MODELING PROTOCOL AND RISK ASSESSMENT WORK PLAN

Cleaner Air Oregon

Aligned Data Centers PDX01

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

1. EXECUTIVE SUMMARY

Aligned Data Centers (Aligned) is proposing to construct and operate a new data center campus, PDX01, in Washington County, Oregon. Aligned will additionally submit an air contaminant discharge permit (ACDP) application to the Oregon Department of Environmental Quality (Oregon DEQ) in support of this document. This modeling protocol and risk assessment work plan for a Level 3 Risk Assessment under the Cleaner Air Oregon (CAO) program is being submitted in accordance with OAR 340-245-0210 for Oregon DEQ approval. Aligned has included the appropriate emission inventory information required under OAR 340-245-0040 as part of this submission on the DEQ specific forms as part of Appendix A.

A summary of the contents in this document is provided as follows:

- Section 2 of this document describes the modeling methodology, including model selection, source characterization and selection of meteorological data.
- Section 3 details toxic emission calculation methodology.
- Section 4 includes the risk determination methodology for the CAO risk assessment work plan.

2. MODELING METHODOLOGY

2.1 Model Overview

2.1.1 Dispersion Model Selection

The most recent American Meteorological Society/Environmental Protection Agency Regulatory Model Improvement Committee modeling system, AERMOD version 22112 with Plume Rise Model Enhancements (PRIME) advanced downwash algorithms, is proposed to be used as the dispersion model in the air quality analysis.

2.1.2 Coordinate System

The location of the emission sources, structures, and receptors for this modeling analysis will be represented in the Universal Transverse Mercator (UTM) coordinate system using the North American Datum of 1983 (NAD 83) coordinate system. The UTM grid divides the world into coordinates that are measured in north meters (measured from the equator) and east meters (measured from the central meridian of a particular zone, which is set at 500 km). UTM coordinates for this analysis are based on UTM Zone 10. The location of the proposed facility is approximately 5,044,498 meters Northing and 503,960 meters Easting in UTM Zone 10.

2.1.3 Terrain Elevations

Terrain elevations for receptors will be determined using National Elevation Dataset (NED) supplied by the United States Geological Survey (USGS), where facility grading does not apply. [1] The NED is a seamless dataset with the best available raster elevation data of the contiguous United States. NED data retrieved for this model have a grid spacing of 1/3 arc-second or 10 m. The AERMOD preprocessor, AERMAP version 18081, will be used to compute model object elevations from the NED grid spacing. AERMAP also calculates hill height data for all receptors. The base elevation for buildings and sources will be determined based on facility grading, which are provided in the figures in Appendix B.

2.2 Source Characterization

2.2.1 Facility Description

The PDX01 data center will house computer systems and associated components, such as telecommunications and data storage systems. The facility will include data communications equipment, security systems, and diesel-fueled backup power generators. A copy of the facility site layout is provided in Appendix B. The principal use of the facility will be the storage, management, and dissemination of electronic data.

Processes that will emit air pollutants include diesel-fueled emergency backup generators that will be used in the event of a loss of publicly supplied power. Emergency backup power is the only purpose for the generators.

[1] NED data retrieved from the National Map website at https://viewer.nationalmap.gov/basic/.

The generators will fire No. 2 ultra-low sulfur diesel (ULSD) fuel, resulting in emissions of particulate matter ($PM/PM_{10}/PM_{2.5}$), sulfur dioxide (SO_2), nitrogen oxides (NO_X), carbon monoxide (CO), volatile organic compounds (VOCs), greenhouse gases (GHGs), hazardous air pollutants (HAPs), and toxic air contaminants (TACs).

The generator engines are subject to the federal New Source Performance Standards (NSPS) for Compression Ignition Internal Combustion Engines (40 CFR 60 Subpart IIII) and are all certified to Tier 2 standards. As such, each unit is limited to 100 hours per year of operation for non-emergency usage, inclusive of testing and maintenance.

2.2.2 Source Location Maps and Plots

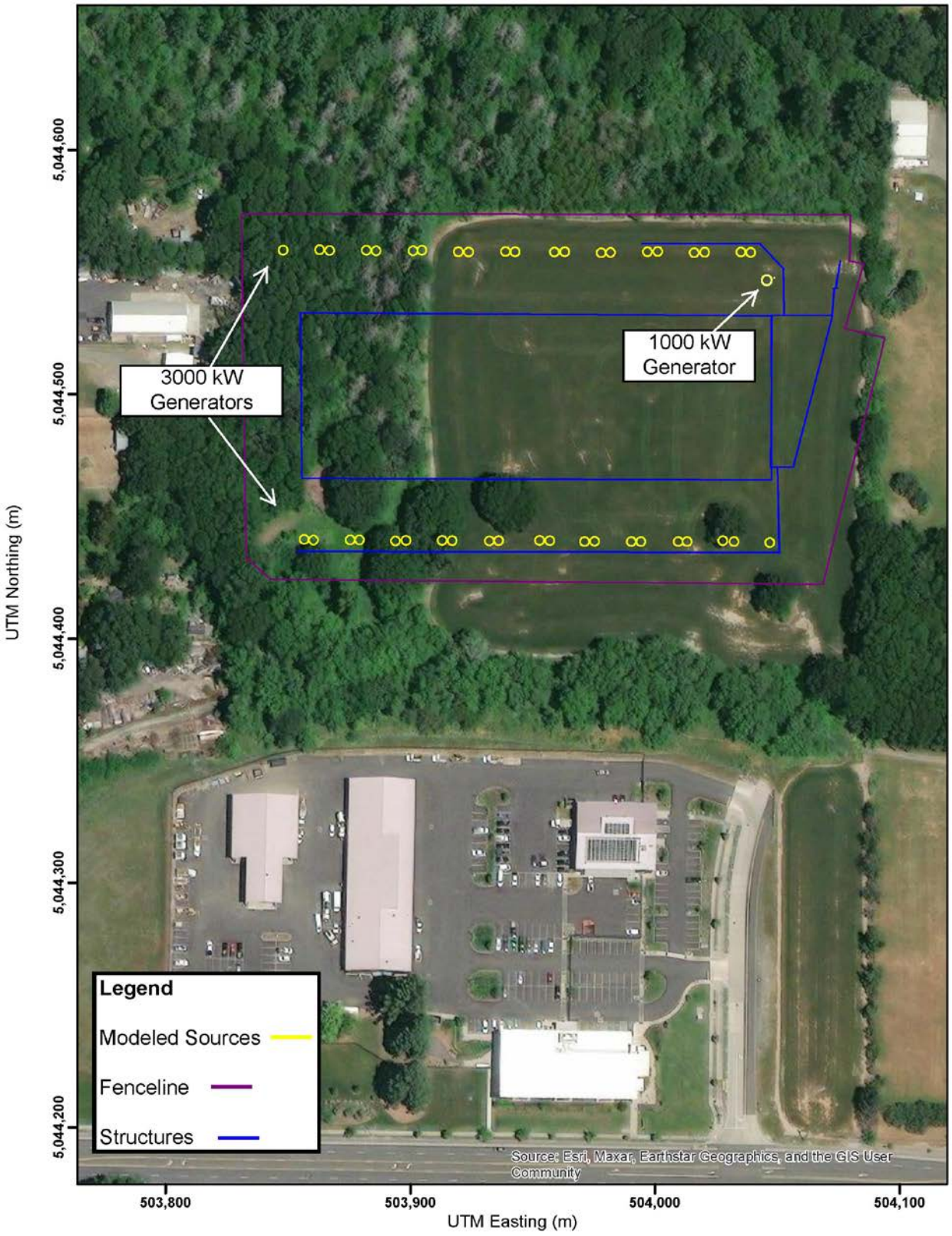
The emission units at the facility are:

- 42 Caterpillar C175-16 or 3516E 3,000 kilowatt (kW) generators, and
- 1 Caterpillar C32 1,000 kW generator.

Two options are listed for the 3,000 kW Caterpillar generator. At this time, it is unknown which generator type will be available, therefore Aligned is requesting the flexibility to install either generator. These 3,000 kW generators will be located to the north and south of the central data center and admin buildings. The single, 1,000 kW generator will be to the northeast. Elevations for the sources and buildings are set to the graded elevation of the facility, with fence line and receptor elevations determined by AERMAP.

A facility layout is provided in Appendix B. A map showing the location of the emission sources is included in Figure 2-1.

Figure 2-1. Model Objects



2.2.3 Stack Dispersion Parameters

The stack parameters used to model emissions are obtained from manufacturer specifications. The 3,000 kW generators engine exhaust is exiting the piping less than a foot above a plenum stack. The engine's radiator exhaust into this plenum. Due to the high volume and lower temperature of the radiator and relative plenum exhaust point to the engine exhaust point, a combination of exhaust flow and temperature is warranted. The flowrates are additive, and the combined temperature is determined using the sensible heat transfer equation.[2]

Sensible Heat Transfer Equation:

$$Q\left(\frac{Btu}{hr}\right) = m\ \left(\frac{lb}{hr}\right)\ x\ Cp\left(\frac{Btu}{lb°F}\right)\ x\ \Delta T\ (°F),$$

$$Q\left(\frac{Btu}{hr}\right) = CFM\left(\frac{ft^3}{min}\right)\ x\ 0.075\left(\frac{lb}{ft^3}\right)\ x\ 60\left(\frac{min}{hr}\right)\ x\ 0.24\left(\frac{Btu}{lb°F}\right)\ x\ (T_{out} - T_{in})\ (°F),$$

$$T_{Rad,out}\ (°F) = \frac{Q_{rad\ heat\ load}\left(\frac{Btu}{hr}\right)}{1.08\left(\frac{Btu}{°F}\right)\left(\frac{min}{hr}\right)\left(\frac{1}{ft^3}\right)x\ CFM\left(\frac{ft^3}{min}\right)} +\ T_{Ambient,in}\ (°F),$$

$$T(K) = \left(\ \frac{(\ T(°F) - 32\ )\ \text{x}\ 5}{9}\ \right) + 273.15,$$

$$T_{combined}\ (K) = \frac{T_{Rad,out}\ (K)\ x\ CFM_{Rad,out}\left(\frac{ft^3}{min}\right) +\ T_{Eng,out}\ (K)\ x\ CFM_{Eng,out}\left(\frac{ft^3}{min}\right)}{CFM_{Rad,out}\left(\frac{ft^3}{min}\right) +\ CFM_{Eng,out}\left(\frac{ft^3}{min}\right)}$$

Where:

- Q = heat transferred (Btu/hr),
- m = overall mass flow rate of air (lb/min),
- Cp = the specific heat of air (0.24 Btu/lb°F),
- CFM = air flow (ft^3/min),
- T = temperature (°F), and
- Density of air = 0.075 (lb/ft^3).

The heat transferred is the summation of the heat loads used to calculate the radiator outlet temperature. The radiator inlet temperature (ambient) is calculated using the average temperature of meteorological data provided by Oregon DEQ for Hillsboro Airport for 2017-2021 (284.8 K). Table 2-1 shows the outlet temperature and flowrate for the 3,000 kW generator's engine and radiator separately, and then combined.

[2] The C175-16 units use a radiator from IEA, as opposed to the radiator specified in the Caterpillar manufacturer's specification sheet. The 3516E units use the radiator detailed in the manufacturer's specification sheet.

Table 2-1. Summary of Radiator and Engine Parameters

Generator	Outlet Temp, Radiator (K)	Outlet Temp, Engine (K)	Flowrate, Radiator (ft^3/min)	Flowrate, Engine (ft^3/min)	Outlet Temp, Combined (K)	Flowrate, Combined (ft^3/min)
CAT C175-16	315.8	750.9	114,645	25,260	395	140,265
CAT 3516E	316.0	756.4	136,844	22,803	379	159,647

There will be no variation in stack height or diameter between the 3,000 kW generator types. The physical parameters for the stack (height and diameter) will reflect the plenum construction. The visual screen height is level to the plenum height for the 3,000 kW generators. The 1,000 kW generator will be modeled assuming the reference stack diameter provided in the manufacturer's specification sheet. This is not the expected "as-built" diameter, but other information is not available.

All stack parameters will be evaluated at 100% load as a worse case representation. Modeled stack orientation, diameter, height, temperature, and flowrate are provided in Appendix E.

Table 2-2. Summary of Exhaust Stack Parameters

Sources		Stack Configuration	Model Source Type	Stack Height (m)	Stack Diameter (m)	Temperature (K)	Velocity (m/s)
GEN01 – GEN42	CAT C175-16 3,000 kW	Vertical/No Obstruction	POINT	6.23	3.65	395.26	6.33
GEN01 – GEN42	CAT C3516E 3,000 kW	Vertical/No Obstruction	POINT	6.23	3.65	378.95	7.21
GEN43	CAT C32 1,000 kW	Vertical/No Obstruction	POINT	3.23	0.20	751.21	118.10

Manufacturer's specification sheets are included in Appendix B. Detailed model parameters are included in Appendix E.

2.2.4 Downwash

Emissions from each source will be evaluated in terms of their proximity to nearby structures. The purpose of this evaluation is to determine if stack discharges might become caught in the turbulent wakes of these structures. Wind blowing around a building creates zones of turbulence that are greater than if the buildings were absent. The concepts and procedures expressed in the Guideline for Determination of Good Engineering Practice Stack Height (Technical Support Document for the Stack Height Regulations)[3] and other related documents will be applied to all structures at the proposed PDX01 facility. The Building Profile Input Program (BPIP) Version 04274 will be used to calculate the downwash values for each point source.

Buildings located within the facility's boundary will be included in this evaluation. Additionally, the facility will have several solid walls surrounding part of the facility that are expected to be 1.5 inches thick. There are no nearby structures outside of the ambient air boundary that are expected to impact emissions. The building parameters are provided in Table 2-3 and are shown in Figure 2-1.

[3] https://www.epa.gov/sites/default/files/2020-09/documents/gep.pdf

Table 2-3. Building Parameters

Building ID	UTM Easting (m)	UTM Northing (m)	Elevation (m)	Height (m)
DC	503,855.1	5,044,533.2	61.26	23.93
AD	504,047.9	5,044,532.3	61.26	15.24
VIS1	503,994.7	5,044,561.6	61.26	6.23
VIS2	504,042.8	5,044,561.7	61.26	6.23
VIS3	504,052.4	5,044,551.2	61.26	6.23
VIS4	504,072.3	5,044,532.1	61.26	6.23
VIS5	504,072.8	5,044,543.1	61.26	6.23
VIS6	504,075.8	5,044,554.6	61.26	6.23
VIS7	504,050.1	5,044,470.1	61.26	6.23
VIS8	503,853.9	5,044,435.7	61.26	6.23

2.2.5 Operating Scenarios

Testing and maintenance on the emergency generators are necessary to ensure reliable availability of backup power in the event of loss of publicly supplied power. Non-emergency operation of the emergency generators is limited by federal regulations to 100 hours/year/generator.[4] While this is a limit for all emergency generators in the nation, most emergency generators operate far less on an annual basis. Oregon DEQ has specified non-emergency operations must be included in compliance demonstration with CAO modeling requirements.

Typically, backup generators at this facility will complete monthly testing at low or no load that lasts approximately 15 – 30 minutes for the generators to get to temperature. Additionally, loaded testing is completed annually to ensure the generators will automatically start, and support load up to full capacity. However, these loaded tests will generally run around 80% load and will be scheduled for 1-2 hours, with an additional hour run for UPS maintenance at 60% load. No two generators are expected to run at the same time in a non-emergency scenario, with the exception of during commissioning. All operations are expected to occur 8 am – 5 pm. To account for this, the AERMOD input file uses variable emission factors to show continuous operation 8 am – 5 pm and no operation outside of these hours.

The proposed modeled scenarios for CAO compliance are intended to support Aligned typical operations while including a high level of conservatism to retain fuel usage flexibility and reduce recordkeeping burdens.

2.2.6 Urban/Rural Determination

Population density around the facility was calculated to determine whether the site location should be classified as urban or rural. This classification is significant due to the impacts urban heat island can have on dispersion characteristics. Mislabeling an urban source as rural would lead to overly conservative concentration estimations by disregarding night to daytime boundary layer impacts.

[4] 40 CFR 60, Subpart IIII; 40 CFR 63 Subpart ZZZZ

In accordance with 40 CFR Part 51 Appendix W, Section 7.2.1.1(b)(ii), land use is classified based on a population per square kilometer within a 3-kilometer radius circle around the facility center. If the population density is greater than 750 people per square kilometer, the area is considered urban.

According to US Census Data through the Environmental Protection Agency's (EPA's) Environmental Justice Screening tool [5], approximately 14,206 people live within a 3 km radius of the facility, making the population density approximately 2,000 people per square kilometer. Therefore, AERMODs Urban Option has been selected.

In the EPA's AERMOD Implementation Guide[6], it is advised to select the population input based on the extent of the urban area that will contribute to the heat island plume, as well as the extent that will be impacted by the project. Because the domain has been modeled at 10 km, the population within a 10 km radius, 237,036, will be utilized for the Urban option. Appendix C includes the Environmental Justice Screening tool outputs used for this determination.

2.3 Meteorological Data

This section discusses the representative meteorological data that will be used for this risk assessment. Five years of surface meteorological data, from 2017 to 2021, are taken from the nearest airport, Hillsboro Airport (Station ID: KHIO; WBAN ID: 94261). The upper air data is taken from the closest upper air station in Salem, Oregon (Station ID: KHIO; WBAN ID: 24232) for the corresponding period. This data was provided by Oregon DEQ on February 3rd, 2023 and has been approved for use in this assessment. The meteorological data is processed using AERMET version 22112 using regulatory default options following EPA's guidance on AERSURFACE and AERMET.

The proposed facility's elevation is approximately 62 m, while the Hillsboro Airport's elevation is 60 m. Additionally, the airport is less than 1 km away from the facility.

Because of the site's proximity to the airport, the similar terrain between the two sites, and the recency of the meteorological dataset, the selected surface station dataset is considered representative for the proposed facility.

[5] https://ejscreen.epa.gov/mapper/

[6] https://gaftp.epa.gov/Air/aqmg/SCRAM/models/preferred/aermod/aermod_implementation_guide.pdf

2.4 Modeling Domain and Receptors

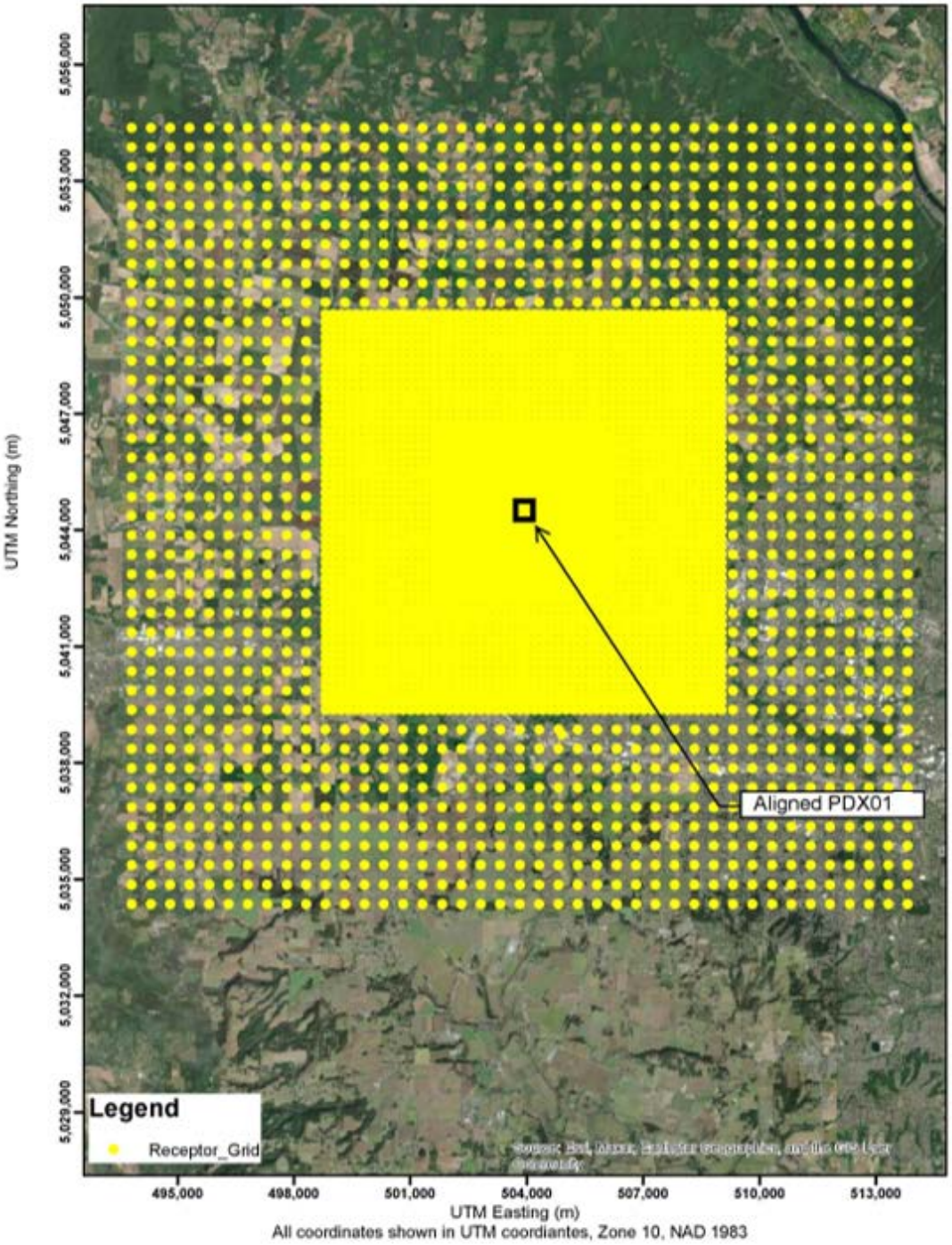
Five square Cartesian receptor grids will be used in the analysis, in alignment with Oregon DEQ's *Recommended Procedures for Air Quality Dispersion Modeling*.

- A grid containing 25-meter spaced receptors and extending 350 meters from the facility center (at least 200 meters from the facility boundary).
- A grid containing 50-meter spaced receptors extending from 350 meters to 1,150 meters from the facility center.
- A grid containing 100-meter spaced receptors extending from 1,150 meters to 2,150 meters from the facility center.
- A grid containing 200-meter spaced receptors extending from 2,150 meters to 5,150 meters from the facility center.
- A grid containing 500-meter spaced receptors extending from 5,350 meters to 10,150 meters from the facility center.

In addition, 25-meter spaced receptors will be included along the property fence line. All receptors will be placed at the ground level.

Additional discrete receptors representing child exposure locations, as discussed in Section 4.1, will also be included for compliance with CAO requirements. All gridded modeled receptors are shown in Figure 2-3.

Figure 2-2. Modeled Receptors



3. TOXIC EMISSION CALCULATIONS

Emission factors for generators are specified in Oregon DEQ guidance under Combustion Emission Factor Search Tool for Tier 2 diesel internal combustion engines. The particulate matter emission factor included in the manufacturer's specifications for these units uses Method 1065 to determine PM emissions and includes a subset of emissions as measured by Oregon Method 5. Oregon DEQ requires that Diesel Particulate Matter (DPM) emissions be verified against Oregon Method 5. Oregon DEQ has suggested that in the absence of specific stationary source stack test information, using a factor of particulate matter plus hydrocarbon from the manufacturer's specification sheet is the best available information. This method is expected to overrepresent potential DPM emissions. Therefore, the lesser of Manufacturer's PM + HC data or the Oregon DEQ default is used to represent DPM emissions.

Cold start emissions are also accounted for in the emission rates calculated for non-metal TACs following Oregon DEQ's guidance.[7]

The maximum daily and annual fuel throughputs are determined based on the conservative assumption that the generators will be operated at 100% load. Units are expected to operate a maximum of 9 hours per day for non-emergency purposes, within the hours of 8 am – 5 pm. These units are also limited to 100 hours per year of operation for non-emergency usage, inclusive of testing and maintenance, by NSPS for Compression Ignition Internal Combustion Engines (40 CFR 60 Subpart IIII). A copy of the emission factors and emission calculations is provided in Appendix D.

[7] Spike duration, cold-start emission spike, and steady-state (warm) emissions based on data from California Energy Commission (CEC) "Air Quality Implications of Backup Generators in California".

4. RISK ASSESSMENT WORK PLAN

4.1 Conceptual Site Model

Risk will be evaluated using all toxic emission units at the proposed PDX01 site. The following list of TACs will be included in the Risk Assessment:[8]

- 1,3-Butadiene
- 2-Methyl naphthalene
- Acenaphthene
- Acenaphthylene
- Acetaldehyde
- Acrolein
- Ammonia
- Anthracene
- Antimony
- Arsenic
- Barium
- Benz[a]anthracene
- Benzene
- Benzo[a]pyrene
- Benzo[b]fluoranthene
- Benzo[e]pyrene
- Benzo[g,h,i]perylene
- Benzo[k]fluoranthene
- Beryllium
- Cadmium
- Chlorobenzene
- Chromium VI
- Chrysene
- Cobalt
- Copper
- Dibenz[a,h]anthracene
- Diesel Particulate Matter
- Ethyl Benzene
- Fluoranthene
- Fluorene
- Formaldehyde
- Hexane
- Hydrogen Chloride
- Indeno[1,2,3-cd]pyrene
- Lead
- Manganese
- Mercury
- Naphthalene
- Nickel
- PAHs (excluding Naphthalene)
- Perylene
- Phenanthrene
- Phosphorus
- Propylene
- Pyrene
- Selenium
- Silver
- Thallium
- Toluene
- Xylenes
- Zinc

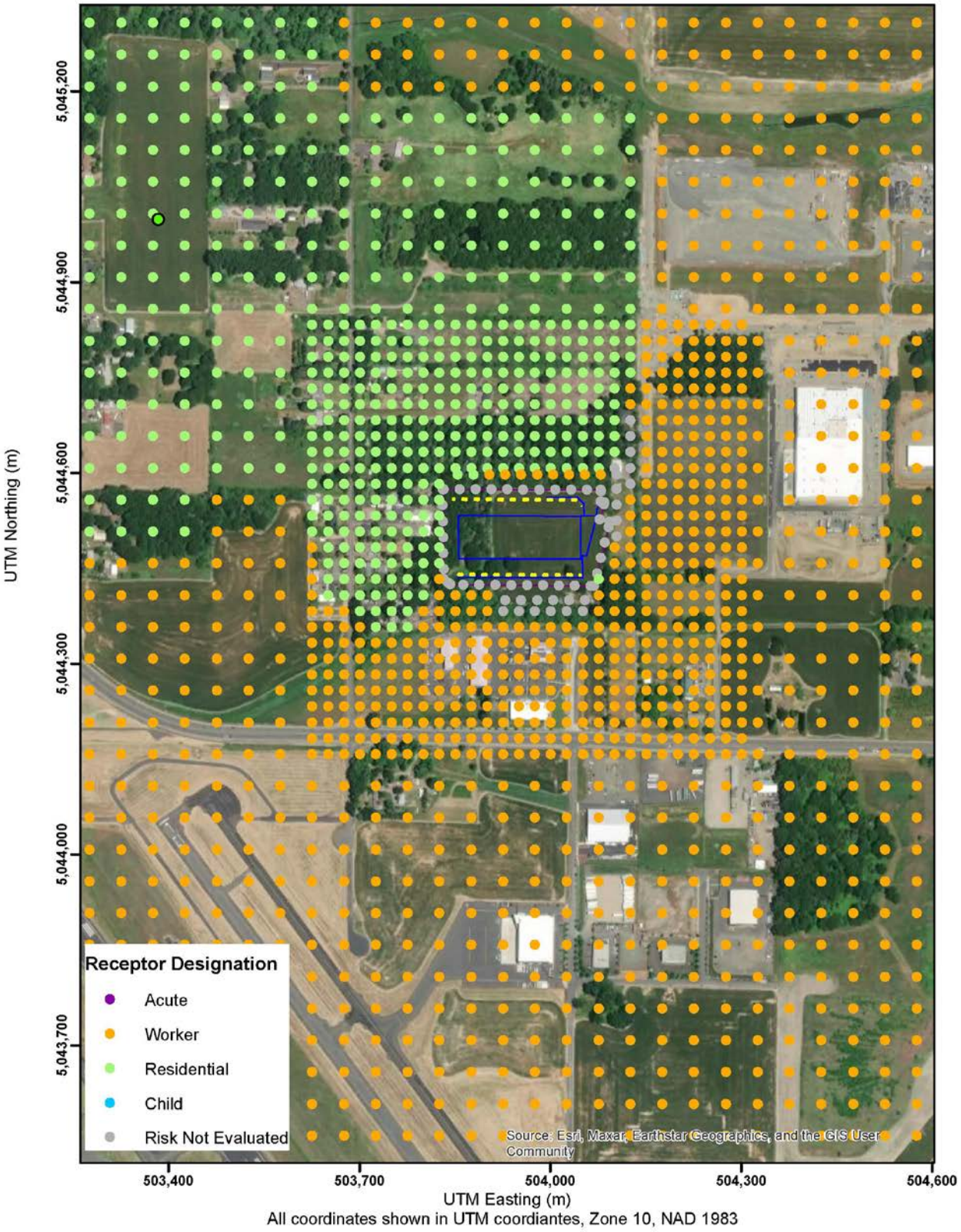
4.1.1 Exposure Locations

The facility is located in the City of Hillsboro which has a mix of zoning and is immediately surrounded by industrial-zoned areas to the east south, and north of the facility. Areas to the north and west are outside of city jurisdiction and designated residential. After review of satellite imagery, this assumption has been retained for both conservatism and consistency with state designations despite family homes being widely dispersed amongst farmlands. Institutional, commercial, and community boundary zones are also within 1.5 km of the facility. Institutional in this instance has been assigned worker / industrial as it encompasses the Hillsboro airport, while the small swatch of commercial zonings have both been assigned residential due to the proximity of houses to these small commercial areas.

The closest residential receptors to the facility include a residence about 200 meters west of the facility and 200 m north, outside of Hillsboro city jurisdiction. There is additionally a home directly to the northeast of the facility when viewed in Google Earth. This property is within the property boundary of the Aligned facility and is therefore designated as Risk Not Evaluated. A zoomed in image of this area is included in Figure 4-1 below.

[8] The TACs that do not have Risk-Based Concentrations (RBCs) identified in OAR 340-245-8010 Table 2 are not included in risk calculations, however their emissions are quantified.

Figure 4-1. Nearby Residential Receptors



The nonresidential child receptor type will be determined based on the available information found online for schools and daycare facilities. These receptors are listed in Table 4-1.

Table 4-1. Child Exposure Locations

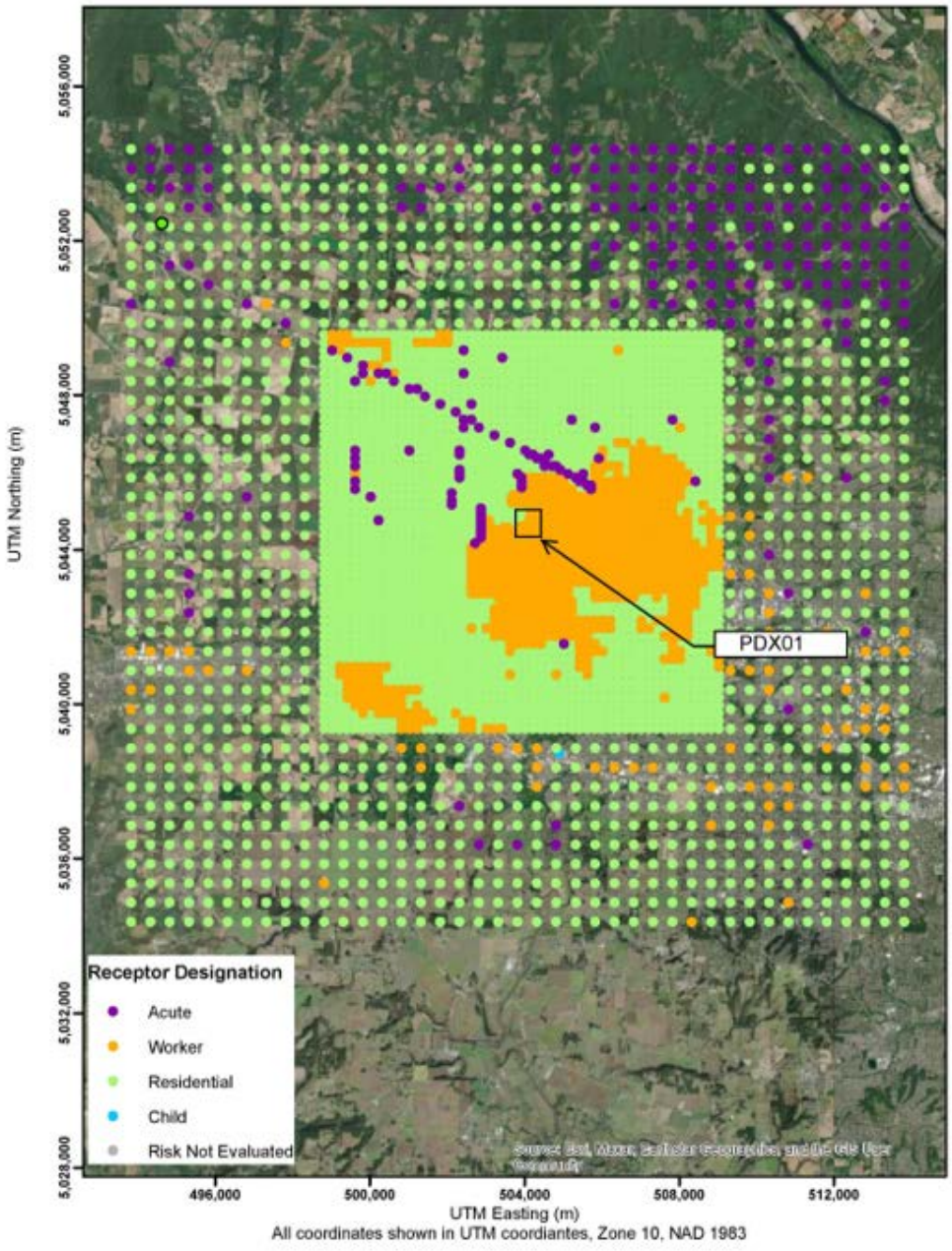
Child Receptor Type	Name	UTM Easting (m)	UTM Northing (m)
School	KLA Schools of Hillsboro	505,099.5	5,042,659
School	Poynter Middle School	502,708.1	5,041,654
School	Quatama Elementary School	507,089.1	5,042,163
School	Orenco Elementary School	507,222.5	5,041,689
School	Goddard School of Hillsboro	505,759.8	5,041,723
School	Jen's Little Hand's Day Care	504,490.4	5,041,207
School	Matatena Montessori Preschool	505,480.7	5,042,538
School	Tippytoes Montessori	506,478.6	5,042,224
School	Hillsboro Knowledge Beginnings	507,960.8	5,043,581
School	The Good Apple Childcare	503,217.4	5,042,562
School	Kidz Academy	503,288.7	5,042,095
School	Montessori Cares	504,228.3	5,041,455
School	Learn and Grow	502,633.2	5,042,618
School	Primrose School of Silicon Forest	507,363.6	5,044,030
School	Hillsboro KinderCare	505,146.5	5,042,190
School	La Petite Academy of Hillsboro North	505,322.9	5,042,114
School	Jugando & aprendiendo childcare	505,164.5	5,041,381
School	Carden Cascade Academy	501,775.5	5,043,347
School	Mooberry Elementary	502,170.2	5,042,244
School	Roots N Wings Preschool	503,023.9	5,042,885
School	Early Learning Matters	505,247.8	5,042,412
School	NW Outdoor Science School	506,063.6	5,042,081
School	Norma's Daycare Bilingual School	500,593.7	5,042,267
School	Patterson Elementary	500,584.1	5,043,690
School	Evergreen Middle School	501,227.9	5,043,922
School	Children's Discovery School	500,251.2	5,043,261
School	Glencoe High School	500,544.1	5,043,059
School	Pioneer Heritage Academy	501,184.0	5,041,650
School	Faith Bible High School	504,908.7	5,038,725
School	Lenox Elementary	508,302.2	5,044,948
School	West Union Elementary	505,983.1	5,047,083
School	Touchstone Preschool	508,226.0	5,045,810
School	All God's Children Daycare	503,107.1	5,040,881
School	Nellie's Daycare	500,604.5	5,042,635
School	Tuality Learning Tree Day School	501,883.5	5,040,865
School	Briar Rose School	502,115.0	5,040,866
School	Universal Warriors Preschool Wee Care	502,320.3	5,041,554
School	Montessori Cares D.B.	503,236.9	5,042,112

Acute risks will be evaluated everywhere that people may spend several hours in a day per OAR 340-245-0020(4). All receptors assessed for chronic risks will be also assessed for acute risks.

The receptors to be included for this risk assessment are provided in Figure 4-2. Digital shapefile for zoning information is obtained from the Oregon Department of Land Conservation and Development in combination

with the City of Hillsboro Maps.[9] Appendix H includes the letter submitted to Oregon DEQ and approved August 17th, 2023 with the designation of receptors.

Figure 4-2. Exposure Receptors by Type



4.2 Toxic Emission Unit Modeled Stack Parameters

All emission units will have the stack parameters as identified in Table 2-2. Aligned has conservatively assumed dispersion parameters at 100% load based on manufacturers specifications for all modeled units. Aligned has modeled both the 3516E and C175 TEUs to determine the resulting worst-case risk between the 3,000 kW generators. Appendix E includes the modeled CAO source parameters for individual units. All sources will be modeled at a unit emission rate of 1 gram per second (g/s).

4.3 Calculation Methodology for Risk

There are up to seven risk-based concentrations (RBCs) that have been developed for each TAC to evaluate potential chronic cancer, chronic noncancer, and acute risks associated with the potential emissions at the facility, which are provided in OAR 340-245-8010 Table 2. All emission sources are modeled with a unit emission rate of 1 g/s. For the analysis, Aligned proposes to use Approach D: Unit Emission Rate with Risk Equivalent Emission Rates (REERs) provided in *Recommended Procedures for Toxic Air Contaminant Health Risk Assessments*.[10] This method produces dispersion factors out of AERMOD that are used in conjunction with the REER to determine potential risk. The REER tables that will be used for calculating risks are provided in Appendix F.

4.3.1 Chronic Risks

Chronic risks will be evaluated based on the annual modeled dispersion factors for the highest contributing individual generators. This method is used to permit a site wide fuel limitation for non-emergency fuel use across any and all generators at the facility. Potential annual emissions are determined by:

- Manufacturer's specifications for potential hourly fuel usage at maximum operating power;
- Restrictions associated with NSPS Subpart IIII of 100 hours of non-emergency operation; and
- Synthetic minor annual permit limitation of 39 tpy of NO_X corresponding to a site-wide annual throughput of 233,223 gallons.

A screening approach was taken to determine the highest contributing individual generators for both potential 3,000 kW generator types using the following steps:

1. Model all generators using the parameters specified in Appendix E at an emission rate of 1 g/s.
2. Calculate residential chronic cancer REERs (See Appendix F Screening REERS for each unit). The REER is calculated for each emission unit type based on 100 hours of operation at 100% load and the RBCs for residential chronic cancer.
3. Tabulate modeled results showing the highest modeled dispersion factors from a single emission point. This table is shown in Appendix G.
4. Scale the maximum modeled results for each unit by the REER determined in Step 2. Appendix G shows the modeled results multiplied by the REER to determine the highest contributing individual generator(s).
5. Rank the individual emission units by the screening results obtained in Step 4. Determine how many units would have to run to reach synthetic minor permit limitation (12 engines) and combine top 12 unit results to determine total risk at each location.

[9] Oregon maps available at https://tools.oregonexplorer.info/OE_HtmlViewer/Index.html?viewer=planners. Hillsboro City Maps available at http://hbmaps.hillsboro-oregon.gov/ .

[10] Section 3.1.3, Recommended Procedures for Toxic Air Contaminant Health Risk Assessments, Oregon DEQ (October 2022).

Using this screening approach and ranking method will allow for differences in fuel consumption, emission factors, and modeled dispersion characteristics to be considered when determining the highest contributing individual generators. The screening results (shown in Appendix G) demonstrate that Generator 43 has the highest individual impacts followed by the 3,000 kW units.

Table 4-2, shows the summation of the top twelve engines if the residential chronic residential REER was multiplied by the maximum modeled dispersion factor for each individual generator. This does not represent the actual risk calculated under the CAO program, rather the comparison demonstrates that the CAT C175-16 generator should be considered the worst-case scenario to determine potential risk. Although the risk is very similar between the two possible main generators, the CAT C175-16 shows the highest overall risk potential, for both chronic and acute. Therefore, the 3,000 kW generators will all be analyzed as C175-16 units for the final determination of risk. Table 4-3 and Table 4-4 list the calculated potential chronic risk at any receptor for each of the twelve units, as summarized in Table 4-2.

Table 4-2. Summary of Maximum Potential Chronic Risk

Generator	Acute REER	Acute Risk	Chronic Residential REER	Potential Chronic Risk at Any Receptor
CAT 3516E	2.33E-03	0.08	1.49E-01	3.57
CAT C175-16	2.37E-03	0.10	1.74E-01	4.08

To determine potential chronic risk in the specified categories, the REER calculation is completed for the individual generators with the highest dispersion factor. The REER calculation assumes a fuel throughput as shown below in Table 4-3, which is then divided by the specified category RBCs. Table 4-4 shows the alternative scenario of 3516E generators which represents lower potential risk.

Table 4-3. Summary of Engines Used for Chronic Risk Assessment

Emission Unit	Screening Model Rank	Potential Annual Hours of Operation	Potential Hourly Fuel Throughput (gallons)	Fuel Throughput (gallons)	Potential Chronic Risk at Any Receptor[11]
GEN 43 (CAT C32)	1	100	71.5	7,150	0.43
GEN28 (CAT C175-16)	2	100	211.4	21,140	0.34
GEN25 (CAT C175-16)	3	100	211.4	21,140	0.34
GEN31 (CAT C175-16)	4	100	211.4	21,140	0.33
GEN34 (CAT C175-16)	5	100	211.4	21,140	0.33
GEN26 (CAT C175-16)	6	100	211.4	21,140	0.33
GEN27 (CAT C175-16)	7	100	211.4	21,140	0.33
GEN33 (CAT C175-16)	8	100	211.4	21,140	0.33
GEN32 (CAT C175-16)	9	100	211.4	21,140	0.33
GEN30 (CAT C175-16)	10	100	211.4	21,140	0.33
GEN29 (CAT C175-16)	11	100	211.4	21,140	0.33
GEN36 (CAT C175-16)	12	100	211.4	21,140	0.33
			Total	**> 233,223**	**4.08**

Table 4-4. Alternative Scenario for Chronic Risk Assessment

Emission Unit	Screening Model Rank	Potential Annual Hours of Operation	Potential Hourly Fuel Throughput (gallons)	Fuel Throughput (gallons)	Potential Chronic Risk at Any Receptor[12]
GEN 43 (CAT C32)	1	100	71.5	7,150	0.43
GEN28 (CAT 3516E)	2	100	208.2	20,820	0.29
GEN34 (CAT 3516E)	3	100	208.2	20,820	0.29
GEN31 (CAT 3516E)	4	100	208.2	20,820	0.29
GEN25 (CAT 3516E)	5	100	208.2	20,820	0.29
GEN26 (CAT 3516E)	6	100	208.2	20,820	0.29
GEN33 (CAT 3516E)	7	100	208.2	20,820	0.29
GEN32 (CAT 3516E)	8	100	208.2	20,820	0.28
GEN27 (CAT 3516E)	9	100	208.2	20,820	0.28
GEN30 (CAT 3516E)	10	100	208.2	20,820	0.28
GEN29 (CAT 3516E)	11	100	208.2	20,820	0.28
GEN36 (CAT 3516E)	12	100	208.2	20,820	0.28
			Total	**> 233,223**	**3.57**

The facility maximum exposure location based on CAT C175-16 modeled results will then be determined as follows:

[11] This does not represent the actual risk calculated under the CAO program. Instead, it represents the potential if individual risks at each receptor were added together and assumed to residental.

[12] This does not represent the actual risk calculated under the CAO program. Instead, it represents the potential if individual risks at each receptor were added together and assumed to residental.

- The modeled dispersion factors for each modeled generator and each modeled receptor will be reviewed as a whole over the 5-year modeling period.
- Under each exposure scenario, the generator REER for all TACs combined will be applied to the annual modeled dispersion factor to calculate the risk from each modeled generator at each identified receptor.
- Under each exposure scenario, a facility risk will be calculated by summing the risks from individual modeled generators at each receptor.
- Under each exposure scenario, the receptor with the maximum facility risk will be determined to be the maximum exposure location. The calculated risk at that receptor represents the assessed facility risk, which will be compared against the corresponding Risk Action Levels (RALs).

The calculated risk from each TAC, along with the facility-wide calculated risks for each chronic exposure category will also be included.

4.3.2 Acute Risks

It is conservatively assumed that the generators will run 9-hours per day at 100% load until the proposed fuel limit of 1,902 gallons is reached. The fuel limit is equivalent to the capacity of one C175-16 generator; the generator with the largest hourly fuel use. Expected operations at the facility will typically be individual generators, with the exception of commissioning as noted in Section 2.2.5. Table 4-2 represents the worst-case acute risk, attributed to GEN2 for the CAT C175-16 generators and GEN22 for the 3516E. Again, the C175-16 generators demonstrate the highest potential risk. Detailed results are provided in Appendix G.

APPENDIX A. APPLICATION FORMS

State of Oregon
DEQ Department of Environmental Quality

Cleaner Air Oregon Pre-Application Fee Form

Form AQ500

DEQ Use Only			
Permit Number:		Type of Application:	
Application Number:			
Date Received:			
Region: NWR - AQ Permit Coordinator		Check No.:	Amount:

1. Company Information			**2. Facility Location Information**		
Legal Name: Aligned Data Centers (PDX) PropCo, LLC			Name: Aligned Data Centers PDX01		
Mailing Address: 2800 Summit Ave			Street Address: E 30th Ave. & NE Evergreen Rd (Official Address TBD)		
City: Plano	State: Texas	ZIP Code: 75074	City: Hillsboro	County: Washington	ZIP Code: 97124

3. Site Contact Person	**4. Industrial Classification Code(s)**
Name: Michael Welch	Primary SIC and NAICS: 7374/518210
Title: VP, Design and Procurement	Secondary SIC and NAICS: 4911/221112
Telephone number: 203.981.6922	**5. Other DEQ Permits**
Fax number:	
Email address: michael.welch@aligneddc.com	

6. Permit Action:

		√	Title V or Standard ACDP	√	Simple ACDP	√	General or Basic ACDP
1	Existing Source Call-In Fee	☐	$10,000	☐	$1,000	☐	$500
2	New Source Consulting Fee	☑	$12,000	☐	$1,900	☐	$1,000

Amount Due: $ 12,000.00

Please attach check payable to Oregon Dept. of Environmental Quality, and mail to:

Oregon Dept. of Environmental Quality
Financial Services - Revenue Section
700 NE Multnomah St., Suite 600
Portland, Oregon 97232-4100

If you don't know which permit type applies to your facility, please contact DEQ, contact information can be found here: www.oregon.gov/deq/aq/aqPermits/Pages/Contacts.aspx

State of Oregon
DEQ Department of Environmental Quality

Cleaner Air Oregon Permit Application

Form AQ501

DEQ Use Only		
Permit or Source Number:	Type of Application:	
Application Number:	SIC/NAICS Code:	
Date Received:	Source Description:	
Regional Office: Portland NWR - AQ Permit Coordinator 6th Floor	Check No.:	Amount:

1. Company Information			2. Facility Location Information		
Legal Name: Aligned Data Centers (PDX) PropCo, LLC			Name: Aligned Data Centers PDX01		
Mailing Address: 2800 Summit Ave			Street Address: NE 30th Ave & NE Evergreen Rd (Official		
City: Plano	State: Texas	Zip Code: 75074	City: Hillsboro	County Washing	Zip Code: 97124
3. Facility Contact Information			**4. Facility Authorized Contact Information**		
Name/Title: Michael Welch			Name/Title: Michael Welch		
Phone: 203.981.6922			Phone: 203.981.6922		
Email: michael.welch@aligneddc.com			Email: michael.welch@aligneddc.com		

5. Source Determination:

- ☐ Existing
- ☑ New
- ☐ Exempt [OAR 340-245-0050(6)] or Gas Combustion Exemption Emissions only [OAR 340-245-0050(5)]
- ☐ *De minimis* [OAR 340-245-0050(7)]

6. CAO Permit Application Checklist of Approved Documents [OAR 340-245-0100(3)]:

- ☑ Source description and process flow diagrams for each process (*Included in either the Modeling Protocol or Risk Assessment Work Plan*)
- ☑ Emissions Inventory
- ☑ Modeling Protocol
- ☑ Risk Assessment Work Plan (*for Level 3 or Level 4 Risk Assessment*)
- ☑ Risk Assessment (*Level 1, 2, 3 or 4*)
- ☐ TBACT or TLAER supporting documentation (*if applicable*)
- ☐ Pollution Prevention Analysis (*if applicable*)
- ☐ Risk Reduction Plan (*if applicable*)
- ☐ Postponement of Risk Reduction (*if applicable*)
- ☐ Air Monitoring Plan (*if applicable*)
- ☐ Additional supporting documentation requested by DEQ
- ☑ CAO applicable Activity Fees (see page 2)

7. Signature

I hereby apply for permission to discharge air contaminants in the State of Oregon, as stated or described in any part of this application, and certify that the information contained in any part of this application and the schedules and exhibits appended hereto, are true and correct to the best of my knowledge and belief.

Michael Welch

Name of official

DocuSigned by:
Michael Welch
3557080671004D3...

Signature of official

The following applicable fees[1] are due with the Cleaner Air Oregon Permit application form:
Qty. = Number of Activities

#	ACTIVITY	Qty.	Title V	Qty.	Standard ACDP	Qty.	Simple ACDP	Qty.	General/ Basic ACDP
3	Submittal Document Modification Fee(s)		$2,500		$2,500		$500		$250
4	Level 1 Risk Assessment - de minimis/no permit required		$1,500		$1,500		$1,000		$800
5	Level 1 Risk Assessment – not de minimis		$2,000		$2,000		$1,500		$1,100
6	Level 2 Risk Assessment - de minimis/no permit required		$3,100		$3,100		$2,300		$2,000
7	Level 2 Risk Assessment – not de minimis		$3,600		$3,600		$2,800		$2,300
8	Level 3 Risk Assessment - de minimis/no permit required		$8,800		$8,200		$5,300		$4,500
9	Level 3 Risk Assessment – not de minimis		$19,900	1	$11,300		$7,700		$6,300
10	Level 4 Risk Assessment - de minimis/no permit required		$21,400		$18,500		$11,700		NA
11	Level 4 Risk Assessment – not de minimis		$34,600		$25,800		$15,500		NA
12	Risk Reduction Plan Fee		$6,700		$6,700		$2,600		$2,600
13	Air Monitoring Plan Fee (includes risk assessment)		$25,900		$25,900		NA		NA
14	Postponement of Risk Reduction Fee		$4,400		$4,400		$4,400		$2,000
15	TBACT/TLAER Review (per Toxic Emissions Unit and type of toxic air contaminant)		$3,000		$3,000		$1,500		$1,500
16	TEU Risk Assessment – no permit mod		$1,000		$1,000		$500		$500
17	TEU Risk Assessment – permit mod		$4,000		$4,000		$2,000		$1,000
18	Level 2 Modeling review only for TEU approval		$1,900		$1,300		$800		$700
19	Level 3 Modeling review only for TEU approval		$3,800		$3,800		$3,500		$3,500
20	Community Engagement Meeting Fee – high		$8,000		$8,000		$8,000		$8,000
21	Community Engagement Meeting Fee – medium		$4,000		$4,000		$4,000		$4,000
22	Community Engagement Meeting Fee - low		$1,000		$1,000		$1,000		$1,000
23	Source Test Review Fee (plan and data review) - complex		$6,000		$6,000		$6,000		$6,000
24	Source Test Review Fee (plan and data review) – moderate		$4,200		$4,200		$4,200		$4,200
25	Source Test Review Fee (plan and data review) - simple		$1,400		$1,400		$1,400		$1,400

[1] – CAO Annual fees for new facilities are submitted as part of the ACDP Application fees as indicated on Form AQ101.

Total Fees:	11,300

(Make check payable to DEQ)
Send payment to:

Oregon Department of Environmental Quality
Financial Services – Revenue Section
700 NE Multnomah St., Suite 600
Portland, OR 97232-4100

State of Oregon
DEQ Department of Environmental Quality

Form AQ523

Categorically Exempt Toxics Emissions Units

Answer Sheet

Facility name: Aligned Data Centers PDX01 Permit Number: N/A

Indicate which of the following categorically exempt activities occur at this facility by checking the appropriate columns below. Submit this form electronically with your Cleaner Air Oregon Emissions Inventory AQ520 form to meet the reporting requirements in OAR 340-245-0040(4)(a)(A) for categorically exempt Toxics Emissions Units. This form is the complete list of categorically exempt TEUs, which can be found in the division 245 rules under OAR 340-245-0060(3)(b).

Yes	No	Categorically Exempt TEU Activities
☑	☐	Evaporative and tail pipe emissions from on-site motor vehicle operation.
☐	☑	Distillate oil, kerosene, gasoline, natural gas or propane burning equipment, provided the aggregate expected actual emissions of the equipment identified does not exceed the de minimis level for any regulated pollutant, based on the expected maximum annual operation of the equipment. If a source's expected emissions from all such equipment exceed the de minimis levels, then the source may identify a subgroup of such equipment as categorically exempt with the remainder not designated as an exempt TEU. The following equipment may never be included as part of the exempt TEU: A. Any individual distillate oil, kerosene or gasoline burning equipment with a rating greater than 0.4 million Btu/hour; and B. Any individual natural gas or propane burning equipment with a rating greater than 2.0 million Btu/hour.
☑	☐	Distillate oil, kerosene, gasoline, natural gas or propane burning equipment brought on site for six months or less for maintenance, construction or similar purposes, such as but not limited to generators, pumps, hot water pressure washers and space heaters, provided that any such equipment that performs the same function as the permanent equipment, must be operated within the source's existing PSEL.
☑	☐	Office activities.
☐	☑	Food service activities.
☑	☐	Janitorial activities.
☑	☐	Personal care activities.
☑	☐	Grounds keeping activities, including, but not limited to building painting and road and parking lot maintenance.
☐	☑	On-site laundry activities.
☐	☑	On-site recreation facilities.
☑	☐	Instrument calibration.
☐	☑	Automotive storage garages.

☑	☐	Refrigeration systems with less than 50 pounds of charge of ozone depleting substances regulated under Title VI, including pressure tanks used in refrigeration systems but excluding any combustion equipment associated with such systems.
☑	☐	Temporary construction activities.
☐	☑	Warehouse activities.
☑	☐	Accidental fires and fire suppression.
☑	☐	Air vents from compressors.
☑	☐	Air purification systems.
☐	☑	Continuous emissions monitoring lines.
☐	☑	Demineralized water tanks.
☐	☑	Pre-treatment of municipal water, including use of deionized water purification systems.
☐	☑	Electrical charging stations.
☐	☑	Fire brigade training.
☐	☑	Instrument air dryers and distribution.
☐	☑	Fully enclosed process raw water filtration systems.
☑	☐	Electric motors.
☑	☐	Pressurized tanks containing gaseous compounds that do not contain toxic air contaminants.
☐	☑	Vacuum sheet stacker vents.
☑	☐	Emissions from wastewater discharges to publicly owned treatment works (POTW) provided the source is authorized to discharge to the POTW, not including on-site wastewater treatment and/or holding facilities.
☐	☑	Log ponds.
☑	☐	Stormwater settling basins.
☑	☐	Paved roads and paved parking lots within an urban growth boundary.
☑	☐	Hazardous air pollutant emissions in fugitive dust from paved and unpaved roads except for those sources that have processes or activities that contribute to the deposition and entrainment of hazardous air pollutants from surface soils.
☑	☐	Health, safety, and emergency response activities.
☐	☑	Non-diesel, compression ignition emergency generators* and pumps used only during loss of primary equipment or utility service due to circumstances beyond the

		reasonable control of the owner or operator, or to address a power emergency, provided that the aggregate horsepower rating of all stationary emergency generator and pump engines is not more than 3,000 horsepower. If the aggregate horsepower rating of all the stationary emergency generator and pump engines is more than 3,000 horsepower, then no emergency generators and pumps at the source may be considered categorically exempt. ***All spark ignition engines remain exempt.**
☐	☑	Non-contact steam vents and leaks and safety and relief valves for boiler steam distribution systems.
☐	☑	Non-contact steam condensate flash tanks.
☐	☑	Non-contact steam vents on condensate receivers, deaerators and similar equipment.
☐	☑	Boiler blowdown tanks.
☐	☑	Ash piles maintained in a wetted condition and associated handling systems and activities.

APPENDIX B. FACILITY LAYOUT, DRAWINGS, AND GENERATOR SPECIFICATION SHEETS

PERFORMANCE DATA[DM8448]

January 18, 2022

Performance Number: DM8448 **Change Level: 16**

SALES MODEL:	C175-16	**COMBUSTION:**	DIRECT INJECTION
BRAND:	CAT	**ENGINE SPEED (RPM):**	1,800
MACHINE SALES MODEL:		**HERTZ:**	60
ENGINE POWER (BHP):	4,423	**FAN POWER (HP):**	187.7
GEN POWER WITH FAN (EKW):	3,000.0	**ASPIRATION:**	TA
COMPRESSION RATIO:	15.3	**AFTERCOOLER TYPE:**	SCAC
RATING LEVEL:	STANDBY	**AFTERCOOLER CIRCUIT TYPE:**	JW+OC+1AC, 2AC
PUMP QUANTITY:	2	**AFTERCOOLER TEMP (F):**	115
FUEL TYPE:	DIESEL	**JACKET WATER TEMP (F):**	210.2
MANIFOLD TYPE:	DRY	**TURBO CONFIGURATION:**	PARALLEL
GOVERNOR TYPE:	ADEM4	**TURBO QUANTITY:**	4
ELECTRONICS TYPE:	ADEM4	**TURBOCHARGER MODEL:**	GTB6251BN-48T-1.38
CAMSHAFT TYPE:	STANDARD	**CERTIFICATION YEAR:**	2014
IGNITION TYPE:	CI	**CRANKCASE BLOWBY RATE (FT3/HR):**	2,436.4
INJECTOR TYPE:	CR	**FUEL RATE (RATED RPM) NO LOAD (GAL/HR):**	22.9
FUEL INJECTOR:	4439455	**PISTON SPD @ RATED ENG SPD (FT/MIN):**	2,598.4
REF EXH STACK DIAMETER (IN):	14		

INDUSTRY	SUBINDUSTRY	APPLICATION
ELECTRIC POWER	STANDARD	PACKAGED GENSET
OIL AND GAS	LAND PRODUCTION	PACKAGED GENSET

General Performance Data

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	4,423	377	0.339	0.333	211.4	207.3	0.500	0.490
2,700.0	90	3,999	341	0.338	0.331	190.4	186.8	0.500	0.491
2,400.0	80	3,576	305	0.340	0.334	171.6	168.3	0.507	0.498
2,250.0	75	3,364	286	0.344	0.338	163.2	160.1	0.514	0.505
2,100.0	70	3,152	268	0.351	0.345	156.1	153.1	0.527	0.517
1,800.0	60	2,729	232	0.371	0.364	142.6	139.9	0.562	0.551
1,500.0	50	2,305	196	0.396	0.388	128.7	126.2	0.609	0.597
1,200.0	40	1,882	160	0.417	0.409	110.7	108.6	0.654	0.642
900.0	30	1,458	124	0.440	0.431	90.4	88.7	0.713	0.699
750.0	25	1,246	106	0.453	0.444	79.5	78.0	0.752	0.738
600.0	20	1,035	88	0.467	0.458	68.2	66.9	0.806	0.791
300.0	10	611	52	0.514	0.504	44.3	43.5	1.048	1.028

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	4,423	91.5	131.3	1,229.8	64.3	891.9	92	451.5
2,700.0	90	3,999	81.4	129.6	1,193.4	56.5	879.2	82	414.6
2,400.0	80	3,576	73.0	128.3	1,163.0	50.0	869.4	74	384.7
2,250.0	75	3,364	69.5	127.8	1,150.7	47.5	865.8	70	373.0
2,100.0	70	3,152	67.1	127.6	1,142.6	45.8	864.2	68	366.1
1,800.0	60	2,729	62.7	127.3	1,127.7	42.8	861.6	65	354.0
1,500.0	50	2,305	57.5	126.9	1,109.9	39.5	858.0	60	339.0
1,200.0	40	1,882	46.4	125.8	1,083.9	32.9	848.4	50	308.0
900.0	30	1,458	34.8	124.5	1,041.6	25.3	834.7	39	267.2
750.0	25	1,246	29.0	123.8	1,014.2	21.3	826.5	33	243.5
600.0	20	1,035	23.2	123.2	961.6	17.6	797.3	27	217.8
300.0	10	611	11.7	122.1	752.4	10.6	649.3	14	160.9

General Performance Data (Continued)

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	WET INLET AIR VOL FLOW RATE	ENGINE OUTLET WET EXH GAS VOL FLOW RATE	WET INLET AIR MASS FLOW RATE	WET EXH GAS MASS FLOW RATE	WET EXH VOL FLOW RATE (32 DEG F AND 29.98 IN HG)	DRY EXH VOL FLOW RATE (32 DEG F AND 29.98 IN HG)

PERFORMANCE DATA[DM8448]

January 18, 2022

EKW	%	BHP	CFM	CFM	LB/HR	LB/HR	FT3/MIN	FT3/MIN
3,000.0	100	4,423	9,772.2	25,620.0	42,761.1	44,259.6	9,320.0	8,667.2
2,700.0	90	3,999	8,943.0	23,086.1	38,888.2	40,238.8	8,477.9	7,889.0
2,400.0	80	3,576	8,243.6	20,980.8	35,642.2	36,860.0	7,761.6	7,230.7
2,250.0	75	3,364	7,953.8	20,121.0	34,304.6	35,462.7	7,463.6	6,958.6
2,100.0	70	3,152	7,753.3	19,531.3	33,379.1	34,486.9	7,254.0	6,770.2
1,800.0	60	2,729	7,382.3	18,480.5	31,695.8	32,707.6	6,876.9	6,433.3
1,500.0	50	2,305	6,952.0	17,314.7	29,788.0	30,700.3	6,460.8	6,059.1
1,200.0	40	1,882	6,076.8	15,264.4	25,920.8	26,704.4	5,737.4	5,392.5
900.0	30	1,458	5,160.3	12,786.8	21,909.9	22,550.1	4,857.0	4,574.5
750.0	25	1,246	4,701.8	11,409.7	19,919.4	20,483.0	4,361.8	4,112.2
600.0	20	1,035	4,243.2	9,964.4	17,938.9	18,422.6	3,897.7	3,682.5
300.0	10	611	3,325.6	6,901.7	14,007.7	14,322.1	3,060.0	2,917.8

Heat Rejection Data

PUMP POWER IS INCLUDED IN HEAT REJECTION BALANCE, BUT IS NOT SHOWN.

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 2ND STAGE 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	4,423	78,959	8,307	178,226	101,475	24,373	27,992	187,548	457,607	487,466
2,700.0	90	3,999	69,753	7,694	159,943	89,988	21,844	22,735	169,590	410,123	436,884
2,400.0	80	3,576	62,814	7,204	144,872	80,799	19,611	18,646	151,631	368,192	392,217
2,250.0	75	3,364	59,856	7,005	138,541	77,146	18,605	17,040	142,651	349,309	372,102
2,100.0	70	3,152	57,690	6,871	134,338	74,726	17,781	16,060	133,672	333,838	355,621
1,800.0	60	2,729	54,063	6,651	127,402	70,419	16,278	14,739	115,714	305,626	325,568
1,500.0	50	2,305	50,535	6,481	119,941	65,533	14,768	13,646	97,755	277,263	295,355
1,200.0	40	1,882	45,772	6,336	107,141	55,828	12,870	11,188	79,796	241,627	257,393
900.0	30	1,458	39,631	6,219	90,342	45,754	10,669	8,349	61,838	200,308	213,378
750.0	25	1,246	36,078	6,172	80,662	40,805	9,471	7,028	52,858	177,821	189,424
600.0	20	1,035	31,984	6,027	70,162	34,336	8,207	5,910	43,879	154,087	164,142
300.0	10	611	21,611	5,163	46,779	17,588	5,475	4,318	25,920	102,790	109,497

Sound Data

SOUND DATA REPRESENTATIVE OF NOISE PRODUCED BY THE "ENGINE ONLY"

EXHAUST:SOUND POWER(1/3 Octave Frequencies)

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	OVERALL SOUND	100 HZ	125 HZ	160 HZ	200 HZ	250 HZ	315 HZ	400 HZ	500 HZ	630 HZ	800 HZ
EKW	%	BHP	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
3,000.0	100	4,423	134.5	109.7	115.8	113.7	115.5	116.0	119.0	119.9	121.5	120.4	121.2
2,700.0	90	3,999	133.2	110.2	116.1	112.6	114.3	114.5	117.3	118.4	120.1	118.3	119.5
2,400.0	80	3,576	132.0	111.6	116.6	111.0	112.7	113.0	115.6	116.9	118.4	116.5	117.7
2,250.0	75	3,364	131.4	112.4	116.8	110.2	111.9	112.3	114.8	116.2	117.6	115.6	116.8
2,100.0	70	3,152	130.7	113.2	117.1	109.3	111.1	111.6	114.0	115.5	116.8	114.7	115.9
1,800.0	60	2,729	129.5	114.8	117.6	107.5	109.4	110.2	112.3	114.1	115.1	113.0	114.0
1,500.0	50	2,305	128.2	116.3	118.1	105.8	107.8	108.7	110.6	112.6	113.4	111.2	112.2
1,200.0	40	1,882	127.0	117.9	118.6	104.1	106.1	107.3	108.9	111.2	111.8	109.5	110.3
900.0	30	1,458	125.7	119.5	119.1	102.3	104.4	105.9	107.3	109.8	110.1	107.7	108.5
750.0	25	1,246	125.1	120.2	119.3	101.4	103.6	105.2	106.4	109.1	109.3	106.8	107.6
600.0	20	1,035	124.4	121.0	119.6	100.6	102.8	104.5	105.6	108.4	108.4	105.9	106.7
300.0	10	611	123.2	122.6	120.0	98.8	101.1	103.0	103.9	106.9	106.8	104.2	104.8

EXHAUST:SOUND POWER(1/3 Octave Frequencies)

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	1000 HZ	1250 HZ	1600 HZ	2000 HZ	2500 HZ	3150 HZ	4000 HZ	5000 HZ	6300 HZ	8000 HZ	10000 HZ

PERFORMANCE DATA[DM8448]

January 18, 2022

EKW	%	BHP	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
3,000.0	100	4,423	122.2	122.6	123.5	124.9	124.7	123.1	122.4	121.6	120.1	119.0	123.4
2,700.0	90	3,999	120.7	121.0	122.2	123.5	123.2	121.5	120.8	120.0	118.7	117.8	123.8
2,400.0	80	3,576	119.4	119.7	120.8	122.5	121.9	120.4	119.8	119.0	117.7	117.1	123.5
2,250.0	75	3,364	118.8	119.1	120.1	122.0	121.3	119.9	119.4	118.6	117.2	116.8	123.3
2,100.0	70	3,152	118.1	118.5	119.4	121.5	120.6	119.3	119.0	118.2	116.7	116.5	123.1
1,800.0	60	2,729	116.9	117.3	118.0	120.4	119.4	118.3	118.1	117.3	115.6	115.9	122.6
1,500.0	50	2,305	115.6	116.2	116.6	119.4	118.1	117.3	117.2	116.4	114.6	115.3	122.1
1,200.0	40	1,882	114.3	115.0	115.1	118.4	116.8	116.3	116.4	115.6	113.6	114.7	121.6
900.0	30	1,458	113.1	113.8	113.7	117.4	115.6	115.3	115.5	114.7	112.6	114.1	121.1
750.0	25	1,246	112.4	113.2	113.0	116.9	114.9	114.8	115.1	114.3	112.1	113.8	120.9
600.0	20	1,035	111.8	112.6	112.3	116.4	114.3	114.2	114.7	113.9	111.6	113.5	120.7
300.0	10	611	110.5	111.4	110.9	115.4	113.0	113.2	113.8	113.0	110.6	112.9	120.2

MECHANICAL:SOUND POWER(1/3 Octave Frequencies)

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	OVERALL SOUND	100 HZ	125 HZ	160 HZ	200 HZ	250 HZ	315 HZ	400 HZ	500 HZ	630 HZ	800 HZ
EKW	%	BHP	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
3,000.0	100	4,423	125.9	89.8	105.6	98.4	100.6	104.5	108.3	111.6	113.3	112.5	114.1
2,700.0	90	3,999	125.8	89.4	105.5	97.9	100.9	103.3	108.7	111.1	112.7	112.2	113.8
2,400.0	80	3,576	126.0	89.0	105.0	97.8	99.8	102.4	108.0	111.0	111.8	111.9	113.0
2,250.0	75	3,364	126.1	88.8	104.7	97.8	99.1	102.1	107.5	111.0	111.3	111.7	112.6
2,100.0	70	3,152	126.2	88.5	104.3	97.8	98.4	101.7	107.0	111.0	110.8	111.6	112.2
1,800.0	60	2,729	126.5	88.1	103.7	97.8	96.9	100.9	106.0	111.0	109.8	111.2	111.4
1,500.0	50	2,305	126.7	87.7	103.0	97.8	95.4	100.2	105.1	111.0	108.8	110.9	110.5
1,200.0	40	1,882	127.0	87.3	102.4	97.7	94.0	99.4	104.1	110.9	107.8	110.6	109.7
900.0	30	1,458	127.2	86.9	101.7	97.7	92.5	98.6	103.1	110.9	106.8	110.2	108.9
750.0	25	1,246	127.3	86.7	101.4	97.7	91.8	98.2	102.6	110.9	106.3	110.1	108.5
600.0	20	1,035	127.4	86.4	101.0	97.7	91.0	97.9	102.1	110.9	105.8	109.9	108.1
300.0	10	611	127.7	86.0	100.4	97.7	89.6	97.1	101.2	110.9	104.8	109.6	107.2

MECHANICAL:SOUND POWER(1/3 Octave Frequencies)

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	1000 HZ	1250 HZ	1600 HZ	2000 HZ	2500 HZ	3150 HZ	4000 HZ	5000 HZ	6300 HZ	8000 HZ	10000 HZ
EKW	%	BHP	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
3,000.0	100	4,423	112.7	113.9	114.6	115.3	115.0	112.7	110.9	111.9	114.3	113.4	117.8
2,700.0	90	3,999	112.5	113.7	114.5	115.0	114.5	112.3	110.4	111.1	113.6	112.9	119.2
2,400.0	80	3,576	112.2	113.2	113.8	114.4	114.2	111.9	110.0	110.7	113.2	112.6	121.4
2,250.0	75	3,364	112.0	112.9	113.4	114.0	114.2	111.7	109.8	110.5	112.9	112.6	122.6
2,100.0	70	3,152	111.8	112.6	113.0	113.7	114.1	111.4	109.6	110.3	112.7	112.5	123.8
1,800.0	60	2,729	111.3	112.1	112.2	113.1	113.9	111.0	109.3	110.0	112.3	112.3	126.2
1,500.0	50	2,305	110.9	111.5	111.4	112.4	113.7	110.6	109.0	109.6	111.9	112.1	128.6
1,200.0	40	1,882	110.5	110.9	110.5	111.7	113.5	110.2	108.6	109.3	111.5	111.9	131.0
900.0	30	1,458	110.1	110.3	109.7	111.1	113.4	109.8	108.3	109.0	111.0	111.8	133.4
750.0	25	1,246	109.9	110.0	109.3	110.7	113.3	109.6	108.1	108.8	110.8	111.7	134.6
600.0	20	1,035	109.7	109.7	108.9	110.4	113.2	109.3	107.9	108.6	110.6	111.6	135.8
300.0	10	611	109.3	109.2	108.1	109.7	113.0	108.9	107.6	108.3	110.2	111.4	138.2

Emissions Data

DIESEL

RATED SPEED NOMINAL DATA: 1800 RPM

GENSET POWER WITH FAN	EKW	3,000.0	2,700.0	2,250.0	1,500.0	750.0	300.0
PERCENT LOAD	%	100	90	75	50	25	10
ENGINE POWER	BHP	4,423	3,999	3,364	2,305	1,246	611
TOTAL NOX (AS NO2)	G/HR	26,766	23,378	17,949	7,858	3,175	2,792
TOTAL CO	G/HR	1,477	1,812	1,917	994	1,008	1,017
TOTAL HC	G/HR	184	146	139	269	289	261
TOTAL CO2	KG/HR	2,236	1,976	1,651	1,287	779	428

PERFORMANCE DATA[DM8448]

January 18, 2022

PART MATTER		G/HR	115.0	122.3	121.5	87.6	96.1	92.4
TOTAL NOX (AS NO2)	(CORR 5% O2)	MG/NM3	3,103.2	3,082.7	2,787.9	1,561.9	1,050.9	1,867.9
TOTAL CO	(CORR 5% O2)	MG/NM3	149.2	215.1	257.1	167.9	279.0	557.1
TOTAL HC	(CORR 5% O2)	MG/NM3	15.7	13.1	16.2	40.1	72.0	121.7
PART MATTER	(CORR 5% O2)	MG/NM3	10.0	12.2	14.2	13.1	24.2	45.9
TOTAL NOX (AS NO2)	(CORR 15% O2)	MG/NM3	1,151.5	1,143.9	1,034.5	579.6	390.0	693.1
TOTAL CO	(CORR 15% O2)	MG/NM3	55.4	79.8	95.4	62.3	103.5	206.7
TOTAL HC	(CORR 15% O2)	MG/NM3	5.8	4.9	6.0	14.9	26.7	45.1
PART MATTER	(CORR 15% O2)	MG/NM3	3.7	4.5	5.3	4.9	9.0	17.0
TOTAL NOX (AS NO2)	(CORR 5% O2)	PPM	1,512	1,502	1,358	761	512	910
TOTAL CO	(CORR 5% O2)	PPM	119	172	206	134	223	446
TOTAL HC	(CORR 5% O2)	PPM	29	24	30	75	134	227
TOTAL NOX (AS NO2)	(CORR 15% O2)	PPM	561	557	504	282	190	338
TOTAL CO	(CORR 15% O2)	PPM	44	64	76	50	83	165
TOTAL HC	(CORR 15% O2)	PPM	11	9	11	28	50	84
TOTAL NOX (AS NO2)		G/HP-HR	6.07	5.86	5.35	3.41	2.55	4.56
TOTAL CO		G/HP-HR	0.34	0.45	0.57	0.43	0.81	1.66
TOTAL HC		G/HP-HR	0.04	0.04	0.04	0.12	0.23	0.43
PART MATTER		G/HP-HR	0.03	0.03	0.04	0.04	0.08	0.15
TOTAL NOX (AS NO2)		G/KW-HR	8.25	7.97	7.27	4.64	3.46	6.20
TOTAL CO		G/KW-HR	0.46	0.62	0.78	0.59	1.10	2.26
TOTAL HC		G/KW-HR	0.06	0.05	0.06	0.16	0.32	0.58
PART MATTER		G/KW-HR	0.04	0.04	0.05	0.05	0.10	0.21
TOTAL NOX (AS NO2)		LB/HR	59.01	51.54	39.57	17.32	7.00	6.16
TOTAL CO		LB/HR	3.26	3.99	4.23	2.19	2.22	2.24
TOTAL HC		LB/HR	0.41	0.32	0.31	0.59	0.64	0.57
TOTAL CO2		LB/HR	4,930	4,357	3,639	2,836	1,717	943
PART MATTER		LB/HR	0.25	0.27	0.27	0.19	0.21	0.20
OXYGEN IN EXH		%	9.6	9.8	10.2	11.6	12.7	14.5
DRY SMOKE OPACITY		%	0.3	0.6	0.8	0.0	0.5	1.9
BOSCH SMOKE NUMBER			0.70	0.73	0.74	0.64	0.71	0.85

RATED SPEED POTENTIAL SITE VARIATION: 1800 RPM

GENSET POWER WITH FAN		**EKW**	**3,000.0**	**2,700.0**	**2,250.0**	**1,500.0**	**750.0**	**300.0**
PERCENT LOAD		**%**	**100**	**90**	**75**	**50**	**25**	**10**
ENGINE POWER		**BHP**	**4,423**	**3,999**	**3,364**	**2,305**	**1,246**	**611**
TOTAL NOX (AS NO2)		G/HR	32,120	28,053	21,539	9,430	3,810	3,351
TOTAL CO		G/HR	2,658	3,261	3,451	1,789	1,814	1,830
TOTAL HC		G/HR	245	194	185	358	385	347
PART MATTER		G/HR	160.9	171.2	170.2	122.6	134.5	129.4
TOTAL NOX (AS NO2)	(CORR 5% O2)	MG/NM3	3,723.8	3,699.3	3,345.5	1,874.3	1,261.1	2,241.5
TOTAL CO	(CORR 5% O2)	MG/NM3	268.6	387.2	462.8	302.2	502.2	1,002.8
TOTAL HC	(CORR 5% O2)	MG/NM3	20.9	17.4	21.5	53.3	95.7	161.8
PART MATTER	(CORR 5% O2)	MG/NM3	14.0	17.1	19.8	18.4	33.9	64.3
TOTAL NOX (AS NO2)	(CORR 15% O2)	MG/NM3	1,381.8	1,372.7	1,241.4	695.5	468.0	831.7
TOTAL CO	(CORR 15% O2)	MG/NM3	99.7	143.7	171.7	112.1	186.3	372.1
TOTAL HC	(CORR 15% O2)	MG/NM3	7.7	6.5	8.0	19.8	35.5	60.0
PART MATTER	(CORR 15% O2)	MG/NM3	5.2	6.4	7.4	6.8	12.6	23.8
TOTAL NOX (AS NO2)	(CORR 5% O2)	PPM	1,814	1,802	1,630	913	614	1,092
TOTAL CO	(CORR 5% O2)	PPM	215	310	370	242	402	802
TOTAL HC	(CORR 5% O2)	PPM	39	33	40	100	179	302
TOTAL NOX (AS NO2)	(CORR 15% O2)	PPM	673	669	605	339	228	405
TOTAL CO	(CORR 15% O2)	PPM	80	115	137	90	149	298
TOTAL HC	(CORR 15% O2)	PPM	14	12	15	37	66	112
TOTAL NOX (AS NO2)		G/HP-HR	7.29	7.03	6.42	4.09	3.05	5.47
TOTAL CO		G/HP-HR	0.60	0.82	1.03	0.78	1.45	2.99
TOTAL HC		G/HP-HR	0.06	0.05	0.06	0.16	0.31	0.57
PART MATTER		G/HP-HR	0.04	0.04	0.05	0.05	0.11	0.21
TOTAL NOX (AS NO2)		G/KW-HR	9.91	9.56	8.73	5.57	4.15	7.44

PERFORMANCE DATA[DM8448]

January 18, 2022

TOTAL CO	G/KW-HR	0.82	1.11	1.40	1.06	1.98	4.07
TOTAL HC	G/KW-HR	0.08	0.07	0.08	0.21	0.42	0.77
PART MATTER	G/KW-HR	0.05	0.06	0.07	0.07	0.15	0.29
TOTAL NOX (AS NO2)	LB/HR	70.81	61.85	47.49	20.79	8.40	7.39
TOTAL CO	LB/HR	5.86	7.19	7.61	3.94	4.00	4.03
TOTAL HC	LB/HR	0.54	0.43	0.41	0.79	0.85	0.76
PART MATTER	LB/HR	0.35	0.38	0.38	0.27	0.30	0.29

Regulatory Information

EPA TIER 2		2006 - 2010		
GASEOUS EMISSIONS DATA MEASUREMENTS PROVIDED TO THE EPA ARE CONSISTENT WITH THOSE DESCRIBED IN EPA 40 CFR PART 89 SUBPART D 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 NON-ROAD REGULATIONS.				
Locality	**Agency**	**Regulation**	**Tier/Stage**	**Max Limits - G/BKW - HR**
U.S. (INCL CALIF)	EPA	NON-ROAD	TIER 2	CO: 3.5 NOx + HC: 6.4 PM: 0.20

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

ALTITUDE DERATE DATA IS BASED ON THE ASSUMPTION OF A 20 DEGREES CELSIUS(36 DEGREES FAHRENHEIT) DIFFERENCE BETWEEN AMBIENT OPERATING TEMPERATURE AND ENGINE INLET SCAC TEMPERATURE. AMBIENT OPERATING TEMPERATURE IS DEFINED AS THE AIR TEMPERATURE MEASURED AT THE TURBOCHARGER COMPRESSOR INLET.

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	4,423	4,423	4,423	4,423	4,423	4,423	4,423	4,423	4,423	4,423	4,423	4,423	4,423
1,000	4,423	4,423	4,423	4,423	4,423	4,423	4,423	4,423	4,423	4,423	4,423	4,405	4,423
2,000	4,423	4,423	4,423	4,423	4,423	4,423	4,423	4,423	4,423	4,423	4,423	4,355	4,423
3,000	4,423	4,423	4,423	4,423	4,423	4,423	4,423	4,423	4,423	4,376	4,309	4,216	4,423
4,000	4,345	4,345	4,345	4,345	4,345	4,345	4,344	4,344	4,343	4,280	4,190	4,100	4,345
5,000	4,174	4,174	4,174	4,174	4,174	4,174	4,173	4,172	4,170	4,130	4,073	4,017	4,174
6,000	4,015	4,015	4,015	4,015	4,015	4,015	4,013	4,011	4,008	3,988	3,960	3,933	4,015
7,000	3,868	3,868	3,868	3,868	3,868	3,868	3,866	3,863	3,859	3,853	3,847	3,840	3,868
8,000	3,751	3,751	3,751	3,751	3,751	3,751	3,749	3,745	3,742	3,736	3,729	3,723	3,751
9,000	3,634	3,634	3,634	3,634	3,634	3,634	3,633	3,628	3,624	3,618	3,612	3,606	3,634
10,000	3,523	3,523	3,523	3,523	3,523	3,523	3,521	3,517	3,512	3,506	3,500	3,495	3,523
11,000	3,417	3,417	3,417	3,417	3,417	3,417	3,415	3,411	3,406	3,400	3,394	3,388	3,417
12,000	3,312	3,312	3,312	3,312	3,312	3,312	3,310	3,304	3,299	3,294	3,288	3,282	3,312
13,000	3,206	3,206	3,206	3,206	3,206	3,206	3,204	3,198	3,193	3,188	3,182	3,176	3,206
14,000	3,100	3,100	3,100	3,100	3,100	3,100	3,098	3,093	3,088	3,083	3,079	3,074	3,100
15,000	2,993	2,993	2,993	2,993	2,993	2,993	2,991	2,988	2,984	2,981	2,977	2,974	2,993

Cross Reference

Test Spec	Setting	Engine Arrangement	Engineering Model	Engineering Model Version	Start Effective Serial Number	End Effective Serial Number
0K8532	LL6018	3079788	GS265	-	WYB01883	
0K8532	LL6018	5683569	PG323	-	TB800177	
0K8532	LL6018	5717349	PG323	-	TB800100	

PERFORMANCE DATA[DM8448]

January 18, 2022

Performance Parameter Reference

Parameters Reference:DM9600-14
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%
Fuel rate +/- 5%
Specific DEF consumption +/- 3%
DEF rate +/- 5%
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

PERFORMANCE DATA[DM8448]

Sound Pressure : TM7080
Date Released : 10/27/21

9625 55th Street Kenosha, WI 53144
Phone: (262) 942-1414 Fax: (262) 942-1410

Quote # 22-2057-A

DATA SHEET

Date Sent: 4/6/2022

Title: Stacked dual circuit

Prepared for: HOLT CAT

IRVING TX

Attn: Chris Autry

Job Reference: Ashburn

Engine Data

Engine Manufacturer: Caterpillar
Engine Model: C175-16
Rating: DM8448
HP: 4423 KW: 3000 HZ: 60 RPM: 1800
Manifold Type: Dry Coolant: 50 % E.G.
Data Supllied By: Customer

JW Heat Load:	85,865	Btu/Min
JW Flow:	582	GPM
JW Outlet Temp:	210	Deg. F
AC Heat Load:	29,392	Btu/Min
AC Flow:	350	GPM
AC Inlet Temp:	148	Deg. F

Site Data

Ambient: 110 Deg. F
Deg. Air Rise: 15 Deg. F
Elevation: 300 Ft
Environment: Normal
Site Location: Enclosure
Total External Static: 0.50 Inches H2O
Data Supplied By: Customer

Radiator Data

Radiator Model: EC092F

CFM: 114,645
Fan Speed: 567 RPM
Fan Diameter: 100 Inches
Fan Tip Speed: 14,844 FPM
Fan Type: Blower
Fan Part #: 100 in 24.5 deg std
Number of Blades: 10
Blade Material: Alum Adj Pitch, Airfoil

Fan Drive Type: V-Belt
Horse Power: 100
Motor RPM:
Phase:
HZ:
Volts:

	JW	AC	
Pressure Drop:	2.3	1.4	PSI
Number of Passes:	1	1	

Radiator SPL: @ 25 FT

Optional Equipment

C175 Fan Drive with JW and AC Connection Kit
Wishbone
Fuel Cooler
(2) Murphy Level Switches
Discount for 5+ units

Special Notes:

Prepared By: James Pye
QMSR # 137

Representative:

SAXON COMPANY
PO BOX 1081, Seabrook, TX 77586-1081
Phone 281-532-3333, Fax 281-532-2102

APPROVAL DRAWING

SENT FROM HENNIG ENCLOSURES ON 2-15-23

CUSTOMER PO NUMBER ---

HENNIG S/O NUMBER ---

GENERATOR MODEL C-175 3,000kW

COLOR SELECTION RAL 9016

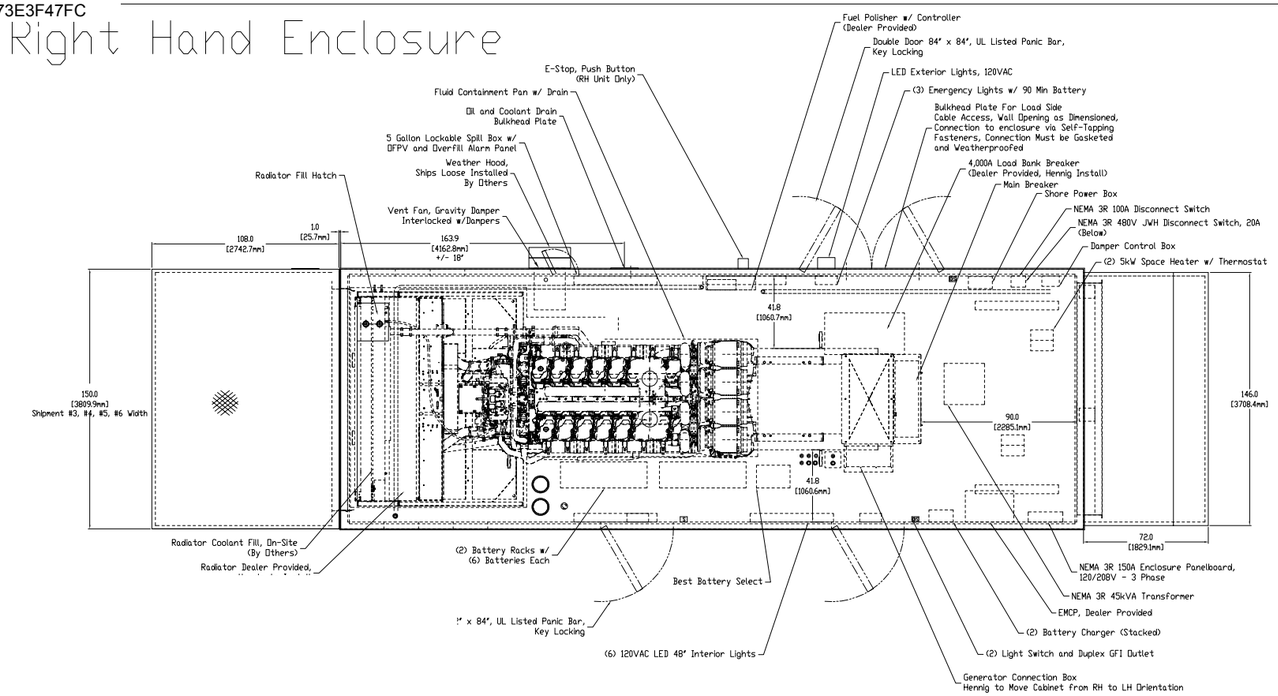
NOTICE

MANUFACTURE OF THE ITEMS SHOWN IN THIS DRAWING CANNOT START UNTIL THIS DRAWING IS RECEIVED AT HENNIG WITH CUSTOMER APPROVAL.
ANY ALTERATIONS MUST BE INITIALED AND WILL BE SUBJECT TO HENNIG REVIEW.

SIGNED AS APPROVED _____ NAME & TITLE

DATE _____

Right Hand Enclosure



	Qty	Description	Supplied By	Installed By
	1	Double Door, 84" x 84", Key Locking, UL Listed Internal Panic Bar	Hennig	Hennig
RH Only	2	Single Door, 42" x 84", Key Locking,UL Listed Internal Panic Bar	Hennig	Hennig
	1	Discharge Plenum Access Panel	Hennig	Hennig
		14ga. Galvanneald Panels, 4" Mineral Wool Insulation	Hennig	Hennig
	1	Gravity Discharge Damper, EM-31	Hennig	Hennig
	1	Lifting Base w/ 6.6" Recess	Hennig	Hennig
	1	Motorized Intake Damper w/ position switches, 120V, Fail Open (VCD-33)	Hennig	Hennig
	1	Silencer, Hospital Grade, Internally Insulated w/ Condensate Drain	Hennig	Others
	1	Exhaust Extensions w/ Flapper, Carbon Steel	Hennig	Others
	2	Flex Pipe w/ Thermal Insulation Wrap	Hennig	Hennig
	1	UL 142 Rated Fuel Tank, 5,062 Gallons Usable Capacity	Hennig	Hennig
	2	Flex Fuel Lines	Hennig	Hennig
	1	150A Panelboard, 120/208V, 3ph	Hennig	Hennig
	1	45kVA Transformer, 480:120/208-3Ph	Hennig	Hennig
	1	100A Disconnect Switch, 3Ph	Hennig	Hennig
	6	Interior 120VAC LED Lights, 48"L	Hennig	Hennig
	1	Fuel Polishing System	Holt CAT	Hennig
	3	Emergency Lights w/ 90 Minute Battery Pack	Hennig	Hennig
	2	Light Switches w/ Duplex GFCI Outlets	Hennig	Hennig
	1	E-Stop, Push Button	Hennig	Hennig
	1	Ventilation Fan w/ Thermostat	Hennig	Others
	2	5kW Space Heater w/ Thermostat	Hennig	Hennig
	1	120VAC LED Exterior Lights	Hennig	Hennig
	1	Batteries, Battery Chargers, and BBS	Holt CAT	Hennig
	18	Vibration Isolators - Seismic	Holt CAT	Hennig
	1	3,000KW C175-16 Gen-Set	Holt CAT	Hennig
	1	4000A Load Bank Breaker and Cabinet	Holt CAT	Hennig
	1	Radiator, Coolant Fill On-Site by Others	Holt CAT	Hennig

Shipment #1 Weights (Each)			
Enclosure	Base	Generator	Total
23,973	16,651	60,500	101,124

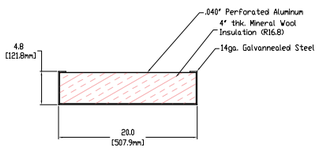
Shipment #2 Weights
Tank
25,000

Shipment #3 Weights
Discharge Plenum Base
7,500

Shipment #4 Weights
Lower Discharge Plenum
3,500

Shipment #5 Weights
Middle Discharge Plenum
3,000

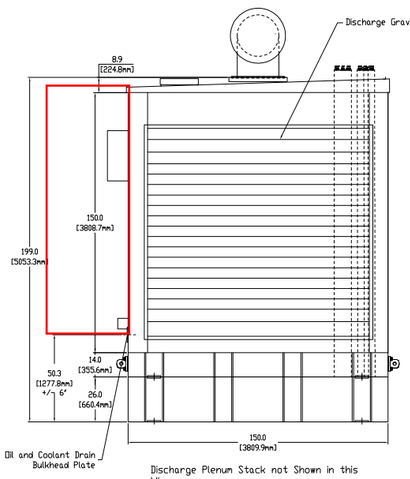
Shipment #6 Weights
Upper Discharge Plenum
3,000



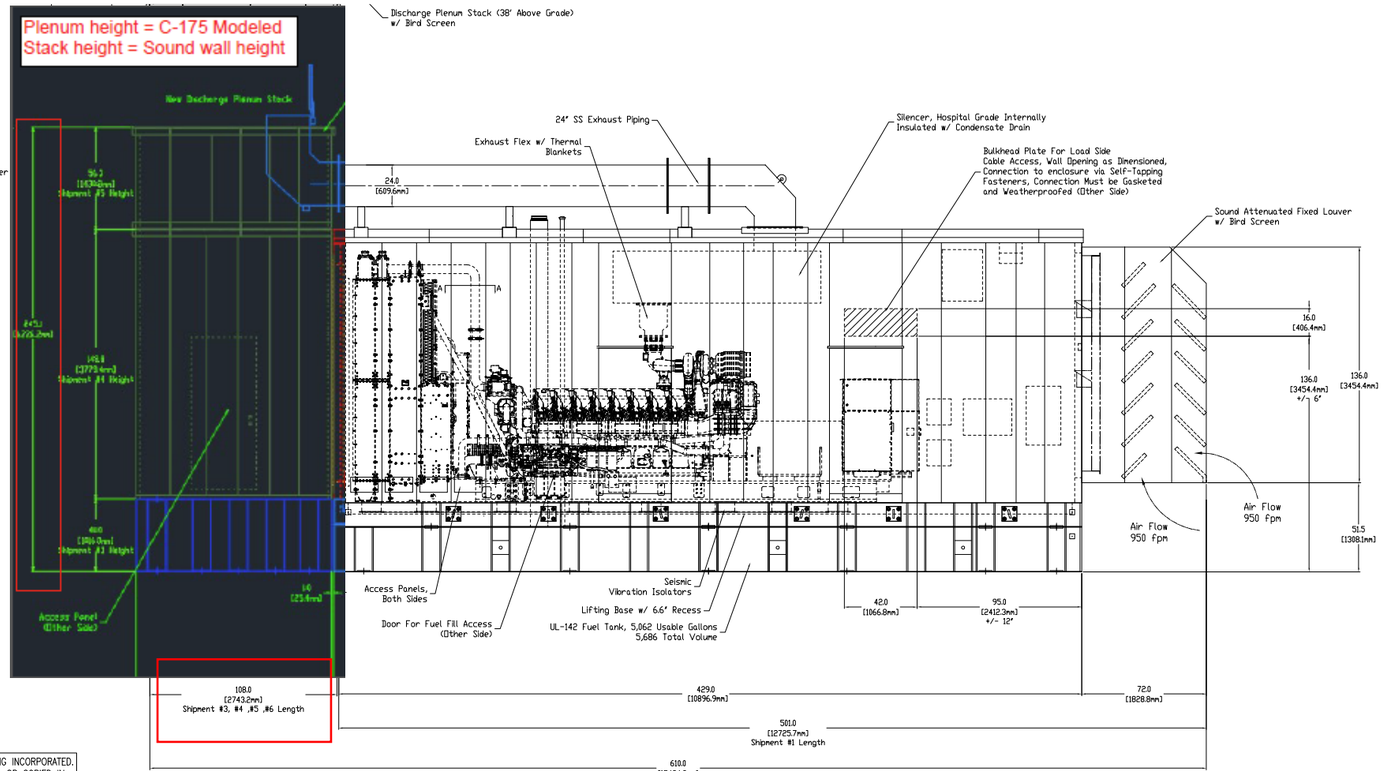
SECTION A-A

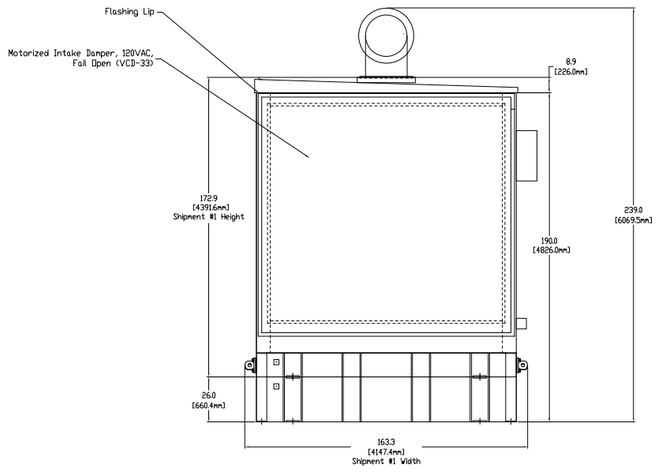
Loose Parts:

- Base/Enclosure/Generator Ship Together
- UL-142 Tank Ships Separate
- Discharge Plenum Stacks and Base Ship Separate
- Exhaust Piping and Flapper
- Ventilation Fan Hood
- Vent Extensions



Discharge Plenum Stack not Shown in this View





Notes:

1. Enclosure Designed for an Average 82 dB(A) @ 3m, 1m above the ground
2. Enclosure Powdercoated RAL 9016
3. Tank Painted RAL 7040 Grey.
4. All Wiring In EMT Conduit Or Raceway.
5. Jacket Heater, Batteries & Battery Charger To Be Installed & Wired At Hennig Ass'y.
6. Designed to 100 mph Wind Resistance, 40 lb/sqft Roof Load.
7. Exhaust Extension Shipped Loose.
8. Designed for 950 fpm Based Upon 124,433 SCFM Generator Cooling and Combustion Air Flow Requirements; .5" wg max.
9. UL 2200 FTPP Listing and Label

HENNIG ENCLOSURE SYSTEMS

Level 2 - Walk-In Enclosure

DRAWN BY	DJT	DATE	2-15-23
CHECKED BY	CG	DATE	2-15-23
ENGINE DISTRIBUTOR	Holt CAT	GENERATOR MODEL	3,000kW C175-16
		DRAWING #	GET-1635 Submittal

DO NOT SCALE THE DRAWING

PERFORMANCE DATA[EM4716]

April 20, 2023

Performance Number: EM4716 **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:	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[EM4716]

April 20, 2023

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[EM4716]

April 20, 2023

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[EM4716]

April 20, 2023

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
5643811	LL2327	5577462	PG296	-	ZNL00001	

Supplementary Data

Type	Classification	Performance Number
ALTITUDE DATA	HIGH RESOLUTION	EM5585

Performance Parameter Reference

Parameters Reference:DM9600-14

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%
Fuel rate +/- 5%
Specific DEF consumption +/- 3%
DEF rate +/- 5%
Heat rejection +/- 5%

PERFORMANCE DATA[EM4716]

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

PERFORMANCE DATA[EM4716]

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 : 10/27/21

PERFORMANCE DATA[DM9933]

February 1, 2023

Performance Number: DM9933 **Change Level: 04**

SALES MODEL:	C32	**COMBUSTION:**	DIRECT INJECTION
BRAND:	CAT	**ENGINE SPEED (RPM):**	1,800
MACHINE SALES MODEL:		**HERTZ:**	60
ENGINE POWER (BHP):	1,474	**FAN POWER (HP):**	56.3
GEN POWER WITH FAN (EKW):	1,000.0	**ASPIRATION:**	TA
COMPRESSION RATIO:	15.0	**AFTERCOOLER TYPE:**	ATAAC
RATING LEVEL:	STANDBY	**AFTERCOOLER CIRCUIT TYPE:**	JW+OC, ATAAC
PUMP QUANTITY:	1	**INLET MANIFOLD AIR TEMP (F):**	120
FUEL TYPE:	DIESEL	**JACKET WATER TEMP (F):**	210.2
MANIFOLD TYPE:	DRY	**TURBO CONFIGURATION:**	PARALLEL
GOVERNOR TYPE:	ADEM4	**TURBO QUANTITY:**	2
ELECTRONICS TYPE:	ADEM4	**TURBOCHARGER MODEL:**	GTB45518BS-52T-1.37
IGNITION TYPE:	CI	**CERTIFICATION YEAR:**	2007
INJECTOR TYPE:	EUI	**PISTON SPD @ RATED ENG SPD (FT/MIN):**	1,913.4
REF EXH STACK DIAMETER (IN):	8		
MAX OPERATING ALTITUDE (FT):	997		

INDUSTRY	SUBINDUSTRY	APPLICATION
ELECTRIC POWER	STANDARD	PACKAGED GENSET
OIL AND GAS	LAND PRODUCTION	PACKAGED GENSET

General Performance Data

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)
EKW	%	BHP	PSI	LB/BHP-HR	LB/BHP-HR	GAL/HR	GAL/HR
1,000.0	100	1,483	333	0.342	0.337	71.5	70.4
900.0	90	1,338	301	0.341	0.336	64.2	63.3
800.0	80	1,195	268	0.348	0.343	58.7	57.9
750.0	75	1,124	252	0.353	0.348	56.0	55.2
700.0	70	1,053	237	0.354	0.349	52.6	51.9
600.0	60	912	205	0.353	0.348	45.4	44.8
500.0	50	772	173	0.350	0.345	38.1	37.5
400.0	40	635	143	0.351	0.346	31.4	30.9
300.0	30	496	111	0.357	0.352	25.0	24.6
250.0	25	426	96	0.363	0.358	21.8	21.5
200.0	20	355	80	0.373	0.367	18.7	18.4
100.0	10	209	47	0.424	0.418	12.5	12.3

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
1,000.0	100	1,483	70.8	118.8	1,214.1	58.6	892.5	76	424.5
900.0	90	1,338	64.3	111.4	1,153.5	52.2	856.8	70	392.7
800.0	80	1,195	60.6	106.7	1,117.9	48.8	833.4	66	375.9
750.0	75	1,124	58.4	104.2	1,102.3	47.0	822.2	63	366.1
700.0	70	1,053	54.2	100.0	1,080.1	43.6	811.1	59	345.5
600.0	60	912	44.3	90.6	1,028.7	35.7	789.8	49	304.7
500.0	50	772	33.5	81.3	968.0	27.4	769.5	37	264.3
400.0	40	635	24.3	74.9	899.7	20.8	733.5	27	224.9
300.0	30	496	16.1	70.5	816.3	15.3	679.6	19	185.5
250.0	25	426	12.3	69.0	768.2	12.9	646.0	15	165.6
200.0	20	355	8.9	67.9	713.3	10.7	605.3	11	147.2
100.0	10	209	4.5	67.5	572.6	7.8	491.3	6	123.0

General Performance Data (Continued)

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	WET INLET AIR VOL FLOW RATE	ENGINE OUTLET WET EXH GAS VOL FLOW RATE	WET INLET AIR MASS FLOW RATE	WET EXH GAS MASS FLOW RATE	WET EXH VOL FLOW RATE (32 DEG F AND 29.98 IN HG)	DRY EXH VOL FLOW RATE (32 DEG F AND 29.98 IN HG)
EKW	%	BHP	CFM	CFM	LB/HR	LB/HR	FT3/MIN	FT3/MIN
1,000.0	100	1,483	3,105.2	8,115.3	13,517.7	14,024.8	2,950.9	2,698.6

PERFORMANCE DATA[DM9933]

February 1, 2023

900.0	90	1,338	2,944.7	7,443.4	12,775.8	13,231.6	2,780.0	2,550.6
800.0	80	1,195	2,860.8	7,069.3	12,380.1	12,796.7	2,687.9	2,475.7
750.0	75	1,124	2,799.4	6,858.4	12,094.1	12,491.0	2,630.6	2,427.3
700.0	70	1,053	2,654.6	6,439.5	11,425.3	11,795.7	2,491.4	2,301.6
600.0	60	912	2,369.9	5,618.4	10,126.3	10,445.3	2,210.8	2,046.3
500.0	50	772	2,090.3	4,815.2	8,871.8	9,141.4	1,926.2	1,786.0
400.0	40	635	1,819.3	4,039.9	7,654.2	7,876.2	1,664.7	1,547.4
300.0	30	496	1,549.9	3,272.7	6,487.7	6,664.2	1,412.4	1,317.4
250.0	25	426	1,414.6	2,888.8	5,920.9	6,075.3	1,284.6	1,200.7
200.0	20	355	1,292.4	2,528.2	5,413.4	5,545.9	1,167.2	1,094.3
100.0	10	209	1,149.4	1,989.9	4,805.1	4,893.7	1,028.8	975.8

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
1,000.0	100	1,483	20,153	7,292	58,664	32,275	8,277	16,551	62,887	155,406	165,547
900.0	90	1,338	18,470	6,522	52,678	28,324	7,440	14,394	56,743	139,692	148,807
800.0	80	1,195	16,970	5,949	49,043	26,036	6,799	13,345	50,677	127,654	135,984
750.0	75	1,124	16,223	6,124	47,027	24,781	6,486	12,683	47,666	121,777	129,723
700.0	70	1,053	15,326	6,876	43,772	22,824	6,093	11,231	44,653	114,394	121,858
600.0	60	912	13,529	6,786	37,588	19,231	5,263	8,681	38,675	98,811	105,259
500.0	50	772	11,822	5,357	31,812	16,013	4,411	6,504	32,735	82,825	88,230
400.0	40	635	10,869	4,421	25,935	12,562	3,637	4,598	26,908	68,277	72,732
300.0	30	496	9,934	3,738	20,129	9,084	2,892	2,986	21,049	54,294	57,837
250.0	25	426	9,352	3,463	17,322	7,412	2,525	2,290	18,081	47,414	50,508
200.0	20	355	8,620	3,178	14,651	5,809	2,162	1,718	15,065	40,584	43,232
100.0	10	209	6,683	2,334	9,950	2,795	1,444	1,067	8,853	27,118	28,888

Emissions Data

DIESEL

RATED SPEED NOMINAL DATA: 1800 RPM

GENSET POWER WITH FAN		EKW	1,000.0	750.0	500.0	250.0	100.0
PERCENT LOAD		%	100	75	50	25	10
ENGINE POWER		BHP	1,483	1,124	772	426	209
TOTAL NOX (AS NO2)		G/HR	7,256	4,250	2,777	1,877	1,108
TOTAL CO		G/HR	192	123	265	435	672
TOTAL HC		G/HR	19	55	53	40	80
TOTAL CO2		KG/HR	726	568	384	219	125
PART MATTER		G/HR	26.9	19.9	34.3	53.7	43.0
TOTAL NOX (AS NO2)	(CORR 5% O2)	MG/NM3	2,346.5	1,746.8	1,683.5	2,004.0	1,999.0
TOTAL CO	(CORR 5% O2)	MG/NM3	62.1	49.6	159.5	470.0	1,358.8
TOTAL HC	(CORR 5% O2)	MG/NM3	5.4	19.7	27.7	36.7	147.6
PART MATTER	(CORR 5% O2)	MG/NM3	7.3	6.9	17.8	53.8	69.4
TOTAL NOX (AS NO2)	(CORR 5% O2)	PPM	1,143	851	820	976	974
TOTAL CO	(CORR 5% O2)	PPM	50	40	128	376	1,087
TOTAL HC	(CORR 5% O2)	PPM	10	37	52	68	275
TOTAL NOX (AS NO2)		G/HP-HR	4.93	3.81	3.61	4.41	5.32
TOTAL CO		G/HP-HR	0.13	0.11	0.34	1.02	3.22
TOTAL HC		G/HP-HR	0.01	0.05	0.07	0.09	0.38
PART MATTER		G/HP-HR	0.02	0.02	0.04	0.13	0.21
TOTAL NOX (AS NO2)		LB/HR	16.00	9.37	6.12	4.14	2.44
TOTAL CO		LB/HR	0.42	0.27	0.58	0.96	1.48
TOTAL HC		LB/HR	0.04	0.12	0.12	0.09	0.18
TOTAL CO2		LB/HR	1,600	1,252	847	484	275
PART MATTER		LB/HR	0.06	0.04	0.08	0.12	0.09
OXYGEN IN EXH		%	10.0	11.4	12.2	13.4	15.7
DRY SMOKE OPACITY		%	0.7	0.7	1.3	3.0	2.2

PERFORMANCE DATA[DM9933]

BOSCH SMOKE NUMBER		0.18	0.16	0.57	1.30	1.00

RATED SPEED POTENTIAL SITE VARIATION: 1800 RPM

GENSET POWER WITH FAN		**EKW**	**1,000.0**	**750.0**	**500.0**	**250.0**	**100.0**
PERCENT LOAD		**%**	**100**	**75**	**50**	**25**	**10**
ENGINE POWER		**BHP**	**1,483**	**1,124**	**772**	**426**	**209**
TOTAL NOX (AS NO2)		G/HR	8,780	5,143	3,360	2,272	1,341
TOTAL CO		G/HR	359	231	495	813	1,256
TOTAL HC		G/HR	36	104	100	76	151
PART MATTER		G/HR	52.5	38.7	66.9	104.7	83.8
TOTAL NOX (AS NO2)	(CORR 5% O2)	MG/NM3	2,839.3	2,113.6	2,037.0	2,424.8	2,418.8
TOTAL CO	(CORR 5% O2)	MG/NM3	116.2	92.7	298.2	879.0	2,541.0
TOTAL HC	(CORR 5% O2)	MG/NM3	10.2	37.3	52.3	69.3	278.9
PART MATTER	(CORR 5% O2)	MG/NM3	14.2	13.4	34.8	104.9	135.3
TOTAL NOX (AS NO2)	(CORR 5% O2)	PPM	1,383	1,030	992	1,181	1,178
TOTAL CO	(CORR 5% O2)	PPM	93	74	239	703	2,033
TOTAL HC	(CORR 5% O2)	PPM	19	70	98	129	521
TOTAL NOX (AS NO2)		G/HP-HR	5.97	4.60	4.37	5.34	6.43
TOTAL CO		G/HP-HR	0.24	0.21	0.64	1.91	6.03
TOTAL HC		G/HP-HR	0.02	0.09	0.13	0.18	0.73
PART MATTER		G/HP-HR	0.04	0.03	0.09	0.25	0.40
TOTAL NOX (AS NO2)		LB/HR	19.36	11.34	7.41	5.01	2.96
TOTAL CO		LB/HR	0.79	0.51	1.09	1.79	2.77
TOTAL HC		LB/HR	0.08	0.23	0.22	0.17	0.33
PART MATTER		LB/HR	0.12	0.09	0.15	0.23	0.18

Regulatory Information

EPA TIER 2		**2006 - 2010**		
GASEOUS EMISSIONS DATA MEASUREMENTS PROVIDED TO THE EPA ARE CONSISTENT WITH THOSE DESCRIBED IN EPA 40 CFR PART 89 SUBPART D 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 NON-ROAD REGULATIONS.				
Locality	**Agency**	**Regulation**	**Tier/Stage**	**Max Limits - G/BKW - HR**
U.S. (INCL CALIF)	EPA	NON-ROAD	TIER 2	CO: 3.5 NOx + HC: 6.4 PM: 0.20

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

STANDARD

ALTITUDE CORRECTED POWER CAPABILITY (BHP)

AMBIENT OPERATING TEMP (F)	**50**	**60**	**70**	**80**	**90**	**100**	**110**	**120**	**130**	**NORMAL**
ALTITUDE (FT)										
0	1,474	1,474	1,474	1,474	1,474	1,468	1,442	1,417	1,393	1,474
1,000	1,474	1,474	1,474	1,466	1,439	1,413	1,388	1,364	1,341	1,474
2,000	1,474	1,465	1,438	1,411	1,385	1,360	1,336	1,314	1,291	1,434
3,000	1,438	1,410	1,383	1,358	1,333	1,309	1,286	1,264	1,242	1,389
4,000	1,383	1,356	1,331	1,306	1,282	1,259	1,237	1,216	1,195	1,345
5,000	1,330	1,304	1,280	1,256	1,233	1,211	1,190	1,169	1,149	1,302
6,000	1,278	1,254	1,230	1,207	1,185	1,164	1,144	1,124	1,105	1,260
7,000	1,228	1,205	1,182	1,160	1,139	1,119	1,099	1,080	1,062	1,220
8,000	1,180	1,157	1,135	1,114	1,094	1,074	1,056	1,037	1,020	1,180
9,000	1,133	1,111	1,090	1,070	1,050	1,032	1,014	996	979	1,141

PERFORMANCE DATA[DM9933]

10,000	1,087	1,066	1,046	1,027	1,008	990	973	956	940	1,103
11,000	1,043	1,023	1,004	985	967	950	933	917	902	1,066
12,000	1,001	981	963	945	928	911	895	880	865	1,029
13,000	959	941	923	906	889	874	858	843	829	994
14,000	919	901	884	868	852	837	822	808	794	959
15,000	880	863	847	831	816	802	788	774	761	926

Cross Reference

Test Spec	Setting	Engine Arrangement	Engineering Model	Engineering Model Version	Start Effective Serial Number	End Effective Serial Number
0K8987	PP6050	2537557	GS277	-	SYC00001	
0K7838	GG0346	3208618	GS490	-	JDB00001	
0K8987	PP6050	3249750	GS277	-	SYC00001	
0K8987	PP6050	3367659	GS471	-	PRH00001	
0K8987	PP6050	3801431	GS471	-	PRH00001	
0K8987	PP6050	4391323	GS471	-	PRH03719	
0K8987	PP6050	4447558	GS471	-	PRH00001	
0K8987	PP6050	4447562	GS471	-	PRH00001	
0K8987	PP6050	5233431	GS471	-	PRH00001	
0K8987	PP6050	5612763	GS471	DK	PRH00001	
0K8987	PP6050	6034725	PG457	-	PRH00001	

Performance Parameter Reference

Parameters Reference:DM9600-14

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%
Fuel rate +/- 5%
Specific DEF consumption +/- 3%
DEF rate +/- 5%
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

PERFORMANCE DATA[DM9933]

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,

PERFORMANCE DATA[DM9933]

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 : 10/27/21

Austin • Brownsville • Corpus Christi • Dallas • Edinburg • Ft Worth • Laredo • Longview • Pflugerville • San Antonio • Victoria • Waco

Submittal

Project Name: Aligned Energy PDX01-1 House Gen 1000kW
Project Number: 23-0050
Contractor: **Aligned Energy**

Standby Power Generator System
(1) Caterpillar Generator Set
Model: C32 1000kW, 480/277 VAC, 3 PH, 60 Hz

Submitted by:
HOLT CAT
Power Systems Division
5665 SE Loop
San Antonio, TX 78222-3903
Holt Cat ID: SE220754
Represented by:

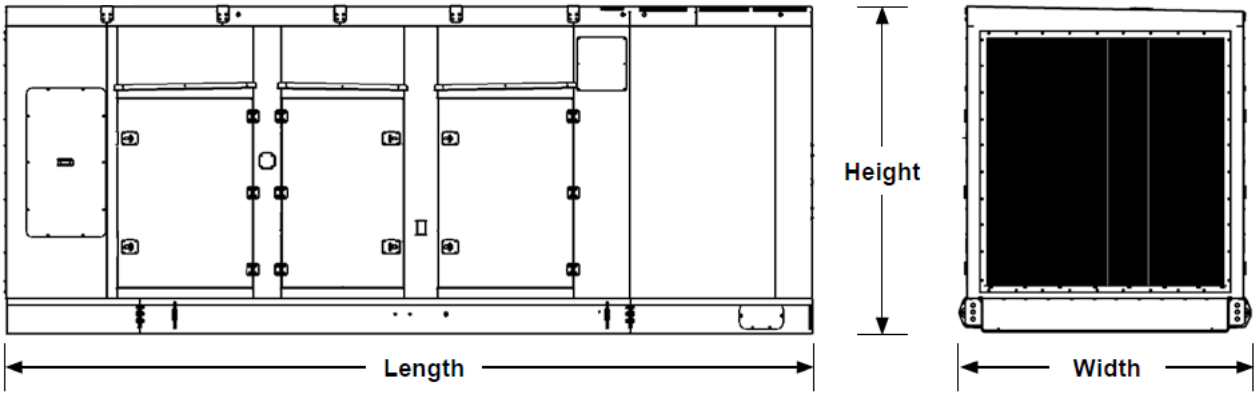
Chris Autry
Sales Representative
469.586.9551
Christopher.Autry@holtcat.com

Tinotenda Charuma
Project Manager
214-808-3466
Tino.Charuma@holtcat.com

This submittal was prepared based on the customer quote and is to meet the intent of the customer supplied specification.

. .

Enclosure Weights and Dimensions



Note: For reference only – do not use for installation design. Please contact your dealer for exact weights and dimensions.

Enclosure Base Options	Weight		Length		Width		Height	
	kg	lbs	mm	in	mm	in	mm	in
With Lifting Base	3500	7716	7010	276	2554	101	2844	112
With 1000 gal integral tank base	5920	13,051	7645	301	2554	101	3213	127
With 2000 gal integral tank base	6050	13,338	7645	301	2554	101	3213	127
With 3600 gal tank with lifting base	7000	15,432	9750	384	2554	101	3759	148

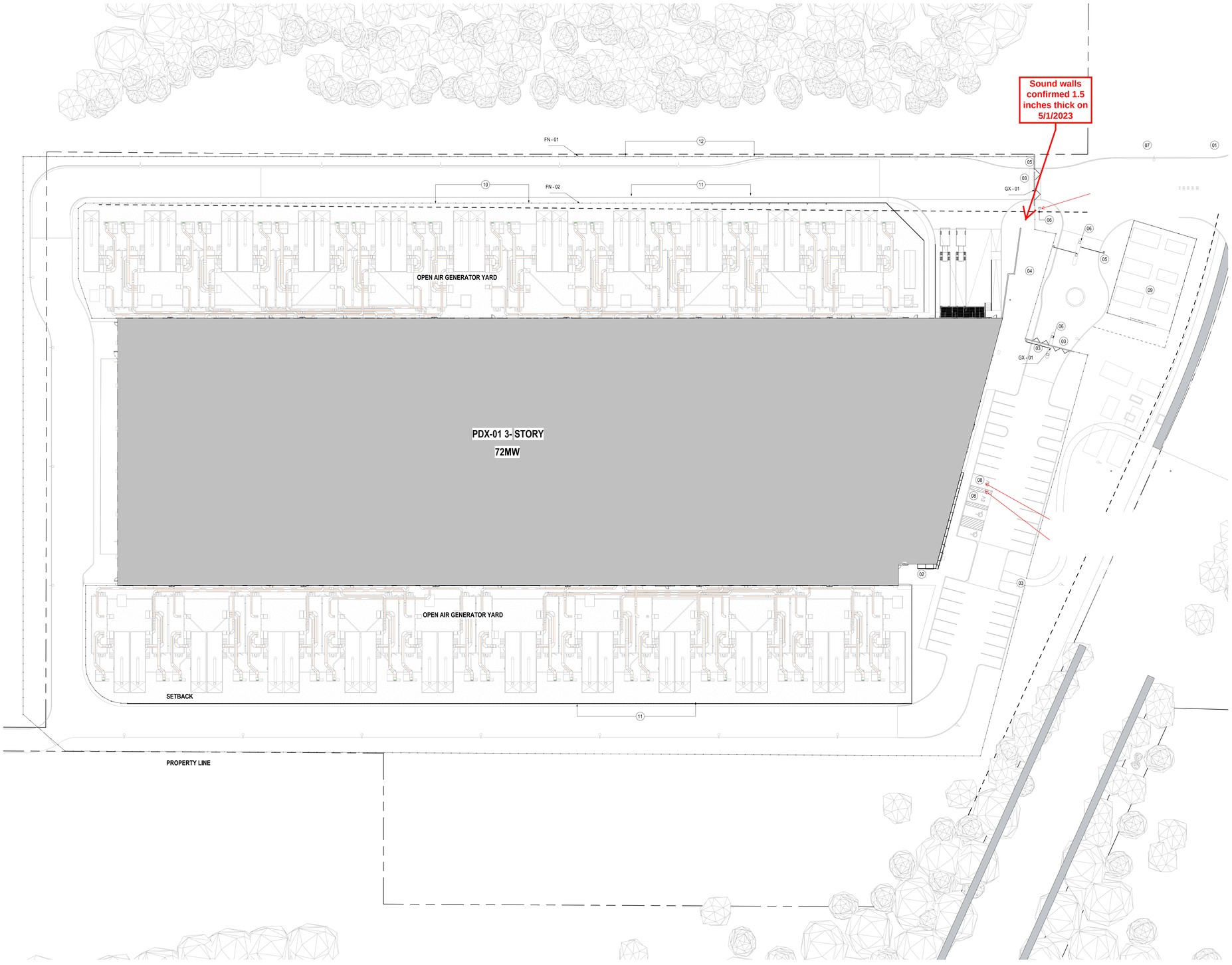
*Weight does not include package generator set weight.

	Generator Set Wights**	
	kg	lbs
C27 Open Generator Set	6622	14,600
C32 Open Generator Set	6668	14,700

**Dry Weight

Note: For reference only - do not use for installation design. Please contact your dealer for exact weights and dimensions.

LET'S DO THE WORK.™



1 SITE PLAN - ENLARGED
SCALE: 1" = 30'-0"

EXTERIOR SECURITY ACCESS SCHEDULE

DESIGNATION	MATERIAL DESCRIPTION	SPEC SECTION	MANUFACTURER	PRODUCT	NOTES
GX - 01	ENTRANCE SWING GATE	32 31 13	BAVAK SPEEDGATE B	SMART SWING BATTERY OPERATED	PER BOD
GX - 02	ENTRANCE BARRIER ARM	32 31 13	STRONG ARM	ANTI TAIL GATE BARRIER ARM	CONTRACTIOR FURNISH/ INCLUDING STRONGARM CONTROL BOX - OWNER TO CONFIRM THE SPECIFICATION
GX - 03	SITE TRUNSTILE	11 14 13	TBD	SECURED PEDESTRIAN ENTRY TRUNSTILE	CONTRACTIOR FURNISH - OWNER TO CONFIRM THE SPECIFICATION
GX - 04	SWITCH YARD SLIDING GATE	32 31 13	TBD	MANUAL ACCESS GATE WITH PADLOCK	
FN - 01	PERIMETER SITE FENCE		AMERISTAR MONTAGE CLASSIC		
FN - 02	YARD FENCE		TBD		

GENERAL NOTES

A. INFORMATION ON THIS DRAWING WAS DERIVED FROM INFORMATION IN SURVEY DATA PROVIDED BY CIVIL.
B. DASHED LINES IN GRAYSCALE REPRESENT EXISTING EASEMENTS.
C. DRAWING SHOWN FOR REFERENCE ONLY. REFER TO CIVIL DRAWINGS FOR ADDITIONAL INFO.
D. CONSTRUCTION SHALL COMMENCE IN ACCORDANCE WITH IBC CH. 33 SAFEGUARDS DURING CONSTRUCTION.
E. GAPS IN SHEET NOTE NUMBERING SEQUENCE IN LIST ABOVE (AS MAY OCCUR) ARE INTENTIONAL. SHEET NOTES NOT SHOWN IN LIST ARE NOT USED ON THIS SHEET.

SHEET NOTES

01 MONUMENT SIGN TYP DETAIL REFER ELECTRICAL FOR POWER REQUIREMENT
02 ADMIN ENTRANCE REFER CONSTRUCTION PLANS
03 VEHICLE BI FOLD GATE, BY OTHERS
04 LOADING DOCK SCREEN WALL - 25' TALL IMP WALL
05 GATE AND GATE BARRIER ARM OPERATOR REFERE ELECTRICAL AND SEURITY DRAWINGS
06 INTERCOM AND CARD READER LOCATION REFER SECURITY DRAWING
07 SITE LIGHTIN REFER ELECTRICAL
08 EV CHARGER, TYP. REFER ELECTRICAL FOR POWER REQUIREMENTS
09 SWITCH GEAR YARD REFER ELECTRICAL
10 CHAINLINK YARD FENCE - 6' TALL
11 GEN YARD SCREEN WALL, 20' TALL REFER ARCHITECTURE DETAIL
12 CHAINLINK PERIMETER FENCE

ALIGNED DATA CENTER

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Gensler

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Suite 150 - #5981
Neptune, NJ 07753
Tel 732.774.2000

Harper Houf Peterson Righellis Inc.
CIVIL
205 SE SPOKANE ST
SUITE 200
PORTLAND, OR 97202
Tel 503.221.1131

△	Date	Description
1	03/03/2023	ISSUED FOR SCHEMATIC DESIGN
3	05/05/2023	ISSUED FOR DESIGN DEVELOPMENT

Seal / Signature

PROGRESS SET NOT FOR CONSTRUCTION

Project Name
Aligned PDX01

Project Number
006.4658.000

Description
SITE PLAN - ENLARGED

Scale
1" = 30'-0"

AS0.1.

DRAWING NO. _____ OF _____

5/5/2023 1:42:26 PM

APPENDIX C. URBAN DETERMINATION

EJSCREEN ACS Summary Report

Location: User-specified point center at 45.551180, -122.948320
Ring (buffer): 10-kilometers radius
Description:

Summary of ACS Estimates	2016 - 2020
Population	237,036
Population Density (per sq. mile)	1,976
People of Color Population	103,072
% People of Color Population	43%
Households	84,290
Housing Units	87,578
Housing Units Built Before 1950	3,081
Per Capita Income	38,881
Land Area (sq. miles) (Source: SF1)	119.97
% Land Area	100%
Water Area (sq. miles) (Source: SF1)	0.06
% Water Area	0%

	2016 - 2020 ACS Estimates	Percent	MOE (±)
Population by Race			
Total	237,036	100%	1,951
Population Reporting One Race	217,885	92%	4,363
White	157,379	66%	1,935
Black	6,326	3%	578
American Indian	1,738	1%	188
Asian	34,449	15%	678
Pacific Islander	1,086	0%	311
Some Other Race	16,906	7%	673
Population Reporting Two or More Races	19,151	8%	796
Total Hispanic Population	49,378	21%	1,271
Total Non-Hispanic Population	187,658		
White Alone	133,964	57%	1,925
Black Alone	6,107	3%	578
American Indian Alone	688	0%	117
Non-Hispanic Asian Alone	34,240	14%	678
Pacific Islander Alone	1,072	0%	311
Other Race Alone	520	0%	361
Two or More Races Alone	11,067	5%	340
Population by Sex			
Male	117,990	50%	1,178
Female	119,046	50%	963
Population by Age			
Age 0-4	15,546	7%	406
Age 0-17	56,885	24%	797
Age 18+	180,150	76%	739
Age 65+	26,953	11%	437

Data Note: Detail may not sum to totals due to rounding. Hispanic population can be of any race.
N/A means not available. **Source:** U.S. Census Bureau, American Community Survey (ACS) 2016 - 2020 .

EJSCREEN ACS Summary Report

Location: User-specified point center at 45.551180, -122.948320
Ring (buffer): 10-kilometers radius
Description:

	2016 - 2020 ACS Estimates	Percent	MOE (±)
Population 25+ by Educational Attainment			
Total	160,271	100%	934
Less than 9th Grade	7,689	5%	394
9th - 12th Grade, No Diploma	6,653	4%	298
High School Graduate	29,623	18%	366
Some College, No Degree	32,837	20%	360
Associate Degree	15,132	9%	488
Bachelor's Degree or more	68,337	43%	495
Population Age 5+ Years by Ability to Speak English			
Total	221,489	100%	1,785
Speak only English	152,772	69%	1,299
Non-English at Home[1+2+3+4]	68,717	31%	1,013
[1]Speak English "very well"	44,534	20%	601
[2]Speak English "well"	13,765	6%	488
[3]Speak English "not well"	7,958	4%	401
[4]Speak English "not at all"	2,460	1%	236
[3+4]Speak English "less than well"	10,418	5%	401
[2+3+4]Speak English "less than very well"	24,183	11%	631
Linguistically Isolated Households*			
Total	3,980	100%	210
Speak Spanish	1,819	46%	210
Speak Other Indo-European Languages	537	14%	109
Speak Asian-Pacific Island Languages	1,566	39%	74
Speak Other Languages	57	1%	62
Households by Household Income			
Household Income Base	84,290	100%	432
< $15,000	3,823	5%	326
$15,000 - $25,000	3,882	5%	208
$25,000 - $50,000	13,084	16%	275
$50,000 - $75,000	15,001	18%	253
$75,000 +	48,501	58%	451
Occupied Housing Units by Tenure			
Total	84,290	100%	432
Owner Occupied	49,720	59%	411
Renter Occupied	34,570	41%	387
Employed Population Age 16+ Years			
Total	186,262	100%	1,151
In Labor Force	130,320	70%	934
Civilian Unemployed in Labor Force	6,123	3%	450
Not In Labor Force	55,941	30%	736

Data Note: Datail may not sum to totals due to rounding. Hispanic population can be of anyrace.
N/A means not available. **Source:** U.S. Census Bureau, American Community Survey (ACS)
*Households in which no one 14 and over speaks English "very well" or speaks English only.

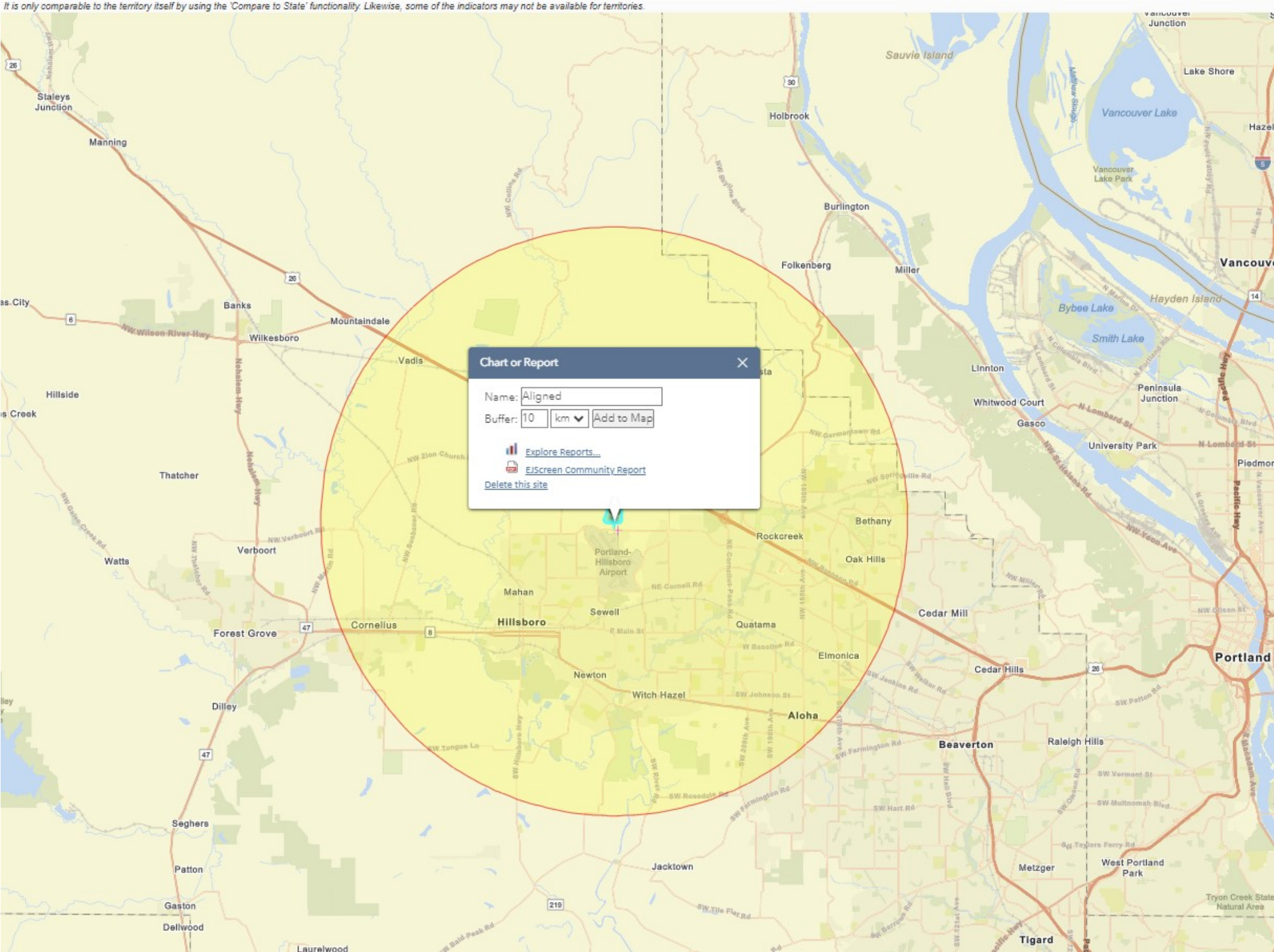
EJSCREEN ACS Summary Report

Location: User-specified point center at 45.551180, -122.948320
Ring (buffer): 10-kilometers radius
Description:

	2016 - 2020 ACS Estimates	Percent	MOE (±)
Population by Language Spoken at Home*			
Total (persons age 5 and above)	218,737	100%	1,741
English	150,552	69%	1,832
Spanish	32,741	15%	1,480
French, Haitian, or Cajun	755	0%	407
German or other West Germanic	1,145	1%	258
Russian, Polish, or Other Slavic	2,191	1%	297
Other Indo-European	8,153	4%	429
Korean	2,357	1%	338
Chinese (including Mandarin, Cantonese)	3,762	2%	347
Vietnamese	3,173	1%	386
Tagalog (including Filipino)	1,975	1%	484
Other Asian and Pacific Island	8,596	4%	479
Arabic	1,404	1%	492
Other and Unspecified	1,932	1%	494
Total Non-English	68,185	31%	2,527

Data Note: Detail may not sum to totals due to rounding. Hispanic popultion can be of any race.
N/A meansnot available. **Source:** U.S. Census Bureau, American Community Survey (ACS) 2016 - 2020.
*Population by Language Spoken at Home is available at the census tract summary level and up.

It is only comparable to the territory itself by using the 'Compare to State' functionality. Likewise, some of the indicators may not be available for territories.



EJScreen Report (Version 2.1)

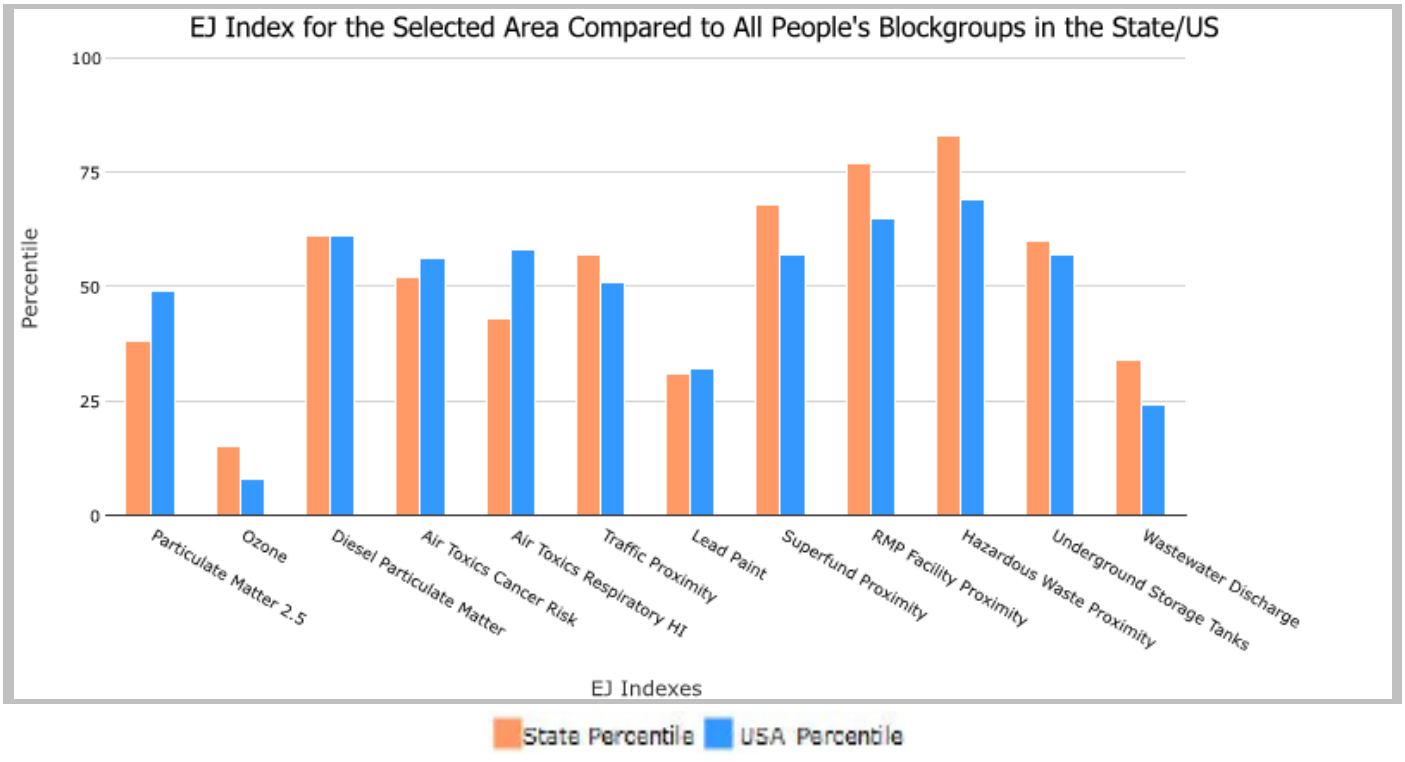
3 kilometers Ring Centered at 45.551143,-122.948341, OREGON, EPA Region 10

Approximate Population: 14,206

Input Area (sq. miles): 10.91

(The study area contains 4 blockgroup(s) with zero population.)

Selected Variables	State Percentile	USA Percentile
Environmental Justice Indexes		
EJ Index for Particulate Matter 2.5	38	49
EJ Index for Ozone	15	8
EJ Index for Diesel Particulate Matter*	61	61
EJ Index for Air Toxics Cancer Risk*	52	56
EJ Index for Air Toxics Respiratory HI*	43	58
EJ Index for Traffic Proximity	57	51
EJ Index for Lead Paint	31	32
EJ Index for Superfund Proximity	68	57
EJ Index for RMP Facility Proximity	77	65
EJ Index for Hazardous Waste Proximity	83	69
EJ Index for Underground Storage Tanks	60	57
EJ Index for Wastewater Discharge	34	24



This report shows the values for environmental and demographic indicators and EJSCREEN indexes. It shows environmental and demographic raw data (e.g., the estimated concentration of ozone in the air), and also shows what percentile each raw data value represents. These percentiles provide perspective on how the selected block group or buffer area compares to the entire state, EPA region, or nation. For example, if a given location is at the 95th percentile nationwide, this means that only 5 percent of the US population has a higher block group value than the average person in the location being analyzed. The years for which the data are available, and the methods used, vary across these indicators. Important caveats and uncertainties apply to this screening-level information, so it is essential to understand the limitations on appropriate interpretations and applications of these indicators. Please see EJSCREEN documentation for discussion of these issues before using reports.

EJScreen Report (Version 2.1)

3 kilometers Ring Centered at 45.551143,-122.948341, OREGON, EPA Region 10

Approximate Population: 14,206

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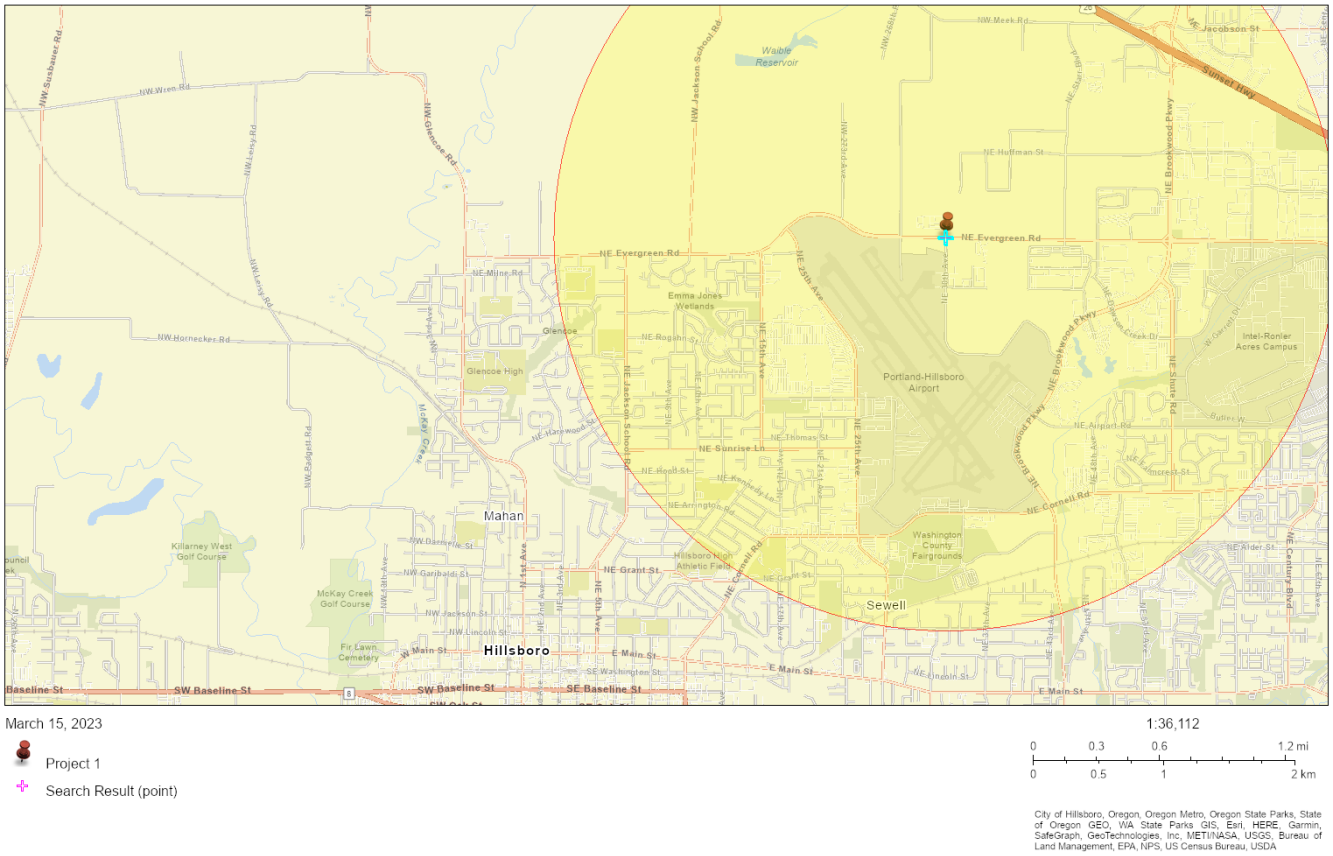


Sites reporting to EPA	
Superfund NPL	0
Hazardous Waste Treatment, Storage, and Disposal Facilities (TSDF)	10

EJScreen Report (Version 2.1)

3 kilometers Ring Centered at 45.551143,-122.948341, OREGON, EPA Region 10

Approximate Population: 14,206

Input Area (sq. miles): 10.91

(The study area contains 4 blockgroup(s) with zero population.)

Selected Variables	Value	State Avg.	%ile in State	USA Avg.	%ile in USA
Pollution and Sources					
Particulate Matter 2.5 (µg/m^3)	8.34	8.69	29	8.67	43
Ozone (ppb)	32.6	37	10	42.5	6
Diesel Particulate Matter* (µg/m^3)	0.32	0.337	52	0.294	60-70th
Air Toxics Cancer Risk* (lifetime risk per million)	30	32	59	28	80-90th
Air Toxics Respiratory HI*	0.4	0.47	42	0.36	80-90th
Traffic Proximity (daily traffic count/distance to road)	250	660	53	760	51
Lead Paint (% Pre-1960 Housing)	0.071	0.24	26	0.27	30
Superfund Proximity (site count/km distance)	0.064	0.081	58	0.13	52
RMP Facility Proximity (facility count/km distance)	1.2	0.78	78	0.77	80
Hazardous Waste Proximity (facility count/km distance)	5.1	1.6	92	2.2	87
Underground Storage Tanks (count/km^2)	2.5	3.8	58	3.9	63
Wastewater Discharge (toxicity-weighted concentration/m distance)	3.2E-05	0.0046	36	12	24
Socioeconomic Indicators					
Demographic Index	27%	27%	58	35%	47
People of Color	33%	25%	76	40%	54
Low Income	21%	29%	36	30%	39
Unemployment Rate	4%	5%	48	5%	51
Limited English Speaking Households	4%	2%	83	5%	73
Less Than High School Education	7%	9%	54	12%	46
Under Age 5	6%	5%	62	6%	57
Over Age 64	13%	18%	34	16%	39

*Diesel particular matter, air toxics cancer risk, and air toxics respiratory hazard index are from the EPA's Air Toxics Data Update, which is the Agency's ongoing, comprehensive evaluation of air toxics in the United States. This effort aims to prioritize air toxics, emission sources, and locations of interest for further study. It is important to remember that the air toxics data presented here provide broad estimates of health risks over geographic areas of the country, not definitive risks to specific individuals or locations. Cancer risks and hazard indices from the Air Toxics Data Update are reported to one significant figure and any additional significant figures here are due to rounding. More information on the Air Toxics Data Update can be found at: https://www.epa.gov/haps/air-toxics-data-update.

For additional information, see: www.epa.gov/environmentaljustice

EJScreen is a screening tool for pre-decisional use only. It can help identify areas that may warrant additional consideration, analysis, or outreach. It does not provide a basis for decision-making, but it may help identify potential areas of EJ concern. Users should keep in mind that screening tools are subject to substantial uncertainty in their demographic and environmental data, particularly when looking at small geographic areas. Important caveats and uncertainties apply to this screening-level information, so it is essential to understand the limitations on appropriate interpretations and applications of these indicators. Please see EJScreen documentation for discussion of these issues before using reports. This screening tool does not provide data on every environmental impact and demographic factor that may be relevant to a particular location. EJScreen outputs should be supplemented with additional information and local knowledge before taking any action to address potential EJ concerns.

APPENDIX D. EMISSION CALCULATIONS

Oregon DEQ Form AQ520 for the emission inventory is submitted in a separate electronic copy using a Microsoft Excel file.

APPENDIX E. MODELED SOURCE PARAMETERS

This appendix is supplied to Oregon DEQ in a separate electronic copy using a Microsoft Excel file.

APPENDIX F. SCREENING REER CALCULATIONS

This appendix is supplied to Oregon DEQ in a separate electronic copy using a Microsoft Excel file.

APPENDIX G. SCREENING RESULTS

This appendix is supplied to Oregon DEQ in a separate electronic copy using a Microsoft Excel file.

APPENDIX H. EXPOSURE LOCATION DETERMINATION

Trinity Consultants
8705 SW Nimbus Ave, Ste 350, Beaverton, OR 97008 / P 503.713.5550 / **trinityconsultants.com**

July 7, 2023

Owen Rudloff
Department of Environmental Quality
Northwest Region, Air Quality
700 NE Multnomah Street, Suite 600
Portland, Oregon 97232
Owen.RUDLOFF@deq.oregon.gov

RE: Aligned Hillsboro Data Center Cross Walk Receptor Designations

Owen,

Please see the following exposure locations summary and description of methodology for Aligned Data Centers in Hillsboro, Oregon. Note that this crosswalk is being submitted in advance of the Air Contaminant Discharge Permit application and Cleaner Air Oregon (CAO) Risk Assessment Work Plan per call with DEQ on June 9th, 2023, in order to gain confirmation and streamline approval process.

EXPOSURE LOCATIONS

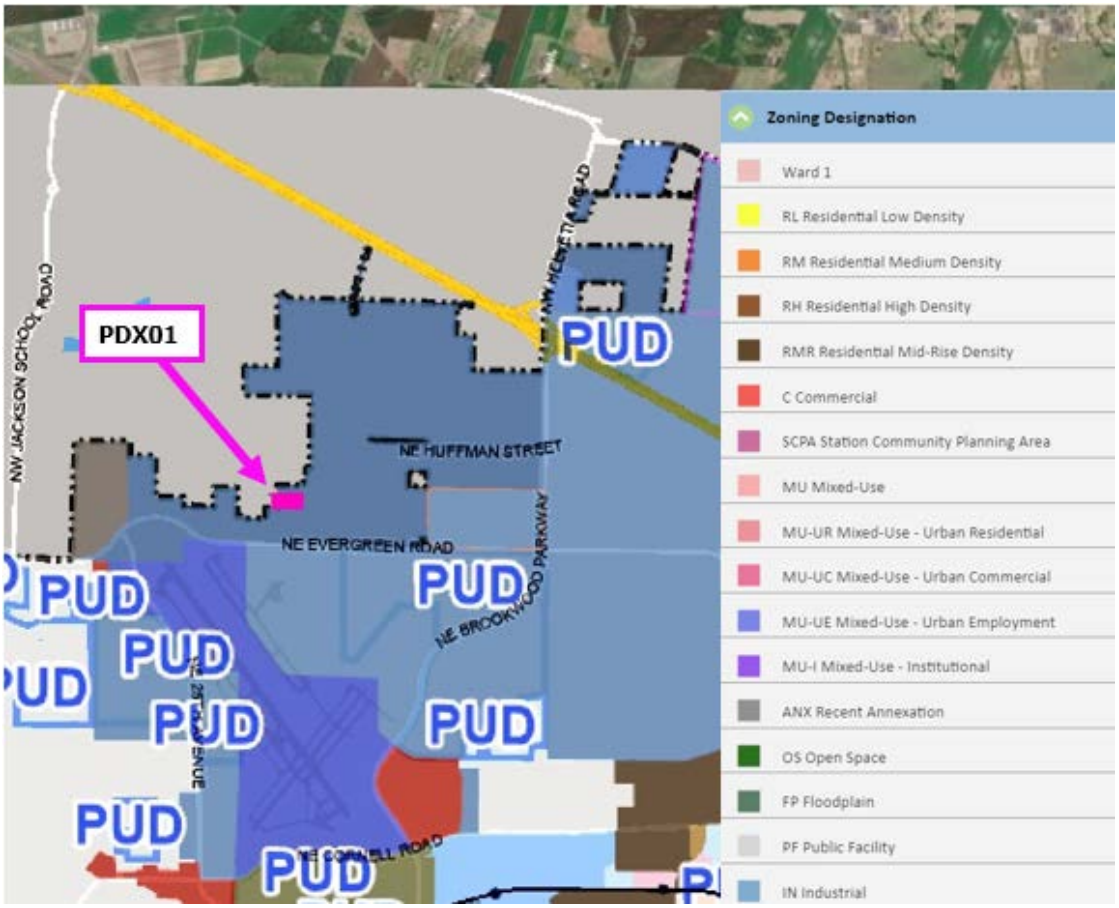
To determine the receptor type for exposure outside of Hillsboro city boundaries, the "Oregon State Zoning – 2017" provided by the Oregon Spatial Data Library[1] will be utilized as state zoning data, a recommended starting point for exposure location determination by the Oregon DEQ. For receptors within 1.5 km of the facility, Hillsboro City Zoning Maps will be deferred to for receptor designations, as these zoning boundaries represent more accurate and updated data.[2] For each zoning classification, Aligned will use the Oregon DEQ-provided "Cleaner Air Oregon State Zoning to Exposure Location Crosswalk" guide to determine exposure locations. Receptors within state zoning categories with multiple options for recommended exposure locations including "Exclusive Farm Use", "Marginal Farm Land", and Mixed Farm-Forest" will be treated as residential receptors for the sake of conservatism.

The facility is located in the City of Hillsboro which has a mix of zoning and is immediately surrounded by industrial-zoned areas to the east south, and north of the facility. Areas to the north and west are outside of city jurisdiction and designated residential. After review of satellite imagery, this assumption has been retained for both conservatism and consistency with state designations despite family homes being widely dispersed amongst farmlands. Institutional, commercial, and community boundary zones are also within 1.5 km of the facility. Institutional in this instance has been assigned worker / industrial as it encompasses the Hillsboro airport, while the small swatch of commercial zonings have both been assigned residential due to the proximity of houses to these small commercial areas. See Figure 1 showcasing Hillsboro zoning designations in reference to the facilities boundary.

[1] https://spatialdata.oregonexplorer.info/geoportal/search

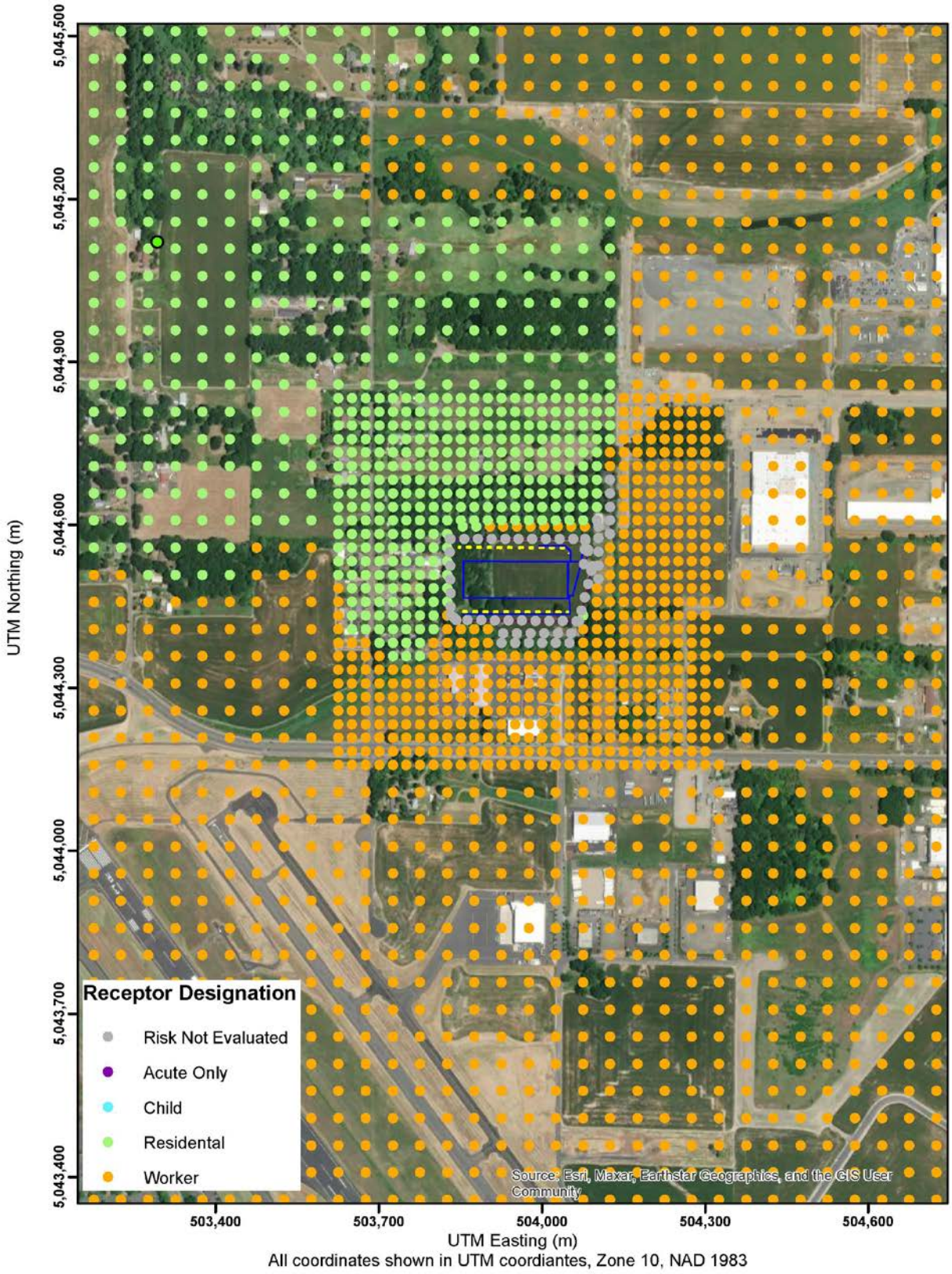
[2] http://hbmaps.hillsboro-oregon.gov/

Figure 1: Hillsboro City Map Overlay



The closest residential receptors to the facility include a residence about 200 meters west of the facility and 200 m north, outside of Hillsboro city jurisdiction. There is additionally a home directly to the northeast of the facility when viewed in Google Earth. This property is within the property boundary of the Aligned facility and is therefore designated as Risk Not Evaluated. A zoomed in image of this area and correlated designations is included in Figure 2.

Figure 2. Nearby Residential Receptors



The nonresidential child receptor type will be determined based on the available information found online for schools and daycare facilities. The closest child receptor is just over 1.5 km from the facility. The child exposure locations will be added to the model as discrete receptors. Acute risks should be evaluated everywhere that people may spend several hours in a day per OAR 340-245-0020(4). All receptors assessed for chronic risks will also be assessed for acute risks.

Attached is the excel spreadsheet with receptor designations for your review. Additionally, the letter includes a facility site map with the physical fenceline and property boundary and a figure of all receptors with designations.

Please do not hesitate to reach out to me at 458.206.6770 if you have any questions about what has been included in this summary.

Sincerely,

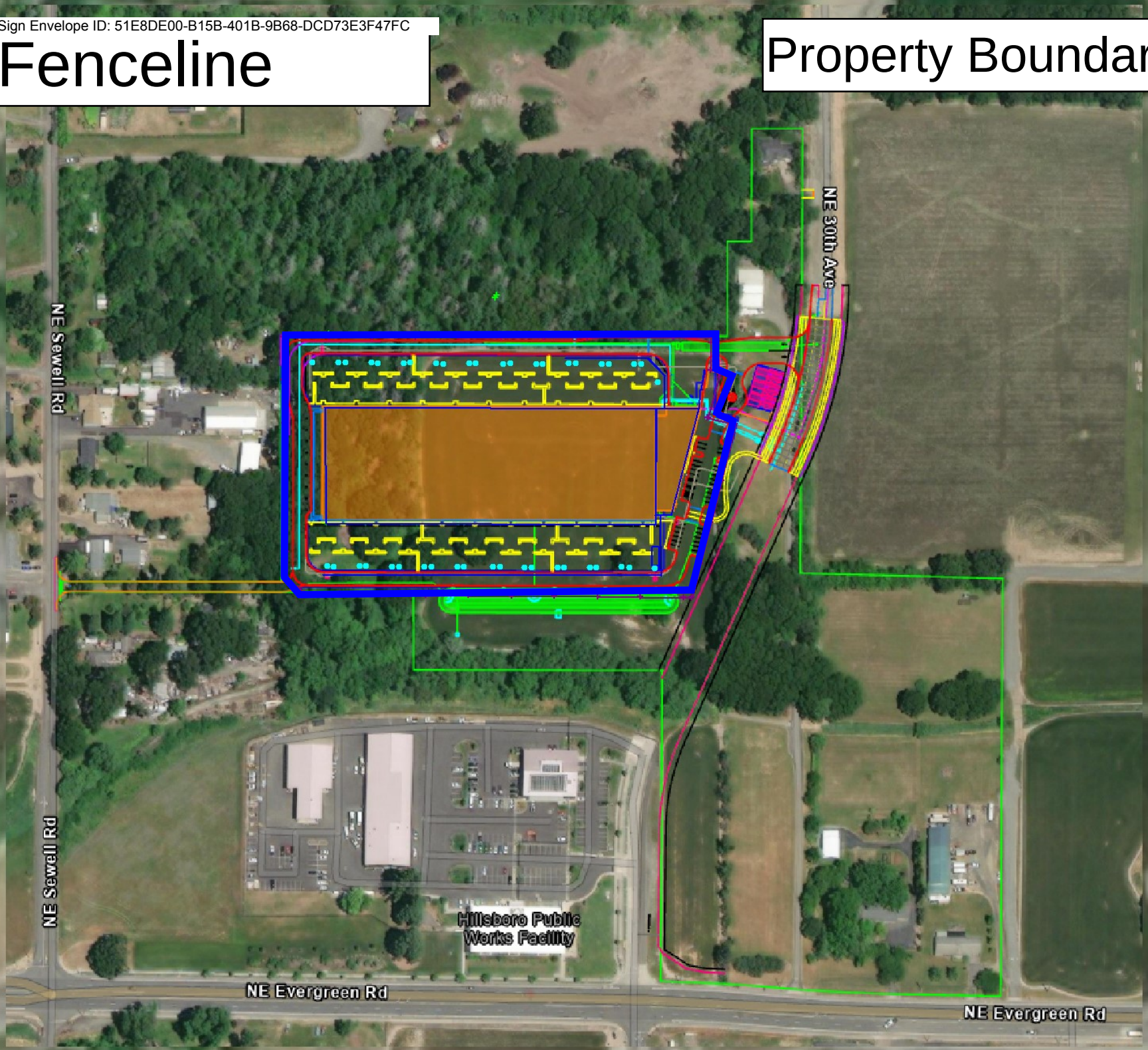
TRINITY CONSULTANTS

Beth Ryder
Managing Consultant

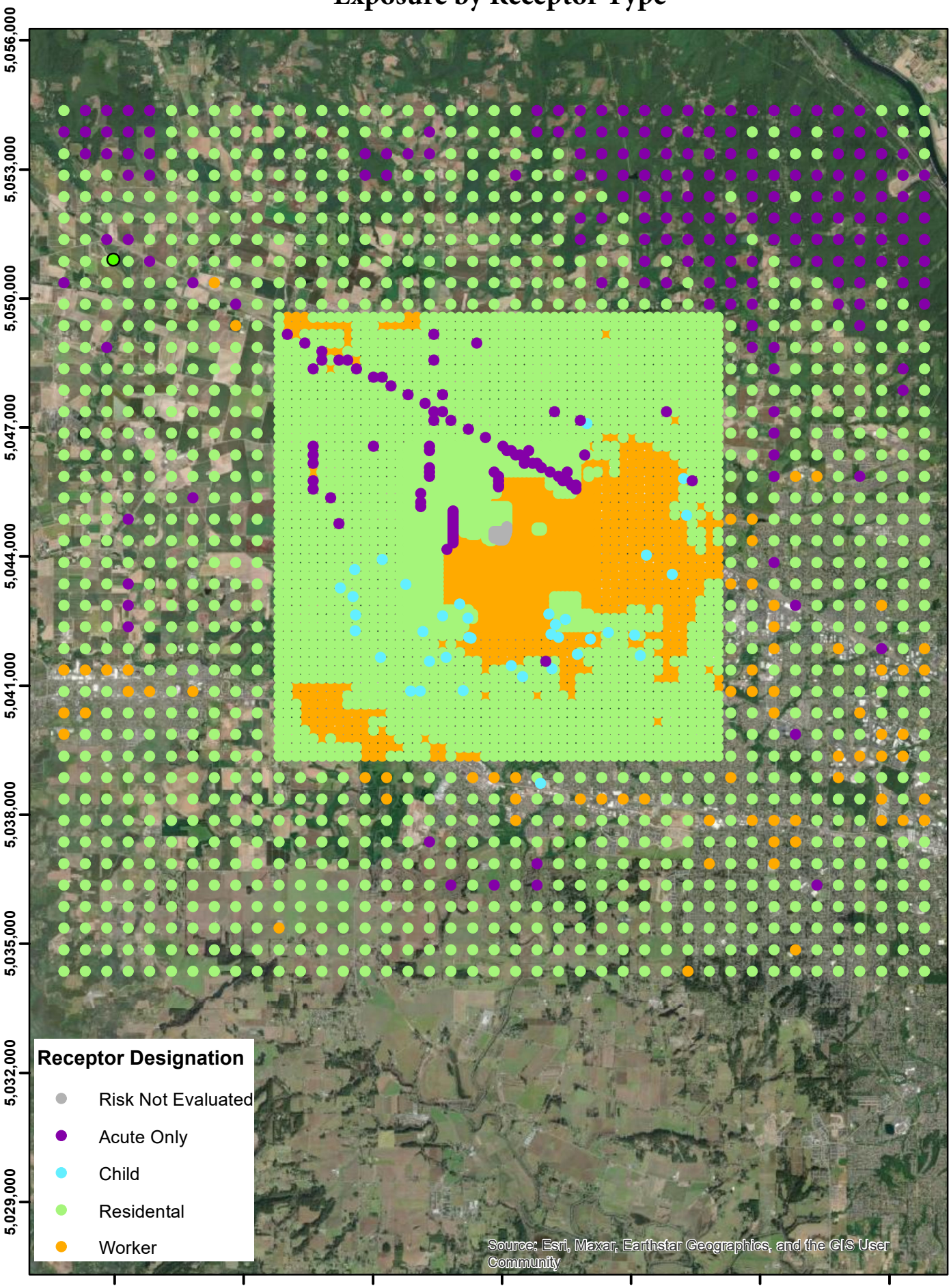
cc: Kristen Martin, ODEQ
Weston Li, ODEQ
Jessica Baker, Aligned
Dustin Johnson, Aligned
Jordan Hanna, Trinity

Fenceline

Property Boundary



Aligned Data Centers PDX01
Exposure by Receptor Type



All coordinates shown in UTM coordiantes, Zone 10, NAD 1983