Cleaner Air Oregon Level-3 Risk Assessment

Sierra Pacific Industries
Seneca Sawmill Company
Eugene, Oregon

Prepared for:

Sierra Pacific Industries

April 1, 2024

BRIDGEWATER GROUP, INC.

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1.0 Introduction

Sierra Pacific Industries (SPI) owns and operates the Seneca Sawmill Company (SSC) located at 90201 Highway 99 North in Eugene, Oregon (source number 207459). SPI acquired the sawmill in 2021. SSC operates a sawmill, drying kilns, natural gas-fired boilers, and a variety of saws and wood-processing equipment. The facility is permitted to produce a maximum of 540,000,000 board feet of lumber per year. SSC is planning a three-year project to modify the existing facility starting in 2024, updating the sawmill and adding drying kilns. The modifications will entail reconfiguration of equipment and replacement of equipment that will enable the facility to produce lumber grades that the current mill layout is not configured to produce.

The site is shown in Figure 1-1 and is located at a latitude of N 44° 6' 46" and longitude of W123° 10' 39", which corresponds to Universal Transverse Mercator (UTM – NAD 83) Zone 10 coordinates of 485,800 meters Easting by 4,884,400 meters Northing. The site is about 135 acres and has an approximate elevation of 337 feet above sea level.

The Lane Regional Air Protection Agency (LRAPA) called SSC into Oregon's Cleaner Air Oregon (CAO) Program (OAR-340-245) on January 2, 2024. CAO is a health-based permitting program that regulates emissions of toxic air contaminants from facilities based on risk to nearby communities. CAO requires facilities to report toxic air contaminant emissions, assess potential health risks to people nearby and reduce toxic air contaminant risk if it exceeds specified risk action levels (RALs). The risk assessment procedure is defined under OAR-340-245-0050. Because SSC is planning to modify the existing facility starting in 2024, LRAPA is requiring the risk assessment to be based on the proposed reconfigured facility.

SSC submitted their first CAO emissions inventory (EI) on January 16, 2024. Although the EI have just been submitted and has yet to be approved by LRAPA, SSC submitted a modeling protocol and a risk assessment work plan (MPRAWP) on February 9, 2024 to keep the permit application process moving forward. LRAPA provided initial comments on the MPRAWP on February 16, 2024. SSC submitted revised MPRAWPs on March 1, 2024, and March 19, 2024. LRARA approved the MPRAWP on March 22, 2024. This document is the Level-3 Risk Assessment for the SSC facility.

Cleaner Air Oregon requirements for New and Reconstructed source are different than for Existing sources. For Cleaner Air Oregon purposes, Seneca Sawmill Company is an Existing source as that term is defined in OAR 340-245-0020(20). Based on OAR 340-245-0020(42), reconstructed means "an individual project is constructed at an air contamination source that, once constructed, increases the hourly capacity of any changed equipment to emit, and where the fixed capital cost of new components exceeds 50 percent of the fixed capital cost that would have been required to construct a comparable new source." SSC's proposed project to modify the sawmill involves installing new equipment and reconfiguring existing equipment, which significantly reduces the project cost compared to a greenfield facility, i.e., a "comparable new source." SPI prepared cost estimates for the proposed project and for a similar project as a greenfield. Our analysis demonstrates that the cost of this project is estimated at less than 50%

of the cost to construct a comparable new facility. The proposed project will not cause the facility to be deemed a Reconstructed source for the purposes of Cleaner Air Oregon.

Figure 1-1: Site Location

Seneca Sawmill
Boundary
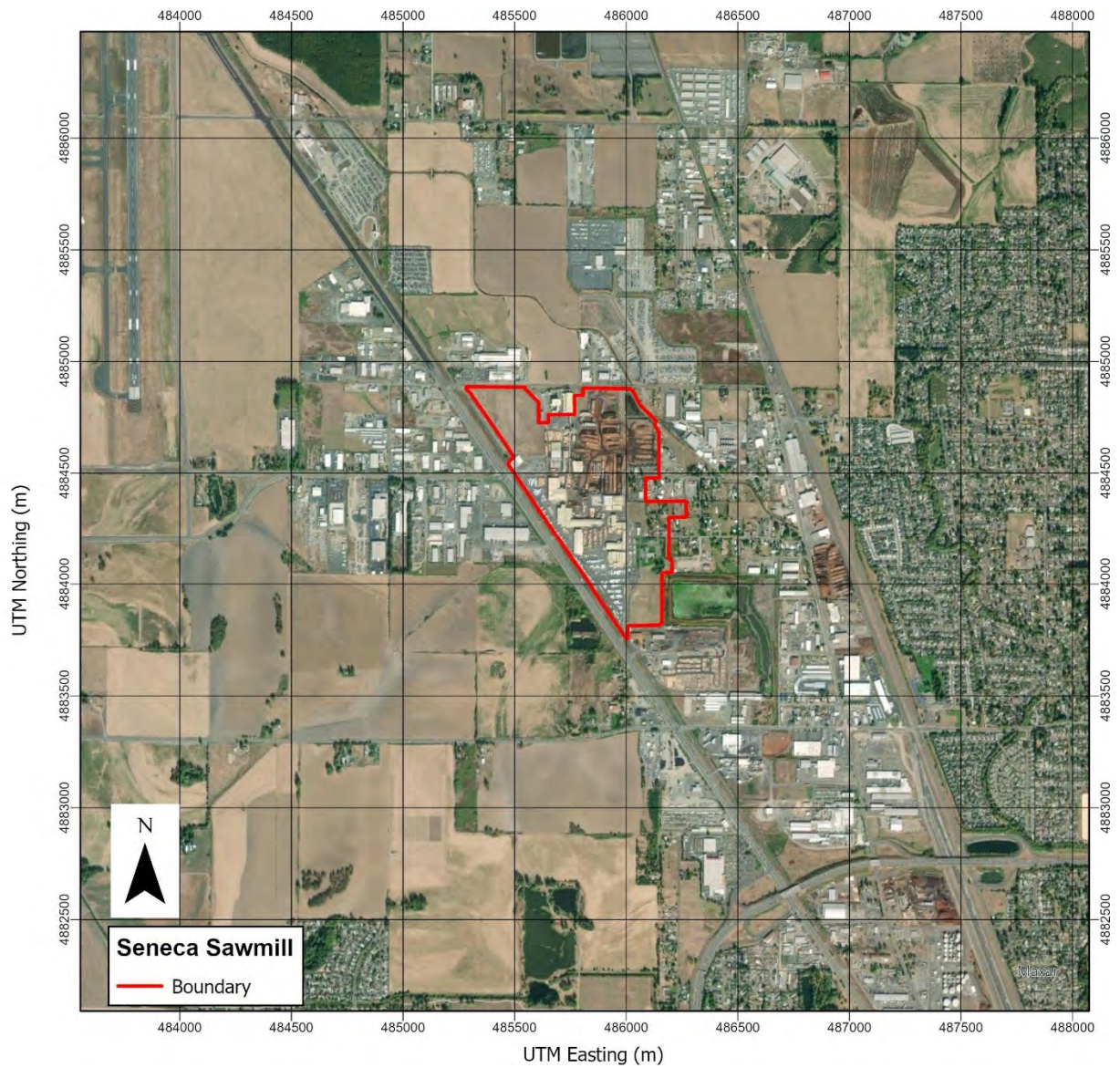
2.0 Source Description

2.1 Process Description

SSC takes raw timber and mills the wood into framing materials, shop lumber and appearance boards, heavy timbers, and other wood by-products (bark, biomass for energy production and wood chips for paper). Western Hemlock and Douglas fir logs are brought onsite by logging truck. The logs are unloaded and placed in the storage yard. Logs are then moved to the sawmill for processing. State-of-the-art computer technology individually analyzes each log so the mill can maximize the lumber it gets from each log. Once sized, the logs are debarked and cut. After the milling process, modern computer-controlled kilns dry the lumber produced in the sawmills. Finished products are shipped by truck or rail.

2.2 Toxic Emission Unit Descriptions

Figure 2-1 shows the conceptual site model for the CAO process. It shows the TEU labeling between the permit, EI, modeling, and risk assessment. The permit EU represents the sources identified in the current permit. A description of each TEU group is provided below. The EI provides greater detail. Figure 2-2 shows the location of each TEU. As per OAR 340-245-0020(5), emissions from the combustion of natural gas are segregated into a distinct Toxic Emission Units (TEUs) and the risk at each exposure location from those TEUs are determined separately and not included in the total facility risk.

Figure 2-1: CAO Conceptual Site Model

Inputs		Permit EU ID	Emission Unit Description	Control Type	CAO EI TEU	Model ID		Poll. Emitted		Exposure Pathway
NG	>	Boiler-3	50 MMBTU/hr Natural Gas Boiler		BOIL3	BOIL3	>	Gases, PM		NA
NG	>	Boiler-4	50 MMBTU/hr Natural Gas Boiler		BOIL4	BOIL4	>	Gases, PM		NA
NG	>	Boiler-5	50 MMBTU/hr Natural Gas Boiler		BOIL5	BOIL5	>	Gases, PM		NA
Saw Blades	>		Mill grinding	Baghouse	GRIND	GRIND	>	PM	>	Inhalation
		Kilns	12 Drying Kilns		KILNS					
Cut Lumber	>		Existing Dimension Kiln (4 bays)		DK	DK	>	Gases	>	Inhalation
			Relocated Kiln (8 bays)		NK	NK	>	Gases	>	Inhalation
Gasoline	>	GDF	Gasoline Dispensing Facility		GDF	GDF	>	Gases	>	Inhalation
Diesel	>	CIA-1	Diesel Fired 150 kW Emergency Gen		EGEN	EGEN	>	Gases, PM	>	Inhalation
Paint	>		Painting	Filter	PAINT	PAINT	>	Gases	>	Inhalation
Weld rods	>		Fabrication Shop Welding		WELD	WELD	>	PM	>	Inhalation
Metal	>		Fabrication Shop Metal Cutting	Water Table	MCUT	MCUT	>	PM	>	Inhalation

Figure 2-2: TEU Locations
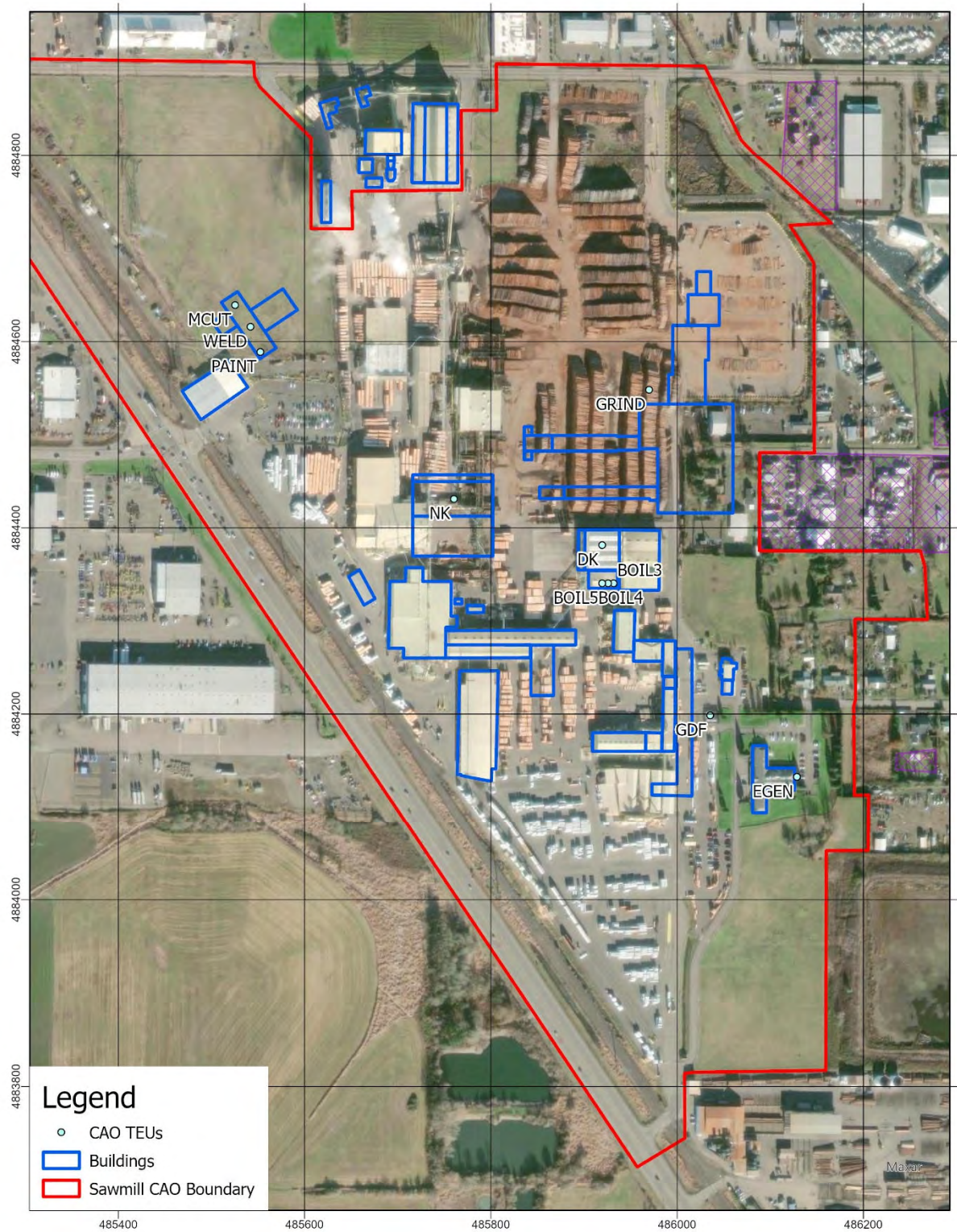
BOIL3, BOIL4, BOIL5: Natural Gas-fired Boilers

SSC is permitted for three (3) 50 MMBtu/hr Natural Gas-Fired Boilers. Only one boiler is currently installed and operating. Each boiler is capable of generating 40,000 pounds per hour of steam. These boilers are used to dry dimensional lumber if steam from the neighboring cogeneration facility (SSE) is not sufficient for current demand.

GRIND: Mill Grinding Cyclone and Baghouse

Grinding wheels are used to sharpen the mill's saw blades. The primary material emitted from the grinding process is typically the grinding wheel itself which is normally comprised of aluminum oxide. These emissions are controlled by a cyclone and baghouse (GRIND). The estimated emissions is based on the outlet concentration of 0.005 gr/dscf. The toxic air contaminant and hazardous air pollutant speciation is based on analysis of the material collected from processing the same materials by the existing Mill A grinding cyclone.

KILNS: Drying Kilns (DK and NK)

After the milling process, two modern computer-controlled kilns are used to dry the lumber produced in the sawmills. The existing kiln (DK) has 4 bays and the new kiln (NK) will have 8 bays. For each bay there are two lines of roof vents running down the length of the bay. HAP emission factors are from DEQ HAP and VOC Emission Factors for Lumber Drying, 2021, AQ-EF09 assuming a maximum kiln temperature of 200°F. For this assessment, the pollutant emission factor is set to the larger of the Douglas Fir or Hemlock emission factors. This requires determining which species controls the production level for both the annual and daily production rates. This is complicated by the VOC PSEL being set to 249 tpy, while the maximum annual production rate of 540,000 MBF/yr would result in 301 tpy of VOCs if only Douglas Fir were dried. In the Emissions Inventory stage, it was determined that Hemlock controlled the annual maximum emissions for all five TACs, while the daily maximum emissions are split between the species. The total kiln production rate is set to 540,000 MBF/yr, with the daily rate set to 1584 MBF/day Hemlock and 2715.4 MBF/day Douglas Fir.

GDF: Gasoline Dispensing Facilities

This EU represents the gasoline dispensing facility. Fuel is held in a 6,000 gallon and a 2,000 gallon tank.

EGEN: Emergency Generator

This EU represents the office building diesel emergency generator. The unit is a categorically insignificant activity. It could operate up to 4 hours/day and 100 hours/year, with a maximum fuel use of 11.7 gallons per hour.

PAINT: Paint Booth

This TEU includes toxics from paints used at the facility. SSC expects only limited painting in the new paint booth. Particulate emissions are controlled with overspray filtration and is exhausted out the side of the building. VOCs are assumed to be entirely emitted in the booth.

Emissions are based on SDS sheets for each product used.

WELD: Fabrication Shop Welding

This EU represents the truck and fabrication shop arc welding which occurs at the fabrication shop. Welding is assumed to only use the FCAW E71T weld rod. It is assumed these emissions are released into the main building and are not controlled.

MCUT: Fabrication Shop Metal Cutting

This EU represents metal cutting using a plasma table with accessory oxy-acetylene torch for cutting mild steel. Daily and annual maximum emissions are based on the worst-case settings. The worst-case consists of the maximum row of plasma cutting added to the maximum row of oxyfuel torch cutting because the unit cuts with either the plasma torch or the oxy-acetylene torch, not both simultaneously. Material under 2" thick is plasma cut, and material over 2" thick will be oxy-acetylene torch cut. The thicker plate will be cut less frequently and will be limited to less time in a day and during the year. Only mild steel is cut. The plasma table has a water reservoir directly below the cutting surface (e.g. considered semidry). It is assumed these emissions are released into the main building and are not controlled.

2.3 Source Characterization

Table 2-1 shows the source type and location for each TEU. All coordinates are in Universal Transverse Mercator (UTM) NAD 83 Zone 10.

The elevation slopes slightly upward from northwest to southeast with the fab shop area at approximately 114 m above sea level, the main campus at 115 m, and the southeast section at 115.5 m, based on the average elevations across the property.

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. The BPIP-Prime software package calculates the direction-specific building dimensions for input into AERMOD. Figure 2-3 shows the building footprints and Table 2-2 shows the building ID and heights.

Table 2-3 shows the source parameters. Point source parameters were provided by SPI.

Table 2-1: Modeled Source Types and Coordinates

| TEU	Description	Type	X(m)	Y(m)	Z(m)
BOIL3	NG Boiler #3	POINTCAP	485932	4884340	115
BOIL4	NG Boiler #4	POINTCAP	485926	4884340	115
BOIL5	NG Boiler #5	POINTCAP	485920	4884340	115
GRIND	Mill Grinding Cyclone and Baghouse	POINT	485970	4884548	115
PAINT	Paint Booth	POINT	485553	4884589	114
EGEN	Administrative Emergency Generator	POINT	486129	4884132	115.5
GDF	Gasoline Dispensing Facility	VOLUME	486036	4884199	115
WELD	Diesel Dispensing Facility	VOLUME	485542	4884616	114
MCUT	Fab Shop Welding Fugitives	VOLUME	485525	4884639	114
NK	New Kiln (8 bays)	BUOYLINE			115
	Line ID	X1 (m)	Y1 (m)	X2 (m)	Y2 (m)
	NK01	485721	4884448	485721	4884415
	NK02	485732	4884448	485732	4884415
	NK03	485743	4884448	485743	4884415
	NK04	485754	4884448	485754	4884415
	NK05	485764	4884448	485764	4884415
	NK06	485775	4884448	485775	4884415
	NK07	485786	4884448	485786	4884415
	NK08	485797	4884448	485797	4884415
DK	Existing Dimension Kiln (4 bays)	BUOYLINE			115
	Line ID	X1 (m)	Y1 (m)	X2 (m)	Y2 (m)
	DK01	485903	4884360	485936	4884360
	DK02	485903	4884371	485936	4884371
	DK03	485903	4884382	485936	4884382
	DK04	485903	4884392	485936	4884392

Figure 2-3: Building Locations
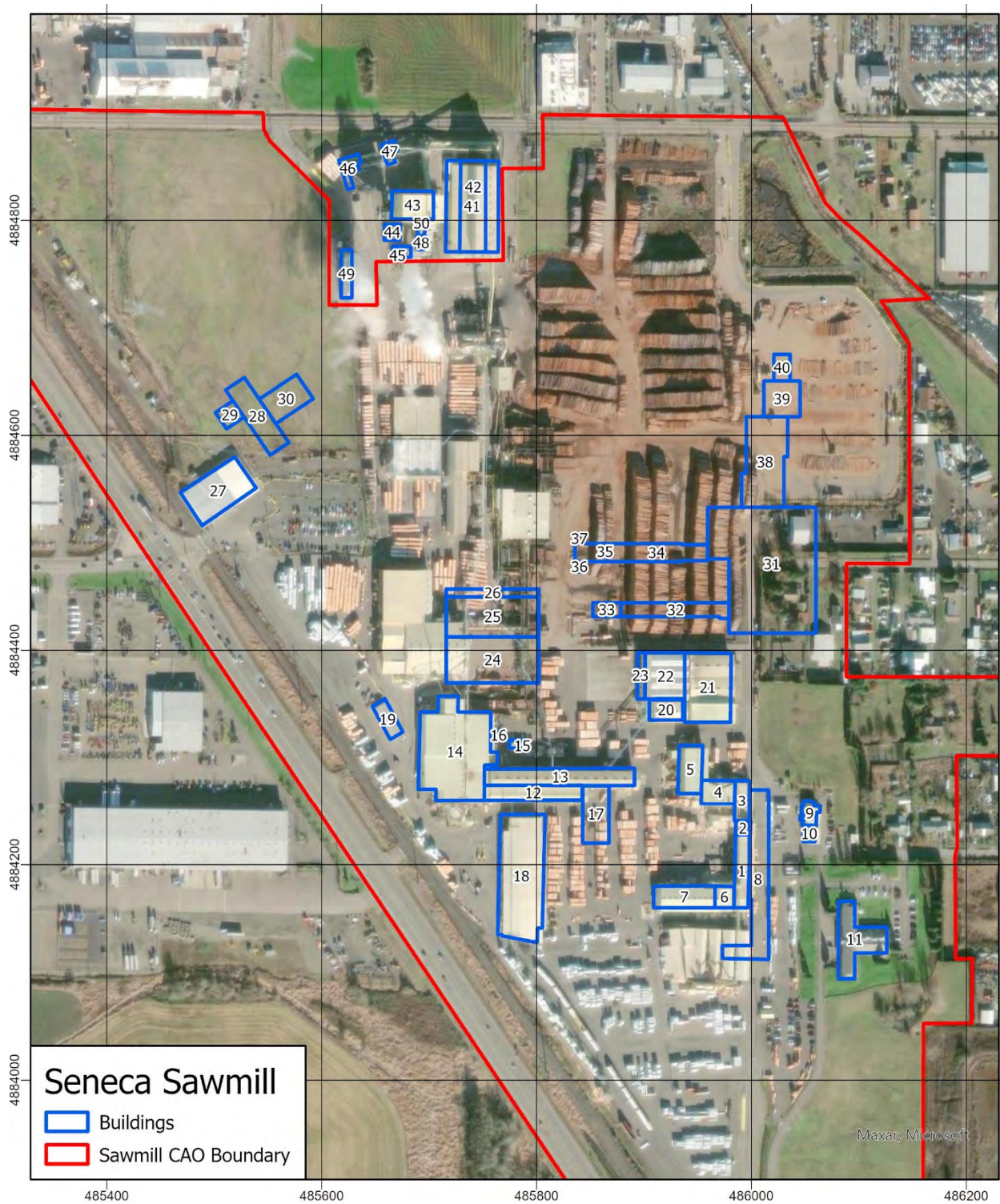
Table 2-2: Building IDs and Heights

Fig ID	Name	Desc	Hgt (ft)	Fig ID	Name	Desc	Hgt (ft)
1	BPTS	Big Planer Tray Sorter Bldg	37.3	27	PURCH	Purchasing Bldg	19.3
2	BPTE	Big Planer Tower Extension	42.3	28	FABC	Center Fab Shop	42.8
3	BPTI	Big Planer Trimmer Infeed Bldg	27.3	29	FAB1W	West Fab Shop	34.4
4	P1I	Planer No. 1 Infeed Bldg	28.3	30	FAB1E	Truck Shop	34.4
5	P1I	Planer No. 1 Infeed Bldg	28.3	31	NMAINSM	New Main Mill Bldg	46.5
6	BPS	Big Planer South	16.5	32	NLLSORT	New LL Sort	32.0
7	BPSS	Big Planer South Storage	37.3	33	NLLSTK	New LL Stacker	20.0
8	NSORTB	Big Planer Sort Bldg	37.3	34	NSORTS	New SM Sorter S	37.9
9	TruckS	Truck Shop	20.0	35	NSORTN	New SM Sorter N	30.8
10	TruckSC	Truck Shop Try Cover	21.5	36	NSTKS	New SM Stacker S	28.3
11	ADMIN	Admin Bldg	25.0	37	NSTKN	New SM Stacker N	28.3
12	MATS	Mill "A" Tray Sorter Bldg	34.7	38	NSBBH	New SM BH	51.4
13	MABS	Mill "A" Bin Sorter Bldg	44.2	39	NMERCH	New SM Merch	47.3
14	MA	Mill "A" Bldg	40.8	40	NBARK	New SM Barker	40.0
15	Comp	Compressor Bldg	17.0	41	FSB	SSE: Base of Fuel Building	39.9
16	MAOout1	Mill A Out 1	10.0	42	FSBUP	SSE: Upper part of Fuel Storage Building	81.1
17	NSTUDPK	Mill A Stud pk	44.2	43	BMAIN	SSE: CoGen Boiler Bldg	73.3
18	DOME	Dome Shed	41.2	44	WTB	SSE: Water Treatment Bldg	22.5
19	OFFICE	Mill Office	17.0	45	ESP	SSE: ESP	59.0
20	DIMBB	DIM Kiln Boiler Bldg	31.0	46	TD	SSE: TD	30.0
21	DimDS1	Dim Kiln Dry Shed	29.4	47	HS1	SSE: HS1	45.0
22	DimK4	Dim Kiln	28.4	48	BEC3	SSE: BEC3	41.0
23	DimKC14	Dim Kiln Ctrl	35.2	49	CT	SSE: CT	36.0
24	NKDS18	New Stud Kiln Dry Shed	29.4	50	BEC1	SSE: BEC1	62.0
25	NK18	New Stud Kiln	28.4	51	BEC2	SSE: BEC2	45.0
26	NKC18	New Stub Kiln Ctrl	35.2				

Table 2-3: Source Parameters

POINT	Hgt (m)	Temp (k)	ACFM (cfm)	Vel (m/s)	Dia(m)
BOIL3	12.2	423.2	14200	10.2	0.91
BOIL4	12.2	423.2	14200	10.2	0.91
BOIL5	12.2	423.2	14200	10.2	0.91
GRIND	6.1	Ambient	3,170	9.1	0.46
PAINT	13.1	294.3	30,000	15.8	1.07
EGEN	2.7	783.2	1,197	69.7	0.10
VOLUME	Hgt (m)	Sigma Y (m)	Sigma Z (m)		
GDF	2.4	1.6	1.1		
WELD	6.5	4.8	6.1		
MCUT	6.5	4.8	6.1		
BUOYLINE	Hgt (m)				
NK	8.6				
DK	8.6				

The WELD and MCUT volume sources are located in the new fabrication shop. Since these sources emit into the building, the dimensions of these sources is based on the size of the building. The release height is assumed to be ½ of the building height, the lateral dispersion coefficient (sigma y) is based on the building width divided by 4.3, and the vertical dispersion coefficient (sigma z) is based on the building height divided by 2.15 as per AERMOD guidance.
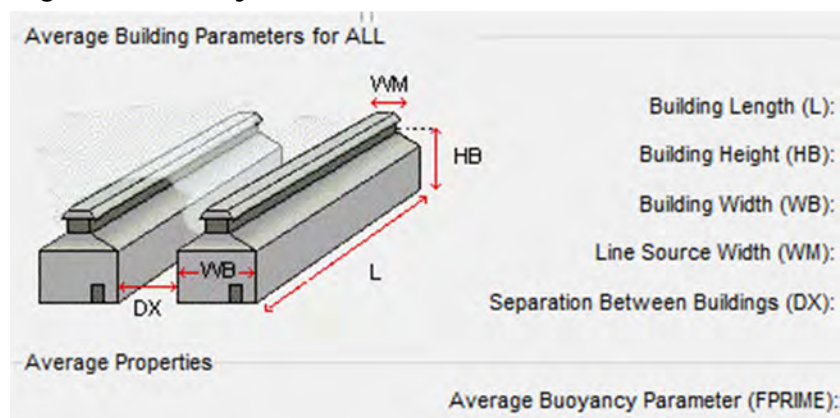
The gas dispenser facility (GDF) is made up of three tanks surrounded by a fence and a dispensing area. The height of source is set to the approximate height (8') of the fence around the tanks, the lateral dispersion coefficient (sigma y) is based on the approximate length of the center tank (7-m) divided by 4.3, and the vertical dispersion coefficient (sigma z) is based on the fence height divided by 2.15.

The kilns were modeled as sets of buoyant line sources. The buoyant line implementation in AERMOD is based on the buoyant line source algorithm from the Buoyant Line and Point Source (BLP) dispersion model[1] with very little modification and similar limitations. The parameters for the buoyant line source are entered via the BLPINPUT card. Figure 3-2 shows a schematic of the needed parameters.

The new kiln bays run north-south and the existing kiln bays run east-west. All kiln bays are configured the same, with two lines of vents on each bay, with one line of vents being used as intakes and the other line being used for exhaust. During drying, the exhaust is toggled between the two lines at a regular interval (approximately 90 minutes). Thus, the modeled line source was centered between the two line of vents.

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[1] 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.

Figure 2-4: Buoyant Line Source Characterization

Average Building Parameters for ALL

WM
HB
WB
DX
L

Building Length (L):

Building Height (HB):

Building Width (WB):

Line Source Width (WM):

Separation Between Buildings (DX):

Average Properties

Average Buoyancy Parameter (FPRIME):

The BLP algorithm assumes buoyant line sources are continuous lines that run the length of the building, thus, the building length (L) is set to the length of the line (33.21 m). The building height (BH) to the average roof height (8.64 m), building width (BW) is the width of a bay (10.76 m), line source width (WM) is the size of the vents (0.5 m), and the separation between buildings (DX) is zero as the bays are adjacent. The average buoyancy parameter (FPRIME) is given by:

$$\text{FPRIME } (m^4/s^3) = g \, (L \, W_m \, w) \, (T_s - T_a)/T_s$$

where:

g = acceleration of gravity (9.81 m/s^2)
L = line source length (m)
W_m = line source width (m)
w = exit velocity (m/s)
Ts = exit temperature (°K)
Ta = ambient air temperature (°K)

Note that the expression (L W_m w) is equal to the exhaust volume (V) out of the kiln. For the kilns, the following values were used:

V = 58,800 ACFM/kiln (Vendor specification) = 27.75 m^3/s
Ts = 185 °F = 358.15 °K (lower bound of operating conditions)
Ta = 80.8 °F = 300.26 °K (5-year average of highest daily average temperature)
FPRIME = 9.81 * 27.75 * (358.15-300.26)/358.15 = 43.95 m^4/s^3

2.3 Compounds Emitted

Table 2-4 shows the toxics air pollutants emitted from the facility, 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 2-4: Compounds emitted from SSC

CAS	Pollutant	Type	EL,MP	TBACT RAL
75-07-0	Acetaldehyde	Volatile	-	HI3
107-02-8	Acrolein	Volatile	-	HI5
7429-90-5	Aluminum and compounds	Particulate	-	HI5
7664-41-7	Ammonia	Volatile	-	HI3
7440-36-0	Antimony and compounds	Particulate	-	HI3
7440-38-2	Arsenic and compounds	Particulate	Y	HI3
71-43-2	Benzene	Volatile	-	HI3
7440-41-7	Beryllium and compounds	Particulate	-	HI3
106-99-0	1,3-Butadiene	Volatile	-	HI3
7440-43-9	Cadmium and compounds	Particulate	Y	HI3
18540-29-9	Chromium VI, chromate and dichromate particulate	Particulate	Y	HI3
7440-48-4	Cobalt and compounds	Particulate	-	HI3
7440-50-8	Copper and compounds	Particulate	-	HI3
110-82-7	Cyclohexane	Volatile	-	HI3
C200	Diesel Particulate Matter	Particulate	-	HI3
100-41-4	Ethyl benzene	Volatile	-	HI3
C239	Fluorides	Volatile	Y	HI3
50-00-0	Formaldehyde	Volatile	-	HI3
110-54-3	Hexane	Volatile	-	HI3
7647-01-0	Hydrochloric acid	Volatile	-	HI3
98-82-8	Isopropylbenzene (Cumene)	Volatile	-	HI3
7439-92-1	Lead and compounds	Particulate	Y	HI3
7439-96-5	Manganese and compounds	Particulate	-	HI3
7439-97-6	Mercury and compounds	Particulate	Y	HI3
67-56-1	Methanol	Volatile	-	HI3
91-20-3	Naphthalene	Volatile	Y	HI3
C365	Nickel compounds, insoluble	Particulate	-	HI3
C401	Polycyclic aromatic hydrocarbons (PAHs)	Volatile	Y	--
56-55-3	Benz[a]anthracene	Volatile	-	--
50-32-8	Benzo[a]pyrene	Volatile	Y	HI3
205-99-2	Benzo[b]fluoranthene	Volatile	-	--
191-24-2	Benzo[g,h,i]perylene	Volatile	-	--
207-08-9	Benzo[k]fluoranthene	Volatile	-	--
218-01-9	Chrysene	Volatile	-	--
53-70-3	Dibenz[a,h]anthracene	Volatile	-	--
206-44-0	Fluoranthene	Volatile	-	--
193-39-5	Indeno[1,2,3-cd]pyrene	Volatile	-	--
123-38-6	Propionaldehyde	Volatile	-	HI5
7782-49-2	Selenium and compounds	Particulate	-	HI3
7631-86-9	Silica, crystalline (respirable)	Particulate	-	HI5
108-88-3	Toluene	Volatile	-	HI3
526-73-8	1,2,3-Trimethylbenzene	Volatile	-	HI3
95-63-6	1,2,4-Trimethylbenzene	Volatile	-	HI3
108-67-8	1,3,5-Trimethylbenzene	Volatile	-	HI3
7440-62-2	Vanadium (fume or dust)	Particulate	-	HI3
1330-20-7	Xylene (mixture), including m-xylene, o-xylene, p-xylene	Volatile	-	HI3

CAS	Pollutant	Type	EL,MP	TBACT RAL
Compounds emitted without RBC's				
540-84-1	2,2,4-Trimethylpentane			
91-57-6	2-Methyl naphthalene			
83-32-9	Acenaphthene			
208-96-8	Acenaphthylene			
120-12-7	Anthracene			
1309-64-4	Antimony trioxide			
7440-39-3	Barium and compounds			
192-97-2	Benzo[e]pyrene			
86-73-7	Fluorene			
78-79-5	Isoprene, except from vegetative emission sources			
1313-27-5	Molybdenum trioxide			
108-38-3	m-Xylene			
95-47-6	o-Xylene			
198-55-0	Perylene			
85-01-8	Phenanthrene			
C504	Phosphorus and Compounds			
106-42-3	p-Xylene			
7440-22-4	Silver and compounds			
7440-28-0	Thallium and compounds			
7440-66-6	Zinc and compounds			
1314-13-2	Zinc oxide			

3.0 Modeling Protocol

This section is a modeling protocol and is intended to outline the assumptions and methodologies that were used in an air quality analysis for calculate 24-hour and annual risk values for each TEU for use in the Risk Assessment Work Plan (Section 4).

3.1 Model Selection

Air quality dispersion modeling was conducted to simulate the downwind transport of toxic air contaminants emitted by all the existing TEUs at the facility. The analysis estimated 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 modeling was performed using the following version for AERMOD and all preprocessors:

- AERMOD: 23132
- BPIP: 04274
- AERMAP: 18081

AERMOD modeling was 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 were also incorporated.
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3.2 Meteorological Data

For this analysis, five-years (2017-2021) of Eugene Airport hourly meteorological data were used. These data were processed by LRAPA. LRAPA used Version 21112 of AERMET to process the data, including the Adjust U-star option. A windrose for the KEUG data set is shown in Figure 3-1.

Figure 3-1: Eugene Airport Wind Rose

Station #24221 - EUGENE/MAHLON SWEET ARPT, OR Dates: 1/1/2017 - 00:00 ... 12/31/2021 - 23:59
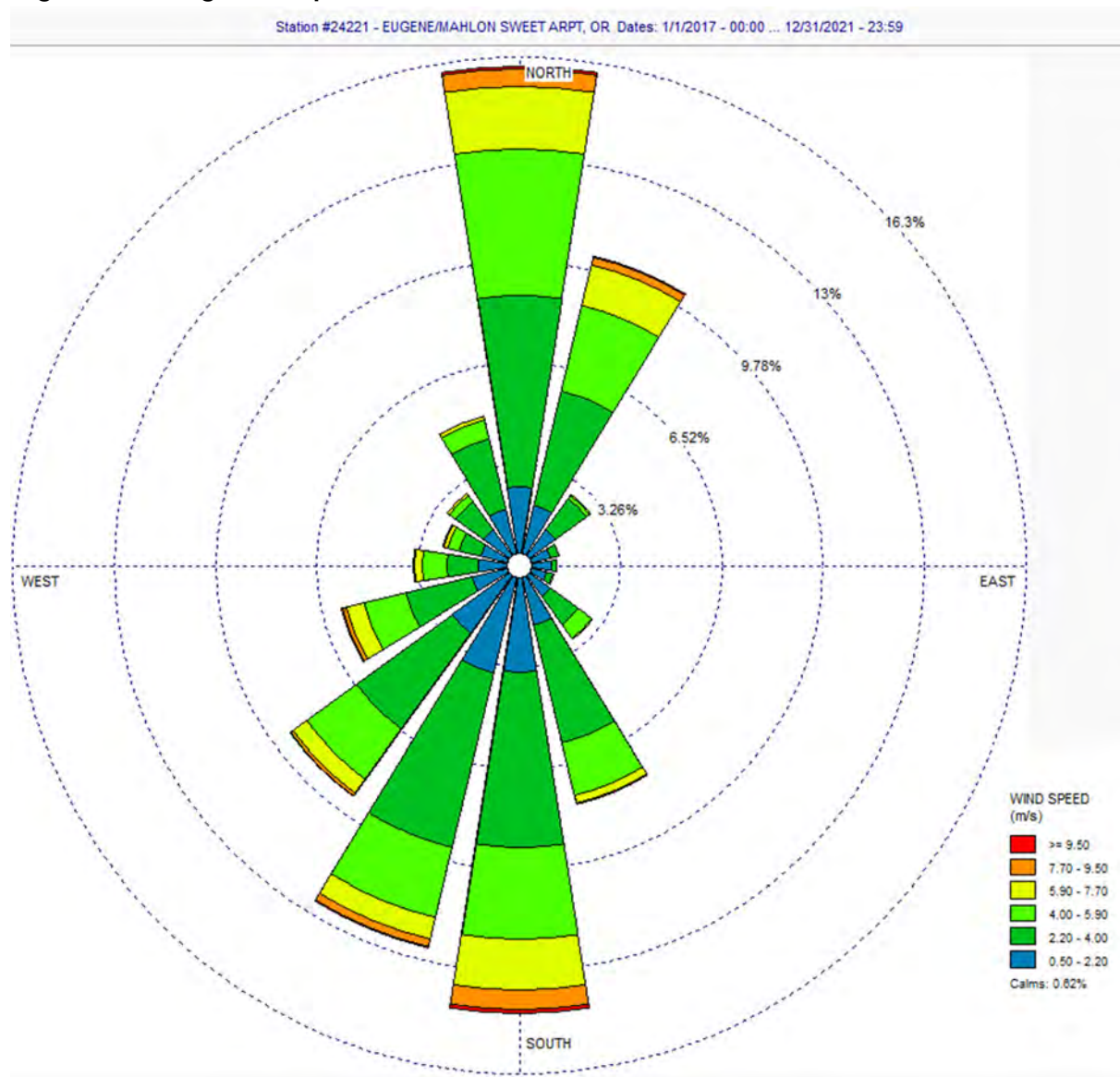
3.3 Land Use Determination

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 3-2 and Table 3-1 show the land use around SSC. Just over 50% of landuse within 3 km of the facility is classified as urban. Thus, urban dispersion coefficients were used in AERMOD. This option requires a population estimate to account for the urban heat island effect. For this analysis, the City of Eugene population of 177,923 (2022) from the U.S. Census Bureau (https://www.census.gov/quickfacts/eugenecityoregon) was used.
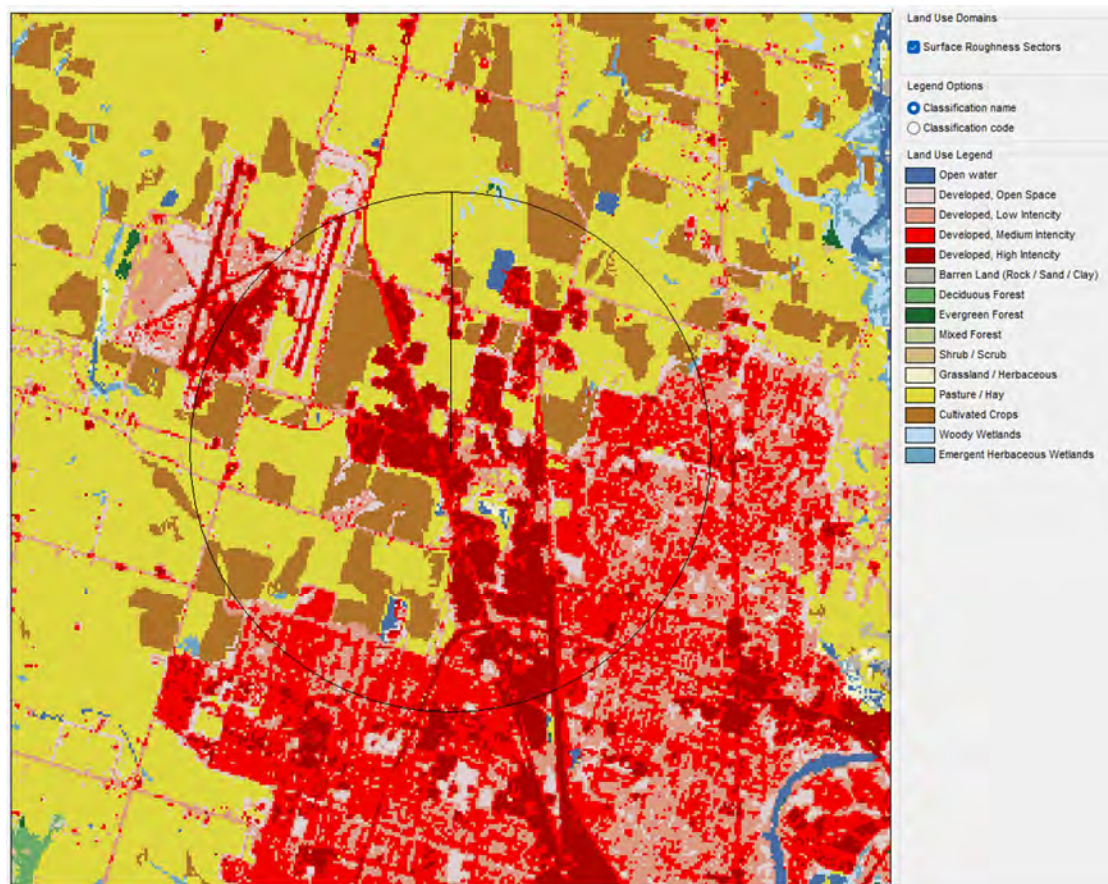
Figure 3-2: Land Use around SSC

Table 3-1: Rural and Urban Land Use Determination

Cat	Description	Count	Type	Percent
11	Open Water:	206	Rural	0.7%
21	Developed, Open Space:	1438	Rural	4.6%
22	Developed, Low Intensity:	4307	Urban	13.7%
23	Developed, Medium Intensity:	7109	Urban	22.6%
24	Developed, High Intensity:	4552	Urban	14.5%
31	Barren Land (Rock/Sand/Clay):	1	Rural	0.0%
71	Grasslands/Herbaceous:	38	Rural	0.1%
81	Pasture/Hay:	8664	Rural	27.6%
82	Cultivated Crops:	5026	Rural	16.0%
90	Woody Wetlands:	38	Rural	0.1%
95	Emergent Herbaceous Wetland:	37	Rural	0.1%
	Total:	31416		
	Percent Urban			50.8%

3.4 Receptor Grid

Following Oregon Department of Environmental Quality guidance, 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.

Additional receptors were placed at schools and daycares. For schools, a statewide GIS layer[2] was used to identify the location of schools within 10 kilometers of the facility. For daycares, three sources were used:

- Manual entries from Google search
- Oregon Child Care Centers ArcGIS Online database
- HIFLD Daycare ArcGIS Online database for OR.

Additional receptors were also placed to resolve residential locations that were not identified by the grid described above. In 2020, the Seneca cogeneration facility (SSE) conducted a CAO analysis and worked with LRAPA on this identification process. The additional receptors identified in the previous process were included in this analysis.

More discussion on the identification of receptors is provided in Section 4.2.

Receptor locations are provided in the UTM coordinate system. Elevations and hill heights were obtained using the AERMAP preprocessor and the 1/3-Arc-Second NED GEOTIFF elevation data. The results from AERMAP were used as input to the AERMOD input file for each modeling run.

Near-field and far-field receptor grids are shown in Figure 3-3 and 3-4.

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[2] https://spatialdata.oregonexplorer.info/geoportal/details;id=1270fe6e833f4d0eabacc71300069738
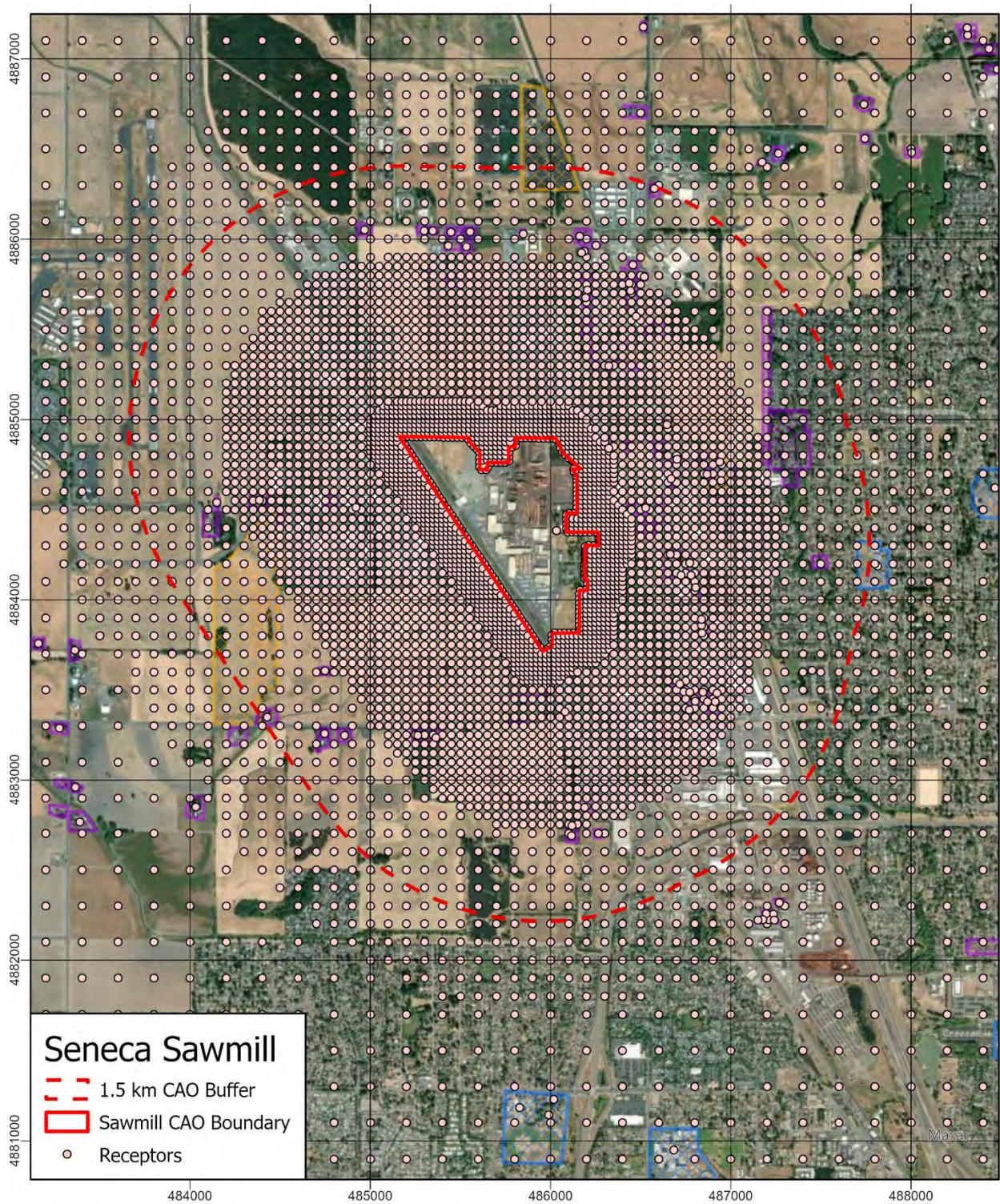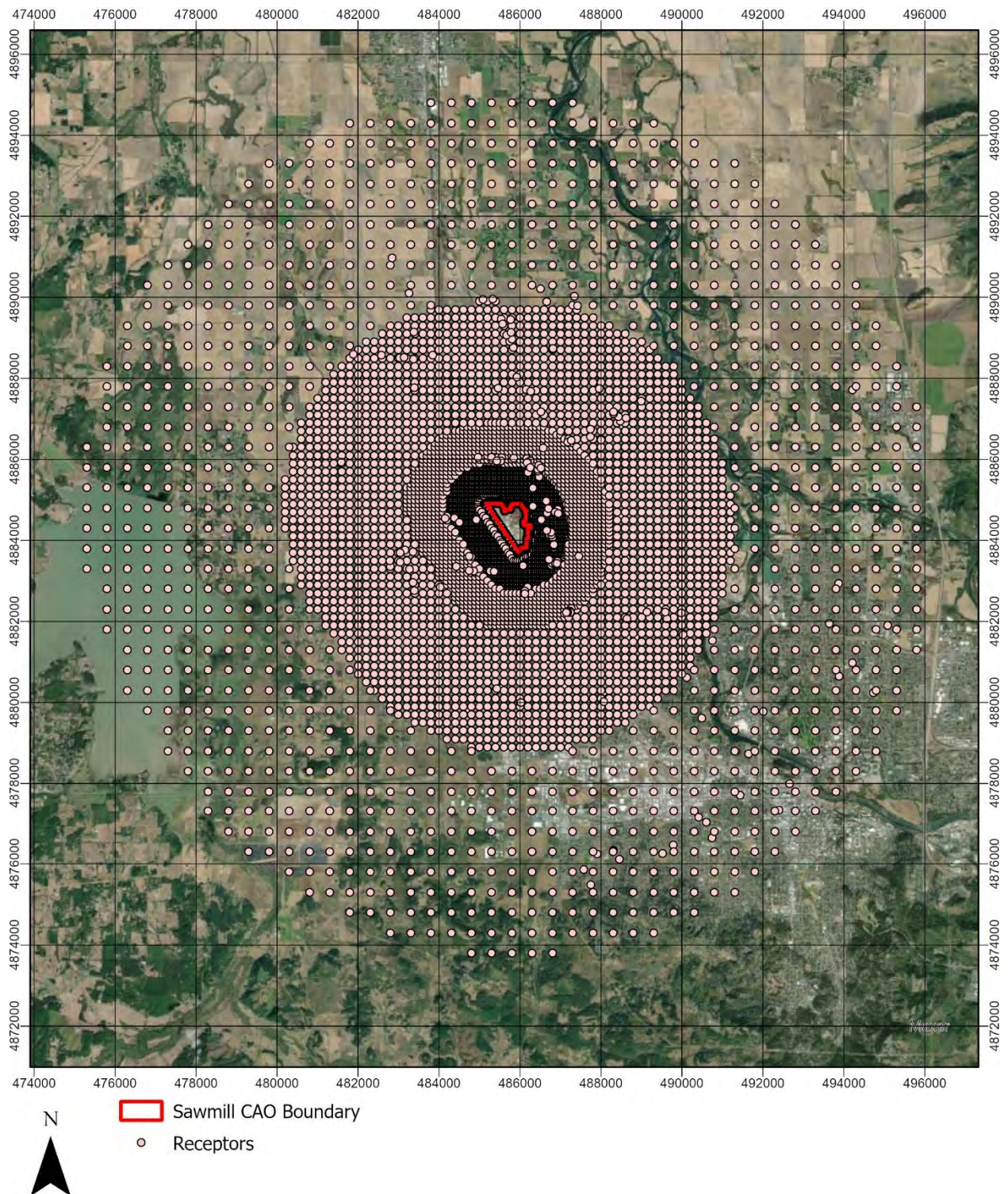
Figure 3-3: Near-Field Receptor Grid

Figure 3-4: Far Field Receptor Grid

N

▭ Sawmill CAO Boundary

○ Receptors

3.5 Model Execution

Each point and volume source was run separately using a 1 g/s unit emission rate. The line sources will be modeled a 1 g/s/m unit emission rate (e.g., 1 divided by the length of the line). The outputs are 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 were then used in the risk assessment for the risk calculations as described below.

This air quality analysis submittal includes the electronic modeling files, which include:

- AERMAP, BPIP, and AERMOD input and output files;
- Downwash files including building heights and locations; and
- Meteorological data.

4.0 Risk Assessment Work Plan

4.1 Methodology

Figure 4-1 shows the Level-3 Risk Assessment process. Using the CAO toxic air pollutant EI (e.g., AQ520 CAO spreadsheet), the 24-hr and annual average unit concentration files from AERMOD runs, the Risk Based Concentrations (RBCs), and the land use designations at each receptor, the chronic cancer, chronic non-cancer and acute hazard index risk were found at every receptor.

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Figure 4-1: Level-3 Refined Risk Assessment

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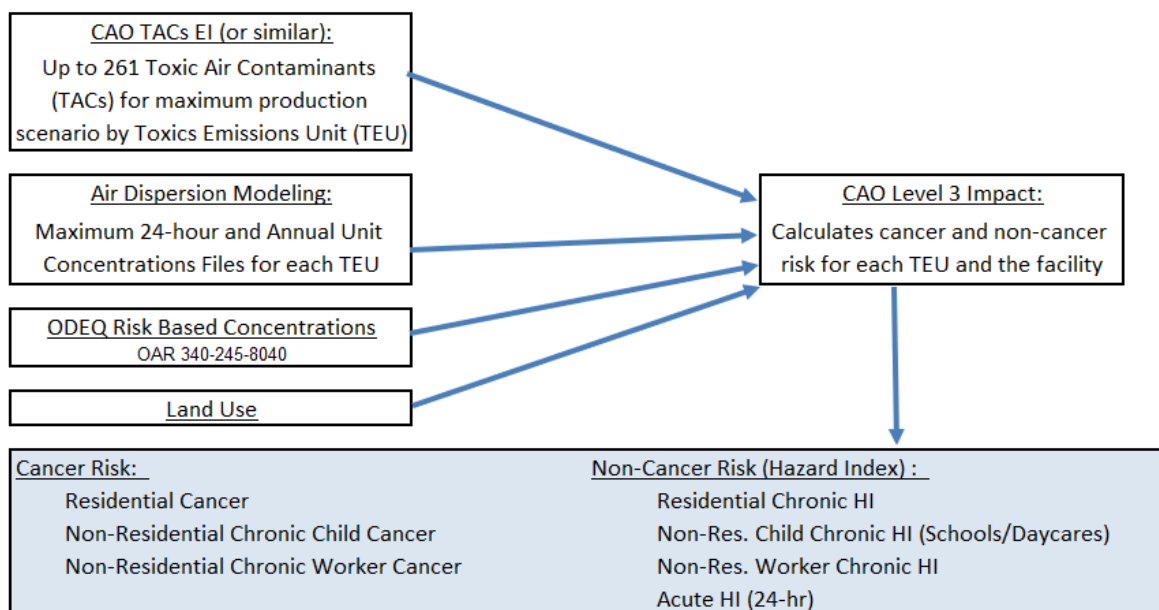
The land use classifications are applied to reach receptors around the facility to define their exposure class. The receptors, identified by class, are shown in Figure 4-2. Receptors exposure classes are defined as residential, non-residential child (schools/daycares), non-residential worker, open space, and excluded. The excluded class applies to receptors where the risk is not calculated, for example, along roads or highways or along the facility property line or train tracks where people will likely not congregate. Chronic exposure is only applicable to residential, non-residential child, and non-residential worker classes. The acute exposure is applied to all classes except the excluded class.

4.2 Exposure Locations

Each receptor is assigned an exposure type based on its land use designation. Two sources of land use data were used:

- The City of Eugene 2023 zoning land use layer from City of Eugene Mapping Hub. https://mapping.eugene-or.gov/datasets/Eugene-PWE::eugene-zoning-1/explore?location=44.052864%2C-123.095056%2C12.90)
- 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, including the City of Eugene. The data set has 55 zoning classifications, which are binned into three categories: residential, worker, and open space.

The City of Eugene land use layer was the primary layer. A crosswalk between the land use categories and the exposure types is shown in Table 4-1. All special areas in the layer are identified as Residential.

The 2023 statewide layer was used for areas outside the City of Eugene layer.   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 was evaluated for acute risk only.

For both layers, the Public Lands category were designated as a Worker exposure type as per Oregon DEQ CAO guidance.

The zoning dataset does not identify schools or daycares. For schools, a statewide GIS layer[3] was used to identify the location of schools within 10 kilometers of the facility. For daycares, three sources was used:

- o Manual entries from Google search
- o Oregon Child Care Centers ArcGIS Online database
- o HIFLD Daycare ArcGIS Online database for OR

Each school or daycare was explicitly identified with a receptor assigned a daycare/school exposure class. Both child and worker exposure were evaluated at these receptors. There are 188 schools and daycares within 10 km of the facility with the closest school/daycare 1.3 km from the facility. The list of schools and daycares is provided in a spreadsheet.

Next, the zoning dataset also does not identify residences located in industrial, farmland or forested areas. For these residences, a building footprint layer[4] from the City of Eugene was used, as it identifies whether a building is a residence or not. This review focused on areas within 1.5 kilometers of the facility.

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[3] https://spatialdata.oregonexplorer.info/geoportal/details;id=1270fe6e833f4d0eabacc71300069738

[4] https://mapping.eugene-or.gov/datasets/eugene-buildings-hub?selectedAttribute=EntryAgenc

Table 4-1: City of Eugene Land Use Crosswalk

Category	Description	Exposure
AG	Agricultural	OpenSpace
C-1	Neighborhood Commercial	Worker
C-2	Community Commercial	Worker
C-3	Major Commercial	Worker
E-1	Campus Employment	Worker
E-2	Mixed Use Employment	Worker
GO	General Office	Worker
I-2	Light-Medium Industrial	Worker
I-3	Heavy Industrial	Worker
NR	Natural Resource	OpenSpace
PL	Public Land	Worker
PRO	Park, Recreation, and Open Space	OpenSpace
R-1	Low-Density Residential	RES
R-2	Medium-Density Residential	RES
R-3	Limited High-Density Residential	RES
R-4	High-Density Residential	RES
S-**	Special Areas	RES

Table 4-2: Statewide Land Use Crosswalk

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

* Future Urban Development (FUD) is agricultural lands that are within the urban growth boundary, that slated for future development.

A detailed review of the land uses and exposure assignments was made for areas within 1.5 kilometers of the facility. Figure 4-2 shows the land use around the facility, with receptor exposure types and areas of modified land use. The dashed red line identifies the area within 1.5 km of the facility. Under OAR 340-245-0020 (definitions), exposure locations are identified based on allowed land use zoning unless the owner wants to demonstrate that an area is not being used in the manner allowed by the land use zoning at the time the modeling is to be performed. Thus, if there is evidence of a residence at receptor location, it was reclassified as residential despite the underlying land use. If a receptor was in a commercial area which bordered a residential area, and if the residential area was not adequately sampled by the receptor grid, the receptor was left unchanged to match the underlying land use and an additional receptor was added into the nearby residential area.

An additional receptor was placed on the cell tower building located just east of the existing kiln. This receptor was assigned an acute exposure type as the tower is infrequently visited.

A spreadsheet with receptor and their exposure type is provided with this submittal.

Figure 4-2: Receptor Exposure Classes
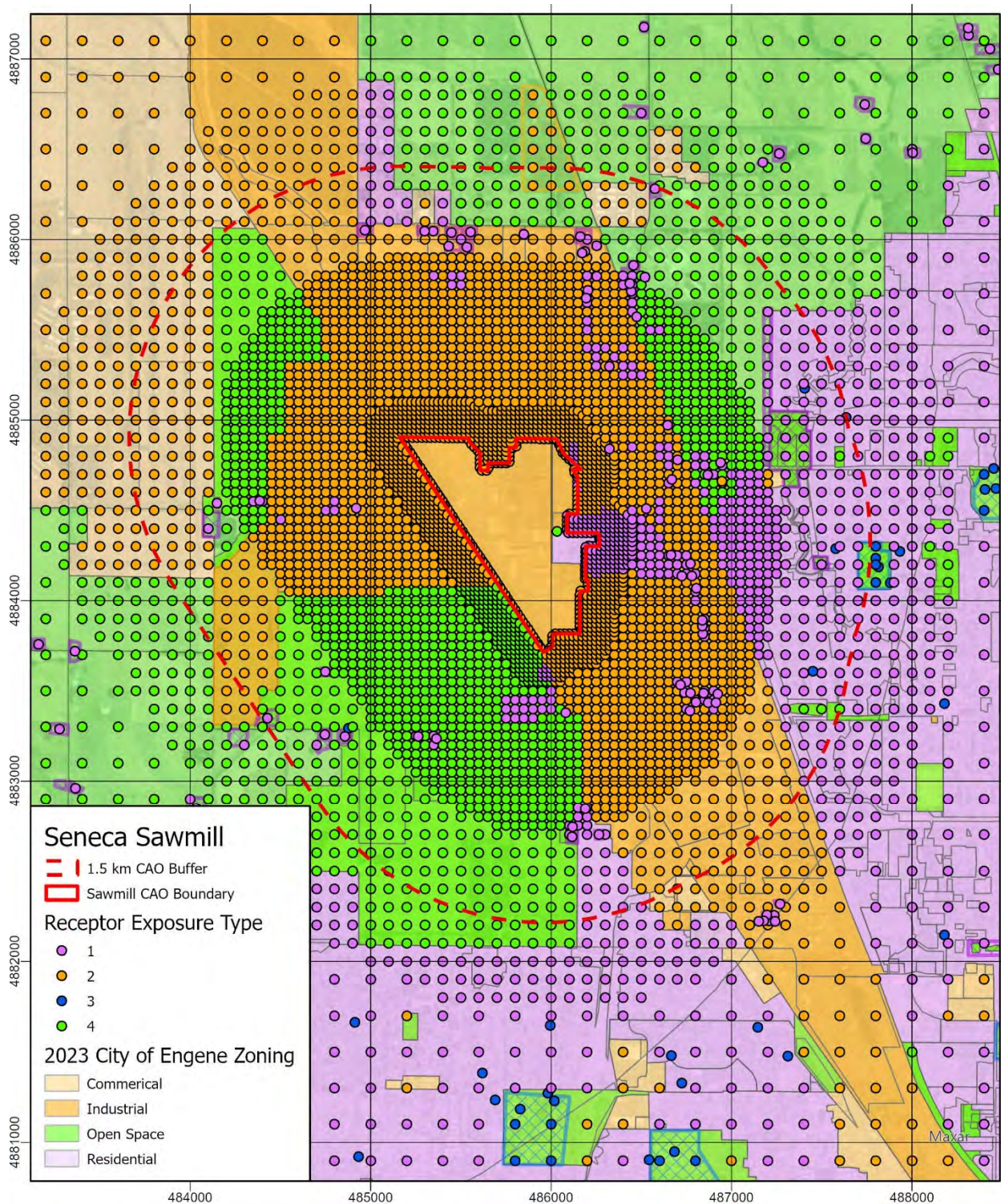
4.3 Risk Calculation Methodology

Using the 24-hr and annual emission rates from CAO toxic air contaminant emissions inventory (Provided in Appendix A), the 24-hr and annual average concentration files from AERMOD runs, the RBCs (Table 4-3), and the exposure designations at each receptor, the chronic cancer, chronic non-cancer and acute hazard index risk will be found at every receptor. The risk at each receptor from source ($R_{r,s}$) is given by:

$$R_{r,s} = \chi_{r,s}\, C \sum_p \frac{Q_p\, TO_{p,o}}{RBC_{p,L(r)}}$$

where $\chi_{r,g}$ is the unit concentration for source s at receptor r, C is a constant to convert g/s to either lbs/day or lbs/year, Q_p is the pollutant emission rate from the CAO emission inventory (AQ520), $TO_{p,o}$ is the target organ factor (0 or 1) for pollutant p and organ o, and $RBC_{p,L(r)}$ is the RBC for pollutant p and exposure type L at the receptor r. For cancer risk, the target organ factor is always 1. For non-cancer risk, different pollutants impact different parts of the body so the non-cancer risk is not additive. When applied, the target organ factor is set to 1 for pollutants that impact a particular organ and zero otherwise. The target organ analysis was done because the non-cancer risk exceeds the Source Permit Level. The analysis was conducted for the two highest target organ risks.

Each receptor has seven risk numbers for each source, as shown below:

1. residential chronic cancer risk
2. non-residential child chronic cancer risk
3. worker chronic cancer risk
4. residential chronic non-cancer risk
5. non-residential child chronic non-cancer risk
6. worker chronic non-cancer risk
7. acute risk

For the chronic risk values, the maximum of the three exposure types (residential, non-residential child, and worker) is identified and used for the risk comparisons. These final three risk values (chronic cancer, chronic non-cancer, and acute) are rounded[5] and compared to the existing source Risk Action Levels (RALs), which shown in Table 4-4.

If the facility non-cancer risk exceeds the non-cancer TBACT RAL of 3, then the Risk Determination Ratio (RDR) will be explicitly calculated. The RDR is the combined risk for HI3 chemicals/3 plus the combined risk for HI5 chemicals/5.   All compounds are HI3 compounds except Acrolein and Propionaldehyde, which are HI5 compounds.

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[5] Risk is rounded to one decimal place for comparison to the Source Permit Level. For comparison to other Risk Action Levels, risk is rounded off to a whole number. Values are rounded up if the last digit is 5 or greater, otherwise risk is rounded down. (OAR 340-245-0200.4)

Table 4-3: Compound RBCs

		Chronic Cancer			Chronic Non-Cancer			Acute
		Res	Child	Worker	Res	Child	Worker	
CAS	Pollutant	ug/m3	ug/m3	ug/m3	ug/m3	ug/m3	ug/m3	ug/m3
75-07-0	Acetaldehyde	0.45	12	5.5	140	620	620	470
107-02-8	Acrolein	--	--	--	0.35	1.5	1.5	6.9
7429-90-5	Aluminum and Compounds	--	--	--	5	22	22	--
7664-41-7	Ammonia	--	--	--	500	2200	2200	1200
7440-36-0	Antimony and Compounds	--	--	--	0.3	1.3	1.3	1
7440-38-2	Arsenic and compounds	0.000024	0.0013	0.00062	0.00017	0.0024	0.0024	0.2
71-43-2	Benzene	0.13	3.3	1.5	3	13	13	29
7440-41-7	Beryllium and compounds	0.00042	0.011	0.005	0.007	0.031	0.031	0.02
106-99-0	1,3-Butadiene	0.033	0.86	0.4	2	8.8	8.8	660
7440-43-9	Cadmium and compounds	0.00056	0.014	0.0067	0.005	0.037	0.037	0.03
18540-29-9	Chromium VI, chromate and dichromate particulate	0.000031	0.00052	0.001	0.083	0.88	0.88	0.3
7440-48-4	Cobalt and compounds	--	--	--	0.1	0.44	0.44	--
7440-50-8	Copper and compounds	--	--	--	--	--	--	100
110-82-7	Cyclohexane	--	--	--	6000	26000	26000	--
C200	Diesel particulate matter	0.1	2.6	1.2	5	22	22	--
100-41-4	Ethyl benzene	0.4	10	4.8	260	1100	1100	22000
C239	Fluorides	--	--	--	2.3	20	20	240
50-00-0	Formaldehyde	0.17	4.3	2	9	40	40	49
110-54-3	Hexane	--	--	--	700	3100	3100	--
7647-01-0	Hydrochloric acid	--	--	--	20	88	88	2100
98-82-8	Isopropylbenzene (cumene)	--	--	--	400	1800	1800	--
7439-92-1	Lead and compounds	--	--	--	0.15	0.66	0.66	0.15
7439-96-5	Manganese and compounds	--	--	--	0.09	0.4	0.4	0.3
7439-97-6	Mercury and compounds	--	--	--	0.077	0.63	0.63	0.6
67-56-1	Methanol	--	--	--	4000	18000	18000	28000
91-20-3	Naphthalene	0.029	0.76	0.35	3.7	16	16	200
C365	Nickel compounds, insoluble	0.0038	0.1	0.046	0.014	0.062	0.062	0.2
C401	Polycyclic aromatic hydrocarbons (PAHs)	0.000043	0.0016	0.003	--	--	--	--
56-55-3	Benz[a]anthracene	0.00021	0.0078	0.015	--	--	--	--
50-32-8	Benzo[a]pyrene	0.000043	0.0016	0.003	0.002	0.0088	0.0088	0.002
205-99-2	Benzo[b]fluoranthene	0.000053	0.002	0.0038	--	--	--	--
191-24-2	Benzo[g,h,i]perylene	0.0047	0.17	0.34	--	--	--	--
207-08-9	Benzo[k]fluoranthene	0.0014	0.052	0.1	--	--	--	--
218-01-9	Chrysene	0.00043	0.016	0.03	--	--	--	--
53-70-3	Dibenz[a,h]anthracene	4.3E-06	0.00016	0.0003	--	--	--	--
206-44-0	Fluoranthene	0.00053	0.02	0.038	--	--	--	--
193-39-5	Indeno[1,2,3-cd]pyrene	0.00061	0.022	0.043	--	--	--	--
123-38-6	Propionaldehyde	--	--	--	8	35	35	--
7782-49-2	Selenium and compounds	--	--	--	--	--	--	2
7631-86-9	Silica, crystalline (respirable)	--	--	--	3	13	13	--
108-88-3	Toluene	--	--	--	5000	22000	22000	7500
526-73-8	1,2,3-Trimethylbenzene	--	--	--	60	260	260	--
95-63-6	1,2,4-Trimethylbenzene	--	--	--	60	260	260	--
108-67-8	1,3,5-Trimethylbenzene	--	--	--	60	260	260	--
7440-62-2	Vanadium (fume or dust)	--	--	--	0.1	0.44	0.44	0.8

CAS	Pollutant	Chronic Cancer			Chronic Non-Cancer			Acute
		Res ug/m3	Child ug/m3	Worker ug/m3	Res ug/m3	Child ug/m3	Worker ug/m3	ug/m3
1330-20-7	Xylene (mixture), including m-xylene, o-xylene, p-xylene	--	--	--	220	970	970	8700

Table 4-4: Existing Facility Risk Action Levels

	Existing Source	
	Cancer	Non-Cancer
Source Permit Level	5	0.5
Community Engagement Level	25	1
TBACT Level	50	3*/5** or RDR of 1
Risk Reduction Level	200	6*/10** or RDR of 2
Immediate Curtailment Level	500	12*/20** or RDR of 4

* For pollutant identified as HI3 in OAR 340-245-8010, Table 2.
** For pollutant identified as HI5 in OAR 340-245-8010, Table 2.
 RDR: Risk Determination Ratio = (Combined Risk for HI3 chemicals / 3) + (Combined Risk for HI5 chemicals / 5)

4.4 Risk Evaluation

The facility risk levels are shown in Table 4-5 for natural gas sources and in Table 4-6 for the non-natural gas sources. The rounded risk is shown at the bottom of the table. All facility risk values are less than the Community Engagement Level. Since the facility risk does not exceed the Community Engagement level, the Risk Determination Ratio (RDR) was not calculated. The chronic risk values are also less than the Source Permit Level, while the acute risk exceeds the Source Permit Level. Since the acute risk value exceeds the Source Permit Level, the target organ analysis was conducted for this risk and is shown in Table 4-7. The nervous system and respiratory target organs have the two highest risk values.

Table 4-5: Natural Gas Source Risk Values

Level 3 CAO Summary: Seneca Sawmill   >Met: Eugene Met, (Revision: 2024-03-20)   Scenario: NG

Source	Description	Residential Chronic Cancer	Non-Residential Chronic Child Cancer	Non-Residential Chronic Worker Cancer	Residential Chronic Non-cancer	Non-Residential Chronic Child Non-cancer	Non-Residential Chronic Worker Non-cancer	Acute Non-cancer
BOIL3	Boiler 3	0.4096	0.0047	0.0234	0.0113	0.0002	0.0019	0.0083
BOIL4	Boiler 4	0.4105	0.0047	0.0237	0.0113	0.0002	0.0019	0.0081
BOIL5	Boiler 5	0.3982	0.0046	0.0239	0.0110	0.0002	0.0019	0.0077
Recp by Recp Max >		**1.211**	**0.014**	**0.071**	**0.033**	**0.001**	**0.006**	**0.02**
Rounded Risk		**1**			**<0.1**			**<0.1**

Table 4-6: Facility Risk Values

Level 3 CAO Summary: Seneca Sawmill   >Met: Eugene Met, (Revision: 2024-03-20)   Scenario: NON-NG

| Source	Description	Residential Chronic Cancer	Non-Residential Chronic Child Cancer	Non-Residential Chronic Worker Cancer	Residential Chronic Non-cancer	Non-Residential Chronic Child Non-cancer	Non-Residential Chronic Worker Non-cancer	Acute Non-cancer
GRIND	Mill Grinding Cyclone and Baghouse	3.1259	0.0056	0.1236	0.1474	0.0009	0.0289	0.0600
PAINT	Paint Booth	0	0	0	0	0	0	0.0000
MCUT	Plasma and oxy-acetylene torch cutting	0	0	0	0.0123	0.0007	0.0593	0.8286
WELD	Electric arc welding	0.0130	0.0002	0.0088	0.0019	0.0001	0.0082	0.0407
EGEN	Office Diesel Emergency Generator	0.0772	0.0001	0.0058	0.0020	0.0000	0.0003	0.0026
GDF	Gas Dispensing facility	0.2306	0.0001	0.0146	0.0096	0.0000	0.0016	0.0312
NK	New Kiln (8 bays,16 lines)	0.5854	0.0071	0.2165	0.0142	0.0011	0.0148	0.0667
DK	Existing Dimension Kiln (4 lines, 8 bays)	1.6726	0.0056	0.1199	0.0404	0.0008	0.0082	0.0555
Recp by Recp Max >		**5.090**	**0.016**	**0.270**	**0.199**	**0.003**	**0.076**	**0.91**
Rounded Risk		**5**			**0.2**			**1**
Source Permit Level		**5**			**0.5**			**0.1**
Community Engagement Level		**25**			**1**			**1**

Table 4-7: Acute Target Organ Risk

Source	Description	Nervous Acute Non-cancer	Respiratory Acute Non- cancer
GRIND	Mill Grinding Cyclone and Baghouse	0.0250	0.0030
PAINT	Paint Booth	0.0000	0.0000
MCUT	Plasma and oxy-acetylene torch cutting	0.8283	0.0003
WELD	Electric arc welding	0.0399	0.0004
EGEN	Office Diesel Emergency Generator	0.0000	0.0020
GDF	Gas Dispensing facility	0.0004	0.0001
NK	New Kiln (8 bays,16 lines)	0.0005	0.0662
DK	Existing Dimension Kiln (4 lines, 8 bays)	0.0004	0.0550
Recp by Recp Max >		**0.87**	**0.08**
Rounded Risk		**1**	**0.1**

Figure 4-3 shows the receptors which have a cancer risk at or above 0.5-in-a-million risk or a hazard index of 0.5 or above.

The risk calculations were made in an Excel spreadsheet. The spreadsheet has tabs for the RBCs, the target organ assignments, annual and 24-hr emissions, annual and 24-hr unit concentrations, receptors, seven risk evaluations, and a final summary. The spreadsheet is included as part of the risk assessment submittal.

Figure 4-3: Receptors with Risk Values Over 0.5
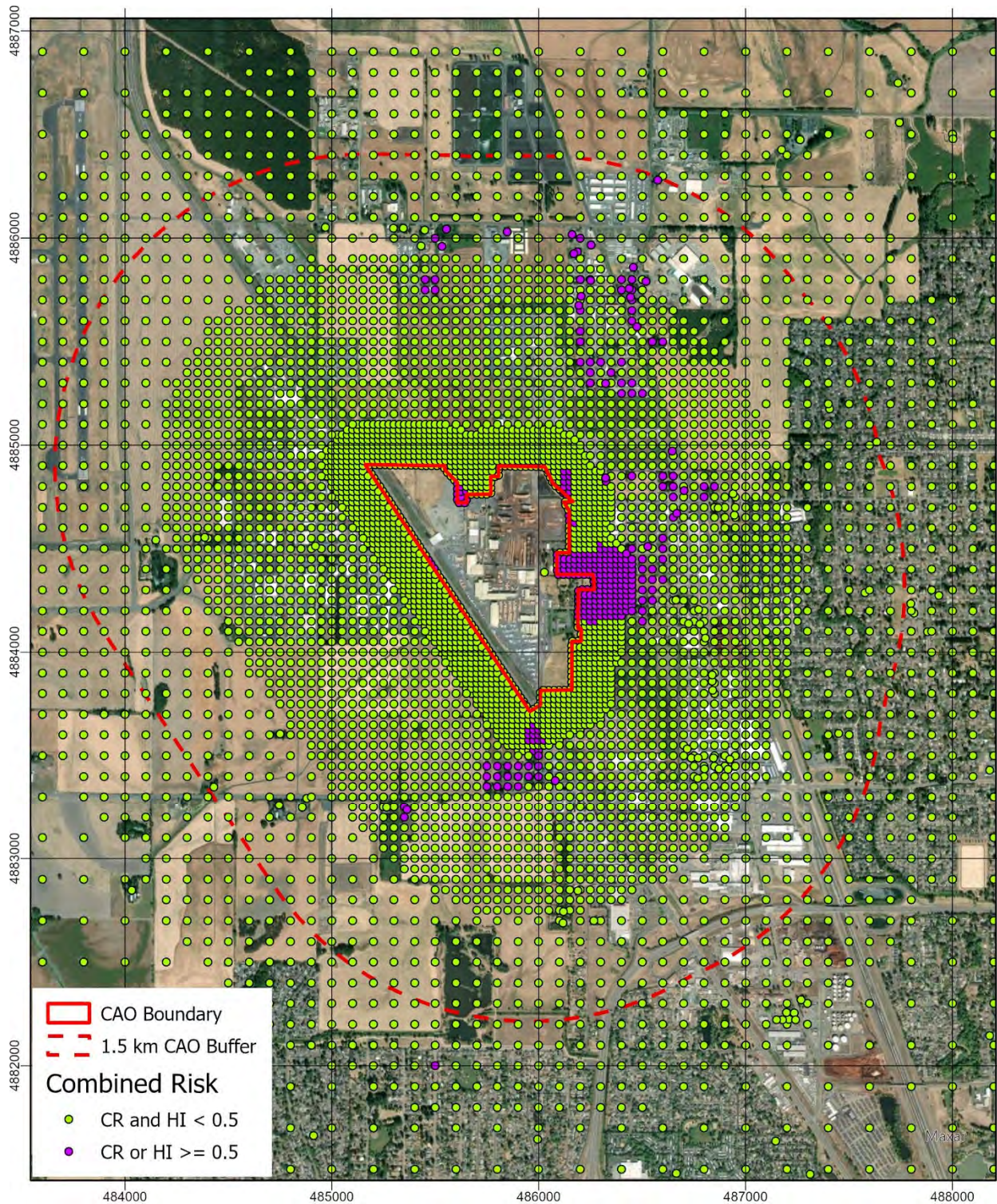
4.5 Uncertainty Analysis

CAO rules require that a quantitative or qualitative uncertainty evaluation be included in a Level 3 risk assessment.

Only a portion of the total reportable pollutants have RBCs. However, ODEQ has determined that they have captured the most toxic compounds in the current RBC list. Thus, incorporating a new compound into the RBC list would have a small potential to increase risk.

Threshold risk values (TRV's) form the basis for the RBCs. Both the TRV and RBC values consider scientific uncertainty for safety, particularly in sensitive populations. Often the exact level of exposure that causes health effects in people is unknown because: 1) experiments are rarely conducted on people; 2) science experiments can only reflect the doses tested; and 3) different people have different sensitivities to the same dose. The greater the scientific uncertainty in determining potential harm, the more scientists add safety buffers to the TRV and RBC values. DEQ must review and update the priority contaminant list and toxicity reference values (TRVs) every three years. DEQ and Oregon Health Authority (OHA) staff do an in-depth review of the contaminants on the priority list and TRVs and identify changes to recommend to the Environmental Quality Commission, which has oversight responsibility for DEQ and has authority to adopt DEQ rules. The public can also file a petition to either add a pollutant, or remove a pollutant, or remove a pollutants TRV, or revise a pollutants TRV. A petition to revise the Acute TRV for Manganese was submitted to DEQ and DEQ is in the process of convening the Air Toxics Science Advisory Committee (ATSAC) to review this TRV. If ATSAC concurs with the petition, then the Manganese TRV could be increased, thus, lowering the risk values calculated in this assessment.

Another source of uncertainty is in the emission calculations. Sources can rely on existing literature (e.g., AP-42), mass balances approaches, or another source's testing for characterizing emissions from a process. In some cases, the existing data is dated, often based on older and less efficient equipment or controls. Often, conservative assumptions are used.

AERMOD is designed to predict the overall maximum impact within a domain. However, it is well documented that the model often cannot accurately predict the actual concentration at a specific location. Localized variations in winds, the influences of trees and terrain can influence when and where the worst-case impact may occur around a facility. For example, the downwash algorithm in AERMOD is a simplification of reality, treating all buildings as rectangular boxes. Wind tunnel studies have documented that for long buildings, modeled downwash is greatly overestimated downwind of the site. Downwash is also not well characterized when the winds are approaching a building from a diagonal direction (e.g. toward a corner). Thus, AERMOD has to potential to underpredict or overpredict at a particular location.

A chronic exposure location is defined in the CAO rules in terms of residential locations and non-residential locations. For residential locations, the rule indicates that the location is considered residential based on whether "… a person or persons may reasonably be present for most hours of each day over a period of many years" (340-245-0020 (21)(i)). For the chronic non-

residential location, the rules state such a location is where "a person or persons may reasonably be present for a few hours several days per week, possibly over a period of several years" (340-245-0020 (21)(ii)). In practice both of these chronic cancer exposure locations assume a continuous exposure duration of 70 consecutive years, which is expected to overestimate chronic cancer exposures and, therefore, risk.

For acute exposures, the CAO regulation requires the use of the maximum 24-hour concentration that the computer model predicts using five years of meteorological data (1,825 days). Thus, the acute risk can be driven by the one "bad" meteorological day, regardless of whether such an impact would actually occur when the public is present or at the same time that the facility is emitting from all of its all TEU's at maximum capacity. Thus, using the 24-hr maximum provides a very conservative risk estimate as it assumes that someone will be present at a time when there is perfect alignment between worst-case meteorological conditions and maximum facility emissions.