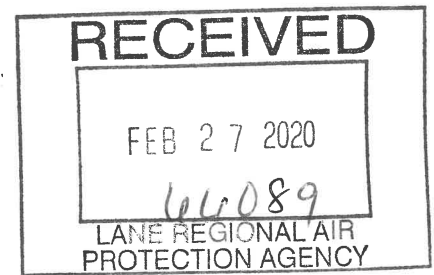




February 27, 2020



HAND DELIVERED

Jonathan Wright, Environmental Engineer
Lane Regional Air Protection Agency
1010 Main Street
Springfield, OR 97477

ROUTE TO: pdf
May
SW

EI # 2016470
FILE G/users/ops

RE: Cleaner Air Oregon Emissions Inventory Submittal
Seneca Sustainable Energy, LLC
Title V Operating Permit No. 206470

Dear Jonathan:

The purpose of this letter is to respond to LRAPA's December 2, 2019 letter indicating that Seneca has been called in to the Cleaner Air Oregon program. More specifically, with this submittal we are providing LRAPA with the following:

- CAO Emissions Inventory Form AQ405CAO (electronically submitted on enclosed thumb drive).
- Emission Inventory Supporting Information Document – This document provides a description of the emission factors, calculation methodologies and assumption made to estimate the emissions in the inventory.
- Form ED601 identifying Seneca's categorically insignificant activities.

If you have any question related to this submittal please contact me 541-762-0706 or bway@senecasawmill.com.

Sincerely,

Brent Way
Seneca Sustainable Energy, LLC
EH&S Coordinator

Enclosures

cc: Max Hueflte/LRAPA (w/o enclosures)

Emission Inventory Supporting Information

Seneca Sustainable Energy – Permit #: 206470

Cleaner Air Oregon Emissions Inventory

February 27, 2020

Introduction

On December 2, 2019 Seneca Sustainable Energy LLC, (“SSE”) was “called in” to the Cleaner Air Oregon (CAO) program. The first step in the CAO process is to submit a CAO Emissions Inventory Form that provides emission estimates of CAO regulated toxic air contaminants (TACs) from each non-exempt toxic emissions unit (TEU) at the facility. The only non-exempt TEU at the SSE facility is a wood-fired electrical cogeneration power plant (cogen plant) referred to in SSE Title V Air Operating Permit as EU-1. We have included a completed Form ED601 identifying our categorically insignificant activities.

The purpose of this document is to provide a description of the emission factors used to estimate emissions of TACs.

Source Description

SSE operates a wood-fired electrical cogeneration power plant located at 29650 East Enid Road, Eugene, Oregon. The facility began operations in January 2011. The wood-fired cogeneration power plant is rated at 18.8 megawatts. The wood-fired boiler has a maximum heat input capacity of 352.8 MMBtu per hour and has a steam output of 200,000 pounds per hour.

The wood-fired boiler is equipped with extensive air pollution control systems and pollution reduction practices including multiclones, a five-field electrostatic precipitator, urea injection selective non-catalytic reduction, flue gas recirculation and low-NOx combustion. At the time the facility was permitted, EPA credited it with being the best controlled wood-fired facility of its type.

The facility is allowed to combust only clean biomass materials in the boiler. The facility is not allowed to combust chemically-treated wood products; including painted or oil stained material, or preservative treated wood, fossil fuel, or sanderdust.

Emission Factors in General

An emission factor is a value that relates the quantity of an air pollutant released to the atmosphere relative to the activity associated with the release of that pollutant. The mass emission rate of a particular air pollutant then can be determined based on the activity level of the process being evaluated as follows:

$$E = A \times EF$$

where:

- E = emissions;
- A = activity rate;
- EF = emission factor

In the case of a wood-fired boiler an emission factor can take the form of the mass of a pollutant emitted per unit of biomass combusted or per unit of heat input to the boiler. The equation that would be used for estimating toxic air contaminant (TAC) emission rates is as follows:

$$E_{lb/hr} = TAC \ EF_{lb/MMBtu} \times \text{Boiler Heat Input Rate}_{MMBtu/hr}$$

Emission factors can be derived from engineering calculations but are often derived from direct analytical source testing of the exhaust stream. For the SSE Cleaner Air Oregon air toxics emissions inventory the following publicly available sources were evaluated to select emission factors:

- SSE source testing in April 2011 and September 2013
 - Analytes for these tests included ammonia, acetaldehyde, acrolein, chlorine, formaldehyde, hydrogen chloride, styrene and toluene. Generally speaking, source specific testing data should be used to derive emission factors over test data from other sources.
- The U.S. Environmental Protection Agency's AP-42, *Compilation of Air Pollutant Emissions Factors*. AP-42
 - EPA's AP-42 is a compilation of air pollutant emission factors from several hundred different types of source categories. The emissions factors have been developed and compiled from source test data, material balance studies, and engineering estimates. While there have been periodic updates to certain section the current and fifth edition was published in January 1995.
 - Chapter 1.6 covers "Wood Residue Combustion in Boilers" and was updated in 2003.
- California Air Toxics Emission Factor (CATEF) Database
 - The California Air Toxics Emission Factor (CATEF) database contains approximately 2000 air toxics emission factors calculated from source test data collected for the Air Toxics Hot Spots Program. Most of the source test data is based on emission measurements from the early 1990's. The emission factor data has not been updated since 1996.
- National Council for Air and Stream Improvement (NCASI) Technical Bulletin No. 858 (TB 858)

- NCASI's TB 858 document entitled, "Compilation of "Air Toxic" and Total Hydrocarbon Emissions Data for Sources at Kraft, Sulfite and Non-Chemical Pulp Mills – an Update was published in February 2003. Tables 20A and 20B in the technical bulletin contain a summary of "Air Toxic" and trace metals emissions from wood-fired boilers.

Toxic Air Contaminants Potentially Emitted from the SSE Cogen Plant

Based on a review of the emission factor sources referenced above there are 111 different substances listed on the OAR 340-245-8020 Table 2 Toxic Air Contaminant Reporting List that may be emitted from the SSE Cogen Plant. For the purpose of this emission factor evaluation these substances can be grouped into several classifications as follows:

- Dioxins and Furans (D/Fs)
- Polycyclic aromatic hydrocarbons (PAHs)
- Polychlorinated biphenyls (PCBs)
- Metals
- Other organics
- Other inorganics

Emission Factor Selection

Dioxins and Furans

Polychlorinated dibenzo-*p*-dioxins and polychlorinated dibenzofurans (PCDD/F, dioxin) or dioxins and furans (D/Fs) can be formed through the de novo process as the result of incomplete combustion of biomass provided precursor materials containing chlorine are present. Copper is a catalyst that, under the right circumstances, can promote D/F formation. Historically, wood-fired boilers have been allowed to combust chemically treated wood that could contain copper and chlorinated organics, thus providing dioxin precursor materials and a dioxin formation catalyst. Additionally many wood-fired boilers are allowed to combust old corrugated containers (OCC) rejects that include a variety of plastics. The plastics could contribute chlorinated precursor materials to form dioxins as well as other organics such as benzene. By contrast, the SSE cogen plant only burns clean biomass and not chemically treated wood or products like OCC rejects. Furthermore, D/Fs have a tendency to adhere to particulate matter in the exhaust and could be removed by the extensive particulate controls provided on the SSE boiler resulting in lower emission compared to wood-fired boilers without such controls. As a result, the application of emission factors derived at facilities that do not exclusively combust clean fuel are not representative of the SSE cogen boiler which is restricted to clean fuel and that employs extremely effective PM controls.

There are 75 different congeners of dioxins and 135 different isomers of furans but not all congeners or isomers are highly toxic. The Cleaner Air Oregon program regulates the 7 most

toxic dioxin congeners and the 10 most toxic furan isomers. Ideally, emission factors for these compounds would be based on testing for the 17 D/F compounds regulated by the CAO program in order to more accurately perform the required source risk assessment. For example, Table 1.6-3 in EPA's AP-42 document does not have emission factors for each of the individual D/Fs compounds listed in the rule. There is an emission factor for *total* Hexachlorodibenzo-p-dioxins but there are no emission factors for each of the hexa-chlorinated dioxins compounds of greatest concern identified in the CAO. As such, the use of AP-42 emission factors for D/Fs would significantly overestimate emissions of the regulated dioxin compounds.

On the other hand, California's CATEF database includes individual emission factors for each of the 17 D/F compounds regulated by the rule from a boiler with an ESP/Multiclone PM controls system similar to the SSE boiler. The CATEF resource is selected for the purpose of completing SSE's CAO air toxic inventory for dioxins and furans.

PAHs

Polycyclic aromatic hydrocarbons (PAHs) are naturally occurring chemicals that can also be formed in small quantities when wood is burned. The CAO toxic air contaminants reporting list (OAR 340-245-8020 Table 2) lists over 30 PAHs or PAH derivatives. DEQ's *Draft Recommended Procedures for Toxic Air Contaminant Health Risk Assessments*¹ identifies 26 PAHs and of these 19 have Risk Based Concentration (RBCs) currently established in the rule (OAR 340-245-8020 Table 4).

A review of the NCASI, AP-42, and CATEF resources indicate that emission factors for the following 20 PAHs are available with a majority of these available from the AP-42 or CATEF resources (NCASI TB 858 only summarized naphthalene emissions data):

PAH TAC	CAS #
Acenaphthene	83-32-9
Acenaphthylene	208-96-8
Anthracene	120-12-7
Benzo(a) anthracene	56-55-3
Benzo(a) pyrene	50-32-8
Benzo(b) fluoranthene	205-99-2
Benzo(e) pyrene	192-97-2
Benzo(g,h,i)perylene	191-24-2
Benzo(j)fluoranthene	205-82-3
Benzo(k)fluoranthene	207-08-9

¹ Oregon Department of Environmental Quality, *Draft Recommended Procedures for Toxic Air Contaminant Health Risk Assessments* (October 2019), Appendix E, Table E-3.

Chrysene	218-01-9
Dibenzo(a,h) anthracene	53-70-3
Fluoranthene	206-44-0
Fluorene	86-73-7
Indeno (1,2,3-c,d) pyrene	193-39-5
2-Methyl Naphthalene	91-57-6
Naphthalene	91-20-3
Perylene	198-55-0
Phenanthrene	85-01-8
Pyrene	129-00-0

The availability of PAH emission factors in NCASI TB 858 is limited. A number of PAH emission factors in AP-42 have a rating of “D” indicating below average quality. Therefore, for the purpose of developing the SSE air toxic emission inventory, emission factors from the CATEF database will be used to estimate emissions of PAHs with the following adjustments:

- The NCASI emission factor for Naphthalene will be used as the data was derived from a large number of sources (14) and the emission factor is higher than AP-42 and CATEF therefore it is likely conservative.
- The AP-42 emission factor for Benzo(j)fluoranthene will be used. The NCASI and CATEF resources do not have emission factors for this TAC and while the EPA rating for this emission factor is “D” it is being included to be conservative.

PCBs

Polychlorinated Biphenyls (PCBs) are also chlorinated organic compounds that can be emitted during wood combustion. As previously discussed the SSE Cogen Plant only burns clean biomass and not chemically treated wood or products like OCC rejects that could contribute to PCB emissions. DEQ’s *Draft Recommended Procedures for Toxic Air Contaminant Health Risk Assessments*² indicates there are 209 PCB congeners. The EPA and NCASI resources both have the same emission factors for PCBs. The CATEF resource has similar emission factors for PCBs but the dataset is more complete as both nona- and octa- congener groups are also included. Because the CATEF dataset is more complete and it was used for estimating other organo-chlorine TACs, these emission factors will be used in the SSE air toxics emissions inventory. None of the resources provide emission factors for individual PCB congeners and the sum total of all congener groups are provided in the inventory for an estimate of total PCBs.

² Oregon Department of Environmental Quality, *Draft Recommended Procedures for Toxic Air Contaminant Health Risk Assessments* (October 2019), Appendix E, Table E-3.

METALS

The CATEF database does not have wood-fired boiler emission factors for metals. Both the NCASI and AP-42 resources have metals emission factors for wood combustion and the factors are derived from the same basic set of source tests. However, the NCASI data breaks out the emission factors based on the type of control device used including data from boilers controlled by “Fabric Filter/ESP”. This data is more representative of the SSE Cogen Plant that is well controlled by an ESP so the NCASI data are used for the SSE CAO air toxics inventory.

OTHER INORGANICS

Other inorganic TACs that may be emitted from the SSE Cogen Plant include ammonia, chlorine and hydrochloric acid. SSE has conducted testing for these substances and the emission factors derived from those source tests are used for the SSE CAO air toxics inventory.

OTHER ORGANICS

While the CATEF database includes some emission factor for “other organics” the NCASI and AP-42 resources contain the largest number of emission factors for other organic TACs. Both datasets were derived from EPA compiled source test data however the NCASI data included adjustments for non-detects and excluded data that was not representative of the forest products industry. As such, for the “other organic” TACs the NCASI data was used to complete the SSE CAO air toxics emissions inventory with the exception of acetaldehyde, acrolein, formaldehyde, styrene and toluene for which SSE source test data was used.

Other Information

Mean Values

The CATEF and NCASI emission factor datasets included mean, median, maximum and minimum values. Mean values were selected for this inventory.

Heat Content

The CATEF database emission factors were provided on a pound of pollutant emitted per ton of wood/bark waste combusted basis (lb/ton). This data was converted to a pound of pollutant emitted per million btu heat input basis (lb/MMBtu) based on hog fuel heat content of 5,195 Btu per pound³.

Use of Seneca Source Test Data

³ Average value from SSE source tests in 2014, 2015 and 2016.

For ammonia the average values from the April 2011 and September 2013 source tests (5.932 ppmv and 16.61 ppmv average of three test runs), respectively were used to determine the ammonia emission factor.

Acetaldehyde, acrolein, chlorine, formaldehyde, hydrogen chloride, styrene and toluene were included in the September 2013 testing and the average value determined by the three test runs was used for this emissions inventory. It is noted that for a most of the test runs a number of analytes had non-detect values. Appendix G of DEQs October 2019 DRAFT Recommended Procedures for Toxic Air Contaminant Health Risk Assessments allows for certain adjustments to be made to account for non-detects but due to the limited amount of test runs no adjustment to the reported emission rates were made.



Title V Operation Permit Program
CATEGORICALLY INSIGNIFICANT ACTIVITIES

FORM ED601
Answer Sheet

Facility name: Seneca Sustainable Energy Permit Number: 206470

Indicate which of the following categorically insignificant activities are present at the facility by placing an "X" in the "Yes" or "No" column.

Yes	No	Type of activity	Categorically Insignificant Activities
<input type="checkbox"/>	<input checked="" type="checkbox"/>		Constituents of a chemical mixture present at less than 1 percent by weight of any chemical or compound regulated under divisions 200 through 268 excluding divisions 248 and 262 of this chapter, or less than 0.1 percent by weight of any carcinogen listed in the U.S. Department of Health and Human Service's Annual Report on Carcinogens when usage of the chemical mixture is less than 100,000 pounds/year
<input checked="" type="checkbox"/>	<input type="checkbox"/>		Evaporative and tail pipe emissions from on-site motor vehicle operation
<input checked="" type="checkbox"/>	<input type="checkbox"/>		Distillate oil, kerosene, gasoline, natural gas or propane burning equipment, provided the aggregate expected actual emissions of the equipment identified as categorically insignificant do not exceed the de minimis level for any regulated pollutant, based on the expected maximum annual operation of the equipment. If a source's expected emissions from all such equipment exceed the de minimis levels, then the source may identify a subgroup of such equipment as categorically insignificant with the remainder not categorically insignificant. The following equipment may never be included as categorically insignificant: A. Any individual distillate oil, kerosene or gasoline burning equipment with a rating greater than 0.4 million Btu/hour; B. Any individual natural gas or propane burning equipment with a rating greater than 2.0 million Btu/hour
<input type="checkbox"/>	<input checked="" type="checkbox"/>		Distillate oil, kerosene, gasoline, natural gas or propane burning equipment brought on site for six months or less for maintenance, construction or similar purposes, such as but not limited to generators, pumps, hot water pressure washers and space heaters, provided that any such equipment that performs the same function as the permanent equipment, must be operated within the source's existing PSEL
<input checked="" type="checkbox"/>	<input type="checkbox"/>		Office activities
<input type="checkbox"/>	<input checked="" type="checkbox"/>		Food service activities
<input checked="" type="checkbox"/>	<input type="checkbox"/>		Janitorial activities
<input checked="" type="checkbox"/>	<input type="checkbox"/>		Personal care activities
<input checked="" type="checkbox"/>	<input type="checkbox"/>		Grounds keeping activities, including, but not limited to building painting and road and parking lot maintenance
<input type="checkbox"/>	<input checked="" type="checkbox"/>		On-site laundry activities
<input type="checkbox"/>	<input checked="" type="checkbox"/>		On-site recreation facilities
<input checked="" type="checkbox"/>	<input type="checkbox"/>		Instrument calibration
<input checked="" type="checkbox"/>	<input type="checkbox"/>		Maintenance and repair shop
<input type="checkbox"/>	<input checked="" type="checkbox"/>		Automotive repair shops or storage garages;
<input checked="" type="checkbox"/>	<input type="checkbox"/>		Air cooling or ventilating equipment not designed to remove air contaminants generated by or released from associated equipment
<input checked="" type="checkbox"/>	<input type="checkbox"/>		Refrigeration systems with less than 50 pounds of charge of ozone depleting substances regulated under Title VI, including pressure tanks used in refrigeration systems but excluding any combustion equipment associated with such systems
<input checked="" type="checkbox"/>	<input type="checkbox"/>		Bench scale laboratory equipment and laboratory equipment used exclusively for chemical and physical analysis, including associated vacuum producing devices but excluding research and development facilities



Title V Operation Permit Program
CATEGORICALLY INSIGNIFICANT ACTIVITIES

FORM ED601
Answer Sheet

Yes	No	Type of activity
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Temporary construction activities
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Warehouse activities
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Accidental fires
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Air vents from air compressors
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Air purification systems
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Continuous emissions monitoring vent lines
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Demineralized water tanks
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Pre-treatment of municipal water, including use of deionized water purification systems
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Electrical charging stations
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Fire brigade training
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Instrument air dryers and distribution
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Process raw water filtration systems
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Pharmaceutical packaging
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Fire suppression
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Blueprint making
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Routine maintenance, repair, and replacement such as anticipated activities most often associated with and performed during regularly scheduled equipment outages to maintain a plant and its equipment in good operating condition, including but not limited to steam cleaning, abrasive use, and woodworking
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Electric motors
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Storage tanks, reservoirs, transfer and lubricating equipment used for ASTM grade distillate or residual fuels, lubricants, and hydraulic fluids
<input checked="" type="checkbox"/>	<input type="checkbox"/>	On-site storage tanks not subject to any New Source Performance Standard (NSPS), including underground storage tanks (UST), storing gasoline or diesel used exclusively for fueling of the facility's fleet of vehicles
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Natural gas, propane, and liquefied petroleum gas (LPG) storage tanks and transfer equipment
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Pressurized tanks containing gaseous compounds
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Vacuum sheet stacker vents
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Emissions from wastewater discharges to publicly owned treatment works (POTW) provided the source is authorized to discharge to the POTW, not including on-site wastewater treatment and/or holding facilities
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Log ponds
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Storm water settling basins
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Fire suppression and training
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Paved roads and paved parking lots within an urban growth boundary
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Hazardous air pollutant emissions in fugitive dust from paved and unpaved roads except for those sources that have processes or activities that contribute to the deposition and entrainment of hazardous air pollutants from surface soils
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Health, safety, and emergency response activities



Title V Operation Permit Program
CATEGORICALLY INSIGNIFICANT ACTIVITIES

FORM ED601
Answer Sheet

Yes	No	Type of activity
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Emergency generators and pumps used only during loss of primary equipment or utility service due to circumstances beyond the reasonable control of the owner or operator, or to address a power emergency, provided that the aggregate horsepower rating of all stationary emergency generator and pump engines is not more than 3,000 horsepower. If the aggregate horsepower rating of all stationary emergency generator and pump engines is more than 3,000 horsepower, then no emergency generators and pumps at the source may be considered categorically insignificant
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Non-contact steam vents and leaks and safety and relief valves for boiler steam distribution systems
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Non-contact steam condensate flash tanks
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Non-contact steam vents on condensate receivers, deaerators and similar equipment
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Boiler blow down tanks
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Industrial cooling towers that do not use chromium-based water treatment chemicals
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Ash piles maintained in a wetted condition and associated handling systems and activities
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Uncontrolled oil/water separators in effluent treatment systems, excluding systems with a throughput of more than 400,000 gallons per year of effluent located at the following sources: A. Petroleum refineries; B. Sources that perform petroleum refining and re-refining of lubricating oils and greases including asphalt production by distillation and the reprocessing of oils and/or solvents for fuels; or C. Bulk gasoline plants, bulk gasoline terminals, and pipeline facilities
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Combustion source flame safety purging on startup
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Broke beaters, pulp and repulping tanks, stock chests and pulp handling equipment, excluding thickening equipment and repulpers
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Stock cleaning and pressurized pulp washing, excluding open stock washing systems
<input type="checkbox"/>	<input checked="" type="checkbox"/>	White water storage tanks