MODELING REPORT AND RISK ASSESSMENT

Cleaner Air Oregon

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1. EXECUTIVE SUMMARY

Northwest RE LLC (NW RE) is proposing to construct and operate a new aluminum can manufacturing facility in Millersburg, Oregon (the Millersburg Facility). NW RE has submitted an air contaminant discharge permit (ACDP) application to the Oregon Department of Environmental Quality (Oregon DEQ). This modeling protocol and risk assessment work plan for a Level 3 Risk Assessment under the Cleaner Air Oregon (CAO) program is being submitted in accordance with OAR 340-245-0210 for Oregon DEQ approval. NW RE has included the appropriate emission inventory information required under OAR 340-245-0040 as part of this submission on the DEQ specific forms in Appendix A.

A summary of the contents in this document is provided as follows:

- Section 2 of this document describes the modeling methodology, including model selection, source characterization and selection of meteorological data.
- Section 3 details toxic emission calculation methodology.
- Section 4 includes the risk determination methodology for the CAO risk assessment work plan.

2. MODELING METHODOLOGY

2.1 Model Overview

2.1.1 Dispersion Model Selection

The most recent American Meteorological Society/Environmental Protection Agency Regulatory Model Improvement Committee modeling system, AERMOD version 23132 with Plume Rise Model Enhancements (PRIME) advanced downwash algorithms, is proposed to be used as the dispersion model in the air quality analysis.

2.1.2 Coordinate System

The location of the emission sources, structures, and receptors for this modeling analysis is represented in the Universal Transverse Mercator (UTM) coordinate system using the World Geodetic System (WGS) 1984 projection. The UTM grid divides the world into coordinates that are measured in north meters (measured from the equator) and east meters (measured from the central meridian of a particular zone, which is set at 500 km). The location of the proposed facility is approximately 4,947,254.80 meters Northing and 494,770.70 meters Easting in UTM Zone 10.

2.1.3 Terrain Elevations

Terrain elevations for receptors will be determined using National Elevation Dataset (NED) supplied by the United States Geological Survey (USGS), where facility grading does not apply.[1] The NED is a seamless dataset with the best available raster elevation data of the contiguous United States. NED data retrieved for this model have a grid spacing of 1/3 arc-second or 10 m. The AERMOD preprocessor, AERMAP version 18081, will be used to compute model object elevations from the NED grid spacing. AERMAP also calculates hill height data for all receptors. AERMAP was initially used to determine the base elevation for each building onsite, and the lowest elevation of 68.63 meters was conservatively used as the elevation for each building and source onsite.

2.2 Source Characterization

2.2.1 Facility Description

NW RE is proposing to construct and operate a new aluminum can manufacturing facility in Millersburg, Oregon. The Millersburg Facility will have four beverage can manufacturing lines located in the production building.

Air emissions from these processes are due to coating application, cleaning materials, and natural gas combustion. The inside spray application is controlled by one baghouse per line. All exhausts from the process emissions associated with coatings application and curing processes in the decorator, pin ovens (POs), inside spray/baghouses, and internal bake ovens (IBOs) are routed to the regenerative thermal oxidizer (RTO) to control volatile organic compounds (VOCs). Emissions associated with natural gas combustion from the IBOs and POs are emitted separately to the RTO exhaust stack, but remain

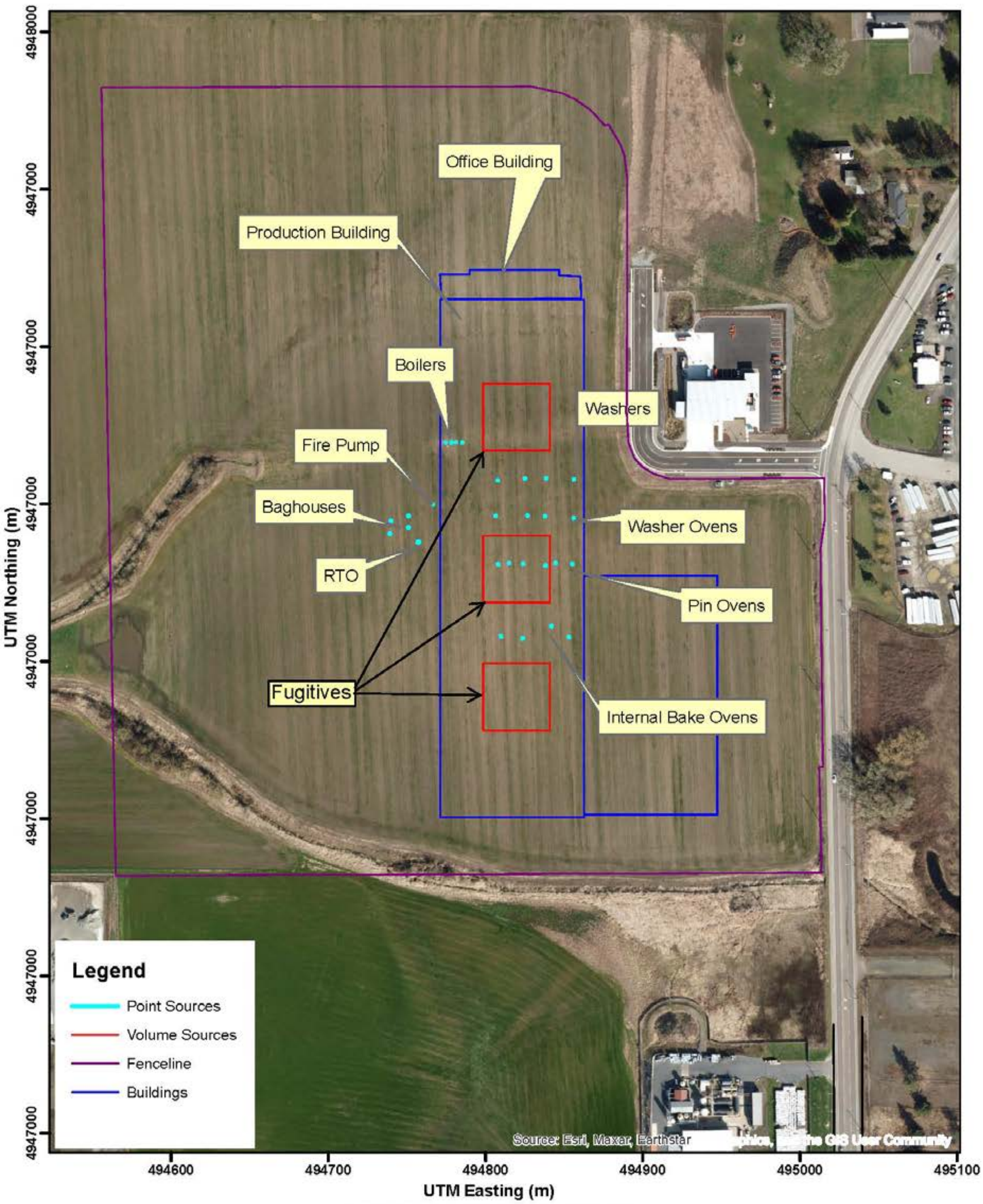
[1] NED data retrieved from the National Map website at https://viewer.nationalmap.gov/basic/.

uncontrolled. The facility has installed a RTO bypass, that results in four separate emission points after the baghouses.

The diesel fueled fire pump is mainly operated for testing and maintenance purposes; however, the purpose of the fire pump is to provide fire-protection water in the unlikely event a fire was to occur at the Millersburg Facility.

A process flow diagram and a copy of the facility site layout is provided in Appendix B. A description of each emission source is provided in Section 3. A map showing the location of the emission sources is included in Figure 2-1.

Figure 2-1. Model Objects



All Coordinates shown in UTM Coordinates,
Zone 10, WGS 1984

2.2.2 Stack Dispersion Parameters

The stack parameters used to model emissions are determined based on expected design of the facility and similar operations throughout the country. Stack orientation, diameter, and height are provided in Table 2-1. AERMAP was initially used to determine the base elevation for each building onsite, and the lowest elevation of 68.63 meters was conservatively used as the elevation for each building as described in Section 2.1.3.

Table 2-1. Summary of Point Source Parameters

Source	Model ID	X Coordinate (m)	Y Coordinate (m)	Elevation (m)	Stack Height (m)	Stack Diameter (m)	Exhaust Temperature (K)	Exhaust Velocity (m/s)
RTO	RTO	494,757.30	4,947,175.80	68.63	18.29	1.22	422.04	28.99
WO1	203	494,837.90	4,947,192.20	68.63	17.37	0.51	430.37	20.35
WO2	303	494,826.80	4,947,192.60	68.63	17.37	0.51	430.37	20.35
WO3	403	494,806.40	4,947,192.40	68.63	17.37	0.51	430.37	20.35
WO4	103	494,856.10	4,947,191.10	68.63	17.37	0.51	430.37	20.35
PO1	106A	494,855.30	4,947,161.80	68.63	16.76	0.52	505.37	6.92
PO2	206A	494,844.60	4,947,162.30	68.63	16.76	0.52	505.37	6.92
PO3	306B	494,838.20	4,947,160.90	68.63	16.76	0.52	505.37	6.92
PO4	306A	494,824.00	4,947,162.00	68.63	16.76	0.52	505.37	6.92
PO5	406A	494,814.90	4,947,162.30	68.63	16.76	0.52	505.37	6.92
PO6	406B	494,808.00	4,947,161.60	68.63	16.76	0.52	505.37	6.92
IBO1	114	494,853.10	4,947,115.40	68.63	16.76	0.64	477.59	8.33
IBO2	214	494,841.90	4,947,122.30	68.63	16.76	0.64	477.59	8.33
IBO3	314	494,823.70	4,947,114.70	68.63	16.76	0.64	477.59	8.33
IBO4	414	494,809.80	4,947,115.80	68.63	16.76	0.64	477.59	8.33
Boiler 1	8	494,774.70	4,947,238.90	68.63	16.76	0.28	338.71	6.16
Boiler 2	9	494,778.30	4,947,239.00	68.63	16.76	0.28	338.71	6.16
Boiler 3	10	494,781.20	4,947,239.20	68.63	16.76	0.28	338.71	6.16
Boiler 4	11	494,785.30	4,947,239.00	68.63	16.76	0.28	338.71	6.16
Baghouse Bypass 1	36A	494,739.70	4,947,189.10	68.63	7.92	0.66	Ambient	13.74
Baghouse Bypass 2	36B	494,739.20	4,947,181.10	68.63	7.92	0.66	Ambient	13.74
Baghouse Bypass 3	37A	494,751.10	4,947,192.40	68.63	7.92	0.66	Ambient	13.74
Baghouse Bypass 4	37B	494,751.00	4,947,185.10	68.63	7.92	0.66	Ambient	13.74
Washer 1	201	494,838.50	4,947,216.30	68.63	17.37	0.51	338.71	4.81
Washer 2	301	494,825.10	4,947,216.20	68.63	17.37	0.51	338.71	4.81
Washer 3	401	494,807.80	4,947,214.90	68.63	17.37	0.51	338.71	4.81
Washer 4	101	494,856.30	4,947,215.60	68.63	17.37	0.51	338.71	4.81
Fire Pump	FP	494,766.70	4,947,199.60	68.63	4.572	0.20	784.82	55.7

The fugitive toxic emissions associated with potential leaks at valves and flanges and open areas of the line from the coatings occur inside of the production building. Therefore, the fugitives within the building are incorporated as a volume source. A volume source is a source whose emissions are distributed over threedimensional space. Initial lateral and initial vertical dimensions are determined based on the User's Guide for the AMS/EPA Regulatory Model (AERMOD) Table 3-2. *Summary of Suggested Procedures for Estimating Initial Lateral Dimensions σyo and Initial Vertical Dimensions σzo for Volume and Line Sources*[2]. Fugitives associated with the facility process are modeled as three identical volume sources that are elevated sources on the production building. The initial lateral dimension is determined as the shorter of 1/3 the length or width of the source divided by 2.15, and the initial vertical dimension is the height of the source divided by 2.15.

Table 2-2. Summary of Volume Source Parameters

Source Description	Source ID	Release Height (m)	Initial Lateral Dimension (m)	Initial Vertical Dimension (m)
Fugitives	F1	7.47	42.53	6.95
Fugitives	F2	7.47	42.53	6.95
Fugitives	F3	7.47	42.53	6.95

2.2.3 Downwash

Emissions from each source will be evaluated in terms of their proximity to nearby structures. The purpose of this evaluation is to determine if stack discharges might become caught in the turbulent wakes of these structures. Wind blowing around a building creates zones of turbulence that are greater than if the buildings were absent. The concepts and procedures expressed in the Guideline for Determination of Good Engineering Practice Stack Height (Technical Support Document for the Stack Height Regulations)[3] and other related documents are applied to all structures at the Millersburg facility. The Building Profile Input Program (BPIP) Version 04274 will be used to calculate the downwash values for each point source.

Buildings located within the Facility fenceline will be included in this evaluation. Building elevations are determined using AERMAP as described in Section 2.1.3. The building parameters are provided in Table 2-3 and are shown in Figure 2-1.

Table 2-3. Building Parameters

Building ID	Description	UTM Easting (m)	UTM Northing (m)	Elevation (m)	Height (m)
OFFICE	Office Building	494,783.10	4,947,348.70	68.63	14.94
PA	Production Building	494,771.20	4,947,330.00	68.63	14.94
WA	Warehouse Building	494,862.80	4,947,154.30	68.63	16.15

[2] User's Guide for the AMS/EPA Regulatory Model (AERMOD), USEPA, April 2021.

[3] https://www.epa.gov/sites/default/files/2020-09/documents/gep.pdf

2.2.4 Operating Scenarios

During normal operation, the RTO controls emissions from the ultraviolet (UV) rim coating, inside spray, internal bake ovens, and pin ovens. As a result, when the RTO is running, the only process toxic emission source exhausts from the RTO, the four washers, the fire pump, and the fugitive sources. However, the Millersburg Facility intends to permit continuous operation with 8,760 hours of operation each year, during which the RTO will need to be bypassed for periods of downtime for routine maintenance, startup, and potential upset conditions. In RTO bypass situations, uncontrolled toxic air contaminants (TACs) will be emitted from the stacks associated with the IBOs, POs, and baghouses in addition to the fire pump, washers, and fugitives.

2.2.5 Urban/Rural Determination

The Multi-Resolution Land Characteristics Consortium National 2016 Land Cover Database (NLCD) was consulted to determine whether the site location should be classified as urban or rural.

In accordance with 40 CFR Part 51 Appendix W, Section 7.2.1.1(b)(i), the land use is classified based on a 3-kilometer radius circle around the facility center. Developed, high intensity and developed, medium intensity areas are considered urban, and all other areas are considered rural.

The NLCD2016 data map demonstrates that more than 50% of the land use within a 3-kilometer radius of the facility is rural. A land use map with this graphical interpretation is included in Appendix C. AERMOD's urban option will not be selected.

2.3 Meteorological Data

This section discusses the selection of representative meteorological data that will be used for this risk assessment. A copy of the AERMOD-ready data is provided in this submittal as Appendix F.

2.3.1 Meteorological Data Overview

Five years of surface meteorological data, from 2017 to 2021, are taken from the most representative nearby airport, Salem McNary Field (Station ID: KSLE; WBAN ID: 24232). The upper air data is taken from the most representative upper air station in Salem, Oregon (Station ID: SLE; WBAN: 24232) for the corresponding period. The meteorological data is processed using AERMET version 19191 using regulatory default options following EPA's guidance on AERSURFACE and AERMET. The ADJ_U* option is used to more accurately account for low wind speed, stable atmosphere conditions.

Salem was chosen over two other available datasets: the Corvallis Municipal Airport (KCVO), and an onsite meteorological dataset provided by Oregon DEQ for a Hollingsworth and Vose (HV) facility in Corvallis. While both of these sites are slightly closer to the project site (approximately 20 km away, versus approximately 27 km for KSLE), both appear to be less representative of the project site.

KCVO is an AWOS weather station, meaning it does not record "1-minute" wind data and uses a threshold wind speed of ~3 mph, below which all measured wind speeds are recorded as "calm" or "variable" wind. These "calm" or "variable" winds are not usable by AERMOD, and result in the "calm" hour being skipped over. In the case of KCVO, this results in 26% of all hours being unusable, making the data unrepresentative and potentially not conservative. KSLE is an ASOS station, meaning it does record "1-minute" wind data and also records speeds much lower than 3 mph. As a result, only 1% of hours at KSLE are recorded as "calm", meaning KSLE will provide a more representative and conservative dataset for modeling.

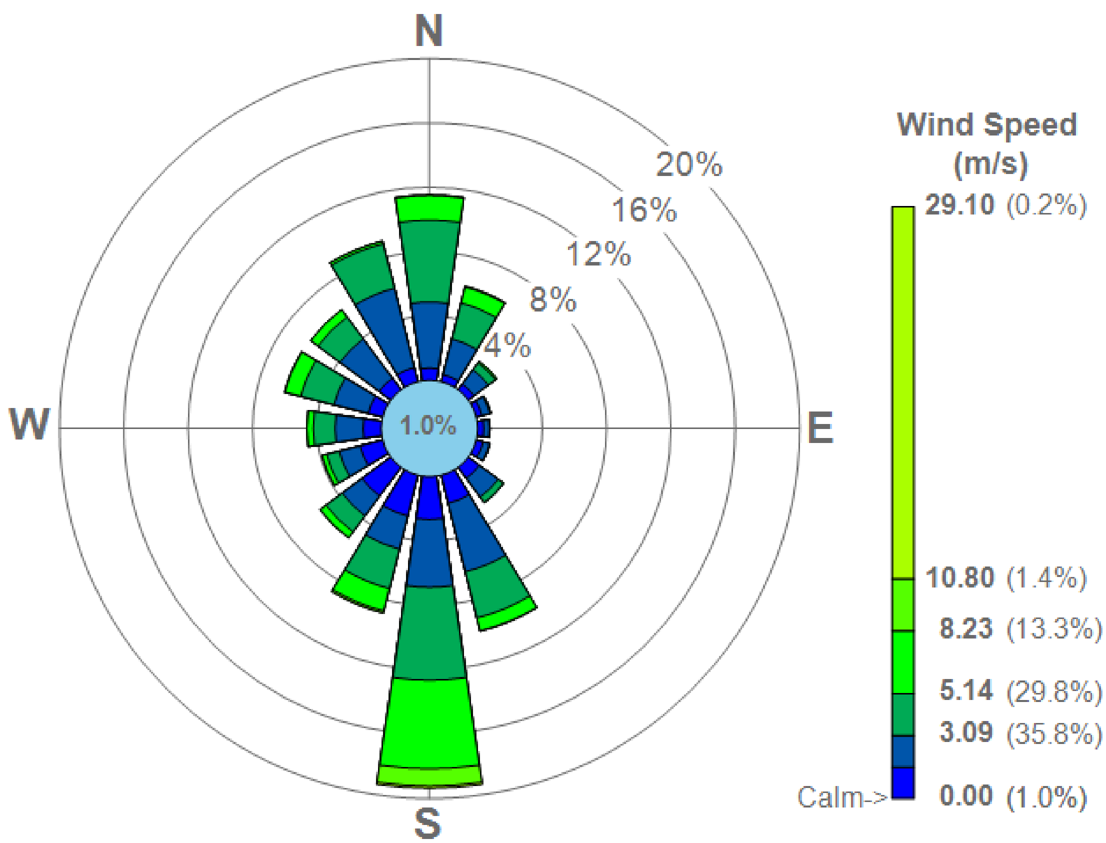
The HV site in Corvallis appears to have data quality issues. The data provided by Oregon DEQ for the site indicates that a wind direction blowing from 330 to 30 degrees (NNW to NNE) never occurred (zero hours out of 8760) during all of 2017. Given natural variability of wind directions at any site, plus the fact that KCVO records approximately 10% of all wind directions as blowing from that 60 degree arc, this is highly unlikely to be correct. Additionally, the wind speeds in the HV dataset appear to be extremely low: 14 mph is the highest wind speed recorded in the year (as opposed to a maximum speed of 35 mph in the KCVO dataset and 60 mph in the KSLE dataset), and more than 50% of winds in the HV dataset are below 3 mph, as opposed to 26% and 19% in the KCVO and KSLE datasets). Together, these facts suggest that the HV station may be improperly sited (e.g. with a building located too close to the station to the north, blocking winds from that direction), or has other issues resulting in these highly unlikely data patterns.

Given the data quality issues with the KCVO and HV sites, the KSLE data was selected. This data is also considered to be more representative of the project site because KSLE is located near the center of the Willamette Valley, as is the project site, while both KCVO and the HV site are located close to the extreme western edge of the valley.

One-minute automated surface observing system (ASOS) data was processed using the latest version of AERMINUTE pre-processing tool (version 15272). The 1-minute wind speed threshold of 0.5 meter per second (m/s) is applied for the 1-minute ASOS data according to EPA guidance.[4] The wind rose for the modeled period (2017-2021) is provided in Figure 2-2.

[4] EPA Memo *Use of ASOS meteorological data in AERMOD dispersion modeling*, March 8, 2013.

Figure 2-2. 2017-2021 Wind Rose at Salem McNary Field (KSLE)



The total percentage of calm wind data is 1.0% for the modeled period. AERSURFACE was used to process land cover data to determine surface characteristics for use in AERMET.

Thirty years of precipitation data for the period of 1981-2010 was reviewed against the precipitation data for 2017-2021 to identify the moisture condition for each year. Moisture conditions were determined in accordance with EPA's AERSURFACE User Guide. The moisture condition for 2013-2015 was Dry, and the moisture condition for 2016-2017 was Average.

2.3.2 Meteorological Data Representativeness

Per 40 CFR Part 51 Appendix W, Section 8.4.1(b), the representativeness of meteorological data is dependent on factors including "(1) The proximity of the meteorological monitoring site to the area under consideration; (2) the complexity of the terrain; (3) the exposure of the meteorological monitoring site; and (4) the period of time during which data are collected".

Salem McNary Field's meteorological station is located approximately 25.5 kilometers to the north of the facility. The terrain of the project site and of the Salem Airport is flat. The project site elevation is approximately 62.5 m, while the Salem Airport elevation is approximately 62 m. The meteorological dataset includes five recent years of data, from 2017 to 2021. The total percentage of missing data is 0.23% for the modeled period.

Because of the site's proximity to the Salem Airport, the similar terrain between the two sites, and the recency and high quality/completeness of the meteorological dataset, the selected surface station dataset is considered representative for the proposed facility.

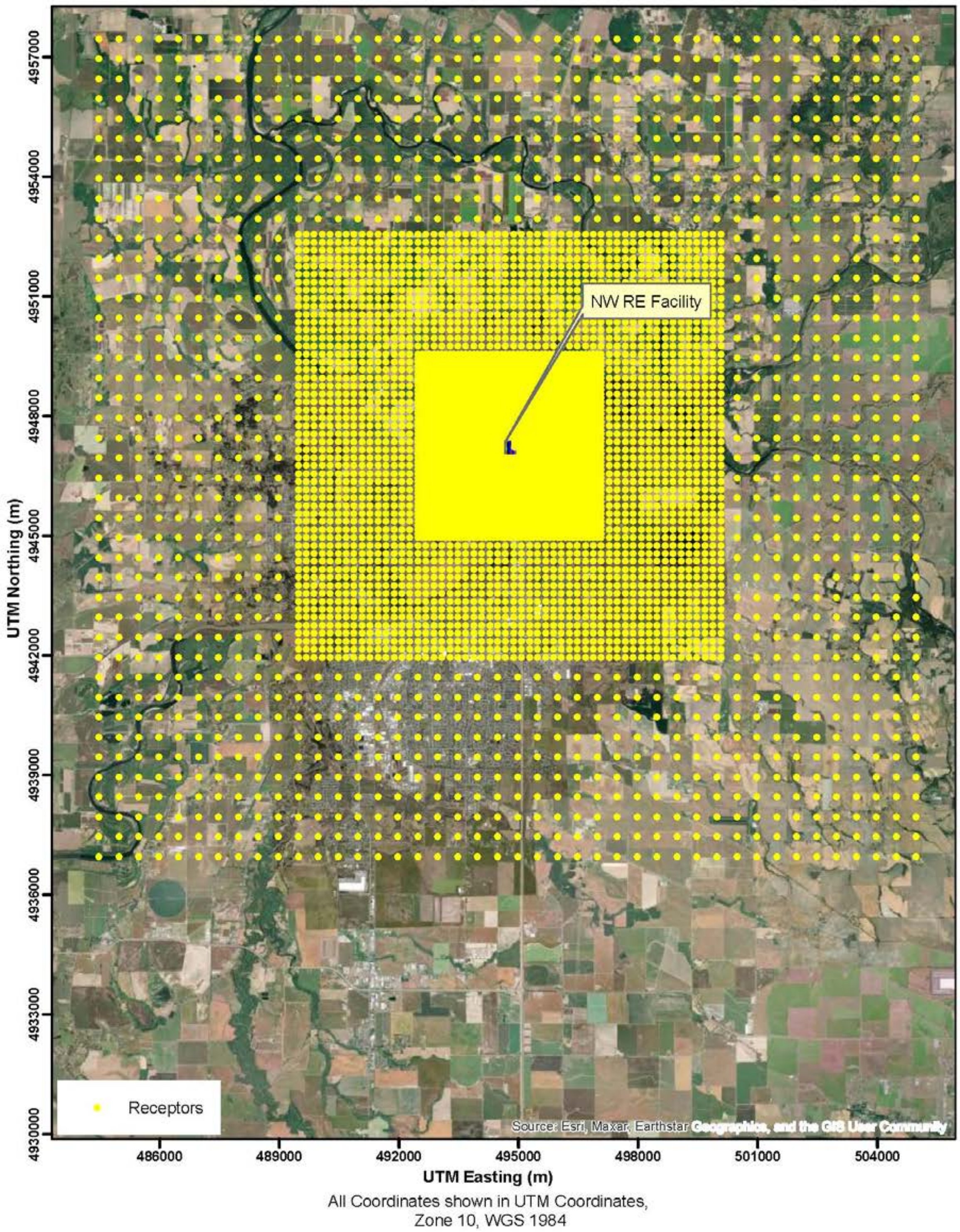
2.4 Modeling Domain and Receptors

Five square Cartesian receptor grids will be used in the analysis, in alignment with Oregon DEQ's *Recommended Procedures for Air Quality Dispersion Modeling*.

- A grid containing 25-meter spaced receptors and extending 500 meters from the facility center (at least 200 meters from the fenceline).
- A grid containing 50-meter spaced receptors extending from 500 meters to 1,300 meters from the facility center.
- A grid containing 100-meter spaced receptors extending from 1,300 meters to 2,300 meters from the facility center.
- A grid containing 200-meter spaced receptors extending from 2,300 meters to 5,300 meters from the facility center.
- A grid containing 500-meter spaced receptors extending from 5,300 meters to 10,300 meters from the facility center.

In addition, 25-meter spaced receptors will be included along the Facility's physical fenceline. All receptors will be placed at ground level elevation, as calculated using the AERMOD preprocessor, AERMAP version 18081. All gridded modeled receptors are shown in Figure 2-3.

Figure 2-3. Modeled Receptors



3. TOXIC EMISSION CALCULATIONS

3.1 Process Emission Calculations

The Facility is expected to produce a maximum of 5,003,005,000 12 ounce (oz) equivalent cans per year across the four production lines. Based on the equipment physical capacity, each production line can move 4,000 12 oz equivalent cans per minute. Emissions are calculated on an hourly basis using the equipment physical capacity with 24 hours expected production on a daily or acute basis. The RTO bypass scenario will consist of 18 hours of RTO bypass and 6 hours of normal operation per day for the acute basis.

NW RE has standard dry film weights (mg/can) that are applied to the can based on the coating used. These standards are utilized to determine the volume of coating applied for every 1,000-12 oz equivalent cans by applying the coating density and weight percent of solids in the respective coating. This volume of coating applied for every 1,000-12 oz equivalent cans was multiplied by the can production to determine the coating throughput at the Facility. For process emissions from coating applications, the material for each process that yields highest potential emissions was used in requested PTE calculations.

Emissions of all toxics are calculated on an acute and chronic basis as shown in Appendix D and Appendix E. Safety Data Sheets (SDS) for each applied material is included in Appendix D.

3.1.1 Coating Processes/Inks and Ovens – Material Balance

The cans are conveyed to the UV bottom coaters where a UV rim coating is applied to the bottom of the can by rollers before being cured by UV lamps. The UV Rim coating application is controlled by the RTO.

During the can coating process, the overvarnish and inks are applied at the decorator. These coatings are rolled on and therefore applied with 100% transfer efficiency. The heat in the pin ovens volatilizes the overvarnish on the cans in the pin ovens. However, as the cans are conveyed to the pin ovens from the decorator, 12% of the toxic air contaminants in the overvarnish are volatilized and emitted as fugitives. The remaining 88% is emitted through the RTO with a 98% destruction efficiency during normal operations. Fugitives from conveying cans from the decorating process to the pin ovens are calculated by multiplying the total content of each toxic in overvarnish by the 12% of material not captured.

Isopropyl alcohol is used for cleanup at the UV Rim Coater and Decorator and is emitted entirely as fugitives. It is assumed 25,000 lbs/year will be used and evenly distributed throughout the year.

After the pin ovens, inside spray and can marking ink are applied to the cans. The inside spray is applied with a 93% transfer efficiency onto the can. This process is controlled by one baghouse for each line, each with a removal efficiency of 99.9% and 100% capture of overspray. From there, the cans are sent to the internal bake ovens. Between the inside spray application and the drying process, it is expected 12% will emit as fugitives. The captured emissions from application and drying in each oven are controlled by the RTO.

Hourly RTO Emissions [lbs/hr] = ∑(Coating [gal/hr] x Coating Density [lbs/gal] x Toxic Content [wt%]) x 88% Capture Efficiency x (1-98% Destruction Efficiency)

Annual RTO Emissions [lbs/yr] = ∑(Coating [gal/yr] x Coating Density [lbs/gal] x Toxic Content [wt%]) x 88% Capture Efficiency x (1-98% Destruction Efficiency)

Hourly Fugitive Emissions [lbs/hr] = Cleaning Solution [100% IPA] + ∑(Coating [gal/hr] x Coating Density [lbs/gal] x Toxic Content [wt%]) x (1-88% Capture Efficiency)

Annual Fugitive Emissions [lbs/yr] = Cleaning Solution [100% IPA] + ∑(Coating [gal/yr] x Coating Density [lbs/gal] x Toxic Content [wt%]) x (1-88% Capture Efficiency)

Alternatively, during the bypass scenario, volatilized toxics will not be controlled by the RTO. The volatilized emissions will be released via the pin ovens and internal bake oven stacks. The particulate matter emissions from the inside spray and can marking inks application will be released through the baghouse bypass stacks. It is assumed the overspray, (7%) is emitted via baghouse bypass stacks, while the remaining 93% is emitted in the internal bake ovens. The bypass scenario may be summarized as:

- Inside Spray (Butanol, 2-Butoxyethanol, Phenol):
  - 12% is fugitives
  - Of the remaining 88%
    - 7% to baghouse bypass
    - 93% to IBO stacks
- Inks at Decorator and Overvarnish (Butanol, 2-Butoxyethanol, Formaldehyde [non-formed])
  - 12% fugitives
  - 88% to PO stacks
- Can Marking Inks – applied with Inside Spray (Butanone and IPA)
  - 12% fugitives
  - 88% to IBO stacks

Formaldehyde, butanol, butoxyethanol, phenol, butanone, and isopropyl alcohol are toxic chemicals inherent in the inks or coatings that use material balance to determine the expected emissions associated with the facility.

3.1.2 Coating Processes/Inks and Ovens – Formed Formaldehyde

Formaldehydes are generated as a by-product in aluminum can coating ovens during the coating curing process. NW RE has used source testing from another facility to determine an emission factor of 0.014 lbs formaldehyde/lb coating solid. This emission factor is applied for inside spray, overvarnish, and UV Rim Coater applied materials. All chemicals expected for the site are reviewed and the material with the highest overall formed formaldehyde is used to calculate emissions on an acute and chronic basis.

Normal Operation Annual Uncontrolled Formed Formaldehyde Emissions [lbs/yr] = ∑(0.014 [lb formaldehyde/lb coating solid] x Annual Coating Usage [lbs] x Coating Solid Content [wt%])

Bypass Operation Annual Uncontrolled Formed Formaldehyde Emissions [lbs/yr] = ∑(Normal Operation Annual Uncontrolled Formed Formaldehyde Emissions [lbs/yr] x Percent RTO Downtime [%])

Annual Uncontrolled Formed Formaldehyde Emissions [lbs/yr] = ∑(Normal Operation Annual Uncontrolled Formed Formaldehyde Emissions [lbs/yr] + Bypass Operation Annual Uncontrolled Formed Formaldehyde Emissions [lbs/yr])

Annual Controlled Formed Formaldehyde Emissions [lbs/yr] = ∑(Normal Operation Annual Uncontrolled Formed Formaldehyde Emissions [lbs/yr] x (1-98% Destruction Efficiency))

These formed formaldehydes are vented to and controlled by the RTO along with the coater oven emissions during normal operations. Capture efficiency for formed formaldehyde is 100% and destruction efficiency is 98%. During the bypass scenario the formed formaldehyde is emitted via IBO and POs exhaust stacks.

3.1.3 Washers

The washers will emit hydrogen fluoride and sulfuric acid from the cleaning materials. Emissions are derived from stack testing performed at a comparable facility. The stack test resulted in emission factors for stack and fugitive emissions per million cans processed. The Millersburg facility can process up to 0.24 million 12 oz equivalent cans per hour per line (MMcans/hr/line) with four available lines. Acute emissions assume 24 hours of operation and annual or chronic emissions are determined using the annual production efficiency.

3.1.4 Fire Pump

The fire pump is expected to operate a maximum of 9 hours per day for non-emergency purposes, within the hours of 8 am – 5 pm. Emission factors for the fire pump were taken from the Oregon DEQ-provided Combustion Emission Factor Search tool for engines <750 kW, except for the emission factor for Diesel Particulate Matter (DPM). The DPM emission factor was taken from Tier 3 engine standards approved by the California Air Resources Board. A copy of the emission factors and emission calculations is provided in Appendix D.

3.2 Natural Gas Emission Combustion Calculations

The facility will combust natural gas in its ovens, boilers, miscellaneous small sources (HVAC, etc), and RTO. The emissions from the natural gas combustion in these units are calculated based on the maximum burner rating of the burners and the number of burners in each unit.

Natural Gas Fired Emission Unit Capacity:

- 4 washer ovens = 20 MMBtu/hr total capacity, each oven has two burners = 8 burners at 2.5 MMBtu/hr each;
- 6 pin ovens = 15 MMBtu/hr total capacity = 6 burners at 2.5 MMBtu/hr each;
- 4 Internal bake ovens = 18 MMBtu/hr total capacity, each oven has three burners = 12 burners at 1.5 MMBtu/hr each;
- 1 RTO = 5 MMBtu/hr;
- 4 Boilers = 15.6 MMBtu/hr total capacity = 3.9 MMBtu/hr each; and
- Other small units including miscellaneous HVAC, hot water heater, etc = 10 MMBtu/hr total capacity.

Natural gas combustion emission factors were taken from Oregon DEQ-provided Combustion Emission Factor Search tool for natural gas external combustion for units <10 MMBtu/hr. It is assumed that all units run continuously at capacity. Chronic categories model continuous operations through normal operating scenario (e.g. IBO and PO combustion exhaust to RTO stack) plus 74.76 hours of IBO and PO combustion emissions to each oven exhaust. Therefore, 74.76 hours of combustion from the IBOs and PO are double counted and the RTO is allowed to run all year. As a result, natural gas combustion will be overestimated by a maximum of 2,841 MMBtu/year.

Each washer oven and boiler have its own exhaust stack for emissions during both normal and bypass operating scenarios. Other small units are assumed to emit within the production building and are emitted to the atmosphere as fugitives. During normal operation, natural gas combustion emissions from the IBOs and POs are emitted from the RTO exhaust stack but remain uncontrolled. However, during RTO bypass, natural gas combustion emissions are emitted from the IBOs and POs exhaust stack to the atmosphere.

4. RISK ASSESSMENT WORK PLAN

4.1 Conceptual Site Model

Risk will be evaluated using all toxic emission units at the proposed site. The following list of TACs will be included in the Risk Assessment for process emissions:[5]

- 2-Butoxyethanol
- Butanol
- Butanone
- Formaldehyde
- Hydrofluoric Acid
- Isopropyl Alcohol
- Phenol
- Sulfuric Acid
- Diesel combustion byproducts
- Natural gas combustion byproducts

4.1.1 Exposure Locations

Conservatively, each exposure type model will be run with the full receptor grid. For example, all receptors will be considered as residential receptors for the residential risk determination rather than just those in residentially zoned areas. The same will be done for the worker exposure models and the child exposure models. For each model, the receptor with the highest modeled risk will be used for the risk determination.

Because all receptors will be treated with child exposure, no additional discrete receptors will be added to the grid for individual child locations. Instead, a list of schools and daycares within a 10-kilometer radius of the Millersburg Facility is included in Table 4-1. Figure 4-1 demonstrates these child exposure places and their respective locations to the Millersburg Facility.

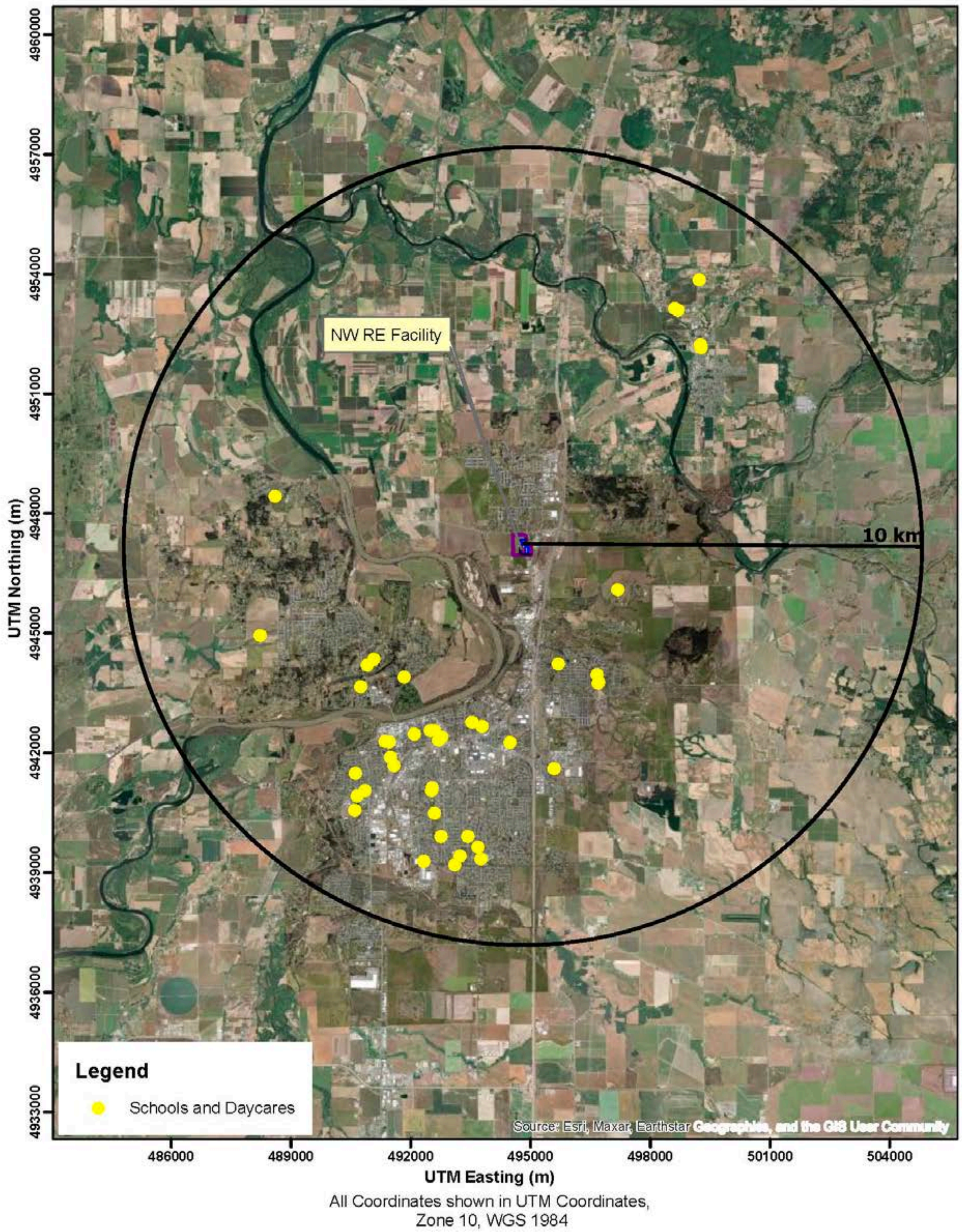
Acute risks should be evaluated everywhere that people may spend several hours in a day per OAR 340-245-0020(4). All receptors assessed for chronic risks will be also assessed for acute risks.

[5] The TACs that do not have Risk-Based Concentrations (RBCs) identified in OAR 340-245-8010 Table 2 are not included in risk calculations, however their emissions are quantified.

Table 4-1. Child Exposure Locations

Child Receptor Type	Name	UTM Easting (m)	UTM Northing (m)
School	Clover Ridge School	497,180.41	4,946,094.51
School	Timber Ridge School	496,693.45	4,943,759.71
School	South Shore Elementary School	494,487.00	4,942,266.19
Daycare	Stephanie's Fun Care	495,689.23	4,944,239.73
Daycare	Awesome Blossom Child Care	493,436.69	4,939,917.60
Daycare	My Little Playschool	493,100.46	4,939,201.71
School	Central Elementary School	491,495.28	4,941,903.20
School	North Albany Elementary School	490,907.75	4,944,213.80
School	Waverly Elementary School	493,782.27	4,942,672.60
School	Oak Elementary School	493,233.29	4,939,420.17
School	Lafayette Elementary School	492,760.90	4,939,908.44
School	Periwinkle Elementary School	506,205.40	4,940,897.08
School	Sunrise Elementary School	492,514.21	4,941,063.50
School	Liberty Elementary School	490,601.46	4,940,568.92
School	Takena Elementary School	490,619.39	4,941,500.63
School	Oak Grove Elementary School	488,234.48	4,944,947.37
School	Fairmount School	491,830.97	4,943,915.76
School	Timber Ridge School	496,714.00	4,943,781.36
School	Meadow Ridge Elementary School	496,668.02	4,943,960.67
School	Memorial Middle School	490,856.04	4,941,068.08
School	Albany Christian School	492,090.88	4,942,473.06
School	Albany Options	492,539.52	4,941,134.90
School	Calapooia Middle School	492,596.15	4,940,500.34
Daycare	Good Shepherd Lutheran School and Childcare	493,677.79	4,939,643.10
Daycare	North Albany Learning Center	490,754.58	4,943,676.06
Daycare	Presbyterian Child Care Center	491,468.65	4,942,285.57
Daycare	Hey Diddle Diddle Learning Center	492,777.89	4,942,406.83
Daycare	Mighty Explorers	491,578.67	4,941,680.70
Daycare	Maple Lawn Preschool	493,530.24	4,942,772.82
Daycare	Tiny Acorns	495,594.36	4,941,619.07
School	Jefferson Elementary School	499,252.26	4,952,243.18
School	Jefferson Middle School	498,624.53	4,953,146.60
School	Jefferson Christian School	499,230.67	4,953,868.76
School	North Albany Middle School	491,077.32	4,944,362.64
School	Jefferson High School	498,688.65	4,953,104.49
School	Linn Benton Lincoln ESD	492,589.94	4,942,564.89
School	Fir Grove Elementary	488,608.44	4,948,444.33
School	Sundborn Children's House	492,697.46	4,942,328.96
School	First Christian Pre-Primary	491,357.79	4,942,302.84
School	Madison School	492,497.07	4,942,566.90
School	Kidco Head Start - Jefferson	499,269.83	4,952,164.44
School	West Albany High School	490,663.41	4,940,931.91
School	Oak Creek School	492,333.25	4,939,283.85
School	South Albany High School	493,752.79	4,939,342.72

Figure 4-1. Nearby Schools and Daycares



4.1.2 Exposure Pathways

An exposure pathway is the course a toxic air contaminant takes from a source to the exposed organism. The toxic chemicals incorporated into this risk assessment are airborne. Adjustments to incorporate any variance in exposure pathways is accommodated using the risk-based concentration (RBC) as defined by OAR 340-245-8010, Table 2. Oregon DEQ fully details adjustments for multipathway pollutants in Section 2.5 of the Recommended Procedures for Toxic Air Contaminant Health Risk Assessments (July 2020). The DEQ developed multipathway adjustment factors (MPAFs) for residential exposure scenarios that consider the following:

- Inhalation of TACs in air;
- Deposition of airborne TACs to backyard soil;
- Contact with soil by incidental ingestion and dermal exposure;
- Uptake into garden vegetables and ingestion of vegetables; and
- Bioaccumulation into women and infant ingestion of breastmilk.

DEQ also created non-residential MPAFs with the following considerations: agricultural land, livestock grazing areas, drinking water reservoirs, and bodies of water used for fishing. MPAFs were also calculated separately for cancer effects and non-cancer effects. The toxic pollutants emitted through both process emissions and fuel combustion that use RBCs adjusted through MPAFs for multipathway chronic cancer consideration are arsenic, cadmium, chromium VI, lead, naphthalene, PAHs, and benzo[a]pyrene. The following TACs from the Facility use RBCs adjusted for multipathway chronic non-cancer consideration: arsenic, cadmium, chromium VI, mercury, naphthalene, and PAHs.[6]

4.2 Calculation Methodology for Risk

There are up to seven RBCs that have been developed for each TAC to evaluate potential chronic cancer, chronic noncancer, and acute risks associated with the potential emissions at the facility, which are provided in OAR 340-245-8010 Table 2. NW RE will use Approach C: Risk-Equivalent Emission Rate (REER) provided in Recommended Procedures for Toxic Air Contaminant Health Risk Assessments.[7] All emission sources are modeled using the parameters identified in Section 2. The calculated REERs that are used in the model to determine risk are provided in Appendix E. REER calculations use the annual and daily emission rates described in the approved CAO Form AQ520.

The facility maximum exposure location is determined as follows:

- Under each exposure scenario, the receptor with the maximum facility risk is determined to be the maximum exposure location. The risk at that receptor represents the assessed facility risk, which is compared against the corresponding risk action level (RAL).
- Risk is determined separately for TAC emissions generated via the combustion of natural gas. Note that for combustion emissions, risk will be calculated but not compared to against the applicable RALs, pursuant to OAR 340-245-0050(5)(b).

[6] Section 2.5 and Table C-1, Recommended Procedures for Toxic Air Contaminant Health Risk Assessments, Oregon DEQ (October 2022).

[7] Section 3.1.3, Recommended Procedures for Toxic Air Contaminant Health Risk Assessments, Oregon DEQ (October 2022).

5. RISK CHARACTERIZATION

There are up to seven RBCs that have been developed for each TAC to evaluate potential chronic cancer, chronic noncancer, and acute risks around the facility, which are provided in OAR 340-245-8010, Table 2. Table 5-1 below summarizes the calculated facility risks by exposure type and compares to the selected Risk Action Levels (RALs) under OAR 340-245-8010, Table 1. Plots of residential chronic cancer risk, residential chronic non-cancer risk, and acute non-cancer risk are also provided in Appendix G. As shown in Table 5-1, a permit with toxics attachment is required for chronic and acute averaging periods.

Table 5-1. Risk Summary and Comparison to RALs

	Residential Chronic Risks		Non-residential Chronic Risks				Acute Non-cancer Risks – Normal Operation	Acute Non-cancer Risks – Bypass Operation[8]
Type	Chronic Cancer	Chronic Non-cancer	Child Cancer	Child Non-cancer	Worker Cancer	Worker Non-cancer		
Total Natural Gas Combustion Risk / Hazard Index	10.84	0.30	0.56	0.03	0.37	0.03	0.05	0.07
Total Excess Cancer Risk / Hazard Index	1.02	1.11	0.04	0.24	0.08	0.24	0.15	1.41
New Facility Permit Level	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Permit Required?	Yes	Yes	No	No	No	No	No	Yes
New Source Community Engagement Level	5	1	5	1	5	1	1	1
Community Engagement Required?	No	No	No	No	No	No	No	No
New Source TLAER Level	10	1	10	1	10	1	1	1
TLAER Required?	No	No	No	No	No	No	No	No

[8] Modeled Risk rounds to the nearest whole number for comparison to Risk Action Levels.

5.1 Uncertainty Evaluation

This section discusses the assumptions made to this risk assessment and a qualitative discussion on the uncertainty in the reported risks.

5.1.1 Selection of TACs for Evaluation

The list of TACs used for this risk assessment is presented in Section 4.1. The list of TACs that could potentially be emitted by coating application, diesel combustion from the fire pump, or natural gas combustion, include TACs that do not have RBCs established in OAR Chapter 340-245 (e.g., butanol, and zinc). Therefore, not counting the emissions of TACs that do not have an RBC may result in an underestimate of the potential risks.

5.1.2 Emission Rate Calculations

Coating process related emission rates used for this risk assessment are calculated based on a material balance where it is assumed that all TACs in applied coatings will be volatilized and emitted. It is unlikely that all TACs will be emitted as a large portion of the coatings and inks are likely to remain on the cans as intended. Therefore, this results in an overestimate in the quantified emission rates for the TACs that were calculated from this material balance.

Furthermore, the coating material used in the risk assessment uses the highest emitting toxic chemical among multiple potential coating types. As an example: Chemical 1, 2, and 3 are all used in Inside Spray operations. Chemical 1 is used for the emissions of Butanol (lower amounts are contained within chemical 2 and 3) and Chemical 3 is used for the emissions for 2-Butoxy Ethanol (lower amount contained in Chemical 1 and 2). Only one coating is applied to each can, but the calculations assume a worst case imaginary coating between all available types is used to determine potential emissions.

Other conservative assumptions made in the emission calculations which may result in an overestimate in the calculated risks:

- Natural gas combustion emission units were assumed to operate continuously for 8,760 hours a year.
- Natural gas combustion emissions for normal operation from the RTO was calculated assuming continuous operation with exhaust from the IBOs and POs. This is an overestimate because this double counts the emissions from IBOs and POs during bypass emissions and overestimates annual RTO operation.
- The annual bypass scenario assumes that the facility will be operating at the maximum hourly capacity for all bypass hours of operation.
- The acute scenario assumes the firepump is operated for 9 hours per day between 8 am and 5 pm. It is expected the firepump will actually operate 30 minutes per day once per week.

5.1.3 Exposure Assessment Assumptions

The risks calculated are based on AERMOD outputs, which are expected to overestimate the predicted dispersion factors at receptor locations, for the following reasons:

- AERMOD is an EPA-approved steady-state plume model and is periodically updated to refine the dispersion calculations and provide more accurate results with the intention to avoid underestimating the impacts.
- The modeled dispersion factors are based on the maximum results over the 5-year meteorological period, to cover the weather conditions that can result in high dispersion factors in the model domain.

- All receptors are assumed to be residential, worker, child, and acute receptors.

5.1.4 Derivation of Toxicity Values

The calculated risks are determined based on the model results and the RBCs for each TAC evaluated in this risk assessment. The RBCs in OAR Chapter 340-245 are determined from the Toxicity Reference Values (TRVs) and then are adjusted with expected exposure duration and target organs for each TAC.

Firstly, the TRVs are obtained from various sources, including but not limited to EPA's Integrated Risk Information System (IRIS) database, Agency for Toxic Substances and Disease Registry (ATSDR) Toxicological Profiles, California's Office of Environmental Health Hazard Assessment (OEHHA). The TRVs are selected from the reference concentrations (RfCs) for noncancer effects and unit risk factors (URFs) for cancer effects. When EPA and other agencies developed the RfCs or URFs, uncertainty factors (UFs) are applied to derive the doses or concentrations from various studies. The UFs usually include interspecies extrapolation, possible human variability in sensitivity etc. which are intended to result in protective doses or concentrations.

Secondly, the exposure duration is also based on conservative assumptions, e.g., a worker stays in the area with highest ambient concentration (in this case a fence boundary location) for 8 hours per day, 250 days per year over a period of 25 years. These assumptions overestimate the reported risks.

Lastly, not all TACs have the same target organ for the same type of exposure type. For example, arsenic compounds target the nervous system while DPM target respiratory system for the chronic effects. However, when calculating the risks reported in this risk assessment, it is assumed that both arsenic compounds and DPM target the same organ by summing the calculated risks directly. Therefore, the reported risks are likely overestimated in this risk assessment.

5.2 Suggested Permit Conditions

The facility has several materials used in the coating processes that relate to emissions associated with the facility. NW RE would like the flexibility to ensure that updated or customer requested materials may be used at the site in the future without permit modification. As such, NW RE is requesting limits that allow flexibility for updated materials that may or may not be within the facility's control. In accordance with this request, NW RE calculated Requested PTE using the material for each coating process that would yield the highest potential emissions. The facility will track throughput and calculate actual emissions of each material used.

Furthermore, NW RE tracks material throughput based on purchasing records. The facility is requesting that monthly tracked purchases be divided by operating days to determine the daily throughput for the facility. Coatings applied daily will vary depending on the production line and customer needs.

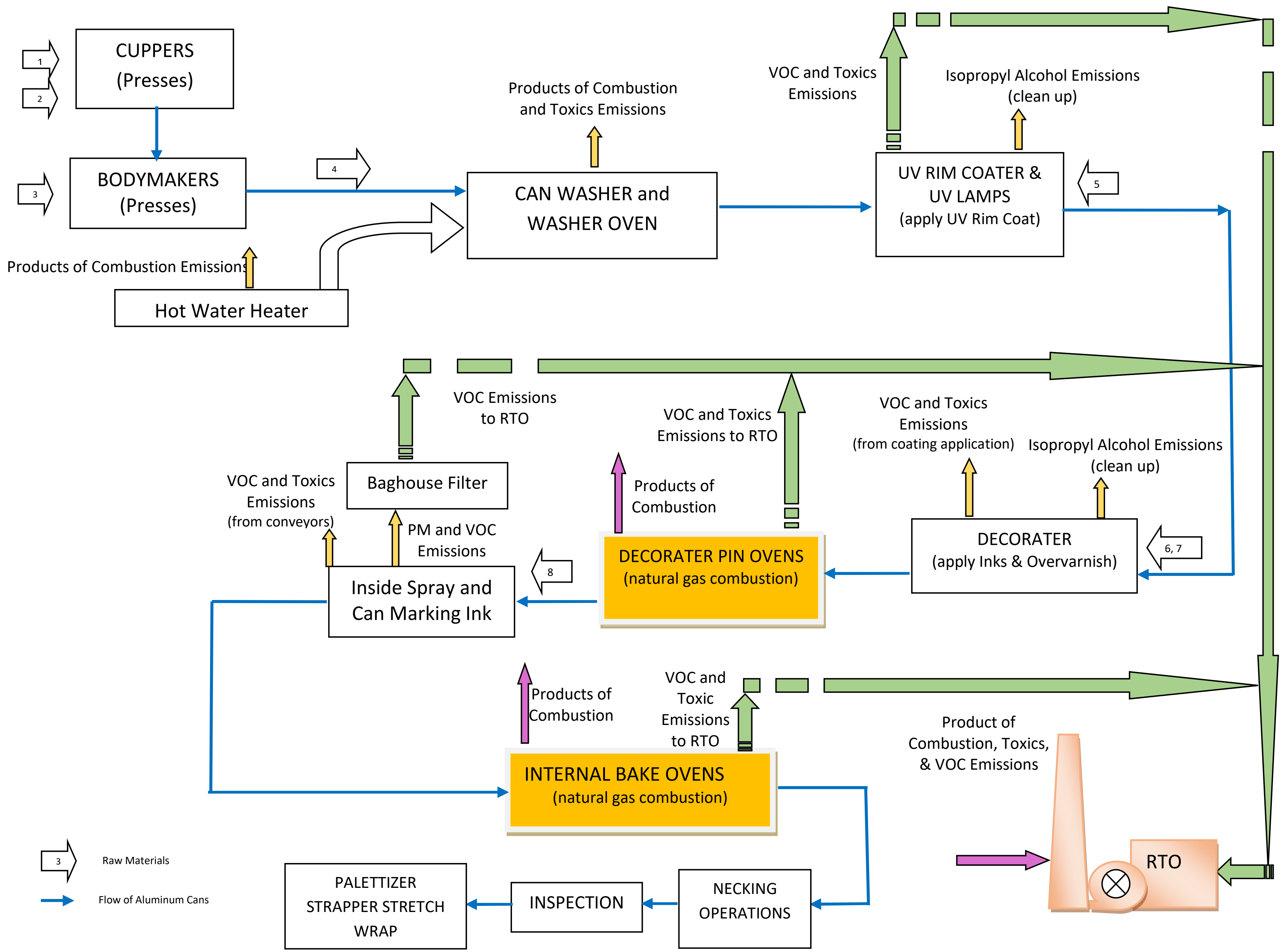
Bypass operations will be tracked based on number of hours in bypass operation.

APPENDIX A. APPLICATION FORMS

Oregon DEQ Form AQ520 for the emission inventory is submitted in a separate electronic copy using a Microsoft Excel file.

APPENDIX B. PROCESS FLOW DIAGRAM, FACILITY LAYOUT AND DRAWINGS

FLOW DIAGRAM FOR AIR EMISSIONS (Aluminum Cans)



FLOW DIAGRAM FOR AIR EMISSIONS (Aluminum Cans)

Aluminum Can Manufacturing Process

The North American Industrial Classification (NAICS) code that applies to this Facility is 332431 – “Metal Can Manufacturing”.

The aluminum can manufacturing process begins by feeding a continuous aluminum sheet (1) through a lubricator, where the cupping lubricant (2) is applied, and then into a cupping press. The cupper forms the aluminum into short cups. In the bodymakers, the cups are extruded into formed cans with the use of bodymaker lubricants (3).

Aluminum cans are conveyed to the Can Washer to remove any lubricants used in the cupping and bodymaker processes. The Can washers use Can Washing chemicals (4) to help remove the lubricants from the aluminum can bodies. Hot water is used in the Can washing process. The aluminum cans are then dried in the washer oven using natural gas as the fuel. The burning of natural gas in the washer oven and for the hot water heater produces products of combustion. Emissions from the can washing chemicals are captured by the RTO with 88% capture efficiency and emitted from the RTO. The other 12% of emissions from these emissions are emitted as fugitives. Wastewater generated in the washers is discharged to the wastewater treatment system (not shown in this flow diagram).

After the washer, the cans are conveyed to the ultraviolet (UV) bottom coater where a UV coating (5) is applied to the bottom of the can by rollers. The UV coating is cured by UV lamps. Isopropyl Alcohol is used for cleanup. Waste rags soaked with isopropyl alcohol are laundered at an off-site facility and returned for re-use or disposed of according to regulations. Isopropyl alcohol emissions from the cleanup process are vented directly to the atmosphere.

The aluminum cans are conveyed to the printer/decorator for application of inks (6) and overvarnish (7) by rollers. During the printing/decorating process and when the aluminum cans are being conveyed from the printer/decorator to the decorator oven, a small amount of Volatile Organic Compounds (VOC) is emitted fugitively. The VOC emissions from the printing/decorating process are exhausted directly to the atmosphere as fugitives. Isopropyl Alcohol is used for cleanup and wipe down of the rollers. Waste rags soaked with isopropyl alcohol and inks are laundered at an off-site facility and returned for re-use or disposed of according to regulations. Isopropyl alcohol emissions from the cleanup process are vented directly to the atmosphere as fugitives.

The decorated aluminum cans are thermally cured in the pin oven using natural gas as fuel. Products of combustion are released uncontrolled via the RTO exhaust stack. VOC from the overvarnish and ink emitted during the curing process are controlled by the RTO during normal operations.

The aluminum cans are then conveyed to the internal coating process where the interior surface of the aluminum cans are sprayed with the inside coating (8) using airless spray guns. The oversprayed emissions from this process are exhausted through a baghouse filter to remove particulate matter (PM) and vented to the RTO. A small amount of VOC and PM are emitted fugitively. The dust and the baghouse filters are sent to an off-site recycler or disposal facility.

The aluminum cans also receive a small ink identification dot on the outside bottom of the cans while in the spray machine pocket for quality assurance purposes.

FLOW DIAGRAM FOR AIR EMISSIONS (Aluminum Cans)

The aluminum cans are then conveyed to internal bake oven for thermal curing of the coating.

The internally coated aluminum cans are then cured in the internal bake oven using natural gas as the fuel. Products of combustion are released uncontrolled via the RTO exhaust stack. VOC from the inside spray and can identification markings emitted during the curing process are controlled by the RTO during normal operations.

Aluminum cans exiting the internal coating oven are conveyed to the waxer that applies a thin coat of lubricant to the outside top edge of the can in preparation for necking. This lubricant does not contain VOCs. The necker then reduces the diameter of the aluminum can opening while the flanger roll back the top edge of the can to form a lip for attaching the aluminum can end or lid. The aluminum cans are conveyed to the tester to check for defects. Finished aluminum cans are palletized for shipment or storage. There are no air emissions associated with the waxing, necking, or palletizing processes.

The finished cans are palletized, strapped and stretched wrapped prior to storage and then shipment to customers. Fiber cores from the strapping and stretch wrapping process are collected and sent to an off-site facility for recycling.

Formaldehydes

Formaldehydes are generated as a by-product in aluminum can coating ovens during the coating curing process. These formed formaldehydes are vented to the RTO along with the coater oven emissions during normal operations.

Oven and RTO Emissions

1. Oven Preheat

During the preheating of the decorator pin ovens and internal bake ovens, the products of combustion are vented directly to the atmosphere. When the ovens have reached the specified temperature for proper curing of the inks and coatings that have been applied to the aluminum cans, the oven emissions are diverted to the RTO through duct dampers located on the building room, follow by the feeding of the aluminum cans into the ovens.

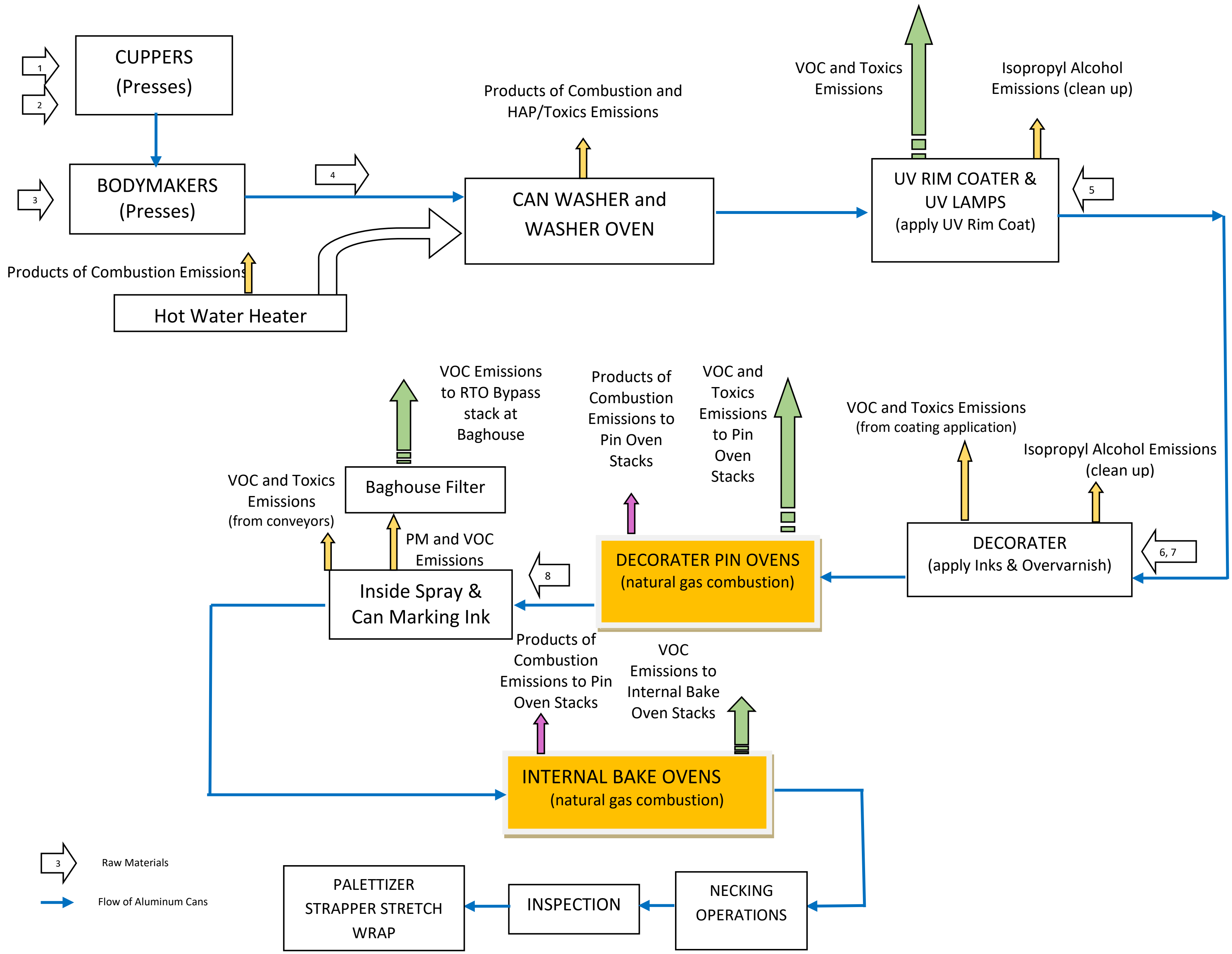
2. Normal Operation of Ovens

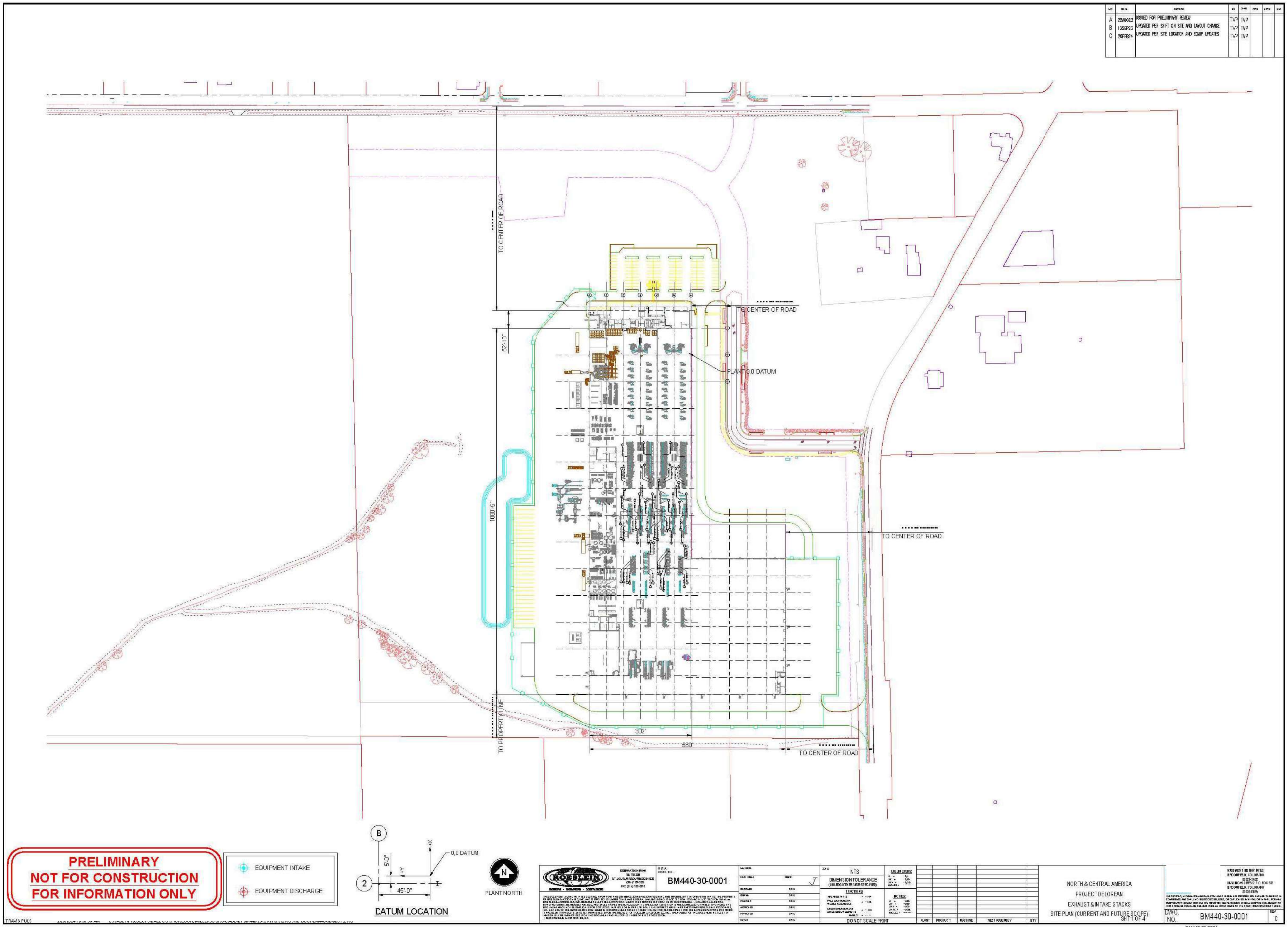
The fumes generated in the decorator pin ovens and internal bake ovens are vented to the Regenerative Thermal Oxidizer (RTO) where VOCs and formaldehydes are oxidized before discharging to the atmosphere.

3. RTO By-Pass

When the RTO malfunctions or during RTO maintenance, the fumes generated in the decorator pin ovens and internal bake ovens are vented directly to the atmosphere through stacks on each of the ovens.

FLOW DIAGRAM FOR BYPASS EMISSIONS (Aluminum Cans)

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B 13SEP23 UPDATED PER SHIFT ON SITE AND LAYOUT CHANGE TVP TVP
C 26FEB24 UPDATED PER SITE LOCATION AND EQUIP UPDATES TVP TVP
TO CENTER OF ROAD
TO CENTER OF ROAD
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52'-13"
1080'-5"
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580'
TO PROPERTY LINE
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45'-0"
DATUM LOCATION
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EQUIPMENT DISCHARGE
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FOR INFORMATION ONLY
ROESLEIN
BM440-30-0001
NTS
DIMENSION TOLERANCE
DO NOT SCALE PRINT
NORTH & CENTRAL AMERICA
PROJECT DELOREAN
EXHAUST & INTAKE STACKS
SITE PLAN (CURRENT AND FUTURE SCOPE)
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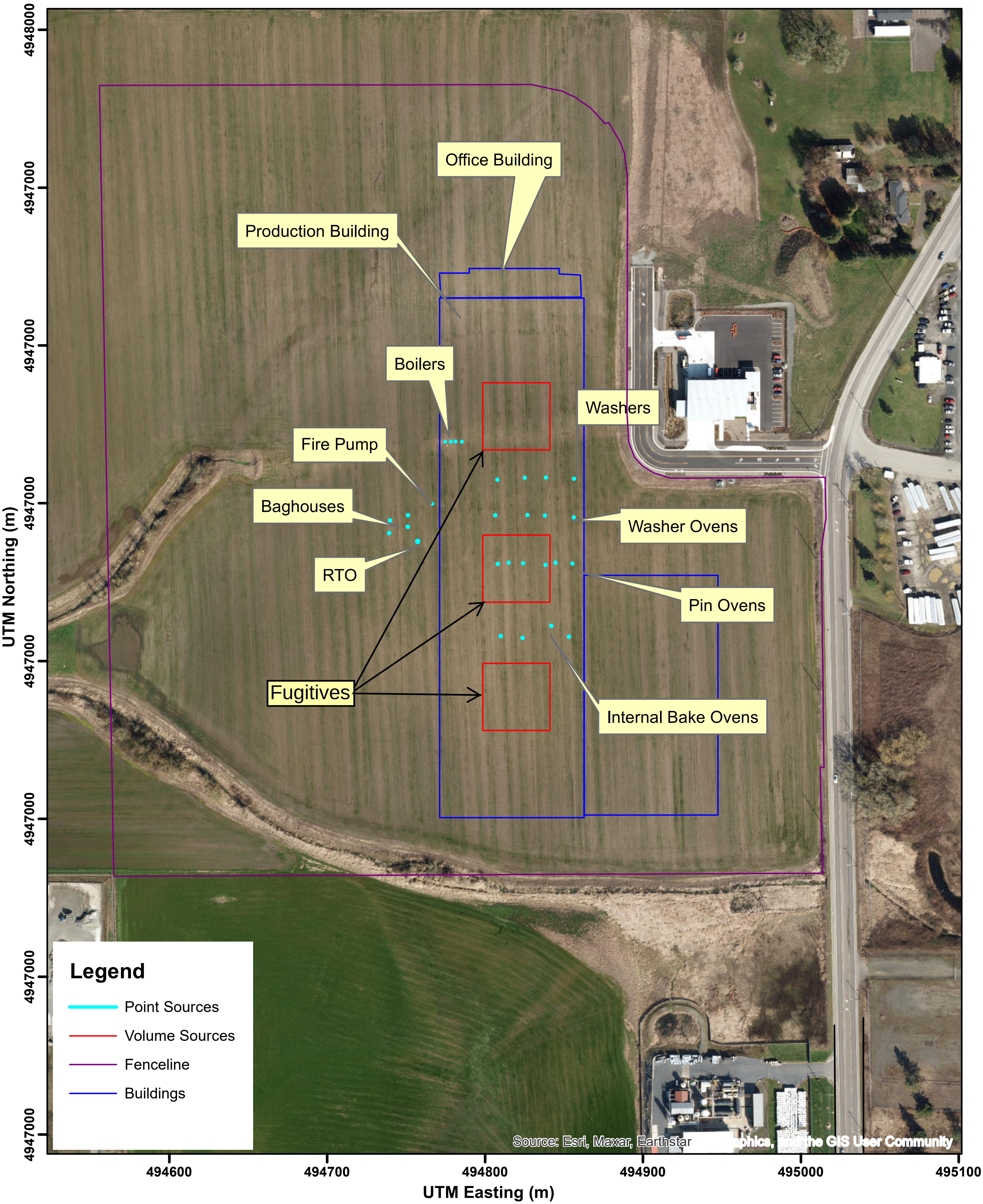
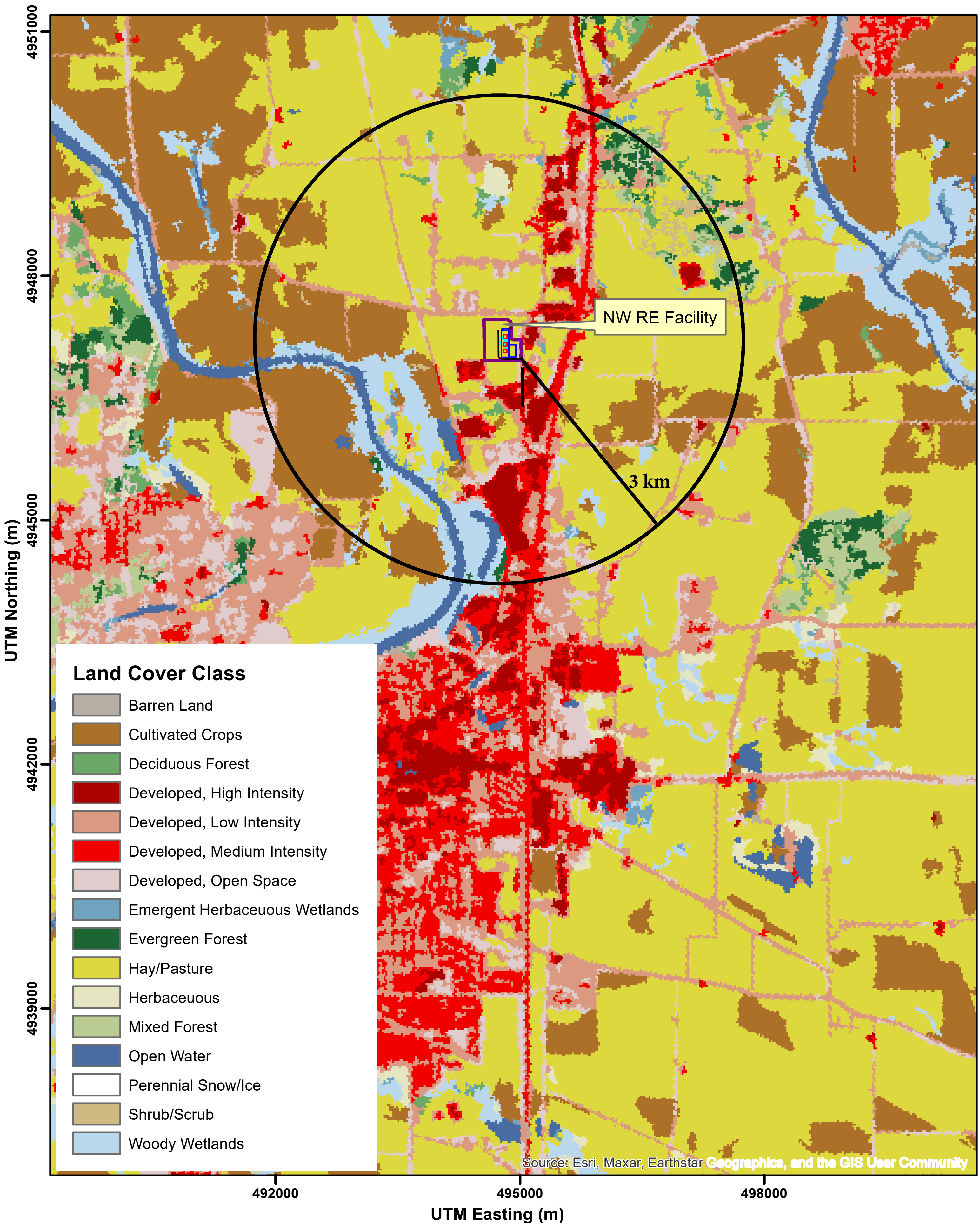


All Coordinates shown in UTM Coordinates,
Zone 10, WGS 1984

APPENDIX C. LANDUSE MAP



All Coordinates shown in UTM Coordinates,
Zone 10, WGS 1984

APPENDIX D. EMISSION CALCULATIONS

Files are submitted to the agency electronically.

APPENDIX E. REERS CALCULATIONS

Files are submitted to the agency electronically.

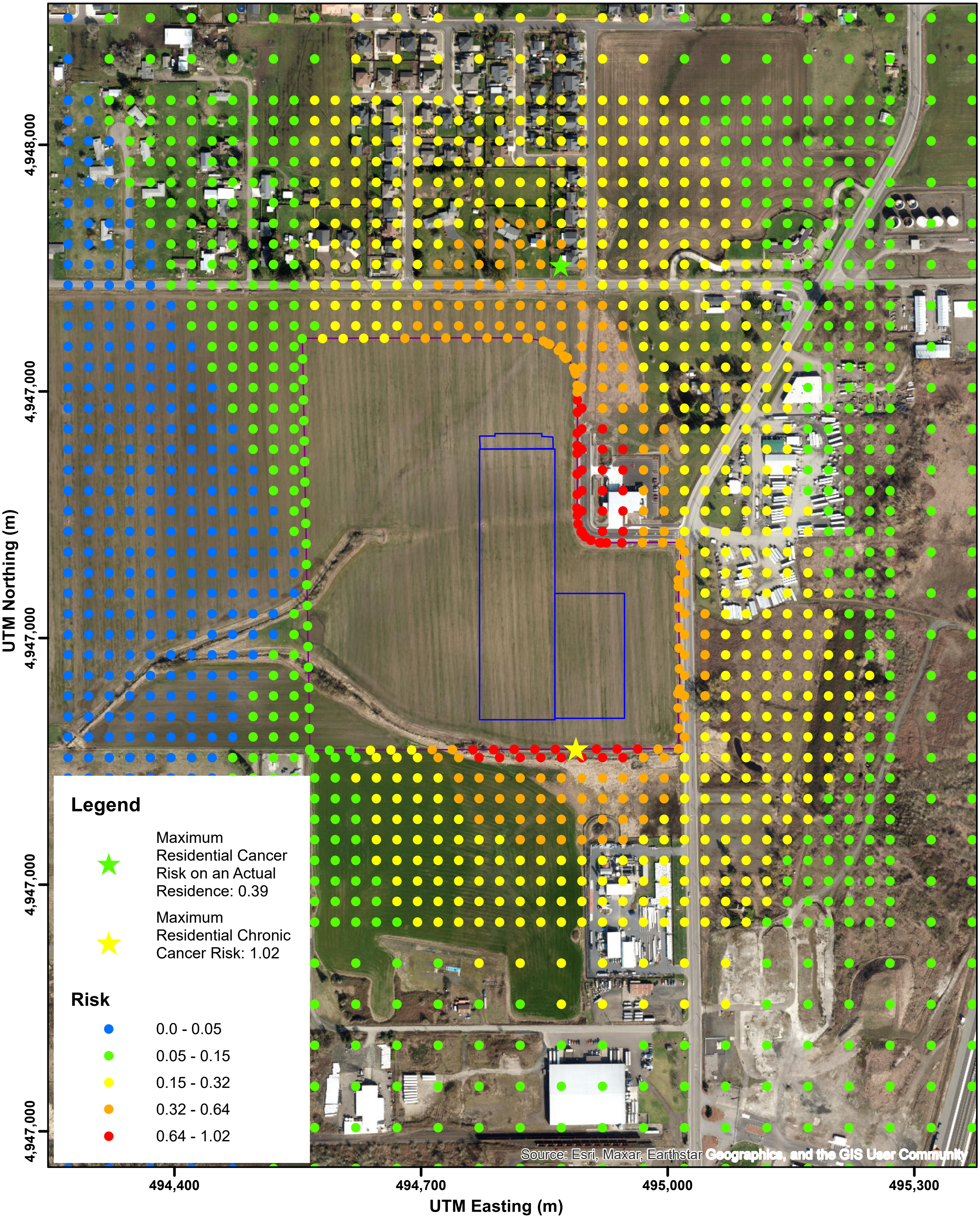
APPENDIX F. METEOROLOGICAL DATA

Files are submitted to the agency electronically.

APPENDIX G. MODELED RISK

Model files are submitted to the agency electronically. Each model input file includes the seven risk categories for the specified operating scenario.

Residential Chronic Cancer Risk



All Coordinates shown in UTM Coordinates,
Zone 10, WGS 1984