

---

---

Cleaner Air Oregon Modeling Protocol

Cascade Steel Rolling Mills  
McMinnville, Oregon

Submitted to:  
Oregon Department of Environmental Quality

May 6, 2024

BRIDGEWATER GROUP, INC.

---

# Contents

---

<u>Section</u>		<u>Page</u>
1.0	Introduction	1-1
2.0	Source Description	2-1
	2.1 Process Description	2-1
	2.2 Toxic Emission Unit Descriptions	2-2
	2.3 Compounds Emitted	2-7
3.0	Modeling Protocol	3-1
	3.1 Source Characterization	3-1
	3.2 Model Selection	3-9
	3.3 Meteorological Data	3-9
	3.4 Land Use Determination	3-11
	3.5 Receptor Grid	3-14
	3.6 Exposure Locations	3-15
	3.7 Model Execution	3-19

---

## Tables

<u>Table</u>		<u>Page</u>
2-1	Compound emitted from CSRM	2-7
3-1	CSRM Buildings	3-2
3-2	Source Type and Location	3-4
3-3	Source Parameters	3-5
3-4	30-Year Moisture Analysis	3-10
3-5	Rural and Urban Land Use Determination	3-12
3-6	Statewide Land Use Crosswalk	3-16

## Figures

<u>Figure</u>		<u>Page</u>
1-1	Site Location	1-2
2-1	Process Flow Diagram	2-1
2-2	CAO Conceptual Site Model	2-6
3-1	CSRM Buildings	3-1
3-2	CSRM Emission Points	3-3
3-3	Buoyant Line Source Characterization	3-8
3-4	McMinnville Airport Wind Rose	3-11
3-5	Land Use around CSRM	3-13
3-6	Property and CAO Boundary	3-14
3-7	Near Field Receptor Exposure Classes	3-17
3-8	Far Field Receptor Exposure Classes	3-18

---

# 1.0 Introduction

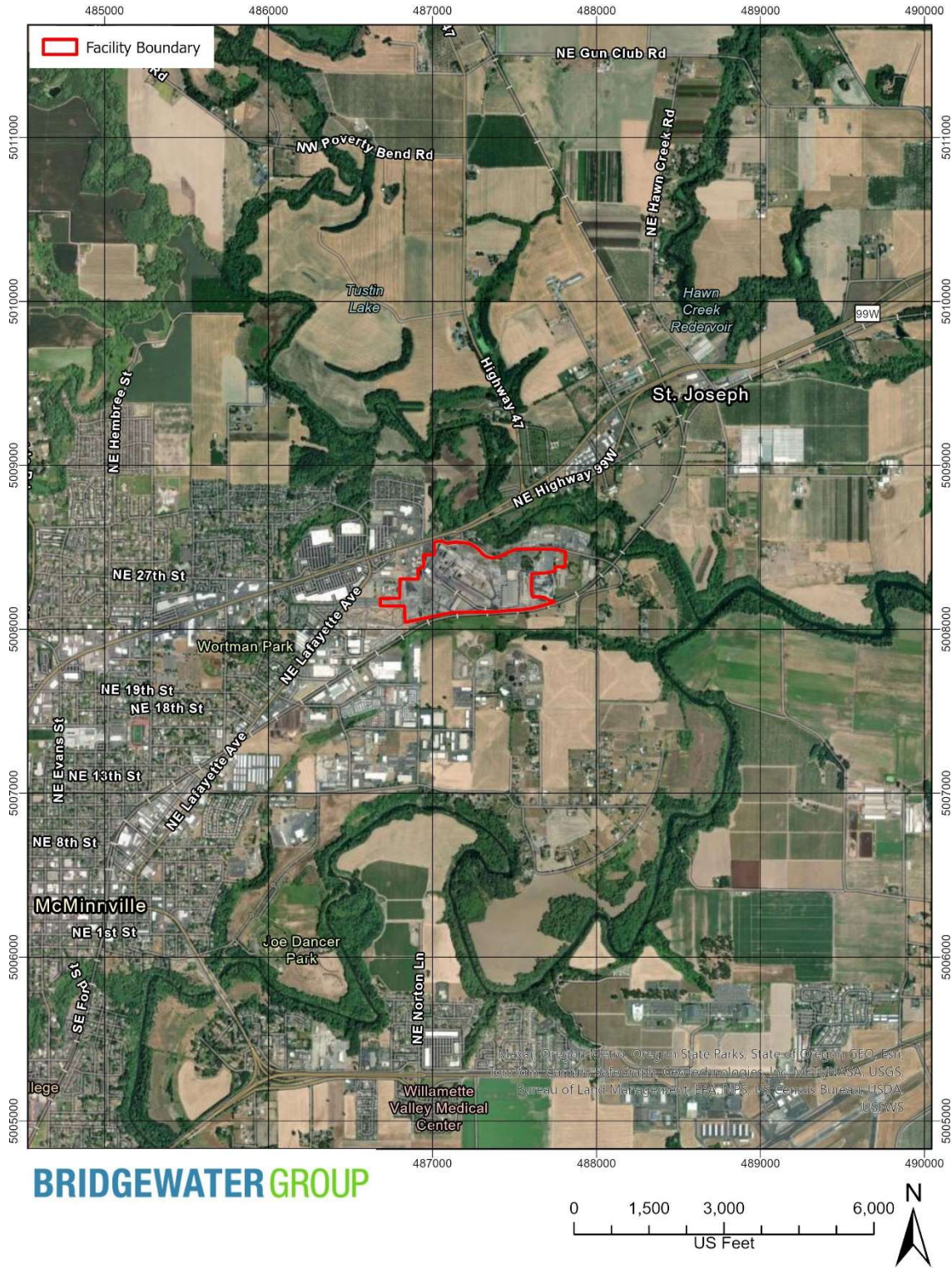
---

Cascade Steel Rolling Mill (CSRM) operates a steel manufacturing facility located at 3200 N Highway 99 in McMinnville, Oregon (source number 202528). The site is shown in Figure 1-1 and is located at a latitude of N 45° 13' 43" and longitude of W123° 9' 49", which corresponds to Universal Transverse Mercator (UTM - NAD 83) Zone 10 coordinates of 487,156 meters Easting by 5,008,356 meters Northing.

Cascade Steel Rolling Mills, Inc. melts ferrous scrap metal (for example, auto bodies, machines, and appliances) to produce steel products, predominately consisting of reinforcing bar (rebar) for the construction industry, but also including flat and round merchant bar for steel fabrication and various other finished products. The steel mill was founded in 1968 and now consists of a melt shop, a rolling mill, and supporting operations. The 85-acre facility is served by truck and rail.

CSRM was called into the Cleaner Air Oregon (CAO) program on February 7, 2022. CAO regulates emissions of toxic air contaminants from facilities based on comparing a calculated risk value to certain risk action levels (RALs) defined in the regulations. The risk assessment procedure is defined under OAR-340-245-0050. CAO is a multi-step process, involving the development of an air toxics emissions inventory, dispersion modeling, and a risk assessment. Over the past two years, CSRM has conducted numerous source tests of various emission sources to better characterize their emissions and has submitted multiple versions of their emissions inventory (May 9, 2022; October 10, 2022; February 13, 2023; July 3, 2023; August 9, 2023; October 9, 2023; November 14, 2023; and most recently on March 1, 2024). On April 5, 2024, the Oregon Department of Environmental Quality (ODEQ) approved the March 1, 2024 emission inventory. The next step in the CAO process is for CSRM to submit a modeling protocol by May 5, 2024. The CAO modeling protocol outlines the methods, assumptions, and datasets that will be used to calculate the facility concentrations for use in the risk assessment. CSRM is planning on conducting a Level-4 risk assessment, which will be outlined in a Level-4 Risk Assessment Workplan (RAWP). This document is the CAO modeling protocol for CSRM.

**Figure 1-1: Site Location**

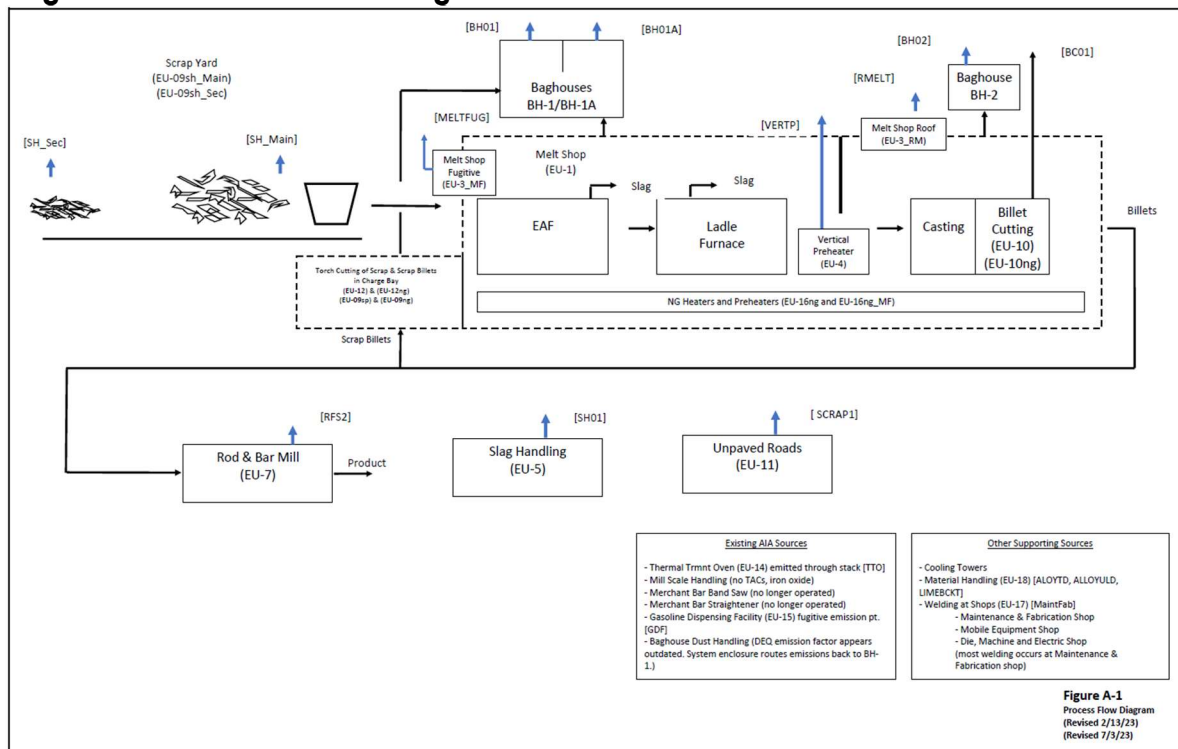


# 2.0 Source Description

## 2.1 Process Description

Figure 2-1 shows the process flow diagram for CSR. CSR receives clean scrap via rail or truck. The scrap is unloaded and sorted into one of two storage piles areas (main and secondary). Scrap is loaded into charge buckets and transferred to the Electric Arc Furnace (EAF), which melts the scrap to produce molten steel. The molten steel is poured into a ladle from a bottom tap. Melted nonferrous scrap constituents, which are lighter than the molten metal, float to the top of the EAF vessel and are decanted off into a slag pit. The chemistry of the molten metal is fine-tuned in the ladle furnace (LF) through the addition of alloys and other compounds. After the final chemistry and temperature adjustments are made, the ladle is moved to the casting area. The molten metal is poured from the ladle into the tundish, which is a reservoir above the continuous caster molds. Molten metal funnels from the tundish into a continuous caster into a series of five molds. The solidified metal billets exiting the bottom of the mold are cut into appropriate lengths. After cooling, the scale is removed and the billets are transferred to the Rolling Mill where they are reformed into bars, smooth rods, rebar coils, wire rod and bar-length products.

Figure 2-1: Process Flow Diagram



---

## 2.2 Toxic Emission Unit Descriptions

Figure 2-2 shows the conceptual site model for the CAO process. As per OAR 340-245-0020(5), emissions from the combustion of natural gas will be segregated into distinct Toxic Emission Units (TEUs) and kept separate from the other TEUs. Figure 2-2 also shows the TEU labeling between the emissions inventory and modeling IDs. In most cases, the labeling comprises of the TEU id and the modeling id, separated by an underscore. In many cases, a TEU exhausts to multiple exhaust points. Likewise, an exhaust point can emit emissions from numerous TEU's. A brief description of each TEU is provided below.

### Scrap Handling (EU-9sh\_Main, EU-9sh\_Sec)

Scrap ferrous metal is transported to the scrap storage yards by rail and by truck. There are two scrap storage yards. The Main Yard (EU-9sh\_Main) is where the scrap is transported to the EAF using scrap buckets, which are filled by electromagnets and grapples that pick up the scrap. The Secondary Yard (EU-9sh\_Sec) is essentially a surge pile where scrap can be temporarily stockpiled prior to transfer to the Main Yard. Emissions from the scrap handling are, as DEQ has directed, currently characterized by EPA's drop equation, which is a function of wind speed (the higher the speed, the higher the emissions). Thus, there are two modeled source IDs for each activity: one for the daily impacts (SH\_MainV and SH\_SecV) and the other for the annual impacts (SH\_MainA and SH\_SecA).

### Scrap Preparation (EU-09sp-SC, EU-09ng-SC)

Infrequently, larger pieces of scrap are cut to size to accommodate further handling. Cuts are made using handheld natural gas fueled torches. This activity is referred to as scrap preparation and it occurs within the charge bay of the melt shop with emissions controlled by the baghouse BH-1/1A system (EU-09sp-SC\_BH01, EU-09sp-SC\_BH01A) with a small building fugitive component (EU-09sp-SC\_MELTFUG). The natural gas portion of the activity is split out from the cutting emissions (EU-09ng-SC\_BH01, EU-09ng-SC\_BH01A, EU-09ng-SC\_MELTFUG). The modeled emission points are BH01, BH01A, and MELTFUG.

### Melt Shop Operations (EU-1, EU-3, EU-4, and EU-16ng)

The melt shop consists of three major processes: the EAF, the ladle furnace, and the continuous caster.

The scrap from the scrap storage yard is placed in a charge bucket and transferred into the EAF area. The charge bucket contents are deposited into the EAF, which melts to scrap to produce molten steel. Dolomitic lime, calcium carbide, and carbon, in the form of coal or coke, can also be added to arrive at the specified metallurgical properties. The EAF has three auxiliary burners that are fueled by natural gas.

Melted nonferrous scrap constituents, which are lighter than the molten metal, float to the top of the EAF vessel and are decanted off into a slag pit. Since slag contains sufficient residual ferrous material, it is later reclaimed by magnet and returned to the EAF. Slag handling is discussed below.



---

After initial melting and gross refining of the metal in the EAF, the steel is poured into a ladle from a bottom tap in the EAF. The chemistry of the molten metal is fine-tuned in the ladle furnace through the addition of alloys and other compounds. The ladle furnace also utilizes an electric arc to melt and refine steel.

After the final chemistry and temperature adjustments are made, the ladle is moved to the casting area. Natural gas fired vertical preheaters (EU-4) are utilized to pre-heat ladles prior to being filled with molten steel. From the ladle furnace, the molten metal is transferred to the continuous caster area. The molten metal is poured from the ladle into the tundish. Four natural gas fired heaters that are used to pre-heat the tundish prior to the first introduction of molten steel. Molten metal funnels from the tundish into a continuous caster with a series of five molds. The solidified metal billets exiting from the bottom of the molds.

The melt shop EU designations are carried over from past permits. EU-1 is the melt shop emissions that are captured and controlled by three baghouses (BH01, BH01A, and BH02). EU-3 are the melt shop fugitives not captured by the baghouses and either exit through the roof monitor (EU-3\_RM) or seep out of "other openings" (EU-3\_MELTFUG). DEQ's Review Report indicates that MELTFUG emissions are based on 5% of the emissions exiting the roof monitor.

EU-4 is a natural gas fired vertical preheater which exhausts from its own dedicated stack. Its modeled emission point is VERTP. EU-16ng are the emissions from the various EAF preheaters, tundish preheaters, and other natural gas combustion sources in the melt shop and exhausted to baghouses (EU-16ng\_BH01 and EU-16ng\_BH01A), to the roof monitor (EU-16ng\_RMELT) and to the other Melt Shop openings (EU-16ng\_MELTFUG).

### **Billet Cutting (EU-10, EU-10ng, EU-12, and EU-12ng)**

After casting, the solidified metal billets exiting the bottom of the mold are cut into appropriate lengths for rolling using natural gas touches (EU-10). The natural gas portion is classified as EU-10ng.

After the cut billets are cooled, the scale is removed, and the billets are transferred to the Rolling Mill for further processing. Off-spec billets are identified and are cut down in size using natural gas torches so they can be reprocessed at the EAF. This scrap billet cutting occurs within the EAF charge bay with emissions primarily being controlled by baghouses BH-1/BH-1A (EU-12\_BH01, EU12\_BH01A), along with a building fugitive component (EU-12\_MELTFUG). The natural gas combustion is broken out as separate TEUs (EU-12ng-BH01, EU-12ng\_BH01A, and EU-12\_MELTFUG).

### **Slag Handling (EU-5)**

During the EAF melting process, slag, which is lighter than the molten metal, floats to the top of the EAF vessel and is decanted off into a slag pit. The slag is moved from the pit to the wall just north of the melt shop and wetted with city water and an oxidizing agent for hydrogen sulfide control. A spray bar equipped with 10 nozzles is used to wet the slag. The spray bars apply about 120 gpm of water to the slag over a period of about 10 hours. Emissions from the slag pile are assumed to be fugitive. Its modeled emission point is SHF01. Emissions from the slag pile are, as DEQ has requested, currently characterized by EPA's drop equation, which is a



---

function of wind speed (the higher the speed, the higher the emissions). Thus, there are two modeled source IDs for this activity: one for the daily impacts (SHF01V) and the other for the annual impacts (SHF01C).

### **Reheat Furnace (EU-7)**

In the rod and bar mill, billets are reformed into bars, smooth rods, rebar coils, wire rod and bar-length products. The rod and bar mill includes a large natural gas fired reheat furnace (EU-7) which emissions from a dedicated stack (emission point RFS2).

### **Thermal Treatment Oven (EU-14)**

The Thermal Treatment Oven is a small natural gas combustion source with TEU designation (EU-14) and emits through stack with emission point TTO.

### **Gas Dispensing Facility (EU-15)**

The facility includes a gasoline storage tank that dispenses fuel to vehicles. Its modeled emission point is GDF.

### **Unpaved Roads (EU-11)**

Most of the roads at CSRSM are paved. However, the paths through the scrap piles are not. The road through the secondary scrap pile is SCRAP1 and the road through the main scrap yard is SCRAP2. These roads are gravel covered. The currently approved emission inventory does include the emissions for SCRAP2 as an unpaved road. CSRSM has determined that it is not currently feasible to maintain this road section as a paved road and emissions from this source will therefore be included in an update to the emission inventory which will be submitted with the RAWP.

### **Electric Arc Welding (EU-17)**

Electric arc welding occurs at three maintenance shops at the facility with a majority of the welding occurring at the Maintenance and Fabrication Shop. The welding fumes are controlled by a fume extractor/filter system that exhausts into the shop (emission point MAINTFAB).

### **Material Handling (EU-18)**

Silicon manganese and ferro manganese alloys are brought to the site via trucks. The trucks dump the alloys into three-sided and roofed storage bins (EU-18\_ATDSiMn and EU-18\_ATDFeMn) and are designated as emission points ALLTD1 and ALLTD2. Emissions from the alloy dumping are, at DEQ's request, currently characterized by EPA's drop equation, which is a function of wind speed (the higher the speed, the higher the emissions). Thus, there are two modeled source IDs for each activity: one for the daily impacts (ALLTD1V and ALLTD2V) and the other for the annual impacts (ALLTD1C and ALLTD2C).

The alloys are then transferred to a feeder-hopper to convey the materials into the melt shop (EU-18\_AULDSiMn and EU-18\_AULDFeMn). The hopper is emission point ALLULD.

---

Dolomitic Lime and Quick Lime are stored in super sacks and periodically the entire super sack will be placed into a charge bucket containing scrap. The super sack can break during this transfer process and produce emissions of the lime materials. These emissions are EU-18\_LIMEBCKT with an emission point of LBCKT.

**Figure 2-2: CAO Conceptual Site Model**

Input	Control Device	Emission Point	Model ID	Pollutants	Pathway
EI TEU Material Process					
<b>Scrap Handling and Preparation</b>					
EU-09ng: Natural Gas Combustion for Cutting	Baghouse	EU-09ng-SC_BH01 EU-09ng-SC_BH01A EU-09ng-SC_MELTFUG	BH01 BH01A MELTFUG	NG Comb.	Inhalation
EU-09sc Scrap Cutting	Baghouse	EU-09sp-SC_BH01 EU-09sp-SC_BH01A EU-09sp-SC_MELTFUG	BH01 BH01A MELTFUG	EL/MP Metals	Inhalation, multipathway
EU-09sh Scrap Handling	Water Spray	EU-09sh_Main (daily) EU-09sh_Main (annual) EU-09sh_Sec (daily) EU-09sh_Sec (annual)	SH_MAINV SH_MAINA SH_SECV SH_SECA	EL/MP Metals	
EU-18 Material Handling	Water Spray	EU-18_ATDSiMn (daily) EU-18_ATDSiMn (annual) EU-18_ATDFeMn (daily) EU-18_ATDFeMn (annual) EU-18_AULDSiMn EU-18_AULDFeMn EU-18_LIMEBCKT	ALLTD1V ALLTD1C ALLTD2V ALLTD2C ALLULD ALLULD LBCKT	EL/MP Metals EL/MP Metals EL/MP Metals EL/MP Metals Silica	
<b>Meltshop Operations, Melting and Pouring</b>					
EU-01 Meltshop	Baghouse	EU-1_BH01 EU-1_BH01A EU-1_BH02	BH01 BH01A BH02	Gases HF, Fluorides Dioxins/Furans PCB	Inhalation Inhalation, multipathway
EU-03 building fugitives		EU-3_MF	MELTFUG	EL/MP Metals	Inhalation, multipathway
EU-03 roof monitor		EU-3_RM	RMELT	EL/MP Metals	Inhalation, multipathway
EU-16ng	Baghouse	EU-16NG_BH01 EU-16NG_BH01A EU-16NG_RMELT EU-16NG_MF	BH01 BH01A RMELT MELTFUG	NG Comb.	Inhalation
EU-4		EU-4	VERTP		
<b>Slag Handling</b>					
EU-5	Spray	EU-5 (daily) EU-5 (annual)	SHF01V SHF01A	EL/MP Metals Dioxins/Furans PCB Fluorides	Inhalation, multipathway Inhalation
<b>Billet Casting and Cutting</b>					
EU-10ng		EU-10ng	BCUT	NG Comb.	Inhalation
EU-10		EU-10	BCUT	EL/MP Metals	Inhalation, multipathway
EU-12	Baghouse	EU-12_BH01 EU-12_BH01A EU-12_MELTFUG	BH01 BH01A MELTFUG	EL/MP Metals	Inhalation, multipathway
EU-12ng	Baghouse	EU-12ng_BH01 EU-12ng_BH01A EU-12ng_MELTFUG	BH01 BH01A MELTFUG	NG Comb.	Inhalation
<b>Rolling Mill Operations</b>					
EU-7		EU-7	RFS2	NG Comb.	Inhalation
EU-14		EU-14	TTO	NG Comb.	Inhalation
<b>Other Processes</b>					
EU-15		EU-15	GDF	Hydrocarbons	Inhalation
EU-11		EU-11 EU-11	SCRAP1 SCRAP2	EL/MP Metals	Inhalation, multipathway
EU-17		EU-17	MAINTFAB	Metals, Silica Silica, Fluorides	Inhalation

## 2.3 Compounds Emitted

Table 2-1 shows the toxics air pollutants included in the current CAO emissions inventory, along with the form of the pollutant (particulate or volatile gas), whether the pollutant has an early-life (EL) or multipath way (MP) adjustment made to its Risk Based Concentrations (RBCs), and what the respective TBACT RAL is (either 3 or 5). The lower part of the table shows compounds which are emitted but do not have RBCs.

**Table 2-1: CAO Emissions Inventory Compounds Emitted from CSR**

CAS	Pollutant	Type	EL,MP	TBACT RAL
75-07-0	Acetaldehyde	Gas	-	HI3
107-02-8	Acrolein	Gas	-	HI5
7429-90-5	Aluminum and compounds	Particulate	-	HI5
7664-41-7	Ammonia	Gas	-	HI3
7440-36-0	Antimony and compounds	Particulate	-	HI3
7440-38-2	Arsenic and compounds	Particulate	EL,MP	HI3
71-43-2	Benzene	Gas	-	HI3
7440-41-7	Beryllium and compounds	Particulate	-	HI3
74-83-9	Bromomethane (Methyl bromide)	Gas	-	HI3
7440-43-9	Cadmium and compounds	Particulate	EL,MP	HI3
108-90-7	Chlorobenzene	Gas	-	HI3
74-87-3	Chloromethane (Methyl chloride)	Gas	-	HI3
18540-29-9	Chromium VI, chromate and dichromate particulate	Particulate	EL,MP	HI3
7440-48-4	Cobalt and compounds	Particulate	-	HI3
7440-50-8	Copper and compounds	Particulate	-	HI3
110-82-7	Cyclohexane	Gas	-	HI3
75-09-2	Dichloromethane (Methylene chloride)	Gas	EL,MP	HI3
100-41-4	Ethyl benzene	Gas	-	HI3
C239	Fluorides	Gas	EL,MP	HI3
50-00-0	Formaldehyde	Gas	-	HI3
118-74-1	Hexachlorobenzene	Gas	-	--
110-54-3	Hexane	Gas	-	HI3
7664-39-3	Hydrogen fluoride	Gas	EL,MP	HI3
7783-06-4	Hydrogen sulfide	Gas	-	HI3
98-82-8	Isopropylbenzene (Cumene)	Gas	-	HI3
7439-92-1	Lead and compounds	Particulate	EL,MP	HI3
7439-96-5	Manganese and compounds	Particulate	-	HI3
7439-97-6	Mercury and compounds	Particulate	EL,MP	HI3
91-20-3	Naphthalene	Gas	EL,MP	HI3
C365	Nickel compounds, insoluble	Particulate	-	HI3
C447	Polybrominated diphenyl ethers (PBDEs)	Gas	-	HI3
1336-36-3	Polychlorinated biphenyls (PCBs)	Gas	EL,MP	--
C645	Polychlorinated biphenyls (PCBs) TEQ	Gas	EL,MP	HI3
C646	Polychlorinated dibenzo-p-dioxins (PCDDs) & dibenzofurans (PCDFs) TEQ	Gas	EL,MP	HI3
C401	Polycyclic aromatic hydrocarbons (PAHs)	Gas	EL,MP	--
56-55-3	Benz[a]anthracene	Gas	-	--
50-32-8	Benzo[a]pyrene	Gas	EL,MP	HI3
205-99-2	Benzo[b]fluoranthene	Gas	-	--
191-24-2	Benzo[g,h,i]perylene	Gas	-	--

CAS	Pollutant	Type	EL,MP	TBACT RAL
207-08-9	Benzo[k]fluoranthene	Gas	-	--
218-01-9	Chrysene	Gas	-	--
53-70-3	Dibenz[a,h]anthracene	Gas	-	--
206-44-0	Fluoranthene	Gas	-	--
193-39-5	Indeno[1,2,3-cd]pyrene	Gas	-	--
7782-49-2	Selenium and compounds	Particulate	-	HI3
7631-86-9	Silica, crystalline (respirable)	Particulate	-	HI5
100-42-5	Styrene	Gas	-	HI3
79-34-5	1,1,2,2-Tetrachloroethane	Gas	-	--
108-88-3	Toluene	Gas	-	HI3
526-73-8	1,2,3-Trimethylbenzene	Gas	-	HI3
95-63-6	1,2,4-Trimethylbenzene	Gas	-	HI3
108-67-8	1,3,5-Trimethylbenzene	Gas	-	HI3
7440-62-2	Vanadium (fume or dust)	Particulate	-	HI3
75-01-4	Vinyl chloride	Gas	EL,MP	HI3
1330-20-7	Xylene (mixture), including m-xylene, o-xylene, p-xylene	Gas	-	HI3
<b>Compounds emitted without RBC's</b>				
7440-39-3	Barium and compounds	Particulate		
1313-27-5	Molybdenum trioxide	Particulate		
7440-66-6	Zinc and compounds	Particulate		
7440-22-4	Silver and compounds	Particulate		
7440-28-0	Thallium and compounds	Particulate		
C504	Phosphorus and Compounds	Particulate		
75-69-4	Trichlorofluoromethane (Freon 11)	Gas		
120-82-1	1,2,4-Trichlorobenzene	Gas		
83-32-9	Acenaphthene	Gas		
208-96-8	Acenaphthylene	Gas		
120-12-7	Anthracene	Gas		
192-97-2	Benzo[e]pyrene	Gas		
86-73-7	Fluorene	Gas		
198-55-0	Perylene	Gas		
85-01-8	Phenanthrene	Gas		
129-00-0	Pyrene	Gas		
540-84-1	2,2,4-Trimethylpentane	Gas		
91-57-6	2-Methyl naphthalene	Gas		
78-79-5	Isoprene, except from vegetative emission sources	Gas		
1309-64-4	Antimony trioxide	Particulate		

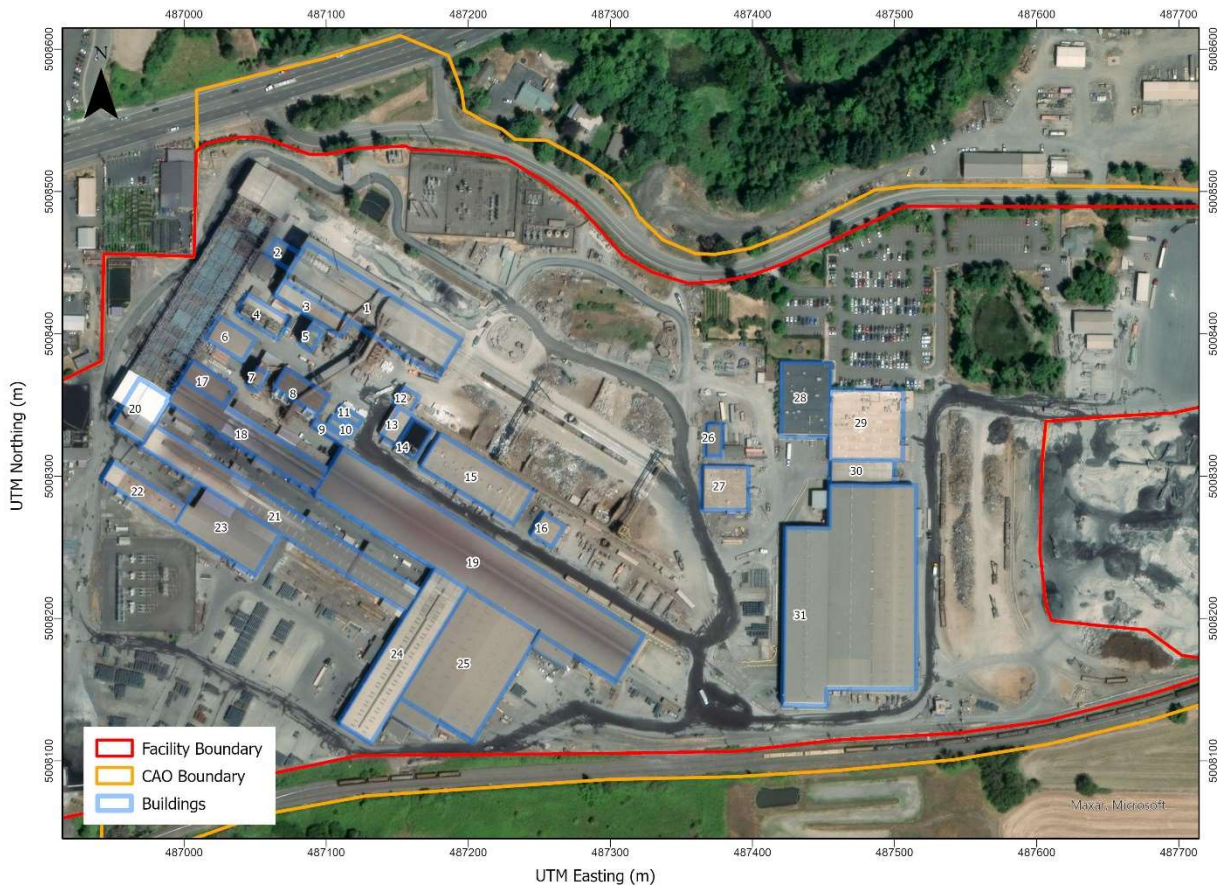
# 3.0 Modeling Protocol

This section is a modeling protocol and is intended to outline the assumptions and methodologies that will be used in an air quality analysis for calculating 24-hour and annual risk values for each TEU for use in the Risk Assessment Work Plan.

## 3.1 Source Characterization

Figure 3-1 shows the buildings at CSRM. The building blocks and heights are labeled in Table 3-1. The orange line represents the CAO boundary, the redline is the facility property boundary, and the blue line is the building footprint. The site is flat so an average elevation of 49.22 meters is used for all buildings and sources.

Figure 3-1: CSRM Buildings



**Table 3-1. CSRM Buildings**

Number	ID	Building Desc	X (m)	Y (m)	Hgt(ft)
6	ALLOY	Alloy Warehouse	487028.7	5008397.9	20.0
2	BC01	Billet Cutting	487065.8	5008457.2	44.6
8	BH1	Baghouse 1	487076.6	5008358.0	64.3
7	BH1A	Baghouse 1A	487047.5	5008369.3	76.5
5	BH2	Baghouse 2	487085.3	5008398.1	76.5
31	EWARE	East Warehouse	487433.6	5008202.6	42.0
23	GLIDES	Glide Shop	487026.1	5008264.1	29.8
10	LOCKER1	Locker Office 1	487101.4	5008339.5	8.0
11	LOCKER2	Locker Office 2	487108.4	5008347.2	8.0
1	MELTS	Meltshop	487128.7	5008418.2	96.0
16	MESHOP	Maintenance Shop	487251.5	5008263.5	22.0
13	MSS	Melt Shop Storage	487146.2	5008336.1	33.0
28	OFFICE1	Newer Office	487433.7	5008355.1	17.5
29	OFFICE2	Older Office	487476.3	5008337.5	18.2
30	OFFLINK	Office Link Building	487473.1	5008303.8	41.0
27	OLIND	Machine Shop	487376.5	5008293.0	20.0
26	OLOFF	Old H&S	487368.9	5008327.0	9.2
3	RBAY	Refractory Bay	487086.3	5008419.2	51.0
17	RBMILL1	Rod and Bar Mill (NNW)	487012.7	5008366.7	29.8
18	RBMILL2	Rod and Bar Mill (NW)	487040.2	5008329.5	52.0
19	RBMILL3	Rod and Bar Mill (SE)	487203.2	5008239.4	60.0
20	REHEAT	Reheat Furnace	486965.6	5008347.4	55.0
21	ROLLM	Rolling Mill	487063.8	5008271.7	53.0
22	ROLLS	Roll Shop	486967.1	5008289.4	27.9
24	SHIPW	Shipping Warehouse	487149.8	5008175.0	41.0
15	STORE	Storeroom	487201.8	5008299.6	24.0
9	UNLOAD	Unload Building	487097.1	5008332.8	30.0
25	WARE	Warehouse	487196.8	5008168.3	43.0
4	WTP	Water Treatment W	487051.1	5008413.6	25.0
12	WTP8	WTP Tank #8	487152.4	5008354.8	33.0
14	WTP9	WTP Tank#9	487153.6	5008320.4	13.2

For point sources, the evaluation of building downwash on the adjacent stack is deemed necessary, since the stack height may be below Good Engineering Practice (GEP) heights. The formula for GEP height estimation is:

$$H_s = H_b + 1.50L_b$$

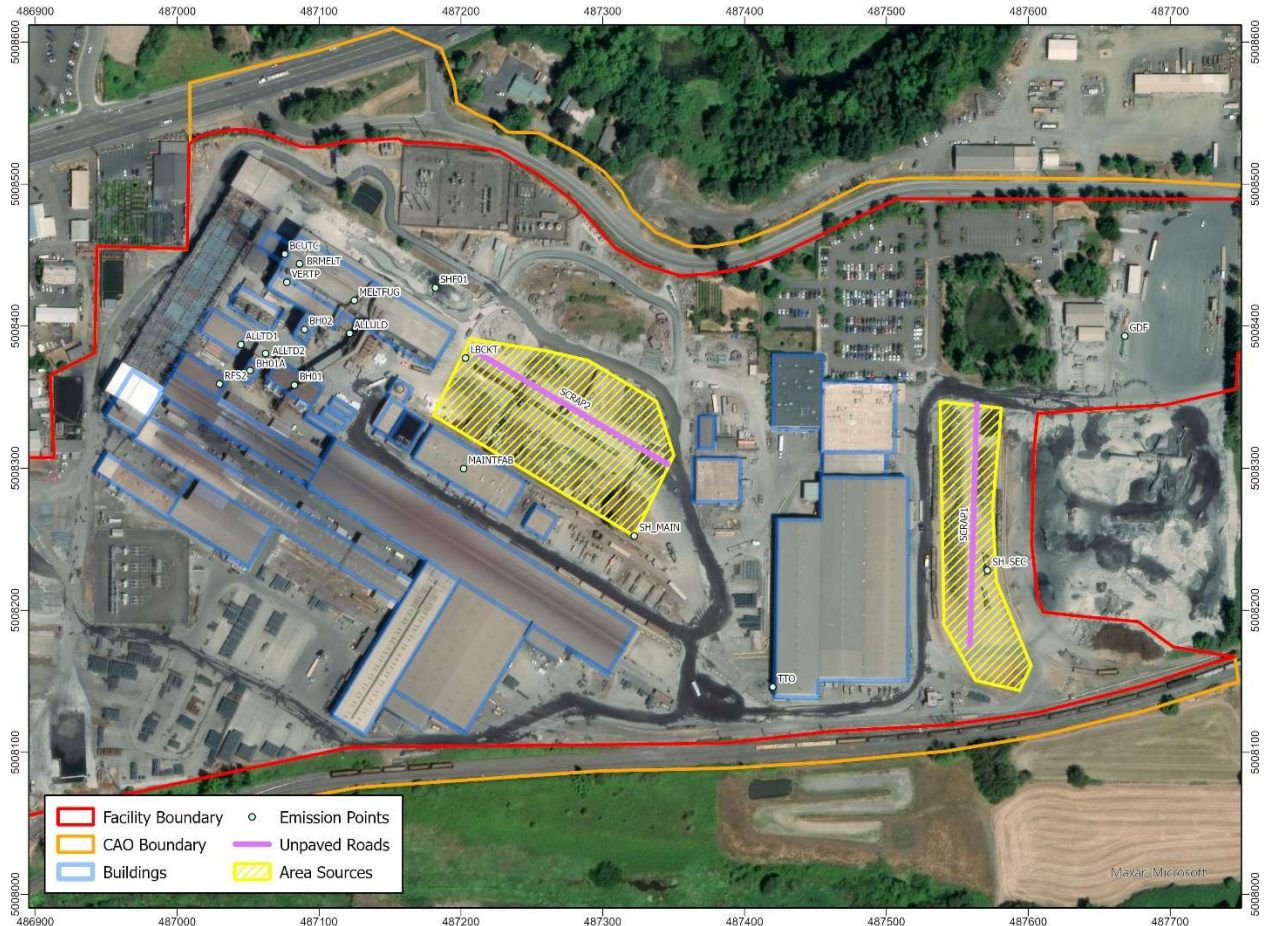
where:  $H_s$  = GEP stack height  
 $H_b$  = building height  
 $L_b$  = the lesser building dimension of the height, length, or width



The effects of aerodynamic downwash due to buildings and other structures will be accounted for by using wind direction-specific building parameters calculated by the USEPA-approved Building Parameter Input Program Prime (BPIP-Prime) and the algorithms included in AERMOD.

Figure 3-2 shows the location of each emission point. The source characteristics are shown in Table 3-2.

**Figure 3-2: CSRM Emission Points**



**Table 3-2: Source Type and Location**

Model ID	Description	Type	X (m)	Y (m)		
<b>POINT SOURCES</b>						
BH01	EAF Baghouse 1	POINTHOR	487082.8	5008358.5		
BH01A	EAF Baghouse 1A	POINTHOR	487051.6	5008368.8		
BH02	EAF Baghouse 2	POINTHOR	487089.8	5008397.8		
BCUTC	Billet Cutting Stack	POINT	487075.8	5008450.6		
VERTP	Vertical Preheater	POINT	487077.3	5008430.7		
RFS2	Reheat Furnace Stack	POINT	487030.0	5008359.2		
TTO	Thermal Treatment Oven	POINT	487420.0	5008146.0		
<b>VOLUME SOURCES</b>						
MELTFUG	Melt Shop Other Openings	VOLUME	487125.0	5008418.0		
SHF01V	Slag Handling (daily)	VOLUME	487182.0	5008427.0		
SHF01C	Slag Handling (annual)	VOLUME	487182.0	5008427.0		
GDF	Gasoline Dispensing Facility	VOLUME	487668.0	5008393.0		
MAINTFAB	Maintenance Fab (Welding)	VOLUME	487201.8	5008299.6		
ALLTD1	Alloy Truck dump 1 (SiMn) (annual)	VOLUME	487044.9	5008387.0		
ALLTD1V	Alloy Truck dump 1 (SiMn) (daily)	VOLUME	487044.9	5008387.0		
ALLTD2C	Alloy Truck dump 2 (FeMn) (annual)	VOLUME	487062.3	5008380.7		
ALLTD2V	Alloy Truck dump 2 (FeMn) (daily)	VOLUME	487062.3	5008380.7		
ALLULD	Alloy feed hopper to EAF	VOLUME	487121.6	5008394.9		
LBCKT	Lime addition to charge bucket	VOLUME	487203.2	5008377.6		
<b>AREA SOURCES</b>						
SH_SECA	Scrap Handling Secondary Pile (Annual)	AREAPOLY	487571.3	5008228.2		
SH_SECV	Scrap Handling Secondary Pile (Daily WS Variable)	AREAPOLY	487581.1	5008342.2		
SH_MAINA	Scrap Handling Main Pile (Annual)	AREAPOLY	487322.3	5008252.3		
SH_MAINV	Scrap Handling Main (Daily WS Variable)	AREAPOLY	487322.3	5008252.3		
<b>LINE SOURCES</b>						
			<b>X 1(m)</b>	<b>Y 1(m)</b>	<b>X 2(m)</b>	<b>Y 2 (m)</b>
SCRAP1	Unpaved Road 1, Secondary Pile	LINE	487563.7	5008345.3	487558.0	5008175.0
SCRAP2	Unpaved Road 2, Main scrap pile	LINE	487345.9	5008302.7	487208.6	5008383.2
<b>BUOYLINE SOURCE</b>						
BRMELT	Melt Shop Roof Monitor	BUOYLINE	487075.8	5008450.6	487095.7	5008438.1

**Table 3-3: Source Parameters**

Point Sources					
Model	Comments:	Hgt (ft)	Temp (K)	Vel (m/s)	Dia (m)
BH01	2023 Source test	64.3	-55.28	3.83	9.65
BH01A	2023 Source test	76.5	-55.28	3.86	4.33
BH02	2023 Source test	76.5	-21.18	4.18	4.83
BCUTC	Design drawings, 2017 source test	114.2	-21.45	12.94	2.64
VERTP	CSRM provided	57.1	1144.30	19.59	0.41
RFS2	CSRM provided	79.7	727.40	4.46	1.85
TTO	Unknown, assumed ambient and conservative values	43.0	0.00	0.10	0.10
Volume Sources					
		Hgt (ft)	Sy(m)	Sz(m)	
MELTFUG	H = MS bldg/2; Sy=W/4.3, Sz = H*2/2.15	52.5	7.12	14.88	
SHF01V	H = 10' pile (1/2 wall); Sy=Dump width (22 m)/4.3, Sz = H/2.15	10.0	5.12	1.42	
SHF01C	Same as above	10.0	5.12	1.42	
GDF	H=1/2 Truck Height (20'), Sy= Truck Len/4.3, Sz=H*2/2.15	10.0	4.88	2.84	
MAINTFAB	H = Shop Hgt (24')/2; Sy=BW/4.3, Sz = H*2/2.15	12.0	6.41	3.40	
ALLTD1C	H = Alloy bldg. Hgt/2; Sy=Alloy W/4.3, Sz = H*2/2.15	10.0	2.13	1.42	
ALLTD1V	Same as above	10.0	2.13	1.42	
ALLTD2C	H = Alloy bldg. Hgt/2; Sy=Shed W/4.3, Sz = H*2/2.15	10.0	1.63	1.42	
ALLTD2V	Same as above	10.0	1.63	1.42	
ALLULD	H = 1/2 shed height (1/3 MS), Sy = space between buildings/4.3, Sz = H*2/2.15	16.0	1.86	4.54	
LBCKT	Bucket = 16'1" dia, 14'8" hgt on a 62.5" rail, H= top of bucket, Sy = W/4.3, Sz = H/2.15	19.9	1.14	2.82	
Area Sources					
		Hgt (ft)	# VERT	Sz(m)	
SH_SECA	H=pile hgt (20')/2, Sz = H*2/2.15	10	8	2.84	
SH_SECV	Same as above	10	8	2.84	
SH_MAINA	H=pile hgt (30')/2, Sz = H*2/2.15	15	7	4.25	
SH_MAINV	Same as above	15	7	4.25	
Line Sources					
		Hgt (ft)	Line Width (m)	Sz(m)	
SCRAP1	H=0.5*VH*1.7, Line Width = (VW+6), Sz=VH*1.7/2.15	8.50	8.74	2.41	
SCARP2	H=0.5*VH*1.7, Line Width = (VW+6), Sz=VH*1.7/2.15	8.50	8.74	2.41	
Buoyant Line Source					
		Hgt (ft)	FPRIME (m <sup>4</sup> /s <sup>3</sup> )		
BRMELT	See below	104.992	90.4		

Baghouses BH01, BH01A, and BH02 have roof monitor type exhausts, which exhaust horizontally out of the top of the units. Source parameters are based on the 2023 source test. In AERMOD, the user may model a plume with an exit temperature that exceeds the ambient temperature by a fixed amount by entering a negative value for exit temperature equal in magnitude to the temperature difference. Thus, a value of -21.18 K represents an exhaust temperature of ambient plus 21.28 K. To determine the temperature difference, the temperature measured from the stack test were subtracted from concurrent ambient temperature from the McMinnville Airport, which is about 4.3 kilometers from the facility.

---

The new billet cutting exhaust system was recently built to convey emissions from the billet cutting activities to stack emission points. It is three adjacent 5' stacks which use fans to vent the billet cutting area. Since the exhausts are within one stack diameter of each other, the stacks were treated as a single equivalent diameter stack using the total flow rate of 150,000 acfm. The exhaust temperature difference will be set -21.45 K which is the temperature difference from a 2019 source test (-33.9 K) multiplied by the ratio of the source test flow rate (94,942 acfm) and the designed stack flow rate (150,000 acfm) to account for the extra air forced through the stacks by the fans.

Source parameters for the preheater (VERTP) and reheat furnace (RFS2) were provided by CSRSM, based on an analysis conducted in 1996. Since these sources are natural gas sources, the source parameters were not updated.

The parameters for the thermal treat oven (TTO) are not known. Since this source is a small natural gas source, conservative parameters were selected using the ambient temperature (T=0K), and conservative low flow (0.1 m/s) and diameter (0.1 m) values.

Most of the VOLUME sources are next to buildings or structures. For these, the release height will be set to 1/2 of the adjacent building height, the lateral initial plume dimension (Sigma-y) will be set the building width divided by 4.3 as per AERMOD guidance, and the vertical initial plume dimension (Sigma-z) will be set to the building height divided 2.15 as per guidance.

Slag is taken from the slag pit inside the melt shop and is placed outside along a wall just northwest of the melt shop, where it is sprayed with water and an oxidizing agent. The release height will be set to 1/2 of the height of the wall, which corresponds to the top of the slag pile. Sigma-y is based on the typical length of the slag along the wall (~22 m) divided by 4.3. Sigma-z was treated like other volume sources, with the wall height divided by 2.15. Emissions from the slag pile are, as DEQ has requested, currently characterized by EPA's drop equation, which is a function of wind speed (the higher the speed, the higher the emissions). For the emissions inventory, the 24-hour emissions are based on the maximum daily wind speed observed over a five-year period. However, the use of this maximum emissions rate on a day with low winds would greatly overestimate the modeled concentrations for that day. To account for this, a HOUREMIS file is used to adjust the emissions based on the daily wind speed. The daily adjustment ( $A(d)$ ) on a given day is given by:

$$A(d) = \frac{\left\{ \frac{u(d)}{5} \right\}^{1/3}}{\left\{ \frac{U}{5} \right\}^{1/3}}$$

where  $u(d)$  is the average daily wind speed for day  $d$ , and  $U$  is the maximum daily wind speed used in the emissions calculation. For the annual calculation, the 5-year period average wind speed is used, so no adjustment is required. The acute slag handling source is SHF01V and the annual source is SHF01C.

This wind speed adjustment is applied to other sources (ALLTD1V, ALLTD2V, SH\_SecV, and SH\_MainV) that use the drop equation.

---

The Alloy feed hopper to EAF (ALLULD) is tucked in a corner next the melt shop, a smaller shed, and the baghouse piping support structures. For this source, the shed height, which is roughly 1/3 of the melt shop, is used for the release height estimate. The sigma-y was based space between the buildings and structures (estimated to be 8 meter) divided by 4.3.

The Lime Bucket source (LBCKT) is based on the size of the charge bucket. The release height is assumed to be the top of the bucket. The Sigma-y and Sigma-z are set like the other volume sources.

The scrap handling areas (SH\_Main and SH\_Sec) are modeled as AREAPOLY sources. The release height is assumed to be 1/2 of the estimated pile height (20' for the secondary pile and 30' for the main piles). The drop equation is used in these sources' emissions estimate so the sources have daily (SH\_MAINV and SH\_SECV) and annual (SH\_MAINA and SH\_SECA) model ID's. Sigma-z is set to the pile height divided by 2.15.

The unpaved roads at the facility are gravel based and are watered. The roads are characterized using the Haul Road Workgroup Recommendations<sup>1</sup> (November 2011) approach. The release height is  $0.5 \cdot VH \cdot 1.7$ , where VH is the vehicle height (10 feet). The line width is the vehicle width (9 ft) plus 6 meters, and Sigma-z is the  $VH \cdot 1.7 / 2.15$ .

The roof monitor (BRMELT) is modeled as a buoyant line source. The buoyant line implementation in AERMOD is based on the buoyant line source algorithm from the Buoyant Line and Point Source (BLP) dispersion model<sup>2</sup> with very little modification and similar limitations. The parameters for the buoyant line source are entered via the BLPINPUT card. Figure 3-3 shows a schematic of the needed parameters.

The BLP algorithm assumes buoyant line sources are continuous lines that run the length of the building; thus, the building length (BL) is set to the length of the line (24.08 m). The building height (BH) to the average roof height (32 m), building width (BW) is the width of a melt shop (30.6 m), line source width (WM) is the width of the roof monitor (110 inches = 2.79 m), and the separation between buildings (DX) is zero as there is only one line. The average buoyancy parameter (FPRIME) is given by:

$$FPRIME (m^4/s^3) = g (L W_m w) (T_s - T_a) / T_s$$

where:

- g = acceleration of gravity (9.81 m/s<sup>2</sup>)
- L = line source length (m)
- W<sub>m</sub> = line source width (m)
- w = exit velocity (m/s)
- T<sub>s</sub> = exit temperature (°K)
- T<sub>a</sub> = ambient air temperature (°K)

---

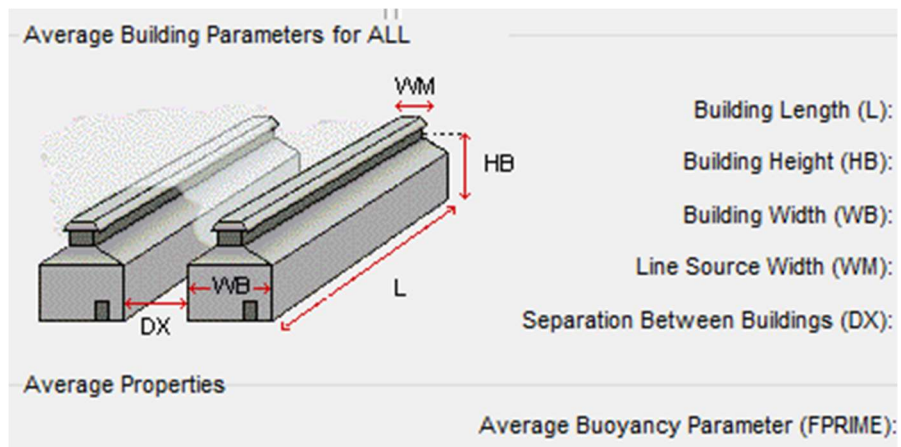
<sup>1</sup> [https://www.epa.gov/sites/default/files/2020-10/documents/haul\\_road\\_workgroup-final\\_report\\_package-20120302.pdf](https://www.epa.gov/sites/default/files/2020-10/documents/haul_road_workgroup-final_report_package-20120302.pdf)

<sup>2</sup> Schulman, L.L., and J.S. Scire, 1980: Buoyant Line and Point Source (BLP) Dispersion Model User's Guide. Final Report. Environmental Research & Technology, Inc. P-7304B. July 1980.

Note that the expression  $(L W_m w)$  is equal to the exhaust volume  $(V)$  out of the roof monitor. For the rood monitor, the following values were used based on the 2019 source test:

$$\begin{aligned} V &= 394,154 \text{ ACFM} = 186 \text{ m}^3/\text{s} \\ T_s &= 101.1 \text{ }^\circ\text{F} = 311.5 \text{ }^\circ\text{K} \text{ (lower bound of operating conditions)} \\ T_a &= 73.3 \text{ }^\circ\text{F} = 296.1 \text{ }^\circ\text{K} \\ \text{FPRIME} &= 9.81 * 186 * (311.5-296.1)/311.5 = 90.4 \text{ m}^4/\text{s}^3 \end{aligned}$$

**Figure 3-3: Buoyant Line Source Characterization**



---

## 3.2 Model Selection

Air quality dispersion modeling will be conducted to simulate the downwind transport of toxic air contaminants emitted by all the existing TEUs at the facility. The analysis will estimate maximum off-site concentrations using the AERMOD (AMS [American Meteorological Society]/EPA [Environmental Protection Agency] Regulatory Model), which follows the procedure requirements as specified in 40 CFR Part 51, Appendix W, "Guidelines on Air Quality Models (Revised)". AERMOD incorporates air dispersion for both surface and elevated sources, and accounts for differing terrain (i.e., simple and/or complex). AERMOD includes three components: a meteorological data preprocessor, AERMET; a terrain data preprocessor, AERMAP; and the air dispersion model, AERMOD. The dispersion model will be performed using the following versions for AERMOD and all preprocessors:

- AERMOD: 23132
- AERMET: 23132
- AERMINUTE: 20060
- AERMAP: 18081
- BPIPrime: 04274

AERMOD modeling will be performed using regulatory default options, which include stack tip downwash, buoyancy-induced dispersion, upper-bound downwash concentrations, default wind speed profile exponents and vertical potential temperature gradients, and a routine for processing concentration averages during calm winds and when there are missing meteorological data. The effects from local terrain will also be incorporated.

## 3.3 Meteorological Data

For this analysis, five-years (2018-2022) of hourly surface meteorological data from the National Weather Service (NWS) station at the McMinnville airport (KMMV) will be used. The station is located about 4.3 kilometers southeast of CSRM. The station includes one-minute data which can be processed through AERMINUTE as per EPA suggestion. Upper air data from Salem Airport will be used. A five-year wind rose is shown in Figure 3-4.

The surface parameters (surface roughness, Bowen ratio, and noon-time albedo) will be determined using the most recent version of AERSURFACE. A 30-year moisture analysis for McMinnville area will be conducted to determine the wetness condition for each of the five years. For this analysis, annual precipitation data from the PRISM explorer<sup>3</sup> site will be used (dataset AN81m). This dataset provides the best possible precipitation estimates, using all relevant station networks and data sources, and provides a consistent and continuous dataset for precipitation values. The last 30 years of annual precipitation values are shown in Table 3-4. The yellow highlighted entries are the five years being used in AERMOD. Using these data, the 30<sup>th</sup> and 70<sup>th</sup> percentile values are determined. If the yearly precipitation exceeded the 70<sup>th</sup> percentile, then the year will be defined as wet. If the yearly precipitation is less than the 30<sup>th</sup> percentile, then the year will be defined as dry. If the precipitation is between the 30<sup>th</sup> and 70<sup>th</sup>

---

<sup>3</sup> <https://prism.oregonstate.edu/explorer/>



percentiles, it will be defined as average. Since albedo and Bowen ratio are area averages, all sectors will have the same values. Also, albedo and surface roughness are the same for all wetness conditions.

**Table 3-4: 30-Year Moisture Analysis**

Year	PPT (in.)	Year	PPT (in.)	Condition
1993	34.22	2008	32.48	
1994	34.04	2009	33.76	
1995	43.86	2010	49.71	
1996	78.77	2011	38.94	
1997	50.47	2012	51.46	
1998	50.76	2013	25.5	
1999	48.84	2014	46.51	
2000	29.45	2015	49.26	
2001	36.6	2016	52.85	
2002	40.28	2017	54.27	
2003	44.53	2018	34.7	Dry
2004	32.14	2019	32.19	Dry
2005	39.98	2020	39.16	Ave
2006	52.1	2021	45.84	Ave
2007	39.25	2022	43.46	Ave
70th Percentile		48.966		
30th Percentile		36.03		

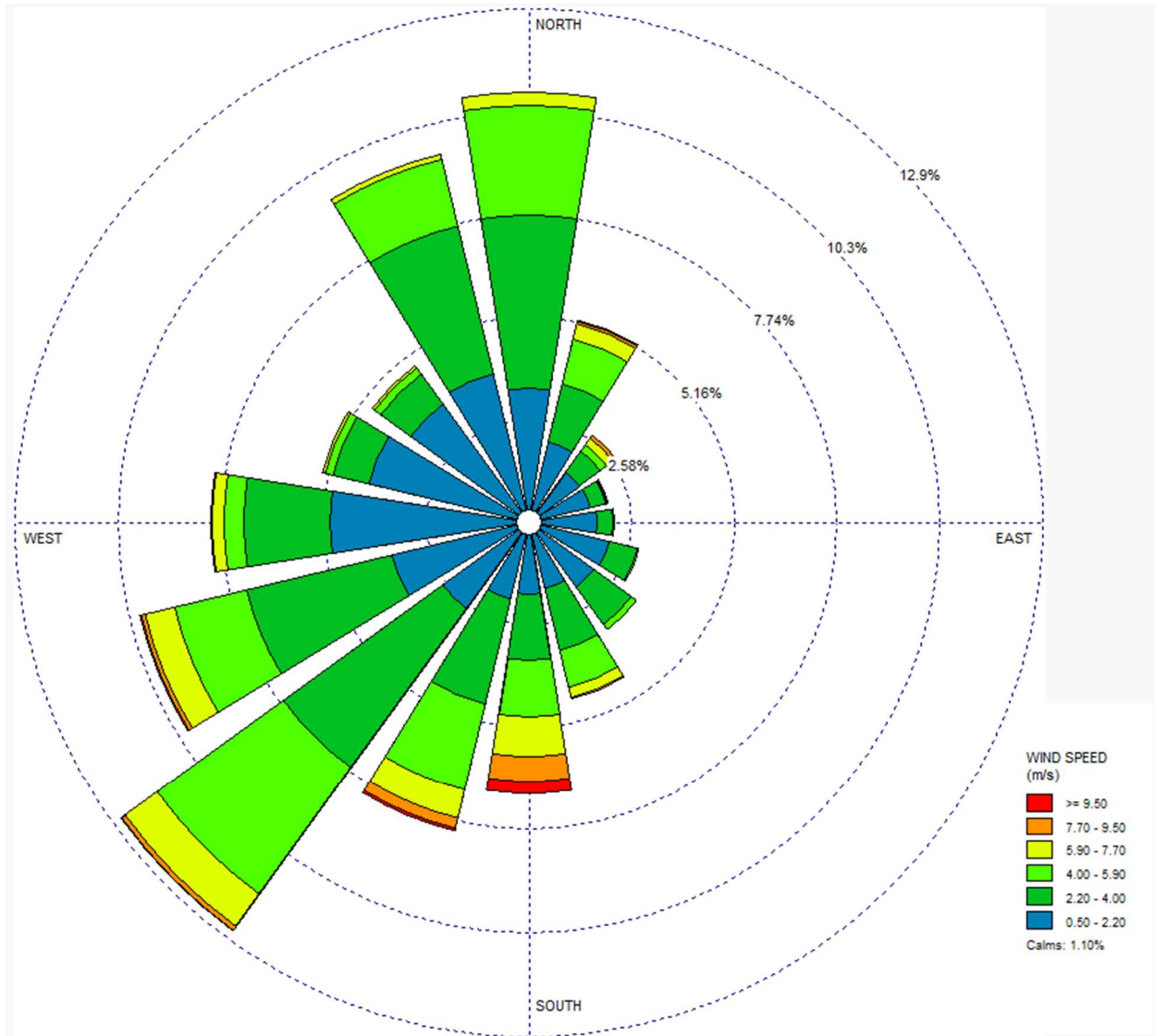
Yellow highlighted entries are the five years being used in AERMOD.

For this analysis, 16 equal sectors are used. The months of December to February will be assumed as “winter”, March to May will be assumed as “spring”, June to August will be assumed as “summer”, and September to November will be assumed as “autumn”.

AERSURFACE will be run to generate monthly surface roughness, Bowen ratio, and noon-time albedo for each of the three moisture conditions.

The appropriate AERSURFACE surface parameters will then be entered into the AERMET Stage 2 processing. The meteorological data will be processed using the AERMET program to generate a surface (SFC) and vertical profile (PFL) meteorological file for use in AERMOD.

**Figure 3-4: McMinnville Airport Wind Rose**



### 3.4 Land Use Determination

AERMOD allows for the choice of rural or urban dispersion conditions around the source location, which depends upon the land use characteristics within 3 kilometers of the facility (as per Appendix W to 40 CFR Part 51, section 7.2.1.1). Following Auer (1977), if more than 50% of the land use is industrial, commercial, or developed residential, then these areas are designated as urban. All other types of land use are considered rural. The most objective approach is to use the 2016 NLCD land cover classification data (the same data set as used in AERSURFACE) and designate the “Developed Intensity” areas (IDs 22, 23 & 24) as urban based on Auer’s classification. These classes are:

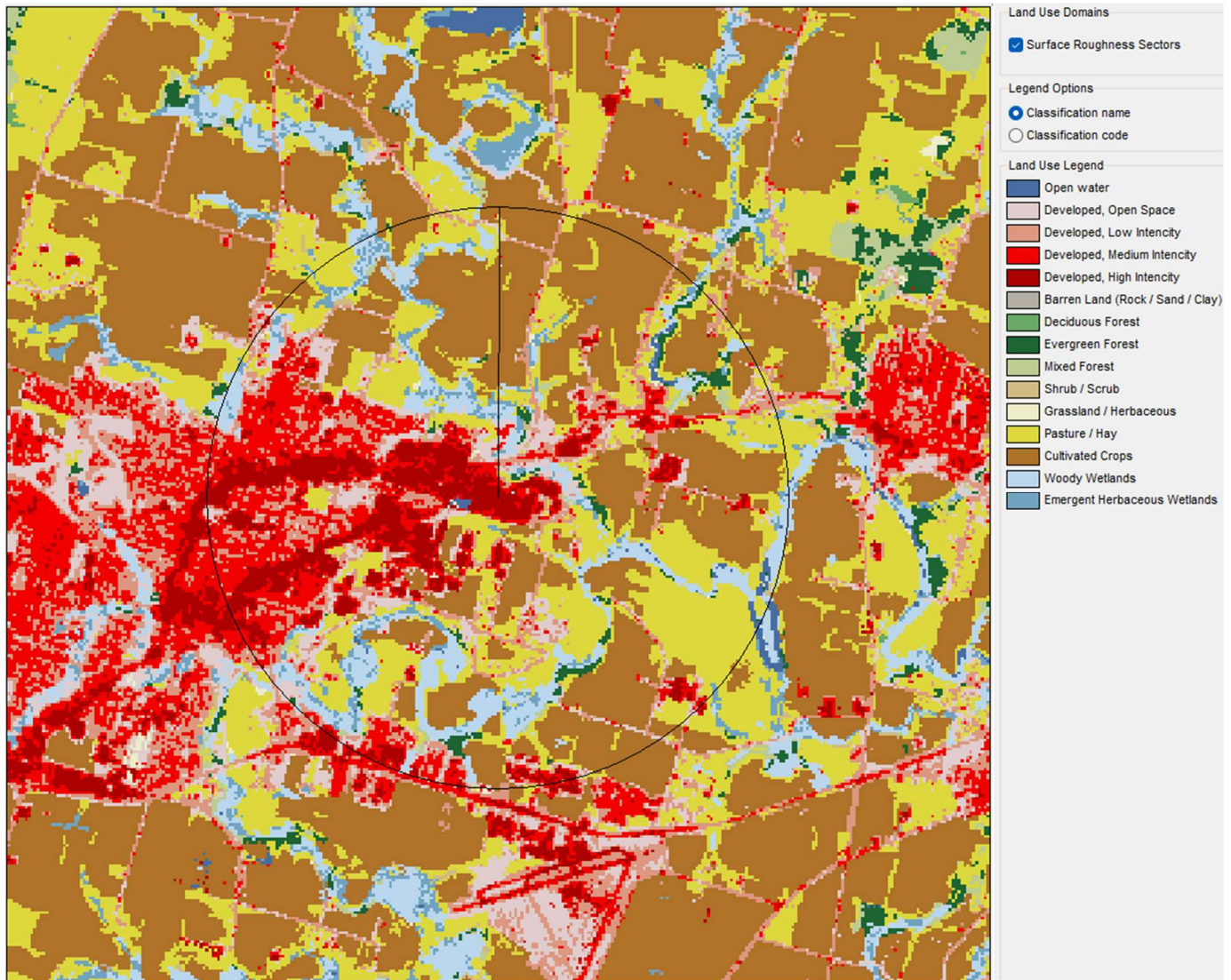
- Developed, Low Intensity (NLDC Code 22) - areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 20 to 49 percent of total cover. These areas most commonly include single-family housing units.
- Developed, Medium Intensity (NLCD Code 23) - This classification includes areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 50 to 79 percent of the total cover.
- Developed, High Intensity (NLCD Code 24) - This classification includes highly developed areas where people reside or work in high numbers. Examples include apartment complexes, row houses and commercial/industrial. Impervious surfaces account for 80 to 100 percent of the total cover.

Figure 3-5 and Table 3-5 show the land use around GRM. About 69% of land use within 3 km of the facility is classified as rural. Thus, rural dispersion coefficients will be used in AERMOD.

**Table 3-5: Rural and Urban Land Use Determination**

Cat	Starting Direction:	Count	Type	Percent
11	Open Water:	152	Rural	0.48%
21	Developed, Open Space:	1819	Rural	5.79%
22	Developed, Low Intensity:	3054	Urban	9.72%
23	Developed, Medium Intensity:	3804	Urban	12.10%
24	Developed, High Intensity:	2747	Urban	8.74%
31	Barren Land (Rock/Sand/Clay):	1	Rural	0.00%
42	Evergreen Forest:	377	Rural	1.20%
43	Mixed Forest:	137	Rural	0.44%
52	Shrub/Scrub:	52	Rural	0.17%
71	Grasslands/Herbaceous:	48	Rural	0.15%
81	Pasture/Hay:	6852	Rural	21.80%
82	Cultivated Crops:	9259	Rural	29.46%
90	Woody Wetlands:	2423	Rural	7.71%
95	Emergent Herbaceous Wetland:	701	Rural	2.23%
Total:		31426		
Percent Urban				31%
Percent Rural				69%

Figure 3-5: Land Use around CSR



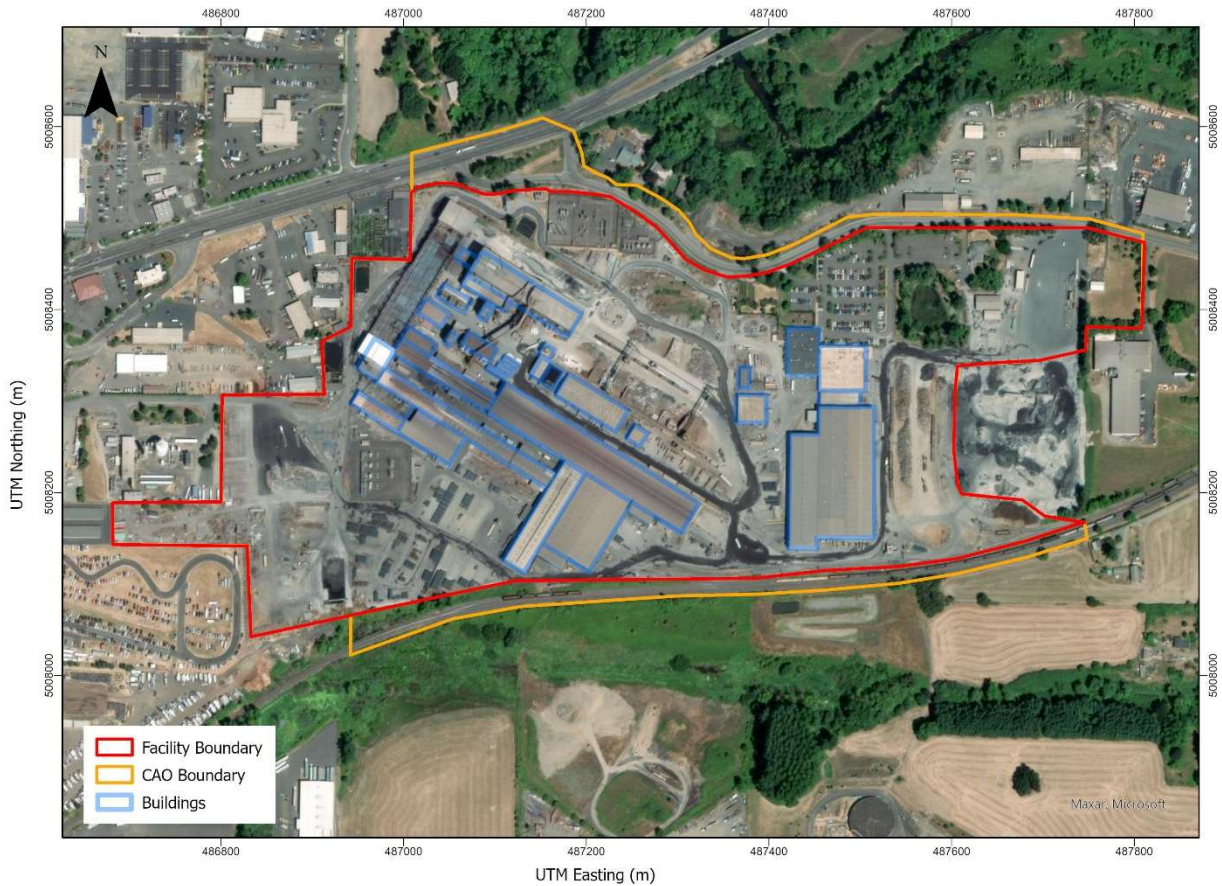
Black circle has a 3-km radius centered on the facility.



### 3.5 Receptor Grid

Figure 3-6 shows the CSRM facility boundary (red) and the CAO boundary (orange). Under the Cleaner Air Oregon Rules, section 340-245-0020 (36) indicates "nonresidential exposure location" means an exposure location outside the boundary of a source where people may reasonably be present for a few hours several days per week, possibly over a period of several years". Thus, the CAO boundary is expanded to cover adjacent areas where roads and rail tracks are since people are not likely to congregate there.

Figure 3-6. Property and CAO Boundary



The following receptor grid spacing will be used in the modeling analyses:

- 25-meter spacing along the CAO boundary,
- 25-meter spacing out to 200 m from the CAO boundary,
- 50-meter spacing out to 1.0 kilometers,
- 100-meter spacing out to 2.0 kilometers,
- 200-meter spacing out to 5.0 kilometers,
- 500-meter spacing out to 10.0 kilometers.

The CAO rules also require that schools and daycares also be identified. For schools and daycares, the following resources will be used:

- 
- Manual entries from Google search
  - Oregon Educational Locations database from Oregon GEOHub published September 2022<sup>4</sup>
  - Homeland Infrastructure Foundation -Level Data (HIFLD) Child Care Centers ArcGIS database published March 2022<sup>5</sup>

Each school or daycare will be explicitly identified with a receptor. Duplicate entries will be screened by merging sites that are within 100 m of each other. After that screening, there are 84 schools and daycares within 10 km of the facility with the closest school/daycare being 0.94 km from the facility. The list of schools and daycares is provided in a spreadsheet.

Receptor elevations for AERMOD will be determined using the AERMAP pre-processor. AERMAP uses United States Geological Survey (USGS) 1-degree and 7.5-minute Digital Elevation Model (DEM) files and a newer National Elevation Dataset (NED). AERMAP will be run to generate the receptor elevations using the NED data. The dataset will be downloaded using the Lakes Environmental AERMOD View program (version 10.0.0).

### 3.6 Exposure Locations

Each receptor is assigned an exposure type based on its land use designation using the Statewide 2023 Oregon Zoning data from the Oregon Department of Land Conservation and Development. This data layer is an element of the Oregon GIS Framework and is available through the Oregon Spatial Data Library. This feature class contains zoning data from 198 local jurisdictions. The data set has 55 zoning classifications, which are binned into three categories: residential, industrial/commercial, and open space.

A crosswalk between the statewide land use categories and the exposure types is shown in Table 4-2. The residential bin includes any category designating a residence. For example, mixed use commercial and residential areas and tribal reservation lands are defined as residential. The open space category includes parks, forests, beaches, and agricultural areas. Open space receptors will be evaluated for acute risk only. Public Lands category will be designated as a Child/Worker exposure type as per Oregon DEQ CAO guidance. School/Daycare receptors will also be evaluated for worker and child exposure.

Figures 3-7 and 3-8 show the near and far field land use around the facility, with receptor exposures. A spreadsheet with receptor and their exposure type is provided with this submittal.

---

<sup>4</sup> [https://geohub-oregon-geo.hub.arcgis.com/datasets/173bee2ad1f14f4ebc144e0a0b3ca6a7\\_0/explore](https://geohub-oregon-geo.hub.arcgis.com/datasets/173bee2ad1f14f4ebc144e0a0b3ca6a7_0/explore)

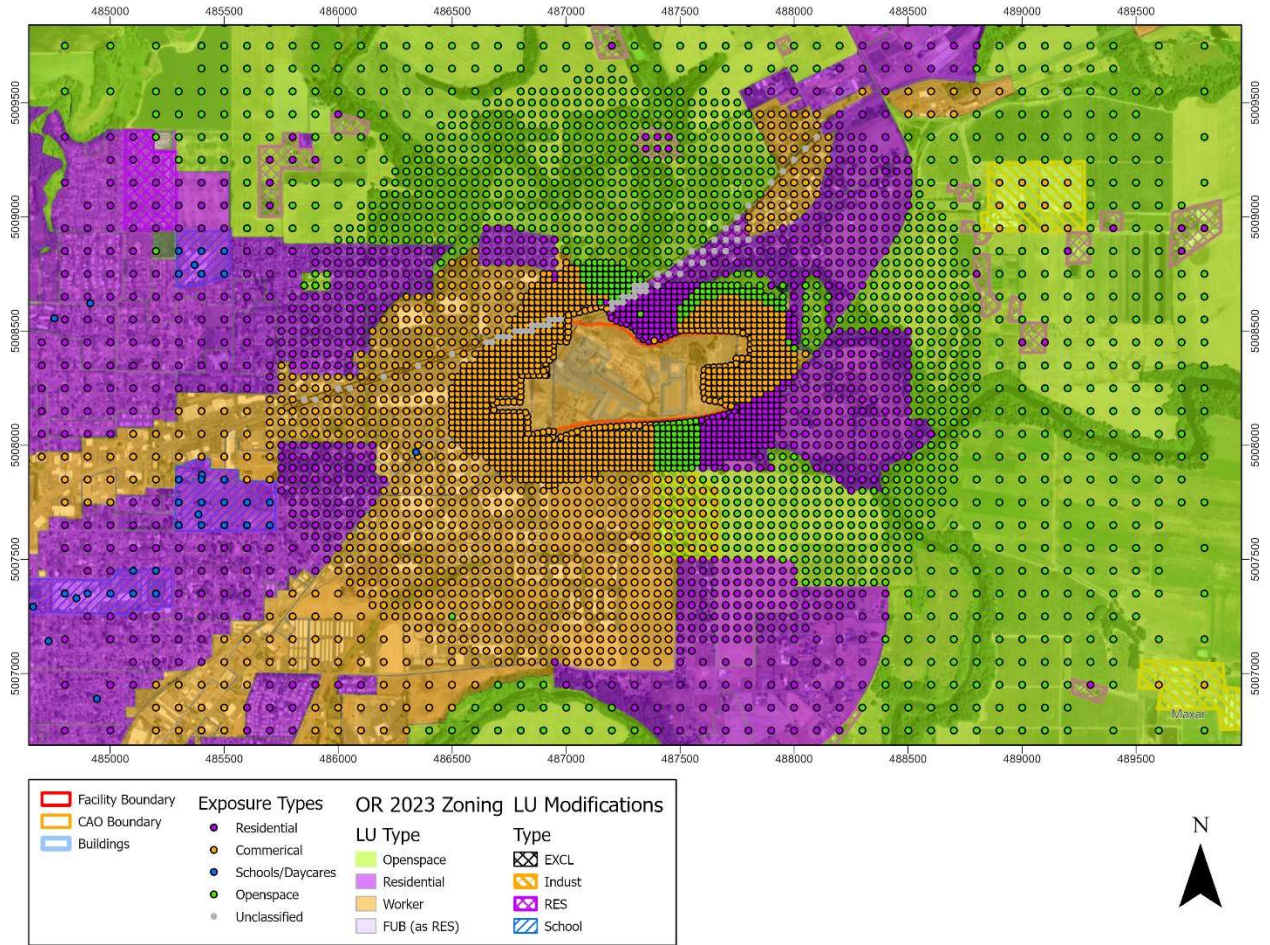
<sup>5</sup> <https://hifld-geoplatform.opendata.arcgis.com/datasets/child-care-centers/explore>

**Table 3-6: Statewide Land Use Crosswalk**

<b>LU Code</b>	<b>Description</b>	<b>CAO code</b>	<b>LU Code</b>	<b>Description</b>	<b>CAO code</b>
BD	Beaches and Dunes	Open space	MFL10	Marginal Farm Land 10+	Open space
CC	Commercial - Central	Worker	MHDR	Medium High-density Res.	Residential
CE	Coastal Estuarine	Open space	MLDR	Medium Low-density Res.	Residential
CEE	Combo equal emphasis	Worker	MUREH	Mixed-Use Com. & Res. Extremely High	Residential
CG	Commercial - General	Worker	MURH	Mixed-Use Com. & Res. High	Residential
CN	Commercial - Neighborhood	Worker	MURL	Mixed-Use Com. & Res. Low	Residential
CO	Commercial - Office	Worker	MURM	Mixed-Use Com. & Res. Medium	Residential
CPE	Combo with priority emphasis	Worker	MURMH	Mixed-Use Com. & Res. Med-high	Residential
CS	Coastal Shorelands	Open space	MURVH	Mixed-Use Com. & Res. V.High	Residential
EFU160	Exclusive Farm Use 160+	Open space	ND	No Data	Open space
EFU20	Exclusive Farm Use 20+	Open space	O	Other	Open space
EFU40	Exclusive Farm Use 40+	Open space	OSC	Open Space/Conservation	Open space
EFU80	Exclusive Farm Use 80	Open space	PF	Public & semi-public Uses	Child/Work
FF160	Mixed Farm-Forest 160+	Open space	PF80	Prime Forest 80	Open space
FF20	Mixed Farm-Forest 20	Open space	POS	Parks & Open Space	Open space
FF40	Mixed Farm-Forest 40	Open space	RC	Rural Commercial	Worker
FF80	Mixed Farm-Forest 80	Open space	RI	Rural Industrial	Worker
FOR	Federal Forest	Open space	RNG	Federal Range	Open space
FUD	Future Urban Development	Residential	RR1	Rural Residential 1 acre	Residential
HDR	High-density Res.	Residential	RR10	Rural Residential 10 acres	Residential
IC	Industrial Campus	Worker	RR2	Rural Residential 2-4 acres	Residential
IH	Industrial - Heavy	Worker	RR5	Rural Residential 5 acres	Residential
IL	Industrial - Light	Worker	SF80	Secondary Forest 80	Open space
IO	Industrial Office	Worker	UCRC	UC Rural Commercial	Worker
IRM	Indian reservation/tribal trust	Open space	UCRI	UC Rural Industrial	Worker
LDR	Low-density Res.	Residential	VHDR	Very High-density Res.	Residential
MA	Mineral and Aggregate	Worker	VLDR	Very Low-density Res.	Residential
MDR	Medium-density Res.	Residential			

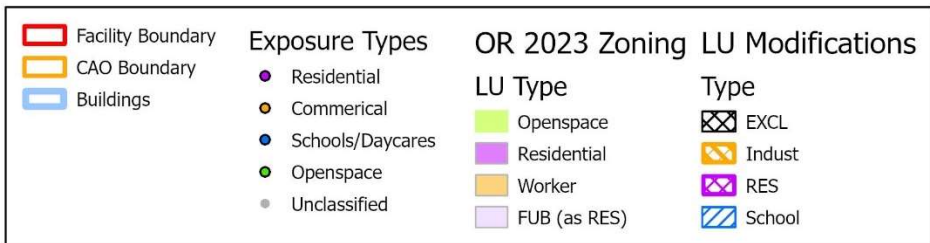
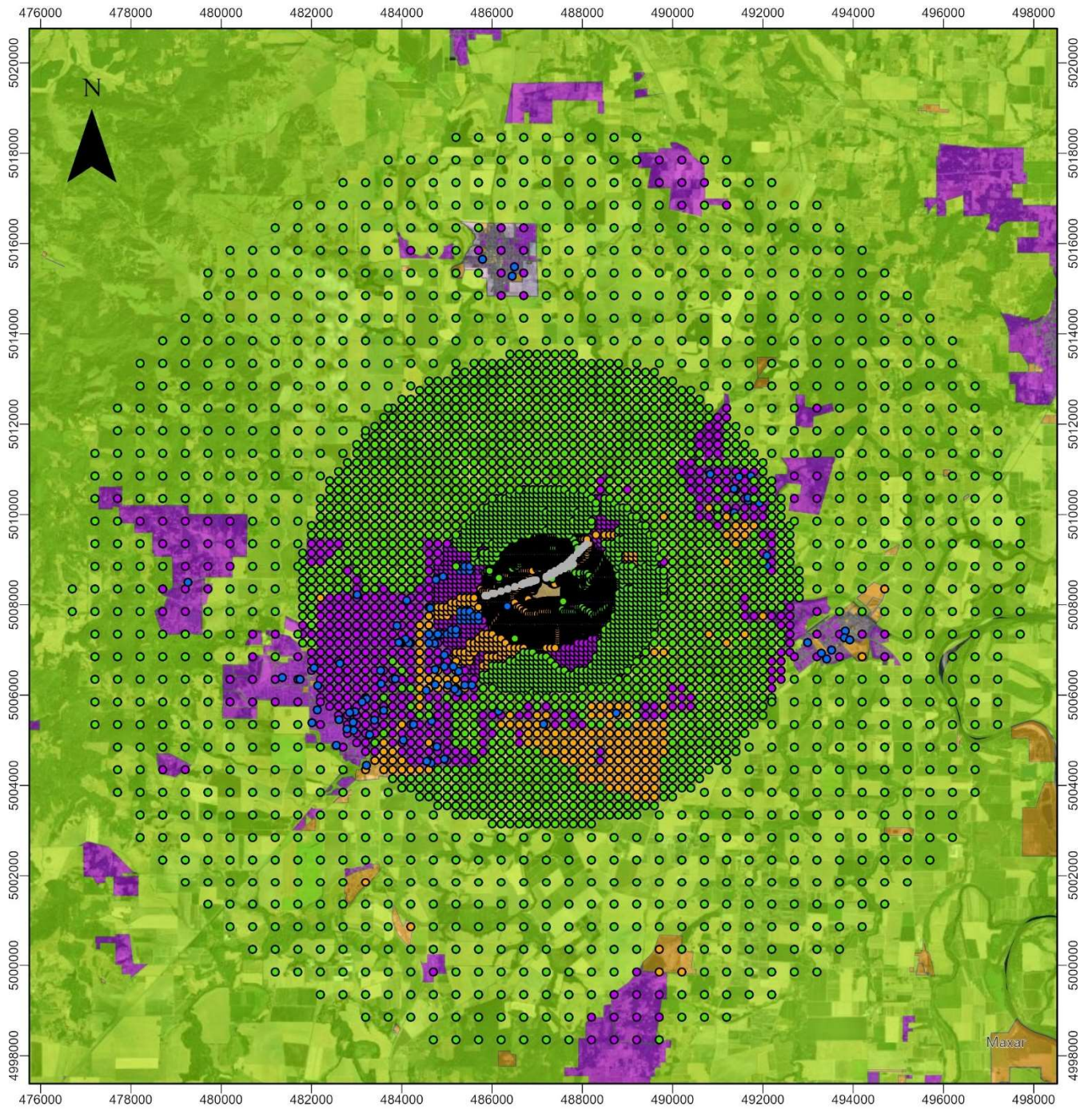


**Figure 3-7: Near Field Receptor Exposure Classes**





**Figure 3-8: Far Field Receptor Exposure Classes**



---

## 3.7 Model Execution

Each source will be run separately using an unit emission rate (e.g. 1 g/s). For SCRAP1 and SCRAP2 line sources, the unit emission rate is divided by the line length. For the area sources, the unit emission rate will be divided by the area. The model will be run, and the outputs will be plot files of the maximum 24-hour unit concentrations and the 5-year average annual unit concentrations at each receptor for each source. These plot files will then be used in the risk assessment for the risk calculations, which will be described in the Risk Assessment Work Plan, which will be submitted at a later date.