

Lane Regional Air Protection Agency
Standard Air Contaminant Discharge Permit

REVIEW REPORT

University of Oregon
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Permit No. 208557

1. General Background Information

The facility is permitted to operate a central power station for electrical power generation, utilizing two boilers and a combined cycle cogeneration system with a combustion turbine and duct burner. The power station serves the heating and cooling needs of the University of Oregon campus and educational facilities, as well as, implementing a market-based approach to the production and sale of power. The central power station utilizes primarily natural gas with the potential to use fuel-oil as a back-up fuel source and is located north of Franklin Boulevard near the main campus. Along with the central power station, the facility operates several small boilers in campus buildings and many categorically insignificant emission units throughout campus. The emission units (EU) at the facility are the following:

| Emission Unit | Emission Unit Description |
|---------------|---|
| EU-1 | Boiler #1, Central Power Station, Nebraska, 79 MMBtu/hr, gas/oil-fired (1994) |
| EU-2 | Boiler #2, Central Power Station, Babcock & Wilcox, 78 MMBtu/hr, gas/oil-fired (2011) |
| EU-3 | Heat recovery steam generator combined cycle cogeneration plant (2011): Combustion Turbine, Central Power Station, 8.6 MW, Solar Taurus 70, gas/oil-fired Duct Burner, Central Power Station, 45 MMBtu/hr, Rentec HRSG, gas-fired |
| EU-4 | Printing services, Baker Center Downtown |
| EU-5 | Unpaved parking lots (See emission details attached to this review report for locations) |
| EU-6 | Emergency Generators: 3 Generators, Central Power Station, Caterpillar, 2.2 MW each, oil-fired (2009) Generator, Franklin Office, Caterpillar, 80 kW, oil-fired (2016) Generator, Knight Law, Cummins, 65 kW, gas-fired (1988) Generator, Mac Court, Kohler, 30 kW, LPG-fired (1973) Generator, UOPD, Olympian, 55 kW, gas-fired (2012) Generator, Rainier Building, Cummins, 80 kW, oil-fired (2013) Generator, Willamette Hall, Waukesha, 325 kW, gas-fired (1988) Generator, Hatfield-Dowlin Complex, Kohler, 400 kW, oil-fired (2013) Generator, PK Park, Deere, 80 kW, oil-fired (2009) Generator, Hayward, Cat G50F3, 50 kW, gas-fired (2006) Generator, Autzen, Caterpillar, 750 kW, oil-fired (2002) |

| Emission Unit | Emission Unit Description |
|---------------|--|
| EU-7 | Boiler, Casanova Center, Kewanee, 8.4 MMBtu/hr, gas-fired Boiler, Casanova Center, Kewanee, 4.2 MMBtu/hr, gas-fired |
| EU-8 | 2 Boilers, Agate Hall, Cleaver Brooks, 2.5 MMBtu/hr each, gas-fired |
| EU-9 | Boiler, Romania Center, Fire Tube, 2.5 MMBtu/hr, gas-fired |
| EU-10 | 2 Make-up air heaters, Practice Facility, 3.0 MMBtu/hr, gas-fired |
| EU-11 | Boiler, Baker Center Downtown, 2.04 MMBtu/hr, gas-fired (2012) |
| EU-12 | 2 Boilers, Hatfield Dowlin Complex, Lochinvar Crest Model FBN2500, 2.3 MMBtu/hr each, gas-fired |
| EU-13 | Categorically Insignificant Activities: Boiler, U of O Annex, Crane Co., assumed <0.1 MMBtu/hr, gas-fired 2 Boilers, Alder House, Weil-McClain LGB-4, 0.3 MMBtu/hr each, gas-fired Boiler, Innovation Center, A.O. Smith HW 679, 0.5 MMBtu/hr, gas-fired Boiler, Innovation Center, Lochinvar Knight KBN501, 0.5 MMBtu/hr, gas-fired Boiler, Long House, Lochinvar Knight KHN085, 0.085 MMBtu/hr, gas-fired Boiler, Long House, Munchkin Model 80M, 0.07 MMBtu/hr, gas-fired Boiler, Moss Street Center, Lochinvar KHN110, 0.11 MMBtu/hr, gas-fired Boiler, Museum of History, Weil-McClain Ultra 80, 0.08 MMBtu/hr, gas-fired Boiler, Museum of History, LARRS, assumed <0.1 MMBtu/hr, gas-fired |

2. Reasons for Permit Action

This is a permit renewal for an existing Air Contaminant Discharge Permit (ACDP) which was issued on January 14, 2011 and scheduled to expire on January 14, 2016. The application for the renewal of this permit was received from the University of Oregon on October 9, 2015 and the existing permit remains valid until this permit is issued. This facility is required to obtain a Standard ACDP due to the operation of the following processes listed in LRAPA Title 37, Table 1, Part C, along with the other applicable source categories listed in LRAPA Title 37, Table 1:

| Source Category | Description |
|-----------------|--|
| B.12 | Boilers and other Fuel Burning Equipment over 10 MMBTU/hr heat input |
| B.25 | Electrical Power Generation from combustion, excluding units used exclusively as emergency generators and less than 500kW |
| C.3 | All Sources electing to maintain the source's baseline emission rate, or netting basis |
| C.4 | All Sources subject to a BACT, LAER, NESHAP, NSPS, LRAPA MACT, or other significant Air Quality regulation(s) |
| C.6 | All Sources having the Potential to Emit more than 100 tons of any regulated air contaminant in a year, other than GHGs and HAPs |

3. Permit Modification Details

The following table details the changes that occurred during the previous permit term and the subsequent additions or removals in this permitting action:

| Date | Permit Modification | Description |
|------------|---|--|
| 10/04/2009 | Installation of 3, 2.2 MW Emergency Generators | Three emergency generators were installed, but not documented in the previous permitting action. These generators will be included in this permit action, as they are subject to NSPS Subpart IIII for stationary compression ignition internal combustion engines. |
| 12/31/2010 | Removal of Temporary Boiler | The back-up boiler that was installed and documented in the previous permitting action (EU-5) was removed in 2010, as the installation of the cogeneration emission unit accounted for the lack of a backup steam that had been provided by the Eugene Water and Electric Board (EWEB), but was no longer available for use by the facility. |
| 07/11/2011 | Removal of Erie City Boiler | Previously listed as EU-4, the Erie City boiler was decommissioned and removed from the facility during the previous permit term. |
| 04/30/2012 | Installation of Baker Center Boiler | During the previous permit term, LRAPA approved the installation of a 2.04 MMBtu/hr boiler at the facility and it will be added as an emission unit (EU-11) in this permitting action. |
| 02/12/2016 | Installation of 80 kW Emergency Generator | During the permit renewal process, it came to the attention of LRAPA that the facility had installed an 80 kW emergency generator at their Emergency Operations Center. The facility retroactively supplied the Notice of Intent to Construct paperwork to document the installation of the generator. |
| | Inclusion of Small Emergency Generators as Emission Units | During the permit renewal process, the addition of the 3, 2.2 MW Emergency Generators increased the aggregate emergency generator horsepower to over 3000 hp, requiring that all emergency generators be included as emission units and no longer considered categorically insignificant. EU-6 has been redefined in the permit as all emergency generators at the facility. |

4. Enforcement History

On December 9, 2009, the facility informed LRAPA that EU-1 in the central power station had failed and, as a result, they had operated a newly installed, 54 MMBtu/hr temporary boiler. The temporary boiler installation began on October 28, 2009 and was completed on November 25, 2009. The Notice of Intent to Construct for the temporary boiler was received by LRAPA on December 8, 2009, therefore; a permit had not been issued for the new emission unit before its operation. On December 10, 2009, LRAPA issued Notice of Non-Compliance No. 3162 (NON 3162) to the facility for operating a boiler without a permit. The violation was resolved with the issuance of an addendum to the permit for the temporary boiler and a fine of \$2250 was assessed. The facility paid the full amount of the fine, \$2250, on April 16, 2010 and the case was closed.

On November 19, 1990, visible emissions in excess of the permitted limits were observed from the stack of Boiler #3 at the University of Oregon Physical Plant. Opacity was observed and documented by an LRAPA employee at 90% black smoke, which violated the permitted opacity limitation of 40%. Once made aware of the situation, the facility made adjustments to Boiler #3 to remedy the low oxygen conditions that were causing inefficient combustion. The facility was issued Notice of Non-Compliance No. 90-13 (NON 90-13) on December 3, 1990. The facility was required to repair and calibrate the opacity meters and to ensure that an alarm system was in place to indicate when the system was operating incorrectly. No penalty was assessed for this violation and the case was closed.

5. Plant Site Emission Limit (PSEL)

**Annual Plant Site Emission Limits (PSELs)
12-month rolling (tons/year)**

| | PM | PM ₁₀ | PM _{2.5} | CO | NO _x | VOC | SO ₂ | GHG |
|------|----|------------------|-------------------|----|-----------------|-----|-----------------|--------|
| PSEL | 44 | 17 | 9 | 99 | 53 | 39 | 39 | 74,000 |

In order to ensure compliance with the PSELs, the facility is required to estimate emissions and comply with a fuel usage limit of 1165 million standard cubic feet of natural gas (MMscf) and 329 thousand gallons of fuel oil (kgal) on a 12-month rolling basis for EU-1, EU-2 and EU-3. The natural gas usage limit was determined by assuming that EU-1, EU-2 and EU-3 consumed fuel at 50% of their maximum capacity, which is currently a magnitude of 3-times higher than historical throughput values. The fuel oil limit was established assuming a 200-hour usage maximum per unit for EU-1, EU-2 and EU-3 on a 12-month rolling basis.

6. Baseline Emission Rate (BER)

| Pollutant | Baseline Emission Rate ¹ | Netting Basis ² | | | Plant Site Emission Limit (PSEL) | | | Increase over Netting Basis | SER ³ |
|-------------------|-------------------------------------|----------------------------|---|--------------------|----------------------------------|--------------------------------------|-----------------------|-----------------------------|------------------|
| | (tons/yr) | Previous (tons/yr) | Previous Corrected ⁴ (tons/yr) | Proposed (tons/yr) | Previous PSEL (tons/yr) | Proposed PSEL (tons/yr) ⁵ | PSEL Change (tons/yr) | (tons/yr) | (tons/yr) |
| PM | 279 | 218 | 279 | 76 | 51 | 44 | -7 | -32 | 25 |
| PM ₁₀ | 230 | 189 | 230 | 36 | 21 | 17 | -4 | -19 | 15 |
| PM _{2.5} | N/A | 3 | N/A | 19 | 12 | 9 | -3 | -10 | 10 |
| CO | 226 | 226 | 226 | 199 | 99 | 99 | 0 | -100 | 100 |
| NO _x | 116 | 116 | 116 | 89 | 49 | 53 | 4 | -36 | 40 |
| VOC | 49 | 49 | 49 | 49 | 39 | 39 | 0 | -10 | 40 |
| SO ₂ | 34 | 34 | 34 | 34 | 41 | 39 | -2 | 5 | 40 |
| GHG ⁶ | 21,880 | N/A | N/A | 21,880 | N/A | 74,000 | 74,000 | 52,120 | 75,000 |

¹The baseline emission rates for PM, PM₁₀, CO, NO_x, VOC and SO₂ represent estimated actual emissions from 1978. The baseline emission rates for CO, NO_x, VOC and SO₂ were determined in a previous permitting action, but the baselines for PM and PM₁₀ were corrected in this permitting action. A baseline emission rate is not required for PM_{2.5} in accordance with the definition of “baseline emission rate” in LRAPA Title 12. The previous permitting action established a baseline for PM_{2.5} based on historical maximum 12-month rolling emissions between the years of 2000 and 2010. In this permit action, the baseline for PM_{2.5} was removed and the netting basis was adjusted to account for this change.

²The netting basis for PM_{2.5} was set as a fraction of the netting basis for PM₁₀ as of May 1, 2011, per the definition of “netting basis” in LRAPA Title 12. The calculation sheet for establishing the PM_{2.5} netting basis and the PM_{2.5} PSEL is located in the attachment to this review report.

³The potential to emit for the facility, including aggregate insignificant activities, is over the major source threshold for NO_x and CO, therefore; the facility requested limitations in order to limit the potential to emit. These so-called “synthetic minor” limitations are required to ensure compliance with the PSELs and to maintain the facility’s minor source status.

⁴The netting basis was corrected for PM and PM₁₀ in this permitting action to account for a corrected baseline, which included incorporating a PM₁₀ fraction of PM (0.95 PM₁₀/PM with high pressure multiclone control device) to the hog fuel boiler baseline emission rates, applying a PM₁₀ fraction of PM for the hog fuel pile baseline emission rate (0.5 PM₁₀/PM based on an aerodynamic particle size multiplier), and correcting the PM emission factor for the hog fuel boiler #4. See the calculation sheet in the attachment of this review report for the PM₁₀ to PM fractions and PM emission factor references.

⁵The PSELs are set in accordance with Section 42-0040 and 42-0041. The PSEL for NO_x, PM and PM₁₀ are set at source-specific levels to reflect the netting basis.

⁶The baseline for greenhouse gas (GHG) is set to the actual GHG emissions from 2009. The emissions were calculated using updated global warming potentials for CH₄ (25) and N₂O (298).

7. Unassigned Emissions Reductions

| Pollutant | Unassigned Emissions | | | SER (tons/yr) | Reductions ¹ (tons/yr) |
|--------------------------------|----------------------|--|--------------------|------------------|--------------------------------------|
| | Previous (tons/yr) | Corrected Previous ² (tons/yr) | Proposed (tons/yr) | | |
| PM | 167 | 228 | 25 | 25 | 203 |
| PM ₁₀ | 168 | 209 | 15 | 15 | 194 |
| PM _{2.5} ³ | 0 | 0 | 8 | 10 | N/A |
| CO | 127 | 127 | 100 | 100 | 27 |
| NO _x | 67 | 67 | 36 | 40 | 31 |
| VOC | 10 | 10 | 10 | 40 | 0 |
| SO ₂ | 0 | 0 | 0 | 40 | 0 |
| GHG | N/A | N/A | 0 | 75,000 | N/A |

¹The unassigned emissions for the facility were reduced in this permitting action to no more than the SER for the pollutants with established unassigned emissions from prior permitting actions. The proposed netting basis was adjusted accordingly for these emissions reductions. [LRAPA 42-0045-5]

²The unassigned emissions in the last permitting action for PM and PM₁₀ were established using a different baseline than the one established in this permitting action, for this reason, the unassigned emissions were corrected to account for this discrepancy.

³The PM_{2.5} unassigned emissions were established by multiplying the current PM₁₀ unassigned emissions by the R factor ratio established in the PM_{2.5} PSEL and netting basis calculation. The calculation of the R factor is detailed in the attachment to this review report.

8. General Emission Limitations

The facility is subject to the visible emissions standards in OAR 340-208-0110(4) and the particulate grain-loading standard in OAR 340-226-0210(b)(B) because DEQ adopted versions of these rules on April 16, 2015 that were determined to be more stringent than the existing LRAPA versions of these rules (LRAPA 32-010 and 32-015, respectively). The facility is subject to the highest and best requirement of LRAPA 32-005. Operation of well-maintained fuel-burning equipment should assure compliance with the grain loading and visible emissions limits.

9. Hazardous Air Pollutants (HAPs)

Total HAP emissions from the facility are estimated to be less than 10 tons per year. The estimates of HAP emissions from EU-1, EU-2 and EU-3 from the facility are based on the fuel throughput limits detailed in the permit using AP-42 emission factors. HAP emissions from the small boilers, heaters and categorically insignificant activities were calculated by aggregating the heat input values of each device. The HAP emissions from the emergency generators were calculated by aggregating maximum fuel burn rate for the oil-burning units and by aggregating the maximum heat input values for the gas-burning units. Material balances were used to calculate

the HAP emissions from the facility's printing operations. Detailed HAP emission calculations are included in the attachment to this review report.

The review report from the previous permitting action indicated that the facility could be subject to the NESHAP for Industrial, Commercial, and Institutional Boilers and Process Heaters (40 CFR 63 Subpart DDDDD) once it was promulgated. The facility is not subject to Subpart DDDDD because it is only applicable to major sources of HAP, which this facility is not. Although the facility is also not subject to the requirements of the area source NESHAP for Industrial, Commercial, and Institutional Boilers (40 CFR 63 Subpart JJJJJ) due to the operation of natural gas boilers as defined by 40 CFR 63.11195(e), the facility must continue to operate as natural gas boilers in order to maintain its exemption from the NESHAP requirements.

10. Typically Achievable Control Technology (TACT)

EU-1 and EU-2 are subject to LRAPA Title 46 for PM and SO₂, NSPS Dc for small industrial-commercial-institutional steam generating units, and are therefore not required to meet TACT for these pollutants emitted from this type of equipment. EU-1 and EU-2 have the potential to emit more than 10 tons per year of CO and EU-1 has the potential to emit more than 10 tons of NO_x, so both emission units are required to meet TACT; good combustion practices employed by this facility are considered TACT.

EU-3 is subject to LRAPA Title 46 for NO_x and SO₂, NSPS KKKK for stationary combustion turbines, and is therefore not required to meet TACT for these pollutants emitted from this type of equipment. EU-3 has the potential to emit more than 5 tons per year of particulate and more than 10 tons per year of CO, so EU-3 is required to meet TACT; good combustion practices employed by this facility are considered TACT.

11. New Source Review (NSR) and Prevention of Significant Deterioration (PSD)

The proposed PSELs for all regulated pollutants do not exceed the Baseline Emission Rate (BER) by more than the Significant Emission Rates (SERs), therefore, the facility is not subject to the requirements of New Source Review (NSR) or the Prevention of Significant Deterioration (PSD).

12. New Source Performance Standards (NSPS)

Subpart Dc – Boilers: EU-1 and EU-2 are subject to 40 CFR 60 Subpart Dc – Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units. Oil used in the boilers is required to have a sulfur content of 0.50 weight percent or less to comply with the sulfur standard detailed in Subpart Dc. The facility is required to comply with the sulfur dioxide (SO₂) standards by maintaining fuel certification records.

Subpart KKKK – Combustion Turbine and Duct Burner: EU-3 is subject to the requirements in 40 CFR 60 Subpart KKKK – Standards of Performance for Stationary Combustion Turbines. The pollutants regulated by Subpart KKKK are nitrogen oxides (NO_x) and sulfur dioxide (SO₂). The Subpart KKKK NO_x standard is 25 parts per million (ppm) NO_x at 15% oxygen (O₂) when firing 50% or more natural gas and 74 ppm NO_x @15% O₂ at 50% or more fuel oil. The facility has elected to demonstrate compliance with the NO_x standard by conducting performance testing. The facility shall comply with the Subpart KKKK SO₂ standard by maintaining a current, valid purchase contract, tariff or transportation contract specifying the following: fuel oil with a

maximum sulfur content of 0.05 percent by weight (500 ppm) and natural gas with a maximum total sulfur content of 20 grains of sulfur per 100 standard cubic feet (20 gr/100 scf).

Subpart IIII – Emergency Generators: The compression ignition internal combustion engines in EU-6 are subject to the requirements of 40 CFR 60 Subpart IIII – Standards of Performance for Stationary Compression Ignition Internal Combustion Engines. The facility has no time limit for the use of the emergency generators during an emergency situation, but the limit on use for readiness testing and maintenance checks is 50 hours per year. This 50-hour maximum operational limitation for non-emergency situations is based on LRAPA policy and reflects the May 1, 2015 D.C. Circuit Court ruling restricting the use of backup generators as part of emergency demand-response programs. The maximum engine power, maximum engine speed, oil displacement, model year and installation date of the emergency generators determines the emission standards that are applicable per the emission unit.

Subpart JJJJ – Emergency Generators: The spark ignition internal combustion engines in EU-6 are subject to the requirements of 40 CFR Subpart JJJJ – Standards of Performance for Stationary Spark Ignition Internal Combustion Engines. The facility has no time limit for the use of the emergency generators during an emergency situation, but the limit on use for readiness testing and maintenance checks is 50 hours per year. This 50-hour maximum operational limitation for non-emergency situations is based on LRAPA policy and reflects the May 1, 2015 D.C. Circuit Court ruling restricting the use of backup generators as part of emergency demand-response programs. The maximum engine power and the year of construction of the emergency generators determines applicability to the emissions standards of the subpart.

13. Performance Testing

In accordance with NSPS Subpart KKKK, performance testing must be conducted to demonstrate continuous compliance with the NO_x emission standard for EU-3. The performance test is an annual compliance test, unless the NO_x emission result from the performance test is less than or equal to 75 percent of the NO_x emission limit for the turbine, then the facility may reduce the frequency of subsequent performance tests to once every 2 years (no more than 26 calendar months following the previous performance test).

14. Reporting Requirements

The facility is required to submit a semi-annual report by **July 30th** of each year and an annual report, including the greenhouse gas report, by **January 30th** for the previous calendar year. Semi-annual reporting is required by way of 40 CFR 60.4375(a) and 40 CFR 60.7(c).

15. Public Notice

The draft permit was on public notice from April 18, 2017 to May 22, 2017. No written comments were submitted during the 35-day comment period.

Emission Factors

| Emission Unit (fuel) | Pollutant (Emission Factor Source) | Emission Factor | Emission Factor Units |
|---|--|--------------------|-----------------------|
| EU-1 Boiler #1 (natural gas) | PM / PM ₁₀ / PM _{2.5} (2011 Source Test) ¹ | 9.2 / 9.2 / 9.2 | lbs/MMcf natural gas |
| | SO ₂ (DEQ AQ-EF05) | 1.7 | |
| | NO _x (2001 & 2011 Source Test) ¹ | 107.4 | |
| | CO DEQ AQ-EF05 | 84 | |
| | VOC DEQ AQ-EF05 | 5.5 | |
| EU-1 Boiler #1 (#2 fuel oil) | PM / PM ₁₀ / PM _{2.5} (WebFIRE) | 3.3 / 2.3 / 1.6 | lbs/1000 gallons oil |
| | SO ₂ (DEQ AQ-EF04) | 71 | |
| | NO _x (2001 & 2011 Source Test) ¹ | 19.8 | |
| | CO (DEQ AQ-EF04) | 5 | |
| | VOC (DEQ AQ-EF04) | 0.2 | |
| EU-2 Boiler #2 (natural gas) | PM / PM ₁₀ / PM _{2.5} (Vender Specification) | 5.5 / 5.5 / 5.5 | lbs/MMcf natural gas |
| | SO ₂ (DEQ AQ-EF05) | 1.7 | |
| | NO _x (Vender Specification) | 12.4 | |
| | CO (Vender Specification) | 39.1 | |
| | VOC (Vender Specification) | 4.0 | |
| EU-2 Boiler #2 (#2 fuel oil) | PM / PM ₁₀ / PM _{2.5} (Vender Specification: PM ₁₀ assumed 69.7% of PM, PM _{2.5} assumed 46.9% of PM) | 4.0 / 2.79 / 1.88 | lbs/1000 gallons oil |
| | SO ₂ (DEQ AQ-EF04) | 71 | |
| | NO _x (Vender Specification) | 16.7 | |
| | CO (Vender Specification) | 12.0 | |
| | VOC (Vender Specification) | 0.6 | |
| EU-3 Combustion Turbine (natural gas) | PM / PM ₁₀ / PM _{2.5} (Vender Specification) | 21.0 / 21.0 / 21.0 | lbs/MMcf natural gas |
| | SO ₂ (DEQ AQ-EF05) | 1.7 | |
| | NO _x (Vender Specification) | 60.0 | |
| | CO (Vender Specification) | 61.0 | |
| | VOC (Vender Specification) | 35.0 | |

| Emission Unit (fuel) | Pollutant (Emission Factor Source) | Emission Factor | Emission Factor Units |
|---|--|-------------------------------|-----------------------|
| EU-3 Combustion Turbine (#2 fuel oil) | PM / PM ₁₀ / PM _{2.5} (Vender Specification: PM ₁₀ assumed 94.1% of PM, PM _{2.5} assumed 92.2% of PM) | 5.4 / 5.08 / 4.98 | lbs/1000 gallons oil |
| | SO ₂ (AP-42, Table 3.1-2a) | 7.0 | |
| | NO _x (Vender Specification) | 42.0 | |
| | CO (Vender Specification) | 17.0 | |
| | VOC (Vender Specification) | 4.9 | |
| EU-3 Duct Burner (natural gas only) | PM / PM ₁₀ / PM _{2.5} (Vender Specification) | 10.0 / 10.0 / 10.0 | lbs/MMcf natural gas |
| | SO ₂ (DEQ AQ-EF05) | 1.7 | |
| | NO _x (Vender Specification) | 85.0 | |
| | CO (Vender Specification) | 73.0 | |
| | VOC (Vender Specification) | 16.0 | |
| EU-4 Printing Services | VOC ² (Product SDS) | VOC Content | lbs/gallon product |
| EU-5 Unpaved Parking Lots | PM (AP-42, 13.2.2) | 1.26 | lbs/VMT |
| | PM ₁₀ (AP-42, 13.2.2) | 0.30 | |
| | PM _{2.5} (AP-42, 13.2.2) | 0.03 | |
| EU-6 Emergency Generators (#2 fuel oil) | PM / PM ₁₀ / PM _{2.5} (DEQ AQEF-07) | 42.5 / 42.5 / 42.5 | lbs/1000 gallons oil |
| | SO ₂ (DEQ AQEF-07) | 39.7 | |
| | NO _x (DEQ AQEF-07) | 604 | |
| | CO (DEQ AQEF-07) | 130 | |
| | VOC (DEQ AQEF-07) | 49.3 | |
| EU-6 Emergency Generators (natural gas) | PM / PM ₁₀ / PM _{2.5} (AP-42 3.2.1) | 0.0099871/0.0099871/0.0099871 | lbs/MMBtu |
| | SO ₂ (AP-42 3.2.1) | 0.000588 | |
| | NO _x (AP-42 3.2.1) | 4.08 | |
| | CO (AP-42 3.2.1) | 0.317 | |
| | VOC (AP-42 3.2.1) | 0.118 | |

¹NOTE: Emission factor updated in this permitting cycle to reflect most recent emission factor verification testing. The emission factor listed is the average of all valid runs from the source test(s).

²NOTE: Assumes that 100% of the VOCs in the printing products used are volatilized to the atmosphere.

Emission Calculations to Establish PSELS

| Pollutant: PM | | | | | | | | | | |
|---------------------|--|--------------|-------------|---------------------------|-------------|---------------------------|-----------------|------------------------|-------------------------------|-------------------|
| Time | Source | Fuel | Hourly Rate | Units | Annual Rate | Units | Emission Factor | Units | Reference | Emissions tons/yr |
| Baseline | Boiler #1 | Hog Fuel | 25 | 10 ³ lbs steam | 102,000 | 10 ³ lbs steam | 0.908 | lb/Kib steam | January 29, 1986 Source Test | 46.3 |
| Baseline | Boiler #2 | Hog Fuel | 35 | 10 ³ lbs steam | 90,000 | 10 ³ lbs steam | 0.835 | lb/Kib steam | March 20, 1986 Source Test | 37.6 |
| Baseline | Boiler #3 | Hog Fuel | 35 | 10 ³ lbs steam | 112,000 | 10 ³ lbs steam | 0.388 | lb/Kib steam | March 21, 1986 Source Test | 21.7 |
| Baseline | Boiler #4 | Hog Fuel | 99 | 10 ³ lbs steam | 419,000 | 10 ³ lbs steam | 0.557 | lb/Kib steam | November 20, 1986 Source Test | 116.7 |
| Baseline | All Boilers | #6 Oil | 1.2933 | Kgal | 200 | Kgal | 20.8 | lb/10 ³ gal | DEQ AQ-EF04 | 2.1 |
| Baseline | Agate Boiler #1 | PS300 #4 Oil | 0.95 | Gal. | 8.33 | Kgal | 8.30 | lb/10 ³ gal | DEQ AQ-EF04 | 0.035 |
| Baseline | Agate Boiler #2 | PS300 #4 Oil | 0.95 | Gal. | 8.33 | Kgal | 8.30 | lb/10 ³ gal | DEQ AQ-EF04 | 0.035 |
| Baseline | Hog Fuel Pile | - | - | Unit (ton) | 66,308 | Unit(ton) | 0.50 | lb/ton | Previous LRAPA Permit | 16.6 |
| Baseline | Unpaved Areas | - | 7 | VMT | 60,176 | VMT | 1.26 | lbs/VMT | AP-42, 13.2.2 | 37.9 |
| Total | | | | | | | | | | 279 |
| Allowable Emissions | EU-1 -- Boiler #1 | Nat. Gas | 0.072 | mmcf | 307.7 | mmcf | 9.2 | lbs/mmcf | 2011 Source Test | 1.42 |
| Allowable Emissions | EU-2 -- Boiler #2 | Nat. Gas | 0.078 | mmcf | 333.4 | mmcf | 5.5 | lbs/mmcf | Vender Spec | 0.92 |
| Allowable Emissions | EU-3 -- Comb. Turbine Generator | Nat. Gas | 0.078 | mmcf | 332.0 | mmcf | 21.0 | lbs/mmcf | Vender Spec | 3.49 |
| Allowable Emissions | EU-3 -- HRSG Duct Burner | Nat. Gas | 0.045 | mmcf | 192.0 | mmcf | 10.0 | lbs/mmcf | Vender Spec | 0.96 |
| Allowable Emissions | EU-1 -- Boiler #1 | #2 Oil | 0.520 | Kgal | 104.0 | Kgal | 3.3 | lb/Kgal | DEQ AQ-EF04 | 0.17 |
| Allowable Emissions | EU-2 -- Boiler #2 | #2 Oil | 0.563 | Kgal | 112.7 | Kgal | 4.0 | lb/Kgal | Vender Spec | 0.23 |
| Allowable Emissions | EU-3 -- Comb. Turbine Generator | #2 Oil | 0.561 | Kgal | 112.2 | Kgal | 5.4 | lb/Kgal | Vender Spec | 0.30 |
| Allowable Emissions | EU-6 -- Emergency Generators | #2 Oil | 0.60 | Kgal | 29.9 | Kgal | 42.5 | lb/Kgal | DEQ AQ-EF07 | 0.63 |
| Allowable Emissions | EU-6 -- Emergency Generators | LPG | 0.007 | Kgal | 0.4 | Kgal | 0.8 | lb/Kgal | AP-42, Table 1.5-1 | 1.4E-04 |
| Allowable Emissions | EU-6 -- Emergency Generators | Nat. Gas | 1.7 | MMBtu | 84.5 | MMBtu | 9.99E-03 | lb/MMBtu | AP-42, Table 3.2-2 | 4.2E-04 |
| Allowable Emissions | Unpaved Areas | - | 6 | VMT | 56,737 | VMT | 1.26 | lbs/VMT | AP-42, 13.2.2 | 35.7 |
| Allowable Emissions | EU-6,7,8,9,10,11,12 -- Small Boilers and Heaters | Nat. Gas | 0.004 | mmcf | 35.3 | mmcf | 2.5 | lbs/mmcf | DEQ AQ-EF05 | 0.04 |
| Allowable Emissions | EU-13 -- Categorically Insignificant | Nat. Gas | 0.002 | mmcf | 15.8 | mmcf | 2.5 | lbs/mmcf | DEQ AQ-EF05 | 0.02 |
| Total | | | | | | | | | | 43.9 |

| Pollutant: PM ₁₀ | | | | | | | | | | |
|-----------------------------|--|--------------|-------------|---------------------------|-------------|---------------------------|-----------------|------------------------|---------------------------------------|-------------------|
| Time | Source | Fuel | Hourly Rate | Units | Annual Rate | Units | Emission Factor | Units | Reference | Emissions tons/yr |
| Baseline | Boiler #1 | Hog Fuel | 25 | 10 ³ lbs steam | 102,000 | 10 ³ lbs steam | 0.863 | lb/Kib steam | Jan 29, 1986 Source Test, DEQ AQ-EF03 | 44.0 |
| Baseline | Boiler #2 | Hog Fuel | 35 | 10 ³ lbs steam | 90,000 | 10 ³ lbs steam | 0.793 | lb/Kib steam | Mar 20, 1986 Source Test, DEQ AQ-EF03 | 35.7 |
| Baseline | Boiler #3 | Hog Fuel | 35 | 10 ³ lbs steam | 112,000 | 10 ³ lbs steam | 0.369 | lb/Kib steam | Mar 21, 1986 Source Test, DEQ AQ-EF03 | 20.6 |
| Baseline | Boiler #4 | Hog Fuel | 99 | 10 ³ lbs steam | 419,000 | 10 ³ lbs steam | 0.529 | lb/Kib steam | Nov 20, 1986 Source Test, DEQ AQ-EF03 | 110.9 |
| Baseline | All Boilers | #6 Oil | 1.2933 | Kgal | 200 | Kgal | 18.2 | lb/10 ³ gal | DEQ AQ-EF04 | 1.8 |
| Baseline | Agate Boiler #1 | PS300 #4 Oil | 0.95 | Gal. | 8.33 | Kgal | 2.40 | lb/10 ³ gal | FIRE 6.25 | 0.010 |
| Baseline | Agate Boiler #2 | PS300 #4 Oil | 0.95 | Gal. | 8.33 | Kgal | 2.40 | lb/10 ³ gal | FIRE 6.25 | 0.010 |
| Baseline | Hog Fuel Pile | - | - | Unit (ton) | 66,308 | Unit(ton) | 0.25 | lb/ton | Previous LRAPA Permit, AP-42 13.2.5 | 8.3 |
| Baseline | Unpaved Areas | - | 7 | VMT | 60,176 | VMT | 0.30 | lbs/VMT | AP-42, 13.2.2 | 9.0 |
| Total | | | | | | | | | | 230 |
| Allowable Emissions | EU-1 -- Boiler #1 | Nat. Gas | 0.072 | mmcf | 307.7 | mmcf | 9.2 | lbs/mmcf | 2011 Source Test | 1.42 |
| Allowable Emissions | EU-2 -- Boiler #2 | Nat. Gas | 0.078 | mmcf | 333.4 | mmcf | 5.5 | lbs/mmcf | Vender Spec | 0.92 |
| Allowable Emissions | EU-3 -- Comb. Turbine Generator | Nat. Gas | 0.078 | mmcf | 332.0 | mmcf | 21.0 | lbs/mmcf | Vender Spec | 3.49 |
| Allowable Emissions | EU-3 -- HRSG Duct Burner | Nat. Gas | 0.045 | mmcf | 192.0 | mmcf | 10.0 | lbs/mmcf | Vender Spec | 0.96 |
| Allowable Emissions | EU-1 -- Boiler #1 | #2 Oil | 0.520 | Kgal | 104.0 | Kgal | 2.30 | lb/Kgal | DEQ AQ-EF04 | 0.12 |
| Allowable Emissions | EU-2 -- Boiler #2 | #2 Oil | 0.563 | Kgal | 112.7 | Kgal | 2.79 | lb/Kgal | Vender Spec | 0.16 |
| Allowable Emissions | EU-3 -- Comb. Turbine Generator | #2 Oil | 0.561 | Kgal | 112.2 | Kgal | 5.08 | lb/Kgal | Vender Spec | 0.29 |
| Allowable Emissions | EU-6 -- Emergency Generators | #2 Oil | 0.60 | Kgal | 29.9 | Kgal | 42.5 | lb/Kgal | DEQ AQ-EF07 | 0.63 |
| Allowable Emissions | EU-6 -- Emergency Generators | LPG | 0.007 | Kgal | 0.4 | Kgal | 0.8 | lb/Kgal | AP-42, Table 1.5-1 | 1.4E-04 |
| Allowable Emissions | EU-6 -- Emergency Generators | Nat. Gas | 1.7 | MMBtu | 84.5 | MMBtu | 9.99E-03 | lb/MMBtu | AP-42, Table 3.2-2 | 4.2E-04 |
| Allowable Emissions | Unpaved Areas | - | 6 | VMT | 56,737 | VMT | 0.30 | lbs/VMT | AP-42, 13.2.2 | 8.5 |
| Allowable Emissions | EU-6,7,8,9,10,11,12 -- Small Boilers and Heaters | Nat. Gas | 0.004 | mmcf | 35.3 | mmcf | 2.5 | lbs/mmcf | DEQ AQ-EF05 | 0.04 |
| Allowable Emissions | EU-13 -- Categorically Insignificant | Nat. Gas | 0.002 | mmcf | 15.8 | mmcf | 2.5 | lbs/mmcf | DEQ AQ-EF05 | 0.02 |
| Total | | | | | | | | | | 16.55 |

| Pollutant: PM _{2.5} | | | | | | | | | | |
|------------------------------|--|----------|-------------|-------|-------------|-------|-----------------|----------|--------------------|-------------------|
| | Source | Fuel | Hourly Rate | Units | Annual Rate | Units | Emission Factor | Units | Reference | Emissions tons/yr |
| Allowable Emissions | EU-1 -- Boiler #1 | Nat. Gas | 0.072 | mmcf | 307.7 | mmcf | 9.2 | lbs/mmcf | 2011 Source Test | 1.42 |
| Allowable Emissions | EU-2 -- Boiler #2 | Nat. Gas | 0.078 | mmcf | 333.4 | mmcf | 5.5 | lbs/mmcf | Vender Spec | 0.92 |
| Allowable Emissions | EU-3 -- Comb. Turbine Generator | Nat. Gas | 0.078 | mmcf | 332.0 | mmcf | 21.0 | lbs/mmcf | Vender Spec | 3.49 |
| Allowable Emissions | EU-3 -- HRSG Duct Burner | Nat. Gas | 0.045 | mmcf | 192.0 | mmcf | 10.0 | lbs/mmcf | Vender Spec | 0.96 |
| Allowable Emissions | EU-1 -- Boiler #1 | #2 Oil | 0.520 | Kgal | 104.0 | Kgal | 1.6 | lb/Kgal | DEQ AQ-EF04 | 0.08 |
| Allowable Emissions | EU-2 -- Boiler #2 | #2 Oil | 0.563 | Kgal | 112.7 | Kgal | 1.88 | lb/Kgal | Vender Spec | 0.11 |
| Allowable Emissions | EU-3 -- Comb. Turbine Generator | #2 Oil | 0.561 | Kgal | 112.2 | Kgal | 4.98 | lb/Kgal | Vender Spec | 0.28 |
| Allowable Emissions | EU-6 -- Emergency Generators | #2 Oil | 0.60 | Kgal | 29.9 | Kgal | 42.5 | lb/Kgal | DEQ AQ-EF07 | 0.63 |
| Allowable Emissions | EU-6 -- Emergency Generators | LPG | 0.007 | Kgal | 0.4 | Kgal | 0.8 | lb/Kgal | AP-42, Table 1.5-1 | 1.4E-04 |
| Allowable Emissions | EU-6 -- Emergency Generators | Nat. Gas | 1.7 | MMBtu | 84.5 | MMBtu | 9.99E-03 | lb/MMBtu | AP-42, Table 3.2-2 | 4.2E-04 |
| Allowable Emissions | Unpaved Areas | - | 6 | VMT | 56,737 | VMT | 0.03 | lbs/VMT | AP-42, 13.2.2 | 0.9 |
| Allowable Emissions | EU-6,7,8,9,10,11,12 -- Small Boilers and Heaters | Nat. Gas | 0.004 | mmcf | 35.3 | mmcf | 2.5 | lbs/mmcf | DEQ AQ-EF05 | 0.04 |
| Allowable Emissions | EU-13 -- Categorically Insignificant | Nat. Gas | 0.002 | mmcf | 15.8 | mmcf | 2.5 | lbs/mmcf | DEQ AQ-EF05 | 0.02 |
| | | | | | | | | | Total | 8.8 |

| Pollutant: SO ₂ | | | | | | | | | | |
|----------------------------|--|--------------|-------------|---------------------------|-------------|---------------------------|-----------------|------------------------|-------------------------------|-------------------|
| Time | Source | Fuel | Hourly Rate | Units | Annual Rate | Units | Emission Factor | Units | Reference | Emissions tons/yr |
| Baseline | Boiler #1 | Hog Fuel | 25 | 10 ³ lbs steam | 102,000 | 10 ³ lbs steam | 0.014 | lb/Klb steam | DEQ AQ-EF02 | 0.7 |
| Baseline | Boiler #2 | Hog Fuel | 35 | 10 ³ lbs steam | 90,000 | 10 ³ lbs steam | 0.014 | lb/Klb steam | DEQ AQ-EF02 | 0.6 |
| Baseline | Boiler #3 | Hog Fuel | 35 | 10 ³ lbs steam | 112,000 | 10 ³ lbs steam | 0.014 | lb/Klb steam | DEQ AQ-EF02 | 0.8 |
| Baseline | Boiler #4 | Hog Fuel | 99 | 10 ³ lbs steam | 419,000 | 10 ³ lbs steam | 0.014 | lb/Klb steam | DEQ AQ-EF02 | 2.9 |
| Baseline | All Boilers | #6 Oil | 1.2933 | Kgal | 200 | Kgal | 275 | lb/10 ³ gal | DEQ AQ-EF04 | 27.5 |
| Baseline | Agate Boiler #1 | PS300 #4 Oil | 0.95 | Gal. | 8.33 | Kgal | 203 | lb/10 ³ gal | AP-42, Table 13.1-1. @ S=1.35 | 0.8 |
| Baseline | Agate Boiler #2 | PS300 #4 Oil | 0.95 | Gal. | 8.33 | Kgal | 203 | lb/10 ³ gal | AP-42, Table 13.1-1. @ S=1.35 | 0.8 |
| | | | | | | | | | Total | 34.2 |
| Allowable Emissions | EU-1 -- Boiler #1 | Nat. Gas | 0.072 | mmcf | 307.7 | mmcf | 1.7 | lbs/mmcf | DEQ AQ-EF05 | 0.26 |
| Allowable Emissions | EU-2 -- Boiler #2 | Nat. Gas | 0.078 | mmcf | 333.4 | mmcf | 1.7 | lbs/mmcf | DEQ AQ-EF05 | 0.28 |
| Allowable Emissions | EU-3 -- Comb. Turbine Generator | Nat. Gas | 0.078 | mmcf | 332.0 | mmcf | 1.7 | lbs/mmcf | DEQ AQ-EF05 | 0.28 |
| Allowable Emissions | EU-3 -- HRSG Duct Burner | Nat. Gas | 0.045 | mmcf | 192.0 | mmcf | 1.7 | lbs/mmcf | DEQ AQ-EF05 | 0.16 |
| Allowable Emissions | EU-1 -- Boiler #1 | #2 Oil | 0.520 | Kgal | 104.0 | Kgal | 71 | lb/Kgal | DEQ AQ-EF04 | 3.69 |
| Allowable Emissions | EU-2 -- Boiler #2 | #2 Oil | 0.563 | Kgal | 112.7 | Kgal | 71 | lb/Kgal | DEQ AQ-EF04 | 4.00 |
| Allowable Emissions | EU-3 -- Comb. Turbine Generator | #2 Oil | 0.561 | Kgal | 112.2 | Kgal | 7.0 | lb/Kgal | AP-42, Table 3.1-2a | 0.39 |
| Allowable Emissions | EU-6 -- Emergency Generators | #2 Oil | 0.60 | Kgal | 29.9 | Kgal | 39.7 | lb/Kgal | DEQ AQ-EF07 | 0.59 |
| Allowable Emissions | EU-6 -- Emergency Generators | LPG | 0.007 | Kgal | 0.4 | Kgal | 0.02 | lb/Kgal | AP-42, Table 1.5-1 | 3.5E-06 |
| Allowable Emissions | EU-6 -- Emergency Generators | Nat. Gas | 1.7 | MMBtu | 84.5 | MMBtu | 5.88E-04 | lb/MMBtu | AP-42, Table 3.2-2 | 2.5E-05 |
| Allowable Emissions | EU-6,7,8,9,10,11,12 -- Small Boilers and Heaters | Nat. Gas | 0.004 | mmcf | 35.3 | mmcf | 0.6 | lbs/mmcf | DEQ AQ-EF05 | 0.01 |
| Allowable Emissions | EU-13 -- Categorically Insignificant | Nat. Gas | 0.002 | mmcf | 15.8 | mmcf | 0.6 | lbs/mmcf | DEQ AQ-EF05 | 0.005 |
| | | | | | | | | | Total | 9.7 |

| Pollutant: CO | | | | | | | | | | |
|---------------------|--|--------------|-------------|---------------|-------------|---------------|-----------------|------------------------|--------------------|-------------------|
| Time | Source | Fuel | Hourly Rate | Units | Annual Rate | Units | Emission Factor | Units | Reference | Emissions tons/yr |
| Baseline | Boiler #1 | Hog Fuel | 2.35 | tons hog fuel | 9,623 | tons hog fuel | 6.6 | lb/ton hog fuel | AP-42, Table 1.6-2 | 31.8 |
| Baseline | Boiler #2 | Hog Fuel | 3.30 | tons hog fuel | 8,491 | tons hog fuel | 6.6 | lb/ton hog fuel | AP-42, Table 1.6-2 | 28.0 |
| Baseline | Boiler #3 | Hog Fuel | 3.30 | tons hog fuel | 10,566 | tons hog fuel | 6.6 | lb/ton hog fuel | AP-42, Table 1.6-2 | 34.9 |
| Baseline | Boiler #4 | Hog Fuel | 9.34 | tons hog fuel | 39,528 | tons hog fuel | 6.6 | lb/ton hog fuel | AP-42, Table 1.6-2 | 130.4 |
| Baseline | All Boilers | #6 Oil | 1.2933 | Kgal | 200 | Kgal | 5 | lb/10 ³ gal | DEQ AQ-EF04 | 0.5 |
| Baseline | Agate Boiler #1 | PS300 #4 Oil | 0.95 | Gal. | 8.33 | Kgal | 5 | lb/10 ³ gal | DEQ AQ-EF04 | 0.02 |
| Baseline | Agate Boiler #2 | PS300 #4 Oil | 0.95 | Gal. | 8.33 | Kgal | 5 | lb/10 ³ gal | DEQ AQ-EF04 | 0.02 |
| Total | | | | | | | | | | 225.6 |
| Allowable Emissions | EU-1 -- Boiler #1 | Nat. Gas | 0.072 | mmcf | 307.7 | mmcf | 84 | lbs/mmcf | DEQ AQ-EF05 | 12.92 |
| Allowable Emissions | EU-2 -- Boiler #2 | Nat. Gas | 0.078 | mmcf | 333.4 | mmcf | 39.1 | lbs/mmcf | Vender Spec | 6.52 |
| Allowable Emissions | EU-3 -- Comb. Turbine Generator | Nat. Gas | 0.078 | mmcf | 332.0 | mmcf | 61 | lbs/mmcf | Vender Spec | 10.12 |
| Allowable Emissions | EU-3 -- HRSG Duct Burner | Nat. Gas | 0.045 | mmcf | 192.0 | mmcf | 73 | lbs/mmcf | Vender Spec | 7.01 |
| Allowable Emissions | EU-1 -- Boiler #1 | #2 Oil | 0.520 | Kgal | 104.0 | Kgal | 5 | lb/Kgal | DEQ AQ-EF04 | 0.26 |
| Allowable Emissions | EU-2 -- Boiler #2 | #2 Oil | 0.563 | Kgal | 112.7 | Kgal | 12 | lb/Kgal | Vender Spec | 0.68 |
| Allowable Emissions | EU-3 -- Comb. Turbine Generator | #2 Oil | 0.561 | Kgal | 112.2 | Kgal | 17 | lb/Kgal | Vender Spec | 0.95 |
| Allowable Emissions | EU-6 -- Emergency Generators | #2 Oil | 0.60 | Kgal | 29.9 | Kgal | 130 | lb/Kgal | DEQ AQ-EF07 | 1.94 |
| Allowable Emissions | EU-6 -- Emergency Generators | LPG | 0.007 | Kgal | 0.4 | Kgal | 8.4 | lb/Kgal | AP-42, Table 1.5-1 | 0.001 |
| Allowable Emissions | EU-6 -- Emergency Generators | Nat. Gas | 1.7 | MMBtu | 84.5 | MMBtu | 0.317 | lb/MMBtu | AP-42, Table 3.2-2 | 0.01 |
| Allowable Emissions | EU-6,7,8,9,10,11,12 -- Small Boilers and Heaters | Nat. Gas | 0.004 | mmcf | 35.3 | mmcf | 84 | lbs/mmcf | DEQ AQ-EF05 | 1.48 |
| Allowable Emissions | EU-13 -- Categorically Insignificant | Nat. Gas | 0.002 | mmcf | 15.8 | mmcf | 84 | lbs/mmcf | DEQ AQ-EF05 | 0.67 |
| Total | | | | | | | | | | 42.6 |

| Pollutant: VOC | | | | | | | | | | |
|---------------------|--|--------------|-------------|---------------------------|-------------|---------------|-----------------|------------------------|--------------------|-------------------|
| Time | Source | Fuel | Hourly Rate | Units | Annual Rate | Units | Emission Factor | Units | Reference | Emissions tons/yr |
| Baseline | Boiler #1 | Hog Fuel | 25 | 10 ³ lbs steam | 102,000 | tons hog fuel | 0.13 | lb/Klb steam | DEQ AQ-EF02 | 6.6 |
| Baseline | Boiler #2 | Hog Fuel | 35 | 10 ³ lbs steam | 90,000 | tons hog fuel | 0.13 | lb/Klb steam | DEQ AQ-EF02 | 5.9 |
| Baseline | Boiler #3 | Hog Fuel | 35 | 10 ³ lbs steam | 112,000 | tons hog fuel | 0.13 | lb/Klb steam | DEQ AQ-EF02 | 7.3 |
| Baseline | Boiler #4 | Hog Fuel | 99 | 10 ³ lbs steam | 419,000 | tons hog fuel | 0.13 | lb/Klb steam | DEQ AQ-EF02 | 27.2 |
| Baseline | All Boilers | #6 Oil | 1.2933 | Kgal | 200 | Kgal | 0.76 | lb/10 ³ gal | DEQ AQ-EF04 | 0.1 |
| Baseline | Agate Boiler #1 | PS300 #4 Oil | 0.95 | Gal. | 8.33 | Kgal | 0.34 | lb/10 ³ gal | DEQ AQ-EF04 | 0.001 |
| Baseline | Agate Boiler #2 | PS300 #4 Oil | 0.95 | Gal. | 8.33 | Kgal | 0.34 | lb/10 ³ gal | DEQ AQ-EF04 | 0.001 |
| Baseline | Printing Services | | 0.7 | lb | 4233 | lb | | | | 2.12 |
| Total | | | | | | | | | | 49.2 |
| Allowable Emissions | EU-1 -- Boiler #1 | Nat. Gas | 0.072 | mmcf | 307.7 | mmcf | 5.5 | lbs/mmcf | DEQ AQ-EF05 | 0.85 |
| Allowable Emissions | EU-2 -- Boiler #2 | Nat. Gas | 0.078 | mmcf | 333.4 | mmcf | 4.0 | lbs/mmcf | Vender Spec | 0.67 |
| Allowable Emissions | EU-3 -- Comb. Turbine Generator | Nat. Gas | 0.078 | mmcf | 332.0 | mmcf | 35.0 | lbs/mmcf | Vender Spec | 5.81 |
| Allowable Emissions | EU-3 -- HRSG Duct Burner | Nat. Gas | 0.045 | mmcf | 192.0 | mmcf | 16.0 | lbs/mmcf | Vender Spec | 1.54 |
| Allowable Emissions | EU-1 -- Boiler #1 | #2 Oil | 0.520 | Kgal | 104.0 | Kgal | 0.2 | lb/Kgal | DEQ AQ-EF04 | 0.01 |
| Allowable Emissions | EU-2 -- Boiler #2 | #2 Oil | 0.563 | Kgal | 112.7 | Kgal | 0.6 | lb/Kgal | Vender Spec | 0.03 |
| Allowable Emissions | EU-3 -- Comb. Turbine Generator | #2 Oil | 0.561 | Kgal | 112.2 | Kgal | 4.90 | lb/Kgal | Vender Spec | 0.27 |
| Allowable Emissions | EU-6 -- Emergency Generators | #2 Oil | 0.60 | Kgal | 29.9 | Kgal | 49.3 | lb/Kgal | DEQ AQ-EF07 | 0.74 |
| Allowable Emissions | EU-6 -- Emergency Generators | LPG | 0.007 | Kgal | 0.4 | Kgal | 1.1 | lb/Kgal | AP-42, Table 1.5-1 | 0.0002 |
| Allowable Emissions | EU-6 -- Emergency Generators | Nat. Gas | 1.7 | MMBtu | 84.5 | MMBtu | 0.118 | lb/MMBtu | AP-42, Table 3.2-2 | 0.005 |
| Allowable Emissions | Printing Services | | | | 582.5 | gal | | | Material Balance | 1.95 |
| Allowable Emissions | EU-6,7,8,9,10,11,12 -- Small Boilers and Heaters | Nat. Gas | 0.004 | mmcf | 35.3 | mmcf | 5.5 | lbs/mmcf | DEQ AQ-EF05 | 0.10 |
| Allowable Emissions | EU-13 -- Categorically Insignificant | Nat. Gas | 0.002 | mmcf | 15.8 | mmcf | 5.5 | lbs/mmcf | DEQ AQ-EF05 | 0.04 |
| Total | | | | | | | | | | 12.0 |

| Pollutant: NO _x | | | | | | | | | | |
|----------------------------|--|--------------|-------------|---------------------------|-------------|---------------------------|-----------------|------------------------|----------------------------------|-------------------|
| Time | Source | Fuel | Hourly Rate | Units | Annual Rate | Units | Emission Factor | Units | Reference | Emissions tons/yr |
| Baseline | Boiler #1 | Hog Fuel | 25 | 10 ³ lbs steam | 102,000 | 10 ³ lbs steam | 0.31 | lb/Klb steam | DEQ AQ-EF02 | 15.8 |
| Baseline | Boiler #2 | Hog Fuel | 35 | 10 ³ lbs steam | 90,000 | 10 ³ lbs steam | 0.31 | lb/Klb steam | DEQ AQ-EF02 | 14.0 |
| Baseline | Boiler #3 | Hog Fuel | 35 | 10 ³ lbs steam | 112,000 | 10 ³ lbs steam | 0.31 | lb/Klb steam | DEQ AQ-EF02 | 17.4 |
| Baseline | Boiler #4 | Hog Fuel | 99 | 10 ³ lbs steam | 419,000 | 10 ³ lbs steam | 0.31 | lb/Klb steam | DEQ AQ-EF02 | 64.9 |
| Baseline | All Boilers | #6 Oil | 1.2933 | Kgal | 200 | Kgal | 42.0 | lb/10 ³ gal | Previous LRAPA Permit | 4.2 |
| Baseline | Agate Boiler #1 | PS300 #4 Oil | 0.95 | Gal. | 8.33 | Kgal | 20 | lb/10 ³ gal | DEQ AQ-EF04 | 0.1 |
| Baseline | Agate Boiler #2 | PS300 #4 Oil | 0.95 | Gal. | 8.33 | Kgal | 20 | lb/10 ³ gal | DEQ AQ-EF04 | 0.1 |
| Total | | | | | | | | | | 116.4 |
| Allowable Emissions | EU-1 -- Boiler #1 | Nat. Gas | 0.072 | mmcf | 307.7 | mmcf | 107.4 | lbs/mmcf | Average of 2001&2011 Source Test | 16.52 |
| Allowable Emissions | EU-2 -- Boiler #2 | Nat. Gas | 0.078 | mmcf | 333.4 | mmcf | 12.4 | lbs/mmcf | Vender Spec | 2.07 |
| Allowable Emissions | EU-3 -- Comb. Turbine Generator | Nat. Gas | 0.078 | mmcf | 332.0 | mmcf | 60.0 | lbs/mmcf | Vender Spec | 9.96 |
| Allowable Emissions | EU-3 -- HRSG Duct Burner | Nat. Gas | 0.045 | mmcf | 192.0 | mmcf | 85.0 | lbs/mmcf | Vender Spec | 8.16 |
| Allowable Emissions | EU-1 -- Boiler #1 | #2 Oil | 0.520 | Kgal | 104.0 | Kgal | 19.8 | lb/Kgal | Average of 2001&2011 Source Test | 1.03 |
| Allowable Emissions | EU-2 -- Boiler #2 | #2 Oil | 0.563 | Kgal | 112.7 | Kgal | 16.7 | lb/Kgal | Vender Spec | 0.94 |
| Allowable Emissions | EU-3 -- Comb. Turbine Generator | #2 Oil | 0.561 | Kgal | 112.2 | Kgal | 42.0 | lb/Kgal | Vender Spec | 2.36 |
| Allowable Emissions | EU-6 -- Emergency Generators | #2 Oil | 0.60 | Kgal | 29.9 | Kgal | 604.0 | lb/Kgal | DEQ AQ-EF07 | 9.02 |
| Allowable Emissions | EU-6 -- Emergency Generators | LPG | 0.007 | Kgal | 0.4 | Kgal | 15.0 | lb/Kgal | AP-42, Table 1.5-1 | 0.003 |
| Allowable Emissions | EU-6 -- Emergency Generators | Nat. Gas | 1.7 | MMBtu | 84.5 | MMBtu | 4.08 | lb/MMBtu | AP-42, Table 3.2-2 | 0.17 |
| Allowable Emissions | EU-6,7,8,9,10,11,12 -- Small Boilers and Heaters | Nat. Gas | 0.004 | mmcf | 35.3 | mmcf | 100 | lbs/mmcf | DEQ AQ-EF05 | 1.76 |
| Allowable Emissions | EU-13 -- Categorically Insignificant | Nat. Gas | 0.002 | mmcf | 15.8 | mmcf | 100 | lbs/mmcf | DEQ AQ-EF05 | 0.79 |
| Total | | | | | | | | | | 52.8 |

| PSEL SUMMARY | | | | | | | | | |
|---|---------|------------------|-------------------|-----------------|------|------|-----------------|--|--|
| | TONS/YR | | | | | | | | |
| | PM | PM ₁₀ | PM _{2.5} | SO _x | CO | VOC | NO _x | | |
| 1. NETTING BASIS | 76 | 36 | 19 | 34 | 199 | 79 | 89 | | |
| 2. CURRENT PSEL (2010-2015) | 51 | 21 | 12 | 41 | 99 | 49 | 49 | | |
| 3. ESTIMATED ACTUAL EMISSIONS (2015-2020) | 43.9 | 16.55 | 8.8 | 9.7 | 42.6 | 12.0 | 52.8 | | |
| 4. PROPOSED PSELS (2015-2020) | 44 | 17 | 9 | 39 | 99 | 39 | 53 | | |
| 5. NETTING DIFFERENCE (#1 minus #4) | -32 | -19 | -10 | 5.0 | -100 | -40 | -36 | | |
| 6. SIGNIFICANT EMISSION RATE (SER) | 25 | 15 | 10 | 40 | 100 | 40 | 40 | | |

| Fuel Consumption Limitations | | | | |
|------------------------------|-------------|---------------|-------------|------------|
| | Natural Gas | | Fuel Oil | |
| | (mmscf) | (mmscf) | (Kgal) | (Kgal) |
| | (Hourly) | (Annual) | (Hourly) | (Annual) |
| | (Max. Rate) | | (Max. Rate) | |
| Boiler #1 | 0.072 | 307.7 | 0.520 | 104.0 |
| Boiler #2 | 0.078 | 333.4 | 0.563 | 112.7 |
| Combustion Turbine | 0.078 | 332.0 | 0.561 | 112.2 |
| Duct Burner | 0.045 | 192.0 | N.A. | N.A. |
| Total | | 1165.0 | | 329 |

PM_{2.5} PSEL and Netting Basis Calculation

PM_{2.5} PSEL and Netting Basis

FORM ED605
Answer Sheet

Facility: University of Oregon

Emissions Detail:

| Emissions Unit ID | Device/process ID | PM10 PSEL (tons/year) | PM2.5 fraction (f) | Reference | PM2.5 PSEL (tons/yr) |
|-------------------|---------------------------------------|-----------------------|--------------------|--------------|----------------------|
| EU-1 | Boiler #1 - gas fired | 1.42 | 1 | DEQ AQ-EF08 | 1.42 |
| EU-2 | Boiler #2 - gas fired | .92 | 1 | DEQ AQ-EF08 | 0.92 |
| EU-3 | Turbine - gas fired | 3.49 | 1 | AP 42 3.1 | 3.49 |
| EU-3 | Duct Burner | 0.96 | 1 | DEQ AQ-EF08 | 0.96 |
| EU-1 | Boiler #1 - oil fired | 0.12 | .67 | DEQ AQ-EF08 | 0.0804 |
| EU-2 | Boiler #2 - oil fired | 0.16 | .67 | DEQ AQ-EF08 | 0.1072 |
| EU-3 | Turbine - oil fired | 0.29 | .98 | Vendor Specs | 0.2842 |
| EU-5 | Unpaved parking lots | 8.5 | .1 | DEQ AQ-EF08 | 0.85 |
| EU-6 | Emergency Generators | .63 | 1 | DEQ AQ-EF07 | 0.63 |
| EU-7 - EU-12 | Aggregate Small Boilers - gas fired | .04 | 1 | DEQ AQ-EF08 | 0.04 |
| EU-13 | Cat Insignificant Boilers - gas fired | .02 | 1 | DEQ AQ-EF08 | 0.02 |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| TOTAL | | 16.55 | 9.42 | | 8.8018 |

PM2.5 PSEL/PM10 PSEL = R

PM10 Netting Basis

PM2.5 Netting Basis = R * PM10 Netting Basis

| |
|----------------|
| 8.8/17 = 0.518 |
| 36 |
| 19 |

Calculation of Unpaved Road Vehicle Miles Travelled (VMT)

| 1. Baseline Case | | | | | |
|------------------|------------------|--------------|---------------------|--------------------|--------------|
| Lot Name | Vehicle Capacity | Percent Full | Number of days/year | Distance Travelled | VMT/yr |
| | | | | (Round Trip Miles) | |
| 35 | 20 | 0.40 | 260 | 0.03 | 62 |
| Bean Lot | 550 | 0.95 | 365 | 0.0625 | 11920 |
| Temp Lots | 100 | 0.70 | 365 | 0.625 | 15969 |
| Power Plant | 50 | 1.00 | 260 | 0.125 | 1625 |
| Access Rd | 2 | N/A | 156 | 1 | 15600 |
| Autzen | 5000 | 1.00 | 7 | 0.3 | 10500 |
| Autzen | 5000 | 0.15 | 20 | 0.3 | 4500 |
| | | | | TOTAL | 60176 |

| 2. Estimated Emissions 2015-2020 | | | | | | |
|----------------------------------|------------------|--------------|---------------------|--------------------|--------------|--|
| Lot Name ¹ | Vehicle Capacity | Percent Full | Number of days/year | Distance Travelled | VMT/yr | Notes |
| | | | | (Round Trip Miles) | | |
| 35 | 20 | 0.75 | 260 | 0.03 | 117 | |
| Access Rd - N of Tracks | 1 | N/A | 60 | 1 | 6000 | |
| Autzen | 2164 | 1.00 | 8 | 0.3 | 5194 | Football |
| Autzen | 1556 | 1.00 | 45 | 0.3 | 21006 | UO baseball |
| Autzen | 1556 | 1.00 | 40 | 0.3 | 18672 | Eugene Emeralds baseball |
| Autzen | 750 | 1.00 | 20 | 0.3 | 4500 | Other Athletic Department events/usage |
| CPS Storage Area | 12 | N/A | 260 | 0.4 | 1248 | |
| | | | | TOTAL | 56737 | |

¹NOTE: The facility updated the list of active lots in this permitting action, removing the Global Scholars-Housing lot and the North Parking Lot for Jaqua.

Unpaved Road Dust Emission Factor – AP-42 13.2.2

| | k (lb/VMT) | s(%) | S(mph) | M (%) | C | a | c | d | E (uncorrected) | E (Corrected) ¹ |
|-------|------------|------|--------|-------|---------|-----|-----|-----|-----------------|----------------------------|
| PM-30 | 6.0 | 4.0 | 15.0 | 0.2 | 0.00047 | 1.0 | 0.3 | 0.3 | 2.14 | 1.26 |
| PM10 | 1.8 | 4.0 | 15.0 | 0.2 | 0.00047 | 1.0 | 0.2 | 0.5 | 0.51 | 0.30 |
| PM2.5 | 0.2 | 4.0 | 15.0 | 0.2 | 0.00036 | 1.0 | 0.2 | 0.5 | 0.05 | 0.03 |

¹NOTE: Corrected for the number of days with at least 0.254 mm of precipitation per year, p, p =150 based on AP-42 Figure 13.2.2-1

VOC and HAP Emissions from Printing Services

| Product | Annual Amount | Product Density | VOC | VOC Emissions | VOC Emissions |
|---------------------------|---------------|-----------------|-----------|---------------|---------------|
| | Used (gal) | (lb/gal) | (lbs/gal) | lbs/yr | tons/yr |
| Varn Low Odor Blend | 550 | 6.91 | 6.78 | 3729 | 1.865 |
| Concentrate 2451 | 6 | 9.18 | 2.21 | 13.26 | 0.007 |
| MRC | 6 | 6.593 | 4.11 | 24.66 | 0.012 |
| Ink anti-skin | 2 | 5.57 | 4.27 | 8.54 | 0.004 |
| Alkaless | 15 | 7.544 | 7.54 | 113.1 | 0.057 |
| Dylek PS aerosol | 0.5 | 5.8 | 4.14 | 2.07 | 0.001 |
| Lube Trac Plus | 1 | 5.7 | 5.62 | 5.62 | 0.003 |
| Premium OTF Plate Cleaner | 2 | 10.0 | 0.3 | 0.6 | 0.000 |
| Total | 582.5 | | | 3897 | 1.9 |

| Product | Annual Amount | Product Density | VOC |
|------------------|---------------|-----------------|------------|
| | Used (gal) | (lb/gal) | (lbs/gal) |
| OS green | 2400 | 10.0 | VOC Exempt |
| OS reflux blue | 160 | 10.0 | VOC Exempt |
| OS special black | 2400 | 10.0 | VOC Exempt |
| OS red | 2000 | 10.0 | VOC Exempt |
| OS yellow | 2000 | 10.0 | VOC Exempt |

| Product | Annual Amount Used (gal) | Product Density (lb/gal) | HAPs | | | | | | | | HAPs Emissions lbs/yr | HAPs Emissions tons/yr |
|---------------------|-----------------------------|-----------------------------|------------------|-------------|-----------------|-------------|---------------|------------|-------|-------------|--------------------------|---------------------------|
| | | | Xylene Emissions | | Ethylene Glycol | | Ethyl Benzene | | MIBK | | | |
| | | | wt. % | lbs/yr | wt. % | lbs/yr | wt. % | lbs/yr | wt. % | lbs/yr | | |
| Varn Low Odor Blend | 550 | 6.91 | 1.5% | 57.0 | | | | | | | 57.01 | 0.029 |
| Concentrate 2451 | 6 | 9.18 | | | 10% | 5.51 | | | | | 5.51 | 0.003 |
| MRC | 6 | 6.593 | 20% | 7.9 | | | 5% | 2.0 | | | 9.89 | 0.005 |
| Dylek PS aerosol | 0.5 | 5.8 | | | | | | | 1% | 0.03 | 0.03 | 0.000 |
| Total | 562.5 | | | 64.9 | | 5.51 | | 2.0 | | 0.03 | 72.4 | 0.04 |

EU-1, EU-2, EU-3 Emissions Estimate for Hazardous Air Pollutants (HAPs)

| HAP | Emission Factors | | | | | | | | EMISSIONS | | |
|---|--------------------------|--------------------|----------------|--------------------|--------------------------|--------------------|----------------------|--------------------|-------------|---------------|-------------|
| | Natural Gas | Information | Distillate Oil | Information | Natural Gas | Information | Distillate Oil | Information | (Tons/yr) | (Tons/yr) | (Tons/yr) |
| | (lb/10 ⁶ scf) | Source | (lb/Kgal) | Source | (lb/10 ⁶ scf) | Source | (lb/Kgal) | Source | Nat. Gas | Fuel Oil | TOTAL |
| | (Boilers/duct burner) | | (Boilers) | | (Combustion Turbine) | | (Combustion Turbine) | | | | |
| Organics | | | | | | | | | | | |
| 2-Methylnaphthalene ^a | 2.40E-05 | AP-42 ^b | | | | | | | 1.00E-05 | 0.00E+00 | 1.00E-05 |
| 3-Methylchloranthrene ^a | 1.80E-06 | AP-42 ^b | | | | | | | 7.50E-07 | 0.00E+00 | 7.50E-07 |
| 7,12-Dimethylbenz(a)anthracene ^a | 1.60E-05 | AP-42 ^b | | | | | | | 6.66E-06 | 0.00E+00 | 6.66E-06 |
| Acetaldehyde | | | | | 4.01E-02 | AP-42 ^d | | | 6.66E-03 | 0.00E+00 | 6.66E-03 |
| Acrolein | | | | | 6.42E-03 | AP-42 ^d | | | 1.07E-03 | 0.00E+00 | 1.07E-03 |
| Ancenaphthylene ^a | 1.80E-06 | AP-42 ^b | 2.53E-07 | AP-42 ^c | | | | | 7.50E-07 | 2.74E-08 | 7.77E-07 |
| Acenaphthene | | | 2.11E-05 | AP-42 ^c | | | | | 0.00E+00 | 2.29E-06 | 2.29E-06 |
| Anthracene ^a | 2.46E-06 | AP-42 ^b | 1.22E-06 | AP-42 ^c | | | | | 1.02E-06 | 1.32E-07 | 1.16E-06 |
| Benz(a)anthracene ^a | | | 4.01E-06 | AP-42 ^c | | | | | 0.00E+00 | 4.34E-07 | 4.34E-07 |
| Benzene | 2.10E-03 | AP-42 ^b | 2.14E-04 | AP-42 ^c | 1.20E-02 | AP-42 ^d | 7.65E-03 | AP-42 ^d | 2.87E-03 | 4.52E-04 | 3.32E-03 |
| Benzo(g,h,i)perylene | | | 2.26E-06 | AP-42 ^c | | | | | 0.00E+00 | 2.45E-07 | 2.45E-07 |
| Benzo(a)pyrene ^a | 1.20E-06 | AP-42 ^b | | | | | | | 5.00E-07 | 0.00E+00 | 5.00E-07 |
| Benzo(b)fluoranthene ^a | 1.80E-06 | AP-42 ^b | 1.48E-06 | AP-42 ^c | | | | | 7.50E-07 | 1.60E-07 | 9.10E-07 |
| Benzo(k)fluoranthene ^a | 1.80E-06 | AP-42 ^b | | | | | | | 7.50E-07 | 0.00E+00 | 7.50E-07 |
| Chrysene ^a | 1.80E-06 | AP-42 ^b | 2.38E-06 | AP-42 ^c | | | | | 7.50E-07 | 2.58E-07 | 1.01E-06 |
| Dibenzo(a,h)anthracene ^a | 1.20E-06 | AP-42 ^b | 1.67E-06 | AP-42 ^c | | | | | 5.00E-07 | 1.81E-07 | 6.81E-07 |
| Dichlorobenzene ^a | 1.20E-06 | AP-42 ^b | | | | | | | 5.00E-07 | 0.00E+00 | 5.00E-07 |
| Ethylbenzene | | | 6.36E-05 | AP-42 ^c | 3.21E-02 | AP-42 ^d | | | 5.33E-03 | 6.89E-06 | 5.33E-03 |
| Fluorene ^a | 2.80E-06 | AP-42 ^b | 4.47E-06 | AP-42 ^c | | | | | 1.17E-06 | 4.84E-07 | 1.65E-06 |
| Fluoranthene ^a | | | 4.84E-06 | AP-42 ^c | | | | | 0.00E+00 | 5.24E-07 | 5.24E-07 |
| Formaldehyde | 7.50E-02 | AP-42 ^b | 4.80E-02 | AP-42 ^c | 7.12E-01 | AP-42 ^d | 3.89E-02 | AP-42 ^d | 1.49E-01 | 7.38E-03 | 1.57E-01 |
| Hexane | 1.80E+00 | AP-42 ^b | | | | | | | 7.50E-01 | 0.00E+00 | 7.50E-01 |
| Indeno(1,2,3-cd)pyrene | 1.80E-06 | AP-42 ^b | 2.14E-06 | AP-42 ^c | | | | | 7.50E-07 | 2.32E-07 | 9.82E-07 |
| Naphthalene | 6.10E-04 | AP-42 ^b | 1.13E-03 | AP-42 ^c | 1.30E-03 | AP-42 ^d | 4.87E-03 | AP-42 ^d | 4.71E-04 | 3.95E-04 | 8.66E-04 |
| PAH | | | | | 2.21E-03 | AP-42 ^d | 5.56E-03 | AP-42 ^d | 3.66E-04 | 3.12E-04 | 6.78E-04 |
| Phenanthrene ^a | 1.70E-05 | AP-42 ^b | 1.05E-05 | AP-42 ^c | | | | | 7.08E-06 | 1.14E-06 | 8.22E-06 |
| Pyrene ^a | 5.00E-06 | AP-42 ^b | 4.25E-06 | AP-42 ^c | | | | | 2.08E-06 | 4.60E-07 | 2.54E-06 |
| Toluene | 3.40E-03 | AP-42 ^b | 6.20E-03 | AP-42 ^c | 1.30E-01 | AP-42 ^d | | | 2.31E-02 | 6.72E-04 | 2.37E-02 |
| Xylenes | | | 1.09E-04 | AP-42 ^c | 6.42E-02 | AP-42 ^d | | | 1.07E-02 | 1.18E-05 | 1.07E-02 |
| Metals | | | | | | | | | | | |
| Arsenic | 2.00E-04 | AP-42 ^b | 5.56E-04 | AP-42 ^c | | | 1.53E-03 | AP-42 ^d | 8.33E-05 | 1.46E-04 | 2.29E-04 |
| Barium | 4.40E-03 | AP-42 ^b | 2.57E-03 | AP-42 ^c | | | | | 1.83E-03 | 2.78E-04 | 2.11E-03 |
| Beryllium | 1.20E-05 | AP-42 ^b | 4.17E-04 | AP-42 ^c | | | 4.31E-05 | AP-42 ^d | 5.00E-06 | 4.76E-05 | 5.26E-05 |
| Cadmium | 1.10E-03 | AP-42 ^b | 4.17E-04 | AP-42 ^c | | | 6.67E-04 | AP-42 ^d | 4.58E-04 | 8.26E-05 | 5.41E-04 |
| Chromium | 1.40E-03 | AP-42 ^b | 4.17E-04 | AP-42 ^c | | | 1.53E-03 | AP-42 ^d | 5.83E-04 | 1.31E-04 | 7.14E-04 |
| Cobalt | 8.40E-05 | AP-42 ^b | | | | | | | 3.50E-05 | 0.00E+00 | 3.50E-05 |
| Lead | 2.71E-04 | AP-42 ^b | 1.25E-03 | AP-42 ^c | | | 1.95E-03 | AP-42 ^d | 1.13E-04 | 2.45E-04 | 3.58E-04 |
| Manganese | 3.80E-04 | AP-42 ^b | 8.34E-04 | AP-42 ^c | | | 1.10E-01 | AP-42 ^d | 1.58E-04 | 6.25E-03 | 6.41E-03 |
| Mercury | 2.60E-04 | AP-42 ^b | 4.17E-04 | AP-42 ^c | | | 1.67E-04 | AP-42 ^d | 1.08E-04 | 5.45E-05 | 1.63E-04 |
| Nickel | 2.10E-03 | AP-42 ^b | 4.17E-04 | AP-42 ^c | | | 6.39E-04 | AP-42 ^d | 8.75E-04 | 8.11E-05 | 9.56E-04 |
| Selenium | 2.40E-05 | AP-42 ^b | 5.56E-04 | AP-42 ^c | | | 3.48E-03 | AP-42 ^d | 1.00E-05 | 2.55E-04 | 2.65E-04 |
| TOTAL | | | | | | | | | 0.95 | 0.0168 | 0.97 |

NOTES:

- a. This air contaminant is considered polycyclic organic matter (POM) and therefore is defined as a HAP under Section 112(b) of the Clean Air Act.
- b. AP-42, 5th Edition--Supplement D, Section 1.4, "Natural Gas Combustion", dated 7/98.
- c. AP-42--5th Edition--Supplement E, Section 1.3 "Fuel Oil Combustion", dated 9/98.
- d. AP-42--5th Edition--Supplement F, Section 3.1 "Stationary Gas Turbines", dated 4/2000.

Maximum fuel consumption based on throughput limitations established in the permit.

Average heating value of distillate oil is 139,000 BTU/gal; average heating value of natural gas is 1003 BTU/cf.

Small Heaters, Boilers and Categorically Insignificant Emission Units Estimate for HAPs Emissions

| HAP | EMISSION FACTORS | | EMISSIONS |
|---|--|-----------------------|-----------------------|
| | Natural Gas (lb/10 ⁶ scf) (Boilers/Heaters) | Information Source | (Tons/yr) Nat. Gas |
| Organics | | | |
| 2-Methylnaphthalene ^a | 2.40E-05 | AP-42 ^a | 3.63E-06 |
| 3-Methylchloranthrene ^a | 1.80E-06 | AP-42 ^a | 2.72E-07 |
| 7,12-Dimethylbenz(a)anthracene ^a | 1.60E-05 | AP-42 ^a | 2.42E-06 |
| Ancenaphthylene ^a | 1.80E-06 | AP-42 ^a | 2.72E-07 |
| Anthracene ^a | 2.46E-06 | AP-42 ^a | 3.72E-07 |
| Benzene | 2.10E-03 | AP-42 ^a | 3.17E-04 |
| Benzo(a)pyrene ^a | 1.20E-06 | AP-42 ^a | 1.81E-07 |
| Benzo(b)fluoranthene ^a | 1.80E-06 | AP-42 ^a | 2.72E-07 |
| Benzo(k)fluoranthene ^a | 1.80E-06 | AP-42 ^a | 2.72E-07 |
| Chrysene ^a | 1.80E-06 | AP-42 ^a | 2.72E-07 |
| Dibenzo(a,h)anthracene ^a | 1.20E-06 | AP-42 ^a | 1.81E-07 |
| Dichlorobenzene ^a | 1.20E-06 | AP-42 ^a | 1.81E-07 |
| Fluorene ^a | 2.80E-06 | AP-42 ^a | 4.23E-07 |
| Formaldehyde | 7.50E-02 | AP-42 ^a | 1.13E-02 |
| Hexane | 1.80E+00 | AP-42 ^a | 2.72E-01 |
| Indeno(1,2,3-cd)pyrene | 1.80E-06 | AP-42 ^a | 2.72E-07 |
| Naphthalene | 6.10E-04 | AP-42 ^a | 9.22E-05 |
| Phenanathrene ^a | 1.70E-05 | AP-42 ^a | 2.57E-06 |
| Pyrene ^a | 5.00E-06 | AP-42 ^a | 7.56E-07 |
| Toluene | 3.40E-03 | AP-42 ^a | 5.14E-04 |
| Metals | | | |
| Arsenic | 2.00E-04 | AP-42 ^a | 3.02E-05 |
| Barium | 4.40E-03 | AP-42 ^a | 6.65E-04 |
| Beryllium | 1.20E-05 | AP-42 ^a | 1.81E-06 |
| Cadmium | 1.10E-03 | AP-42 ^a | 1.66E-04 |
| Chromium | 1.40E-03 | AP-42 ^a | 2.12E-04 |
| Cobalt | 8.40E-05 | AP-42 ^a | 1.27E-05 |
| Lead | 2.71E-04 | AP-42 ^a | 4.10E-05 |
| Manganese | 3.80E-04 | AP-42 ^a | 5.74E-05 |
| Mercury | 2.60E-04 | AP-42 ^a | 3.93E-05 |
| Nickel | 2.10E-03 | AP-42 ^a | 3.17E-04 |
| Selenium | 2.40E-05 | AP-42 ^a | 3.63E-06 |
| | | TOTAL | 0.29 |

NOTES:

- a. AP-42, 5th Edition--Supplement D, Section 1.4, "Natural Gas Combustion", dated 7/98.
- b. Average heating value of natural gas is 1003 BTU/cf
- c. Hours of Operation assumed at 8760 hrs

| | | |
|---|--------------|----------|
| Aggregate Heat Input - Small Boilers and Heaters | 32.8 | MMBtu/hr |
| Aggregate Nat. Gas Usage Rate - Small Boilers and Heaters | 0.03 | MMcf/hr |
| Maximum Nat. Gas Usage - Small Boilers and Heaters | 286 | MMcf/yr |
| Aggregate Heat Input - Cat Insignificant Boilers | 1.8 | MMBtu/hr |
| Aggregate Nat. Gas Usage Rate - Cat Insignificant Boilers | 0.002 | MMcf/hr |
| Maximum Nat. Gas Usage -Cat Insignificant Boilers | 16 | MMcf/yr |

EU-6 Emergency Generators Emissions Estimate for Hazardous Air Pollutants (HAPs)

| HAP | EMISSION FACTORS | | | | EMISSIONS (Tons/yr) |
|---------------------------|---------------------------|-----------------------|-----------------------|-----------------------|------------------------|
| | Natural Gas (lb/MMBtu) | Information Source | Fuel Oil (lb/Kgal) | Information Source | |
| | (SI ICE) | | (IC ICE) | | |
| Organics | | | | | |
| 1,1,2,2-Tetrachloroethane | 4.00E-05 | AP-42 ^a | | | 1.69E-05 |
| 1,1,2-Trichloroethane | 3.18E-05 | AP-42 ^a | | | 1.34E-05 |
| 1,1-Dichloroethane | 2.36E-05 | AP-42 ^a | | | 9.97E-06 |
| 1,2,3-Trimethylbenzene | 2.30E-05 | AP-42 ^a | | | 9.71E-06 |
| 1,2,4-Trimethylbenzene | 1.43E-05 | AP-42 ^a | | | 6.04E-06 |
| 1,2-Dichloroethane | 2.36E-05 | AP-42 ^a | | | 9.97E-06 |
| 1,2-Dichloropropane | 2.69E-05 | AP-42 ^a | | | 1.14E-05 |
| 1,3,5-Trimethylbenzene | 3.38E-05 | AP-42 ^a | | | 1.43E-05 |
| 1,3-Butadiene | 2.67E-04 | AP-42 ^a | 3.91E-05 | AP-42 ^b | 1.19E-04 |
| 1,3-Dichloropropene | 2.64E-05 | AP-42 ^a | | | 1.11E-05 |
| 2-Methylnaphthalene | 3.32E-05 | AP-42 ^a | | | 1.40E-05 |
| 2,2,4-Trimethylpentane | 2.50E-04 | AP-42 ^a | | | 1.06E-04 |
| Acenaphthene | 1.25E-06 | AP-42 ^a | 1.42E-06 | AP-42 ^b | 7.40E-07 |
| Acenaphthylene | 5.53E-06 | AP-42 ^a | 5.06E-06 | AP-42 ^b | 3.09E-06 |
| Acetaldehyde | 8.36E-03 | AP-42 ^a | 7.67E-04 | AP-42 ^b | 3.64E-03 |
| Acrolein | 5.14E-03 | AP-42 ^a | 9.25E-05 | AP-42 ^b | 2.18E-03 |
| Anthracene | | | 1.87E-06 | AP-42 ^b | 2.79E-07 |
| Benzene | 4.40E-04 | AP-42 ^a | 9.33E-04 | AP-42 ^b | 3.25E-04 |
| Benzo(a)anthracene | | | 1.68E-06 | AP-42 ^b | 2.51E-07 |
| Benzo(b)fluoranthene | 1.66E-07 | AP-42 ^a | 9.91E-08 | AP-42 ^b | 8.49E-08 |
| Benzo(k)fluoranthene | | | 1.55E-07 | AP-42 ^b | 2.31E-08 |
| Benzo(a)pyrene | | | 1.88E-07 | AP-42 ^b | 2.81E-08 |
| Benzo(e)pyrene | 4.15E-07 | AP-42 ^a | | | 1.75E-07 |
| Benzo(g,h,i)perylene | 4.14E-07 | AP-42 ^a | 4.89E-07 | AP-42 ^b | 2.48E-07 |
| Biphenyl | 2.12E-04 | AP-42 ^a | | | 8.95E-05 |
| Butane | 5.41E-04 | AP-42 ^a | | | 2.28E-04 |
| Butyl/Isobutyraldehyde | 1.01E-04 | AP-42 ^a | | | 4.26E-05 |
| Carbon Tetrachloride | 3.67E-05 | AP-42 ^a | | | 1.55E-05 |
| Chlorobenzene | 3.04E-05 | AP-42 ^a | | | 1.28E-05 |
| Chloroethane | 1.87E-06 | AP-42 ^a | | | 7.90E-07 |
| Chloroform | 2.85E-05 | AP-42 ^a | | | 1.20E-05 |
| Chrysene | 6.93E-07 | AP-42 ^a | 3.53E-07 | AP-42 ^b | 3.45E-07 |
| Cyclopentane | 2.27E-04 | AP-42 ^a | | | 9.59E-05 |
| Dibenz(a,h)anthracene | | | 5.83E-07 | AP-42 ^b | 8.70E-08 |
| Ethane | 1.05E-01 | AP-42 ^a | | | 4.43E-02 |
| Ethylbenzene | 3.97E-05 | AP-42 ^a | | | 1.68E-05 |
| Ethylene Dibromide | 4.43E-05 | AP-42 ^a | | | 1.87E-05 |
| Fluoranthene | 1.11E-06 | AP-42 ^a | 7.61E-06 | AP-42 ^b | 1.60E-06 |
| Fluorene | 5.67E-06 | AP-42 ^a | 2.92E-05 | AP-42 ^b | 6.75E-06 |
| Formaldehyde | 5.28E-02 | AP-42 ^a | 1.18E-03 | AP-42 ^b | 2.25E-02 |
| Indeno(1,2,3-cd)pyrene | | | 3.75E-07 | AP-42 ^b | 5.60E-08 |
| Methanol | 2.50E-03 | AP-42 ^a | | | 1.06E-03 |
| Methylcyclohexane | 1.23E-03 | AP-42 ^a | | | 5.19E-04 |
| Methylene Chloride | 2.00E-05 | AP-42 ^a | | | 8.45E-06 |
| n-Hexane | 1.11E-03 | AP-42 ^a | | | 4.69E-04 |
| n-Nonane | 1.10E-04 | AP-42 ^a | | | 4.64E-05 |
| n-Octane | 3.51E-04 | AP-42 ^a | | | 1.48E-04 |
| n-Pentane | 2.60E-03 | AP-42 ^a | | | 1.10E-03 |
| Naphthalene | 7.44E-05 | AP-42 ^a | 8.48E-05 | AP-42 ^b | 4.41E-05 |
| PAH | 2.69E-05 | AP-42 ^a | 1.68E-04 | AP-42 ^b | 3.64E-05 |
| Phenanthrene | 1.04E-05 | AP-42 ^a | 2.94E-05 | AP-42 ^b | 8.78E-06 |
| Phenol | 2.40E-05 | AP-42 ^a | | | 1.01E-05 |
| Propane | 4.19E-02 | AP-42 ^a | | | 1.77E-02 |
| Propylene | | | 2.58E-03 | AP-42 ^b | 3.85E-04 |
| Pyrene | 1.36E-06 | AP-42 ^a | 4.78E-06 | AP-42 ^b | 1.29E-06 |
| Styrene | 2.36E-05 | AP-42 ^a | | | 9.97E-06 |
| Tetrachloroethane | 2.48E-06 | AP-42 ^a | | | 1.05E-06 |
| Toluene | 4.08E-04 | AP-42 ^a | 4.09E-04 | AP-42 ^b | 2.33E-04 |
| Vinyl Chloride | 1.49E-05 | AP-42 ^a | | | 6.29E-06 |
| Xylene | 1.84E-04 | AP-42 ^a | 2.85E-04 | AP-42 ^b | 1.20E-04 |
| | | | | TOTAL | 0.10 |

NOTES:

a. AP-42, 5th Edition--Section 3.2 Table 3.2-2, "Natural Gas-fired Reciprocating Engines", dated 7/00.

b. AP-42, 5th Edition--Section 3.3 Table 3.3-2, "Gasoline And Diesel Industrial Engines", dated 10/96.

c. Hours of Operation assumed at 500 hrs

| | | |
|---|-------|----------|
| Aggregate Heat Input - Natural Gas Emergency Generators | 1.7 | MMBtu/hr |
| Maximum Nat. Gas Heat Input - Emergency Generators | 844.5 | MMBtu/yr |
| Aggregate Fuel Usage - Fuel Oil Emergency Generators | 0.6 | Kgal/hr |
| Maximum Fuel Oil Usage - Emergency Generators | 298.6 | Kgal/yr |