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# ENGINEERING EVALUATION / FACT SHEET

## BACKGROUND INFORMATION

| | |
|---|---|
| Application No.: | R13-3241 |
| Plant ID No.: | 107-00163 |
| Applicant: | Parkersburg Utility Board |
| Facility Name: | 19th St. Wastewater Treatment Plant |
| Location: | Parkersburg, WV |
| NAICS Code: | 221320 |
| Application Type: | Modification |
| Received Date: | March 11, 2015 |
| Engineer Assigned: | Steven R. Pursley, PE |
| Fee Amount: | $2,000.00 |
| Date Received: | March 11, 2015 |
| Complete Date: | April 16, 2015 |
| Due Date: | July 15, 2015 |
| Applicant Ad Date: | March 16, 2015 |
| Newspaper: | *The Parkersburg News and Sentinel* |
| UTM's: | Easting: 451.964 km Northing: 4,348.12 km Zone: 17 |
| Description: | Addition of an emergency generator, flare and two boilers to a wastewater treatment plant. |

## DESCRIPTION OF PROCESS

The Parkersburg Utility Board (PUB) submitted the application to add a flare, emergency generator and boiler to their existing wastewater treatment plant.

The 9,520 scf/hr flare is part of the digester gas safety system. Excess gas produced by the primary digesters that is not stored in the secondary digesters or utilized by the boilers is flared to safely release the methane/carbon dioxide mixture to the atmosphere. The flare will switch on whenever pressure in the digester gas piping exceeds a set point via a pressure switch.

The 540 hp diesel fired emergency generator will provide power during blackout scenarios.

The 2 mmbtu (each) boilers will provide energy to heat water that is used in multiple heat exchangers to provide building heat and sludge heating. The boilers will utilize digester gas as their primary fuel. When digester gas is insufficient, they will be supplemented with natural gas.

## SITE INSPECTION

Because of the low potential emissions, a site inspection was deemed unnecessary by the writer at this time.

## ESTIMATE OF EMISSIONS BY REVIEWING ENGINEER

Emissions calculations from the emergency generator were based on AP-42 tables 3.3-1 and 3.3-2. Annual emissions were based on 500 hours of operation per year.

All emissions calculations from the boilers except $SO_2$ were based on AP-42 tables 1.4-1, 1.4-2 and 1.4-3. $SO_2$ emissions from the boilers were based on hydrogen sulfide testing performed by the applicant on their biogas. Then, a mass balance was performed.

Emissions from the flare were also based on AP-42 emission factors for natural gas combustion. In order to determine the fuel (biogas) rate to the flare, an industry standard maximum of 18 $ft^3$ of gas produced per pound of volatile solids destroyed.

| Source | $PM/PM_{10}$ | | $SO_2$ | | $NO_x$ | | VOC | | CO | | HAPs | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy |
| Em. Gen. 2S | 1.35 | 0.34 | 1.27 | 0.32 | 19.27 | 4.82 | 1.57 | 0.39 | 4.15 | 1.04 | 0.02 | 0.01 |
| Boiler 3S | 0.02 | 0.11 | 0.01 | 0.01 | 0.30 | 1.31 | 0.02 | 0.09 | 0.26 | 1.14 | 0.01 | 0.03 |
| Boiler 4S | 0.02 | 0.11 | 0.01 | 0.01 | 0.30 | 1.31 | 0.02 | 0.09 | 0.26 | 1.14 | 0.01 | 0.03 |
| Flare 5S | 0.05 | 0.21 | 0.01 | 0.02 | 0.59 | 2.58 | 0.04 | 0.17 | 0.51 | 2.24 | 0.01 | 0.05 |
| **Total** | 1.44 | 0.77 | 1.30 | 0.36 | 20.46 | 10.02 | 1.65 | 0.74 | 5.18 | 5.56 | 0.05 | 0.12 |

## REGULATORY APPLICABILITY

The following state and federal rules are applicable to the facility:

STATE RULES

### 45CSR2: To Prevent and Control Particulate Air Pollution from Combustion of Fuel in Indirect Heat Exchangers

The boilers are fuel burning units under 45CSR2 and are, therefore, subject to the applicable requirements therein. However, pursuant to the exemption given under §45-2-11, as the MDHI of each boiler is less than 10 mmBtu/hr, the units are not subject to sections 4, 5, 6, 8 and 9 of 45CSR2. The only remaining substantive requirement is under Section 3.1 - Visible Emissions Standards.

Pursuant to 45CSR2, Section 3.1, the boilers are subject to an opacity limit of 10%. Proper maintenance and operation of the boilers (and the use of natural gas and biogas as fuel) should keep the opacity of the units well below 10% during normal operations.

### 45CSR6: To Prevent and Control Particulate Air Pollution from Combustion of Refuse

The flare meets the definition of an "incinerator" under 45CSR6 and is, therefore, subject to the requirements therein. The substantive requirements applicable to the flare are discussed below.

45CSR6 Emission Standards for Incinerators - Section 4.1

Section 4.1 limits PM emissions from incinerators to a value determined by the following formula:

Emissions (lb/hr) = F x Incinerator Capacity (tons/hr)

Where, the factor, F, is as indicated in Table I below:

**Table I:** Factor, F, for Determining Maximum Allowable Particulate Emissions

| Incinerator Capacity | Factor F |
|---|---|
| A. Less than 15,000 lbs/hr | 5.43 |
| B. 15,000 lbs/hr or greater | 2.72 |

PUB calculated potential particulate matter emissions from the flare to be 0.05 lbs/hr. Based on information included in the application, the maximum amount of vapor sent to the combustor will be 6,048 cubic feet per hour. Assuming a density of 0.0718 lb/cf (at STP) this gives a mass flow rate of about 434 pounds per hour. Based on the above, the

aggregate particulate matter limit of the flare is 1.18 lbs/hr. As the hourly particulate matter emission rate from the flare is 0.01 lbs/hr, the unit is in compliance with this emission limit.

45CSR6 Opacity Limits for - Section 4.3, 4.4

Pursuant to Section 4.3, and subject to the exemptions under 4.4, the flare has a 20% limit on opacity during operation. As the primary constituent in the vapors combusted in the unit shall be a mixture of methane and carbon dioxide, particulate matter emissions from the flare are expected to be nominal. Therefore, the flare should easily meet this requirement.

**45CSR10: To Prevent and Control Air Pollution From the Emission of Sulfur Oxides.**

Because the boilers are less than 10 mmbtu the only substantive requirement of 45CSR10 applicable to the modification is the limit in section 5.1 which prohibits combustion of a process gas stream containing $H_2S$ in excess of 50 grains per 100 scf. Given a combustion rate of 6,048 cubic feet per hour, this limit would allow combustion of up to 0.43 pounds of $H_2S$ per hour (about 0.40 pounds of sulfur). Since the boilers will emit less than 0.01 pounds of $SO_2$ per hour the units will obviously meet the requirement.

**45CSR13: Permits for Construction, Modification, Relocation and Operation of Stationary Sources of Air Pollutants, Notification Requirements, Administrative Updates, Temporary Permits, General Permits, and Procedures for Evaluation**

The proposed changes to the facility have an uncontrolled (and without any restrictions on the annual hours of operation) potential-to-emit (PTE) in excess of six (6) lbs/hour and ten (10) TPY or a regulated pollutant ($NO_x$). Additionally, the emergency generator and flare are subject to "substantive requirements" of an emission control rule (See 40 CFR 60, Subpart IIII and 40CSR6 respectively). Therefore, under §45-13-2.24(a) and (b), the modification is defined as a "stationary source." Pursuant to §45-13-5.1, "[n]o person shall cause, suffer, allow or permit the construction . . . and operation of any stationary source to be commenced without . . . obtaining a permit to construct." As a result of this statutory language, PUB is required to obtain a permit or register with an appropriate general permit under 45CSR13 for the proposed modification.

As required under §45-13-8.3 ("Notice Level A"), PUB placed a Class I legal advertisement in a "newspaper of general circulation in the area where the source is . . . located." The ad ran on March 16, 2015 in *Parkersburg News and Sentinel* and the affidavit of publication for this legal advertisement was submitted on April 2, 2015.

**45CSR22: Air Quality Management Fee Program**

This facility is a minor source and not subject to 45CSR30. PUB is required to keep their Certificate to Operate current.

FEDERAL RULES

**40 CFR 60, Subpart IIII: Standards of Performance for Stationary Compression Ignition Internal Combustion Engines**

Subpart IIII of 40 CFR 60 is the NSPS for stationary compression ignition internal combustion engines (diesel fired engines). Section §60.4200 states that "provisions of [Subpart IIII] are applicable to manufacturers, owners, and operators of stationary compression ignition (CI) internal combustion engines (ICE)." Specifically, §60.4200(a)(2) states that Subpart IIII applies to "[o]wners and operators of stationary CI ICE that commence construction after July 11, 2005, where the stationary CI ICE are:

(i) Manufactured after April 1, 2006, and are not fire pump engines

PUB has proposed the construction of one (1) new CI ICE emergency generator (manufactured after 2007) that is subject to Subpart IIII. Based on the standards for owner/operators of emergency generator CI ICE under §60.4205, the following table details the emission standards for the engine:

| Duty | Size (kw) | Displacement (L/cyl) | Source | Emission Standards (g/kw-hr) | | |
|---|---|---|---|---|---|---|
| | | | | NMHC + $NO_x$ | CO | PM |
| Emergency | 400 | <10 | §80.112, Table 1 | 4.0 | 3.5 | 0.2 |

The Caterpillar C15 ATAAC engine is a EPA Tier 3 engine certified to meet these standards.

**40 CFR 63, Subpart ZZZZ: National Emission Standard for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines**

On June 1, 2013 the DAQ took delegation of the area source provisions of 40 CFR 63, Subpart ZZZZ. As the facility is defined as an areas source of HAPs, the facility is subject to applicable requirements of Subpart ZZZZ. PUB only needs to comply with 40 CFR 60 Subpart IIII to comply with 40 CFR 63 Subpart ZZZZ.

NON-APPLICABILITY DETERMINATIONS

**40 CFR 60, Subpart Dc:** **Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units**

Per §60.40c(a), boilers under 10 mmbtu/hr are not subject to the rule.

**40 CFR 63, Subpart JJJJJJ:** **National Emission Standard for Hazardous Air Pollutants for Industrial, Commercial, and Institutional Boilers Area Sources**

Per §63.11195(e), gas fired boilers are exempt from the rule.

TOXICITY OF NON-CRITERIA REGULATED POLLUTANTS

The only non-criteria regulated pollutants that will be emitted from the

AIR QUALITY IMPACT ANALYSIS

Since the facility is not a major source as defined in 45CSR14, no modeling was performed.

MONITORING OF OPERATIONS

The permittee will be required to perform the following monitoring and recordkeeping.

* Records of hours of operation of the emergency generator on a monthly basis
* Records of quantity and type of fuel burned in the emergency generator.
* Records of the maximum sulfur content on a per-shipment basis for fuel oil burned in the emergency generator.
* PUB will be required to perform periodic opacity testing on the flare.

## RECOMMENDATION TO DIRECTOR

Information supplied in the application indicates that compliance with all applicable regulations will be achieved. Therefore it is the recommendation of the writer that permit R13-3241 for the modification of a wastewater treatment plant in Parkersburg, Wood County, be granted to the Parkersburg Utility Board.

Steven R. Pursley, PE
Engineer

June 10, 2015