Modeling Protocol and Risk Assessment Report

Mount Bachelor Ski Resort—Mount Bachelor, Oregon

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The material and data in this report were prepared under the supervision and direction of the undersigned.

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Abbreviations and Acronyms

AGL	above ground level
ASOS	Automated Surface Observation Systems
AAQS	ambient air quality standards
ACDP	air contaminant discharge permit
ADJ_U*	adjustment to the surface frictional velocity
bend met station	Bend Municipal airport meteorological monitoring station
BLR	exhaust stack for the ESP controlling the proposed biomass boiler
BPIP	Building Profile Input Program
CAO	Cleaner Air Oregon
DEQ	Department of Environmental Quality (Oregon)
EPA	U.S. Environmental Protection Agency
ESP	dry electrostatic precipitator
GHG	greenhouse gas
g/s	grams per second
HAP	hazardous air pollutant
hp	horsepower
IMD	Internal Management Directive
MFA	Maul Foster & Alongi, Inc.
MMBtu	million British thermal units
NAAQS	National Ambient Air Quality Standards
NCLD16	Station of Oregon National Land Cover Dataset (2016)
NO_2	nitrogen dioxide
NOC	notice of intent to construct
NO_X	nitrogen oxides
OAR	Oregon Administrative Rule
PM	particulate matter
$PM_{2.5}$	particulate matter less than 2.5 microns in aerodynamic diameter
proposed project	proposed biomass boiler, proposed propane boilers, and associated emission control equipment
PTE	potential to emit
RAL	risk action level
RAWP	Risk Assessment Work Plan
RBC	risk-based concentration
Redmond met station	the Roberts Field Airport meteorological monitoring station
the resort	The Mount Bachelor Ski Resort

RBC	risk-based concentration
SER	Significant Emission Rate
SET	significant emission threshold
SO_2	sulfur dioxide
TAC	toxic air contaminant
TEU	toxic emissions unit
Three Sisters area	Three Sisters Wilderness Class I Area
ug/m^3	microgram per cubic meter
USGS	U.S. Geological Survey
Wisewood	Wisewood Energy Inc.

1 Introduction

The Mount Bachelor Ski Resort (the resort) operates a year-round outdoor adventure area on the slopes of Mount Bachelor located 22 miles west of Bend, Oregon. The resort does not currently have equipment or activities that fall under Oregon Administrative Rule (OAR) 340-216-8010, Table 1 which would require an air contaminant discharge permit (ACDP). As result, the resort does not currently operate under an ACDP.

The resort is proposing to install a biomass fuel-fired boiler (proposed biomass boiler), two supplemental propane-fuel-fired boilers (proposed propane boilers), and associated emissions control to provide heat to residential and employee buildings at the resort (proposed project). Wisewood Energy Inc. (Wisewood) has been retained by the resort to provide engineering services for the development and construction of the proposed biomass boiler, associated emission control equipment, and the building that will contain the proposed biomass boiler.

In addition to the proposed project, the resort has four existing diesel-fueled emergency generators (existing emergency generators) that are used to provide electricity to resort buildings during power outages. The existing emergency generators have an aggregate horsepower (hp) rating of 2,800 hp. The aggregate rating of the existing emergency generators is less than the threshold stated in OAR 340-216-8010, Table 1, Part B, Category 87.a. However, as a result of the proposed project, the existing emergency generators will now be required to be included in an ACDP for the resort.

Maul Foster & Alongi, Inc. (MFA) has been retained by Wisewood to assist the resort with developing a notice of intent to construct (NOC) and ACDP application for the proposed project. Both the proposed biomass boiler and proposed propane boilers will be subject to Title 40 of the Code of Federal Regulations Part 63 (Subpart JJJJJJ) and as a result, will be required to obtain, at a minimum, a Simple ACDP prior to construction and operation.

The resort is located within 10 kilometers of the Three Sisters Wilderness Class I Area (Three Sisters area). OAR 340-200-0020(160)(w) states that a new source located within 10 kilometers of a Class I area with an emissions increase less than the Significant Emission Rate (SER), and would have an impact on such area equal to or greater than 1 microgram per cubic meter (ug/m^3) (based on a 24-hour average) is emitting at an SER. As discussed in Section 7.1, the proposed project will not have an impact on the Three Sisters area greater than 1 ug/m^3. As a result, the proposed project will not emit any regulated pollutants at or above an SER and doesn't meet any of the other criteria for a Standard ACDP. Therefore, the resort will be required to obtain a Simple ACDP to construct and operate the proposed project. A regulatory analysis that led to this determination is included with the Simple ACDP application that is being submitted concurrently with this modeling protocol.

On September 1, 2021, the Department of Environmental Quality (DEQ) issued an Internal Management Directive (IMD)[1] for investigating compliance with short-term Ambient Air Quality Standards (AAQS) for new sources required to obtain a Simple or Standard ACDP. As part of the IMD, the DEQ prepared a trial short-term significant emission threshold (SET) for three pollutants, total oxides of nitrogen (NO_X), sulfur dioxide (SO_2), and particulate matter with an aerodynamic diameter

[1] DEQ. Short-Term NAAQS Compliance Internal Management Directive. September 1, 2021.

less than 2.5 microns ($PM_{2.5}$). MFA reviewed short-term emissions of the affected pollutants from the proposed project and existing emergency generators at the resort and identified that the short-term SET for NO_X and $PM_{2.5}$ will be exceeded, as shown in Table 1-1.

Table 1-1. Proposed Total Resort Short-Term Potential to Emit

Parameter	$PM_{2.5}$ 24-Hour Assessment (lb/day)	SO_2 1-Hour Assessment (lb/hr)	NO_2 1-Hour Assessment (lb/hr)
Proposed PTE	7.54	0.52	37.3
Short-Term SET(2)	5	3	3
Proposed PTE Exceeds Short-Term Set?	**YES**	no	**YES**

Notes
(1) DEQ. Recommend Procedures for Air Quality Dispersion Modeling. March 2022.

As a result, 1-hour and 24-hour dispersion modeling assessments for nitrogen dioxide (NO_2) and $PM_{2.5}$, respectively, will be conducted to demonstrate short-term emissions from the resort will not exceed an applicable AAQS. The proposed methodology for demonstrating compliance with the short-term AAQS for the affected pollutants is presented in Section 4 of this modeling protocol. As identified in Section 7 of this modeling protocol, the results of a cumulative impact analysis identified that NO_2 and $PM_{2.5}$ emissions from the resort will not exceed an applicable short-term AAQS.

OAR 340-245-0050(2)(a)(A) states that any proposed new source that is required to obtain a Simple ACDP, and is not an exempt source under OAR 340-245-0050(6), must go through the Cleaner Air Oregon (CAO) permitting program prior to submitting an ACDP application. As the resort must obtain a Simple ACDP, the resort is required to go through the CAO permitting program.

MFA submitted a toxic air contaminant (TAC) and criteria pollutant emissions inventory to the DEQ on October 10, 2023. The DEQ provided written approval of the emissions inventory via a letter on November 9, 2023 (approved emissions inventory). MFA proposes to submit a combined application package that includes an SER analysis, short-term AAQS analysis, a CAO modeling protocol, Risk Assessment Work Plan (RAWP), the results of each analysis, and the Simple ACDP application.

The remainder of this combined modeling protocol and RAWP outlines the modeling methodologies proposed to assess $PM_{2.5}$ and NO_2 impacts within the Three Sisters area, short-term AAQS compliance demonstrations, and perform a level 3 risk assessment; and includes the results of each assessment when performed according to the proposed methodologies.

2 Facility Description

2.1 Resort Location

The resort operates on approximately 4,323 acres on the eastern slopes of Mount Bachelor at an approximate elevation of 6,335 feet above mean sea-level. Mount Bachelor is located in the

Cascade Mountain range approximately 22 miles west of Bend, Oregon. The resort is surrounded by federal and state-owned coniferous forests to the west, north, and east, and alpine tundra to the south. An aerial image of the resort location and the proposed employee access boundary is shown in Figure 2 1. The topography of the area immediately surrounding the resort is presented in Figure 2-2.

2.2 Process Description

The proposed biomass boiler will be Kohlbach manufactured boiler with a maximum heat input rating of 5.20 million British thermal units (MMBtu) per hour. Process exhaust from the proposed biomass boiler will be routed through a multi-clone and dry electrostatic precipitator (ESP) system for control of PM emissions. The resort is proposing to permit the proposed biomass boiler for continuous annual operation (i.e., 8,760 hours per year), as shown in the approved emissions inventory.

The proposed propane boilers will be manufactured by Fulton Heating Solutions and each boiler will have a maximum hourly heat input rating of 5.58 MMBtu per hour. As a result of the proposed energy system configuration, only one of the proposed propane boilers will be operational at any given time. The active proposed propane boiler will only be used as a supplemental source of heat during periods when additional energy is needed beyond the capacity of the proposed biomass boiler or during low-fire periods when it is impracticable to run the proposed biomass boiler. The resort is proposing to permit the proposed propane boilers assuming only one is operational at any time and continuous annual operation (i.e., 8,760 hours per year), as shown in the approved emissions inventory.

As discussed in Section 1, the resort has four existing diesel-fired emergency generators that are used to provide electricity to resort buildings during a power outage. The existing emergency generators only operate for emergency purposes except for periods of maintenance and readiness testing. For readiness testing, the resort currently operates each generator individually for a single 30-minute period once per week.

3 Emission Estimates and Model Sources

The approved emissions inventory containing estimated emissions of criteria pollutants, greenhouse gases (GHG), hazardous air pollutants (HAPs), and TACs is presented in Appendix A. The following subsections detail each proposed and existing emissions unit.

3.1 Proposed Biomass Boiler

The proposed criteria pollutant, GHG, HAP, and TAC potential to emit (PTE) for the proposed biomass boiler are shown in the approved emissions inventory.

The exhaust stack for the ESP controlling the proposed biomass boiler will be represented in the air dispersion model as a vertical point source with model ID **BLR**. Stack height above ground level (AGL) and exhaust parameters for the proposed biomass boiler were provided by Wisewood Energy. The proposed model source parameters and SER and AAQS model emission rates for **BLR** are presented in Table 3-1.

3.2 Proposed Propane Boilers

The proposed criteria pollutant, GHG, HAP, and TAC PTE for the proposed propane boiler is shown in the approved emissions inventory.

The exhaust stack for the proposed propane boiler will be represented in the air dispersion model as a horizontal point source with model ID **PROP**. Stack height AGL and exhaust parameters for the proposed propane boiler were provided by Wisewood Energy. The proposed model source parameters and SER and AAQS model emission rates for **PROP** are presented in Table 3-1.

3.3 Existing Emergency Generators

The proposed criteria pollutant, GHG, HAP, and TAC PTE for the existing emergency generators are shown in the approved emissions inventory.

Each existing emergency engine will be represented in the air dispersion model as its own horizontal point source with model IDs **EGEN1** through **EGEN4**. Stack height AGL and orientation for each emergency generator were provided by Mount Bachelor. Exhaust parameters for the emergency generators were estimated using parameters for diesel-fired generators of comparable size. The proposed model source parameters and SER and AAQS model emission rates for **EGEN1** through **EGEN4** are presented in Table 3-1.

Consistent with EPA guidance (EPA 2011), MFA proposes to use the average hourly emissions rate for the 1-hour NO_2 NAAQS compliance demonstration as shown in Table 3-1.

3.4 Operating Scenarios

Summaries of the resort-wide criteria pollutant and HAP and TAC PTE are presented in the approved emissions inventory.

MFA proposes to assess the worst-case hourly NO_2 model scenario assuming operation of the proposed biomass boiler, a single proposed propane boiler, and all four emergency generators at the resort (modeled using annual average emission rates).

Similarly, for the worst-case 24-hour assessments ($PM_{2.5}$ SER analysis, $PM_{2.5}$ short-term AAQS, and acute noncancer risk) and annual assessments (excess cancer and chronic noncancer risk), MFA proposes to use the maximum daily and annual emission rates for the proposed biomass boiler, one of the proposed propane boilers, and all four emergency generators.

MFA proposes to conduct a Level 3 Risk Assessment to determine the potential excess cancer risk and chronic and acute noncancer risk (expressed numerically through the chronic and acute hazard index) impacts from the facility for comparison to the applicable risk action levels (RALs) shown in OAR 340-245-8010 Table 1.

4 Air Dispersion Modeling Methodology

The following subsections detail the proposed air dispersion model methodology, including input parameters and assumptions applicable to the SER analysis, short-term AAQS demonstration, and level 3 risk assessment dispersion model.

4.1 Model Selection

MFA proposes to execute the dispersion model using the model versions shown in Table 4-1 below. Lakes Environmental, a third-party overlay software, will be used to execute the dispersion model.

Table 4-1. Proposed Model Selection

Model	Model Version
AERMOD	22112
AERMET	22112
AERMAP	18081
AERSURFACE	20060
AERMINUTE	15272
BPIP	04274

4.2 Meteorological Data

In preparation for air dispersion modeling, MFA developed the meteorological and terrain data files shown in Table 4-2 below.

Table 4-2. Proposed Meteorological and Terrain Data

Dataset	Data Reference
Surface	Station ID 726835 (Roberts Field Airport)
Upper Air	Station ID 24232 for Salem, OR (National Oceanic and Atmospheric Administration/ Earth System Research Laboratory Radiosonde Database)
Terrain	U.S. Geological Survey National Elevation Dataset (1/3-arc seconds with horizontal resolution of 10 meters)

4.2.1 Surface Meteorological Data

MFA identified two ambient monitoring stations with model-appropriate meteorological data near the resort: the Roberts Field Airport monitoring station (ID 726835) located in Redmond, Oregon (Redmond met station) and the Bend Municipal airport monitoring station (ID 720638) located in Bend, Oregon (Bend met station). MFA compared the two data sets to identify which would better represent expected meteorological conditions at the resort. MFA determined the Redmond met station data were more representative than the Bend met station for the following reasons:

- The Redmond met station represents the only meteorological station with data completeness that meets the 90 percent standard in Appendix W to Part 51 *Guideline on Air Quality Models* for each individual quarter in the most recent five-year dataset (2018-2022).
- The Redmond met station is part of the automated surface observation system (ASOS) network that measured 1-minute wind data with a sonic anemometer. As a result, wind speeds down to 0.5 meters per second (m/s) can be used for modeling. Conversely, the Bend met station is not part of the ASOS network and typically measures windspeeds down to 1.54 m/s (3 knots per hour).
- Aggregate data completeness for the most current five-year period (2018-2022) was greater than 99 percent for the Redmond met station while the Bend met station was 96 percent. Furthermore, the Redmond met station had less than 1 percent calm winds for the current five-year period versus the Bend met station which had 23 percent calm winds. As AERMOD does not calculate a concentration during hours with calm winds, approximately 27 percent of the total available hours for the Bend met station would not have concentrations calculated while only 1.2 percent of the Redmond met station would not have concentrations calculated.

Hourly data for wind speed, wind direction, cloud cover, and temperature for the years 2018 through 2022 were downloaded for the Redmond met station by file transfer protocol from the National Oceanic and Atmospheric Administration, National Centers for Environmental Information.

A wind rose for the Redmond met station for the period from 2018 through 2022 is presented in Figure 4-1. The wind direction for this dataset shows a bimodal distribution between the northwest and southeast.

4.2.2 Upper-Air Data

Upper-air meteorological data for Salem, OR (station ID 24232) were collected from the National Oceanic and Atmospheric Administration Earth System Research Laboratory Radiosonde Database in Forecast Systems Laboratory format. Upper-air meteorological data were extracted for the period from 2018 through 2022.

4.2.3 Data Processing—AERMET

The surface and upper air meteorological data were processed using the EPA AERMET program to produce five years of model-ready meteorological data for use in the AERMOD dispersion model. The adjustment to the surface frictional velocity (ADJ_U*) option was selected as part of the AERMET processing. The land-use surface characteristics were processed using AERSURFACE, and AERMINUTE was used to process and incorporate the ASOS 1-minute data into AERMET.

When ASOS 1-minute data are used, AERMET enables a default wind speed adjustment option. This option adds 0.26 m/s to all wind speeds to account for wind speed truncation (in units of whole knots) applied by the ASOS quality assurance system. Per the EPA technical memorandum (EPA 2013b), a minimum wind speed detection threshold of 0.5 m/s was used to account for the adjustment. Wind direction randomization was not selected when running AERMET because ASOS 1-minute data increases the precision of wind direction measurements and, unlike non-ASOS data, are rounded to the nearest ten whole degrees.

An analysis of the missing hours for the 2018 to 2022 meteorological data set produced by AERMET was performed by running AERMOD for each calendar quarter. Each calendar quarter was reviewed for the number of missing hours shown in the output file. To be considered complete and valid, each calendar quarter must have less than ten percent missing hours. As shown in Table 4-3, all quarters between 2018 and 2022 meet this criterion.

4.3 AERSURFACE Land Use and Terrain

AERSURFACE was used to generate seasonal values for albedo, Bowen ratio, and surface roughness heights required as part of the AERMET processing. State of Oregon National Land Cover Data Set 2016 land cover class definitions, along with concurrent percent impervious surface and percent tree canopy data, were downloaded from the U.S. Geological Survey and processed using AERSURFACE to generate the surface characteristics necessary to run AERMET. The State of Oregon National Land Cover Data Set 2016 data were processed in AERSURFACE using the settings described in Table 4-4.

Table 4-4. Proposed AERSURFACE Settings

Parameter	Setting
Study radius for surface roughness	1.0 kilometer
Are the surface data collected at an airport?	Yes
Should continuous snow cover be assumed?	No
Is this an arid region?	No
Number of sectors	12
Months assumed to constitute “winter”	December, January, and February
Months assumed to constitute “Spring”	March, April, and May
Months assumed to constitute “Summer”	June, July, and August
Months assumed to constitute “Autumn”	September, October, and November
Period for land use calculations	Monthly

Soil moisture conditions were determined following the methodology set forth in Section 3.2.8 of the EPA User’s Guide for the AERSURFACE Tool, dated February 2020 (AERSURFACE User’s Guide; EPA 2020), as follows:

> [surface moisture] should be entered as either WET, DRY or AVERAGE, where, in general, WET is defined as precipitation amounts equal to or greater than the 70th percentile of the 30-year climatological records; DRY is equal to or less than the 30th percentile; and AVERAGE is between the 30th and 70th percentiles.

Annual precipitation data for each year of the five-year meteorological data set were reviewed and compared against the 30-year climatological record[2] to determine the representative soil moisture condition for each modeling year. As shown in Table 4-5, the average annual precipitation varied between the lower 30th percentile up to the upper 70th percentile of the 30-year climatological record. To account for this variability, AERSURFACE was executed for each year using the corresponding surface moisture condition associated with that year’s annual rainfall.

[2] As a result of missing data between 1996 and 1997, two additional years, 1989 and 1990, were included with the 30-year precipitation calculations to create 30 years of annual precipitation data.

MFA proposes to execute the air dispersion model using rural dispersion coefficients. To make this determination, MFA followed the land-use procedure, as recommended in Section 7.2.1.1(b) of Appendix W to Part 51 *Guideline on Air Quality Models*, to conclude that less than 50 percent of the land use in the modeling domain is represented by the urban land-use type.

4.4 Building Downwash

The most recent version of the EPA Building Profile Input Program for PRIME will be used to execute the dispersion model as shown in Table 4-1. The proposed locations of structures that are projected to influence downwash are presented in Figure 4 2. Table 4-6 presents the heights of each proposed downwash structure.

4.5 Emission Unit Locations

The locations of each emissions unit to be included in the dispersion model are shown in Figure 4-2.

4.6 AAQS and Level 3 Risk Assessment Model Receptor Locations and Terrain

Receptors for the short-term AAQS compliance demonstration dispersion model and Level 3 Risk Assessment will be defined consistent with Section 2.4 of the DEQ's guidance document (DEQ Recommended Procedures) (DEQ 2022) as shown in Table 4-7 below.

4-7: Proposed Receptor Locations

Receptor Spacing (meters)	Receptor Distance (meters)
25	Along the property boundary and out to at least 200 meters from the property boundary.
50	200 to 1,000
100	1,000 to 2,000
200	2,000 to 5,000
500	5,000 to 10,000

Figure 4-3 presents the proposed receptor spacing and locations within the modeling domain. Figure 4-4 presents the proposed receptor locations in the area immediately surrounding the employee access area. Receptors that fall along roadway and/or rail right-of-way interstitial spaces are identified in blue in Figure 4-3 and Figure 4-4. As described in Section 6.2.1 below, MFA proposes to not assess risk in the Level 3 Risk Assessment at these locations. However, these receptors will be included in the short-term AAQS compliance demonstration.

Terrain elevations for proposed model receptors, emission unit base elevations, and downwash structures base elevations will be derived from the US Geological Survey National Elevation Dataset data at a resolution of 1/3 arc seconds (a horizontal resolution of roughly 10 meters) and processed using the current version of AERMAP.

4.7 Sensitive Receptors – CAO Only

MFA identified one location considered to be a "sensitive exposure area" within three kilometers from the resort. The identified sensitive location is a day-use childcare facility located in the West Village Lodge approximately 180 meters west of the proposed biomass boiler building. The childcare facility is owned and operated by Mount Bachelor and can only be used by visitors to the resort or resort employees. As shown in Figure 4-4, several receptors are located at the childcare facility, and as a result, MFA does not propose to add any additional discrete receptors to this sensitive area.

4.8 Class I Model Receptor Locations

For the SER analysis at the Three Sisters area, MFA proposes to use Class I receptors obtained through the National Park Service[3]. Receptor latitude and longitude values were downloaded and converted to Universal Trans Mercator coordinates for Zone 11 in meters. Receptor elevations were derived from the same terrain data as detailed in Section 4.6, such that the base elevations of the modeled sources will be consistent (based on the same terrain data set) with the base elevations of the Class I receptors. The locations of the proposed receptors for the Three Sisters area are provided in Figure 4-5 and discussion of the modeling results are presented in Section 7.1 of this document.

4.9 Proposed Model Emission Rates – CAO Only

MFA proposes to execute the dispersion model using unit emission rates for annual assessments (excess cancer and chronic noncancer) for significant toxic emission units (TEUs) and all assessments for gas exemption TEUs. The maximum modeled unit concentration in micrograms per cubic meter (ug/m^3) at each modeled receptor for the annual and 24-hour averaging periods will be considered a modeled "dispersion factor" in units of ug/m^3 per g/s. When this dispersion factor is multiplied by the g/s TAC emission rate for the modeled TEU, the result is the modeled concentration of the TAC. Therefore, a single unit emission rate model result can be used to calculate the modeled concentration for each TAC. The dispersion factors, in combination with TAC emission rates for each TEU in g/s and the risk-based concentrations (RBCs) in ug/m^3 set forth under OAR 340-245-8010 Table 2, will be used to conduct the chronic cancer and noncancer Level 3 risk assessments. The proposed acute and chronic model emission rates for each TEU are provided in Table 4-8 and Table 4-9, respectively.

For the 24-hour (acute) assessment, MFA developed risk equivalent emission rates for each TEU. The proposed risk equivalent emission rates were calculated by dividing the individual TAC emission rate for each TEU by their respective acute RBC. The resulting value for each TAC was then summed together to create a total risk equivalent emission rate for the TEU. This process was repeated for each TEU at the resort. The risk equivalent emission rates will be modeled for the 24-hour averaging period to assess the cumulative acute risk from the resort. The proposed risk equivalent emission rates are provided in Table 4-10.

[3] National Park Service website, http://www.nature.nps.gov/air/maps/Receptors/index.cfm [accessed on March 26, 2023]

5 Short-term AAQS and SER Modeling Assessments

The resort is not located in a Class I designated area under OAR 340 204 0050. As a result, the resort is considered to be located in a Class II designated area for purposes of dispersion modeling per OAR 340 204 0060(1)(a).

5.1 SER Evaluation

As identified in Section 1, an SER analysis must be performed to identify the predicted $PM_{2.5}$ impact in the Three Sisters area. As shown in Table 1-1, daily emissions of $PM_{2.5}$ are the highest between the two pollutants that have a short-term Class I AAQS ($PM_{2.5}$ and SO_2) identified in OAR 340, Division 202. Further, daily emissions of PM with a diameter of less than 10 microns (PM_{10}) are equal to that of $PM_{2.5}$. Therefore, MFA proposes only to model $PM_{2.5}$ for the SER analysis as it represents the most conservative assessment.

The SER evaluation will include modeled high first high $PM_{2.5}$ 24-hour concentrations from the proposed biomass and propane boilers, and the existing emergency generators. In addition, MFA proposes to include secondary fine particulate value referenced in Section 5.2.4 to the modeled concentration to create a design value. The design values will be compared against the 1 ug/m^3 threshold, per OAR 340-200-0020(160)(w), in tabular format.

5.2 Short-Term AAQS Evaluation

As stated in Section 1, the resort must demonstrate compliance with the NO_2 1-hour and $PM_{2.5}$ 24-hour AAQS as part of the permitting process.

5.2.1 Cumulative Impact Assessment

MFA proposes to proceed straight to the applicable AAQS assessments without first performing Class II single source impact analyses. As discussed in section 5.2.5, there are no nearby competing sources and therefore, the only differences between the single source impact analyses and the cumulative impact analyses will be the addition of background concentrations and the use of statistical averaging consistent with Appendix W guidance.

The short-term AAQS assessments will predict modeled concentrations from the proposed biomass and propane boilers, and the existing emergency generators. The applicable background concentration will be added to the predicted concentrations from the short-term AAQS dispersion model runs, resulting in a design value. For the $PM_{2.5}$ 24-hour AAQS assessment, the secondary fine particulate value referenced in Section 5.2.3 below will also be added to the design value. The design values will be compared against the applicable AAQS in tabular format.

5.2.2 NO_X to NO_2 Conversion

MFA will apply the regulatory default Ambient Ratio Method 2 (i.e., ARM2) option to simulate the conversion of nitrogen monoxide to NO_2 in the ambient air for the 1-hour NO_2 NAAQS assessment. To predict ambient air concentrations of NO_2 using the Ambient Ratio Method 2 modeling approach, MFA will apply the national default minimum and maximum ambient NO_2/NO_X ratios of 0.5 and 0.9, respectively.

5.2.3 Secondary Impacts

Emissions of NO_X and SO_2 contribute to the formation of secondary $PM_{2.5}$ in the form of nitrates and sulfates. The formation of secondary $PM_{2.5}$ has an additive impact on modeled concentrations of as emitted, direct $PM_{2.5}$. MFA proposes to follow the qualitative Tier 1 approach to determine impacts of secondary $PM_{2.5}$ formation according to EPA's memorandum (EPA 2019a).

MFA used the most conservative secondary $PM_{2.5}$ values shown in Table 4-1 of the guidance document (EPA 2019a) to calculate site-specific secondary formation impacts as shown in Table 5-1. MFA proposes to add the $PM_{2.5}$ 24-hour secondary impact concentration shown in Table 5-1 to the direct $PM_{2.5}$ concentration predicted for both the Class I wilderness area and 24-hour AAQS assessments.

5.2.4 Background Concentrations

Consistent with Section 3.4 of the DEQ Recommended Procedures and in anticipation of dispersion modeling, MFA obtained background concentrations from the Northwest International Air Quality Environmental Science and Technology (e.g., NW AIRQUEST) Consortium lookup tool. MFA used the average of the four nearest values surrounding the resort location to estimate the proposed background concentrations presented in Table 5-2. Background concentrations for 24-hour $PM_{2.5}$ and 1-hour NO_2 will be applied to the appropriate short-term AAQS assessment.

5.2.5 Competing Sources

MFA searched for nearby facilities within ten kilometers of the resort with existing air quality permits using the DEQ's permit search website and did not find any sources. As a result, MFA proposes to conduct the short-term AAQS compliance demonstrations without competing source data.

6 Risk Assessment Work Plan

MFA proposes to estimate cancer and noncancer risk from the resort by conducting a Level 3 Risk Assessment using the methodology outlined OAR 340-245-0050(10). The following subsections detail the proposed inputs and assumptions that were used in support of the Level 3 Risk Assessment.

6.1 Conceptual Site Model

Sections 2 through 4 discuss the resort location, process description, TEUs, and TAC emission estimates to satisfy the requirements for a conceptual site model set forth under OAR 340-245-0210(2)(a). Exposure locations are described in more detail in Section 6.2 below. Specific TEU designations are discussed in more detail in the following subsections.

6.1.1 Gas Combustion TEUs

The specific procedures for assessing the risk of each TEU are dependent on the TEU designation per OAR 340-245-0050(4). Per OAR 340-245-0050(5), the gas combustion "exemption applies to TEUs that solely combust natural gas, propane, [or] liquefied petroleum gas." As identified in Section 2.2, the proposed propane boilers will only be able to combust propane. As a result, the proposed propane boilers will be considered gas combustion TEUs for risk assessment purposes and risk will be assessed separately from the significant TEUs.

6.1.2 Aggregated TEUs

A Level 3 Risk Assessment will be conducted that includes all resort TEUs other than those qualifying as a gas combustion TEU or exempt TEU. The resort is not requesting aggregated TEUs at this time.

6.1.3 Non-Exempt TEUs

A Level 3 Risk Assessment will be conducted that includes all resort TEUs other than those qualifying under the gas combustion TEU exemption. This assessment will be used to determine whether the resort exceeds the source permit RAL (i.e., de minimis source determination) per OAR 340 245 0050(7). Cancer and noncancer risks will be reported separately for Gas Combustion, Aggregated TEUs (if any), and Significant TEUs. Risks associated with Aggregated TEUs, if any TEUs are proposed as such, will be compared with the applicable Aggregated TEU RALs. For compliance demonstration, only calculated risks associated with Significant TEUs will be compared with the applicable RALs.

6.2 Exposure Assessment

6.2.1 Land-Use Zoning Classification Data for Determining Exposure Types

In anticipation of dispersion modeling, the Department of Land Conservation and Development's statewide zoning data were reviewed to determine land-use classifications for areas in the modeling domain. The Oregon statewide zoning classifications provide the basis for the initial categorization of exposure classifications (i.e., residential, nonresidential worker, nonresidential child, or acute).

The zoning data were further evaluated against local data such as the Deschutes County zoning and school-location information. MFA also reviewed aerial imagery, using Esri ArcGIS and Google Earth software to determine whether the existing zoning information reflects actual land use and the corresponding exposure type categorization.

The zoning data and internal MFA review process indicate that multiple proposed receptor locations fall within roadway and/or rail right-of-way interstitial spaces, which are identified in black in

Figures 4-3 and 4-4. These locations are proposed for dispersion modeling in order to maintain a uniform receptor grid. MFA does not propose to conduct risk evaluations for any receptor locations in roadways or rail rights-of-way. In the crosswalk-of-receptors, which will be provided to the DEQ in spreadsheet format because of the number of receptor locations, these locations are labeled as "Risk Not Assessed," even though they will be modeled. MFA has reviewed receptor locations near the resort where it is expected that the maximally exposed receptors will be located. If there are receptors farther from the proposed facility that are located in roadways or rail rights-of-way that have been unknowingly identified as an exposure location by the automated zoning evaluation process, and these locations have an impact on the risk assessment evaluation, these will be excluded from evaluation in the risk assessment report.

Figure 6-1 presents the existing land-use zoning identified for the modeling domain, and Figure 6-2 is provided for the area immediately surrounding the resort. Figures 6-3 and 6-4 present the corresponding exposure location categorization for the modeling domain and the immediate area surrounding the resort, respectively. For additional clarification, Table 6-1 shows all proposed receptor coordinates and their exposure classifications.

6.2.2 Exposure Pathways

MFA assumes that predicted cancer and noncancer risk (i.e., chronic and acute hazard index) resulting from resort TEUs will not have additional exposure pathways (i.e., ingestion or injection) other than those already accounted for in each published RBC. Moreover, based on a review of land-use zoning classifications and aerial imagery, there are no known locations that might present additional exposure pathways that require further analysis. Since no additional exposure pathways have been observed, a Level 4 Risk Assessment is not warranted.

6.2.3 Risk-Based Concentrations

Excess cancer risk and chronic and acute noncancer risk will be assessed using the most current RBCs available as shown in OAR 340 245 8010 Table 2. The TACs from the emissions inventory and corresponding RBCs to be included in the Level 3 Risk Assessment are presented in Table 6-2.

6.3 Risk Estimates

As described in Section 4.9, a single dispersion model will be executed using a unit emission rate of 1 g/s for each TEU for annual (chronic cancer and noncancer) assessments, and for the 24-hour (acute) assessment for the Gas Combustion TEU. For the 24-hour (acute) assessment, MFA developed risk equivalent emission rates for each Significant TEU, as shown in Table 4-8.

6.3.1 Example Calculation—Level 3 Risk Assessment

Example calculations for estimating excess cancer risk and chronic noncancer hazard index for a single proposed exposure location are presented in Equation 1 and Equation 2 per OAR 340-245-0210(2)(c).

Equation 1.

$$\text{Excess Cancer Risk (chances-in-a-million)} = \sum \frac{(\text{TAC annual emission rate [g/s]}) \times \left(\text{proposed TEU dispersion factor } \left[\frac{\mu g/m^3}{g/s}\right]\right)}{(\text{applicable RBC at exposure location [ug/m}^3])}$$

Equation 2.

$$\text{Chronic Noncancer Hazard Index} = \sum \frac{(\text{TAC annual emission rate [g/s]}) \times \left(\text{proposed TEU dispersion factor } \left[\frac{\mu g/m^3}{g/s}\right]\right)}{(\text{applicable RBC at exposure location } [ug/m^3])}$$

The total facility excess cancer risk and chronic noncancer hazard index will be derived by summing each individual TAC risk contribution at each proposed exposure location.

The example calculation for estimating the acute noncancer hazard index for a single proposed exposure location is presented in Equation 3.

Equation 3.

$$\text{Acute Noncancer Hazard Index} = \sum \left(\text{TEU risk equivalent emission rate } \left[\frac{g/s}{ug/m^3}\right]\right) \times \left(\text{proposed TEU dispersion factor } \left[\frac{\mu g/m^3}{g/s}\right]\right)$$

The total facility acute noncancer hazard index will be derived by summing each individual Significant TEU's risk contribution at each proposed exposure location.

6.3.2 Revised Noncancer Risk Action Levels

The CAO rules identify certain TACs that may have developmental, reproductive, respiratory, or other noncancer severe health effects and set RALs for these TACs. The calculation of the risk determination ratio is required when facilities emit a mixture of TACs assigned noncancer TBACT RALs of both a hazard index of 3 and a hazard index of 5, as identified in OAR 340-245-8010, Table 2. The risk determination ratio formula under OAR 340-245-0200(5) is presented below in Equation 4.

Equation 4.

$$\text{Risk Determination Ratio} = \frac{\text{Risk}_{\text{HI3}}}{3} + \frac{\text{Risk}_{\text{HI5}}}{5}$$

As shown in Table 6-2, TAC emissions from the facility are comprised of a mixture of TACs with assigned hazard indices of 3 and 5 per OAR 340-245-8010 Table 2. As a result, if the estimated facility chronic and acute noncancer risk is greater than the Community Engagement RAL, the risk determination ratio will be determined per Equation 4.

6.4 Uncertainty Analysis

Although the proposed Level 3 Risk Assessment will be conducted using the most accurate and current information, there are various levels of uncertainty associated with the proposed risk assessment. Per OAR 340 245 0210(2)(d), known quantitative and qualitative uncertainties with the proposed Level 3 Risk Assessment include, but may not be limited to, the following:

Acute Assessments:

- To assess acute noncancer risk (i.e., acute hazard index), the full 24-hour exposure duration will be assumed. While it is unlikely a person would be at most of the proposed exposure locations for 24 consecutive hours, this method will provide a worst-case potential exposure duration for an individual at these locations. For example, if an employee at an identified acute exposure location only works a single, eight-hour shift, the exposure would only be a third of what is being assumed in the proposed Level 3 Risk Assessment. **Hence, the proposed Level 3 Risk Assessment may overestimate acute noncancer risk due to the 24-hour exposure duration assumption for chemicals with RBCs based on Toxicity Reference Values with an**

exposure period of 24-hours or more. Conversely, the proposed Level 3 Risk Assessment may underestimate acute noncancer risk for TRVs with an exposure period of less than 24 hours because the model is executed for the 24-hour averaging period.

- The Level 3 Risk Assessment relies on modeling using a five-year period of hourly meteorological data. Some meteorological conditions, which may only occur a few days or less in a five-year period, result in worst-case dispersion characteristics. It is extremely unlikely that these infrequent meteorological conditions would occur at the same time that the facility is simultaneously operating all TEUs at maximum capacity. **Therefore, the proposed Level 3 Risk Assessment likely overestimates acute noncancer risk because of the improbability of resort operations at maximum capacity aligning with worst-case meteorological conditions.**

Cancer and Chronic Noncancer Assessments:

- The RBCs developed by the DEQ for excess cancer risk and chronic noncancer risk assume a 70-year exposure duration for 24 hours per day. It is unlikely that a person would remain at the same residence or in areas potentially impacted by emissions covered by the CAO program for 70 consecutive years for 24 hours per day. The risk assessments also account for a person being exposed to the resort emission rate for the entire exposure duration (i.e., 70 years). **Therefore, the proposed Level 3 Risk Assessment will overestimate cancer and chronic noncancer risk due to the unrealistic exposure duration assumption.**
- The excess cancer risk and chronic noncancer risk assessments will be performed assuming that all TEUs operate for the course of the calendar year at their potential to emit levels. It is physically impossible that the resort could operate the proposed biomass boiler and proposed propane boilers at maximum capacity for an entire year without shutdown time for maintenance and cleaning. **Therefore, the proposed Level 3 Risk Assessment will overestimate cancer and chronic noncancer risk due to the overestimation of emissions resulting from continuous facility operation at potential to emit levels.**

All Assessments:

- Only TACs that have applicable RBCs published by the DEQ will be assessed. Table 6-3 presents a list of the TACs that could be emitted from the proposed facility TEUs that do not have RBCs published by the DEQ. **As a result, the proposed Level 3 Risk Assessment may not accurately assess cancer and/or noncancer risk associated with those TACs that do not have an associated RBC. MFA understands the development of RBCs incorporates a level of conservatism that may overestimate cancer and/or noncancer risk from TACs with known RBCs.**

7 Modeling Results

Preliminary results of the SER analysis, the short-term AAQS analysis, and the Level 3 Risk Assessment using the proposed model inputs, as described in Section 2 through 6, are provided below.

7.1 SER Analysis Results

Results of the SER analysis for $PM_{2.5}$ are presented in Table 7-1. The location of the receptor with the highest 24-hour modeled $PM_{2.5}$ concentration is shown in Figure 4-6. As shown in Table 7-1, the maximum 24-hour modeled concentration does not exceed the SER threshold of 1 ug/m^3 at any modeled receptor in the Three Sisters area. As a result, emissions of $PM_{2.5}$ from the resort do not emit at the SER.

7.2 AAQS Modeling Results

Results of the short-term AAQS modeling analysis for the $PM_{2.5}$ 24-hour and NO_2 1-hour are presented in Table 7-2. As shown in Table 7-2, the design value for $PM_{2.5}$ 24-hour is below the AAQS of 35 ug/m^3, and the design value for NO_2 1-hour is below the AAQS of 188 ug/m^3. These results show the resort is in compliance with the short-term AAQS for $PM_{2.5}$ and NO_2.

7.3 Level 3 Risk Assessment Results

A summary of the modeled dispersion factors for each significant TEU and Gas Combustion TEU is provided in Table 7-3 and Table 7-4, respectively. The modeled concentrations at the location of the maximum predicted risk for each modeled TEU are presented in Table 7-5 and Table 7-6 for significant TEUs and gas combustion TEUs, respectively. As shown in Tables 7-4 through 7-6, there were no locations within 10 kilometers of the resort that were identified as residential or worker exposure locations. As a result, residential cancer and noncancer, and worker cancer and noncancer were not assessed.

The results of the Level 3 Risk Assessment were compared to the most current RALs published in OAR 340-245-8010 Table 1. As shown in Table 7-7 below, the maximum predicted excess child cancer risk, child and chronic and acute noncancer hazard indices are below the source permit level RAL for new sources per OAR 340-245-8010 Table 1. The maximum predicted excess child cancer risk, and child chronic and acute noncancer hazard indices for the gas combustion TEU are presented in Table 7-8.

Table 7-7. Level 3 Risk Assessment Result Summary for Significant TEUs

Exposure Assessment	Facility Risk / Hazard Index	RAL Analysis
Cancer Risk (chances-in-a-million)		
Residential	(1)	–
Non-Residential Child	**0.1**	**Below Source Permit Level**
Worker	(1)	–
Chronic Noncancer Hazard Index		
Residential	(1)	–
Non-Residential Child	**<0.1**	**Below Source Permit Level**
Worker	(1)	–
Acute Noncancer Hazard Index	**0.3**	**Below Source Permit Level**

Notes
(1) There are no locations within 10 kilometers of the resort classified as residential and worker exposure. Therefore, residential and worker exposure were not assessed.

Table 7-8. Level 3 Risk Assessment Result Summary for Gas Combustion TEUs

Exposure Assessment	Facility Risk / Hazard Index
Cancer Risk (chances-in-a-million)	
Residential	(1)
Non-Residential Child	<0.1
Worker	(1)
Chronic Noncancer Hazard Index	
Residential	(1)
Non-Residential Child	<0.1
Worker	(1)
Acute Noncancer Hazard Index	<0.1

Notes
(1) There are no locations within 10 kilometers of the resort classified as residential and worker exposure. Therefore, residential and worker exposure were not assessed.

8 Closing

MFA looks forward to working with the DEQ throughout the permit application process. If there are any questions or comments regarding this document, please contact Andrew Rogers, Project Meteorologist with MFA at (503) 407-6406.

References

DEQ. 2022. Recommended Procedures for Air Quality Dispersion Modeling. Oregon Department of Environmental Quality: Portland, OR. March.

EPA. 2011. Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO_2 National Ambient Air Quality Standard. Memorandum to Regional Air Division Directors. March 1.

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EPA. 2019. Richard A. Wayland, U.S. Environmental Protection Agency Air Quality Assessment Division. Guidance on the Development of Modeled Emission Rates for Precursors (MERPs) as a Tier 1 Demonstration Tool for Ozone and PM2.5 Under the PSD Permitting Program. Memorandum to Regional Air Division Directors. April 30.

Limitations

The services undertaken in completing this report were performed consistent with generally accepted professional consulting principles and practices. No other warranty, express or implied, is made. These services were performed consistent with our agreement with our client. This report is solely for the use and information of our client unless otherwise noted. Any reliance on this report by a third party is at such party's sole risk.

Opinions and recommendations contained in this report apply to conditions existing when services were performed and are intended only for the client, purposes, locations, time frames, and project parameters indicated. We are not responsible for the impacts of any changes in environmental standards, practices, or regulations subsequent to performance of services. We do not warrant the accuracy of information supplied by others, or the use of segregated portions of this report.

Figures

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Figure 2-1
Aerial Image of Facility

Mount Bachelor Ski Resort
Mount Bachelor, OR

Legend

Employee Access Area

Key Map

0 500
Meters

Data Sources
Aerial photography from the U.S. Department of Agriculture; reference labels from Esri.

MAUL FOSTER ALONGI
p. 971 544 2139 | www.maulfoster.com

Path: X:\0_MFA_Projects\M1443\01\002\Pro\M1443.01_002_005.aprx\Fig 2-1 Aerial Photography of Facility
Print Date: 7/19/2023
Reviewed By: arogers
Produced By: jelstrott
Project: M1443.01.002

Path: X:\0_MFA_Projects\M1443\01\002\Pro\M1443_01_002_005.aprx\Fig 2-2 Local Topography

Print Date: 4/18/2023

Reviewed By: arogers

Produced By: sturner

Project: M1443.01.002

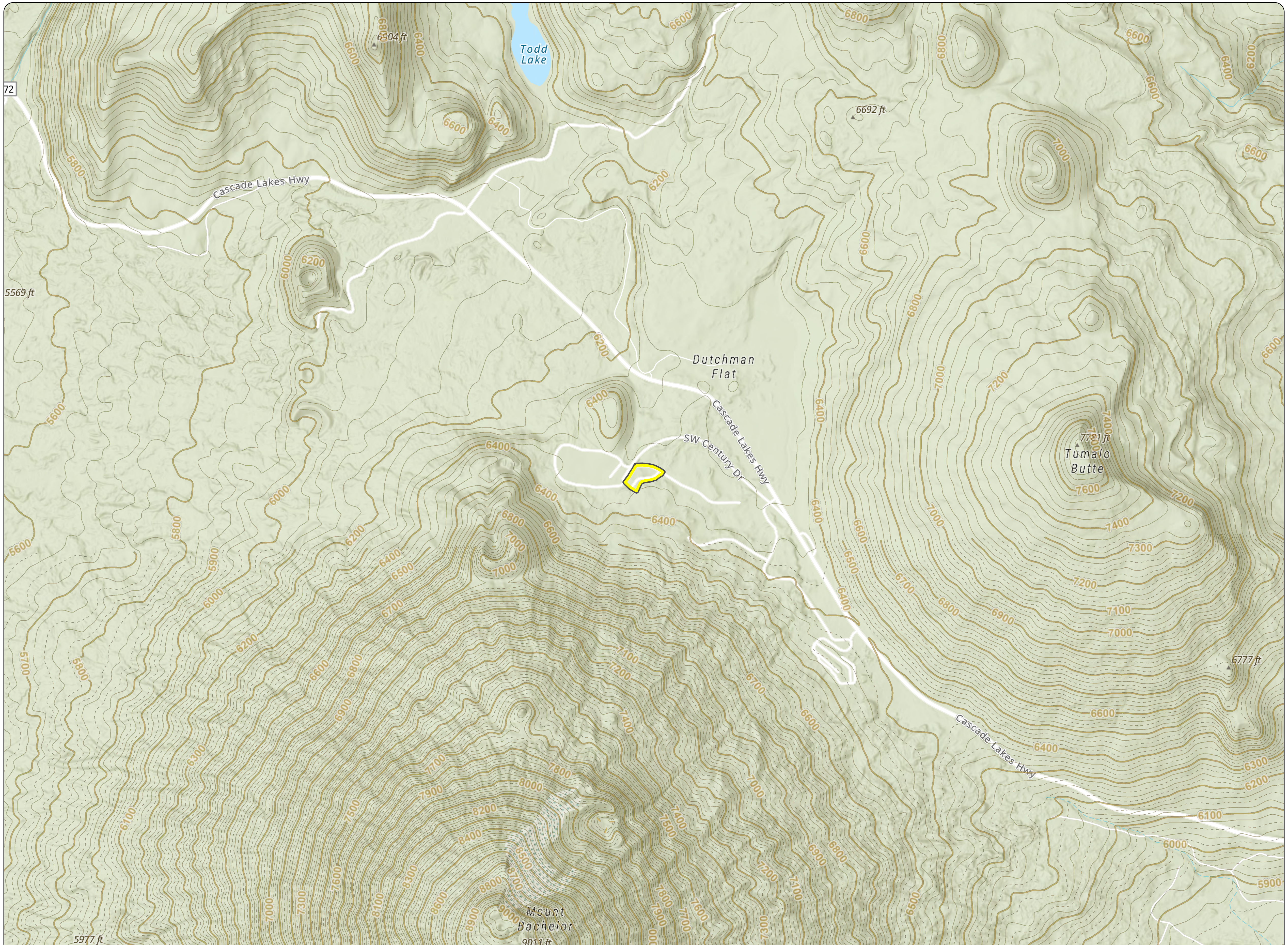

Figure 2-2
Local Topography

Mount Bachelor Ski Resort
Mount Bachelor, OR

Legend

Employee Access Area

Key Map

0 500
Meters

Data Source
Topographic basemap obtained from the U.S. Geological Survey.

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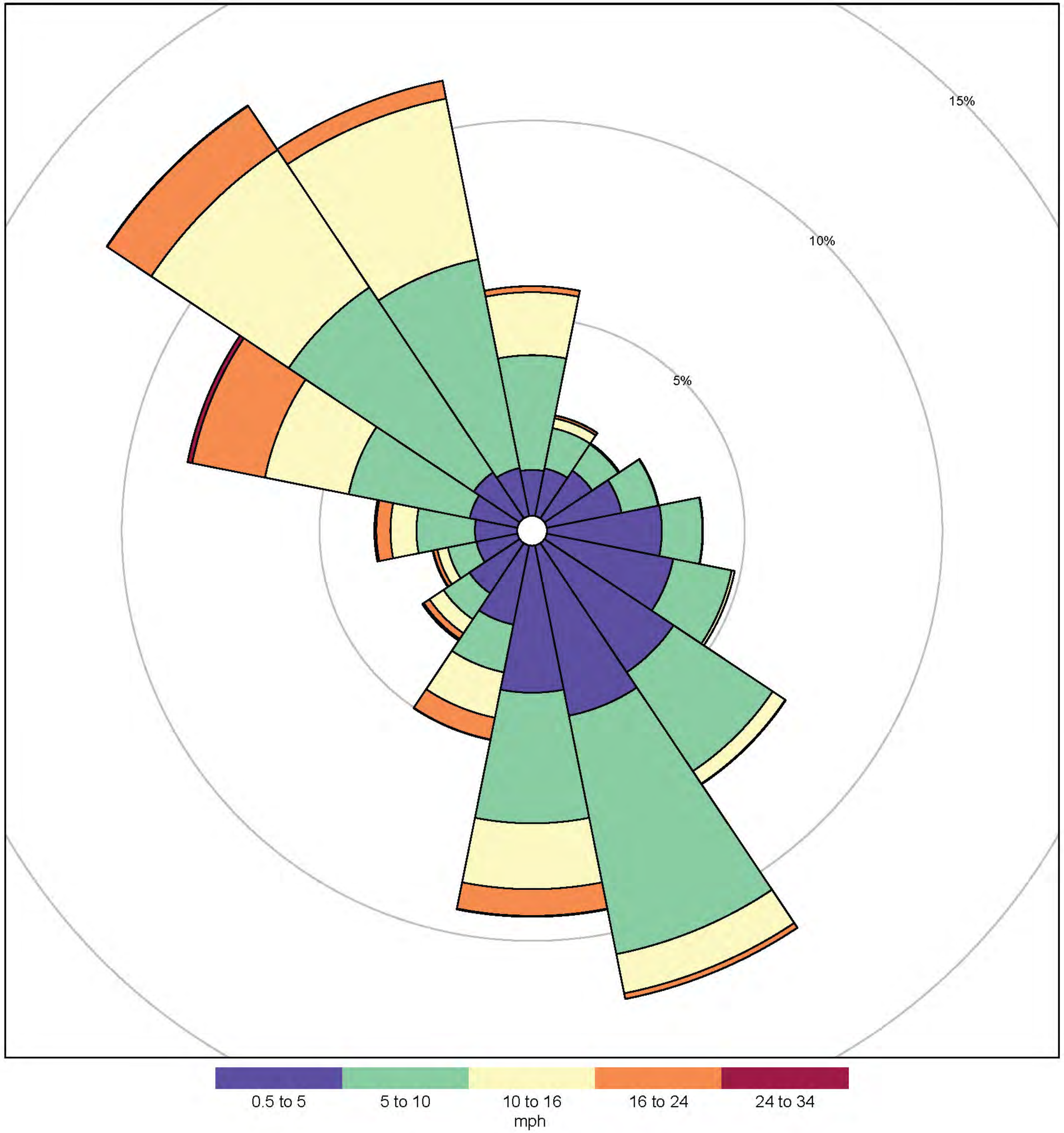
Figure 4-1
Wind Rose

Mount Bachelor Ski Resort
Mount Bachelor, OR



Note
Wind Direction = Blowing From
mph = miles per hour

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Produced By: jelstrott
Project: 1443.01.002

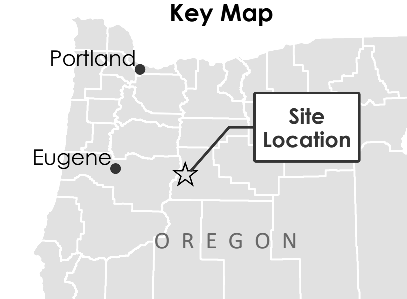
Figure 4-2
Proposed Downwash Structures and Emission Units

Mount Bachelor Ski Resort
Mount Bachelor, OR

Legend

- Emission Unit
- Mount Bachelor Daycare
- Employee Access Area
- Downwash Structure

Key Map



0 30
Meters

Data Sources
Aerial photography from Esri; early learning facility data obtained from the Oregon Department of Education.

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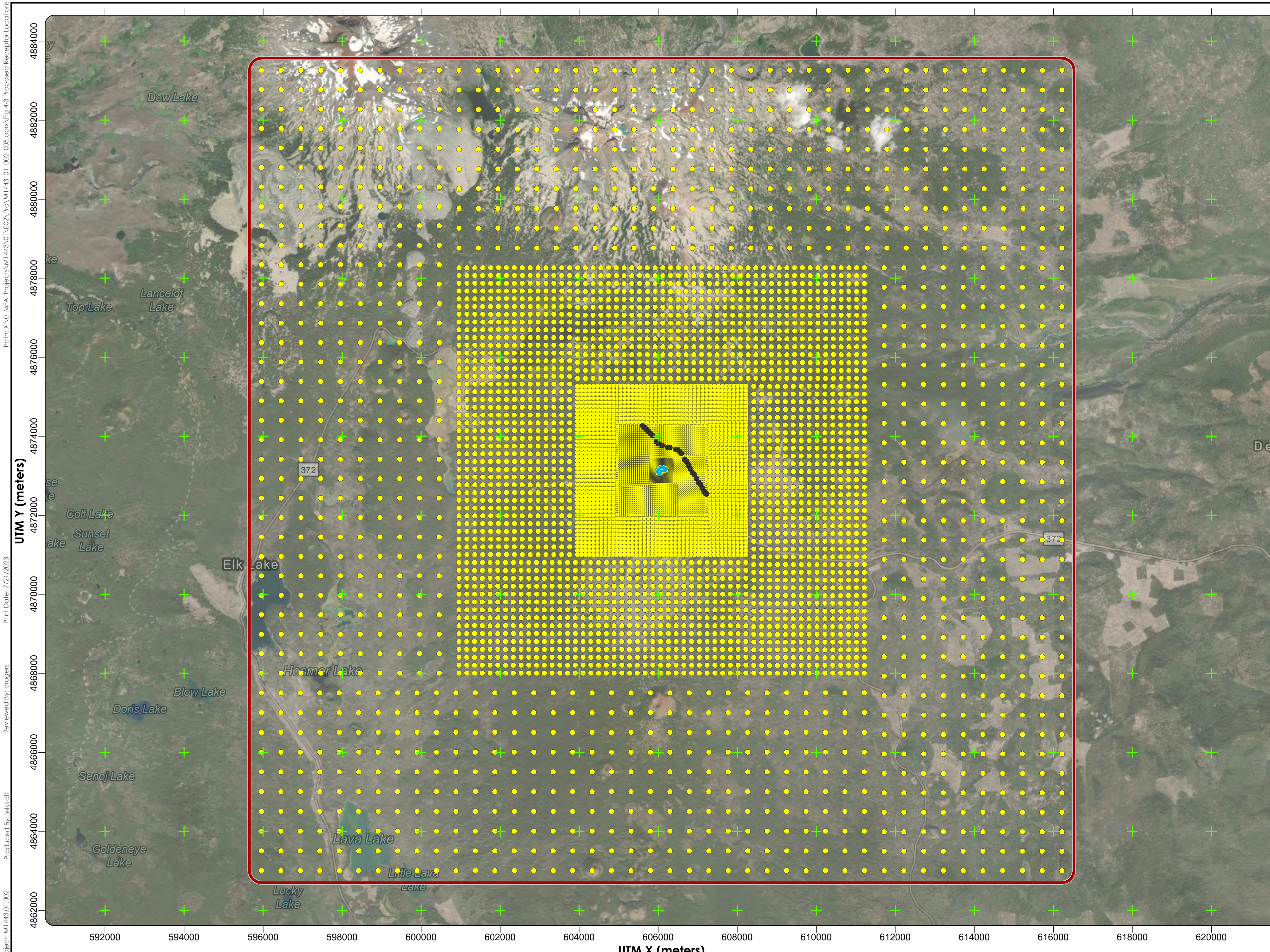
Project: M1443.01.002 Produced By: jelstrott Reviewed By: arogers Print Date: 7/20/2023 Path: X:\0_MFA_Projects\M1443\01\002\Pro\M1443_01_002_005.aprx\Fig 4-2 Proposed Downwash Structures and emission units

Figure 4-3
Proposed Receptor Locations for AAQS/ Level 3 RA Modeling

Mount Bachelor Ski Resort
Mount Bachelor, OR



Legend

- Proposed Receptor
- Proposed Receptor in Right-of-Way
- Proposed Modeling Domain Extent
- Employee Access Area
- UTM 2-Kilometer Grid Mark

Key Map

Note
UTM = Universal Transverse Mercator coordinate system

0 2,000
Meters

Data Source
Aerial photography and reference labels from Esri.

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Path: X:\0_MFA_Projects\M1443\01\002\Pro\M1443.01_002_005.aprx\Fig 4-3 Proposed Receptor Locations
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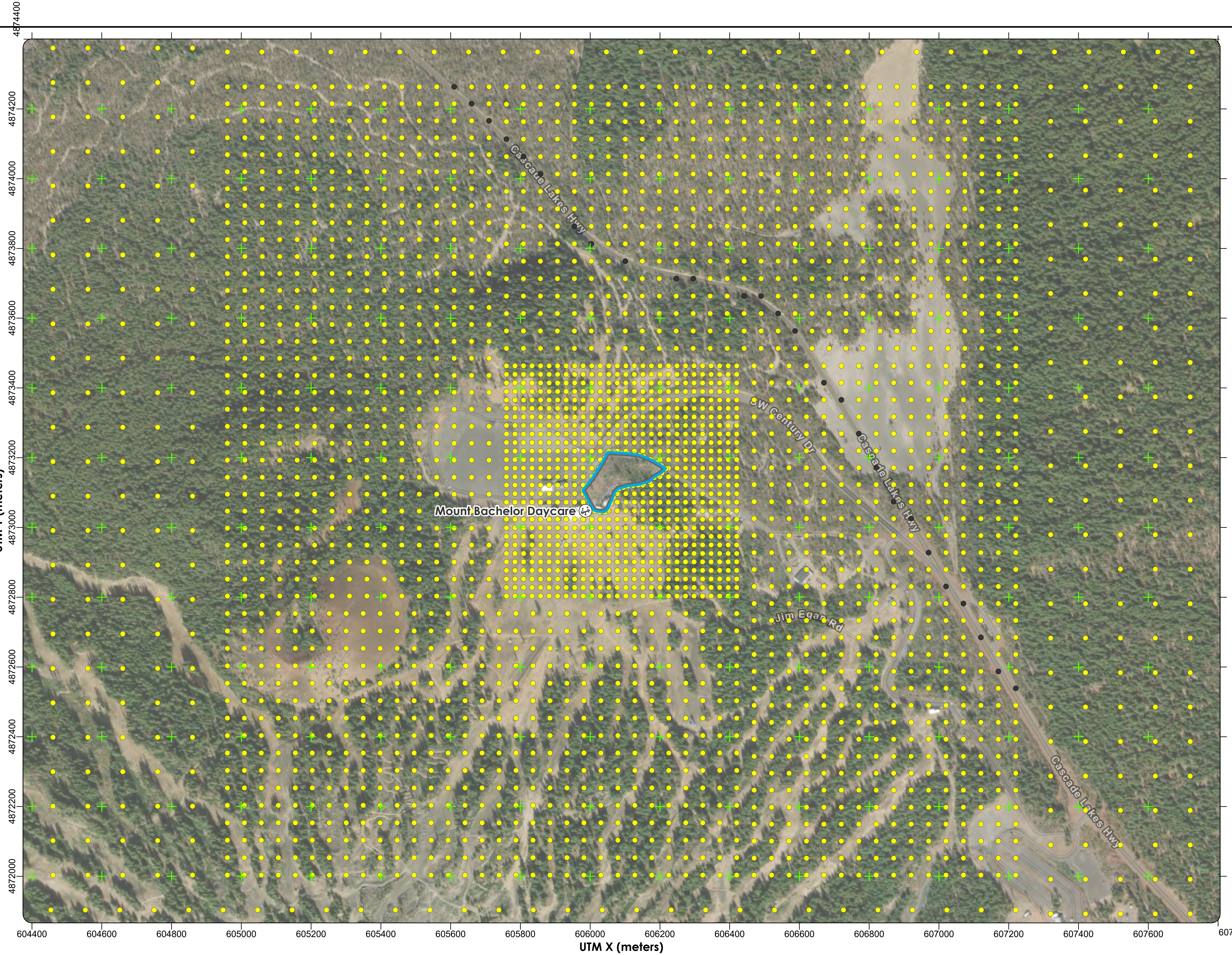
Produced By: jelstrott
Project: M1443.01.002



Path: X:\0_MFA_Projects\M1443\01\002\Pro\M1443.01_002_005.aprx\Fig 4-4 Proposed Receptor Locations - Immediate

Print Date: 7/21/2023

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Project: M1443.01.002

Figure 4-4
Proposed Receptor Locations for AAQS/ Level 3 RA Modeling in the Immediate Area

Mount Bachelor Ski Resort
Mount Bachelor, OR

Legend

- Proposed Receptor
- Proposed Receptor in Right-of-Way
- Mount Bachelor Daycare
- Exposure Assessment Boundary
- Proposed Modeling Domain Extent
- UTM 200-Meter Grid Mark

Key Map

Note
UTM = Universal Transverse Mercator coordinate system

0 300
Meters

Data Source
Aerial photography and reference labels from Esri.

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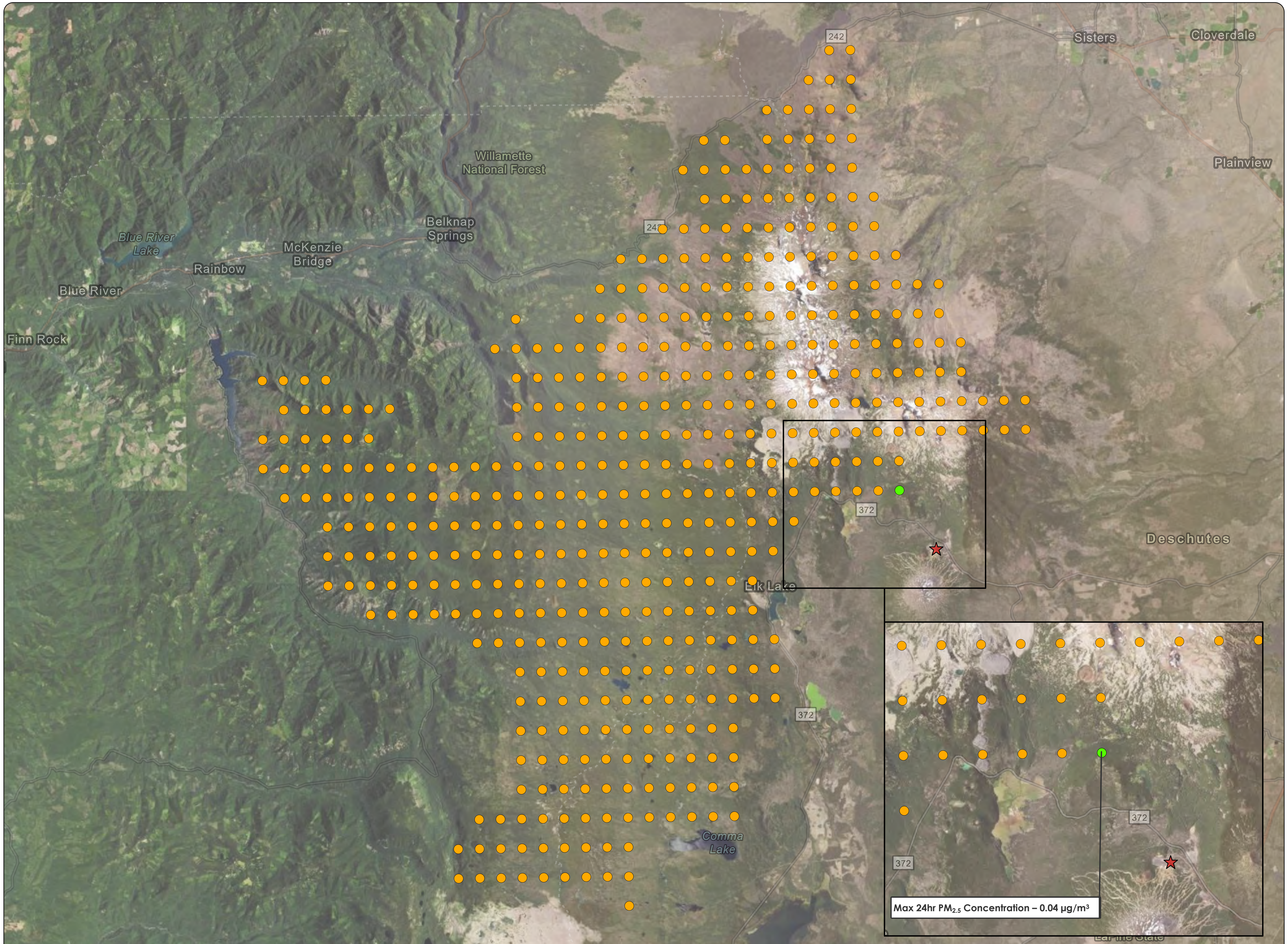


Figure 4-5
Proposed Receptor Locations for Three Sisters Area

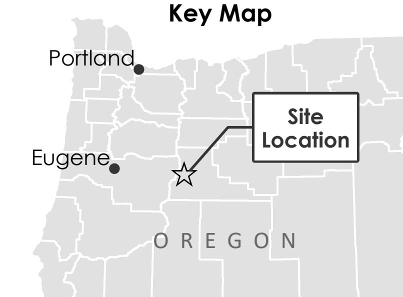
Mount Bachelor Ski Resort
Mount Bachelor, OR

Legend

- Site Location
- Maximum Receptor
- Proposed Receptor

Note
SER = significant emission rate.
µg/m³ = micrograms per cubic meter air.

Key Map



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Meters

Data Sources
Aerial photography from the U.S. Department of Agriculture; reference labels from Esri.

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Print Date: 7/18/2023
Reviewed By: arogers
Produced By: jelstrott
Project: M1443.01.002

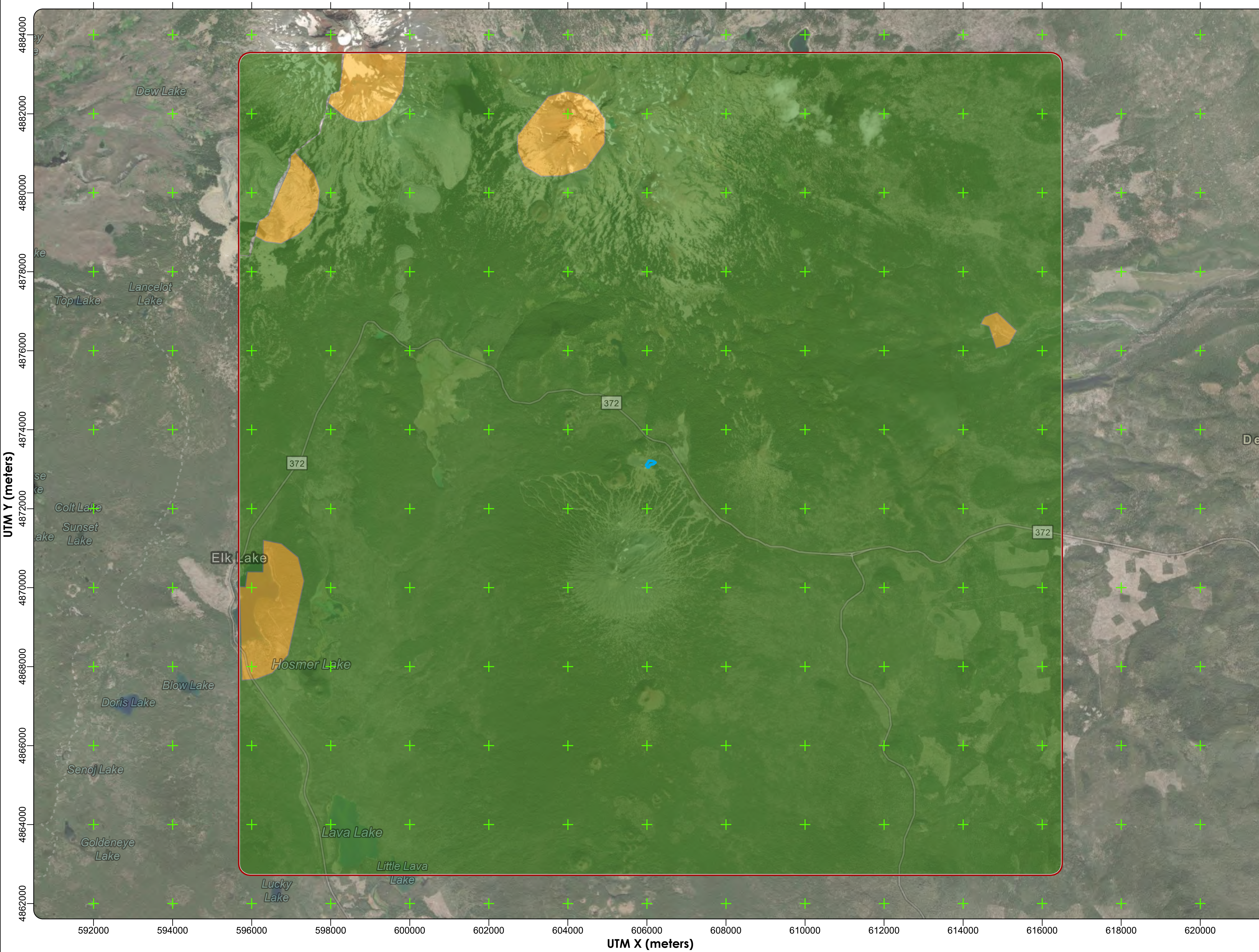


Figure 6-1
Existing Land-Use Zoning Classifications

Mount Bachelor Ski Resort
Mount Bachelor, OR

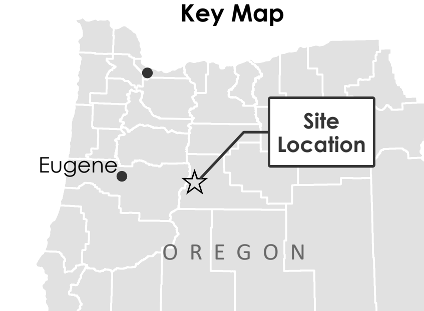
Legend

- Employee Access Area
- Proposed Modeling Domain Extent
- UTM 2-Kilometer Grid Mark

Zoning - Oregon Department of Land Conservation and Development

- Prime Forest 80
- Open Space/Conservation

Key Map



Note
UTM = Universal Transverse Mercator coordinate system
Zoning data from the Oregon Department of Land Conservation and Development (2017).
Existing land use classifications revised to reflect the risk-based concentration categories presented in Oregon Administrative Rule 340-245-8040 Table 4.

zoning data is unavailable and where tax lot land use is more conservative.

0 3
Kilometers

Data Source
Aerial photography and reference labels from Esri.

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Path: X:\0_MFA_Projects\M1443\01\002\Pro\M1443_01_002_005.aprx\Fig 6-1 Existing Land-Use Zoning Classifications
Print Date: 7/18/2023
Reviewed By: arogers
Produced By: jelstrott
Project: M1443.01.002

Figure 6-2
Existing Land-Use Zoning Classifications in the Immediate Area

Mount Bachelor Ski Resort
Mount Bachelor, OR

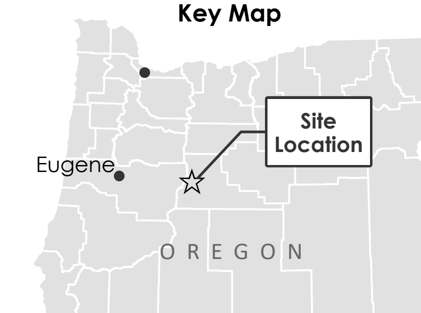
Legend

- Mount Bachelor Daycare
- Employee Access Area
- UTM 50-Meter Grid Mark

Zoning - Oregon Department of Land Conservation and Development

- Prime Forest 80

Key Map



Note
UTM = Universal Transverse Mercator coordinate system
Zoning data from the Oregon Department of Land Conservation and Development (2017).
Existing land use classifications revised to reflect the risk-based concentration categories presented in Oregon Administrative Rule 340-245-8040 Table 4.

zoning data is unavailable and where tax lot land use is more conservative.

0 60
Meters

Data Source
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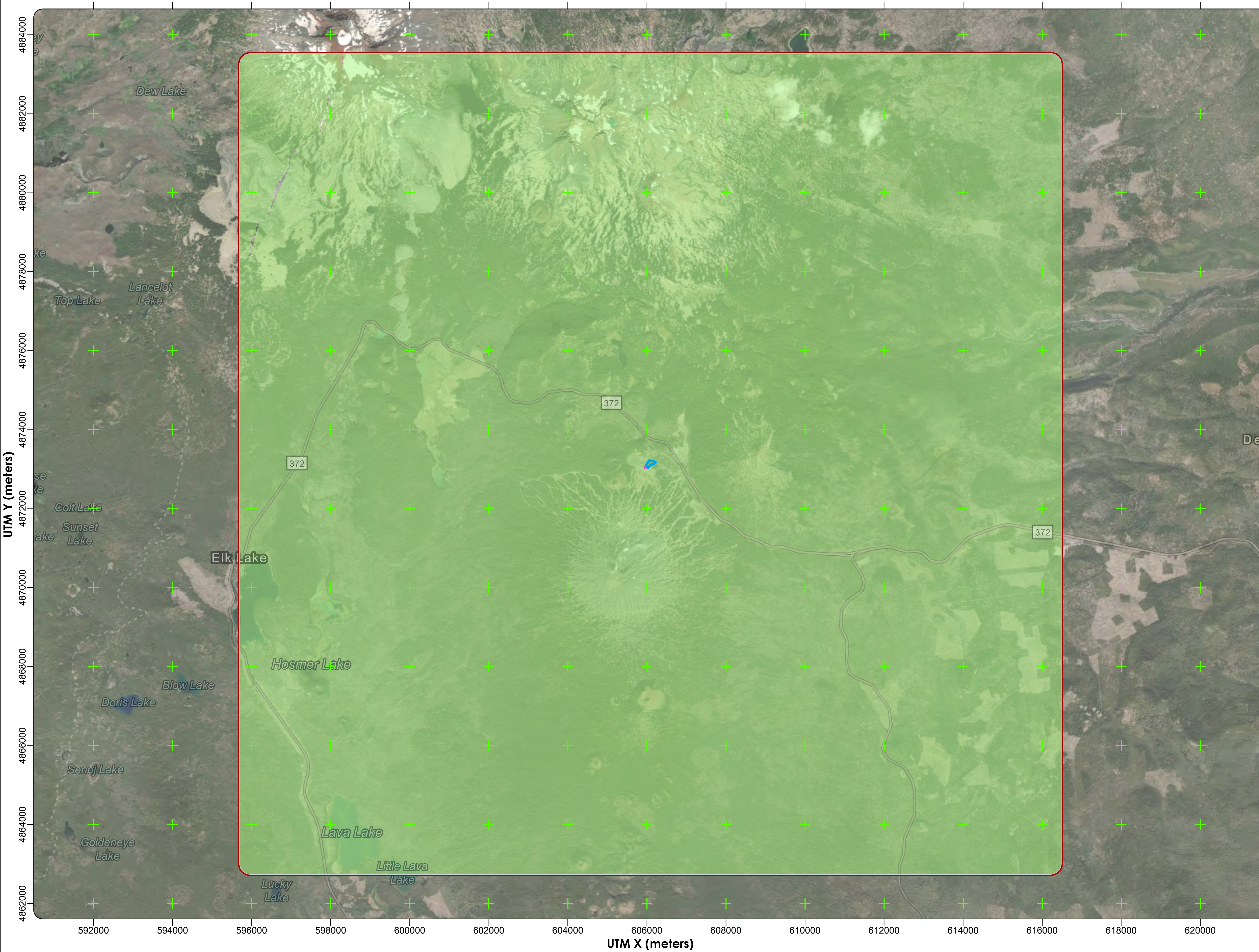
Figure 6-3
Proposed Exposure Categorization

Mount Bachelor Ski Resort
Mount Bachelor, OR



Legend

- Employee Access Area
- Proposed Modeling Domain Extent
- UTM 2-Kilometer Grid Mark

Proposed Land Use Classifications

- Acute
- Child

Key Map

Note
UTM = Universal Transverse Mercator coordinate system

0 3
Kilometers

Data Source
Aerial photography and reference labels from Esri.

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Path: X:\0_MFA_Projects\M1443\01\002\Pro\M1443.01_002_005.aprx\Fig 6-3 Proposed Exposure Categorization
Print Date: 7/18/2023
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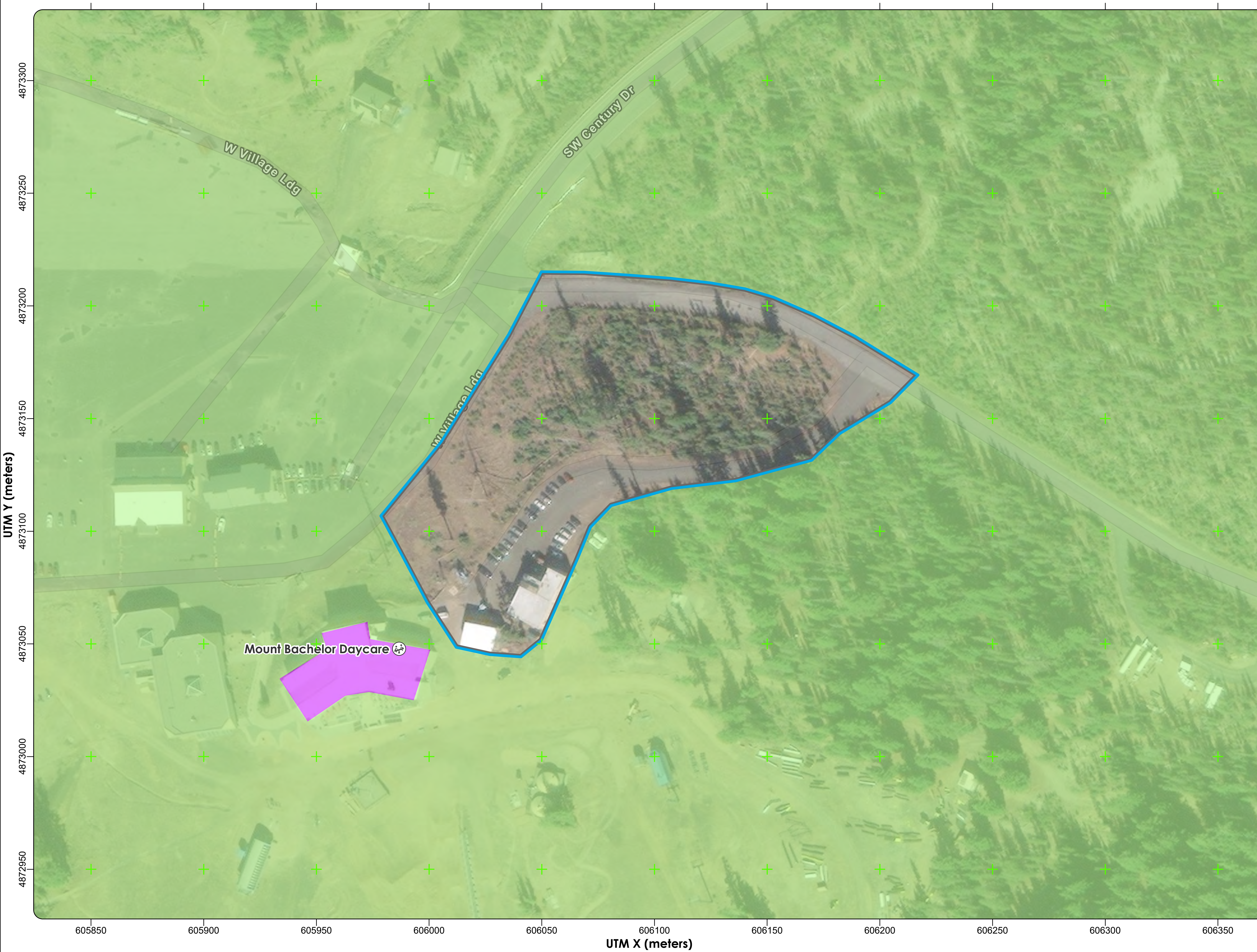

Figure 6-4
Proposed Exposure Categorization in the Immediate Area

Mount Bachelor Ski Resort
Mount Bachelor, OR

Legend

- Mount Bachelor Daycare
- Employee Access Area
- UTM 50-Meter Grid Mark

Proposed Land Use Classifications

- Acute
- Child

Key Map

Note
UTM = Universal Transverse Mercator coordinate system

0 50
Meters

Data Source
Aerial photography and reference labels from Esri.

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Tables

Table 3-1
Proposed Model Emission Rates and Release Parameters
Wisewood Energy—Mount Bachelor, Oregon

Emission Unit ID	Description	Modeled Hours [1] (hrs/day)	Emission Estimates			Proposed Model Emission Rates	
			$PM_{2.5}$ Maximum Daily (lb/day)	NO_X Maximum Hourly (lb/hr)	NO_X Annual (tons/yr)	$PM_{2.5}$ 24-hr Assessment (g/s)	NO_X 1-hr Assessment (g/s)
BLR	Proposed Biomass Boiler	24.0	5.62 [2]	1.23 [2]	--	0.0295 [a]	0.1547 [b]
PROP	Proposed Propane Boiler	24.0	1.02 [3]	0.79 [3]	--	0.0054 [a]	0.0999 [b]
EGEN1	Existing Emergency Engine	24.0	0.23 [4]	--	1.35 [4]	0.0012 [a]	0.0389 [c]
EGEN2	Existing Emergency Engine	24.0	0.13 [4]	--	0.80 [4]	0.0007 [a]	0.0231 [c]
EGEN3	Existing Emergency Engine	24.0	0.13 [4]	--	0.80 [4]	0.0007 [a]	0.0231 [c]
EGEN4	Existing Emergency Engine	24.0	0.40 [4]	--	0.57 [4]	0.0021 [a]	0.0164 [c]

Emission Unit ID	Stack Orientation	Source Type	Release Height (m)	Release Diameter (m)	Exit Velocity (m/s)	Exit Flowrate [d] (m^3/s)	Exit Temperature (K)
BLR	Vertical [6]	Point	15.9 [6]	0.36 [6]	3.11 [6]	0.32	393 [6]
PROP	Horizontal [6]	Point	7.00 [6]	0.36 [6]	3.19 [6]	0.32	393 [6]
EGEN1	Horizontal [7]	Point	3.12 [7]	0.30 [7]	30.5 [8]	2.22	673 [8]
EGEN2	Horizontal [7]	Point	7.62 [7]	0.28 [7]	30.5 [8]	1.83	673 [8]
EGEN3	Horizontal [7]	Point	3.43 [7]	0.25 [7]	30.5 [8]	1.47	673 [8]
EGEN4	Horizontal [7]	Point	7.62 [7]	0.17 [7]	30.5 [8]	0.70	673 [8]

Notes

(a) Proposed $PM_{2.5}$ model emission rate (g/s) = ($PM_{2.5}$ daily emissions estimate [lb/day]) x (453.592 g/lb) / (24 hrs/day) / (3,600 s/hr)

(b) Proposed NO_X model emission rate (g/s) = (NO_X hourly emissions estimate [lb/hr]) x (453.592 g/lb) / (3,600 s/hr)

(c) Proposed NO_X model emission rate (g/s) = (NO_X annual emissions estimate [tons/yr]) x (2,000 lb/ton) x (453.592 g/lb) / (8,760 hrs/yr) / (3,600 s/hr); See reference (5).

(d) Exit flowrate (m^3/s) = (exit velocity [m/s]) x ([π] x [release diameter {m}/2] ^{2})

References

(1) Assumes continuous daily operation.

(2) See Table 2, Proposed Biomass Boiler Criteria Pollutant and GHG Emission Estimates.

(3) See Table 4, Proposed Propane Boiler Criteria Pollutant and GHG Emission Estimates.

(4) See Table 6, Emergency Engines Criteria Pollutant and GHG Emission Estimates.

(5) EPA Memorandum, "Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO2 National Ambient Air Quality Standard," dated March 1, 2011. EPA recommends modeling impacts from intermittent emissions based on the annual average hourly rate instead of the maximum hourly rate.

(6) Information provided by Wisewood Engineering.

(7) Information provided by the Mount Bachelor resort.

(8) Variable estimated using known exhaust parameters for similar size and type emergency engines.

Table 4-3
Assessment of Missing Meteorological Data
Wisewood Energy—Mount Bachelor, Oregon

Quarter	Meteorological Data Assessment per Year														
	2018			2019			2020			2021			2022		
	Total Hours (1)	Missing Hours (2)	Available (a) (%)	Total Hours (1)	Missing Hours (2)	Available (a) (%)	Total Hours (1)	Missing Hours (2)	Available (a) (%)	Total Hours (1)	Missing Hours (2)	Available (a) (%)	Total Hours (1)	Missing Hours (2)	Available (a) (%)
Q1	2,160	18	99.2%	2,160	9	99.6%	2,184	5	99.8%	2,160	13	99.4%	2,160	19	99.1%
Q2	2,184	2	99.9%	2,184	3	100%	2,184	12	99.5%	2,184	31	98.6%	2,184	19	99.1%
Q3	2,208	22	99.0%	2,208	9	99.6%	2,208	0	100%	2,208	0	100%	2,208	15	99.3%
Q4	2,208	8	99.6%	2,208	20	99.1%	2,208	14	99.4%	2,208	7	99.7%	2,208	1	100%

Notes

Q1 = January 1st to March 31st; Q2 = April 1st to June 30th; Q3 = July 1st to September 30th; Q4 = October 1st to December 31st.

(a) Available hours (%) = ([total hours] - [missing hours]) / (total hours) x (100)

References

(1) Total hours obtained from the surface and profile quality assurance files generated using AERMET (version 22112) for the period between January 1, 2018 through December 31, 2022. The combined 5-year meteorological dataset is representative of the Roberts Field Airport monitoring station (ID 726835).

(2) The number of missing hours was determined by preparing a Surface Quality Assurance excel file generated using AERMET version 22112.

Table 4-5
Surface Soil Moisture Condition Assessment
Wisewood Energy—Mount Bachelor, Oregon

Calendar Year	Annual Precipitation [1] (in)	Climatic Significance [2]	Calendar Year Soil Moisture [3]
2018	4.85	Lower 30th Percentile	Dry
2019	10.6	Upper 70th Percentile	Wet
2020	6.50	Lower 30th Percentile	Dry
2021	6.25	Lower 30th Percentile	Dry
2022	7.45	Middle 40th Percentile	Average
32-Year Climate Precipitation Data [4]			
Average Annual Precipitation [5]			7.94
Lower 30th Percentile Annual Precipitation [6]			6.61
Upper 70th Percentile Annual Precipitation [7]			9.62

References

(1) Climatological data obtained from the Western Regional Climate Center for Roberts Field Airport monitoring station (ID 357062). https://wrcc.dri.edu [Accessed on June 1, 2023]

(2) Climatic significance represents annual precipitation compared to 32-year climatological period.

(3) Surface moisture conditions correspond to "Dry", "Average" or "Wet" soil content determined by comparing annual precipitation to 30-year climatological period. This method is consistent with the methodology set forth in the current version of the US EPA AERSURFACE User's Guide dated January 16, 2013.

(4) Represents 32-year period between 1989 and 2022. There were two years (1996 and 1997) where precipitation data were missing for the entire year. As a result, 1989 and 1990 were included for the 30-year climatological calculations.

(5) Represents average annual precipitation during 32-year climatological period.

(6) Represents lower limit of middle 30th percentile annual precipitation during 32-year climatological period.

(7) Represents upper limit of middle 70th percentile annual precipitation during 32-year climatological period.

Table 4-6
Proposed Downwash Structure Heights
Wisewood Energy—Mount Bachelor, Oregon

Downwash Structure ID	Description	Tier Height	
		(ft)	(m) [a]
BLD_1	Proposed Boiler Building	34.1 [1]	10.4
BLD_2	Maintenance Building	25.0 [1]	7.62
BLD_3	Mount Bachelor Ski Patrol	25.0 [1]	7.62
BLD_4	Mount Bachelor Visitor Center	28.0 [2]	8.53

Notes

(a) Tier height (m) = (tier height [ft]) / (3.28084 ft/m)

References

(1) Information provided by Wisewood Energy or Mount Bachelor.

(2) Building height estimated using Google Earth.

Table 4-8
Proposed TAC Daily Model Emission Rates
Wisewood Energy—Mount Bachelor, Oregon

Toxic Air Contaminant [1]	CAS or DEQ ID	Acute RBC? (Yes/No)	Biomas Boiler		Propane Boiler		Emergency Generators							
			BLR		PROP		EGEN1		EGEN2		EGEN3		EGEN4	
			(lb/day) [1]	(g/s) [a]	(lb/day) [1]	(g/s) [a]	(lb/day) [1]	(g/s) [a]	(lb/day) [1]	(g/s) [a]	(lb/day) [1]	(g/s) [a]	(lb/day) [1]	(g/s) [a]
1,1,1-Trichloroethane (Methyl chloroform)	71-55-6	Yes	7.2E-03	3.8E-05	--	--	--	--	--	--	--	--	--	--
1,2-Dichloropropane (Propylene dichloride)	78-87-5	Yes	2.1E-03	1.1E-05	--	--	--	--	--	--	--	--	--	--
1,3-Butadiene	106-99-0	Yes	--	--	--	--	6.2E-03	3.3E-05	3.7E-03	1.9E-05	3.7E-03	1.9E-05	2.0E-03	1.1E-05
Acetaldehyde	75-07-0	Yes	3.5E-02	1.9E-04	5.6E-04	2.9E-06	2.2E-02	1.2E-04	1.3E-02	7.0E-05	1.3E-02	7.0E-05	7.3E-03	3.8E-05
Acetone	67-64-1	Yes	6.6E-02	3.5E-04	--	--	--	--	--	--	--	--	--	--
Acrolein	107-02-8	Yes	3.2E-02	1.7E-04	3.5E-04	1.8E-06	9.7E-04	5.1E-06	5.8E-04	3.0E-06	5.8E-04	3.0E-06	3.2E-04	1.7E-06
Benzene	71-43-2	Yes	0.12	6.4E-04	1.0E-03	5.5E-06	5.3E-03	2.8E-05	3.2E-03	1.7E-05	3.2E-03	1.7E-05	1.7E-03	9.1E-06
Bromomethane (Methyl bromide)	74-83-9	Yes	1.4E-03	7.4E-06	--	--	--	--	--	--	--	--	--	--
Carbon tetrachloride	56-23-5	Yes	1.2E-03	6.5E-06	--	--	--	--	--	--	--	--	--	--
Chlorine	7782-50-5	Yes	9.9E-02	5.2E-04	--	--	--	--	--	--	--	--	--	--
Chlorobenzene	108-90-7	No	2.1E-03	1.1E-05	--	--	--	--	--	--	--	--	--	--
Chloroform	67-66-3	Yes	2.5E-03	1.3E-05	--	--	--	--	--	--	--	--	--	--
Chloromethane (Methyl chloride)	74-87-3	Yes	5.4E-03	2.9E-05	--	--	--	--	--	--	--	--	--	--
Ethylbenzene	100-41-4	Yes	1.5E-03	8.0E-06	1.2E-03	6.5E-06	3.1E-04	1.6E-06	1.9E-04	9.7E-07	1.9E-04	9.7E-07	1.0E-04	5.3E-07
Formaldehyde	50-00-0	Yes	0.13	6.9E-04	2.2E-03	1.2E-05	4.9E-02	2.6E-04	2.9E-02	1.5E-04	2.9E-02	1.5E-04	1.6E-02	8.4E-05
Hexane	110-54-3	No	3.6E-02	1.9E-04	8.2E-04	4.3E-06	7.7E-04	4.0E-06	4.6E-04	2.4E-06	4.6E-04	2.4E-06	2.5E-04	1.3E-06
Hydrochloric Acid	7647-01-0	Yes	0.54	2.9E-03	--	--	5.3E-03	2.8E-05	3.2E-03	1.7E-05	3.2E-03	1.7E-05	1.7E-03	9.1E-06
Hydrogen Fluoride	7664-39-3	Yes	1.1E-02	5.9E-05	--	--	--	--	--	--	--	--	--	--
Isopropyl alcohol	67-63-0	Yes	0.56	3.0E-03	--	--	--	--	--	--	--	--	--	--
Methanol	67-56-1	Yes	9.1E-02	4.8E-04	--	--	--	--	--	--	--	--	--	--
Methyl ethyl ketone (2-Butanone)	78-93-3	Yes	8.7E-04	4.6E-06	--	--	--	--	--	--	--	--	--	--
Methyl isobutyl ketone (MIBK, Hexone)	108-10-1	No	5.6E-02	2.9E-04	--	--	--	--	--	--	--	--	--	--
Methylene chloride (Dichloromethane)	75-09-2	Yes	5.0E-02	2.6E-04	--	--	--	--	--	--	--	--	--	--
Phenol	108-95-2	Yes	2.0E-02	1.0E-04	--	--	--	--	--	--	--	--	--	--
Propionaldehyde	123-38-6	No	3.9E-02	2.0E-04	--	--	--	--	--	--	--	--	--	--
Styrene	100-42-5	Yes	5.9E-02	3.1E-04	--	--	--	--	--	--	--	--	--	--
Toluene	108-88-3	Yes	1.4E-03	7.5E-06	4.8E-03	2.5E-05	3.0E-03	1.6E-05	1.8E-03	9.4E-06	1.8E-03	9.4E-06	9.8E-04	5.2E-06
Xylene (mixture)	1330-20-7	Yes	6.5E-04	3.4E-06	3.5E-03	1.9E-05	1.2E-03	6.4E-06	7.2E-04	3.8E-06	7.2E-04	3.8E-06	4.0E-04	2.1E-06
Benz[a]anthracene	56-55-3	No	1.0E-05	5.3E-08	--	--	--	--	--	--	--	--	--	--
Benzo[a]pyrene	50-32-8	Yes	2.8E-04	1.5E-06	--	--	1.0E-06	5.4E-09	6.1E-07	3.2E-09	6.1E-07	3.2E-09	3.3E-07	1.7E-09
Benzo[b]fluoranthene	205-99-2	No	1.8E-05	9.3E-08	--	--	--	--	--	--	--	--	--	--
Benzo[g,h,i]perylene	191-24-2	No	1.9E-05	9.9E-08	--	--	--	--	--	--	--	--	--	--
Benzo[j]fluoranthene	205-82-3	No	1.9E-05	1.0E-07	--	--	--	--	--	--	--	--	--	--
Benzo[k]fluoranthene	207-08-9	No	6.5E-06	3.4E-08	--	--	--	--	--	--	--	--	--	--
Chrysene	218-01-9	No	9.9E-06	5.2E-08	--	--	--	--	--	--	--	--	--	--
Fluoranthene	206-44-0	No	2.1E-04	1.1E-06	--	--	--	--	--	--	--	--	--	--
Indeno[1,2,3-cd]pyrene	193-39-5	No	1.3E-05	6.7E-08	--	--	--	--	--	--	--	--	--	--
Naphthalene	91-20-3	Yes	1.2E-02	6.5E-05	4.4E-05	2.3E-07	5.6E-04	3.0E-06	3.4E-04	1.8E-06	3.4E-04	1.8E-06	1.8E-04	9.6E-07
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	1746-01-6	No	1.2E-10	6.2E-13	--	--	--	--	--	--	--	--	--	--
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	40321-76-4	No	1.7E-10	8.7E-13	--	--	--	--	--	--	--	--	--	--
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	39227-28-6	No	1.1E-10	5.7E-13	--	--	--	--	--	--	--	--	--	--
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	57653-85-7	No	2.6E-10	1.4E-12	--	--	--	--	--	--	--	--	--	--
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	19408-74-3	No	2.8E-10	1.4E-12	--	--	--	--	--	--	--	--	--	--
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	35822-46-9	No	1.2E-09	6.4E-12	--	--	--	--	--	--	--	--	--	--
Octachlorodibenzo-p-dioxin (OCDD)	3268-87-9	No	3.1E-09	1.6E-11	--	--	--	--	--	--	--	--	--	--
2,3,7,8-Tetrachlorodibenzofuran (TcDF)	51207-31-9	No	1.0E-09	5.3E-12	--	--	--	--	--	--	--	--	--	--
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	57117-41-6	No	5.0E-10	2.6E-12	--	--	--	--	--	--	--	--	--	--
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	57117-31-4	No	7.6E-10	4.0E-12	--	--	--	--	--	--	--	--	--	--
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	70648-26-9	No	4.4E-10	2.3E-12	--	--	--	--	--	--	--	--	--	--
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	57117-44-9	No	3.9E-10	2.1E-12	--	--	--	--	--	--	--	--	--	--
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	72918-21-9	No	8.3E-11	4.4E-13	--	--	--	--	--	--	--	--	--	--
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	60851-34-5	No	3.3E-10	1.7E-12	--	--	--	--	--	--	--	--	--	--
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	67562-39-4	No	7.1E-10	3.7E-12	--	--	--	--	--	--	--	--	--	--
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	55673-89-7	No	1.0E-10	5.2E-13	--	--	--	--	--	--	--	--	--	--
Octachlorodibenzofuran (OCDF)	39001-02-0	No	6.2E-10	3.3E-12	--	--	--	--	--	--	--	--	--	--
Antimony and compounds	7440-36-0	Yes	3.8E-05	2.0E-07	--	--	--	--	--	--	--	--	--	--
Arsenic and compounds	7440-38-2	Yes	2.4E-04	1.2E-06	--	--	4.6E-05	2.4E-07	2.7E-05	1.4E-07	2.7E-05	1.4E-07	1.5E-05	7.8E-08
Beryllium and compounds	7440-41-7	Yes	3.6E-06	1.9E-08	--	--	--	--	--	--	--	--	--	--
Cadmium and compounds	7440-43-9	Yes	4.0E-05	2.1E-07	--	--	4.3E-05	2.2E-07	2.6E-05	1.3E-07	2.6E-05	1.3E-07	1.4E-05	7.3E-08
Chromium VI	18540-29-9	Yes	3.4E-05	1.8E-07	--	--	2.9E-06	1.5E-08	1.7E-06	8.9E-09	1.7E-06	8.9E-09	9.3E-07	4.9E-09
Cobalt and compounds	7440-48-4	No	6.2E-05	3.3E-07	--	--	--	--	--	--	--	--	--	--
Copper and compounds	7440-50-8	Yes	4.7E-04	2.5E-06	--	--	1.2E-04	6.1E-07	7.0E-05	3.7E-07	7.0E-05	3.7E-07	3.8E-05	2.0E-07
Lead and compounds	7439-92-1	Yes	6.5E-04	3.4E-06	--	--	2.4E-04	1.2E-06	1.4E-04	7.4E-07	1.4E-04	7.4E-07	7.7E-05	4.1E-07
Manganese and compounds	7439-96-5	Yes	1.2E-02	6.3E-05	--	--	8.9E-05	4.6E-07	5.3E-05	2.8E-07	5.3E-05	2.8E-07	2.9E-05	1.5E-07
Mercury and compounds	7439-97-6	Yes	1.3E-04	6.9E-07	--	--	5.7E-05	3.0E-07	3.4E-05	1.8E-07	3.4E-05	1.8E-07	1.9E-05	9.8E-08
Nickel and compounds	7440-02-0	Yes	3.5E-04	1.8E-06	--	--	1.1E-04	5.8E-07	6.6E-05	3.5E-07	6.6E-05	3.5E-07	3.6E-05	1.9E-07
Selenium and compounds	7782-49-2	Yes	2.0E-04	1.1E-06	--	--	6.3E-05	3.3E-07	3.7E-05	2.0E-07	3.7E-05	2.0E-07	2.1E-05	1.1E-07
Vanadium (fume or dust)	7440-62-2	Yes	7.4E-05	3.9E-07	--	--	--	--	--	--	--	--	--	--
Polychlorinated Biphenyls	1336-36-3	No	9.8E-07	5.1E-09	--	--	--	--	--	--	--	--	--	--
2,4-Dinitrotoluene	121-14-2	No	1.2E-04	6.2E-07	--	--	--	--	--	--	--	--	--	--
Bis(2-ethylhexyl) phthalate (DEHP)	117-81-7	No	5.8E-06	3.0E-08	--	--	--	--	--	--	--	--	--	--
Hydrogen cyanide	74-90-8	Yes	2.6E-03	1.3E-05	--	--	--	--	--	--	--	--	--	--
Ethylene dichloride (EDC, 1,2-dichloroethane)	107-06-2	No	3.6E-03	1.9E-05	--	--	--	--	--	--	--	--	--	--
Isopropylbenzene (Cumene)	98-82-8	No	2.2E-03	1.2E-05	--	--	--	--	--	--	--	--	--	--
p-Dichlorobenzene (1,4-Dichlorobenzene)	106-46-7	Yes	3.5E-02	1.8E-04	--	--	--	--	--	--	--	--	--	--
Vinyl Chloride	75-01-4	Yes	2.3E-03	1.2E-05	--	--	--	--	--	--	--	--	--	--
Trichloroethene (TCE, Trichloroethylene)	79-01-6	Yes	2.5E-03	1.3E-05	--	--	--	--	--	--	--	--	--	--
2,4,6-Trichlorophenol	88-06-2	No	2.5E-05	1.3E-07	--	--	--	--	--	--	--	--	--	--
Pentachlorophenol	87-86-5	No	2.7E-05	1.4E-07	--	--	--	--	--	--	--	--	--	--
Tetrachloroethene (Perchloroethylene)	127-18-4	Yes	3.1E-03	1.6E-05	--	--	--	--	--	--	--	--	--	--
Ammonia	7664-41-7	Yes	--	--	0.44	2.3E-03	2.3E-02	1.2E-04	1.4E-02	7.1E-05	1.4E-02	7.1E-05	7.5E-03	3.9E-05
PAHs (excluding Naphthalene)	401	No	--	--	1.5E-05	7.7E-08	1.0E-03	5.4E-06	6.2E-04	3.2E-06	6.2E-04	3.2E-06	3.4E-04	1.8E-06
Total DPM	200	No	--	--	--	--	0.96	5.0E-03	0.57	3.0E-03	0.57	3.0E-03	0.31	1.6E-03

Notes

HAP = hazardous air pollutant; RBC = risk-based concentration; g/s = grams per second; lb/day = pounds per day.

[a] Emission rate (g/s) = (daily emissions estimate [lb/day]) x (453.592 g/lb) / (24 hrs/day) / (3,600 s/hr)

References

[1] See Table 9, Proposed Biomass Boiler TAC and HAP Emission Estimates, in the approved emissions inventory,

Table 4-9
Proposed TAC Annual Model Emission Rates
Wisewood Energy—Mount Bachelor, Oregon

Toxic Air Contaminant [1]	CAS or DEQ ID	Chronic RBC? (Yes/No)		Biomas Boiler		Propane Boiler		Emergency Generators							
				BLR		PROP		EGEN1		EGEN2		EGEN3		EGEN4	
		Cancer	Noncancer	(lb/yr) [1]	(g/s) [a]	(lb/yr) [1]	(g/s) [a]	(lb/yr) [1]	(g/s) [a]	(lb/yr) [1]	(g/s) [a]	(lb/yr) [1]	(g/s) [a]	(lb/yr) [1]	(g/s) [a]
1,1,1-Trichloroethane (Methyl chloroform)	71-55-6	No	Yes	2.63	3.8E-05	--	--	--	--	--	--	--	--	--	--
1,2-Dichloropropane (Propylene dichloride)	78-87-5	No	Yes	0.77	1.1E-05	--	--	--	--	--	--	--	--	--	--
1,3-Butadiene	106-99-0	Yes	Yes	--	--	--	--	1.24	1.8E-05	0.74	1.1E-05	0.74	1.1E-05	0.41	5.8E-06
Acetaldehyde	75-07-0	Yes	Yes	12.9	1.9E-04	0.20	2.9E-06	4.48	6.4E-05	2.66	3.8E-05	2.66	3.8E-05	1.46	2.1E-05
Acetone	67-64-1	No	Yes	24.1	3.5E-04	--	--	--	--	--	--	--	--	--	--
Acrolein	107-02-8	No	Yes	11.9	1.7E-04	0.13	1.8E-06	0.19	2.8E-06	0.12	1.7E-06	0.12	1.7E-06	6.3E-02	9.1E-07
Benzene	71-43-2	Yes	Yes	44.7	6.4E-04	0.38	5.5E-06	1.06	1.5E-05	0.63	9.1E-06	0.63	9.1E-06	0.35	5.0E-06
Bromomethane (Methyl bromide)	74-83-9	No	Yes	0.52	7.4E-06	--	--	--	--	--	--	--	--	--	--
Carbon tetrachloride	56-23-5	Yes	Yes	0.45	6.5E-06	--	--	--	--	--	--	--	--	--	--
Chlorine	7782-50-5	No	Yes	36.0	5.2E-04	--	--	--	--	--	--	--	--	--	--
Chlorobenzene	108-90-7	No	Yes	0.76	1.1E-05	--	--	--	--	--	--	--	--	--	--
Chloroform	67-66-3	No	Yes	0.92	1.3E-05	--	--	--	--	--	--	--	--	--	--
Chloromethane (Methyl chloride)	74-87-3	No	Yes	1.98	2.9E-05	--	--	--	--	--	--	--	--	--	--
Ethylbenzene	100-41-4	Yes	Yes	0.56	8.0E-06	0.45	6.5E-06	6.2E-02	9.0E-07	3.7E-02	5.3E-07	3.7E-02	5.3E-07	2.0E-02	2.9E-07
Formaldehyde	50-00-0	Yes	Yes	47.9	6.9E-04	0.81	1.2E-05	9.86	1.4E-04	5.87	8.4E-05	5.87	8.4E-05	3.22	4.6E-05
Hexane	110-54-3	No	Yes	13.1	1.9E-04	0.30	4.3E-06	0.15	2.2E-06	9.1E-02	1.3E-06	9.1E-02	1.3E-06	5.0E-02	7.2E-07
Hydrochloric Acid	7647-01-0	No	Yes	199	2.9E-03	--	--	1.06	1.5E-05	0.63	9.1E-06	0.63	9.1E-06	0.35	5.0E-06
Hydrogen Fluoride	7664-39-3	No	Yes	4.13	5.9E-05	--	--	--	--	--	--	--	--	--	--
Isopropyl alcohol	67-63-0	No	Yes	206	3.0E-03	--	--	--	--	--	--	--	--	--	--
Methanol	67-56-1	No	Yes	33.4	4.8E-04	--	--	--	--	--	--	--	--	--	--
Methyl ethyl ketone (2-Butanone)	78-93-3	No	Yes	0.32	4.6E-06	--	--	--	--	--	--	--	--	--	--
Methyl isobutyl ketone (MIBK, Hexone)	108-10-1	No	Yes	20.3	2.9E-04	--	--	--	--	--	--	--	--	--	--
Methylene chloride (Dichloromethane)	75-09-2	Yes	Yes	18.1	2.6E-04	--	--	--	--	--	--	--	--	--	--
Phenol	108-95-2	No	Yes	7.29	1.0E-04	--	--	--	--	--	--	--	--	--	--
Propionaldehyde	123-38-6	No	Yes	14.2	2.0E-04	--	--	--	--	--	--	--	--	--	--
Styrene	100-42-5	No	Yes	21.4	3.1E-04	--	--	--	--	--	--	--	--	--	--
Toluene	108-88-3	No	Yes	0.52	7.5E-06	1.74	2.5E-05	0.60	8.7E-06	0.36	5.2E-06	0.36	5.2E-06	0.20	2.8E-06
Xylene (mixture)	1330-20-7	No	Yes	0.24	3.4E-06	1.29	1.9E-05	0.24	3.5E-06	0.14	2.1E-06	0.14	2.1E-06	7.9E-02	1.1E-06
Benz[a]anthracene	56-55-3	Yes	No	3.7E-03	5.3E-08	--	--	--	--	--	--	--	--	--	--
Benzo[a]pyrene	50-32-8	Yes	Yes	0.10	1.5E-06	--	--	2.0E-04	2.9E-09	1.2E-04	1.7E-09	1.2E-04	1.7E-09	6.7E-05	9.6E-10
Benzo[b]fluoranthene	205-99-2	Yes	No	6.5E-03	9.3E-08	--	--	--	--	--	--	--	--	--	--
Benzo[g,h,i]perylene	191-24-2	Yes	No	6.9E-03	9.9E-08	--	--	--	--	--	--	--	--	--	--
Benzo[j]fluoranthene	205-82-3	Yes	No	7.1E-03	1.0E-07	--	--	--	--	--	--	--	--	--	--
Benzo[k]fluoranthene	207-08-9	Yes	No	2.4E-03	3.4E-08	--	--	--	--	--	--	--	--	--	--
Chrysene	218-01-9	Yes	No	3.6E-03	5.2E-08	--	--	--	--	--	--	--	--	--	--
Fluoranthene	206-44-0	Yes	No	7.6E-02	1.1E-06	--	--	--	--	--	--	--	--	--	--
Indeno[1,2,3-cd]pyrene	193-39-5	Yes	No	4.6E-03	6.7E-08	--	--	--	--	--	--	--	--	--	--
Naphthalene	91-20-3	Yes	Yes	4.54	6.5E-05	1.6E-02	2.3E-07	0.11	1.6E-06	6.7E-02	9.6E-07	6.7E-02	9.6E-07	3.7E-02	5.3E-07
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	1746-01-6	Yes	Yes	4.3E-08	6.2E-13	--	--	--	--	--	--	--	--	--	--
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	40321-76-4	Yes	Yes	6.1E-08	8.7E-13	--	--	--	--	--	--	--	--	--	--
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	39227-28-6	Yes	Yes	4.0E-08	5.7E-13	--	--	--	--	--	--	--	--	--	--
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	57653-85-7	Yes	Yes	9.5E-08	1.4E-12	--	--	--	--	--	--	--	--	--	--
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	19408-74-3	Yes	Yes	1.0E-07	1.4E-12	--	--	--	--	--	--	--	--	--	--
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	35822-46-9	Yes	Yes	4.4E-07	6.4E-12	--	--	--	--	--	--	--	--	--	--
Octachlorodibenzo-p-dioxin (OCDD)	3268-87-9	Yes	Yes	1.1E-06	1.6E-11	--	--	--	--	--	--	--	--	--	--
2,3,7,8-Tetrachlorodibenzofuran (TcDF)	51207-31-9	Yes	Yes	3.7E-07	5.3E-12	--	--	--	--	--	--	--	--	--	--
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	57117-41-6	Yes	Yes	1.8E-07	2.6E-12	--	--	--	--	--	--	--	--	--	--
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	57117-31-4	Yes	Yes	2.8E-07	4.0E-12	--	--	--	--	--	--	--	--	--	--
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	70648-26-9	Yes	Yes	1.6E-07	2.3E-12	--	--	--	--	--	--	--	--	--	--
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	57117-44-9	Yes	Yes	1.4E-07	2.1E-12	--	--	--	--	--	--	--	--	--	--
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	72918-21-9	Yes	Yes	3.0E-08	4.4E-13	--	--	--	--	--	--	--	--	--	--
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	60851-34-5	Yes	Yes	1.2E-07	1.7E-12	--	--	--	--	--	--	--	--	--	--
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	67562-39-4	Yes	Yes	2.6E-07	3.7E-12	--	--	--	--	--	--	--	--	--	--
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	55673-89-7	Yes	Yes	3.6E-08	5.2E-13	--	--	--	--	--	--	--	--	--	--
Octachlorodibenzofuran (OCDF)	39001-02-0	Yes	Yes	2.3E-07	3.3E-12	--	--	--	--	--	--	--	--	--	--
Antimony and compounds	7440-36-0	No	Yes	1.4E-02	2.0E-07	--	--	--	--	--	--	--	--	--	--
Arsenic and compounds	7440-38-2	Yes	Yes	8.6E-02	1.2E-06	--	--	9.1E-03	1.3E-07	5.4E-03	7.8E-08	5.4E-03	7.8E-08	3.0E-03	4.3E-08
Beryllium and compounds	7440-41-7	Yes	Yes	1.3E-03	1.9E-08	--	--	--	--	--	--	--	--	--	--
Cadmium and compounds	7440-43-9	Yes	Yes	1.5E-02	2.1E-07	--	--	8.6E-03	1.2E-07	5.1E-03	7.3E-08	5.1E-03	7.3E-08	2.8E-03	4.0E-08
Chromium VI	18540-29-9	Yes	Yes	1.2E-02	1.8E-07	--	--	5.7E-04	8.2E-09	3.4E-04	4.9E-09	3.4E-04	4.9E-09	1.9E-04	2.7E-09
Cobalt and compounds	7440-48-4	No	Yes	2.3E-02	3.3E-07	--	--	--	--	--	--	--	--	--	--
Copper and compounds	7440-50-8	No	No	0.17	2.5E-06	--	--	2.3E-02	3.4E-07	1.4E-02	2.0E-07	1.4E-02	2.0E-07	7.6E-03	1.1E-07
Lead and compounds	7439-92-1	No	Yes	0.24	3.4E-06	--	--	4.7E-02	6.8E-07	2.8E-02	4.1E-07	2.8E-02	4.1E-07	1.5E-02	2.2E-07
Manganese and compounds	7439-96-5	No	Yes	4.36	6.3E-05	--	--	1.8E-02	2.5E-07	1.1E-02	1.5E-07	1.1E-02	1.5E-07	5.8E-03	8.3E-08
Mercury and compounds	7439-97-6	No	Yes	4.8E-02	6.9E-07	--	--	1.1E-02	1.6E-07	6.8E-03	9.8E-08	6.8E-03	9.8E-08	3.7E-03	5.4E-08
Nickel and compounds	7440-02-0	Yes	Yes	0.13	1.8E-06	--	--	2.2E-02	3.2E-07	1.3E-02	1.9E-07	1.3E-02	1.9E-07	7.3E-03	1.0E-07
Selenium and compounds	7782-49-2	No	No	7.4E-02	1.1E-06	--	--	1.3E-02	1.8E-07	7.5E-03	1.1E-07	7.5E-03	1.1E-07	4.1E-03	5.9E-08
Vanadium (fume or dust)	7440-62-2	No	Yes	2.7E-02	3.9E-07	--	--	--	--	--	--	--	--	--	--
Polychlorinated Biphenyls	1336-36-3	Yes	No	3.6E-04	5.1E-09	--	--	--	--	--	--	--	--	--	--
2,4-Dinitrotoluene	121-14-2	Yes	No	4.3E-02	6.2E-07	--	--	--	--	--	--	--	--	--	--
Bis(2-ethylhexyl) phthalate (DEHP)	117-81-7	Yes	No	2.1E-03	3.0E-08	--	--	--	--	--	--	--	--	--	--
Hydrogen cyanide	74-90-8	No	Yes	0.93	1.3E-05	--	--	--	--	--	--	--	--	--	--
Ethylene dichloride (EDC, 1,2-dichloroethane)	107-06-2	Yes	Yes	1.33	1.9E-05	--	--	--	--	--	--	--	--	--	--
Isopropylbenzene (Cumene)	98-82-8	No	Yes	0.81	1.2E-05	--	--	--	--	--	--	--	--	--	--
p-Dichlorobenzene (1,4-Dichlorobenzene)	106-46-7	Yes	Yes	12.7	1.8E-04	--	--	--	--	--	--	--	--	--	--
Vinyl Chloride	75-01-4	Yes	Yes	0.84	1.2E-05	--	--	--	--	--	--	--	--	--	--
Trichloroethene (TCE, Trichloroethylene)	79-01-6	Yes	Yes	0.91	1.3E-05	--	--	--	--	--	--	--	--	--	--
2,4,6-Trichlorophenol	88-06-2	Yes	No	9.1E-03	1.3E-07	--	--	--	--	--	--	--	--	--	--
Pentachlorophenol	87-86-5	Yes	No	9.8E-03	1.4E-07	--	--	--	--	--	--	--	--	--	--
Tetrachloroethene (Perchloroethylene)	127-18-4	Yes	Yes	1.12	1.6E-05	--	--	--	--	--	--	--	--	--	--
Ammonia	7664-41-7	No	Yes	--	--	160	2.3E-03	4.57	6.6E-05	2.72	3.9E-05	2.72	3.9E-05	1.49	2.1E-05
PAHs (excluding Naphthalene)	401	Yes	No	--	--	5.3E-03	7.7E-08	0.21	3.0E-06	0.12	1.8E-06	0.12	1.8E-06	6.7E-02	9.7E-07
Total DPM	200	Yes	Yes	--	--	--	--	191	2.8E-03	114	1.6E-03	114	1.6E-03	62.4	9.0E-04

Notes

HAP = hazardous air pollutant; RBC = risk-based concentration; g/s = grams per second; lb/yr = pounds per year.

[a] Emission rate (g/s) = (daily emissions estimate [lb/day]) x (453.592 g/lb) / (8,760 hrs/yr) / (3,600 s/hr)

References

[1] See Table 9, Proposed Biomass Boiler TAC and HAP Emission Estimates, in the approved emissions inventory,

Table 4-10
Proposed Acute Risk Equivalent Emission Rates
Wisewood Energy—Mount Bachelor, Oregon

Toxic Air Contaminant	CAS or DEQ ID	(Hidden)	Acute Risk-Based Concentration (Yes/No)	Acute Risk Based Concentration [1] (ug/m^3)	Acute Risk Equivalent Emission Rate [a] (g/s per ug/m^3)				
					Proposed Biomass Boiler	Emergency Generator 1	Emergency Generator 2	Emergency Generator 3	Emergency Generator 4
Model ID	--		--	--	**BLR**	**EGEN1**	**EGEN2**	**EGEN3**	**EGEN4**
1,1,1-Trichloroethane (Methyl chloroform)	71-55-6	71556	Yes	11,000	3.44E-09	--	--	--	--
1,2-Dichloropropane (Propylene dichloride)	78-87-5	78875	Yes	230	4.79E-08	--	--	--	--
1,3-Butadiene	106-99-0	106990	Yes	660	--	4.94E-08	2.94E-08	2.94E-08	1.61E-08
Acetaldehyde	75-07-0	75070	Yes	470	3.95E-07	2.50E-07	1.49E-07	1.49E-07	8.15E-08
Acetone	67-64-1	67641	Yes	62,000	5.59E-09	--	--	--	--
Acrolein	107-02-8	107028	Yes	6.90	2.47E-05	7.37E-07	4.39E-07	4.39E-07	2.40E-07
Benzene	71-43-2	71432	Yes	29.0	2.22E-05	9.64E-07	5.74E-07	5.74E-07	3.14E-07
Bromomethane (Methyl bromide)	74-83-9	74839	Yes	3,900	1.90E-09	--	--	--	--
Carbon tetrachloride	56-23-5	56235	Yes	1,900	3.41E-09	--	--	--	--
Chlorine	7782-50-5	7782505	Yes	170	3.05E-06	--	--	--	--
Chlorobenzene	108-90-7	108907	No	[3]	--	--	--	--	--
Chloroform	67-66-3	67663	Yes	490	2.69E-08	--	--	--	--
Chloromethane (Methyl chloride)	74-87-3	74873	Yes	1,000	2.85E-08	--	--	--	--
Ethylbenzene	100-41-4	100414	Yes	22,000	3.64E-10	7.43E-11	4.42E-11	4.42E-11	2.42E-11
Formaldehyde	50-00-0	50000	Yes	49.0	1.40E-05	5.28E-06	3.14E-06	3.14E-06	1.72E-06
Hexane	110-54-3	110543	No	[3]	--	--	--	--	--
Hydrochloric Acid	7647-01-0	7647010	Yes	2,100	1.36E-06	1.33E-08	7.92E-09	7.92E-09	4.34E-09
Hydrogen Fluoride	7664-39-3	7664393	Yes	16.0	3.71E-06	--	--	--	--
Isopropyl alcohol	67-63-0	67630	Yes	3,200	9.26E-07	--	--	--	--
Methanol	67-56-1	67561	Yes	28,000	1.71E-08	--	--	--	--
Methyl ethyl ketone (2-Butanone)	78-93-3	78933	Yes	5,000	9.14E-10	--	--	--	--
Methyl isobutyl ketone (MIBK, Hexone)	108-10-1	108101	No	(3)	--	--	--	--	--
Methylene chloride (Dichloromethane)	75-09-2	75092	Yes	2,100	1.24E-07	--	--	--	--
Phenol	108-95-2	108952	Yes	5,800	1.81E-08	--	--	--	--
Propionaldehyde	123-38-6	123386	No	[3]	--	--	--	--	--
Styrene	100-42-5	100425	Yes	21,000	1.46E-08	--	--	--	--
Toluene	108-88-3	108883	Yes	7,500	9.97E-10	2.11E-09	1.25E-09	1.25E-09	6.88E-10
Xylene (mixture)	1330-20-7	1330207	Yes	8,700	3.93E-10	7.31E-10	4.35E-10	4.35E-10	2.38E-10
Benz[a]anthracene	56-55-3	56553	No	[3]	--	--	--	--	--
Benzo[a]pyrene	50-32-8	50328	Yes	2.0E-03	7.28E-04	2.68E-06	1.59E-06	1.59E-06	8.73E-07
Benzo[b]fluoranthene	205-99-2	205992	No	[3]	--	--	--	--	--
Benzo[g,h,i]perylene	191-24-2	191242	No	[3]	--	--	--	--	--
Benzo[j]fluoranthene	205-82-3	205823	No	[3]	--	--	--	--	--
Benzo[k]fluoranthene	207-08-9	207089	No	[3]	--	--	--	--	--
Chrysene	218-01-9	218019	No	[3]	--	--	--	--	--
Dibenz[a,h]anthracene	53-70-3	53703	No	[3]	--	--	--	--	--
Fluoranthene	206-44-0	206440	No	[3]	--	--	--	--	--
Indeno[1,2,3-cd]pyrene	193-39-5	193395	No	[3]	--	--	--	--	--
Naphthalene	91-20-3	91203	Yes	200	3.26E-07	1.48E-08	8.79E-09	8.79E-09	4.82E-09
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	1746-01-6	1746016	No	[3]	--	--	--	--	--
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	40321-76-4	40321764	No	[3]	--	--	--	--	--
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	39227-28-6	39227286	No	[3]	--	--	--	--	--
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	57653-85-7	57653857	No	[3]	--	--	--	--	--
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	19408-74-3	19408743	No	[3]	--	--	--	--	--
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	35822-46-9	35822469	No	[3]	--	--	--	--	--
Octachlorodibenzo-p-dioxin (OCDD)	3268-87-9	3268879	No	[3]	--	--	--	--	--
2,3,7,8-Tetrachlorodibenzofuran (TcDF)	51207-31-9	51207319	No	[3]	--	--	--	--	--
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	57117-41-6	57117416	No	[3]	--	--	--	--	--
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	57117-31-4	57117314	No	[3]	--	--	--	--	--
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	70648-26-9	70648269	No	[3]	--	--	--	--	--
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	57117-44-9	57117449	No	[3]	--	--	--	--	--
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	72918-21-9	72918219	No	[3]	--	--	--	--	--
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	60851-34-5	60851345	No	[3]	--	--	--	--	--
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	67562-39-4	67562394	No	[3]	--	--	--	--	--
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	55673-89-7	55673897	No	[3]	--	--	--	--	--
Octachlorodibenzofuran (OCDF)	39001-02-0	39001020	No	[3]	--	--	--	--	--
Antimony and compounds	7440-36-0	7440360	Yes	1.00	2.01E-07	--	--	--	--
Arsenic and compounds	7440-38-2	7440382	Yes	0.20	6.20E-06	1.20E-06	7.14E-07	7.14E-07	3.91E-07
Beryllium and compounds	7440-41-7	7440417	Yes	0.020	9.34E-07	--	--	--	--
Cadmium and compounds	7440-43-9	7440439	Yes	0.030	7.08E-06	7.50E-06	4.46E-06	4.46E-06	2.45E-06
Chromium VI	18540-29-9	18540299p	Yes	0.30	5.94E-07	5.00E-08	2.98E-08	2.98E-08	1.63E-08
Cobalt and compounds	7440-48-4	7440484	No	[3]	--	--	--	--	--
Copper and compounds	7440-50-8	7440508	Yes	100.0	2.48E-08	6.15E-09	3.66E-09	3.66E-09	2.01E-09
Lead and compounds	7439-92-1	7439921	Yes	0.15	2.28E-05	8.30E-06	4.94E-06	4.94E-06	2.71E-06
Manganese and compounds	7439-96-5	7439965	Yes	0.30	2.09E-04	1.55E-06	9.23E-07	9.23E-07	5.06E-07
Mercury and compounds	7439-97-6	7439976	Yes	0.60	1.16E-06	5.00E-07	2.98E-07	2.98E-07	1.63E-07
Nickel and compounds	7440-02-0	7440020in	Yes	0.20	9.18E-06	2.92E-06	1.74E-06	1.74E-06	9.54E-07
Selenium and compounds	7782-49-2	7782492	Yes	2.00	5.31E-07	1.65E-07	9.82E-08	9.82E-08	5.38E-08
Vanadium (fume or dust)	7440-62-2	7440622	Yes	0.80	4.87E-07	--	--	--	--
Polychlorinated Biphenyls	1336-36-3	1336363	No	[3]	--	--	--	--	--
2,4-Dinitrotoluene	121-14-2	121142	No	[3]	--	--	--	--	--
Bis(2-ethylhexyl) phthalate (DEHP)	117-81-7	117817	No	[3]	--	--	--	--	--
Hydrogen cyanide	74-90-8	74908	Yes	340	3.95E-08	--	--	--	--
Ethylene dichloride (EDC, 1,2-dichloroethane)	107-06-2	107062	No	[3]	--	--	--	--	--
Isopropylbenzene (Cumene)	98-82-8	98828	No	[3]	--	--	--	--	--
p-Dichlorobenzene (1,4-Dichlorobenzene)	106-46-7	106467	Yes	12,000	1.52E-08	--	--	--	--
Vinyl Chloride	75-01-4	75014	Yes	1,300	9.28E-09	--	--	--	--
Trichloroethene (TCE, Trichloroethylene)	79-01-6	79016	Yes	2.10	6.21E-06	--	--	--	--
2,4,6-Trichlorophenol	88-06-2	88062	No	[3]	--	--	--	--	--
Pentachlorophenol	87-86-5	87865	No	[3]	--	--	--	--	--
Tetrachloroethene (Perchloroethylene)	127-18-4	127184	Yes	41.0	3.93E-07	--	--	--	--
Ammonia	7664-41-7	7664417	Yes	1,200	--	1.00E-07	5.95E-08	5.95E-08	3.26E-08
PAHs (excluding Naphthalene)	PAHs	PAHs	No	#N/A	--	--	--	--	--
Total DPM	DPM	DPM	No	#N/A	--	--	--	--	--
TEU Risk Equivalent Emission Rate [b] (g/s per ug/m^3)					**1.06E-03**	**3.23E-05**	**1.92E-05**	**1.92E-05**	**1.05E-05**

Notes

g/s = grams per second; TAC = toxic air contaminant; ug/m3 = micrograms per cubic meter; TEU = toxic emission unit.

(a) TAC acute risk equivalent emission rate (g/s per ug/m^3) = (daily emissions estimate [g/s]) / (acute risk based concentration [ug/m3])
Daily emissions estimate (g/s) = (2)

(b) TEU Risk Equivalent Emission Rate (g/s per ug/m^3) = ∑ (TAC acute risk equivalent emission rates [g/s per ug/m^3])

References

(1) Oregon Administrative Rule 340-245-8010 Table 2.
(2) See Table 4-8, Proposed TAC Daily Model Emission Rates.
(3) TAC does not have an acute based concentration listed in OAR 340-245-8010 Table 2.

Table 5-1
Proposed Secondary Impacts from PM2.5 Precursors
Wisewood Energy—Mount Bachelor, Oregon

Precursor	Proposed Annual Emissions Estimate (tons/yr)	Hypothetical Facility MERP for 24-Hour $PM_{2.5}$ (tons/yr)
NO_X	12.4 (1)	3,003 (2)
SO_2	0.62 (1)	1,203 (2)

Pollutant and Averaging Period	Class II SIL (ug/m^3)	Secondary Impact		Additive Secondary Impact Percentage Less than 100%?
		Concentration (ug/m^3)	Percent of SIL	
$PM_{2.5}$ 24-Hour	1.2 (3)	5.6E-03 (a)	0.46 (b)	Yes (4)

Notes

MERP = modeled emission rates for precursors; ppb = parts per billion; SIL = Significant Impact Level; tons/yr = tons per year; ug/m^3 = microgram per cubic meter.

(a) $PM_{2.5}$ daily secondary impact concentration (ug/m^3) = ([proposed annual NO_X emissions estimate {tons/yr}] / [hypothetical facility NO_X MERP for 24-hour $PM_{2.5}$ {tons/yr}] + [proposed annual SO_2 emissions estimate {tons/yr}] / [hypothetical facility SO_2 MERP for 24-hour $PM_{2.5}$ {tons/yr}]) x ($PM_{2.5}$ 24-hour class II SIL [ug/m^3])

(b) Secondary impact percent of SIL (%) = (secondary impact concentration [ug/m^3]) / (class II SIL [ug/m^3]) x (100%)

References

(1) See Table 8 of the approved emissions inventory.

(2) EPA, "Guidance on the Development of Modeled Emission Rates for Precursors (MERPs) as a Tier I Demonstration Tool for O_3 and $PM_{2.5}$ under the PSD Permitting Program, "April 30, 2019. Table 4-1 "Lowest, median, and highest illustrative MERP values (tons/yr) by precursor, pollutant and climate zone." Conservatively assumes the lowest MERP values for the Northwest climate zone as the most-representative of the Portland area.

(3) See Table 5-2, Proposed Background Concentrations and Assessments.

(4) EPA, "Guidance on the Development of Modeled Emission Rates for Precursors (MERPs) as a Tier I Demonstration Tool for O_3 and $PM_{2.5}$ under the PSD Permitting Program, "April 30, 2019. Per Section 4.1, a value less than 100% indicates that the SIL would not be exceeded when considering the combined impacts of the applicable precursors.

Table 5-2
Proposed Background Concentrations and Assessments
Wisewood Energy—Mount Bachelor, Oregon

Pollutant	Averaging Period	Background Concentration (ug/m^3)	Class II SIL (ug/m^3)	AAQS (ug/m^3)	Preliminary NAAQS Review Value (ug/m^3)	Prelim. NAAQS Review Value Exceeds SIL? (Yes/No)
$PM_{2.5}$	24-hour	11.4 [1]	1.2 [2]	35 [3]	23.6 [a]	Yes [5]
NO_2	1-hour	2.2 [b]	8.0 [2]	188 [b]	186 [a]	Yes [5]

Notes

atm = atmosphere; g/mol = grams per mole; AAQS = Ambient Air Quality Standard; ppb = parts per billion; SIL = significant impact level; ug/m3 = micrograms per cubic meter.

(a) Preliminary AAQS review value (ug/m^3) = (AAQS [ug/m^3]) - (background concentration [ug/m^3])

(b) Concentration (ug/m^3) = (concentration [ppb] / 10^9) x (molecular weight [g/mol]) x (10^6 ug/g) x (standard pressure [atm]) / (ideal gas constant [m^3-atm/K-mol]) / ([standard temperature {°C}] + 273.15)

NO_2 1-hour background concentration (ppb) =	1.15	(1)
NO_2 1-hour AAQS (ppb) =	100	(4)
Molecular weight of NO_2 (g/mol) =	46.0055	
Standard pressure (atm) =	1.00	
Ideal gas constant (m^3-atm/K-mol) =	8.21E-05	
Standard temperature (°C) =	25.0	

References

(1) NW-AIRQUEST Regional Background Design Values 2014-2017. Value represents the average of the four nearest locations surrounding the resort location which are presented below. https://idahodeq.maps.arcgis.com [accessed October 7, 2023].

Value	Quadrant Background Concentrations	
	$PM_{2.5}$ 24-Hour (ug/m^3)	NO_2 1-Hour (ppb)
NW Location	11.66	1.14
SW Location	11.69	1.14
SE Location	11.62	1.15
NE Location	10.68	1.15

(2) Oregon Administrative Rule 340-200-0020(163)(b).

(3) Oregon Administrative Rule 340-202-0060(2).

(4) Oregon Administrative Rule 340-202-0100(2). Converted from parts per million to parts per billion.

(5) Consistent with Section 3.1 of the latest DEQ "Recommended Procedures for Air Quality Dispersion Modeling" dated March 2022, if the preliminary NAAQS review value is larger than the SIL, then sufficient buffer above the background concentration exists to allow for additional concentrations below the NAAQS, and the SIL is protective of the NAAQS. As a result, a single source SIL analysis is sufficient to demonstrate whether a project is considered significant with respect to the NAAQS.

Table 6-2
Applicable Risk-Based Concentrations
Wisewood Energy—Mount Bachelor, Oregon

Toxic Air Contaminant	CAS	DEQ Sequence Number	Noncancer TBACT RAL [1]	RBC? (Yes/No)	Risk-Based Concentration [1] (µg/m³) Residential Chronic Cancer	Residential Chronic Noncancer	Non-Residential Chronic Child Cancer	Child Noncancer	Worker Cancer	Worker Noncancer	Acute Noncancer
1,1,1-Trichloroethane (Methyl chloroform)	71-55-6	326	HI3	Yes	--	5,000	--	22,000	--	22,000	11,000
1,2-Dichloropropane (Propylene dichloride)	78-87-5	195	HI3	Yes	--	4.00	--	18.0	--	18.0	230
1,3-Butadiene	106-99-0	75	HI3	Yes	0.033	2.00	0.86	8.80	0.40	8.80	660
Acetaldehyde	75-07-0	1	HI3	Yes	0.45	140	12.0	620	5.50	620	470
Acetone	67-64-1	5	HI3	Yes	--	31,000	--	140,000	--	140,000	62,000
Acrolein	107-02-8	5	HI5	Yes	--	0.35	--	1.50	--	1.50	6.90
Benzene	71-43-2	46	HI3	Yes	0.13	3.00	3.30	13.0	1.50	13.0	29.0
Bromomethane (Methyl bromide)	74-83-9	324	HI3	Yes	--	5.00	--	22.0	--	22.0	3,900
Carbon tetrachloride	56-23-5	91	HI3	Yes	0.17	100	4.30	440	2.00	440	1,900
Chlorine	7782-50-5	101	HI3	Yes	--	0.15	--	0.66	--	0.66	170
Chlorobenzene	108-90-7	108	HI3	Yes	--	50.0	--	220	--	220	--
Chloroform	67-66-3	118	HI3	Yes	--	300	--	1,300	--	1,300	490
Chloromethane (Methyl chloride)	74-87-3	325	HI3	Yes	--	90.0	--	400	--	400	1,000
Ethylbenzene	100-41-4	229	HI3	Yes	0.40	260	10.0	1,100	4.80	1,100	22,000
Formaldehyde	50-00-0	250	HI3	Yes	0.17	9.00	4.30	40.0	2.00	40.0	49.0
Hexane	110-54-3	432	HI3	Yes	--	700	--	3,100	--	3,100	--
Hydrochloric Acid	7647-01-0	292	HI3	Yes	--	20.0	--	88.0	--	88.0	2,100
Hydrogen Fluoride	7664-39-3	240	HI3	Yes	--	2.10	--	19.0	--	19.0	16.0
Isopropyl alcohol	67-63-0	302	HI3	Yes	--	200	--	880	--	880	3,200
Methanol	67-56-1	321	HI3	Yes	--	4,000	--	18,000	--	18,000	28,000
Methyl ethyl ketone (2-Butanone)	78-93-3	333	HI3	Yes	--	5,000	--	22,000	--	22,000	5,000
Methyl isobutyl ketone (MIBK, Hexone)	108-10-1	328	HI3	Yes	--	3,000	--	13,000	--	13,000	--
Methylene chloride (Dichloromethane)	75-09-2	328	HI3	Yes	59.0	600	620	2,600	1,200	2,600	2,100
Phenol	108-95-2	497	HI3	Yes	--	200	--	880	--	880	5,800
Propionaldehyde	123-38-6	559	HI5	Yes	--	8.00	--	35.0	--	35.0	--
Styrene	100-42-5	585	HI3	Yes	--	1,000	--	4,400	--	4,400	21,000
Toluene	108-88-3	600	HI3	Yes	--	5,000	--	22,000	--	22,000	7,500
Xylene (mixture)	1330-20-7	628	HI3	Yes	--	220	--	970	--	970	8,700
Benz[a]anthracene	56-55-3	405	--	Yes	2.1E-04	--	7.8E-03	--	0.015	--	--
Benzo[a]pyrene	50-32-8	406	HI3	Yes	4.3E-05	2.0E-03	1.6E-03	8.8E-03	3.0E-03	8.8E-03	2.0E-03
Benzo[b]fluoranthene	205-99-2	407	--	Yes	5.3E-05	--	2.0E-03	--	3.8E-03	--	--
Benzo[g,h,i]perylene	191-24-2	410	--	Yes	4.7E-03	--	0.17	--	0.34	--	--
Benzo[j]fluoranthene	205-82-3	411	--	Yes	1.4E-04	--	5.2E-03	--	0.010	--	--
Benzo[k]fluoranthene	207-08-9	412	--	Yes	1.4E-03	--	0.052	--	0.10	--	--
Chrysene	218-01-9	414	--	Yes	4.3E-04	--	0.016	--	0.030	--	--
Dibenz[a,h]anthracene	53-70-3	419	--	Yes	4.3E-06	--	1.6E-04	--	3.0E-04	--	--
Fluoranthene	206-44-0	424	--	Yes	5.3E-04	--	0.020	--	0.038	--	--
Indeno[1,2,3-cd]pyrene	193-39-5	426	--	Yes	6.1E-04	--	0.022	--	0.043	--	--
Naphthalene	91-20-3	428	HI3	Yes	0.029	3.70	0.76	16.0	0.35	16.0	200
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	1746-01-6	527	HI3	Yes	1.0E-09	1.3E-07	9.0E-08	2.6E-05	4.2E-08	2.6E-05	--
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	40321-76-4	528	HI3	Yes	1.0E-09	1.3E-07	9.0E-08	2.6E-05	4.2E-08	2.6E-05	--
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	39227-28-6	529	HI3	Yes	1.0E-08	1.3E-06	9.0E-07	2.6E-04	4.2E-07	2.6E-04	--
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	57653-85-7	530	HI3	Yes	1.0E-08	1.3E-06	9.0E-07	2.6E-04	4.2E-07	2.6E-04	--
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	19408-74-3	531	HI3	Yes	1.0E-08	1.3E-06	9.0E-07	2.6E-04	4.2E-07	2.6E-04	--
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	35822-46-9	532	HI3	Yes	1.0E-07	1.3E-05	9.0E-06	2.6E-03	4.2E-06	2.6E-03	--
Octachlorodibenzo-p-dioxin (OCDD)	3268-87-9	533	HI3	Yes	3.4E-06	4.2E-04	3.0E-04	0.085	1.4E-04	0.085	--
2,3,7,8-Tetrachlorodibenzofuran (TcDF)	51207-31-9	539	HI3	Yes	1.0E-08	1.3E-06	9.0E-07	2.6E-04	4.2E-07	2.6E-04	--
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	57117-41-6	540	HI3	Yes	3.4E-08	4.2E-06	3.0E-06	8.5E-04	1.4E-06	8.5E-04	--
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	57117-31-4	541	HI3	Yes	3.4E-09	4.2E-07	3.0E-07	8.5E-05	1.4E-07	8.5E-05	--
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	70648-26-9	542	HI3	Yes	1.0E-08	1.3E-06	9.0E-07	2.6E-04	4.2E-07	2.6E-04	--
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	57117-44-9	543	HI3	Yes	1.0E-08	1.3E-06	9.0E-07	2.6E-04	4.2E-07	2.6E-04	--
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	72918-21-9	544	HI3	Yes	1.0E-08	1.3E-06	9.0E-07	2.6E-04	4.2E-07	2.6E-04	--
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	60851-34-5	545	HI3	Yes	1.0E-08	1.3E-06	9.0E-07	2.6E-04	4.2E-07	2.6E-04	--
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	67562-39-4	546	HI3	Yes	1.0E-07	1.3E-05	9.0E-06	2.6E-03	4.2E-06	2.6E-03	--
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	55673-89-7	547	HI3	Yes	1.0E-07	1.3E-05	9.0E-06	2.6E-03	4.2E-06	2.6E-03	--
Octachlorodibenzofuran (OCDF)	39001-02-0	548	HI3	Yes	3.4E-06	4.2E-04	3.0E-04	0.085	1.4E-04	0.085	--
Antimony and compounds	7440-36-0	33	HI3	Yes	--	0.30	--	1.30	--	1.30	1.00
Arsenic and compounds	7440-38-2	37	HI3	Yes	2.4E-05	1.7E-04	1.3E-03	2.4E-03	6.2E-04	2.4E-03	0.20
Beryllium and compounds	7440-41-7	58	HI3	Yes	4.2E-04	7.0E-03	0.011	0.031	5.0E-03	0.031	0.020
Cadmium and compounds	7440-43-9	83	HI3	Yes	5.6E-04	5.0E-03	0.014	0.037	6.7E-03	0.037	0.030
Chromium VI	18540299p	136	HI3	No	3.1E-05	0.083	5.2E-04	0.88	1.0E-03	0.88	0.30
Cobalt and compounds	7440-48-4	146	HI3	Yes	--	0.10	--	0.44	--	0.44	--
Copper and compounds	7440-50-8	149	HI3	Yes	--	--	--	--	--	--	100
Lead and compounds	7439-92-1	305	HI3	Yes	--	0.15	--	0.66	--	0.66	0.15
Manganese and compounds	7439-96-5	312	HI3	Yes	--	0.090	--	0.40	--	0.40	0.30
Mercury and compounds	7439-97-6	316	HI3	Yes	--	0.077	--	0.63	--	0.63	0.60
Nickel and compounds	7440020in	364	HI3	Yes	3.8E-03	0.014	0.10	0.062	0.046	0.062	0.20
Selenium and compounds	7782-49-2	575	HI3	Yes	--	--	--	--	--	--	2.00
Vanadium (fume or dust)	7440-62-2	620	HI3	Yes	--	0.10	--	0.44	--	0.44	0.80
Polychlorinated Biphenyls	1336-36-3	456	--	Yes	5.3E-04	--	0.020	--	9.2E-03	--	--
2,4-Dinitrotoluene	121-14-2	218	--	Yes	0.011	--	0.29	--	0.13	--	--
Bis(2-ethylhexyl) phthalate (DEHP)	117-81-7	522	--	Yes	0.080	--	11.0	--	5.00	--	--
Hydrogen cyanide	74-90-8	161	HI3	Yes	--	0.80	--	3.50	--	3.50	340
Ethylene dichloride (EDC, 1,2-dichloroethane)	107-06-2	233	HI3	Yes	0.038	7.00	1.00	31.0	0.46	31.0	--
Isopropylbenzene (Cumene)	98-82-8	157	HI3	Yes	--	400	--	1,800	--	1,800	--
p-Dichlorobenzene (1,4-Dichlorobenzene)	106-46-7	112	HI3	Yes	0.091	60.0	2.40	260	1.10	260	12,000
Vinyl Chloride	75-01-4	624	HI3	Yes	0.11	100	0.22	440	2.70	440	1,300
Trichloroethene (TCE, Trichloroethylene)	79-01-6	608	HI3	Yes	0.20	2.10	3.50	9.20	2.90	9.20	2.10
2,4,6-Trichlorophenol	88-06-2	126	--	Yes	0.050	--	1.30	--	0.60	--	--
Pentachlorophenol	87-86-5	124	--	Yes	0.20	--	5.10	--	2.40	--	--
Tetrachloroethene (Perchloroethylene)	127-18-4	488	HI3	Yes	3.80	41.0	100	180	46.0	180	41.0
Ammonia	7664-41-7	26	HI3	Yes	--	500	--	2,200	--	2,200	1,200
PAHs (excluding Naphthalene)	401	401	--	Yes	4.3E-05	--	1.6E-03	--	3.0E-03	--	--
Total DPM	200	200	HI3	Yes	0.10	5.00	2.60	22.0	1.20	22.0	--

References

(1) See Oregon Administrative Rule 340-245-8010 Table 2.

Table 6-3
List of TACs With No Published Risk-Based Concentrations
Wisewood Energy—Mount Bachelor, Oregon

Toxic Air Contaminant	CAS	DEQ Sequence Number	RBC? (Yes/No)
Acetophenone	98-86-2	4	No
Barium and compounds	7440-39-3	45	No
2-Chlorophenol	95-57-8	122	No
Crotonaldehyde	4170-30-3	156	No
4,6-Dinitro-o-cresol (and salts)	534-52-1	215	No
2,4-Dinitrophenol	51-28-5	216	No
Trichlorofluoromethane (Freon 11)	75-69-4	249	No
1-Methylphenanthrene	832-69-9	343	No
Molybdenum trioxide	1313-27-5	361	No
4-nitrophenol	100-02-7	388	No
Acenaphthene	83-32-9	402	No
Acenaphthylene	208-96-8	403	No
Anthracene	120-12-7	404	No
Benzo[e]pyrene	192-97-2	409	No
Fluorene	86-73-7	425	No
2-Methyl naphthalene	91-57-6	427	No
Perylene	198-55-0	429	No
Phenanthrene	85-01-8	430	No
Pyrene	129-00-0	431	No
7,12-Dimethylbenz[a]anthracene	57-97-6	436	No
3-Methylcholanthrene	56-49-5	439	No
Decachlorobiphenyl	2051-24-3	484	No
Phosphorus and compounds	--	504	No
Butyl benzyl phthalate	85-68-7	519	No
Dibutyl phthalate	84-74-2	520	No
Diethyl phthalate	84-66-2	523	No
Silver and compounds	7440-22-4	580	No
Zinc and compounds	7440-66-6	632	No
Chromium (Total)	7440-47-3	--	No
di-n-octylphthalateb	117-84-0	--	No

Table 7-1
SER Modeling Results
Wisewood Energy—Mount Bachelor, Oregon

Pollutant	Averaging Period	Modeled Concentration [1] (ug/m^3)	$PM_{2.5}$ Daily Secondary Impact [2] (ug/m^3)	Calculated Design Value [a] (ug/m^3)	SER Threshold [3] (ug/m^3)	Exceeds Threshold? (Yes/No)
$PM_{2.5}$	24-hour	0.04209	5.57E-03	0.048	1.0	No

Notes

ug/m^3 = micrograms per cubic meter; SER = significant emission rate.

[a] Calculated design value(ug/m^3) = (modeled concentration [ug/m^3]) + ($PM_{2.5}$ daily secondary impact [ug/m^3])

References

[1] Modeled high 1st high 24-hour concentration using AERMOD dispersion model. Representative of all modeled sources.

[2] See Table 5-1, Proposed Secondary Impacts from $PM_{2.5}$ Precursors.

[3] OAR 340-200-0020(160)(w).

Table 7-2
Short-term AAQS Modeling Results
Wisewood Energy—Mount Bachelor, Oregon

Pollutant	Averaging Period	Modeled Concentration [1] (ug/m^3)	$PM_{2.5}$ Daily Secondary Impact [2] (ug/m^3)	Background Concentration [3] (ug/m^3)	Design Value (ug/m^3)	AAQS [3] (ug/m3)	Exceeds AAQS? (Yes/No)
$PM_{2.5}$	24-hour	7.94064 [4]	5.57E-03	11.41	19.4 [a]	35	No
NO_2	1-hour	140.77131 [5]	--	2.15	143 [b]	188	No

Notes

ug/m^3 = micrograms per cubic meter; AAQS = ambient air quality standard.

[a] $PM_{2.5}$ 24-hour design value (ug/m^3) = (modeled concentration [ug/m^3]) + ($PM_{2.5}$ daily secondary impact [ug/m^3]) + (background concentration [ug/m^3])

[b] NO_2 1-hour design value (ug/m^3) = (modeled concentration [ug/m^3]) + (NO_2 background concentration [ug/m^3])

References

[1] Modeled using AERMOD dispersion model.

[2] See Table 5-1, Proposed Secondary Impacts from $PM_{2.5}$ Precursors.

[3] See Table 5-2, Proposed Background Concentrations and Assessments.

[4] Representative of the 8th highest 24-hour modeled concentration from all sources.

[5] Representative of the 8th highest daily 1-hour maximum concentration from all sources.

Table 7-3
Maximum Predicted Risk Exposure Location per Significant TEU
Wisewood Energy—Mount Bachelor, Oregon

Modeled Toxic Emission Unit	Cancer/Non-Cancer						Acute Noncancer
	Residential		Child		Worker		
	Residential Chronic Cancer		Non-Residential Chronic Child Cancer		Worker Cancer		
	Exposure Location	Dispersion Factor (ug/m^3/[g/s])	Exposure Location [1]	Dispersion Factor (ug/m^3/[g/s])	Exposure Location	Dispersion Factor (ug/m^3/[g/s])	Exposure Location
BLR	[2]	--	263	4.10333	[3]	--	[4]
EGEN1	[2]	--	263	7.91018	[3]	--	[4]
EGEN2	[2]	--	263	5.37365	[3]	--	[4]
EGEN3	[2]	--	263	10.0128	[3]	--	[4]
EGEN4	[2]	--	263	12.5054	[3]	--	[4]

Notes

TEU = toxic emission unit

References

[1] Exposure location represents the following receptor ID coordinates in the unit emission rate dispersion model with the highest predicted cancer or noncancer risk:

Receptor ID	UTM X (m)	UTM Y (m)
263	605,979.00	4,873,048.50

[2] There are no receptors within 10 kilometers from the resort that are classified as residential exposure.

[3] There are no receptors within 10 kilometers from the resort that are classified as worker exposure.

[4] Exposure location represents the following receptor ID coordinates in the acute REER dispersion model with the cumulative highest predicted acute noncancer risk.

Receptor ID	UTM X (m)	UTM Y (m)
486	606,199.00	4,873,122.00

Table 7-4
Maximum Predicted Risk Exposure Location per TEU (Gas Combustion)
Wisewood Energy—Mount Bachelor, Oregon

Modeled Toxic Emission Unit	Cancer/Non-Cancer						Acute	
	Residential		Child		Worker			
	Exposure Location [1]	Dispersion Factor (ug/m^3/[g/s])	Exposure Location [1]	Dispersion Factor (ug/m^3/[g/s])	Exposure Location [1]	Dispersion Factor (ug/m^3/[g/s])	Exposure Location [1]	Dispersion Factor (ug/m^3/[g/s])
PROP	[2]	--	263	6.5831	[3]	--	7,664	992.3128

References

[1] Exposure location represents the following receptor ID coordinates in the unit emission rate dispersion model with the highest predicted cancer or noncancer risk:

Receptor ID	UTM X (m)	UTM Y (m)
263	605,979.00	4,873,048.50
7,664	606,152.71	4,873,203.92

[2] There are no receptors within 10 kilometers from the resort that are classified as residential exposure.

[3] There are no receptors within 10 kilometers from the resort that are classified as worker exposure.

Table 7-5
Level 3 Risk Assessment Results for Significant TEUs
Wisewood Energy—Mount Bachelor, Oregon

Toxic Air Contaminant	CAS	Cancer			Chronic Noncancer			
		Child			Child			Acute
		Calculated Conc. (a) (ug/m³)	RBC (2) (ug/m³)	Excess Risk Per Million	Calculated Conc. (a) (ug/m³)	RBC (ug/m³)	Hazard Index	Hazard Index (3)
Exposure Location (4)		**263**			**263**			--
Cumulative Resort-wide Risk (5)		--	--	**0.1**	--	--	**<0.1**	**0.3**
BLR								
Cumulative TEU Risk		--	--	**0.011**	--	--	**7.7E-03**	--
Dispersion Factor (ug/m³/[g/s])		**4.10**			**4.10**			--
1,1,1-Trichloroethane (Methyl chloroform)	71-55-6	1.6E-04	(6)	--	1.6E-04	22,000	7.1E-09 (b)	--
1,2-Dichloropropane (Propylene dichloride)	78-87-5	4.5E-05	(6)	--	4.5E-05	18.0	2.5E-06 (b)	--
Acetaldehyde	75-07-0	7.6E-04	12.0	6.3E-05 (b)	7.6E-04	620	1.2E-06 (b)	--
Acetone	67-64-1	1.4E-03	(6)	--	1.4E-03	140,000	1.0E-08 (b)	--
Acrolein	107-02-8	7.0E-04	(6)	--	7.0E-04	1.50	4.7E-04 (b)	--
Benzene	71-43-2	2.6E-03	3.30	8.0E-04 (b)	2.6E-03	13.0	2.0E-04 (b)	--
Bromomethane (Methyl bromide)	74-83-9	3.0E-05	(6)	--	3.0E-05	22.0	1.4E-06 (b)	--
Carbon tetrachloride	56-23-5	2.7E-05	4.30	6.2E-06 (b)	2.7E-05	440	6.0E-08 (b)	--
Chlorine	7782-50-5	2.1E-03	(6)	--	2.1E-03	0.66	3.2E-03 (b)	--
Chlorobenzene	108-90-7	4.5E-05	(6)	--	4.5E-05	220	2.0E-07 (b)	--
Chloroform	67-66-3	5.4E-05	(6)	--	5.4E-05	1,300	4.2E-08 (b)	--
Chloromethane (Methyl chloride)	74-87-3	1.2E-04	(6)	--	1.2E-04	400	2.9E-07 (b)	--
Ethylbenzene	100-41-4	3.3E-05	10.0	3.3E-06 (b)	3.3E-05	1,100	3.0E-08 (b)	--
Formaldehyde	50-00-0	2.8E-03	4.30	6.6E-04 (b)	2.8E-03	40.0	7.1E-05 (b)	--
Hexane	110-54-3	7.7E-04	(6)	--	7.7E-04	3,100	2.5E-07 (b)	--
Hydrochloric Acid	7647-01-0	0.012	(6)	--	0.012	88.0	1.3E-04 (b)	--
Hydrogen Fluoride	7664-39-3	2.4E-04	(6)	--	2.4E-04	19.0	1.3E-05 (b)	--
Isopropyl alcohol	67-63-0	0.012	(6)	--	0.012	880	1.4E-05 (b)	--
Methanol	67-56-1	2.0E-03	(6)	--	2.0E-03	18,000	1.1E-07 (b)	--
Methyl ethyl ketone (2-Butanone)	78-93-3	1.9E-05	(6)	--	1.9E-05	22,000	8.5E-10 (b)	--
Methylene chloride (Dichloromethane)	75-09-2	1.1E-03	620	1.7E-06 (b)	1.1E-03	2,600	4.1E-07 (b)	--
Methyl isobutyl ketone (MIBK, Hexone)	108-10-1	1.2E-03	(6)	--	1.2E-03	13,000	9.2E-08 (b)	--
Phenol	108-95-2	4.3E-04	(6)	--	4.3E-04	880	4.9E-07 (b)	--
Propionaldehyde	123-38-6	8.4E-04	(6)	--	8.4E-04	35.0	2.4E-05 (b)	--
Styrene	100-42-5	1.3E-03	(6)	--	1.3E-03	4,400	2.9E-07 (b)	--
Toluene	108-88-3	3.1E-05	(6)	--	3.1E-05	22,000	1.4E-09 (b)	--
Xylene (mixture)	1330-20-7	1.4E-05	(6)	--	1.4E-05	970	1.4E-08 (b)	--
Benz[a]anthracene	56-55-3	2.2E-07	7.8E-03	2.8E-05 (b)	2.2E-07	(7)	--	--
Benzo[a]pyrene	50-32-8	6.0E-06	1.6E-03	3.7E-03 (b)	6.0E-06	8.8E-03	6.8E-04 (b)	--
Benzo[b]fluoranthene	205-99-2	3.8E-07	2.0E-03	1.9E-04 (b)	3.8E-07	(7)	--	--
Benzo[g,h,i]perylene	191-24-2	4.1E-07	0.17	2.4E-06 (b)	4.1E-07	(7)	--	--
Benzo[j]fluoranthene	205-82-3	4.2E-07	5.2E-03	8.1E-05 (b)	4.2E-07	(7)	--	--
Benzo[k]fluoranthene	207-08-9	1.4E-07	0.052	2.7E-06 (b)	1.4E-07	(7)	--	--
Chrysene	218-01-9	2.1E-07	0.016	1.3E-05 (b)	2.1E-07	(7)	--	--
Dibenz[a,h]anthracene	53-70-3	--	1.6E-04	-- (b)	--	(7)	--	--
Fluoranthene	206-44-0	4.5E-06	0.020	2.2E-04 (b)	4.5E-06	(7)	--	--
Indeno[1,2,3-cd]pyrene	193-39-5	2.7E-07	0.022	1.2E-05 (b)	2.7E-07	(7)	--	--
Naphthalene	91-20-3	2.7E-04	0.76	3.5E-04 (b)	2.7E-04	16.0	1.7E-05 (b)	--
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	1746-01-6	2.6E-12	9.0E-08	2.8E-05 (b)	2.6E-12	2.6E-05	9.9E-08 (b)	--
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	40321-76-4	3.6E-12	9.0E-08	4.0E-05 (b)	3.6E-12	2.6E-05	1.4E-07 (b)	--
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	39227-28-6	2.3E-12	9.0E-07	2.6E-06 (b)	2.3E-12	2.6E-04	9.0E-09 (b)	--
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	57653-85-7	5.6E-12	9.0E-07	6.2E-06 (b)	5.6E-12	2.6E-04	2.2E-08 (b)	--
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	19408-74-3	5.9E-12	9.0E-07	6.6E-06 (b)	5.9E-12	2.6E-04	2.3E-08 (b)	--
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	35822-46-9	2.6E-11	9.0E-06	2.9E-06 (b)	2.6E-11	2.6E-03	1.0E-08 (b)	--
Octachlorodibenzo-p-dioxin (OCDD)	3268-87-9	6.6E-11	3.0E-04	2.2E-07 (b)	6.6E-11	0.085	7.8E-10 (b)	--
2,3,7,8-Tetrachlorodibenzofuran (TcDF)	51207-31-9	2.2E-11	9.0E-07	2.4E-05 (b)	2.2E-11	2.6E-04	8.3E-08 (b)	--
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	57117-41-6	1.1E-11	3.0E-06	3.6E-06 (b)	1.1E-11	8.5E-04	1.3E-08 (b)	--
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	57117-31-4	1.6E-11	3.0E-07	5.5E-05 (b)	1.6E-11	8.5E-05	1.9E-07 (b)	--
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	70648-26-9	9.6E-12	9.0E-07	1.1E-05 (b)	9.6E-12	2.6E-04	3.7E-08 (b)	--
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	57117-44-9	8.5E-12	9.0E-07	9.4E-06 (b)	8.5E-12	2.6E-04	3.3E-08 (b)	--
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	72918-21-9	1.8E-12	9.0E-07	2.0E-06 (b)	1.8E-12	2.6E-04	6.9E-09 (b)	--
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	60851-34-5	7.2E-12	9.0E-07	8.0E-06 (b)	7.2E-12	2.6E-04	2.8E-08 (b)	--
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	67562-39-4	1.5E-11	9.0E-06	1.7E-06 (b)	1.5E-11	2.6E-03	5.9E-09 (b)	--
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	55673-89-7	2.1E-12	9.0E-06	2.4E-07 (b)	2.1E-12	2.6E-03	8.3E-10 (b)	--
Octachlorodibenzofuran (OCDF)	39001-02-0	1.3E-11	3.0E-04	4.5E-08 (b)	1.3E-11	0.085	1.6E-10 (b)	--
Antimony and compounds	7440-36-0	8.2E-07	(6)	--	8.2E-07	1.30	6.3E-07 (b)	--
Arsenic and compounds	7440-38-2	5.1E-06	1.3E-03	3.9E-03 (b)	5.1E-06	2.4E-03	2.1E-03 (b)	--
Beryllium and compounds	7440-41-7	7.7E-08	0.011	7.0E-06 (b)	7.7E-08	0.031	2.5E-06 (b)	--
Cadmium and compounds	7440-43-9	8.7E-07	0.014	6.2E-05 (b)	8.7E-07	0.037	2.4E-05 (b)	--
Chromium VI	18540-29-9	7.3E-07	(6)	--	7.3E-07	(7)	--	--
Cobalt and compounds	7440-48-4	1.3E-06	(6)	--	1.3E-06	0.44	3.0E-06 (b)	--
Copper and compounds	7440-50-8	1.0E-05	(6)	--	1.0E-05	(7)	--	--
Lead and compounds	7439-92-1	1.4E-05	(6)	--	1.4E-05	0.66	2.1E-05 (b)	--
Manganese and compounds	7439-96-5	2.6E-04	(6)	--	2.6E-04	0.40	6.4E-04 (b)	--
Mercury and compounds	7439-97-6	2.9E-06	(6)	--	2.9E-06	0.63	4.5E-06 (b)	--
Nickel and compounds	7440-02-0	7.5E-06	(6)	--	7.5E-06	(7)	--	--
Selenium and compounds	7782-49-2	4.4E-06	(6)	--	4.4E-06	(7)	--	--
Vanadium (fume or dust)	7440-62-2	1.6E-06	(6)	--	1.6E-06	0.44	3.6E-06 (b)	--
Polychlorinated Biphenyls	1336-36-3	2.1E-08	0.020	1.1E-06 (b)	2.1E-08	(7)	--	--
2,4-Dinitrotoluene	121-14-2	2.5E-06	0.29	8.7E-06 (b)	2.5E-06	(7)	--	--
Bis(2-ethylhexyl) phthalate (DEHP)	117-81-7	1.3E-07	11.0	1.1E-08 (b)	1.3E-07	(7)	--	--
Hydrogen cyanide	74-90-8	5.5E-05	(6)	--	5.5E-05	3.50	1.6E-05 (b)	--

Table 7-5
Level 3 Risk Assessment Results for Significant TEUs
Wisewood Energy—Mount Bachelor, Oregon

Toxic Air Contaminant	CAS	Cancer: Child: Calculated Conc. [a] (ug/m^3)	Cancer: Child: RBC [2] (ug/m^3)	Cancer: Child: Excess Risk Per Million	Chronic Noncancer: Child: Calculated Conc. [a] (ug/m^3)	Chronic Noncancer: Child: RBC (ug/m^3)	Chronic Noncancer: Child: Hazard Index	Acute: Hazard Index [3]
Exposure Location [4]		**263**			**263**			--
Cumulative Resort-wide Risk [5]		--	--	**0.1**	--	--	**<0.1**	**0.3**
Ethylene dichloride (EDC, 1,2-dichloroethane)	107-06-2	7.9E-05	1.00	7.9E-05 (b)	7.9E-05	31.0	2.5E-06 (b)	--
Isopropylbenzene (Cumene)	98-82-8	4.8E-05	(6)	--	4.8E-05	1,800	2.6E-08 (b)	--
p-Dichlorobenzene (1,4-Dichlorobenzene)	106-46-7	7.5E-04	2.40	3.1E-04 (b)	7.5E-04	260	2.9E-06 (b)	--
Vinyl Chloride	75-01-4	4.9E-05	0.22	2.2E-04 (b)	4.9E-05	440	1.1E-07 (b)	--
Trichloroethene (TCE, Trichloroethylene)	79-01-6	5.4E-05	3.50	1.5E-05 (b)	5.4E-05	9.20	5.8E-06 (b)	--
2,4,6-Trichlorophenol	88-06-2	5.4E-07	1.30	4.1E-07 (b)	5.4E-07	(7)	--	--
Pentachlorophenol	87-86-5	5.8E-07	5.10	1.1E-07 (b)	5.8E-07	(7)	--	--
Tetrachloroethene (Perchloroethylene)	127-18-4	6.6E-05	100.0	6.6E-07 (b)	6.6E-05	180	3.7E-07 (b)	--
EGEN1								
Cumulative TEU Risk		--	--	**0.025**	--	--	**1.6E-03**	--
Dispersion Factor (ug/m3/[g/s])		**7.91**			**7.91**			--
1,3-Butadiene	106-99-0	1.4E-04	0.86	1.6E-04 (b)	1.4E-04	8.80	1.6E-05 (b)	--
Acetaldehyde	75-07-0	5.1E-04	12.0	4.2E-05 (b)	5.1E-04	620	8.2E-07 (b)	--
Acrolein	107-02-8	2.2E-05	(6)	--	2.2E-05	1.50	1.5E-05 (b)	--
Benzene	71-43-2	1.2E-04	3.30	3.7E-05 (b)	1.2E-04	13.0	9.3E-06 (b)	--
Ethylbenzene	100-41-4	7.1E-06	10.0	7.1E-07 (b)	7.1E-06	1,100	6.4E-09 (b)	--
Formaldehyde	50-00-0	1.1E-03	4.30	2.6E-04 (b)	1.1E-03	40.0	2.8E-05 (b)	--
Hexane	110-54-3	1.7E-05	(6)	--	1.7E-05	3,100	5.6E-09 (b)	--
Hydrochloric Acid	7647-01-0	1.2E-04	(6)	--	1.2E-04	88.0	1.4E-06 (b)	--
Toluene	108-88-3	6.9E-05	(6)	--	6.9E-05	22,000	3.1E-09 (b)	--
Xylene (mixture)	1330-20-7	2.8E-05	(6)	--	2.8E-05	970	2.8E-08 (b)	--
Benzo[a]pyrene	50-32-8	2.3E-08	1.6E-03	1.5E-05 (b)	2.3E-08	8.8E-03	2.6E-06 (b)	--
Naphthalene	91-20-3	1.3E-05	0.76	1.7E-05 (b)	1.3E-05	16.0	8.0E-07 (b)	--
Arsenic and compounds	7440-38-2	1.0E-06	1.3E-03	8.0E-04 (b)	1.0E-06	2.4E-03	4.3E-04 (b)	--
Cadmium and compounds	7440-43-9	9.8E-07	0.014	7.0E-05 (b)	9.8E-07	0.037	2.6E-05 (b)	--
Chromium VI	18540299p	6.5E-08	5.2E-04	1.3E-04 (b)	6.5E-08	0.88	7.4E-08 (b)	--
Copper and compounds	7440-50-8	2.7E-06	(6)	--	2.7E-06	(7)	--	--
Lead and compounds	7439-92-1	5.4E-06	(6)	--	5.4E-06	0.66	8.2E-06 (b)	--
Manganese and compounds	7439-96-5	2.0E-06	(6)	--	2.0E-06	0.40	5.0E-06 (b)	--
Mercury and compounds	7439-97-6	1.3E-06	(6)	--	1.3E-06	0.63	2.1E-06 (b)	--
Nickel and compounds	7440020in	2.5E-06	0.10	2.5E-05 (b)	2.5E-06	0.062	4.1E-05 (b)	--
Selenium and compounds	7782-49-2	1.4E-06	(6)	--	1.4E-06	(7)	--	--
Ammonia	7664-41-7	5.2E-04	(6)	--	5.2E-04	2,200	2.4E-07 (b)	--
PAHs (excluding Naphthalene)	401	2.4E-05	1.6E-03	0.015 (b)	2.4E-05	(7)	--	--
Total DPM	200	0.022	2.60	8.4E-03 (b)	0.022	22.0	9.9E-04 (b)	--
EGEN2								
Cumulative TEU Risk		--	--	**1.0E-02**	--	--	**6.4E-04**	--
Dispersion Factor (ug/m3/[g/s])		**5.37**			**5.37**			--
1,3-Butadiene	106-99-0	5.7E-05	0.86	6.6E-05 (b)	5.7E-05	8.80	6.5E-06 (b)	--
Acetaldehyde	75-07-0	2.1E-04	12.0	1.7E-05 (b)	2.1E-04	620	3.3E-07 (b)	--
Acrolein	107-02-8	8.9E-06	(6)	--	8.9E-06	1.50	5.9E-06 (b)	--
Benzene	71-43-2	4.9E-05	3.30	1.5E-05 (b)	4.9E-05	13.0	3.8E-06 (b)	--
Ethylbenzene	100-41-4	2.9E-06	10.0	2.9E-07 (b)	2.9E-06	1,100	2.6E-09 (b)	--
Formaldehyde	50-00-0	4.5E-04	4.30	1.1E-04 (b)	4.5E-04	40.0	1.1E-05 (b)	--
Hexane	110-54-3	7.1E-06	(6)	--	7.1E-06	3,100	2.3E-09 (b)	--
Hydrochloric Acid	7647-01-0	4.9E-05	(6)	--	4.9E-05	88.0	5.6E-07 (b)	--
Toluene	108-88-3	2.8E-05	(6)	--	2.8E-05	22,000	1.3E-09 (b)	--
Xylene (mixture)	1330-20-7	1.1E-05	(6)	--	1.1E-05	970	1.1E-08 (b)	--
Benzo[a]pyrene	50-32-8	9.4E-09	1.6E-03	5.9E-06 (b)	9.4E-09	8.8E-03	1.1E-06 (b)	--
Naphthalene	91-20-3	5.2E-06	0.76	6.8E-06 (b)	5.2E-06	16.0	3.2E-07 (b)	--
Arsenic and compounds	7440-38-2	4.2E-07	1.3E-03	3.2E-04 (b)	4.2E-07	2.4E-03	1.8E-04 (b)	--
Cadmium and compounds	7440-43-9	3.9E-07	0.014	2.8E-05 (b)	3.9E-07	0.037	1.1E-05 (b)	--
Chromium VI	18540299p	2.6E-08	5.2E-04	5.1E-05 (b)	2.6E-08	0.88	3.0E-08 (b)	--
Copper and compounds	7440-50-8	1.1E-06	(6)	--	1.1E-06	(7)	--	--
Lead and compounds	7439-92-1	2.2E-06	(6)	--	2.2E-06	0.66	3.3E-06 (b)	--
Manganese and compounds	7439-96-5	8.1E-07	(6)	--	8.1E-07	0.40	2.0E-06 (b)	--
Mercury and compounds	7439-97-6	5.3E-07	(6)	--	5.3E-07	0.63	8.3E-07 (b)	--
Nickel and compounds	7440020in	1.0E-06	0.10	1.0E-05 (b)	1.0E-06	0.062	1.7E-05 (b)	--
Selenium and compounds	7782-49-2	5.8E-07	(6)	--	5.8E-07	(7)	--	--
Ammonia	7664-41-7	2.1E-04	(6)	--	2.1E-04	2,200	9.6E-08 (b)	--
PAHs (excluding Naphthalene)	401	9.5E-06	1.6E-03	5.9E-03 (b)	9.5E-06	(7)	--	--
Total DPM	200	8.8E-03	2.60	3.4E-03 (b)	8.8E-03	22.0	4.0E-04 (b)	--

Table 7-5
Level 3 Risk Assessment Results for Significant TEUs
Wisewood Energy—Mount Bachelor, Oregon

Toxic Air Contaminant	CAS	Cancer Child Calculated Conc. [a] (ug/m^3)	Cancer Child RBC [2] (ug/m^3)	Cancer Child Excess Risk Per Million	Chronic Noncancer Child Calculated Conc. [a] (ug/m^3)	Chronic Noncancer Child RBC (ug/m^3)	Chronic Noncancer Child Hazard Index	Acute Hazard Index [3]
Exposure Location [4]		263			263			--
Cumulative Resort-wide Risk [5]		--	--	0.1	--	--	<0.1	0.3
EGEN3								
Cumulative TEU Risk		--	--	0.019	--	--	1.2E-03	--
Dispersion Factor (ug/m3/[g/s])		10.0			10.0			--
1,3-Butadiene	106-99-0	1.1E-04	0.86	1.2E-04 [b]	1.1E-04	8.80	1.2E-05 [b]	--
Acetaldehyde	75-07-0	3.8E-04	12.0	3.2E-05 [b]	3.8E-04	620	6.2E-07 [b]	--
Acrolein	107-02-8	1.7E-05	[6]	--	1.7E-05	1.50	1.1E-05 [b]	--
Benzene	71-43-2	9.1E-05	3.30	2.8E-05 [b]	9.1E-05	13.0	7.0E-06 [b]	--
Ethylbenzene	100-41-4	5.3E-06	10.0	5.3E-07 [b]	5.3E-06	1,100	4.9E-09 [b]	--
Formaldehyde	50-00-0	8.5E-04	4.30	2.0E-04 [b]	8.5E-04	40.0	2.1E-05 [b]	--
Hexane	110-54-3	1.3E-05	[6]	--	1.3E-05	3,100	4.3E-09 [b]	--
Hydrochloric Acid	7647-01-0	9.1E-05	[6]	--	9.1E-05	88.0	1.0E-06 [b]	--
Toluene	108-88-3	5.2E-05	[6]	--	5.2E-05	22,000	2.3E-09 [b]	--
Xylene (mixture)	1330-20-7	2.1E-05	[6]	--	2.1E-05	970	2.1E-08 [b]	--
Benzo[a]pyrene	50-32-8	1.7E-08	1.6E-03	1.1E-05 [b]	1.7E-08	8.8E-03	2.0E-06 [b]	--
Naphthalene	91-20-3	9.6E-06	0.76	1.3E-05 [b]	9.6E-06	16.0	6.0E-07 [b]	--
Arsenic and compounds	7440-38-2	7.8E-07	1.3E-03	6.0E-04 [b]	7.8E-07	2.4E-03	3.3E-04 [b]	--
Cadmium and compounds	7440-43-9	7.3E-07	0.014	5.2E-05 [b]	7.3E-07	0.037	2.0E-05 [b]	--
Chromium VI	18540299p	4.9E-08	5.2E-04	9.4E-05 [b]	4.9E-08	0.88	5.6E-08 [b]	--
Copper and compounds	7440-50-8	2.0E-06	[6]	--	2.0E-06	[7]	--	--
Lead and compounds	7439-92-1	4.1E-06	[6]	--	4.1E-06	0.66	6.2E-06 [b]	--
Manganese and compounds	7439-96-5	1.5E-06	[6]	--	1.5E-06	0.40	3.8E-06 [b]	--
Mercury and compounds	7439-97-6	9.8E-07	[6]	--	9.8E-07	0.63	1.6E-06 [b]	--
Nickel and compounds	7440020in	1.9E-06	0.10	1.9E-05 [b]	1.9E-06	0.062	3.1E-05 [b]	--
Selenium and compounds	7782-49-2	1.1E-06	[6]	--	1.1E-06	[7]	--	--
Ammonia	7664-41-7	3.9E-04	[6]	--	3.9E-04	2,200	1.8E-07 [b]	--
PAHs (excluding Naphthalene)	401	1.8E-05	1.6E-03	0.011 [b]	1.8E-05	[7]	--	--
Total DPM	200	0.016	2.60	6.3E-03 [b]	0.016	22.0	7.5E-04 [b]	--
EGEN4								
Cumulative TEU Risk		--	--	0.013	--	--	8.1E-04	--
Dispersion Factor (ug/m3/[g/s])		12.5			12.5			--
1,3-Butadiene	106-99-0	7.3E-05	0.86	8.5E-05 [b]	7.3E-05	8.80	8.3E-06 [b]	--
Acetaldehyde	75-07-0	2.6E-04	12.0	2.2E-05 [b]	2.6E-04	620	4.2E-07 [b]	--
Acrolein	107-02-8	1.1E-05	[6]	--	1.1E-05	1.50	7.6E-06 [b]	--
Benzene	71-43-2	6.2E-05	3.30	1.9E-05 [b]	6.2E-05	13.0	4.8E-06 [b]	--
Ethylbenzene	100-41-4	3.7E-06	10.0	3.7E-07 [b]	3.7E-06	1,100	3.3E-09 [b]	--
Formaldehyde	50-00-0	5.8E-04	4.30	1.3E-04 [b]	5.8E-04	40.0	1.4E-05 [b]	--
Hexane	110-54-3	9.0E-06	[6]	--	9.0E-06	3,100	2.9E-09 [b]	--
Hydrochloric Acid	7647-01-0	6.2E-05	[6]	--	6.2E-05	88.0	7.1E-07 [b]	--
Toluene	108-88-3	3.5E-05	[6]	--	3.5E-05	22,000	1.6E-09 [b]	--
Xylene (mixture)	1330-20-7	1.4E-05	[6]	--	1.4E-05	970	1.5E-08 [b]	--
Benzo[a]pyrene	50-32-8	1.2E-08	1.6E-03	7.5E-06 [b]	1.2E-08	8.8E-03	1.4E-06 [b]	--
Naphthalene	91-20-3	6.6E-06	0.76	8.7E-06 [b]	6.6E-06	16.0	4.1E-07 [b]	--
Arsenic and compounds	7440-38-2	5.4E-07	1.3E-03	4.1E-04 [b]	5.4E-07	2.4E-03	2.2E-04 [b]	--
Cadmium and compounds	7440-43-9	5.0E-07	0.014	3.6E-05 [b]	5.0E-07	0.037	1.4E-05 [b]	--
Chromium VI	18540299p	3.4E-08	5.2E-04	6.4E-05 [b]	3.4E-08	0.88	3.8E-08 [b]	--
Copper and compounds	7440-50-8	1.4E-06	[6]	--	1.4E-06	[7]	--	--
Lead and compounds	7439-92-1	2.8E-06	[6]	--	2.8E-06	0.66	4.2E-06 [b]	--
Manganese and compounds	7439-96-5	1.0E-06	[6]	--	1.0E-06	0.40	2.6E-06 [b]	--
Mercury and compounds	7439-97-6	6.7E-07	[6]	--	6.7E-07	0.63	1.1E-06 [b]	--
Nickel and compounds	7440020in	1.3E-06	0.10	1.3E-05 [b]	1.3E-06	0.062	2.1E-05 [b]	--
Selenium and compounds	7782-49-2	7.4E-07	[6]	--	7.4E-07	[7]	--	--
Ammonia	7664-41-7	2.7E-04	[6]	--	2.7E-04	2,200	1.2E-07 [b]	--
PAHs (excluding Naphthalene)	401	1.2E-05	1.6E-03	7.6E-03 [b]	1.2E-05	[7]	--	--
Total DPM	200	0.011	2.60	4.3E-03 [b]	0.011	22.0	5.1E-04 [b]	--

Notes

lb = pound; yr = year; ug = microgram; m^3 = cubic meter; RBC = risk-based concentration; TAC = toxic air contaminant.

[a] Calculated concentration (ug/m^3) = (dispersion factor [(ug/m^3)/(g/s)]) x (TAC emission rate per TEU [g/s])

TAC emission rate per TEU (g/s) =

[b] Excess cancer risk = (RBC cancer [ug/m^3]) / (annual concentration [ug/m^3])

References

[1] See Table 4-9, Proposed TAC Annual Model Emission Rates.

[2] OAR 340-245-8010, Table 2.

[3] Represents highest modeled acute risk using the proposed risk equivalent emission rates in Table 4-10, "Proposed Acute Risk Equivalent Emission Rates".

[4] See Table 7-3, Maximum Predicted Risk Exposure Location per Significant TEU.

[5] Risk comparison value is the facility total risk rounded in accordance with OAR 340-245-0020(4)(a)(A).

[6] This TAC does not have a nonresidential child cancer RBC listed in OAR 340-245-8010, Table 2.

[7] This TAC does not have a nonresidential child noncancer RBC listed in OAR 340-245-8010, Table 2.

Table 7-6
Level 3 Risk Assessment Results for Gas Combustion TEUs
Wisewood Energy—Mount Bachelor, Oregon

Toxic Air Contaminant	CAS	Cancer			Chronic Noncancer					
		Child			Child			Acute		
		Calculated Conc. [a] (ug/m^3)	RBC [2] (ug/m^3)	Excess Risk Per Million	Calculated Conc. [a] (ug/m^3)	RBC [2] (ug/m^3)	Hazard Index	Calculated Conc. [b] (ug/m^3)	RBC [2] (ug/m^3)	Hazard Index
Exposure Location [4]		263			263			263		
Cumulative Gas Combustion Risk [5]		--	--	<0.1	--	--	<0.1	--	--	<0.1
PROP										
Cumulative TEU Risk		--	--	3.53E-04	--	--	2.0E-05	--	--	2.6E-03
Dispersion Factor (ug/m^3/[g/s])		6.58			6.58			992		
Acetaldehyde	75-07-0	1.9E-05	12.0	1.6E-06 [c]	1.9E-05	620	3.1E-08 [c]	2.9E-03	470	6.2E-06 [c]
Acrolein	107-02-8	1.2E-05	[7]	--	1.2E-05	1.50	8.1E-06 [c]	1.8E-03	6.90	2.7E-04 [c]
Benzene	71-43-2	3.6E-05	3.30	1.1E-05 [c]	3.6E-05	13.0	2.8E-06 [c]	5.4E-03	29.0	1.9E-04 [c]
Ethylbenzene	100-41-4	4.2E-05	10.0	4.2E-06 [c]	4.2E-05	1,100	3.9E-08 [c]	6.4E-03	22,000	2.9E-07 [c]
Formaldehyde	50-00-0	7.6E-05	4.30	1.8E-05 [c]	7.6E-05	40.0	1.9E-06 [c]	0.012	49.0	2.3E-04 [c]
Hexane	110-54-3	2.8E-05	[7]	--	2.8E-05	3,100	9.1E-09 [c]	4.3E-03	[12]	--
Toluene	108-88-3	1.6E-04	[7]	--	1.6E-04	22,000	7.5E-09 [c]	0.025	7,500	3.3E-06 [c]
Xylene (mixture)	1330-20-7	1.2E-04	[7]	--	1.2E-04	970	1.3E-07 [c]	0.018	8,700	2.1E-06 [c]
Naphthalene	91-20-3	1.5E-06	0.76	2.0E-06 [c]	1.5E-06	16.0	9.5E-08 [c]	2.3E-04	200	1.1E-06 [c]
Ammonia	7664-41-7	0.015	[7]	--	0.015	2,200	6.9E-06 [c]	2.29	1,200	1.9E-03 [c]
PAHs (excluding Naphthalene)	401	5.1E-07	1.6E-03	3.2E-04 [c]	5.1E-07	[10]	--	7.6E-05	[12]	--

Notes

lb = pound; yr = year; ug = microgram; m^3 = cubic meter; RBC = risk-based concentration; TAC = toxic air contaminant.

[a] Calculated concentration (ug/m^3) = (dispersion factor [{ug/m^3}/{g/s}]) x (annual TAC emission rate per TEU [g/s])

Annual TAC emission rate per TEU (g/s) =

[b] Calculated concentration (ug/m^3) = (dispersion factor [{ug/m^3}/{g/s}]) x (daily TAC emission rate per TEU [g/s])

Daily TAC emission rate per TEU (g/s) =

[c] Excess cancer risk = (RBC cancer [ug/m^3]) / (annual concentration [ug/m^3])

References

[1] See Table 4-9, Proposed TAC Annual Model Emission Rates.

[2] OAR 340-245-8010, Table 2.

[3] See Table 4-8, Proposed TAC Daily Model Emission Rates.

[4] See Table 7-4, Maximum Predicted Risk Exposure Location per TEU (Gas Combustion).

[5] Risk comparison value is the gas combustion risk rounded in accordance with OAR 340-245-0020(4)(a)(A).