

DEPARTMENT OF ENVIRONMENTAL QUALITY
AIR QUALITY DIVISION
ACTIVITY REPORT: Scheduled Inspection

M067554944

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| FACILITY: UNIVERSITY OF MICHIGAN | | SRN / ID: M0675 |
| LOCATION: 1239 KIPKE DR, ANN ARBOR | | DISTRICT: Jackson |
| CITY: ANN ARBOR | | COUNTY: WASHTENAW |
| CONTACT: Brandi Campbell , Occupational Safety & Environmental Health | | ACTIVITY DATE: 09/03/2020 |
| STAFF: Diane Kavanaugh Vetort | COMPLIANCE STATUS: Compliance | SOURCE CLASS: MAJOR |
| SUBJECT: Major Source FCE inspection conducted virtually on two dates: 9/3 and 9/8. PCE Records review under separate report. | | |
| RESOLVED COMPLAINTS: | | |

M0675 UNIVERSITY OF MICHIGAN, 1239 Kipke Drive, Ann Arbor, MI 48109

FULL COMPLIANCE EVALUATION (FCE) COMPLETE SCHEDULED COMPLIANCE INSPECTION CONDUCTED VIRTUALLY (FACETIME) WITH WALKING TOUR ONSITE WITH CONTACT BRANDI CAMPBELL. Due to the current Stay Home Stay Safe executive order and COVID-19 pandemic EGLE-AQD is attempting to conduct prioritized and abbreviated inspections with use of virtual and electronic records receipts in cases where this is possible. **PARTIAL COMPLIANCE EVALUATION (PCE) RECORDS REVIEW IS UNDER SEPARATE MACES ENTRY.**

CONTACT: Brandi Campbell (BC), Environment, Health, & Safety, Sr. Environmental Specialist, 734-647-9017, campbelb@umich.edu

AQD: Diane Kavanaugh Vetort (DKV), Jackson District Office

On September 3, 2020, AQD DKV conducted inspection accompanied by BC of the following buildings/process equipment:

Hoover Heating Plant (HHP)

ETO Sterilizers

Crematory

On September 8, 2020 AQD DKV conducted inspection accompanied by BC of the following buildings/process equipment:

Central Power Plant (CPP)

North Campus Research Complex (NCRC)

COMPLIANCE INSPECTION

The purpose of the inspection is to determine the facility compliance status with the applicable federal and state Air Pollution Control regulations, specifically Act 451, Natural Resources and Environmental Protection, Part 55, Air Pollution Control, the administrative rules, and the conditions of UM's Renewal Operating Permit (ROP) MI-ROP-M0675-2014a. UM's renewal is in-house under technical review at this time.

The UM is a major source for criteria pollutants and hazardous air pollutants (HAP) and therefore is subject to one or more Major Source Maximum Achievable Control Technology (MACT) standards. UM also has installed a large number of emergency diesel and natural gas internal combustion engine generators subject to Major Source (MACT) standard (40 CFR 63 Subpart ZZZZ) and the associated New Source Performance Standard, 40 CFR Part 60, Subpart IIII or JJJJ. UM operates numerous natural gas and/or fuel oil capable boilers subject to the Major Source Boiler MACT standard (40 CFR 63 Subpart DDDDD) and New Source Performance Standard (40 CFR 60 Subpart Dc, or Db). UM submitted ROP Certifications timely and reported deviations as required during the previous 12 month period (2019 to 2020). UM submitted their 2019 MAERs timely.

The focus of the AQD compliance inspection was the UM campus three main power and/or heating facilities: UM Central Power Plant (CPP) main power and heating plant; Hoover Heating Plant (HHP) small heating plant for Athletics, Crisler Arena, and maintenance/main offices; and North Campus Research Complex (NCRC) power and heating plant for the former Pfizer area complex. In addition, the Crematory and the Ethylene Oxide Sterilizer processes were also prioritized for this inspection.

On September 3, 2020 Brandi contacted me through FaceTime (FT) at the subject locations. She entered the subject buildings and I was able to speak to her, ask questions, observe and speak to operators, and view control rooms and process equipment conditions. Specific significant observations for each location are discussed below.

HHP (9/3) EUB0805-02, -03, -04 Boilers

Brandi and I made contact with Glen Theeck, Maintenance Supervisor by FT and observed the plant's control room, log books. This is a heating plant and it meters steam to three main buildings. No oil has been used in the past 12 months. Boiler 1 is dismantled/decommissioned in place. All are subject to the Boiler MACT with current applicable requirements under FG-BOILERMACT. BLR 02, BLR 03, are also subject to NSPS Subpart Dc.

Preventative maintenance is schedule internally and externally, annually by Global Insurance Company. They check boiler efficiency and regularly check the stacks. There is continuous O2 monitoring for peak performance.

Brandi and Glen walked me virtually around each boiler and they appeared to be in good condition, housekeeping was good. We went outside to view the two fuel oil underground storage tank area, which looked to be in good condition.

CREMATORY (9/3) EUI0213-02

EU-I0213-02 is a Matthews Cremation Division model IE43-PPI (Power-Pak 1), natural gas fired, 750 lb. maximum capacity, 150 lbs./hr. burn rate located at the Medical Sciences II Building 0213. Has a secondary combustion chamber with afterburner.

Brandi contacted me when she reached the Crematory location. Brandi informed me the long time Manager was no longer working there. We met with Kenny, long time Operator. The Unit was not operating at this time. Kenny continues to be the person to observe the stack during burns. Brandi and I went with him out to the mezzanine level to observe the stack and see again where they normally observe for visible emissions (Opacity) smoke.

In the crematory room I observed the control panel, and the condition of the Unit and area. I also had Brandi show me the Opacity monitor in-stack in this room. It is equipped with a sensor and light alarm is triggered at the control panel. EU-I0213-02 appeared to be installed and operating properly. COMPLIANT

Following the inspection Brandi emailed to me a copy of the log sheet I reviewed during the inspection. She also sent a copy of another log sheet and their Quarterly Spreadsheet documenting waste being burned. COMPLIANT

During the inspection I observed the control panel temperature monitoring parameter recording device. Brandi sent records demonstrating its operation during burns reaches above the minimum allowed temperature. Following the prior inspection in 2017 their IT Department set up this temperature monitor with back up and downloading capabilities and alarm system to notify if malfunctioning. It was connected to the Building Automation System to provide for another back up.

ETO STERILZERS (9/3)

Brandi contact me on FT outside of the ETO Room. Upon entering we observed/met a 3M Technician that happened to be there today checking the Abators. He had one open and I was able to view the filters. 3M is the sterilizer manufacturer and provides some emergency response and a maintenance contract. BTEC Inc. prepared UM's EtO Sterilizer Malfunction Abatement Plan (MAP). The MAP was revised recently because the ROP is currently in Renewal. This will be placed in their plant files. It explains the process in more detail.

EU-ETO-1E, EU-ETO-2E are the smaller Units (5XL) - limited to use no more than 100 grams of EtO per cycle/load.

EU-ETO-3E, EU-ETO-4E, EU-ETO-5E, EU-ETO-6E are larger Units (8XL) - limited to use no more than 170 grams EtO per cycle/load.

I observed the two sizes which look like hair spray canisters (100 small, 170 larger). Canisters are contained in cardboard boxes and stored in a metal cabinet.

FG-6ETO: EtO emission limit for all sterilizers combined is 1.42 lb/yr based on 12 month rolling time period as determined at the end of each calendar month. AQD requested FG-6ETO records for the 12 month period ending July 2020. Brandi emailed the emissions and usage spreadsheets. COMPLIANT

FG-6ETO also contains an emission limit in pounds per hour, based on the testing of all sterilizers operating at one time. AQD has not required testing to date. Normally all sterilizers do not operate at the same time. Testing is proposed to be added to the Renewal.

ROP Condition VI. requires recordkeeping. UM is required to keep record of the number of cycles/loads processed in each Sterilizer per calendar day and per calendar month. COMPLIANT

I observed EtO #4 was operational. Only one was running currently today. I was able to hear the associated control abator unit was running. Each unit runs single use cycles, approximately 3 cycles can be run per unit, per 2 days. Each cycle takes 15 hours.

From the prior inspection in 2017, I had detailed the following: Daily PM's are done including alarm sound checks. Every 6 months they check the motors. There are vacuum alarms to assure sterilizer vacuum. Numerous leak detection monitors are located in the room and outside the door. Monitors are also in EtO storage cabinet s. Monitors are calibrated (ChemDAQ system). Per manager at the time there are 7 monitors in 7 areas, with 0.1 ppm detection limit. The temperature of the Cat Ox. abator control must reach 373 degrees F before start up of the Unit and they are interlocked.

The controls are 3M Model 50 EtO "Abator" catalytic oxidizers. They contain a charcoal base, honeycomb catalyst. Per UM, they have not needed to change the material in them yet. Emissions are mostly water vapor. There is an error code for catalyst bed failure, dedicated to each unit/line. The MAP and the 3M maintenance agreement assures they are installed and operating properly to meet the 99.9 percent control efficiency requirement in the ROP.

ROP VIII. shows 4 stacks, SV-EF-310, 311, (each 20 in diameter and 77.25 feet) and SV-EF-312, 313 (28 in dia. and 85.25 ft). I observed a monitor in the sterilizer room labeled E312 and E313. Per BC and 3M Technician today, these are dual exhausts and only one operates at a time. The stacks are located on the 3rd floor roof and it is a secure area to prevent accidental exposure to anyone in the area. Brandi clarified for me, EF-312 (with EF-313 backup) exhausts the discharge from all 6 of the abators whereas EF 310 (EF-311 backup) provides general exhaust from the room.

THIS WAS THE END OF DAY ONE

On September 8, 2020 Brandi contacted me through FaceTime (FT) at the subject locations. She entered the subject buildings and I was able to speak to her, ask questions, observe and speak to operators, and view control rooms and process equipment conditions. Specific significant observations for each location are discussed below.

North Campus Research Complex (NCRC) 9/8:

NORTH CAMPUS RESEARCH COMPLEX (NCRC): BOILERS EU-BOILER2, EU-BOILER3, EU-BOILER1A, EU-BOILER1B, EU-BOILER5, EU-BOILER6, EU-TURBINE (Cogen Turbine, Nat gas w/No. 2 fuel oil capability), EU-DUCTBURNER (Supplemental heat to BOILER4 - Nat gas only). Turbine is subject to NSPS Subpart GG and MACT YYYY. Applicable requirements are also in FG-BOILERS1A&1B, FG-BOILERS2&3, FGBOILERS5&6 for the boilers indicated. NCRC includes buildings No. 800 and No. 85 with Diesel Emergency Generators and Fire Pumps. These have applicable requirements under FG-EMERG-III, and/or FG-EMERG-ZZZZ, FG-85-EMERGENS, FG-85-FIREPUMPS. Brandi and I briefly met with an Operator in the control room and he assisted us during the inspection. She walked through the majority of the plant and I observed the condition of most of the equipment.

EU-TURBINE (Cogen Turbine) 40.1 MMBTU/hr, EU-DUCTBURNER (Supplemental heat to BOILER4 - Nat gas

only), NOx limit 36.1 lbs/hr 12 month rolling time period. Fuel oil 0.10% sulfur content by weight. Exhaust goes to Ductburner or to SV-BYPASS stack. The CO-GEN was operational today. And the associate Boiler 4 (EUDUCTBURNER) was also operating. It was running at 15,000 lbs of steam (waste heat off the Turbine). Max load of the Turbine is about 3 MW. It is on low load now, per Brandi powering mainly the labs only.

FG-BOILERS1A&1B, each 19.9 MMBTU/hr capacity. NOx limit lb/MMBTU and 1.02 tons per month for each boiler. No.2 fuel oil limit 0.05% sulfur by weight. Subject to NSPS Subpart Dc, and MACT DDDDD (Boiler MACT). These are the Clayton boilers and they start-up faster; so they have kept them. They maintenance check and test them every shift (2). Never run for the most part.

FG-BOILERS2&3, each 63.2 MMBTU/hr (50,000lbs steam/hr), NOx limit lbs/MMBTU and 3.23 tons per month. No. 2 fuel oil 0.10 % sulfur content by weight. Subject to MACT DDDDD (Boiler MACT).

FGBOILERS5&6, each 72 MMBTU.hr (nat. gas capacity) and 70 MMBTU/hr (No. 2 fuel oil capacity), NOx limits lbs/MMBTU (combined), NOx 3.58 tons per month each. Opacity 20% Rule 301. Fuel oil 0.10% sulfur content by weight. Subject to NSPS Subpart Dc, and MACT DDDDD (Boiler MACT). Boiler #5 was operational today. It was running at 16,000 lbs of steam. (These are the green colored boilers).

Central Power Plant (CPP) 9/8:

CENTRAL POWER PLANT (CPP): The University of Michigan CPP generates steam and electricity for use by various UM buildings and facilities. The plant consists of seven boilers and two turbines (all fired with natural gas and fuel oil; Boilers 7 and 8 are natural gas only), as well as associated steam turbines, electrical generators and ancillary equipment.

Brandi contacted me by FT and we started the inspection in the Control Room. She had some assistance from one of the Operators. I observed the overview screens of the plant's operational status. Boiler 6, Boilers 7 & 8 and Turbines 9 & 10 (Co Gen system) were all operational today. I observed the Water to Fuel Ratio monitoring screens and the CEMS Opacity screen. This is applicable only when fuel oil is being burned and that is not normal and was not occurring today.

EU-B0260-02 - not operating. EU-B0260-03 - not operating. EU-B0260-04 - not operating. EU-B0260-06 - operating. EU-B0260-07 and -08 are steam boilers for Turbines EU-T0260-09 and -10 - all of these EU were operating. These EU are associated together under flexible group FG-BT0260-CO cogeneration system. Also, EU-B0260-01 and -02 have Applicable Requirements in FG-B0260-01-02 and EU-B0260-03 -04 have Applicable Requirements in FG-B0260-03-04.

All the CPP Boilers, except for EU-B0260-07 and -08, are subject to the Boiler MACT Subpart DDDDD. FG-BT0260-CO (EU-T0260-09 and -10) are subject to NSPS Subpart GG and Turbine MACT Subpart YYYY, and Compliance Assurance Monitoring (CAM) for the water to fuel ratio monitoring device.

The last RATA testing of CPP Boilers 3, 4, and 6 (NOx CEMS) and the Boiler 6 (COMS) were conducted on February 11, 12, and 13, 2020.. The testing was observed and reviewed by AQD and determined to be acceptable. The required 5 year stack testing of Boiler 2, Boiler 6 and the Cogen Turbine 10 was conducted March 12, 20, 21, and 22, 2018.

FG-B0262-01-02, SO2 emission rate from the two boilers when firing No. 2 fuel oil limit 0.56 lbs/MMBTU heat input, based upon a 24-hr period. NOx limit 0.30 lb/MMBTU heat input from the two boilers when firing No. 2 fuel oil based on a 24-hr average period. NOx limit 0.20 lbs/MMBTU heat input from the two boilers when firing natural gas based on a 24-hr averaging period.

FG-B0260-03-04: includes Boilers 3 and 4. Boilers 3, and 4 are capable of firing natural gas or distillate fuel oil at the following heat input capacities: BLR 3: 315 MMBtu/hr; BLR 4: 315 MMBtu/hr; They are subject to CAIR Ozone NOx Trading Program and have exhaust stack specific requirements. SV-B0260-01 North Stack: 250 ft. and SV-B0260-02 South Stack: 159 ft.

Boiler 3 CEMS/COMS is NOx/O2 Horiba Model ENDA-E4220L, P-1576.
Boiler 4 is NOx/O2 Horiba ENDA-E4220L, P-1577.

Limits from ROP:

SO₂ limit 0.56 lb/MMBTU heat input (each) while firing oil, based on 24 hour time period
NO_x limit 0.55 lb/MMBTU heat input (each) while firing natural gas & exhausting to South Stack, on a 24 hr average

EU-B0260-06: includes Boiler 6. The Boiler is rated 376 MMBtu/hr, and is capable of firing natural gas or distillate fuel oil. Boiler 6 is subject to CAIR Ozone NO_x Trading Program, and federal NSPS Subpart Db. Boiler 6 is NO_x /O₂ Horiba Model ENDA –E4220L, P-2072.

Limits from ROP:

NO_x limit 0.10 lbs NO_x /MMBtu heat input, nor
NO_x limit 36.0 lbs NO_x/hr, based on a 24-hr rolling time period.
NO_x limit 88.3 tons NO_x/yr 12 month rolling time period.
SO₂ limit 0.30 lbs SO₂/MMBtu and,
SO₂ limit 108.0 lbs SO₂/hr, based on a 24-hr rolling time period.
SO₂ limit 38.6 tons SO₂/yr 12 month rolling time period.
CO limit 0.15 lbs/MMBtu (oil fired) nor 0.10 lbs/MMBtu (natural gas)
CO limit 170.3 tons per 12 month rolling time period.
(Also have 20% Opacity limit, VOC limits -refer to ROP)

Maximum No. 2 fuel usage limit: 1,774,286 gallons per 12 month rolling time period as determined by the tenth day of each calendar month.

Turbine 10 Specs: EU-T0260-10 Solar Centaur Model T5900, 3.8 MW industrial gas turbine and that can burn either natural gas or No. 2 fuel oil. The turbine uses water injection at the combustor section to reduce NO_x emissions.

CO emission limit 7.54 lbs/hr natural gas, nor 37.87 lbs/hr when firing No. 2 fuel oil.

Turbine 9 Specs: EU-T0260-09 Solar Centaur Model T5900, 3.8 MW industrial gas turbine and that can burn either natural gas or No. 2 fuel oil. The turbine uses water injection at the combustor section to reduce NO_x emissions.

Both turbines contain a heat recovery steam generator (referred to as Boiler 7 and 8) that each use a natural gas duct burner for supplemental firing. Normal operation of this combined-cycle system is continuous at 100 percent turbine load. Distillate oil use in the turbines is limited to 1,000 hours per year and the sulfur content of the fuel is not to exceed 0.15 percent by weight.

During a prior inspection I learned that steam is sent through tunnels. There are approximately 4 tunnels some with two lines, for example there is a 6 inch and 10 inch line to the Hospitals. Water is continually collected in a loop. The Control panels show monitoring for all parameters of load, and water in gallons per minute (GPM). CPP has automatic load balancing. My understanding is that what electricity UM produces supplements Detroit Edison: Maximum they are allowed is 26 MW.

FG-BOILERMACT

UM ROP contains the Major Source Boiler MACT Subpart DDDDD Table and references @ 187 boilers currently. UM subject boilers are either "gas 1 subcategory" gaseous fuel or "light liquid subcategory" fuel. They fall into one of four subcategories: Large gaseous fuel, Large liquid fuel, Small gaseous fuel, Small liquid fuel. The "Light Liquid subcategory" emission limits are listed. UM has made a decision to limit all boilers to the 48 hour annual liquid fuel use limitation allowing their combined fuel boilers to remain under the "gas 1 subcategory". The remainder of the requirements, including testing and tune-ups are tracked by UM in a spreadsheet. It is noted these ROP Template Tables have been updated and UM added and removed numerous boilers since the prior ROP was issued. There will be significant changes in the Renewal currently in technical review.

COMPLIANCE SUMMARY

The AQD determined the University of Michigan to be in substantial compliance with the conditions of their ROP MI-ROP-M0675-2014a and the applicable federal requirements reviewed. UM submitted all reports timely during the FCE period and has demonstrated compliance. UM has submitted Test plans

and has conducted many compliant tests during the time period referenced here and continues to conduct regular testing of Boilers and Generators.

One pending item related to the Crematory was updated on 9/24/20 by email from contact Brandi Campbell: I wanted to let you know that the crematory is scheduled for an inspection on October 20th by Matthews. I will keep you posted. If you have any questions, please let me know.

:

NAME *Brandi Campbell*

DATE *10/14/20*

SUPERVISOR *[Signature]*