JAG program to enhance surveillance and expand system capabilities in the public access areas of the police station.

Moved by Mr. Young and seconded by Mr. Chas to approve Captain Iglio's request. Motion Carried Unanimously.

5-J. Motion to Ratify an Agreement with St. Anne's Golf Course, LLC, for the donation of property. Tax Parcel Nos: 23-051.00-001; 23-053.00-060; 23-054.00-001.

Morris Deputy: This agreement is for Capano to build the clubhouse, pool and related parking lot for donation to the Town. The Town in turn will lease the clubhouse, pool and golf course to the Delaware Sports Complex group, who will complete construction of the actual golf course and upon completion, operate and maintain the property. The Town will use the golf course for spray.

A resident of The Legends questioned the impact another golf course would have on The Legends. He also questioned what would be done with the Legends Golf Course if it closed.

The Town responded that St. Anne's has been planned for development since early 2000's. If the golf course closes, the Town will maintain the land since it is used for spray irrigation.

Patty McQuen: Her family was under the impression that the lot line between the Charter School and their property was to become a buffer zone. They found out in June that there was just an easement and no buffer zone. The easement to their farm has erosion; a drainage grate is covered with debris, etc. Who is responsible to clean the drain and maintain the easement?
Morris Deputy: The Town has a right-of-way where the sewer main goes to the treatment facility, which will eventually be turned over to the Town -- the developer maintains it now.
Mayor Branner recommended she give Mr. Deputy more specific information at the end of the meeting and the Town will contact the developer to clean it up.
P. McQuen: Requested additional trees and landscaping be planted by the easement at the Charter School, the homes and the ravine.
Mayor Branner said we will review the recorded landscape plan to see what was previously approved.

Moved by Mr. Faulkner and seconded by Mr. Reynolds to Ratify an Agreement with St. Anne's Golf Course, LLC, for the donation of property. Tax Parcel Nos.: 23-051.00-001; 23-053.00-060; 23-054.00-001. Motion Carried Unanimously.

5-K. Adopt an Ordinance to Regulate Non-Storm Water discharges to the Municipal Separate Storm Sewer System (MS4).

Tabled until September.

5-L. Motion to authorize the execution of a deed to transfer a portion of property along Merrimac Avenue, from the Town of Middletown to Duke Realty, LP. Tax Parcel No. 23-042.00-003.

Morris Deputy: Per the record plan for the Amazon project, .16 acres of land from the Merrimac right-of-way was to be dedicated to Duke Realty. Their attorneys realized it never happened and are now asking for the transfer.

Moved by Mr. Faulkner and seconded by Mr. Reynolds to authorize the execution of a deed to transfer .16 acres of property along Merrimac Avenue from the Town of Middletown to Duke Realty. Motion Carried Unanimously.

5-M. Motion to Ratify an Agreement with a Financial Advisory Consultant.

Morris Deputy: The Town went to bid for professional services from a financial advisory consultant to handle various financial matters for the Town. The businesses short-listed were: PFM Group, Fairmont Capital and Public Advisory Consultants. We recommend the bid be awarded to Public Advisory Consultants. The contract will be a time and material, as needed contract.

Moved by Mr. Chas and seconded by Mr. Faulkner to accept the recommendation by the Town Manager to award the financial advisory consultant contract to Public Advisory Consultants. Motion Carried Unanimously.

5-N. Motion to Adopt an amended G/L Account Reconciliation Policy for the Town of Middletown.

Morris Deputy: The Department of Justice reviewed the previously adopted policy and asked that we amend it by identifying a responsible person and to identify a time limit to have this done. We appointed the Accounting Manager and decided it would be done at the end of every month.

Moved by Mr. Chas and seconded by Mr. Faulkner to accept the recommendation of the Town Manager to amend the G/L Account Reconciliation Policy for the Town of Middletown. Motion Carried Unanimously.

5-O. Introduce an Ordinance to Amend Chapter 104: Obstructions, in the Town of Middletown Code of Ordinances.

Mayor Branner introduced the Ordinance to Amend Chapter 104: Obstructions, in the Town of Middletown Code of Ordinances.

The Ordinance will be acted on at the September Council Meeting.

5-P. <u>Motion to Ratify a Ground Lease Agreement with Delaware Sports Complex, LLC</u>. Tax Parcel No. 23-043.00-001.

Mayor Branner said this Lease Agreement is subject to acceptance by all parties in conjunction with the agreement with St. Anne's Golf Course, item 5-J.

Moved by Mr. Stout and seconded by Mr. Reynolds to approve a Ground Lease Agreement with Delaware Sports Complex, LLC, subject to the completion and execution of agreement acceptable to all parties. Motion Carried Unanimously.

5-Q. <u>Motion to Ratify a Ground Lease Agreement with Summit Bridge Properties, LLC</u>. Tax Parcel Nos: 23-052.00-001; 23-051.00-001; 23-053.00-060; and 23-054.00-001.

Motion by Mr. Reynolds and seconded by Mr. McGhee to Ratify a Ground Lease Agreement with Summit Bridge Properties, LLC. Subject to the completion and execution of agreement by all parties. Motion Carried Unanimously.

6. Unfinished Business:

- Fred Ackerman, Resident: Said he heard the reason the house burned down in St. Anne's was because there was an issue with fire hydrants.
  Mayor Branner said the rumor he heard was that at least 4 hydrants had to be hit because there was no water. He contacted the Fire Chief who said there was more water than you could ever imagine at the first hydrant they hit. Water was not an issue. It was a combination of wind and quick burning material. The water is a looped system and never stops running. The fire is still under investigation.

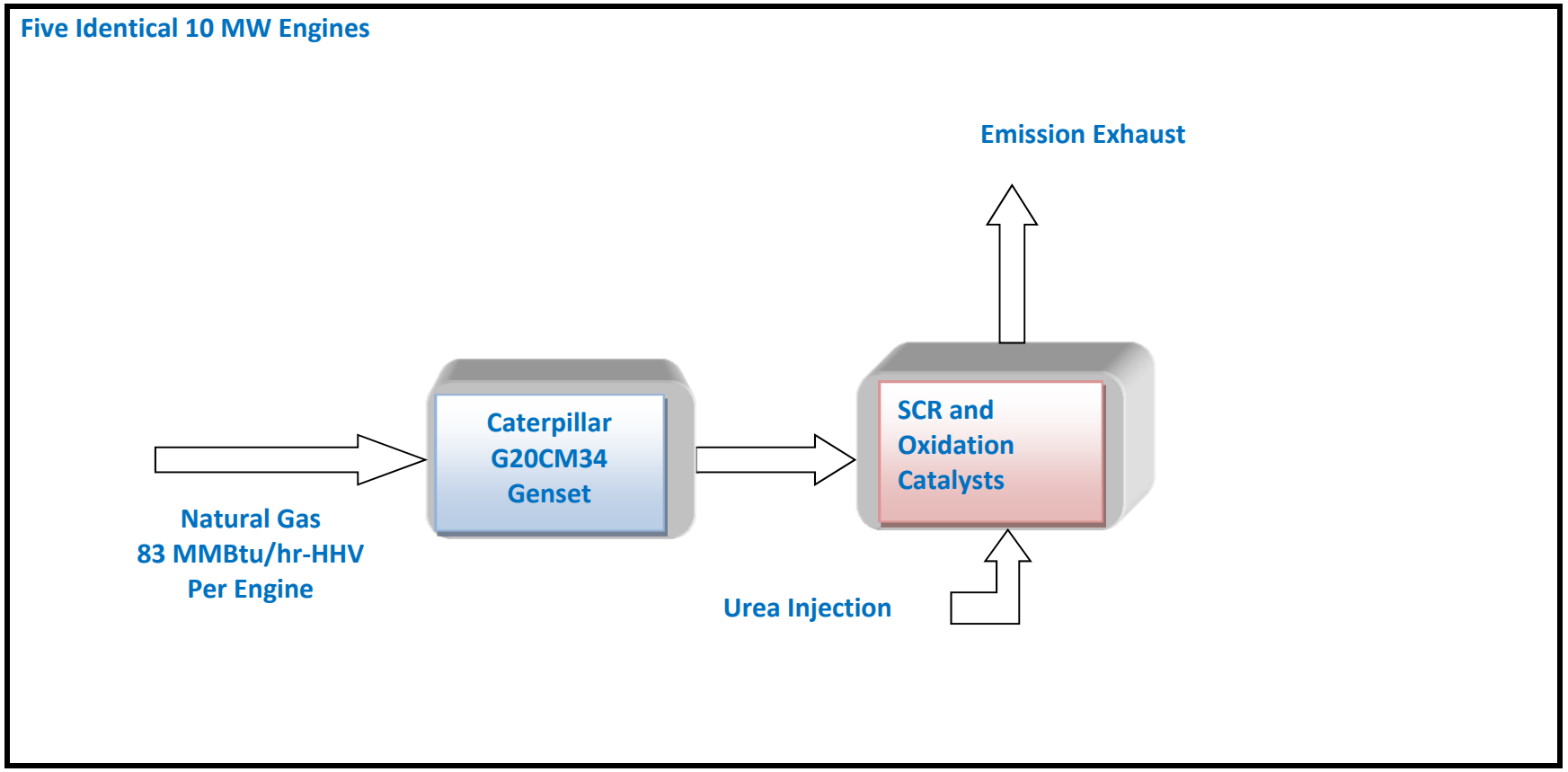
7. New Business:

- Jim Reynolds announced that the MOT Little League major boys, 11 and 12 year olds, won the State Championship again. They will be going to Bristol, Connecticut. The 9 and 10 year olds also won and will be going to New Jersey.
- Howard Young announced tomorrow night is National Night Out at Redding Middle School from 5 to 8 p.m. Demonstrations by local agencies – police department, fire department, K-9 unit, etc., will be presented. Cabela's will also be there.
- Lee Rosenson asked if the Town has considered cameras for the police. Mayor Branner said the police officers have had cameras for 2-1/2 years.
- Lee Rosenson reported that all the street lights are out on the connector Road from Cleaver Farm Road. The road is full of pot holes.
  Mayor Branner said the Town will take care of the street lights. The connector road is not a recorded road. It was put in as a convenience by Jerry Heisler. The Town patches it as necessary. When the Highlands development starts, that connector road will be removed; an extension of Lake Street to Cleaver Farm Road will be constructed.
- Patty McCune expressed safety concerns about the condition of the roads and traffic patterns at Walmart's entrance and parking lot, and the connecting roadway to the adjoining retail businesses. Asked if the Town had any control over the parking lot traffic patterns. Also asked how long does the Police Department keep the recordings of accidents.
  Mayor Branner said renovations to the road should start in August. The shopping center is private property; the police will respond when called. Concerns may be directed to the manager at Walmart. At this time, there is no mandate on how long recordings must be kept, but the MPD has kept theirs.

Moved by Mr. Reynolds and seconded by Mr. Faulkner to adjourn. Motion Carried Unanimously.

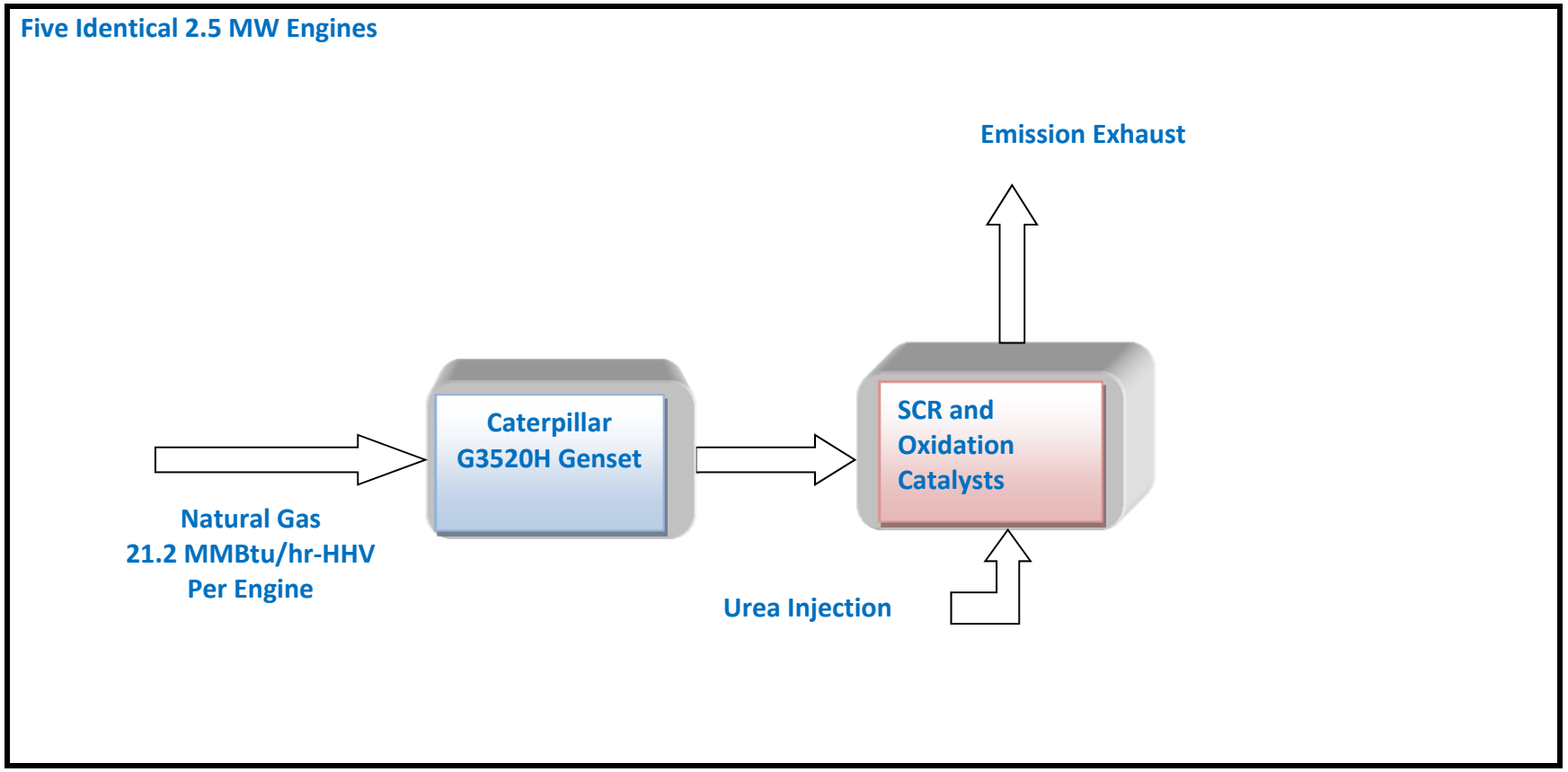
Process Flow Diagram

Sketch the Process Flow Diagram for the equipment or process being applied for. Include each emission unit and control device (even existing emission units that will not be modified by this application). You may identify each emission unit with a simple shape. Label each emission unit and control device with a unique identifier. Show the relationship between each emission unit and/or control device by drawing arrows between them to indicate the flow of air pollutants. List which application forms are included for each emission unit or control device below the shape representing each emission unit or control device . See http://www.delaware.gov/reg2/default.htm for example Process Flow Diagrams for common processes. If you already have a Process Flow Diagram for the equipment or process being applied for, you may attach it to the application instead of using this form.



Process Flow Diagram

Sketch the Process Flow Diagram for the equipment or process being applied for. Include each emission unit and control device (even existing emission units that will not be modified by this application). You may identify each emission unit with a simple shape. Label each emission unit and control device with a unique identifier. Show the relationship between each emission unit and/or control device by drawing arrows between them to indicate the flow of air pollutants. List which application forms are included for each emission unit or control device below the shape representing each emission unit or control device . See http://www.delaware.gov/reg2/default.htm for example Process Flow Diagrams for common processes. If you already have a Process Flow Diagram for the equipment or process being applied for, you may attach it to the application instead of using this form.



Generic Process Equipment Application

If you are using this form electronically, press F1 at any time for help

General Information

1.	Facility Name: **Middletown Technology Center**
2.	Equipment ID Number: **E11**
3.	Provide a brief description of Equipment or Process: **Cooling Tower**
4.	Manufacturer: **SPX Cooling Technologies**
5.	Model: **Marley Class F400**
6.	Serial Number: **To be determined**

Raw Material Information

7. Raw Materials Used in Process

If there are more than four Raw Materials used, attach additional copies of this page as needed.

Raw Material Used	CAS Number	Usage Rate (include units)	MSDS Attached?
7.1.			☐ YES ☐ NO
7.2.			☐ YES ☐ NO
7.3.			☐ YES ☐ NO
7.4.			☐ YES ☐ NO

Attach a copy of all calculations made to support the data in the table above.
Attach a Material Safety Data Sheet (MSDS) for each Raw Material used.

Products Produced Information

8. Products Produced

If there are more than four Products Produced, attach additional copies of this page as needed.

Product Produced	CAS Number	Production Rate (include units)	MSDS Attached?
8.1.			☐ YES ☐ NO
8.2.			☐ YES ☐ NO
8.3.			☐ YES ☐ NO
8.4.			☐ YES ☐ NO

Attach a copy of all calculations made to support the data in the table above.
Attach a Material Safety Data Sheet (MSDS) for each Product Produced.

Byproducts Generated Information

9. Byproducts Generated

If there are more than four Byproducts Generated, attach additional copies of this page as needed.

	Byproduct Generated	CAS Number	Generation Rate (include units)	MSDS Attached?
9.1.				☐ YES ☐ NO
9.2.				☐ YES ☐ NO
9.3.				☐ YES ☐ NO
9.4.				☐ YES ☐ NO

Attach a copy of all calculations made to support the data in the table above.
Attach a Material Safety Data Sheet (MSDS) for each Byproduct Generated.

General Information

10. Manufacturer's Rated Capacity or Maximum Throughput of Equipment or Process: **40,000 gpm**

11. Describe Important Manufacturer Specifications and/or Operating Parameters for Equipment or Process: **0.001% drift rate**

Attach the Manufacturer's Specification Sheet(s) for the equipment or process.

Control Device Information

12. Is an Air Pollution Control Device Used? ☒ YES ☐ NO

If an Air Pollution Control Device is used, complete the rest of Question 12. If not, proceed to Question 13.

12.1. Is Knockout Used? ☐ YES ☒ NO

If YES, complete Form AQM-4.11 and attach it to this application.

12.2. Is a Settling Chamber Used? ☐ YES ☒ NO

If YES, complete Form AQM-4.10 and attach it to this application.

12.3. Is an Inertial or Cyclone Collector Used? ☐ YES ☒ NO

If YES, complete Form AQM-4.5 and attach it to this application.

12.4. Is a Fabric Collector or Baghouse Used? ☐ YES ☒ NO

If YES, complete Form AQM-4.6 and attach it to this application.

12.5. Is a Venturi Scrubber Used? ☐ YES ☒ NO

If YES, complete Form AQM-4.8 and attach it to this application.

12.6. Is an Electrostatic Precipitator Used? ☐ YES ☒ NO

If YES, complete Form AQM-4.7 and attach it to this application.

12.7. Is Adsorption Equipment Used? ☐ YES ☒ NO

Control Device Information

If YES, complete Form AQM-4.2 and attach it to this application.

12.8. Is a Scrubber Used? ☐ YES ☒ NO

If YES, complete Form AQM-4.4 and attach it to this application.

12.9. Is a Thermal Oxidizer or Afterburner Used? ☐ YES ☒ NO

If YES, complete Form AQM-4.1 and attach it to this application.

12.10. Is a Flare Used? ☐ YES ☒ NO

If YES, complete Form AQM-4.3 and attach it to this application.

12.11. Is Any Other Control Device Used? ☐ YES ☒ NO

If YES, attach a copy of the control device Manufacturer's Specification Sheet(s).

If any other control device is used, complete the rest of Question 12. If not, proceed to Question 13.

12.12. Describe Control Device:

12.13. Pollutants Controlled: ☐ VOCs ☐ HAPs ☐ PM ☐ PM_{10} ☐ $PM_{2.5}$ ☐ NO_X ☐ SO_X ☐ Metals ☐ Other (Specify):

12.14. Control Device Manufacturer:

12.15. Control Device Model:

12.16. Control Device Serial Number:

12.17. Control Device Design Capacity:

12.18. Control Device Removal or Destruction Efficiency:

Stack Information

13. How Does the Process Equipment Vent:
(check all that apply)
☒ Directly to the Atmosphere
☐ Through a Control Device Covered by Forms AQM-4.1 through 4.12
☐ Through Another Control Device Described on This Form

If any of the process equipment vents directly to the atmosphere or through another control device described on this form, proceed to Question 14. If the process equipment vents through a control device, provide the stack parameters on the control device form and proceed to Question 18.

14. Number of Air Contaminant Emission Points:

If there are more than three Emission Points, attach additional copies of this page as needed.

For the first Emission Point

15. Emission Point Name: **E11**

15.1. Stack Height Above Grade: **32 feet**

15.2. Stack Exit Diameter: **feet**
(Provide Stack Dimensions If Rectangular Stack)

15.3. Is a Stack Cap Present? ☐ YES ☒ NO

15.4. Stack Configuration: ☒ Vertical ☐ Horizontal ☐ Downward-Venting
(check all that apply) ☐ Other (Specify):

Stack Information
15.5. Stack Exit Gas Temperature: **°F**
15.6. Stack Exit Gas Flow Rate: **ACFM**
15.7. Distance to Nearest Property Line: **604 feet**
15.8. Describe Nearest Obstruction: **Cooling Building**
15.9. Height of Nearest Obstruction: **30 feet**
15.10. Distance to Nearest Obstruction: **80 feet**
15.11. Are Stack Sampling Ports Provided? ☐ YES ☒ NO
For the second Emission Point. If there is no second Emission Point, proceed to Question 18.
16. Emission Point Name:
16.1. Stack Height Above Grade: **feet**
16.2. Stack Exit Diameter: **feet** *(Provide Stack Dimensions If Rectangular Stack)*
16.3. Is a Stack Cap Present? ☐ YES ☐ NO
16.4. Stack Configuration: ☐ Vertical ☐ Horizontal ☐ Downward-Venting *(check all that apply)* ☐ Other (Specify):
16.5. Stack Exit Gas Temperature: **°F**
16.6. Stack Exit Gas Flow Rate: **ACFM**
16.7. Distance to Nearest Property Line: **feet**
16.8. Describe Nearest Obstruction:
16.9. Height of Nearest Obstruction: **feet**
16.10. Distance to Nearest Obstruction: **feet**
16.11. Are Stack Sampling Ports Provided? ☐ YES ☐ NO
For the third Emission Point. If there is no third Emission Point, proceed to Question 18.
17. Emission Point Name:
17.1. Stack Height Above Grade: **feet**
17.2. Stack Exit Diameter: **feet** *(Provide Stack Dimensions If Rectangular Stack)*
17.3. Is a Stack Cap Present? ☐ YES ☐ NO
17.4. Stack Configuration: ☐ Vertical ☐ Horizontal ☐ Downward-Venting *(check all that apply)* ☐ Other (Specify):
17.5. Stack Exit Gas Temperature: **°F**
17.6. Stack Exit Gas Flow Rate: **ACFM**
17.7. Distance to Nearest Property Line: **feet**
17.8. Describe Nearest Obstruction:
17.9. Height of Nearest Obstruction: **feet**
17.10. Distance to Nearest Obstruction: **feet**

Stack Information

17.11. Are Stack Sampling Ports Provided? ☐ YES ☒ NO

Monitoring Information

18. Will Emissions Data be Recorded by a Continuous Emission Monitoring System? ☐ YES ☒ NO

If Yes, attach a copy of the Continuous Emission Monitoring System Manufacturer's Specification Sheets

If YES, complete the rest of Question 18. If NO, proceed to Question 19.

18.1. Pollutants Monitored: ☐ VOCs ☐ HAPs ☐ PM ☐ PM_{10} ☐ $PM_{2.5}$ ☐ NO_X ☐ SO_X ☐ Metals ☐ Other (Specify):

18.2. Describe the Continuous Emission Monitoring System:

18.3. Manufacturer:

18.4. Model:

18.5. Serial Number:

18.6. Will Multiple Emission Units Be Monitored at the Same Point? ☐ YES ☐ NO

If YES, complete the rest of Question 18. If NO, proceed to Question 19.

18.7. Emission Units Monitored:

18.8. Will More Than One Emission Unit be Emitting From the Combined Point At Any Time? ☐ YES ☐ NO

If YES, complete the rest of Question 18. If NO, proceed to Question 19.

18.9. Emission Units Emitting Simultaneously:

Voluntary Emission Limitation Request Information

19. Are You Requesting Any Voluntary Emission Limitations to Avoid Major Source Status, Minor New Source Review, MACT, NSPS, etc.? ☐ YES ☒ NO

If YES, complete the rest of Question 19. If NO, proceed to Question 20.

19.1. Describe Any Requested Emission Limitations:

Voluntary Operating Limitation Request Information

20. Are You Requesting Any Voluntary Operating Limitations to Avoid Major Source Status, Minor New Source Review, MACT, NSPS, etc.? ☐ YES ☒ NO

If YES, complete the rest of Question 20. If NO, proceed to Question 21.

Voluntary Operating Limitation Request Information
20.1. Describe Any Requested Operating Limitations:

Additional Information
21. Is There Any Additional Information Pertinent to this Application? ☐ YES ☐ NO
If YES, complete the rest of Question 21.
21.1. Describe:

Generator/Engine Application

If you are using this form electronically, press F1 at any time for help

General Information

1.	Facility Name: **Middletown Technology Center**
2.	Equipment ID: **Engine #1 through Engine #5**
3.	Manufacturer: **Caterpillar**
4.	Model: **G20CM34**
5.	Serial Number: **To be determined**
6.	Rated Heat Input: **83** MMBTU/hour
7.	Maximum Power Output: **10000 kilowatt**
8.	Date of Manufacture: **To be determined**
9.	Installation Date: **To be determined**
10.	Is the Equipment Being Applied For a Generator or an Engine? ☒ Generator ☐ Engine
If the equipment is a Generator, complete the rest of Question 10. If not, proceed to Question 11.	
10.1.	Is the Generator Existing or New? ☐ Existing ☒ New
10.2.	Will the Generator Be Classified as an Emergency Generator or a Distributed Generator? ☐ Emergency ☒ Distributed
10.3.	Has an Initial Notification Pursuant to 7 **DE Admin. Code** 1144 Been Submitted for this Generator? ☐ YES ☒ NO
If NO, include a copy of the Initial Notification with this application.	
10.4.	Have the Emissions From the Generator Been Certified to Meet the Currently Applicable US EPA Non-Road Emission Standards? ☒ YES ☐ NO
If YES, attach a copy of the Manufacturer's Certification. If NO, attach copies of any/all of the following: any maintenance or operating requirements/instructions provided by the generator manufacturer; the type, or a description, of any emission control equipment use; and/or emissions test data for the generator (such as a manufacturer's technical data sheet), any supporting documentation for any emission control equipment used, any supporting calculations, any quality control or assurance information, and any other information needed to demonstrate compliance with the requirements. Proceed to Question 11.	
11.	Primary Fuel: ☒ Natural Gas ☐ Diesel ☐ Propane ☐ Biodiesel ☐ Other (specify):
11.1.	Maximum Annual Primary Fuel Consumption: **1299 MMCF**
11.2.	Heat Content of Primary Fuel: **950 BTU/CF**
11.3.	Maximum Firing Rate: **78723 MMCF/hr**
11.4.	Percent Sulfur of Primary Fuel: **NA** %
11.5.	Percent Ash of Primary Fuel: **NA** %

General Information

12. Secondary Fuel: ☐ Natural Gas ☐ Diesel ☐ Propane ☐ Biodiesel ☐ Other (specify):

12.1. Maximum Annual Secondary Fuel Consumption: **MMCF**

12.2. Heat Content of Secondary Fuel: **BTU/CF**

12.3. Maximum Firing Rate: **MMCF/hr**

12.4. Percent Sulfur of Secondary Fuel: %

12.5. Percent Ash of Secondary Fuel: %

Stack Information

13. How Does the Process Equipment Vent:
(check all that apply)
☐ Directly to the Atmosphere
☒ Through a Control Device Covered by Forms AQM-4.1 through 4.12

If any of the process equipment vents directly to the atmosphere proceed to Question 14. If the process equipment vents through a control device, provide the stack parameters on the control device form and proceed to Question 15.

14. Emission Point Name: **PT1**

14.1. Stack Height Above Grade: **50 feet**

14.2. Stack Exit Diameter: **3.67 feet**
(Provide Stack Dimensions If Rectangular Stack)

14.3. Is a Stack Cap Present? ☐ YES ☒ NO

14.4. Stack Configuration: ☒ Vertical ☐ Horizontal ☐ Downward-Venting
(check all that apply) ☐ Other (Specify):

14.5. Stack Exit Gas Temperature: **604 °F**

14.6. Stack Exit Gas Flow Rate: **57177 ACFM**

14.7. Distance to Nearest Property Line: **672 ft**

14.8. Describe Nearest Obstruction: **Powerhouse Building**

14.9. Height of Nearest Obstruction: **30 ft**

14.10. Distance to Nearest Obstruction: **163 ft**

14.11. Are Stack Sampling Ports Provided? ☐ YES ☒ NO

Monitoring Information

15. Will Emissions Data be Recorded by a Continuous Emission Monitoring System? ☐ YES ☒ NO

If Yes, Attach a Copy of the Continuous Emission Monitoring System Manufacturer's Specification Sheets

If YES, complete the rest of Question 15. If NO, proceed to Question 16.

Monitoring Information

15.1. Pollutants Monitored: ☐ VOCs ☐ HAPs ☐ PM ☐ PM_{10} ☐ $PM_{2.5}$ ☒ NO_X ☐ SO_X ☐ Metals
☒ Other (Specify): **Annnual Stack Testing for NOx, CO and VOC**

15.2. Describe the Continuous Emission Monitoring System:

15.3. Manufacturer:

15.4. Model:

15.5. Serial Number:

15.6. Will Multiple Emission Units Be Monitored at the Same Point? ☐ YES ☐ NO

If YES, complete the rest of Question 15. If NO, proceed to Question 16.

15.7. Emission Units Monitored:

15.8. Will More Than One Emission Unit be Emitting From the Combined Point At Any Time? ☐ YES ☐ NO

If YES, complete the rest of Question 15. If NO, proceed to Question 16.

15.9. Emission Units Emitting Simultaneously:

Visible Emissions Monitoring Information

For Primary Fuel

16. Proposed Technique Used to Monitor Visible Emissions:
☐ Opacity Monitor (COM)
☒ Manual (Method 9)
☐ Manual (Method 22)
☐ Other (Describe):

If an Opacity Monitor (COM) is used, complete the rest of Question 16. If not, proceed to Question 17.

16.1. Describe the Continuous Opacity Monitoring System:

16.2. Manufacturer:

16.3. Model:

16.4. Serial Number:

17. Proposed Frequency of Opacity Monitoring:

For Secondary Fuel. If no Secondary Fuel is used, proceed to Question 20.

18. Proposed Technique Used to Monitor Visible Emissions:
☐ Opacity Monitor (COMs)
☐ Manual (Method 9)
☐ Manual (Method 22)
☐ Other (Describe):

If an Opacity Monitor (COMs) is used, complete the rest of Question 18. If not, proceed to Question 19.

18.1. Describe the Continuous Opacity Monitoring System:

18.2. Manufacturer:

18.3. Model:

Visible Emissions Monitoring Information

18.4. Serial Number:

19. Proposed Frequency of Opacity Monitoring:

Monitoring and Alarm Information

20. Are There Any Alarms You Would Like the Department to Consider When Drafting the Permit? ☐ YES ☐ NO

If YES, complete the rest of Question 20. If NO, proceed to Question 21.

20.1. Describe the System Alarm(s):

If there are more than five alarms, attach additional copies of this page as needed.

	Operating Parameter Monitored	Describe Alarm Trigger	Monitoring Device or Alarm Type	Does the Alarm Initiate an Automated Response?
20.1.1.			☐ Visual ☐ Auditory ☐ Automatic (Remote Monitoring) ☐ Other	☐ NO ☐ YES Describe:
20.1.2.			☐ Visual ☐ Auditory ☐ Automatic (Remote Monitoring) ☐ Other	☐ NO ☐ YES Describe:
20.1.3.			☐ Visual ☐ Auditory ☐ Automatic (Remote Monitoring) ☐ Other	☐ NO ☐ YES Describe:
20.1.4.			☐ Visual ☐ Auditory ☐ Automatic (Remote Monitoring) ☐ Other	☐ NO ☐ YES Describe:
20.1.5.			☐ Visual ☐ Auditory ☐ Automatic (Remote Monitoring) ☐ Other	☐ NO ☐ YES Describe:

Emissions Information

21. Do You Plan to Take Any Emission Limitations to Avoid Major Source Status, Minor New Source Review, MACT, NSPS, etc.? ☐ YES ☒ NO

If YES, complete the rest of Question 21. If NO, proceed to Question 22.

Emissions Information

21.1. Describe Any Proposed Emission Limitations:

Operating Information

22. Do You Plan to Take Any Operating Limitations to Avoid Major Source Status, Minor New Source Review, MACT, NSPS, etc.? ☒ YES ☐ NO

If YES, complete the rest of Question 22. If NO, proceed to Question 23.

22.1. Describe Any Proposed Operating Limitations: **Limit total natural gas consumption for all five 10 MW engines to 1299 MMCF/yr**

Additional Information

23. Is There Any Additional Information Pertinent to this Application? ☒ YES ☐ NO

If YES, complete the rest of Question 23.

23.1. Describe: **Emission calculation table showing maximum fuel consumption and potential emissions.**

Generator/Engine Application

If you are using this form electronically, press F1 at any time for help

General Information

1.	Facility Name: **Middletown Technology Center**
2.	Equipment ID: **Engine #6 through Engine #10**
3.	Manufacturer: **Caterpillar**
4.	Model: **G3520H**
5.	Serial Number: **To be determined**
6.	Rated Heat Input: **21.2** MMBTU/hour
7.	Maximum Power Output: **2500 kilowatt**
8.	Date of Manufacture: **To be determined**
9.	Installation Date: **To be determined**
10.	Is the Equipment Being Applied For a Generator or an Engine? ☒ Generator ☐ Engine
If the equipment is a Generator, complete the rest of Question 10. If not, proceed to Question 11.	
10.1.	Is the Generator Existing or New? ☐ Existing ☒ New
10.2.	Will the Generator Be Classified as an Emergency Generator or a Distributed Generator? ☐ Emergency ☒ Distributed
10.3.	Has an Initial Notification Pursuant to 7 **DE Admin. Code** 1144 Been Submitted for this Generator? ☐ YES ☒ NO
If NO, include a copy of the Initial Notification with this application.	
10.4.	Have the Emissions From the Generator Been Certified to Meet the Currently Applicable US EPA Non-Road Emission Standards? ☒ YES ☐ NO
If YES, attach a copy of the Manufacturer's Certification. If NO, attach copies of any/all of the following: any maintenance or operating requirements/instructions provided by the generator manufacturer; the type, or a description, of any emission control equipment use; and/or emissions test data for the generator (such as a manufacturer's technical data sheet), any supporting documentation for any emission control equipment used, any supporting calculations, any quality control or assurance information, and any other information needed to demonstrate compliance with the requirements. Proceed to Question 11.	
11.	Primary Fuel: ☒ Natural Gas ☐ Diesel ☐ Propane ☐ Biodiesel ☐ Other (specify):
11.1.	Maximum Annual Primary Fuel Consumption: **348 MMCF**
11.2.	Heat Content of Primary Fuel: **905 BTU/CF**
11.3.	Maximum Firing Rate: **21064 MMCF/hr**
11.4.	Percent Sulfur of Primary Fuel: **NA** %
11.5.	Percent Ash of Primary Fuel: **NA** %

General Information

12. Secondary Fuel: ☐ Natural Gas ☐ Diesel ☐ Propane ☐ Biodiesel ☐ Other (specify):

12.1. Maximum Annual Secondary Fuel Consumption: **MMCF**

12.2. Heat Content of Secondary Fuel: **BTU/CF**

12.3. Maximum Firing Rate: **MMCF/hr**

12.4. Percent Sulfur of Secondary Fuel: %

12.5. Percent Ash of Secondary Fuel: %

Stack Information

13. How Does the Process Equipment Vent:
(check all that apply)
☐ Directly to the Atmosphere
☒ Through a Control Device Covered by Forms AQM-4.1 through 4.12

If any of the process equipment vents directly to the atmosphere proceed to Question 14. If the process equipment vents through a control device, provide the stack parameters on the control device form and proceed to Question 15.

14. Emission Point Name: **PT6 through PT10**

14.1. Stack Height Above Grade: **50 feet**

14.2. Stack Exit Diameter: **1.67 feet**
(Provide Stack Dimensions If Rectangular Stack)

14.3. Is a Stack Cap Present? ☐ YES ☒ NO

14.4. Stack Configuration: ☒ Vertical ☐ Horizontal ☐ Downward-Venting
(check all that apply) ☐ Other (Specify):

14.5. Stack Exit Gas Temperature: **604 °F**

14.6. Stack Exit Gas Flow Rate: **15152 ACFM**

14.7. Distance to Nearest Property Line: **154 ft**

14.8. Describe Nearest Obstruction: **Powerhouse Building**

14.9. Height of Nearest Obstruction: **30 ft**

14.10. Distance to Nearest Obstruction: **74 ft**

14.11. Are Stack Sampling Ports Provided? ☒ YES ☐ NO

Monitoring Information

15. Will Emissions Data be Recorded by a Continuous Emission Monitoring System? ☐ YES ☒ NO

If Yes, Attach a Copy of the Continuous Emission Monitoring System Manufacturer's Specification Sheets

If YES, complete the rest of Question 15. If NO, proceed to Question 16.

Monitoring Information

15.1. Pollutants Monitored: ☐ VOCs ☐ HAPs ☐ PM ☐ PM_{10} ☐ $PM_{2.5}$ ☐ NO_X ☐ SO_X ☐ Metals
☒ Other (Specify): **Annnual Stack Testing for NOx, CO and VOC**

15.2. Describe the Continuous Emission Monitoring System:

15.3. Manufacturer:

15.4. Model:

15.5. Serial Number:

15.6. Will Multiple Emission Units Be Monitored at the Same Point? ☐ YES ☐ NO

If YES, complete the rest of Question 15. If NO, proceed to Question 16.

15.7. Emission Units Monitored:

15.8. Will More Than One Emission Unit be Emitting From the Combined Point At Any Time? ☐ YES ☐ NO

If YES, complete the rest of Question 15. If NO, proceed to Question 16.

15.9. Emission Units Emitting Simultaneously:

Visible Emissions Monitoring Information

For Primary Fuel

16. Proposed Technique Used to Monitor Visible Emissions:
☐ Opacity Monitor (COM)
☐ Manual (Method 9)
☐ Manual (Method 22)
☐ Other (Describe):

If an Opacity Monitor (COM) is used, complete the rest of Question 16. If not, proceed to Question 17.

16.1. Describe the Continuous Opacity Monitoring System:

16.2. Manufacturer:

16.3. Model:

16.4. Serial Number:

17. Proposed Frequency of Opacity Monitoring:

For Secondary Fuel. If no Secondary Fuel is used, proceed to Question 20.

18. Proposed Technique Used to Monitor Visible Emissions:
☐ Opacity Monitor (COMs)
☐ Manual (Method 9)
☐ Manual (Method 22)
☐ Other (Describe):

If an Opacity Monitor (COMs) is used, complete the rest of Question 18. If not, proceed to Question 19.

18.1. Describe the Continuous Opacity Monitoring System:

18.2. Manufacturer:

18.3. Model:

Visible Emissions Monitoring Information

18.4. Serial Number:

19. Proposed Frequency of Opacity Monitoring:

Monitoring and Alarm Information

20. Are There Any Alarms You Would Like the Department to Consider When Drafting the Permit? ☐ YES ☐ NO

If YES, complete the rest of Question 20. If NO, proceed to Question 21.

20.1. Describe the System Alarm(s):

If there are more than five alarms, attach additional copies of this page as needed.

	Operating Parameter Monitored	Describe Alarm Trigger	Monitoring Device or Alarm Type	Does the Alarm Initiate an Automated Response?
20.1.1.			☐ Visual ☐ Auditory ☐ Automatic (Remote Monitoring) ☐ Other	☐ NO ☐ YES Describe:
20.1.2.			☐ Visual ☐ Auditory ☐ Automatic (Remote Monitoring) ☐ Other	☐ NO ☐ YES Describe:
20.1.3.			☐ Visual ☐ Auditory ☐ Automatic (Remote Monitoring) ☐ Other	☐ NO ☐ YES Describe:
20.1.4.			☐ Visual ☐ Auditory ☐ Automatic (Remote Monitoring) ☐ Other	☐ NO ☐ YES Describe:
20.1.5.			☐ Visual ☐ Auditory ☐ Automatic (Remote Monitoring) ☐ Other	☐ NO ☐ YES Describe:

Emissions Information

21. Do You Plan to Take Any Emission Limitations to Avoid Major Source Status, Minor New Source Review, MACT, NSPS, etc.? ☐ YES ☒ NO

If YES, complete the rest of Question 21. If NO, proceed to Question 22.

Emissions Information

21.1. Describe Any Proposed Emission Limitations: **None**

Operating Information

22. Do You Plan to Take Any Operating Limitations to Avoid Major Source Status, Minor New Source Review, MACT, NSPS, etc.? ☒ YES ☐ NO

If YES, complete the rest of Question 22. If NO, proceed to Question 23.

22.1. Describe Any Proposed Operating Limitations: **Limit total natural gas consumption for all five 2.5 MW engines to 348 MMCF/yr**

Additional Information

23. Is There Any Additional Information Pertinent to this Application? ☒ YES ☐ NO

If YES, complete the rest of Question 23.

23.1. Describe: **Emission calculation table showing maximum fuel consumption and potential emissions.**

Selective Catalytic Reduction (SCR), Selective Non-Catalytic Reduction (SNCR), Non-Selective Catalytic Reduction (NSCR), and Ammonia Injection Application

If you are using this form electronically, press F1 at any time for help

General Information

1.	Facility Name: **Middletown Technology Center**
2.	Equipment ID Number: **Engine #1 through Engine #5**
3.	Manufacturer: **Caterpillar**
4.	Model: **G20CM34**
5.	Serial Number: **To be determined**
6.	Type: ☒ Selective Catalytic Reduction ☐ Selective Non-Catalytic Reduction ☐ Non-Selective Catalytic Reduction ☐ Ammonia Injection
Attach the Manufacturer's Specification Sheet.	

Contaminant Information

7. Concentration of Each Contaminant in the Waste Gas and Removal Efficiency

If more than five Contaminants are present, attach additional copies of this page as needed.

	Contaminant	CAS Number	Concentration in Waste Gas	Removal Efficiency
7.1.	**NOx**		**% by Weight**	**95** %
7.2.	**CO**		**% by Weight**	**93** %
7.3.	**VOC**		**% by Weight**	**50** %
7.4.			**% by Weight**	%
7.5.			**% by Weight**	%

Gas Stream Information

8.	Maximum Inlet Volumetric Gas Flow Rate:	**acfm** at	**°F**
9.	Maximum Outlet Volumetric Gas Flow Rate:	**acfm** at	**°F**
10.	Pressure Drop:	**inches water**	

Operational Information

11.	Design Operating Temperature:	**°F**

Operational Information

12.	Ammonia/Urea Slip:	ppm
13.	Method of Determining Slip:	☐ Continuous Emissions Monitor ☒ Stack Test ☐ Manufacturer's Specifications ☐ Other (Specify):
14.	Describe the Operating Conditions that are Monitored to Determine the Reducing Agent Injection Rate: **Meter**	
15.	Describe the Process Controls for Proper Mixing of the Reducing Agent in the Gas Stream:	
16.	Operating Temperature Range for Catalyst: From **°F** To **°F**	
17.	Describe the Oxidation Catalyst Used:	
18.	Design Service Life of Catalyst:	
19.	Describe Reducing Agent Used: **Urea or aqueous ammonia (19% conc.)**	
20.	Expected Usage Rate of Reducing Agent:	
21.	Expected Concentration of Reducing Agent:	
Attach justification for the Expected Usage Rate and Concentration of the Reducing Agent.		
22.	Describe How Spent Catalyst is Treated or Disposed of:	
If SNCR is used complete Question 23. If not, proceed to Question 24.		
23.	Describe How Frequently the System is Optimized:	

Stack Information

24.	Emission Point Name: **PT1 through PT5**
24.1.	Stack Height Above Grade: **50 feet**
24.2.	Stack Exit Diameter: **3.67 feet** *(Provide Stack Dimensions If Rectangular Stack)*
24.3.	Is a Stack Cap Present? ☐ YES ☒ NO
24.4.	Stack Configuration: ☒ Vertical ☐ Horizontal ☐ Downward-Venting *(check all that apply)* ☐ Other (Specify):
24.5.	Stack Exit Gas Temperature: **604 °F**
24.6.	Stack Exit Gas Flow Rate: **57177 ACFM**
24.7.	Distance to Nearest Property Line: **672 feet**
24.8.	Describe Nearest Obstruction: **Powerhouse Building**
24.9.	Height of Nearest Obstruction: **30 feet**
24.10.	Distance to Nearest Obstruction: **163 feet**

Stack Information

24.11. Are Stack Sampling Ports Provided? ☒ YES ☐ NO

Monitoring and Alarm Information

25. Are There Any Alarms You Would Like the Department to Consider When Drafting the Permit? ☐ YES ☒ NO

If YES, complete the rest of Question 25. If NO, proceed to Question 26.

25.1. Describe the System Alarm(s):

If there are more than five alarms, attach additional copies of this page as needed.

	Operating Parameter Monitored	Describe Alarm Trigger	Monitoring Device or Alarm Type	Does the Alarm Initiate an Automated Response?
25.1.1.			☐ Visual ☐ Auditory ☐ Automatic (Remote Monitoring) ☐ Other	☐ NO ☐ YES Describe:
25.1.2.			☐ Visual ☐ Auditory ☐ Automatic (Remote Monitoring) ☐ Other	☐ NO ☐ YES Describe:
25.1.3.			☐ Visual ☐ Auditory ☐ Automatic (Remote Monitoring) ☐ Other	☐ NO ☐ YES Describe:
25.1.4.			☐ Visual ☐ Auditory ☐ Automatic (Remote Monitoring) ☐ Other	☐ NO ☐ YES Describe:
25.1.5.			☐ Visual ☐ Auditory ☐ Automatic (Remote Monitoring) ☐ Other	☐ NO ☐ YES Describe:

Additional Information

26. Is There Any Additional Information Pertinent to this Application? ☒ YES ☐ NO

If YES, complete the rest of Question 26.

26.1. Describe: **Manufacturers Emission Guarantees**

Selective Catalytic Reduction (SCR), Selective Non-Catalytic Reduction (SNCR), Non-Selective Catalytic Reduction (NSCR), and Ammonia Injection Application

If you are using this form electronically, press F1 at any time for help

General Information

1. Facility Name: **Middletown Technology Center**
2. Equipment ID Number: **Engine #6 through Engine #10**
3. Manufacturer: **Caterpillar**
4. Model: **G3520H**
5. Serial Number: **To be determined**
6. Type:
   - ☒ Selective Catalytic Reduction
   - ☐ Selective Non-Catalytic Reduction
   - ☐ Non-Selective Catalytic Reduction
   - ☐ Ammonia Injection

Attach the Manufacturer's Specification Sheet.

Contaminant Information

7. Concentration of Each Contaminant in the Waste Gas and Removal Efficiency

If more than five Contaminants are present, attach additional copies of this page as needed.

	Contaminant	CAS Number	Concentration in Waste Gas	Removal Efficiency
7.1.	**NOx**		**% by Weight**	**95** %
7.2.	**CO**		**% by Weight**	**93** %
7.3.	**VOC**		**% by Weight**	**50** %
7.4.			**% by Weight**	%
7.5.			**% by Weight**	%

Gas Stream Information

8. Maximum Inlet Volumetric Gas Flow Rate: **acfm** at **°F**
9. Maximum Outlet Volumetric Gas Flow Rate: **acfm** at **°F**
10. Pressure Drop: **7.5 inches water**

Operational Information

11. Design Operating Temperature: 742 **°F**

Operational Information

12.	Ammonia/Urea Slip:	ppm
13.	Method of Determining Slip:	☐ Continuous Emissions Monitor ☒ Stack Test ☐ Manufacturer's Specifications ☐ Other (Specify):
14.	Describe the Operating Conditions that are Monitored to Determine the Reducing Agent Injection Rate: **Meter**	
15.	Describe the Process Controls for Proper Mixing of the Reducing Agent in the Gas Stream:	
16.	Operating Temperature Range for Catalyst: From **°F** To **°F**	
17.	Describe the Oxidation Catalyst Used:	
18.	Design Service Life of Catalyst:	
19.	Describe Reducing Agent Used: **Urea or aqueous ammonia (19% conc.)**	
20.	Expected Usage Rate of Reducing Agent:	
21.	Expected Concentration of Reducing Agent:	
Attach justification for the Expected Usage Rate and Concentration of the Reducing Agent.		
22.	Describe How Spent Catalyst is Treated or Disposed of:	
If SNCR is used complete Question 23. If not, proceed to Question 24.		
23.	Describe How Frequently the System is Optimized:	

Stack Information

24.	Emission Point Name: **PT6 through PT10**
24.1.	Stack Height Above Grade: **50 feet**
24.2.	Stack Exit Diameter: **1.67 feet** *(Provide Stack Dimensions If Rectangular Stack)*
24.3.	Is a Stack Cap Present? ☐ YES ☒ NO
24.4.	Stack Configuration: ☒ Vertical ☐ Horizontal ☐ Downward-Venting *(check all that apply)* ☐ Other (Specify):
24.5.	Stack Exit Gas Temperature: **735 °F**
24.6.	Stack Exit Gas Flow Rate: **15152 ACFM**
24.7.	Distance to Nearest Property Line: **154 feet**
24.8.	Describe Nearest Obstruction: **Powerhouse Building**
24.9.	Height of Nearest Obstruction: **30 feet**
24.10.	Distance to Nearest Obstruction: **74 feet**

Stack Information

24.11. Are Stack Sampling Ports Provided? ☒ YES ☐ NO

Monitoring and Alarm Information

25. Are There Any Alarms You Would Like the Department to Consider When Drafting the Permit? ☐ YES ☒ NO

If YES, complete the rest of Question 25. If NO, proceed to Question 26.

25.1. Describe the System Alarm(s):

If there are more than five alarms, attach additional copies of this page as needed.

	Operating Parameter Monitored	Describe Alarm Trigger	Monitoring Device or Alarm Type	Does the Alarm Initiate an Automated Response?
25.1.1.			☐ Visual ☐ Auditory ☐ Automatic (Remote Monitoring) ☐ Other	☐ NO ☐ YES Describe:
25.1.2.			☐ Visual ☐ Auditory ☐ Automatic (Remote Monitoring) ☐ Other	☐ NO ☐ YES Describe:
25.1.3.			☐ Visual ☐ Auditory ☐ Automatic (Remote Monitoring) ☐ Other	☐ NO ☐ YES Describe:
25.1.4.			☐ Visual ☐ Auditory ☐ Automatic (Remote Monitoring) ☐ Other	☐ NO ☐ YES Describe:
25.1.5.			☐ Visual ☐ Auditory ☐ Automatic (Remote Monitoring) ☐ Other	☐ NO ☐ YES Describe:

Additional Information

26. Is There Any Additional Information Pertinent to this Application? ☒ YES ☐ NO

If YES, complete the rest of Question 26.

26.1. Describe: **Manufacturers Emission Guarantees**

Emissions Information Application

If you are using this form electronically, press F1 at any time for help

Process Information	
1.	Number of Individual Pieces of Process Equipment in Process: **5 - 10 MW Reciprocating Engines**
2.	Number of Individual Control Devices in Process: **5**

Emissions Information for First Emission Point/Stack

3. Emission Point Name: **PT1 through PT5 (Emissions below are per engine)**

4. Equipment ID Number for all Process Equipment and Control Devices Venting Through Emission Point/Stack:

5. Pollutant Emissions

If more than 18 pollutants are emitted at this Emission Point/Stack, attach additional copies of this page as needed.

	Pollutant Name (Specify VOCs and HAPs Individually in 5.10 through 5.18)	CAS Number (Not required for 5.1 through 5.9)	Maximum Uncontrolled Emission Rate at Design Capacity	Maximum Controlled Emission Rate at Design Capacity	Annual Potential to Emit (PTE)	Expected Annual Emissions
5.1.	Particulate Matter (PM)		**2 lbs/hour**	**2 lbs/hour**	**3.3** tons/year	tons/year
5.2.	PM_{10}		**1.14 lbs/hour**	**1.14 lbs/hour**	**1.88** tons/year	tons/year
5.3.	$PM_{2.5}$		**1.14 lbs/hour**	**1.14 lbs/hour**	**1.88** tons/year	tons/year
5.4.	Sulfur Oxides (SO_X)		**0.22 lbs/hour**	**0.22 lbs/hour**	**0.37** tons/year	tons/year
5.5.	Nitrogen Oxides (NO_X)		**26.68 lbs/hour**	**1.32 lbs/hour**	**2.18** tons/year	tons/year
5.6.	Carbon Monoxide (CO)		**32.63 lbs/hour**	**2.29 lbs/hour**	**3.78** tons/year	tons/year
5.7.	Lead		**0 lbs/hour**	**0 lbs/hour**	**0** tons/year	tons/year
5.8.	Total Volatile Organic Compounds (VOCs)		**2.2 lbs/hour**	**1.1 lbs/hour**	**1.82** tons/year	tons/year

Emissions Information for First Emission Point/Stack

5.9.	Total Hazardous Air Pollutants (HAPs)		**lbs/hour**	**lbs/hour**	tons/year	tons/year
5.10.	**Formaldehyde**	**50-00-0**	**4.19 lbs/hour**	**0.84 lbs/hour**	**1.38** tons/year	tons/year
5.11.	**Ammonia**	**7664-41-7**	**lbs/hour**	**0.44 lbs/hour**	**0.73** tons/year	tons/year
5.12.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
5.13.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
5.14.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
5.15.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
5.16.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
5.17			**lbs/hour**	**lbs/hour**	tons/year	tons/year
5.18.			**lbs/hour**	**lbs/hour**	tons/year	tons/year

6. Provide Any Additional Information Necessary to Understanding the Emission Rates Provided Above:

Attach the Basis of Determination or Calculations for each Emission Rate provided above.

Emissions Information for Second Emission Point/Stack

7. Emission Point Name:

8. Equipment ID Number for all Process Equipment and Control Devices Venting Through Emission Point/Stack:

9. Pollutant Emissions

If more than 18 pollutants are emitted at this Emission Point/Stack, attach additional copies of this page as needed.

Pollutant Name (Specify VOCs and HAPs Individually in 9.10 through 9.18)	CAS Number (Not required for 9.1 through 9.9)	Maximum Uncontrolled Emission Rate at Design Capacity	Maximum Controlled Emission Rate at Design Capacity	Annual Potential to Emit (PTE)	Expected Annual Emissions

Emissions Information for Second Emission Point/Stack

9.1.	Particulate Matter (PM)		**lbs/hour**	**lbs/hour**	tons/year	tons/year
9.2.	PM_{10}		**lbs/hour**	**lbs/hour**	tons/year	tons/year
9.3.	$PM_{2.5}$		**lbs/hour**	**lbs/hour**	tons/year	tons/year
9.4.	Sulfur Oxides (SO_X)		**lbs/hour**	**lbs/hour**	tons/year	tons/year
9.5.	Nitrogen Oxides (NO_X)		**lbs/hour**	**lbs/hour**	tons/year	tons/year
9.6.	Carbon Monoxide (CO)		**lbs/hour**	**lbs/hour**	tons/year	tons/year
9.7.	Lead		**lbs/hour**	**lbs/hour**	tons/year	tons/year
9.8.	Total Volatile Organic Compounds (VOCs)		**lbs/hour**	**lbs/hour**	tons/year	tons/year
9.9.	Total Hazardous Air Pollutants (HAPs)		**lbs/hour**	**lbs/hour**	tons/year	tons/year
9.10.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
9.11.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
9.12.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
9.13.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
9.14.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
9.15.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
9.16.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
9.17			**lbs/hour**	**lbs/hour**	tons/year	tons/year
9.18.			**lbs/hour**	**lbs/hour**	tons/year	tons/year

10. Provide Any Additional Information Necessary to Understanding the Emission Rates Provided Above:

Attach the Basis of Determination or Calculations for each Emission Rate provided above.

Emissions Information for Third Emission Point/Stack

11. Emission Point Name:

12. Equipment ID Number for all Process Equipment and Control Devices Venting Through Emission Point/Stack:

13. Pollutant Emissions

If more than 18 pollutants are emitted at this Emission Point/Stack, attach additional copies of this page as needed.

	Pollutant Name (Specify VOCs and HAPs Individually in 13.10 through 13.18)	CAS Number (Not required for 13.1 through 13.9)	Maximum Uncontrolled Emission Rate at Design Capacity	Maximum Controlled Emission Rate at Design Capacity	Annual Potential to Emit (PTE)	Expected Annual Emissions
13.1.	Particulate Matter (PM)		**lbs/hour**	**lbs/hour**	tons/year	tons/year
13.2.	PM_{10}		**lbs/hour**	**lbs/hour**	tons/year	tons/year
13.3.	$PM_{2.5}$		**lbs/hour**	**lbs/hour**	tons/year	tons/year
13.4.	Sulfur Oxides (SO_X)		**lbs/hour**	**lbs/hour**	tons/year	tons/year
13.5.	Nitrogen Oxides (NO_X)		**lbs/hour**	**lbs/hour**	tons/year	tons/year
13.6.	Carbon Monoxide (CO)		**lbs/hour**	**lbs/hour**	tons/year	tons/year
13.7.	Lead		**lbs/hour**	**lbs/hour**	tons/year	tons/year
13.8.	Total Volatile Organic Compounds (VOCs)		**lbs/hour**	**lbs/hour**	tons/year	tons/year
13.9.	Total Hazardous Air Pollutants (HAPs)		**lbs/hour**	**lbs/hour**	tons/year	tons/year
13.10.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
13.11.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
13.12.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
13.13.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
13.14.			**lbs/hour**	**lbs/hour**	tons/year	tons/year

Emissions Information for Third Emission Point/Stack					
13.15.		**lbs/hour**	**lbs/hour**	tons/year	tons/year
13.16.		**lbs/hour**	**lbs/hour**	tons/year	tons/year
13.17		**lbs/hour**	**lbs/hour**	tons/year	tons/year
13.18.		**lbs/hour**	**lbs/hour**	tons/year	tons/year
14. Provide Any Additional Information Necessary to Understanding the Emission Rates Provided Above:					
Attach the Basis of Determination or Calculations for each Emission Rate provided above.					

Emissions Information for Fourth Emission Point/Stack					
15. Emission Point Name:					
16. Equipment ID Number for all Process Equipment and Control Devices Venting Through Emission Point/Stack:					
17. Pollutant Emissions					
If more than 18 pollutants are emitted at this Emission Point/Stack, attach additional copies of this page as needed.					
Pollutant Name (Specify VOCs and HAPs Individually in 17.10 through 17.18)	CAS Number (Not required for 17.1 through 17.9)	Maximum Uncontrolled Emission Rate at Design Capacity	Maximum Controlled Emission Rate at Design Capacity	Annual Potential to Emit (PTE)	Expected Annual Emissions
17.1. Particulate Matter (PM)		**lbs/hour**	**lbs/hour**	tons/year	tons/year
17.2. PM_{10}		**lbs/hour**	**lbs/hour**	tons/year	tons/year
17.3. $PM_{2.5}$		**lbs/hour**	**lbs/hour**	tons/year	tons/year
17.4. Sulfur Oxides (SO_X)		**lbs/hour**	**lbs/hour**	tons/year	tons/year
17.5. Nitrogen Oxides (NO_X)		**lbs/hour**	**lbs/hour**	tons/year	tons/year
17.6. Carbon Monoxide (CO)		**lbs/hour**	**lbs/hour**	tons/year	tons/year

Emissions Information for Fourth Emission Point/Stack

17.7.	Volatile Organic Compounds (VOCs)		**lbs/hour**	**lbs/hour**	tons/year	tons/year
17.8.	Lead		**lbs/hour**	**lbs/hour**	tons/year	tons/year
17.9.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
17.10.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
17.11.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
17.12.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
17.13.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
17.14.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
17.15.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
17.16.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
17.17			**lbs/hour**	**lbs/hour**	tons/year	tons/year
17.18.			**lbs/hour**	**lbs/hour**	tons/year	tons/year

18. Provide Any Additional Information Necessary to Understanding the Emission Rates Provided Above:

Attach the Basis of Determination or Calculations for each Emission Rate provided above.

If there are more than four Emission Points/Stacks, attach additional copies of this form as needed.

Overall Process Emissions

19. Pollutant Emissions

If more than 18 pollutants are emitted from this Process, attach additional copies of this page as needed.

Pollutant Name (Specify VOCs and HAPs Individually in 19.10 through 19.18)	CAS Number (Not required for 19.1 through 19.9)	Maximum Uncontrolled Emission Rate at Design Capacity	Maximum Controlled Emission Rate at Design Capacity	Annual Potential to Emit (PTE)	Expected Annual Emissions

Overall Process Emissions

19.1.	Particulate Matter (PM)		**10 lbs/hour**	**10 lbs/hour**	**16.5** tons/year	tons/year
19.2.	PM_{10}		**5.7 lbs/hour**	**5.7 lbs/hour**	**9.41** tons/year	tons/year
19.3.	$PM_{2.5}$		**5.7 lbs/hour**	**5.7 lbs/hour**	**9.41** tons/year	tons/year
19.4.	Sulfur Oxides (SO_X)		**1.12 lbs/hour**	**1.12 lbs/hour**	**1.86** tons/year	tons/year
19.5.	Nitrogen Oxides (NO_X)		**133.38 lbs/hour**	**6.61 lbs/hour**	**15.21** tons/year	tons/year
19.6.	Carbon Monoxide (CO)		**163.14 lbs/hour**	**11.46 lbs/hour**	**24.33** tons/year	tons/year
19.7.	Lead		**0 lbs/hour**	**0 lbs/hour**	**0** tons/year	tons/year
19.8.	Total Volatile Organic Compounds (VOCs)		**11.02 lbs/hour**	**5.51 lbs/hour**	**9.67** tons/year	tons/year
19.9.	Total Hazardous Air Pollutants (HAPs)		**lbs/hour**	**lbs/hour**	**10.69** tons/year	tons/year
19.10.	**Formaldehyde**	**50-00-0**	**20.94 lbs/hour**	**4.19 lbs/hour**	**7.73** tons/year	tons/year
19.11.	**Ammonia**	**7664-41-7**	**lbs/hour**	**2.2 lbs/hour**	**3.64** tons/year	tons/year
19.12.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
19.13.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
19.14.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
19.15.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
19.16.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
19.17			**lbs/hour**	**lbs/hour**	tons/year	tons/year
19.18.			**lbs/hour**	**lbs/hour**	tons/year	tons/year

20. Provide Any Additional Information Necessary to Understanding the Emission Rates Provided Above: **See attached application**

Attach the Basis of Determination or Calculations for each Emission Rate provided above.

Minor New Source Review Information

21. Does the Process Have the Potential to Emit More Than Five Tons Per Year of Any Pollutant? ☒ YES ☐ NO

22. Is the Source New or Existing? ☒ NEW ☐ EXISTING
See Question 11 of AQM-1

If the Process has the Potential to Emit more than five tons per year of any pollutant, and is a New Source, a Control Technology Analysis pursuant to Regulation No. 1125 Section 4 must be conducted and attached to this application.

Additional Information

23. Is There Any Additional Information Pertinent to this Application? ☒ YES ☐ NO

If YES, complete the rest of Question 23.

23.1. Describe: **See attached application**

Emissions Information Application

If you are using this form electronically, press F1 at any time for help

Process Information

1.	Number of Individual Pieces of Process Equipment in Process: **5 - 2.5 MW Reciprocating Engines**
2.	Number of Individual Control Devices in Process: **5**

Emissions Information for First Emission Point/Stack

3.	Emission Point Name: **PT6 through PT10 (Emissions below are per engine)**
4.	Equipment ID Number for all Process Equipment and Control Devices Venting Through Emission Point/Stack:
5.	Pollutant Emissions

If more than 18 pollutants are emitted at this Emission Point/Stack, attach additional copies of this page as needed.

	Pollutant Name (Specify VOCs and HAPs Individually in 5.10 through 5.18)	CAS Number (Not required for 5.1 through 5.9)	Maximum Uncontrolled Emission Rate at Design Capacity	Maximum Controlled Emission Rate at Design Capacity	Annual Potential to Emit (PTE)	Expected Annual Emissions
5.1.	Particulate Matter (PM)		**0.5 lbs/hour**	**0.5 lbs/hour**	**1.33** tons/year	tons/year
5.2.	PM_{10}		**0.5 lbs/hour**	**0.29 lbs/hour**	**0.47** tons/year	tons/year
5.3.	$PM_{2.5}$		**0.5 lbs/hour**	**0.29 lbs/hour**	**0.47** tons/year	tons/year
5.4.	Sulfur Oxides (SO_X)		**0.06 lbs/hour**	**0.06 lbs/hour**	**0.1** tons/year	tons/year
5.5.	Nitrogen Oxides (NO_X)		**8.97 lbs/hour**	**0.46 lbs/hour**	**0.75** tons/year	tons/year
5.6.	Carbon Monoxide (CO)		**11.55 lbs/hour**	**0.81 lbs/hour**	**1.33** tons/year	tons/year
5.7.	Lead		**0 lbs/hour**	**0 lbs/hour**	**0** tons/year	tons/year
5.8.	Total Volatile Organic Compounds (VOCs)		**1.9 lbs/hour**	**0.34 lbs/hour**	**0.56** tons/year	tons/year

Emissions Information for First Emission Point/Stack

5.9.	Total Hazardous Air Pollutants (HAPs)		**lbs/hour**	**lbs/hour**	**0.318** tons/year	tons/year
5.10.	**Ammonia**	**7664-41-7**	**lbs/hour**	**0.04 lbs/hour**	**0.16** tons/year	tons/year
5.11.	**Formaldehyde**	**50-00-0**	**1.52 lbs/hour**	**0.15 lbs/hour**	**0.25** tons/year	tons/year
5.12.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
5.13.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
5.14.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
5.15.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
5.16.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
5.17			**lbs/hour**	**lbs/hour**	tons/year	tons/year
5.18.			**lbs/hour**	**lbs/hour**	tons/year	tons/year

6. Provide Any Additional Information Necessary to Understanding the Emission Rates Provided Above:

Attach the Basis of Determination or Calculations for each Emission Rate provided above.

Emissions Information for Second Emission Point/Stack

7. Emission Point Name:

8. Equipment ID Number for all Process Equipment and Control Devices Venting Through Emission Point/Stack:

9. Pollutant Emissions

If more than 18 pollutants are emitted at this Emission Point/Stack, attach additional copies of this page as needed.

Pollutant Name (Specify VOCs and HAPs Individually in 9.10 through 9.18)	CAS Number (Not required for 9.1 through 9.9)	Maximum Uncontrolled Emission Rate at Design Capacity	Maximum Controlled Emission Rate at Design Capacity	Annual Potential to Emit (PTE)	Expected Annual Emissions

Emissions Information for Second Emission Point/Stack

9.1.	Particulate Matter (PM)		**lbs/hour**	**lbs/hour**	tons/year	tons/year
9.2.	PM_{10}		**lbs/hour**	**lbs/hour**	tons/year	tons/year
9.3.	$PM_{2.5}$		**lbs/hour**	**lbs/hour**	tons/year	tons/year
9.4.	Sulfur Oxides (SO_X)		**lbs/hour**	**lbs/hour**	tons/year	tons/year
9.5.	Nitrogen Oxides (NO_X)		**lbs/hour**	**lbs/hour**	tons/year	tons/year
9.6.	Carbon Monoxide (CO)		**lbs/hour**	**lbs/hour**	tons/year	tons/year
9.7.	Lead		**lbs/hour**	**lbs/hour**	tons/year	tons/year
9.8.	Total Volatile Organic Compounds (VOCs)		**lbs/hour**	**lbs/hour**	tons/year	tons/year
9.9.	Total Hazardous Air Pollutants (HAPs)		**lbs/hour**	**lbs/hour**	tons/year	tons/year
9.10.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
9.11.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
9.12.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
9.13.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
9.14.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
9.15.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
9.16.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
9.17			**lbs/hour**	**lbs/hour**	tons/year	tons/year
9.18.			**lbs/hour**	**lbs/hour**	tons/year	tons/year

10. Provide Any Additional Information Necessary to Understanding the Emission Rates Provided Above:

Attach the Basis of Determination or Calculations for each Emission Rate provided above.

Emissions Information for Third Emission Point/Stack

11. Emission Point Name:

12. Equipment ID Number for all Process Equipment and Control Devices Venting Through Emission Point/Stack:

13. Pollutant Emissions

If more than 18 pollutants are emitted at this Emission Point/Stack, attach additional copies of this page as needed.

	Pollutant Name (Specify VOCs and HAPs Individually in 13.10 through 13.18)	CAS Number (Not required for 13.1 through 13.9)	Maximum Uncontrolled Emission Rate at Design Capacity	Maximum Controlled Emission Rate at Design Capacity	Annual Potential to Emit (PTE)	Expected Annual Emissions
13.1.	Particulate Matter (PM)		**lbs/hour**	**lbs/hour**	tons/year	tons/year
13.2.	PM_{10}		**lbs/hour**	**lbs/hour**	tons/year	tons/year
13.3.	$PM_{2.5}$		**lbs/hour**	**lbs/hour**	tons/year	tons/year
13.4.	Sulfur Oxides (SO_X)		**lbs/hour**	**lbs/hour**	tons/year	tons/year
13.5.	Nitrogen Oxides (NO_X)		**lbs/hour**	**lbs/hour**	tons/year	tons/year
13.6.	Carbon Monoxide (CO)		**lbs/hour**	**lbs/hour**	tons/year	tons/year
13.7.	Lead		**lbs/hour**	**lbs/hour**	tons/year	tons/year
13.8.	Total Volatile Organic Compounds (VOCs)		**lbs/hour**	**lbs/hour**	tons/year	tons/year
13.9.	Total Hazardous Air Pollutants (HAPs)		**lbs/hour**	**lbs/hour**	tons/year	tons/year
13.10.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
13.11.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
13.12.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
13.13.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
13.14.			**lbs/hour**	**lbs/hour**	tons/year	tons/year

Emissions Information for Third Emission Point/Stack					
13.15.		**lbs/hour**	**lbs/hour**	tons/year	tons/year
13.16.		**lbs/hour**	**lbs/hour**	tons/year	tons/year
13.17		**lbs/hour**	**lbs/hour**	tons/year	tons/year
13.18.		**lbs/hour**	**lbs/hour**	tons/year	tons/year
14. Provide Any Additional Information Necessary to Understanding the Emission Rates Provided Above:					
Attach the Basis of Determination or Calculations for each Emission Rate provided above.					

Emissions Information for Fourth Emission Point/Stack					
15. Emission Point Name:					
16. Equipment ID Number for all Process Equipment and Control Devices Venting Through Emission Point/Stack:					
17. Pollutant Emissions					
If more than 18 pollutants are emitted at this Emission Point/Stack, attach additional copies of this page as needed.					
Pollutant Name (Specify VOCs and HAPs Individually in 17.10 through 17.18)	CAS Number (Not required for 17.1 through 17.9)	Maximum Uncontrolled Emission Rate at Design Capacity	Maximum Controlled Emission Rate at Design Capacity	Annual Potential to Emit (PTE)	Expected Annual Emissions
17.1. Particulate Matter (PM)		**lbs/hour**	**lbs/hour**	tons/year	tons/year
17.2. PM_{10}		**lbs/hour**	**lbs/hour**	tons/year	tons/year
17.3. $PM_{2.5}$		**lbs/hour**	**lbs/hour**	tons/year	tons/year
17.4. Sulfur Oxides (SO_X)		**lbs/hour**	**lbs/hour**	tons/year	tons/year
17.5. Nitrogen Oxides (NO_X)		**lbs/hour**	**lbs/hour**	tons/year	tons/year
17.6. Carbon Monoxide (CO)		**lbs/hour**	**lbs/hour**	tons/year	tons/year

Emissions Information for Fourth Emission Point/Stack

17.7.	Volatile Organic Compounds (VOCs)		**lbs/hour**	**lbs/hour**	tons/year	tons/year
17.8.	Lead		**lbs/hour**	**lbs/hour**	tons/year	tons/year
17.9.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
17.10.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
17.11.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
17.12.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
17.13.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
17.14.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
17.15.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
17.16.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
17.17			**lbs/hour**	**lbs/hour**	tons/year	tons/year
17.18.			**lbs/hour**	**lbs/hour**	tons/year	tons/year

18. Provide Any Additional Information Necessary to Understanding the Emission Rates Provided Above:

Attach the Basis of Determination or Calculations for each Emission Rate provided above.

If there are more than four Emission Points/Stacks, attach additional copies of this form as needed.

Overall Process Emissions

19. Pollutant Emissions

If more than 18 pollutants are emitted from this Process, attach additional copies of this page as needed.

Pollutant Name (Specify VOCs and HAPs Individually in 19.10 through 19.18)	CAS Number (Not required for 19.1 through 19.9)	Maximum Uncontrolled Emission Rate at Design Capacity	Maximum Controlled Emission Rate at Design Capacity	Annual Potential to Emit (PTE)	Expected Annual Emissions

Overall Process Emissions

19.1.	Particulate Matter (PM)		**1.52 lbs/hour**	**1.52 lbs/hour**	**4.13** tons/year	tons/year
19.2.	PM_{10}		**1.43 lbs/hour**	**1.43 lbs/hour**	**2.35** tons/year	tons/year
19.3.	$PM_{2.5}$		**1.43 lbs/hour**	**1.43 lbs/hour**	**2.35** tons/year	tons/year
19.4.	Sulfur Oxides (SO_X)		**0.3 lbs/hour**	**0.3 lbs/hour**	**0.5** tons/year	tons/year
19.5.	Nitrogen Oxides (NO_X)		**44.84 lbs/hour**	**2.28 lbs/hour**	**3.87** tons/year	tons/year
19.6.	Carbon Monoxide (CO)		**57.77 lbs/hour**	**4.03 lbs/hour**	**6.79** tons/year	tons/year
19.7.	Lead		**0 lbs/hour**	**0 lbs/hour**	**0** tons/year	tons/year
19.8.	Total Volatile Organic Compounds (VOCs)		**9.5 lbs/hour**	**1.71 lbs/hour**	**2.85** tons/year	tons/year
19.9.	Total Hazardous Air Pollutants (HAPs)		**lbs/hour**	**lbs/hour**	**1.62** tons/year	tons/year
19.10.	**Ammonia**	**7664-41-7**	**lbs/hour**	**0.19 lbs/hour**	**0.31** tons/year	tons/year
19.11.	**Formaldehyde**	**50-00-0**	**7.6 lbs/hour**	**0.76 lbs/hour**	**1.27** tons/year	tons/year
19.12.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
19.13.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
19.14.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
19.15.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
19.16.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
19.17			**lbs/hour**	**lbs/hour**	tons/year	tons/year
19.18.			**lbs/hour**	**lbs/hour**	tons/year	tons/year

20. Provide Any Additional Information Necessary to Understanding the Emission Rates Provided Above: **See attached application**

Attach the Basis of Determination or Calculations for each Emission Rate provided above.

Minor New Source Review Information

21. Does the Process Have the Potential to Emit More Than Five Tons Per Year of Any Pollutant? ☐ YES ☒ NO

22. Is the Source New or Existing? ☒ NEW ☐ EXISTING
See Question 11 of AQM-1

If the Process has the Potential to Emit more than five tons per year of any pollutant, and is a New Source, a Control Technology Analysis pursuant to Regulation No. 1125 Section 4 must be conducted and attached to this application.

Additional Information

23. Is There Any Additional Information Pertinent to this Application? ☒ YES ☐ NO

If YES, complete the rest of Question 23.

23.1. Describe: **See attached application**

Emissions Information Application

If you are using this form electronically, press F1 at any time for help

Process Information	
1.	Number of Individual Pieces of Process Equipment in Process: **1 - Cooling Tower #1**
2.	Number of Individual Control Devices in Process: **1**

Emissions Information for First Emission Point/Stack

3. Emission Point Name: **PT11**

4. Equipment ID Number for all Process Equipment and Control Devices Venting Through Emission Point/Stack: **1**

5. Pollutant Emissions

If more than 18 pollutants are emitted at this Emission Point/Stack, attach additional copies of this page as needed.

	Pollutant Name (Specify VOCs and HAPs Individually in 5.10 through 5.18)	CAS Number (Not required for 5.1 through 5.9)	Maximum Uncontrolled Emission Rate at Design Capacity	Maximum Controlled Emission Rate at Design Capacity	Annual Potential to Emit (PTE)	Expected Annual Emissions
5.1.	Particulate Matter (PM)		**0.4 lbs/hour**	**0.4 lbs/hour**	**1.75** tons/year	**0** tons/year
5.2.	PM_{10}		**0.4 lbs/hour**	**0.4 lbs/hour**	**1.75** tons/year	**0** tons/year
5.3.	$PM_{2.5}$		**0.24 lbs/hour**	**0.24 lbs/hour**	**1.05** tons/year	**0** tons/year
5.4.	Sulfur Oxides (SO_X)		**lbs/hour**	**lbs/hour**	tons/year	tons/year
5.5.	Nitrogen Oxides (NO_X)		**lbs/hour**	**lbs/hour**	tons/year	tons/year
5.6.	Carbon Monoxide (CO)		**lbs/hour**	**lbs/hour**	tons/year	tons/year
5.7.	Lead		**0 lbs/hour**	**lbs/hour**	**0** tons/year	**0** tons/year
5.8.	Total Volatile Organic Compounds (VOCs)		**lbs/hour**	**lbs/hour**	tons/year	tons/year

Emissions Information for First Emission Point/Stack

5.9.	Total Hazardous Air Pollutants (HAPs)		**lbs/hour**	**lbs/hour**	tons/year	tons/year
5.10.			**lbs/hour**	**0 lbs/hour**	tons/year	tons/year
5.11.			**lbs/hour**	**0 lbs/hour**	tons/year	tons/year
5.12.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
5.13.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
5.14.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
5.15.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
5.16.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
5.17			**lbs/hour**	**lbs/hour**	tons/year	tons/year
5.18.			**lbs/hour**	**lbs/hour**	tons/year	tons/year

6. Provide Any Additional Information Necessary to Understanding the Emission Rates Provided Above:

Attach the Basis of Determination or Calculations for each Emission Rate provided above.

Emissions Information for Second Emission Point/Stack

7. Emission Point Name:

8. Equipment ID Number for all Process Equipment and Control Devices Venting Through Emission Point/Stack:

9. Pollutant Emissions

If more than 18 pollutants are emitted at this Emission Point/Stack, attach additional copies of this page as needed.

Pollutant Name (Specify VOCs and HAPs Individually in 9.10 through 9.18)	CAS Number (Not required for 9.1 through 9.9)	Maximum Uncontrolled Emission Rate at Design Capacity	Maximum Controlled Emission Rate at Design Capacity	Annual Potential to Emit (PTE)	Expected Annual Emissions

Emissions Information for Second Emission Point/Stack

9.1.	Particulate Matter (PM)		**lbs/hour**	**lbs/hour**	tons/year	tons/year
9.2.	PM_{10}		**lbs/hour**	**lbs/hour**	tons/year	tons/year
9.3.	$PM_{2.5}$		**lbs/hour**	**lbs/hour**	tons/year	tons/year
9.4.	Sulfur Oxides (SO_X)		**lbs/hour**	**lbs/hour**	tons/year	tons/year
9.5.	Nitrogen Oxides (NO_X)		**lbs/hour**	**lbs/hour**	tons/year	tons/year
9.6.	Carbon Monoxide (CO)		**lbs/hour**	**lbs/hour**	tons/year	tons/year
9.7.	Lead		**lbs/hour**	**lbs/hour**	tons/year	tons/year
9.8.	Total Volatile Organic Compounds (VOCs)		**lbs/hour**	**lbs/hour**	tons/year	tons/year
9.9.	Total Hazardous Air Pollutants (HAPs)		**lbs/hour**	**lbs/hour**	tons/year	tons/year
9.10.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
9.11.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
9.12.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
9.13.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
9.14.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
9.15.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
9.16.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
9.17			**lbs/hour**	**lbs/hour**	tons/year	tons/year
9.18.			**lbs/hour**	**lbs/hour**	tons/year	tons/year

10. Provide Any Additional Information Necessary to Understanding the Emission Rates Provided Above:

Attach the Basis of Determination or Calculations for each Emission Rate provided above.

Emissions Information for Third Emission Point/Stack

11. Emission Point Name:

12. Equipment ID Number for all Process Equipment and Control Devices Venting Through Emission Point/Stack:

13. Pollutant Emissions

If more than 18 pollutants are emitted at this Emission Point/Stack, attach additional copies of this page as needed.

	Pollutant Name (Specify VOCs and HAPs Individually in 13.10 through 13.18)	CAS Number (Not required for 13.1 through 13.9)	Maximum Uncontrolled Emission Rate at Design Capacity	Maximum Controlled Emission Rate at Design Capacity	Annual Potential to Emit (PTE)	Expected Annual Emissions
13.1.	Particulate Matter (PM)		**lbs/hour**	**lbs/hour**	tons/year	tons/year
13.2.	PM_{10}		**lbs/hour**	**lbs/hour**	tons/year	tons/year
13.3.	$PM_{2.5}$		**lbs/hour**	**lbs/hour**	tons/year	tons/year
13.4.	Sulfur Oxides (SO_X)		**lbs/hour**	**lbs/hour**	tons/year	tons/year
13.5.	Nitrogen Oxides (NO_X)		**lbs/hour**	**lbs/hour**	tons/year	tons/year
13.6.	Carbon Monoxide (CO)		**lbs/hour**	**lbs/hour**	tons/year	tons/year
13.7.	Lead		**lbs/hour**	**lbs/hour**	tons/year	tons/year
13.8.	Total Volatile Organic Compounds (VOCs)		**lbs/hour**	**lbs/hour**	tons/year	tons/year
13.9.	Total Hazardous Air Pollutants (HAPs)		**lbs/hour**	**lbs/hour**	tons/year	tons/year
13.10.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
13.11.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
13.12.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
13.13.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
13.14.			**lbs/hour**	**lbs/hour**	tons/year	tons/year

Emissions Information for Third Emission Point/Stack					
13.15.		**lbs/hour**	**lbs/hour**	tons/year	tons/year
13.16.		**lbs/hour**	**lbs/hour**	tons/year	tons/year
13.17		**lbs/hour**	**lbs/hour**	tons/year	tons/year
13.18.		**lbs/hour**	**lbs/hour**	tons/year	tons/year
14. Provide Any Additional Information Necessary to Understanding the Emission Rates Provided Above:					
Attach the Basis of Determination or Calculations for each Emission Rate provided above.					

Emissions Information for Fourth Emission Point/Stack					
15. Emission Point Name:					
16. Equipment ID Number for all Process Equipment and Control Devices Venting Through Emission Point/Stack:					
17. Pollutant Emissions					
If more than 18 pollutants are emitted at this Emission Point/Stack, attach additional copies of this page as needed.					
Pollutant Name (Specify VOCs and HAPs Individually in 17.10 through 17.18)	CAS Number (Not required for 17.1 through 17.9)	Maximum Uncontrolled Emission Rate at Design Capacity	Maximum Controlled Emission Rate at Design Capacity	Annual Potential to Emit (PTE)	Expected Annual Emissions
17.1. Particulate Matter (PM)		**lbs/hour**	**lbs/hour**	tons/year	tons/year
17.2. PM_{10}		**lbs/hour**	**lbs/hour**	tons/year	tons/year
17.3. $PM_{2.5}$		**lbs/hour**	**lbs/hour**	tons/year	tons/year
17.4. Sulfur Oxides (SO_X)		**lbs/hour**	**lbs/hour**	tons/year	tons/year
17.5. Nitrogen Oxides (NO_X)		**lbs/hour**	**lbs/hour**	tons/year	tons/year
17.6. Carbon Monoxide (CO)		**lbs/hour**	**lbs/hour**	tons/year	tons/year

Emissions Information for Fourth Emission Point/Stack

17.7.	Volatile Organic Compounds (VOCs)		**lbs/hour**	**lbs/hour**	tons/year	tons/year
17.8.	Lead		**lbs/hour**	**lbs/hour**	tons/year	tons/year
17.9.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
17.10.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
17.11.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
17.12.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
17.13.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
17.14.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
17.15.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
17.16.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
17.17			**lbs/hour**	**lbs/hour**	tons/year	tons/year
17.18.			**lbs/hour**	**lbs/hour**	tons/year	tons/year

18. Provide Any Additional Information Necessary to Understanding the Emission Rates Provided Above:

Attach the Basis of Determination or Calculations for each Emission Rate provided above.

If there are more than four Emission Points/Stacks, attach additional copies of this form as needed.

Overall Process Emissions

19. Pollutant Emissions

If more than 18 pollutants are emitted from this Process, attach additional copies of this page as needed.

Pollutant Name (Specify VOCs and HAPs Individually in 19.10 through 19.18)	CAS Number (Not required for 19.1 through 19.9)	Maximum Uncontrolled Emission Rate at Design Capacity	Maximum Controlled Emission Rate at Design Capacity	Annual Potential to Emit (PTE)	Expected Annual Emissions

Overall Process Emissions

19.1.	Particulate Matter (PM)		**0.4 lbs/hour**	**0.4 lbs/hour**	**1.75** tons/year	**0** tons/year
19.2.	PM_{10}		**0.4 lbs/hour**	**0.4 lbs/hour**	**1.75** tons/year	**0** tons/year
19.3.	$PM_{2.5}$		**0.24 lbs/hour**	**0.24 lbs/hour**	**1.05** tons/year	**0** tons/year
19.4.	Sulfur Oxides (SO_X)		**lbs/hour**	**lbs/hour**	tons/year	tons/year
19.5.	Nitrogen Oxides (NO_X)		**lbs/hour**	**lbs/hour**	tons/year	tons/year
19.6.	Carbon Monoxide (CO)		**lbs/hour**	**lbs/hour**	tons/year	tons/year
19.7.	Lead		**lbs/hour**	**lbs/hour**	tons/year	tons/year
19.8.	Total Volatile Organic Compounds (VOCs)		**lbs/hour**	**lbs/hour**	tons/year	tons/year
19.9.	Total Hazardous Air Pollutants (HAPs)		**lbs/hour**	**lbs/hour**	tons/year	tons/year
19.10.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
19.11.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
19.12.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
19.13.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
19.14.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
19.15.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
19.16.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
19.17			**lbs/hour**	**lbs/hour**	tons/year	tons/year
19.18.			**lbs/hour**	**lbs/hour**	tons/year	tons/year

20. Provide Any Additional Information Necessary to Understanding the Emission Rates Provided Above: **See attached application**

Attach the Basis of Determination or Calculations for each Emission Rate provided above.

Minor New Source Review Information

21. Does the Process Have the Potential to Emit More Than Five Tons Per Year of Any Pollutant? ☐ YES ☒ NO

22. Is the Source New or Existing? ☒ NEW ☐ EXISTING
See Question 11 of AQM-1

If the Process has the Potential to Emit more than five tons per year of any pollutant, and is a New Source, a Control Technology Analysis pursuant to Regulation No. 1125 Section 4 must be conducted and attached to this application.

Additional Information

23. Is There Any Additional Information Pertinent to this Application? ☒ YES ☐ NO

If YES, complete the rest of Question 23.

23.1. Describe: **See attached application**

Air Emissions Modeling Application

This form is optional. Applications will be considered complete without this form. Completing this form may expedite processing of your permit.

If you are using this form electronically, press F1 at any time for help. For additional help conducting air emissions modeling see the air contaminant equipment registration form booklet sections V and VI available at:
http://www.awm.delaware.gov/AQM/Pages/AirContaminantEquipmentRegistration.aspx.

General Information

1. Identification of Equipment/Process Being Modeled: **five (5) 10,000 kW and (5) 2500 kW Natural Gas Fired Engines**

2. Modeling Tool Used: ☐ SCREEN3 ☐ AERSCREEN ☐ Other (Specify):
☐ ISC3 ☒ AERMOD

Modeling Information

3. Modeling Information

If there are more than 20 Contaminants, attach additional copies of this page as needed

	Contaminant Name	Maximum Controlled Emission Rate at Design Capacity	Short Term Emission Rate	Threshold Limit Value (TLV)	TLV Source	Maximum Downwind Concentration (MDC) (8-Hour Average)	TLV:MDC Ratio
3.1.	**NO2**	lbs/day	grams/second	mg/m^3		mg/m^3	
3.2.	**CO**	lbs/day	grams/second	mg/m^3		mg/m^3	
3.3.		lbs/day	grams/second	mg/m^3		mg/m^3	
3.4.		lbs/day	grams/second	mg/m^3		mg/m^3	
3.5.		lbs/day	grams/second	mg/m^3		mg/m^3	
3.6.		lbs/day	grams/second	mg/m^3		mg/m^3	
3.7.		lbs/day	grams/second	mg/m^3		mg/m^3	
3.8.		lbs/day	grams/second	mg/m^3		mg/m^3	
3.9.		lbs/day	grams/second	mg/m^3		mg/m^3	

Modeling Information

3.10.	lbs/day	grams/second	mg/m^3		mg/m^3	
3.11.	lbs/day	grams/second	mg/m^3		mg/m^3	
3.12.	lbs/day	grams/second	mg/m^3		mg/m^3	
3.13.	lbs/day	grams/second	mg/m^3		mg/m^3	
3.14.	lbs/day	grams/second	mg/m^3		mg/m^3	
3.15.	lbs/day	grams/second	mg/m^3		mg/m^3	
3.16.	lbs/day	grams/second	mg/m^3		mg/m^3	
3.17.	lbs/day	grams/second	mg/m^3		mg/m^3	
3.18.	lbs/day	grams/second	mg/m^3		mg/m^3	
3.19.	lbs/day	grams/second	mg/m^3		mg/m^3	
3.20.	lbs/day	grams/second	mg/m^3		mg/m^3	

NOTE: If the TLV:MDC Ratio is less than 100 for any of the Contaminants listed above, the equipment may not be eligible for approval. Contact the Department immediately to discuss the situation.

Attach copies of all modeling analyses conducted.

Additional Information

4. Is There Any Additional Information Pertinent to this Application? ☒ YES ☐ NO

If YES, complete the rest of Question 4.

4.1. Describe: **Refined modeling analysis will be included with final air permit application.**

DELAWARE DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL ("DNREC")

ENVIRONMENTAL PERMIT APPLICATION BACKGROUND STATEMENT

Pursuant to 7 Del. C. Chapter 79

FILING STATUS:

This Background Statement is being filed with DNREC because:

☒ 1. It is an initial application for a new permit (or permits) and the applicant or applicant company has not been issued any permits by DNREC in the previous five (5) years [See 7 Del. C. § 7902(a) and (b)];

☐ 2. It is required on an annual basis because the applicant or applicant company has been designated a chronic violator pursuant to 7 Del. C. § 7904 [See 7 Del. C. § 7902(a)(7) and (b)(2)]; or

☐ 3. It is required on an annual basis as the applicant or applicant company has been found guilty, pled guilty or no contest to any crime involving violation of environmental standards which resulted in serious physical injury or serious harm to the environment as defined in 7 Del. C. § 7902(c) [See 7 Del. C. § 7902(a)(7) and (b)(2)].

APPLICANT OR APPLICANT COMPANY'S NAME OR COMPANY'S NAME FILING STATEMENT	**Cirrus Delaware LLC**
DATE OF APPLICATION OR DATE OF STATEMENT	**03/08/2016**
PERMIT(S) BEING APPLIED FOR OR STATEMENT FOR FILING STATUSES 2 OR 3	☒ **Permit Type(s)** **Minor Source Air Permit** ☐ **Statement for filing Statuses 2 or 3—If filing under these statuses, attach a statement of the date of designation as Chronic Violator or the date of Conviction/Plea.**
OTHER DNREC PERMITS HELD	☒ **N/A – No other permits held with DNREC** ☐ List **of all DNREC permits currently held with dates of issuance and expiration attached.**

ENVIRONMENTAL PERMIT APPLICATION BACKGROUND STATEMENT

Please note: **Companies filing statements pursuant to Chapter 79 have the right to identify information to be afforded confidential status pursuant to 7 Del. C. § 7903(b) and the requirements set forth in Section 6, "Requests for Confidentiality" of the DNREC *Freedom of Information Act Regulation*.**

PROVIDING ALL OF THE INFORMATION REQUESTED IN THIS FORM SATISFIES THE REQUIREMENTS OF 7 DEL. C. CHAPTER 79 ("ENVIRONMENTAL PERMIT APPLICATION BACKGROUND STATEMENT") UNLESS THE DELAWARE DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL ("DNREC") OR THE DELAWARE DEPARTMENT OF JUSTICE DETERMINES THAT ADDITIONAL SUBMISSIONS ARE NECESSARY. FAILURE TO PROVIDE THE INFORMATION REQUESTED OR PROVIDING ERRONEOUS INFORMATION IS GROUNDS FOR DENYING OR REVOKING AN ENVIRONMENTAL PERMIT/APPROVAL/LICENSE, AND FOR CIVIL AND/OR CRIMINAL PENALTIES.

A. **(Authority – 7 Del. C. § 7902(a)(1&2) & § 7905)** Attach a complete list (full names) of all current members of the applicant company's board of directors, all current corporate officers, all persons owning more than 20% of the applicant's stock or other resources, all subsidiary/affiliated companies with type of business performed, street addresses, all parent companies with addresses, all companies with which the applicant's company shares two or more members of the board of directors, and the name(s) of the person(s) serving as the applicant's local chief operating officer(s) with respect to each facility covered by the permit in question or for the statement required for filing Statuses 2 or 3. [Note: For companies that do not have a *facility* located in Delaware, no listing for the local chief operating officer(s) is required].

☒ Information attached

☐ Information attached, except for local chief operating officer as there is no facility located in the State of Delaware.

B. **(Authority - 7 Del. C. § 7905)** Please check one of the following selections below, showing type of ownership for the applicant or applicant/statement company:

☐	Proprietorship	List the state, county, book record and page number where the certificate is found (Attach hereto).
☐	Partnership	List the state, county, book record and page number where the certificate is found (Attach hereto).
☒	Corporation (LLC's included)	List the city, state, date of incorporation, corporation file number, current corporate standing, registered agent, and address of the registered agent (Attach hereto).
☐	Municipality	
☐	Public Institution/ Government Agency	
☐	Other	_____

C. (Authority - 7 Del. C. § 7902(a)(3) & § 7905) Have any of the following been issued to or agreed to by the applicant or applicant/statement company, any employee, person, entity, or subsidiary/affiliated company, specified in response to Item A, for violation of any environmental statute, regulation, permit, license, approval, or order, regardless of the state in which it occurred, during the five years prior to the date of this application/statement

OFFENSE	YES	NO
Notice of Violation(s)		x
Administrative Order(s)		x
Administrative Penalty(ies)		x
Civil Action(s)		x
Civil Penalty(ies)		x
Civil and/or Administrative Settlement Agreement(s)		x
Permit/License/Approval Revocation		x
Arrest(s)		x
Conviction(s)		x
Criminal Penalty(ies)		x
Criminal Plea Bargain		x

D. **(Authority - 7 Del. C. § 7902(a)(3), (a)(4) & § 7905)** If you answered "yes" to any of the actions listed in Item C above for the applicant or applicant company or any other person identified in Item A, attach a description of the incidents or events leading to the issuance of each action, regardless of the state in which it occurred, for the 5 years prior to the date of the statement, and the disposition of each action, what state the action/offense occurred in, and any actions that have been taken to correct the violations that led to such enforcement action.

☒ N/A

☐ Information attached

E. **(Authority - 7 Del. C. § 7902(a)(5) & § 7905)** Attach a description of any felony or other criminal conviction for a crime involving harm to the environment or violation of environmental standards of any person or entity identified in Item A above that resulted in a fine greater than $1,000 or a sentence longer than 7 days, regardless of whether such fine or sentence was suspended.

☒ N/A

☐ Description attached

F. **(Authority - 7 Del. C. § 7902(a)(6) & § 7905)** Attach copies of any and all settlements of environmental claims involving the applicant, associated with actions identified in response to Item D above, whether or not such settlements were based on agreements where the applicant did not admit liability for the action.

☒ N/A

☐ Information attached

Items for Filing Statuses 2 or 3 Only

G. (Authority - 7 Del. C. § 7902(a)(7) and § 7905) If the applicant or applicant/statement company has been found guilty, pled guilty or no contest, to any crime involving violation of environmental standards which resulted in serious physical injury or serious harm to the environment attach a summary of the events involved and a copy of the disposition of the action (*See 7 Del. C. § 7902(c) for definitions of "serious physical injury" or "serious harm to the environment" before answering this question.*)

☒ N/A

☐ Yes – Information Attached.

H. (Authority - 7 Del. C. § 7902(a)(8)) – If the applicant or applicant/statement company has been designated a chronic violator under 7 Del. C. § 7904, a detailed written report from an independent inspector who has inspected the applicant's premises for the purpose of detecting potential safety and environmental hazards to employees and the surrounding community. The Secretary may waive the duty to submit a detailed written report upon a showing of good cause by the applicant. A showing by the applicant that the acts which caused it to be designated as a chronic violator did not jeopardize public health shall constitute "good cause" under this paragraph.

I. (Authority - 7 Del. C. § 7902(a)(7)) – If the applicant or applicant/statement company has been designated a chronic violation under § 7904 of this Title, ***OR*** has been found guilty or pled no contest to any crime involving violation of environmental standards which resulted in serious physical injury or serious harm to the environment, a statement made under oath by the applicant or applicant/statement company's local chief operating officer with respect to the facilities covered by the permit, stating that: (a) disclosures made by the applicant/reporting company under federal and state environmental statutes and regulations during the preceding calendar year have been, to the chief operating officer's knowledge, complete and accurate, and (b) that the facility has implemented policies, programs, procedures, standards or systems reasonably designated, in light of the size, scope, and nature of facility operations to detect deter and promptly correct any noncompliance with state environmental statutes and regulations. The statement filed pursuant to this paragraph shall include an acknowledgement by the affiant that intentionally false statements submitted in compliance with this paragraph constitute criminal perjury as defined at 11 Del. C. §§1221-1222.

STATE OF DELAWARE – DEPT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL

ENVIRONMENTAL PERMIT BACKGROUND STATEMENT

CERTIFICATION

I HEREBY CERTIFY THAT I HAVE READ THE PRECEDING SUBMISSION, HAVE PROVIDED ALL OF THE INFORMATION REQUESTED, AND THAT ALL OF THE INFORMATION PROVIDED IS TRUE AND ACCURATE TO THE BEST OF MY KNOWLEDGE AND BELIEF.

John Ramagano

SIGNATURE—APPLICANT OR
OFFICER OF APPLICANT / STATEMENT COMPANY

DATE: 3/8/2016

NAME: John G. Ramagano

TITLE: Partner

COMPANY NAME: Cirrus Delaware LLC

ADDRESS: 5400 Limestone Road

Wilmington, DE 19808

TELEPHONE: (848) 889-6556

FAX NUMBER: (302) 239-8485

REGISTERED AGENT NAME:

ADDRESS:

TELEPHONE:

FAX NUMBER:

SWORN TO AND SUBSCRIBED

BEFORE ME THIS 8th DAY OF

MARCH, 2016

ELIZABETH ANN LOGAN
NOTARY PUBLIC
STATE OF DELAWARE
My Commission Expires Dec. 15, 2017

Elizabeth Ann Logan

NOTARY PUBLIC SIGNATURE (SEAL)

ELIZABETH ANN LOGAN

PRINTED NAME OF NOTARY PUBLIC

DELAWARE / NEW CASTLE

STATE / COUNTY

MY COMMISSION EXPIRES ON: Dec 15, 2017

jmb:20-24.doc/Rev. 8/2006