RAMBOLL

ENVIRONMENT
& HEALTH

North Dakota Department of Environmental Quality (NDDEQ)
Via e-permits
Division of Air Quality (DoAQ)
4201 Normandy Street, 2nd Floor
Bismark, ND 58503-1324

SYNTHETIC MINOR SOURCE AIR CONSTRUCTION PERMIT APPLICATION
APPLIED DIGITAL CORPORATION
DICKEY COUNTY, NORTH DAKOTA

December 3rd, 2024

Ramboll
1999 Broadway
Suite 2225
Denver, CO 80202
USA

T +1 303.382.5460
www.ramboll.com

To Whom It May Concern,

On behalf of Applied Digital Corporation (Applied Digital), Ramboll is submitting this application for a permit to construct sixty (60) emergency generators at the ELN Building 1 GEN Plant (ELN GEN Plant). The application and all required information and supplemental documentation will be submitted in CERIS-ND for the site.

The ELN GEN Plant is located in Dickey County at 9663 87th Ave. SE. in Ellendale, North Dakota 58436. The purpose of this application is to authorize the construction and operation of sixty (60) Caterpillar 3516E diesel-fueled emergency generators. Applied Digital seeks to establish federally enforceable limits on the site wide total annual fuel usage in order to classify the facility as a synthetic minor source. The purpose of the generators is to provide emergency backup power to the data center.

Enclosed are the application, facility map, facility plot plans, emissions calculations, supporting documentation, and associated permit application.

Please contact Katie Wipfli (kwipfli@ramboll.com) or Eric Hodek (EHodek@ramboll.com) if you have any questions related to this application.

Sincerely,

Eric S. Hodek
Regional Director - Northwest
D 303 382 5467
M 281 896 3648
ehodek@ramboll.com

Prepared for:
Applied Digital

Submitted to:
North Dakota Department of Environmental Quality (NDDEQ)
Division of Air Quality (DoAQ)

Prepared by:
Ramboll Americas Engineering Solutions, Inc.

Date:
December 2024

Project Number:
1940109266

APPLICATION FOR A PERMIT TO CONSTRUCT

ELN BUILDING 1 GEN PLANT

APPLIED DIGITAL CORPORATION

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APPENDICES

ACRONYMS AND ABBREVIATIONS

NDAC	North Dakota Administrative Code
NDDEQ	North Dakota Department of Environmental Quality
AP-42	EPA's AP-42, Compilation of Air Pollutant Emission Factors, Fifth Edition
CO	Carbon Monoxide
CFR	Code of Federal Regulations
EPA	United States Environmental Protection Agency
EPN	Emission Point Number
FCAA	Federal Clean Air Act
FIN	Facility Identification Number
H_2S	Hydrogen Sulfide
HAP	Hazardous Air Pollutant
ICE	Internal Combustion Engine
lb	Pound
lb-mol	Pound-Mole
MACT	Maximum Achievable Control Technology
Mgal	1,000 gallons
MMBTU/hr	Million British Thermal Units per Hour
MMscf/yr	Million Standard Cubic Feet per Year
SSM	Startup, Shutdown, and Maintenance
NESHAP	National Emission Standards for Hazardous Air Pollutants
NO_x	Nitrogen Oxides
NO_2	Nitrogen Dioxide
NSPS	New Source Performance Standards
NSR	New Source Review
ppmv	Parts per Million by Volume
PSD	Prevention of Significant Deterioration
psia	Pounds per Square Inch (absolute)
RVP	Reid Vapor Pressure
scf/hr	Standard Cubic Feet per Hour
SO_2	Sulfur Dioxide
Title V	Federal Operating Permits Program
tpy	Tons per Year
VOC	Volatile Organic Compound

INTRODUCTION

Applied Digital Corporation (Applied Digital) owns and operates a data center in Dickey County, North Dakota. On behalf of Applied Digital, Ramboll is submitting the enclosed synthetic minor site-specific construction permit application for the ELN Building 1 GEN Plant (ELN GEN Plant) facility with sixty (60) diesel-fueled Caterpillar 3516E emergency generators (GA1-GA15, GB1-GB15, GC1-GC15, GD1-GD15). This permit to construct application is being submitted to the North Dakota Department of Environmental Quality (NDDEQ) in accordance with Chapter 33.1-15-14 of the North Dakota Air Pollution Control Rules. This permit application seeks to establish Federally Enforceable Limits (FEL) to obtain synthetic minor source status by limiting site wide fuel usage for the engines on-site 525,729 gallons per year for maintenance and readiness purposes. Emergency generator operations are not listed source categories under Title 40 of the Code of Federal Regulations (40 CFR), part 52 (40 CFR §52.21(b)(1)), therefore, the facility would be considered a major source if criteria pollutant emissions are greater than or equal to the major source threshold of 250 tons per year for each pollutant. Major stationary sources, as defined in NDAC Chapter 33.1-15-14-06, require an operating permit in the state of North Dakota for all sources in a contiguous area under common control that emits or has the potential to emit 100 tpy or more of any criteria pollutant, 10 tpy of any single hazardous air contaminant, or 25 tpy of total hazardous air contaminant emissions. As demonstrated in **Appendix A** of this application, the facility is requesting federally enforceable limits to remain below major source thresholds.

The purpose of this application is to authorize the construction and operation of sixty (60) Caterpillar 3516E generator engines. Dickey County is in an attainment area for all criteria pollutants. The facility is requesting to be established as a synthetic minor source with respect to both Prevention of Significant Deterioration (PSD) review (under NDAC 23.1-06) as well as the Federal Operating Permits Program (Title V) (under NDAC Chapter 33.1-15-14-06).

Enclosed are the required application materials consisting of the following: facility maps, facility plot plans, emission calculations, and other documentation supporting this registration application.

1. FACILITY DESCRIPTION

Applied Digital Corporation (Applied Digital) is constructing the Applied Digital ELN GEN Plant located in Dickey County at 9663 87th Ave. SE Ellendale, ND 58436. The site primarily operates on grid power but relies on generators as a back-up in the instance of lost power supply. This facility is seeking to be permitted under a synthetic minor source construction permit (PTC) through the establishment of an FEL on site-wide total fuel usage. The site-wide fuel usage limit is calculated assuming a site-wide synthetic minor source limitation of 99.5 tpy of NO_X emissions. **Table 1-1** provides a summary of the requested fuel usage for non-emergency purposes.

Table 1-1. Requested Site-Wide 12-Month Rolling Limitations

Total Site-wide Fuel Usage for Non-Emergency Purposes (gal/yr)
Proposed Fuel Usage Limit
525,729

To demonstrate compliance with this limitation, Applied Digital will monitor fuel usage continuously during each run using a controller module for each engine, which will be tied into the facility's building management software system, and tank-mounted gauges that will be checked periodically with a dipstick. Additional information regarding fuel usage monitoring can be provided to NDDEQ upon request.

Total equipment at the facility is presented below and includes the site location in **Figure 1-1**. NO_x, CO, VOC, PM_{10}, and $PM_{2.5}$ emission factors are based on manufacturer specifications and included in **Appendix B.**

The total equipment present at the facility consists of sixty (60) new 4,393 bhp Caterpillar 3516E Engine Generator Sets (GA1-GA15, GB1-GB15, GC1-GC15, GD1-GD15). Each of these engines are diesel fired for the purpose of electricity production in the event of loss of utility power.

Figure 1-1. Site Location

2. EMISSIONS SUMMARY

The site wide emission rates proposed for the facilities are presented in **Table 2-1**. Detailed emission calculations for the proposed equipment and operations are presented in **Appendix A**.

2.1 Emissions Calculations

2.1.1 Internal Combustion Unit

Emissions from the diesel-driven generator engine(s) (GA1-GA15, GB1-GB15, GC1-GC15, GD1-GD15) of nitrogen oxides (NO_x), particulate matter (PM), carbon monoxide (CO) and VOCs were estimated using manufacturer specifications. SO_2 and HAPs emissions were estimated using AP-42 and CO_2 was estimated using 40 CFR 98, Subpart A, Table A-1.

Table 2-1 - Total Potential Emissions Rates from Generators

Pollutant	Total Potential Annual Emissions for All Generators [All Purposes] [1] (tpy)
Criteria Pollutants	
NO_X	99.5
CO	24.2
VOC	2.5
$PM/PM_{10}/PM_{2.5}$	1.6
SO_2	0.1

Table 2-1 - Total Potential Emissions Rates from Generators (contd.)

Pollutant	Total Potential Annual Emissions for All Generators [All Purposes] [1] (tpy)
Hazardous Air Pollutants	
Benzene	0.028
Toluene	0.010
Xylenes	7.0E-03
Formaldehyde	2.8E-03
Acetaldehyde	9.1E-04
Acrolein	2.8E-04
Total PAH	0.008
Total HAP	0.057
Greenhouse Gases	
CO_2	5,873.25
CH_4	0.24
N_2O	0.05
CO_2e	5,893.40

Notes:

[1] Through this application, Applied Digital is requesting a site-wide diesel fuel usage limitation of 525,729 gal/yr to avoid Title V and New Source Review applicability.

3. COMPLIANCE WITH FEDERAL AND STATE PERMIT REQUIREMENTS

A summary of compliance with applicable state and federal requirements is provided in **Table 3-1** and **Table 3-2**. **Table 3-1** outlines the state registration and applicable permitting requirements. **Table 3-2** outlines federal requirements including applicable NSPS and Maximum Achievable Control Technology (MACT) regulations.

Table 3-1– North Dakota Permitting Compliance		
Citation	**Summary of Requirement**	**Demonstration of Compliance**
NDAC §33.1-15-14-06 q(2)(a)	(2) A major stationary source of air contaminants, that directly emits or has the potential to emit, one hundred tons [90.68 metric tons] per year or more of any air contaminant subject to regulation (including any major source of fugitive emissions of any such contaminant, as determined by rule by the administrator of the United States environmental protection agency). For purposes of this definition, air contaminant subject to regulation does not include greenhouse gases as defined in title 40 Code of Federal Regulations 86.1818-12(a). The fugitive emissions of a stationary source shall not be considered in determining whether it is a major stationary source for the purposes of this section, unless the source belongs to one of the following categories of stationary source:	All emissions from the facility authorized under this registration will not exceed the listed thresholds and are not a source category listed. The facility is seeking federally enforceable limits to categorize the facility as a synthetic minor source. Please see **Appendix A** for emissions calculations.
NDAC §33.1-15-14-02 1.a	No construction, installation, or establishment of a new stationary source within a source category designated in section 33.1-15-14-01 may be commenced unless the owner or operator thereof shall file an application for, and receive, a permit to construct in accordance with this chapter.	The facility is a listed source under section 33.1-15-14-01, and is not a major source under 33.1-15-14-06. Thus, the facility requires a permit to construct.
NDAC §33.1-15-14-02 13.c	(1) Any single internal combustion engine with less than five hundred brake horsepower, or multiple engines with a combined brake horsepower rating less than five hundred brake horsepower. (2) Any single internal combustion engine with a maximum rating of less than one thousand brake horsepower, or multiple engines with a combined brake horsepower rating of less than one thousand brake horsepower, and which operates a total of five hundred hours or less in a rolling twelve-month period. (3) Any internal combustion engine, or multiple engines at the same facility, with a total combined actual emission rate of five tons [4.54 metric tons] per year or less of any air contaminant for which an ambient air quality standard has been promulgated in section 33.1-15-02-04. (4) The exemptions listed in paragraphs 1, 2, and 3 do not apply to engines that are a utility unit as defined in section 33.1-15-21-08.1.	The facility does not have any engines meeting the listed requirements for exemption from obtaining a permit to construct. Therefore, the facility requires a permit to construct.

Table 3-1– North Dakota Permitting Compliance		
Citation	**Summary of Requirement**	**Demonstration of Compliance**
NDAC §33.1-15-14-02 6.a.	6. Public participation - Final action on application. a. The following source categories are subject to the public participation procedures under this subsection: (1) Those affected facilities designated under chapter 33.1-15-13. (2) New sources that will be required to obtain a permit to operate under section 33.1-15-14-06. (3) Modifications to an existing facility which will increase the potential to emit from the facility by the following amounts: (a) One hundred tpy [90.72 metric tons] or more of particulate matter, sulfur dioxide, NO_x, hydrogen sulfide, CO, or VOCs; (b) Ten tpy [9.07 metric tons] or more of any contaminant listed under section 112(b) of the federal Clean Air Act; or (c) Twenty five tpy [22.68 metric tons] or more of any combination of contaminants listed under section 112(b) of the federal Clean Air Act. (4) Sources which the department has determined to have a major impact on air quality. (5) Those for which a request for a public comment period has been received from the public. 9 (6) Sources for which a significant degree of public interest exists regarding air quality issues. (7) Those sources which request a federally enforceable permit which limits their potential to emit.	This facility is seeking to establish federally enforceable limits. Therefore, this permit application is subject to public participation.
NDAC §33.1-15-14-02 9.a-f.	9. Permit to construct - Conditions. The department may impose any reasonable conditions upon a permit to construct, including conditions concerning: a. Sampling, testing, and monitoring of the facilities or the ambient air or both. b. Trial operation and performance testing. c. Prevention and abatement of nuisance conditions caused by operation of the facility. d. Recordkeeping and reporting. e. Compliance with applicable rules and regulations in accordance with a compliance schedule. f. Limitation on hours of operation, production rate, processing rate, or fuel usage when necessary to assure compliance with this article. The violation of any conditions so imposed may result in revocation or suspension of the permit or other appropriate enforcement action.	The facility will comply with applicable permit conditions and demonstrate compliance with applicable rules through recordkeeping and reporting.

Table 3-1– North Dakota Permitting Compliance		
Citation	**Summary of Requirement**	**Demonstration of Compliance**
NDAC §33.1-15-14-02 14.a.	Emission tests or performance tests or both shall be conducted by the owner or operator of a facility and data reduced in accordance with the applicable procedure, limitations, standards, and test methods established by this article. Such tests must be conducted under the owner's or operator's permit to construct, and such permit is subject to the faithful completion of the test in accordance with this article.	The facility does not include new equipment that requires an initial or performance tests. Any applicable testing will be followed according to manufacturer specifications or applicable permit conditions.
NDAC §33.1-15-14-02 14.b.	All dates and periods of trial operation for the purpose of performance or emission testing pursuant to a permit to construct must be approved in advance by the department. Trial operation shall cease if the department determines, on the basis of the test results, that continued operation will result in the violation of this article. Upon completion of any test conducted under a permit to construct, the department may order the cessation of the operation of the tested equipment or facility until such time as a permit to operate has been issued by the department.	Any performance or emission testing conducted by Applied Digital will notify and receive approval from the department prior to conducting the test.
NDAC §33.1-15-14-03 1.e.	Sources which are subject to the title V permitting requirements in section 33.1-15-14-06 based solely on their potential to emit may apply for a federally enforceable minor source permit to operate which would limit their potential to emit to a level below the title V permit to operate applicability threshold.	The facility does not meet the exemption requirements of 33.1-15-14-03.d. and is not applicable to the title V permitting requirements of section 33.1-15-14-06. Any additional Title V applications will be submitted by Applied Digital upon department request. Thus, the facility will comply with all applicable requirements. The facility is required to obtain a federally enforceable minor source permit to operate (PTO)
NDAC §33.1-15-14-03	No person may operate or cause the routine operation of an installation or source designated in section 33.1-15-14-01 without applying for and obtaining, in accordance with this section, a permit to operate.	The facility will apply for a federally enforceable minor source PTO after the construction permit has been received.

Table 3-1– North Dakota Permitting Compliance		
Citation	**Summary of Requirement**	**Demonstration of Compliance**
NDAC §33.1-15-12-01 1.	Except as noted below the title of the subpart, the subparts and appendices of title 40 CFR, part 60, as they exist on July 1, 2019, which are listed under section 33.1-15-12-02 are incorporated into this chapter by reference. Any changes to the standards of performance are listed below the title of the standard. Reference to part 60 within the subparts means this chapter.	The facility has sixty generator engines subject to NSPS IIII and will comply with the performance standards as applicable.
NDAC §33.1-15-02	It is the purpose of these air quality standards to set forth levels of air quality for the maintenance of public health and welfare and to provide guidance to governmental and other parties interested in abating air pollution. Since the ambient air in North Dakota is generally cleaner than these standards, the standards are not a permit for the unnecessary degradation of air quality.	The facility must comply with the North Dakota and Federal Ambient Air Quality Standards. In addition to these standards, compliance with the Policy for the Control of Hazardous Air Pollutant Emissions in North Dakota (Air Toxics Policy) is required.
NDAC §33.1-15-03-02	No person may discharge into the ambient air from any single source of emission whatsoever any air contaminant which exhibits an opacity greater than twenty percent except that a maximum of forty percent opacity is permissible for not more than one six-minute period per hour.	The facility must comply with an opacity limit of 20% except for one six-minute period per hour when 40% opacity is permissible.
NDAC §33.1-15-06	This chapter applies to any installation in which fuel is burned in which the SO_2 emissions are substantially due to the sulfur content of the fuel bumed and in which the fuel is burned primarily to produce heat. This chapter is not applicable to installations which are subject to an SO_2 emission limit under Chapter 33-15-12, Standards for Performance for New Stationary Sources, or installations which bum pipeline quality natural gas. The emergency natural gas engines fire pipeline quality natural gas; therefore, these units are exempt from Chapter 33-15-06.	The emergency diesel engine fires distillate oil contains no more than 0.0015 percent sulfur by weight to meet the rules requirements.

Table 3-1– North Dakota Permitting Compliance		
Citation	**Summary of Requirement**	**Demonstration of Compliance**
NDAC §33.1-15-08	No person shall operate, or cause to be operated, any internal combustion engine which emits from any source any unreasonable and excessive smoke, obnoxious or noxious gases, fumes or vapor.	The emergency generators are subject to this chapter's requirements. Therefore, Applied Digital will comply as applicable.
NDAC §33.1-15-16	An odor will be considered objectionable when a department certified inspector or at least thirty percent of a randomly selected group of persons, or an odor panel exposed to the odor would deem that odor objectionable if the odor were present in their place of residence.	The owner/operator shall not discharge into the ambient air any objectionable odorous air contaminant which is in excess of the limits established in NDAC 33-15-16.
NDAC §33.1-15-17	No person shall cause or permit fugitive emissions from any source whatsoever, including a building, its appurtenances, or a road, to be used, constructed, altered, repaired, or demolished; or activities such as loading, unloading, storing, handling, or transporting of materials without taking reasonable precautions to prevent such emissions from causing air pollution as defined in section 33.1-15-01-04.	This facility has no fugitive emissions and is, therefore, not applicable to this chapter.

Table 3-2. Federal Standard Applicability		
Federal Standard	**Name**	**Applicability**
New Source Performance Standards		
NSPS IIII	Standards of Performance for Stationary Compression Ignition Internal Combustion Engines	Subpart IIII applies to manufacturers, owners, and operators of compression ignition ICE. *The facility includes sixty (60) Spark Ignition diesel-fired internal combustion engines (E1 – E60) which commenced construction after June 12th, 2006 and were manufactured after July 1st, 2008. Therefore, the engines are subject to the requirements of 40 CFR §60, Subpart IIII* ***GA1 through GA15, GB1 through GB15, GC1 through GC15, and GD1 through GD15 will comply with the following requirements:*** ***40 CFR §60.4202(b)(2) –*** *For 2011 model year and later for engines greater than or equal to 900 kW, the Tier 2 emission standards as described in 40 CFR part 1039, appendix I, for all pollutants and the smoke standards as specified in 40 CFR 1039.105.* ***Applicable Tier 2 Emission Standards*** *–* *NMHC + NO_x: 6.4 g/kW-hr* *PM: 0.2 g/kW-hr* *CO: 3.5 g/kW-hr* ***40 CFR §60.4207(b)*** *– Diesel fuel requirements.* ***40 CFR §60.4212(a)-(e)*** *– Engine test methods and procedures for CI with < 30L displacement.* ***40 CFR §60.4214(d), (g), (j) –*** *Notification, reporting, and recordkeeping requirements.* ***40 CFR §60.4214(f)*** *– Performance test submissions beginning February 26, 2025.* ***40 CFR §60.4218 –*** *General Provisions.*
NSPS JJJJ	Standards of Performance for Stationary Spark Ignition Internal Combustion Engines	Subpart JJJJ applies to manufacturers, owners, and operators of spark ignition ICE. *The facility does not include spark ignited internal combustion engines; therefore, this subpart does not apply.*
Maximum Achievable Control Technology		
MACT ZZZZ	National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines	This subpart applies to all spark and compression ignition ICE. *The generator engines (GA1-GA15, GB1-GB15, GC1-GC15, GD1-GD15) are considered new stationary RICE located at an area source since construction commenced after June 12th, 2006. As such, 40 CFR§63.6590(c) states that a new or reconstructed stationary RICE located at an area source of HAPs must meet the requirements of NESHAP Subpart ZZZZ by meeting the requirements of NSPS Subpart IIII.*

APPENDIX A
APPLICATION FORMS

PERMIT APPLICATION FOR AIR CONTAMINANT SOURCES

NORTH DAKOTA DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF AIR QUALITY
SFN 8516 (9-2021)

SECTION A - FACILITY INFORMATION

Name of Firm or Organization Applied Digital Corporation		
Applicant's Name Steve Lattimer		
Title Data Center Architect	Telephone Number (303) 591-9876	E-mail Address slattimer@applieddigital.com
Contact Person for Air Pollution Matters Katie Wipfli		
Title Senior Lead Consultant	Telephone Number (406) 706-7886	E-mail Address kwipfli@ramboll.com
Mailing Address (Street & No.) 3811 Turtle Creek Blvd. Suite 2100		
City Dallas	State TX	ZIP Code 75219
Facility Name ELN Building 1 GEN Plant		
Facility Address (Street & No.) 9663 87th Ave. SE		
City Ellendale	State ND	ZIP Code 58436

County Dickey	Coordinates NAD 83 in Decimal Degrees (to forth decimal degree)	
	Latitude 46.01438300	Longitude -98.57426900

Legal Description of Facility Site Emergency generator system to provide emergency backup power to facility data center				
Quarter NE	Quarter SE	Section 4	Township 129 N	Range 63 W

Land Area at Facility Site 136 Acres (or) 5,934,370 Sq. Ft.	MSL Elevation at Facility 1473'

SECTION B – GENERAL NATURE OF BUSINESS

Describe Nature of Business	North American Industry Classification System Number	Standard Industrial Classification Number (SIC)
Computer Processing and Data Preparation and Processing Services	518210	7374

SECTION C – GENERAL PERMIT INFORMATION

Type of Permit? ☒ Permit to Construct (PTC) ☐ Permit to Operate (PTO)

If application is for a Permit to Construct, please provide the following data:

Planned Start Construction Date 05/2025	Planned End Construction Date 09/2025

SECTION D – SOURCE IDENTIFICATION AND CATEGORY OF EACH SOURCE INCLUDED ON THIS PERMIT APPLICATION

		Permit to Construct				Minor Source Permit to Operate						
Your Source ID Number	Source or Unit (Equipment, Machines, Devices, Boilers, Processes, Incinerators, Etc.)	New Source	Existing Source Modification	Existing Source Expansion	Existing Source Change of Location	New Source	Existing Source Initial Application	Existing Source After Modification	Existing Source After Expansion	Existing Source After Change of Location	Existing Source After Change of Ownership	Other
GA1-GA15	Generator	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
GB1-GB15	Generator	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
GC1-GC15	Generator	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
GD1-GD15	Generator	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
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		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Add additional pages if necessary

SECTION D2 – APPLICABLE REGULATIONS

Source ID No.	Applicable Regulations (NSPS/MACT/NESHAP/etc.)
Facility-wide	NSPS IIII, MACT ZZZZ

SECTION E – TOTAL POTENTIAL EMISSIONS

Pollutant	Amount (Tons Per Year)
NO_x	99.5
CO	24.2
PM	1.6

Pollutant	Amount (Tons Per Year)
PM_{10} (filterable and condensable)	1.6
$PM_{2.5}$ (filterable and condensable)	1.6
SO_2	0.1
VOC	2.5
GHG (as CO_2e)	5,873.25
Largest Single HAP	0.028
Total HAPS	0.057

*If performance test results are available for the unit, submit a copy of test with this application. If manufacturer guarantee is used provide spec sheet.

SECTION F1 – ADDITIONAL FORMS

Indicate which of the following forms are attached and made part of the application

☐ Air Pollution Control Equipment (SFN 8532)	☐ Fuel Burning Equipment Used for Indirect Heating (SFN 8518)
☐ Construct/Operate Incinerators (SFN 8522)	☐ Hazardous Air Pollutant (HAP) Sources (SFN 8329)
☐ Natural Gas Processing Plants (SFN 11408)	☐ Manufacturing or Processing Equipment (SFN 8520)
☐ Glycol Dehydration Units (SFN 58923)	☐ Volatile Organic Compounds Storage Tank (SFN 8535)
☐ Flares (SFN 59652)	■ Internal Combustion Engines and Turbines (SFN 8891)
☐ Grain, Feed, and Fertilizer Operations (SFN 8524)	☐ Oil/Gas Production Facility Registration (SFN 14334)

SECTION F2 – OTHER ATTACHMENTS INCLUDED AS PART OF THIS APPLICATION

1.	Emissions calculations	4.	
2.	Supplemental Data	5.	
3.		6.	

I, the undersigned applicant, am fully aware that statements made in this application and the attached exhibits and statements constitute the application for Permit(s) to Construct and/or Operate Air Contaminant sources from the North Dakota Department of Environmental Quality and certify that the information in this application is true, correct and complete to the best of my knowledge and belief. Further, I agree to comply with the provisions of Chapter 23.1-06 of the North Dakota Century Code and all rules and regulations of the Department, or revisions thereof. I also understand the permit is nontransferable and, if granted a permit, I will promptly notify the Department upon sale or legal transfer of this permitted establishment.

Signature	Date

INSTRUCTIONS

SITE PLANS TO BE ATTACHED TO APPLICATION:

Prepare and attach a plot plan drawn to scale or properly dimensioned, showing at least the following:

a. The property involved and the outlines and heights of all buildings on the property. Identify property lines plainly. Also, indicate if there is a fence around the property that prevents public access.

b. Location and identification of all existing or proposed equipment, manufacturing processes, etc., and points of emission or discharge of air contaminants to the atmosphere.

c. Location of the facility or property with respect to the surrounding area, including residences, businesses and other permanent structures, streets and roadways. Identify all such structures and roadways. Indicate direction (**NORTH**) on the drawing and the prevailing wind direction.

EQUIPMENT PLANS AND SPECIFICATIONS FOR PERMIT TO CONSTRUCT:

Supply plans and specifications, including as a minimum an assembly drawing, dimensioned and to scale, in plan, elevation and as many sections as are needed to show clearly the design and operation of the equipment and the means by which air contaminants are controlled.

The following must be shown:

a. Size and shape of the equipment. Show exterior and interior dimensions and features.

b. Locations, sizes, and shape details of all features which may affect the production, collection, conveying, or control of air contaminants of any kind, location, size, and shape details concerning all material handling equipment.

c. All data and calculations used in selecting or designing the equipment.

d. Horsepower rating of all internal combustion engines driving the equipment.

NOTE: **STRUCTURAL DESIGN CALCULATIONS AND DETAILS ARE NOT REQUIRED.** WHEN STANDARD COMMERCIAL EQUIPMENT IS TO BE INSTALLED, THE MANUFACTURER'S CATALOG DESCRIBING THE EQUIPMENT MAY BE SUBMITTED IN LIEU OF ITEMS a, b, c, and d OF ABOVE, WHICH THE CATALOG COVERS. ALL INFORMATION REQUIRED ABOVE THAT THE CATALOG DOES NOT CONTAIN MUST BE SUBMITTED BY THE APPLICANT.

ADDITIONAL INFORMATION MAY BE REQUIRED:

If the application is signed by an authorized representative of the owner, a LETTER OF AUTHORIZATION must be attached to the application.

SEND COMPLETED APPLICATION AND ALL ATTACHMENTS TO:

North Dakota Department of Environmental Quality
Division of Air Quality
4201 Normandy Street, 2nd Floor
Bismarck, ND 58503-1324
(701) 328-5188

PERMIT APPLICATION FOR INTERNAL COMBUSTION ENGINES AND TURBINES

NORTH DAKOTA DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF AIR QUALITY
SFN 8891 (9-2021)

NOTE: READ INSTRUCTIONS BEFORE COMPLETING THIS FORM.
- Must include SFN 8516 or SFN 52858

SECTION A – GENERAL INFORMATION

Name of Firm or Organization	Facility Name
Applied Digital Corporation	ELN Building 1 GEN Plant

SECTION B – FACILITY AND UNIT INFORMATION

Source ID Number (From form SFN 8516) GA1-GA15, GB1-GB15, GC1-GC15, GD1-GD15		
Type of Unit (check all that apply)	☐ Stationary Natural Gas-Fired Engine ☐ Stationary Diesel and Dual Fuel Engine ☐ Stationary Gasoline Engine ☐ Stationary Natural Gas-Fired Turbine	■ Emergency Use Only ☐ Non-Emergency Use ☐ Peaking ☐ Demand Response
	■ Other – Specify: Diesel	

SECTION C – MANUFACTURER DATA

Make	Model	Date of Manufacture
Caterpillar	3516E	

Reciprocating Internal Combustion Engine

☐ Spark Ignition ☐ Compression Ignition ■ Lean Burn
■ 4 Stroke ☐ 2 Stroke ☐ Rich Burn

Maximum Rating (BHP @ rpm)	Operating Capacity (BHP @ rpm)
1,800	1,800

Engine Subject to:
- ■ 40 CFR 60, Subpart IIII
- ☐ 40 CFR 60, Subpart JJJJ
- ■ 40 CFR 63, Subpart ZZZZ
- ☐ 40 CFR 60, Subpart OOOO (for compressors)
- ☐ 40 CFR 60, Subpart OOOOa (for compressors)

Turbine
Dry Low Emissions? ☐ Yes ☐ No

Heat Input (MMBtu/hr)	Maximum Rating (HP)	75% Rating (HP)	Efficiency

Turbine Subject to:
☐ 40 CFR 60, Subpart GG ☐ 40 CFR 60, Subpart KKKK

SECTION D – FUELS USED

Natural Gas (10^6 cu ft/year)	Percent Sulfur	Percent H_2S
Oil (gal/year)	Percent Sulfur	Grade No.
LP Gas (gal/year)	Other – Specify: Diesel	

SECTION E – NORMAL OPERATING SCHEDULE

Hours Per Day	Days Per Week	Weeks Per Year	Hours Per Year	Peak Production Season (if any)
			239 hrs each	

SECTION F – STACK PARAMETERS

Emission Point ID Number		Stack Height Above Ground Level (feet)	
E1 - E60		12.0	
Stack Diameter (feet at top)	Gas Discharged (SCFM)	Exit Temp (°F)	Gas Velocity (FPS)
1.0	22,806	902	298.5

SECTION G – EMISSION CONTROL EQUIPMENT

Is any emission control equipment installed on this unit?

☒ No ☐ Yes – Complete and attach form SFN 8532

SECTION H – MAXIMUM AIR CONTAMINANTS EMITTED

Pollutant	Maximum Pounds Per Hour	Amount (Tons Per Year)	Basis of Estimate*
NO_x	3,271.56	99.5	Manufacturer Specifications
CO	383.52	24.2	Manufacturer Specifications
PM	42.24	1.6	Manufacturer Specifications
PM_{10} (filterable and condensable)	42.24	1.6	Manufacturer Specifications
$PM_{2.5}$ (filterable and condensable)	42.24	1.6	Manufacturer Specifications
SO_2	2.59	0.1	100% Conversions of H2S
VOC	23.24	2.5	Manufacturer Specifications
GHG (as CO_2e)	279,112.18	5,873.25	AP-42, Chapter 3.4
Largest Single HAP	1.33	0.028	AP-42, Chapter 3.4
Total HAPS	2.69	0.057	Ap-42, Chapter 3.4

* If performance test results are available for the unit, submit a copy of test with this application, if manufacture data used, submit manufacturers specification sheets.

IS THIS UNIT IN COMPLIANCE WITH ALL APPLICABLE AIR POLLUTION RULES AND REGULATIONS?

☒ YES ☐ NO

If "NO" a Compliance Schedule (SFN 61008) must be completed and attached.

Attach and label separate sheet(s) if you need more space to explain any system or answers or to provide complete listings of Emissions, Contaminants, or other items.

SEND COMPLETED APPLICATION AND ALL ATTACHMENTS TO:

North Dakota Department of Environmental Quality
Division of Air Quality
4201 Normandy Street, 2nd Floor
Bismarck, ND 58503-1324
(701) 328-5188

APPENDIX B
EMISSION CALCULATIONS

Number of Generator Engines (Site-Wide)

CAT 3516E Engines	60

Power Output by Load

Engine Group	Power Output (bhp/gen) [1]				
	10% Load	25% Load	50% Load	75% Load	Full Standby
CAT 3516E Engines	590	1,236	2,294	3,347	4,393

Notes:

(1) Per the manufacturer specification sheet and performance data.

(2) Converted from bhp to kW by

kW = 1.34 bhp

Engine Group	Diesel Fuel Consumption (gal/hr/engine) [1]					Heat Input (MMBtu/hr/engine) [2]				
	10% Load	25% Load	50% Load	75% Load	Full Standby	10% Load	25% Load	50% Load	75% Load	Full Standby
CAT 3516E Engines	36.7	66.4	125.9	168.1	208.2	5.03	9.10	17.25	23.03	28.53

Notes:

(1) Refer to enclosed manufacturer specification sheet and performance data.

(2) Diesel fuel consumption was converted to heat input based on the diesel high heating value from the USEPA's AP-42, Section 3.4, Large Stationary Diesel and All Stationary Dual-fuel Engines, Table 3.4-1, footnote a (October 1996):

Diesel HHV = 0.137 MMBtu/gal

Pollutant	Uncontrolled Emission Factors for CAT Engines (g/bhp-hr)				
	10% Load	25% Load	50% Load	75% Load	Full Standby
NO_X	10.68	7.07	3.03	3.65	5.63
CO	2.60	1.68	0.73	0.74	0.66
VOC[1]	0.27	0.07	0.05	0.04	0.04
Filterable PM^2	0.03	0.12	0.10	0.07	0.05

Notes:

(1) Assumes that all hydrocarbons (HC) are VOC.

(2) Assumes that all filterable PM is less than 2.5 microns in diameter (i.e., PM = PM_{10} = $PM_{2.5}$).

(3) Refer to enclosed manufacturer performance data. Emission factors are conservatively based on the manufacturer's "Rated Speed Potential Site Variation" (i.e., not-to-exceed) emissions data.

AP-42 Emission Factors

Pollutant	Emission Factor (lb/MMBtu)[1]
SO_2[2]	1.52E-03
Condensable PM	7.70E-03
Benzene	7.76E-04
Toluene	2.81E-04
Xylenes	1.93E-04
Formaldehyde	7.89E-05
Acetaldehyde	2.52E-05
Acrolein	7.88E-06
Total PAH[3]	2.12E-04

Notes:

1 Emission factors are from the U.S. EPA's AP-42, Section 3.4, Large Stationary Diesel And All Stationary Dual-fuel Engines, Tables 3.4-1, 3.4-2, 3.4-3, and 3.4-4 (October 1996).

2 The SO_2 emission factor was calculated based on the maximum allowable diesel fuel sulfur content under NSPS Subpart IIII:

Diesel Sulfur Content = 0.0015 wt.% Sulfur

3 PAH = Polycyclic Aromatic Hydrocarbons

GHG Emission Factors

Pollutant	Emission Factor - Heat Input-Based (lb/MMBtu)[1]
CO_2	163.05
CH_4	6.61E-03
N_2O	1.32E-03
CO_2e[2]	163.61

Notes:

1 Per 40 CFR 98, Subpart C, Tables C-1 and C-2 for No. 2 fuel oil combustion. The emission factors were converted from kg/MMBtu to lb/MMBtu.

2 The CO_2e emission factor is calculated as the sum of each GHG pollutant multiplied by its global warming potential, per 40 CFR 98, Subpart A, Table A-1:

CO_2: 1
CH_4: 25
N_2O: 298

Hourly Emission Rate

Pollutant	CAT Engines - Hourly Emission Factors (lb/hr/gen) [1, 2]						Maximum Hourly Emissions (lb/hr)
	10% Load	25% Load	50% Load	75% Load	Full Standby	Maximum	
Criteria Pollutants							
NO_X	13.89	19.27	15.32	26.93	54.53	**54.53**	**3,271.56**
CO	3.38	4.58	3.69	5.46	6.39	**6.39**	**383.52**
VOC	0.35	0.19	0.25	0.30	0.39	**0.39**	**23.24**
Filt. PM^3	0.04	0.33	0.51	0.52	0.48	**0.52**	**30.99**
$PM/PM_{10}/PM_{2.5}$ [3]	0.08	0.40	0.64	0.69	0.70	**0.70**	**42.24**
SO_2	7.62E-03	1.38E-02	2.61E-02	3.49E-02	4.32E-02	**0.04**	**2.59**
Hazardous Air Pollutants							
Benzene	3.90E-03	7.06E-03	1.34E-02	1.79E-02	2.21E-02	**2.21E-02**	**1.33**
Toluene	1.41E-03	2.56E-03	4.85E-03	6.47E-03	8.02E-03	**8.02E-03**	**0.48**
Xylenes	9.71E-04	1.76E-03	3.33E-03	4.45E-03	5.51E-03	**5.51E-03**	**0.33**
Formaldehyde	3.97E-04	7.18E-04	1.36E-03	1.82E-03	2.25E-03	**2.25E-03**	**0.14**
Acetaldehyde	1.27E-04	2.29E-04	4.35E-04	5.80E-04	7.19E-04	**7.19E-04**	**0.04**
Acrolein	3.96E-05	7.17E-05	1.36E-04	1.82E-04	2.25E-04	**2.25E-04**	**0.01**
Total PAH	1.07E-03	1.93E-03	3.66E-03	4.88E-03	6.05E-03	**6.05E-03**	**0.36**
Total HAP	7.92E-03	1.43E-02	2.72E-02	3.63E-02	4.49E-02	**4.49E-02**	**2.69**
Greenhouse Gases							
CO_2	820.00	1,483.59	2,813.02	3,755.90	4,651.87	**4,651.87**	**279,112.18**
CH_4	0.03	0.06	0.11	0.15	0.19	**0.19**	**11.32**
N_2O	0.01	0.01	0.02	0.03	0.04	**0.04**	**2.26**
CO_2e	822.81	1,488.68	2,822.67	3,768.79	4,667.83	**4,667.83**	**280,069.98**

Notes:

1 For engine-specific emission factors:
Hourly Emissions at Load *X* (lb/hr/gen) = Emission Factor at Load *X* (g/hp-hr) x Engine Power at Load *X* (bhp/gen) / (453.6 g/lb)

2 For AP-42 & GHG emission factors:
Hourly Emissions at Load *X* (lb/hr/gen) = Emission Factor (lb/MMBtu) x Heat Input at Load *X* (MMBtu/hr/gen)

3 Total $PM/PM_{10}/PM_{2.5}$ is the sum of filterable $PM/PM_{10}/PM_{2.5}$ and condensable PM.

Fuel Usage-Based Emission Rate

Pollutant	CAT Engines - Fuel Usage-Based Emission Factors (lb/gal) [1, 2]					
	10% Load	25% Load	50% Load	75% Load	Full Standby	Maximum
Criteria Pollutants						
NO_X	0.38	0.29	0.12	0.16	0.26	**0.38**
CO	0.09	0.07	0.03	0.03	0.03	**0.09**
VOC	0.01	0.00	0.00	0.00	0.00	**0.01**
Filt. PM^3	1.06E-03	4.92E-03	4.02E-03	3.07E-03	2.33E-03	**4.92E-03**
$PM/PM_{10}/PM_{2.5}$ [3]	2.12E-03	5.98E-03	5.07E-03	4.13E-03	3.38E-03	**5.98E-03**
SO_2	2.08E-04	2.08E-04	2.08E-04	2.08E-04	2.08E-04	**2.08E-04**
Hazardous Air Pollutants						
Benzene	1.06E-04	1.06E-04	1.06E-04	1.06E-04	1.06E-04	**1.06E-04**
Toluene	3.85E-05	3.85E-05	3.85E-05	3.85E-05	3.85E-05	**3.85E-05**
Xylenes	2.64E-05	2.64E-05	2.64E-05	2.64E-05	2.64E-05	**2.64E-05**
Formaldehyde	1.08E-05	1.08E-05	1.08E-05	1.08E-05	1.08E-05	**1.08E-05**
Acetaldehyde	3.45E-06	3.45E-06	3.45E-06	3.45E-06	3.45E-06	**3.45E-06**
Acrolein	1.08E-06	1.08E-06	1.08E-06	1.08E-06	1.08E-06	**1.08E-06**
Total PAH	2.91E-05	2.91E-05	2.91E-05	2.91E-05	2.91E-05	**2.91E-05**
Total HAP	2.16E-04	2.16E-04	2.16E-04	2.16E-04	2.16E-04	**2.16E-04**
Greenhouse Gases						
CO_2	22.34	22.34	22.34	22.34	22.34	**22.34**
CH_4	9.06E-04	9.06E-04	9.06E-04	9.06E-04	9.06E-04	**9.06E-04**
N_2O	1.81E-04	1.81E-04	1.81E-04	1.81E-04	1.81E-04	**1.81E-04**
CO_2e	22.42	22.42	22.42	22.42	22.42	**22.42**

Notes:

1 For engine-specific emission factors:
Per-Gallon Emissions at Load *X* (lb/gal/gen) = {Emission Factor at Load *X* (g/hp-hr) x Engine Power at Load *X* (bhp/gen) / (453.6 g/lb)} / {Engine-Specific Fuel Usage at Load *X* (gal/hr)}

2 For AP-42 & GHG emission factors:
Per-Gallon Emissions at Load *X* (lb/gal/gen) = {Emission Factor (lb/MMBtu) x Heat Input at Load *X* (MMBtu/hr/gen)} / {Engine-Specific Fuel Usage at Load *X* (gal/hr)}

3 Total $PM/PM_{10}/PM_{2.5}$ is the sum of filterable $PM/PM_{10}/PM_{2.5}$ and condensable PM.

Proposed Fuel Usage Limitation

Engine Group	Total Fuel Usage Limit (gal/yr)[1]		Total Hour Limit (hr/yr/gen)[2]	
All Engines	525,729	gal/year	239	hours/year /gen

Notes:

[1] Total fuel usage limitation proposed here is based on the requested site-wide NO_X emission limitation of 99.5 tpy and the maximum NO_X emission factor from all engines.

[2] Total hours limitation for maintenance checks and readiness testing proposed here is based on manufacturer-recommended maintenance schedules.

Table 2-1 - Total Potential Emissions Rates from Generators

Pollutant	Total Potential Annual Emissions for All Generators [All Purposes] [1] (tpy)
Criteria Pollutants	
NO_X	99.5
CO	24.2
VOC	2.5
$PM/PM_{10}/PM_{2.5}$	1.6
SO_2	0.1

Table 2-1 - Total Potential Emissions Rates from Generators (contd.)

Pollutant	Total Potential Annual Emissions for All Generators [All Purposes] [1] (tpy)
Hazardous Air Pollutants	
Benzene	0.028
Toluene	0.010
Xylenes	7.0E-03
Formaldehyde	2.8E-03
Acetaldehyde	9.1E-04
Acrolein	2.8E-04
Total PAH	0.008
Total HAP	0.057
Greenhouse Gases	
CO_2	5,873.25
CH_4	0.24
N_2O	0.05
CO_2e	5,893.40

Notes:

[1] Through this application, Applied Digital is requesting a site-wide diesel fuel usage limitation of 525,729 gal/yr to avoid Title V and New Source Review applicability.

APPENDIX C
FACILITY MAPS

SUBSTATION

RETENTION POND

SITE ENTRY

BUILDING 1

GENERATOR PLANT BLDG 1

FIRE WATER TANK 110X50X16

PUMP HOUSE

FACILITIES GARAGE

SITE EXIT

APPENDIX D
ENGINE DOCUMENTATION

PERFORMANCE DATA[EM4718]

October 7, 2024

Performance Number: EM4718 **Change Level: 02**

SALES MODEL:	3516E	**COMBUSTION:**	DIRECT INJECTION
BRAND:	CAT	**ENGINE SPEED (RPM):**	1,800
MACHINE SALES MODEL:		**HERTZ:**	60
ENGINE POWER (BHP):	4,393	**FAN POWER (HP):**	154.2
GEN POWER WITH FAN (EKW):	3,000.0	**ASPIRATION:**	TA
COMPRESSION RATIO:	13.9	**AFTERCOOLER TYPE:**	ATAAC
RATING LEVEL:	MISSION CRITICAL STANDBY	**AFTERCOOLER CIRCUIT TYPE:**	JW+OC, ATAAC
PUMP QUANTITY:	1	**INLET MANIFOLD AIR TEMP (F):**	122
FUEL TYPE:	DIESEL	**JACKET WATER TEMP (F):**	219.2
MANIFOLD TYPE:	DRY	**TURBO CONFIGURATION:**	PARALLEL
GOVERNOR TYPE:	ADEM5	**TURBO QUANTITY:**	4
ELECTRONICS TYPE:	ADEM5	**TURBOCHARGER MODEL:**	TPX44-H32-CT70-CA50-TT70-TA80
IGNITION TYPE:	CI	**CERTIFICATION YEAR:**	2020
INJECTOR TYPE:	MEUI-C	**CRANKCASE BLOWBY RATE (FT3/HR):**	4,390.2
FUEL INJECTOR:	5816980	**FUEL RATE (RATED RPM) NO LOAD (GAL/HR):**	17.2
UNIT INJECTOR TIMING (IN):	0.88	**PISTON SPD @ RATED ENG SPD (FT/MIN):**	2,539.4
REF EXH STACK DIAMETER (IN):	12		
MAX OPERATING ALTITUDE (FT):	6,562		

INDUSTRY	SUBINDUSTRY	APPLICATION
ELECTRIC POWER	STANDARD	PACKAGED GENSET

General Performance Data

THE INLET MANIFOLD AIR TEMP LISTED IN THE HEADER, AND IN THE GENERAL PERFORMANCE DATA, IS THE AVERAGE INLET MANIFOLD TEMP FRONT TO REAR ON THE ENGINE.

THIS STANDBY RATING IS FOR A STANDBY ONLY ENGINE ARRANGEMENT. RERATING THE ENGINE TO A STANDARD PRIME OR CONTINUOUS RATING IS NOT PERMITTED.

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	BRAKE MEAN EFF PRES (BMEP)	BRAKE SPEC FUEL CONSUMPTN (BSFC)	ISO BRAKE SPEC FUEL CONSUMPTN (BSFC)	VOL FUEL CONSUMPTN (VFC)	ISO VOL FUEL CONSUMPTN (VFC)	ELEC SPEC FUEL CONSUMPTN (ESFC)	ISO ELEC SPEC FUEL CONSUMPTN (ESFC)
EKW	%	BHP	PSI	LB/BHP-HR	LB/BHP-HR	GAL/HR	GAL/HR	LB/EKW-HR	LB/EKW-HR
3,000.0	100	4,393	406	0.336	0.330	208.2	204.3	0.492	0.483
2,700.0	90	3,976	367	0.340	0.333	190.3	186.7	0.500	0.491
2,400.0	80	3,557	328	0.349	0.343	175.1	171.7	0.517	0.508
2,250.0	75	3,347	309	0.356	0.349	168.1	164.9	0.530	0.520
2,100.0	70	3,137	290	0.362	0.355	160.2	157.1	0.541	0.531
1,800.0	60	2,716	251	0.370	0.363	141.7	139.0	0.559	0.548
1,500.0	50	2,294	212	0.389	0.382	125.9	123.5	0.595	0.584
1,200.0	40	1,872	173	0.406	0.398	107.2	105.2	0.634	0.622
900.0	30	1,449	134	0.401	0.393	81.8	80.3	0.645	0.633
750.0	25	1,236	114	0.381	0.374	66.4	65.1	0.628	0.616
600.0	20	1,022	94	0.392	0.384	56.4	55.4	0.667	0.655
300.0	10	590	55	0.441	0.433	36.7	36.0	0.869	0.852

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	INLET MFLD PRES	INLET MFLD TEMP	EXH MFLD TEMP	EXH MFLD PRES	ENGINE OUTLET TEMP	COMPRESSOR OUTLET PRES	COMPRESSOR OUTLET TEMP
EKW	%	BHP	IN-HG	DEG F	DEG F	IN-HG	DEG F	IN-HG	DEG F
3,000.0	100	4,393	91.7	119.6	1,263.2	61.5	901.9	100	451.3
2,700.0	90	3,976	82.2	119.3	1,247.8	54.4	904.4	90	423.5
2,400.0	80	3,557	74.9	118.9	1,242.3	48.9	913.3	82	403.8
2,250.0	75	3,347	72.1	119.0	1,240.1	46.9	917.3	79	395.9
2,100.0	70	3,137	67.8	119.3	1,240.0	43.8	925.8	74	384.0
1,800.0	60	2,716	56.0	120.2	1,245.9	35.5	953.4	62	348.0
1,500.0	50	2,294	47.1	118.6	1,248.2	29.9	973.6	52	318.8
1,200.0	40	1,872	33.9	114.2	1,255.9	21.9	1,002.7	38	269.7
900.0	30	1,449	16.7	112.4	1,203.6	12.3	984.1	20	191.4
750.0	25	1,236	8.9	110.5	1,091.8	8.1	915.3	11	150.2
600.0	20	1,022	5.8	108.3	1,004.5	6.6	847.7	8	133.3
300.0	10	590	0.9	104.2	780.2	4.2	671.9	3	108.0

General Performance Data (Continued)

GENSET POWER	PERCENT LOAD	ENGINE POWER	WET INLET AIR VOL	ENGINE OUTLET	WET INLET AIR	WET EXH GAS	WET EXH VOL	DRY EXH VOL

PERFORMANCE DATA[EM4718]

October 7, 2024

WITH FAN			FLOW RATE	WET EXH GAS VOL FLOW RATE	MASS FLOW RATE	MASS FLOW RATE	FLOW RATE (32 DEG F AND 29.98 IN HG)	FLOW RATE (32 DEG F AND 29.98 IN HG)
EKW	%	BHP	CFM	CFM	LB/HR	LB/HR	FT3/MIN	FT3/MIN
3,000.0	100	4,393	8,689.8	22,803.0	37,643.0	39,120.1	8,234.2	7,508.7
2,700.0	90	3,976	8,100.6	21,092.5	34,770.1	36,119.8	7,602.7	6,941.1
2,400.0	80	3,557	7,618.2	19,872.8	32,572.6	33,813.7	7,116.5	6,503.0
2,250.0	75	3,347	7,434.9	19,421.7	31,724.7	32,917.4	6,934.8	6,343.9
2,100.0	70	3,137	7,140.4	18,713.3	30,413.9	31,551.3	6,641.0	6,078.0
1,800.0	60	2,716	6,316.6	16,737.0	26,667.4	27,671.7	5,823.4	5,324.6
1,500.0	50	2,294	5,698.5	15,244.3	23,951.1	24,844.2	5,229.6	4,787.6
1,200.0	40	1,872	4,748.1	12,895.5	19,832.8	20,593.5	4,335.7	3,959.7
900.0	30	1,449	3,421.3	9,198.1	14,210.7	14,791.0	3,132.4	2,847.7
750.0	25	1,236	2,813.2	7,143.6	11,655.6	12,126.4	2,554.4	2,323.7
600.0	20	1,022	2,588.4	6,214.7	10,705.5	11,105.8	2,337.3	2,139.1
300.0	10	590	2,189.5	4,545.1	9,126.5	9,387.3	1,974.8	1,838.2

Heat Rejection Data

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	REJECTION TO JACKET WATER	REJECTION TO ATMOSPHERE	REJECTION TO EXH	EXHAUST RECOVERY TO 350F	FROM OIL COOLER	FROM AFTERCOOLER	WORK ENERGY	LOW HEAT VALUE ENERGY	HIGH HEAT VALUE ENERGY
EKW	%	BHP	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN
3,000.0	100	4,393	52,144	8,993	175,769	91,810	23,854	53,683	186,315	447,861	477,084
2,700.0	90	3,976	48,348	8,755	162,671	85,129	21,755	46,560	168,590	408,442	435,094
2,400.0	80	3,557	45,188	8,663	152,310	80,972	19,852	39,923	150,835	372,717	397,037
2,250.0	75	3,347	43,721	8,625	147,003	79,360	18,929	37,161	141,942	355,388	378,578
2,100.0	70	3,137	42,430	8,593	141,837	77,229	18,002	34,024	133,031	337,986	360,040
1,800.0	60	2,716	40,153	8,591	130,286	71,150	16,087	27,442	115,184	302,034	321,742
1,500.0	50	2,294	37,137	8,662	118,761	66,069	14,137	20,821	97,288	265,422	282,742

Emissions Data

PARTICULATE EMISSIONS WERE NOT MEASURED FOR THIS RATING. PUBLISHED PM DATA IS ESTIMATED FROM MEASURED SMOKE METER DATA.

DIESEL

RATED SPEED NOMINAL DATA: 1800 RPM

GENSET POWER WITH FAN		EKW	3,000.0	2,250.0	1,500.0	750.0	300.0
PERCENT LOAD		%	100	75	50	25	10
ENGINE POWER		BHP	4,393	3,347	2,294	1,236	590
TOTAL NOX (AS NO2)		G/HR	24,589	12,160	6,934	8,735	6,302
TOTAL CO		G/HR	2,899	2,470	1,673	2,077	1,535
TOTAL HC		G/HR	190	142	118	84	160
TOTAL CO2		KG/HR	2,097	1,691	1,268	673	371
PART MATTER		G/HR	200.9	249.8	229.1	153.7	16.6
TOTAL NOX (AS NO2)	(CORR 5% O2)	MG/NM3	2,610.4	1,597.8	1,214.4	2,955.6	3,548.5
TOTAL CO	(CORR 5% O2)	MG/NM3	305.9	319.2	290.7	686.3	917.4
TOTAL HC	(CORR 5% O2)	MG/NM3	17.4	16.0	17.7	24.0	84.5
PART MATTER	(CORR 5% O2)	MG/NM3	17.6	27.2	33.4	41.1	11.3
TOTAL NOX (AS NO2)	(CORR 15% O2)	MG/NM3	968.6	592.9	450.6	1,096.7	1,316.7
TOTAL CO	(CORR 15% O2)	MG/NM3	113.5	118.5	107.9	254.7	340.4
TOTAL HC	(CORR 15% O2)	MG/NM3	6.4	5.9	6.6	8.9	31.4
PART MATTER	(CORR 15% O2)	MG/NM3	6.5	10.1	12.4	15.3	4.2
TOTAL NOX (AS NO2)	(CORR 5% O2)	PPM	1,272	778	592	1,440	1,728
TOTAL CO	(CORR 5% O2)	PPM	245	255	233	549	734
TOTAL HC	(CORR 5% O2)	PPM	32	30	33	45	158
TOTAL NOX (AS NO2)	(CORR 15% O2)	PPM	472	289	219	534	641
TOTAL CO	(CORR 15% O2)	PPM	91	95	86	204	272
TOTAL HC	(CORR 15% O2)	PPM	12	11	12	17	59
TOTAL NOX (AS NO2)		G/HP-HR	5.63	3.65	3.03	7.07	10.68
TOTAL CO		G/HP-HR	0.66	0.74	0.73	1.68	2.60
TOTAL HC		G/HP-HR	0.04	0.04	0.05	0.07	0.27

PERFORMANCE DATA[EM4718]

PART MATTER	G/HP-HR	0.05	0.07	0.10	0.12	0.03
TOTAL NOX (AS NO2)	G/KW-HR	7.66	4.96	4.12	9.61	14.53
TOTAL CO	G/KW-HR	0.90	1.01	0.99	2.29	3.54
TOTAL HC	G/KW-HR	0.06	0.06	0.07	0.09	0.37
PART MATTER	G/KW-HR	0.06	0.10	0.14	0.17	0.04
TOTAL NOX (AS NO2)	LB/HR	54.21	26.81	15.29	19.26	13.89
TOTAL CO	LB/HR	6.39	5.44	3.69	4.58	3.38
TOTAL HC	LB/HR	0.42	0.31	0.26	0.18	0.35
TOTAL CO2	LB/HR	4,623	3,728	2,794	1,484	819
PART MATTER	LB/HR	0.44	0.55	0.51	0.34	0.04
OXYGEN IN EXH	%	8.9	9.4	9.5	8.5	12.0
DRY SMOKE OPACITY	%	2.0	2.6	2.9	4.3	0.2
BOSCH SMOKE NUMBER		0.86	0.96	1.02	1.16	0.70

RATED SPEED POTENTIAL SITE VARIATION: 1800 RPM

GENSET POWER WITH FAN		**EKW**	**3,000.0**	**2,250.0**	**1,500.0**	**750.0**	**300.0**
PERCENT LOAD		**%**	**100**	**75**	**50**	**25**	**10**
ENGINE POWER		**BHP**	**4,393**	**3,347**	**2,294**	**1,236**	**590**
TOTAL NOX (AS NO2)		G/HR	29,507	14,592	8,321	10,482	7,562
TOTAL CO		G/HR	5,219	4,446	3,012	3,738	2,763
TOTAL HC		G/HR	253	188	157	111	213
PART MATTER		G/HR	281.2	349.8	320.7	215.1	23.3
TOTAL NOX (AS NO2)	(CORR 5% O2)	MG/NM3	3,132.5	1,917.4	1,457.3	3,546.7	4,258.2
TOTAL CO	(CORR 5% O2)	MG/NM3	550.6	574.6	523.3	1,235.4	1,651.3
TOTAL HC	(CORR 5% O2)	MG/NM3	23.1	21.3	23.6	31.9	112.4
PART MATTER	(CORR 5% O2)	MG/NM3	24.6	38.1	46.7	57.6	15.8
TOTAL NOX (AS NO2)	(CORR 15% O2)	MG/NM3	1,162.4	711.5	540.8	1,316.1	1,580.1
TOTAL CO	(CORR 15% O2)	MG/NM3	204.3	213.2	194.2	458.4	612.8
TOTAL HC	(CORR 15% O2)	MG/NM3	8.6	7.9	8.8	11.8	41.7
PART MATTER	(CORR 15% O2)	MG/NM3	9.1	14.1	17.3	21.4	5.9
TOTAL NOX (AS NO2)	(CORR 5% O2)	PPM	1,526	934	710	1,728	2,074
TOTAL CO	(CORR 5% O2)	PPM	441	460	419	988	1,321
TOTAL HC	(CORR 5% O2)	PPM	43	40	44	60	210
TOTAL NOX (AS NO2)	(CORR 15% O2)	PPM	566	347	263	641	770
TOTAL CO	(CORR 15% O2)	PPM	163	171	155	367	490
TOTAL HC	(CORR 15% O2)	PPM	16	15	16	22	78
TOTAL NOX (AS NO2)		G/HP-HR	6.76	4.38	3.64	8.49	12.82
TOTAL CO		G/HP-HR	1.20	1.33	1.32	3.03	4.68
TOTAL HC		G/HP-HR	0.06	0.06	0.07	0.09	0.36
PART MATTER		G/HP-HR	0.06	0.10	0.14	0.17	0.04
TOTAL NOX (AS NO2)		G/KW-HR	9.19	5.95	4.94	11.54	17.43
TOTAL CO		G/KW-HR	1.63	1.81	1.79	4.11	6.37
TOTAL HC		G/KW-HR	0.08	0.08	0.09	0.12	0.49
PART MATTER		G/KW-HR	0.09	0.14	0.19	0.24	0.05
TOTAL NOX (AS NO2)		LB/HR	65.05	32.17	18.34	23.11	16.67
TOTAL CO		LB/HR	11.51	9.80	6.64	8.24	6.09
TOTAL HC		LB/HR	0.56	0.42	0.35	0.25	0.47
PART MATTER		LB/HR	0.62	0.77	0.71	0.47	0.05

Regulatory Information

EPA EMERGENCY STATIONARY		**2011 - ----**		
GASEOUS EMISSIONS DATA MEASUREMENTS PROVIDED TO THE EPA ARE CONSISTENT WITH THOSE DESCRIBED IN EPA 40 CFR PART 60 SUBPART IIII AND ISO 8178 FOR MEASURING HC, CO, PM, AND NOX. THE "MAX LIMITS" SHOWN BELOW ARE WEIGHTED CYCLE AVERAGES AND ARE IN COMPLIANCE WITH THE EMERGENCY STATIONARY REGULATIONS.				
Locality	**Agency**	**Regulation**	**Tier/Stage**	**Max Limits - G/BKW - HR**
U.S. (INCL CALIF)	EPA	STATIONARY	EMERGENCY STATIONARY	CO: 3.5 NOx + HC: 6.4 PM: 0.20

Altitude Derate Data

A BLANK IN THE ALTITUDE DERATE TABLE SIGNIFIES THAT NO RATING IS AVAILABLE AT THAT SPECIFIED ALTITUDE AND AMBIENT TEMPERATURE.

THE TEMPERATURES LISTED IN THE CHART ARE AMBIENT TEMPERATURES. THE FOLLOWING DERATE CHART WAS CALCULATED ASSUMING A 5 DEG C RISE IN AIR TEMPERATURE BETWEEN AMBIENT AND THE TURBOCHARGER INLET.

PERFORMANCE DATA[EM4718]

October 7, 2024

STANDARD

ALTITUDE CORRECTED POWER CAPABILITY (BHP)

AMBIENT OPERATING TEMP (F)	30	40	50	60	70	80	90	100	110	120	130	140	NORMAL
ALTITUDE (FT)													
0	4,393	4,393	4,393	4,393	4,393	4,393	4,393	4,393	4,393	4,393	1,927		4,393
1,000	4,393	4,393	4,393	4,393	4,393	4,393	4,393	4,393	4,393	4,393	1,860		4,393
2,000	4,393	4,393	4,393	4,393	4,393	4,393	4,393	4,393	4,393	4,304			4,393
3,000	4,393	4,393	4,393	4,393	4,393	4,393	4,393	4,393	4,313	2,786			4,393
4,000	4,393	4,393	4,393	4,393	4,393	4,393	4,393	4,355	4,037	1,625			4,393
5,000	4,393	4,393	4,393	4,393	4,393	4,383	4,334	4,221	3,517				4,393
6,000	4,393	4,393	4,393	4,356	4,307	4,246	4,183	4,064	2,023				4,393
7,000	4,393	4,380	4,306	4,226	4,160	4,072	3,968	3,778					4,378
8,000	4,347	4,247	4,153	4,051	3,974	3,836	3,573	3,093					4,274
9,000	4,203	4,068	3,954	3,831	3,738	3,550	3,208	2,621					4,152
10,000	3,990	3,831	3,691	3,541	3,442	3,250	2,968	2,196					3,986
11,000	3,755	3,560	3,390	3,239	3,162	3,018	2,762	1,678					3,815
12,000	3,413	3,252	3,123	3,015	2,940	2,762	2,300	1,104					3,539
13,000	3,070	2,977	2,897	2,829	2,750	2,477	1,702						3,198
14,000	2,754	2,728	2,691	2,660	2,553	2,240							2,841
15,000	2,454	2,461	2,285	2,143	2,057	1,713							2,523

Cross Reference

Test Spec	Setting	Engine Arrangement	Engineering Model	Engineering Model Version	Start Effective Serial Number	End Effective Serial Number
5643812	LL2329	5577462	PG296	-	ZNL00001	

Supplementary Data

Type	Classification	Performance Number
ALTITUDE DATA	HIGH RESOLUTION	EM5585

Performance Parameter Reference

Parameters Reference:DM9600-15

PERFORMANCE DEFINITIONS

PERFORMANCE DEFINITIONS DM9600
APPLICATION:
Engine performance tolerance values below are representative of a typical production engine tested in a calibrated dynamometer test cell at SAE J1995 standard reference conditions. Caterpillar maintains ISO9001:2000 certified quality management systems for engine test Facilities to assure accurate calibration of test equipment. Engine test data is corrected in accordance with SAE J1995. Additional reference material SAE J1228, J1349, ISO 8665, 3046-1:2002E, 3046-3:1989, 1585, 2534, 2288, and 9249 may apply in part or are similar to SAE J1995. Special engine rating request (SERR) test data shall be noted.
PERFORMANCE PARAMETER TOLERANCE FACTORS:
Power +/- 3%
Torque +/- 3%
Exhaust stack temperature +/- 8%
Inlet airflow +/- 5%
Intake manifold pressure-gage +/- 10%
Exhaust flow +/- 6%
Specific fuel consumption +/- 3%
Specific fuel consumption (C7-C18) +/- 4%
Fuel rate +/- 5%
Specific DEF consumption +/- 3%
DEF rate +/- 5%

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Heat rejection +/- 5%
Heat rejection exhaust only +/- 10%
Heat rejection CEM only +/- 10%
Heat Rejection values based on using treated water.
Torque is included for truck and industrial applications, do not use for Gen Set or steady state applications.
On C7 - C18 engines, at speeds of 1100 RPM and under these values are provided for reference only, and may not meet the tolerance listed.
On 3500 and C175 engines, at speeds below Peak Torque these values are provided for reference only, and may not meet the tolerance listed.
These values do not apply to C280/3600. For these models, see the tolerances listed below.
C280/3600 HEAT REJECTION TOLERANCE FACTORS:
Heat rejection +/- 10%
Heat rejection to Atmosphere +/- 50%
Heat rejection to Lube Oil +/- 20%
Heat rejection to Aftercooler +/- 5%
TEST CELL TRANSDUCER TOLERANCE FACTORS:
Torque +/- 0.5%
Speed +/- 0.2%
Fuel flow +/- 1.0%
Temperature +/- 2.0 C degrees
Intake manifold pressure +/- 0.1 kPa
OBSERVED ENGINE PERFORMANCE IS CORRECTED TO SAE J1995 REFERENCE
AIR AND FUEL CONDITIONS.
REFERENCE ATMOSPHERIC INLET AIR
FOR 3500 ENGINES AND SMALLER
SAE J1228 AUG2002 for marine engines, and J1995 JAN2014 for other engines, reference atmospheric pressure is 100 KPA (29.61 in hg), and standard temperature is 25deg C (77 deg F) at 30% relative humidity at the stated aftercooler water temp, or inlet manifold temp.
FOR 3600 ENGINES
Engine rating obtained and presented in accordance with ISO 3046/1 and SAE J1995 JANJAN2014 reference atmospheric pressure is 100 KPA (29.61 in hg), and standard temperature is 25deg C (77 deg F) at 30% relative humidity and 150M altitude at the stated aftercooler water temperature.
MEASUREMENT LOCATION FOR INLET AIR TEMPERATURE
Location for air temperature measurement air cleaner inlet at stabilized operating conditions.
REFERENCE EXHAUST STACK DIAMETER
The Reference Exhaust Stack Diameter published with this dataset is only used for the calculation of Smoke Opacity values displayed in this dataset. This value does not necessarily represent the actual stack diameter of the engine due to the variety of exhaust stack adapter options available. Consult the price list, engine order or general dimension drawings for the actual stack diameter size ordered or options available.
REFERENCE FUEL
DIESEL
Reference fuel is #2 distillate diesel with a 35API gravity;
A lower heating value is 42,780 KJ/KG (18,390 BTU/LB) when used at 15 deg C (59 deg F), where the density is 850 G/Liter (7.0936 Lbs/Gal).
GAS
Reference natural gas fuel has a lower heating value of 33.74 KJ/L (905 BTU/CU Ft). Low BTU ratings are based on 18.64 KJ/L (500 BTU/CU FT) lower heating value gas. Propane ratings are based on 87.56 KJ/L (2350 BTU/CU Ft) lower heating value gas.
ENGINE POWER (NET) IS THE CORRECTED FLYWHEEL POWER (GROSS) LESS
EXTERNAL AUXILIARY LOAD
Engine corrected gross output includes the power required to drive standard equipment; lube oil, scavenge lube oil, fuel transfer, common rail fuel, separate circuit aftercooler and jacket water pumps. Engine net power available for the external (flywheel) load is calculated by subtracting the sum of auxiliary load from the corrected gross flywheel out put power. Typical auxiliary loads are radiator cooling fans, hydraulic pumps, air compressors and battery charging alternators. For Tier 4 ratings additional Parasitic losses would also include Intake, and Exhaust Restrictions.
ALTITUDE CAPABILITY
Altitude capability is the maximum altitude above sea level at standard temperature and standard pressure at which the engine could develop full rated output power on the current performance data set.
Standard temperature values versus altitude could be seen on TM2001.
When viewing the altitude capability chart the ambient temperature is the inlet air temp at the compressor inlet.
Engines with ADEM MEUI and HEUI fuel systems operating at conditions above the defined altitude capability derate for atmospheric pressure and temperature conditions outside the values

defined, see TM2001.
Mechanical governor controlled unit injector engines require a setting change for operation at conditions above the altitude defined on the engine performance sheet. See your Caterpillar technical representative for non standard ratings.
REGULATIONS AND PRODUCT COMPLIANCE
TMI Emissions information is presented at 'nominal' and 'Potential Site Variation' values for standard ratings. No tolerances are applied to the emissions data. These values are subject to change at any time. The controlling federal and local emission requirements need to be verified by your Caterpillar technical representative.
Customer's may have special emission site requirements that need to be verified by the Caterpillar Product Group engineer.
EMISSION CYCLE LIMITS:
Cycle emissions Max Limits apply to cycle-weighted averages only. Emissions at individual load points may exceed the cycle-weighted limit.
WET & DRY EXHAUST/EMISSIONS DESCRIPTION:
Wet - Total exhaust flow or concentration of total exhaust flow
Dry - Total exhaust flow minus water vapor or concentration of exhaust flow with water vapor excluded
EMISSIONS DEFINITIONS:
Emissions : DM1176
EMISSION CYCLE DEFINITIONS
1. For constant-speed marine engines for ship main propulsion, including,diesel-electric drive, test cycle E2 shall be applied, for controllable-pitch propeller sets
test cycle E2 shall be applied.
2. For propeller-law-operated main and propeller-law-operated auxiliary engines the test cycle E3 shall be applied.
3. For constant-speed auxiliary engines test cycle D2 shall be applied.
4. For variable-speed, variable-load auxiliary engines, not included above, test cycle C1 shall be applied.
HEAT REJECTION DEFINITIONS:
Diesel Circuit Type and HHV Balance : DM9500
HIGH DISPLACEMENT (HD) DEFINITIONS:
3500: EM1500
RATING DEFINITIONS:
Agriculture : TM6008
Fire Pump : TM6009
Generator Set : TM6035
Generator (Gas) : TM6041
Industrial Diesel : TM6010
Industrial (Gas) : TM6040
Irrigation : TM5749
Locomotive : TM6037
Marine Auxiliary : TM6036
Marine Prop (Except 3600) : TM5747
Marine Prop (3600 only) : TM5748
MSHA : TM6042
Oil Field (Petroleum) : TM6011
Off-Highway Truck : TM6039
On-Highway Truck : TM6038
SOUND DEFINITIONS:
Sound Power : DM8702
Sound Pressure : TM7080
Date Released : 03/12/24