SIMPLE air contaminant discharge permit

review report

Department of Environmental Quality

Eastern Region

**Source Information:**

|  |  |
| --- | --- |
| SIC | 2869 |
| NAICS | 325193 |

|  |  |
| --- | --- |
| Source Categories (Table 1 Part, code) | B, 57 |
| Public Notice Category | II |

**Compliance and Emissions Monitoring Requirements:**

|  |  |
| --- | --- |
| FCE | No |
| Compliance schedule | No |
| Unassigned emissions | No |
| Emission credits | No |
| Special Conditions | No |

|  |  |
| --- | --- |
| Source test [date(s)] | No |
| COMS | No |
| CEMS | No |
| Ambient monitoring | No |

**Reporting Requirements:**

|  |  |
| --- | --- |
| Annual report (due date) | 2/15 |
| Quarterly report (due dates) | No |

|  |  |
| --- | --- |
| Monthly report (due dates) | No |
| Excess emissions report | No |
| Semi Annual NSPS | Yes |

**Air Programs:**

|  |  |
| --- | --- |
| Synthetic Minor (SM) | No |
| SM -80 | No |
| NSPS (list subparts) | A, VVa, NNN, RRR |
| NESHAP (list subparts) | No |
| Part 68 Risk Management | No |
| CFC | No |
| NSR | No |
| PSD | No |
| RACT | No |
| TACT | No |
| Other (specify) | No |

**Table Of Contents**

PERMITTING 3

source description 3

compliance 6

emissions 6

major source applicability 7

additional requirements 8

source testing 9

public notice 9

PSEL DETAIL SHEETS 11

Hazardous Air Pollutants 14

PERMITTING

PERMITTING ACTION

# The permit is a modification of an existing Simple Air Contaminant Discharge Permit (ACDP) which was issued on 3/25/10 and was originally scheduled to expire on 3/1/15.

OTHER PERMITS

# No other permits have been issued or are required by the Department of Environmental Quality for this source.

ATTAINMENT STATUS

# The source is located in an attainment area for all pollutants.

# The source is not located within 10 kilometers of any Class I Air Quality Protection Areas.

source description

overview

# The permittee is completing construction of a fuel-grade cellulosic ethanol demonstration plant near Boardman. This permit modification updates the list of process units and emission points to reflect the as-built configuration as compared to the planned design configuration reflected in the initial permit. Changes were made due to improvements of the process itself as well as improvements in various process devices since the initial permit application.

process and control devices

# Many changes have been made to the process since the initial permit application was submitted in 2009. The current emission points of the plant are as follows:

## **Unit 100 – Hydrolysis** Wood chips are pretreated with low-pressure steam followed by hydrolyzation with heat and dilute acid. The hydrolyzate is separated from the lignin. Emission sources include:

### T1010 – Live Bottom Bin, which holds wood chips for pretreatment;

### F1030 – Filter Press Chamber, solid materials are washed with hot water, neutralized with caustic, and pressed to reduce water content;

### H1050 – Lignin Dryer Feed Hopper, receives lignin from the filter press (F1030) prior to feeding to the lignin dryer (D1050);

### D1050 – Full Ring Dryer for Lignin, is a steam-heated GEA Barr-Rosin dryer which reduces lignin moisture from approximately 40% to 10%. Emissions from the dryer are sent to a reverse jet baghouse (F1060) made for the system that has a 99.5% control efficiency;

### H1080 – Lignin Bulk Bag Hopper, receives lignin from the dryer (D1050) and prepares the lignin to be sold.

## **Unit 200 – Hydrolyzate Neutralization, Lignin Drying, Sugar Storage** Lime is added to the hydrolyzate to neutralize the slightly acidic liquid. The resulting gypsum precipitate is filtered out. Emission sources include:

### V2000 – Hydrolyzate Neutralizer 300 gallon, fixed roof tank used to neutralize the slightly acidic hydrolyzate;

### F2000 – Hydrolyzate Filter, which is used to remove the gypsum precipitate from the hydrolyzate. Hydrolyzate is pumped to hydrolyzate storage tanks T2010 and T2020.

## **Units 300/310/320 – Syrup and Lime Handling, Seed Train, Media Preparation, Fermentation** The xylose and glucose in the filtered hydrolyzate (syrup) is converted to acetic acid by fermentation using a proprietary media, a naturally occurring acetogen, which does not produce CO2, a byproduct of traditional yeast fermentation. The emission points associated with these units are:

### T3110 – Media Mix Tank, media is dumped from bags into the media mix tank. Dust from this operation is collected by a pulse jet baghouse (D3110);

### T3260 – Media Recycling Tank, 3400 gallon, fixed roof tank used to store media mix prior to recycling.

## **Unit 390 – Broth Clarification** The fermented hydrolyzate (broth) is filtered to remove suspended solids. Emission points include:

### T3910 – Extraction Column Feed Tank, 3400 gallon, fixed roof tank which receives liquid broth from the fermentation tanks prior to feeding to the extraction column;

### F3910 – Broth Clarifier, a filter which removes suspended solids from the broth. The filtered liquid is pumped to the Clarified Broth Tank;

### T3920 – Clarified Broth Tank, 3400 gallon, fixed roof tank which receives filtered broth from the broth clarifier;

### F3930 – Reverse Osmosis (RO) Membrane, receives clarified broth from T3920 and uses reverse osmosis to reduce the liquid volume by 50%. The permeate (effectively clear water) is stored in the RO water holding tank for reuse in other parts of the plant. The retentate is returned to the clarified broth (acidification feed) pump.

## **Unit 400 – Acidification** Acid is added to the clarified broth and the resulting gypsum precipitate is filtered out. Emission points include:

### T4030 – Acidification Surge Tank, 3400 gallon, fixed roof tank which holds acidified broth;

### F4020 – Acidification Polishing Filter, removes fine particulates from the acidified broth.

## **Unit 440 – Acetic Acid Recovery and Concentration** The dilute acetic acid is sent to a pulsed extraction column and rectification column where the acetic acid is concentrated.

## **Unit 500 – Reactive Distillation and Purification** The concentrated acid is converted to an ester and the ester is purified. Emission points include:

### T5002 – Concentrated Acetic Acid Day Tank, 212 gallon fixed roof tank which receives concentrated acetic acid from the rectification column;

### T5004 – Ethanol Day Tank, 376 gallon fixed roof tank which holds ethanol.

## **Units 700/710 – Hydrogenolysis and Ethanol Purification** The ester is hydrogenated to produce ethanol. The ethanol is purified and later denatured by addition of gasoline.

## **Units 900-980 – Utilities** Various ancillary units which support the production of ethanol. Emission points include:

### E9010 – Cooling Tower, a 3-cell evaporative cooling tower that provides chilled water to various processes throughout the plant;

### B9110 – Boiler #1, a 8.3875 MMBtu/hr, natural gas-fired Clayton Industries boiler which supplies low and medium pressure steam to various units;

### B9111 – Boiler #2, a 8.3875 MMBtu/hr, natural gas-fired Clayton Industries boiler which supplies high pressure steam to various units;

### X9250 – Deaerator, removes oxygen from the condensate return of the process steam heat system prior to reintroduction to the boilers;

### X9610 – Thermal Oxidizer, a natural gas fired Catalytic Comb. -45M thermal oxidizer that controls organic emissions from the following units: Vacuum Skid Vent Header from Fermentation/Seed Train Processes (E1081), Acidification Vessels (V4010/11), Gypsum Belt Filter and Vacuum Separator (V4015), Extraction Column Process Vent, Rectifying Column Process Vent, RWD Column Process Vent, Ethyl Acetate Purification Column Process Vent, Hydrogenolysis Feed Tank (V7010), Hydrogenolysis Knock Out Pot (V7030), Ethanol Overhead Receiver (V7130), Ethyl Acetate Tank 1 (T9910), Ethyl Acetate Tank 2 (T9911), Neat Ethanol Storage Tank 1 (T9940), Neat Ethanol Storage Tank 2 (T9941), Process Denatured Ethanol Storage Tank (T9950), Gasoline Storage Tank (T9960), Product Denatured Ethanol Tank (T9970), and Organic Slop Tank (T9980). Design residence time is 1.00 second with a 99.9% control efficiency of total organic compounds;

### T9520 – Wastewater Neutralization Tank 1, 15,000 gallon fixed roof tank which receives wastewater from various processes throughout the plant. It includes a neutralization system to adjust the pH;

### T9521 – Wastewater Neutralization Tank 2, 15,000 gallon fixed roof tank which receives wastewater from various processes throughout the plant. It includes a neutralization system to adjust the pH;

### T9540 – Retentate Waste Tank, 3400 gallon fixed roof tank to hold retentate waste;

### TK-100-01 – CIP Rinse Tank, a 1000 gallon fixed roof tank which will hold dilute broth;

### TK-100-02 – CIP Wash Tank, a 1000 gallon fixed roof tank which will hold dilute broth.

compliance

# The facility has not yet begun operations but will be inspected by Department personnel to ensure compliance with the permit conditions after operations commence.

emissions

# Proposed PSEL information:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Pollutant** | **Baseline Emission Rate (tons/yr)** | **Netting Basis** | | **Plant Site Emission Limits (PSEL)** | | |
| **Previous (tons/yr)** | **Proposed (tons/yr)** | **Previous PSEL (tons/yr)** | **Proposed PSEL (tons/yr)** | **PSEL Increase (tons/yr)** |
| PM | 0 | 0 | 0 | 24 | 24 | 0 |
| PM10 | 0 | 0 | 0 | 14 | 14 | 0 |
| PM2.5 | 0 | 0 | 0 | 0 | 9 | 9 |
| SO2 | 0 | 0 | 0 | 39 | 39 | 0 |
| NOx | 0 | 0 | 0 | 39 | 39 | 0 |
| CO | 0 | 0 | 0 | 99 | 99 | 0 |
| VOC | 0 | 0 | 0 | 39 | 39 | 0 |
| GHG (CO2e) | 0 | 0 | 0 | 0 | 74,000 | 74,000 |

## The **baseline emission rate** is zero since the facility was not in existence during the baseline period (1977-78).

## The **netting basis** is zero because this facility was constructed after the baseline period and has not undergone New Source Review in accordance with OAR 340-200-0020(71)(b)(A) and because the PSEL for all pollutants is equal to the generic PSEL in accordance with OAR 340-200-0020(71)(b)(B).

## The proposed PSELs for all pollutants are equal to the Generic PSEL in accordance with OAR 340-216-0064(4)(b) and the netting basis is zero in accordance with OAR 340-222-0040(2).

## The PSEL for PM2.5 and greenhouse gas (GHG) have been added in this modification since they were added to the list of regulated pollutants after the previous permit was issued.

## The emission detail sheet supporting the PSEL is attached to this review report.

## The PSEL is a federally enforceable limit on the potential to emit.

significant emission rate analysis

# For each pollutant, the proposed Plant Site Emission Limit is less than the Netting Basis plus the significant emission rate, thus no further air quality analysis is required.

# An analysis of the proposed PSEL increases over the Netting Basis is shown in the following table.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Pollutant** | **SER** | **Requested Increase Over Previous Netting Basis** | **Increase Due to Utilizing Capacity that Existed in the Baseline Period** | **Increase Due to Physical Changes or Changes in the Method of Operation** |
| PM | 25 | 24 | 0 | 24 |
| PM10 | 15 | 14 | 0 | 14 |
| PM2.5 | 10 | 9 | 0 | 9 |
| SO2 | 40 | 39 | 0 | 39 |
| NOx | 40 | 39 | 0 | 39 |
| CO | 100 | 99 | 0 | 99 |
| VOC | 40 | 39 | 0 | 39 |
| GHG (CO2e) | 75,000 | 74,000 | 0 | 74,000 |

major source applicability

criteria pollutants

# A major source is a facility that has the potential to emit 100 tons/yr or more of any criteria pollutant. For greenhouse gases a major source is a facility that has the potential to emit 100 ton/yr or more of any single greenhouse gas and has the potential to emit 100,000 ton/yr CO2e of all greenhouse gases, including fugitives. This facility is not a major source of criteria pollutant emissions.

Hazardous air pollutants

# A major source is a facility that has the potential to emit 10 tons/yr or more of any single HAP or 25 tons/yr or more of combined HAPs. When operating at its maximum annual capacity, this facility is not a major source of hazardous air pollutants.

|  |  |
| --- | --- |
| **Hazardous Air Pollutant** | **Potential to Emit (tons/year)** |
| Methanol | 2.4 |
| Various HAP  (individually less than 1.0 ton/yr each) | 0.16 |
| **Total** | **2.6** |

additional requirements

nsps applicability

# The previous permit indicated 40 CFR Part 60, Subpart Dc – Standards of Performance for Small industrial-Commercial-Institutional Steam Generating Units was applicable since the planned boiler had a rated capacity greater than 10 MMBtu/hr. The design has changed to utilize 2 natural gas fired boilers with a rated capacity of 8.4 MMBtu/hr. These boilers are not subject to NSPS Subpart Dc, so the facility is no longer subject to this subpart.

# 40 CFR Part 60, Subpart Kb – Standards for Volatile Organic Liquid Storage Vessels is not applicable to the facility. All tanks were installed after the 7/23/84 applicability date. However, none of the tanks are equal to or greater than the applicable size of 19,815 gallons (75 m3).

# 40 CFR Part 60, Subpart VVa – Standards of Performance for Equipment Leaks of VOC in the Synthetic Organic Chemicals Manufacturing Industry is applicable to all affected process units.

# 40 CFR Part 60, Subpart NNN – VOC Emissions from Synthetic Organic Chemical Manufacturing Industry Distillation Operations is applicable to the distillation columns of this facility.

# 40 CFR Part 60, Subpart RRR – VOC Emissions from Synthetic Organic Chemical Manufacturing Industry Reactor Processes is applicable to the reactor processes of this facility.

neshaps/mact applicability

# The facility is not a major source of Hazardous Air Pollutant (HAP) emissions. Therefore, the current National Emission Standards for Hazardous Air Pollutants (NESHAP) are not applicable. The facility is not subject to Subpart VVVVVV for chemical manufacturing area sources because it does not process, use or produce any of the compounds listed in Table 1 of Subpart VVVVVV.

RACT applicability

# The RACT rules are not applicable to this source because it is not in the Portland AQMA, Medford AQMA or Salem SKATS.

source testing

proposed testing

# Expected emissions are low enough that testing will not be required.

public notice

# Pursuant to OAR 340-216-0064(5)(b)(B), modification of Simple Air Contaminant Discharge Permits require public notice in accordance with OAR 340-209-0030(3)(b), which requires that the Department provide notice of the proposed permit action and a minimum of 30 days for interested persons to submit written comments. **The public notice was issued on Oct. 28, 2011 and the comment period ended on Nov. 28, 2011.**

Comments were received from the permittee seeking clarification and correction of several errors in the permit.

The permittee asked about the removal of Hazardous Air Pollutants (HAP) from the PSEL. As a rule, a generic PSEL for HAP is established when a facility has the potential to emit as a major source (10 tons/yr of any individual HAP or 25 tons/yr of all HAP combined) but desires a federally enforceable limit on the allowable HAP emissions. This is also called a synthetic minor condition. This facility does not have the potential to emit HAP as a major source so the synthetic minor (as enforced by a PSEL on HAP emissions) is not necessary. For this reason the PSEL for HAP was removed.

The permittee requested the ability to estimate emissions from the tanks using EPA’s AP-42 in addition to using EPA’s TANK software. Since results are equivalent, the change has been made to the permit.

The emission factor used to calculate particulate emissions from the thermal oxider is 0.0164 lb/hr but is listed as 0.164 lb/hr in the permit and review report detail sheets. The emission factors listed in the permit and review report are typographical errors and have been corrected.

In the Review Report’s detail sheet for Hazardous Air Pollutant emissions, the methanol emissions from the hydrolysate neutralizer (V2000) should be 0.01147 ton/yr rather than 0.1147 ton/yr. The typographical error has been corrected.

:ww

PSEL DETAIL SHEETS

**PM**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Emission Point** | **Operating Parameter** | **Emission Factor** | | **Emissions (ton/yr)** |
| **Rate** | **Reference** |
| F1060 – Lignin Dryer | 3650 BDT/yr feed | 0.1156 lb/BDT | Source Estimate | 0.21 |
| D3110 – Media Dust Collector | 8760 hr/yr | 0.0135 lb/hr | Source Estimate | 0.059 |
| E9010 – Cooling Tower | 880,000 Mgal/yr | 0.035 lb/Mgal | AP-42 Table 13.4-1, 2 | 15.40 |
| B9110 – Boiler #1 | 71.87 MMft3/yr | 7.6 lb/MMft3 | AP-42 Table 1.4-2 | 0.27 |
| B9111 – Boiler #2 | 71.87 MMft3/yr | 7.6 lb/MMft3 | AP-42 Table 1.4-2 | 0.27 |
| X9250 - Deaerator | 13.8 Mlb/yr steam | 0.324 lb/Mlb | Source Estimate | 0.002 |
| X9610 – Thermal Oxidizer | 8760 hr/yr | 0.0164 lb/hr | Source Estimate | 0.07 |
| **Total** | | | | **16.28** |

**PM10**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Emission Point** | **Operating Parameter** | **Emission Factor** | | **Emissions (ton/yr)** |
| **Rate** | **Reference** |
| F1060 – Lignin Dryer | 3650 BDT/yr feed | 0.1156 lb/BDT | 100% of PM is PM10 | 0.21 |
| D3110 – Media Dust Collector | 8760 hr/yr | 0.0135 lb/hr | 100% of PM is PM10 | 0.059 |
| E9010 – Cooling Tower | 880,000 Mgal/yr | 0.016 lb/Mgal | 47% of PM is PM10 | 7.19 |
| B9110 – Boiler #1 | 71.87 MMft3/yr | 7.6 lb/MMft3 | 100% of PM is PM10 | 0.27 |
| B9111 – Boiler #2 | 71.87 MMft3/yr | 7.6 lb/MMft3 | 100% of PM is PM10 | 0.27 |
| X9250 - Deaerator | 13.8 Mlb/yr steam | 0.324 lb/Mlb | 100% of PM is PM10 | 0.002 |
| X9610 – Thermal Oxidizer | 8760 hr/yr | 0.0164 lb/hr | 100% of PM is PM10 | 0.07 |
| **Total** | | | | **8.07** |

**PM2.5**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Emission Point** | **Operating Parameter** | **Emission Factor** | | **Emissions (ton/yr)** |
| **Rate** | **Reference** |
| F1060 – Lignin Dryer | 3650 BDT/yr feed | 0.1156 lb/BDT | 100% of PM10 is PM2.5 | 0.21 |
| D3110 – Media Dust Collector | 8760 hr/yr | 0.0135 lb/hr | 100% of PM10 is PM2.5 | 0.059 |
| E9010 – Cooling Tower | 880,000 Mgal/yr | 0.016 lb/Mgal | 100% of PM10 is PM2.5 | 7.19 |
| B9110 – Boiler #1 | 71.87 MMft3/yr | 7.6 lb/MMft3 | 100% of PM is PM10 | 0.27 |
| B9111 – Boiler #2 | 71.87 MMft3/yr | 7.6 lb/MMft3 | 100% of PM is PM10 | 0.27 |
| X9250 - Deaerator | 13.8 Mlb/yr steam | 0.324 lb/Mlb | 100% of PM is PM10 | 0.002 |
| X9610 – Thermal Oxidizer | 8760 hr/yr | 0.0164 lb/hr | 100% of PM is PM10 | 0.07 |
| **Total** | | | | **8.07** |

**SO2**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Emission Point** | **Operating Parameter** | **Emission Factor** | | **Emissions (ton/yr)** |
| **Rate** | **Reference** |
| B9110 – Boiler #1 | 71.87 MMft3/yr | 0.6 lb/MMft3 | AP-42 Table 1.4-2 | 0.02 |
| B9111 – Boiler #2 | 71.87 MMft3/yr | 0.6 lb/MMft3 | AP-42 Table 1.4-2 | 0.02 |
| X9610 – Thermal Oxidizer | 8760 hr/yr | 0.001 lb/hr | Source Estimate | 0.01 |
| **Total** | | | | **0.05** |

**NOx**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Emission Point** | **Operating Parameter** | **Emission Factor** | | **Emissions (ton/yr)** |
| **Rate** | **Reference** |
| B9110 – Boiler #1 | 71.87 MMft3/yr | 100 lb/MMft3 | AP-42 Table 1.4-1 | 3.59 |
| B9111 – Boiler #2 | 71.87 MMft3/yr | 100 lb/MMft3 | AP-42 Table 1.4-1 | 3.59 |
| X9610 – Thermal Oxidizer | 8760 hr/yr | 0.237 lb/hr | Source Estimate | 1.04 |
| **Total** | | | | **8.22** |

**CO**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Emission Point** | **Operating Parameter** | **Emission Factor** | | **Emissions (ton/yr)** |
| **Rate** | **Reference** |
| B9110 – Boiler #1 | 71.87 MMft3/yr | 84 lb/MMft3 | AP-42 Table 1.4-1 | 3.02 |
| B9111 – Boiler #2 | 71.87 MMft3/yr | 84 lb/MMft3 | AP-42 Table 1.4-1 | 3.02 |
| X9610 – Thermal Oxidizer | 8760 hr/yr | 0.295 lb/hr | Source Estimate | 1.29 |
| **Total** | | | | **7.33** |

**VOC**

| **Emission Point** | **Operating Parameter** | **Emission Factor** | | **Emissions (ton/yr)** |
| --- | --- | --- | --- | --- |
| **Rate** | **Reference** |
| T1010 – Live Bottom Bin | 3650 BDT/yr | 1.57 lb/BDT | Source Estimate | 2.87 |
| F1030 – Filter Press | 3650 BDT/yr | 0.595 lb/BDT | Source Estimate | 1.09 |
| H1050 – Lignin Dryer Feed | 3650 BDT/yr | 0.0344 lb/BDT | Source Estimate | 0.06 |
| F1060 – Lignin Dryer | 3650 BDT/yr | 3.215 lb/BDT | Source Estimate | 5.87 |
| H1080 – Lignin Bulk Bagger | 3650 BDT/yr | 0.0344 lb/BDT | Source Estimate | 0.06 |
| V2000 – Hydrolyzate Neutralizer | 7800 Mgal/yr | 0.013 lb/Mgal | Source Estimate | 0.05 |
| F2000 – Hydrolyzate Filter | 7800 Mgal/yr | 0.038 lb/Mgal | Source Estimate | 0.15 |
| T3260 – Media Recycle | 525.6 Mgal/yr | 0.167 lb/Mgal | Source Estimate | 0.04 |
| T3910 – Extraction Column Feed Tank | 5200 Mgal/yr |  | EPA – TANKS/AP-42 | 0.19 |
| F3910 – Broth Clarifier | 5300 Mgal/yr | 7.75E-04 lb/Mgal | Source Estimate | 0.002 |
| T3920 – Clarified Broth Tank | 5300 Mgal/yr |  | EPA – TANKS/AP-42 | 0.001 |
| T3930 – RO Membrane | 587 Mgal/yr | 5.32E-03 lb/Mgal | Source Estimate | 0.002 |
| T4030 – Acidification Surge Tank | 5200 Mgal/yr |  | EPA – TANKS/AP-42 | 0.219 |
| F4020 – Acidification Polishing Filter | 5200 Mgal/yr | 0.07 lb/Mgal | Source Estimate | 0.18 |
| T5002 – Concentrated Acetic Acid Day Tank | 255.3 Mgal/yr |  | EPA – TANKS/AP-42 | 0.45 |
| T5004 – Ethanol Day Tank | 25 Mgal/yr |  | EPA – TANKS/AP-42 | 0.27 |
| B9110 – Boiler #1 | 71.87 MMft3/yr | 5.5 lb/MMft3 | AP-42 Table 1.4-2 | 0.20 |
| B9111 – Boiler #2 | 71.87 MMft3/yr | 5.5 lb/MMft3 | AP-42 Table 1.4-2 | 0.20 |
| T9540 – Retentate Waste Tank | 255.3 Mgal/yr |  | EPA – TANKS/AP-42 | 0.043 |
| X9610 – Thermal Oxidizer | 8760 hr/yr | 0.0548 lb/hr | Source Estimate | 0.24 |
| T9520 – Wastewater Neutralization Tank #1 | 7700 Mgal/yr |  | EPA – TANKS/AP-42 | 0.06 |
| T9521 – Wastewater Neutralization Tank #2 | 7700 Mgal/yr |  | EPA – TANKS/AP-42 | 0.06 |
| TK-100-01 – CIP Rinse Tank | 5800 Mgal/yr |  | EPA – TANKS/AP-42 | 4.47E-07 |
| TK-100-02 – CIP Wash Tank | 5800 Mgal/yr |  | EPA – TANKS/AP-42 | 4.47E-07 |
| **Total** | | | | **12.31** |

**CO2e**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Emission Point** | **Operating Parameter** | **Emission Factor** | | **Emissions (ton/yr)** |
| **Rate** | **Reference** |
| B9110 – Boiler #1  CO2  Methanea  N2Ob | 71.87 MMft3/yr | 120,000 lb/MMft3  48.3 lb/MMft3  680 lb/MM ft3 | AP-42 Table 1.4-2 | 4,312  1.7  24.4 |
| B9111 – Boiler #2  CO2  Methanea  N2Ob | 71.87 MMft3/yr | 120,000 lb/MMft3  48.3 lb/MMft3  680 lb/MM ft3 | AP-42 Table 1.4-2 | 4,312  1.7  24.4 |
| X9610 – Thermal Oxidizer  CO2  Methanea  N2Ob | 19272 MMBtu/yr | 117 lb/MMBtu  4.2E-02 lb/MMBtu  6.2E-02 | EPA430-K-08-003  (assumes all natural gas) | 1,127  0.4  0.6 |
| **Total** | | | | **9,804** |

## Assumes global warming potential of 21.

## Assumes global warming potential of 310.

Hazardous Air Pollutants

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Compound** | **Methanol** | **Dichloro-benzene** | **Formaldehyde** | **Hexane** | **Naphthalene** | **Toluene** | **Cadmium** | **Nickel** |
| T1010 – Live Bottom Bin | 0.5475 |  |  |  |  |  |  |  |
| F1030 – Filter Press | 0.5420 |  |  |  |  |  |  |  |
| H1050 – Lignin Dryer Feed | 0.0118 |  |  |  |  |  |  |  |
| F1060 – Lignin Dryer | 1.1000 |  |  |  |  |  |  |  |
| H1080 – Lignin Bulk Bag | 0.0118 |  |  |  |  |  |  |  |
| V2000 – Hydrolyzate Neutralizer | 0.01147 |  |  |  |  |  |  |  |
| F2000 – Hydrolyzate Filter Press | 0.0767 |  |  |  |  |  |  |  |
| B9110 – Boiler #1 |  | 4.3E-05 | 2.7E-03 | 6.5E-02 | 2.2E-05 | 1.2E-04 | 3.95E-05 | 7.5E-05 |
| B9111 – Boiler #2 |  | 4.3E-05 | 2.7E-03 | 6.5E-02 | 2.2E-05 | 1.2E-04 | 3.95E-05 | 7.5E-05 |
| X9610 – Thermal Oxidizer |  | 1.1E-05 | 7.1E-04 | 1.7E-02 | 5.8E-06 | 3.2E-05 | 1.0E-05 | 2.0E-05 |
| T9520 – Wastewater Neutralization Tank #1 | 4.4E-02 |  |  |  |  |  |  |  |
| T9521 – Wastewater Neutralization Tank #2 | 4.4E-02 |  |  |  |  |  |  |  |
| **Total** | **2.39** | **9.7E-05** | **6.1E-03** | **1.5E-01** | **5.0E-05** | **2.7E-04** | **8.9E-05** | **1.7E-04** |