

DEPARTMENT OF ENVIRONMENTAL QUALITY
AIR QUALITY DIVISION
ACTIVITY REPORT: On-site Inspection

N342260293

FACILITY: OAKLAND UNIVERSITY		SRN / ID: N3422
LOCATION: 408 Meadow Brook Road, ROCHESTER		DISTRICT: Warren
CITY: ROCHESTER		COUNTY: OAKLAND
CONTACT: Cora Hanson , Environmental Health and Life Safety Manager		ACTIVITY DATE: 06/29/2021
STAFF: Iranna Konanahalli	COMPLIANCE STATUS: Compliance	SOURCE CLASS: SM OPT OUT
SUBJECT: FY 2021 scheduled Synthetic Minor CMS inspection of Oakland University ("Oakland U" or "Oakland")		
RESOLVED COMPLAINTS:		

Oakland University (N3422)
2200 North Squirrel Road
Rochester Hills, Michigan 48309-4402

NAICS: 611310 & SIC Code: 8221 - Colleges, Universities, and Professional Schools

Phone: 248-370-4196 or 248-370-4427 for Ms. Hanson

Phone: 248-370-4196 for Ms. Peterson

Fax: 248-370-4376

VN: AQD issued October 12, 2021, Violation Notice (VN) for failure to demonstrate compliance with PTI No. 419-92C, FG-TURB/WHRU#1 (EU-TURBINE#1 & EU-WHRU#1) and federal New Source Performance Standard, 40 CFR, Part 60, Subparts A and KKKK (NSPS 4K)

Active Permit-to-Install (PTI) No.: 419-92C (ROP Opt-out) dated January 19, 2016, for a combined cycle heat and power cogeneration system (Centaur 50-6201S gas turbine generator set) consisting of a natural gas fired turbine (51 MMBtu/hr) and a waste heat recovery unit (equipped with a 10 MMBtu/hr duct burner for additional heat for a total of 60 MMBtu/hr), with attendant demolition of existing boilers (EU-HTWGEN#3 and EU-HTWGEN#4) to make room for the Cogen System. The duct burner can act as stand-alone boiler of 15 MM BTU per hour, as well. As requested by SEMI-Warren DO, all process equipment, including the boilers (Nos. 1 and 2, each boiler of capacity 100 MM BTU per hour, PTI No. 419-92A), two dual fuel RICE emergency generators (PTI No. 110-07), are consolidated into this RO synthetic minor or opt-out permit. Installation of the turbine together with the duct burner was continuing as PTI was being reviewed and AQD (Engineers: John Vial & Melissa Byrnes) accepted this without a waiver as an application was already submitted. The permit (PTI No. 419-92C) requires monitoring process parameters which will demonstrate that the turbine is operating in LowNox mode. Via PTI No. 419-92C, FG-FACILITY, the permit requires fuel usage records and especially NOx limit calculations. The only wastes generated are the products of combustion of natural gas and distillate oil. The criteria pollutant emissions were based upon vendor guaranteed numbers. Concerning Co-Gen, NOx emissions were based upon 25 ppmv at 15% O2, and CO emissions were based upon 25 ppmv at 15% O2. ROP opt out limits for CO and NOx are established at the facility level. All other pollutants are significantly below threshold levels and the facility deemed to be a true minor. HAP

emissions are minimal and TACs met the appropriate screening levels during the PTI review.

VOIDS: PTI Nos. 419-92B (Approved: 7/22/1996 & Voided: 01/19/2016,) 419-92A (Approved: 02/29/1996 & Voided: 07/22/1996) and 419-92 (Approved: 11/4/1992 & Voided: 02/29/1996)

To be voided: PTI No. 110-07 (Approved: 8/7/2007) because two emergency diesel generators are now covered by 419-92C (FG-GENERATORS: EU-00006 & EU-00007, consisting of two (2) Mitsubishi S16R-PTA engines).

Oakland's boilers (hot water) may NOT be subject to emission limits: Area Source NESHAP / MACT 6J, 40 CFR Part 63, Subpart JJJJJJ / 6J National Emission Standards for Hazardous Air Pollutants for Area Sources: Industrial, Commercial, and Institutional Boilers, Page 15554, Federal Register / Vol. 76, No. 54 / Monday, March 21, 2011 / Rules and Regulations / Final rule. This rule does NOT apply to boilers that burn only gaseous fuels or any solid waste. AQD has decided not to take delegation of these standards and therefore no attempt has been made to evaluate the applicability of NESHAP / MACT 6J. A gas-fired boiler that periodically fires liquid fuels during gas curtailment and supply emergencies or for periodic (not to exceed a total of 48 hours during any calendar year) testing is still considered a gas-fired boiler.

Boilers (09/3/1971) are NOT subject to: New Source Performance Standards for Industrial-Commercial-Institutional Steam Generating Units (40 CFR, Part 60, Subpart Db or Dc [NSPS Db or Dc]) based upon installation dates (installed before June 19, 1984, with respect to boilers >= 100 million BTU per hour heat input and June 9, 1989, with respect to boilers (Small Boilers) >= 10 million BTU per hour heat input).

Oakland's two (2) emergency generators are NOT subject to: NSPS IIII or 4I, New Source Standards of Performance for Stationary Compression Ignition Internal Combustion Engines, 39154 Federal Register / Vol. 71, No. 132 / Tuesday, July 11, 2006 / Rules and Regulations / Final Rule. Two generators are not subject to NSPS 4I based upon manufacture date (before April 1, 2006) and PTI review.

Oakland's two (2) emergency generators may be subject to: RICE MACT 4Z, Area Source NESHAP / MACT ZZZZ, Standards of Performance for Stationary Spark Ignition Internal Combustion Engines and National Emission Standards for Hazardous Air Pollutants for Reciprocating Internal Combustion Engines / Final rule (Page 3568, Federal Register / Vol. 73, No. 13 / Friday, January 18, 2008 / Rules and Regulations / Final rule). US EPA revised RICE MACT several times (75 FR 9648 [03/03/10], 75 FR 51570 [08/20/10], 76 FR 12863 [03/09/11], 76 FR 37954 [06/28/11], 78 FR 6674 [01/30/13], 80 FR 68808 [11/06/15 - Proposed Amendment]). AQD has decided not to take delegation of these standards and therefore no attempt has been made to evaluate Oakland's compliance with NESHAP / RICE MACT 4Z.

Not Subject to: NESHAP/ MACT T, area source National Emission Standards for Hazardous Air Pollutants: Halogenated Solvent Cleaning (40 CFR, Part 63, Subpart T; NESHAP/ MACT T); Correction; 29484 Federal Register / Vol. 60, No. 107 / Monday, June 5, 1995 / Rules and Regulations; amended National Air Emission Standards for

Hazardous Air Pollutants: Halogenated Solvent Cleaning (40 CFR, Part 63, Subpart T); Final Rule; Page 25138 Federal Register / Vol. 72, No. 85 / Thursday, May 3, 2007 / Rules and Regulations. Oakland U does NOT use the MACT T listed halogenated HAP solvents (>5%w: methylene chloride (CAS No. 75-09-2), perchloroethylene (CAS No. 127-18-4), trichloroethylene (CAS No. 79-01-6), 1,1,1-trichloroethane (CAS No. 71-55-6), carbon tetrachloride (CAS No. 56-23-5), and chloroform (CAS No. 67-66-3)) in the cold-cleaners.

GHG: Although AQD does not regulate Green House Gases (GHG), it issues opt-out permits for Title V (ROP) or US EPA GHG reporting requirements. US EPA is regulating GHG via PSD program using a rule known as “tailoring rule”. If GHG (e.g.CO₂) > 100 tpy and CO_{2e} >100,000 tpy (both conditions must be met) based upon potential-to-emit (PTE), then the facility in question is subject to ROP / Title V permit. The deadline (July 1, 2012) to either obtain a ROP opt-out permit or ROP has passed based upon FY 2013 inspection. In June 2019, EPA issued GHG emission regulations for existing fossil fuel-fired power plants in the Affordable Clean Energy (ACE) Rule. The U.S. Court of Appeals for the District of Columbia Circuit federal appeals court, in January 2021, struck down the Trump administration's Clean Power Plan replacement.

Gas Turbines subject to: 40 CFR, Part 60, subpart KKKK (NSPS 4K), Standards of Performance for Stationary Combustion Turbines; Final Rule (Thursday, July 6, 2006), Page 38482 Federal Register / Vol. 71, No. 129 / Thursday, July 6, 2006 / Rules and Regulations/ Final Rule. The standards reflect changes in nitrogen oxides (NO_x) emission control technologies and turbine design since standards for these units were originally promulgated in **40 CFR part 60, subpart GG**. The NO_x and sulfur dioxide (SO₂) standards have been established at a level which brings the emissions limits up to date with the performance of current combustion turbines. NSPS 4K is effective from July 6, 2006. Regulated entities are stationary combustion turbines with a heat input at peak load equal to or greater than 10.7 gigajoules (GJ) (10 million British thermal units (MMBtu)) per hour that commenced construction, modification, or reconstruction after February 18, 2005. The applicability of the final rule is similar to that of 40 CFR part 60, subpart GG, except that the final rule applies to new, modified, and reconstructed stationary combustion turbines, and their associated heat recovery steam generators (HRSG) and duct burners. The stationary combustion turbines subject to subpart KKKK, 40 CFR part 60, are exempt from the requirements of 40 CFR part 60, subpart GG. Heat recovery steam generators and duct burners subject to subpart KKKK are exempt from the requirements of 40 CFR part 60, subparts Da, Db, and Dc. The pollutants that are regulated by the final rule are NO_x and SO₂ (40 CFR § 60.4315). The limits are stated in 40 CFR, Subpart KKKK, Table 1 and Permit No. 419-92C, I.1: 25 ppmv dry at 15% oxygen for new turbine firing natural gas (> 50 MMBtu/h and ≤ 850 MMBtu/h HHV at peak load). Or 150 ng/J of useful output (1.2 lb/MWh) per NSPS 4K. In order to demonstrate compliance with the NO_x limit, an initial performance test is required. Oakland U is prohibited from burning any fuel other than pipeline quality sweet natural gas (PTI No. 419-92C, FG-TURB/WHRU#1 [EU-TURBINE#1& EU-WHRU#1], II.1). According to 40 CFR § 60.4340, Oakland must perform **annual** performance tests in accordance with 40 CFR § 60.4400 to demonstrate continuous compliance. Alternatively, Oakland U must either install and maintain (1) Continuous Emission Monitoring System (NO_x CEMS) as described in §§ 60.4335(b) and 60.4345, or (2) Continuous Parameter Monitoring System (NO_x CPMS). Oakland U must establish a

valid parameter range (40 CFR § 60.4410) if it has chosen to continuously monitor parameters indicative of proper operation of NOx emission controls in accordance with 40 CFR § 60.4340. The parameters are to be established during 40 CFR § 60.8 performance test.

Emission Units (EUs)

Emission Unit ID	Emission Unit Description (Process Equipment & Control Devices)	Installation Date / Modification Date	Flexible Group ID
EU_HTWGEN#1	High temperature water (HTW) generator #1. International Boiler Works Model TJW-C-10,000 HTW Generator (Natural Gas) Serial #M-3526. Boiler has a rated heat input capacity of 100 MMBtu/hr	9/3/1971*	FG-BOILERS
EU_HTWGEN#2	High temperature water (HTW) generator #2. International Boiler Works Model TJW-C-10,000 HTW Generator (Natural Gas) Serial #M-3337. Boiler has a rated heat input capacity of 100 MMBtu/hr	9/3/1971*	FG-BOILERS
EU-TURBINE#1	Centaur 50-6201S gas turbine generator set package with SoLoNox, natural gas fired. The turbine has a heat release capacity of approximately 51.25 MMBtu/hr.	06/30/2016	FGTURB/WHRU#1
EU_WHRU#1	Custom waste heat recovery unit with duct burner for a total of 60 MMBtu/hr. No steam or generation on the back side, but the WHRU can run as a standalone boiler for a total of 15 MMBtu/hr	06/30/2016	FGTURB/WHRU#1
EU-00006	Emergency back-up diesel and natural gas fired generator. The generator produces 1500 kilowatts of electricity per hour and is equipped with a Mitsubishi S16R-PTA engine. The engine is equipped with a dual fuel control system to allow the blending of natural gas and diesel fuels	10/01/2008 Mfg 80%ULSD + 20% Biodiesel	FG-FACILITY FG-GENERATORS
EU-00007	Emergency back-up diesel and natural gas fired generator. The generator produces 1500 kilowatts of electricity per hour and is equipped with a Mitsubishi S16R-PTA engine. The engine is equipped with a dual fuel control system to allow the blending of natural gas and diesel fuels	10/01/2008 Mfg 80%ULSD + 20% Biodiesel	FG-FACILITY FG-GENERATORS
Changes to the equipment described in this table are subject to the requirements of R 336.1201, except as allowed by R 336.1278 to R 336.1290.			

Flexible Group (FGs)

Flexible Group ID	Flexible Group Description	Associated Emission Unit IDs
FG-BOILERS	Two natural gas natural gas fired boilers	EU_HTWGEN#1 EU_HTWGEN#2
FG-GENERATORS	Emergency back-up diesel and natural gas fired generator. The generator produces 1500 kilowatts of electricity per hour and is equipped with a Mitsubishi S16R-PTA engine. The engine is equipped with a dual fuel control system to allow the blending of natural gas and diesel fuels	EU00006 EU00007
FGTURB/WHRU#1	Centaur 50-6201S gas turbine generator set package with SoLoNox, natural gas fired. The turbine has a heat release capacity of approximately 51.25 MMBtu/hr. Custom waste heat recovery unit with duct burner for a total of 60 MMBtu/hr. No steam or generation on the back side, but the WHRU can run as a standalone boiler for a total of 15 MMBtu/hr	EUTURBINE#1 EU-WHRU#1
FG-FACILITY	All process equipment source-wide including equipment covered by other permits, grand-fathered equipment and exempt equipment.	

ROP opt-out PTI No. 419-92B regulated only four boilers. Potential-to-Emit (PTE) NOx emissions corresponding to four boilers (PTI No. 419-92B, SC 14 limit: 84 tpy NOx and 1,200 million SCF NG / 12-mo) and two diesel generators (PTI No. 110-07, SC 1,2 & 1.3 limits: 110,000 gallons of diesel / 12-mo and 1,000 hours / 12-mo) is 98 (84 for four boilers and the generators) tons per year. The other process equipment at Oakland such as two 0.63 MM BTU / hour boilers, two dynamometers (one engine using gasoline and one chassis using diesel) at Science & Engineering building were not included. The Permit-to-Install Install revision (PTI No. 419-92B → PTI No. 419-92C dated January 19, 2016) addressed this issue by consolidating all process equipment into it.

PTI voids: PTI Nos. 419-92B (Approved: 7/22/1996 & Voided: 01/19/2016,) 419-92A (Approved: 02/29/1996 & Voided: 07/22/1996) and 419-92 (Approved: 11/4/1992 & Voided: 02/29/1996)

To be voided: PTI No. 110-07 (Approved: 8/7/2007) because two emergency diesel generators are now covered by 419-92C (FG-GENERATORS: EU-00006 & EU-00007, consisting of two (2) Mitsubishi S16R-PTA engines).

On June 29, 2021, I conducted a level-2 **FY 2021 scheduled Synthetic Minor CMS** inspection of Oakland University (“Oakland U” or “Oakland”) located at 2200 North Squirrel Road, Rochester Hills, Michigan 48309-4402. The inspection was conducted to determine compliance with federal Clean Air Act; Article II, Part 55, Air Pollution Control, of the Natural Resources and Environmental Protection Act, 1994 PA 451; Michigan Department of Environment, Great Lakes and Energy, Air Quality Division (EGLE-AQD) rules; and the permit conditions.

During the inspection, Ms. Cora Hanson (Phone: 248-370-4427 or 248-370-4196; Cell: 248.421.6858; Fax: 248-370-4376; E-mail: cHanson@oakland.edu), Environmental Health and Life Safety Manager, assisted me.

Oakland University ("Oakland") is a higher educational institute and is one of the state universities in Michigan. Oakland has student population of 20,519 (fall 2014). Most students are from Southeast Michigan (Oakland = 44.7%, Macomb = 30.8%, Wayne = 6.2%). Oakland offers 130 bachelors and 135 graduate degrees). Oakland with Beaumont admitted medical students beginning in 2011. Recently (2019), Oakland university student population has dropped to 19,000.

Oakland has two (Boiler Nos. 1 [International Boiler Works Model TJW-C-10,000 HTW Generator. Serial # M-3256] and 2 [International Boiler Works Model TJW-C-10,000 HTW Generator. Serial # M-3337] of design capacity 100 million BTU per hour were installed in CY 1969 and 1971) natural gas fired boilers (no fuel oil back-up) for comfort air space heating and two Diesel / Bio-diesel / natural gas emergency generators to handle power supply interruptions. About June 2016, Boiler Nos. 3 (34 MM BTU per hour) and 4 (32 MM BTU per hour) were replaced by one gas-fired turbine (occupying Boiler No. 4 space) for electric power generation and a waste heat recovery unit with a duct burner (occupying Boiler No. 3 space). The change has been reflected in PTI No. 419-92C.

All equipment such as boilers, turbine with WHRU, etc. generate hot water for space heating and not steam.

PTI No. 419-92C, FG-BOILERS (EU_HTWGEN#1, EU_HTWGEN#2)

Two natural gas fired boilers known as hot water generators Nos. 1 & 2 (100 MMBtu/hr, each).

1. EU_HTWGEN#1 (09/03/1971): High Temp Water (HTW) Generator #1. International Boiler Works Model TJW-C-10,000 HTW Generator. Serial # M-3256
2. EU_HTWGEN#2 (09/03/1971): High Temp Water (HTW) Generator #2. International Boiler Works Model TJW-C-10,000 HTW Generator. Serial # M-3337

As stated before, about 2016, Boiler Nos. 3 and 4 were replaced with a turbine and a waste heat recovery unit utilizing the same space.

FG-BOILERS, III.1

The boilers are capable of burning only natural gas (PTI No. 419-92C, FG-BOILERS, III.1: only combust NG). No fuel oil backup.

FG-BOILERS, VI.1

Natural gas usage records are kept and NOx emission calculations are done (PTI No. 419-92C, FG-BOILERS, VI.1: NG usage and NOx calculations).

CY 2020: 15.11 & 0.1858 MM SCF of pipeline quality sweet natural gas was used in hot water generators Nos. 1 & 2, respectively.

PTI No. 419-92C, FG-GENERATORS

EU-BACKUPGEN#1& EU-BACKUPGEN#2: Emergency back-up diesel and natural gas fired generators. Each of two generators produces 1500 kilowatts (kW) or 1.5 megawatts (MW) on a continuous basis and 1600 kW on a standby basis. Each generator is equipped with Mitsubishi S16R-PTA Internal Combustion Engine. Each engine is equipped with a dual fuel control system to allow blending of natural gas and Diesel; Bio-diesel may also be used. .

The generators are installed and fully commissioned. The diesel generators are as follows:

1. Engine1: Mitsubishi S16R-PTA; 1.5 MW; Serial No. 11121; equipped with dual-fuel (natural gas and diesel) control system; January 6, 2016, non-resettable hour meter reading: **652** hours. During CY 2020 the engine was not used. CY 2018: 23 gallons of Diesel and 0.0072 MM SCF of NG in Engine1. CY 2019: 167 gallons of Diesel and 0.0123 MM SCF of NG in Engine1 running 53 hours.
2. Engine2: Mitsubishi S16R-PTA; 1.5 MW; Serial No. 11123; equipped with dual-fuel (natural gas and diesel) control system; January 6, 2016, non-resettable hour meter reading: **1,398** hours. During CY 2020 the engine was not used. CY 2018: 71 gallons of Diesel and 0.0227 M SCF of NG in Engine2. CY 2019: 486 gallons of Diesel and 0.0187 MM SCF of NG in Engine2 running 175 hours.

Only Ultra-low Sulfur Diesel (ULSD 15 ppm Sulfur diesel) is used in the engines (see Crystal Flash of Monroe (734-241-8633) Invoice (08/31/2020)) .

Obviously, the limits are met (PTI No. 419-92C, FG-GENERATORS, II.1: 7,962 gallons of distillate oil per year; III.1: 1,000 generator-hours per year; III.2: 0.05%S)

Two 2,000-gallon diesel tanks are present to serve the generators. The generators were purchased used and are not subject to NSPS 4I based upon installation dates and PTI review (PTI No. 110-07).

The dual fuel (NG & ULSD) RICE generators (2) are fired for testing once in a year. The generators hardly are used for emergency electricity due to power interruption.

PTI No. 419-92C, FG-TURB/WHRU#1 (EUTURBINE#1, EU_WHRU#1)

A nominally rated 51.25 MMBtu/hr natural gas-fired turbine, a waste heat recovery unit with a nominally rated 60 MMBtu/hr natural gas-fired duct burner and an electrical generator operating in combined-cycle mode.

Pollutant	Limit	Time Period/ Operating Scenario	Equipment	08/02/18 Stk Tst	
1. NO _x	25 ppmv dry at 15% oxygen	30-day rolling average as determined each day the turbine operates	FGTURB/WHRU#1	25.17 ppm @ 15% O ₂	
2. NO _x	8.44 pph (turbine and waste heat recovery unit)	24-hour rolling average as determined each hour the boiler operates	FGTURB/WHRU#1		
*Test protocol shall specify averaging time. ppmv = parts per million by volume (ppmv) at 15 percent oxygen.					
Custom Stack Analysis, LLC (Brian E. Lemasters), conducted stack sampling on August 02, 2018, on Cummins Model GTA28 Generator Outlet.					

FG-TURB/WHRU#1,II

Only pipeline quality natural gas is burned in the turbines and duct burner (FG-TURB/WHRU#1,II.1: only NG)

Oakland U failed to provide necessary information and records to show compliance with this flexible group, gas turbine with a duct-burner (FG-TURB/WHRU#1). AQD issued October 12, 2021, Violation Notice (VN) for failure to demonstrate compliance with PTI No. 419-92C, FG-TURB/WHRU#1 (EU-TURBINE#1 & EU-WHRU#1) and federal New Source Performance Standard, 40 CFR, Part 60, Subparts A and KKKK (NSPS 4K)

PTI No. 419-92C, FG-FACILITY

Natural gas usage:

- CY 2018:** EU-HTWGEN#1 = 20.45, EU_HTWGEN#2 = 23.8, EU-TURBINE#1 (gas turbine) = 351.4, EU-WHRU#1 (ductburner) = 34.8 MM SCF
- CY 2019:** EU-HTWGEN#1 = 22.18, EU_HTWGEN#2 = 0.0, EU-TURBINE#1 (gas turbine) = 386.3, EU-WHRU#1 (ductburner) = 6.94 MM SCF
- CY 2020:** EU-HTWGEN#1 = 15.1, EU_HTWGEN#2 = 0.37, EU-TURBINE#1 (gas turbine) = 345, EU-WHRU#1 (ductburner) = 29 MM SCF

Diesel (ULSD) used only in generators during mostly testing.

1. **CY 2018:** Gen1 = 23 gallons of Diesel & 0.0072 MM SCFT of natural gas and Gen2 = 71 gallons of Diesel & 0.0227 MM SCFT of natural gas.
2. **CY 2019:** Gen1 = 167 gallons of Diesel & 0.012 MM SCFT of natural gas and Gen2 = 486 gallons of Diesel & 0.0187 MM SCFT of natural gas.
3. **CY 2020:** Gen1 = 0 gallons of Diesel & 0.00 MM SCFT of natural gas and Gen2 = 14 gallons of Diesel & 0.0 MM SCFT of natural gas

(PTI No. 419-92C, FG-FACILITY, II.1-2 Material Limits: 850 million standard cubic feet of natural gas per year and 8,000 gallons of diesel per year)

Conclusion:

AQD issued October 12, 2021, Violation Notice (VN) for failure to demonstrate compliance with PTI No. 419-92C, FG-TURB/WHRU#1 and federal New Source Performance Standard, 40 CFR, Part 60, Subparts A and KKKK (NSPS 4K). Oakland U is not in compliance with its permit & NSPS 4K.

NAME *J. S. Marshall*

DATE December 9, 2021

SUPERVISOR *Joyce*