

Environmental Solutions – Technical Services

Air Toxics: 1999 NEI vs. 2011 NEI for Oregon

March 18, 2015

EQC A

Overview

- ❖ Acronyms and terms
- ❖ Datasets
- ❖ Pollutant selection
- ❖ Data comparison
- ❖ Questions and contact info

Acronyms and terms

- ❖ EIS Gateway = Emission Inventory System Gateway
 - Internet based
 - Developed by EPA to provide registered users with access to EI data
 - Allows users to add, view and edit data, request reports
- ❖ Event = Wildfire (WF) and Prescribed Burn (Rx Fire)
 - Data is specific to date and time, hence “event”
- ❖ POM = Polycyclic Organic Material
- ❖ PAH = Polycyclic Aromatic Hydrocarbons, a subset of POM
- ❖ SCC = EPA Source Classification Code
 - Specifies an emissions source

Datasets & limitations (herding the cats.....)

❖ 1999 NEI HAPs

- EPA ftp site

<ftp://ftp.epa.gov/pub/EmisInventory/finalnei99ver3/haps/summaries/>

- *Not specific to SCC*
- *No CASrn*

❖ 1999 Diesel PM_{2.5}

- EPA ftp site:

ftp://ftp.epa.gov/pub/EmisInventory/nei_criteria_summaries/1999criteriasummaryfiles/

- *Specific to SCC*

❖ 2011 NEI HAPs and Diesel PM_{2.5}

- EPA EIS Gateway <https://eis.epa.gov/eis-system-web/welcome.html>
- Reports requested: Event, Facility, Nonpoint (incl. biogenics), Nonroad, On-Road, and Process (permitted point process level)
- Report Dataset: 2011-2011 NEI V2 with Biogenics
- Report type: County by Source Classification (SCC)
- Report download: March 9-13, 2015

Pollutant Selection

- ❖ DEQ Benchmarks
- ❖ Bruce Hope's 1999 NATA analysis
 - air toxics contributing to cancer risk in Oregon
 - analysis of results from the 1999 NATA

Data comparison: Benchmark toxics

Benchmark CHEMICAL NAME	CAS	1999 HAP Category Name	1999 tpy	2011 tpy
1,3-BUTADIENE	106990	1,3-Butadiene	986.3	2,316.4
1,3-DICHLOROPROPENE	542756	1,3-Dichloropropene	1,640.2	0.002
1,4-DICHLOROBENZENE	106467	1,4-Dichlorobenzene	129.1	0.047
2,4-/2,6-TOLUENE DIISOCYANATE (MIXTURE)	26471625	2,4-Toluene Diisocyanate	3.7	0.003
ACETALDEHYDE	75070	Acetaldehyde	3,345.0	22,802.4
ACROLEIN	107028	Acrolein	1,056.4	2,206.9
ACRYLONITRILE	107131	Acrylonitrile	34.1	1.6
AMMONIA	7664417	--	--	--
ARSENIC	7440382	Arsenic Compounds(Inorganic Including Arsine)	7.4	0.6
BENZENE	71432	Benzene (Including Benzene From Gasoline)	8,627.9	8,175.0
BERYLLIUM	7440417	Beryllium Compounds	0.2	0.1
CADMIUM	7440439	Cadmium Compounds	32.4	0.1
CADMIUM FUMES	1306190	--	--	--
CARBON DISULFIDE	75150	Carbon Disulfide	30.4	0.8
CARBON TETRACHLORIDE	56235	Carbon Tetrachloride	34.4	0.9
CHLORINE	7782505	Chlorine	113.4	30.1
CHLOROFORM	67663	Chloroform	247.2	7.0
CHROMIUM, HEXAVALENT	18540299		0.001	0.250
COBALT COMPOUNDS	7440484	Cobalt Compounds	2.0	0.3
DIESEL PARTICULATE MATTER	DPM25		4,852.4	3,242.0
DIOXINS & FURANS, CHLORINATED	1746016	Dioxins/Furans as 2,3,7,8-TCDD TEQs	1.E-05	--
ETHYLENE DIBROMIDE	106934	Ethylene Dibromide (Dibromoethane)	2.2	0.007
ETHYLENE DICHLORIDE	107062	Ethylene Dichloride (1,2-Dichloroethane)	3.4	1.4
ETHYLENE OXIDE	75218	Ethylene Oxide	7.3	0.5
FORMALDEHYDE	50000	Formaldehyde	7,185.1	41,054.4
HYDROGEN CHLORIDE	7647010	Hydrochloric Acid (Hydrogen Chloride [Gas Only])	3,322.5	638.2
HYDROGEN CYANIDE	74908	Cyanide Compounds	1,340.9	418.7
HYDROGEN FLUORIDE	7664393	Hydrogen Fluoride (Hydrofluoric Acid)	246.4	28.7
HYDROGEN SULFIDE	2148878	--	--	--
LEAD COMPOUNDS	7439921	Lead Compounds	41.3	10.6
MANGANESE COMPOUNDS	7439965	Manganese Compounds	95.5	12.9
MERCURY (ELEMENTAL)	7439976	Mercury Compounds	2.7	0.3

Data comparison: Benchmark toxics cont'd

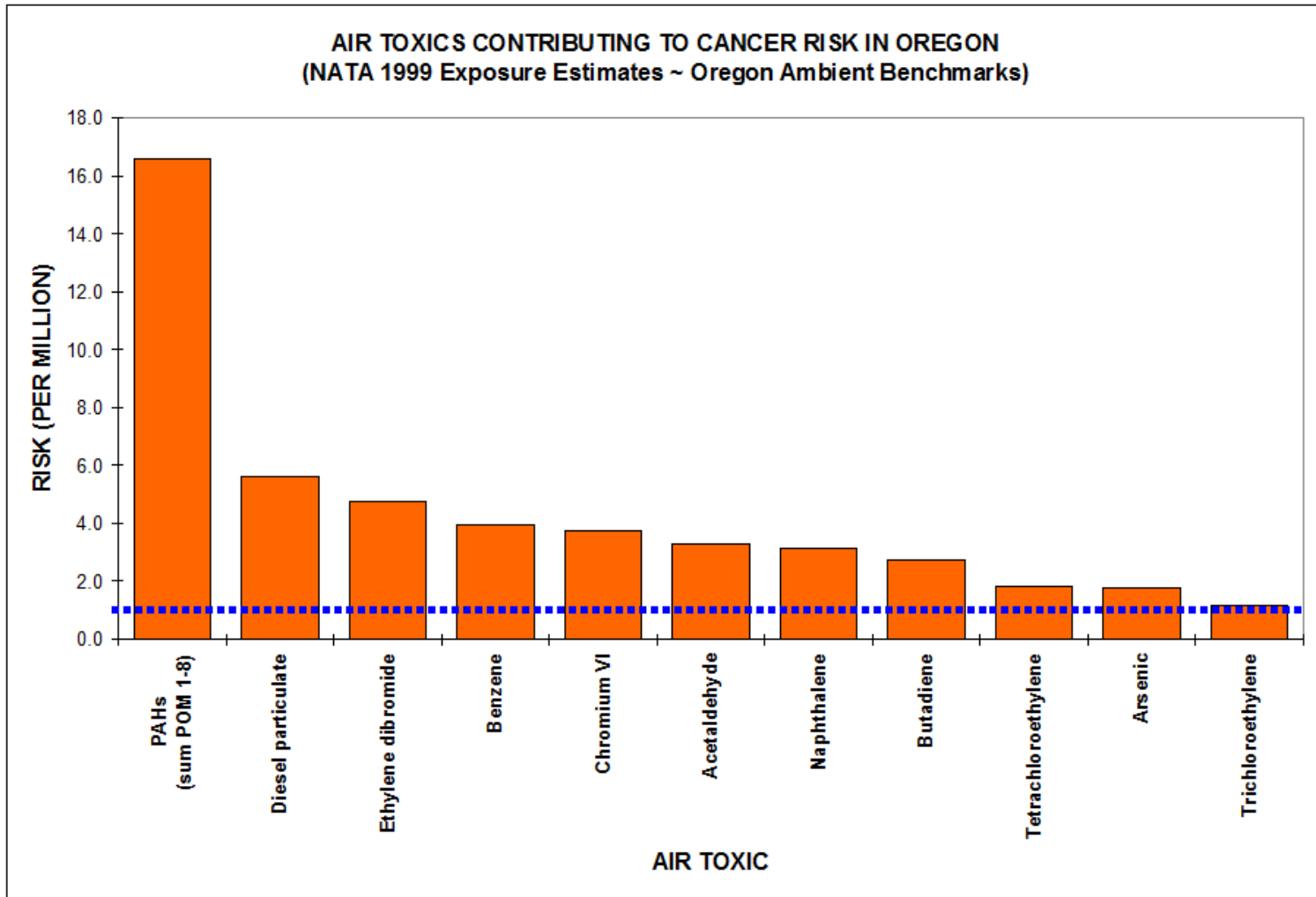
Benchmark CHEMICAL NAME	CAS	1999 HAP Category Name	1999 tpy	2011 tpy
METHANOL	67561	Methanol	12,576.5	85,603.1
METHYL BROMIDE	74839	Methyl Bromide (Bromomethane)	364.7	0.4
METHYL CHLORIDE	74873	Methyl Chloride (Chloromethane)	815.4	606.4
METHYL CHLOROFORM	71556	Methyl Chloroform (1,1,1-Trichloroethane)	2,716.8	58.7
METHYLENE CHLORIDE	75092	Methylene Chloride (Dichloromethane)	3,015.1	13.7
NAPHTHALENE	91203	Naphthalene	502.0	234.9
POLYCYCLIC AROMATIC HYDROCARBONS (PAH)	Various	PAH (8 POM group total)	2,791.5	494
n-HEXANE	110543	Hexane	4,079.1	3,308.3
Nickel acetate	373024	Nickel Compounds	14.0	1.5
Nickel carbonate	3333393			
Nickel carbonyl	13463393			
Nickel chloride	7718549			
Nickel hydroxide	12054487			
NICKEL REFINERY DUST	NRF			
NICKEL SUBSULFIDE	12035722			
Nickel sulfate	7786814			
Nickelocene	1271289			
PHOSPHINE	7803512			
PHOSPHORIC ACID	7664382	--	--	--
POLYCHLORINATED BIPHENYLS (PCB)	1336363	Polychlorinated Biphenyls (Aroclors)	1.7	0.2
TETRACHLOROETHYLENE	127184	Tetrachloroethylene (Perchloroethylene)	997.3	30.2
TOLUENE	108883	Toluene	28,221.4	10,789.5
TRICHLOROETHYLENE	79016	Trichloroethylene	2,252.5	110.2
VINYL CHLORIDE	75014	Vinyl Chloride	6.7	2.6
WHITE PHOSPHORUS	7723140	Phosphorus Compounds	8.2	0.1
XYLENES (MIXED)	1330207	Xylenes (Mixed Isomers)	14,367.1	5,001.9

Slides 9, 10,
12, 13

"Nickel Compounds"

"Nickel"

Pollutant Selection: Bruce's 1999 NATA analysis



B. Hope to C. Swab, April 2006

Pollutant Selection: Bruce's 1999 NATA analysis



State of Oregon
Department of
Environmental
Quality

AIR TOXICS IN OREGON

Analysis of Results from the 1999 National Air Toxics Assessment (NATA)

Bruce Hope
Technical Section
Air Quality Division
811 SW 6th Avenue
Portland, Oregon 97204-1390
503.229.6251

DRAFT FINAL

11 SEPT 2006

TABLE 3.2.1.1A. Air toxics in Oregon with a cancer risk greater than zero.

Air Toxic	Average Total Risk*		Risk Ratio	Presence [‡]
	National	Oregon		
Total risk	41.48	63.33	1.53	
PAH (8-POM group total)	1.26	16.60	13.18	28
Benzene	10.45	13.88	1.33	34
Diesel particulate matter**	4.91	5.63	1.15	1
Chromium VI	1.49	3.74	2.51	11
Ethylene dibromide	3.99	3.42	0.86	19
Acetaldehyde	2.99	3.32	1.11	31
Carbon tetrachloride	3.29	3.21	0.98	36
Naphthalene	2.18	3.14	1.44	17
Butadiene	3.99	2.74	0.69	14
Arsenic compounds	0.37	2.31	6.18	3
Tetrachloroethane	2.58	2.26	0.87	21
DEHP	2.22	2.22	1.00	36
Tetrachloroethylene	1.54	1.84	1.19	8
Trichloroethylene	0.23	1.19	5.21	5
Methylene chloride	0.25	0.70	2.82	1
Ethylene dichloride	0.80	0.68	0.85	0
Dichloropropene	0.35	0.35	1.00	0
Dichlorobenzene	0.57	0.32	0.57	0
Vinyl chloride	0.40	0.31	0.76	0
Propylene dichloride	0.30	0.28	0.94	0
Ethylene oxide	0.41	0.22	0.54	0
Nickel compounds	0.14	0.16	1.13	0
Cadmium compounds	0.16	0.10	0.61	0
Lindane (all isomers)	0.08	0.09	1.12	0
Quinoline [§]	0.06	0.06	1.03	1
Acrylonitrile	0.22	0.05	0.25	0
Polychlorinated biphenyls	2.17E-02	2.54E-02	1.17	0
Hexachlorobutadiene	3.20E-02	2.16E-02	0.67	0
Bromofom	1.19E-02	6.63E-03	0.56	0
Berillium compounds	5.05E-02	4.22E-03	0.08	0
Hexachloroethane	7.61E-03	4.16E-03	0.55	0
Toluene diisocyanate	2.94E-02	2.86E-03	0.10	0
Trichloroethane	4.27E-03	1.17E-03	0.27	0
Propylene oxide	3.35E-03	4.30E-04	0.13	0
Formaldehyde	5.90E-05	1.90E-04	3.22	0
Benzyl chloride	3.39E-03	1.52E-04	0.04	0
Dinitrotoluene	1.42E-03	1.08E-04	0.08	0

* Average across census tracts; does not include cancer risk due to DPM

** Ratio of average HAP/EM concentration to Oregon ABC for DPM

‡ Number of counties in which this air toxic is above 1 per million risk

§ Not emitted in Oregon; NFI to be revised

USEPA source: fe008pollutant.xls

DEQ file: E:\Air\NATA_1999 OR\Report_NATA_1999\National_rank\National_pollutant_rank_cancer.xls (state summary)

11.09.2006

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Data Comparison: Table 3.2.1.1A, rank 1-14

Bruce's Chart 1999 Cancer Risk Rank	Table 3.2.1.1A. Air toxics in Oregon with a cancer risk > 0 (1999)				----- 2011 NEI -----		
	----- 1999 NEI -----						
	Table Rank	1999 NEI Pollutant Code	Air Toxic	Total (tpy)	2011 NEI Pollutant Code	Air Toxic	Total (tpy)
1	1	250	PAH (8 POM group total)	2,791	Various	15-PAH	360
						POM as non-15 PAH	133
4	2	71432	Benzene	8,628	71432	Benzene	8,175
2	3	SCC dependent	Diesel PM2.5	4,852	SCC dependent	Diesel PM2.5	3,242
5	4	18540299	Chromium VI (1)	0.001	18540299	Chromium VI	0.25
3	5	106934	Ethylene dibromide	2.2	106934	Ethylene dibromide	0.007
6	6	75070	Acetaldehyde	3,345	75070	Acetaldehyde (2)	3,250
						56235	Carbon tetrachloride
7	8	91203	Naphthalene	502	91203	Naphthalene	235
8	9	106990	Butadiene	986	106990	Butadiene	2,316
10	10	93	Arsenic compounds	7.4	7440382	Arsenic	0.57
						79345	Tetrachloroethane
	12	117817	DEHP	0.6	117817	DEHP	1.01
9	13	127184	Tetrachloroethylene	997	127184	Tetrachloroethylene	30
11	14	79016	Trichloroethylene	2,252	79016	Trichloroethylene	110

(1) 1999 Cr+6 data from the DEQ Area Mobile Emissions Estimates (AMEE) database

(2) Biogenic not included: see slide 10

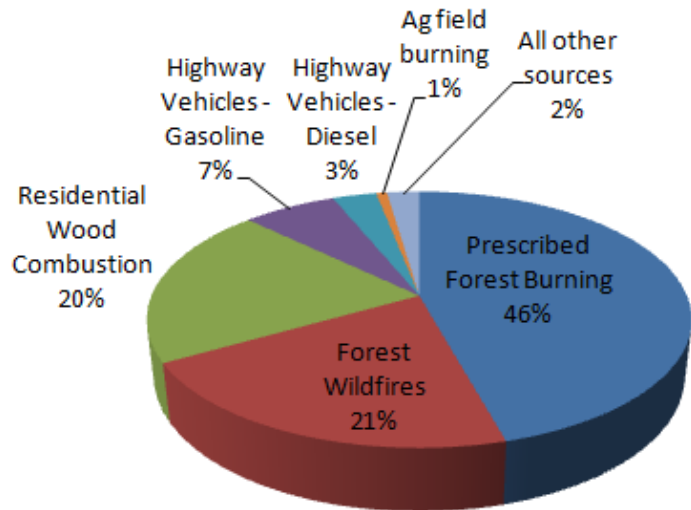
Data Comparison: Table 3.2.1.1A, rank 1-14. 2011 data details

3.2.1.1A	----- 2011 NEI -----									
Table Rank	2011 NEI Pollutant Code	Air Toxic	Total (tpy)	Biogenic (tpy)	Event (tpy)	Area (tpy)	Nonroad (tpy)	Onroad (tpy)	Point (tpy)	2011 data comments
1	Various	15-PAH	360		240.5	80.4	3.2	35.2	1.0	67% from WF & Rx Burning, 92% of area = RWC
		POM as non-15 PAH	133		128.7	3.4			1.3	96% from WF & Rx Burning
2	71432	Benzene	8,175		5,305.6	1,006.2	573.5	1,221.5	68.3	65% from WF & Rx Burning. 80% of area = RWC
3	SCC dependent	Diesel PM2.5	3,242				1,779.8	1,394.5	67.7	55% Nonroad, 43% Onroad
4	18540299	Chromium VI	0.25			0.01	4.E-03	4.E-04	0.24	94% from permitted point
5	106934	Ethylene dibromide	0.007			1.E-03			0.01	81% from permitted point
6	75070	Acetaldehyde	22,802	19,553	1,925	572	144	453	156	86% Biogenic, 6% WF + Rx Burn
7	56235	Carbon tetrachloride	0.90			0.10			0.80	89% from permitted point
8	91203	Naphthalene	235			128	10	88	10	52% from wood combustion, 37% from on-road
9	106990	Butadiene	2,316		1,910	160	71	169	6	82% from WF + Rx Burn
10	7440382	Arsenic	0.57			0.09	0.09	0.08	0.32	
11	79345	Tetrachloroethane	0.88			0.72			0.16	
12	117817	DEHP	1.01			0.61			0.41	
13	127184	Tetrachloroethylene	30			23			7	
14	79016	Trichloroethylene	110			16			94	

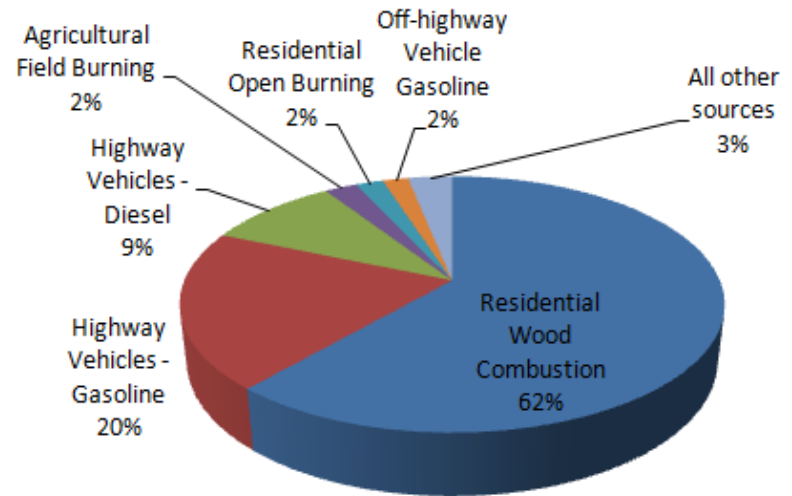
Data Comparison: Table 3.2.1.1A, rank 15-37

Table 3.2.1.1A. Air toxics in Oregon with a cancer risk > 0 (1999)												
----- 1999 NEI -----				----- 2011 NEI -----								
Table Rank	1999 NEI Pollutant Code	Air Toxic	Total (tpy)	2011 NEI Pollutant Code	Air Toxic	Total (tpy)	Biogenic (tpy)	Event (tpy)	Area (tpy)	Nonroad (tpy)	Onroad (tpy)	Point (tpy)
15	75092	Methylene chloride	3,015	75092	Methylene chloride	13.7			7.8			5.9
16	107062	Ethylene dichloride	3.4	107062	Ethylene dichloride	1.45			0.99			0.46
17	542756	Dichloropropene	1,640	542756	Dichloropropene	0.0025			0.00033			0.00215
18	106467	Dichlorobenzene	129	106467	Dichlorobenzene	0.047			0.020			0.028
19	75014	Vinyl chloride	6.7	75014	Vinyl chloride	2.6			1.8			0.8
20	78875	Propylene dichloride	6.0	78875	Propylene dichloride	0.54			0.08			0.46
21	75218	Ethylene oxide	7.3	75218	Ethylene oxide	0.48			0.48			
22	226	Nickel compounds	14.0	7440020	Nickel	1.5			0.19	0.02	0.07	1.26
23	125	Cadmium compounds	32.4	7440439	Cadmium	0.10			0.06			0.04
24	58899	Lindane (all isomers)	0.6	58899	Lindane (all isomers)							
25	91225	Quinoline	7.E-04	91225	Quinoline							
26	107131	Acrylonitrile	34.1	107131	Acrylonitrile	1.62			1.34			0.28
27	1336363	PCBs	1.7	1336363	PCBs	0.25			0.14			0.11
28	87683	Hexachlorobutadiene	8.E-04	87683	Hexachlorobutadiene	6E-05			6E-05			
29	75252	Bromoform	0.04	75252	Bromoform	0.040			0.001			0.039
30	109	Beryllium compounds	0.19	7440417	Beryllium	0.07			0.060			0.013
31	67721	Hexachloroethane	0.01	67721	Hexachloroethane							
32	584849	Toluene diisocyanate	3.7	584849	Toluene diisocyanate	0.0034			0.0034			
33	79005	Trichloroethane	3.3	79005	Trichloroethane	0.0031			0.0005			0.0026
34	75569	Propylene oxide	6.6	75569	Propylene oxide	1.03			0.07			0.96
35	50000	Formaldehyde	7,185	50000	Formaldehyde	41,054	26,663	12,144	1,178	300	597	173
36	100447	Benzyl chloride	1.2	100447	Benzyl chloride	0.72			0.03			0.69
37	121142	Dinitrotoluene	0.05	121142	Dinitrotoluene	0.0044			0.0041			0.0003

NEI Data: 2011 15-PAH

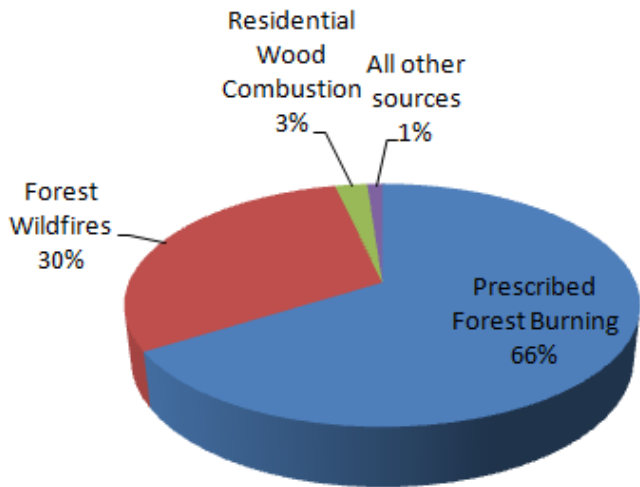


Including Events

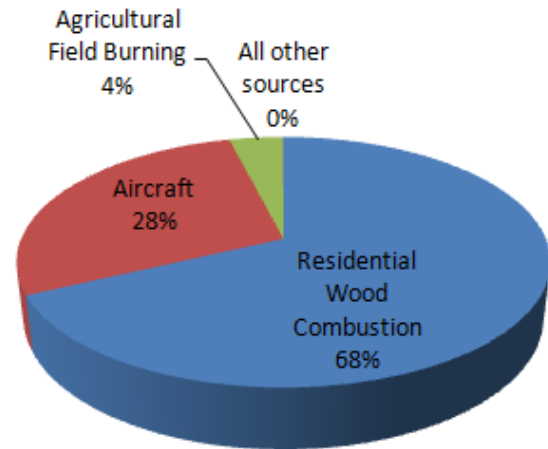


Excluding Events

NEI Data: 2011 POM as non-15 PAH

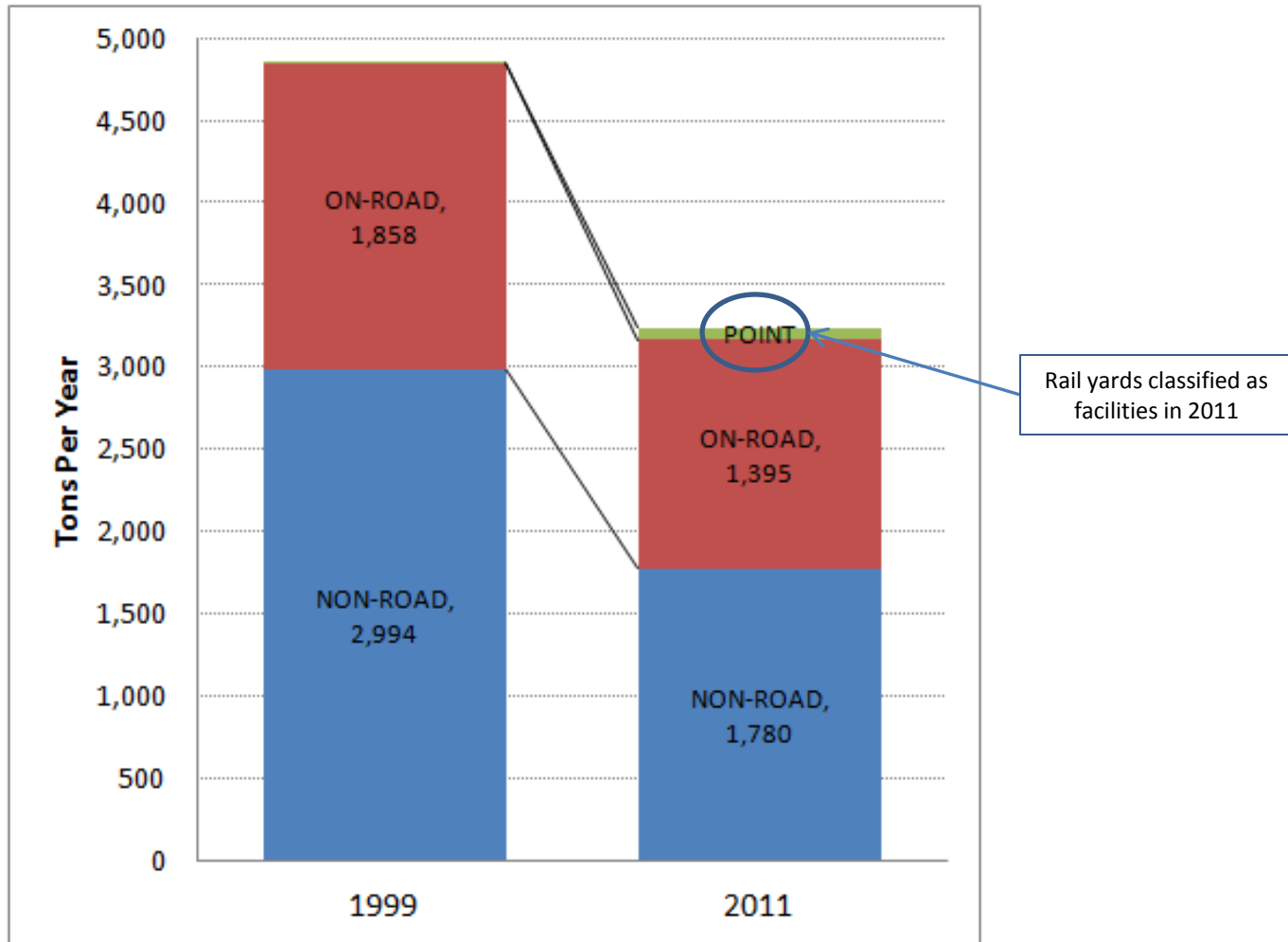


Including Events

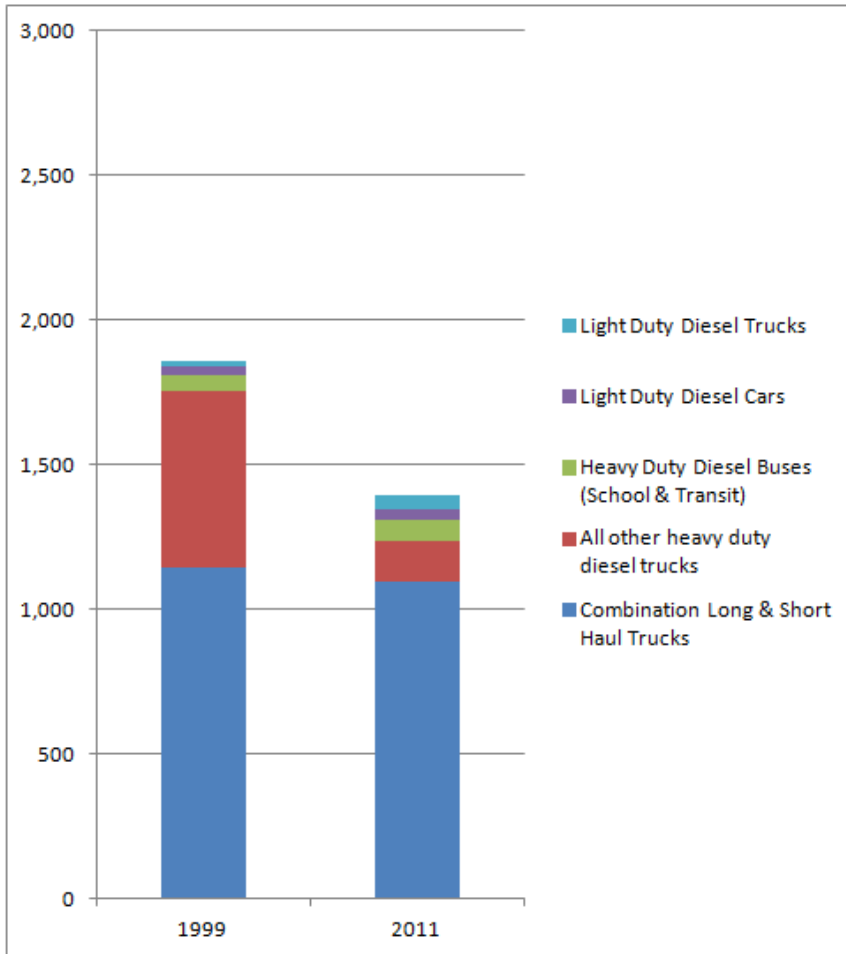


Excluding Events

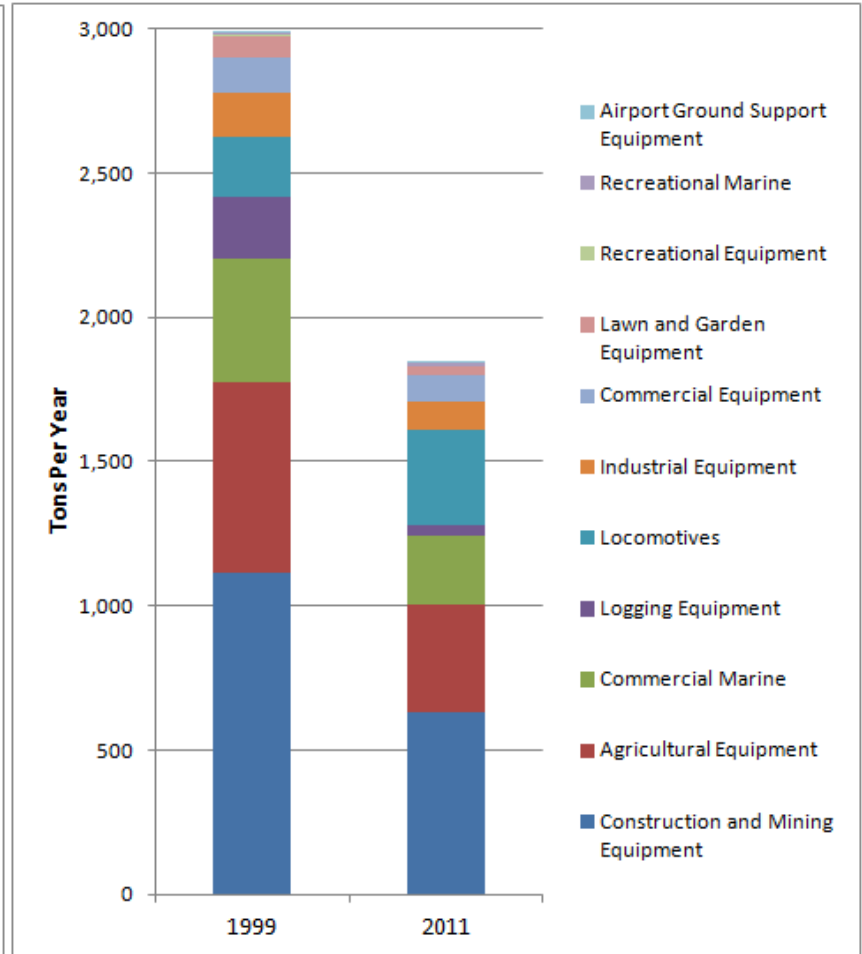
NEI: Data comparison: Diesel PM_{2.5}



NEI: Data comparison: Diesel PM_{2.5}



On-Road



Nonroad (incl. yard locomotives)

Further investigation needed (?)

- ❖ nickel (?)
- ❖ lead (?)
- ❖ cadmium (?)
- ❖ manganese (?)
- ❖ others (?)

Questions and contact

- ❖ Questions?
- ❖ contact info:
Christopher Swab,
swab.christopher@deq.state.or.us
503-229-5661