

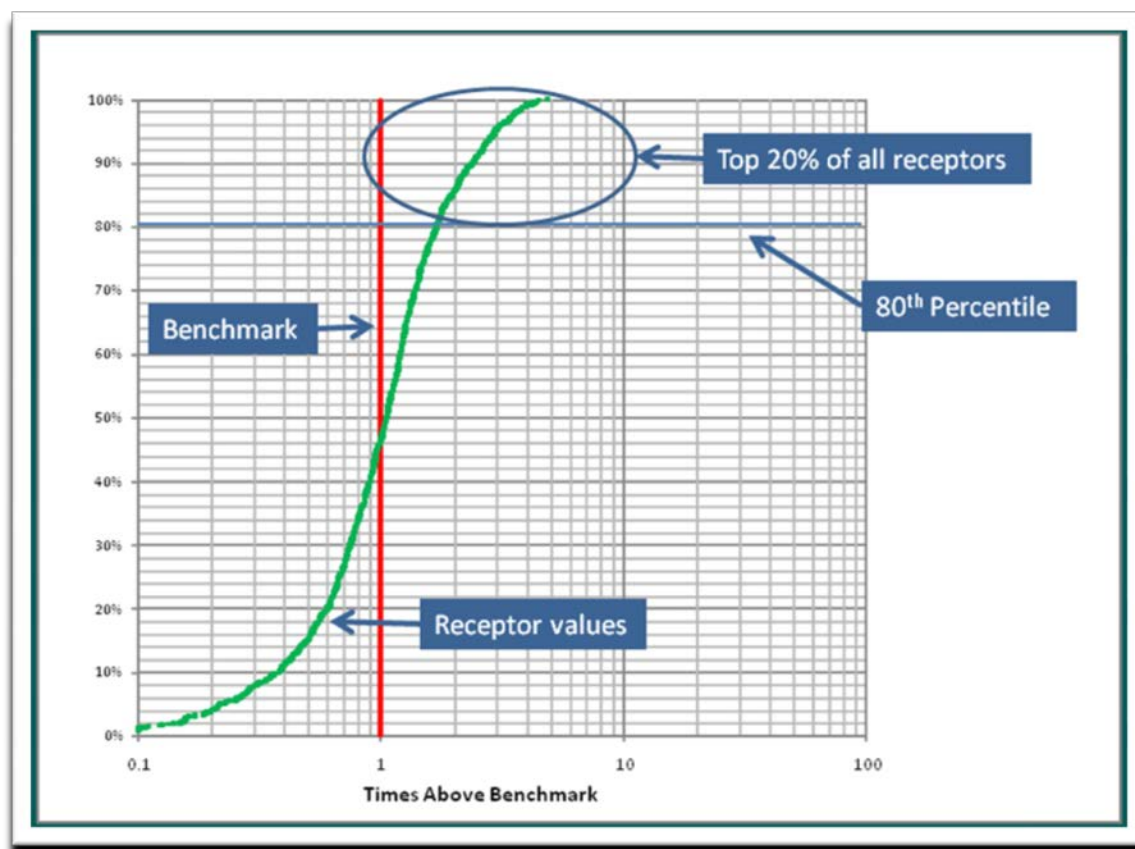
5. Emission Source Categories Ranked by Total Risk

DEQ sorted source categories by total risk based on area wide and localized impacts. This section describes the method and results of ranking source category emissions using total 2017 modeled risk. First, DEQ calculated total times above benchmark for all modeled source categories, which is described in section 5.1. In developing potential emission reduction strategies (described in the white papers in [section 7](#) and [Appendix 12.9](#)), DEQ broke the modeling categories down further, and in some cases combined the modeling categories. For example, the modeling source category of “on-road mobile” was divided into two white papers: on-road gasoline and on-road diesel, because the potential emission reduction strategies for each are very different. DEQ then calculated the total times above benchmark for white paper categories, which is described in section 5.2.

5.1 Method

To rank emission source categories based on total risk, DEQ used the 80th percentile times above benchmark for all emission source categories and all pollutants. DEQ used the 98th or top percentile of the metals unique to point sources. The method employed here for the ranking of source categories based on total risk is different from the approach used to set reduction targets for the individual toxic pollutants as described in [Section 4](#). Those toxic reduction targets were based on the average concentration of all receptors above the benchmark, not on a set percentile, for example the 80th percentile, of source category risk as used in the source category ranking. The S-curve in Figure 84 illustrates the percentile concept.

Figure 84: S Curve



The total risk rankings were developed for area and zonal sources using top 20% of receptors, which is consistent with the mobile and area source analysis. When DEQ analyzed emissions within 500 meters of roadways, the data set was almost the same as the 80th percentile.

Figure 85 shows the modeled source categories sorted against the times above benchmarks for all pollutants. Green shading and orange shading identify pollutants causing the highest risk, also known as risk driver pollutants. Rows in gray at the bottom of the table are for source categories that have a total risk less than 1.0, that is, concentrations that are below benchmarks. The large risk value for acrolein in the “Area Other” emission source category is from structural fires. In the PATS study area, there were 1,325 structural fires in 2005. A very small percentage of these are intentionally set for training purposes. The Portland Fire Department has approximately six practice burns per year. Since structural fires are not subject to emission control strategies, these emissions and concentrations could be included in background rather than considered as primary emissions.

Figure 85: Times above Benchmarks for 80th Percentile Receptors for Modeled Source Categories

Emission Source Category	Acetaldehyde	Acrolein	Butadiene	Formaldehyde	Naphthalene	Benzene	Dichlorobenzene	Diesel PM	Ethylbenzene	Trichloroethylene	Arsenic	Cadmium	Chromium	Lead	Manganese	Nickel	15 PAH	Total	Rank
RWC	0.32	0.77	1.30	3.93	1.53	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.75	37.60	1
On Road Mobile	0.48	0.75	11.80	3.90	1.16	3.89	0.00	3.04	0.85	0.00	2.50	0.00	1.65	0.00	0.00	0.01	4.44	34.48	2
Area Other*	0.08	10.36	0.01	1.60	3.31	0.90	0.00	1.81	0.11	0.00	0.68	0.52	0.00	0.00	0.00	0.03	4.49	23.89	3
Construction	0.15	0.19	0.12	1.85	0.02	0.32	0.00	8.75	0.04	0.00	0.21	0.00	0.00	0.00	0.00	0.00	0.73	12.38	4
NRM Other	0.13	0.21	0.97	0.95	0.30	1.62	0.00	4.05	0.23	0.00	0.13	0.00	0.04	0.00	0.00	0.00	1.93	10.55	5
Lawn & Garden	0.10	0.24	1.28	1.24	0.33	2.46	0.00	0.77	0.56	0.00	0.21	0.00	0.05	0.00	0.00	0.00	3.13	10.38	6
Solvent Use	0.00	0.00	0.00	0.05	3.48	0.82	2.20	0.00	0.68	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.32	7
Point	0.01	0.24	0.00	0.31	1.45	0.41	0.00	0.01	0.07	0.02	0.21	0.38	0.22	0.01	0.19	0.10	0.24	3.87	8
Airport	0.10	0.13	0.29	1.54	0.07	0.24	0.00	0.38	0.02	0.00	0.03	0.00	0.00	0.02	0.00	0.00	0.29	3.12	9
Rail	0.01	0.04	0.02	0.15	0.01	0.01	0.00	1.69	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.30	2.26	10
ROB	0.02	0.33	0.11	0.11	0.01	0.22	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.93	1.73	11
Marine	0.01	0.01	0.02	0.12	0.03	0.08	0.00	0.19	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.03	0.53	12
Gas Stations	0.00	0.00	0.00	0.00	0.06	0.15	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.27	13
POTW	0.00	0.01	0.00	0.00	0.01	0.02	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	14
Dry Cleaners	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15

Between 1 and 5

Above 5

* Acrolein from structural fires

No perchloroethylene or methylene chloride

Figure 86 shows the modeled source categories sorted against the times above benchmarks for cadmium, lead, manganese and nickel. While there are more pollutants from industrial sources than these four metals, they are the most clear-cut examples of localized impacts. Sorting on the 98th percentile, Figure 85 shows how the categories lined up for these metals. Green shading identifies risk driver pollutants. Rows in gray are below benchmarks for those categories.

Figure 86: Average Times above Benchmarks for 98th Percentile Receptors from Localized Impact Pollutants for Modeled Source Categories

	Cadmium	Lead	Manganese	Nickel	Total	Rank
Point	2.94	0.08	1.26	0.64	4.93	1
Area Other	0.63	0.00	0.00	0.04	0.67	2
Airport	0.00	0.05	0.00	0.00	0.05	3
Rail	0.05	0.00	0.00	0.00	0.05	4
On Road Mobile	0.00	0.00	0.00	0.01	0.01	5
RWC	0.01	0.00	0.00	0.00	0.01	6
NRM Other	0.00	0.00	0.00	0.00	0.00	7
Construction	0.00	0.00	0.00	0.00	0.00	8
Lawn & Garden	0.00	0.00	0.00	0.00	0.00	9
Marine	0.00	0.00	0.00	0.00	0.00	10
POTW	0.00	0.00	0.00	0.00	0.00	11
Solvent Use	0.00	0.00	0.00	0.00	0.00	12
Gas Stations	0.00	0.00	0.00	0.00	0.00	13
ROB	0.00	0.00	0.00	0.00	0.00	14
Dry Cleaners	0.00	0.00	0.00	0.00	0.00	15

Between 1 and 5

Modeled emission source categories are different than emission source categories in the white papers. Some modeled source categories contributed relatively lower risk when compared with other categories (marine, gas stations, residential open burning, and dry cleaners), and for these, no white papers were developed. Reducing emissions from emission source categories without white papers could still reduce risk. Figure 87 shows the modeled emission source categories as compared to the white paper categories.

Figure 87: Crosswalk from Modeling Source Category to White Paper Source Category

Modeling Source Category	White Paper Source Category
On Road Mobile	On-Road Gasoline On-Road Diesel
Residential Wood Combustion	Residential Wood Combustion and Heating
Area Other (also includes structural fires, no white paper)	Industrial Fuel Use Residential Heat Non Wood (included in Residential Wood Combustion and Heating White Paper) Asphalt Use Restaurants (included in Miscellaneous White Paper)
Publicly Owned Treatment Works (POTWs) and Landfills	Miscellaneous (POTWs, Landfills, and Restaurants)
Construction	Non Road Diesel Non Road Gasoline
Non Road Mobile Other	
Lawn & Garden	
Solvent Use	Solvent-Coating Use – Paint Strippers & Architectural Consumer Products
Airport	No white paper written
Rail	Rail
Residential Open Burning	No white paper written
Marine	No white paper written
Gas Stations	No white paper written
Dry Cleaners	No white paper written

5.2 Total Risk Ranking by Source Category

Based on the 2017 PATS modeling results, DEQ ranked emission source categories by their total risk. DEQ developed separate rankings for sources with area wide impacts and for sources with localized impacts. Figure 88 contains the area wide ranking. The top total risk from air toxics are residential wood combustion and on-road gasoline for area wide sources. Figure 89 lists the ranking for localized impacts. The top total risk from air toxics for localized impacts is metal production.

Figure 88: PATS Domain Wide Rankings for White Paper Source Categories

White Paper Category Ranking	Times Above Benchmark 80 th Percentile Receptors
1. RWC	37.6
2. On Road Mobile Gas	29.0
3. Construction Diesel	11.9
4. Lawn and Garden - Diesel	9.5
5. On Road Mobile Diesel	5.5
6. Non Road Mobile Other - Diesel	5.4
7. Non Road Mobile Other - Gas	5.2
8. Solvent-Coating	4.6
9. Point	3.9
10. Airport	3.1
11. Consumer Products	2.7
12. Rail	2.3
13. Industrial Fuel Use	2.2
14. Residential Open Burning	1.7
15. Residential Heat Non Wood	1.2
16. Asphalt Use	1.0
17. Lawn and Garden - Gas	0.9
18. Construction Gas	0.5

Figure 89: Localized Impact for White Paper Source Categories

White Paper Category Risk Drivers
Metal Production (<i>Cadmium, Manganese, Nickel, Benzene</i>)
Glass Manufacturing (<i>Arsenic</i>)
Electroplaters (<i>Chromium</i>)
Bulk Terminals (<i>Benzene</i>)
Surface Coating (<i>Ethylbenzene</i>)
Asphalt Roofing (<i>Benzene</i>)
Industrial Fuel Use (<i>Cadmium</i>)