SIMPLE air contaminant discharge permit

review report

Department of Environmental Quality

**Source Information:**

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

|  |  |
| --- | --- |
| Source Categories (Table 1 Part, code) | B,13; 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 | 18 months after startup |
| COMS | No |
| CEMS | No |
| Ambient monitoring | No |

**Reporting Requirements**

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

|  |  |
| --- | --- |
| Monthly report | No |
| Excess emissions report | No |
| Semi-annual NSPS | Yes |

**Air Programs**

|  |  |
| --- | --- |
| Synthetic Minor (SM) | No |
| SM -80 | No |
| NSPS (list subparts) | A, Dc, 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 |

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PERMITTING

PERMITTING ACTION

# The proposed permit is a new permit for a new source.

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 will build and operate a fuel-grade cellulosic ethanol demonstration plant near Boardman. The plant is designed as a working laboratory that will allow scale up and optimization of the process design for production of fuel ethanol from cellulosic (wood chip) feedstock. After process optimization is complete, the demonstration plant will be decommissioned and a larger, commercial scale facility will be developed.

process and control devices

# The facility will include the following processes:

## **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;

### F1020 – 1st Stage Fiber Filter, which removes solid material from the hydrolyzate;

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

### T1040 – Combined Hydrolyzate Tank, which is a 8000 gallon, fixed roof tank that receives the hydrolyzate liquid.

## **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. Lignin cake from the filter press (F1030) is dried. Emission sources include:

### Y2010 – Lignin Dryer, 3.75 MMBtu/hr natural gas-fired dryer to dry the lignin from 50% to 90% dryness.

### V2020 – Hydrolyzate Tank 1, 5833 gallon, fixed roof tank used to neutralize the slightly acidic hydrolyzate;

### V2030 – Hydrolyzate Tank 2, 5833 gallon, fixed roof tank used to neutralize the slightly acidic hydrolyzate;

### F2020 – Hydrolyzate Filter, which is used to remove the gypsum precipitate from the hydrolyzate;

### T2040 – Hydrolyzate Filtrate Tank, 1269 gallon, fixed roof tank used to hold the filtered hydrolyzate.

## **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. However, CO2 is used to provide a blanket in the three fermentation tanks, the dilute syrup storage tank, and the three seed train fermentation tanks. Vapor volume sharing is used to minimize the need to release this CO2 to the atmosphere. Most of these units have no emissions. However the emission points associated with these units are:

### D3110 – Media Dust Collector, media is dumped from bags into the media mix tank. Dust from this operation is collected by the media dust collector.

### CO2 Vent – Provides a vent for the CO2 used to blanket the fermentation tanks and dilute syrup storage tanks.

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

### T3910 – Clarifier Feed Tank, 3396 gallon, fixed roof tank which receives liquid broth from the three fermentation tanks and has an internal agitator to keep solids suspended prior to feeding to the clarifier;

### F3910 – Broth Clarifier, a filter which removes suspended solids from the broth. The collected solids are disposed of and the filtered liquid is pumped to the Clarifier Filtrate and Clean-In-Process Tank;

### T3920 – Clarifier Filtrate & Clean-In-Process Tank, 3396 gallon, fixed roof tank which receives filtered broth from the broth clarifier.

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

### F4010 – Gypsum Filter, which is a belt filter designed to remove gypsum from the dilute acetic acid using a vacuum based system;

### T4010 – Dilute Acetic Acid Day Tank, 3008 gallon, fixed roof tank which temporarily holds dilute acetic acid;

### F4020 – Acidification Polishing Filter, removes fine particulates from the dilute acetic acid;

### T4030 – Solids Backwash Tank, 92 gallon, fixed roof tank which receives solids from the polishing filter and reintroduces the material back into the acidification process.

## **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. Emission points include:

### T4040 – Concentrated Acetic Acid Day Tank, 212 gallon fixed roof tank which receives the concentrated acetic acid from the rectification column and from the sulfuric acid day tank.

## **Unit 500 – Reactive Distillation and Purification** The concentrated acid is converted to an ester and the ester is purified. No emission points are listed for this process.

## **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, a 40.8 MMBtu/hr, natural gas-fired boiler which creates steam for supplying process heat to various units;

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

### X9620 – Flare, air-assisted smokeless flare used primarily in emergency and upset conditions to safely remove potentially explosive levels of flammable gas from the process area;

### T9960 – Gasoline Storage tank, 595 gallon tank for storage of gasoline used to denature the ethanol;

### T9520 – Wastewater Neutralization Tank, 25,000 gallon fixed roof tank which receives wastewater from various processes throughout the plant. It includes a neutralization system to adjust the pH prior to treatment in the wastewater treatment system;

### T9510 – Process Wastewater Tank, 48,000 gallon fixed roof tank which receives wastewater from the wastewater neutralization tank prior to feed to the wastewater treatment system. The tank includes an agitator to keep solids from settling out;

### X9510 – Wastewater Treatment Facility, 21,000 gallon/day capacity system which uses a membrane bioreactor system to aerobically treat the wastewater to standards acceptable prior to discharge to the Port of Morrow’s wastewater treatment system.

compliance

# The facility will be inspected by Department personnel to ensure compliance with the permit conditions.

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 | 0 | 24 | 24 |
| PM10 | 0 | 0 | 0 | 0 | 14 | 14 |
| SO2 | 0 | 0 | 0 | 0 | 39 | 39 |
| NOx | 0 | 0 | 0 | 0 | 39 | 39 |
| CO | 0 | 0 | 0 | 0 | 99 | 99 |
| VOC | 0 | 0 | 0 | 0 | 39 | 39 |

## 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 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 |
| SO2 | 40 | 39 | 0 | 39 |
| NOx | 40 | 39 | 0 | 39 |
| CO | 100 | 99 | 0 | 99 |
| VOC | 40 | 39 | 0 | 39 |

major source applicability

criteria pollutants

# A major source is a facility that has the potential to emit 100 tons/yr or more per year of any criteria pollutant. 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) | 0.4 |
| **Total** | **2.8** |

additional requirements

nsps applicability

40 CFR Part 60, Subpart A contains the general monitoring, recordkeeping, reporting and test conditions for all sources subject to a New Source Performance Standard. The appropriate regulations from Subpart A have been included in the permit.

# 40 CFR Part 60, Subpart Dc – Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units is applicable to the source because the boiler (unit B9110) commenced construction after 6/9/89 and the maximum heat load is 100 MMBtu/hr or less but greater than or equal to 10 MMBtu/hr. (Maximum heat load is 40.8 MMBtu/hr.) For boilers which burn natural gas pollutant specific standards have not been established (standards are for units which burn coal, wood, and oil). However, the notification requirements of 40 CFR 60.48c(a) are applicable.

# 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. Only Tanks T9520 (Wastewater Neutralization Tank, 25,000 gal), T9510 (Process Wastewater Tank, 48,000 gal), and a tank in X9510 (Wastewater Treatment Facility, 240,000 gal) are greater than the applicable size 19,815 gallons (75 m3). However, these tanks are process tanks and are exempt from the definition of storage vessel in 40 CFR 60.111b.

# 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 list 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

# The CO2 vent will be tested no later than 18 months after startup for VOC emissions. The ethanol product rate and other operating parameters will be recorded during the test.

public notice

# Pursuant to OAR 340-216-0064(5)(a), issuance 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 permit was placed on public notice from February 19, 2010 to March 22, 2010. No comments were received in response to the public notice.**

:msf

**Emission Detail Sheet**

**PM**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Emission Point** | **Operating Parameter** | **Emission Factor** | | **Emissions (ton/yr)** |
| **Rate** | **Reference** |
| Y2010 – Lignin Dryer | 32.235 MMft3/yr | 7.6 lb/MMft3 | AP-42 Table 1.4-2 | 0.12 |
| D3110 – Media Dust Collector | 0.135 lb/hr | 8760 hr/yr | Source Estimate | 0.59 |
| E9010 – Cooling Tower | 851,472 Mgal/yr | 0.035 lb/Mgal | AP-42 Table 13.4-1, 2 | 14.90 |
| B9110 – Boiler | 350.4 MMft3/yr | 7.6 lb/MMft3 | AP-42 Table 1.4-2 | 1.33 |
| **Total** |  |  |  | **16.96** |

**PM10**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Emission Point** | **Operating Parameter** | **Emission Factor** | | **Emissions (ton/yr)** |
| **Rate** | **Reference** |
| Y2010 – Lignin Dryer | 32.235 MMft3/yr | 7.6 lb/MMft3 | AP-42 Table 1.4-2 | 0.12 |
| D3110 – Media Dust Collector | 0.135 lb/hr | 8760 hr/yr | Source Estimate | 0.59 |
| E9010 – Cooling Tower | 851,472 Mgal/yr | 0.019 lb/Mgal | AP-42 Table 13.4-1 | 8.09 |
| B9110 – Boiler | 350.4 MMft3/yr | 7.6 lb/MMft3 | AP-42 Table 1.4-2 | 1.33 |
| **Total** |  |  |  | **10.14** |

**SO2**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Emission Point** | **Operating Parameter** | **Emission Factor** | | **Emissions (ton/yr)** |
| **Rate** | **Reference** |
| Y2010 – Lignin Dryer | 32.235 MMft3/yr | 0.6 lb/MMft3 | AP-42 Table 1.4-2 | 0.01 |
| B9110 – Boiler | 350.4 MMft3/yr | 0.6 lb/MMft3 | AP-42 Table 1.4-2 | 0.11 |
| **Total** |  |  |  | **0.12** |

**NOx**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Emission Point** | **Operating Parameter** | **Emission Factor** | | **Emissions (ton/yr)** |
| **Rate** | **Reference** |
| Y2010 – Lignin Dryer | 32.235 MMft3/yr | 100 lb/MMft3 | AP-42 Table 1.4-1 | 1.61 |
| B9110 - Boiler | 350.4 MMft3/yr | 100 lb/MMft3 | AP-42 Table 1.4-1 | 17.52 |
| X9620 – Flare | 1535.4 MMBtu/yr | 0.068 lb/MMBtu | AP-42 Table 13.5-1 | 0.05 |
| **Total** |  |  |  | **19.18** |

**CO**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Emission Point** | **Operating Parameter** | **Emission Factor** | | **Emissions (ton/yr)** |
| **Rate** | **Reference** |
| Y2010 – Lignin Dryer | 32.235 MMft3/yr | 84 lb/MMft3 | AP-42 Table 1.4-1 | 1.35 |
| B9110 - Boiler | 350.4 MMft3/yr | 84 lb/MMft3 | AP-42 Table 1.4-1 | 14.72 |
| X9620 – Flare | 1535.4 MMBtu/yr | 0.37 lb/MMBtu | AP-42 Table 13.5-1 | 0.28 |
| **Total** |  |  |  | **16.35** |

**VOC**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Emission Point** | **Operating Parameter** | **Emission Factor** | | **Emissions (ton/yr)** |
| **Rate** | **Reference** |
| T1010 – Live Bottom Bin | 3650 BDT/yr | 1.74 lb/BDT | Source Estimate | 3.17 |
| F1020 – 1st Stage Fiber Filter | 3119 Mgal/yr | 0.1048 lb/Mgal | Source Estimate | 0.16 |
| F1030 – Filter Press | 7100 Mgal/yr | 0.0228 lb/Mgal | Source Estimate | 0.08 |
| T1040 – Combined Hydrolyzate Tank |  |  | EPA – TANKS/AP-42 | 1.12 |
| Y2010 – Lignin Dryer | 32.235 MMft3/yr | 5.5 lb/MMft3 | AP-42 Table 1.4-2 | 0.09 |
| CO2 Vent | 0.26 lb/hr | 8760 hr/yr | Source Estimate | 1.14 |
| F4010 – Gypsum Filter | 5300 Mgal/yr | 1.66 lb/Mgal | Source Estimate | 4.41 |
| T4010 – Dilute Acetic Acid Day Tank |  |  | EPA – TANKS/AP-42 | 0.20 |
| F4020 – Acidification Polishing Filter | 5200 Mgal/yr | 0.07 lb/Mgal | Source Estimate | 0.18 |
| T4030 – Solids Backwash Tank |  |  | EPA – TANKS/AP-42 | 0.02 |
| T4440 – Concentrated Acetic Acid Day Tank |  |  | EPA – TANKS/AP-42 | 0.13 |
| B9110 – Boiler | 350.4 MMft3/yr | 5.5 lb/MMft3 | AP-42 Table 1.4-2 | 0.96 |
| X9620 – Flare | 1535.4 MMBtu/yr | 0.14 lb/MMBtu | AP-42 Table 13.5-1 | 0.11 |
| T9960 – Gasoline Storage |  |  | EPA – TANKS/AP-42 | 0.25 |
| T9520 – Wastewater Neutralization Tank |  |  | EPA – TANKS/AP-42 | 0.14 |
| T9510 – Process Wastewater Tanka |  |  | EPA – TANKS/AP-42 | 0.15 |
| X9510 – Wastewater Treatment Facility |  |  | EPA – TANKS/AP-42 | 5.65 |
| T9960 – Gasoline Storage Tank |  |  | EPA – TANKS/AP-42 | 0.24 |
| **Total** |  |  |  | **17.97** |

**Hazardous Air Pollutants**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Compound** | **Methanol** | **Dichlorobenzene** | **Formaldehyde** | **Hexane** | **Naphthalene** | **Toluene** | **Cadmium** | **Nickel** |
| T1010 – Live Bottom Bin | 5.5E-01 |  |  |  |  |  |  |  |
| F1020 – 1st Stage Filter | 6.6E-02 |  |  |  |  |  |  |  |
| F1030 – Filter Press | 3.2E-02 |  |  |  |  |  |  |  |
| T1040 – Combined Hydrolyzate Tank | 4.4E-01 |  |  |  |  |  |  |  |
| Y2010 – Lignin Dryer |  | 1.9E-05 | 1.2E-03 | 2.9E-02 | 9.8E-06 | 5.5E-05 | 1.8E-05 | 3.4E-05 |
| V2020 – Hydrolyzate Tank 1 | 4.4E-04 |  |  |  |  |  |  |  |
| V2030 – Hydrolyzate Tank 2 | 4.4E-04 |  |  |  |  |  |  |  |
| F2020 – Hydrolyzate Filter | 8.8E-04 |  |  |  |  |  |  |  |
| T2040 – Hydrolyzate Filtrate Tank | 8.8E-04 |  |  |  |  |  |  |  |
| CO2 Vent | 5.4E-01 |  |  |  |  |  |  |  |
| F4010 – Gypsum Filter | 5.3E-01 |  |  |  |  |  |  |  |
| B9110 - Boiler |  | 2.1E-04 | 1.3E-02 | 3.2E-01 | 1.1E-04 | 6.0E-04 | 1.9E-04 | 3.7E-04 |
| T9520 – Wastewater Neutralization Tank | 9.9E-02 |  |  |  |  |  |  |  |
| T9510 – Process Wastewater Tank | 1.0E-01 |  |  |  |  |  |  |  |
| X9510 – Wastewater Treatment Facility | 2.6E-02 |  |  |  |  |  |  |  |
| T9960 – Gasoline Storage Tank |  |  |  | 1.1E-02 | 1.5E-06 | 2.1E-03 |  |  |
| **Total** | **2.39** | **2.3E-04** | **1.4E-02** | **3.6E-01** | **1.2E-04** | **2.7E-03** | **2.1E-04** | **4.0E-04** |