CLEANER AIR OREGON—
RISK ASSESSMENT WORK PLAN

ROSEBURG FOREST PRODUCTS
MEDFORD, OREGON

Prepared for

OREGON DEPARTMENT OF ENVIRONMENTAL QUALITY

June 9, 2020 (Revised November 16, 2021)

Project No. 1419.12.02

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ACRONYMS AND ABBREVIATIONS

CAO	Cleaner Air Oregon
DEQ	Oregon Department of Environmental Quality
facility	medium density fiberboard manufacturing facility located at 2685 North Pacific Highway in Medford, Oregon
MFA	Maul Foster & Alongi, Inc.
OAR	Oregon Administrative Rule
RAL	risk action level
RAWP	Level 3 Risk Assessment work plan
RBC	risk-based concentration
RCO	regenerative catalytic oxidizer
RFP	Roseburg Forest Products
TAC	toxic air contaminant
TEU	toxic emissions unit

1 INTRODUCTION

Roseburg Forest Products (RFP) owns and operates a medium-density fiberboard manufacturing facility located at 2685 North Pacific Highway in Medford, Oregon (the "facility"). The facility currently operates under Title V Operating Permit No. 15-0073-TV-01 issued by the Oregon Department of Environmental Quality (DEQ) on June 8, 2017.

Thus far, RFP has completed the Cleaner Air Oregon (CAO) permitting program requirements presented in Table 1-1. Each completed requirement is presented with the date of RFP submittal and the corresponding date of DEQ approval. Subsequent to the DEQ approval dates in Table 1-1 below, an updated TAC emissions inventory and modeling protocol were submitted to the DEQ on November 16, 2021 due to new source test data for the regenerative catalytic oxidizer (RCO) stack. Other than the updated dates in Table 1-1, no further revisions are necessary for this updated Level 3 Risk Assessment work plan (RAWP).

Table 1-1. CAO Process Step Submittals and Approvals

CAO Requirement	RFP Submittal Date	DEQ Approval Date
CAO Emissions Inventory	May 30, 2019 (Revised November 16, 2021)	January 8, 2020
CAO Modeling Protocol	*February 6, 2020* *(Revision 1—May 15, 2020)* (Revision 2—February 26, 2021) (Revision 3—November 16, 2021)	May 28, 2020

RFP has retained Maul Foster & Alongi, Inc. (MFA) to assist the facility with the dispersion modeling and risk assessment component of the CAO permitting process. RFP intends to conduct a Level 3 Risk Assessment to estimate the potential excess cancer risk and chronic and acute noncancer risk (expressed numerically as the chronic and acute hazard index) impacts from the facility for comparison to the applicable risk action levels (RAL) shown in Oregon Administrative Rule (OAR) OAR 340-245-8010 Table 1.

The remainder of this RAWP outlines the proposed methodology for completing the Level 3 Risk Assessment for the facility and presents specific information required by OAR-340-245-0210(2). In order to avoid duplicating efforts, CAO modeling protocol sections relevant to the RAWP are directly referenced where applicable. This revision reflects RFP's response to comments supplied by the DEQ.

2 CONCEPTUAL SITE MODEL

Sections 2 and 3 of the CAO modeling protocol discusses the facility location, process description, toxic emission units (TEUs), and toxic air contaminant (TAC) emission estimates to satisfy the requirements set forth under OAR 340-245-0210(2)(a).

2.1 Gas Combustion TEUs

The specific procedures for assessing the risk of each TEU is dependent on the TEU designation per OAR 340-245-0050(4). Per OAR 340-245-0050(5), the gas combustion "exemption applies to TEUs that solely combust natural gas, propane, [or] liquefied petroleum gas." The following TEUs represent sources of natural gas-fired combustion emissions only (shown with the corresponding dispersion model ID in parentheses):

- Boiler 4 natural gas-fired combustion (BLR_NG)
- Dryer nos. 2 and 3 natural gas-fired combustion (DRY_NG)
- RCO natural gas-fired combustion (RCO_NG)

Dispersion model IDs are presented in Tables 3-1 through 3-4 of the CAO modeling protocol with applicable TAC-approved annual and daily emission rates. RFP will separately determine risk at each exposure location from Gas Combustion TEUs.

Per supporting documentation for the United States Environmental Protection Agency National Emissions Inventory from 2011[1], four percent of chromium emitted during natural gas combustion is in the hexavalent form. As a result, RFP will issue a revision to the approved CAO emissions inventory, accounting for the four percent hexavalent chromium emission rate, with the submittal of the final Risk Assessment Report.

2.2 Aggregated TEUs

A Level 3 Risk Assessment will be conducted that includes all facility TEUs other than those qualifying under the gas combustion TEU exemption. This assessment will be used to determine whether the facility exceeds the source permit RAL (i.e., de minimis source determination) per OAR 340-245-0050(7). After completion of the Level 3 Risk Assessment, if it is determined that one or more of the assessed cancer or noncancer facility risks exceed the source permit RAL, RFP will determine which, if any, TEUs at the facility may be collectively grouped into the Aggregated TEU category. Aggregated TEU "means all of a source's TEUs that are identified by an owner or operator with total cumulative risk less than the Aggregate TEU Level" per OAR 340-245-0020(8). For existing sources, the cancer Aggregate TEU RAL is equal to an excess lifetime cancer risk of 2.5-in-one-million,

[1] USEPA. 2011 National Emissions Inventory, version 2 Technical Support Document. August 2015.

and the noncancer Aggregate TEU RAL is equal to a hazard index of 0.1, as established under OAR 340-245-8010 Table 1.

Cancer and noncancer risks will be reported separately for Gas Combustion, Aggregated TEUs (if any), and Significant TEUs (if any). Risks associated with Aggregated TEUs will be compared with the applicable Aggregated TEU RALs. For compliance demonstration, only calculated risks associated with Significant TEUs will be compared with the applicable RALs.

3 EXPOSURE ASSESSMENT

3.1 Land-Use Zoning Classification—Exposure Types

Section 4 of the CAO modeling protocol provides details relevant to the exposure assessment, including the dispersion modeling approach to estimate TAC concentrations at exposure locations and the corresponding exposure type classifications to satisfy the requirements under OAR 340-245-0210(2)(b).

3.2 Exposure Pathways

A Level 3 Risk Assessment is proposed in this RAWP. It is assumed that cancer and noncancer risk (i.e., chronic and acute hazard index) resulting from facility TEUs will not have additional exposure pathways (i.e., ingestion or injection) other than those already accounted for in each published risk-based concentration (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. Since no additional exposure pathways have been observed, a Level 4 Risk Assessment is not warranted.

4 RISK CHARCTERIZATION

4.1 Risk-Based Concentrations

Excess cancer risk and chronic and acute noncancer risk will be assessed using the most current RBCs available as shown in OAR 340-245-8040 Table 4. The TACs from the approved CAO emissions inventory and corresponding RBCs to be included in the Level 3 Risk Assessment are presented in Table 4-1 (attached).

4.2 Risk Estimates

As described in section 4.4 of the CAO modeling protocol, a single dispersion model will be executed using a unit emission rate of 1 gram per second (g/s) for each TEU for both the 24-hour and annual averaging periods. The maximum modeled unit concentration in micrograms per cubic meter ($\mu g/m^3$) for each averaging period will be considered a "dispersion factor" with units of $\mu g/m^3$ per g/s per exposure location.

Risk estimates will be determined for each TEU by multiplying this dispersion factor by the TAC-specific emission rate (g/s) presented in the approved CAO emission inventory to produce a maximum predicted model concentration for a specific TAC. The maximum predicted model concentration for a specific TAC will be divided by the appropriate RBC. The resulting risk for all TACs will be summed for each TEU. For all TEUs at each exposure location, the calculated risks will be summed to obtain the total excess cancer risk, the total chronic noncancer hazard index, and the total acute noncancer hazard index for the facility. RFP is not proposing to assess noncancer risk by calculating separate hazard indices per noncancer target organ.

4.2.1 Example Calculation—Level 3 Risk Assessment

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

Equation 1.

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

Equation 2.

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

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

4.3 Revised Noncancer Risk Action Levels

The Environmental Quality Commission adopted new CAO hazard index rules on April 24, 2020. The new hazard index rules identify certain TACs that may have developmental, reproductive, respiratory, or other noncancer severe health effects and set new RALs for these TACs. The noncancer hazard index RALs for existing facilities, both before and after issuance of the new hazard index rules, are presented in Table 4-2. The new hazard index rules do not affect cancer risk determinations.

Table 4-2. Revisions to the Noncancer Hazard Index Risk Action Levels

Risk Action Levels For Existing Sources	Noncancer Hazard Index	
	Before Issuance	After Issuance
Aggregate TEU Level	0.1	0.1
Source Permit Level	0.5	0.5
Community Engagement Level	1	1
TBACT Level	5	5[(a)] or 3[(b)] or Risk Determination Ratio of >1[(c)]
Risk Reduction Level	10	10[(a)] or 6[(b)] or Risk Determination Ratio of 2[(c)]
Immediate Curtailment Level	20	20[(a)] or 12[(b)] or Risk Determination Ratio of 4[(c)]

(a) If all TACs emitted by the source are identified as hazard index of 5 in OAR 340-245-8030, Table 3, and OAR 340-245-8040, Table 4.

(b) If all TACs emitted by the source are identified as hazard index of 3 in OAR 340-245-8030, Table 3, and OAR 340-245-8040, Table 4.

(c) If TACs emitted by the source include contaminants listed as both hazard index of 3 and 5 in OAR 340-245- 8030, Table 3, and OAR 340-245-8040, Table 4, and a Risk Determination Ratio is required to be calculated under OAR 340-245-0200.

The calculation of the risk determination ratio is required when facilities emit a mixture of TACs assigned noncancer TBACT RALs of both a hazard index of 3 and a hazard index of 5, as identified in OAR 340-245-8030, Table 3 and OAR 340-245-8040, Table 4. The risk determination ratio formula under OAR 340-245-0200(5) is presented below in Equation 3.

Equation 3.

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

As shown in the approved CAO 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, respectively. As a result, if the estimated facility chronic and acute noncancer risk is greater than the Community Engagement RAL, the risk determination ratio will be determined per Equation 3.

5 UNCERTAINTY ANALYSIS

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

Acute Assessments:

- To assess acute noncancer risk (i.e., acute hazard index), the full 24-hour exposure duration will be assumed. While it is unlikely a person would be at most of the proposed exposure locations for 24 consecutive hours, this method will provide a worst-case potential exposure duration for an individual at these locations. For example, if an employee at an identified acute

exposure location only works a single, eight-hour shift, the exposure would only be a third of what is being assumed in the proposed Level 3 Risk Assessment. **Hence, the proposed Level 3 Risk Assessment likely overestimates acute noncancer risk due to the 24-hour exposure duration assumption.**

- The Level 3 Risk Assessment will be conducted assuming each TEU at the facility is operating at maximum design capacity for 24 hours, simultaneously. For example, the boiler typically does not 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 proposed 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 extremely unlikely that these infrequent meteorological conditions would occur at the same time that the facility is simultaneously operating all TEUs at maximum capacity. **Therefore, the proposed Level 3 Risk Assessment likely overestimates acute noncancer risk because of the improbability of facility operations at maximum capacity aligning with worst-case meteorological conditions.**

- Dispersion modeling will be 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 five-year period of hourly meteorological 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 all TEUs at the facility. For example, the highest predicted concentration for the RCO 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 Board Cooler 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 meteorological dataset. **Therefore, the proposed Level 3 Risk Assessment likely overestimates acute noncancer risk because it is unlikely that that the highest predicted concentration from each TEU occurs at every exposure location the on the same day.**

<u>Cancer and Chronic Noncancer Assessments:</u>

- 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).

Therefore, the proposed Level 3 Risk Assessment will overestimate cancer and chronic noncancer risk due to the unrealistic exposure duration assumption.

- The excess cancer and chronic noncancer risk assessments will be performed assuming that all TEUs operate for the course of the calendar year at their maximum operational capacities. It is physically impossible that the facility could operate several of its TEUs at maximum capacity for an entire year without shutdown time for maintenance and cleaning of equipment, such as the boiler or flash tube dryers. **Therefore, the proposed Level 3 Risk Assessment will overestimate cancer and chronic noncancer risk due to the overestimation of emissions resulting from continuous maximum capacity facility operation.**

All Assessments:

- Only excess cancer risk and chronic and acute noncancer hazard index from TACs that have RBCs published by the DEQ will be assessed. 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 proposed Level 3 Risk Assessment may not accurately assess cancer and/or noncancer risk associated with those TACs that do not yet 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 CLOSING

MFA looks forward to working with the DEQ through the CAO permit application process. If there are any questions or comments regarding this risk assessment work plan, please contact Brian Snuffer Zukas at (971) 254-8077.

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 4–1
Applicable Risk-Based Concentrations
Roseburg Forest Products—Medford, Oregon

Toxic Air Contaminant	CAS	RBC? (Yes/No)	Noncancer TBACT RAL [1]	Risk-Based Concentration [1] (µg/m³)						
				Residential Chronic		Non-Residential Chronic				Acute
				Cancer	Noncancer	Child Cancer	Child Noncancer	Worker Cancer	Worker Noncancer	Noncancer
1,1,1-Trichloroethane (methyl chloroform)	71-55-6	Yes	HI3	--	5,000	--	22,000	--	22,000	11,000
1,2-Dichloropropane (propylene dichloride)	78-87-5	Yes	HI3	--	4.00	--	18.0	--	18.0	230
Acetaldehyde	75-07-0	Yes	HI3	0.45	140	12.0	620	5.50	620	470
Acetophenone	98-86-2	No	--	--	--	--	--	--	--	--
Acrolein	107-02-8	Yes	HI5	--	0.35	--	1.50	--	1.50	6.90
Benzene	71-43-2	Yes	HI3	0.13	3.00	3.30	13.0	1.50	13.0	29.0
Bromomethane (methyl bromide)	74-83-9	Yes	HI3	--	5.00	--	22.0	--	22.0	3,900
n-Butyl alcohol (1-Butanol)	71-36-3	No	--	--	--	--	--	--	--	--
Carbon tetrachloride	56-23-5	Yes	HI3	0.17	100	4.30	440	2.00	440	1,900
Chlorine	7782-50-5	Yes	HI3	--	0.15	--	0.66	--	0.66	170
Chlorobenzene	108-90-7	Yes	HI3	--	50.0	--	220	--	220	--
Chloroform	67-66-3	Yes	HI3	--	300	--	1,300	--	1,300	490
Chloromethane (methyl chloride)	74-87-3	Yes	HI3	--	90.0	--	400	--	400	1,000
Crotonaldehyde	4170-30-3	No	--	--	--	--	--	--	--	--
Cumene	98-82-8	Yes	HI3	--	400	--	1,800	--	1,800	--
Diethylphthalate	84-66-2	No	--	--	--	--	--	--	--	--
Dibutyl phthalate	84-74-2	No	--	--	--	--	--	--	--	--
Ethylbenzene	100-41-4	Yes	HI3	0.40	260	10.0	1,100	4.80	1,100	22,000
Ethylene glycol monobutyl ether	111-76-2	Yes	HI3	--	82.0	--	360	--	360	29,000
Formaldehyde	50-00-0	Yes	HI3	0.17	9.00	4.30	40.0	2.00	40.0	49.0
Hexane	110-54-3	Yes	HI3	--	700	--	3,100	--	3,100	--
Hydrochloric acid	7647-01-0	Yes	HI3	--	20.0	--	88.0	--	88.0	2,100
Hydrogen fluoride	7664-39-3	Yes	HI3	--	2.10	--	19.0	--	19.0	16.0
Isopropyl alcohol (isopropanol)	67-63-0	Yes	HI3	--	200	--	880	--	880	3,200
Methanol	67-56-1	Yes	HI3	--	4,000	--	18,000	--	18,000	28,000
Methyl ethyl ketone	78-93-3	Yes	HI3	--	5,000	--	22,000	--	22,000	5,000
Methyl isobutyl ketone	108-10-1	Yes	HI3	--	3,000	--	13,000	--	13,000	--
Methylene diphenyl diisocyanate (MDI)	101-68-8	Yes	HI3	--	0.080	--	0.35	--	0.35	12.0
Dichloromethane (methylene chloride)	75-09-2	Yes	HI3	59.0	600	620	2,600	1,200	2,600	2,100
Phenol	108-95-2	Yes	HI3	--	200	--	880	--	880	5,800
Propionaldehyde	123-38-6	Yes	HI5	--	8.00	--	35.0	--	35.0	--
Propylene	115-07-1	Yes	HI5	--	3,000	--	13,000	--	13,000	--
Propylene glycol monomethyl ether	107-98-2	Yes	HI3	--	7,000	--	31,000	--	31,000	--
Styrene	100-42-5	Yes	HI3	--	1,000	--	4,400	--	4,400	21,000
Toluene	108-88-3	Yes	HI3	--	5,000	--	22,000	--	22,000	7,500
Xylenes	1330-20-7	Yes	HI3	--	220	--	970	--	970	8,700
Antimony and compounds	7440-36-0	Yes	HI3	--	0.30	--	1.30	--	1.30	1.00
Arsenic and compounds	7440-38-2	Yes	HI3	2.4E-05	1.7E-04	1.3E-03	2.4E-03	6.2E-04	2.4E-03	0.20
Barium and compounds	7440-39-3	No	--	--	--	--	--	--	--	--
Beryllium and compounds	7440-41-7	Yes	HI3	4.2E-04	7.0E-03	0.011	0.031	5.0E-03	0.031	0.020
Cadmium and compounds	7440-43-9	Yes	HI3	5.6E-04	5.0E-03	0.014	0.037	6.7E-03	0.037	0.030
Chromium and compounds	7440-47-3	No	--	--	--	--	--	--	--	--
Chromium VI	18540-29-9	Yes	HI3	3.1E-05	0.083	5.2E-04	0.88	1.0E-03	0.88	0.30
Cobalt and compounds	7440-48-4	Yes	HI3	--	0.10	--	0.44	--	0.44	--
Copper and compounds	7440-50-8	Yes	HI3	--	--	--	--	--	--	100
Lead and compounds	7439-92-1	Yes	HI3	--	0.15	--	0.66	--	0.66	0.15
Manganese and compounds	7439-96-5	Yes	HI3	--	0.090	--	0.40	--	0.40	0.30
Mercury and compounds	7439-97-6	Yes	HI3	--	0.077	--	0.63	--	0.63	0.60
Molybdenum trioxide	1313-27-5	No	--	--	--	--	--	--	--	--
Nickel and compounds	7440-02-0	Yes	HI3	3.8E-03	0.014	0.10	0.062	0.046	0.062	0.20
Phosphorus and compounds	7723-14-0	No	--	--	--	--	--	--	--	--
Selenium and compounds	7782-49-2	Yes	HI3	--	--	--	--	--	--	2.00
Silver and compounds	7440-22-4	No	--	--	--	--	--	--	--	--
Vanadium (fume or dust)	7440-62-2	Yes	HI3	--	0.10	--	0.44	--	0.44	0.80
Zinc and compounds	7440-66-6	No	--	--	--	--	--	--	--	--
Acenaphthene	83-32-9	No	--	--	--	--	--	--	--	--
Acenaphthylene	208-96-8	No	--	--	--	--	--	--	--	--
Anthracene	120-12-7	No	--	--	--	--	--	--	--	--
Benzo(a)anthracene	56-55-3	Yes	--	2.1E-04	--	7.8E-03	--	0.015	--	--
Benzo(a)pyrene	50-32-8	Yes	HI3	4.3E-05	2.0E-03	1.6E-03	8.8E-03	3.0E-03	8.8E-03	2.0E-03
Benzo(b)fluoranthene	205-99-2	Yes	--	5.3E-05	--	2.0E-03	--	3.8E-03	--	--
Benzo(e)pyrene	192-97-2	No	--	--	--	--	--	--	--	--
Benzo(g,h,i)perylene	191-24-2	Yes	--	4.7E-03	--	0.17	--	0.34	--	--
Benzo(j)fluoranthene	205-82-3	Yes	--	1.4E-04	--	5.2E-03	--	0.010	--	--
Benzo(k)fluoranthene	207-08-9	Yes	--	1.4E-03	--	0.052	--	0.10	--	--
Chrysene	218-01-9	Yes	--	4.3E-04	--	0.016	--	0.030	--	--
Dibenzo(a,h)anthracene	53-70-3	Yes	--	4.3E-06	--	1.6E-04	--	3.0E-04	--	--
Fluoranthene	206-44-0	Yes	--	5.3E-04	--	0.020	--	0.038	--	--
Fluorene	86-73-7	No	--	--	--	--	--	--	--	--
Indeno(1,2,3,c,d)pyrene	193-39-5	Yes	--	6.1E-04	--	0.022	--	0.043	--	--
2-Methyl naphthalene	91-57-6	No	--	--	--	--	--	--	--	--
Naphthalene	91-20-3	Yes	HI3	0.029	3.70	0.76	16.0	0.35	16.0	200
Perylene	198-55-0	No	--	--	--	--	--	--	--	--
Phenanthrene	85-01-8	No	--	--	--	--	--	--	--	--
Pyrene	129-00-0	No	--	--	--	--	--	--	--	--
2,3,7,8-Tetrachlorodibenzo-p-dioxin	1746-01-6	Yes	HI3	1.0E-09	1.3E-07	9.0E-08	2.6E-05	4.2E-08	2.6E-05	--
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	40321-76-4	Yes	HI3	1.0E-09	1.3E-07	9.0E-08	2.6E-05	4.2E-08	2.6E-05	--
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	39227-28-6	Yes	HI3	1.0E-08	1.3E-06	9.0E-07	2.6E-04	4.2E-07	2.6E-04	--
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	57653-85-7	Yes	HI3	1.0E-08	1.3E-06	9.0E-07	2.6E-04	4.2E-07	2.6E-04	--
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	19408-74-3	Yes	HI3	1.0E-08	1.3E-06	9.0E-07	2.6E-04	4.2E-07	2.6E-04	--
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	35822-46-9	Yes	HI3	1.0E-07	1.3E-05	9.0E-06	2.6E-03	4.2E-06	2.6E-03	--
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin	3268-87-9	Yes	HI3	3.4E-06	4.2E-04	3.0E-04	0.085	1.4E-04	0.085	--
2,3,7,8-Tetrachlorodibenzofuran	51207-31-9	Yes	HI3	1.0E-08	1.3E-06	9.0E-07	2.6E-04	4.2E-07	2.6E-04	--
1,2,3,7,8-Pentachlorodibenzofuran	57117-41-6	Yes	HI3	3.4E-08	4.2E-06	3.0E-06	8.5E-04	1.4E-06	8.5E-04	--
2,3,4,7,8-Pentachlorodibenzofuran	57117-31-4	Yes	HI3	3.4E-09	4.2E-07	3.0E-07	8.5E-05	1.4E-07	8.5E-05	--
1,2,3,4,7,8-Hexachlorodibenzofuran	70648-26-9	Yes	HI3	1.0E-08	1.3E-06	9.0E-07	2.6E-04	4.2E-07	2.6E-04	--
1,2,3,6,7,8-Hexachlorodibenzofuran	57117-44-9	Yes	HI3	1.0E-08	1.3E-06	9.0E-07	2.6E-04	4.2E-07	2.6E-04	--
1,2,3,7,8,9-Hexachlorodibenzofuran	72918-21-9	Yes	HI3	1.0E-08	1.3E-06	9.0E-07	2.6E-04	4.2E-07	2.6E-04	--
2,3,4,6,7,8-Hexachlorodibenzofuran	60851-34-5	Yes	HI3	1.0E-08	1.3E-06	9.0E-07	2.6E-04	4.2E-07	2.6E-04	--
1,2,3,4,6,7,8-Heptachlorodibenzofuran	67562-39-4	Yes	HI3	1.0E-07	1.3E-05	9.0E-06	2.6E-03	4.2E-06	2.6E-03	--
1,2,3,4,7,8,9-Heptachlorodibenzofuran	55673-89-7	Yes	HI3	1.0E-07	1.3E-05	9.0E-06	2.6E-03	4.2E-06	2.6E-03	--
1,2,3,4,6,7,8,9-Octachlorodibenzofuran	39001-02-0	Yes	HI3	3.4E-06	4.2E-04	3.0E-04	0.085	1.4E-04	0.085	--

REFERENCE:

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

Table 5–1
List of TACs With No Published Risk-Based Concentrations
Roseburg Forest Products—Medford, Oregon

Toxic Air Contaminant [1]	CAS	Risk-Based Concentration? [2] (Yes/No)
Acetophenone	98-86-2	No
n-Butyl alcohol (1-Butanol)	71-36-3	No
Crotonaldehyde	4170-30-3	No
Diethylphthalate	84-66-2	No
Dibutyl phthalate	84-74-2	No
Barium and compounds	7440-39-3	No
Molybdenum trioxide	1313-27-5	No
Phosphorus and compounds	7723-14-0	No
Silver and compounds	7440-22-4	No
Zinc and compounds	7440-66-6	No
Acenaphthene	83-32-9	No
Acenaphthylene	208-96-8	No
Anthracene	120-12-7	No
Benzo(e)pyrene	192-97-2	No
Fluorene	86-73-7	No
2-Methyl naphthalene	91-57-6	No
Perylene	198-55-0	No
Phenanthrene	85-01-8	No
Pyrene	129-00-0	No

REFERENCES:

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

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