

Cleaner Air Oregon

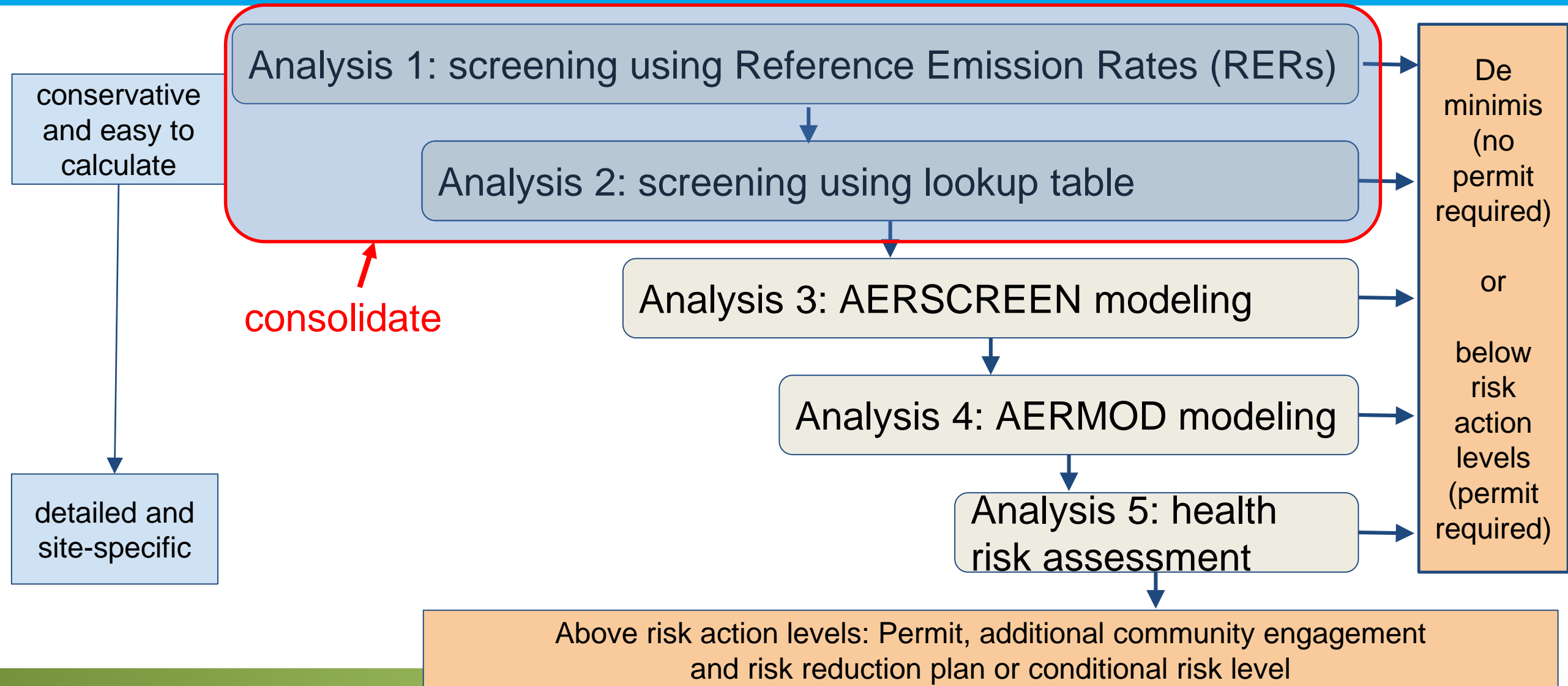
REFORMING OREGON'S INDUSTRIAL AIR QUALITY REGULATIONS

Inviting Oregonians to help create new regulations that protect what we all care about: the health of our people and our planet, and the economic vitality of our communities.

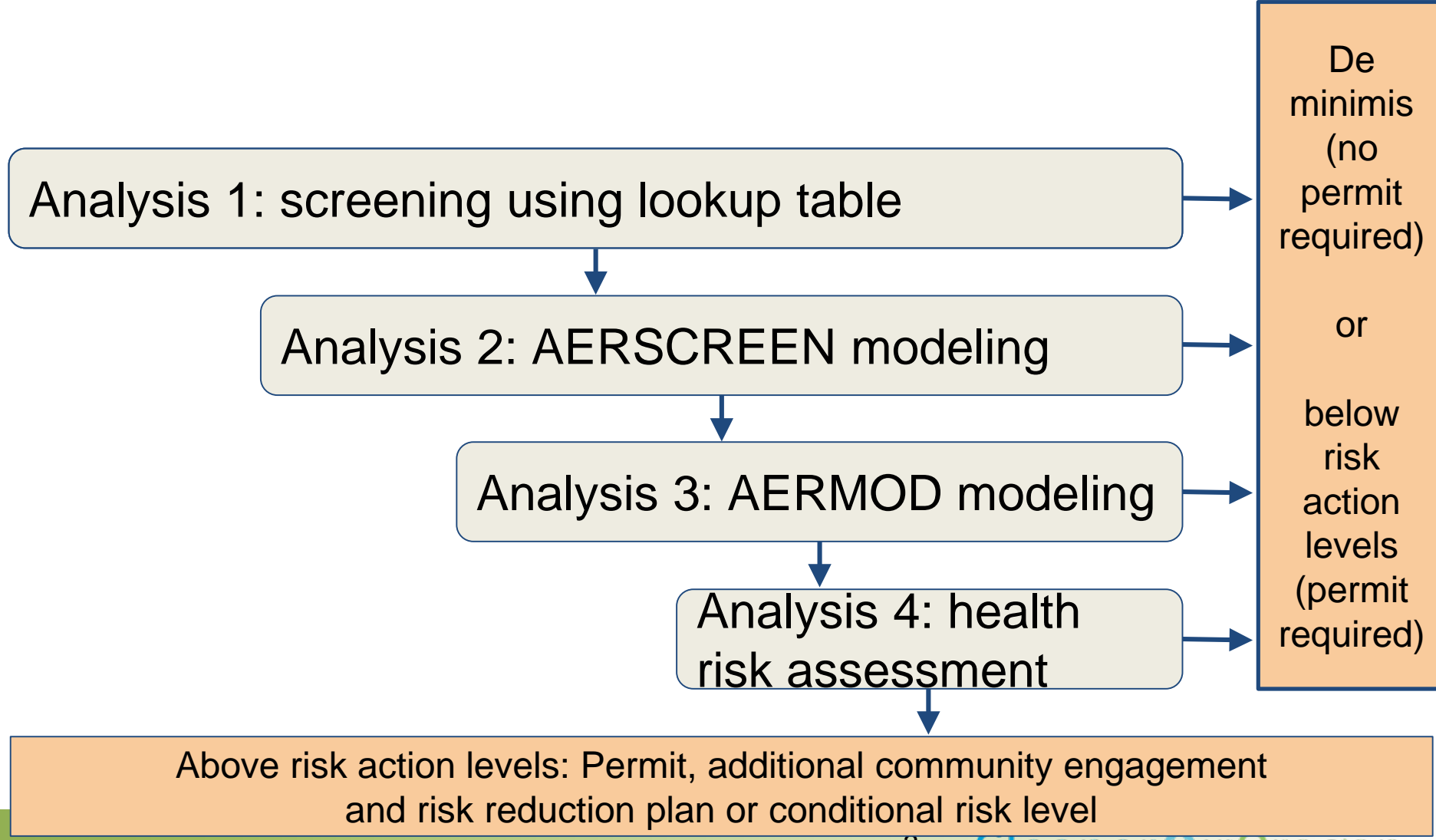
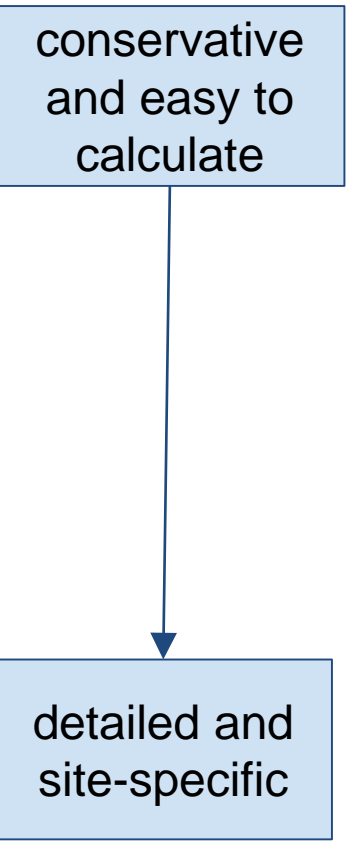
Combining the RERs and lookup table screening steps

Joe Westersund, DEQ

Screening process proposal- June



Screening process proposal- new



Why make this change?

- Estimating risk with the lookup table
 - Gives the same results as RERs if little information known
 - Is more accurate than RERs if some parameters known
 - Makes assumptions more transparent

About the lookup table

- A table of dispersion factors
 - Estimates how concentrations decrease as air travels away from a stack
 - Converts emissions at the stack (lbs/year or lbs/day) to an air concentration ($\mu\text{g}/\text{m}^3$) some distance out
- Created by DEQ using AERMOD modeling
 - Model results averaged across Portland, Salem, Eugene, Medford, Redmond, and Hermiston meteorology
 - Uses defaults for building dimensions, stack diameter etc

When lookup table doesn't apply

- The lookup table can't be used in some cases, such as
 - Complex topography
 - Fugitive emissions
- In those cases, facilities would need to use AERSCREEN or AERMOD instead of the lookup table

Parts of the lookup table

See last page of Discussion Draft Rules Tables

Table 6A: Dispersion Factors for Annual Exposure ($\mu\text{g}/\text{m}^3$ / pounds/year)

Stack Ht (m)	50	60	70	80	90	100	110	120	130	140	150	160	170
5	0.0033	0.0026	0.0021	0.0017	0.0014	0.0012	0.0010	0.00088	0.00076	0.00066	0.00058	0.00051	0.00046
10	0.0014	0.0012	0.0011	0.00094	0.00084	0.00075	0.00068	0.00062	0.00057	0.00052	0.00048	0.00044	0.00041
15	0.00075	0.00061	0.00054	0.00049	0.00044	0.00040	0.00037	0.00034	0.00031	0.00029	0.00027	0.00025	0.00024
20	0.00072	0.00054	0.00035	0.00031	0.00028	0.00026	0.00023	0.00022	0.00020	0.00019	0.00017	0.00015	0.00013
25	0.00050	0.00041	0.00035	0.00025	0.00019	0.00018	0.00016	0.00015	0.00014	0.00013	0.00012	0.00012	0.00011

Table 6A: Dispersion Factors for Annual Exposure ($\mu\text{g}/\text{m}^3$ / pounds/year)

Stack Ht (m)	50	60	70	80	90	100	110	120	130	140	150
5	0.0033	0.0026	0.0021	0.0017	0.0014	0.0012	0.0010	0.00088	0.00076	0.00066	0.00058
10	0.0014	0.0012	0.0011	0.00094	0.00084	0.00075	0.00068	0.00062	0.00057	0.00052	0.00048
15	0.00075	0.00061	0.00054	0.00049	0.00044	0.00040	0.00037	0.00034	0.00031	0.00029	0.00027
20	0.00072	0.00054	0.00035	0.00031	0.00028	0.00026	0.00023	0.00022	0.00020	0.00019	0.00017
25	0.00050	0.00041	0.00035	0.00025	0.00019	0.00018	0.00016	0.00015	0.00014	0.00013	0.00012

Table 6B: Dispersion Factors for 24 hour Exposure ($\mu\text{g}/\text{m}^3$ / pounds/day)

Stack Ht (m)	50	60	70	80	90	100	110	120	130	140	150	160	170
5	8.3	7.1	6.1	5.2	4.4	3.8	3.2	2.7	2.4	2.1	1.8	1.6	1.4
10	3.8	3.4	3.1	2.8	2.6	2.4	2.2	2.1	2.0	1.8	1.7	1.6	1.5
15	1.8	1.6	1.6	1.5	1.4	1.3	1.2	1.1	1.1	1.0	0.95	0.91	0.87
20	1.6	1.3	0.91	0.86	0.82	0.77	0.73	0.69	0.65	0.62	0.59	0.56	0.54
25	0.97	0.93	0.85	0.64	0.52	0.50	0.48	0.46	0.44	0.40	0.38	0.36	0.34

Table 6B: Dispersion Factors for 24 hour Exposure ($\mu\text{g}/\text{m}^3$ / pounds/day)

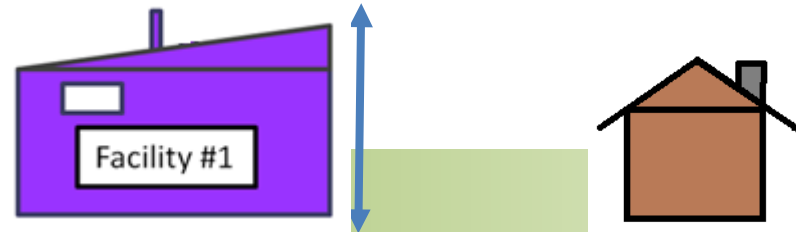
Stack Ht (m)	50	60	70	80	90	100	110	120	130	140	150
5	8.3	7.1	6.1	5.2	4.4	3.8	3.2	2.7	2.4	2.1	1.8
10	3.8	3.4	3.1	2.8	2.6	2.4	2.2	2.1	2.0	1.8	1.7
15	1.8	1.6	1.6	1.5	1.4	1.3	1.2	1.1	1.1	1.0	0.95
20	1.6	1.3	0.91	0.86	0.82	0.77	0.73	0.69	0.65	0.62	0.59
25	0.97	0.93	0.85	0.64	0.52	0.50	0.48	0.46	0.44	0.40	0.38

Use of dispersion factors in a Level 1 screening risk assessment:

For each Toxic Emissions Unit, select the appropriate stack height and distance to nearest exposure locations approved by DEQ. For each exposure location, find the corresponding annual dispersion factor in Table 6A. For each air toxic, multiply the annual air toxic emission rate (in pounds/year) by the dispersion factor. Divide the product by the RBC for all the air toxics for the appropriate exposure scenarios in OAR 340-245-8050 Table 5. Add up the resulting ratios for all Toxic Emissions Units. Compare the results with the Risk Action Levels in OAR 340-245-8010 Table 1. Repeat the process for daily emission rates (in pounds/day) using Table 6B at the acute exposure location.

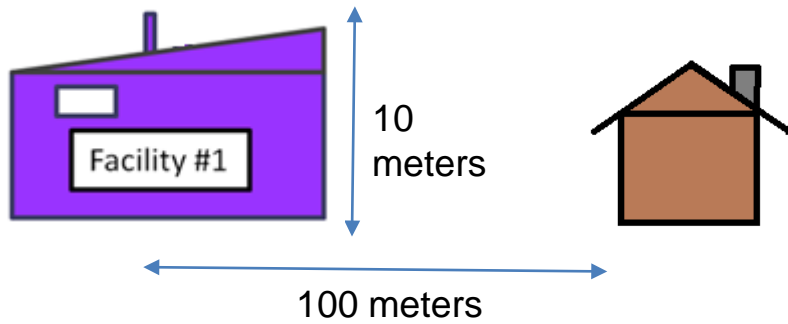
For a stack height between the values shown in the table, either use the next lowest stack height, or interpolate the dispersion factor.

In the absence of a known stack height and exposure location distance, use the annual dispersion factor (0.0033 $\mu\text{g}/\text{m}^3$ / pounds/year) and daily dispersion factor (8.3 $\mu\text{g}/\text{m}^3$ / pounds/day) for a stack height of 5 meters and a exposure location distance of 50 meters.



Lookup table example

- For a 10m stack, 100m from the nearest receptor



[Lookup table](#)

OAR 340-245-8060 Table 6
Level 1 Risk Assessment Tool
Dispersion Factors

Table 6A: Dispersion Factors for Annual Exposure ($\mu\text{g}/\text{m}^3$ / pounds/year)

Stack Ht (m)	Exposure Location Distance (meters)												
	50	60	70	80	90	100	110	120	130	140	150	160	
5	0.0033	0.0026	0.0021	0.0017	0.0014	0.0012	0.0010	0.00088	0.00076	0.00066	0.00058	0.00051	0.00045
10	0.0014	0.0012	0.0011	0.00094	0.00084	0.00075	0.00068	0.00062	0.00057	0.00052	0.00048	0.00043	0.00039
15	0.00075	0.00061	0.00054	0.00049	0.00044	0.00040	0.00037	0.00034	0.00031	0.00029	0.00027	0.00025	0.00023
20	0.00072	0.00054	0.00035	0.00031	0.00028	0.00026	0.00023	0.00022	0.00020	0.00019	0.00017	0.00016	0.00015
25	0.00050	0.00041	0.00035	0.00025	0.00019	0.00018	0.00016	0.00015	0.00014	0.00013	0.00012	0.00011	0.00010
30	0.00037	0.00030	0.00026	0.00023	0.00019	0.00013	0.00012	0.00011	0.00010	0.000096	0.000090	0.000085	0.000080
35	0.00030	0.00023	0.00019	0.00017	0.00015	0.00013	0.00011	0.000081	0.000075	0.000071	0.000068	0.000065	0.000062
40	0.00023	0.00019	0.00015	0.00013	0.00012	0.00011	0.000096	0.000081	0.000064	0.000054	0.000051	0.000048	0.000045
45	0.00018	0.00016	0.00013	0.00011	0.000095	0.000085	0.000078	0.000072	0.000063	0.000053	0.000042	0.000039	0.000036
50	0.00014	0.00013	0.00011	0.000090	0.000077	0.000068	0.000062	0.000057	0.000053	0.000048	0.000042	0.000036	0.000031

Stack Ht (m)	Exposure Location Distance (meters)											
	180	190	200	250	300	350	400	450	500	600	700	800
5	0.00041	0.00037	0.00034	0.00023	0.00017	0.00013	0.00010	0.000084	0.000071	0.000052	0.000040	0.000031
10	0.00038	0.00035	0.00033	0.00023	0.00017	0.00013	0.000098	0.000078	0.000064	0.000047	0.000036	0.000028

Lookup table example

- If stack height and receptor distance not known, use the most conservative values- top left corner
- This is equivalent to using RERs

OAR 340-245-8060 Table 6
Level 1 Risk Assessment Tool
Dispersion Factors

Table 6A: Dispersion Factors for Annual Exposure ($\mu\text{g}/\text{m}^3$ / pounds/year)

Stack Ht (m)	Exposure Location Distance (meters)											
	50	60	70	80	90	100	110	120	130	140	150	160
5	0.0033	0.0026	0.0021	0.0017	0.0014	0.0012	0.0010	0.00088	0.00076	0.00066	0.00058	0.00051
10	0.0014	0.0012	0.0011	0.00094	0.00084	0.00075	0.00068	0.00062	0.00057	0.00052	0.00048	0.00044
15	0.00075	0.00061	0.00054	0.00049	0.00044	0.00040	0.00037	0.00034	0.00031	0.00029	0.00027	0.00025
20	0.00072	0.00054	0.00035	0.00031	0.00028	0.00026	0.00023	0.00022	0.00020	0.00019	0.00017	0.00016
25	0.00050	0.00041	0.00035	0.00025	0.00019	0.00018	0.00016	0.00015	0.00014	0.00013	0.00012	0.00011
30	0.00037	0.00030	0.00026	0.00023	0.00019	0.00013	0.00012	0.00011	0.00010	0.000096	0.000090	0.000085
35	0.00030	0.00023	0.00019	0.00017	0.00015	0.00013	0.00011	0.000081	0.000075	0.000071	0.000068	0.000065
40	0.00023	0.00019	0.00015	0.00013	0.00012	0.00011	0.000096	0.000081	0.000064	0.000054	0.000051	0.000048
45	0.00018	0.00016	0.00013	0.00011	0.000095	0.000085	0.000078	0.000072	0.000063	0.000053	0.000042	0.000040
50	0.00014	0.00013	0.00011	0.000090	0.000077	0.000068	0.000062	0.000057	0.000053	0.000048	0.000042	0.000040

Stack Ht (m)	Exposure Location Distance (meters)											
	180	190	200	250	300	350	400	450	500	600	700	800
5	0.00041	0.00037	0.00034	0.00023	0.00017	0.00013	0.00010	0.000084	0.000071	0.000052	0.000040	0.000036
10	0.00038	0.00035	0.00033	0.00023	0.00017	0.00013	0.000098	0.000078	0.000064	0.000047	0.000036	0.000033
15	0.00033	0.00031	0.00029	0.00021	0.00016	0.00012	0.000092	0.000074	0.000061	0.000045	0.000034	0.000031
20	0.00029	0.00027	0.00025	0.00018	0.00014	0.00010	0.000076	0.000062	0.000050	0.000038	0.000029	0.000026
25	0.00025	0.00023	0.00021	0.00015	0.00011	0.00008	0.000064	0.000052	0.000041	0.000031	0.000023	0.000020
30	0.00021	0.00019	0.00017	0.00012	0.00009	0.00006	0.000048	0.000039	0.000029	0.000021	0.000015	0.000013
35	0.00018	0.00016	0.00014	0.00010	0.00007	0.00005	0.000036	0.000029	0.000021	0.000015	0.000010	0.000008
40	0.00015	0.00013	0.00011	0.00008	0.00005	0.00003	0.000024	0.000019	0.000014	0.000010	0.000007	0.000005
45	0.00012	0.00010	0.00009	0.00006	0.00004	0.00002	0.000016	0.000012	0.000009	0.000006	0.000004	0.000003
50	0.00010	0.00008	0.00007	0.00005	0.00003	0.00002	0.000014	0.000010	0.000007	0.000005	0.000003	0.000002

[Lookup table](#)

Risk calculation using dispersion factors

$$\text{cancer risk estimate} = \frac{\text{emissions}_{x,\text{annual}} * DF_{\text{annual}}}{RBC_{x,\text{cancer}}}$$

$$\text{noncancer chronic risk estimate} = \frac{\text{emissions}_{x,\text{annual}} * DF_{\text{annual}}}{RBC_{x,\text{noncancer chronic}}}$$

$$\text{noncancer acute risk estimate} = \frac{\text{emissions}_{x,\text{daily}} * DF_{\text{daily}}}{RBC_{x,\text{noncancer acute}}}$$

[Lookup table](#)

OAR 340-245-8060 Table 6
Level 1 Risk Assessment Tool
Dispersion Factors

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5	0.0033	0.0026	0.0021	0.0017	0.0014	0.0012	0.0010	0.00088	0.00076	0.00066	0.00055
10	0.0014	0.0012	0.0011	0.00094	0.00084	0.00075	0.00068	0.00062	0.00057	0.00052	0.00047



Questions?