



November 8, 2019

Matt Hoffman
Oregon Department of Environmental Quality
Northwest Region
2020 SW Fourth Ave Suite 400
Portland, OR 97201

**Re: QTS Investment Properties Hillsboro, LLC
Standard Air Contaminant Discharge Permit Application, Revision 3
Hillsboro, Oregon**

Dear Mr. Hoffman:

QTS Investment Properties Hillsboro, LLC (QTS) is submitting the attached revision of the Standard Air Contaminant Discharge Permit (ACDP) application for the data center located at 4950 NE Huffman Street, Hillsboro, Oregon, in response to the requested revisions in the letter, dated October 11, 2019, from the Oregon Department of Environmental Quality (ODEQ). Note that a Standard ACDP application was initially submitted in January 2019. A revised application was submitted in June 2019, followed by a second revision of the application submitted in September 2019. This revision is submitted pursuant to ODEQ's request for additional information, corrections, and updates regarding the second revision submitted on September 12, 2019.

In the revised Standard ACDP application submitted in June 2019, QTS proposed to update the make and model of the diesel-fired emergency generators to MTU 16V4000 DS2250, each rated at 2,250 kW_e, to implement load tracking and to include necessary documentation to begin the Cleaner Air Oregon (CAO) risk assessment process. In the second revision of the application submitted in September 2019, QTS proposed to reduce the number of requested emergency generators from 20 to nine, due to a change in anticipated demand for the facility. With this third revision of this submittal package, QTS is addressing all comments from ODEQ regarding the submittal in September 12, 2019, and is proposing the installation and operation of four (4) emergency generators (GN01 – GN04) instead of nine to meet the actual demand of the first upcoming project. QTS will start the permitting process for the additional emergency generators once the timeline of the next project phase of the facility is known. The projected actual facility-wide emissions, based on 52 hours per year per generator at 50% load, for the pollutant emitted at the greatest rate, nitrogen oxides (NO_x), is 1.63 tons per year (tpy), well below the 39 tpy PSEL. Note that a revised Modeling Protocol and a revised Level 1 Risk Assessment addressing ODEQ's comments are being submitted in parallel with this application.

To reduce administrative burden, QTS proposes that language be included in the permit to allow the addition, removal, or modification of an emergency engine-generator set without notification. However,

this would only be included provided the new or modified emergency engine-generator set does not increase criteria pollutant emissions from routine maintenance checks and readiness testing activities in excess of de minimis levels as defined in OAR 340-200-0020(39).

As part of this revised application package, QTS has included the following updated documents:

- Appendix A: Required application forms for a Standard ACDP Source;
- Appendix B: Process flow diagram, plot plan, site map;
- Appendix C: Detailed emissions calculations; and
- Appendix D: Engine specifications and emissions data;

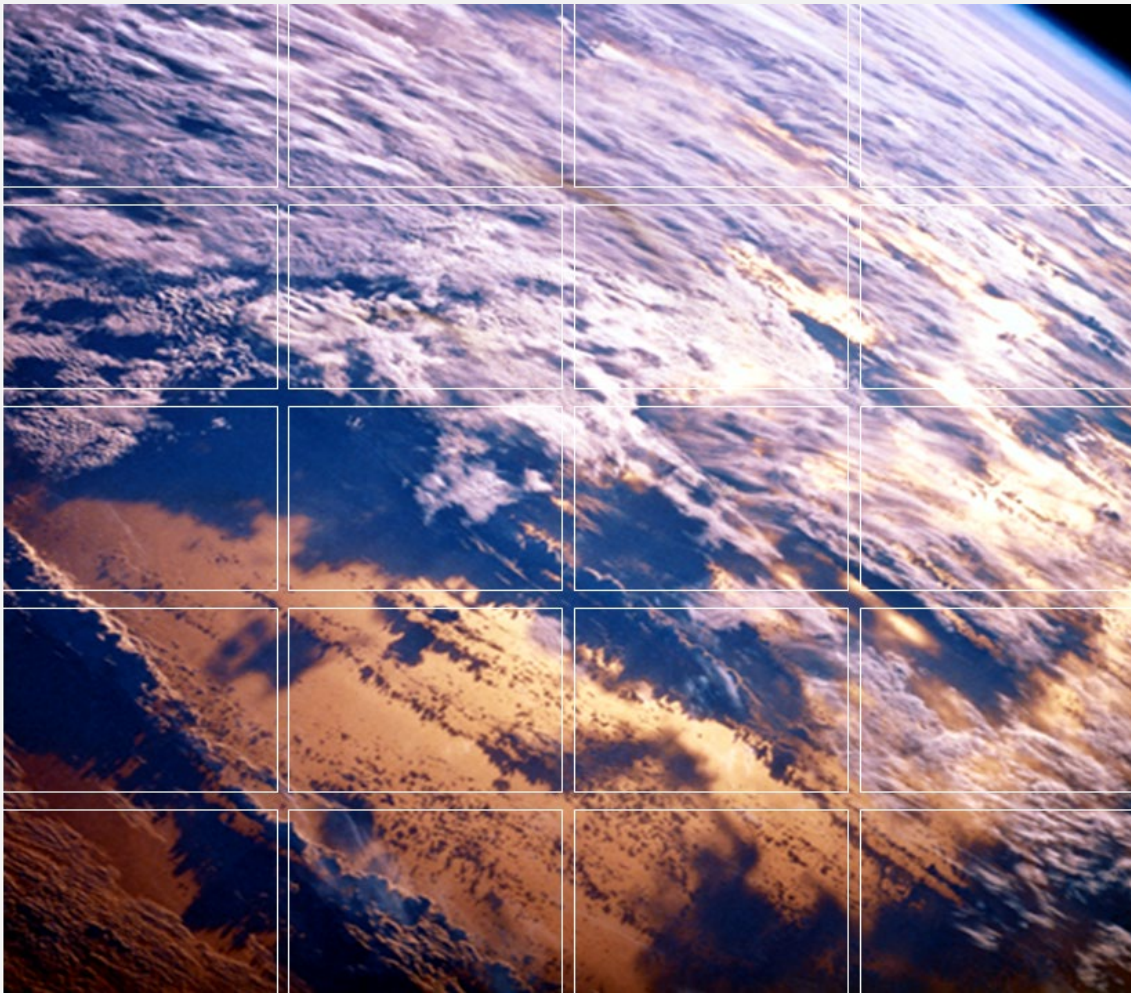
If you or your staff require any additional information regarding this request, please contact me at (678) 835-5215 or Tiffany Johnston of Environmental Resources Management (ERM) at (513) 830-9062.

Sincerely,



Laney Marinich,
Vice President – Property Development

cc: William Fowler, QTS
Tiffany Johnston, ERM



Standard Air Contaminant Discharge Permit Application Revision 3

QTS Investment Properties Hillsboro, LLC

8 November 2019

Project No.: 0483509

Signature Page

8 November 2019

Standard Air Contaminant Discharge Permit Application Revision 3

QTS Investment Properties Hillsboro, LLC



Tiffany A. Johnston
Partner-In-Charge

Environmental Resources Management, Inc.

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Cincinnati, Ohio 45242

513-830-9030

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1. INTRODUCTION

QTS Investment Properties Hillsboro, LLC (QTS) proposes to construct and operate four diesel-fired emergency generators and associated fuel storage tanks at a new data center located at 4950 NE Huffman Street, Hillsboro, Oregon in Washington County (“the facility”, “the data center”). The location is currently designated as in attainment or unclassifiable for all criteria pollutants. QTS is proposing to construct these generators in order to ensure constant electrical supply for the new site, and to accommodate current and expected future market demands, starting November 2019.

In the revised Standard Air Contaminant Discharge Permit (ACDP) application submitted in June 2019, QTS proposed to update the make and model of the 20 diesel fired emergency generators from the original application submitted in January 2019, and included the necessary documentation to begin the Cleaner Air Oregon (CAO) risk assessment process. In the second revision of the application submitted in September 2019, QTS proposed to reduce the number of requested emergency generators from 20 to nine, due to a change in anticipated demand for the facility. With this third revision of this Standard ACDP application, QTS is addressing all comments in the letter from the Oregon Department of Environmental Quality (ODEQ) dated October 11, 2019, regarding the submittal on September 12, 2019. Additionally, QTS is proposing the installation and operation of four emergency generators (GN01 – GN04) instead of nine to meet the actual demand of the first upcoming project. QTS will start the permitting process for the additional emergency generators once the timeline of the next project phase of the facility is known. Please note that a revised Modeling Protocol and a revised Level 1 Risk Assessment addressing ODEQ’s comments are being submitted in parallel with this application.

2. PROJECT DESCRIPTION

QTS seeks to authorize the installation and operation of four MTU 16V4000 DS2250 diesel-fired standby emergency generators (GN01 – GN04); each rated at 2,250 kWe via Standard Air Contaminant Discharge Permit (ACDP). In accordance with Oregon Administrative Code (OAR) 340-216-0025(5) (a) (B), QTS is applying for a Standard ACDP in lieu of a Simple ACDP due to the facility’s complexity and applicable rules. These generators will be used to provide backup power for site operations in case of utility failure or other related on-site power failure. Each generator will be equipped with a diesel fuel storage tank that will be exempt from permitting under OAR 340-232-0150 and are not subject to any federal regulations.

Additionally, QTS requests that language be included in the permit to allow the addition, removal, or modification of an emergency engine-generator set without notification; provided the new or modified emergency engine-generator set does not increase criteria pollutant emissions from routine maintenance checks and readiness testing activities in excess of de minimis levels as defined in OAR 340-200-0020(39). QTS will maintain records of such changes, make them available to the ODEQ upon request, and provide written notification of such changes within 30 days of completing commissioning.

With this Standard ACDP application, QTS will maintain compliance with the Generic Plant Site Emission Limits (PSEL) for all criteria pollutants, pursuant to OAR 340-200-0020(72). QTS proposes to implement load tracking with specific emission factors supplied by the manufacturer to more accurately report emissions and to demonstrate compliance with the PSEL. Detailed information regarding load tracking, emissions calculations, and compliance with the PSEL can be found in Section 3 of this document.

The proposed new generators are subject to New Source Performance Standards (NSPS) Subpart IIII. As required by NSPS Subpart IIII, the emergency generators are Tier 2 certified and will be operated to comply with the corresponding testing and maintenance operating limit of 100 hours per year per unit. The emergency generators will be equipped with a non-resettable hour meter to track compliance with

this limit. Additionally, QTS will only use ultra-low sulfur diesel (ULSD) fuel to maintain compliance with the fuel sulfur content usage restrictions per NSPS Subpart IIII. Logs will be kept to track operating load and hours of operation for compliance with the Generic PSEL for the facility. The new proposed emergency generators will not be used for peak shaving or as part of an Emergency Demand Response Program (EDRP) as described in 40 CFR 60.4211(f) (2). Per 40 CFR 60.4211(f) (3), each emergency generator's operation for non-emergency purposes unrelated to maintenance and testing of the emergency generators is limited to 50 hours per calendar year. These 50 hours are included as part of the 100 hours per year limit for maintenance and testing. Detailed information regarding the emergency generators is included in Appendix D. Additional regulatory discussion for the site is provided in Section 4 of this application.

3. PROJECT EMISSIONS

QTS proposes to use the manufacturer-supplied emission factors corresponding to each load percentage (i.e., 25%, 50%, 75%, 100%) as well as hours operated to determine monthly and 12-month rolling actual emissions. To be conservative and ensure permit compliance, QTS will round the average actual monthly load to the next higher load increment; for example, if the average monthly load for a specific generator is 33% of capacity, emissions would be determined using the 50% load emission rate. Accounting for the reduced operating loads that the emergency generators experience will result in a more accurate estimate of actual pollutant emissions and in turn help ensure ongoing compliance with the facility's Generic PSEL. Table 3-1 below presents the emission factors per generator for use when accounting for actual operating load. These emission factors are based on the enclosed manufacturer specifications (Appendix D).

Table 3-1: Proposed Emission Factors per Generator

Source	Pollutant ^[1]	Emission Factor (EF) (lb/hr) ^[2,3,4]			
		25% Load	50% Load	75% Load	100% Load
GN01 – GN04	VOC	2.20	2.04	1.86	1.60
	NO _x	6.19	15.71	30.54	46.81
	CO	3.58	3.86	5.78	9.36
	PM/PM ₁₀ /PM _{2.5}	0.66	0.50	0.78	0.50
	SO ₂	0.01	0.02	0.03	0.04

Notes:

1. Conservatively assumes PM = PM₁₀ = PM_{2.5}, that HC emissions approximate VOC, and that all engines use only ultra-low sulfur diesel fuel.
2. EFs for GN01 – GN04 are based on MTU 16V4000 DS2250 manufacturer specifications.
3. EFs were converted from manufacturer-supplied g/kWh to lb./hr. by multiplying by the kilowatt-hour corresponding to each load and then converting from grams to pounds. See Appendix C for detailed emission calculations.
4. SO₂ emissions based on AP-42 Section 3.4 (10/96) emission rate of 8.09e-3 lb./hp-hr. * Sulfur Content. Sulfur content of ultra-low sulfur diesel is 15 ppm.

$$\text{Equation A: Site Wide Monthly Emissions (tons)} = \frac{\sum_{i=1}^n (\text{Emission Factor @ Load } L \left(\frac{\text{lb}}{\text{hr}} \right) * \text{hrs}))}{2000 \frac{\text{lb}}{\text{ton}}}$$

Where:

- *Emission Factor @ Load L = manufacturer-supplied, generator-specific emission rate corresponding to the average monthly generator load, where the average actual load is rounded up to the next higher level of 25%, 50%, 75%, or 100% load;*
- *hrs. = total non-emergency operating hours for each engine in the given month;*
- *i = generator number; and*
- *n = number of emergency generators on site.*

Projected actual site-wide NO_x emissions, summarized in Table 3-2 below, are based on 52 hours per year per generator for non-emergency use at each operating load and demonstrate compliance with the site's PSEL of 39 tpy. When quantifying emissions from diesel combustion, NO_x is the pollutant of concern because it is emitted at the greatest rate. All other pollutants are emitted at rates far below their respective PSELs. Detailed emissions calculations for all pollutants are included in Appendix C of this application.

Table 3-2: Project Actual Site-Wide NO_x Emissions

Operating Load	GN01 – GN04		Site Wide
	Emission Factor		PSEL
	Value	Units	tpy
25%	4.5	g/kWh	39
50%	5.7	g/kWh	
75%	7.4	g/kWh	
100%	8.5	g/kWh	

All emergency generators at the facility are equipped with a non-resettable hour meter and a corresponding system for recording operating load. The above proposed method of calculating emissions will allow the facility to more accurately track and report actual emissions, reduce the over-reporting of emissions, and account for the partial load under which the generators typically operate, while still demonstrating permit compliance.

4. REGULATORY APPLICABILITY

The proposed QTS data center will be located in Washington County, which is in attainment or unclassifiable for all criteria pollutants. The following regulatory analysis identifies potentially applicable state and federal air quality regulations and explains why each regulation is or is not considered applicable to the proposed project.

4.1 Federal Regulations

4.1.1 New Source Performance Standards

New Source Performance Standards (NSPS) require new, modified, or reconstructed sources to control emissions to the level achievable by the best-demonstrated technology as specified in the applicable provisions. The NSPS regulations may be found in 40 CFR 60. An analysis of potentially applicable NSPS subparts is presented below.

4.1.1.1 Subpart A – General Provisions

Facilities subject to source-specific NSPS are also subject to the general provisions of NSPS Subpart A. Because the facility is subject to another 40 CFR 60 subpart, as discussed in Section 4.1.1.2, the provisions of Subpart A are applicable. NSPS Subpart A may require the following of facilities subject to a source-specific NSPS:

- Initial construction/reconstruction notifications
- Initial startup notifications
- Performance tests
- Performance test date initial notifications
- General monitoring requirements
- General recordkeeping requirements
- Semiannual monitoring system and/or excess emissions reports.

The facility will comply with the provisions of NSPS Subpart A, as applicable.

4.1.1.2 Subpart IIII – NSPS for Stationary Compression Ignition Internal Combustion Engines

NSPS Subpart IIII establishes emission standards and compliance requirements for the control of emissions from stationary compression ignition (CI) internal combustion engines (ICE) which are constructed, reconstructed, or modified after July 11, 2005.

With this application, QTS proposes to install four new CI ICE. Thus, QTS will operate a total of four CI ICE, which were constructed after July 2005. Therefore, the facility contains units subject to NSPS IIII and is required to comply with the provisions of this subpart.

Because the proposed generators are identified as emergency, they will be equipped with a non-resettable hour meter and will not operate for greater than 100 hours per year for maintenance and testing purposes. The engines will comply with EPA Tier 2 emission standards and with the fuel requirements of this subpart by using only 15 ppm or lower sulfur diesel fuel.

4.1.2 National Emission Standards for Hazardous Air Pollutants

National Emission Standards for Hazardous Air Pollutants (NESHAP) are emission standards for hazardous air pollutants (HAP) that are generally applicable to major sources of HAPs, but also apply to certain area sources of HAPs. A HAP major source is defined as having potential emissions in excess of 10 tons per year for any individual HAP and/or 25 tons per year for total HAPs. NESHAP apply to specific pollutant sources (40 CFR 61), or to sources in specifically regulated industrial source categories (CAA Section 112(d)), or on a case-by-case basis (Section 112(g) or 112(j)) for facilities not regulated as a specific industrial source type (40 CFR 63). The facility will be an area source for HAPs. An applicability analysis of potentially applicable NESHAP (Part 63) subparts is presented below.

4.1.2.1 Subpart A – General Provisions

All affected sources are subject to the general provisions of NESHAP Subpart A unless specifically excluded by the source-specific NESHAP. NESHAP Subpart A requires initial notification, performance testing, recordkeeping, and monitoring, provides reference methods, and mandates general control device requirements for all other subparts as applicable.

4.1.2.2 Subpart ZZZZ – NESHAP for Stationary Reciprocating Internal Combustion Engines

NESHAP Subpart ZZZZ provides HAP emission limitations and operating limitations for stationary reciprocating internal combustion engines (RICE), including emergency engines, located at facilities that are major or area sources of HAP emissions.

QTS proposes to operate a total of four CI ICE. The facility will have the potential to emit approximately 0.029 tons of total HAP per year, as shown in the emissions calculations included in Appendix C. Thus, proposed HAP emissions are below the major source threshold of 25 tpy combined HAP or 10 tpy for any single HAP, and the facility will be considered an area source of HAP.

Per 40 CFR 63.90(c)(1), QTS will comply with the New Source Performance Standard provisions in 40 CFR 60, Subpart IIII for the existing and planned generator engines. Consequently, no further provisions under NESHAP Subpart ZZZZ will apply to these engines.

4.2 OREGON STATE REGULATIONS

The following regulatory review identifies potentially applicable state air quality regulations and explains why each regulation is or is not considered applicable to the facility.

4.2.1 OAR 340-206: Air Pollution Emergencies

This division establishes criteria for identifying and declaring air pollution levels that would be of significant harm for regulated pollutants in nonattainment areas. QTS is located in Washington County, which is not considered a nonattainment area, thus QTS is not subject to the requirements of this division.

4.2.2 OAR 340-208: Visible Emissions and Nuisance Requirements

This division establishes standards for visible and nuisance emissions in all areas of Clackamas, Columbia, Multnomah, and Washington Counties. QTS is located in Washington County and the particulate matter emissions from each emergency generator is 0.022 lb. PM/MMBtu, well below 0.272 lb. PM/MMBtu limit per OAR 340-208-0610(1). Thus, QTS is subject to and will comply with the requirements of this division.

4.2.3 OAR 340-212: Stationary Source Testing and Monitoring

This division specifies the testing and monitoring requirements and procedures for all stationary sources in the state, which includes some general recordkeeping and reporting requirements. QTS is proposing to permit the new facility under a Standard ACDP with this application package and included supporting documentation for all air pollution sources located at the facility. QTS will track engine operating hours, operating load, fuel usage, and run reason in order to maintain compliance with all applicable state and federal standards. Thus, QTS is subject to and will comply with the requirements of this division.

4.2.4 OAR 340-214: Stationary Source Reporting Requirements

This division specifies recordkeeping reporting requirements and procedures for all stationary sources in the state. QTS will maintain applicable records for preparation of required reporting to demonstrate compliance with all state and federal requirements. Unless otherwise required by the permit, QTS will submit semi-annual reports for the periods of January 1st through June 30th, and July 1st through December 31st within 30 days after the period ends.

4.2.5 OAR 340-215: Greenhouse Gas Reporting Requirements

Pursuant to OAR 340-215-0030, sources are subject to registration and reporting requirements if they emit more than 2,500 metric tons (2,756 ton) per calendar year of actual emissions of GHG on a carbon dioxide equivalent (CO_{2e}) basis. Projected actual CO_{2e} emissions from the QTS site is 202 tons, well below the 2,756 ton threshold. QTS will continue to track GHG emissions closely under a Standard ACDP. Should the site exceed this threshold, QTS will register and report its greenhouse gas emissions with ODEQ in accordance with OAR 340-215.

4.2.6 OAR 340-222: Stationary Source Plant Site Emission Limits

This division outlines procedures to establish a PSEL, which is required for all ACDPs. QTS is applying for a Standard ACDP, thus they are subject to the requirements of this division and are requesting Generic PSELs as defined in OAR 340-200-0020(72). Projected actual site-wide NO_x emissions, the pollutant of concern for QTS, for the site's emergency generators at various operating loads demonstrate compliance with the site's PSEL of 39 tpy.

4.2.7 OAR 340-226: General Emission Standards

This division establishes general emission limits and standards and applies to all areas of the state. QTS operates fuel burning equipment that are Tier 2 certified and in compliance with NSPS and NESHAP requirements. As discussed in this section, QTS is in compliance with all applicable rules in OAR 340-208 through 268. Therefore, QTS is in compliance with the applicable section of this division.

4.2.8 OAR 340-228: Requirements for Fuel Burning Equipment and Fuel Sulfur Content

This division establishes requirements and standards for the types of fuel used in fuel burning equipment and applies to all areas of the state. QTS will only purchase ULSD fuel to maintain compliance with the fuel sulfur content usage restrictions per NSPS Subpart IIII and OAR 340-228-0110(2).

4.2.9 OAR 340-238: New Source Performance Standards

This division adopts 40 CFR 60, Standards of Performance for certain new stationary sources. 40 CFR 60 requires new, modified, or reconstructed sources to control emissions to the level achievable by the best demonstrated technology as specified in the applicable provisions. An analysis of potentially applicable NSPS subparts is presented in Section 4.1.1 above.

4.2.10 OAR 340-242: Rules Applicable to the Portland Area

This division establishes specific rules to the Portland Air Quality Maintenance Area (AQMA) as it relates to the PSEL donation program, industrial growth, and employee commuting options. This division applies to employers within the Portland AQMA with more than 100 employees at a work site, and to new sources or modifications that have increases of VOC or NO_x equal to or greater than the Significant Emission Rate (SER). QTS is located within the Portland AQMA and will employ 25 people at the data center. Projected actual site-wide NO_x emissions demonstrate compliance with the site's Generic PSEL. Thus, the rules of this division are not applicable.

4.2.11 OAR 340-245: Cleaner Air Oregon

This division establishes specific rules for Oregon's risk-based toxic air contaminant permitting program, known as Cleaner Air Oregon (CAO). This division applies to all areas of the state and to all sources, excluding sources located on tribal and federal lands that are not subject to regulation by DEQ. QTS is proposing to permit the new facility under a Standard ACDP, therefore is subject to the rules of this division. QTS has submitted a revised Level 1 Risk Assessment, a revised Modeling Protocol and relative forms in parallel with this Standard ACDP application. The results from the revised Level 1 Risk Assessment indicate residential cancer Risk Action Level (RAL) at 7.26, with the remaining cancer and non-cancer RAL all below 1. QTS understands and will follow all community engagement requirements for new facilities with an RAL above 5 and below 10. Pursuant OAR 340-245-0120, QTS will engage in any public meetings or public notice to ensure that consideration of environmental justice is appropriately emphasized. Additionally, QTS will work with the DEQ to submit any additional information requested for completion of this Cleaner Air Oregon program.

APPENDIX A OREGON DEQ FORMS



State of Oregon
Department of
Environmental
Quality

Administrative Information

FORM AQ101
ANSWER SHEET

FOR DEQ USE ONLY	
Permit Number:	Type of Application:
Application No:	RNW MOD NEW EXT
Date Received :	
Regional Office:	Check No. Amount \$

1. Company	2. Facility Location
Legal Name:	Name:
Mailing Address:	Street Address:
City, State, Zip Code:	City, County, Zip Code:
Number of employees (corporate):	Number of employees (facility):
3. Facility Contact Person	4. Industrial Classification Code(s)
Name:	Primary SIC and NAICS:
Title:	Secondary SIC and NAICS:
Telephone number:	5. Other DEQ Permits
Fax. number:	
e-mail address:	
6. Permit Action: Short Term Activity ACDP New Simple ACDP New Construction ACDP New Standard ACDP New Standard ACDP (PSD/NSR) Renewal of an existing permit without changes (include form AQ403 for Standard ACDPs) Renewal of an existing permit with changes (include form AQ403 for Standard ACDPs) Revision (or Modification) to an existing permit application	

7. Signature

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

Name of official (Printed or Typed)

Larry Mainis

Signature of official

Title of official and phone number

11/11/2019

Date

Administrative Information

FEE INFORMATION (Make the check payable to DEQ)

Note: The initial application fees and annual fees specified below (OAR 340-216-8020, Table 2, Parts 1 and 2) are only required for initial permit applications. These fees are not required for an application to renew or modify an existing permit. The appropriate specific activity fee(s) specified below (OAR 340-216-8020, Table 2, Part 3) applies to permit modifications or may be in addition to initial permit application fees.

OAR 340-216-8020, Table 2, Part 1 – INITIAL PERMITTING APPLICATION FEES:	
Short Term Activity ACDP	
Basic ACDP	
Assignment to General ACDP	
Simple ACDP	
Construction ACDP	
Standard ACDP	
Standard ACDP (Major NSR or Type A State NSR)	
OAR 340-216-8020, TABLE 2, PART 2 - ANNUAL FEES:	
Simple ACDP – Low Fee Class	
Simple ACDP – High Fee Class	
Standard ACDP	
OAR 340-216-8020, TABLE 2, PART 3 - SPECIFIC ACTIVITY FEES:	
Non-Technical Permit Modification	
Basic Technical Permit Modification	
Simple Technical Permit Modification	
Moderate Technical Permit Modification	
Complex Technical Permit Modification	
Major NSR or type A State NSR Permit Modification	
Modeling review (outside Major NSR or Type A State NSR)	
Public Hearing at Source's Request	
State MACT Determination	
TOTAL FEES	

Submit two copies of the completed application to:

New or Modified Permits (include fees):	Permit Renewals (no fees):
Oregon Department of Environmental Quality Financial Services - Revenue Section 700 NE Multnomah St., Suite 600 Portland, OR 97232-4100	Oregon Department of Environmental Quality Air Quality Program, Northwest Region Office 700 NE Multnomah St., Suite 600 Portland, OR 97232-4100



State of Oregon
Department of
Environmental
Quality

Administrative Information

FORM AQ101
ANSWER SHEET

CONTACT LIST

1. Company Information:

Legal Name:	Other company name (if different than legal name):
-------------	--

2. Site Contact Person: *(A person who deals with DEQ staff about equipment problems.)*

Name:	Telephone number:
Title:	Email address:

3. Facility Contact Person: *(If other than the site contact person, a person involved with all environmental issues at the facility although they may be housed at a different site.)*

Name:	Telephone number:
Title:	Email address:

4. Mailing Contact Person: *(If other than the site contact person, a person to whom the company would like all agency communications directed.)*

Name:	Telephone number:
Title:	Email address:

5. Invoice Contact Person: *(If other than the site contact person, a valid contact information to which invoices and communications related to resolving invoice questions can be directed.)*

Name:	Telephone number:
Title:	Email address:



NOTICE OF INTENT TO CONSTRUCT

FORM AQ104
ANSWER SHEET

FOR DEQ USE ONLY

Permit Number:

Regional Office:

Application No:

Date Received :

1. Source Number:

2. Company

Legal Name: QTS Investment Properties Hillsboro, LLC

Ownership type: LLC

Mailing Address:

12851 Foster Street

City, State, Zip Code:

Overland Park, Kansas, 66213

3. Facility Location

Name: QTS Investment Properties Hillsboro, LLC

Plant start date: 05/2019

Street Address:

4950 NE Huffman Street

City, County, Zip Code:

Hillsboro, Washington County, 97124

4. Number of Employees (corporate): 700

Number of Employees (plant site): 25

5. Facility Contact Person

Name: William Fowler

Title: Site Services Manager

Phone number: 804-952-8421

Fax number: N/A

e-mail address: William.Fowler@qtsdatacenters.com

6. Industrial Classification Code(s)

SIC: 3751

NAICS:

7. Type of construction/change: (see instructions)

New Facility

8. Signature

I certify that the information contained in this notice, including any schedules and exhibits attached to the notice, are true and correct to the best of my knowledge and belief.

Laney Marinich

Name of official (Printed or Typed)

Signature of official

Vice President, Property Development - (678) 835-5215

Title of official and phone number

11/11/2019

Date

Construction Information

9. Description of proposed construction:

QTS seeks to authorize the installation and operation of four MTU 16V4000 DS2250 diesel-fired emergency generators (GN01 - GN04); each rated at 2,250 kW via Standard Air Contaminant Discharge Permit (ACDP). In accordance with Oregon Administrative Code (OAR) 340-216-0025(5)(a)(B), QTS is applying for a Standard ACDP in lieu of a Simple ACDP due to the facility's complexity and applicable rules. These generators will be used to provide backup power for site operations in case of utility failure or other related on-site power failure. Each generator will be equipped with a diesel fuel storage tank that will be exempt from permitting under OAR 340-232-0150 and are not subject to any federal regulations.

Additionally, QTS requests that language be included in the permit to allow the addition, removal, or modification of an emergency engine-generator set without notification; provided the new or modified emergency engine-generator set does not increase criteria pollutant emissions from routine maintenance checks and readiness testing activities in excess of de minimis levels as defined in OAR 340-200-0020(39). QTS will maintain records of such changes, make them available to the ODEQ upon request, and provide written notification of such changes within 30 days of completing commissioning.

10. Will the construction increase the capacity of the facility? If yes, how much?
New Facility
11. Will the construction increase pollutant emissions? If yes, how much (see question 19) ?
See Form AQ104
12. Will the construction cause new pollutant emissions? If yes, which pollutants and how much?
See Form AQ104
13. Estimated timing of construction.
- | | | |
|----|------------------|---------|
| a. | Commence date: | 11/2019 |
| b. | Begin date: | 11/2019 |
| c. | Completion date: | 12/2019 |
14. Will tax credits be requested once construction is completed?
15. Attach relevant forms from Form Series AQ200, Device/Process Forms.
Appendix A
16. Attach relevant forms from Form Series AQ300, Control Device Description Forms, if applicable.
Not Applicable
17. Attach process flow diagram.
Appendix B
18. Attach a city map or drawing showing the facility location.
Appendix B
19. If applicable, attach a Land Use Compatibility Statement.
Appendix A

NOTICE OF INTENT TO CONSTRUCT

FORM AQ104
ANSWER SHEET

Emissions Data

20. Pre-and Post-Construction emission summary data

a. Emissions Point	b. Pollutant	c. Pre-Construction Emissions		d. Post-Construction Emissions	
		short-term (lb/hr)	Annual (tons/year)	short-term (lb/hr)	Annual ^[1] (tons/year)
GN01 - GN04	VOC @ 25% Load	--	--	2.20, each	0.11, each
GN01 - GN04	VOC @ 50% Load	--	--	2.04, each	0.10, each
GN01 - GN04	VOC @ 75% Load	--	--	1.86, each	0.09, each
GN01 - GN04	VOC @ 100% Load	--	--	1.60, each	0.08, each
GN01 - GN04	NO _x @ 25% Load	--	--	6.19, each	0.31, each
GN01 - GN04	NO _x @ 50% Load	--	--	15.71, each	0.79, each
GN01 - GN04	NO _x @ 75% Load	--	--	30.54, each	1.53, each
GN01 - GN04	NO _x @ 100% Load	--	--	46.81, each	2.34, each
GN01 - GN04	CO @ 25% Load	--	--	3.58, each	0.18, each
GN01 - GN04	CO @ 50% Load	--	--	3.86, each	0.19, each
GN01 - GN04	CO @ 75% Load	--	--	5.78, each	0.29, each
GN01 - GN04	CO @ 100% Load	--	--	9.36, each	0.47, each
GN01 - GN04	SO ₂ @ 25% Load	--	--	0.01, each	0.001, each
GN01 - GN04	SO ₂ @ 50% Load	--	--	0.02, each	0.001, each
GN01 - GN04	SO ₂ @ 75% Load	--	--	0.03, each	0.002, each
GN01 - GN04	SO ₂ @ 100% Load	--	--	0.04, each	0.002, each
GN01 - GN04	PM @ 25% Load	--	--	0.66, each	0.03, each
GN01 - GN04	PM @ 50% Load	--	--	0.50, each	0.02, each
GN01 - GN04	PM @ 75% Load	--	--	0.78, each	0.04, each
GN01 - GN04	PM @ 100% Load	--	--	0.50, each	0.02, each
GN01 - GN04	PM ₁₀ @ 25% Load	--	--	0.66, each	0.03, each
GN01 - GN04	PM ₁₀ @ 50% Load	--	--	0.50, each	0.02, each
GN01 - GN04	PM ₁₀ @ 75% Load	--	--	0.78, each	0.04, each
GN01 - GN04	PM ₁₀ @ 100% Load	--	--	0.50, each	0.02, each
GN01 - GN04	PM _{2.5} @ 25% Load	--	--	0.66, each	0.03, each
GN01 - GN04	PM _{2.5} @ 50% Load	--	--	0.50, each	0.02, each
GN01 - GN04	PM _{2.5} @ 75% Load	--	--	0.78, each	0.04, each
GN01 - GN04	PM _{2.5} @ 100% Load	--	--	0.50, each	0.02, each

1. Post-construction annual emissions (tons/year) are based on 100 hour per generator per year at respective operating loads.

Land Use Compatibility Statement

SECTION 1 - TO BE COMPLETED BY APPLICANT			
1A. Applicant Name: William Fowler	1B. Project Name: QTS Investment Properties Hillsboro, LLC		
Contact Name: Kevin Snead	Physical Address: 4950 NE Huffman Street		
Mailing Address: 6000 Technology Blvd	City, State, Zip: Hillsboro, Washington County, 97124		
City, State, Zip: Sandston, VA 23150	Tax Lot #: 1N221000 - 2603, and 3100		
Telephone: (804) 952-8365	Township: T1N Range: R2W Section: 21 and 22		
Tax Account #: 30-0885235	Latitude: 45° 33' 32.67" N Longitude: 122° 55' 46.37" W		
1C. Describe the project, include the type of development, business, or facility and services or products provided (attach additional information if necessary): <p>With this permit application, QTS Investment Properties Hillsboro, LLC (QTS) proposes to construct and operate 20 diesel-fired emergency generators at a new data center located at 4950 NE Huffman Street, Hillsboro, Oregon in Washington County, currently designated as in attainment for all criteria pollutants. The facility will maintain business-critical information and other computer-related services on servers and similar equipment. QTS is proposing to construct these generators in order to ensure constant electrical supply for the new site, and to accommodate current and expected future market demands.</p>			
1D. Check the type of DEQ permit(s) or approval(s) being applied for at this time. <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <input type="checkbox"/> Air Quality Notice of Construction <input checked="" type="checkbox"/> Air Contaminant Discharge Permit (<i>excludes portable facility permits</i>) <input type="checkbox"/> Air Quality Title V Permit <input type="checkbox"/> Air Quality Indirect Source Permit <input type="checkbox"/> Parking/Traffic Circulation Plan <input type="checkbox"/> Solid Waste Land Disposal Site Permit <input type="checkbox"/> Solid Waste Treatment Facility Permit <input type="checkbox"/> Solid Waste Composting Facility Permit (includes Anaerobic Digester) <input type="checkbox"/> Conversion Technology Facility Permit <input type="checkbox"/> Solid Waste Letter Authorization Permit <input type="checkbox"/> Solid Waste Material Recovery Facility Permit <input type="checkbox"/> Solid Waste Energy Recovery Facility Permit <input type="checkbox"/> Solid Waste Transfer Station Permit <input type="checkbox"/> Waste Tire Storage Site Permit </td> <td style="width: 50%; vertical-align: top;"> <input type="checkbox"/> Pollution Control Bond Request <input type="checkbox"/> Hazardous Waste Treatment, Storage, or Disposal Permit <input type="checkbox"/> Clean Water State Revolving Fund Loan Request <input type="checkbox"/> Wastewater/Sewer Construction Plan/Specifications (<i>includes review of plan changes that require use of new land</i>) <input type="checkbox"/> Water Quality NPDES Individual Permit <input type="checkbox"/> Water Quality WPCF Individual Permit (<i>for onsite construction-installation permits use the DEQ Onsite LUCS form</i>) <input type="checkbox"/> Water Quality NPDES Stormwater General Permit (<i>1200-A, 1200-C, 1200-CA, 1200-COLS, and 1200-Z</i>) <input type="checkbox"/> Water Quality General Permit (<i>all general permits, except 600, 700-PM, 1700-A, and 1700-B when they are mobile.</i>) <input type="checkbox"/> Water Quality 401 Certification for federal permit or license </td> </tr> </table>		<input type="checkbox"/> Air Quality Notice of Construction <input checked="" type="checkbox"/> Air Contaminant Discharge Permit (<i>excludes portable facility permits</i>) <input type="checkbox"/> Air Quality Title V Permit <input type="checkbox"/> Air Quality Indirect Source Permit <input type="checkbox"/> Parking/Traffic Circulation Plan <input type="checkbox"/> Solid Waste Land Disposal Site Permit <input type="checkbox"/> Solid Waste Treatment Facility Permit <input type="checkbox"/> Solid Waste Composting Facility Permit (includes Anaerobic Digester) <input type="checkbox"/> Conversion Technology Facility Permit <input type="checkbox"/> Solid Waste Letter Authorization Permit <input type="checkbox"/> Solid Waste Material Recovery Facility Permit <input type="checkbox"/> Solid Waste Energy Recovery Facility Permit <input type="checkbox"/> Solid Waste Transfer Station Permit <input type="checkbox"/> Waste Tire Storage Site Permit	<input type="checkbox"/> Pollution Control Bond Request <input type="checkbox"/> Hazardous Waste Treatment, Storage, or Disposal Permit <input type="checkbox"/> Clean Water State Revolving Fund Loan Request <input type="checkbox"/> Wastewater/Sewer Construction Plan/Specifications (<i>includes review of plan changes that require use of new land</i>) <input type="checkbox"/> Water Quality NPDES Individual Permit <input type="checkbox"/> Water Quality WPCF Individual Permit (<i>for onsite construction-installation permits use the DEQ Onsite LUCS form</i>) <input type="checkbox"/> Water Quality NPDES Stormwater General Permit (<i>1200-A, 1200-C, 1200-CA, 1200-COLS, and 1200-Z</i>) <input type="checkbox"/> Water Quality General Permit (<i>all general permits, except 600, 700-PM, 1700-A, and 1700-B when they are mobile.</i>) <input type="checkbox"/> Water Quality 401 Certification for federal permit or license
<input type="checkbox"/> Air Quality Notice of Construction <input checked="" type="checkbox"/> Air Contaminant Discharge Permit (<i>excludes portable facility permits</i>) <input type="checkbox"/> Air Quality Title V Permit <input type="checkbox"/> Air Quality Indirect Source Permit <input type="checkbox"/> Parking/Traffic Circulation Plan <input type="checkbox"/> Solid Waste Land Disposal Site Permit <input type="checkbox"/> Solid Waste Treatment Facility Permit <input type="checkbox"/> Solid Waste Composting Facility Permit (includes Anaerobic Digester) <input type="checkbox"/> Conversion Technology Facility Permit <input type="checkbox"/> Solid Waste Letter Authorization Permit <input type="checkbox"/> Solid Waste Material Recovery Facility Permit <input type="checkbox"/> Solid Waste Energy Recovery Facility Permit <input type="checkbox"/> Solid Waste Transfer Station Permit <input type="checkbox"/> Waste Tire Storage Site Permit	<input type="checkbox"/> Pollution Control Bond Request <input type="checkbox"/> Hazardous Waste Treatment, Storage, or Disposal Permit <input type="checkbox"/> Clean Water State Revolving Fund Loan Request <input type="checkbox"/> Wastewater/Sewer Construction Plan/Specifications (<i>includes review of plan changes that require use of new land</i>) <input type="checkbox"/> Water Quality NPDES Individual Permit <input type="checkbox"/> Water Quality WPCF Individual Permit (<i>for onsite construction-installation permits use the DEQ Onsite LUCS form</i>) <input type="checkbox"/> Water Quality NPDES Stormwater General Permit (<i>1200-A, 1200-C, 1200-CA, 1200-COLS, and 1200-Z</i>) <input type="checkbox"/> Water Quality General Permit (<i>all general permits, except 600, 700-PM, 1700-A, and 1700-B when they are mobile.</i>) <input type="checkbox"/> Water Quality 401 Certification for federal permit or license		
1E. This application is for: <input type="checkbox"/> Permit Renewal <input checked="" type="checkbox"/> New Permit <input type="checkbox"/> Permit Modification <input type="checkbox"/> Other:			
SECTION 2 - TO BE COMPLETED BY CITY OR COUNTY PLANNING OFFICIAL			
Instructions: Written findings of fact for all local decisions are required; written findings from previous actions are acceptable. For uses allowed outright by the acknowledged comprehensive plan, DEQ will accept written findings in the form of a reference to the specific plan policies, criteria, or standards that were relied upon in rendering the decision with an indication of why the decision is justified based on the plan policies, criteria, or standards.			
2A. The project proposal is located: <input checked="" type="checkbox"/> Inside city limits <input checked="" type="checkbox"/> Inside UGB <input type="checkbox"/> Outside UGB			
2B. Name of the city or county that has land use jurisdiction (the legal entity responsible for land use decisions for the subject property or land use): <u>Hillsboro</u>			

Land Use Compatibility Statement

SECTION 2 - TO BE COMPLETED BY CITY OR COUNTY PLANNING OFFICIAL		
Applicant Name: <u>William Fowler</u>	Project Name: <u>QTS Investment Properties</u>	
2C. Is the activity allowed under Measure 49 (2007)? <input checked="" type="checkbox"/> No, Measure 49 is not applicable <input type="checkbox"/> Yes; if yes, then check one:		
<input type="checkbox"/> Express; approved by DLCD order #:		
<input type="checkbox"/> Conditional; approved by DLCD order #:		
<input type="checkbox"/> Vested; approved by local government decision or court judgment docket or order #:		
2D. Is the activity a composting facility? <input checked="" type="checkbox"/> No <input type="checkbox"/> Yes; Senate Bill 462 (2013) notification requirements have been met.		
2E. Is the activity or use compatible with your acknowledged comprehensive plan as required by OAR 660-031? <i>Please complete this form to address the activity or use for which the applicant is seeking approval (see 1.C on the previous page). If the activity or use is to occur in multiple phases, please ensure that your approval addresses the phases described in 1.C. For example, if the applicant's project is described in 1.C as a subdivision and the LUCS indicates that only clearing and grading are allowed outright but does not indicate whether the subdivision is approved, DEQ will delay permit issuance until approval for the subdivision is obtained from the local planning official.</i>		
<input type="checkbox"/> The activity or use is specifically exempt by the acknowledged comprehensive plan; explain:		
<input type="checkbox"/> Yes, the activity or use is pre-existing nonconforming use allowed outright by (provide reference for local ordinance):		
<input type="checkbox"/> Yes, the activity or use is allowed outright by (provide reference for local ordinance):		
<input checked="" type="checkbox"/> Yes, the activity or use received preliminary approval that includes requirements to fully comply with local requirements; findings are attached.		
<input type="checkbox"/> Yes, the activity or use is allowed; findings are attached.		
<input type="checkbox"/> No, see 2.C above, activity or use allowed under Measure 49; findings are attached.		
<input type="checkbox"/> No, (complete below or attach findings for noncompliance and identify requirements the applicant must comply with before compatibility can be determined): Relevant specific plan policies, criteria, or standards:		
Provide the reasons for the decision:		
Additional comments (attach additional information as needed): <u>Development Review approval granted by City.</u> <u>Case File No. DR-039-17</u>		
Planning Official Signature: <u>Ruth Klein</u>		Title: <u>Senior Planner</u>
Print Name: <u>Ruth Klein</u>	Telephone #: <u>503-681-6465</u>	Date: <u>12/27/18</u>
If necessary, depending upon city/county agreement on jurisdiction outside city limits but within UGB:		
Planning Official Signature:		Title:
Print Name:	Telephone #:	Date:

Facility Name:

Permit Number:

Provide the requested information for each generator used to power the plant. If any one of several generators might be used at the plant at any given time, describe the generator with the highest power rating. If more than one generator is permanently located at the plant, describe all of them.

	Primary generator	Generator 2	Generator 3
ID No.			
Manufacturer			
Year manufactured			
Size (enter units ^a)			
Type of fuels used			
Maximum amount of fuel to be used per hour ^b			
Projected maximum amount of fuel to be used per year ^b			
Projected maximum number of hours to be operated in one year.			
Maintenance schedule ^c			
Manufacturer's emission rates attached (yes/no)			

^a Units for generator size are either kilowatt or horsepower (kW or hp).

^b Units for the amount of fuel are cubic feet, therms, gallons, etc.

^c "Maintenance schedule" refers to regularly scheduled maintenance only, i.e., annual, monthly, weekly, or none.



Plant Site Emissions Detail Sheet
Current/Future Operations

Form AQ402
Answer Sheet

Facility Name: QTS Investment Properties Hillsboro, LLC

Permit Number: TBD

1. Emissions Point	Production Rates		4. Pollutant	Emission Factors			Emissions	
	2. Short-term (Specify units)	3. Annual (hrs/year/gen)		5. Short-term (g/kWh)	6. Long-term (g/kWh)	7. Reference(s)	8. Short-term (lb/hr)	9. Annual (tons/year)
GN01 - GN04	n/a	100	VOC @ 25% Load	1.60, each	1.60, each	Manufacturer	2.20, each	0.11, each
GN01 - GN04	n/a		VOC @ 50% Load	0.74, each	0.74, each	Manufacturer	2.04, each	0.10, each
GN01 - GN04	n/a		VOC @ 75% Load	0.45, each	0.45, each	Manufacturer	1.86, each	0.09, each
GN01 - GN04	n/a		VOC @ 100% Load	0.29, each	0.29, each	Manufacturer	1.60, each	0.08, each
GN01 - GN04	n/a	100	NO _x @ 25% Load	4.50, each	4.50, each	Manufacturer	6.19, each	0.31, each
GN01 - GN04	n/a		NO _x @ 50% Load	5.70, each	5.70, each	Manufacturer	15.71, each	0.79, each
GN01 - GN04	n/a		NO _x @ 75% Load	7.40, each	7.40, each	Manufacturer	30.54, each	1.53, each
GN01 - GN04	n/a		NO _x @ 100% Load	8.50, each	8.50, each	Manufacturer	46.81, each	2.34, each
GN01 - GN04	n/a	100	CO @ 25% Load	2.60, each	2.60, each	Manufacturer	3.58, each	0.18, each
GN01 - GN04	n/a		CO @ 50% Load	1.40, each	1.40, each	Manufacturer	3.86, each	0.19, each
GN01 - GN04	n/a		CO @ 75% Load	1.40, each	1.40, each	Manufacturer	5.78, each	0.29, each
GN01 - GN04	n/a		CO @ 100% Load	1.70, each	1.70, each	Manufacturer	9.36, each	0.47, each
GN01 - GN04	n/a	100	SO ₂ @ 25% Load	0.01, each	0.01, each	15 ppm sulfur fuel	0.01, each	0.001, each
GN01 - GN04	n/a		SO ₂ @ 50% Load	0.01, each	0.01, each	15 ppm sulfur fuel	0.02, each	0.001, each
GN01 - GN04	n/a		SO ₂ @ 75% Load	0.01, each	0.01, each	15 ppm sulfur fuel	0.03, each	0.002, each
GN01 - GN04	n/a		SO ₂ @ 100% Load	0.01, each	0.01, each	15 ppm sulfur fuel	0.04, each	0.002, each
GN01 - GN04	n/a	100	PM @ 25% Load	0.48, each	0.48, each	Manufacturer	0.66, each	0.03, each
GN01 - GN04	n/a		PM @ 50% Load	0.18, each	0.18, each	Manufacturer	0.50, each	0.02, each
GN01 - GN04	n/a		PM @ 75% Load	0.19, each	0.19, each	Manufacturer	0.78, each	0.04, each
GN01 - GN04	n/a		PM @ 100% Load	0.09, each	0.09, each	Manufacturer	0.50, each	0.02, each
GN01 - GN04	n/a	100	PM ₁₀ @ 25% Load	0.48, each	0.48, each	Assume PM ₁₀ =PM	0.66, each	0.03, each
GN01 - GN04	n/a		PM ₁₀ @ 50% Load	0.18, each	0.18, each	Assume PM ₁₀ =PM	0.50, each	0.02, each
GN01 - GN04	n/a		PM ₁₀ @ 75% Load	0.19, each	0.19, each	Assume PM ₁₀ =PM	0.78, each	0.04, each
GN01 - GN04	n/a		PM ₁₀ @ 100% Load	0.09, each	0.09, each	Assume PM ₁₀ =PM	0.50, each	0.02, each
GN01 - GN04	n/a	100	PM _{2.5} @ 25% Load	0.48, each	0.48, each	Assume PM _{2.5} =PM	0.66, each	0.03, each
GN01 - GN04	n/a		PM _{2.5} @ 50% Load	0.18, each	0.18, each	Assume PM _{2.5} =PM	0.50, each	0.02, each
GN01 - GN04	n/a		PM _{2.5} @ 75% Load	0.19, each	0.19, each	Assume PM _{2.5} =PM	0.78, each	0.04, each
GN01 - GN04	n/a		PM _{2.5} @ 100% Load	0.09, each	0.09, each	Assume PM _{2.5} =PM	0.50, each	0.02, each
GN01 - GN04	n/a	100	CO _{2e} @ 25% Load	682.49, each	682.49, each	40 CFR 98	938.90, each	46.94, each
GN01 - GN04	n/a		CO _{2e} @ 50% Load	704.62, each	704.62, each	40 CFR 98	1941.76, each	97.09, each
GN01 - GN04	n/a		CO _{2e} @ 75% Load	672.92, each	672.92, each	40 CFR 98	2777.17, each	138.86, each
GN01 - GN04	n/a		CO _{2e} @ 100% Load	668.28, each	668.28, each	40 CFR 98	3680.32, each	184.02, each
TOTAL	n/a	100	VOC @ 25% Load	-	-	-	19.81	0.99
TOTAL	n/a		VOC @ 50% Load	-	-	-	18.35	0.92
TOTAL	n/a		VOC @ 75% Load	-	-	-	16.71	0.84
TOTAL	n/a		VOC @ 100% Load	-	-	-	14.37	0.72
TOTAL	n/a	100	NO _x @ 25% Load	-	-	-	55.72	2.79
TOTAL	n/a		NO _x @ 50% Load	-	-	-	141.37	7.07
TOTAL	n/a		NO _x @ 75% Load	-	-	-	274.86	13.74
TOTAL	n/a		NO _x @ 100% Load	-	-	-	421.30	21.06
TOTAL	n/a	100	CO @ 25% Load	-	-	-	32.19	1.61
TOTAL	n/a		CO @ 50% Load	-	-	-	34.72	1.74
TOTAL	n/a		CO @ 75% Load	-	-	-	52.00	2.60
TOTAL	n/a		CO @ 100% Load	-	-	-	84.26	4.21
TOTAL	n/a	100	SO ₂ @ 25% Load	-	-	-	0.09	0.00
TOTAL	n/a		SO ₂ @ 50% Load	-	-	-	0.18	0.01
TOTAL	n/a		SO ₂ @ 75% Load	-	-	-	0.27	0.01
TOTAL	n/a		SO ₂ @ 100% Load	-	-	-	0.37	0.02
TOTAL	n/a	100	PM @ 25% Load	-	-	-	5.94	0.30
TOTAL	n/a		PM @ 50% Load	-	-	-	4.46	0.22
TOTAL	n/a		PM @ 75% Load	-	-	-	7.06	0.35
TOTAL	n/a		PM @ 100% Load	-	-	-	4.46	0.22
TOTAL	n/a	100	PM ₁₀ @ 25% Load	-	-	-	5.94	0.30
TOTAL	n/a		PM ₁₀ @ 50% Load	-	-	-	4.46	0.22
TOTAL	n/a		PM ₁₀ @ 75% Load	-	-	-	7.06	0.35
TOTAL	n/a		PM ₁₀ @ 100% Load	-	-	-	4.46	0.22
TOTAL	n/a	100	PM _{2.5} @ 25% Load	-	-	-	5.94	0.30
TOTAL	n/a		PM _{2.5} @ 50% Load	-	-	-	4.46	0.22
TOTAL	n/a		PM _{2.5} @ 75% Load	-	-	-	7.06	0.35
TOTAL	n/a		PM _{2.5} @ 100% Load	-	-	-	4.46	0.22
TOTAL	n/a	100	CO _{2e} @ 25% Load	-	-	-	8450.06	422.50
TOTAL	n/a		CO _{2e} @ 50% Load	-	-	-	17475.88	873.79
TOTAL	n/a		CO _{2e} @ 75% Load	-	-	-	24994.57	1249.73
TOTAL	n/a		CO _{2e} @ 100% Load	-	-	-	33122.88	1656.14

**HAZARDOUS AIR POLLUTANT (HAP)
EMISSIONS DETAIL SHEET**

**FORM AQ403
ANSWER SHEET**

Facility Name: QTS Investment Properties Hillsboro, LLC

Permit Number: TBD

Emissions Data

1. Emissions Point	2. Annual Production Rate ^[1] (MMBtu/yr)	3. Pollutant ^[2,4,5]	4. Emission Factor ^[1,6] (lb/MMBtu)	5. EF Reference	6. Annual Emissions ^[3,6] (tons/yr)
GN01 - GN04	2,249	Benzene	1.35E-03	SCAQMD Supplemental Instructions of Reporting Procedures for AB2588 Facilities for Reporting their Quadrennial Air Toxics Emissions Inventory	6.07E-03
		1,3-Butadiene	1.58E-03		7.09E-03
		Benzo[a]pyrene	2.57E-07		1.16E-06
		Cadmium	1.09E-05		4.89E-05
		Formaldehyde	1.25E-02		5.63E-02
		Hexavalent Chromium	7.25E-07		3.26E-06
		Arsenic	1.16E-05		5.22E-05
		Lead	6.01E-05		2.71E-04
		Acrolein	2.46E-04		1.11E-03
		Nickel	2.83E-05		1.27E-04
		Ammonia	5.80E-03		2.61E-02
		PAHs (excluding Naphthalene)	2.62E-04		1.18E-03
		Naphthalene	1.43E-04		6.42E-04
		Acetaldehyde	5.68E-03		2.55E-02
		Copper	2.97E-05		1.34E-04
		Ethyl Benzene	7.90E-05		3.55E-04
		Hexane	1.95E-04		8.77E-04
		Hydrogen Chloride	1.35E-03		6.07E-03
		Manganese	2.25E-05		1.01E-04
		Mercury	1.45E-05		6.52E-05
		Selenium	1.59E-05		7.17E-05
		Toluene	7.64E-04		3.44E-03
		Xylenes	3.07E-04		1.38E-03
		Diesel Particulate Matter	4.99E-01		5.79E-01
Total TAP	--	--	0.72		

Applications for Standard ACDPs must also include the most recent Toxics Release Inventory report, if applicable (see instructions).

1. Annual production rate and emission factors are per generator.

2. Includes pollutants listed in Table 1 of OAR 340-244-0040 and OAR 340-246-0090(3) that are emitted from the sources.

3. Annual emissions (tons/year) is site-wide total emissions with 100 hours per generator operating at 100% load.

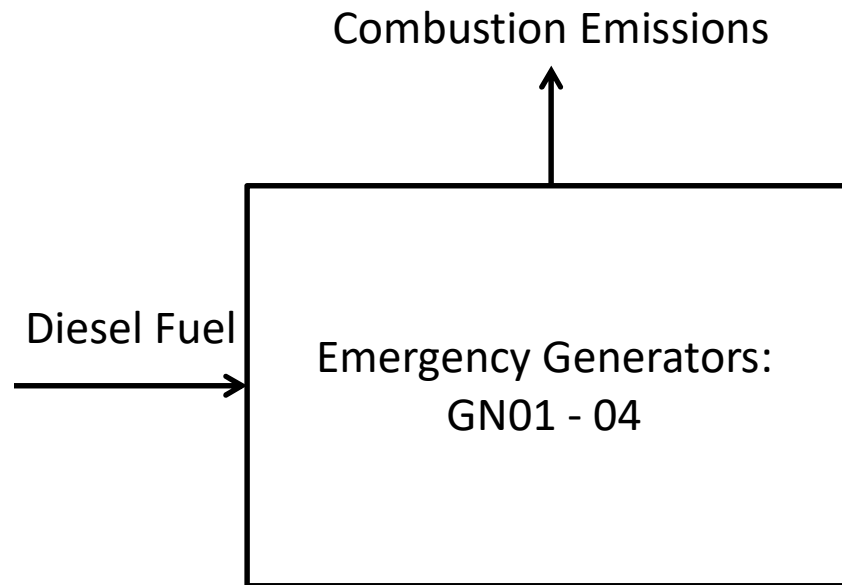
4. Diesel Particulate Matter Emission factor based on maximum PM + HC emission factor from MTU 16V4000G84S emission specifications which occurs at 25% operating load.

5. Fuel usage at 100% operating load used for all pollutants except DPM, which uses fuel usage at 25% load to correspond with maximum PM + HC emission factor in lb/hr.

6. Cold-start DPM emission is not taken into account in the emission factor (lb/MMBtu), but it is calculated in the annual emission rate conservatively assuming 20 cold starts per generator per year (1 per month and 4 additional for maintenance events if needed). Each cold start is assumed to be 1 minute. See sample calculation below:

$$DPM \left(\frac{lb}{hr} \right) \times \left(\text{Annual Operational Hr} - \frac{\# \text{ of cold starts}}{60 \text{ min}} \right) + DPM \left(\frac{lb}{hr} \right) \times \text{Cold Start Factor} \times \left(\frac{\# \text{ of cold starts}}{60 \text{ min}} \right)$$

APPENDIX B PROCESS FLOW DIAGRAM, PLOT PLAN, SITE MAP

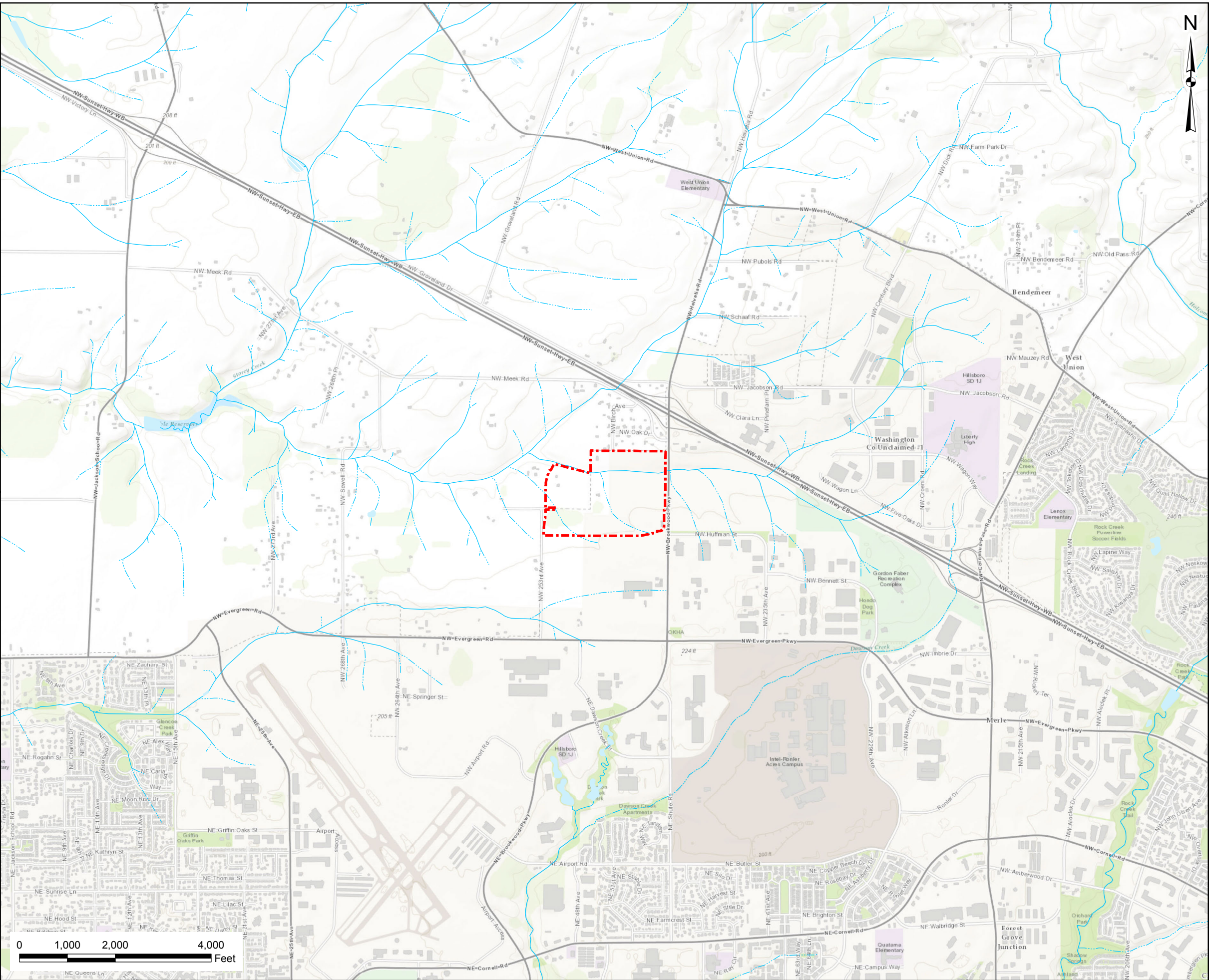


Environmental Resources Management

DESIGN: B. WILDEY	DRAWN: B. WILDEY	CHKD.: K. CREWS
DATE: 10/23/2019	SCALE: n/a	REVISION: 0.0

Appendix B - Process Flow Diagram
 QTS Investment Properties Hillsboro Data Center
 QTS Investment Properties Hillsboro, LLC
 Hillsboro, Oregon



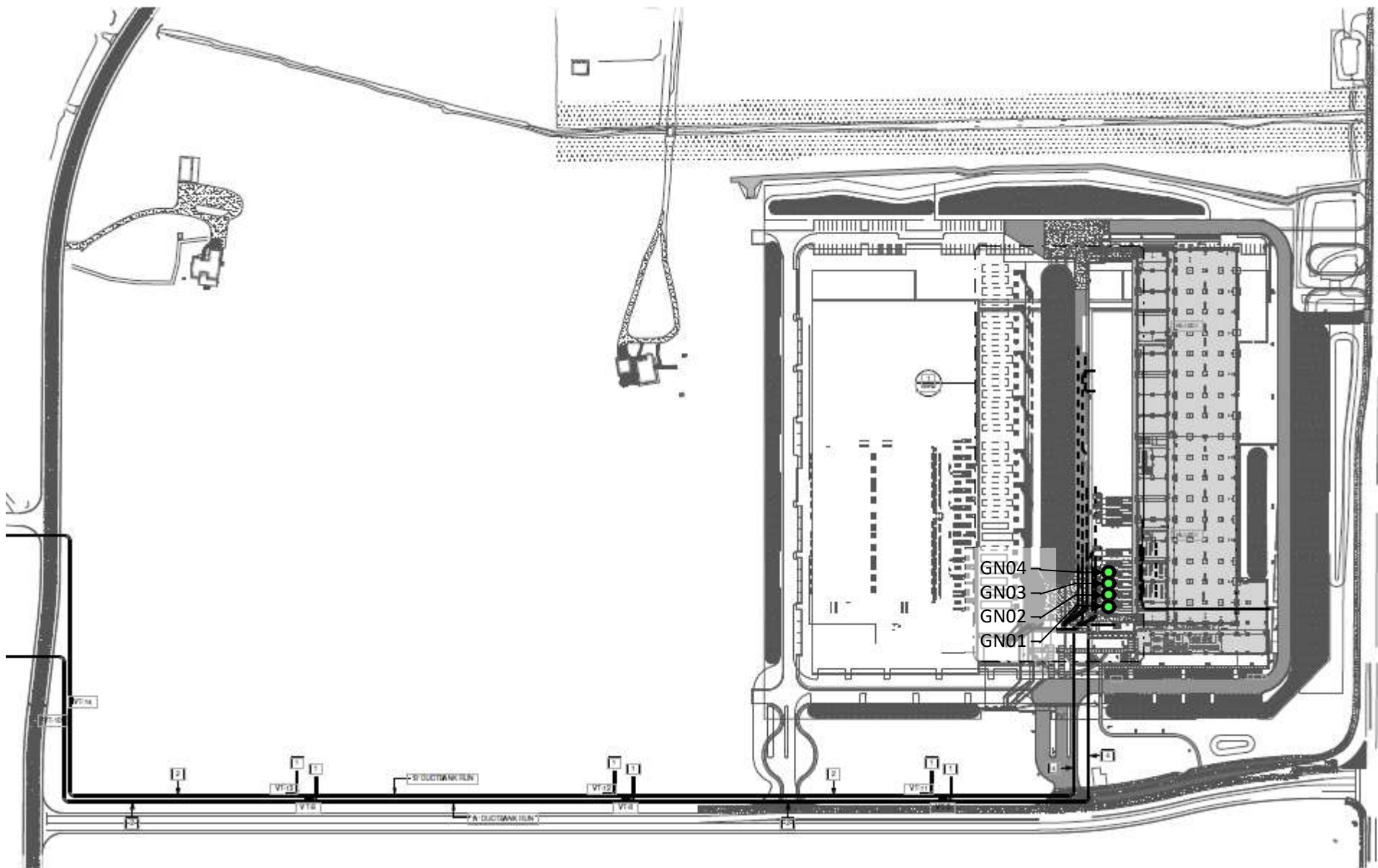


Legend

- Site Boundary
- National Hydrographic Dataset
 - Perennial Stream/River
 - Intermittent Stream/River
 - Lake/Pond - Intermittent
 - Lake/Pond - Perennial

Notes:
Hydrographic data provided by the USGS National Hydrographic Dataset.

Figure 1
*Location Map
QTS Hillsboro Site
Hillsboro, Oregon*



● Proposed Generator Location

Environmental Resources Management
 Site Map
 QTS Hillsboro
 Hillsboro, Oregon



DESIGN:	DRAWN:	CHKD.:
DATE: 10/23/2019	SCALE:	REV.:
W.O.NO.: Q:\Team\AQCC\QTS\Hillsboro\SitePlan.dwg, 11/8/2018 3:57:57 PM		

APPENDIX C EMISSION CALCULATIONS

Table 1 Emergency Standby Generator Specifications

Manufacturer	MTU
Model	16V4000G84S
Rating ^[1]	2,250 kWe
EPN	GN01 - GN04
Power generation per unit @ 50% load ^[1]	1,250 kWm
	1,676 bhp
Power generation per unit @ 100% load ^[1]	2,498 kWm
	3,280 bhp
Number of units	4
Annual max operating hours (non-emergency) ^[2]	100
Annual projected actual operating hours (non-emergency) ^[3]	52
Fuel type	Diesel
Fuel high heat value	0.138 MMBtu/gal

1. Based on manufacturer specifications for MTU 16V4000 DS2250 diesel generator set.
2. Per 40 CFR 60 Subpart IIII, maintenance and testing of emergency standby generators must not exceed 100 hours per year.
3. Projected actual operating hours per year are based on one hour per week per generator.

Table 2 Generator Manufacturer Specifications^[1]

Operating Load	GN01 - GN04		
	Rating		Fuel Consumption
	(kWm)	(bhp)	(gal/hr)
25%	624	837	42
50%	1,250	1,676	86
75%	1,872	2,510	123
100%	2,498	3,350	163

1. Based on manufacturer specifications for MTU 16V4000 DS2250 diesel generator set.

Table 3 GN01 - GN04 Emission Factors

Pollutant ^[1,2,3,4,5]	25% Load		50% Load		75% Load		100% Load	
	Emission Factor		Emission Factor		Emission Factor		Emission Factor	
	(g/kWh)	(lb/hr)	(g/kWh)	(lb/hr)	(g/kWh)	(lb/hr)	(g/kWh)	(lb/hr)
VOC	1.60	2.20	0.74	2.04	0.45	1.86	0.29	1.60
NO _x	4.5	6.19	5.7	15.71	7.4	30.54	8.5	46.81
CO	2.6	3.58	1.4	3.86	1.4	5.78	1.7	9.36
SO ₂	0.007	0.01	0.007	0.02	0.007	0.03	0.007	0.04
PM	0.48	0.66	0.18	0.50	0.19	0.78	0.09	0.50
CO ₂	680.2	936	702.2	1,935	670.6	2,768	666.0	3,668
CH ₄	0.028	0.04	0.028	0.08	0.027	0.11	0.027	0.15
N ₂ O	0.006	0.01	0.006	0.02	0.005	0.02	0.005	0.03
CO ₂ e	682	939	705	1,942	673	2,777	668	3,680

1. Based on manufacturer specifications for MTU 16V4000G84S for standby operation. Emission factors were converted from (g/kWh) to (lb/hr) by multiplying by the corresponding kilowatt-hour (kWh) and converting from grams to pounds.

2. SO₂ emissions based on AP-42 Section 3.4 (10/96) emission rate of 8.09E-3 lb/hp-hr * Sulfur Content. Sulfur content of ultra-low sulfur diesel is 15 ppm.

3. CO₂e emissions based on 40 CFR 98 Global Warming Potentials for CH₄ and N₂O from Table A-1 and emission factors for N₂O, CH₄, and CO₂ from Tables C-1 and C-2.

4. Sample Calculation:

$$25\% \text{ Load } NO_x \left(\frac{lb}{hr} \right) = 4.5 \left(\frac{g}{kWh} \right) * 624 \text{ kWm} * \left(\frac{1 \text{ lb}}{453.592 \text{ g}} \right) = 6.19 \text{ lb/hr}$$

Table 4 Criteria Pollutant Site-Wide Projected Actual Emissions ^[1]

Pollutant	GN01 - GN04			
	Emission Factor per Generator		Site-Wide Projected Actual Emissions	
	Value	Units	lb/hr	tpy
NO _x	5.70	g/kWh ^[2]	62.83	1.63
SO ₂	0.01	g/kWh ^[3]	0.08	0.002
CO	1.40	g/kWh ^[2]	15.43	0.40
VOC	0.74	g/kWh ^[2]	8.16	0.21
PM	0.18	g/kWh ^[2]	1.98	0.05
PM ₁₀	0.18	g/kWh ^[4]	1.98	0.05
PM _{2.5}	0.18	g/kWh ^[4]	1.98	0.05
CO ₂ e	705	g/kWh ^[5]	7,767	202

1. Projected actual emissions are based on 52 hours per year per generator for non-emergency use at 50% standby load.
2. Based on manufacturer data for MTU 16V4000G84S, "50% Standby" operation.
3. Each unit fires or will fire 15 ppm (0.0015%) sulfur diesel fuel. Emission Factor calculated based on AP-42 Chapter 3, Section 4: $8.09\text{E-}3 \times S = 8.09\text{E-}3 \times 0.0015 = 1.2\text{E-}5$ lb/hp-hr.
4. Conservatively assumes PM₁₀ = PM_{2.5} = PM.
5. CO₂e emissions based on 40 CFR 98 Global Warming Potentials for CH₄ and N₂O from Table A-1 and emission factors for N₂O, CH₄, and CO₂ from Tables C-1 and C-2.

Table 5 Hazardous Air Pollutant Projected Site-Wide Actual Emissions ^[1]

Pollutant	Emission Factor per Generator ^[2]	Site-Wide Projected Actual Emissions (GEN 01-04)	
	lb/MMBtu	lb/hr	tpy
1,3-Butadiene	1.58E-03	7.48E-02	1.94E-03
Acetaldehyde	5.68E-03	0.27	7.01E-03
Acrolein	2.46E-04	1.17E-02	3.03E-04
Arsenic	1.16E-05	5.50E-04	1.43E-05
Benzene	1.35E-03	6.41E-02	1.67E-03
Cadmium	1.09E-05	5.16E-04	1.34E-05
Copper	2.97E-05	1.41E-03	3.67E-05
Ethyl Benzene	7.90E-05	3.75E-03	9.75E-05
Formaldehyde	1.25E-02	0.59	1.54E-02
Hexane	1.95E-04	9.25E-03	2.41E-04
Hexavalent Chromium	7.25E-07	3.44E-05	8.94E-07
Lead	6.01E-05	2.86E-03	7.42E-05
Manganese	2.25E-05	1.07E-03	2.77E-05
Mercury	1.45E-05	6.88E-04	1.79E-05
Naphthalene	1.43E-04	6.78E-03	1.76E-04
Nickel	2.83E-05	1.34E-03	3.49E-05
PAHs (excluding Naphthalene)	2.62E-04	1.25E-02	3.24E-04
Selenium	1.59E-05	7.57E-04	1.97E-05
Toluene	7.64E-04	3.63E-02	9.43E-04
Xylenes	3.07E-04	1.46E-02	3.79E-04
Total HAP		1.11	2.88E-02

1. Projected actual emissions are based on 52 hours per year per generator for non-emergency use at 50% standby load.
2. Emission factors from *SCAQMD Supplemental Instructions of Reporting Procedures for AB2588 Facilities for Reporting their Quadrennial Air Toxics Emissions Inventory*, Table B-2, per generator.

Table 6 Projected Actual Site-Wide NOx Emissions at Varying Loads ^[1]

Operating Load	GN01 - GN04				Site Wide
	Emission Factor per Generator ^[2]		Site-Wide Projected Actual Emissions		PSEL
	Value	Units	lb/hr	tpy	TPY
25%	4.5	g/kWh	24.76	0.64	39
50%	5.7	g/kWh	62.83	1.63	
75%	7.4	g/kWh	122.16	3.18	
100%	8.5	g/kWh	187.24	4.87	

1. Projected actual emissions are based on 52 hours per year per generator for non-emergency use at various standby loads (25%, 50%, 75%, and 100%).
2. Emission factors based on manufacturer data for MTU 16V4000G84S.

APPENDIX D ENGINE MANUFACTURER SPECIFICATIONS

DIESEL GENERATOR SET

MTU 16V4000 DS2250

2250 kWe / 60 Hz / Standby
380 - 13.8kV

Reference MTU 16V4000 DS2250 (2045 kWe) for Prime Rating Technical Data



SYSTEM RATINGS

Standby

Voltage (L-L)	380V	480V*	600V	4160V	12470V	13200V	13800V
Phase	3	3	3	3	3	3	3
PF	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Hz	60	60	60	60	60	60	60
kW	2250	2250	2250	2250	2250	2250	2250
kVA	2812	2812	2812	2812	2812	2812	2812
Amps	4273	3383	2706	390	130	123	117
skVA@30%							
Voltage Dip	3625	8400	3900	5000	4120	4120	4900
Generator							
Model	1020FDL1102	744RSL4058	1020FDS1120	744FSM4376	1020FDH1246	1020FDH1244	1020FDH1246
Temp Rise	130 °C/40 °C	130 °C/40 °C	130 °C/40 °C	130 °C/40 °C	130 °C/40 °C	130 °C/40 °C	130 °C/40 °C
Connection	6 LEAD WYE	4 LEAD WYE	6 LEAD WYE	6 LEAD WYE	6 LEAD WYE	6 LEAD WYE	6 LEAD WYE

* UL 2200 Offered

CERTIFICATIONS AND STANDARDS

// **Emissions** – EPA Tier 2 Certified

// **Generator set is designed and manufactured in facilities certified to standards ISO 9001:2008 and ISO 14001:2004**

// **Seismic Certification** – Optional

- IBC Certification
- OSHPD Pre-Approval

// **UL 2200 Listed** – Optional

// **Performance Assurance Certification (PAC)**

- Generator Set Tested to ISO 8528-5 for Transient Response
- Verified product design, quality and performance integrity
- All engine systems are prototype and factory tested

// **Power Rating**

- Accepts Rated Load in One Step Per NFPA 110
- Permissible average power output during 24 hours of operation is approved up to 85%.

STANDARD FEATURES*

- // MTU Onsite Energy is a single source supplier
- // Global Product Support
- // 2 Year Standard Warranty
- // 16V4000 Diesel Engine
 - 76.3 Liter Displacement
 - Common Rail Fuel Injection
 - 4-Cycle
- // Complete Range of Accessories
- // Generator
 - Brushless, Rotating Field Generator
 - 2/3 Pitch Windings
 - PMG (Permanent Magnet Generator) supply to regulator
 - 300% Short Circuit Capability
- // Digital Control Panel(s)
 - UL Recognized, CSA Certified, NFPA 110
 - Complete System Metering
 - LCD Display
- // Cooling System
 - Integral Set-Mounted
 - Engine-Driven Fan

STANDARD EQUIPMENT*

// Engine

Air Cleaners
 Oil Pump
 Oil Drain Extension and S/O Valve
 Full Flow Oil Filter
 Closed Crankcase Ventilation
 Jacket Water Pump
 Inter Cooler Water Pump
 Thermostats
 Blower Fan and Fan Drive
 Radiator - Unit Mounted
 Electric Starting Motor - 24V
 Governor - Electronic Isochronous
 Base - Structural Steel
 SAE Flywheel and Bell Housing
 Charging Alternator - 24V
 Battery Box and Cables
 Flexible Fuel Connectors
 Flexible Exhaust Connection
 EPA Certified Engine

// Generator

NEMA MG1, IEEE and ANSI standards compliance for temperature rise and motor starting
 Sustained short circuit current of up to 300% of the rated current for up to 10 seconds
 Self-Ventilated and Drip-Proof
 Superior Voltage Waveform
 Digital, Solid State, Volts-per-Hertz Regulator

No Load to Full Load Regulation
 Brushless Alternator with Brushless Pilot Exciter
 4 Pole, Rotating Field
 130 °C Max. Standby Temperature Rise
 1 Bearing, Sealed
 Flexible Coupling
 Full Amortisseur Windings
 125% Rotor Balancing
 3-Phase Voltage Sensing
 ±0.25% Voltage Regulation
 100% of Rated Load - One Step
 5% Max. Total Harmonic Distortion

// Digital Control Panel(s)

Digital Metering
 Engine Parameters
 Generator Protection Functions
 Engine Protection
 CANBus ECU Communications
 Windows®-Based Software
 Multilingual Capability
 Remote Communications to RDP-110 Remote Annunciator
 Programmable Input and Output Contacts
 UL Recognized, CSA Certified, CE Approved
 Event Recording
 IP 54 Front Panel Rating with Integrated Gasket
 NFPA110 Compatible

* Represents standard product only. Consult Factory/MTU Onsite Energy Distributor for additional configurations.

APPLICATION DATA

// Engine

Manufacturer	MTU
Model	16V4000G84S
Type	4-Cycle
Arrangement	16-V
Displacement: L (in ³)	76.3 (4,656)
Bore: cm (in)	17 (6.69)
Stroke: cm (in)	21 (8.27)
Compression Ratio	16.5:1
Rated RPM	1,800
Engine Governor	Electronic Isochronous (ADEC)
Max. Power: kWm (bhp)	2,500 (3,353)
Speed Regulation	±0.25%
Air Cleaner	Dry

// Liquid Capacity (Lubrication)

Total Oil System: L (gal)	300 (79.3)
Engine Jacket Water Capacity: L (gal)	175 (46.2)
After Cooler Water Capacity: L (gal)	50 (13.2)
System Coolant Capacity: L (gal)	547 (145)

// Electrical

Electric Volts DC	24
Cold Cranking Amps Under -17.8 °C (0 °F)	2,800

// Fuel System

Fuel Supply Connection Size	-16 JIC 37° Female 1" NPT Adapter Provided
Fuel Return Connection Size	-16 JIC 37° Female 1" NPT Adapter Provided
Max. Fuel Lift: m (ft)	1 (3)
Recommended Fuel	Diesel #2
Total Fuel Flow: L/hr (gal/hr)	1,200 (317)

// Fuel Consumption

At 100% of Power Rating: L/hr (gal/hr)	617 (163)
At 75% of Power Rating: L/hr (gal/hr)	467 (123)
At 50% of Power Rating: L/hr (gal/hr)	325 (86)

// Cooling - Radiator System

Ambient Capacity of Radiator: °C (°F)	40 (104)
Max. Restriction of Cooling Air: Intake and Discharge Side of Rad.: kPa (in. H ₂ O)	0.12 (0.5)
Water Pump Capacity: L/min (gpm)	1,350 (357)
After Cooler Pump Capacity: L/min (gpm)	583 (154)
Heat Rejection to Coolant: kW (BTUM)	930 (52,888)
Heat Rejection to After Cooler: kW (BTUM)	680 (38,671)
Heat Radiated to Ambient: kW (BTUM)	206 (11,711)
Fan Power: kW (hp)	95.4 (128)

// Air Requirements

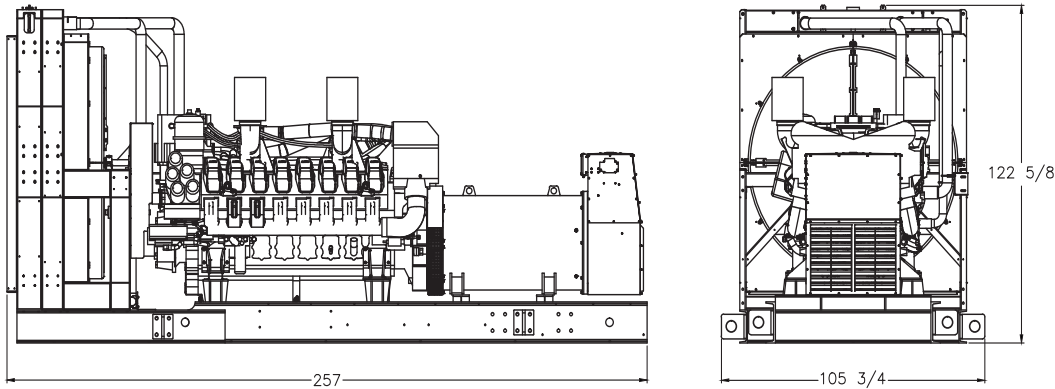
Aspirating: *m ³ /min (SCFM)	192 (6,780)
Air Flow Required for Rad.	
Cooled Unit: *m ³ /min (SCFM)	2,053 (72,500)
Remote Cooled Applications; Air Flow Required for Dissipation of Radiated Generator Set Heat for a Max. of 25 °F Rise: *m ³ /min (SCFM)	752 (26,412)

* Air density = 1.184 kg/m³ (0.0739 lbm/ft³)

// Exhaust System

Gas Temp. (Stack): °C (°F)	505 (941)
Gas Volume at Stack	
Temp: m ³ /min (CFM)	504 (17,799)
Max. Allowable	
Back Pressure: kPa (in. H ₂ O)	8.5 (34.1)

WEIGHTS AND DIMENSIONS



Drawing above for illustration purposes only, based on standard open power 480 volt generator set. Lengths may vary with other voltages. Do not use for installation design. See website for unit specific template drawings.

System	Dimensions (LxWxH)	Weight (less tank)
Open Power Unit (OPU)	6,528 x 2,686 x 3,115 mm (257 x 105.7 x 122.6 in)	16,429 kg (36,220 lb)

Weights and dimensions are based on open power units and are estimates only. Consult the factory for accurate weights and dimensions for your specific generator set.

SOUND DATA

Unit Type	Standby Full Load
Level 0: Open Power Unit dB(A)	98.7

Sound data is provided at 7 m (23 ft). Generator set tested in accordance with ISO 8528-10 and with infinite exhaust.

EMISSIONS DATA

NO _x + NMHC	CO	PM
5.07	0.52	0.04

All units are in g/hp-hr and shown at 100% load (not comparable to EPA weighted cycle values). Emission levels of the engine may vary with ambient temperature, barometric pressure, humidity, fuel type and quality, installation parameters, measuring instrumentation, etc. The data was obtained in compliance with US EPA regulations. The weighted cycle value (not shown) from each engine is guaranteed to be within the US EPA Standards.

RATING DEFINITIONS AND CONDITIONS

- // Standby ratings apply to installations served by a reliable utility source. The standby rating is applicable to varying loads for the duration of a power outage. No overload capability for this rating. Ratings are in accordance with ISO 8528-1, ISO 3046-1, BS 5514, and AS 2789. Average load factor: ≤ 85%.
- // Deration Factor:
 - Altitude:** Consult your local MTU Onsite Energy Power Generation Distributor for altitude derations.
 - Temperature:** Consult your local MTU Onsite Energy Power Generation Distributor for temperature derations.

C/F = Consult Factory/MTU Onsite Energy Distributor
N/A = Not Available

	Genset	Marine	O & G	Rail	C & I
Application	X				
Engine model	16V4000G84S				
Rated power [kW]	2500				
Rated speed [rpm]	1800				
Application group	3D				
Emission Stage/Optimisation	EPA Stationary EMERG T2 (40CFR60)				
Test cycle	D2				
Data Set No.	XZ59554101095				
Data Set Basis	EPA Stationary EMERG T2 (40CFR60)				
Fuel sulphur content [ppm]	8,1				

Inhalt <i>content</i>	Notiz <i>Note</i>	Seite <i>Page</i>	Buchstabe/Revision <i>change index</i>
Emissions Daten Blatt (EDS) <i>emission Data Sheet (EDS)</i>	O2 gem. <i>O2 meas.</i>	2	
Not to exceed Werte <i>Not to exceed values</i>	O2 gem. <i>O2 meas.</i>	3	

Unterschriftenweg	EDS erstellt	TETC Teamleiter	TET Leiter Org.-Einheit	Baureihen - Teamleiter	Baureihen Leiter Org.-Einheit	Freigabe im Windchill
Datum	07.06.2018	-	-	07.06.2018	07.06.2018	07.06.2018
Org.-Einheit	TETE	-	-	TKFV1	TKF	TKM
Name	T.Lenhof	-	-	Dr. Kneifel	Dr. Baumgarten	Link

<div><div><div><div><div></div><div></div></div><div><div></div><div></div></div></div><div>mtu</div></div><div>MTU Friedrichshafen GmbH</div><div>Alle Rechte aus Schutzrechtsanmeldungen vorbehalten. Weitergabe, Vervielfältigung oder sonstige Verwertung ohne Zustimmung nicht gestattet. Zuwiderhandlungen verpflichten zum Schadensersatz. All industrial property rights reserved. Disclosure, reproduction or use for any other purpose is prohibited unless our express permission has been given. Any infringement results in liability to pay damages.</div></div>			WORD	Datum/ Date	Name	Projekt-/Auftrags-Nr. Project/Order No.	Format/Size A3	
						Verwendbar f.Type Applicable to Model		
			Erstell. Drawn	12.02.2018 13:49:48	link	Material-Nr./Material No. EDS 4000 1234		
			Bearb. Change	14.06.2018 11:06:11	link			
			Inhalt Content	07.06.2018	Lenhof	Benennung/ Title EMISSIONSDATENBLATT EMISSION DATA SHEET		
Gepr. Checked	14.06.2018 11:06:11	baumgart en						
Motortyp / Engine Type 16V4000G84S								
Zeichnungs-Nr./Drawing No. ZNG00013267			Blatt/ Sheet 1 von/of 3					
Beschreibung/Description								

Aenderungsbeschreibung/Description of Revision Freigabe		Kommt vor/Frequency
Buchst./Rev. Ltr.	Aenderungs-Nr./Revision Notice No.	Bearbeitungsstatus/Lifecycle
-.3	PR030109	Freigegeben

Table B-2: DEFAULT EF FOR DIESEL / DISTILLATE OIL FUEL COMBUSTION (LB / 1000 GAL)

SOURCE: External Combustion Equipment (Boiler, Oven, Dryer, Furnace, Heater, Afterburner)

TAC			
Code	POLLUTANT	CAS NO.	ALL SIZES
2	Benzene	71432	0.0044
4	1,3-Butadiene	106990	0.0148
5	Cadmium	7440439	0.0015
12	Formaldehyde	50000	0.3506
13	Hexavalent chromium	18540299	0.0001
14	Arsenic	7440382	0.0016
15	Lead	7439921	0.0083
17	Nickel	7440020	0.0039
19	Total PAHs (excluding Naphthalene)	1151	0.0445
19	Naphthalene	91203	0.0053
29	Acetaldehyde	75070	0.3506
30	Acrolein	107028	0.3506
32	Ammonia*	7664417	2.9000
36	Copper	7440508	0.0041
40	Ethyl Benzene	100414	0.0002
44	Hexane	110543	0.0035
46	Hydrogen chloride	7647010	0.1863
49	Manganese	7439965	0.0031
50	Mercury	7439976	0.0020
64	Selenium	7782492	0.0022
68	Toluene	108883	0.0044
70	Xylenes	1330207	0.0016

**SOURCE: Stationary and Portable
Internal Combustion Engines (ICE)**

TAC			
Code	POLLUTANT	CAS NO.	ALL SIZES
2	Benzene	71432	0.1863
4	1,3-Butadiene	106990	0.2174
5	Cadmium	7440439	0.0015
12	Formaldehyde	50000	1.7261
13	Hexavalent chromium	18540299	0.0001
14	Arsenic	7440382	0.0016
15	Lead	7439921	0.0083
17	Nickel	7440020	0.0039
19	Naphthalene	91203	0.0197
19	PAHs (excluding Naphthalene)	1151	0.0362
29	Acetaldehyde	75070	0.7833
30	Acrolein	107028	0.0339
32	Ammonia*	7664417	2.9000
36	Copper	7440508	0.0041
40	Ethyl Benzene	100414	0.0109
44	Hexane	110543	0.0269
46	Hydrogen Chloride	7647010	0.1863
49	Manganese	7439965	0.0031
50	Mercury	7439976	0.0020
64	Selenium	7782492	0.0022
68	Toluene	108883	0.1054
70	Xylenes	1330207	0.0424
72	Diesel exhaust particulates	9901	33.5000

SOURCE: Turbines

TAC			
Code	POLLUTANT	CAS NO.	ALL SIZES
2	Benzene	71432	0.1863
4	1,3-Butadiene	106990	0.2174
5	Cadmium	7440439	0.0015
12	Formaldehyde	50000	1.7261
13	Hexavalent chromium	18540299	0.0001
14	Arsenic	7440382	0.0016
15	Lead	7439921	0.0083
17	Nickel	7440020	0.0039
19	Naphthalene	91203	0.0197
19	PAHs (excluding Naphthalene)	1151	0.0362
29	Acetaldehyde	75070	0.7833
30	Acrolein	107028	0.0339
32	Ammonia*	7664417	2.9000
36	Copper	7440508	0.0041
40	Ethyl Benzene	100414	0.0109
44	Hexane	110543	0.0269
46	Hydrogen Chloride	7647010	0.1863
49	Manganese	7439965	0.0031
50	Mercury	7439976	0.0020
64	Selenium	7782492	0.0022
68	Toluene	108883	0.1054
70	Xylenes	1330207	0.0424

*This value corresponds to equipment with SNCR, for equipment with SCR substitute listed value by 1.4 lbs/1000 gal, and for equipment without SNCR or SCR by 0.8 lbs/1000 gal.

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