

# Review Draft - Air Emissions Inventory Methods Report

Presented to:

Oregon Department of Environmental Quality

Air Quality Program Cleaner Air Oregon

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# 1 EXECUTIVE SUMMARY

Chemical Waste Management of the Northwest, Inc. (CWMNW) is an active industrial and hazardous waste facility. CWMNW was called into the Cleaner Air Oregon (CAO) program on March 4<sup>th</sup> 2019. In compliance with the March 4<sup>th</sup> letter, CWMNW submitted an air compound emission inventory on May 31<sup>st</sup>, 2019. In a subsequent letter dated August 8<sup>th</sup>, 2019, the CAO program set a submittal date of December 6<sup>th</sup>, 2019 for several requested responses to comments and to provide an updated emission inventory of the facility with all compound pollutants regulated by CAO. On August 22<sup>nd</sup>, 2019 CWMNW submitted an extension request and proposed schedule with dates for each major task to achieve submittal of a toxics air emissions inventory and risk review. On November 27<sup>th</sup>, 2019 the agency issued an approval of CWMNW's extension request and proposed schedule.

This "Review Draft Air Emissions Inventory Methods Report" along with the accompanying electronic "Draft Emissions Calculation Spreadsheet" is being submitted in compliance with the agency approved December 6<sup>th</sup>, 2019 project task schedule. This submission is intended to provide DEQ a review document to gain agreement on emission calculation methods for each emissions unit. SCS Engineers (SCS) developed the CAO emission inventory in consultation with CWMNW.

This "Review Draft Air Emissions Inventory Methods Report" details the methodologies used to calculate regulated compound pollutants potentially emitted from the facility. As indicated in our discussions, CWMNW has developed this inventory to include all existing and proposed Emission Unit (EU) emissions currently envisioned in our current RCRA Part B permit renewal. These are broken down as follows:

## 1.1 EXISTING EU'S

Unit	Description
EU-1	Inspection and Sampling
EU-2	Stabilization Unit
EU-3	Solidification Unit
EU-4	Reagent Storage
EU-5	Macro Encapsulation Unit
EU-6	B-5 Storage
EU-7	ORU-2 Processing
EU-9	ORU-2 B-4 Ash
EU-11	TOU-1
EU-20	Direct Landfill
EU-21	Ponds
EU-22	Tank Transfer and Fuel Tanks
EU-23	Diesel Fuel Combustion

## 1.2 TO BE CONSTRUCTED EU'S

Unit	Description
EU-8	ORU-3 Processing
EU-10	ORU-3 B-4 Ash
EU-12	TOU-3
EU-13	B-6 Storage
EU-14	TDU-1 Processing
EU-15	TDU-1 B-7 Ash
EU-16	TOU-4
EU-17	PFAS Landfill
EU-18	PFAS Treatment - Solidification/Water Treatment/PM Baghouse
EU-19	PFAS Pond
EU-20	Direct Landfill L-13 and L-14
EU-21	Ponds

## 1.3 BACKGROUND

CWMNW maintains Hazardous Waste Part B permit number ORD 089452353 which authorizes acceptance of all forms of hazardous waste Treatment, Storage and Disposal Facility (TSDF) located in Arlington, Oregon. CWMNW is permitted to accept the universe of RCRA and State hazardous wastes and all non-putrescible non-hazardous wastes for storage, treatment and disposal. Due to the complex nature of these wastes being generated across the nation, CWMNW accepts wastes which contain any concentration of the universe of hazardous constituents, in any volume, on any day. The CWMNW facility supports not only safe treatment and disposal of exempt, small, large and very large quantity generator wastes, but critical cleanups of improperly managed wastes from upland and waterways as a result of releases and/or threatened releases of hazardous substances, pollutants, or contaminants which are expected to negatively affect human health or the environment. Acceptance of waste by this facility from cleanup projects like the Umatilla Chemical Depot, and the planned Portland Harbor cleanup are vital to the CERCLA Superfund cleanup process.

The facility is located seven miles south of Interstate 84 at interchange 137 on Oregon Route OR-19 and then five miles west on Cedar Springs Lane. The approximate latitude and longitude of the site are 45.615249 degrees north, and 120.251550 degrees west, respectively. The nearest community is Arlington, Oregon, located approximately 8 miles north of the facility.

A Vicinity Map is included as Figure 1. A Site Plan showing the locations of various relevant activities and sources of emissions is presented in Figure 2.

The wastes accepted and processed at the facility are characterized by the generator in compliance with 40 CFR part 261, RCRA hazardous waste regulations and the site-specific RCRA Part B permit requirements. Generator's characterization of wastes includes profiling all potential waste streams based upon its individual chemical and physical characteristics as required by 40CFR part 261, comparing the generator characterized waste to the contaminants for that waste to the RCRA land

disposal restrictions contained in 40 CFR part 268.40. 40 CFR part 268.40 establishes the list of contaminants required for analysis for each waste type.

Emissions calculated in the Draft Emissions Spreadsheet (Provided Electronically as Appendix A) were developed using Maximum Expected Throughput (MET) based on facility waste acceptance expectations at the current time, multiplied by the average of the compound concentration, however actual throughput for any of the above EU's may be higher or lower than the MET used in these calculations. The facility wide throughput will be maintained such that calculated facility wide emissions will be below the CAO risk action levels.

Emissions are based on concentrations supplied for each waste treated or disposed by a specific process over a 2-year period (2017 and 2018) for each identified EU, multiplied by the maximum expected throughput for each unit. CWMNW has also estimated the emissions for the Existing ORU-2 TOU, ORU-3- TOU and TDU-1 TOU to be equivalent to the emissions calculations contained in the current ACDP Permit application dated February 1<sup>st</sup>, 2016. The final emissions inventory will be provided on or before October 9<sup>th</sup>, 2020 upon completion of the ORU-2 TOU source test. Calculations for the basis of this interim emissions inventory are provided in excel format accompanying this document (Provided Electronically as Appendix A).

## 1.4 CAO AIR COMPOUND EVALUATION

The purpose of this draft report is to detail the emissions calculation methodology for the CAO listed compounds that are identified and managed at this facility. The final emissions inventory to be submitted to ODEQ on the Agency's Form requires all 633 listed contaminants to be accounted for and calculated at each EU, if they are expected to be present. Based on incoming waste profiles 155 CAO listed generator supplied compounds were identified and calculated as emissions, herein referred to as "compounds". Compounds were further separated by volatility into "non-volatile compounds", with a boiling point over 302 °F (or are compounds which have been altered physically or chemically to meet the non-volatile characteristic), and "volatile compounds", with a boiling point below 302 °F.

In order to determine compound emissions for the various processes at the facility, the available waste profile laboratory data, approximately 5,000 files, were sorted electronically into groups corresponding to the waste processing units described above. Two years of profile laboratory reports were grouped from 2017 and 2018. The laboratory reports associated with each profile were reviewed individually to identify CAO compounds, then the average compound concentrations were calculated using the accepted waste mass. The average concentrations of each compound were multiplied by the MET throughput to calculate the annual and maximum 24-hour mass emissions rates. For maximum daily emissions, maximum daily throughput information was used in the calculation. In addition, for the stabilization and solidification processes, safety data sheets (SDS) for reagent products were reviewed to identify CAO compounds within those products. The concentrations of compounds and the weight throughput was used to determine the compound emission rates for each EU used in these processes.

Due to the complex nature of hazardous waste treatment and disposal processes, best engineering judgement, appropriate EPA methodologies, as well as standard engineering practices were used in the CWMNW emissions inventory to estimate annual and daily emissions from individual EUs. These estimates are based on maximum expected tonnage throughputs, the average concentrations of compounds in waste from the waste profiles, and conservative assumptions regarding volatilization rates.

## 2 EMISSION INVENTORY CALCULATIONS

The methodologies used to estimate annual and daily emissions from these processes are presented in the following subsections. All these methods begin with the profile process, which includes the following profile steps:

1. A waste supplier generates a profile sheet of the waste, detailing its components and provides available laboratory data or related information in compliance with 40 CFR 261 to CWMNW.
2. The profile, laboratory data and related information is reviewed and approved by CWMNW, specifying the type of on-site storage, treatment, and/or disposal.
3. The waste is transferred to a conveyance and transported to the CWMNW facility.
4. Once at CWMNW, the waste is verified at the inspection/sampling station and is sent to its next destination within the facility.

Emissions were calculated using MET based on facility waste acceptance expectations at the current time, multiplied by the average of the compound concentration. Non-disposal EUs without profiles were calculated using laboratory data (e.g. oil output from the ORU systems), EPA AP-42 factors (for fuel combustion, wind-blown particulate emissions), or EPA TANKS 4.0 software (tank emissions).

Profile and laboratory data represent the original concentration of wastes in-situ, CWMNW has employed 1992 technical guidance from the EPA which specifies that a loss of volatile organic compounds (VOCs) during excavation, handling, and transport should have an expected range of 40% to 80%<sup>1</sup>. To be conservative, the CWMNW emissions inventory includes a reduction using the lower threshold of the EPA guidance at 40% (minimum of the EPA range) for volatiles prior to being received by CWMNW. Waste received at CWMNW predominately are containerized or covered therefore no VOC losses have been attributed during storage.

Table 1 below shows each EU at the facility, and its corresponding MET throughput. Individual CAO compound emission rates are provided in the accompanying Excel spreadsheet (Provided Electronically as Appendix A).

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<sup>1</sup> Estimate of Air Impacts for the Excavation of Contaminated Soil, EPA Air/Superfund National Technical Guidance Study Series, 1992



Table 1 - Emission Units and MET

Unit	Description	Throughput (ton/yr)	Throughput (gal/yr)
EU-1	Inspection and Sampling	566,534.00	-
EU-2	Stabilization Unit	452,339.21	-
EU-3	Solidification Unit	159,198.00	-
EU-4	Reagent Storage	94,405.95	-
EU-5	Macro Encapsulation Unit	53,409.00	-
EU-6	B-5 Storage	50,000.00	-
EU-7	ORU-2 Processing	23,000.00	-
EU-8	ORU-3 Processing	23,000.00	-
EU-9	ORU-2 B-4 Ash	13,500.00	-
EU-10	ORU-3 B-4 Ash	13,500.00	-
EU-11	TOU-1	23,000.00	-
EU-12	TOU-3	23,000.00	-
EU-13	B-6 Storage	150,000.00	-
EU-14	TDU-1 Processing	75,000.00	-
EU-15	TDU-1 B-7 Ash	60,000.00	-
EU-16	TOU-4	75,000.00	-
EU-17	PFAS Landfill	1,800,050.00	-
EU-18	PFAS Treatment - Solidification/Water Treatment/PM Baghouse/	500,050.00	-
EU-19	PFAS Pond	-	112,511,250.00
EU-20	Direct Landfill L-13 and L-14	216,938.00	-
EU-21	Ponds	-	5,671,476.00
EU-22	Tank Transfer and Fuel Tanks	-	260,903.75
EU-23	Diesel Fuel Combustion	-	22,350.00

## 2.1 INSPECTION/SAMPLING (EU-1)

Inspection and Sampling is the first EU when a shipment of waste is delivered to CWMNW. The container holding the waste is opened in order to confirm the identity of the waste and remove a sample, if required, depending upon facility permit conditions. This process is conducted at the inspection station as trucks enter the facility or at other locations within the facility. Waste that require sampling and inspection are waste entering the following EUs: stabilization, solidification, macro encapsulation, storage buildings and outside units, and direct to landfill.

The CWMNW RCRA permit requires that 10% of the waste in a discrete shipment is inspected and sampled. CWMNW assumes a volatilization volume of 5 milliliters per drum during an average three-minute sampling time, which is approximately equal to 0.00237% by weight.

## 2.2 STABILIZATION (EU-2)

There are potentially three types of emissions occurring during the stabilization process:

- Volatile compound emissions from stabilization process
- PMCAP (Non-volatile compounds attached to particulate matter) emissions from wastes in the stabilization process
- PMCAP emissions from transporting and mixing of stabilization reagents\*\*

\*\*Emissions from reagent storage are calculated in EU-4.

### 2.2.1 VOC Emissions

During stabilization, a batch of waste is placed in one of six below ground on-site tanks, segregated by permit conditions using generator supplied profile information. Reagents are added to stabilize the waste to meet RCRA Land Disposal Restrictions (LDR) standards for final disposal in the landfill EU20. Emissions from the disposal of these wastes (handling and 50% VOC losses) are included in EU-2.

To calculate compound emissions from VOC's, pre-acceptance reduction methods outlined in section 2 were used. VOC emissions from the balance of the VOC's during the stabilization process were accounted for using a 50% volatilization rate during the process. The balance of the VOC emissions are accounted for in EU-20 (Landfill).

### 2.2.2 PMCAP Emissions

During the stabilization process, there are four primary sources of PM<sub>10</sub> (particulate matter under 10 microns in diameter) emissions, which represents the respirable fraction of total PM. These are unloading waste into the tank, stabilization mixing, tank removal, and unloading the waste in the landfill. Each source's PM<sub>10</sub> emissions is calculated using AP-42 Section 13.2.4 using average moisture contents and the average wind speed for Arlington, Oregon of 5.9 miles per hour.

Using the same the same methods in section 2, the non-volatile compounds are multiplied by each PM<sub>10</sub> sources emissions to determine a pound per year emission of non-volatile compounds in the stabilization process.

## 2.3 SOLIDIFICATION (EU-3)

There are three types of emissions occurring during the solidification process:

- Volatile compound emissions from solidification process
- PMCAP emissions from the solidification process
- PMCAP emissions from transporting and mixing of solidification reagents (diatomaceous earth)  
\*\*

\*\*Emissions from reagent storage are calculated in EU-4.

### 2.3.1 VOC Emissions

During solidification, a batch of waste is placed in one of six below ground tanks on-site, segregated by permit conditions using generator supplied profile information. Reagents typically diatomaceous earth are added to solidify the waste to meet RCRA LDR standards for final disposal in the landfill EU-20. Emissions from the disposal of these wastes (handling and 50% VOC losses) are included in EU-3.

To calculate compound emissions from VOC's, pre-acceptance reduction methods outlined in section 2 were used. VOC emissions from the balance of the VOC's during the solidification process were accounted for using a 40% volatilization rate during the process. The balance of the VOC emissions are accounted for in EU-20 (Landfill).

### 2.3.2 PMCAP Emissions

During the solidification process, there are four primary sources of PM<sub>10</sub> (particulate matter under 10 microns in diameter) emissions, which represents the respirable fraction of total PM. These are unloading waste into the tank, solidification mixing, tank removal, and unloading the waste in the landfill. Each source's PM<sub>10</sub> emissions is calculated using AP-42 Section 13.2.4 using average moisture contents and the average wind speed for Arlington, Oregon of 5.9 miles per hour.

Using the same the same methods in section 2, the non-volatile compounds are multiplied by each PM<sub>10</sub> sources emissions to determine a pound per year emission of non-volatile compounds in the stabilization process.

## 2.4 REAGENT STORAGE (EU-4)

Reagent storage accounts for emissions from handling and storage of the stabilization and solidification reagents prior to use in these units.

For the stabilization process, the following reagents are used, emissions from EU-4 are calculated using average reagent mix ratios for each category of waste being processed. The following reagents were used with their corresponding CAO compound percentage by weight:

- Portland Cement and Fly Ash, 2.5% Silica
- Cement Kiln Dust, 7% Silica
- Portland Cement Only, 0.5% Silica
- Barite, 2.5% Silica
- Hydrated Lime, 1% Silica

- Sulfuric Acid, 100% Sulfuric Acid

Solidification process typically uses the following reagent:

- Diatomaceous Earth, 0.5% Silica

PM<sub>10</sub> emission sources for each reagent include off-load to the reagent pile, and storage. These emissions were calculated using AP-42 Section 13.2.4 using average moisture contents and the average wind speed for Arlington, Oregon of 5.9 miles per hour.

At any given time, three of these reagents occupy the three reagent piles, and windblown dust PM<sub>10</sub> emissions were also calculated. Using the emission factor formula in AP-42 Section 13.2.5, an erosion potential (grams per square meter) was calculated using a conservative disturbance time of 1 day, the strongest wind speed in Arlington since 01/01/2019 (26.4 miles per hour) and a conservative threshold friction velocity of 0.54 meters per second. This erosion potential is multiplied by the calculated surface area of each pile in the three reagent piles to give a final PM<sub>10</sub> emission rate.

CAO compound emissions are calculated using the individual reagent CAO compound percentage applied to the PM<sub>10</sub> emission calculated using the AP-42 methods.

## 2.5 MACRO ENCAPSULATION UNIT (EU-5)

Waste acceptable for macro-encapsulation received at CWMNW are placed in high-density polyethylene bins and sealed tight prior to placement in the landfill on-site. To calculate compound emissions, pre-acceptance reduction methods outlined in section 2 were used. The percent of volatile compounds emitted during the sealing process is assumed to be 2.0% by weight.

## 2.6 B-5 STORAGE (EU-6)

ORU wastes are stored and handled in the Building B-5, and there are three types of compound emissions occurring in Building B-5 related to the ORU waste handling processes:

- Volatile compound emissions exiting from baghouses
- PMCAP emissions exiting from baghouses
- Oil spills and cleanup

### 2.6.1 B-5 Building: Volatile Compound Emissions

Bulk material conveyors and screens are used to handle the ORU waste in Building B-5. The vapors from these conveyors are routed to thermal oxidizer T0U-1 and T0U-3, but a portion of the volatile compounds exits through the baghouses. These emissions calculations are accounted for in the baghouse emissions.

To calculate compound emissions, pre-acceptance reduction methods outlined in section 2 were used. VOC emissions from the balance of the VOC's placed in the Building B-5 were calculated using MET, multiplied by the average of the compound concentration from all wastes stored in Building B-5. VOC emission are calculated based on a 1% volatilization rate emitted through the baghouse.

## 2.6.2 B-5 Building: PMCAP Emissions

The ORU waste emits PM<sub>10</sub> emissions as it is conveyed and screened in Building B-5. PM<sub>10</sub> emissions were calculated using AP-42 Section 13.2.4 with average moisture content and the average wind speed for Arlington, Oregon of 5.9 miles per hour (even though the operation is indoors; this is a conservative approach). In addition, the manufacturer-specified baghouse control efficiency of 99.99% was applied.<sup>2</sup>

Using the same the same methods in section 2, the non-volatile compounds are multiplied by the calculated PM<sub>10</sub> sources emissions to determine a pound per year emission of non-volatile compounds in the storage and material handling process.

## 2.6.3 B-5 Building: Oil Spills and Cleanup

To account for oil leaks, spills and the cleanup of these wastes inside the building, 1.9 liters of waste is conservatively estimated to leak or spill per day, which amounts to roughly 0.0035% of the total waste by weight.

To calculate compound emissions, pre-acceptance reduction methods outlined in section 2 were used. VOC emissions from the balance of the VOC's spilled were accounted using the average of the compound concentration from all wastes stored in Building B-5. VOC emission are calculated based on a 100% volatilization rate emitted through the baghouse.

## 2.7 ORU-2 PROCESSING (EU-7)

Calculations for emissions are based on the heat capacity of each unit. Total propane that can be combusted in the ORU Boiler, which provides steam to each ORU, and the ORU kilns. Emissions are based on a boiler rating of 1 million British thermal units (MMBTU) per hour and a kiln rating of 30 MMBTU per hour.

The compound emission factors used were from AP-42 Table 1.4-3 and 1.4-4. These factors are for natural gas, so a natural gas equivalence was determined based on the ratio of energy density of propane versus natural gas. This equates to an increase from propane standard cubic feet (scf) to natural gas equivalent scf of 2.52. Each compound emission factor was multiplied by the equivalent natural gas throughput to get combustion emissions.

## 2.8 ORU-3 PROCESSING (EU-8)

Calculations for emissions are based on the heat capacity of each unit. Total propane that can be combusted in the ORU Boiler, which provides steam to each ORU, and the ORU kilns. Emissions are based on a boiler rating of 1 MMBTU per hour and a kiln rating of 30 MMBTU per hour.

The compound emission factors used were from AP-42 Table 1.4-3 and 1.4-4. These factors are for natural gas, so a natural gas equivalence was determined based on the ratio of energy density of propane versus natural gas. This equates to an increase from propane scf to natural gas equivalent

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<sup>2</sup> Donaldson Torit Ultra Tek Cartridge SFX445, filtration efficiency of 99.99% on 5.0 µm dust particles

scf of 2.52. Each compound emission factor was multiplied by the equivalent natural gas throughput to get combustion emissions.

## 2.9 ORU-2 B-4 ASH (EU-9)

There are three types of compound emissions occurring in Building B-4:

- Volatile compound emissions exiting from baghouse
- PMCAP emissions exiting from baghouse
- ORU-2 product oil

### 2.9.1 B-4 Building: Volatile Compound Emissions

As ash exits the ORU-2 kiln, it is conveyed to Building B-4. From there, it is stored in piles or containers and transferred to either the landfill or stabilization tanks. The building is controlled by a baghouse, and this is the release point of all building emissions.

Concentrations of each pollutant in the ash were obtained from on-site LDR confirmation laboratory data. Emissions are calculated based on using the average of each compound concentration from the laboratory data and the MET ash throughput. VOC emissions were accounted for using a 50% volatilization rate during storage and handling. The balance of the VOC emissions are accounted for in EU-20 (Landfill).

### 2.9.2 B-4 Building: PMCAP Emissions

The ash emits PM<sub>10</sub> emissions when loaded on to piles in Building B-4, as well as during load-out into the landfill or stabilization tanks. The emission factor for PM<sub>10</sub> was calculated using AP-42 Section 13.2.4 using an average moisture content and an average wind speed of 5.9 miles per hour for Arlington, Oregon (even though the operation is indoors; this is a conservative approach). Emissions from the B-4 unit are controlled by a baghouse and calculated using the manufacturer-specified baghouse control efficiency of 99.99% <sup>2</sup>.

Non-volatile compounds were calculated using the PM<sub>10</sub> emissions above and the average compound concentrations in the ash from laboratory data based on the MET throughput for the ORU-2 process unit.

### 2.9.3 ORU-2 Product Oil

Emissions from the recovered oil generated by the ORU-2 process is an emission source when pumped from the storage tanks to tanker vehicles for shipment off-site. Volatile emissions from this source are calculated using AP-42 5.2 Equation 1 and Table 7.1-2 (Distillate fuel oil No.2). The loading loss (in lb/kgal) is multiplied by the total oil transfer in gallons per year to reach a total annual VOC emission rate. The AP-42 factor used is conservative based on the recovered oil volatility which is less than distillate fuel oil. Laboratory data for CAO compounds was used to calculate the emissions based on the comparative fraction of each compound.

## 2.10 ORU-3 ASH STORAGE/MATERIAL HANDLING (EU-10)

There are three types of compound emissions occurring in Building B-4:

- Volatile compound emissions exiting from baghouse
- PMCAP emissions exiting from baghouse
- ORU-3 product oil

### 2.10.1 B-4 Building: Volatile Compound Emissions

As ash exits the ORU-3 kiln, it is conveyed to Building B-4. From there, it is stored in piles or containers and transferred to either the landfill or stabilization tanks. The building is controlled by a baghouse, and this is the release point of all building emissions.

Concentrations of each pollutant in the ash were obtained from on-site LDR confirmation laboratory data. Emissions are calculated based on using the average of each compound concentration from the laboratory data and the MET ash throughput. VOC emissions were accounted for using a 50% volatilization rate during storage and handling. The balance of the VOC emissions are accounted for in EU-20 (Landfill).

### 2.10.2 B-4 Building: PMCAP Emissions

The ash emits PM<sub>10</sub> emissions when loaded on to piles in Building B-4, as well as during load-out into the landfill or stabilization tanks. The emission factor for PM<sub>10</sub> was calculated using AP-42 Section 13.2.4 using an average moisture content and an average wind speed of 5.9 miles per hour for Arlington, Oregon (even though the operation is indoors; this is a conservative approach). Emissions from the B-4 unit are controlled by a baghouse and calculated using the manufacturer-specified baghouse control efficiency of 99.99% <sup>2</sup>.

Non-volatile compounds were calculated using the PM<sub>10</sub> emissions above and the average compound concentrations in the ash from laboratory data based on the MET throughput for the ORU-2 process unit.

### 2.10.3 ORU-3 Product Oil

Emissions from the recovered oil generated by the ORU-3 process is an emission source when pumped from the storage tanks to tanker vehicles for shipment off-site. Volatile emissions from this source are calculated using AP-42 5.2 Equation 1 and Table 7.1-2 (Distillate fuel oil No.2). The loading loss (in lb/kgal) is multiplied by the total oil transfer in gallons per year to reach a total annual VOC emission rate. The AP-42 factor used is conservative based on the recovered oil volatility which is less than distillate fuel oil. Laboratory data for CAO compounds was used to calculate the emissions based on the comparative fraction of each compound.

## 2.11 TOU-1; ORU-2 THERMAL OXIDIZER (EU-11)

TOU-1 combusts vapors from the processing of ORU wastes and the combustion of propane used to fuel the thermal oxidizer. At this time, TOU-1 source test has not been completed, the stack test will be performed in 2020 as approved by the Agency in their August 2019 letter. However the current emissions included in this inventory includes the emissions from the thermal oxidizer as provided in the February 1, 2016 permit application.

## 2.12 TOU-3; ORU-3 THERMAL OXIDIZER (EU-12)

TOU-3 combusts vapors from the processing of ORU wastes in ORU-3 and the combustion of propane used to fuel the thermal oxidizer. At this time, TOU-3 source test has not been completed. A stack test will be scheduled after construction and commissioning. However, the current emissions included in this inventory includes the emissions from the thermal oxidizer as provided in the February 1<sup>st</sup>, 2016 permit application.

## 2.13 BUILDING B-6 (EU-13)

TDU-1 wastes are stored and handled in the Building B-6, and there are three types of compound emissions occurring in Building B-6 related to the TDU waste handling processes:

- Volatile compound emissions exiting from baghouses
- PMCAP emissions exiting from baghouses
- Oil spills and cleanup

### 2.13.1 B-6 Building: Volatile Compound Emissions

Bulk material conveyors and screens are used to handle the TDU-1 waste in Building B-6. The vapors from these conveyors are routed to the thermal oxidizer, but a portion of the volatile compounds exits through the baghouses. These emissions calculations are accounted for in the baghouse emissions.

To calculate compound emissions, pre-acceptance reduction methods outlined in section 2 were used. VOC emissions from the balance of the VOC's placed in the B-6 building unit were accounted using MET based on facility waste acceptance expectations at the current time, multiplied by the average of the compound concentration from all wastes stored in Building B-6. VOC emissions are calculated based on a 1% volatilization rate emitted through the baghouse.

### 2.13.2 B-6 Building: PMCAP Emissions

The TDU-1 waste emits PM<sub>10</sub> emissions as it is conveyed and screened in Building B-6. PM<sub>10</sub> emissions were calculated using AP-42 Section 13.2.4 with average moisture content and the average wind speed for Arlington, Oregon of 5.9 miles per hour (even though the operation is indoors; this is a conservative approach). In addition, the manufacturer-specified baghouse control efficiency of 99.99% was applied.<sup>3</sup>

Using the same the same methods in section 2, the non-volatile compounds are multiplied by the calculated PM<sub>10</sub> sources emissions to determine a pound per year emission of non-volatile compounds in the storage and material handling process.

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<sup>3</sup> Donaldson Torit Ultra Tek Cartridge SFX445, filtration efficiency of 99.99% on 5.0 µm dust particles



### 2.13.3 B-6 Building: Waste Spills and Cleanup

To account for oil leaks, spills and the cleanup of these wastes inside the building, 1.9 liters of waste is conservatively estimated to leak or spill per day, which amounts to roughly 0.0023% of the total waste by weight.

To calculate compound emissions, pre-acceptance reduction methods outlined in section 2 were used. VOC emissions from the balance of the VOC's spilled were accounted using the average of the compound concentration from all wastes stored in Building B-6. VOC emission are calculated based on a 100% volatilization rate emitted through the baghouse.

## 2.14 TDU-1 PROCESSING UNIT (EU-14)

Calculations for emissions are based on the heat capacity of each unit. Total propane that can be combusted in the TDU Boiler, which provides steam to TDU-1, and the TDU kiln. Emissions are based on a boiler rating of 1 MMBTU per hour and a kiln rating of 30 MMBTU per hour.

The compound emission factors used were from AP-42 Table 1.4-3 and 1.4-4. These factors are for natural gas, so a natural gas equivalence was determined based on the ratio of energy density of propane versus natural gas. This equates to an increase from propane scf to natural gas equivalent scf of 2.52. Each compound emission factor was multiplied by the equivalent natural gas throughput to get combustion emissions.

## 2.15 TDU-1 B-7 ASH (EU-15)

There are two types of compound emissions occurring in Building B-7:

- Volatile compound emissions exiting from baghouse
- PMCAP emissions exiting from baghouse

## 2.16 B-7 BUILDING: VOLATILE COMPOUND EMISSIONS

As ash exits the TDU-1 kiln, it is conveyed to Building B-7. From there, it is stored in piles or containers and transferred to either the landfill or stabilization tanks. The building is controlled by a baghouse, and this is the release point of all building emissions.

Concentrations of each pollutant in the ash were obtained from on-site LDR confirmation laboratory data. Emissions are calculated based on using the average of each compound concentration from the laboratory data and the MET ash throughput. VOC emissions were accounted for using a 50% volatilization rate during storage and handling. The balance of the VOC emissions are accounted for in EU-20 (Landfill).

## 2.17 B-7 BUILDING: PMCAP EMISSIONS

The ash emits PM<sub>10</sub> emissions when loaded on to piles in Building B-7, as well as during load-out into the landfill or stabilization tanks. The emission factor for PM<sub>10</sub> was calculated using AP-42 Section 13.2.4 using an average moisture content and an average wind speed of 5.9 miles per hour for Arlington, Oregon (even though the operation is indoors; this is a conservative approach). Emissions from the B-4 unit are controlled by a baghouse and calculated using the manufacturer-specified baghouse control efficiency of 99.99% <sup>2</sup>.

Non-volatile compounds were calculated using the PM<sub>10</sub> emissions above and the average compound concentrations in the ash from laboratory data based on the MET throughput for the ORU-2 process unit.

## **2.18 TOU-4 (EU-16)**

TOU-4 combusts vapors from the processing of TDU-1 wastes and the combustion of propane used to fuel the thermal oxidizer. At this time, TOU-4 source test has not been completed. A stack test will be scheduled after construction and commissioning. However, the current emissions included in this inventory includes the emissions from the thermal oxidizer as provided in the February 1, 2016 permit application.

## **2.19 PFAS WASTE TREATMENT AND DISPOSAL (EU-17, 18 AND 19)**

PFAS contaminated wastes are accepted at CWMNW for treatment and disposal. These wastes are processed via stabilization, filtration, ponding, and direct to landfill methodologies.

These wastes are received in covered containers and treated in an enclosed process with baghouse emission collections systems for PM emissions. Stabilization of the semi-solid and liquid phase wastes are stabilized with Portland cement. The reagent is stored in silos near the process and controlled by a baghouse.

Once treated, the residual solid wastes are transferred to the landfill for disposal in closed containers. Liquids are treated at the in an enclosed treatment system, permeate is placed in Evaporation Pond D, Filtrate is solidified and placed in the landfill.

CWMNW is conservatively assuming PFAS waste concentrations as being 25% by weight of PFOA and 25% by weight of PFOS. All PM<sub>10</sub> emissions calculated during PFAS treatment unit are multiplied by these fractions to get a conservative estimate of total PMCAP emissions for PFOS and PFOA compounds. PFAS were assumed to all be non-volatile as their boiling points are close to the 302 °F threshold, and when contained in liquid or solid media (such as wastes), they adhere to neighboring substances and are non-volatile.

## **2.20 PFAS LANDFILL (EU-17)**

Both treated wastes from other EUs and direct landfilled wastes accepted at the facility are disposed in the landfill. Volatile compounds that remain from on-site treatment processes and from direct landfilled wastes are calculated using conservative methods which estimate these emissions to be 100% after they are completely contained in the landfill. In addition, there are PMCAP emissions occurring as the waste is unloaded into the landfill. The following sources are accounted for as landfill emissions:

1. Stabilized Waste – 50% balance of Volatile Compound Emissions
2. Solidified Waste – 60% balance of Volatile Compound Emissions
3. Direct to Landfill – 100% of Volatile Compound Emissions
4. Leachate to Landfill – 100% of Volatile Compound Emissions
5. Ash to Landfill ORU-2, ORU-3, TDU-1– 50% balance of Volatile Compound Emissions
6. Direct to Landfill Unloading – PMCAP Emissions
7. Ash to Landfill Unloading – PMCAP Emissions

To calculate compound emissions from treated wastes, VOC emissions from the balance of the VOC's already accounted for in each treatment process are estimated using the Superfund Exposure Assessment Manual (SEAMS) model.

To calculate compound emissions from wastes accepted for direct landfilling, pre-acceptance reduction methods outlined in section 2 were used. VOC emissions from the balance of the VOC's were accounted for using the SEAMS model.

Since volatile emissions release slowly from the contained landfill, the SEAMS landfill model was used to accurately estimate gradual volatilization. The model methodology is detailed below.

## 2.20.1 Leachate to Landfill – Volatile Compound Emissions

The leachate that is not sent to the evaporation ponds may be applied to the landfill. No PM<sub>10</sub> emissions are accounted for, as the leachate is completely liquid. Concentrations of volatile compounds in the leachate were obtained from laboratory samples taken on-site. VOC emissions from the VOCs placed in on the landfill unit is accounted for using MET based on landfill generation expectations at the current time, multiplied by the average of the compound concentration from the lab data. VOC emissions are calculated based on a 100% volatilization rate.

## 2.20.2 DIRECT LANDFILL UNLOADING – PMCAP Emissions

Wastes sent direct to the landfill emit PM<sub>10</sub> emissions when unloaded from trucks in the landfill. The emission factor for PM<sub>10</sub> was calculated using AP-42 Section 13.2.4 with average moisture contents and an average wind speed of 5.9 miles per hour for Arlington, Oregon.

Using the same the same methods in section 2, the non-volatile compounds are multiplied by the calculated PM<sub>10</sub> sources emissions to determine a pound per year emission of non-volatile compounds in the storage and material handling process.

## 2.20.3 Ash to Landfill Unloading– PMCAP Emissions

The ash from ORU-2, ORU-3 and TDU-1 storage units emits PM<sub>10</sub> emissions when unloading from trucks in the landfill. The emission factor for PM<sub>10</sub> was calculated using AP-42 Section 13.2.4 with average moisture contents and an average wind speed of 5.9 miles per hour for Arlington, Oregon for each ash stream.

Using the same the same methods in section 2, the non-volatile compounds are multiplied by the calculated PM<sub>10</sub> sources emissions to determine a pound per year emission of non-volatile compounds in the storage and material handling process.

## 2.20.4 SEAMS Landfill Model

The SEAMS model was taken from Equation 5-1 in the Air/Superfund National Technical Guidance Study Series: Models for Estimating Air Emission Rates from Superfund Remedial Actions, released from the EPA in March 1993. This model is very compatible with the CWMNW facility, specifically used for hazardous waste landfills without internal gas generation. The SEAMS model is found in Equation 1.

Equation 1: SEAMs Model

$$ER = \frac{D_a C_g E_a^{4/3} X_{mol} SA 10^{-12}}{0.01 l}$$

ER = emission rate of compound i (g/s)

$D_a$  = diffusivity of compound in air (cm<sup>2</sup>/s)

$C_g$  = saturation vapor concentration of compound i (µg/m<sup>3</sup>)

SA = exposed area (m<sup>2</sup>)

$E_a$  = air-filled soil porosity (unitless)

$X_{mol}$  = mole fraction of compound in waste (mol/mol)

$l$  = depth of soil cover

Where:

$$X_{mol} = \frac{C MW_w}{C_w MW}$$

$C$  = concentration of compound i (µg/g)

$C_w$  = concentration of waste in soil (µg/g)

MW = molecular weight of compound i (g/mol)

$MW_w$  = molecular weight of waste (g/mol)

Variables  $D_a$  and  $C_g$  for each compound were taken from Appendix A of the 1993 EPA document. All compound compounds that are not present in Appendix A are conservatively assumed to completely volatilize over the year. Variables  $E_a$ ,  $l$ , and  $MW_w$  are taken from Table 5-1 of the 1993 EPA document, 0.35 for compacted soil, 1 meter, and 250 g/mol respectively. Each compound that has available variables is calculated using a conservatively large section of surface area at the landfill, 2.5 million square feet, which accounts the landfill disposal areas

## 2.21 PFAS TREATMENT (EU-18)

### 2.21.1 Stabilization

There are potentially three types of emissions occurring during the PFAS stabilization process:

- Volatile compound emissions from stabilization process

- PMCAP (Non-volatile compounds attached to particulate matter) emissions from wastes in the stabilization process
- PMCAP emissions from transporting and mixing of stabilization reagents\*\*

Reagent for the PFAS stabilization treatment unit are stored in silos with baghouse controls. Emissions from reagent storage are calculated based on a 99.9% baghouse particulate efficiency.

### 2.21.2 VOC Emissions

During stabilization, a batch of waste is placed in an enclosed mixing system. Reagents are added to stabilize the waste to meet stability standards for final disposal in the landfill EU-17 or EU-20. Emissions from the treatment of these wastes (handling and 50% VOC losses) are included in EU-18.

To calculate compound emissions, pre-acceptance reduction methods outlined in section 2 were used. VOC emissions from the balance of the VOC's during the stabilization process were accounted for using a 50% volatilization rate during the process. The balance of the VOC emissions are accounted for in EU-17 and EU-20.

### 2.21.3 PMCAP Emissions

During the stabilization process, there are four primary sources of PM<sub>10</sub> (particulate matter under 10 microns in diameter) emissions, which represents the respirable fraction of total PM. These are unloading waste into the mixing unit, stabilization mixing of reagents and waste in the enclosed mixing system, mixing system removal under controls, and unloading the waste in the landfill. Each source's PM<sub>10</sub> emissions is calculated using AP-42 Section 13.2.4 using average moisture contents and the average wind speed for Arlington, Oregon of 5.9 miles per hour.

Using the same the same methods in section 2, the non-volatile compounds are multiplied by each PM<sub>10</sub> sources emissions to determine a pound per year emission of non-volatile compounds in the stabilization process.

## 2.22 PFAS LIQUIDS POND (EU-19)

To calculate compound emissions, pre-acceptance reduction methods outlined in section 2 were used. VOC emissions from the balance of the VOC's placed in the pond units were accounted using MET based on facility waste acceptance expectations at the current time, multiplied by the average of the compound concentration from all wastes sent to the evaporation ponds. VOC emission are calculated based on a 100% volatilization rate.

## 2.23 LANDFILL EMISSIONS (EU-20)

Both treated wastes from other EUs and direct landfilled wastes accepted at the facility are disposed in the landfill. Volatile compounds that remain from on-site treatment processes and from direct landfilled wastes are calculated using conservative methods which estimate these emissions to be 100% after they are completely contained in the landfill. In addition, there are PMCAP emissions occurring as the waste is unloaded into the landfill. The following sources are accounted for as landfill emissions:

1. Stabilized Waste – 50% balance of Volatile Compound Emissions
2. Solidified Waste – 60% balance of Volatile Compound Emissions

3. Direct to Landfill – 100% of Volatile Compound Emissions
4. Leachate to Landfill – 100% of Volatile Compound Emissions
5. Ash to Landfill ORU-2, ORU-3, TDU-1– 50% balance of Volatile Compound Emissions
6. Direct to Landfill Unloading – PMCAP Emissions
7. Ash to Landfill Unloading – PMCAP Emissions

To calculate compound emissions from treated wastes, VOC emissions from the balance of the VOCs already accounted for in each treatment process are estimated using the SEAMS model.

To calculate compound emissions from wastes accepted for direct landfilling, pre-acceptance reduction methods outlined in section 2 were used. VOC emissions from the balance of the VOC's were accounted for using the SEAMS model.

Since volatile emissions release slowly from the contained landfill, the landfill model was used to accurately estimate gradual volatilization. The model methodology is detailed below.

### 2.23.1 Leachate to Landfill – Volatile Compound Emissions

The leachate that is not sent to the evaporation ponds may be applied to the landfill. No PM<sub>10</sub> emissions are accounted for, as the leachate is completely liquid. Concentrations of volatile compounds in the leachate were obtained from laboratory samples taken on-site. VOC emissions from the VOCs placed in on the landfill unit is accounted for using MET based on landfill generation expectations at the current time, multiplied by the average of the compound concentration from the lab data. VOC emission are calculated based on a 100% volatilization rate.

### 2.23.2 DIRECT LANDFILL UNLOADING – PMCAP Emissions

Wastes sent direct to the landfill emit PM<sub>10</sub> emissions when unloaded from trucks in the landfill. The emission factor for PM<sub>10</sub> was calculated using AP-42 Section 13.2.4 with average moisture contents and an average wind speed of 5.9 miles per hour for Arlington, Oregon.

Using the same the same methods in section 2, the non-volatile compounds are multiplied by the calculated PM<sub>10</sub> sources emissions to determine a pound per year emission of non-volatile compounds in the storage and material handling process.

### 2.23.3 Ash to Landfill Unloading– PMCAP Emissions

The ash from ORU-2, ORU-3 and TDU-1 storage units emit PM<sub>10</sub> emissions when unloading from trucks in the landfill. The emission factor for PM<sub>10</sub> was calculated using AP-42 Section 13.2.4 with average moisture contents and an average wind speed of 5.9 miles per hour for Arlington, Oregon for each ash stream.

Using the same the same methods in section 2, the non-volatile compounds are multiplied by the calculated PM<sub>10</sub> sources emissions to determine a pound per year emission of non-volatile compounds in the storage and material handling process.

### 2.23.4 SEAMS Landfill Model

The SEAMS model was taken from Equation 5-1 in the Air/Superfund National Technical Guidance Study Series: Models for Estimating Air Emission Rates from Superfund Remedial Actions, released

from the EPA in March 1993. This model is very compatible with the CWMNW facility, specifically used for hazardous waste landfills without internal gas generation. The SEAMs model is found in Equation 1.

Equation 1: SEAMs Model

$$ER = \frac{D_a C_g E_a^{4/3} X_{mol} SA 10^{-12}}{0.01 l}$$

ER = emission rate of compound i (g/s)

$D_a$  = diffusivity of compound in air (cm<sup>2</sup>/s)

$C_g$  = saturation vapor concentration of compound i (µg/m<sup>3</sup>)

SA = exposed area (m<sup>2</sup>)

$E_a$  = air-filled soil porosity (unitless)

$X_{mol}$  = mole fraction of compound in waste (mol/mol)

$l$  = depth of soil cover

Where:

$$X_{mol} = \frac{C MW_w}{C_w MW}$$

$C$  = concentration of compound i (µg/g)

$C_w$  = concentration of waste in soil (µg/g)

MW = molecular weight of compound i (g/mol)

$MW_w$  = molecular weight of waste (g/mol)

Variables  $D_a$  and  $C_g$  for each compound were taken from Appendix A of the 1993 EPA document. All compound compounds that are not present in Appendix A are conservatively assumed to completely volatilize over the year. Variables  $E_a$ ,  $l$ , and  $MW_w$  are taken from Table 5-1 of the 1993 EPA document, 0.35 for compacted soil, 1 meter, and 250 g/mol respectively. Each compound that has available variables is calculated using a conservatively large section of surface area at the landfill, 2.5 million square feet, which accounts the landfill disposal areas

## 2.24 EVAPORATION PONDS (EU-21)

To calculate compound emissions, pre-acceptance reduction methods outlined in section 2 were used. VOC emissions from the balance of the VOCs placed in the pond units were accounted using MET based on facility waste acceptance expectations at the current time, multiplied by the average of the compound concentration from all wastes sent to the evaporation ponds. VOC emission are calculated based on a 100% volatilization rate.



## 2.25 TANK EMISSIONS (EU-22)

There are three types of tank emission sources at the facility:

- 10,000 Gallon Diesel Tank
- 5,000 Gallon Gasoline Tank
- Light Organic Waste to Iso-Tanks

The first two tank emission sources are calculated using EPA TANKS 4.0.9d software. The meteorological data location most similar to CWMNW was Pendleton, Oregon, which is roughly 70 miles east of the facility. The model takes into account wind and temperature data from this location. Both tanks dimensions were estimated based on tank size, because they are both underground and not survey-able.

The Iso-Tank emissions are calculated from AP-42 Section 5.2, as these emissions are from transfer emissions rather than venting.

### 2.25.1 10,000 Gallon Diesel Tank

The diesel tank was run in the model with a MET of 74,400 gallons per year and selecting the fuel content as “Distillate Fuel Oil #2” in the model. This resulted in total VOC emissions of 1.12 lb/yr.

Volatile compound concentrations were calculated using a 2015 study from the National Institutes of Health, US National Library of Medicine entitled *VOC Composition of Current Motor Vehicle Fuels and Vapors, and Collinearity Analyses for Receptor Modeling*. Table 1 in the study gives compositions in mg/l of volatile compounds in diesel fuel. This study’s Table 1 also gives a total target VOC concentration for the fuel type. The ratio of each compounds fuel composition divided by total target VOC concentration is multiplied by the EPA TANKS VOC output of 1.12 lb/yr to get total volatile compound emissions per compound.

### 2.25.2 5,000 Gallon Gasoline Tank

The gasoline tank was run in the model with a MET of 19,978 gallons per year (solely for mobile sources) and selecting the fuel content as “Gasoline RVP 9” in the model. This resulted in total VOC emissions of 124.65 lb/yr. A Reid Vapor Pressure (RVP) of 9 is typical in Oregon.

Volatile compound concentrations were calculated using the same 2015 study from the National Institutes of Health, US National Library of Medicine entitled *VOC Composition of Current Motor Vehicle Fuels and Vapors, and Collinearity Analyses for Receptor Modeling*. Table 1 in the study gives compositions in mg/l of volatile compounds in gasoline. This study’s Table 1 also gives a total target VOC concentration for the fuel type. The ratio of each compounds fuel composition divided by total target VOC concentration is multiplied by the EPA TANKS VOC output of 124.65 lb/yr to get total volatile compound emissions per compound.

### 2.25.3 Light Organic Waste to Iso-Tanks

At CWMNW, light organic wastes are pumped into Iso-tanks for storage and shipment off-site. These wastes are pumped from drums or similar approved containers into Iso-tanks or other tanks for shipment off-site to other treatment and disposal facilities.



Emissions from this source are calculated using AP-42 5.2 Equation 1 and Table 7.1-2 (Gasoline RVP 15). The loading loss (in lb/kgal) is multiplied by the total organics transfer in gallons per year to reach a total annual VOC emission rate. The lighter organics are more similar to solvents and are much more volatile than heavy oils.

The 2017 and 2018 waste-profile laboratory data was reviewed for wastes pumped out of drums received at CWMNW. Total compound concentrations were averaged to get an average pound per year throughput of each compound. This pound per year was multiplied by the total amount of volatile compounds per year to get a percent of total volatiles percentage. This fraction is multiplied by the 334 lb/yr emission rate to get emissions from each compound during pump-out into the Iso-tanks. Once the tanks are filled, they are sealed for transport off-site.

## **2.26 DIESEL COMBUSTION EMISSIONS (EU-23)**

There are two types of stationary source (non-mobile) diesel combustion emissions at the facility:

- Emergency Diesel Generators for ORU-2, ORU-3, TDU-1
- Shop Heaters

### **2.26.1 Emergency Diesel Generators**

The typical operational hours for an emergency generator are less than 50 hours per year. The fuel consumption rate for each generator is 29 gallons per hour. Using emission factors from AP-42 Table 3.3-2, compound emission rates can be calculated based on a typical diesel energy content of 139,000 BTU per gallon.

### **2.26.2 Shop Heaters**

Eight space heaters are used at CWMNW during the winter months. All remaining stationary diesel fuel is burned in the heaters. Using the same AP-42 Table 3.3-2 emission factors, compound emission rates are calculated based on a typical diesel energy content of 139,000 BTU per gallon.

## **3 MAX DAILY EMISSION INVENTORY CALCULATIONS**

Maximum daily emissions are calculated based on annual emission rate divided by the number of days per year that each EU is emitting.

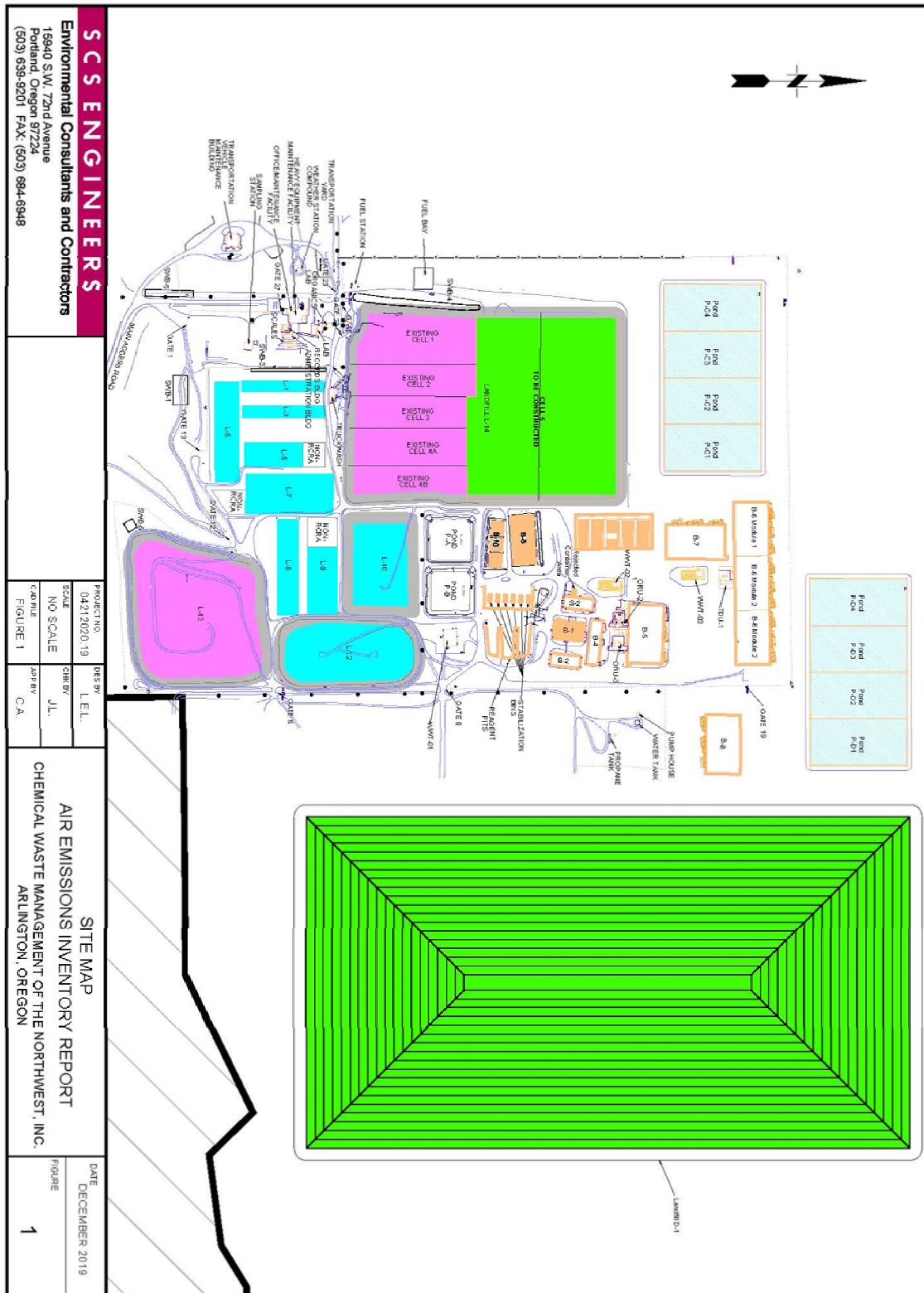
## LIST OF ACRONYMS

CAO	Cleaner Air Oregon
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CWMNW	Chemical Waste Management of the Northwest, Inc.
EPA	United States Environmental Protection Agency
EU	Emission Unit
LDR	Land Disposal Restrictions
MET	Maximum Expected Throughput
MMBTU	Million British Thermal Units
ODEQ	Oregon Department of Environmental Quality
ORU	Organics Recovery Unit
PFAS	Perfluoroalkyl Substances
PFOA	Polyfluorooctanic Acid
PFOS	Perfluorooctanesulfonic Acid
PM <sub>10</sub>	Particulate matter under 10 microns in diameter
PMCAP	Non-volatile compounds attached to particulate matter
lb/yr	pounds per year
RCRA	Resource Conservation and Recovery Act
RO	Reverse osmosis
RVP	Reid Vapor Pressure
scf	Standard Cubic Feet
SCS	SCS Engineers
SDS	Safety Data Sheets
SEAMs	Superfund Exposure Assessment Manual
TDU	RCRA Regulated Organics Unit
TOU	Thermal Oxidizer Unit
TSDF	Treatment, Storage and Disposal Facility
VOC	Volatile Organic Compound
WTP	Wastewater Treatment Plant

Figure 1. Vicinity Map



Figure 2. Site Map





APPENDIX A:

Draft Emissions Inventory Calculation Spreadsheet

(Electronically Attached Excell File)