CLEANER AIR OREGON—
RISK ASSESSMENT REPORT

PACKAGING CORPORATION OF AMERICA
SALEM, OREGON

Prepared for

OREGON DEPARTMENT OF ENVIRONMENTAL QUALITY

CLEANER AIR OREGON PERMITTING PROGRAM

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ACRONYMS AND ABBREVIATIONS

ACDP	Air Contaminant Discharge Permit
ASOS	automated surface observation system
CAO	Cleaner Air Oregon
DEQ	Oregon Department of Environmental Quality
USEPA	U.S. Environmental Protection Agency
facility	corrugated sheet stock and container manufacturing facility at 2121 Madrona Avenue SE in Salem, Oregon
g/s	grams per second
MFA	Maul Foster & Alongi, Inc.
NCEI	National Center for Environmental Information
NLCD16	State of Oregon National Land Cover Dataset, 2016
OAR	Oregon Administrative Rule
PCA	Packaging Corporation of America
RAL	Risk Action Level
RAWP	Risk Assessment Work Plan
RBC	risk-based concentration
Salem McNary station	Salem McNary Regional Airport monitoring station (Station ID 24232) in Salem, Oregon
TAC	toxic air contaminant
TEU	toxic emission unit
ug/m^3	micrograms per cubic meter
USGS	United States Geological Survey

1 INTRODUCTION

Packaging Corporation of America (PCA) owns and operates a corrugated sheet stock and container manufacturing facility located at 2121 Madrona Avenue SE in Salem, Oregon 97302 (the "facility"). The facility operates under Simple Air Contaminant Discharge Permit (ACDP) No. 24-8061-ST-01 issued by the Oregon Department of Environmental Quality (DEQ) on February 10, 2021.

Maul Foster & Alongi, Inc. (MFA) has been retained by PCA to assist the facility with the dispersion modeling and risk assessment components of the Cleaner Air Oregon (CAO) permitting program. A timeline of the CAO permitting process to date is presented in Table 1-1 below.

Table 1-1. CAO Process Step Submittals and Approvals

CAO Requirement	PCA Submittal Date	DEQ Approval Date
CAO Emissions Inventory	November 25, 2020	February 17 2021
CAO Combined Modeling Protocol and Risk Assessment Work Plan	March 18, 2021 (Final Revision—September 17, 2021)	June 11, 2021

Oregon Administrative Rule (OAR) 340-245-0030(1)(e) states that a risk assessment is required to be submitted to the DEQ no later than 120 days after approval of the risk assessment work plan. To satisfy this requirement, MFA performed a Level 3 Risk Assessment to estimate the potential cancer and noncancer risk impacts from the facility for comparison to the applicable risk action levels (RAL), shown in OAR 340-245-8010 Table 1.

The remainder of this risk assessment report outlines the methodology used to complete the Level 3 Risk Assessment and presents a summary of the potential cancer and noncancer risk results.

2 FACILITY DESCRIPTION

2.1 Facility Location

The facility is located in Salem, Oregon, within the Salem urban growth boundary. An aerial image of the facility location and the property boundary is shown in Figure 2-1. The northeastern property boundary is adjacent to the Union Pacific Railroad line.

The area immediately surrounding the facility is characterized primarily by flat terrain with a mixture of land-use zoning including residential, mixed-use, and industrial. Existing land-use zoning

information for the area surrounding the facility is discussed in more detail in Section 5.1. The topography of the area immediately surrounding the facility is presented in Figure 2-2.

2.2 Process Description

The facility manufactures corrugated sheet stock and corrugated containers from paper roll stock. The stock is processed in the corrugator, where the sheet stock is fluted and a mixture of starch, water and other additives is applied by roller. The fluted sheet stock is then sandwiched between two layers of sheet stock and indirectly heated with steam to produce corrugated sheet stock. Steam is supplied to the corrugator by two natural gas-fired boilers.

To meet customer specifications, corrugated sheet stock may be converted into containers. The conversion process involves cutting, printing, gluing and folding the sheet to meet the final container size and shape for end use.

3 EMISSION ESTIMATES AND MODEL SOURCES

Annual and daily TAC emission estimates for the process equipment and activities considered to be toxics emissions units (TEUs), as defined in OAR 340-245-0020(61), were prepared by PCA, as shown in the DEQ-approved emissions inventory. The DEQ-approved daily and annual TAC emission estimates were converted to units of grams per second (g/s) for purposes of conducting the Level 3 Risk Assessment. Tables 3-1 and 3-2 (attached) present the annual and daily TAC emission estimates for significant TEUs, and Table 3-3 (attached) presents the daily and annual TAC emission estimates for natural gas combustion TEUs. Tables 3-1, 3-2 and 3-3 only include emission estimates for TACs with established risk-based concentrations (RBCs) set forth under OAR 340-245-8040 Table 4.

Each TEU identified in the DEQ-approved TAC emissions inventory was included in the dispersion model developed for the facility. Each TEU included in the dispersion model was modeled using a unit emission rate, equivalent to 1 g/s, for all modeled source types as shown in Table 3-4 (attached). Unit emission rate modeling is described in greater detail in Section 5.4.

3.1 TEU—Boilers

The facility operates two natural gas-fired boilers, each with a rated maximum heat input capacity of 14.7 million British thermal units per hour. Exhaust from each boiler is emitted to atmosphere through a dedicated stack. Each boiler stack was represented in the dispersion model as an individual point source with a unique label (BLR_1 and BLR_2). The release parameters for the boiler stacks are presented in Table 3-4 (attached).

3.2 TEU—Ink

The facility applies water-based inks to corrugated containers via flexographic printers to meet customer product specifications. Certain inks used by the facility contain compounds considered to be TACs. As a result, fugitive emissions of volatile TACs may occur during application and use of water-based inks. Ink use occurs at various locations within the production building and fugitive TAC emissions are released to atmosphere via the building ventilation system.

The facility has nine powered roof vents for building ventilation. Each roof vent was represented as an individual point source in the dispersion model with a unique label (VENT_1 through VENT_9). One roof vent has been decommissioned. The vent fan and motor are disabled and there is a cover and panels over the vent that are maintained in a closed and sealed position. Therefore, this vent was not included as a release point in the dispersion model.

The release parameters for the building vents are shown in Table 3-4 (attached). The building vent descriptions in Table 3-4 (attached) refer to the general vicinity of processes within the building. The building vents are part of the building ventilation system and are not designed or dedicated to any specific processes or process areas. The building vents pull fresh air inside the plant, creating mixing and movement throughout the building airspace and providing fresh air and cooling inside the plant. The ventilation system is designed to maintain a slightly negative pressure in the building and the roof vents are the only release points for building ventilation air.

Although there are walls in the interior of the main building (where ink and glue use occurs), none of the walls extend for the entire length of the building, and not all of the walls extend from floor to ceiling. As a result, there are no areas within the main building that are isolated from other sections and ventilation air can move freely among different areas.

Based on the facility process layout, the building layout, and the design of the building ventilation system, fugitive TAC emissions from ink application and use were assumed to be well-mixed with the general building air (and fugitive emissions from glues), and equally distributed among each powered vent which emits to atmosphere.

3.3 TEU—Glue

Multiple glues are applied to corrugated sheets to form containers depending on customer specifications. Certain glues used by the facility contain compounds considered to be TACs. As a result, fugitive emissions of volatile TACs may occur during glue application.

Glue application occurs at various locations within the production building. TAC emissions are emitted to atmosphere through the building ventilation system. Similar to inks and as described in Section 3.2, fugitive TAC emissions from glue application were assumed to be well-mixed with building air (and fugitive emissions from inks), and equally distributed among each powered roof vent (VENT_1 through VENT_9) which emits to atmosphere

4 AIR DISPERSION MODELING METHODOLOGY

The following subsections detail the conceptual site model for the facility. The conceptual site model was developed as a part of the Level 3 Risk Assessment. The dispersion model input and output files will be submitted to the DEQ electronically for review in support of this risk assessment report.

4.1 Model Selection

MFA set up the dispersion model of the facility using the model versions shown in Table 4-1. Lakes Environmental, a third-party overlay software, was used to execute the dispersion modeling assessments.

Table 4-1. Model Selection

Model	Model Version
AERMOD	21112 (1)
AERMET	19191
AERMAP	18081
AERSURFACE	20060
AERMINUTE	15272
BPIP-PRM	04274

NOTE:
(1) AERMOD version number 19191 was approved by the DEQ in the Combined Modeling Protocol and Risk Assessment Work Plan. Because the AERMOD model was executed after release of version 21112, MFA used the latest approved AERMOD version in consultation with the DEQ.

4.2 Meteorological Data

MFA obtained the meteorological and terrain data files shown in Table 4-2.

Table 4-2. Meteorological and Terrain Data

Dataset	Station ID
Surface	Station ID 24232 for Salem, OR (National Center for Environmental Information)
Upper Air	Station ID 24232 for Salem, OR (National Oceanic and Atmospheric Administration/ Earth System Research Laboratory Radiosonde Database)
Terrain	United States Geologic Survey National Elevation Dataset (1/3-arc seconds with horizontal resolution of 10 meter)

4.2.1 Surface Data

Surface meteorological data were collected from the Salem McNary Regional Airport monitoring station (ID 24232) located in Salem, Oregon (Salem McNary station). Hourly data for wind speed, wind direction, cloud cover, and temperature for the period between January 1, 2016 through December 31, 2020 were downloaded by file transfer protocol from the National Center for Environmental Information (NCEI). Salem McNary station data were determined to be the most representative publicly available surface meteorological data for the facility because it is the closest meteorological station to the facility location with data available for download from the NCEI, (approximately 1.3 kilometers to the southeast of the facility), and both the Salem McNary station and the facility are centrally located within the Willamette Valley.

The Salem McNary station is part of the National Weather Service Automated Surface Observation Systems (ASOS) network. The station collects wind speed and wind direction, both of which are sampled once per second, with the average computed every five seconds. These data are referred to as "ASOS 1-minute."

The Salem McNary station is part of the Ice-Free Winds Group within the ASOS network. Ice-Free Winds Group stations collect wind data, using a sonic anemometer, which has no minimum detection threshold to determine "calms." The ASOS 1-minute data (TD-6405) for the years 2016 through 2020 were extracted by file transfer protocol from the NCEI. These data were processed using the U.S. Environmental Protection Agency (USEPA) AERMINUTE program.

4.2.2 Upper Air Data

Upper air meteorological data were extracted from the National Oceanic and Atmospheric Administration Earth System Research Laboratory Radiosonde Database for the years 2016 through 2020 using the Forecast Systems Laboratory format for Salem McNary station.

4.2.3 Data Processing—AERMET

The meteorological data were processed using the USEPA AERMET program to produce five years of model-ready meteorological data for use in the AERMOD model. The adjustment to the surface frictional velocity option (i.e., ADJ_U*) was selected as part of the AERMET processing. The land-use surface characteristics were processed using AERSURFACE.

AERMET allows for a default wind speed adjustment selection option when ASOS 1-minute data are used. This option adds 0.26 meters per second 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 titled "Use of ASOS meteorological data in AERMOD dispersion modeling"[1] dated March 8, 2013, a minimum wind speed detection threshold of 0.5 meters per second was used to account for the adjustment. Wind direction randomization was not selected in AERMET because ASOS 1-minute data increase the precision of wind direction measurements and, unlike non-ASOS data, are rounded to the nearest ten whole degrees.

MFA performed an analysis of the missing hours in the five-year meteorological dataset using the QA feature available in the Lakes Environmental software. Each calendar quarter in the meteorological dataset must have fewer than 10% missing hours to be considered valid and complete. As shown in Table 4-3 (attached), each quarter met this criterion.

A wind rose for the five-year meteorological dataset is presented in Figure 4-1. As shown in Figure 4-1, the wind rose indicates a bimodal wind distribution blowing from the south and north. This is consistent with the orientation of the Willamette Valley relative to the position of the facility.

4.3 Land Use

MFA utilized the AERSURFACE land-use tool to generate seasonal values for albedo, Bowen ratio, and surface roughness heights. State of Oregon National Land Cover Dataset, 2016 (NLCD16) land cover class definitions, along with concurrent percent impervious surface and percent tree canopy data, were downloaded from the United States Geological Survey (USGS) and processed using AERSURFACE to generate the surface characteristics necessary to run AERMET. The NLCD16 data were processed in AERSURFACE using the settings described in Table 4-4 (attached).

Soil moisture conditions were determined following the methodology set forth in Section 3.2.8 of the AERSURFACE User's Guide dated February 2020. As detailed in Section 3.2.8, *"[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 the Salem McNary station were retrieved from the Western Regional Climate Center[2] for the years 2016 to 2020. Annual precipitation data for each year of the 5-year meteorological dataset were reviewed and compared against the 30-year climatological record to determine the representative surface moisture condition for each modeling year. As shown in Table 4-5 (attached), the average annual precipitation for each year of the 5-year meteorological dataset varied between the lower 30th percentile to greater than the 70th percentile of the 30-year climatological record. To account for this variability, MFA executed the AERSURFACE program using the corresponding surface moisture condition associated with each calendar year's annual rainfall.

[1] https://www3.epa.gov/ttn/scram/guidance/clarification/20130308_Met_Data_Clarification.pdf
[2] https://wrcc.dri.edu/ [Accessed on February 8, 2021]

MFA executed the dispersion model using rural dispersion coefficients. To make this determination, MFA followed the land use procedure, as recommended by Appendix W of Title 40 Code of Federal Regulations Part 51[3], to conclude that less than 50 percent of the land use within the modeling domain is represented by the urban land use type.

4.4 Emissions Unit Locations

The locations of each TEU included in the dispersion model are shown in Figure 4-2.

4.5 Building Downwash

The most recent version of the EPA Building Profile Input Program, incorporating the Plume Rise Model Enhancements Algorithms (e.g. BPIP-PRM) was used as shown in Table 4-1 to derive direction-specific downwash parameters for significant building structures located at the facility. The locations for structures that are projected to influence downwash are included in Figure 4-2. Table 4-6 (attached) presents a summary of the building heights that were included in the dispersion model.

4.6 Receptor Locations and Terrain

Dispersion factors were determined for each modeling receptor outside the facility property boundary. MFA placed modeling receptors along the facility boundary and at potential exposure locations in the surrounding area up to 5 kilometers away from the center of the facility. Figure 4-3 presents the receptor spacing and locations for the modeling domain. Figure 4-4 presents the receptor locations in the immediate area surrounding the facility.

Receptors were defined in the dispersion model as shown in Table 4-7.

Table 4-7. Receptor Location Spacing

Receptor Spacing	Receptor Distance
25 m	Along fence line and out to 500 m from fence line
50 m	500 m to 1,000 m
100 m	1,000 m to 2,000 m
200 m	2,000 m to 5,000 m

MFA identified two locations considered to be "sensitive exposure locations" (e.g., schools) within approximately 1-kilometer from the facility property boundary, which are presented in Table 4-8. Each sensitive exposure location shown in Table 4-8 was accounted for in the dispersion model by a receptor within the receptor grid.

[3] Appendix W to Part 51—"Guideline on Air Quality Models." See Section 7.2.1.1.

Table 4-8. Identification of Sensitive Exposure Locations

UTM Coordinates (m)		Sensitive Exposure Location
Easting	Northing	
497471.53	4972349.50	Morningside Elementary School
498121.53	4971849.50	Leslie Middle School

Terrain elevations for model receptors, TEU base elevations, and base elevations of downwash structures were obtained from the USGS National Elevation Dataset at a resolution of 1/3 arc-seconds (a horizontal resolution of roughly 10 meters) and processed using the current version of AERMAP as shown in Table 4-1.

5 RISK ASSESSMENT METHODOLOGY

The following subsections detail the methodology used to perform the risk assessment.

5.1 Land-Use Zoning Classification—Exposure Types

The Department of Land Conservation and Development's statewide zoning data were reviewed to determine land-use classifications for areas within the modeling domain. The Oregon statewide zoning classifications provide the basis for the initial categorization of exposure classifications (e.g. residential, non-residential worker, non-residential child, or acute). The zoning data was further evaluated against local data such as the City of Salem zoning and school-location information. MFA also reviewed aerial imagery via 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 receptor locations fall within the interstitial spaces of roadway and/or rail rights-of-way as shown (in black) in Figures 4-3 and 4-4. These locations were included in the dispersion modeling to maintain a uniform receptor grid per DEQ request. For receptors within the 25 meter and 50 meter receptor grids, MFA did not conduct risk evaluations for any receptor locations in roadways or rail rights-of-way consistent with the DEQ guidance. Note for receptors outside of the 50 meter receptor grid, all receptors were evaluated for risk, even where the receptor is located in a right-of-way. In the crosswalk-of-receptors, previously provided to the DEQ in spreadsheet format with the DEQ-approved modeling protocol and risk assessment work plan, these locations are labeled as "Risk Not Assessed," although they were modeled and dispersion factors were generated.

Figure 5-1 presents the existing land-use zoning identified for the modeling domain, and Figure 5-2 is provided for the area immediately surrounding the facility. Figures 5-3 and 5-4 present the corresponding exposure location categorization for the modeling domain and the immediate area surrounding the facility, respectively.

5.2 Exposure Pathways

It is assumed that cancer and noncancer risk (i.e., chronic and acute hazard index) resulting from facility TEUs do 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, such as a local lake where fish consumption might present an ingestion pathway, or a nearby farm where subsistence farming practices may occur.

5.3 Risk-Based Concentrations

Excess cancer risk and chronic and acute noncancer risk were assessed using the current published RBCs shown in OAR 340-245-8040 Table 4. These RBCs were used for this Level 3 Risk Assessment.

5.4 Unit Emission Rate

MFA executed the dispersion model using unit emission rates (equivalent to 1 g/s) for all TEUs, for both the annual and daily (i.e., 24-hour) averaging periods, as shown in Table 3-4 (attached).

The unit emission rate model produces the dispersion factor, in units of ug/m^3/(g/s), for each modeled TEU for both averaging periods. When multiplied by the TAC emission rate for the modeled TEU, the result is the modeled concentration of the TAC. The dispersion factors were used to conduct the Level 3 Risk Assessments, in combination with TAC emission rates for each TEU in g/s and the RBCs in ug/m^3 set forth under OAR 340-245-8040 Table 4.

5.4.1 Example Calculation—Level 3 Risk Assessment

Example calculations for estimating excess cancer risk and noncancer hazard index (both chronic and acute) for a single exposure location are presented in Equation 1 and Equation 2 to satisfy the requirements set forth under OAR 340-245-0210(2)(c).

Equation 1.

$$\text{Excess cancer risk (chances-in-a-million)} = \Sigma \frac{(\text{TAC annual emission rate [g/s]}) \times (\text{TEU dispersion factor } [\frac{\text{ug/m}^3}{\text{g/s}}])}{(\text{applicable RBC at exposure location [µg/m}^3])}$$

Equation 2.

$$\text{Noncancer Hazard Index } = \Sigma \frac{(\text{TAC annual or daily emission rate [g/s]}) \times (\text{TEU dispersion factor } [\frac{\text{ug/m}^3}{\text{g/s}}])}{(\text{applicable RBC at exposure location [µg/m}^3])}$$

The cumulative facility excess cancer risk and chronic and acute noncancer hazard index was derived by summing each individual TAC risk contribution from all of the TEUs at each exposure location.

5.5 Risk Action Levels

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 the DEQ-approved TAC emissions inventory, TAC emissions from the facility are comprised of a mixture of TACs with assigned hazard indices of 3 and 5 per OAR 340-245-8030 Table 3 and OAR 340-245-8040 Table 4. The CAO rules specify that where an existing source emits a mixture of TACs with assigned hazard indices of 3 and 5, the source must determine the risk determination ratio according to the equation in OAR 340-245-0200(5) and the resulting ratios must be compared to the risk determination ratio RALs in OAR 340-245-8010, Table 1. This step is not necessary if the noncancer Hazard Index values are all below 3.

5.6 Uncertainty Analysis

Although the Level 3 Risk Assessment was conducted using the most accurate and readily available information, there are various levels of uncertainty associated with the risk assessment. Per OAR 340-245-0210(2)(d), known quantitative and qualitative uncertainties with the 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 was assumed. Acute exposure can occur anywhere from one to 24 hours. Although this risk assessment assumed 24 hours of exposure, it is very unlikely that any individual would be exposed for a full 24 hours outside of a residential location. However, if the toxicity reference value is based on data collected for a lower exposure duration than the 24-hour exposure duration, the estimated risk may differ. **Hence, for TACs with RBCs that were developed using toxicity reference values based on longer exposure durations, the Level 3 Risk Assessment may overestimate acute noncancer risk due to the 24-hour exposure duration assumption.**

- The Level 3 Risk Assessment was conducted assuming each TEU at the facility is operating at maximum design capacity for 24 hours, simultaneously. For example, the boilers do not typically need to operate at maximum operational capacity to satisfy the steam requirements of the facility. It is highly unlikely that all TEUs at the facility will simultaneously operate at their maximum capacity for a 24-hour period. **Therefore, the Level 3 Risk Assessment likely overestimates acute noncancer risk due to unrealistic operating conditions.**

- 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 unlikely that these infrequent meteorological conditions would occur at the same time that the facility will be operating all TEUs at maximum capacity. **Therefore, the Level 3 Risk Assessment likely overestimates acute noncancer risk because of the improbability of maximum capacity operation of the facility aligning with worst-case meteorological conditions.**

- Dispersion modeling was used to determine the daily (i.e. 24-hour) dispersion factors per exposure location for use in risk estimate calculations. This method determines, for each TEU, a single day within the one-year period of hourly met data, during which the highest predicted concentration occurs at each exposure location. It is highly unlikely that the maximum predicted concentration at a given exposure location occurs on the same day for each individual TEU at the facility. For example, the highest predicted concentration for the TEU—Boilers may occur at exposure location "X" on March 1 while, due to differences in location, release characteristics (i.e., stack height, velocity, etc.), and meteorological variation, the highest predicted concentration for the TEU—Ink may occur at exposure location "X" on December 1. Thus, the maximum predicted concentrations are not paired-in-time such that maximum predicted concentrations per TEU may occur on different days within the met dataset. **Therefore, the Level 3 Risk Assessment likely overestimates acute noncancer risk because it is unlikely that the highest predicted concentration from each TEU occurs at every exposure location on the same day.**

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 local facility emission rate for the entire exposure duration (i.e., 70 years). The facility has not been at the current location in the current configuration and emitting at the current rates for 70 consecutive years and nor is it likely that it ever will be. **Therefore, the Level 3 Risk Assessment likely overestimates cancer and chronic noncancer risk due to the unrealistic exposure duration assumption.**

All Assessments:

- Only excess cancer risk and chronic and acute noncancer hazard index from TACs that have RBCs published by the DEQ were assessed (in addition to the acute RBC for antimony and compounds as noted above). Table 5-1 (attached) presents a list of the TACs emitted from the facility TEUs that do not have RBCs published by the DEQ. **As a result, the Level 3 Risk Assessment may not accurately assess cancer and/or noncancer risk associated with those TACs that do not have an associated RBC. However, the development of RBCs generally has a level of conservatism that may overestimate cancer and/or noncancer risk from TACs with known RBCs.**

6 RISK ASSESSMENT RESULT SUMMARY

MFA determined the total excess cancer risk and chronic and acute noncancer risk (expressed numerically as the chronic and acute noncancer hazard index) at each modeled exposure location for

both significant TEUs and natural gas combustion TEUs following the applicable requirements set forth in OAR 340-245-0050(1) for Level 3 Risk Assessments. Excess cancer risk, and chronic and acute noncancer hazard index calculation methodologies are discussed in detail in Section 5. The modeled concentration at the location of maximum risk for each modeled TEU and exposure scenario are provided in Table 6-1 (attached).

6.1 Excess Cancer Risk

Following the Level 3 Risk Assessment methodology outlined above, the maximum predicted excess cancer risk for significant TEUs is 0.1 additional chances of developing cancer in a population of 1,000,000 people (chances-in-one-million) as shown in Table 6-2. The maximum predicted excess cancer risk for natural gas combustion TEUs is predicted to be 0.1 additional chances of developing cancer in a population of 1,000,000 people (chances-in-one-million) as shown in Table 6-3.

6.2 Chronic Noncancer Hazard Index

Following the Level 3 Risk Assessment methodology outlined above, the maximum predicted chronic noncancer hazard index for significant TEUs is 0.3 as shown in Table 6-2. The maximum predicted chronic noncancer hazard index for natural gas combustion TEUs is <0.1 as shown in Table 6-3.

6.3 Acute Noncancer Hazard Index

Following the Level 3 Risk Assessment methodology outlined above, the maximum predicted acute noncancer hazard index for significant TEUs is <0.1 as shown in Table 6-2. The maximum predicted acute noncancer hazard index for natural gas combustion TEUs is <0.1 as shown in Table 6-3.

6.4 Risk Action Level Analysis

Per OAR 340-245-0020(14), a *"de minimis source means a source whose excess cancer risk, chronic noncancer risk [i.e., hazard index] and acute noncancer risk [i.e., hazard index] estimates are each less than or equal to the Source Permit Level in OAR 340-245-8010 Table 1 when calculated based on the source's capacity, as determined under OAR 340-245-0050(7)."*

The Level 3 Risk Assessment was completed using TAC emission rates based on the maximum capacity for each TEU as discussed in Section 3. As shown in Table 6-4, the maximum predicted excess cancer risk, and chronic and acute noncancer hazard indices are below the Source Permit Level RAL for existing sources per OAR 340-245-8010 Table 1 notwithstanding the emissions inventory and risk assessment reflecting emission rates beyond what the facility is physically capable of maintaining (see Section 5.6). Therefore, the facility is determined to be a de minimis source with respect to CAO permitting. This risk assessment was performed consistent with the CAO rules in effect on the date of issuance of this report.

Table 6-4. Level 3 Risk Assessment Result Summary for Significant Toxic Emission Units

Exposure Assessment	Facility Risk / Hazard Index	Source Permit Level RAL	RAL Analysis
Cancer Risk (chances-in-a-10^6)			
Residential	**0.1**	**5**	**Below Source Permit Level**
Non-Residential Child	<0.1	5	Below Source Permit Level
Worker	0.1	5	Below Source Permit Level
Chronic Noncancer Hazard Index			
Residential	0.1	0.5	Below Source Permit Level
Non-Residential Child	<0.1	0.5	Below Source Permit Level
Worker	**0.3**	**0.5**	**Below Source Permit Level**
Acute Noncancer Hazard Index	**<0.1**	**0.5**	**Below Source Permit Level**

Table 6-5. Level 3 Risk Assessment Result Summary for Natural Gas Combustion Toxic Emission Units

Exposure Assessment	Facility Risk / Hazard Index	RAL Analysis
Cancer Risk (chances-in-a-10^6)		
Residential	0.1	Not Applicable
Non-Residential Child	<0.1	Not Applicable
Worker	0.1	Not Applicable
Chronic Noncancer Hazard Index		
Residential	<0.1	Not Applicable
Non-Residential Child	<0.1	Not Applicable
Worker	<0.1	Not Applicable
Acute Noncancer Hazard Index	<0.1	Not Applicable

7 CLOSING

PCA and MFA look forward to working with the DEQ throughout the CAO process. If there are any questions or comments regarding this risk assessment report, please contact Erica Frey-Hoyer of PCA at (503) 315-2335, or Eric Bornhorst of MFA at (971) 713-3580.

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.

TABLES

Table 3-1
Annual Emission Rates for Significant Toxic Emission Units—RBC Only
Packaging Corporation of America—Salem, Oregon

Toxic Air Contaminant	CAS	Noncancer Class (HI)	Annual Emission Rates																		Total Facility Significant TEU Annual Emissions Estimate	
			Material Balance (TEU-Ink and TEU-Glue)																			
			Building Vents																			
			No. 1		No. 2		No. 3		No. 4		No. 5		No. 6		No. 7		No. 8		No. 9			
			(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)]	(lb/yr) [(1)]	(g/s) [(a)]	(lb/yr) [(1)]	(g/s) [(a)]	(lb/yr) [(1)]	(g/s) [(a)]	(lb/yr)	(g/s)
Model Release Point ID	--	--	VENT_1		VENT_2		VENT_3		VENT_4		VENT_5		VENT_6		VENT_7		VENT_8		VENT_9		--	--
1,4-Dioxane	123-91-1	HI3	0.019	2.8E-07	0.019	2.8E-07	0.019	2.8E-07	0.019	2.8E-07	0.019	2.8E-07	0.019	2.8E-07	0.019	2.8E-07	0.019	2.8E-07	0.019	2.8E-07	0.17	2.5E-06
Acetaldehyde	75-07-0	HI3	0.48	6.9E-06	0.48	6.9E-06	0.48	6.9E-06	0.48	6.9E-06	0.48	6.9E-06	0.48	6.9E-06	0.48	6.9E-06	0.48	6.9E-06	0.48	6.9E-06	4.31	6.2E-05
Isopropylbenzene (Cumene)	98-82-8	HI3	0.019	2.8E-07	0.019	2.8E-07	0.019	2.8E-07	0.019	2.8E-07	0.019	2.8E-07	0.019	2.8E-07	0.019	2.8E-07	0.019	2.8E-07	0.019	2.8E-07	0.17	2.5E-06
Diethanolamine	111-42-2	HI3	0.25	3.6E-06	0.25	3.6E-06	0.25	3.6E-06	0.25	3.6E-06	0.25	3.6E-06	0.25	3.6E-06	0.25	3.6E-06	0.25	3.6E-06	0.25	3.6E-06	2.26	3.2E-05
Diethylene glycol monobutyl ether	112-34-5	HI3	11.3	1.6E-04	11.3	1.6E-04	11.3	1.6E-04	11.3	1.6E-04	11.3	1.6E-04	11.3	1.6E-04	11.3	1.6E-04	11.3	1.6E-04	11.3	1.6E-04	102	1.5E-03
Diethylene glycol monoethyl ether	111-90-0	HI5	9.60	1.4E-04	9.60	1.4E-04	9.60	1.4E-04	9.60	1.4E-04	9.60	1.4E-04	9.60	1.4E-04	9.60	1.4E-04	9.60	1.4E-04	9.60	1.4E-04	86.4	1.2E-03
Ethylene glycol	107-21-1	HI3	5.59	8.0E-05	5.59	8.0E-05	5.59	8.0E-05	5.59	8.0E-05	5.59	8.0E-05	5.59	8.0E-05	5.59	8.0E-05	5.59	8.0E-05	5.59	8.0E-05	50.3	7.2E-04
Ethylene glycol monobutyl ether	111-76-2	HI3	0.094	1.4E-06	0.094	1.4E-06	0.094	1.4E-06	0.094	1.4E-06	0.094	1.4E-06	0.094	1.4E-06	0.094	1.4E-06	0.094	1.4E-06	0.094	1.4E-06	0.85	1.2E-05
Ethylene oxide	75-21-8	HI3	0.019	2.8E-07	0.019	2.8E-07	0.019	2.8E-07	0.019	2.8E-07	0.019	2.8E-07	0.019	2.8E-07	0.019	2.8E-07	0.019	2.8E-07	0.019	2.8E-07	0.17	2.5E-06
Formaldehyde	50-00-0	HI3	3.83	5.5E-05	3.83	5.5E-05	3.83	5.5E-05	3.83	5.5E-05	3.83	5.5E-05	3.83	5.5E-05	3.83	5.5E-05	3.83	5.5E-05	3.83	5.5E-05	34.5	5.0E-04
Isopropyl alcohol	67-63-0	HI3	51.8	7.4E-04	51.8	7.4E-04	51.8	7.4E-04	51.8	7.4E-04	51.8	7.4E-04	51.8	7.4E-04	51.8	7.4E-04	51.8	7.4E-04	51.8	7.4E-04	466	6.7E-03
Methanol	67-56-1	HI3	3.83	5.5E-05	3.83	5.5E-05	3.83	5.5E-05	3.83	5.5E-05	3.83	5.5E-05	3.83	5.5E-05	3.83	5.5E-05	3.83	5.5E-05	3.83	5.5E-05	34.5	5.0E-04
Vinyl acetate	108-05-4	HI3	13.4	1.9E-04	13.4	1.9E-04	13.4	1.9E-04	13.4	1.9E-04	13.4	1.9E-04	13.4	1.9E-04	13.4	1.9E-04	13.4	1.9E-04	13.4	1.9E-04	121	1.7E-03
Total TAC Emissions Estimate			**100**	**1.4E-03**	**100**	**1.4E-03**	**100**	**1.4E-03**	**100**	**1.4E-03**	**100**	**1.4E-03**	**100**	**1.4E-03**	**100**	**1.4E-03**	**100**	**1.4E-03**	**100**	**1.4E-03**	**902**	**0.013**

NOTES:

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

REFERENCES:

(1) Emission rates from the DEQ-approved modeling protocol and risk assessment work plan per letter dated June 11, 2021.

Table 3-2
Daily Emission Rates for Significant Toxic Emission Units—RBC Only
Packaging Corporation of America—Salem, Oregon

Toxic Air Contaminant	CAS	Noncancer Class (HI)	Daily Emission Rates — Material Balance (TEU-Ink and TEU-Glue) — Building Vents																		Total Facility Significant TEU Daily Emissions Estimate	
			No. 1		No. 2		No. 3		No. 4		No. 5		No. 6		No. 7		No. 8		No. 9			
			(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]	(lb/day) [1]	(g/s) [a]	(lb/day) [1]	(g/s) [a]	(lb/day) [1]	(g/s) [a]	(lb/day)	(g/s)
Model Release Point ID	--	--	VENT_1		VENT_2		VENT_3		VENT_4		VENT_5		VENT_6		VENT_7		VENT_8		VENT_9		--	--
1,4-Dioxane	123-91-1	HI3	5.3E-05	2.8E-07	5.3E-05	2.8E-07	5.3E-05	2.8E-07	5.3E-05	2.8E-07	5.3E-05	2.8E-07	5.3E-05	2.8E-07	5.3E-05	2.8E-07	5.3E-05	2.8E-07	5.3E-05	2.8E-07	4.7E-04	2.5E-06
Acetaldehyde	75-07-0	HI3	1.3E-03	6.9E-06	1.3E-03	6.9E-06	1.3E-03	6.9E-06	1.3E-03	6.9E-06	1.3E-03	6.9E-06	1.3E-03	6.9E-06	1.3E-03	6.9E-06	1.3E-03	6.9E-06	1.3E-03	6.9E-06	0.012	6.2E-05
Isopropylbenzene (Cumene)	98-82-8	HI3	5.3E-05	2.8E-07	5.3E-05	2.8E-07	5.3E-05	2.8E-07	5.3E-05	2.8E-07	5.3E-05	2.8E-07	5.3E-05	2.8E-07	5.3E-05	2.8E-07	5.3E-05	2.8E-07	5.3E-05	2.8E-07	4.7E-04	2.5E-06
Diethanolamine	111-42-2	HI3	6.9E-04	3.6E-06	6.9E-04	3.6E-06	6.9E-04	3.6E-06	6.9E-04	3.6E-06	6.9E-04	3.6E-06	6.9E-04	3.6E-06	6.9E-04	3.6E-06	6.9E-04	3.6E-06	6.9E-04	3.6E-06	6.2E-03	3.2E-05
Diethylene glycol monobutyl ether	112-34-5	HI3	0.031	1.6E-04	0.031	1.6E-04	0.031	1.6E-04	0.031	1.6E-04	0.031	1.6E-04	0.031	1.6E-04	0.031	1.6E-04	0.031	1.6E-04	0.031	1.6E-04	0.28	1.5E-03
Diethylene glycol monoethyl ether	111-90-0	HI5	0.026	1.4E-04	0.026	1.4E-04	0.026	1.4E-04	0.026	1.4E-04	0.026	1.4E-04	0.026	1.4E-04	0.026	1.4E-04	0.026	1.4E-04	0.026	1.4E-04	0.24	1.2E-03
Ethylene glycol	107-21-1	HI3	0.015	8.0E-05	0.015	8.0E-05	0.015	8.0E-05	0.015	8.0E-05	0.015	8.0E-05	0.015	8.0E-05	0.015	8.0E-05	0.015	8.0E-05	0.015	8.0E-05	0.14	7.2E-04
Ethylene glycol monobutyl ether	111-76-2	HI3	2.6E-04	1.4E-06	2.6E-04	1.4E-06	2.6E-04	1.4E-06	2.6E-04	1.4E-06	2.6E-04	1.4E-06	2.6E-04	1.4E-06	2.6E-04	1.4E-06	2.6E-04	1.4E-06	2.6E-04	1.4E-06	2.3E-03	1.2E-05
Ethylene oxide	75-21-8	HI3	5.3E-05	2.8E-07	5.3E-05	2.8E-07	5.3E-05	2.8E-07	5.3E-05	2.8E-07	5.3E-05	2.8E-07	5.3E-05	2.8E-07	5.3E-05	2.8E-07	5.3E-05	2.8E-07	5.3E-05	2.8E-07	4.7E-04	2.5E-06
Formaldehyde	50-00-0	HI3	0.011	5.5E-05	0.011	5.5E-05	0.011	5.5E-05	0.011	5.5E-05	0.011	5.5E-05	0.011	5.5E-05	0.011	5.5E-05	0.011	5.5E-05	0.011	5.5E-05	0.095	5.0E-04
Isopropyl alcohol	67-63-0	HI3	0.14	7.4E-04	0.14	7.4E-04	0.14	7.4E-04	0.14	7.4E-04	0.14	7.4E-04	0.14	7.4E-04	0.14	7.4E-04	0.14	7.4E-04	0.14	7.4E-04	1.28	6.7E-03
Methanol	67-56-1	HI3	0.011	5.5E-05	0.011	5.5E-05	0.011	5.5E-05	0.011	5.5E-05	0.011	5.5E-05	0.011	5.5E-05	0.011	5.5E-05	0.011	5.5E-05	0.011	5.5E-05	0.095	5.0E-04
Vinyl acetate	108-05-4	HI3	0.037	1.9E-04	0.037	1.9E-04	0.037	1.9E-04	0.037	1.9E-04	0.037	1.9E-04	0.037	1.9E-04	0.037	1.9E-04	0.037	1.9E-04	0.037	1.9E-04	0.33	1.7E-03
Total TAC Emissions Estimate			**0.27**	**1.4E-03**	**0.27**	**1.4E-03**	**0.27**	**1.4E-03**	**0.27**	**1.4E-03**	**0.27**	**1.4E-03**	**0.27**	**1.4E-03**	**0.27**	**1.4E-03**	**0.27**	**1.4E-03**	**0.27**	**1.4E-03**	**2.47**	**0.013**

NOTES:

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

REFERENCES:

(1) Emission rates from the DEQ-approved modeling protocol and risk assessment work plan per letter dated June 11, 2021.

Table 3-3
Daily and Annual Emission Rates for Natural Gas Combustion Toxic Emission Units—RBC Only
Packaging Corporation of America—Salem, Oregon

Toxic Air Contaminant	CAS	Noncancer Class (HI)	Emission Rates								Total Facility Gas Combustion TEU Emissions Estimate			
			Natural Gas Boilers (TEU-Boilers)											
			Boiler 1 (BLR_1)				Boiler 2 (BLR_2)							
			Daily		Annual		Daily		Annual		Daily		Annual	
			(lb/day) [1]	(g/s) [a]	(lb/yr) [1]	(g/s) [b]	(lb/day) [1]	(g/s) [a]	(lb/yr) [1]	(g/s) [b]	(lb/day)	(g/s)	(lb/yr)	(g/s)
Arsenic and compounds	7440-38-2	HI3	6.9E-05	3.6E-07	0.025	3.6E-07	6.9E-05	3.6E-07	0.025	3.6E-07	1.4E-04	7.2E-07	0.050	7.2E-07
Beryllium and compounds	7440-41-7	HI3	4.1E-06	2.2E-08	1.5E-03	2.2E-08	4.1E-06	2.2E-08	1.5E-03	2.2E-08	8.2E-06	4.3E-08	3.0E-03	4.3E-08
Cadmium and compounds	7440-43-9	HI3	3.8E-04	2.0E-06	0.14	2.0E-06	3.8E-04	2.0E-06	0.14	2.0E-06	7.6E-04	4.0E-06	0.28	4.0E-06
Cobalt and compounds	7440-48-4	HI3	2.9E-05	1.5E-07	0.011	1.5E-07	2.9E-05	1.5E-07	0.011	1.5E-07	5.8E-05	3.0E-07	0.021	3.0E-07
Copper and compounds	7440-50-8	HI3	2.9E-04	1.5E-06	0.11	1.5E-06	2.9E-04	1.5E-06	0.11	1.5E-06	5.8E-04	3.1E-06	0.21	3.1E-06
Manganese and compounds	7439-96-5	HI3	1.3E-04	6.9E-07	0.048	6.9E-07	1.3E-04	6.9E-07	0.048	6.9E-07	2.6E-04	1.4E-06	0.095	1.4E-06
Mercury and compounds	7439-97-6	HI3	8.9E-05	4.7E-07	0.033	4.7E-07	8.9E-05	4.7E-07	0.033	4.7E-07	1.8E-04	9.4E-07	0.065	9.4E-07
Nickel and compounds	7440-02-0	HI3	7.2E-04	3.8E-06	0.26	3.8E-06	7.2E-04	3.8E-06	0.26	3.8E-06	1.4E-03	7.6E-06	0.53	7.6E-06
Selenium and compounds	7782-49-2	HI3	8.2E-06	4.3E-08	3.0E-03	4.3E-08	8.2E-06	4.3E-08	3.0E-03	4.3E-08	1.6E-05	8.7E-08	6.0E-03	8.7E-08
Vanadium (fume or dust)	7440-62-2	HI3	7.9E-04	4.1E-06	0.29	4.1E-06	7.9E-04	4.1E-06	0.29	4.1E-06	1.6E-03	8.3E-06	0.58	8.3E-06
Benzene	71-43-2	HI3	7.2E-04	3.8E-06	0.26	3.8E-06	7.2E-04	3.8E-06	0.26	3.8E-06	1.4E-03	7.6E-06	0.53	7.6E-06
Formaldehyde	50-00-0	HI3	0.026	1.4E-04	9.40	1.4E-04	0.026	1.4E-04	9.40	1.4E-04	0.052	2.7E-04	18.8	2.7E-04
Hexane	110-54-3	HI3	0.62	3.2E-03	226	3.2E-03	0.62	3.2E-03	226	3.2E-03	1.24	6.5E-03	451	6.5E-03
Benz[a]anthracene	56-55-3	--	6.2E-07	3.2E-09	2.3E-04	3.2E-09	6.2E-07	3.2E-09	2.3E-04	3.2E-09	1.2E-06	6.5E-09	4.5E-04	6.5E-09
Benzo[a]pyrene	50-32-8	HI3	4.1E-07	2.2E-09	1.5E-04	2.2E-09	4.1E-07	2.2E-09	1.5E-04	2.2E-09	8.2E-07	4.3E-09	3.0E-04	4.3E-09
Benzo[b]fluoranthene	205-99-2	--	6.2E-07	3.2E-09	2.3E-04	3.2E-09	6.2E-07	3.2E-09	2.3E-04	3.2E-09	1.2E-06	6.5E-09	4.5E-04	6.5E-09
Benzo[g,h,i]perylene	191-24-2	--	4.1E-07	2.2E-09	1.5E-04	2.2E-09	4.1E-07	2.2E-09	1.5E-04	2.2E-09	8.2E-07	4.3E-09	3.0E-04	4.3E-09
Benzo[k]fluoranthene	207-08-9	--	6.2E-07	3.2E-09	2.3E-04	3.2E-09	6.2E-07	3.2E-09	2.3E-04	3.2E-09	1.2E-06	6.5E-09	4.5E-04	6.5E-09
Chrysene	218-01-9	--	6.2E-07	3.2E-09	2.3E-04	3.2E-09	6.2E-07	3.2E-09	2.3E-04	3.2E-09	1.2E-06	6.5E-09	4.5E-04	6.5E-09
Dibenz[a,h]anthracene	53-70-3	--	4.1E-07	2.2E-09	1.5E-04	2.2E-09	4.1E-07	2.2E-09	1.5E-04	2.2E-09	8.2E-07	4.3E-09	3.0E-04	4.3E-09
Fluoranthene	206-44-0	--	1.0E-06	5.4E-09	3.8E-04	5.4E-09	1.0E-06	5.4E-09	3.8E-04	5.4E-09	2.1E-06	1.1E-08	7.5E-04	1.1E-08
Indeno[1,2,3-cd]pyrene	193-39-5	--	6.2E-07	3.2E-09	2.3E-04	3.2E-09	6.2E-07	3.2E-09	2.3E-04	3.2E-09	1.2E-06	6.5E-09	4.5E-04	6.5E-09
Naphthalene	91-20-3	HI3	2.1E-04	1.1E-06	0.076	1.1E-06	2.1E-04	1.1E-06	0.076	1.1E-06	4.2E-04	2.2E-06	0.15	2.2E-06
Toluene	108-88-3	HI3	1.2E-03	6.1E-06	0.43	6.1E-06	1.2E-03	6.1E-06	0.43	6.1E-06	2.3E-03	1.2E-05	0.85	1.2E-05
Total TAC Emissions Estimate			**0.65**	**3.4E-03**	**237**	**3.4E-03**	**0.65**	**3.4E-03**	**237**	**3.4E-03**	**1.30**	**6.8E-03**	**474**	**6.8E-03**

NOTES:

(a) Acute emission rate (g/s) = (emission rate [lb/day]) x (453.592 g/lb) x (day/24 hrs) x (hr/3,600 s)

(b) Chronic emission rate (g/s) = (emission rate [lb/yr]) x (453.592 g/lb) x (yr/8,760 hrs) x (hr/3,600 s)

REFERENCES:

(1) Emission rates from the DEQ-approved modeling protocol and risk assessment work plan per letter dated June 11, 2021.

Table 3-4
Model Source Parameters
Packaging Corporation of America—Salem, Oregon

Point Sources											
Model ID	Model Source Description	UTM Coordinates [1]		Emission Rate [2] (g/s)	Discharge Orientation [1]	Base Elevation [3] (m)	Release Height [1] (m)	Stack Diameter [1] (m)	Exit Velocity [1] (m/s)	Exit Flowrate [a] (m^3/s)	Exit Temperature [1] (K)
		Easting	Northing								
VENT_1	Roll Pit Area 1 of 3	498,557.14	4,972,695.1	1.00	Vertical	61.4	10.77	1.22	7.60	8.87	Ambient
VENT_2	Roll Pit Area 2 of 3	498,587.45	4,972,668.2	1.00	Vertical	61.7	10.77	1.22	7.60	8.87	Ambient
VENT_3	Roll Pit Area 3 of 3	498,621.94	4,972,637.6	1.00	Vertical	61.5	10.77	1.22	7.60	8.87	Ambient
VENT_4	Corrugator Area 1 of 3	498,547.38	4,972,684.7	1.00	Capped	61.3	10.77	1.22	7.60	8.87	Ambient
VENT_5	Corrugator Area 2 of 3	498,577.81	4,972,658.5	1.00	Capped	61.7	10.77	1.22	7.60	8.87	Ambient
VENT_6	Corrugator Area 3 of 3	498,612.68	4,972,627.4	1.00	Capped	61.6	10.77	1.22	7.60	8.87	Ambient
VENT_7	Production Floor Area 1 of 3	498,516.31	4,972,648.7	1.00	Vertical	61.4	10.77	1.22	7.60	8.87	Ambient
VENT_8	Production Floor Area 2 of 3	498,547.24	4,972,623.4	1.00	Vertical	61.9	10.77	1.22	7.60	8.87	Ambient
VENT_9	Production Floor Area 3 of 3	498,581.74	4,972,591.9	1.00	Vertical	61.9	10.77	1.22	7.60	8.87	Ambient
BLR_1	Boiler Stack 1 of 2	498,573.37	4,972,643.6	1.00	Capped	61.8	12.95	0.56	5.39	1.32	455.4
BLR_2	Boiler Stack 2 of 2	498,576.03	4,972,642.1	1.00	Capped	61.8	11.28	0.51	6.53	1.32	455.4

NOTES:

m/s = meters per second.

m^3/s = cubic meters per second.

(a) Exit flowrate (m^3/s) = (π/4) x (stack diameter [m])^2 x (exit velocity [m/s])

REFERENCES:

(1) Value based on information provided by Packaging Corporation of America.

(2) Dispersion model will be executed using unit emission rates.

(3) Base elevation derived from the US Geological Survey National Elevation Dataset processed in AERMAP utility.

Table 4-3
Assessment of Missing Meteorological Data
Packaging Corporation of America—Salem, Oregon

Quarter [1]	Meteorological Data Assessment by Year														
	2016			2017			2018			2019			2020		
	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	2,184	3	99.9%	2,160	0	100.0%	2,160	14	99.4%	2,160	11	99.5%	2,184	12	99.5%
Q2	2,184	58	97.3%	2,184	132	94.0%	2,184	60	97.3%	2,184	0	100.0%	2,184	3	99.9%
Q3	2,208	59	97.3%	2,208	32	98.6%	2,208	3	99.9%	2,208	20	99.1%	2,208	0	100.0%
Q4	2,208	10	99.5%	2,208	10	99.5%	2,208	10	99.5%	2,208	9	99.6%	2,208	62	97.2%

NOTES:

(a) Available hours (%) = (1 - [missing hours / total hours]) x (100%)

REFERENCES:

(1) Total hours obtained from the surface and profile files generated using AERMET (version 19191) for the period between 2016 and 2020. The combined 5-year meteorological dataset is representative of the Salem McNary Airport meteorological monitoring station (WBAN: 24232).

(2) The number of missing hours was determined using the QA feature in Lakes Environmental software.

Table 4-4
AERSURFACE Settings
Packaging Corporation of America—Salem, Oregon

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
Is this an airport site?	Yes
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

Table 4-5
Surface Soil Moisture Condition Assessment
Packaging Corporation of America—Salem, Oregon

Calendar Year	Annual Precipitation [1] (in)	Climatic Significance [2]	Calendar Year Soil Moisture [3] (in)
2016	47.01	Upper 70th Percentile	Wet
2017	50.91	Upper 70th Percentile	Wet
2018	31.02	Lower 30th Percentile	Dry
2019	30.86	Lower 30th Percentile	Dry
2020	33.78	Middle 40th Percentile	Average

30-Year Climate Precipitation Data [4]		
Average Annual Precipitation	[5]	40.03
Lower 30th Percentile Annual Precipitation	[6]	33.75
Upper 70th Percentile Annual Precipitation	[7]	46.06

REFERENCES:

(1) Annual precipitation data obtained from the National Oceanic and Atmospheric Administration National Climatic Data Center for Salem McNary meteorological monitoring station located in Salem, Oregon (WBAN: 24232).

(2) Climatic significance represents annual precipitation compared to 30-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 EPA AERSURFACE User's Guide dated February 2020.

(4) Represents 30-year period between 1991 and 2020. Period chosen as most current 30-year period available.

(5) Represents average annual precipitation during 30-year climatological period.

(6) Represents lower limit of middle 40th percentile annual precipitation during 30-year climatological period.

(7) Represents upper limit of middle 40th percentile annual precipitation during 30-year climatological period.

Table 4-6
Summary of Downwash Structure Heights
Packaging Corporation of America—Salem, Oregon

Downwash Structure Model ID	Base Elevation [1]		Number of Building Tiers	Tier Height [2]	
	(ft)	(m)		(ft)	(m)
BLD_1	203	61.8	1	30.0	9.14
BLD_2	204	62.3	1	16.0	4.88
BLD_3	201	61.2	1	20.0	6.10
BLD_4	200	61.0	1	16.0	4.88

REFERENCES:

(1) Base elevation derived from United States Geological Survey National Elevation Data (1/3-arc second resolution) using AERMAP.

(2) Value based on information provided by Packaging Corporation of America.

Table 5-1
List of TACs With No Published Risk-Based Concentrations
Packaging Corporation of America—Salem, Oregon

Toxic Air Contaminant [1]	CAS	Risk-Based Concentration? [2] (Yes/No)
Barium and compounds	7440-39-3	No
Zinc and compounds	7440-66-6	No
Butyl acrylate	141-32-2	No
Diethylene glycol	111-46-6	No
Dipropylene glycol	25265-71-8	No
Acenaphthene	83-32-9	No
Acenaphthylene	208-96-8	No
Anthracene	120-12-7	No
Fluorene	86-73-7	No
2-Methyl naphthalene	91-57-6	No
Phenanthrene	85-01-8	No
Pyrene	129-00-0	No
7,12-Dimethylbenz[a]anthracene	57-97-6	No
3-Methylcholanthrene	56-49-5	No

REFERENCES:

(1) See Oregon Administrative Rule 340-245-8020 Table 2.

(2) See Oregon Administrative Rule 340-245-8040 Table 4.

Table 6-1
Maximum Predicted Risk Exposure Location per TEU
Packaging Corporation of America—Salem, Oregon

Modeled TEU	Cancer						Chronic Noncancer						Acute Noncancer	
	Residential		Child		Worker		Residential		Child		Worker			
	Exposure Location (1) (Location of Maximum Risk)	Dispersion Factor ($\mu g/m^3/[g/s]$)	Exposure Location (1) (Location of Maximum Risk)	Dispersion Factor ($\mu g/m^3/[g/s]$)	Exposure Location (1) (Location of Maximum Risk)	Dispersion Factor ($\mu g/m^3/[g/s]$)	Exposure Location (1) (Location of Maximum Risk)	Dispersion Factor ($\mu g/m^3/[g/s]$)	Exposure Location (1) (Location of Maximum Risk)	Dispersion Factor ($\mu g/m^3/[g/s]$)	Exposure Location (1) (Location of Maximum Risk)	Dispersion Factor ($\mu g/m^3/[g/s]$)	Exposure Location (1) (Location of Maximum Risk)	Dispersion Factor ($\mu g/m^3/[g/s]$)
Significant Toxic Emission Units														
VENT_1	542	3.87102	2,371	0.88313	6,255	45.65065	542	3.87102	2,371	0.88313	6,255	45.65065	6,255	219.57296
VENT_2	542	3.14821	2,371	0.8747	6,255	29.80083	542	3.14821	2,371	0.8747	6,255	29.80083	6,255	152.07494
VENT_3	542	2.31008	2,371	0.8541	6,255	16.8342	542	2.31008	2,371	0.8541	6,255	16.8342	6,255	99.36197
VENT_4	542	5.89204	2,371	0.98108	6,255	209.33243	542	5.89204	2,371	0.98108	6,255	209.33243	6,255	908.04304
VENT_5	542	5.04706	2,371	0.97918	6,255	70.61132	542	5.04706	2,371	0.97918	6,255	70.61132	6,255	352.59566
VENT_6	542	3.80386	2,371	0.9611	6,255	29.6361	542	3.80386	2,371	0.9611	6,255	29.6361	6,255	181.60163
VENT_7	542	5.054	2,371	0.99083	6,255	75.15033	542	5.054	2,371	0.99083	6,255	75.15033	6,255	321.57595
VENT_8	542	3.82052	2,371	0.98534	6,255	73.69074	542	3.82052	2,371	0.98534	6,255	73.69074	6,255	278.86702
VENT_9	542	2.56773	2,371	0.9638	6,255	45.62493	542	2.56773	2,371	0.9638	6,255	45.62493	6,255	218.69576
Natural Gas Combustion Toxic Emission Units														
BLR_1	633	2.56894	3,480	0.62274	6,255	44.17367	633	2.56894	3,480	0.62274	6,255	44.17367	6,255	189.87833
BLR_2	633	2.6819	3,480	0.64882	6,255	43.45645	633	2.6819	3,480	0.64882	6,255	43.45645	6,255	186.7655

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)
542	498,396.53	4,972,499.50
633	498,471.53	4,972,249.50
2,371	498,271.53	4,971,899.50
3,480	499,271.53	4,971,249.50
6,255	498,526.94	4,972,756.48

Table 6-2
Level 3 Risk Assessment Results for Significant Toxic Emission Units
Packaging Corporation of America—Salem, Oregon

Toxic Air Contaminant	CAS	Cancer									Chronic Noncancer									Acute		
		Residential			Child			Worker			Residential			Child			Worker			Noncancer		
		Calculated Conc. [a] ($\mu g/m^3$)	RBC [2] ($\mu g/m^3$)	Risk [b] (chances-in-10^6)	Calculated Conc. [a] ($\mu g/m^3$)	RBC [2] ($\mu g/m^3$)	Risk [b] (chances-in-10^6)	Calculated Conc. [a] ($\mu g/m^3$)	RBC [2] ($\mu g/m^3$)	Risk [b] (chances-in-10^6)	Calculated Conc. [a] ($\mu g/m^3$)	RBC [2] ($\mu g/m^3$)	Hazard Index [c]	Calculated Conc. [a] ($\mu g/m^3$)	RBC [2] ($\mu g/m^3$)	Hazard Index [c]	Calculated Conc. [a] ($\mu g/m^3$)	RBC [2] ($\mu g/m^3$)	Hazard Index [c]	Calculated Conc. [a] ($\mu g/m^3$)	RBC [2] ($\mu g/m^3$)	Hazard Index [c]
Exposure Location [3]			**542**			**2,371**			**6,255**			**542**			**2,371**			**6,255**			**6,255**	
Cumulative Facility-wide Risk		--	--	**0.061**	--	--	**1.2E-03**	--	--	**0.058**	--	--	**0.075**	--	--	**4.1E-03**	--	--	**0.29**	--	--	**6.5E-03**
VENT_1																						
Cumulative TEU Risk		--	--	**6.7E-03**	--	--	**1.3E-04**	--	--	**4.5E-03**	--	--	**8.2E-03**	--	--	**4.3E-04**	--	--	**0.022**	--	--	**5.2E-04**
Dispersion Factor ($\mu g/m^3$/[g/s])			**3.87**			**0.88**			**45.7**			**3.87**			**0.88**			**45.7**			**220**	
1,4-Dioxane	123-91-1	1.1E-06	0.20	5.3E-06	2.4E-07	5.20	4.7E-08	1.3E-05	2.40	5.2E-06	1.1E-06	30.0	3.6E-08	2.4E-07	130	1.9E-09	1.3E-05	130	9.7E-08	6.1E-05	7,200	8.4E-09
Acetaldehyde	75-07-0	2.7E-05	0.45	5.9E-05	6.1E-06	12.0	5.1E-07	3.1E-04	5.50	5.7E-05	2.7E-05	140	1.9E-07	6.1E-06	620	9.8E-09	3.1E-04	620	5.1E-07	1.5E-03	470	3.2E-06
Isopropylbenzene (Cumene)	98-82-8	1.1E-06	--	(4)	2.4E-07	--	(4)	1.3E-05	--	(4)	1.1E-06	400	2.7E-09	2.4E-07	1,800	1.4E-10	1.3E-05	1,800	7.0E-09	6.1E-05	--	(4)
Diethanolamine	111-42-2	1.4E-05	--	(4)	3.2E-06	--	(4)	1.6E-04	--	(4)	1.4E-05	0.20	7.0E-05	3.2E-06	0.88	3.6E-06	1.6E-04	0.88	1.9E-04	7.9E-04	--	(4)
Diethylene glycol monobutyl ether	112-34-5	6.3E-04	--	(4)	1.4E-04	--	(4)	7.4E-03	--	(4)	6.3E-04	0.10	6.3E-03	1.4E-04	0.44	3.3E-04	7.4E-03	0.44	0.017	0.036	--	(4)
Diethylene glycol monoethyl ether	111-90-0	5.3E-04	--	(4)	1.2E-04	--	(4)	6.3E-03	--	(4)	5.3E-04	0.30	1.8E-03	1.2E-04	1.30	9.4E-05	6.3E-03	1.30	4.9E-03	0.030	--	(4)
Ethylene glycol	107-21-1	3.1E-04	--	(4)	7.1E-05	--	(4)	3.7E-03	--	(4)	3.1E-04	400	7.8E-07	7.1E-05	1,800	3.9E-08	3.7E-03	1,800	2.0E-06	0.018	2,000	8.8E-06
Ethylene glycol monobutyl ether	111-76-2	5.2E-06	--	(4)	1.2E-06	--	(4)	6.2E-05	--	(4)	5.2E-06	82.0	6.4E-08	1.2E-06	360	3.3E-09	6.2E-05	360	1.7E-07	3.0E-04	29,000	1.0E-08
Ethylene oxide	75-21-8	1.1E-06	2.0E-04	5.3E-03	2.4E-07	2.1E-03	1.2E-04	1.3E-05	4.0E-03	3.1E-03	1.1E-06	30.0	3.6E-08	2.4E-07	130	1.9E-09	1.3E-05	130	9.7E-08	6.1E-05	160	3.8E-07
Formaldehyde	50-00-0	2.1E-04	0.17	1.3E-03	4.9E-05	4.30	1.1E-05	2.5E-03	2.00	1.3E-03	2.1E-04	9.00	2.4E-05	4.9E-05	40.0	1.2E-06	2.5E-03	40.0	6.3E-05	0.012	49.0	2.5E-04
Isopropyl alcohol	67-63-0	2.9E-03	--	(4)	6.6E-04	--	(4)	0.034	--	(4)	2.9E-03	200	1.4E-05	6.6E-04	880	7.5E-07	0.034	880	3.9E-05	0.16	3,200	5.1E-05
Methanol	67-56-1	2.1E-04	--	(4)	4.9E-05	--	(4)	2.5E-03	--	(4)	2.1E-04	4,000	5.3E-08	4.9E-05	18,000	2.7E-09	2.5E-03	18,000	1.4E-07	0.012	28,000	4.3E-07
Vinyl acetate	108-05-4	7.5E-04	--	(4)	1.7E-04	--	(4)	8.8E-03	--	(4)	7.5E-04	200	3.7E-06	1.7E-04	880	1.9E-07	8.8E-03	880	1.0E-05	0.042	200	2.1E-04
VENT_2																						
Cumulative TEU Risk		--	--	**5.4E-03**	--	--	**1.3E-04**	--	--	**2.9E-03**	--	--	**6.7E-03**	--	--	**4.2E-04**	--	--	**0.014**	--	--	**3.6E-04**
Dispersion Factor ($\mu g/m^3$/[g/s])			**3.15**			**0.87**			**29.8**			**3.15**			**0.87**			**29.8**			**152**	
1,4-Dioxane	123-91-1	8.7E-07	0.20	4.3E-06	2.4E-07	5.20	4.6E-08	8.2E-06	2.40	3.4E-06	8.7E-07	30.0	2.9E-08	2.4E-07	130	1.9E-09	8.2E-06	130	6.3E-08	4.2E-05	7,200	5.8E-09
Acetaldehyde	75-07-0	2.2E-05	0.45	4.8E-05	6.0E-06	12.0	5.0E-07	2.1E-04	5.50	3.7E-05	2.2E-05	140	1.5E-07	6.0E-06	620	9.7E-09	2.1E-04	620	3.3E-07	1.0E-03	470	2.2E-06
Isopropylbenzene (Cumene)	98-82-8	8.7E-07	--	(4)	2.4E-07	--	(4)	8.2E-06	--	(4)	8.7E-07	400	2.2E-09	2.4E-07	1,800	1.3E-10	8.2E-06	1,800	4.6E-09	4.2E-05	--	(4)
Diethanolamine	111-42-2	1.1E-05	--	(4)	3.2E-06	--	(4)	1.1E-04	--	(4)	1.1E-05	0.20	5.7E-05	3.2E-06	0.88	3.6E-06	1.1E-04	0.88	1.2E-04	5.5E-04	--	(4)
Diethylene glycol monobutyl ether	112-34-5	5.1E-04	--	(4)	1.4E-04	--	(4)	4.8E-03	--	(4)	5.1E-04	0.10	5.1E-03	1.4E-04	0.44	3.2E-04	4.8E-03	0.44	0.011	0.025	--	(4)
Diethylene glycol monoethyl ether	111-90-0	4.3E-04	--	(4)	1.2E-04	--	(4)	4.1E-03	--	(4)	4.3E-04	0.30	1.4E-03	1.2E-04	1.30	9.3E-05	4.1E-03	1.30	3.2E-03	0.021	--	(4)
Ethylene glycol	107-21-1	2.5E-04	--	(4)	7.0E-05	--	(4)	2.4E-03	--	(4)	2.5E-04	400	6.3E-07	7.0E-05	1,800	3.9E-08	2.4E-03	1,800	1.3E-06	0.012	2,000	6.1E-06
Ethylene glycol monobutyl ether	111-76-2	4.3E-06	--	(4)	1.2E-06	--	(4)	4.0E-05	--	(4)	4.3E-06	82.0	5.2E-08	1.2E-06	360	3.3E-09	4.0E-05	360	1.1E-07	2.1E-04	29,000	7.1E-09
Ethylene oxide	75-21-8	8.7E-07	2.0E-04	4.3E-03	2.4E-07	2.1E-03	1.1E-04	8.2E-06	4.0E-03	2.1E-03	8.7E-07	30.0	2.9E-08	2.4E-07	130	1.9E-09	8.2E-06	130	6.3E-08	4.2E-05	160	2.6E-07
Formaldehyde	50-00-0	1.7E-04	0.17	1.0E-03	4.8E-05	4.30	1.1E-05	1.6E-03	2.00	8.2E-04	1.7E-04	9.00	1.9E-05	4.8E-05	40.0	1.2E-06	1.6E-03	40.0	4.1E-05	8.4E-03	49.0	1.7E-04
Isopropyl alcohol	67-63-0	2.3E-03	--	(4)	6.5E-04	--	(4)	0.022	--	(4)	2.3E-03	200	1.2E-05	6.5E-04	880	7.4E-07	0.022	880	2.5E-05	0.11	3,200	3.5E-05
Methanol	67-56-1	1.7E-04	--	(4)	4.8E-05	--	(4)	1.6E-03	--	(4)	1.7E-04	4,000	4.3E-08	4.8E-05	18,000	2.7E-09	1.6E-03	18,000	9.1E-08	8.4E-03	28,000	3.0E-07
Vinyl acetate	108-05-4	6.1E-04	--	(4)	1.7E-04	--	(4)	5.8E-03	--	(4)	6.1E-04	200	3.0E-06	1.7E-04	880	1.9E-07	5.8E-03	880	6.5E-06	0.029	200	1.5E-04
VENT_3																						
Cumulative TEU Risk		--	--	**4.0E-03**	--	--	**1.2E-04**	--	--	**1.6E-03**	--	--	**4.9E-03**	--	--	**4.1E-04**	--	--	**8.1E-03**	--	--	**2.4E-04**
Dispersion Factor ($\mu g/m^3$/[g/s])			**2.31**			**0.85**			**16.8**			**2.31**			**0.85**			**16.8**			**99.4**	
1,4-Dioxane	123-91-1	6.4E-07	0.20	3.2E-06	2.4E-07	5.20	4.5E-08	4.6E-06	2.40	1.9E-06	6.4E-07	30.0	2.1E-08	2.4E-07	130	1.8E-09	4.6E-06	130	3.6E-08	2.7E-05	7,200	3.8E-09
Acetaldehyde	75-07-0	1.6E-05	0.45	3.5E-05	5.9E-06	12.0	4.9E-07	1.2E-04	5.50	2.1E-05	1.6E-05	140	1.1E-07	5.9E-06	620	9.5E-09	1.2E-04	620	1.9E-07	6.8E-04	470	1.5E-06
Isopropylbenzene (Cumene)	98-82-8	6.4E-07	--	(4)	2.4E-07	--	(4)	4.6E-06	--	(4)	6.4E-07	400	1.6E-09	2.4E-07	1,800	1.3E-10	4.6E-06	1,800	2.6E-09	2.7E-05	--	(4)
Diethanolamine	111-42-2	8.3E-06	--	(4)	3.1E-06	--	(4)	6.1E-05	--	(4)	8.3E-06	0.20	4.2E-05	3.1E-06	0.88	3.5E-06	6.1E-05	0.88	6.9E-05	3.6E-04	--	(4)
Diethylene glycol monobutyl ether	112-34-5	3.8E-04	--	(4)	1.4E-04	--	(4)	2.7E-03	--	(4)	3.8E-04	0.10	3.8E-03	1.4E-04	0.44	3.2E-04	2.7E-03	0.44	6.2E-03	0.016	--	(4)
Diethylene glycol monoethyl ether	111-90-0	3.2E-04	--	(4)	1.2E-04	--	(4)	2.3E-03	--	(4)	3.2E-04	0.30	1.1E-03	1.2E-04	1.30	9.1E-05	2.3E-03	1.30	1.8E-03	0.014	--	(4)
Ethylene glycol	107-21-1	1.9E-04	--	(4)	6.9E-05	--	(4)	1.4E-03	--	(4)	1.9E-04	400	4.6E-07	6.9E-05	1,800	3.8E-08	1.4E-03	1,800	7.5E-07	8.0E-03	2,000	4.0E-06
Ethylene glycol monobutyl ether	111-76-2	3.1E-06	--	(4)	1.2E-06	--	(4)	2.3E-05	--	(4)	3.1E-06	82.0	3.8E-08	1.2E-06	360	3.2E-09	2.3E-05	360	6.3E-08	1.3E-04	29,000	4.6E-09
Ethylene oxide	75-21-8	6.4E-07	2.0E-04	3.2E-03	2.4E-07	2.1E-03	1.1E-04	4.6E-06	4.0E-03	1.2E-03	6.4E-07	30.0	2.1E-08	2.4E-07	130	1.8E-09	4.6E-06	130	3.6E-08	2.7E-05	160	1.7E-07
Formaldehyde	50-00-0	1.3E-04	0.17	7.5E-04	4.7E-05	4.30	1.1E-05	9.3E-04	2.00	4.6E-04	1.3E-04	9.00	1.4E-05	4.7E-05	40.0	1.2E-06	9.3E-04	40.0	2.3E-05	5.5E-03	49.0	1.1E-04
Isopropyl alcohol	67-63-0	1.7E-03	--	(4)	6.4E-04	--	(4)	0.013	--	(4)	1.7E-03	200	8.6E-06	6.4E-04	880	7.2E-07	0.013	880	1.4E-05	0.074	3,200	2.3E-05
Methanol	67-56-1	1.3E-04	--	(4)	4.7E-05	--	(4)	9.3E-04	--	(4)	1.3E-04	4,000	3.2E-08	4.7E-05	18,000	2.6E-09	9.3E-04	18,000	5.2E-08	5.5E-03	28,000	2.0E-07
Vinyl acetate	108-05-4	4.5E-04	--	(4)	1.6E-04	--	(4)	3.2E-03	--	(4)	4.5E-04	200	2.2E-06	1.6E-04	880	1.9E-07	3.2E-03	880	3.7E-06	0.019	200	9.6E-05

Table 6-2
Level 3 Risk Assessment Results for Significant Toxic Emission Units
Packaging Corporation of America—Salem, Oregon

Toxic Air Contaminant	CAS	Cancer									Chronic Noncancer										Acute		
		Residential			Child			Worker			Residential			Child			Worker			Noncancer		
		Calculated Conc. [a] ($\mu g/m^3$)	RBC [2] ($\mu g/m^3$)	Risk [b] (chances-in-10^6)	Calculated Conc. [a] ($\mu g/m^3$)	RBC [2] ($\mu g/m^3$)	Risk [b] (chances-in-10^6)	Calculated Conc. [a] ($\mu g/m^3$)	RBC [2] ($\mu g/m^3$)	Risk [b] (chances-in-10^6)	Calculated Conc. [a] ($\mu g/m^3$)	RBC [2] ($\mu g/m^3$)	Hazard Index [c]	Calculated Conc. [a] ($\mu g/m^3$)	RBC [2] ($\mu g/m^3$)	Hazard Index [c]	Calculated Conc. [a] ($\mu g/m^3$)	RBC [2] ($\mu g/m^3$)	Hazard Index [c]	Calculated Conc. [a] ($\mu g/m^3$)	RBC [2] ($\mu g/m^3$)	Hazard Index [c]
Exposure Location [3]			**542**			**2,371**			**6,255**			**542**			**2,371**			**6,255**			**6,255**	
Cumulative Facility-wide Risk		--	--	**0.061**	--	--	**1.2E-03**	--	--	**0.058**	--	--	**0.075**	--	--	**4.1E-03**	--	--	**0.29**	--	--	**6.5E-03**
VENT_4																							
Cumulative TEU Risk		--	--	**0.010**	--	--	**1.4E-04**	--	--	**0.020**	--	--	**0.012**	--	--	**4.7E-04**	--	--	**0.10**	--	--	**2.2E-03**
Dispersion Factor ($\mu g/m^3/(g/s)$)			**5.89**			**0.98**			**209**			**5.89**			**0.98**			**209**			**908**	
1,4-Dioxane	123-91-1	1.6E-06	0.20	8.1E-06	2.7E-07	5.20	5.2E-08	5.8E-05	2.40	2.4E-05	1.6E-06	30.0	5.4E-08	2.7E-07	130	2.1E-09	5.8E-05	130	4.4E-07	2.5E-04	7,200	3.5E-08
Acetaldehyde	75-07-0	4.1E-05	0.45	9.0E-05	6.8E-06	12.0	5.6E-07	1.4E-03	5.50	2.6E-04	4.1E-05	140	2.9E-07	6.8E-06	620	1.1E-08	1.4E-03	620	2.3E-06	6.3E-03	470	1.3E-05
Isopropylbenzene (Cumene)	98-82-8	1.6E-06	--	(4)	2.7E-07	--	(4)	5.8E-05	--	(4)	1.6E-06	400	4.1E-09	2.7E-07	1,800	1.5E-10	5.8E-05	1,800	3.2E-08	2.5E-04	--	(4)
Diethanolamine	111-42-2	2.1E-05	--	(4)	3.5E-06	--	(4)	7.6E-04	--	(4)	2.1E-05	0.20	1.1E-04	3.5E-06	0.88	4.0E-06	7.6E-04	0.88	8.6E-04	3.3E-03	--	(4)
Diethylene glycol monobutyl ether	112-34-5	9.6E-04	--	(4)	1.6E-04	--	(4)	0.034	--	(4)	9.6E-04	0.10	9.6E-03	1.6E-04	0.44	3.6E-04	0.034	0.44	0.077	0.15	--	(4)
Diethylene glycol monoethyl ether	111-90-0	8.1E-04	--	(4)	1.4E-04	--	(4)	0.029	--	(4)	8.1E-04	0.30	2.7E-03	1.4E-04	1.30	1.0E-04	0.029	1.30	0.022	0.13	--	(4)
Ethylene glycol	107-21-1	4.7E-04	--	(4)	7.9E-05	--	(4)	0.017	--	(4)	4.7E-04	400	1.2E-06	7.9E-05	1,800	4.4E-08	0.017	1,800	9.3E-06	0.073	2,000	3.6E-05
Ethylene glycol monobutyl ether	111-76-2	8.0E-06	--	(4)	1.3E-06	--	(4)	2.8E-04	--	(4)	8.0E-06	82.0	9.7E-08	1.3E-06	360	3.7E-09	2.8E-04	360	7.9E-07	1.2E-03	29,000	4.2E-08
Ethylene oxide	75-21-8	1.6E-06	2.0E-04	8.1E-03	2.7E-07	2.1E-03	1.3E-04	5.8E-05	4.0E-03	0.014	1.6E-06	30.0	5.4E-08	2.7E-07	130	2.1E-09	5.8E-05	130	4.4E-07	2.5E-04	160	1.6E-06
Formaldehyde	50-00-0	3.2E-04	0.17	1.9E-03	5.4E-05	4.30	1.3E-05	0.012	2.00	5.8E-03	3.2E-04	9.00	3.6E-05	5.4E-05	40.0	1.4E-06	0.012	40.0	2.9E-04	0.050	49.0	1.0E-03
Isopropyl alcohol	67-63-0	4.4E-03	--	(4)	7.3E-04	--	(4)	0.16	--	(4)	4.4E-03	200	2.2E-05	7.3E-04	880	8.3E-07	0.16	880	1.8E-04	0.68	3,200	2.1E-04
Methanol	67-56-1	3.2E-04	--	(4)	5.4E-05	--	(4)	0.012	--	(4)	3.2E-04	4,000	8.1E-08	5.4E-05	18,000	3.0E-09	0.012	18,000	6.4E-07	0.050	28,000	1.8E-06
Vinyl acetate	108-05-4	1.1E-03	--	(4)	1.9E-04	--	(4)	0.040	--	(4)	1.1E-03	200	5.7E-06	1.9E-04	880	2.2E-07	0.040	880	4.6E-05	0.18	200	8.8E-04
VENT_5																							
Cumulative TEU Risk		--	--	**8.7E-03**	--	--	**1.4E-04**	--	--	**6.9E-03**	--	--	**0.011**	--	--	**4.7E-04**	--	--	**0.034**	--	--	**8.4E-04**
Dispersion Factor ($\mu g/m^3/(g/s)$)			**5.05**			**0.98**			**70.6**			**5.05**			**0.98**			**70.6**			**353**	
1,4-Dioxane	123-91-1	1.4E-06	0.20	7.0E-06	2.7E-07	5.20	5.2E-08	1.9E-05	2.40	8.1E-06	1.4E-06	30.0	4.6E-08	2.7E-07	130	2.1E-09	1.9E-05	130	1.5E-07	9.7E-05	7,200	1.4E-08
Acetaldehyde	75-07-0	3.5E-05	0.45	7.7E-05	6.7E-06	12.0	5.6E-07	4.9E-04	5.50	8.8E-05	3.5E-05	140	2.5E-07	6.7E-06	620	1.1E-08	4.9E-04	620	7.8E-07	2.4E-03	470	5.2E-06
Isopropylbenzene (Cumene)	98-82-8	1.4E-06	--	(4)	2.7E-07	--	(4)	1.9E-05	--	(4)	1.4E-06	400	3.5E-09	2.7E-07	1,800	1.5E-10	1.9E-05	1,800	1.1E-08	9.7E-05	--	(4)
Diethanolamine	111-42-2	1.8E-05	--	(4)	3.5E-06	--	(4)	2.5E-04	--	(4)	1.8E-05	0.20	9.1E-05	3.5E-06	0.88	4.0E-06	2.5E-04	0.88	2.9E-04	1.3E-03	--	(4)
Diethylene glycol monobutyl ether	112-34-5	8.2E-04	--	(4)	1.6E-04	--	(4)	0.011	--	(4)	8.2E-04	0.10	8.2E-03	1.6E-04	0.44	3.6E-04	0.011	0.44	0.026	0.057	--	(4)
Diethylene glycol monoethyl ether	111-90-0	7.0E-04	--	(4)	1.4E-04	--	(4)	9.8E-03	--	(4)	7.0E-04	0.30	2.3E-03	1.4E-04	1.30	1.0E-04	9.8E-03	1.30	7.5E-03	0.049	--	(4)
Ethylene glycol	107-21-1	4.1E-04	--	(4)	7.9E-05	--	(4)	5.7E-03	--	(4)	4.1E-04	400	1.0E-06	7.9E-05	1,800	4.4E-08	5.7E-03	1,800	3.2E-06	0.028	2,000	1.4E-05
Ethylene glycol monobutyl ether	111-76-2	6.8E-06	--	(4)	1.3E-06	--	(4)	9.6E-05	--	(4)	6.8E-06	82.0	8.3E-08	1.3E-06	360	3.7E-09	9.6E-05	360	2.7E-07	4.8E-04	29,000	1.6E-08
Ethylene oxide	75-21-8	1.4E-06	2.0E-04	7.0E-03	2.7E-07	2.1E-03	1.3E-04	1.9E-05	4.0E-03	4.9E-03	1.4E-06	30.0	4.6E-08	2.7E-07	130	2.1E-09	1.9E-05	130	1.5E-07	9.7E-05	160	6.1E-07
Formaldehyde	50-00-0	2.8E-04	0.17	1.6E-03	5.4E-05	4.30	1.3E-05	3.9E-03	2.00	1.9E-03	2.8E-04	9.00	3.1E-05	5.4E-05	40.0	1.3E-06	3.9E-03	40.0	9.7E-05	0.019	49.0	4.0E-04
Isopropyl alcohol	67-63-0	3.8E-03	--	(4)	7.3E-04	--	(4)	0.053	--	(4)	3.8E-03	200	1.9E-05	7.3E-04	880	8.3E-07	0.053	880	6.0E-05	0.26	3,200	8.2E-05
Methanol	67-56-1	2.8E-04	--	(4)	5.4E-05	--	(4)	3.9E-03	--	(4)	2.8E-04	4,000	7.0E-08	5.4E-05	18,000	3.0E-09	3.9E-03	18,000	2.2E-07	0.019	28,000	6.9E-07
Vinyl acetate	108-05-4	9.7E-04	--	(4)	1.9E-04	--	(4)	0.014	--	(4)	9.7E-04	200	4.9E-06	1.9E-04	880	2.1E-07	0.014	880	1.5E-05	0.068	200	3.4E-04
VENT_6																							
Cumulative TEU Risk		--	--	**6.5E-03**	--	--	**1.4E-04**	--	--	**2.9E-03**	--	--	**8.0E-03**	--	--	**4.6E-04**	--	--	**0.014**	--	--	**4.3E-04**
Dispersion Factor ($\mu g/m^3/(g/s)$)			**3.80**			**0.96**			**29.6**			**3.80**			**0.96**			**29.6**			**182**	
1,4-Dioxane	123-91-1	1.0E-06	0.20	5.2E-06	2.6E-07	5.20	5.1E-08	8.2E-06	2.40	3.4E-06	1.0E-06	30.0	3.5E-08	2.6E-07	130	2.0E-09	8.2E-06	130	6.3E-08	5.0E-05	7,200	7.0E-09
Acetaldehyde	75-07-0	2.6E-05	0.45	5.8E-05	6.6E-06	12.0	5.5E-07	2.0E-04	5.50	3.7E-05	2.6E-05	140	1.9E-07	6.6E-06	620	1.1E-08	2.0E-04	620	3.3E-07	1.3E-03	470	2.7E-06
Isopropylbenzene (Cumene)	98-82-8	1.0E-06	--	(4)	2.6E-07	--	(4)	8.2E-06	--	(4)	1.0E-06	400	2.6E-09	2.6E-07	1,800	1.5E-10	8.2E-06	1,800	4.5E-09	5.0E-05	--	(4)
Diethanolamine	111-42-2	1.4E-05	--	(4)	3.5E-06	--	(4)	1.1E-04	--	(4)	1.4E-05	0.20	6.9E-05	3.5E-06	0.88	3.9E-06	1.1E-04	0.88	1.2E-04	6.6E-04	--	(4)
Diethylene glycol monobutyl ether	112-34-5	6.2E-04	--	(4)	1.6E-04	--	(4)	4.8E-03	--	(4)	6.2E-04	0.10	6.2E-03	1.6E-04	0.44	3.5E-04	4.8E-03	0.44	0.011	0.030	--	(4)
Diethylene glycol monoethyl ether	111-90-0	5.3E-04	--	(4)	1.3E-04	--	(4)	4.1E-03	--	(4)	5.3E-04	0.30	1.8E-03	1.3E-04	1.30	1.0E-04	4.1E-03	1.30	3.1E-03	0.025	--	(4)
Ethylene glycol	107-21-1	3.1E-04	--	(4)	7.7E-05	--	(4)	2.4E-03	--	(4)	3.1E-04	400	7.6E-07	7.7E-05	1,800	4.3E-08	2.4E-03	1,800	1.3E-06	0.015	2,000	7.3E-06
Ethylene glycol monobutyl ether	111-76-2	5.2E-06	--	(4)	1.3E-06	--	(4)	4.0E-05	--	(4)	5.2E-06	82.0	6.3E-08	1.3E-06	360	3.6E-09	4.0E-05	360	1.1E-07	2.5E-04	29,000	8.5E-09
Ethylene oxide	75-21-8	1.0E-06	2.0E-04	5.2E-03	2.6E-07	2.1E-03	1.3E-04	8.2E-06	4.0E-03	2.0E-03	1.0E-06	30.0	3.5E-08	2.6E-07	130	2.0E-09	8.2E-06	130	6.3E-08	5.0E-05	160	3.1E-07
Formaldehyde	50-00-0	2.1E-04	0.17	1.2E-03	5.3E-05	4.30	1.2E-05	1.6E-03	2.00	8.2E-04	2.1E-04	9.00	2.3E-05	5.3E-05	40.0	1.3E-06	1.6E-03	40.0	4.1E-05	0.010	49.0	2.0E-04
Isopropyl alcohol	67-63-0	2.8E-03	--	(4)	7.2E-04	--	(4)	0.022	--	(4)	2.8E-03	200	1.4E-05	7.2E-04	880	8.1E-07	0.022	880	2.5E-05	0.14	3,200	4.2E-05
Methanol	67-56-1	2.1E-04	--	(4)	5.3E-05	--	(4)	1.6E-03	--	(4)	2.1E-04	4,000	5.2E-08	5.3E-05	18,000	2.9E-09	1.6E-03	18,000	9.1E-08	0.010	28,000	3.6E-07
Vinyl acetate	108-05-4	7.3E-04	--	(4)	1.9E-04	--	(4)	5.7E-03	--	(4)	7.3E-04	200	3.7E-06	1.9E-04	880	2.1E-07	5.7E-03	880	6.5E-06	0.035	200	1.8E-04

Table 6-2
Level 3 Risk Assessment Results for Significant Toxic Emission Units
Packaging Corporation of America—Salem, Oregon

Toxic Air Contaminant	CAS	Cancer									Chronic Noncancer										Acute Noncancer		
		Residential			Child			Worker			Residential			Child			Worker						
		Calculated Conc. [a] ($\mu g/m^3$)	RBC [2] ($\mu g/m^3$)	Risk [b] (chances-in-10^6)	Calculated Conc. [a] ($\mu g/m^3$)	RBC [2] ($\mu g/m^3$)	Risk [b] (chances-in-10^6)	Calculated Conc. [a] ($\mu g/m^3$)	RBC [2] ($\mu g/m^3$)	Risk [b] (chances-in-10^6)	Calculated Conc. [a] ($\mu g/m^3$)	RBC [2] ($\mu g/m^3$)	Hazard Index [c]	Calculated Conc. [a] ($\mu g/m^3$)	RBC [2] ($\mu g/m^3$)	Hazard Index [c]	Calculated Conc. [a] ($\mu g/m^3$)	RBC [2] ($\mu g/m^3$)	Hazard Index [c]	Calculated Conc. [a] ($\mu g/m^3$)	RBC [2] ($\mu g/m^3$)	Hazard Index [c]
Exposure Location [3]			**542**			**2,371**			**6,255**			**542**			**2,371**			**6,255**				**6,255**	
Cumulative Facility-wide Risk		--	--	**0.061**	--	--	**1.2E-03**	--	--	**0.058**	--	--	**0.075**	--	--	**4.1E-03**	--	--	**0.29**	--	--	**6.5E-03**
VENT_7																							
Cumulative TEU Risk		--	--	**8.7E-03**	--	--	**1.4E-04**	--	--	**7.4E-03**	--	--	**0.011**	--	--	**4.8E-04**	--	--	**0.036**	--	--	**7.7E-04**
Dispersion Factor ($\mu g/m^3/(g/s)$)		**5.05**			**0.99**			**75.2**			**5.05**			**0.99**			**75.2**			**322**		
1,4-Dioxane	123-91-1	1.4E-06	0.20	7.0E-06	2.7E-07	5.20	5.3E-08	2.1E-05	2.40	8.6E-06	1.4E-06	30.0	4.6E-08	2.7E-07	130	2.1E-09	2.1E-05	130	1.6E-07	8.9E-05	7,200	1.2E-08
Acetaldehyde	75-07-0	3.5E-05	0.45	7.7E-05	6.8E-06	12.0	5.7E-07	5.2E-04	5.50	9.4E-05	3.5E-05	140	2.5E-07	6.8E-06	620	1.1E-08	5.2E-04	620	8.4E-07	2.2E-03	470	4.7E-06
Isopropylbenzene (Cumene)	98-82-8	1.4E-06	--	(4)	2.7E-07	--	(4)	2.1E-05	--	(4)	1.4E-06	400	3.5E-09	2.7E-07	1,800	1.5E-10	2.1E-05	1,800	1.2E-08	8.9E-05	--	(4)
Diethanolamine	111-42-2	1.8E-05	--	(4)	3.6E-06	--	(4)	2.7E-04	--	(4)	1.8E-05	0.20	9.1E-05	3.6E-06	0.88	4.1E-06	2.7E-04	0.88	3.1E-04	1.2E-03	--	(4)
Diethylene glycol monobutyl ether	112-34-5	8.2E-04	--	(4)	1.6E-04	--	(4)	0.012	--	(4)	8.2E-04	0.10	8.2E-03	1.6E-04	0.44	3.7E-04	0.012	0.44	0.028	0.052	--	(4)
Diethylene glycol monoethyl ether	111-90-0	7.0E-04	--	(4)	1.4E-04	--	(4)	0.010	--	(4)	7.0E-04	0.30	2.3E-03	1.4E-04	1.30	1.1E-04	0.010	1.30	8.0E-03	0.044	--	(4)
Ethylene glycol	107-21-1	4.1E-04	--	(4)	8.0E-05	--	(4)	6.0E-03	--	(4)	4.1E-04	400	1.0E-06	8.0E-05	1,800	4.4E-08	6.0E-03	1,800	3.4E-06	0.026	2,000	1.3E-05
Ethylene glycol monobutyl ether	111-76-2	6.8E-06	--	(4)	1.3E-06	--	(4)	1.0E-04	--	(4)	6.8E-06	82.0	8.3E-08	1.3E-06	360	3.7E-09	1.0E-04	360	2.8E-07	4.4E-04	29,000	1.5E-08
Ethylene oxide	75-21-8	1.4E-06	2.0E-04	7.0E-03	2.7E-07	2.1E-03	1.3E-04	2.1E-05	4.0E-03	5.2E-03	1.4E-06	30.0	4.6E-08	2.7E-07	130	2.1E-09	2.1E-05	130	1.6E-07	8.9E-05	160	5.5E-07
Formaldehyde	50-00-0	2.8E-04	0.17	1.6E-03	5.5E-05	4.30	1.3E-05	4.1E-03	2.00	2.1E-03	2.8E-04	9.00	3.1E-05	5.5E-05	40.0	1.4E-06	4.1E-03	40.0	1.0E-04	0.018	49.0	3.6E-04
Isopropyl alcohol	67-63-0	3.8E-03	--	(4)	7.4E-04	--	(4)	0.056	--	(4)	3.8E-03	200	1.9E-05	7.4E-04	880	8.4E-07	0.056	880	6.4E-05	0.24	3,200	7.5E-05
Methanol	67-56-1	2.8E-04	--	(4)	5.5E-05	--	(4)	4.1E-03	--	(4)	2.8E-04	4,000	7.0E-08	5.5E-05	18,000	3.0E-09	4.1E-03	18,000	2.3E-07	0.018	28,000	6.3E-07
Vinyl acetate	108-05-4	9.8E-04	--	(4)	1.9E-04	--	(4)	0.015	--	(4)	9.8E-04	200	4.9E-06	1.9E-04	880	2.2E-07	0.015	880	1.6E-05	0.062	200	3.1E-04
VENT_8																							
Cumulative TEU Risk		--	--	**6.6E-03**	--	--	**1.4E-04**	--	--	**7.2E-03**	--	--	**8.1E-03**	--	--	**4.8E-04**	--	--	**0.036**	--	--	**6.6E-04**
Dispersion Factor ($\mu g/m^3/(g/s)$)		**3.82**			**0.99**			**73.7**			**3.82**			**0.99**			**73.7**			**279**		
1,4-Dioxane	123-91-1	1.1E-06	0.20	5.3E-06	2.7E-07	5.20	5.2E-08	2.0E-05	2.40	8.5E-06	1.1E-06	30.0	3.5E-08	2.7E-07	130	2.1E-09	2.0E-05	130	1.6E-07	7.7E-05	7,200	1.1E-08
Acetaldehyde	75-07-0	2.6E-05	0.45	5.9E-05	6.8E-06	12.0	5.7E-07	5.1E-04	5.50	9.2E-05	2.6E-05	140	1.9E-07	6.8E-06	620	1.1E-08	5.1E-04	620	8.2E-07	1.9E-03	470	4.1E-06
Isopropylbenzene (Cumene)	98-82-8	1.1E-06	--	(4)	2.7E-07	--	(4)	2.0E-05	--	(4)	1.1E-06	400	2.6E-09	2.7E-07	1,800	1.5E-10	2.0E-05	1,800	1.1E-08	7.7E-05	--	(4)
Diethanolamine	111-42-2	1.4E-05	--	(4)	3.6E-06	--	(4)	2.7E-04	--	(4)	1.4E-05	0.20	6.9E-05	3.6E-06	0.88	4.0E-06	2.7E-04	0.88	3.0E-04	1.0E-03	--	(4)
Diethylene glycol monobutyl ether	112-34-5	6.2E-04	--	(4)	1.6E-04	--	(4)	0.012	--	(4)	6.2E-04	0.10	6.2E-03	1.6E-04	0.44	3.6E-04	0.012	0.44	0.027	0.045	--	(4)
Diethylene glycol monoethyl ether	111-90-0	5.3E-04	--	(4)	1.4E-04	--	(4)	0.010	--	(4)	5.3E-04	0.30	1.8E-03	1.4E-04	1.30	1.0E-04	0.010	1.30	7.8E-03	0.039	--	(4)
Ethylene glycol	107-21-1	3.1E-04	--	(4)	7.9E-05	--	(4)	5.9E-03	--	(4)	3.1E-04	400	7.7E-07	7.9E-05	1,800	4.4E-08	5.9E-03	1,800	3.3E-06	0.022	2,000	1.1E-05
Ethylene glycol monobutyl ether	111-76-2	5.2E-06	--	(4)	1.3E-06	--	(4)	1.0E-04	--	(4)	5.2E-06	82.0	6.3E-08	1.3E-06	360	3.7E-09	1.0E-04	360	2.8E-07	3.8E-04	29,000	1.3E-08
Ethylene oxide	75-21-8	1.1E-06	2.0E-04	5.3E-03	2.7E-07	2.1E-03	1.3E-04	2.0E-05	4.0E-03	5.1E-03	1.1E-06	30.0	3.5E-08	2.7E-07	130	2.1E-09	2.0E-05	130	1.6E-07	7.7E-05	160	4.8E-07
Formaldehyde	50-00-0	2.1E-04	0.17	1.2E-03	5.4E-05	4.30	1.3E-05	4.1E-03	2.00	2.0E-03	2.1E-04	9.00	2.3E-05	5.4E-05	40.0	1.4E-06	4.1E-03	40.0	1.0E-04	0.015	49.0	3.1E-04
Isopropyl alcohol	67-63-0	2.8E-03	--	(4)	7.3E-04	--	(4)	0.055	--	(4)	2.8E-03	200	1.4E-05	7.3E-04	880	8.3E-07	0.055	880	6.2E-05	0.21	3,200	6.5E-05
Methanol	67-56-1	2.1E-04	--	(4)	5.4E-05	--	(4)	4.1E-03	--	(4)	2.1E-04	4,000	5.3E-08	5.4E-05	18,000	3.0E-09	4.1E-03	18,000	2.3E-07	0.015	28,000	5.5E-07
Vinyl acetate	108-05-4	7.4E-04	--	(4)	1.9E-04	--	(4)	0.014	--	(4)	7.4E-04	200	3.7E-06	1.9E-04	880	2.2E-07	0.014	880	1.6E-05	0.054	200	2.7E-04
VENT_9																							
Cumulative TEU Risk		--	--	**4.4E-03**	--	--	**1.4E-04**	--	--	**4.5E-03**	--	--	**5.4E-03**	--	--	**4.6E-04**	--	--	**0.022**	--	--	**5.2E-04**
Dispersion Factor ($\mu g/m^3/(g/s)$)		**2.57**			**0.96**			**45.6**			**2.57**			**0.96**			**45.6**			**219**		
1,4-Dioxane	123-91-1	7.1E-07	0.20	3.5E-06	2.7E-07	5.20	5.1E-08	1.3E-05	2.40	5.2E-06	7.1E-07	30.0	2.4E-08	2.7E-07	130	2.0E-09	1.3E-05	130	9.7E-08	6.0E-05	7,200	8.4E-09
Acetaldehyde	75-07-0	1.8E-05	0.45	3.9E-05	6.6E-06	12.0	5.5E-07	3.1E-04	5.50	5.7E-05	1.8E-05	140	1.3E-07	6.6E-06	620	1.1E-08	3.1E-04	620	5.1E-07	1.5E-03	470	3.2E-06
Isopropylbenzene (Cumene)	98-82-8	7.1E-07	--	(4)	2.7E-07	--	(4)	1.3E-05	--	(4)	7.1E-07	400	1.8E-09	2.7E-07	1,800	1.5E-10	1.3E-05	1,800	7.0E-09	6.0E-05	--	(4)
Diethanolamine	111-42-2	9.3E-06	--	(4)	3.5E-06	--	(4)	1.6E-04	--	(4)	9.3E-06	0.20	4.6E-05	3.5E-06	0.88	4.0E-06	1.6E-04	0.88	1.9E-04	7.9E-04	--	(4)
Diethylene glycol monobutyl ether	112-34-5	4.2E-04	--	(4)	1.6E-04	--	(4)	7.4E-03	--	(4)	4.2E-04	0.10	4.2E-03	1.6E-04	0.44	3.6E-04	7.4E-03	0.44	0.017	0.036	--	(4)
Diethylene glycol monoethyl ether	111-90-0	3.5E-04	--	(4)	1.3E-04	--	(4)	6.3E-03	--	(4)	3.5E-04	0.30	1.2E-03	1.3E-04	1.30	1.0E-04	6.3E-03	1.30	4.8E-03	0.030	--	(4)
Ethylene glycol	107-21-1	2.1E-04	--	(4)	7.7E-05	--	(4)	3.7E-03	--	(4)	2.1E-04	400	5.2E-07	7.7E-05	1,800	4.3E-08	3.7E-03	1,800	2.0E-06	0.018	2,000	8.8E-06
Ethylene glycol monobutyl ether	111-76-2	3.5E-06	--	(4)	1.3E-06	--	(4)	6.2E-05	--	(4)	3.5E-06	82.0	4.2E-08	1.3E-06	360	3.6E-09	6.2E-05	360	1.7E-07	3.0E-04	29,000	1.0E-08
Ethylene oxide	75-21-8	7.1E-07	2.0E-04	3.5E-03	2.7E-07	2.1E-03	1.3E-04	1.3E-05	4.0E-03	3.1E-03	7.1E-07	30.0	2.4E-08	2.7E-07	130	2.0E-09	1.3E-05	130	9.7E-08	6.0E-05	160	3.8E-07
Formaldehyde	50-00-0	1.4E-04	0.17	8.3E-04	5.3E-05	4.30	1.2E-05	2.5E-03	2.00	1.3E-03	1.4E-04	9.00	1.6E-05	5.3E-05	40.0	1.3E-06	2.5E-03	40.0	6.3E-05	0.012	49.0	2.5E-04
Isopropyl alcohol	67-63-0	1.9E-03	--	(4)	7.2E-04	--	(4)	0.034	--	(4)	1.9E-03	200	9.6E-06	7.2E-04	880	8.2E-07	0.034	880	3.9E-05	0.16	3,200	5.1E-05
Methanol	67-56-1	1.4E-04	--	(4)	5.3E-05	--	(4)	2.5E-03	--	(4)	1.4E-04	4,000	3.5E-08	5.3E-05	18,000	3.0E-09	2.5E-03	18,000	1.4E-07	0.012	28,000	4.3E-07
Vinyl acetate	108-05-4	5.0E-04	--	(4)	1.9E-04	--	(4)	8.8E-03	--	(4)	5.0E-04	200	2.5E-06	1.9E-04	880	2.1E-07	8.8E-03	880	1.0E-05	0.042	200	2.1E-04

Table 6-2
Level 3 Risk Assessment Results for Significant Toxic Emission Units
Packaging Corporation of America—Salem, Oregon

Toxic Air Contaminant	CAS	Cancer									Chronic Noncancer									Acute		
		Residential			Child			Worker			Residential			Child			Worker			Noncancer		
		Calculated Conc. [a] ($\mu g/m^3$)	RBC [2] ($\mu g/m^3$)	Risk [b] (chances-in-10^6)	Calculated Conc. [a] ($\mu g/m^3$)	RBC [2] ($\mu g/m^3$)	Risk [b] (chances-in-10^6)	Calculated Conc. [a] ($\mu g/m^3$)	RBC [2] ($\mu g/m^3$)	Risk [b] (chances-in-10^6)	Calculated Conc. [a] ($\mu g/m^3$)	RBC [2] ($\mu g/m^3$)	Hazard Index [c]	Calculated Conc. [a] ($\mu g/m^3$)	RBC [2] ($\mu g/m^3$)	Hazard Index [c]	Calculated Conc. [a] ($\mu g/m^3$)	RBC [2] ($\mu g/m^3$)	Hazard Index [c]	Calculated Conc. [a] ($\mu g/m^3$)	RBC [2] ($\mu g/m^3$)	Hazard Index [c]
Exposure Location [3]		542			2,371			6,255			542			2,371			6,255			6,255		
Cumulative Facility-wide Risk		--	--	0.061	--	--	1.2E-03	--	--	0.058	--	--	0.075	--	--	4.1E-03	--	--	0.29	--	--	6.5E-03

NOTES:

RBC = risk-based concentration.

TEU = toxic emission unit.

TAC = toxic air contaminant.

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

TAC emission rate per TEU (g/s) = (1)

(b) Risk (chances-in-1,000,000) = (calculated concentration [$\mu g/m^3$]) / (risk-based concentration [$\mu g/m^3$])

(c) Hazard index = (calculated concentration [$\mu g/m^3$]) / (risk-based concentration [$\mu g/m^3$])

REFERENCES:

(1) See Table 3-1, Annual Emission Rates for Significant Toxic Emission Units—RBC Only for Cancer and Chronic Noncancer, and Table 3-2, Daily Emission Rates for Significant Toxic Emission Units—RBC Only for Acute Noncancer.

(2) Oregon Administrative Rule 340-245-8040, Table 4, Risk-Based Concentrations.

(3) Represents the exposure location with the highest predicted cancer or noncancer risk per exposure category.

(4) TAC does not have an established RBC for this exposure category per Oregon Administrative Rule 340-245-8040, Table 4.

Table 6-3
Level 3 Risk Assessment Results for Natural Gas Combustion Toxic Emission Units
Packaging Corporation of America—Salem, Oregon

Toxic Air Contaminant	CAS	Cancer									Chronic Noncancer									Acute		
		Residential			Child			Worker			Residential			Child			Worker			Noncancer		
		Calculated Conc. [a] ($\mu g/m^3$)	RBC [2] ($\mu g/m^3$)	Risk [b] (chances-in-10^6)	Calculated Conc. [a] ($\mu g/m^3$)	RBC [2] ($\mu g/m^3$)	Risk [b] (chances-in-10^6)	Calculated Conc. [a] ($\mu g/m^3$)	RBC [2] ($\mu g/m^3$)	Risk [b] (chances-in-10^6)	Calculated Conc. [a] ($\mu g/m^3$)	RBC [2] ($\mu g/m^3$)	Hazard Index [c]	Calculated Conc. [a] ($\mu g/m^3$)	RBC [2] ($\mu g/m^3$)	Hazard Index [c]	Calculated Conc. [a] ($\mu g/m^3$)	RBC [2] ($\mu g/m^3$)	Hazard Index [c]	Calculated Conc. [a] ($\mu g/m^3$)	RBC [2] ($\mu g/m^3$)	Hazard Index [c]
Exposure Location [3]		**633**			**3,480**			**6,255**			**633**			**3,480**			**6,255**			**6,255**		
Cumulative Facility-wide Risk		--	--	**0.11**	--	--	**6.5E-04**	--	--	**0.092**	--	--	**0.015**	--	--	**3.6E-04**	--	--	**0.025**	--	--	**0.038**
BLR_1																						
Cumulative TEU Risk		--	--	**0.054**	--	--	**3.2E-04**	--	--	**0.046**	--	--	**7.4E-03**	--	--	**1.8E-04**	--	--	**0.012**	--	--	**0.019**
Dispersion Factor ($\mu g/m^3$/[g/s])		**2.57**			**0.62**			**44.2**			**2.57**			**0.62**			**44.2**			**190**		
Arsenic and compounds	7440-38-2	9.3E-07	2.4E-05	0.039	2.2E-07	1.3E-03	1.7E-04	1.6E-05	6.2E-04	0.026	9.3E-07	1.7E-04	5.5E-03	2.2E-07	2.4E-03	9.4E-05	1.6E-05	2.4E-03	6.6E-03	6.8E-05	0.20	3.4E-04
Beryllium and compounds	7440-41-7	5.6E-08	4.2E-04	1.3E-04	1.3E-08	0.011	1.2E-06	9.6E-07	5.0E-03	1.9E-04	5.6E-08	7.0E-03	7.9E-06	1.3E-08	0.031	4.3E-07	9.6E-07	0.031	3.1E-05	4.1E-06	0.020	2.1E-04
Cadmium and compounds	7440-43-9	5.1E-06	5.6E-04	9.1E-03	1.2E-06	0.014	8.8E-05	8.8E-05	6.7E-03	0.013	5.1E-06	5.0E-03	1.0E-03	1.2E-06	0.037	3.3E-05	8.8E-05	0.037	2.4E-03	3.8E-04	0.030	0.013
Cobalt and compounds	7440-48-4	3.9E-07	--	(4)	9.4E-08	--	(4)	6.7E-06	--	(4)	3.9E-07	0.10	3.9E-06	9.4E-08	0.44	2.1E-07	6.7E-06	0.44	1.5E-05	2.9E-05	--	(4)
Copper and compounds	7440-50-8	3.9E-06	--	(4)	9.5E-07	--	(4)	6.8E-05	--	(4)	3.9E-06	--	(4)	9.5E-07	--	(4)	6.8E-05	--	(4)	2.9E-04	100.0	2.9E-06
Manganese and compounds	7439-96-5	1.8E-06	--	(4)	4.3E-07	--	(4)	3.0E-05	--	(4)	1.8E-06	0.090	2.0E-05	4.3E-07	0.40	1.1E-06	3.0E-05	0.40	7.6E-05	1.3E-04	0.30	4.3E-04
Mercury and compounds	7439-97-6	1.2E-06	--	(4)	2.9E-07	--	(4)	2.1E-05	--	(4)	1.2E-06	0.077	1.6E-05	2.9E-07	0.63	4.6E-07	2.1E-05	0.63	3.3E-05	8.9E-05	0.60	1.5E-04
Nickel and compounds	7440-02-0	9.7E-06	3.8E-03	2.6E-03	2.4E-06	0.10	2.4E-05	1.7E-04	0.046	3.6E-03	9.7E-06	0.014	6.9E-04	2.4E-06	0.062	3.8E-05	1.7E-04	0.062	2.7E-03	7.2E-04	0.20	3.6E-03
Selenium and compounds	7782-49-2	1.1E-07	--	(4)	2.7E-08	--	(4)	1.9E-06	--	(4)	1.1E-07	--	(4)	2.7E-08	--	(4)	1.9E-06	--	(4)	8.2E-06	2.00	4.1E-06
Vanadium (fume or dust)	7440-62-2	1.1E-05	--	(4)	2.6E-06	--	(4)	1.8E-04	--	(4)	1.1E-05	0.10	1.1E-04	2.6E-06	0.44	5.9E-06	1.8E-04	0.44	4.2E-04	7.9E-04	0.80	9.8E-04
Benzene	71-43-2	9.7E-06	0.13	7.5E-05	2.4E-06	3.30	7.1E-07	1.7E-04	1.50	1.1E-04	9.7E-06	3.00	3.2E-06	2.4E-06	13.0	1.8E-07	1.7E-04	13.0	1.3E-05	7.2E-04	29.0	2.5E-05
Formaldehyde	50-00-0	3.5E-04	0.17	2.0E-03	8.4E-05	4.30	2.0E-05	6.0E-03	2.00	3.0E-03	3.5E-04	9.00	3.9E-05	8.4E-05	40.0	2.1E-06	6.0E-03	40.0	1.5E-04	0.026	49.0	5.2E-04
Hexane	110-54-3	8.3E-03	--	(4)	2.0E-03	--	(4)	0.14	--	(4)	8.3E-03	700	1.2E-05	2.0E-03	3,100	6.5E-07	0.14	3,100	4.6E-05	0.62	--	(4)
Benz[a]anthracene	56-55-3	8.3E-09	2.1E-04	4.0E-05	2.0E-09	7.8E-03	2.6E-07	1.4E-07	0.015	9.6E-06	8.3E-09	--	(4)	2.0E-09	--	(4)	1.4E-07	--	(4)	6.2E-07	--	(4)
Benzo[a]pyrene	50-32-8	5.6E-09	4.3E-05	1.3E-04	1.3E-09	1.6E-03	8.4E-07	9.6E-08	3.0E-03	3.2E-05	5.6E-09	2.0E-03	2.8E-06	1.3E-09	8.8E-03	1.5E-07	9.6E-08	8.8E-03	1.1E-05	4.1E-07	2.0E-03	2.1E-04
Benzo[b]fluoranthene	205-99-2	8.3E-09	5.3E-05	1.6E-04	2.0E-09	2.0E-03	1.0E-06	1.4E-07	3.8E-03	3.8E-05	8.3E-09	--	(4)	2.0E-09	--	(4)	1.4E-07	--	(4)	6.2E-07	--	(4)
Benzo[g,h,i]perylene	191-24-2	5.6E-09	4.7E-03	1.2E-06	1.3E-09	0.17	7.9E-09	9.6E-08	0.34	2.8E-07	5.6E-09	--	(4)	1.3E-09	--	(4)	9.6E-08	--	(4)	4.1E-07	--	(4)
Benzo[k]fluoranthene	207-08-9	8.3E-09	1.4E-03	6.0E-06	2.0E-09	0.052	3.9E-08	1.4E-07	0.10	1.4E-06	8.3E-09	--	(4)	2.0E-09	--	(4)	1.4E-07	--	(4)	6.2E-07	--	(4)
Chrysene	218-01-9	8.3E-09	4.3E-04	1.9E-05	2.0E-09	0.016	1.3E-07	1.4E-07	0.030	4.8E-06	8.3E-09	--	(4)	2.0E-09	--	(4)	1.4E-07	--	(4)	6.2E-07	--	(4)
Dibenz[a,h]anthracene	53-70-3	5.6E-09	4.3E-06	1.3E-03	1.3E-09	1.6E-04	8.4E-06	9.6E-08	3.0E-04	3.2E-04	5.6E-09	--	(4)	1.3E-09	--	(4)	9.6E-08	--	(4)	4.1E-07	--	(4)
Fluoranthene	206-44-0	1.4E-08	5.3E-04	2.6E-05	3.4E-09	0.020	1.7E-07	2.4E-07	0.038	6.3E-06	1.4E-08	--	(4)	3.4E-09	--	(4)	2.4E-07	--	(4)	1.0E-06	--	(4)
Indeno[1,2,3-cd]pyrene	193-39-5	8.3E-09	6.1E-04	1.4E-05	2.0E-09	0.022	9.2E-08	1.4E-07	0.043	3.3E-06	8.3E-09	--	(4)	2.0E-09	--	(4)	1.4E-07	--	(4)	6.2E-07	--	(4)
Naphthalene	91-20-3	2.8E-06	0.029	9.7E-05	6.9E-07	0.76	9.0E-07	4.9E-05	0.35	1.4E-04	2.8E-06	3.70	7.6E-07	6.9E-07	16.0	4.3E-08	4.9E-05	16.0	3.0E-06	2.1E-04	200	1.0E-06
Toluene	108-88-3	1.6E-05	--	(4)	3.8E-06	--	(4)	2.7E-04	--	(4)	1.6E-05	5,000	3.2E-09	3.8E-06	22,000	1.7E-10	2.7E-04	22,000	1.2E-08	1.2E-03	7,500	1.6E-07

Table 6-3
Level 3 Risk Assessment Results for Natural Gas Combustion Toxic Emission Units
Packaging Corporation of America—Salem, Oregon

Toxic Air Contaminant	CAS	Cancer									Chronic Noncancer									Acute		
		Residential			Child			Worker			Residential			Child			Worker			Noncancer		
		Calculated Conc. [a] ($\mu g/m^3$)	RBC [2] ($\mu g/m^3$)	Risk [b] (chances-in-10^6)	Calculated Conc. [a] ($\mu g/m^3$)	RBC [2] ($\mu g/m^3$)	Risk [b] (chances-in-10^6)	Calculated Conc. [a] ($\mu g/m^3$)	RBC [2] ($\mu g/m^3$)	Risk [b] (chances-in-10^6)	Calculated Conc. [a] ($\mu g/m^3$)	RBC [2] ($\mu g/m^3$)	Hazard Index [c]	Calculated Conc. [a] ($\mu g/m^3$)	RBC [2] ($\mu g/m^3$)	Hazard Index [c]	Calculated Conc. [a] ($\mu g/m^3$)	RBC [2] ($\mu g/m^3$)	Hazard Index [c]	Calculated Conc. [a] ($\mu g/m^3$)	RBC [2] ($\mu g/m^3$)	Hazard Index [c]
Exposure Location [3]		**633**			**3,480**			**6,255**			**633**			**3,480**			**6,255**			**6,255**		
Cumulative Facility-wide Risk		--	--	**0.11**	--	--	**6.5E-04**	--	--	**0.092**	--	--	**0.015**	--	--	**3.6E-04**	--	--	**0.025**	--	--	**0.038**
BLR_2																						
Cumulative TEU Risk		--	--	**0.057**	--	--	**3.3E-04**	--	--	**0.046**	--	--	**7.7E-03**	--	--	**1.8E-04**	--	--	**0.012**	--	--	**0.019**
Dispersion Factor ($\mu g/m^3$/[g/s])		**2.68**			**0.65**			**43.5**			**2.68**			**0.65**			**43.5**			**187**		
Arsenic and compounds	7440-38-2	9.7E-07	2.4E-05	0.040	2.3E-07	1.3E-03	1.8E-04	1.6E-05	6.2E-04	0.025	9.7E-07	1.7E-04	5.7E-03	2.3E-07	2.4E-03	9.8E-05	1.6E-05	2.4E-03	6.5E-03	6.7E-05	0.20	3.4E-04
Beryllium and compounds	7440-41-7	5.8E-08	4.2E-04	1.4E-04	1.4E-08	0.011	1.3E-06	9.4E-07	5.0E-03	1.9E-04	5.8E-08	7.0E-03	8.3E-06	1.4E-08	0.031	4.5E-07	9.4E-07	0.031	3.0E-05	4.0E-06	0.020	2.0E-04
Cadmium and compounds	7440-43-9	5.3E-06	5.6E-04	9.5E-03	1.3E-06	0.014	9.2E-05	8.6E-05	6.7E-03	0.013	5.3E-06	5.0E-03	1.1E-03	1.3E-06	0.037	3.5E-05	8.6E-05	0.037	2.3E-03	3.7E-04	0.030	0.012
Cobalt and compounds	7440-48-4	4.1E-07	--	(4)	9.8E-08	--	(4)	6.6E-06	--	(4)	4.1E-07	0.10	4.1E-06	9.8E-08	0.44	2.2E-07	6.6E-06	0.44	1.5E-05	2.8E-05	--	(4)
Copper and compounds	7440-50-8	4.1E-06	--	(4)	9.9E-07	--	(4)	6.7E-05	--	(4)	4.1E-06	--	(4)	9.9E-07	--	(4)	6.7E-05	--	(4)	2.9E-04	100.0	2.9E-06
Manganese and compounds	7439-96-5	1.8E-06	--	(4)	4.4E-07	--	(4)	3.0E-05	--	(4)	1.8E-06	0.090	2.0E-05	4.4E-07	0.40	1.1E-06	3.0E-05	0.40	7.4E-05	1.3E-04	0.30	4.3E-04
Mercury and compounds	7439-97-6	1.3E-06	--	(4)	3.0E-07	--	(4)	2.0E-05	--	(4)	1.3E-06	0.077	1.6E-05	3.0E-07	0.63	4.8E-07	2.0E-05	0.63	3.2E-05	8.8E-05	0.60	1.5E-04
Nickel and compounds	7440-02-0	1.0E-05	3.8E-03	2.7E-03	2.5E-06	0.10	2.5E-05	1.6E-04	0.046	3.6E-03	1.0E-05	0.014	7.3E-04	2.5E-06	0.062	4.0E-05	1.6E-04	0.062	2.7E-03	7.1E-04	0.20	3.5E-03
Selenium and compounds	7782-49-2	1.2E-07	--	(4)	2.8E-08	--	(4)	1.9E-06	--	(4)	1.2E-07	--	(4)	2.8E-08	--	(4)	1.9E-06	--	(4)	8.1E-06	2.00	4.0E-06
Vanadium (fume or dust)	7440-62-2	1.1E-05	--	(4)	2.7E-06	--	(4)	1.8E-04	--	(4)	1.1E-05	0.10	1.1E-04	2.7E-06	0.44	6.1E-06	1.8E-04	0.44	4.1E-04	7.7E-04	0.80	9.7E-04
Benzene	71-43-2	1.0E-05	0.13	7.8E-05	2.5E-06	3.30	7.4E-07	1.6E-04	1.50	1.1E-04	1.0E-05	3.00	3.4E-06	2.5E-06	13.0	1.9E-07	1.6E-04	13.0	1.3E-05	7.1E-04	29.0	2.4E-05
Formaldehyde	50-00-0	3.6E-04	0.17	2.1E-03	8.8E-05	4.30	2.0E-05	5.9E-03	2.00	2.9E-03	3.6E-04	9.00	4.0E-05	8.8E-05	40.0	2.2E-06	5.9E-03	40.0	1.5E-04	0.025	49.0	5.2E-04
Hexane	110-54-3	8.7E-03	--	(4)	2.1E-03	--	(4)	0.14	--	(4)	8.7E-03	700	1.2E-05	2.1E-03	3,100	6.8E-07	0.14	3,100	4.6E-05	0.61	--	(4)
Benz[a]anthracene	56-55-3	8.7E-09	2.1E-04	4.1E-05	2.1E-09	7.8E-03	2.7E-07	1.4E-07	0.015	9.4E-06	8.7E-09	--	(4)	2.1E-09	--	(4)	1.4E-07	--	(4)	6.1E-07	--	(4)
Benzo[a]pyrene	50-32-8	5.8E-09	4.3E-05	1.3E-04	1.4E-09	1.6E-03	8.8E-07	9.4E-08	3.0E-03	3.1E-05	5.8E-09	2.0E-03	2.9E-06	1.4E-09	8.8E-03	1.6E-07	9.4E-08	8.8E-03	1.1E-05	4.0E-07	2.0E-03	2.0E-04
Benzo[b]fluoranthene	205-99-2	8.7E-09	5.3E-05	1.6E-04	2.1E-09	2.0E-03	1.1E-06	1.4E-07	3.8E-03	3.7E-05	8.7E-09	--	(4)	2.1E-09	--	(4)	1.4E-07	--	(4)	6.1E-07	--	(4)
Benzo[g,h,i]perylene	191-24-2	5.8E-09	4.7E-03	1.2E-06	1.4E-09	0.17	8.3E-09	9.4E-08	0.34	2.8E-07	5.8E-09	--	(4)	1.4E-09	--	(4)	9.4E-08	--	(4)	4.0E-07	--	(4)
Benzo[k]fluoranthene	207-08-9	8.7E-09	1.4E-03	6.2E-06	2.1E-09	0.052	4.1E-08	1.4E-07	0.10	1.4E-06	8.7E-09	--	(4)	2.1E-09	--	(4)	1.4E-07	--	(4)	6.1E-07	--	(4)
Chrysene	218-01-9	8.7E-09	4.3E-04	2.0E-05	2.1E-09	0.016	1.3E-07	1.4E-07	0.030	4.7E-06	8.7E-09	--	(4)	2.1E-09	--	(4)	1.4E-07	--	(4)	6.1E-07	--	(4)
Dibenz[a,h]anthracene	53-70-3	5.8E-09	4.3E-06	1.3E-03	1.4E-09	1.6E-04	8.8E-06	9.4E-08	3.0E-04	3.1E-04	5.8E-09	--	(4)	1.4E-09	--	(4)	9.4E-08	--	(4)	4.0E-07	--	(4)
Fluoranthene	206-44-0	1.5E-08	5.3E-04	2.7E-05	3.5E-09	0.020	1.8E-07	2.4E-07	0.038	6.2E-06	1.5E-08	--	(4)	3.5E-09	--	(4)	2.4E-07	--	(4)	1.0E-06	--	(4)
Indeno[1,2,3-cd]pyrene	193-39-5	8.7E-09	6.1E-04	1.4E-05	2.1E-09	0.022	9.6E-08	1.4E-07	0.043	3.3E-06	8.7E-09	--	(4)	2.1E-09	--	(4)	1.4E-07	--	(4)	6.1E-07	--	(4)
Naphthalene	91-20-3	3.0E-06	0.029	1.0E-04	7.1E-07	0.76	9.4E-07	4.8E-05	0.35	1.4E-04	3.0E-06	3.70	8.0E-07	7.1E-07	16.0	4.5E-08	4.8E-05	16.0	3.0E-06	2.1E-04	200	1.0E-06
Toluene	108-88-3	1.6E-05	--	(4)	4.0E-06	--	(4)	2.7E-04	--	(4)	1.6E-05	5,000	3.3E-09	4.0E-06	22,000	1.8E-10	2.7E-04	22,000	1.2E-08	1.1E-03	7,500	1.5E-07

NOTES:

RBC = risk-based concentration.

TEU = toxic emission unit.

TAC = toxic air contaminant.

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

TAC emission rate per TEU (g/s) = (1)

(b) Risk (chances-in-1,000,000) = (calculated concentration [$\mu g/m^3$]) / (risk-based concentration [$\mu g/m^3$])

(c) Hazard index = (calculated concentration [$\mu g/m^3$]) / (risk-based concentration [$\mu g/m^3$])

REFERENCES:

(1) See Table 3-3, Daily and Annual Emission Rates for Natural Gas Combustion Toxic Emission Units—RBC Only.

(2) Oregon Administrative Rule 340-245-8040, Table 4, Risk-Based Concentrations.

(3) Represents the exposure location with the highest predicted cancer or noncancer risk per exposure category.

(4) TAC does not have an established RBC for this exposure category per Oregon Administrative Rule 340-245-8040, Table 4.

FIGURES

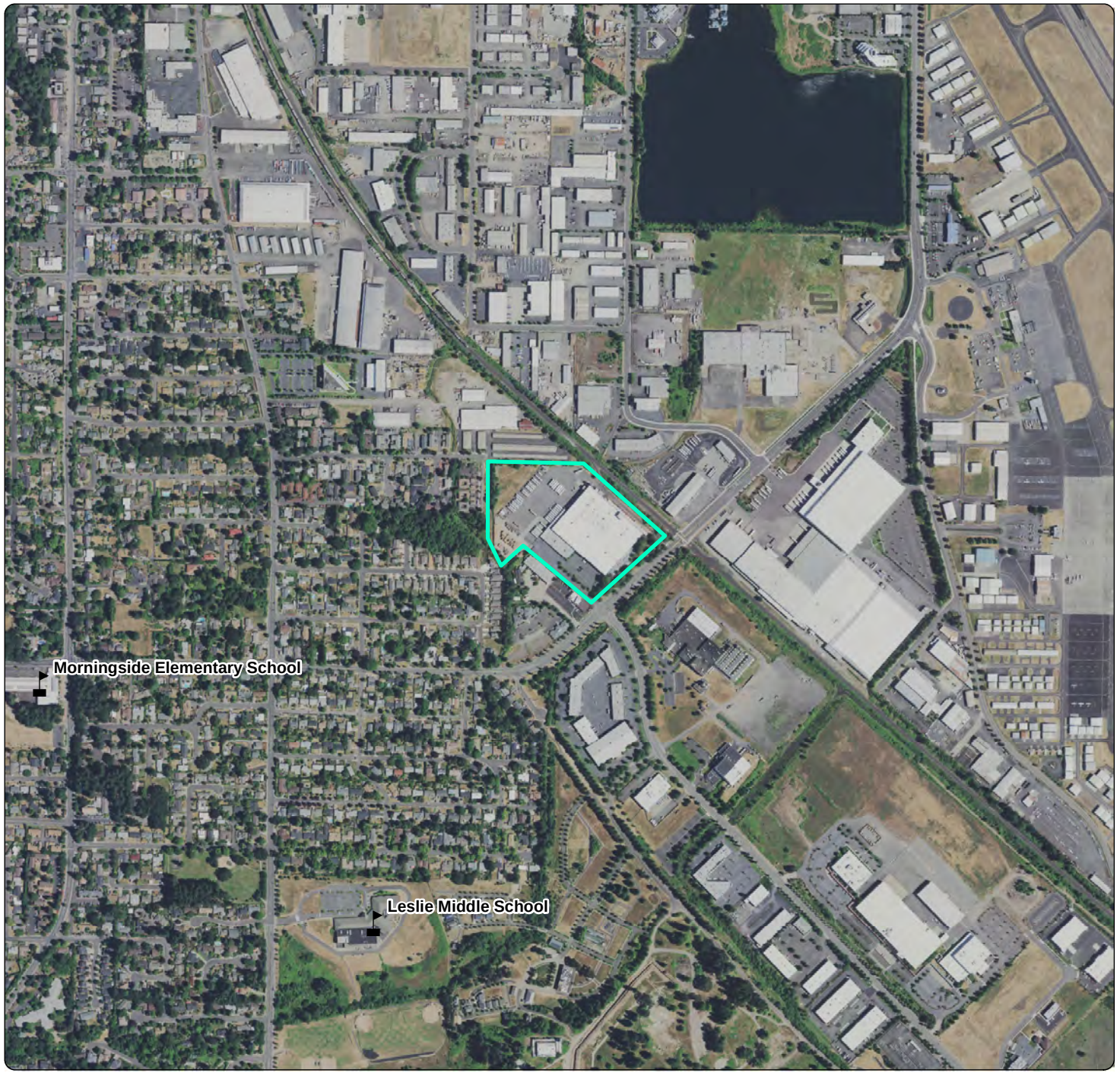

Figure 2-1
Aerial Photograph of Facility

Packaging Corporation of America
Salem, OR

Legend

School Location (2015-16)

Property Boundary

Key Map

0 70 140
Meters

Source:
Aerial photograph obtained from ESRI ArcGIS Online.

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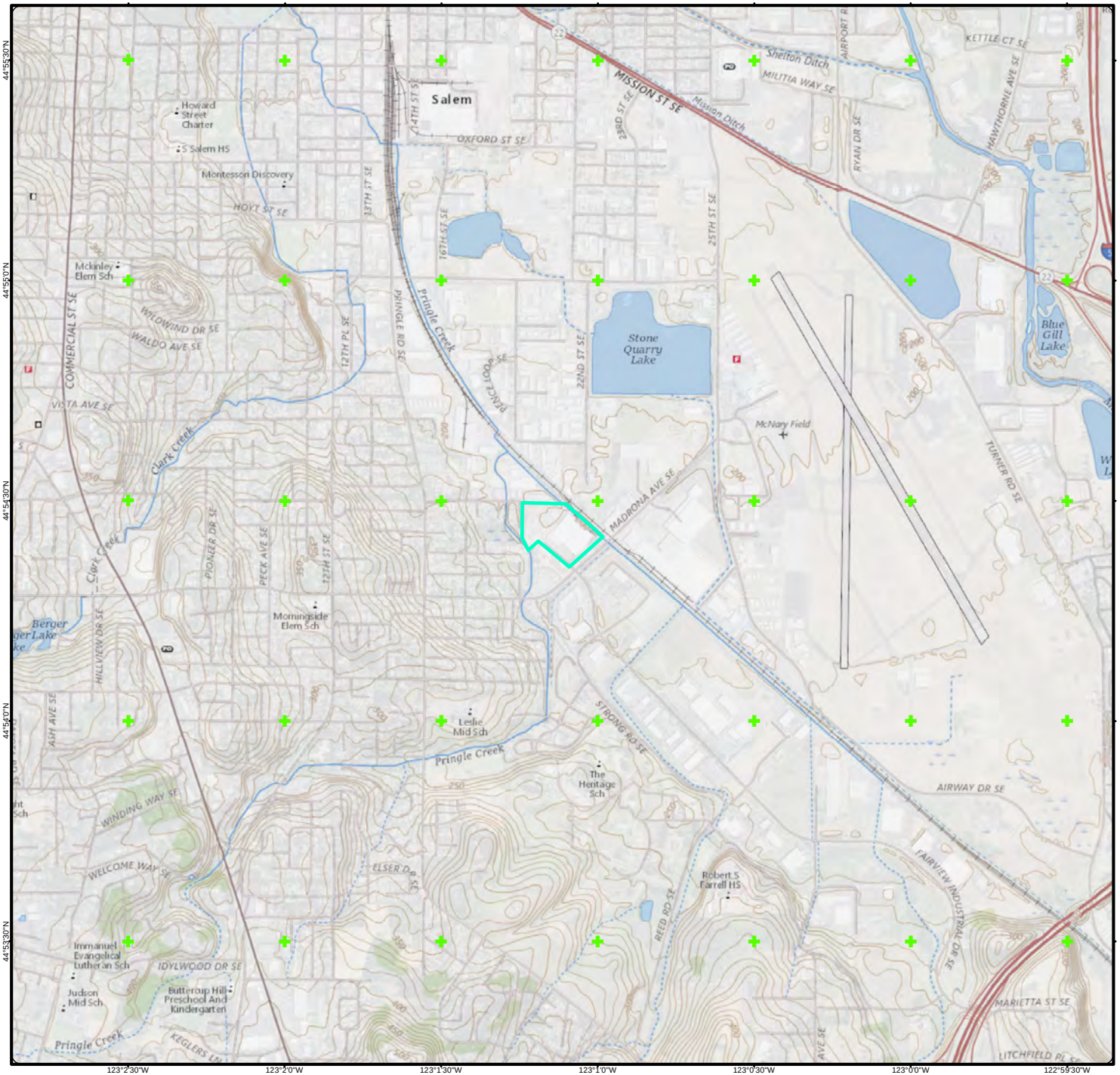

Figure 2-2
Local Topography

Packaging Corporation of America
Salem, OR

Legend

- UTM Grid Guideline
- Property Boundary

Key Map

0 250 500
Meters

Source:
USGS Topographic basemap obtained from ArcGIS Online.

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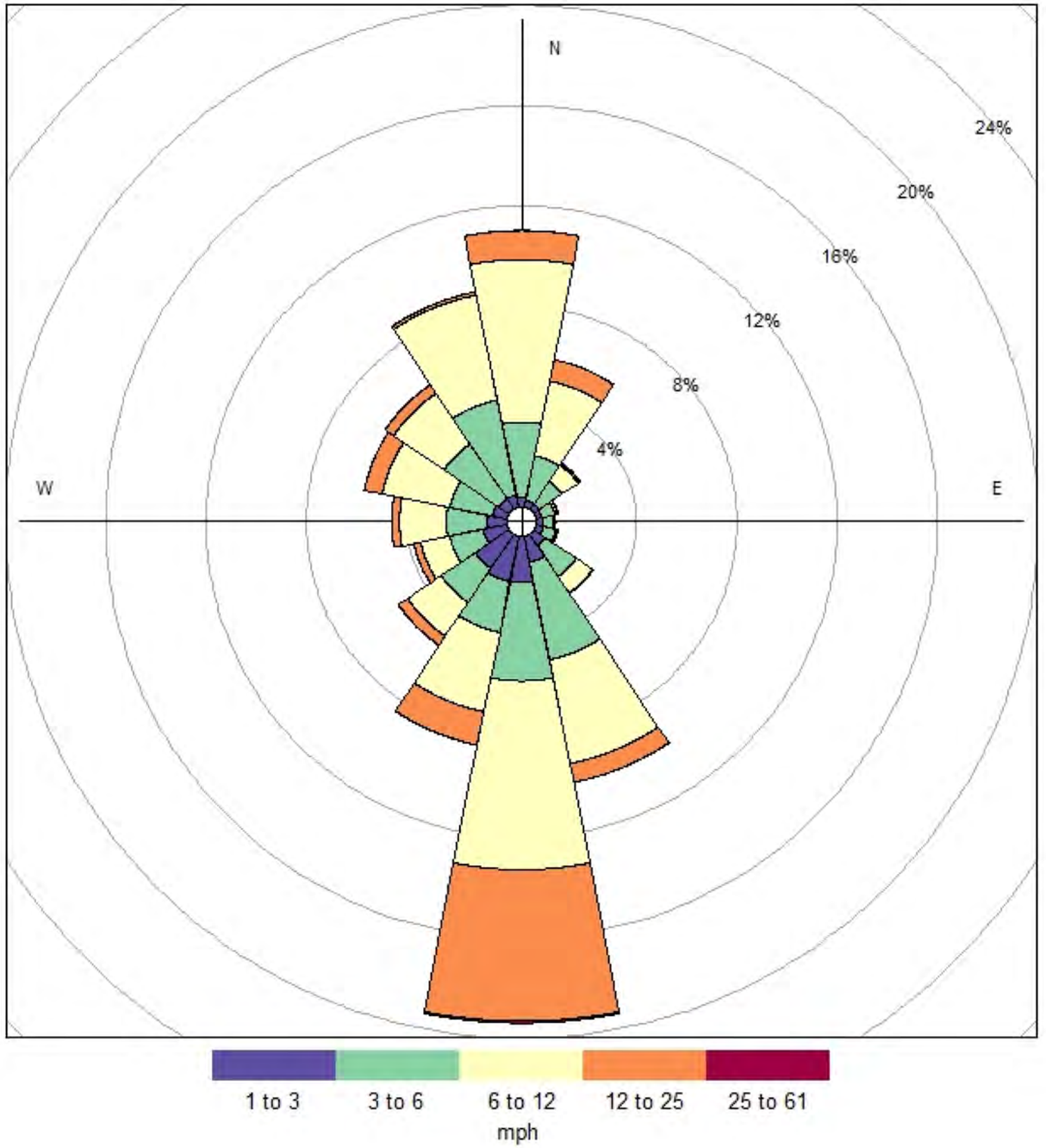
Figure 4-1
Wind Rose
Packaging Corporation of America
Salem, OR



Notes:
Wind Direction = Blowing From
Total Number of Hours = 43,872
Average Wind Speed = 7.09 mph
Calm Winds Frequency = 2.70%

Meteorological data obtained from the Salem McNary Regional Airport monitoring station (ID 24232) for the period between January 1, 2016 to December 31, 2020.

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Figure 4-2
Downwash Structures and Emission Unit Locations

Packaging Corporation of America
Salem, OR

VENT_1
VENT_4
VENT_2
VENT_5
VENT_7
BLR_1
BLR_2
VENT_3
VENT_6
VENT_8
VENT_9
BLD_4, Tier 1
BLD_1, Tier 1
BLD_3, Tier 1
BLD_2, Tier 1

Legend

- UTM Grid Guideline
- Point Sources
- Proposed Downwash Structure
- Property Boundary

Key Map

0 20 40
Meters

Source:
Aerial photograph obtained from ESRI ArcGIS Online.

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UTM X (m)
498500
498600
498700
UTM Y (m)
4972710
4972640
4972570
4972500

Path: X:\1831.01_PackagingCorpOfAmerica\.02\GIS\Fig4-2_Proposed_Downwash_Structures_Emission_Units.mxd
Print Date: 5/20/2021
Reviewed By: E. Bornhost
Produced By: aguse
Project: 1831.01

Figure 4-3
Receptor Locations

Packaging Corporation of America
Salem, OR

Legend

- UTM Grid Guideline
- Proposed Receptor
- Proposed Receptor in Road or Rail Right-of-Way
- Property Boundary
- Blanking Boundary

0 1 2
Kilometers

Sources: Aerial photograph obtained from Esri ArcGIS Online.

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UTM X (m): 492000, 493000, 494000, 495000, 496000, 497000, 498000, 499000, 500000, 501000, 502000, 503000, 504000, 505000

UTM Y (m): 4977000, 4976000, 4975000, 4974000, 4973000, 4972000, 4971000, 4970000, 4969000, 4968000

Path: X:\1831_01_PackagingCorpOfAmerica_02\GIS\Fig4-3_Proposed_Receptor_Locations.mxd
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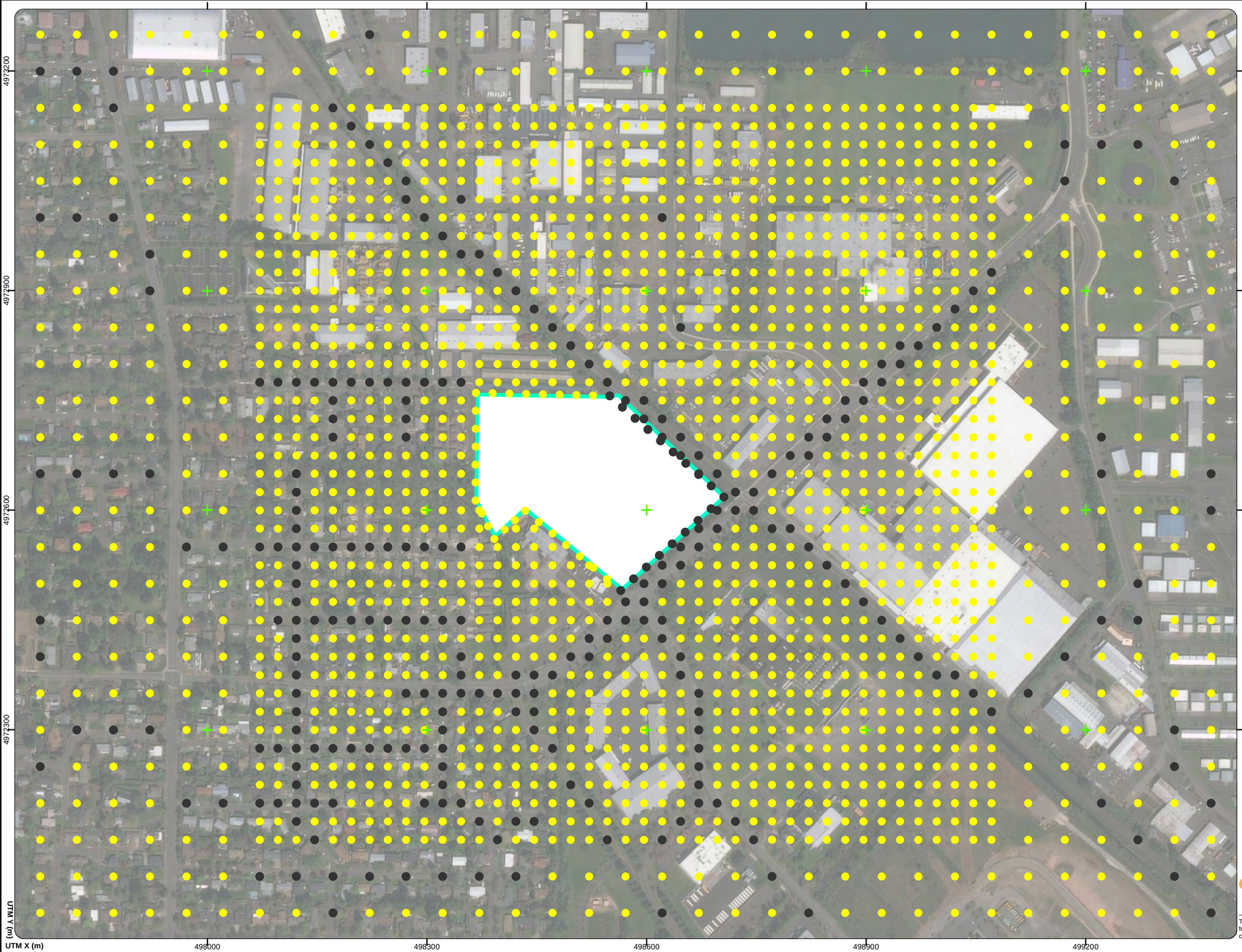
Path: X:\1831_01_PackagingCorpOfAmerica_02\GIS\Fig4-4_Proposed_Receptor_Locations_Immediate.mxd

Project: 1831.01 Produced By: aguse Reviewed By: E. Bornhorst Print Date: 9/16/2021

Figure 4-4
Locations in the Immediate Area

Packaging Corporation of America
Salem, OR



Legend

- UTM Grid Guideline
- Proposed Receptor
- Proposed Receptor in Road or Rail Right-of-Way
- Property Boundary
- Blanking Boundary

0 100 200
Meters

Sources: Aerial photograph obtained from Esri ArcGIS Online.

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Figure 5-1
Existing Land-Use Zoning Classifications
Packaging Corporation of America
Salem, OR

Oregon Statewide Zoning (2017)

- No Data / Other
- Commercial - Central
- Commercial - General
- Commercial - Neighborhood
- Commercial - Office
- Rural Commercial
- Industrial - Heavy
- Industrial - Light
- Industrial Campus
- Industrial Office
- Rural Industrial
- Rural Residential 1 acre; Rural Residential 10 acres; Rural Residential 2-4 acres; Rural Residential 5 acres
- Very Low-density Res.
- Low-density Res.
- Medium Low-density Res.
- Medium High-density Res.
- Medium-density Res.
- Very High-density Res.
- Future Urban Development
- Mixed-Use Com. & Res. Extremely High; Mixed-Use Com. & Res. High; Mixed-Use Com. & Res. Low; Mixed-Use Com. & Res. Med-high; Mixed-Use Com. & Res. Medium; Mixed-Use Com. & Res. V.High
- Exclusive Farm Use
- Mixed Farm-Forest 160+; Mixed Farm-Forest 20; Mixed Farm-Forest 40; Mixed Farm-Forest 80
- Parks & Open Space
- Public & Semi-public Uses

Legend

- UTM Grid Guideline
- Property Boundary
- City Limits (2018)
- Proposed Modeling Domain Extents
- Blanking Boundary

UTM N (m): 4978000, 4977000, 4976000, 4975000, 4974000, 4973000, 4972000, 4971000, 4970000, 4969000, 4968000

UTM E (m): 490000, 491000, 492000, 493000, 494000, 495000, 496000, 497000, 498000, 499000, 500000, 501000, 502000, 503000, 504000

0 1 2
Kilometers

Sources: Aerial photograph obtained from Esri ArcGIS Online. Zoning data obtained from the Oregon Dept. of Land Conservation and Development.

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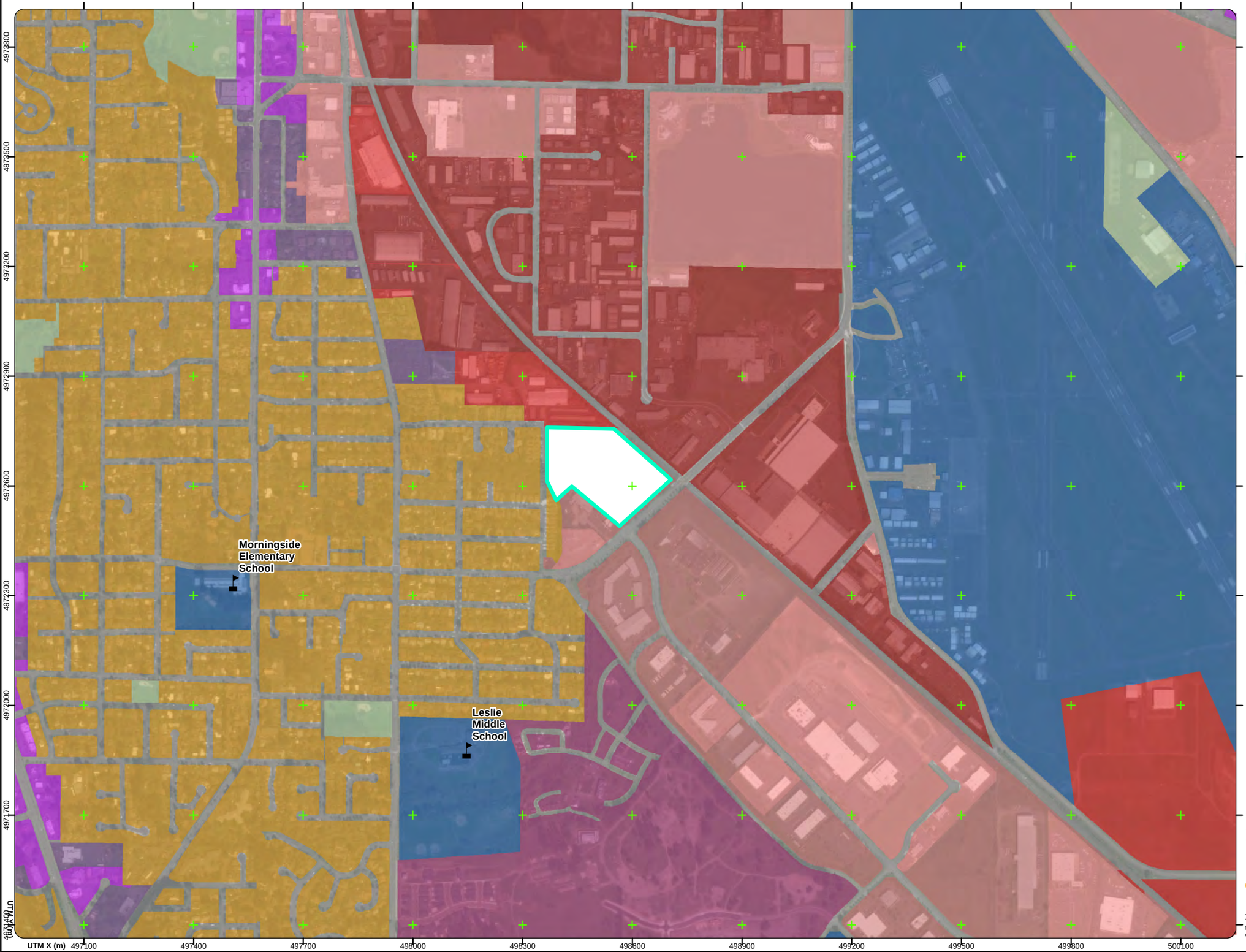
Path: X:\1831_01_PackagingCorpOfAmerica_02\GIS\Fig5-1_Existing_Land_Use.mxd
Project: 1831.01 Produced By: aguse Reviewed By: E. Bornhorst Print Date: 3/17/2021

Figure 5-2
Existing Land-Use Zoning Classifications in the Immediate Area

Packaging Corporation of America
Salem, OR



Legend

- UTM Grid Guideline
- Property Boundary
- Blanking Boundary

Oregon Statewide Zoning (2017)

- Commercial - General
- Commercial - Office
- Rural Commercial
- Industrial - Heavy
- Industrial - Light
- Industrial Campus
- Industrial Office
- Rural Industrial
- Rural Residential 1 acre; Rural Residential 10 acres; Rural Residential 2-4 acres; Rural Residential 5 acres
- Medium Low-density Res.
- Medium High-density Res.
- Future Urban Development
- Mixed-Use Com. & Res.
- Exclusive Farm Use
- Mixed Farm-Forest 160+; Mixed Farm-Forest 20; Mixed Farm-Forest 40; Mixed Farm-Forest 80
- Parks & Open Space
- Public & Semi-public Uses

0 100 200
Meters

Sources: Aerial photograph obtained from Esri ArcGIS Online. Zoning data obtained from the Oregon Dept. of Land Conservation and Development.

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Path: X:\1831_01_PackagingCorpOfAmerica_002\GIS\Fig5-2_Existing_Land_Use_Immediate.mxd
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Reviewed By: E. Bornhorst
Produced By: aguse
Project: 1831.01

Figure 5-3
Exposure Categorization

Packaging Corporation of America
Salem, OR

Legend

- UTM Grid Guideline
- Property Boundary
- Blanking Boundary
- Proposed Modeling Domain Extents

Proposed Exposure Type Classification

- Residential
- Child
- Worker
- Acute-only

UTM Y (m): 4979000, 4975000, 4972000, 4969000

UTM X (m): 492000, 495000, 498000, 501000, 504000

0 1 2
Kilometers

Sources: Aerial photograph obtained from Esri ArcGIS Online.

1. Zoning data obtained from the Oregon Dept. of Land Conservation and Development.
2. Existing land use classifications revised to reflect one of the four risk-based concentration categories presented in Oregon Administrative Rule 340-245-8040 Table 4.
3. Non-taxlot land use areas (e.g., interstate right-of-way) will not be assessed for cancer or noncancer risk.

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Figure 5-4
Exposure Categorization in the Immediate Area

Packaging Corporation of America
Salem, OR

Morningside Elementary School

Leslie Middle School

Legend

- UTM Grid Guideline
- School Location (2015-16)
- Property Boundary
- Blanking Boundary

Proposed Exposure Type Classification

- Residential
- Child
- Worker
- Acute-only

UTM Y (m): 4973800, 4973500, 4973200, 4972900, 4972600, 4972300, 4972000, 4971700, 4971400

UTM X (m): 497100, 497400, 497700, 498000, 498300, 498600, 498900, 499200, 499500, 499800, 500100

0 100 200
Meters

Sources: Aerial photograph obtained from Esri ArcGIS Online.
Zoning data obtained from the Oregon Dept. of Land Conservation and Development.
Existing land use classifications revised to reflect one of the four risk-based concentration categories presented in Oregon Administrative Rule 340-245-8040 Table 4.
Non-taxlot land use areas (e.g., interstate right-of-way) will not be assessed for cancer or noncancer risk.

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