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State of Washington

Washington State Implementation Plan Revision

Interstate Transport of Lead, Nitrogen Dioxide, and Ground-Level Ozone

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Interstate Transport of Lead, Nitrogen Dioxide, and Ozone

Addressing requirements for the 2008 Lead, 2010 Nitrogen Dioxide, and 2008 Ozone National Ambient Air Quality Standards

by

Air Quality
Washington State Department of Ecology
Olympia, Washington

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Executive Summary

The "good neighbor" or "interstate transport" provisions of the Federal Clean Air Act (CAA) protect downwind states from harmful pollution that originates in upwind states. This State Implementation Plan (SIP) revision contains Washington's analysis of the interstate transport of lead (Pb), nitrogen dioxide (NO_2), and ozone (O_3). It finds that Washington's sources do not significantly contribute to Pb, NO_2, and O_3 air pollution in other states. No new rules are proposed.

Lead is a metal found naturally in the environment as well as in manufactured products. Environmental Protection Agency (EPA) sets standards for lead air pollution because lead exposure can cause health and developmental problems, especially in children. Exposures to low levels of lead early in life have been linked to effects on IQ, learning, memory, and behavior. Lead persists in the environment and accumulates in soils. Historically, the major sources of lead were from motor vehicles and industrial sources. Nationwide, lead pollution levels dropped sharply when lead was phased out of gasoline starting in the 1970s. Today, the major sources of lead are lead smelters, ore and metal processers, and piston-engine aircraft operating on leaded aviation gasoline. There are no large smelters in Washington State. Battery recyclers, wood products facilities, pulp and paper mills, glass manufacturers, refineries and piston-engine aircraft operating on leaded aviation gasoline are minor sources of lead in Washington.

All areas in Idaho, Oregon, and Washington are in compliance with the lead standard set in 2008. Lead emissions are relatively heavy and do not travel far from the source of emissions. Ecology's analysis focused on Washington's sources of lead pollution that are located near state borders with Idaho and Oregon and reviewed existing ambient monitoring data and emissions inventories. Ecology found no evidence of significant transport of lead pollution across the state border.

Nitrogen dioxide (NO_2) is an indicator of the nitrogen oxides (NO_x) pollution. The main source of NO_x pollution is the combustion processes. A small percentage of NO_x is directly emitted, but the majority is formed in the atmosphere from a combination of transportation, power plants, off-road equipment, and biomass burning pollution. NO_x exposure has been linked to respiratory effects including airway inflammation in otherwise healthy people and increased respiratory symptoms in people with asthma. Major exposure concerns are localized along the main traffic arteries. NO_x reacts with other elements and compounds in the air and contributes in the formation of ground-level ozone (O_3) and fine particles. Fine particles interstate transport analysis is separate from this submittal.

All areas in Idaho, Oregon, and Washington are in compliance with the NO_2 standard set in 2010. Ecology reviewed existing ambient monitoring data, emissions inventories, design values and EPA guidelines to assess transport of NO_2. Ecology found no evidence of significant NO_2 pollution across the state border.

Ground-level ozone is the primary component of smog. Ground level ozone forms when emissions of nitrogen oxides (NO_x) and volatile organic compounds (VOCs) "cook" in the sun—making it mainly a summertime pollutant. The major sources of human-made NO_x and VOCs are emissions from industrial facilities, electric utilities, motor vehicle exhaust, gasoline vapors, and chemical solvents. Ozone pollution can travel over hundreds of miles and can affect both urban and rural areas.

Breathing air containing elevated levels of ozone can reduce lung function and increase respiratory symptoms. It can aggravate asthma or other respiratory conditions. Ozone exposure also has been associated with increased:

- Vulnerability to respiratory infections.
- Medication use by people with asthma.
- Doctors visits.
- Emergency room visits and hospital admissions for individuals with respiratory disease.

Ozone exposure may also contribute to premature death, especially in people with heart and lung disease. In addition, repeated exposure to ozone damages sensitive vegetation and trees, including those in forests and parks, leading to reduced growth and productivity, increased vulnerability to disease and pests, and damaged foliage.

All areas in Idaho, Oregon, and Washington are in compliance with the ozone standard set in 2008. EPA performed photochemical air quality modeling to project ozone concentrations at air quality monitoring sites to 2018—and to estimate each state's contributions to those 2018 concentrations. EPA found that Washington does not contribute significantly to ozone pollution in other states.

Introduction

Washington State Department of Ecology (Ecology) submits this State Implementation Plan (SIP) revision to address the requirements of the Clean Air Act (CAA) with regard to the 2008 Lead (Pb), 2010 1-hour Nitrogen Dioxide (NO_2), and 2008 Ozone (O_3) National Ambient Air Quality Standards (NAAQS). This revision addresses section 110(a)(2)(D)(i) of the CAA that requires a SIP to:

> *(D) contain adequate provisions –*
>
> > *(i) prohibiting, consistent with the provisions of this subchapter, any source or other type of emissions activity within the State from emitting any air pollutant in amounts which will –*
> >
> > > *(I) contribute significantly to nonattainment in, or interfere with maintenance by, any other State with respect to any such national primary or secondary ambient air quality standard….*
> > >
> > > *(II) interfere with measures required to be included in the applicable implementation plan for any other state….to prevent significant deterioration or to protect visibility*

The requirements to control interstate transport of pollutants are often referred to as "good neighbor" provisions of the CAA. The intent of the provisions is to ensure that residents and the welfare of downwind states are protected from harmful emissions originating in upwind states. Currently, neither Washington nor its neighboring states (Oregon and Idaho) have nonattainment or maintenance areas with respect to Pb, NO_2, or O_3.

The CAA requires Washington to ensure that any source or type of emissions activity within the state will not contribute significantly to nonattainment or interfere with maintenance in another state. The Washington SIP, codified in 40 CFR 52 Subpart WW, contains regulations for minor source permitting to ensure protection of all relevant NAAQS[1]. For major sources, Washington is already subject to a PSD permitting program operated under an EPA Federal Implementation Plan (FIP).

The analysis developed by Washington in support of this SIP revision shows no indication of a significant Pb or NO_2 transport across state borders. EPA's analysis of ozone transport also shows that Washington's sources do not contribute significantly to areas with ozone pollution in other states. Based on our assessment and findings, we assert that Washington does not contribute significantly to nonattainment, or interfere with maintenance, in another state with respect to the Pb, NO_2, and O_3 NAAQS. The information reviewed, findings, and conclusions are presented in three chapters: the first chapter describes the analysis for the interstate transport

[1] Updated revisions to Washington's SIP "General Regulations for Air Pollution Sources", Docket ID no. EPA-OAR-2014-0141, effective November 3, 2014

of Pb, the second chapter details the findings pertaining to interstate transport of NO_2, and the third chapter reviews EPA's analysis and findings related to ozone transport.

Interstate Transport of Lead

Background

Lead (Pb) is a metal found naturally in the environment as well as in manufactured products. Historically, the major sources of lead were fuel combustion from on-road motor vehicles and industrial sources. After EPA's efforts to remove lead from vehicle gasoline, lead emissions from the transportation sector decreased dramatically. Today, the major sources are lead smelters, ore and metal processers and piston-engine aircraft operating on leaded aviation gasoline. Pb associated with coarse particulate material (PM) deposits to a greater extent near local industrial sources, while fine Pb-bearing PM can be transported longer distances[2].

On October 5, 1978, EPA promulgated primary and secondary NAAQS for Pb. Both were set as 1.5 micrograms per cubic meter (μg/m^3), measured as Pb in total suspended particles (Pb-TSP), not to be exceeded by the maximum arithmetic mean concentration averaged over a calendar quarter. The standards were published on the 1977 Air Quality Criteria for Lead, which assessed the scientific evidence available at the time regarding public health effects as result of exposure to lead.

The first review of the Pb standards was initiated in the mid-1980s. Based on the scientific assessment, EPA did not propose any revisions to the 1978 Pb NAAQS. The most recent review was initiated in November, 2004. Based on the assessment findings and considering the significantly different circumstances since Pb was listed in 1976, EPA proposed to revise both primary and secondary standards from 1.5 μg/m^3 to 0.15 μg/m^3, with a rolling three-month period averaging time and a maximum not to be exceeded over a three-year period. The final revisions were published in the federal register on November 12, 2008[3].

EPA's revisions were based on the weight of scientific evidence demonstrating neurocognitive effects of Pb in children. Lead in blood is the most common index of Pb exposure in epidemiologic studies of Pb health effects[4]. The scientific evidence correlates levels of Pb in air with levels of Pb in children's blood, and Pb in children's blood with IQ loss. The 0.15 μg/m^3 level was estimated to be protective against air Pb-related IQ loss in the most susceptible children[5].

On October 14, 2011, EPA issued a *Guidance on Infrastructure State Implementation (SIP) Elements Required Under Sections 110(a)(I) and 110(a)(2) for the 2008 Lead (Pb) National Ambient Air Quality Standards (NAAQS)*. As stated in the guidance, EPA believes that

[2] See EPA/600/R-10/075F, *Integrated Science Assessment for Lead,* Section 1.2.1, EPA, ORD, Research Triangle Park, NC, June 2013

[3] 73 FR 66964

[4] See EPA/600/R-10/075F, *Integrated Science Assessment for Lead*, EPA, ORD, Research Triangle Park, NC, June 2013

[5] See *Integrated Review Plan for the National Ambient Air Quality Standards for Lead,* EPA, November 2011

> *(…) the physical properties of Pb prevent Pb emissions from experiencing the same travel or formation phenomena as $PM_{2.5}$ or ozone. More specifically, there is a sharp decrease in Pb concentrations, at least in the coarse fraction, as the distance from a Pb source increases. Accordingly, while it may be possible for a source in a state to emit Pb in a location and in quantities that may contribute significantly to nonattainment in, or interfere with maintenance by, any other state, EPA anticipates that this would be a rare situation, e.g. where large sources are in close proximity to state boundaries.*

The Guidance indicates also

> *(…) requirements of subsection(2)(D)(i)(I) (prongs 1 and 2) could be satisfied through a state's assessment as to whether or not emissions from Pb sources located in close proximity to their state borders have emissions that impact the neighboring state such that they contribute significantly to nonattainment or interfere with maintenance in that state.*

EPA suggests that sources that emit less than 0.5 tons per year (tpy) or located more than two miles from a state border are unlikely to contribute significantly to nonattainment in another state[6].

Washington's approach

Ecology reviewed the 2011 National Emissions Inventory (NEI) list of facilities reporting lead emissions and determined their distance from state borders. Subsequently, Ecology assessed the information based on EPA's suggestion regarding significance of sources either larger than 0.5 tpy or closer than two miles from the border. The information reviewed, findings and conclusions are presented in the next section.

[6] See Guidance on Infrastructure State Implementation Plan (SIP) Elements Required Under Sections 110(a)(1) and 110(a)(2) for the 2008 Lead (Pb) National Ambient Air Quality Standards (NAAQS) foot note 7, page 8, September 13, 2013

Transport Assessment

The largest sources of lead in Washington are located in King and Snohomish counties. Table 1 lists the largest sources and Figure 1 shows their location:

Table 1 Sources greater than 0.5 tpy in Washington

Facility Type	Site Name	County	Emissions (tpy)	Distance to ID border (miles)	Distance to OR border (miles)
Airport	**Auburn Muni**	**King**	**0.61**	**242**	**122**
Glass Plant	**Saint-Gobain Containers, Inc. (Verallia)**	**King**	**0.54**	**245**	**135**
Airport	**Harvey Field**	**Snohomish**	**0.54**	**233**	**160**

Because of their considerable distance to state borders and the physical properties of Pb, the sources listed in Table 1 are unlikely to contribute significantly to nonattainment, or interfere with maintenance, in another state.

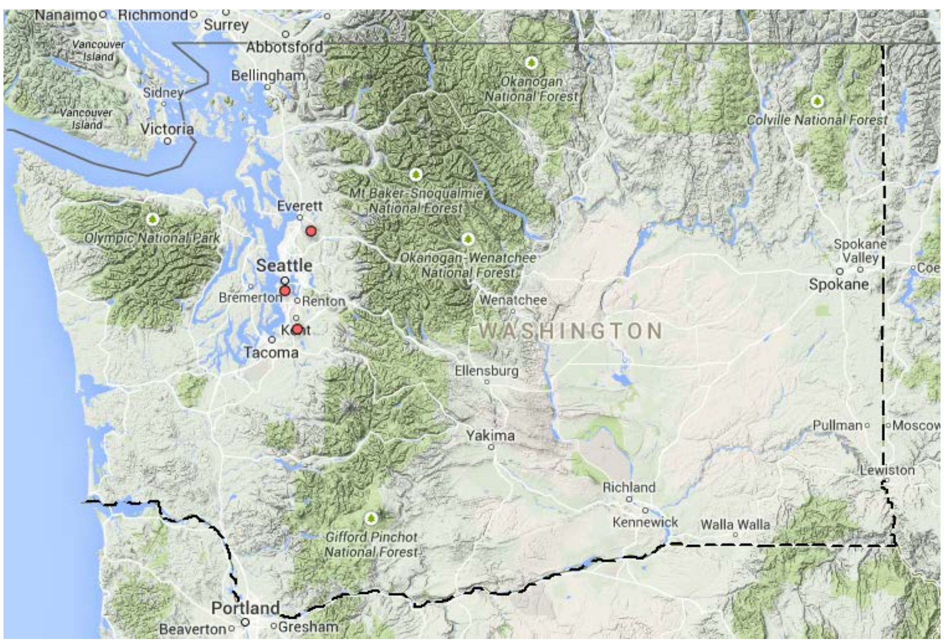

Figure 1 Location of lead sources greater than 0.5 tpy in Washington (red circles).

Closer to the borders, there are several lead sources reporting less than 0.5 tpy according to the 2011 NEI. Sources between 0.1 and 0.5 tpy located in counties bordering other states are shown in Figure 2. The largest source reports 0.16 tpy and corresponds to the Felts Field Airport in

Spokane. The list of all sources smaller than 0.5 tpy located in bordering counties is in the Appendices.

Since the Guidance suggests that sources smaller than 0.5 tpy are not likely to result in significant impact to neighboring states, no further analysis was performed. In addition, there are no areas in nonattainment or maintenance with respect to the 2008 lead NAAQS in Oregon or Idaho. In fact, Pb levels measured in the Portland-Vancouver-Beaverton area are well below the standard (see Appendix A, Figure A-2). The monitor located at the Portland-Vancouver-Beaverton area (Multnomah site) is located near the Oregon-Washington border. The only monitor currently measuring Pb in Idaho is located in Ada County which is far enough from the border and does not represent transport of Pb, at least in the coarse fraction, originating in Washington.

After reviewing all the evidence gathered, Ecology is confident affirming that Washington sources are unlikely to contribute significantly to nonattainment, or interfere with maintenance, with respect to the 2008 lead NAAQS.

Figure 2 Lead sources greater than 0.1 tpy and smaller than 0.5 tpy (red circles), located in bordering counties.

Interstate Transport of Nitrogen Dioxide

Background

Nitrogen dioxide (NO_2) is one of the components of the nitrogen oxides (NOx) group. EPA's NAAQS uses NO_2 as an indicator for NOx. The main source of NO_2 is combustion processes. A small percentage of NO_2 is directly emitted but the majority is formed rapidly from nitric oxide (NO) emissions from transportation, power plants, off-road equipment and biomass burning.

NO_2 is regulated due to its harmful effect on health. NO_2 exposure has been linked to respiratory effects including airway inflammation in healthy people and increased respiratory symptoms in people with asthma.

A second reason for the regulation of NO_2 is its role in the formation of ground-level ozone (O_3) and fine particulate material ($PM_{2.5}$). NO_2 impacts the ozone cycle directly through photolysis, favoring O_3 production. Depending on the level of hydroxyl (OH) radicals present, NO_2 can react to form nitric acid (HNO_3) instead. This is the main atmospheric loss process for NOx. Nitric acid can either react with ammonia (NH_3) to form ammonium nitrate (NH_4NO_3) (which is a main component of $PM_{2.5}$) or be lost through deposition processes (wet and dry) resulting in "acid rain".

NO_2 lifetime in the urban atmosphere is fairly short (~2-6 hours[7]). As a result, transport of NO_2 from urban sources is not common, and interstate transport issues are linked to ozone and $PM_{2.5}$ instead. The main concern regarding NO_2 is near-road exposure in areas with traffic congestion. Monitoring efforts are usually located close to roads, resulting in air quality data associated with local impacts rather than transport issues.

The first primary standard for NO_2 was set by EPA in 1971 as 53 ppb (parts per billion) averaged annually. EPA has reviewed the standard twice since then, however, in both occasions it decided not to revise it. Instead, in 2010, EPA established an additional primary standard for NO_2 at a level of 100 part per billion (ppb), based on the 3-year average of the 98^{th} percentile of the yearly distribution of 1-hour daily maximum concentrations. On February 17, 2012, EPA published the final NO_2 designations[8] identifying all areas in the United States as unclassifiable/attainment for the 2010 1-hour NO_2 NAAQS.

Washington's approach

In September 2009, EPA issued a *Guidance on SIP Elements Required Under Section 110(a)(1) and (2) for the 8-hour Ozone and $PM_{2.5}$ NAAQS* (Harnett Guidance). In this guidance, EPA directed states to develop an adequate technical analysis to support state's findings and

[7] See Beirle *et al.*, *Megacity Emissions and Lifetimes of Nitrogen Oxides Probed from Space*, Science 333, 1737 (2011)
[8] See EPA-HQ-OAR-2011-0572

conclusions. However, there was no guidance suggesting how to approach a technical analysis for NO_2. Therefore, Ecology devised the most reasonable methodology possible taking into consideration other states submittals, emission inventories, ambient data available for the region and the significant fact that all areas are designated attainment or unclassifiable for the 2010 1-hour NO_2 NAAQS.

Ecology's approach included the examination of ambient data for states bordering Washington within a 50 kilometer radius, the standard distance for modeling analysis[9] consistent with EPA's Modeling Guideline. Additionally, Ecology reviewed the most recent NOx emissions inventory for the state of Washington and evaluated state trends.

[9] Appendix W to 40 CFR Part 51

Transport Assessment

Emissions Inventory

The last detailed emissions inventory (EI) for the State of Washington was developed by Ecology in 2011. Table 2 lists anthropogenic source categories used in the 2011 EI:

Table 2 2011 Washington State NOx Emissions Inventory of anthropogenic sources

Source Category		Emissions (tons/year)
On-road mobile sources		164,130
Non-road mobile except locomotives, ships and aircraft		31,467
Point sources		26,361
Others	*Commercial marine vessels*	20,486
	Locomotives	15,026
	Residential fuel use: natural gas, oil, LPG	4,589
	Recreational boats	3,530
	Aircraft: military, commercial, general aviation	3,309
	Woodstoves, fireplaces, inserts	1,803
	Agricultural and silvicultural burning	1,621
	Residential outdoor burning: yard waste and trash	557
	Commercial fuel use: natural gas, LPG	204
	Miscellaneous	28

According to Table 2, On-road mobile sources comprise 57 percent of total NOx emissions, Non-road mobile sources represent 11 percent, and the third largest group, Point sources, comprises 9 percent of all the NOx emissions in Washington in 2011. It is worth mentioning that one of the main point sources (TransAlta Centralia Power Plant) is expected to shut down its two coal-fired boilers: one in 2020 and the second 2025[10].

National trends indicate that NOx emissions have decreased substantially since 1980[11]. Stricter standards for mobile sources as well as regulations for industrial sources suggest that this trend will continue. Ecology performed a standard run of the updated Motor Vehicle Emission Simulator (MOVES2014, database version 20141021) for Washington, to look specifically at future trends in on-road and non-road mobile sources[12] reported for the state. Figure 3 shows the result of the modeling run. On-road mobile sources are divided by type of fuel (ORMgas and ORMdiesel). Figure 3 also shows available NO_2 ambient air monitoring data at the Beacon-Hill monitoring station that represents the Seattle-Tacoma-Bellevue area, which is the most populated area of the state:

[10] "BART Determination Document, TransAlta Centralia Power Plant", Washington State Department of Ecology, revised November 2011

[11] http://www.epa.gov/airtrends/nitrogen.html

[12] MOVES2014 incorporates EPA's NONROAD2008 model

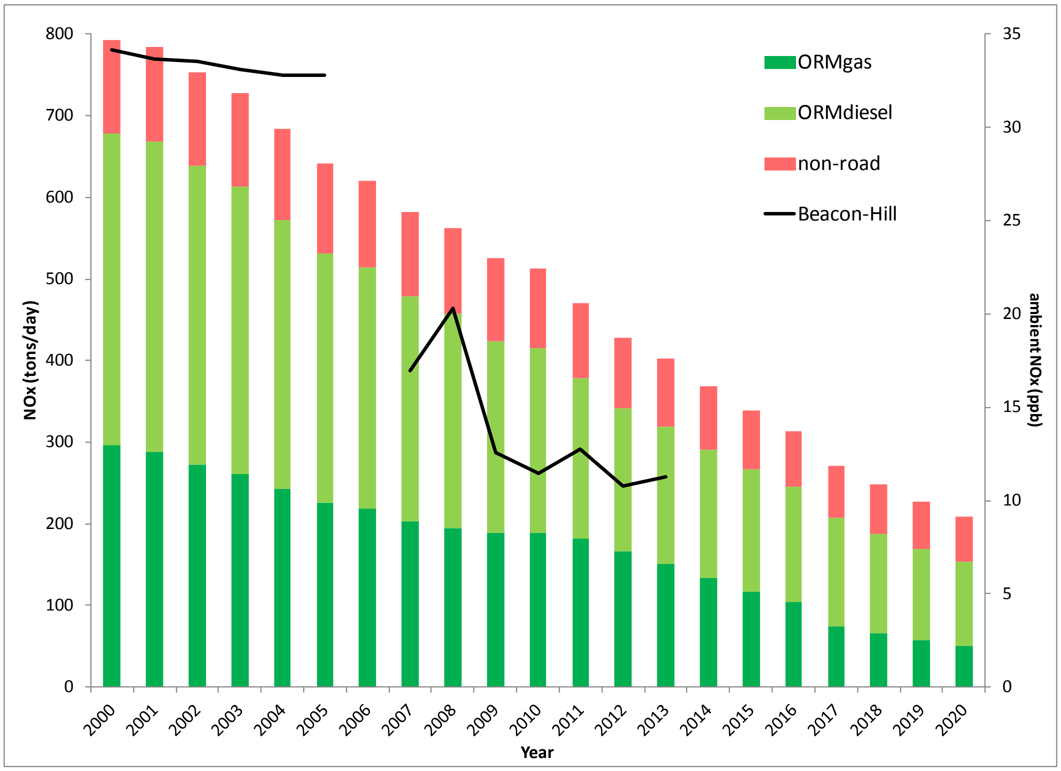

Figure 3 Ambient air monitoring levels[13] and emission estimates for the main categories contributing to NOx in Washington

The past trend estimated with MOVES2014 show a steady decrease in NOx emissions from mobile sources, which overall agrees with the observed ambient values measured at Beacon-Hill. The projected trend suggests that mobile contributions to NOx emissions in the state will continue to decrease.

Currently, there are no nonattainment areas with respect to the 2010 1-hour NO_2 NAAQS in neighboring states. Ecology concludes that since Washington NOx emissions are projected to continue a decreasing trend, it will be even less likely that Washington sources will significantly contribute to nonattainment, or interfere with maintenance, in any other state with respect to the 2010 1-hour NO_2 NAAQS.

[13] Data obtained from AirData website. Data shown is only for comparison of trends and does not necessarily meet the completeness criteria.

Air Quality Data and Design Values for neighboring states

The monitoring site measuring NO_2 in neighboring states and within a 50 kilometer radius is in Oregon. Table 3 lists this site's characteristics. Table 4 shows the latest three design values for the Portland-Vancouver-Beaverton area, which is the only station meeting the completeness criteria in neighboring states. The design values presented cover a period of 5 years (2009-2013):

Table 3 Oregon monitoring site measuring NO_2

State	County	CBSA	Site	Address	Completeness Criteria Met
OR	Multnomah	Portland-Vancouver-Beaverton, OR-WA	410510080	5824 SE Lafayette	Y

Table 4 NO_2 Design values at the Oregon monitoring site

CBSA	Site	Average	2009-2011 (ppb)	2010-2012 (ppb)	2011-2013 (ppb)
Portland-Vancouver-Beaverton, OR-WA	410510080	1 hour	36	34	34

The monitoring site located in the OR-WA border is currently in attainment with respect to the 2010 1-hour NO_2 NAAQS. Therefore, Ecology concludes that Washington sources do not contribute significantly to nonattainment, or interfere with maintenance, in any other state with respect to the 2010 1-hour NO_2 NAAQS.

Interstate Transport of Ozone

Background

Ground-level ozone is the primary component of smog. Ozone that occurs naturally in the upper portions of the earth's atmosphere, often referred to as "good ozone", forms a layer that protects life on earth from the sun's harmful rays. Ozone that forms at ground level, or "bad ozone", is harmful to breath and damaging to sensitive vegetation and ecosystems. Ground level ozone forms when emissions of nitrogen oxides (NO_x) and volatile organic compounds (VOCs) "cook" in the sun making it mainly a summertime pollutant. The major sources of human-made NO_x and VOCs are emissions from industrial facilities, electric utilities, motor vehicle exhaust, gasoline vapors, and chemical solvents. Ozone pollution can be transported through air over hundreds of miles and can affect both urban and rural areas.

Breathing air containing ozone can reduce lung function and increase respiratory symptoms, thereby aggravating asthma or other respiratory conditions. Ozone exposure also has been associated with increased susceptibility to respiratory infections, medication use by asthmatics, doctor visits, and emergency department visits and hospital admissions for individuals with respiratory disease. Ozone exposure may also contribute to premature death, especially in people with heart and lung disease. In addition, scientific evidence showed that repeated exposure to ozone damages sensitive vegetation and trees, including those in forests and parks, leading to reduced growth and productivity, increased susceptibility to disease and pests, and damaged foliage.

On March 12, 2008, EPA strengthened ground-level ozone NAAQS. EPA revised the "primary", or health-based, and "secondary", ecosystem and welfare-based, 8-hour standards to a level of 0.075 parts per million (ppm). In setting the standard, EPA reviewed more than 1700 new scientific studies indicating strong evidence of adverse health impact of ozone at the level above the new standard. However, this standard was not as protective as recommended by EPA's panel of scientific advisors (Clean Air Scientific Advisory Committee) and was challenged in court. Subsequently, EPA proposed to reconsider the standard in 2009. In January 2010, EPA proposed that the new standard is set within the range of 0.060 ppm to 0.070 ppm. However, in September 2011, the Administration issued a statement requesting EPA to withdraw the proposal and continue to implement the standard that was set in 2008 in anticipation of the upcoming scientific and policy review to support the next revision of the ozone standard. At this time, EPA is under a court-ordered deadline to promulgate a new or revise existing ozone standards in December 2015.

Efforts by the EPA and states to address ozone transport have historically been focused on reductions of NO_x. Between 1990 and 2006, ground-level ozone declined 9% nationwide. Eighty-nine of the original one hundred twenty-six areas designated nonattainment for the 1997 standard met that standard during the 2004-2006 period. EPA continues to implement measures to reduce ozone interstate transport through implementation of the 2005 Clean Air Interstate Rule (CAIR), the 2003 NOx Budget Trading Program, and the 2011 Cross-State Air Pollution Rule (a litigation-related stay on this rule was lifted in October 2014).

Washington's approach

On January 22, 2015, EPA issued a *Memorandum on Information of the Interstate Transport "Good Neighbor" Provision for the 2008 Ozone National Ambient Air Quality Standards (NAAQS) under Clean Air Act (CAA) Section 110(a)(2)(D)(i)(I).* The attachment to the memorandum highlights the results from the *Air Quality Modeling Technical Support Document for the 2008 Ozone NAAQS Transport Assessment*[14] (Ozone Transport TSD). In the Ozone Transport TSD document, EPA details photochemical air quality modeling it performed to project ozone concentrations at air quality monitoring sites to 2018 and to estimate state-by-state contributions to those 2018 concentrations. In its analysis, EPA applies the CSARP approach including the approach for identifying nonattainment and maintenance receptors and for identifying upwind states that contribute to these receptors based on the screening threshold (1 percent of the NAAQS). The memorandum states that based on the modeling results a state could either demonstrate that its contribution is below the screening threshold, or it could evaluate the scope of its transport obligation and indentify measures to achieve any needed emissions reductions.

Ecology reviewed EPA's modeling of ozone interstate transport for Washington. It indicates that most western states contribute less than 1 percent to downwind nonattainment or maintenance receptors. Washington's contribution is estimated to be significantly less than the screening threshold. Following the CSARP approach, the memorandum confirms that contributions below the screening threshold do not need further evaluation for actions to address transport.

In accordance with EPA's approach in CSARP and the 2015 "Good Neighbor" Memorandum, and based on the Ozone Transport TSD findings, Ecology asserts that Washington sources do not contribute significantly to nonattainment areas or interfere with maintenance of the 2008 ozone NAAQS.

Transport Assessment

Appendix B contains EPA 2015 "Good Neighbor" Memorandum and its attachment discussing Air Quality Modeling Results. The Ozone Transport TSD is available on EPA's website at http://www.epa.gov/airtransport/O3TransportAQModelingTSD.pdf.

[14] http://www.epa.gov/airtransport/

Appendix.

A. Additional information on Interstate Transport of Lead

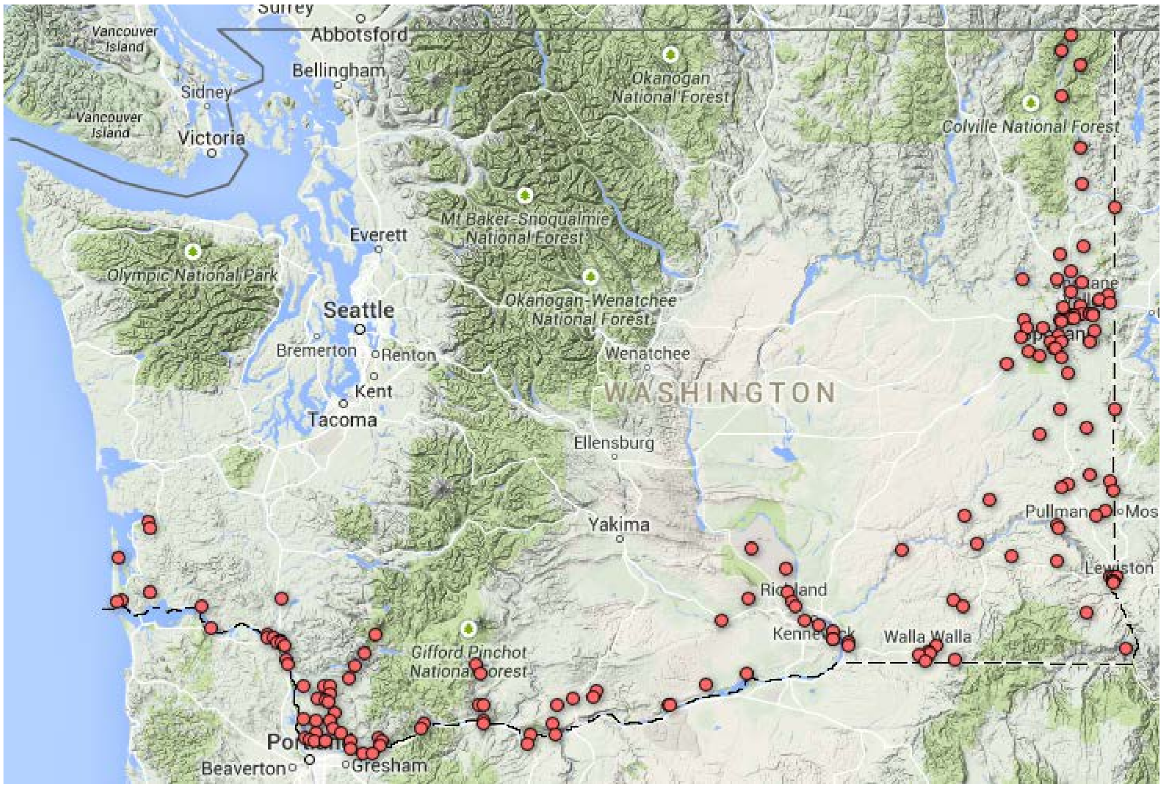

Figure A 1 Lead sources (<0.5 tpy) in all bordering counties.

Table A 1 List of all lead sources smaller than 0.5 tpy located in bordering counties

County	Lead (tons)	Site Name	Facility Type
Spokane	0.16	Felts Field	Airport
Clark	0.14	Pearson Field	Airport
Benton	0.12	VISTA FIELD	Airport
Cowlitz	0.11	Kelso-Longview	Airport
Spokane	0.1	Deer Park	Airport
Klickitat	9.41E-02	Columbia Gorge Regional	Airport
Benton	8.03E-02	Richland	Airport
Walla Walla	7.73E-02	Walla Walla Regional	Airport
Spokane	7.16E-02	Spokane Intl	Airport
Whitman	7.06E-02	Pullman/Moscow Regional	Airport
Cowlitz	4.15E-02	Weyerhaeuser NR Company	Pulp and Paper Plant
Benton	3.66E-02	Prosser	Airport
Whitman	3.60E-02	Whitman Co Memorial	Airport
Clark	2.77E-02	Grove Field	Airport
Whitman	2.65E-02	WILLARD FIELD	Airport
Cowlitz	2.55E-02	Longview Fiber	Pulp and Paper Plant
Klickitat	2.30E-02	Roosevelt Regional Landfill	Landfill
Whitman	2.16E-02	Rosalia Muni	Airport
Spokane	1.61E-02	MEAD FLYING SERVICE	Airport
Klickitat	1.44E-02	GOLDENDALE	Airport
Pacific	1.40E-02	PORT OF ILWACO	Airport
Walla Walla	1.39E-02	MARTIN FIELD	Airport
Clark	1.02E-02	FLY FOR FUN	Airport
Clark	9.71E-03	GOHEEN	Airport
Clark	9.54E-03	WOODLAND STATE	Airport
Pacific	7.24E-03	WILLAPA HARBOR	Airport
Clark	6.50E-03	Georgia-Pacific Consumer Products (Camas) LLC	Pulp and Paper Plant
Klickitat	5.50E-03	Roosevelt Landfill Biogas Project No. 1	Electricity Generation via Combustion
Pend Oreille	4.58E-03	Ione Muni	Airport
Clark	2.82E-03	CEDARS NORTH AIRPARK	Airport
Spokane	2.67E-03	Mutual Materials	Brick, Structural Clay, or Clay Ceramics Plant
Walla Walla	1.88E-03	Boise White Paper LLC	Pulp and Paper Plant
Benton	1.85E-03	U.S. Dept of Energy	
Clark	1.80E-03	PARKSIDE AIRPARK	Airport
Whitman	1.64E-03	SCHOEPFLIN	Airport
Spokane	1.45E-03	OX MEADOWS	Airport
Clark	1.23E-03	BRUSH PRAIRIE AERODROME	Airport
Clark	1.23E-03	GREEN MOUNTAIN	Airport

County	Lead (tons)	Site Name	Facility Type
Spokane	1.09E-03	SKY MEADOWS AIRPARK	Airport
Clark	1.03E-03	WALTER SUTTONS PRIVATE STRIP	Airport
Pend Oreille	1.00E-03	Ponderay Newsprint Company	Pulp and Paper Plant
Spokane	1.00E-03	Honeywell Electronic Materials	
Cowlitz	9.91E-04	MOUNT ST HELENS AERO RANCH	Airport
Spokane	9.90E-04	HOMEPORT	Airport
Clark	9.26E-04	LA CENTER VIEW-AIR	Airport
Clark	9.26E-04	PLEASANT FARM	Airport
Garfield	9.12E-04	DYE SEED RANCH INC.	Airport
Spokane	8.87E-04	FOWLERS NW 40	Airport
Spokane	8.87E-04	ELLERPORT	Airport
Whitman	8.72E-04	GOSSARD FIELD	Airport
Skamania	8.63E-04	KEY WAY	Airport
Benton	8.57E-04	WOODFIELD	Airport
Spokane	8.36E-04	LEES	Airport
Pend Oreille	8.32E-04	SULLIVAN LAKE STATE	Airport
Columbia	8.32E-04	LITTLE GOOSE LOCK AND DAM	Airport
Whitman	8.32E-04	LOWER GRANITE STATE	Airport
Walla Walla	8.32E-04	LOWER MONUMENTAL STATE	Airport
Clark	8.24E-04	BECKER FIELD	Airport
Whitman	8.21E-04	HILL	Airport
Whitman	8.14E-04	OAKESDALE	Airport
Benton	8.06E-04	COOPERS LANDING	Airport
Spokane	7.85E-04	SPANGLE FIELD	Airport
Spokane	7.85E-04	BOYLE R & D	Airport
Spokane	7.85E-04	HARRIS	Airport
Spokane	7.85E-04	MULLAN HILL	Airport
Spokane	7.85E-04	ISAACSON	Airport
Spokane	7.85E-04	FLYING R RANCH	Airport
Spokane	7.85E-04	PETES	Airport
Spokane	7.85E-04	TAIS LANDING	Airport
Clark	7.72E-04	ROBERT L DELANOY	Airport
Clark	7.72E-04	DAYBREAK	Airport
Clark	7.72E-04	MC CLELLAN FIELD	Airport
Klickitat	7.63E-04	SPRING CREEK RANCH	Airport
Whitman	7.19E-04	LACROSSE MUNI	Airport
Klickitat	7.12E-04	TROUT LAKE	Airport
Klickitat	7.12E-04	PORT ELSNER	Airport
Skamania	7.09E-04	BROWNS CAPE HORN	Airport
Columbia	7.08E-04	WELLER CANYON	Airport

County	Lead (tons)	Site Name	Facility Type
Walla Walla	6.71E-04	PAGE	Airport
Walla Walla	6.71E-04	DARCYS AIR STRIP	Airport
Whitman	6.67E-04	WALKER	Airport
Asotin	6.61E-04	HAWKS RUN	Airport
Klickitat	6.61E-04	AEROSTONE RANCH	Airport
Klickitat	6.61E-04	BOBS FIELD	Airport
Klickitat	6.61E-04	PIPER CANYON	Airport
Klickitat	6.61E-04	MERCER RANCH	Airport
Pacific	6.61E-04	MARTIN	Airport
Skamania	6.58E-04	SKY RIVER RANCH	Airport
Garfield	6.56E-04	SCOTT SEED FARM	Airport
Wahkiakum	6.56E-04	MICHAIR	Airport
Spokane	5.71E-04	CHENEY	Rail Yard
Spokane	5.43E-04	TRENTWOOD	Rail Yard
Klickitat	5.00E-04	SDS Lumber Company	Lumber/Sawmill
Cowlitz	4.19E-04	Emerald Kalama Chemical, LLC	Chemical Plant
Spokane	2.93E-04	SI	Rail Yard
Spokane	2.39E-04	PARADISE AIR RANCH	Airport
Cowlitz	2.22E-04	Mint Farm Generating Station	Electricity Generation via Combustion
Clark	2.22E-04	VANCOUVER	Rail Yard
Klickitat	2.00E-04	HILLCREST	Airport
Spokane	1.88E-04	SPOKANE	Rail Yard
Cowlitz	1.60E-04	KALAMA	Rail Yard
Whitman	1.60E-04	Washington State University	Institutional (school, hospital, prison, etc.)
Asotin	1.39E-04	ROGERSBURG	Airport
Spokane	1.28E-04	N A DEGERSTROM YARD	Airport
Klickitat	1.28E-04	MID-COLUMBIA MEDICAL CENTER	Airport
Spokane	1.28E-04	HOLY FAMILY HOSPITAL	Airport
Skamania	1.28E-04	AIR COLUMBIA	Airport
Spokane	1.28E-04	SHAMROCK PORT	Airport
Clark	1.28E-04	ORBIT	Airport
Walla Walla	1.28E-04	ST MARY MEDICAL CENTER	Airport
Asotin	1.28E-04	O & M FACILITIES	Airport
Benton	1.28E-04	KENNEWICK GENERAL HOSPITAL	Airport
Walla Walla	1.28E-04	WALLA WALLA GENERAL HOSPITAL	Airport
Benton	1.28E-04	WNP-2 PLANT SUPPORT FACILITY	Airport
Clark	1.28E-04	LEGACY SALMON CREEK HOSPITAL	Airport
Skamania	1.28E-04	RAINCREEK	Airport
Spokane	1.28E-04	DEACONESS MEDICAL CENTER	Airport
Pacific	1.28E-04	WILLAPA HARBOR	Airport

County	Lead (tons)	Site Name	Facility Type
Spokane	1.28E-04	SACRED HEART MEDICAL CENTER HELISTOP	Airport
Pacific	1.28E-04	OCEAN BEACH HOSPITAL	Airport
Skamania	1.28E-04	SAMPSON	Airport
Pend Oreille	1.28E-04	METALINE RADIO	Airport
Pend Oreille	1.28E-04	BOUNDARY SUBSTATION	Airport
Whitman	1.28E-04	WHITMAN COMMUNITY HOSPITAL	Airport
Klickitat	1.28E-04	SKYLINE HOSPITAL EMS	Airport
Clark	1.28E-04	ST JOSEPH COMMUNITY HOSPITAL	Airport
Cowlitz	1.28E-04	ST JOHNS MEDICAL CENTER	Airport
Asotin	1.28E-04	TRI-STATE HOSPITAL EMS	Airport
Benton	1.28E-04	KADLEC MEDICAL CENTER	Airport
Spokane	1.28E-04	PATHFINDER HELICOPTER	Airport
Pend Oreille	1.28E-04	NEWPORT COMMUNITY HOSP	Airport
Clark	1.28E-04	ROSS COMPLEX	Airport
Garfield	1.28E-04	LOWER GRANITE DAM	Airport
Cowlitz	1.28E-04	COUGAR	Airport
Clark	1.28E-04	SOUTHWEST WASHINGTON MEDICAL CENTER	Airport
Benton	1.28E-04	HAMMER EVOC SKID PAD	Airport
Spokane	1.28E-04	EASTERN STATE HOSPITAL EMS	Airport
Asotin	1.28E-04	KIWI AIR	Airport
Asotin	1.28E-04	TRI-STATE MEMORIAL HOSPITAL EMS	Airport
Klickitat	1.27E-04	WISHRAM	Rail Yard
Spokane	1.14E-04	Kaiser Trentwood	Fabricated Metal Products Plant
Spokane	8.32E-05	YARDLEY	Rail Yard
Benton	8.00E-05	Agrium US Inc	
Spokane	7.77E-05	Inland Empire Paper	Pulp and Paper Plant
Spokane	5.58E-05	MARSHALL	Rail Yard
Cowlitz	4.88E-05	LONGVIEW JCT.	Rail Yard
Walla Walla	3.76E-05	WALLUA	Rail Yard
Asotin	2.77E-05	SNAKE RIVER	Airport
Spokane	7.69E-06	TIGHTCLIFF	Airport
Wahkiakum	7.69E-06	SKAMOKAWA EAST VALLEY	Airport
Whitman	7.69E-06	MC GREGOR	Airport
Pacific	7.69E-06	WIRKKALA	Airport
Pend Oreille	7.69E-06	RIVER BEND	Airport
Benton	7.69E-06	MC WHORTER RANCH	Airport
Klickitat	7.69E-06	WARWICK	Airport
Columbia	7.69E-06	TOUCHET VALLEY	Airport

County	Lead (tons)	Site Name	Facility Type
Spokane	7.69E-06	ELK HEIGHTS	Airport
Benton	7.69E-06	COLUMBIA CREST WINERY	Airport
Cowlitz	7.69E-06	FLYING K RANCH	Airport
Cowlitz	7.69E-06	WALTERS ARV	Airport
Asotin	7.69E-06	SKID ROW	Airport
Spokane	7.69E-06	Fairchild AFB	Airport
Clark	1.51E-06	Clark Public Utilities / River Road Generating Project	Electricity Generation via Combustion

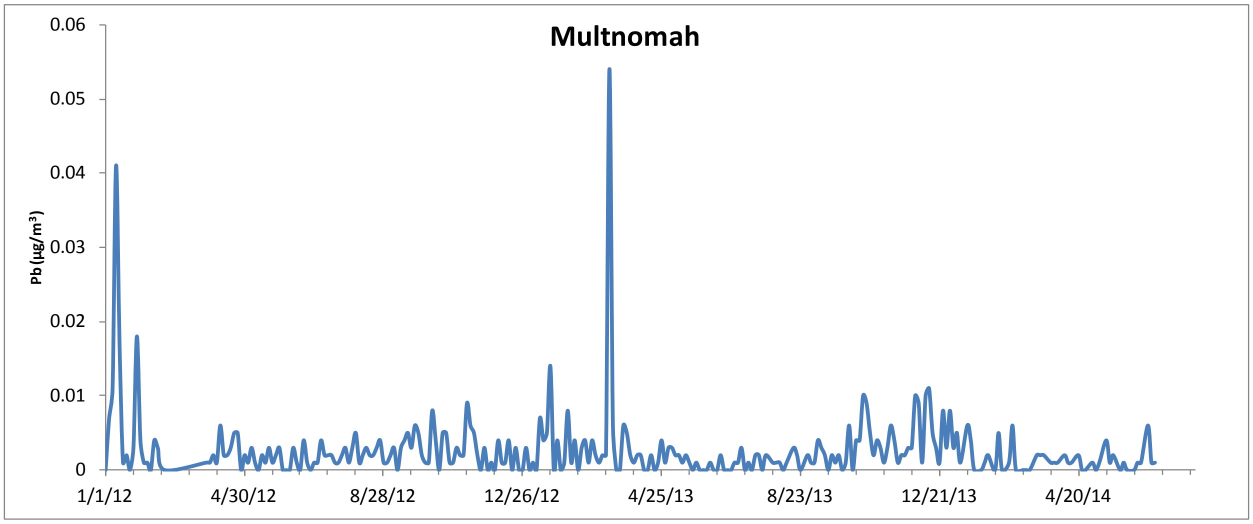

Figure A 2 Available daily mean values of lead at the Multnomah monitoring site

B. EPA 2015 "Good Neighbor" Memorandum

[See next page]