Appendix A

Transport Assessment for the 35 μg/m^3 $PM_{2.5}$ NAAQS

This section employs a weight of evidence approach which demonstrates that California does not contribute significantly to nonattainment or interfere with maintenance of the 35 μg/m^3 24-hour PM2.5 NAAQS in any state.

Figure A.1 shows potential receptors included in this assessment. All $PM_{2.5}$ monitors in the western states with design values that exceed the 35 μg/m^3 $PM_{2.5}$ NAAQS in the most recent three design value years are listed in Table A.1. Receptors without valid design values are not included in any further assessment as potential receptors.

Figure A.1: State of California and Location of Potential Nonattainment and Maintenance Receptors for 35 μg/m^3 $PM_{2.5}$ NAAQS

Table A.1: Western Counties with Daily $PM_{2.5}$ Design Values above the NAAQS

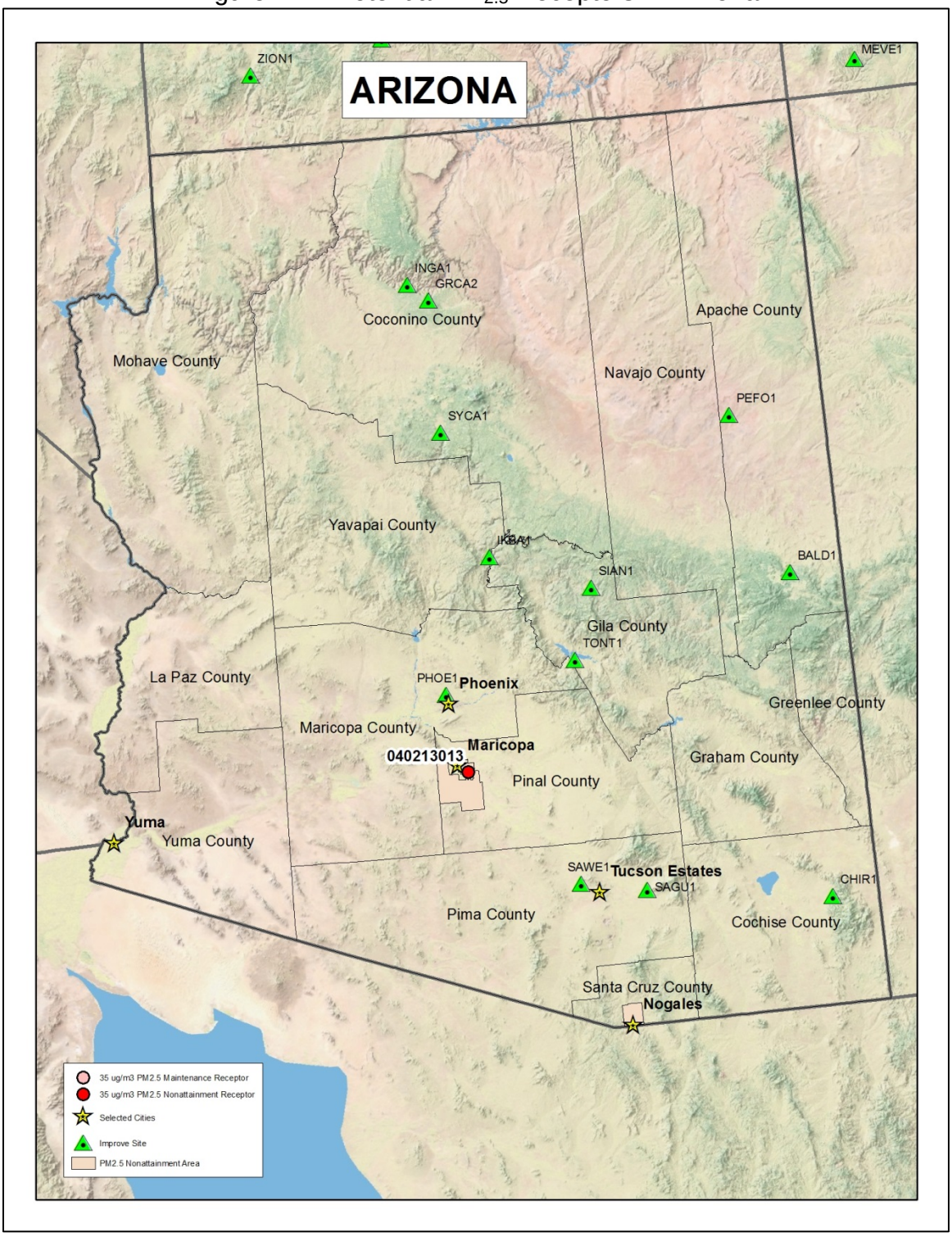
(NAAQS exceedances are in red)

EPA Region	State	County	Non-attainment Area: 35 µg/m³ Standard	Site ID	24-hour Design Values (µg/m³)						Potential Receptor Type
					2010-2012		2011-2013		2012-2014		
09	Arizona	Pinal		04-021-3013	28		33		36		Nonattainment
10	Idaho	Franklin		16-041-0001	70	NV					
10	Idaho	Lemhi		16-059-0004	36		38		39		Nonattainment
10	Idaho	Shoshone		16-079-0017	39		41		40		Nonattainment
08	Montana	Lewis and Clark		30-049-0026	36		28		28		Maintenance
08	Montana	Missoula		30-063-0024	35		37		35		Maintenance
08	Montana	Ravalli		30-081-0007	63		63		61		Nonattainment
08	Montana	Silver Bow		30-093-0005	42		39		37		Nonattainment
09	Nevada	Douglas		32-005-0007			171	NV	98	NV	
09	Nevada	Washoe		32-031-0022			41	NV	35	NV	
09	Nevada	Carson City		32-510-0020			98	NV	58	NV	
10	Oregon	Crook		41-013-0100	31		39		42		Nonattainment
10	Oregon	Jackson		41-029-0133	26		42		43		Nonattainment
10	Oregon	Klamath	Klamath Falls	41-035-0004	33		36		34		Maintenance
10	Oregon	Lake		41-037-0001	34		56		58		Nonattainment
10	Oregon	Lane	Oakridge	41-039-2013	38		40		40		Nonattainment
08	Utah	Box Elder	Salt Lake City	49-003-0003	37		37		37		Nonattainment
08	Utah	Cache	Logan	49-005-0004	37		46		45		Nonattainment
08	Utah	Davis	Salt Lake City	49-011-0004	34		35		38		Nonattainment
08	Utah	Salt Lake	Salt Lake City	49-035-3006	38		41		43		Nonattainment
08	Utah	Salt Lake	Salt Lake City	49-035-3010	35		39		42		Nonattainment
08	Utah	Utah	Provo	49-049-0002	29		45		43		Nonattainment
08	Utah	Utah	Provo	49-049-4001	32	NV	44		42		Nonattainment
08	Utah	Utah	Provo	49-049-5008	41	NV	42	NV			
08	Utah	Utah	Provo	49-049-5010	35		46		44		Nonattainment
08	Utah	Weber	Salt Lake City	49-057-0002	36		39		34		Maintenance
08	Utah	Weber	Salt Lake City	49-057-1003	33		35		36	NV	
10	Washington	Clark		53-011-0023			56	NV	41	NV	
10	Washington	Okanogan		53-047-0013	33	NV	37	NV			
10	Washington	Thurston		53-067-0013			39	NV	32	NV	

NV = non-valid design value

Arizona

Figure A.2: Potential $PM_{2.5}$ Receptors in Arizona



There are two $PM_{2.5}$ nonattainment areas in Arizona (Figure A.2). The Nogales nonattainment area, comprised of a portion of Santa Cruz County on the southern border with Mexico, and the West Central Pinal area, comprising a small portion of Pinal County and located in a more central location. Based on 2012 to 2014 $PM_{2.5}$ data, however, there is only one potential $PM_{2.5}$ nonattainment receptor in Arizona. This receptor is located in the West Central Pinal nonattainment area. The monitoring site in the Nogales nonattainment area currently attains the 35 $\mu g/m^3$ $PM_{2.5}$ NAAQS (Table A.2).

Table A.2: Potential $PM_{2.5}$ Receptors in Arizona (NAAQS exceedances in red)

County	$PM_{2.5}$ NAAQS Nonattainment Area	AQS ID	24-Hr Standard Design Value ($\mu g/m^3$)			Receptor Type	Approximate Distance to California Border (miles)
			2012	2013	2014		
Pinal	West Central Pinal	04-021-3013	28	33	36	Nonattainment	150

The single receptor in Arizona, referred to as the Cowtown monitor, is located on the far western side of Pinal County, outside of the city of Maricopa (Figure A.3). Situated in the West Central Pinal $PM_{2.5}$ nonattainment area, the receptor is located approximately 150 miles east of the California border and almost 190 miles from the nearest California facility in San Bernardino County (Appendix F.1). In addition, California mobile source emissions have decreased approximately 50 percent in the past decade and are projected to decrease an additional 50 percent from 2011 to 2021.

The West Central Pinal $PM_{2.5}$ nonattainment area covers approximately nine percent of Pinal County. Located in a basin at approximately 1,200 feet above sea-level, it is surrounded by mountain ranges. On the western border, between California and the receptor site, the Table Top Mountains reach almost 3,400 feet with open-ended valleys that could allow for transport from areas further to the west. The receptor is situated in the valley of the Gila River, a dry channel approximately 12 miles north of the receptor, and oriented in a way that allows air drainage to flow toward the northwest.[1]

The nonattainment area has a population of approximately 55,000, the majority of whom live in the incorporated city of Maricopa, and comprise a small portion of the population of Pinal County.[2] Although the population of Pinal County has increased by 75 percent in the last decade, most of that growth has been outside the $PM_{2.5}$ nonattainment area, which has seen a population increase of only 40 percent. The total number of vehicle miles traveled, an indication of motor vehicle activity within the county, has increased by far less than the population, only ten percent in the last decade.

[1] U.S. EPA Technical Support Document , Pinal County, Arizona, Area Designation for the 2006 24-hour Fine Particle National Ambient Air Quality Standard, May 10, 2010

[2] Arizona Department of Environmental Quality, Proposed Arizona State Implementation Plan Revision, West Central Pinal County 2006 $PM_{2.5}$ Nonattainment Area, February 2014.

Figure A.3: Pinal County and the West Central Pinal $PM_{2.5}$ Nonattainment Area

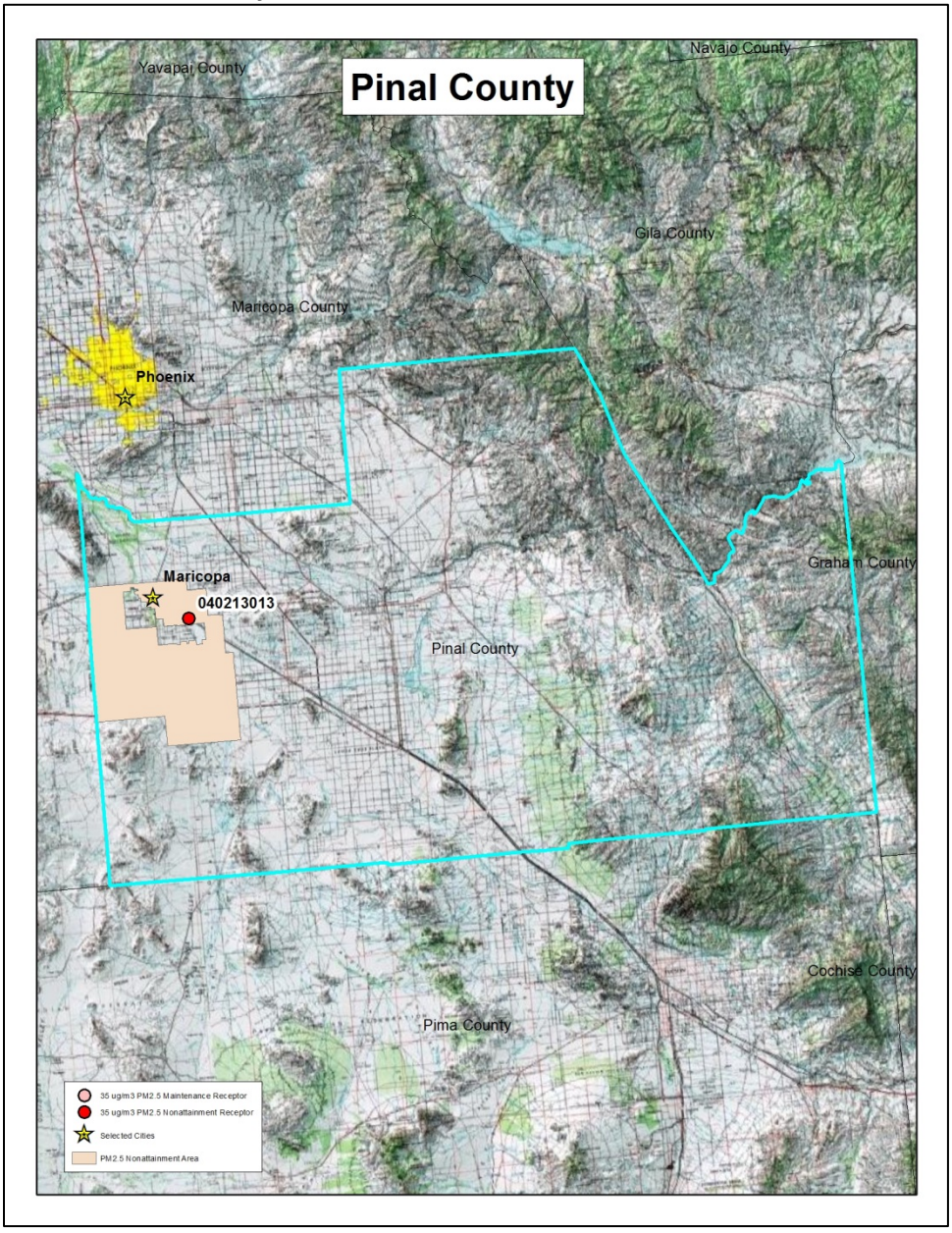


Table A.3: Population and VMT in Pinal County, Arizona[3]

County	Population (2014)	Population (2005)	Population change (2005 to 2014)	2011 VMT (millions mi)	2005 VMT (millions mi)	VMT change (2005 to 2014)
Pinal	401,918	229,549	75.1%	3,354	3,126	7.3%

[3] U.S. EPA, Population and Vehicle Miles Traveled, Emission and Emission-Related Data, 2005: http://www3.epa.gov/airquality/particlepollution/designations/2006standards/techinfo.html; 2011: http://www3.epa.gov/pmdesignations/2012standards/techinfo.htm

$PM_{2.5}$ concentrations at the Cowtown receptor site, situated in the approximate middle of the state, are the highest in Arizona (Table A.4). At Yuma, the only monitoring site on the California border, concentrations are well below the standard. In addition, IMPROVE monitors in Arizona show low concentrations throughout the year, with only occasional spikes (Appendix E.1). The closest IMPROVE site, has fairly high $PM_{2.5}$ concentrations, but is co-located with the JLG Supersite in the Phoenix urban area. The other IMPROVE sites, located east of the Cowtown monitor, show considerably lower concentrations. Potential emission sources and Weighted Emissions Potentials (WEP) for these sites indicate impacts from primarily local Arizona sources (Appendix E.1).

The 24-hour design values at the potential receptor show an steady decrease from a peak in 2007, but a recent increase, exceeding the standard in 2014 (Figure A.4). This is reiterated in the graph showing daily data from 2006 to 2014, which also shows seasonal highs in the spring and summer, with only occasional exceedances of the NAAQS in recent years (Figure A.5).

Table A.4: $PM_{2.5}$ 24-Hour Design Values in Arizona (NAAQS exceedances in red)

County	AQS ID	24-Hour Design Value ($\mu g/m^3$					
		2010-2012		2011-2013		2012-2014	
Cochise	04-003-1005	13		12		13	
Coconino	04-005-1008	12		12		11	NV
La Paz	04-012-8000					8	NV
Maricopa	04-013-0019	26		28		28	
	04-013-1003	16	NV	16	NV	16	NV
	04-013-1004	22	NV	20	NV	20	
	04-013-2001	23	NV	21	NV	18	
	04-013-4003	24		25		24	
	04-013-4005	20	NV	19	NV	18	NV
	04-013-4019					21	NV
	04-013-7020	11		11		11	
	04-013-9812	27	NV	28		25	
	04-013-9997	21		23		21	
Pima	04-019-0011	12		12		14	
	04-019-1028	12		13		13	
Pinal	04-021-0001	21		19		17	
	04-021-3002	23		23		13	
	04-021-3013	28		33		**36**	
Santa Cruz	04-023-0004	28		27		27	
Yavapai	04-025-2002	9		10		10	NV
Yuma	04-027-0004	15		16		19	

NV = non valid design value

Figure A.4: $PM_{2.5}$ 24-Hour Design Values, Pinal County Receptor

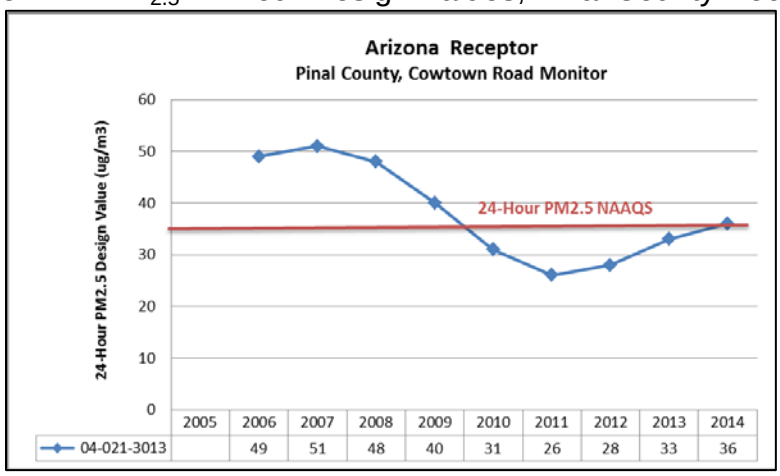
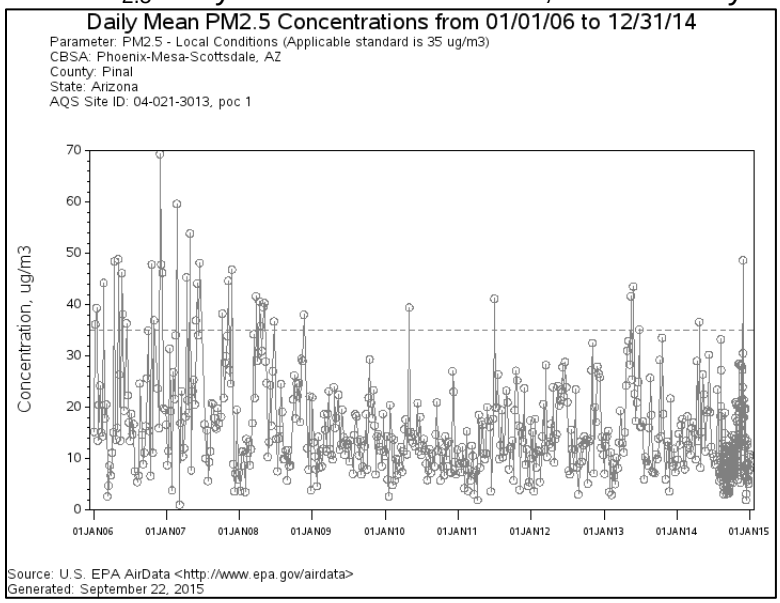


Figure A.5: $PM_{2.5}$ Daily Mean Concentrations, Pinal County Receptor



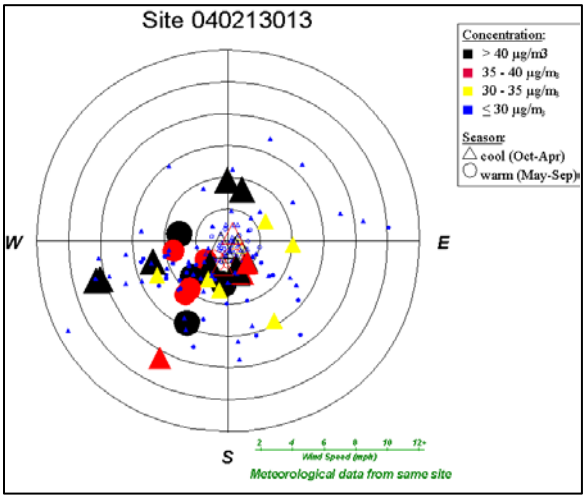
Arizona and U.S. EPA both conducted extensive evaluations of the meteorology of the area.[4] Periods of high steady winds and gusts can occur, particularly during the monsoon season (primarily summer), with the higher wind speeds primarily from the south and southwest. These winds can lead to increased fugitive dust emissions, especially when flowing over the desert areas.

The analyses of wind patterns at the Cowtown monitor, however, indicated that the majority of the $PM_{2.5}$ exceedances did not occur under high wind conditions (Figure A.6), indicating that these were likely due to local rather than transported sources. An analysis of PM_{10} during $PM_{2.5}$ exceedance days showed that although the majority of exceedances were correlated with PM_{10} spikes, these spikes were

[4] State of Arizona, U.S. EPA Technical Support Document , Pinal County, Arizona, Area Designation for the 2006 24-hour Fine Particle National Ambient Air Quality Standard, May 10, 2010

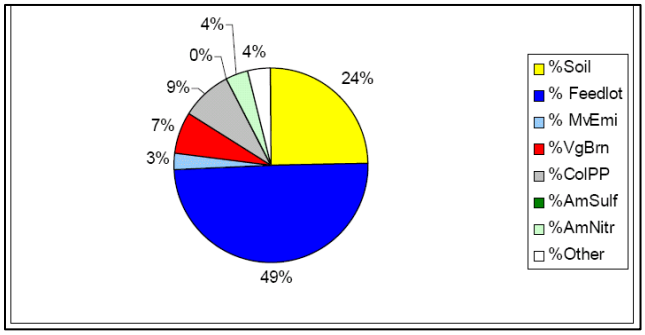
independent of temperature or wind speed and direction, further implicating local source emissions, possibly nearby feedlots.[5]

Figure A.6: Pollution Wind Rose at Cowtown Monitor, Pinal County, Arizona[6]



In 2003, a source apportionment study was commissioned by the Pinal County Air Quality Control District[7]. The results of this study, shown in Figure A.7 below, indicated that violations of the NAAQS were more likely the result of local rather than regional sources, particularly feedlot and geological soil. U.S. EPA cited this study in its technical document[8] and reiterated the conclusion that the majority of the emissions affecting the monitor were indeed local in source with very little contribution from more distant sources.

Figure A.7: Source Contributions at Cowtown Monitor, Pinal County Receptor[9]



Soil - Geological soil ; Feedlot - Feedlot soil ; MvEmi - Motor vehicle; ColPP - Coal fired power plant combustion emissions; AmSulf - Ammonium sulfate; AmNitr - Ammonium nitrate; Other - Unclassified sources.

[5] Ibid
[6] Ibid
[7] Pinal County Air Quality Control District Source Apportionment Study, July 29, 2005
[8] State of Arizona, U.S. EPA Technical Support Document , Pinal County, Arizona, Area Designation for the 2006 24-hour Fine Particle National Ambient Air Quality Standard, May 10, 2010
[9] Pinal County Air Quality Control District Source Apportionment Study, July 29, 2005

Based on the above-described information, the distance from California to this receptor, the intervening terrain, and the predominance of local emission sources, we believe it is reasonable to assume that emissions from California do not significantly contribute to nonattainment of the 35 $\mu g/m^3$ $PM_{2.5}$ NAAQS at this receptor.

Idaho

Figure A.8: Potential $PM_{2.5}$ Receptors in Idaho

Only one portion of Idaho, a partial area of Franklin County on the southern border with Utah, is designated as a nonattainment area for the 35 μg/m^3 $PM_{2.5}$ NAAQS (Figure A.8). This area is considered part of the Logan UT-ID nonattainment area and will be discussed in the Utah section.

There are two potential nonattainment receptors in Idaho, separated by approximately 200 miles. Each of these receptors is evaluated separately.

Table A.5: Potential $PM_{2.5}$ Receptors in Idaho (NAAQS exceedances in red)

County	$PM_{2.5}$ NAAQS Nonattainment Area	AQS ID	24-Hr Standard Design Value (μg/m^3)			Receptor Type	Approximate Distance to California Border (miles)
			2012	2013	2014		
Lemhi		16-059-0004	36	38	39	Nonattainment	380
Shoshone		16-079-0017	39	41	40	Nonattainment	430

There are very few $PM_{2.5}$ monitors in Idaho with complete data (Table A.6). The monitors closer to California, in Canyon County near Boise on the western border with Oregon and Bannock County near Pocatello, near the southern border with Utah, are both below the standard.

Table A.6: $PM_{2.5}$ 24-Hour Design Values in Idaho (NAAQS exceedances in red)

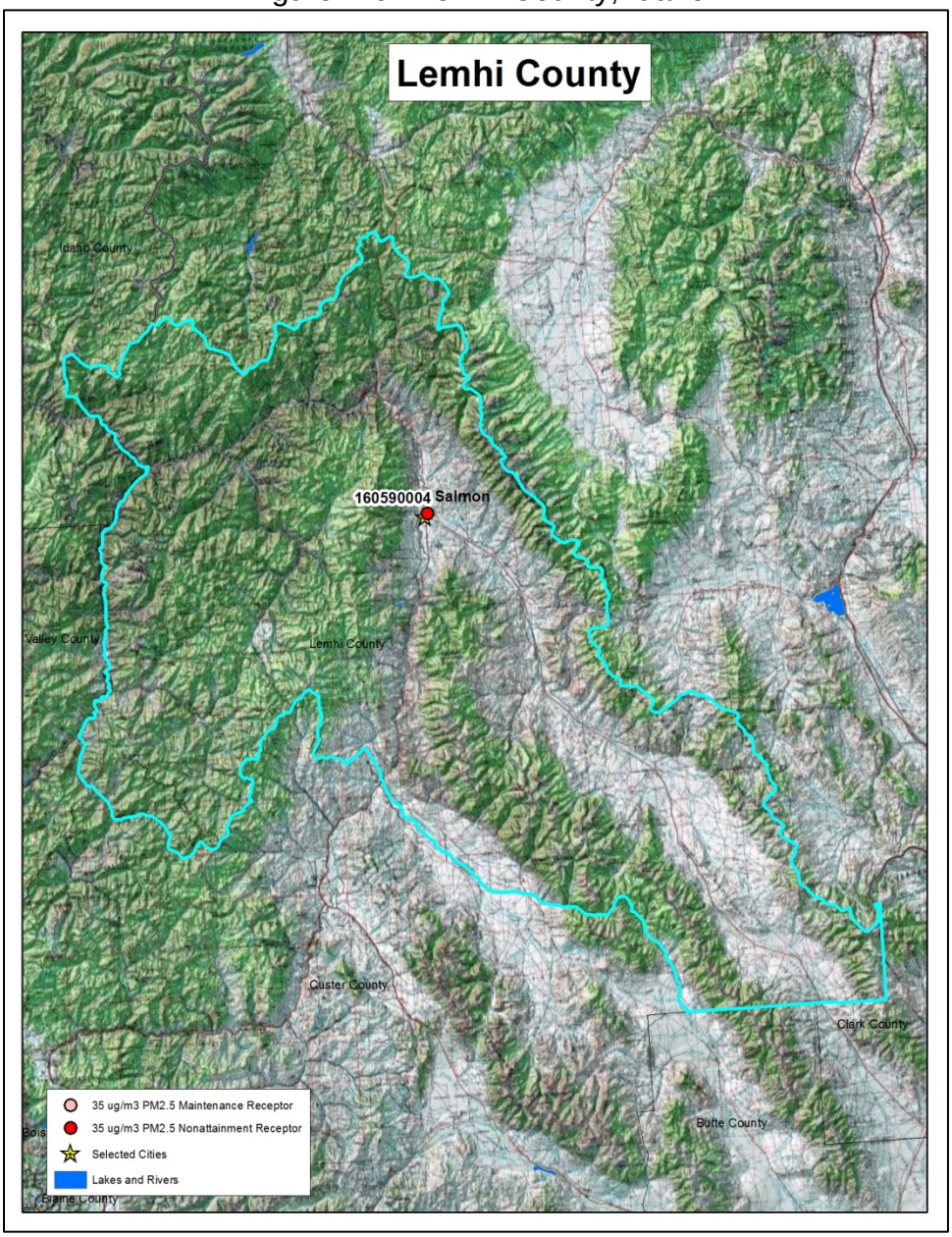
County	AQS ID	24-Hour Design Value (μg/m^3)					
		2010-2012		2011-2013		2012-2014	
Ada	16-001-0010	12	NV				
Bannock	16-005-0020	23		27		24	
Benewah	16-009-0010	27	NV				
Canyon	16-027-0002	15	NV				
Franklin	16-041-0001	70	NV				
Lemhi	16-059-0004	36		38		39	
Shoshone	16-079-0017	39		41		40	

NV = non valid design value

IMPROVE monitors in Idaho show only minor impacts from California on the worst days (Appendix E.1). $PM_{2.5}$ concentration trends show higher concentrations in the summer months, in contrast to the high wintertime concentrations at the Idaho receptors (Figures A.11 and A.15). The weighted emission potential analysis indicates that the worst visibility days at the Idaho IMPROVE sites are the result of more localized regional influences, with California's contributions occurring most often during those days with the best visibility (Appendix E.1). The highest daily concentrations at IMPROVE sites in Idaho can be directly linked to large wildfires in the western states (Appendix E.1).

Lemhi County Nonattainment Receptor, AQS ID 16-059-0004

Figure A.9: Lemhi County, Idaho



Lemhi County is a largely mountainous region, located in the eastern portion of Idaho and sharing a border, and a position along the continental divide, with Montana (Figure A.9). This is the fourth largest county in Idaho by area, encompassing approximately 4,600 square miles. The Salmon River cuts through the center of the county, running northwest to south, creating a large valley that lies approximately 3,000 feet below the surrounding mountain peaks. These peaks rise to over 8,000 feet and

act to limit emission transport to the valley, particularly from the east and west.[10] The receptor is approximately 380 miles from the northeast corner of California, separated by the Sierra Nevada, Cascade, and Bitterroot Ranges. It is almost 600 miles to the closest California emission source (Appendix F.1), with the nearest large local emission source almost 140 miles to the east in Montana. In addition, California mobile source emissions have decreased approximately 50 percent in the past decade and are projected to decrease an additional 50 percent from 2011 to 2021.

The county is considered fairly rural, with an estimated population of less than 8,000 in 2014, with a 2.3 percent decrease in the last decade (Table A.7). The largest populated area in the county is the City of Salmon, home to approximately 3,000 people. The number of vehicle miles traveled has declined along with the declining population, but by a much higher percentage, down 35 percent since 2005.

Table A.7: Population and VMT in Lemhi County, Idaho[11]

County	Population (2014)	Population (2005)	Population change (2005 to 2014)	2011 VMT (millions mi)	2005 VMT (millions mi)	VMT change (2005 to 2014)
Lemhi	7,725	7,909	-2.3%	85	131	-35.1%

The $PM_{2.5}$ 24-hour design values at the Lemhi receptor show that the area has generally been above the standard, dipping to its lowest concentration in 2009 (Figure A.10). Daily data from 2010 to 2014 shows that winter is the high season with summer having the lowest concentrations (Figure A.11). Wildfire impacts were noted in August and September of 2012 when daily average concentrations exceeded 200 $\mu g/m^3$. In total, for 2012 to 2014, over 100 days were flagged as being potentially impacted by wildfires; only 45 of these days were removed by U.S. EPA from design value calculations. Although removing all 100 flagged days from consideration would further lower the 24-hour design values at the Lemhi monitor, the area would still violate the standard. Removing these days from consideration would, however, significantly impact the 12.0 $\mu g/m^3$ $PM_{2.5}$ annual standard, which is discussed in Appendix B.

[10] U.S. EPA Technical Support Document , Idaho Area Designation for the 2006 24-hour Fine Particle National Ambient Air Quality Standard, August 18, 2008

[11] U.S. EPA, Population and Vehicle Miles Traveled, Emission and Emission-Related Data, 2005: http://www3.epa.gov/airquality/particlepollution/designations/2006standards/techinfo.html; 2011: http://www3.epa.gov/pmdesignations/2012standards/techinfo.htm

Figure A.10: $PM_{2.5}$ 24-Hour Design Values, Lemhi County Receptor

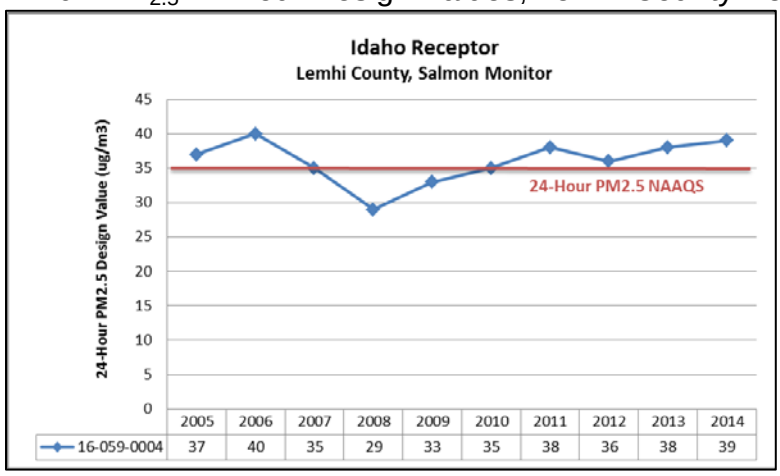
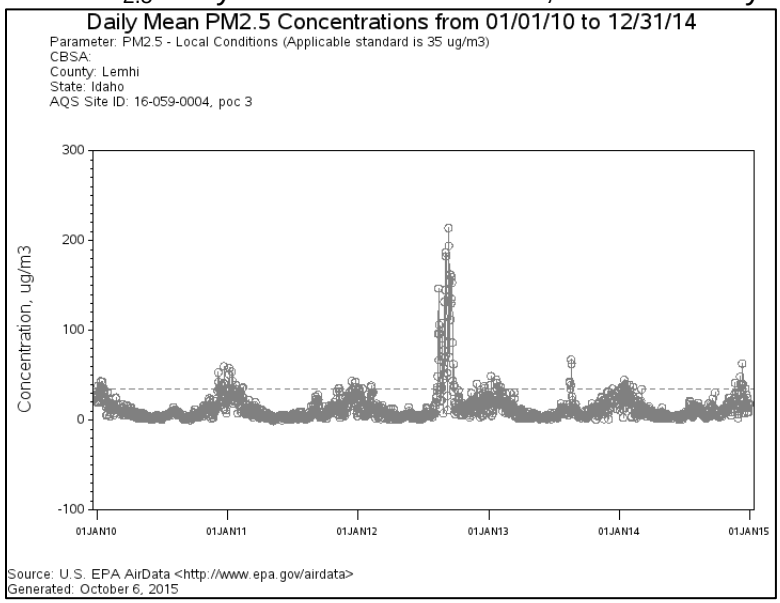


Figure A.11: $PM_{2.5}$ Daily Mean Concentrations, Lemhi County Receptor



During original determinations of attainment status for the 35 $\mu g/m^3$ $PM_{2.5}$ NAAQS, the Lemhi monitor was considered unclassifiable due to monitor malfunctions. In its 2008 technical support document, U.S. EPA found that Lemhi County would not be a candidate for nonattainment due to relatively low emission levels, a small population, minimal commuter activity and a lack of large emission sources.[12]

The Idaho Department of Environmental Quality, however, considers the Salmon receptor area to be an area of concern for $PM_{2.5}$.[13] Residential wood burning,

[12] U.S. EPA Technical Support Document, Idaho Area Designation for the 2006 24-hour Fine Particle National Ambient Air Quality Standard, August 18, 2008
[13] http://www.deq.idaho.gov/media/662796-nonattainment_map.pdf

particularly during periods of wintertime inversions and stagnation events, is considered the primary contributor to $PM_{2.5}$ exceedances.[14]

Based on the above-described information, the distance from California and the intervening terrain, the high level of wildfire related emissions during the otherwise low concentration summer season, as well as the effect of local topography and emission sources, particularly residential wood burning, on wintertime exceedances, we believe it is reasonable to assume that emissions from California do not significantly contribute to nonattainment of the 35 $\mu g/m^3$ $PM_{2.5}$ NAAQS at this receptor.

Shoshone County Nonattainment Receptor, AQS Site ID 16-079-0017

Shoshone County is a rural county in the panhandle region of Idaho in the far north of the state. The potential nonattainment receptor is located in the town of Pinehurst in a small, enclosed, bowl-shaped valley at the western end of the Silver Valley (Figure A.12). The Silver Valley is a long narrow valley, formed by the Coeur d'Alene River. Elevation in the Silver Valley ranges from 2,200 feet where Pinehurst is located to 3,300 feet at the eastern end.[15] The area is in nonattainment for the 12.0 $\mu g/m^3$ $PM_{2.5}$ NAAQS. The receptor is approximately 430 miles from California, separated by the Sierra Nevada, Cascade, and Bitterroot Ranges. It is almost 700 miles from the nearest California emission source (Appendix F.1), with the closest local large emission source found over 80 miles away in Idaho's Nez Perce County to the southwest. In addition, California mobile source emissions have decreased approximately 50 percent in the past decade and are projected to decrease an additional 50 percent from 2011 to 2021.

The population of Shoshone County is currently just above 12,000 (Table A.8), with the population at Pinehurst, the location of the violating monitor, considerably less at approximately 1,600. The populations of both Pinehurst and Shoshone County have declined in recent years with a corresponding decrease in the number of vehicle miles traveled.

[14] U.S. EPA Technical Support Document, Washington State Implementation Plan and Interstate Transport Requirements for the 2006 24-hour Fine Particulate Matter National Ambient Air Quality Standards, May 13, 2015.
[15] State of Idaho Department of Environmental Quality, Idaho Area Designation Recommendations for the 2006 $PM_{2.5}$ NAAQS, December 14, 2007.

Figure A.12: Shoshone County, Idaho

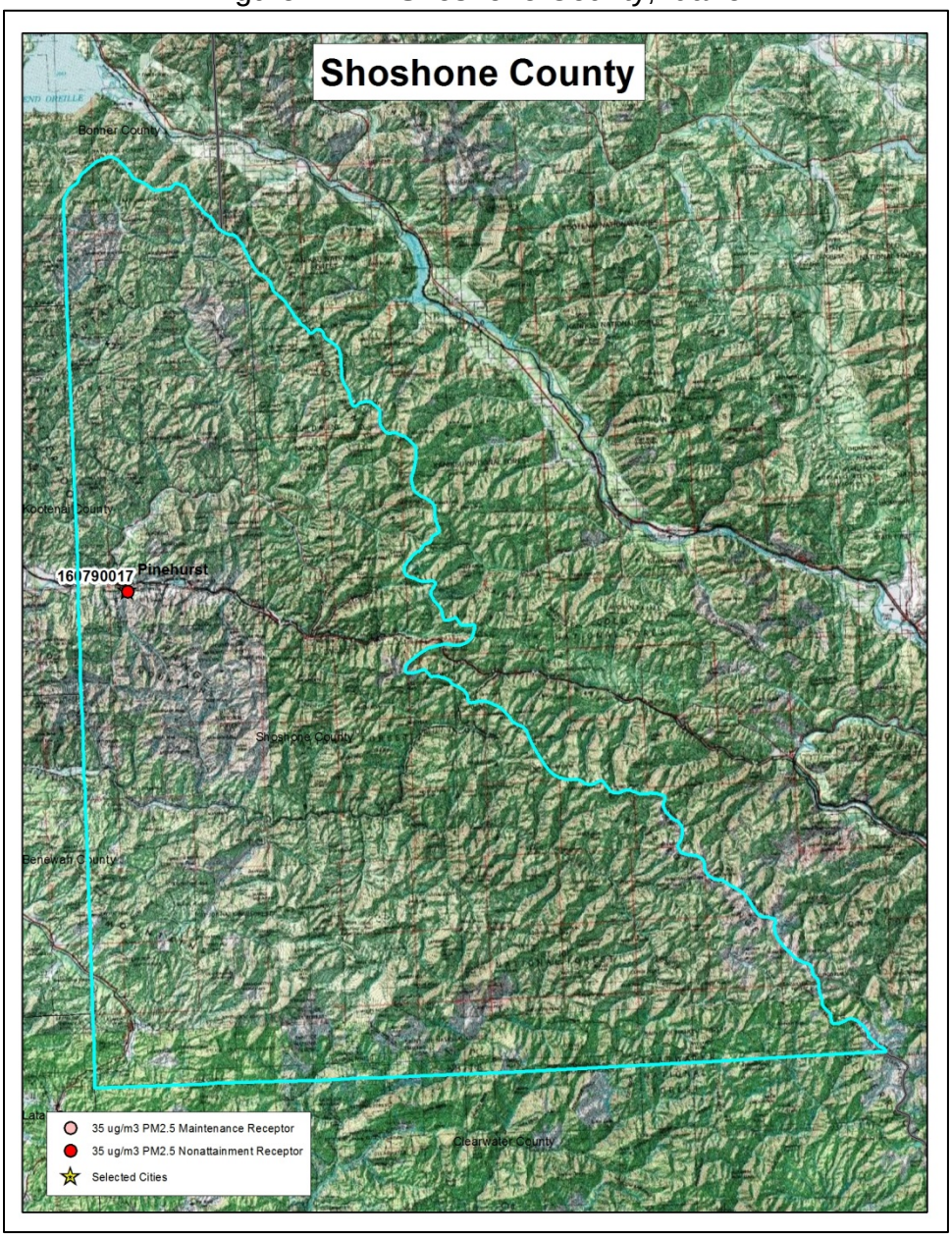


Figure A.13: Pinehurst and the Silver Valley, Shoshone County, Idaho[16]

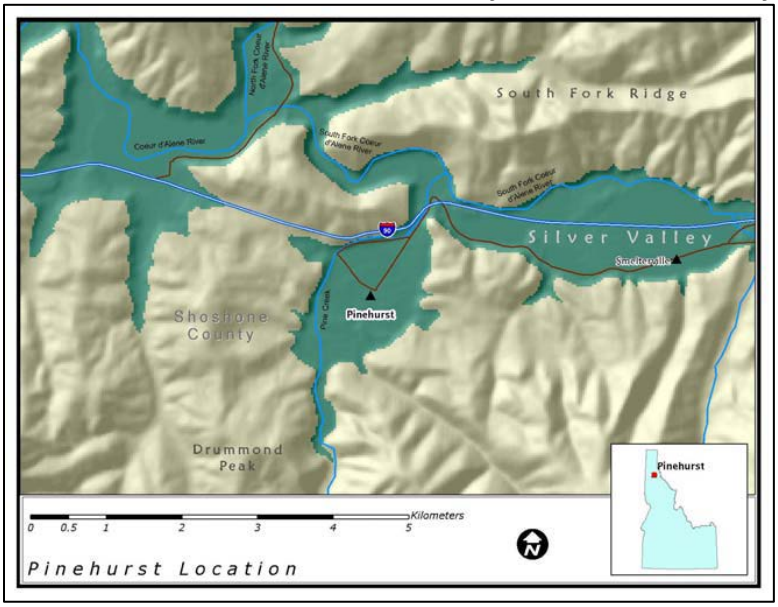


Table A.8: Population and VMT in Shoshone County, Idaho[17]

County	Population (2014)	Population (2005)	Population change (2005 to 2014)	2011 VMT (millions mi)	2005 VMT (millions mi)	VMT change (2005 to 2014)
Shoshone	12,390	13,157	-5.8%	216	227	-4.9%

The Pinehurst 24-hour design values show that the area has generally been above the standard, barely dipping below in 2008 and 2009 (Figure A.14). Daily data for 2011 to 2014 shows that winter is the high season with the lowest concentrations in the summer (Figure A.15). Wildfire impacts were noted in August and September of 2012, although most concentrations did not exceed the 24-hour standard. Idaho flagged 74 days as potential exceptional events at the Shoshone Pinehurst monitor, but only three have been concurred on by U.S. EPA, with only one above the 24-hour standard. Additional concurrence by U.S. EPA on flagged data would have no effect on the attainment status for either the two $PM_{2.5}$ standards.

[16] U.S. EPA Technical Support Document , Idaho Area Designation for the 2006 24-hour Fine Particle National Ambient Air Quality Standard, August 18, 2008.

[17] U.S. EPA, Population and Vehicle Miles Traveled, Emission and Emission-Related Data, 2005: http://www3.epa.gov/airquality/particlepollution/designations/2006standards/techinfo.html; 2011: http://www3.epa.gov/pmdesignations/2012standards/techinfo.htm

Figure A.14: $PM_{2.5}$ 24-Hour Design Values, Shoshone County Receptor

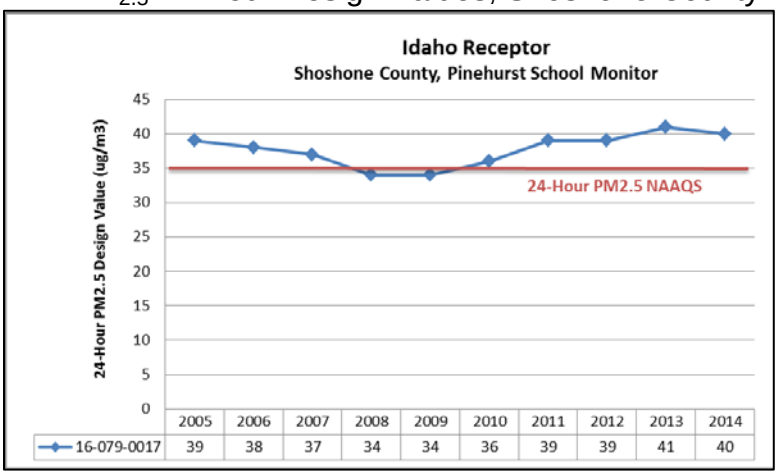
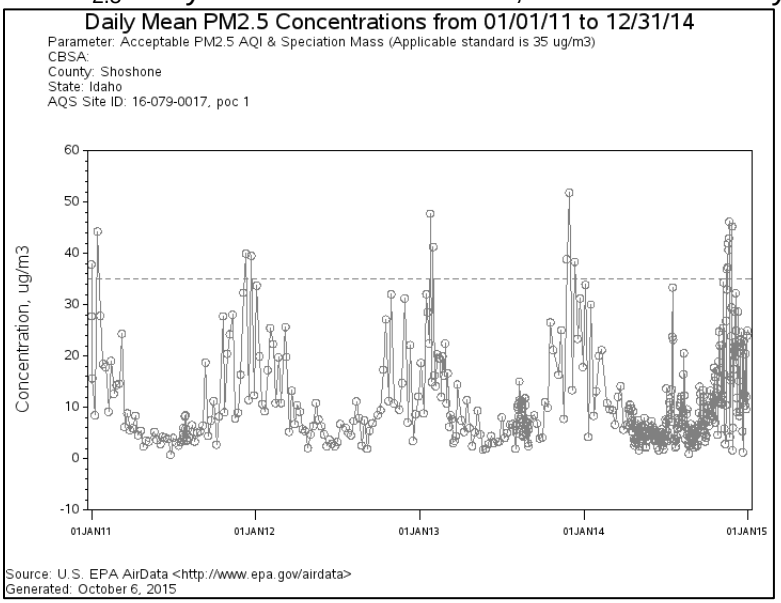


Figure A.15: $PM_{2.5}$ Daily Mean Concentrations, Shoshone County Receptor



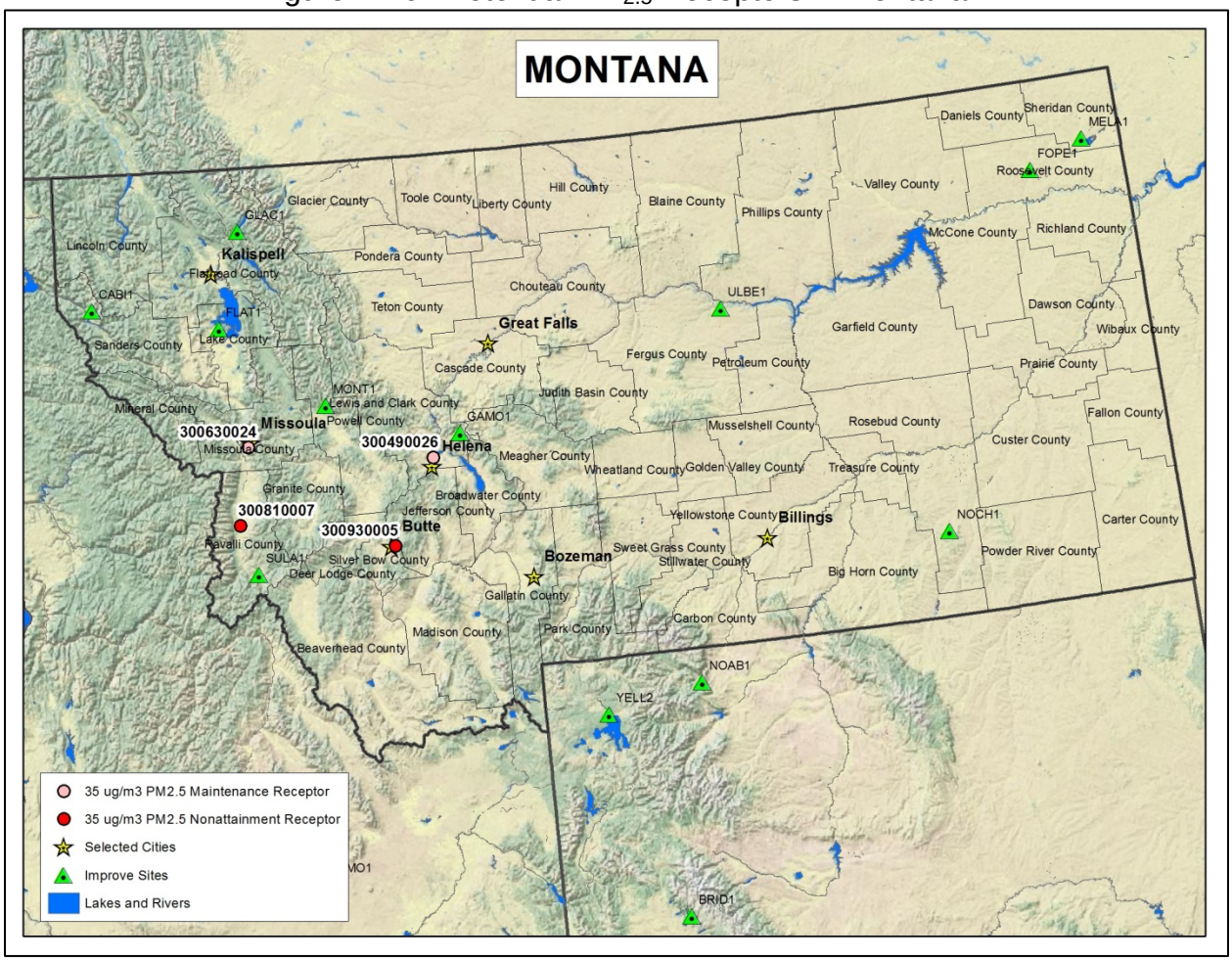
U.S. EPA determined that the main emissions sources affecting the Shoshone Pinehurst monitor were residential wood heating and motor vehicles.[18] However, open burning and slash burning were also identified as large sources that could contribute to violations of the 24-hour $PM_{2.5}$ standard. Idaho's analysis of the Pinehurst area showed that topographical features and wintertime meteorology limit transport of pollutants between other air sheds within Shoshone County and Pinehurst, with even the air from the valley just east of Pinehurst not mixing with air from Pinehurst during exceedances. Idaho asserted that pollutants emitted within Pinehurst remain trapped, and emissions from outside the Silver Valley do not contribute to $PM_{2.5}$ pollutant concentrations.[19]

[18] U.S. EPA Technical Support Document , Idaho Area Designation for the 2006 24-hour Fine Particle National Ambient Air Quality Standard, August 18, 2008.
[19] State of Idaho Department of Environmental Quality, Idaho Area Designation Recommendations for the 2006 $PM_{2.5}$ NAAQS, December 14, 2007

Based on the above-described information, the distance from California and the intervening terrain, and the effect of local topography and emission sources, particularly residential wood burning, on wintertime exceedances, we believe it is reasonable to assume that emissions from California do not significantly contribute to nonattainment of the 35 $\mu g/m^3$ $PM_{2.5}$ NAAQS at this receptor.

Montana

Figure A.16: Potential $PM_{2.5}$ Receptors in Montana



There are two potential nonattainment and two potential maintenance receptors in Montana, all in the western portion of the state (Figure A.16 and Table A.9). Each of these receptors is evaluated separately. The western portion of Montana is dominated by the Rocky Mountains, with the Lewis Range and the Cabinet Mountains to the north, the Absaroka Range to the south, and the Bitterroot Mountains to the west. The receptor sites are approximately 400 to 500 miles from the California border, with mountainous terrain in between.

Table A.9: Potential $PM_{2.5}$ Receptors in Montana (NAAQS exceedances in red)

County	$PM_{2.5}$ NAAQS Nonattainment Area	AQS ID	24-Hr Standard Design Value ($\mu g/m^3$)			Receptor Type	Approximate Distance to California Border (miles)
			2012	2013	2014		
Lewis and Clark		30-049-0026	36	28	28	Maintenance	510
Missoula		30-063-0024	35	37	35	Maintenance	440
Ravalli		30-081-0007	63	63	61	Nonattainment	410
Silver Bow		30-093-0005	42	39	37	Nonattainment	460

IMPROVE monitors located in both Montana and Idaho show only minor impacts from California on even the worst days (Appendix E.1). $PM_{2.5}$ concentration trends at the IMPROVE sites show the highest concentrations are in the summer months. This is in contrast to the peak concentrations seen during the winter months at the Montana monitoring sites, once the impacts of summer and fall wildfires have been excluded. Weighted Emission Potential analysis indicates that the worst visibility days at the IMPROVE sites in Montana have a more localized regional influence (Appendix E.1). The highest daily concentrations at IMPROVE sites in Montana can be directly linked to large wildfires in the western states.

U.S. EPA has noted that two of the potential receptor sites, those located in Ravalli and Missoula Counties, would attain the $PM_{2.5}$ 24-hour standard for 2011-2013 if flagged wildfire exceptional events were excluded. To that effect, they were not included as potential receptors for transport from other states, in particular, Idaho, Oregon, and Washington.[20] A review of the $PM_{2.5}$ daily concentrations at all four potential receptor sites shows that Montana has flagged almost 500 days as being impacted by wildfire exceptional events. If these days were not included toward the design values, as previously indicated in the U.S. EPA technical support documents for the Idaho, Oregon, and Washington transport SIPs, none of these sites would be considered potential receptors (Table A.10). Excluding only those days that exceed 35.4 $\mu g/m^3$ would still result in three of the four potential receptors being removed from this list, leaving only the receptor in Silver Bow County as a potential maintenance receptor.

[20] U.S. EPA Technical Support Document, State Implementation Plan and Interstate Transport Requirements for the 2006 24-hour Fine Particulate Matter National Ambient Air Quality Standards; Idaho, January 22 2015; Oregon, November 19, 2014.; Washington, May 13, 2015.

Table A.10: Impact of Exceptional Events on Potential $PM_{2.5}$ Receptors in Montana
(NAAQS exceedances, and potential exceedances, in red)

County	Site	98th Percentile			24-Hour Design Value		
		2012	2013	2014	2012	2013	2014
Lewis and Clark	**30-049-0026**						
	Official values	32.5	24.1	26.6	36	28	28
	minus all flagged days	23.7	21.8	24.2	33	24	23
	minus flagged days =>35.4	26.2	24.1	24.2	34	25	25
Missoula	**30-063-0024**						
	Official values	53	31.1	20.2	35	37	35
	minus all flagged days	17.3	26.6	18.5	24	24	21
	minus flagged days =>35.4	27.0	27.1	18.6	27	27	24
Ravalli	**30-081-0007**						
	Official values	122.6	35.6	24.9	63	63	61
	minus all flagged days	19.2	33.6	22.8	28	28	25
	minus flagged days =>35.4	30.5	33.6	23.9	32	32	29
Silver Bow	**30-093-0005**						
	Official values	47.9	34.8	28.6	42	39	37
	minus all flagged days	24.5	34.8	27.7	34	31	29
	minus flagged days =>35.4	30.1	34.8	28.6	37	33	31

Montana has an extensive monitoring program, with over 20 $PM_{2.5}$ monitors in operation during the design value years of 2012 to 2014. Although the majority of these monitors do not have valid design values (Table A.11), most of the values calculated are below the 35 $\mu g/m^3$ $PM_{2.5}$ NAAQS. There are no Montana monitors operating between any of the potential receptors and California.

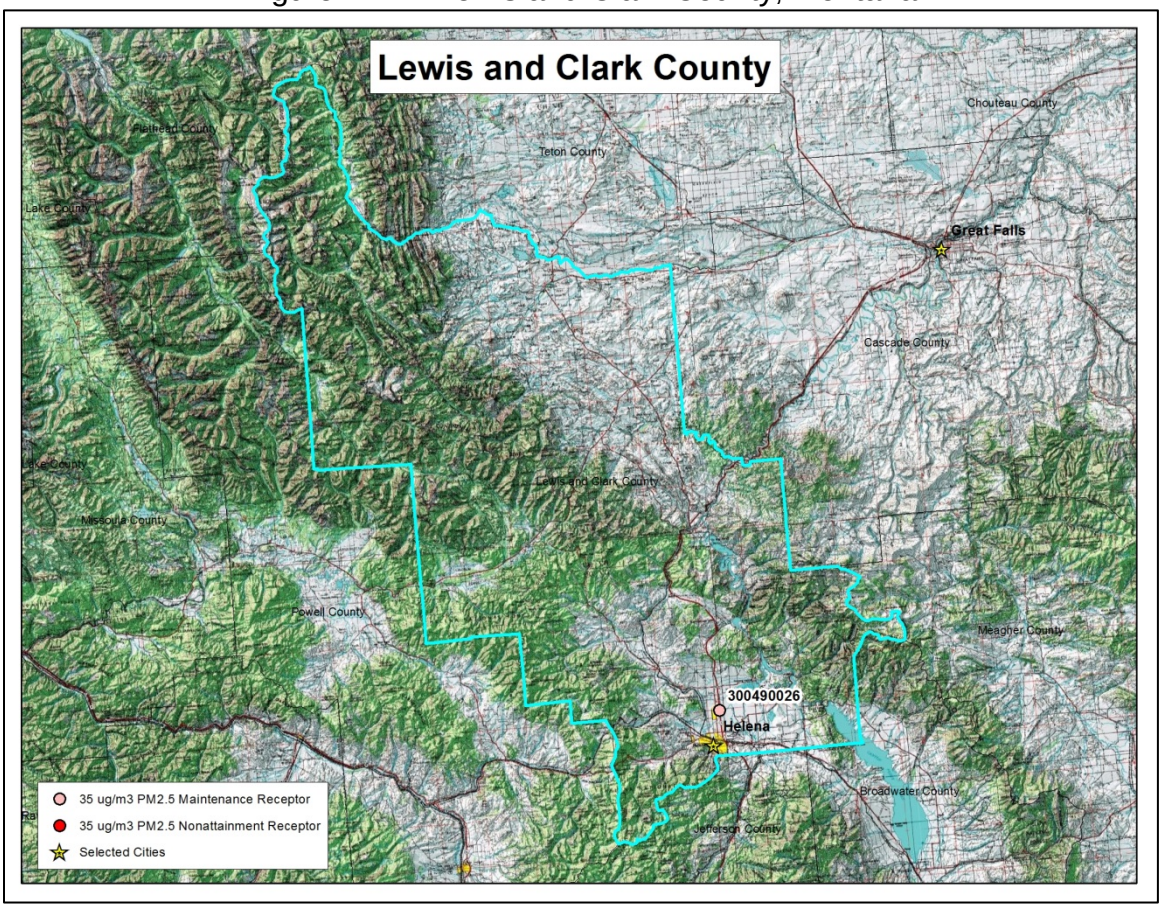
Table A.11: $PM_{2.5}$ 24-hour Design Values in Montana (NAAQS exceedances in red)

County	AQS ID	24-Hour Design Value (μg/m^3)					
		2010-2012		2011-2013		2012-2014	
Fergus	30-027-0006	10	NV	10	NV	12	NV
Flathead	30-029-0007	24	NV	19	NV		
	30-029-0009	20	NV	19	NV		
	30-029-0047	19	NV	16	NV		
	30-029-0049	26	NV	27	NV	26	NV
Gallatin	30-031-0008	33	NV	31	NV		
	30-031-0016	24	NV	26	NV		
	30-031-0018	27	NV	26	NV		
Lewis and Clark	30-049-0004	17	NV	15		15	
	30-049-0026	36		28		28	
Lincoln	30-053-0018	29	NV	29	NV	27	
Missoula	30-063-0024	35		37		35	
	30-063-0031	25	NV	23	NV		
	30-063-0037	31		32		33	
Phillips	30-071-0010	8	NV	9	NV	11	NV
Powder River	30-075-0001	20	NV	20	NV	20	NV
Ravalli	30-081-0007	63		63		61	
Richland	30-083-0001	16		17			
Rosebud	30-087-0001	19	NV	19	NV	20	
Sanders	30-089-0007	13	NV	14	NV		
Silver Bow	30-093-0005	42		39		37	

NV = non valid design value

Lewis and Clark County Maintenance Receptor, AQS ID 30-049-0026

Figure A.17: Lewis and Clark County, Montana



This potential maintenance receptor is situated in the Helena Valley in the Rocky Mountains, with the Lewis Range to the north, the Absaroka Range to the south and the Bitterroot Mountains to the west. Due to topographic conditions, this valley is prone to cold pool inversions during the winter months, when elevated levels of $PM_{2.5}$ occur.[21] The receptor is approximately 500 miles from the California, separated by the Sierra Nevada and Blue Mountains, and the Bitterroot Range in the Northern Rocky Mountains. It is over 700 miles to the nearest California emission source (Appendix F.1) and the closest Montana facility is located less than 10 miles from the monitor in the next county, Jefferson. In addition, California mobile source emissions have decreased approximately 50 percent in the past decade and are projected to decrease an additional 50 percent from 2011 to 2021.

The population of Lewis and Clark County is almost 66,000, the majority residing within the Helena Valley. This population has increased by 13 percent in the last decade, while the number of vehicle miles traveled has decreased by almost 60 percent

[21] U.S. EPA Technical Support Document, Oregon State Implementation Plan and Interstate Transport Requirements for the 2006 24-hour Fine Particulate Matter National Ambient Air Quality Standards, November 19, 2014

(Table A.12), making motor vehicle emissions an unlikely source of $PM_{2.5}$ 24-hour exceedances.

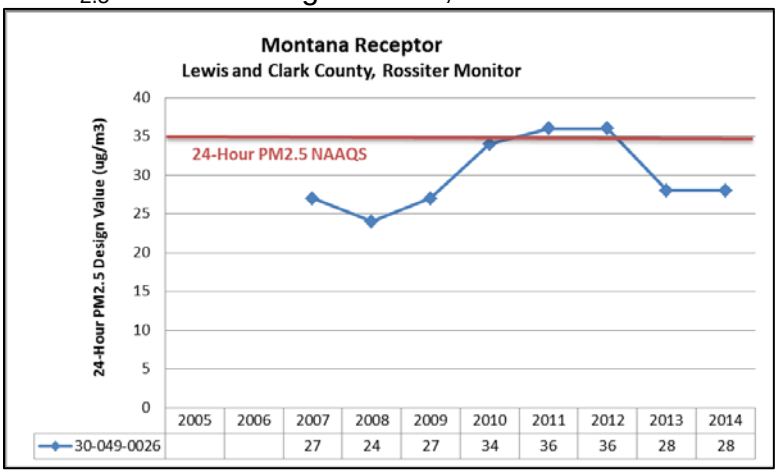
Table A.12: Population and VMT in Lewis and Clark County, Montana[22]

County	Population (2014)	Population (2005)	Population change (2005 to 2014)	2011 VMT (millions mi)	2005 VMT (millions mi)	VMT change (2005 to 2014)
Lewis and Clark	65,856	58,449	12.7%	242	599	-59.6%

The monitoring site in the Helena Valley has generally operated well below the 2006 NAAQS (Figure A.18). The two years with design values above the standard, 2011 and 2012, were heavily flagged for wildfire exceptional events in late summer and early fall. In total, from 2011 to 2014, a combined 101 days were flagged at the site, with 72 of them from 2011 to 2012. As previously noted, excluding these flagged days would result in a 24-hour design value below the standard (Table A.10).

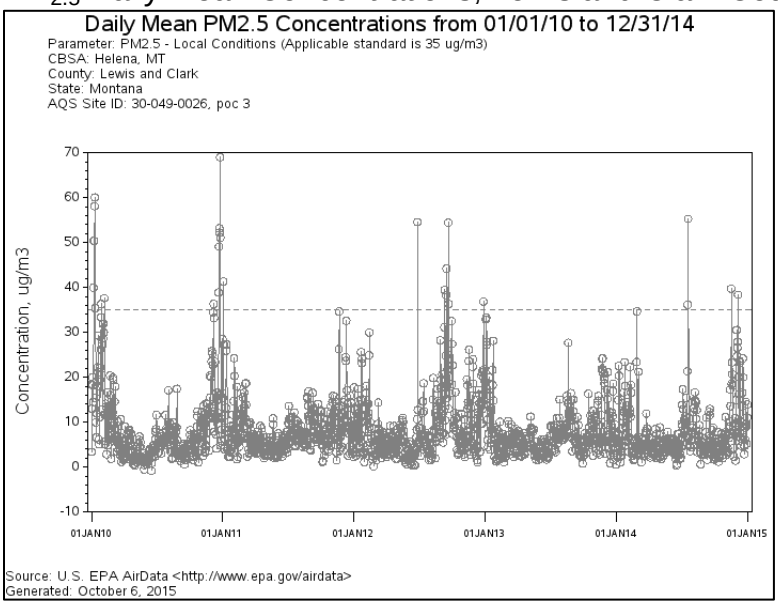
Daily data for 2010 to 2014 indicates that winter is the high season with summer having the lowest concentrations, except when impacted by wildfire events (Figure A.19). In the months when violations of the NAAQS have occurred at the Helena receptor, the nearby Gate of the Mountains Wilderness Area monitor did not exceed 2 µg/m^3 (Appendix E.1).

Figure A.18: $PM_{2.5}$ 24-hour Design Values, Lewis and Clark County Receptor



[22] U.S. EPA, Population and Vehicle Miles Traveled, Emission and Emission-Related Data, 2005: http://www3.epa.gov/airquality/particlepollution/designations/2006standards/techinfo.html; 2011: http://www3.epa.gov/pmdesignations/2012standards/techinfo.htm

Figure A.19: $PM_{2.5}$ Daily Mean Concentrations, Lewis and Clark County Receptor



In evaluating this site as a possible receptor for transported emissions from Idaho, U.S. EPA concluded that local emissions, primarily from residential wood smoke, were the main contributor to exceedances of the $PM_{2.5}$ standard in Helena.[23]

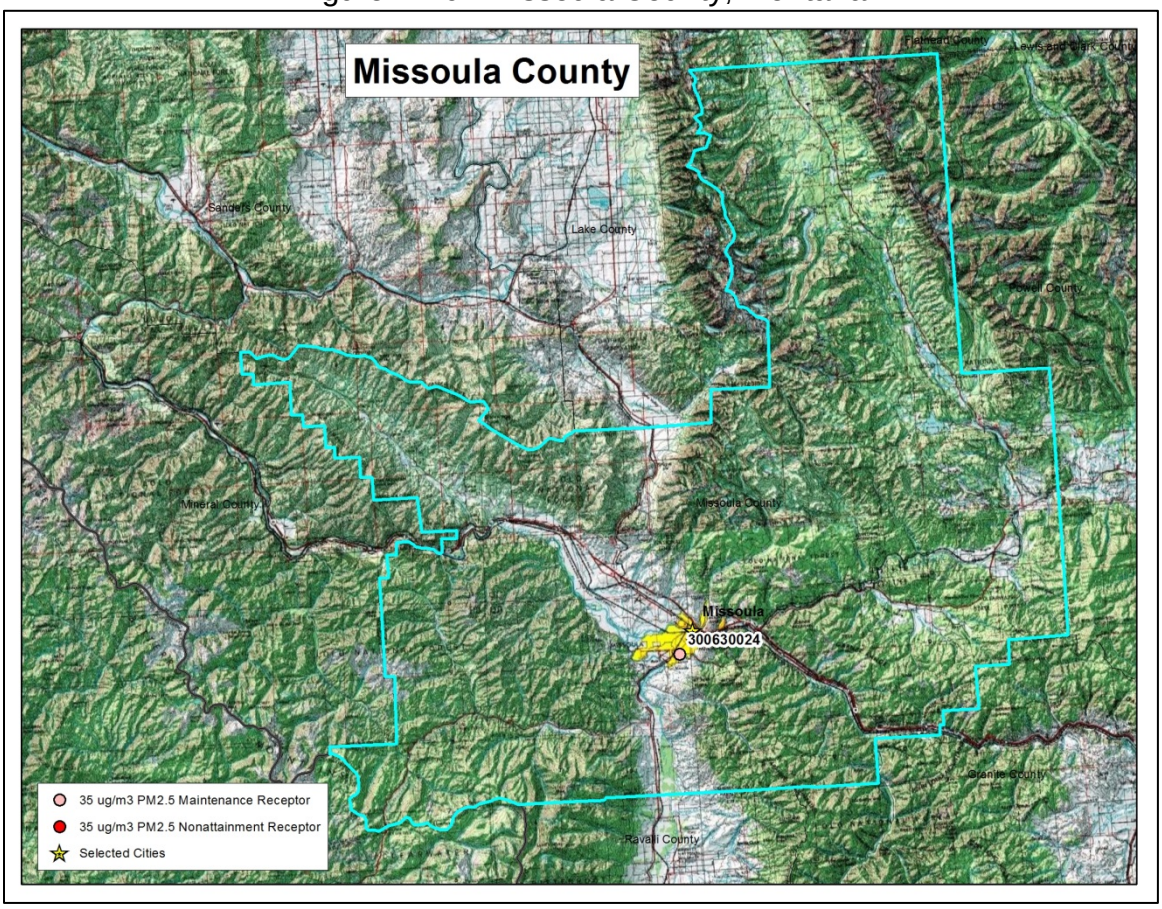
Based on the above-described information, the distance from California and the intervening terrain, the high level of wildfire related emissions, and the effect of local topography and emission sources, particularly residential wood burning, on wintertime exceedances, we believe it is reasonable to assume that emissions from California do not significantly interfere with maintenance of the 35 $\mu g/m^3$ $PM_{2.5}$ NAAQS at this site.

Missoula County Maintenance Receptor, AQS ID 30-063-0024

This potential maintenance receptor is located in the city of Missoula (Figure A.20). Situated in a valley carved out by the Clark Fork River at an elevation of 3,200 feet, the city is surrounded by mountains rising up to 5,000 feet above sea level. The receptor is approximately 440 miles from the California border, separated by the Sierra Nevada and Blue Mountains, and the Bitterroot Range in the Northern Rocky Mountains. It is over 700 miles from the nearest California facility (Appendix F.1), and the closest large Montana facility that would serve as an emission source is located approximately 100 miles from the monitor in Jefferson County to the southeast. In addition, California mobile source emissions have decreased approximately 50 percent in the past decade and are projected to decrease an additional 50 percent from 2011 to 2021.

[23] U.S. EPA Technical Support Document, Idaho State Implementation Plan and Interstate Transport Requirements for the 2006 24-hour Fine Particulate Matter National Ambient Air Quality Standards, January 22 2015

Figure A.20: Missoula County, Montana



The population of Missoula County is almost 113,000, the majority residing in the city of Missoula. This population has increased by 13 percent while the number of vehicle miles traveled has increased by 16 percent (Table A.13) in the last decade.

Table A.13: Population and VMT in Missoula County, Montana[24]

County	Population (2014)	Population (2005)	Population change (2005 to 2014)	2011 VMT (millions mi)	2005 VMT (millions mi)	VMT change (2005 to 2014)
Missoula	112,684	100,086	12.6%	1,128	972	16.1%

This site has operated well below the 35 $\mu g/m^3$ $PM_{2.5}$ standard until 2012 (Figure A.21), when it was heavily impacted by wildfires. Approximately 120 days, from 2011 to 2014, were flagged at each of the two monitors located at this site. As previously noted, excluding these flagged days would result in a 24-hour design value below the standard (previous Table A.10).

[24] U.S. EPA, Population and Vehicle Miles Traveled, Emission and Emission-Related Data, 2005: http://www3.epa.gov/airquality/particlepollution/designations/2006standards/techinfo.html; 2011: http://www3.epa.gov/pmdesignations/2012standards/techinfo.htm

Daily data for 2009 to 2014 shows that winter is the high $PM_{2.5}$ season with summer having the lowest concentrations, except when impacted by wildfire events (Figure A.22). During the months when violations of the NAAQS occurred at the Missoula receptor, the nearby Sula Peak IMPROVE monitor did not exceed 2 $\mu g/m^3$ (Appendix E.1).

Figure A.21: $PM_{2.5}$ 24-Hour Design Values, Missoula County Receptor

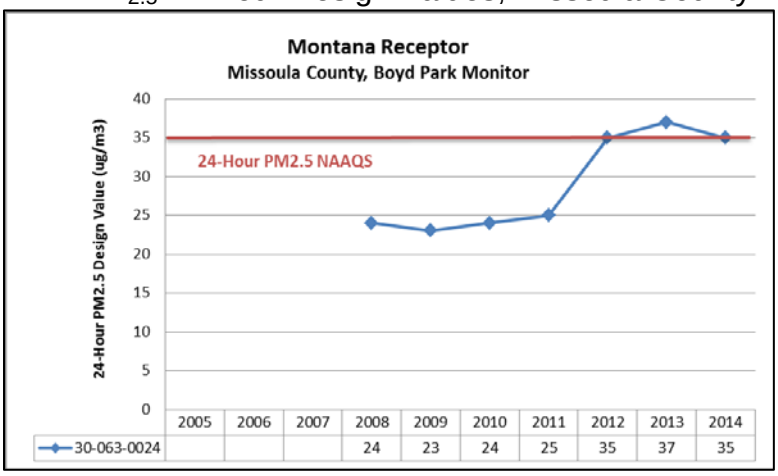
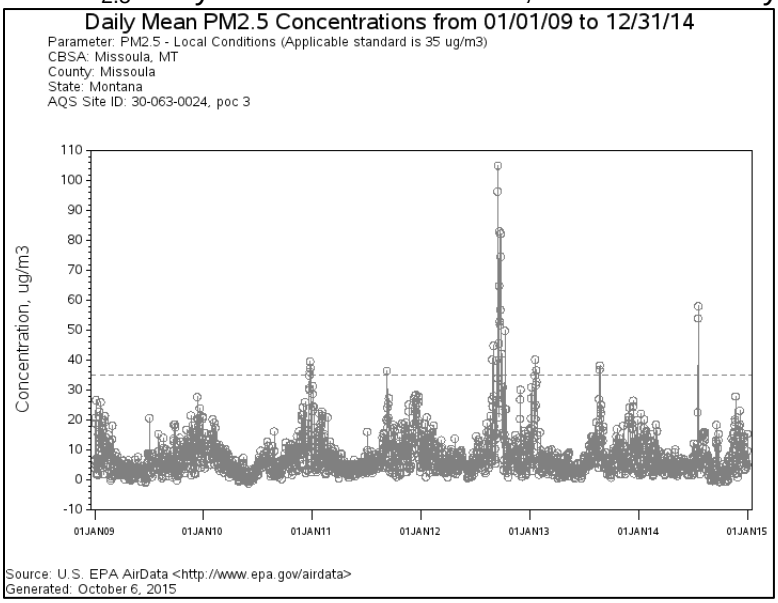


Figure A.22: $PM_{2.5}$ Daily Mean Concentrations, Missoula County Receptor



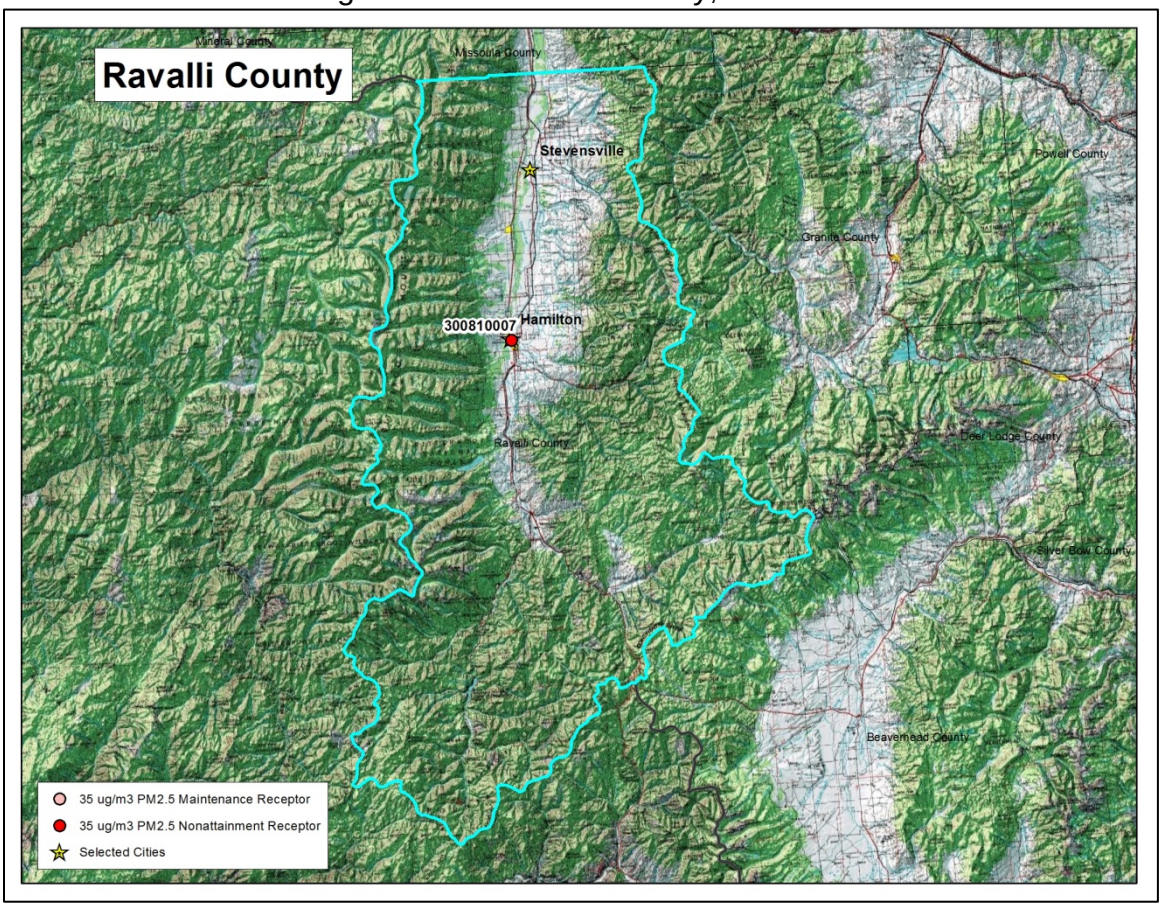
A CMB analysis completed by Montana for the 35 $\mu g/m^3$ $PM_{2.5}$ NAAQS designation process determined that the majority of $PM_{2.5}$ emissions in the area were from residential wood burning with wintertime inversion and stagnant conditions exacerbating the high $PM_{2.5}$ levels in the area. [25]

[25] State of Montana, Missoula County $PM_{2.5}$ Nine-Factor Analysis, December 6, 2007, http://co.missoula.mt.us/airquality/CurrentIssues/PM25/pdfs/MissoulaCo9FactorAnalysisFinal.pdf

Based on the above-described information, the distance from California and the intervening terrain, the high level of wildfire emissions, and the effect of local topography and emission sources, particularly residential wood burning, on wintertime exceedances, we believe it is reasonable to assume that emissions from California do not significantly interfere with maintenance of the 35 $\mu g/m^3$ $PM_{2.5}$ NAAQS at this site.

Ravalli County Nonattainment Receptor, AQS ID 30-081-0007

Figure A.23: Ravalli County, Montana



This potential nonattainment receptor is situated in the city of Hamilton (Figure A.23). Located in the Bitterroot Valley at an elevation of 3,570 feet, the area is surrounded by mountains with the Bitterroot Range to the west. The receptor is approximately 410 miles from the California border, separated by the Sierra Nevada and Blue Mountains, and the Bitterroot Range in the Northern Rocky Mountains. It is over 600 miles from the nearest California facility (Appendix F.1) with the closest Montana facility that would serve as an emission source located approximately 100 miles to the east in Jefferson County. In addition, California mobile source emissions have decreased approximately 50 percent in the past decade and are projected to decrease an additional 50 percent from 2011 to 2021.

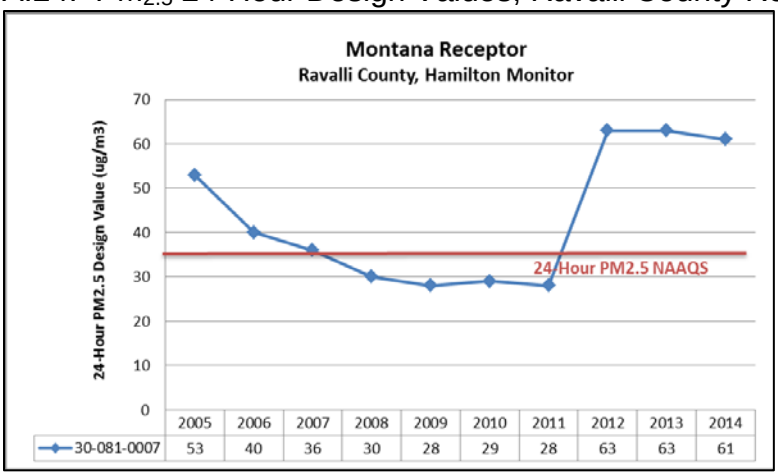
The population of Ravalli County is almost 42,000, with approximately 4,500 residing in the city of Hamilton. This population has increased by almost three percent in the last decade, while the number of vehicle miles traveled has decreased by an equivalent amount (Table A.14).

Table A.14: Population and VMT in Ravalli County, Montana[26]

County	Population (2014)	Population (2005)	Population change (2005 to 2014)	2011 VMT (millions mi)	2005 VMT (millions mi)	VMT change (2005 to 2014)
Ravalli	41,030	39,940	2.7%	498	514	-3.1%

Since 2007, the site has operated well below the standard, exceeding in 2012 (Figure A.24) when it was heavily impacted by wildfires. As previously noted, excluding these flagged days would result in a 24-hour design value below the standard (previous Table A.10).

Figure A.24: $PM_{2.5}$ 24-Hour Design Values, Ravalli County Receptor



Daily data for 2009 to 2014 show that winter is the high $PM_{2.5}$ season, with summer having the lowest concentrations, except when impacted by wildfire events (Figure A.25). In the months when violations of the NAAQS have occurred at the Hamilton receptor, the nearby Sula Peak IMPROVE monitor did not exceed 2 $\mu g/m^3$ (Appendix E.1).

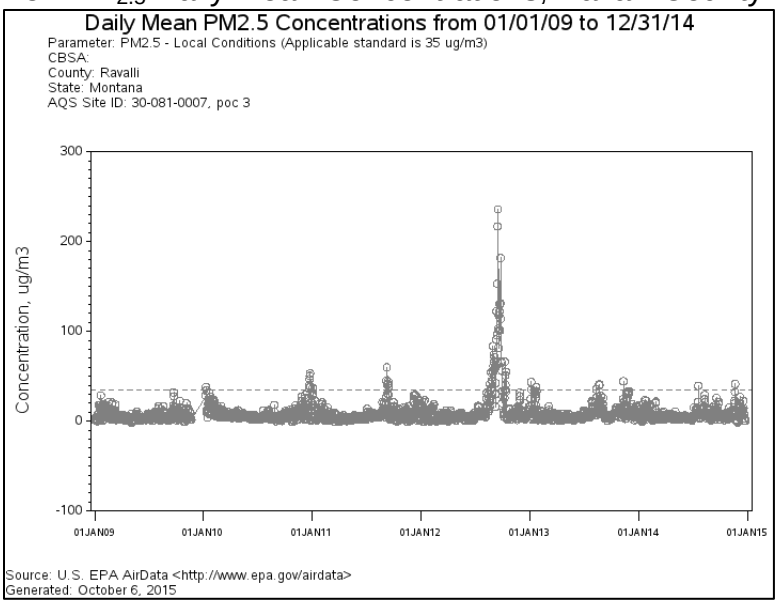
An analysis conducted by Montana as part of the designation process for the 35 $\mu g/m^3$ $PM_{2.5}$ NAAQS indicated that topographic features and meteorology act to contain emissions that contribute to exceedances within the county boundaries[27] and to limit the

[26] U.S. EPA, Population and Vehicle Miles Traveled, Emission and Emission-Related Data, 2005: http://www3.epa.gov/airquality/particlepollution/designations/2006standards/techinfo.html; 2011: http://www3.epa.gov/pmdesignations/2012standards/techinfo.htm

[27] State of Montana, Ravalli County $PM_{2.5}$ Nine-Factor Analysis, December 11, 2007, hhttp://www3.epa.gov/airquality/particlepollution/designations/2006standards/rec/letters/08_MT_rec_a1.pdf

predominant sources to the local area . A limited CMB analysis over the winter of 2006-2007 indicated that, on average, emissions from residential wood smoke accounted for 84 percent of $PM_{2.5}$ mass.[28]

Figure A.25: $PM_{2.5}$ Daily Mean Concentrations, Ravalli County Receptor



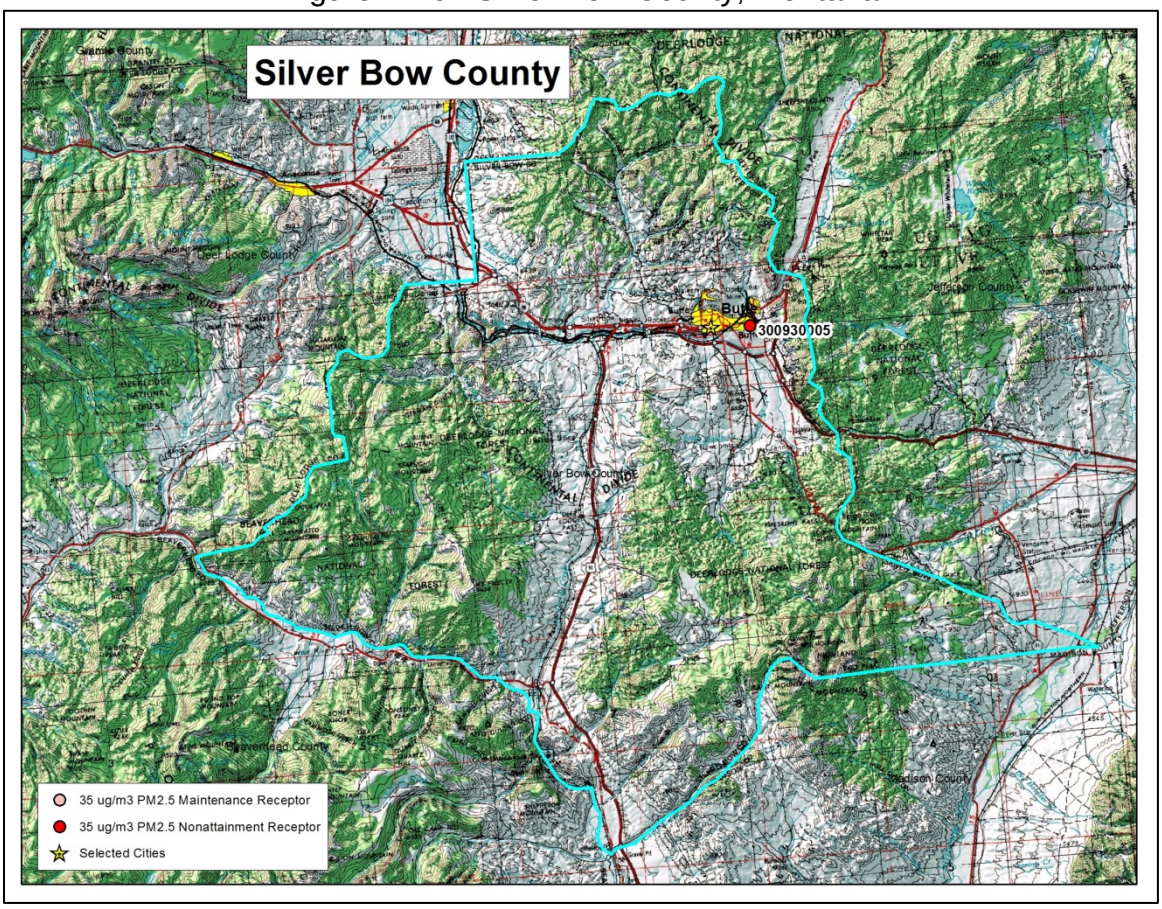
Based on the above-described information, the distance from California and the intervening terrain, the high level of wildfire emissions, and the effect of local topography and emission sources, particularly residential wood burning, on wintertime exceedances, we believe it is reasonable to assume that emissions from California do not significantly contribute to nonattainment of the 35 $\mu g/m^3$ $PM_{2.5}$ NAAQS at this site.

Silver Bow County Nonattainment Receptor, AQS ID 30-093-0005

This potential nonattainment receptor is located in the city of Butte, situated in a high valley at an elevation of 5,500 feet (Figure A.26). The Lewis Range and the Bitterroot Range, part of the Rocky Mountains, are located to the west and have peaks that reach from 7,000 to 11,000 feet above sea level. The receptor is approximately 460 miles from the California border, separated by the Sierra Nevada and Blue Mountains, and the Bitterroot Range in the Northern Rocky Mountains. It is over 650 miles from the nearest California facility (Appendix F.1), with the nearest Montana facility that would serve as a major emission source located approximately 45 miles to the northeast in Jefferson County. In addition, California mobile source emissions have decreased approximately 50 percent in the past decade and are projected to decrease an additional 50 percent from 2011 to 2021.

[28] Ibid.

Figure A.26: Silver Bow County, Montana



The population of Silver Bow County is almost 35,000, with the majority residing in the Butte-Silver Bow metropolitan area (Table A.15). Although the population has increased slightly in the last decade, the number of vehicle miles traveled has decreased by 15 percent.

Table A.15: Population and VMT in Silver Bow County, Montana[29]

County	Population (2014)	Population (2005)	Population change (2005 to 2014)	2011 VMT (millions mi)	2005 VMT (millions mi)	VMT change (2005 to 2014)
Silver Bow	34,680	32,982	5.2%	255	300	-15.0%

Design values at this site has been close to the NAAQS, dipping below the standard in 2006 and remaining there until 2010 (Figure A.27). As noted previously, this site has been heavily impacted by wildfires and would attain the standard if all flagged days were excluded from consideration for regulatory purposes (see previous Table A.10).

[29] U.S. EPA, Population and Vehicle Miles Traveled, Emission and Emission-Related Data, 2005: http://www3.epa.gov/airquality/particlepollution/designations/2006standards/techinfo.html; 2011: http://www3.epa.gov/pmdesignations/2012standards/techinfo.htm

Daily data from 2009 to 2014 shows that winter is the high season at this monitor, with summer having the lowest concentrations (Figure A.28). In the months when violations of the NAAQS have occurred at the Butte receptor, the nearby Sula Peak and Gates of the Mountains IMPROVE monitors did not exceed 2 μg/m^3 (Appendix E.1).

Figure A.27: $PM_{2.5}$ 24-Hour Design Values, Silver Bow County Receptor

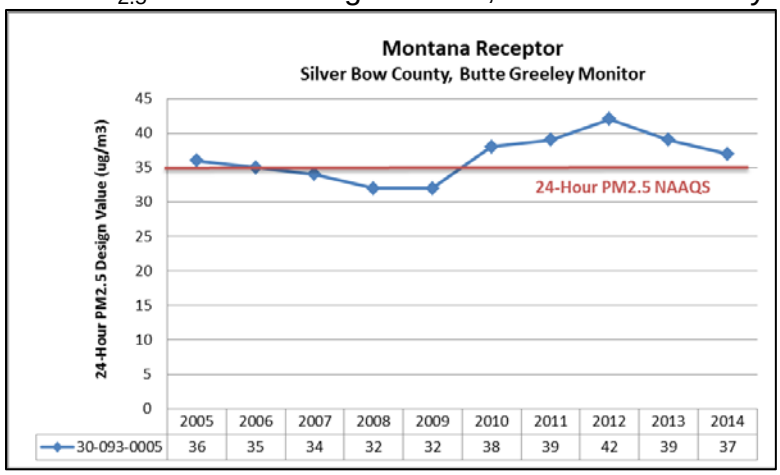
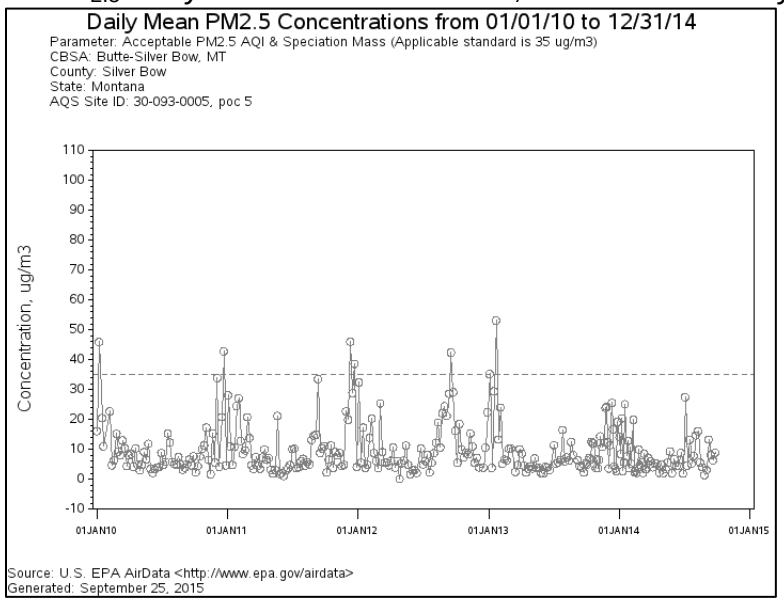


Figure A.28: $PM_{2.5}$ Daily Mean Concentrations, Silver Bow County Receptor



Because of its topography, tucked in a valley between the Bitterroot and Lewis Ranges, the Butte area is prone to wintertime temperature inversions.[30] In evaluating this receptor for possible transport of $PM_{2.5}$ from the State of Washington, U.S. EPA

[30] U.S. EPA Technical Support Document, Idaho State Implementation Plan and Interstate Transport Requirements for the 2006 24-hour Fine Particulate Matter National Ambient Air Quality Standards, January 22 2015

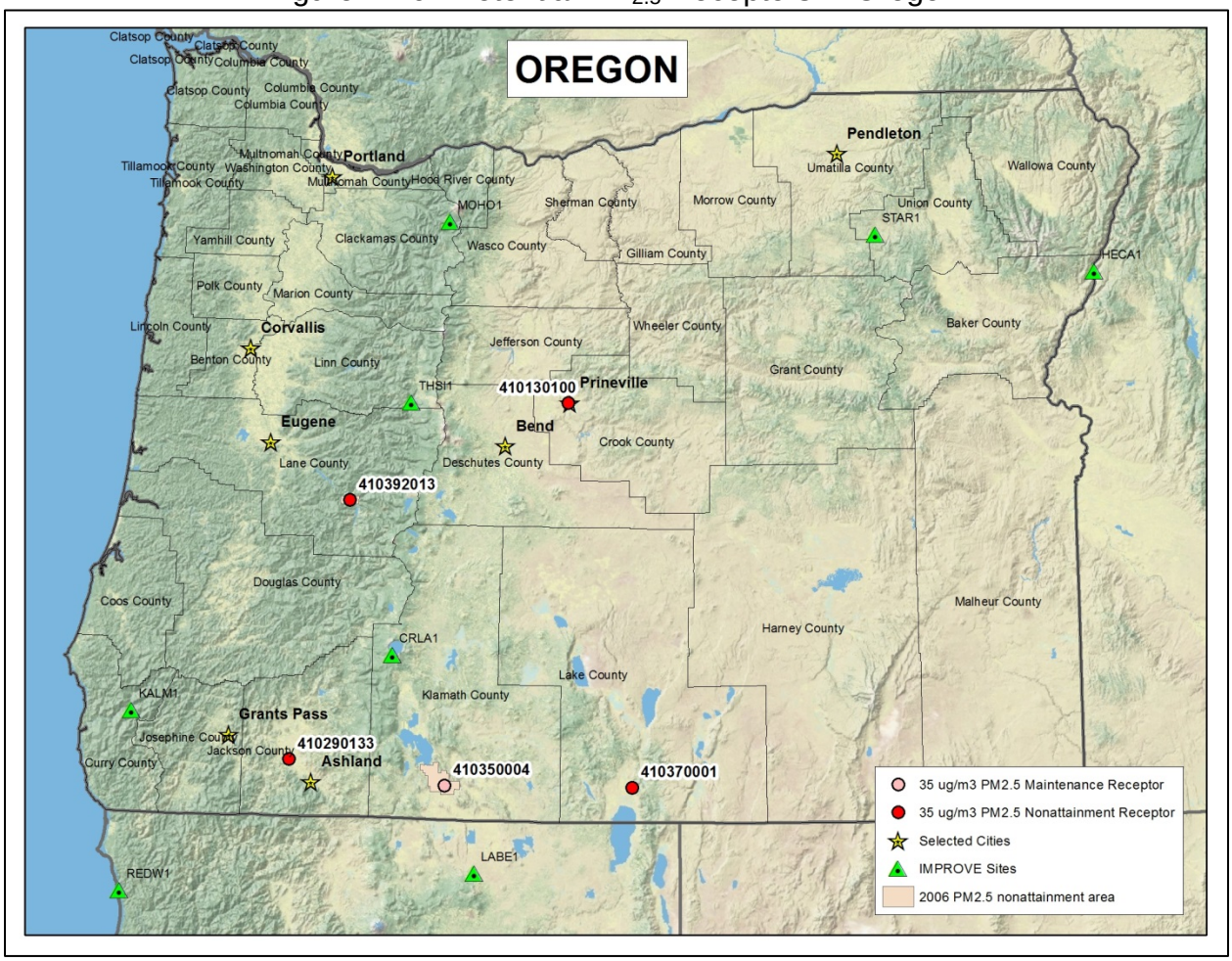
determined that emissions from wood smoke were the primary contributor to exceedances of the $PM_{2.5}$ standard in Butte.[31]

Based on the above-described information, the distance from California and the intervening terrain, the high level of wildfire emissions, and the effect of local topography and emission sources, particularly residential wood burning, on wintertime exceedances, we believe it is reasonable to assume that emissions from California do not significantly contribute to nonattainment of the 35 $\mu g/m^3$ $PM_{2.5}$ NAAQS at this site.

[31] U.S. EPA Technical Support Document, Washington State Implementation Plan and Interstate Transport Requirements for the 2006 24-hour Fine Particulate Matter National Ambient Air Quality Standards, May 13, 2015.

Oregon

Figure A.29: Potential $PM_{2.5}$ Receptors in Oregon



There are two areas in Oregon that are designated as nonattainment for the 35 $\mu g/m^3$ $PM_{2.5}$ NAAQS (Figure A.29 and Table A.16). Potential receptors are located in both of these areas; a potential nonattainment receptor in Oakridge and a potential maintenance receptor in Klamath Falls. The other three potential nonattainment receptors are located in areas that are designated as unclassified/attainment. Each of these areas is evaluated separately.

IMPROVE monitors in California near the Oregon border show a predictably strong influence from both Oregon and California; those on the Oregon side showing a greater Oregon influence (Appendix E.1). The highest daily concentrations at IMPROVE sites in Oregon can be linked directly to large wildfires in Oregon and California[32]. High days

[32] Western Regional Air Partnership (WRAP) Technical Support System: http://vista.cira.colostate.edu/TSS/Results/HazePlanning.aspx

at the IMPROVE samplers, in general, occur during the summer months, whereas the high season for $PM_{2.5}$ at the potential receptors occurs in winter (see individual sections following).

Table A.16: Potential $PM_{2.5}$ Receptors in Oregon (NAAQS exceedances in red)

County	AQS ID	$PM_{2.5}$ NAAQS Nonattainment Area	24-Hr Standard Design Value ($\mu g/m^3$)			Receptor Type	Approximate Distance to California Border (miles)
			2012	2013	2014		
Crook	41-013-0100		31	39	42	Nonattainment	160
Jackson	41-029-0133		26	42	43	Nonattainment	20
Klamath	41-035-0004	Klamath Falls	33	36	34	Maintenance	15
Lake	41-037-0001		34	56	58	Nonattainment	15
Lane	41-039-2013	Oakridge	38	40	40	Nonattainment	120

U.S. EPA has noted that the receptor in Jackson County would attain the 24-hour standard for 2011-2013 if flagged wildfire exceptional events were excluded. This site was, therefore, not included as a potential receptor for transport from other states, in particular, Idaho, Oregon, and Washington[33], but is discussed in this document.

Oregon has a well-established monitoring program, the majority of which record $PM_{2.5}$ levels below the standard (Table A.17).

[33] U.S. EPA Technical Support Document, State Implementation Plan and Interstate Transport Requirements for the 2006 24-hour Fine Particulate Matter National Ambient Air Quality Standards; Idaho, January 22 2015; Oregon, November 19, 2014.; Washington, May 13, 2015.

Table A.17: $PM_{2.5}$ 24-Hour Design Values in Oregon (NAAQS exceedances in red)

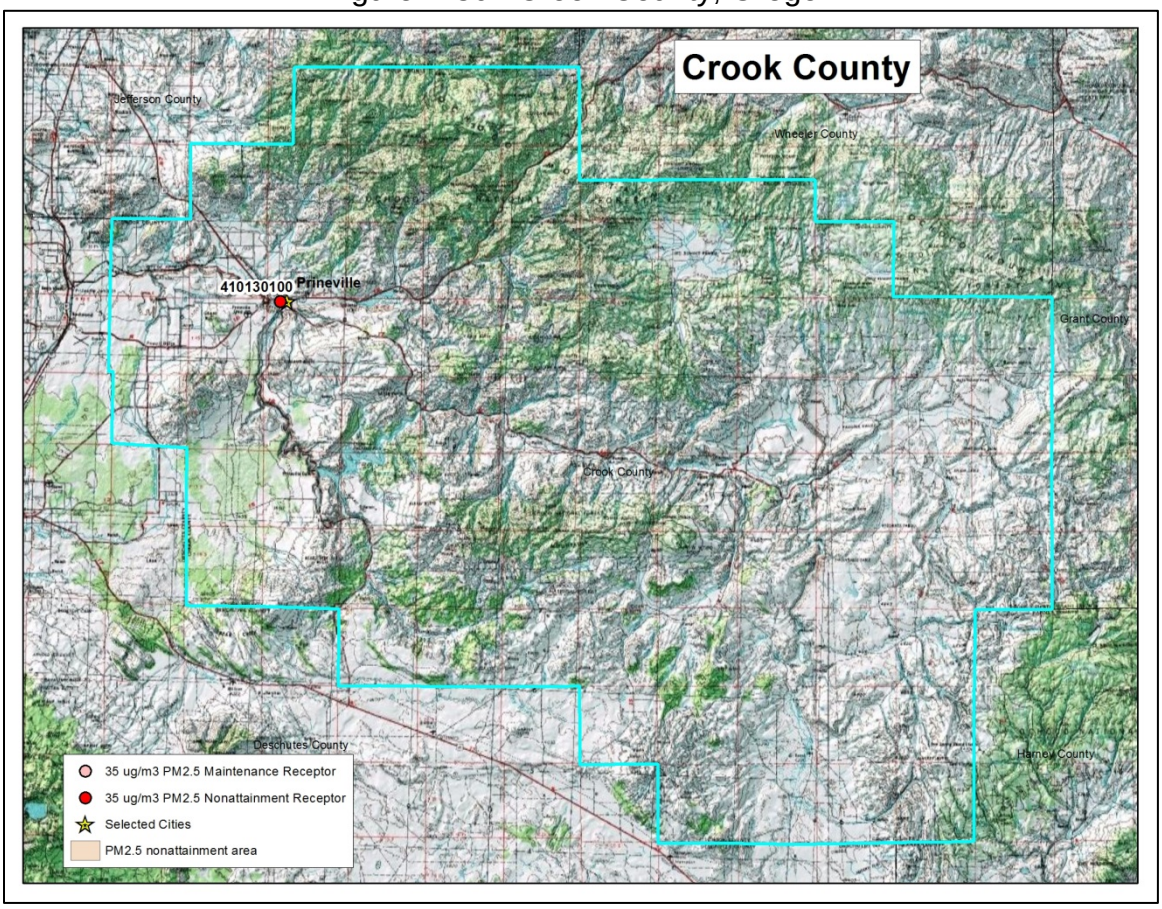
County	AQS ID	24-Hour Design Value (µg/m^3)					
		2010-2012		2011-2013		2012-2014	
Crook	41-013-0100	31		39		42	
Deschutes	41-017-0120	15	NV				
Harney	41-025-0002	32	NV				
Harney	41-025-0003	30		35		31	
Jackson	41-029-0133	26		42		43	
Jackson	41-029-1001	12	NV				
Josephine	41-033-0114	23		28		26	
Klamath	41-035-0004	33		36		34	
Lake	41-037-0001	34		56		58	
Lane	41-039-0058	19	NV	19	NV		
Lane	41-039-0059	21	NV	28	NV	30	
Lane	41-039-0060	21		28		32	
Lane	41-039-1009	15		16		16	
Lane	41-039-2013	38		40		40	
Lane	41-039-9004	19		21		21	
Linn	41-043-2002	25	NV	26	NV	27	NV
Multnomah	41-051-0080	25		32		25	
Multnomah	41-051-0246	13	NV				
Umatilla	41-059-0121	22		27		27	NV
Umatilla	41-059-7002					16	NV
Union	41-061-0119	13	NV				
Washington	41-067-0004	25		34		29	

NV = non valid design value

Crook County Nonattainment Receptor, AQS ID 41-013-0100

Crook County is located in the center portion of Oregon, with the Cascade Mountain range running through the western part of the region, a high desert comprising the eastern part, and the Ochoco Mountains located in the northeastern portion (Figure A.30). Prineville, where the potential receptor is located, is in the rain shadow of the Cascades and has a mild and relatively dry climate. This receptor is approximately 160 miles from the California border, separated by the Klamath Mountains and the Cascade Range. It is almost 400 miles from the nearest California facility (Appendix F.1) with the closest major Oregon facility in Lane County, 100 miles to the southwest. In addition, California mobile source emissions have decreased approximately 50 percent in the past decade and are projected to decrease an additional 50 percent from 2011 to 2021.

Figure A.30: Crook County, Oregon



Crook County has seen a five percent decrease in population and a one percent decrease in vehicle miles traveled (Table A.18) in the last decade. Almost 50 percent of the population resides in the City of Prineville, where the receptor is located.

Table A.18: Population and VMT in Crook County, Oregon[34]

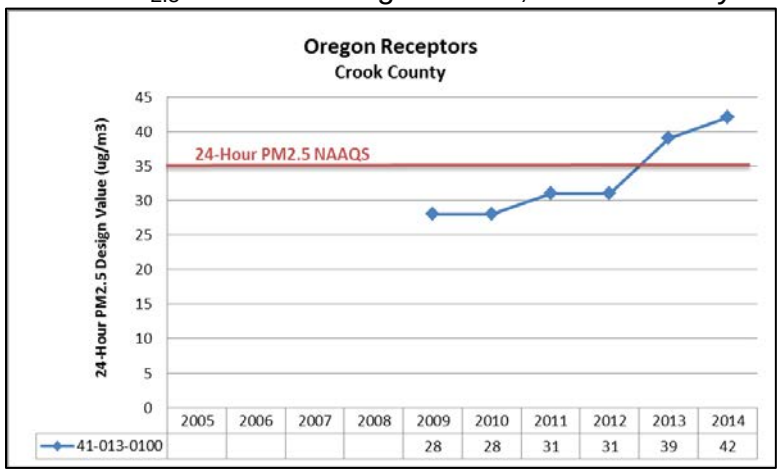
County	Population (2014)	Population (2005)	Population change (2005 to 2014)	2011 VMT (millions mi)	2005 VMT (millions mi)	VMT change (2005 to 2014)
Crook	20,998	22,067	-4.8%	176	178	-1.1%

$PM_{2.5}$ concentrations, as evidenced in $PM_{2.5}$ design values (Figure A.31) have been below 35 $\mu g/m^3$, only recently exceeding the standard. The highest concentrations at the site generally occur during the winter months (Figure A.32), indicating an association with residential wood burning and wintertime inversion meteorology. Background regional levels as recorded at the closest IMPROVE monitor, Three Sisters

[34] U.S. EPA, Population and Vehicle Miles Traveled, Emission and Emission-Related Data, 2005: http://www3.epa.gov/airquality/particlepollution/designations/2006standards/techinfo.html; 2011: http://www3.epa.gov/pmdesignations/2012standards/techinfo.htm

Wilderness Area, show the highest concentrations in the summer months, with winter levels below 2.0 μg/m^3 (Appendix E.1).

Figure A.31: $PM_{2.5}$ 24-Hour Design Values, Crook County Receptor

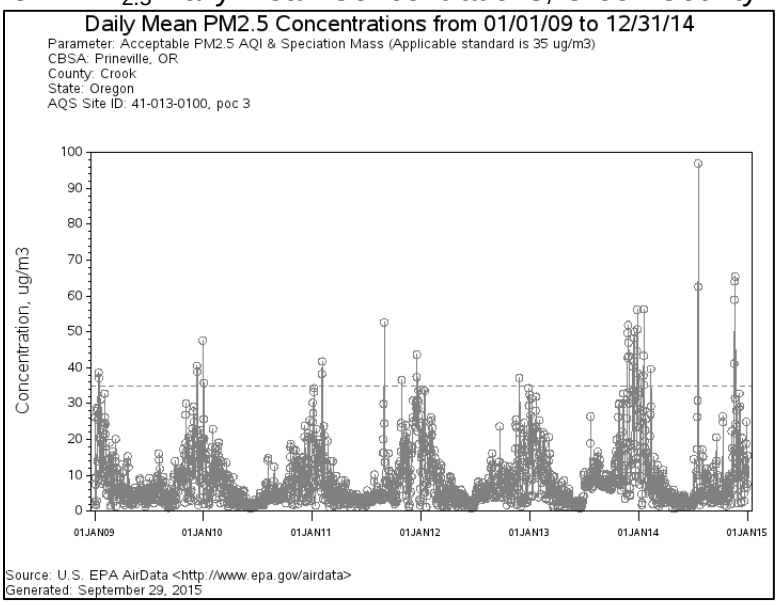


As noted above, daily mean $PM_{2.5}$ concentration time series between 2009 and 2014 show that the highest values have typically occurred in the winter months of December and January with only occasional spikes at other times, due primarily to wildfires impacts (Figure A.32). Coupled with a high rate of residential wood burning,[35] this strongly implies an association with wood combustion from residential heating activities. In its transport assessment,[36] Washington noted that high $PM_{2.5}$ concentrations occurred primarily during periods of low wind speeds and, coupled with the above information, concluded that exceedances at the monitor were likely the result of local emissions trapped by wintertime stagnant conditions. U.S. EPA concurred with this assessment in their analysis.[37]

Based on the above-described information, the distance from California and the intervening terrain, and the effect of local topography and emission sources, particularly residential wood burning, on wintertime exceedances, we believe it is reasonable to assume that emissions from California do not significantly contribute to nonattainment of the 35 μg/m^3 $PM_{2.5}$ NAAQS at this receptor.

[35] Oregon Department of Environmental Quality, Oregon 2005 Residential Wood Combustion Emission Inventory, http://www3.epa.gov/ttnchie1/conference/ei17/session2/christopher.pdf
[36] State of Washington Department of Ecology, Washington State Implementation Plan Revision, Interstate Transport of Fine Particulate Matter, May 11, 2015.
[37] U.S. EPA Technical Support Document, Washington State Implementation Plan and Interstate Transport Requirements for the 2006 24-hour Fine Particulate Matter National Ambient Air Quality Standards, May 13, 2015.

Figure A.32: $PM_{2.5}$ Daily Mean Concentrations, Crook County Receptor

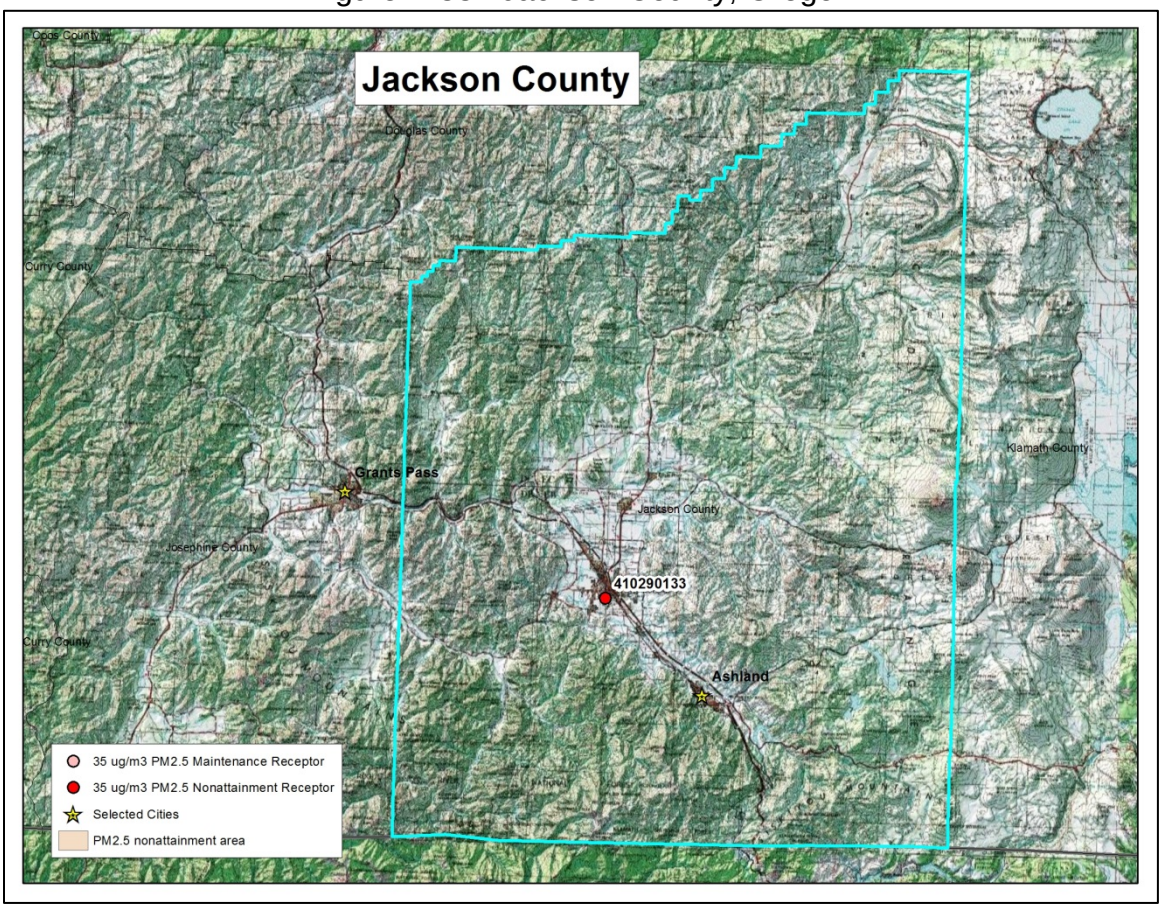


Jackson County Nonattainment Receptor, AQS ID 41-029-0133

The Jackson County potential nonattainment receptor is located in the city of Medford, which lies in a topographic bowl in the Rogue Valley in southern Oregon, sharing its airshed with the city of Ashland (Figure A.33). This bowl is surrounded by mountains on all sides with the Cascades, which range up to 9,500 feet, to the east; the Siskiyou Mountains, ranging up to 7,600 feet, to the south; and to the west and the north, the Coast Range and the Umpqua Divide, ranging up to 5,500 feet. Wintertime inversions are common, causing stagnant conditions and trapping pollutants in episodes that can last several days. Medford is currently a maintenance area for both carbon monoxide and PM_{10}.

The receptor is approximately 20 miles from the California border, separated by the Siskiyou and Klamath Mountains. It is over 250 miles from the nearest large California facility with the nearest large Oregon facility only two miles from the receptor (Appendix F.1). Interstate-5, a major transportation corridor running north-south from California to Washington, cuts through Jackson County and the cities of Medford and Ashland. In addition, California mobile source emissions have decreased approximately 50 percent in the past decade and are projected to decrease an additional 50 percent from 2011 to 2021.

Figure A.33: Jackson County, Oregon



Half the population in Jackson County resides in the cities of Medford and Ashland. The population for the entire county increased almost eight percent in the last decade, while the number of vehicle miles traveled decreased 20 percent (Table A.19).

Table A.19: Population and VMT in Jackson County, Oregon[38]

County	Population (2014)	Population (2005)	Population change (2005 to 2014)	2011 VMT (millions mi)	2005 VMT (millions mi)	VMT change (2005 to 2014)
Jackson	210,287	195,322	7.7%	1,554	1,948	-20.2%

The potential receptor site's 24-hour design values have generally been below the 35 $\mu g/m^3$ $PM_{2.5}$ NAAQS (Figure A.34) with the 2013 design value the highest reported for this location. As noted at the other receptor sites, the highest concentrations occur during the winter months (Figure A.35), indicating an association with residential wood burning and wintertime inversion meteorology. As previously noted, U.S. EPA has determined that the receptor at Jackson would attain the 24-hour standard for 2011-

[38] U.S. EPA, Population and Vehicle Miles Traveled, Emission and Emission-Related Data, 2005: http://www3.epa.gov/airquality/particlepollution/designations/2006standards/techinfo.html; 2011: http://www3.epa.gov/pmdesignations/2012standards/techinfo.htm

2013 if flagged wildfire exceptional events were excluded (Table A.20), and was therefore not included as a potential receptor for transport from Idaho, Oregon, or Washington.[39]

The impact of the wildfires can also be observed at the Crater Lake National Park IMPROVE station, which otherwise shows extremely low values during the period of increase in $PM_{2.5}$ at Medford (Appendix E.1).

Figure A.34: $PM_{2.5}$ 24-Hour Design Values, Jackson County Receptor

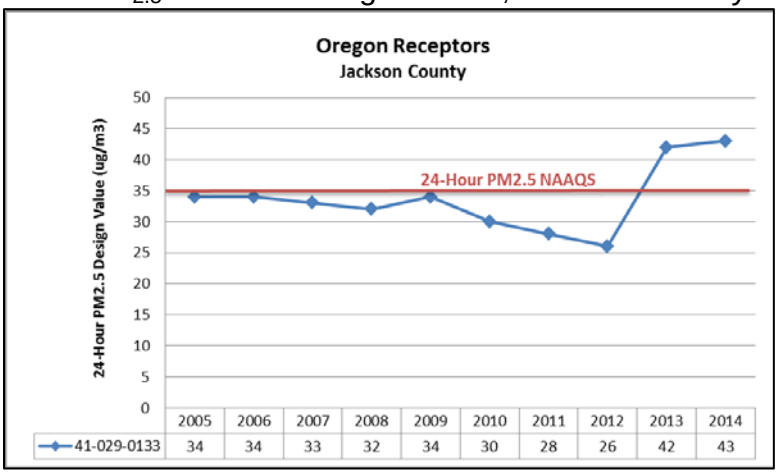


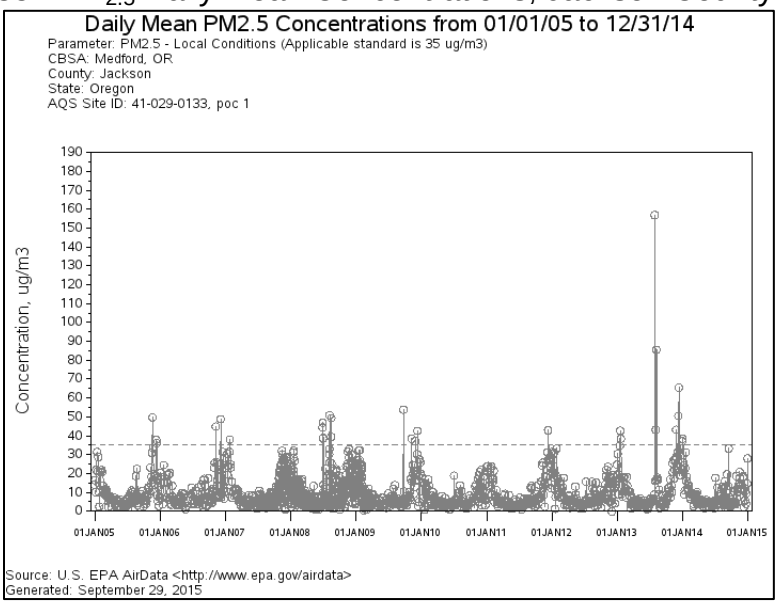
Table A.20: Impact of Exceptional Events on Potential $PM_{2.5}$ Receptor in Jackson County, Oregon (NAAQS exceedances in red)

County	Site	98th Percentile			24-Hour Design Value		
		2012	2013	2014	2012	2013	2014
Jackson	Official values	31	66	31	26	42	43
	Minus all flagged days	31	43	28	26	34	34

Daily data for 2005 to 2014 demonstrates that winter is the high season at the Medford site, with summer having the lowest concentrations, except when impacted by wildfire events (Figure A.35). Coupled with the third highest rate of residential wood burning in the state,[40] this implies a likely association with wood combustion from residential heating activities.

[39] U.S. EPA Technical Support Document, State Implementation Plan and Interstate Transport Requirements for the 2006 24-hour Fine Particulate Matter National Ambient Air Quality Standards; Idaho, January 22 2015; Oregon, November 19, 2014.; Washington, May 13, 2015.
[40] Oregon Department of Environmental Quality, Oregon 2005 Residential Wood Combustion Emission Inventory, http://www3.epa.gov/ttnchie1/conference/ei17/session2/christopher.pdf

Figure A.35: $PM_{2.5}$ Daily Mean Concentrations, Jackson County Receptor



Wood burning for residential heating during the winter is the likely reason for the high $PM_{2.5}$ concentrations and the PM_{10} SIP maintenance plan highlighted control measures particularly focused on wood smoke from residential heating, open burning, industrial emissions, and mobile sources (both on-road and off-road).[41] The primary reason for the recent exceedances, however, is impact from wildfire exceptional events.

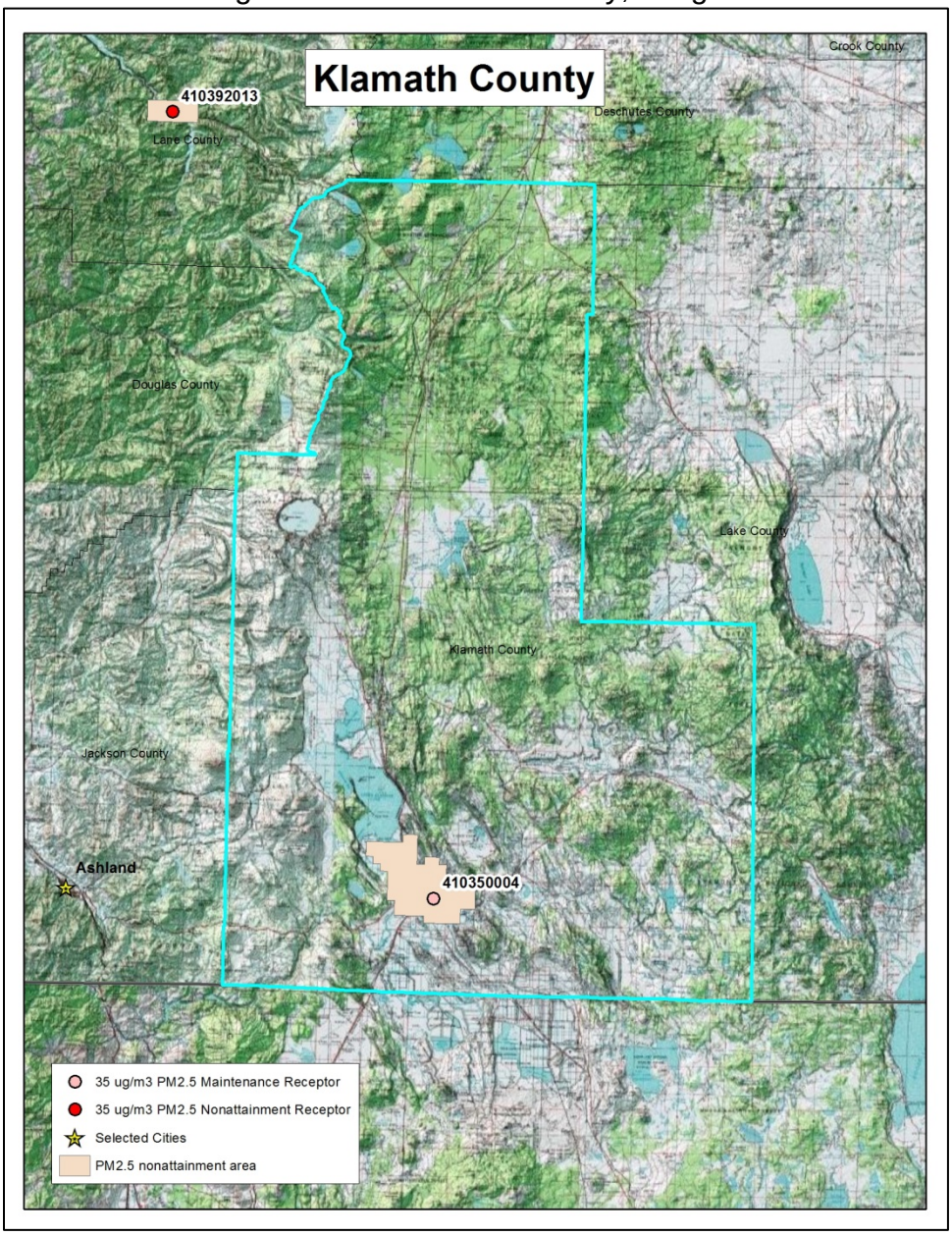
Based on the above-described information, the impact of wildfire activity, the high level of fire and wood burning emissions, and the influence of local topography and wintertime inversions, as well as the intervening terrain between the receptor and California, we believe it is reasonable to assume that emissions from California do not significantly contribute to nonattainment of the 35 $\mu g/m^3$ $PM_{2.5}$ NAAQS at this receptor.

Klamath County Maintenance Receptor, AQS ID 41-035-0004

A small portion of Klamath County is designated nonattainment for the 35 $\mu g/m^3$ $PM_{2.5}$ NAAQS (Figure A.36). Klamath Falls is a relatively small urban community located in a large rural area in southeast Oregon, only 15 miles from the California border. It is over 240 miles to the nearest large California facility with the nearest Oregon facility 60 miles away in Jackson County. In addition, California mobile source emissions have decreased approximately 50 percent in the past decade and are projected to decrease an additional 50 percent from 2011 to 2021.

[41] Oregon Department of Environmental Quality, State Implementation Plan for Particulate Matter (PM10) in the Medford-Ashland Air Quality Maintenance Area, December 10, 2004

Figure A.36: Klamath County, Oregon



The community, which includes the potential maintenance receptor, lies in a valley at the northern end of the Klamath basin, a broader valley surrounded by mountains, which rise to 6,000 feet above sea level A 2005 emission inventory conducted by Oregon shows that wood stove emissions are the most significant source of emissions.[42]

[42] Oregon Department of Environmental Quality, Oregon 2005 Residential Wood Combustion Emission Inventory, http://www3.epa.gov/ttnchie1/conference/ei17/session2/christopher.pdf

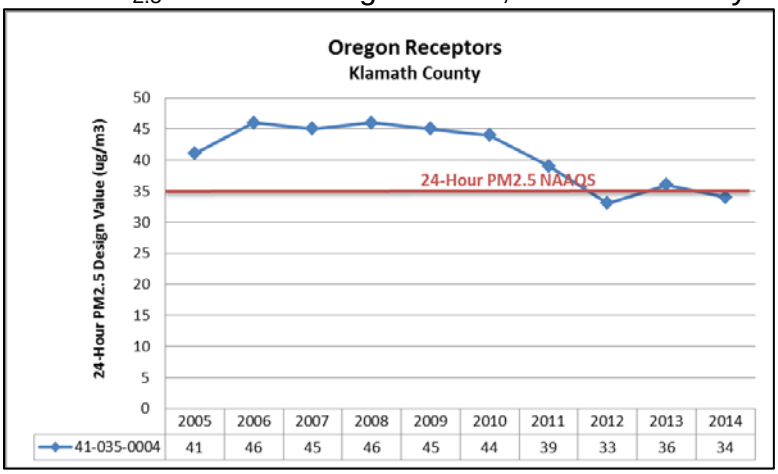
A third of the population of Klamath County resides in the city of Klamath Falls. The population of the county as a whole has decreased slightly (Table A.21) while the number of vehicle miles traveled has increased by three percent.

Table A.21: Population and VMT in Klamath County, Oregon[43]

County	Population (2014)	Population (2005)	Population change (2005 to 2014)	2011 VMT (millions mi)	2005 VMT (millions mi)	VMT change (2005 to 2014)
Klamath	65,455	66,192	-1.1%	832	807	3.1%

Design values at the monitoring site have been consistently above the standard (Figure A.37), only recently attaining in 2012. Daily data for 2005 to 2014 shows that winter is the high season at the Klamath Falls site, with summer having the lowest concentrations (Figure A.38), with the exception of occasional wildfire impacts. Background regional levels as recorded at the two closest IMPROVE monitors, Kalmiopsis and Crater Lake, show their highest values are in the summer months, with winter values below 5 µg/m^3 (Appendix E.1).

Figure A.37: $PM_{2.5}$ 24-Hour Design Values, Klamath County Receptor



Additional air quality monitoring data provide supporting evidence that residential wood combustion emissions are a primary contributor to exceedance days.[44] Most exceedances, with the exception of flagged wildfire events, occurred from December through January, corresponding directly with the winter wood heating season and indicate the exceedances are a seasonal occurrence. A combination of strong wintertime nocturnal inversions and cold temperatures has been cited as the cause behind the current designation status.[45] In addition, U.S. EPA's technical analyses of

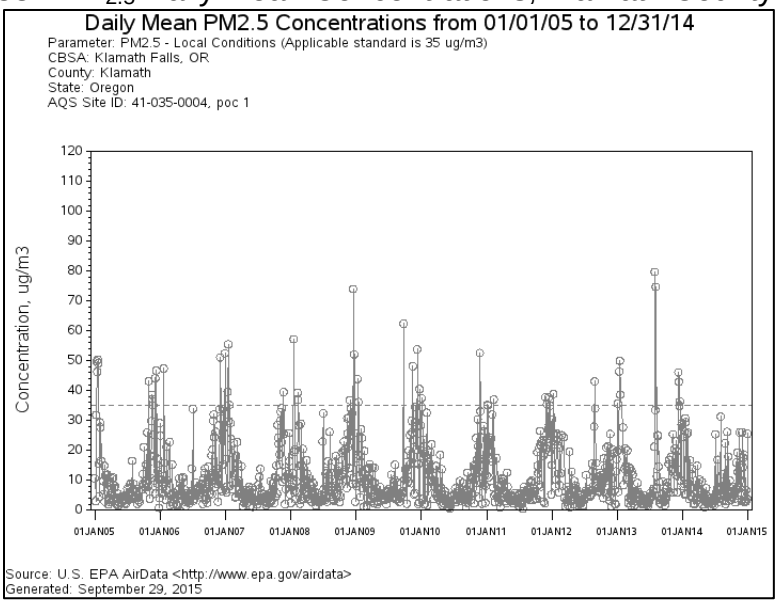
[43] U.S. EPA, Population and Vehicle Miles Traveled, Emission and Emission-Related Data, 2005: http://www3.epa.gov/airquality/particlepollution/designations/2006standards/techinfo.html; 2011: http://www3.epa.gov/pmdesignations/2012standards/techinfo.htm

[44] Oregon Department of Environmental Quality, Oregon 2005 Residential Wood Combustion Emission Inventory, http://www3.epa.gov/ttnchie1/conference/ei17/session2/christopher.pdf

[45] U.S. EPA Technical Support Document, Oregon Area Designations for the 24-Hour Fine Particle National Ambient Air Quality Standard, August 18, 2008

the documents received from other western states, points out that Klamath Falls is topographically isolated from other areas further implicating local sources as the main cause of $PM_{2.5}$ exceedances.[46]

Figure A.38: $PM_{2.5}$ Daily Mean Concentrations, Klamath County Receptor



Based on the above-described information, the intervening terrain between the receptor and California, and the effect of local topography and emission sources, particularly residential wood burning, on wintertime exceedances, we believe it is reasonable to assume that emissions from California do not significantly interfere with maintenance of the 35 $\mu g/m^3$ $PM_{2.5}$ NAAQS at this receptor.

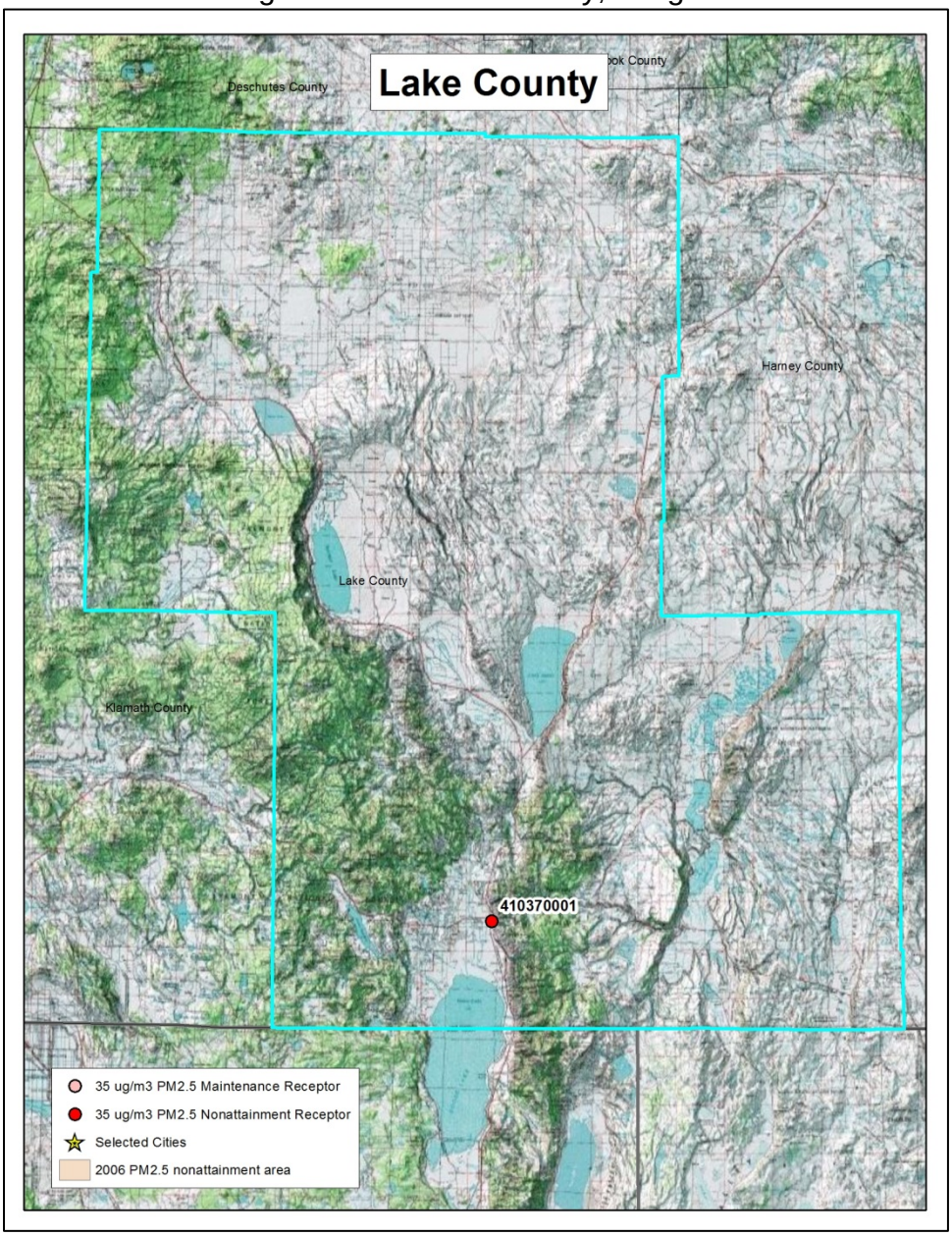
Lake County Nonattainment Receptor, AQS ID 41-037-0001

The sole potential nonattainment receptor in Lake County is located in the city of Lakeview in a broad valley at the foot of the Warner Mountains (Figure A.39). Lakeview is on the edge of the high desert country of southeastern Oregon, at an elevation of 4,800 feet, and is prone to strong wintertime inversions. Lake County shares a southern border with California and Oregon. The potential receptor is only 15 miles from California, with intervening terrain including Goose Lake and the Warner Mountains. The nearest large California facility is approximately 250 miles away, with the closest large Oregon facility 130 miles away in Jackson County to the west. In addition, California mobile source emissions have decreased approximately 50 percent in the past decade and are projected to decrease an additional 50 percent from 2011 to 2021.

[46] U.S. EPA Technical Support Document, State Implementation Plan and Interstate Transport Requirements for the 2006 24-hour Fine Particulate Matter National Ambient Air Quality Standards; Idaho, January 22 2015; Washington, May 13, 2015.

The community, which includes the potential maintenance receptor, lies in a valley at the northern end of the Klamath basin, a broader valley surrounded by mountains, which rise to 6,000 feet above sea level A 2005 emission inventory conducted by Oregon shows that wood stove emissions are the most significant source of emissions.[47]

Figure A.39: Lake County, Oregon



[47] Oregon Department of Environmental Quality, Oregon 2005 Residential Wood Combustion Emission Inventory, http://www3.epa.gov/ttnchie1/conference/ei17/session2/christopher.pdf

The area is currently a PM_{10} maintenance area and participates in U.S. EPA's PM Advance Program in an effort to reduce $PM_{2.5}$ emissions. An Advance Action Plan was submitted in September 2014.[48]

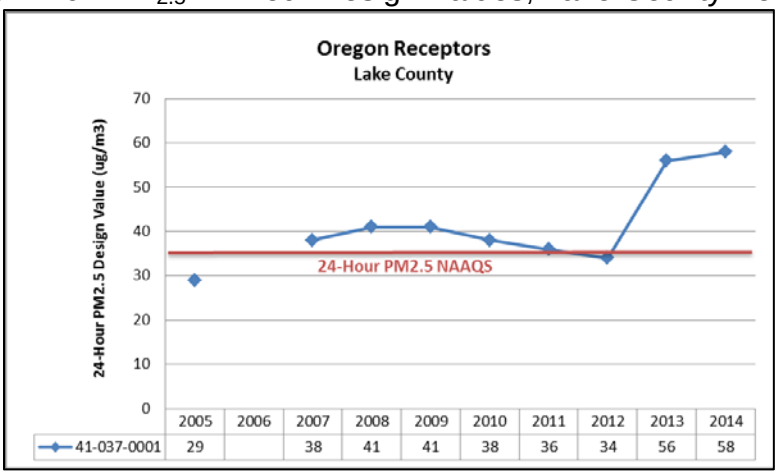
Over half of the population in Lake County is estimated to reside in the Lakeview urban growth area. The county population has grown by over seven percent, while the number of vehicle miles has increased almost 20 percent (Table A.22).

Table A.22: Population and VMT in Lake County, Oregon[49]

County	Population (2014)	Population (2005)	Population change (2005 to 2014)	2011 VMT (millions mi)	2005 VMT (millions mi)	VMT change (2005 to 2014)
Lake	7,838	7,313	7.2%	170	142	19.7%

Design values at this receptor site are consistently above the 35 $\mu g/m^3$ $PM_{2.5}$ NAAQS, dipping below only slightly in 2012 (Figure A.40). Several days were flagged as wildfire events, but these did not impact the design values. The high design values in 2013 and 2014 are primarily due to high concentrations recorded in January 2013. High concentrations at the monitor are generally seen in the winter months (November to February), with lower concentrations (less than 10 $\mu g/m^3$) recorded during summer (Figure A.41). Regional background values, as documented at the closest IMPROVE monitors at Kalmiopsis and Crater Lake in Oregon and Lava Beds in California, show the highest background concentrations are in the summer months, with winter concentrations below 5.0 $\mu g/m^3$ (Appendix E.1).

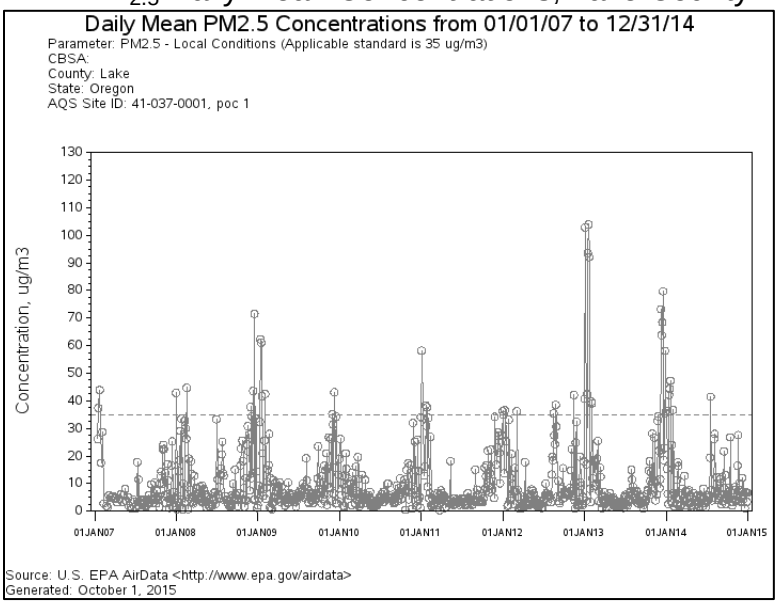
Figure A.40: $PM_{2.5}$ 24-Hour Design Values, Lake County Receptor



[48] State of Oregon Department of Environmental Quality, Lakeview Area – Particulate Matter ($PM_{2.5}$) Advance Action Plan, September 2014

[49] U.S. EPA, Population and Vehicle Miles Traveled, Emission and Emission-Related Data, 2005: http://www3.epa.gov/airquality/particlepollution/designations/2006standards/techinfo.html; 2011: http://www3.epa.gov/pmdesignations/2012standards/techinfo.htm

Figure A.41: $PM_{2.5}$ Daily Mean Concentrations, Lake County Receptor



In September 2014, the Oregon Department of Environmental Quality submitted a PM Advance Action Plan for the Lakeview area as part of U.S EPA's Advance Program.[50] The Advance Program is a collaborative effort between U.S EPA, states, tribes, and local governments to encourage expeditious emission reductions in ozone and fine particle ($PM_{2.5}$) attainment areas and to assist these areas in continuing to meet the NAAQS. The emission inventory undertaken as part of this Advance Action Plan determined that residential wood combustion accounted for over 75 percent of emissions during winter, when daily concentrations were highest.[51]

Based on the above-described information, the effect of local topography and emission sources, particularly residential wood burning, on wintertime exceedances, and the intervening terrain between California and the potential receptor, we believe it is reasonable to assume that emissions from California do not significantly contribute to nonattainment of the 35 $\mu g/m^3$ $PM_{2.5}$ NAAQS at this receptor.

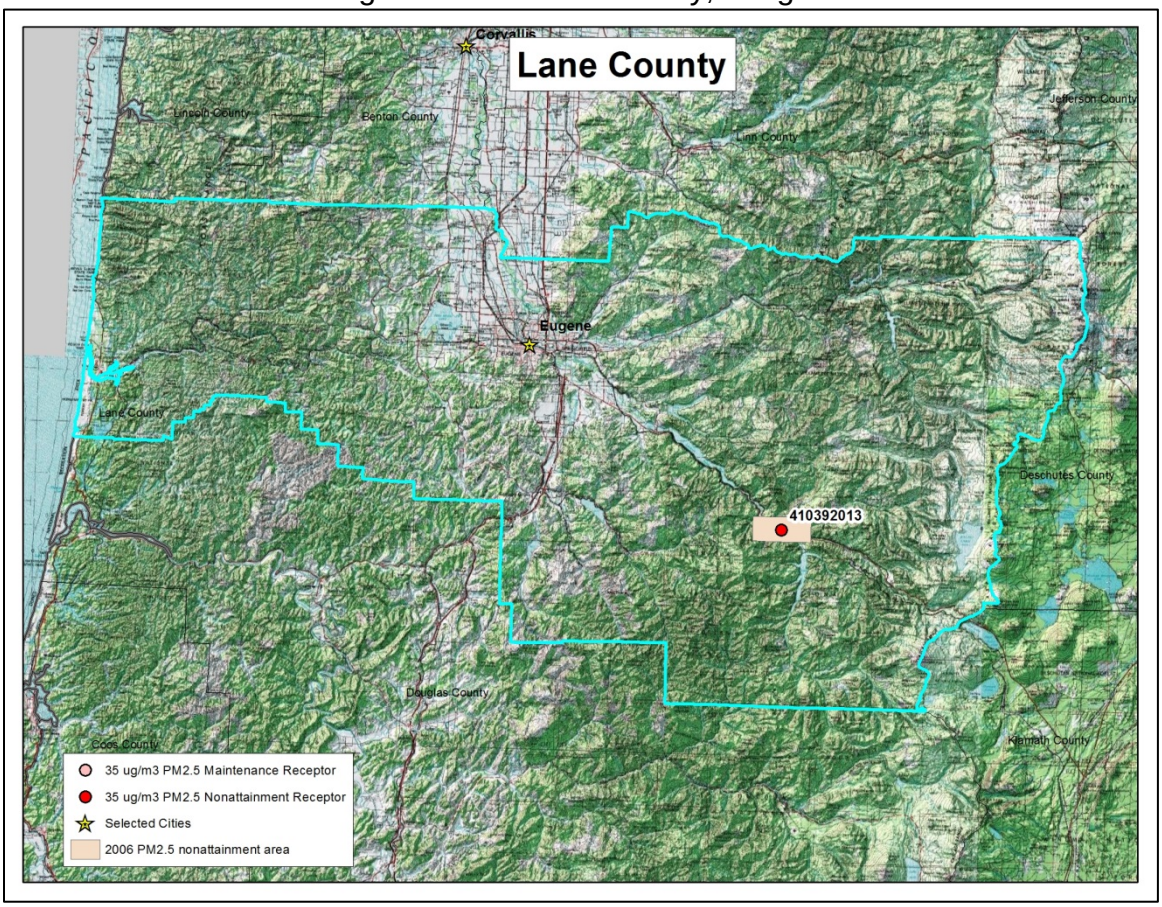
Lane County Nonattainment Receptor, AQS ID 41-039-2013

Oakridge, the location of a potential nonattainment receptor, is a small, isolated mountain community situated in the eastern portion of Lane County, which stretches from the Pacific Ocean to the mountains of the Cascade Range (Figure A.42). The Oakridge Urban Growth Area is currently a maintenance area for PM_{10} and is nonattainment for the 35 $\mu g/m^3$ $PM_{2.5}$ NAAQS. Oakridge lies in the foothills at the southern end of the Willamette River valley, with the Cascade Range rising on the north and south sides. The receptor is approximately 120 miles from the California border with significant topography in between, including the Cascade Range and the Klamath

[50] State of Oregon Department of Environmental Quality, Lakeview Area – Particulate Matter ($PM_{2.5}$) Advance Action Plan, September 2014
[51] Ibid

and Siskiyou Mountains. The closest large California facility is over 250 miles from the receptor, while the nearest large Oregon facility is 130 miles to the south in Jackson County (Appendix F.1). In addition, California mobile source emissions have decreased approximately 50 percent in the past decade and are projected to decrease an additional 50 percent from 2011 to 2021.

Figure A.42: Lane County, Oregon



The majority of the population of Lane County, approximately 60 percent, resides in the Eugene-Springfield metropolitan area, approximately 35 miles to the northwest. In 2010, the city of Oakridge had a population of 3,205[52] and had grown only two percent since 2000. In contrast, the county as a whole had grown over six percent in the past decade, with the number of vehicle miles travelled increasing only half a percent (Table A.23).

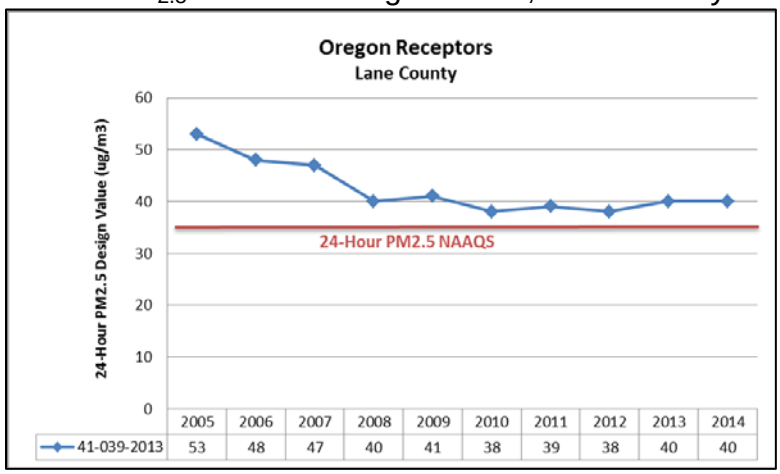
[52] Portland State University, Census Data for Oregon, https://www.pdx.edu/prc/census-data-for-oregon

Table A.23: Population and VMT in Lane County, Oregon[53]

County	Population (2014)	Population (2005)	Population change (2005 to 2014)	2011 VMT (millions mi)	2005 VMT (millions mi)	VMT change (2005 to 2014)
Lane	358,337	335,180	6.9%	2,,736	2723	0.5%

Design values at this receptor site have been consistently above the 35 μg/m^3 $PM_{2.5}$ NAAQS (Figure A.43). High concentrations at the monitor are primarily seen in the winter months (November to February), with low concentrations (less than 10 μg/m^3) during the summer (Figure A.44). Background regional values, as recorded at the closest IMPROVE monitors, Kalmiopsis, Crater Lake, and the Three Sisters, show the highest values in the summer months, with winter values below 5 μg/m^3 (Appendix E.1).

Figure A.43: $PM_{2.5}$ 24-Hour Design Values, Lane County Receptor



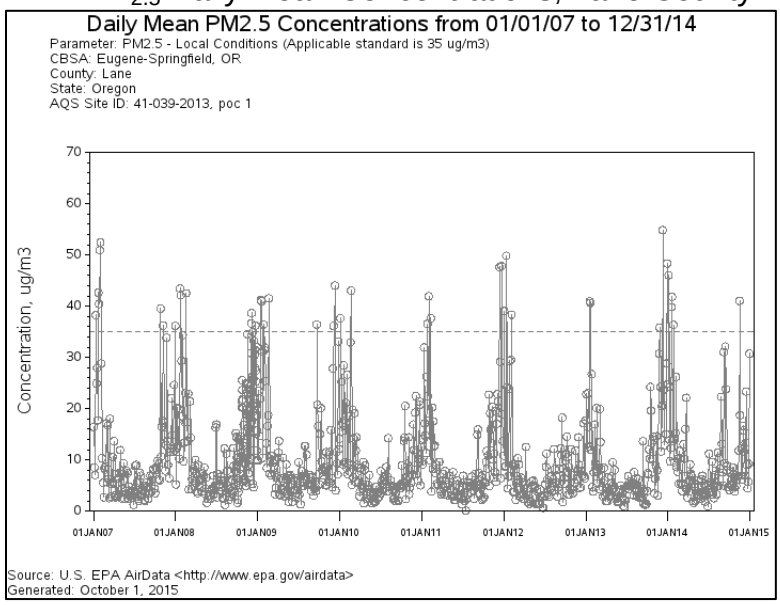
Analysis performed by U.S. EPA as part of the 35 μg/m^3 $PM_{2.5}$ NAAQS designation process, showed that the majority of the $PM_{2.5}$ exceedances occurred during extended winter night time inversions coupled with low wind speed.[54] $PM_{2.5}$ levels were seen to increase in late afternoon, reach a peak at midnight, and then begin to decrease. This profile is characteristic of residential wood combustion. U.S. EPA concluded that emissions from residential wood burning were the largest source of $PM_{2.5}$ emissions in the area.[55]

[53] U.S. EPA, Population and Vehicle Miles Traveled, Emission and Emission-Related Data, 2005: http://www3.epa.gov/airquality/particlepollution/designations/2006standards/techinfo.html; 2011: http://www3.epa.gov/pmdesignations/2012standards/techinfo.htm

[54] U.S. EPA Technical Support Document, Oregon Area Designations for the 2006 24-Hour Fine Particle National Ambient Air Quality Standard, August 18, 2008.

[55] Ibid

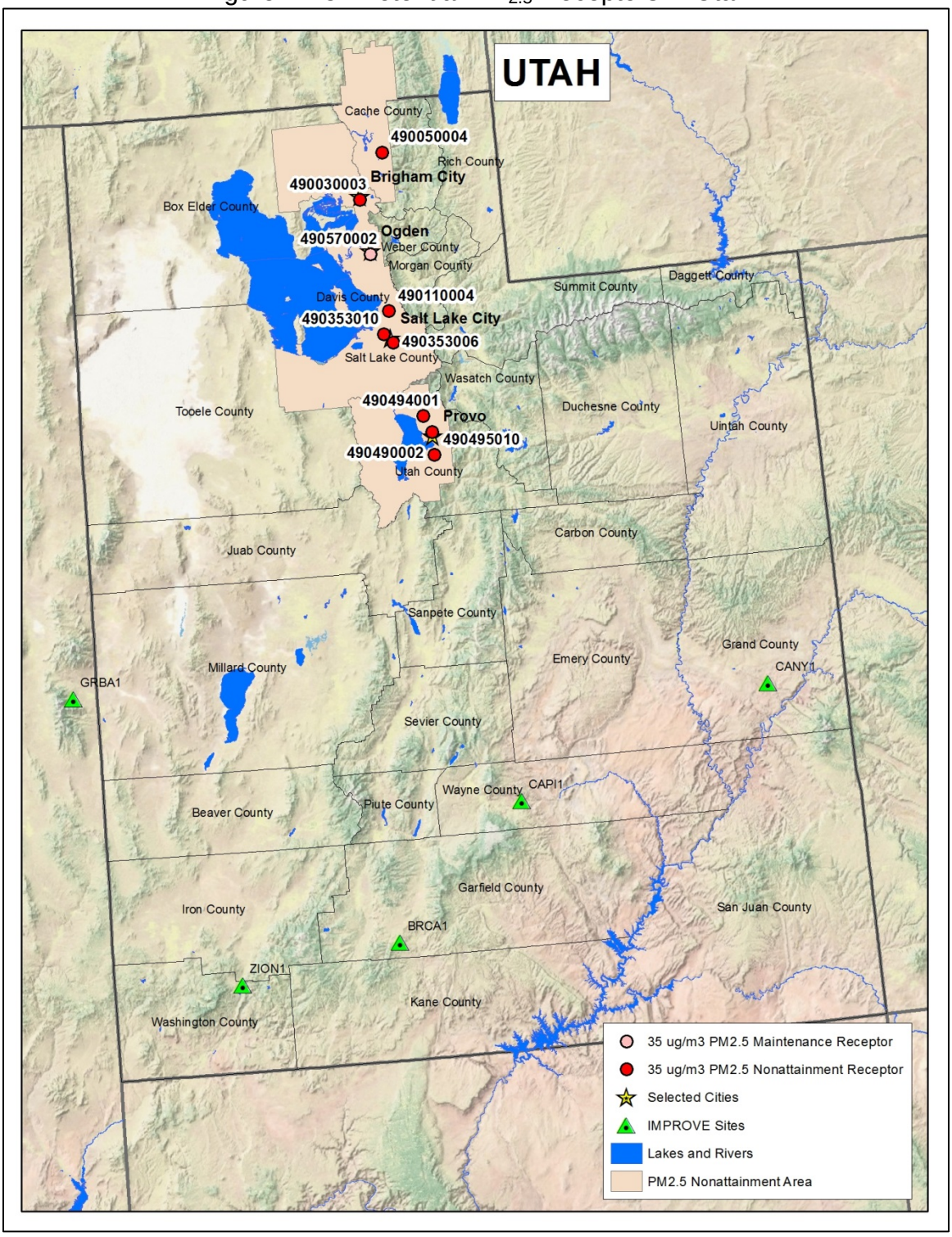
Figure A.44: $PM_{2.5}$ Daily Mean Concentrations, Lane County Receptor



Based on the above-described information, the distance to California and the intervening terrain, as well as the effect of local topography and emission sources, particularly residential wood burning, on wintertime exceedances, we believe it is reasonable to assume that emissions from California do not significantly contribute to nonattainment of the 35 $\mu g/m^3$ $PM_{2.5}$ NAAQS at this receptor.

Utah

Figure A.45: Potential $PM_{2.5}$ Receptors in Utah



All potential maintenance and nonattainment $PM_{2.5}$ receptors in Utah are located within three $PM_{2.5}$ nonattainment areas: Logan $PM_{2.5}$ Nonattainment Area, comprised of portions of Cache County in Utah and Franklin County in Idaho; Provo $PM_{2.5}$ Nonattainment Area, composed of a portion of Utah County; and the Salt Lake City $PM_{2.5}$ Nonattainment Area, comprised of portions of Box Elder, Tooele, and Weber Counties and the entirety of Davis and Salt Lake Counties (Figure A.45 and Table A.24). All three areas are located in the northern portion of the state and are strung in a north-south line with the Great Salt Lake to the west and the Wasatch Mountains, part of the central Rockies, to the east. The Logan $PM_{2.5}$ Nonattainment Area is considered a separate airshed from the Salt Lake City and Provo $PM_{2.5}$ Nonattainment Areas. U.S. EPA determined that although Salt Lake County and Utah County share an airshed, these two nonattainment areas would be treated separately based on jurisdictional boundaries.[56]

Table A.24: Potential $PM_{2.5}$ Receptors in Utah (NAAQS exceedances in red)

County	AQS ID	$PM_{2.5}$ NAAQS Nonattainment Area	24-Hr Standard Design Value ($\mu g/m^3$)			Receptor Type	Approximate Distance to California Border (miles)
			2012	2013	2014		
Box Elder	49-003-0003	Salt Lake City	37	37	37	Nonattainment	410
Cache	49-005-0004	Logan	37	46	45	Nonattainment	490
Davis	49-011-0004	Salt Lake City	34	35	38	Maintenance	420
Salt Lake	49-035-3006	Salt Lake City	38	41	43	Nonattainment	420
	49-035-3010	Salt Lake City	35	39	42	Nonattainment	420
Utah	49-049-0002	Provo	29	45	43	Nonattainment	440
	49-049-4001	Provo	32	44	42	Nonattainment	440
	49-049-5010	Provo	35	46	44	Nonattainment	440
Weber	49-057-0002	Salt Lake City	36	39	34	Maintenance	420

Between the over 400 miles from California to Utah are the Sierra Nevada Mountains and the Great Basin, a large area comprised of a series of depressions, flats, dry lakes, marshy salt pans and sinks scattered between smaller mountain ranges that stretch across much of Nevada and well into Utah.[57] The closest large California facility is between 400 and 480 miles from any of the Utah receptors. The nearest local facilities range from one to 50 miles from the designated receptors. In addition, California mobile source emissions have decreased approximately 50 percent in the past decade and are projected to decrease an additional 50 percent from 2011 to 2021.

IMPROVE monitors between California and Utah, as well as within Utah, show that $PM_{2.5}$ concentrations are lowest in the winter and highest in the summer (Appendix E.1). Although the percentage of contributions from California are highest for the worst

[56] U.S. EPA Technical Support Document, Utah and Utah/Idaho, Area Designation for the 2006 24-hour Fine Particle National Ambient Air Quality Standard, August 18, 2008
[57] World Atlas, Nevada: http://www.worldatlas.com/webimage/countrys/namerica/usstates/nvland.htm

visibility days, these days occurred during summer months and would not, therefore, affect winter exceedance days at the potential receptors in Utah. Concentrations at the IMPROVE sites are generally well below 2 $\mu g/m^3$ during the winter season.

During the most recent design value period, 2012-2014, Utah operated 17 monitoring sites throughout the state, with the majority located around the Great Salt Lake (Table A.25). The area around the Great Salt Lake is home to the majority of the residents of Utah, with over 80 percent of the population residing in the seven counties that make up the three $PM_{2.5}$ nonattainment areas. In the last decade, the population growth in these counties ranged from 11 to 26 percent (Table A.26). The changes in the number of vehicle miles traveled, however, varied widely, from a decrease of 62 percent in Weber County to an almost 120 percent increase in Box Elder County.

Table A.25: $PM_{2.5}$ 24-Hour Design Values in Utah (NAAQS exceedances in red)

County	AQS ID	24-Hour Design Value ($\mu g/m^3$)					
		2010-2012		2011-2013		2012-2014	
Box Elder	49-003-0003	37		37		37	
Cache	49-005-0004	37		46		45	
Davis	49-011-0004	34		35		38	
Duchesne	49-013-7011	16	NV	16	NV		
Salt Lake	49-035-1001	30		32		35	
Salt Lake	49-035-3006	38		41		43	
Salt Lake	49-035-3010	35		39		42	
Tooele	49-045-0003	24		28		29	
Uintah	49-047-5632	20	NV	19	NV	19	NV
Utah	49-049-0002	29		45		43	
Utah	49-049-4001	32	NV	44		42	
Utah	49-049-5008	41	NV	42	NV		
Utah	49-049-5010	35		46		44	
Washington	49-053-0007					9	NV
Washington	49-053-0130	11		12	NV	12	NV
Weber	49-057-0002	36		39		34	
Weber	49-057-1003	33		35		36	NV

NV = non valid design value

Table A.26: Population and VMT in Utah $PM_{2.5}$ Nonattainment Area Counties[58]

County	Population (2014)	Population (2005)	Population change (2005 to 2014)	2011 VMT (millions mi)	2005 VMT (millions mi)	VMT change (2005 to 2014)
Box Elder	51,518	46,440	10.9%	1,694	783	116.4%
Cache	118,343	98,055	20.7%	8,57	936	-8.4%
Davis	329,692	268,187	22.9%	2,555	3,352	-23.8%
Salt Lake	1,091,742	948,172	15.1%	9,562	7,512	27.3%
Utah	560,974	443,738	26.4%	3,942	4,215	-6.5%
Weber	240,475	210,749	14.1%	765	1,995	-61.7%

The three $PM_{2.5}$ nonattainment areas, and the potential receptors located in each area, are discussed below in geographic order from north to south.

Logan $PM_{2.5}$ Nonattainment Area: Cache County/Franklin County Nonattainment Receptor, AQS ID 49-005-0004

There is one potential nonattainment receptor in the Logan $PM_{2.5}$ Nonattainment Area (Figure A.46). Located the furthest north of Utah's three nonattainment areas, the Logan $PM_{2.5}$ Nonattainment Area is comprised of portions of Cache County, Utah and Franklin County, Idaho. This is an isolated valley almost completely circled by mountains, which serve to trap pollutants in the valley when dispersion conditions are poor.[59]

$PM_{2.5}$ 24-hour design values for the potential receptor site in Cache County, Utah, have decreased since 2005, but have never gone below the 35 $\mu g/m^3$ $PM_{2.5}$ NAAQS (Figure A.47). Data from $PM_{2.5}$ monitor in Franklin County, Idaho, is not considered valid and is not included in this analysis. Daily mean concentrations at the Utah receptor site show that the high season for $PM_{2.5}$ is winter, with low levels in the spring and fall. Summer shows a slight bump, but concentrations are well below the standard (Figure A.48).

[58] U.S. EPA, Population and Vehicle Miles Traveled, Emission and Emission-Related Data, 2005: http://www3.epa.gov/airquality/particlepollution/designations/2006standards/techinfo.html; 2011: http://www3.epa.gov/pmdesignations/2012standards/techinfo.htm

[59] U.S. EPA Technical Support Document, Utah and Utah/Idaho, Area Designation for the 2006 24-hour Fine Particle National Ambient Air Quality Standard, August 18, 2008

Figure A.46: Logan $PM_{2.5}$ Nonattainment Area, Utah/Idaho

Figure A.47: $PM_{2.5}$ 24-Hour Design Values, Logan $PM_{2.5}$ Nonattainment Area Receptor

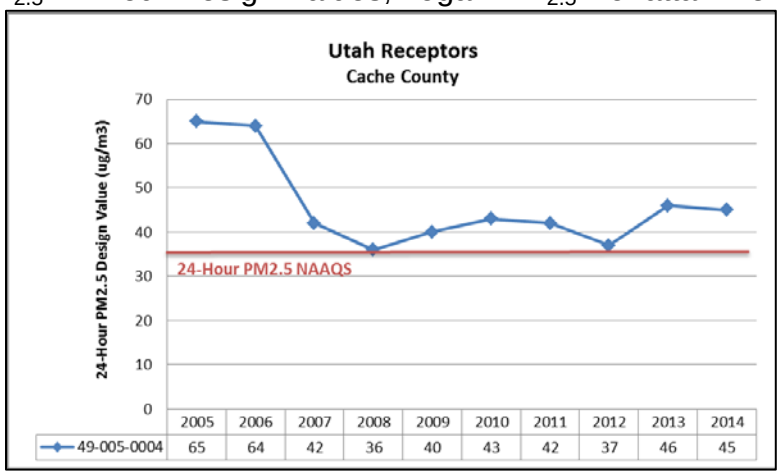
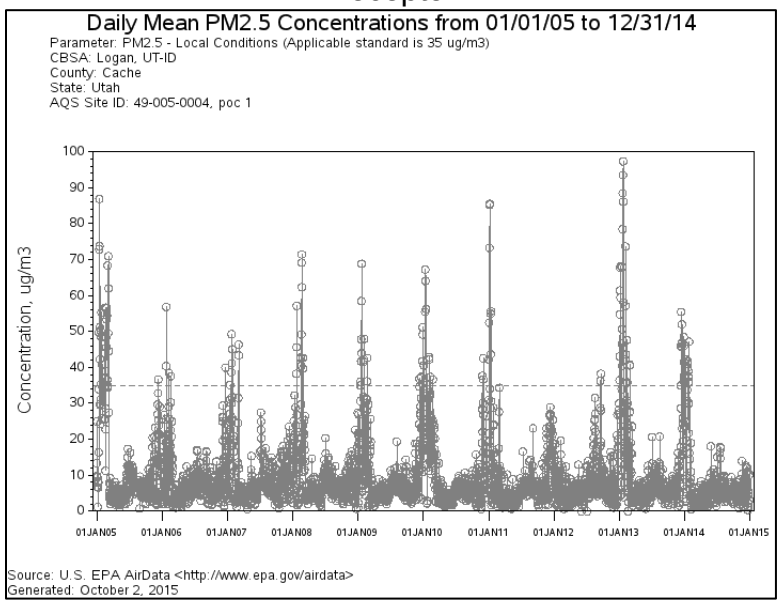


Figure A.48: $PM_{2.5}$ Daily Mean Concentrations, Logan $PM_{2.5}$ Nonattainment Area Receptor



The Cache Valley experiences air stagnation events in the wintertime. During these periods, the stable layer above the ground is much deeper than a typical nocturnal inversion.[60] A prolonged strong inversion can limit the vertical mixing, trapping local pollutants in a thin layer against the valley floor. The Cache Valley is an airshed shared by the states of Utah and Idaho and transport of emissions from surrounding areas of Idaho, Utah, and Wyoming do not contribute significantly to nonattainment in the Cache Valley. U.S. EPA concluded that the inversions that produce the high concentrations of $PM_{2.5}$ in the Logan $PM_{2.5}$ Nonattainment Area were confined to the lower Valley areas and are below the elevated, mountainous terrain areas of both Cache and Franklin Counties.[61]

[60] Ibid.
[61] Ibid

In its analysis of the Oregon Transport SIP submittal, U.S. EPA noted that transport of $PM_{2.5}$ and precursors from the rural regions at the periphery of the Cache Valley was limited. In addition, U.S. EPA determined that most of the observed $PM_{2.5}$ in the Wasatch Front and Cache Valley is locally formed from fresh emission sources and secondary chemistry.[62] Residential heating emissions from woodstoves, emissions from agricultural activities, and mobile source emissions are limited to the Cache Valley, during stable weather events associated with strong inversions, and are trapped there by these inversions, low wind, and significant topography.[63]

Based on the meteorology, topography and characteristics of the $PM_{2.5}$ levels during time periods when the 24-hour $PM_{2.5}$ standard is exceeded, as described above, as well as the low levels of background $PM_{2.5}$ during these time periods at IMPROVE monitors near this receptor (Appendix E.1), U.S. EPA concluded that emissions from Idaho, Oregon, or Washington do not significantly contribute to nonattainment of the 35 $\mu g/m^3$ $PM_{2.5}$ NAAQS at this receptor.[64]

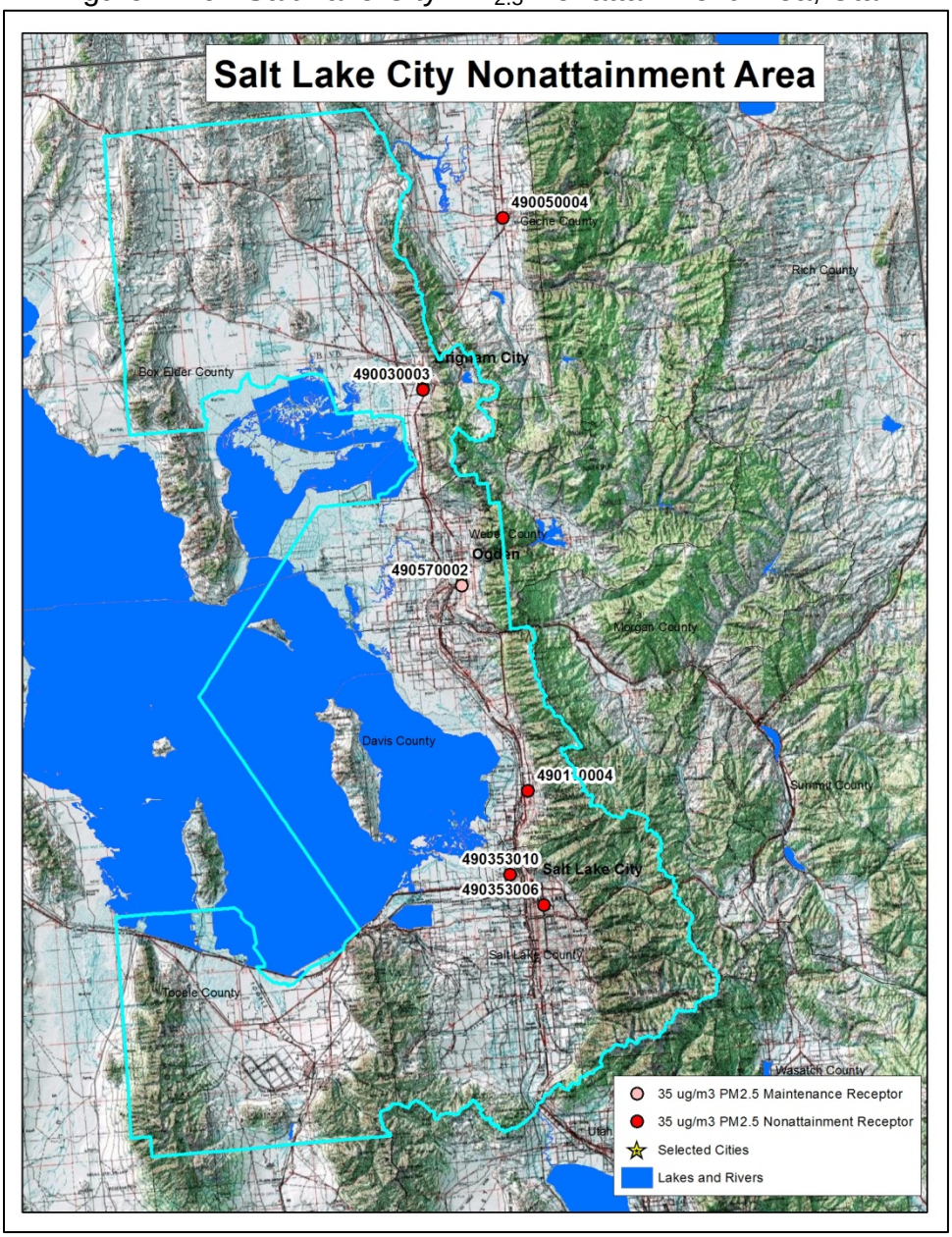
Based on the above-described information, and the previous analyses and conclusions by U.S. EPA and other states, we believe it is reasonable to assume that emissions from California do not significantly contribute to nonattainment of the 35 $\mu g/m^3$ $PM_{2.5}$ NAAQS at the nonattainment receptor in the Logan $PM_{2.5}$ Nonattainment Area.

Salt Lake City $PM_{2.5}$ Nonattainment Area: Box Elder, Davis, and Salt Lake Counties Nonattainment Receptors, AQS IDs 49-003-0003, 49-011-0004, 49-035-3006, and 49-035-3010; Weber County Maintenance Receptor, AQS ID 49-057-0002.

There are five potential $PM_{2.5}$ receptors located in the Salt Lake City $PM_{2.5}$ Nonattainment Area; four nonattainment receptors and one maintenance receptor (Figure A.49). The Salt Lake City $PM_{2.5}$ Nonattainment Area comprises all of Salt Lake and Davis Counties, as well as portions of Box Elder, Tooele, and Weber Counties, and is situated in a valley bordered on the west by the Stansbury Mountains, the Promontory Mountains, and the Great Salt Lake, and on the east by the Wasatch Front.[65] U.S. EPA determined that although Salt Lake County and Utah County share an airshed, these two nonattainment areas are separated based on jurisdictional boundaries.[66]

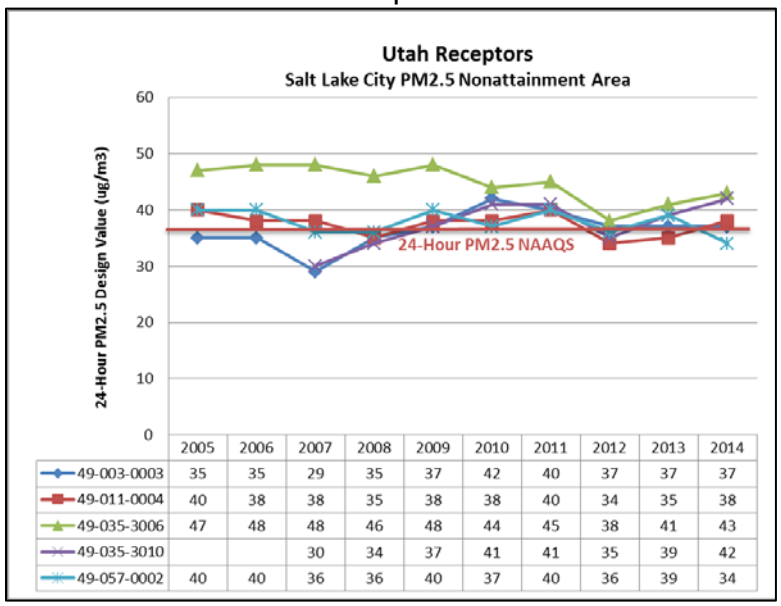
[62] U.S. EPA Technical Support Document, Oregon State Implementation Plan and Interstate Transport Requirements for the 2006 24-hour Fine Particulate Matter National Ambient Air Quality Standards, November 19, 2014
[63] Ibid.
[64] U.S. EPA Technical Support Document, State Implementation Plan and Interstate Transport Requirements for the 2006 24-hour Fine Particulate Matter National Ambient Air Quality Standards; Idaho, January 22 2015; Oregon, November 19, 2014.; Washington, May 13, 2015.
[65] U.S. EPA Technical Support Document, Idaho State Implementation Plan and Interstate Transport Requirements for the 2006 24-hour Fine Particulate Matter National Ambient Air Quality Standards, January 22 2015
[66] U.S. EPA Technical Support Document, Utah and Utah/Idaho, Area Designation for the 2006 24-hour Fine Particle National Ambient Air Quality Standard, August 18, 2008

Figure A.49: Salt Lake City $PM_{2.5}$ Nonattainment Area, Utah



$PM_{2.5}$ 24-hour design values for potential receptors in the Salt Lake Nonattainment Area show that they have remained fairly steady through the last decade. Only one of the monitoring sites recorded a design value below the standard; this occurred in 2007 and 2008 at the newest of the Salt Lake County sites (AQS ID 49-035-3010) (Figure A.50). Daily mean concentrations at all the sites show that the high season for $PM_{2.5}$ in the Salt Lake City area is primarily winter (Figure A.51), with occasional spikes in other seasons.

Figure A.50: $PM_{2.5}$ 24-Hour Design Values, Salt Lake City $PM_{2.5}$ Nonattainment Area Receptors



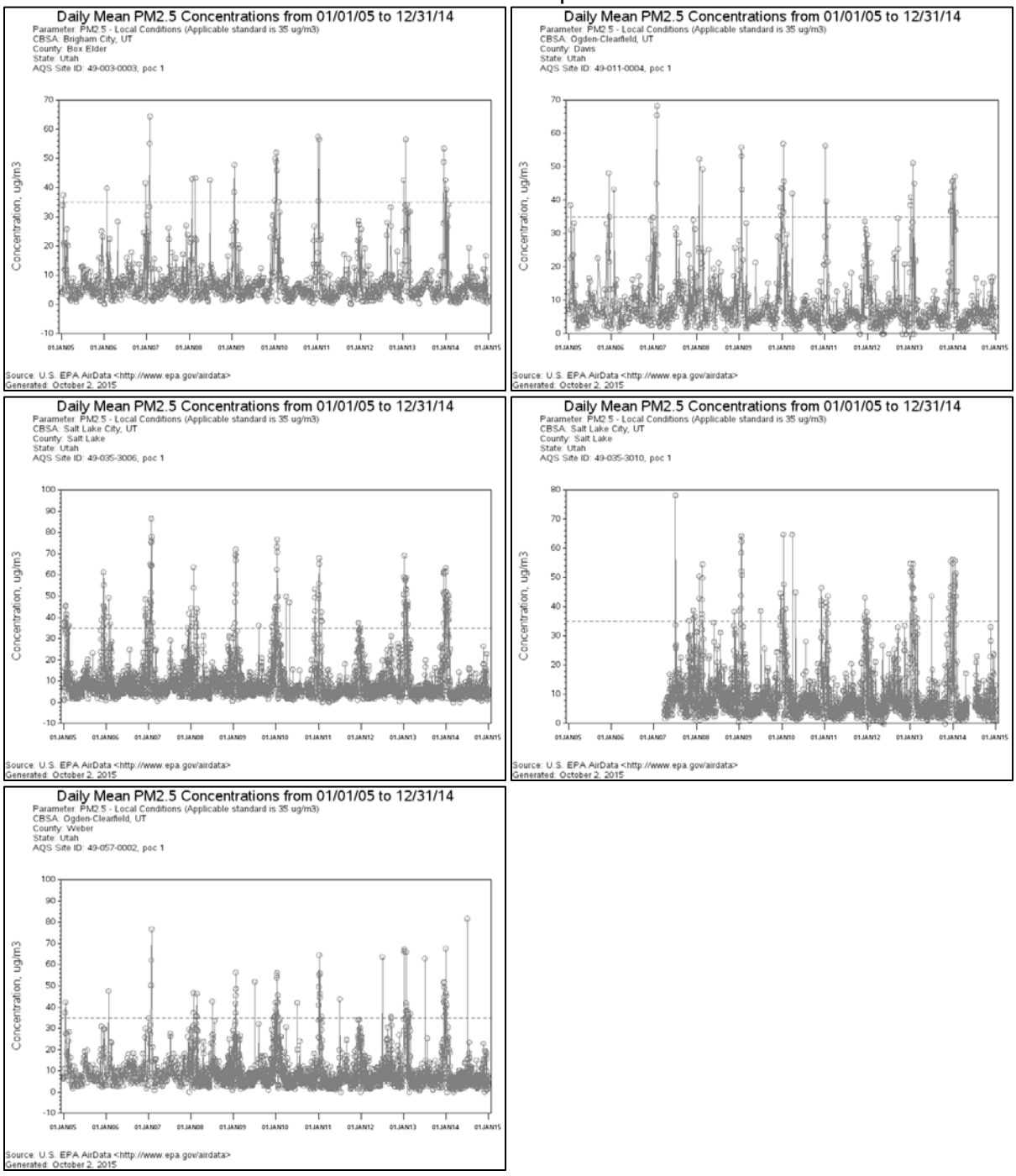
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
49-003-0003	35	35	29	35	37	42	40	37	37	37
49-011-0004	40	38	38	35	38	38	40	34	35	38
49-035-3006	47	48	48	46	48	44	45	38	41	43
49-035-3010			30	34	37	41	41	35	39	42
49-057-0002	40	40	36	36	40	37	40	36	39	34

During the winter months, levels of $PM_{2.5}$ at background monitoring sites located north and west of this receptor (IMPROVE sites at Craters of the Moon, ID, Sawtooth National Forest, ID, and Jarbridge Wilderness Area, NV) are very low, generally below 3 $\mu g/m^3$ (Appendix E.1). The vast majority of the $PM_{2.5}$ in the urban area is generated within the local area and trapped during winter inversion meteorology.[67] Transport between the Salt Lake City and Provo receptors can occur during these inversions, as there is a gap in the mountains separating these airsheds below the average inversion heights for these areas.[68]

Based on the meteorology, topography, and characteristics of the $PM_{2.5}$ levels during time periods when the standard is exceeded, as well as the low levels of background $PM_{2.5}$ during these time periods at IMPROVE monitors near these receptors and those between Idaho, Oregon, Washington, and Utah (Appendix E.1), U.S. EPA concluded that emissions from Idaho, Oregon, or Washington did not significantly contribute to nonattainment or interfere with maintenance of the 35 $\mu g/m^3$ $PM_{2.5}$ NAAQS at these receptors.[69]

[67] U.S. EPA Technical Support Document, State Implementation Plan and Interstate Transport Requirements for the 2006 24-hour Fine Particulate Matter National Ambient Air Quality Standards; Idaho, January 22 2015; Oregon, November 19, 2014.; Washington, May 13, 2015.
[68] U.S. EPA Technical Support Document, Utah and Utah/Idaho, Area Designation for the 2006 24-hour Fine Particle National Ambient Air Quality Standard, August 18, 2008
[69] U.S. EPA Technical Support Document, State Implementation Plan and Interstate Transport Requirements for the 2006 24-hour Fine Particulate Matter National Ambient Air Quality Standards; Idaho, January 22 2015; Oregon, November 19, 2014.; Washington, May 13, 2015

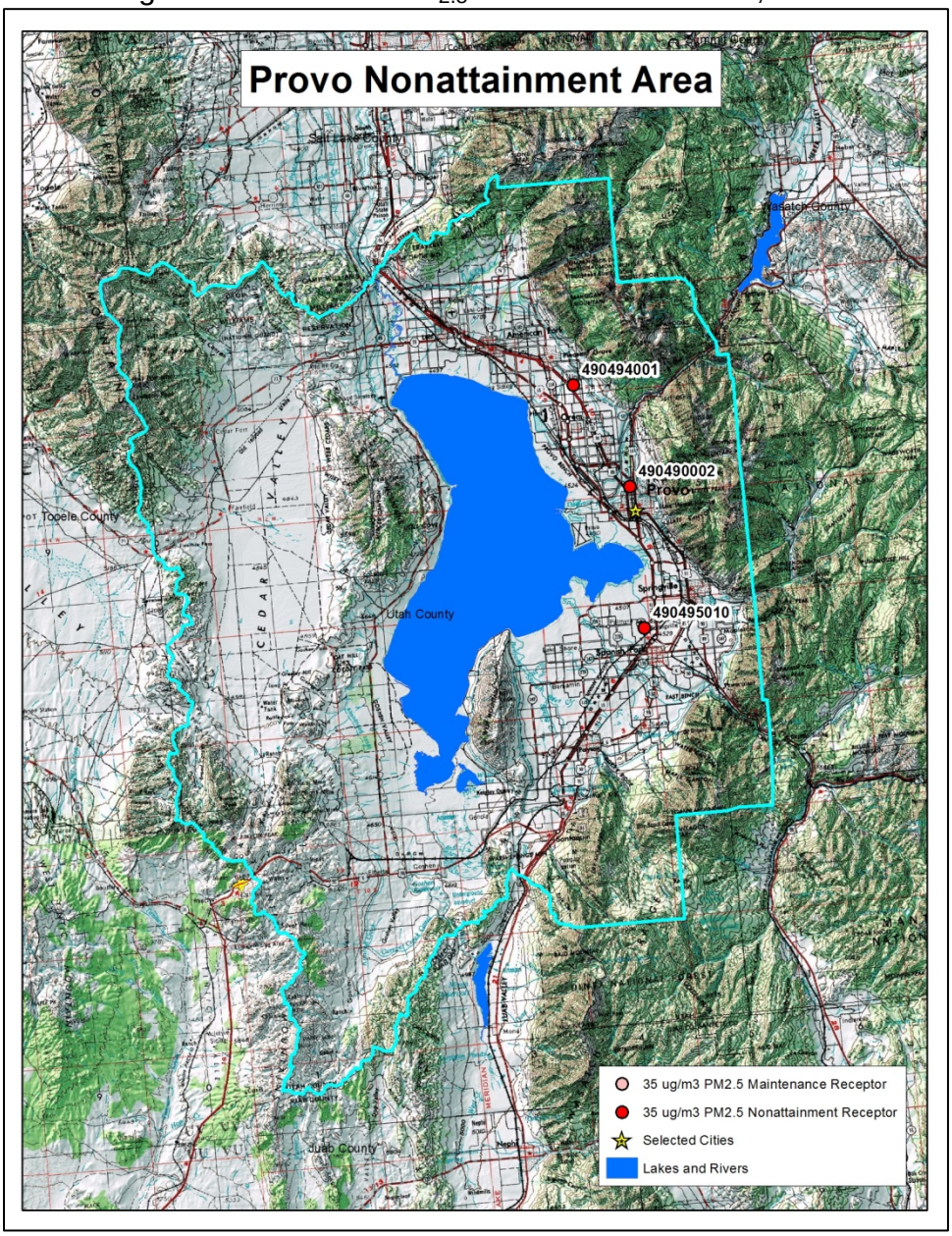
Figure A.51: $PM_{2.5}$ Daily Mean Concentrations, Salt Lake City $PM_{2.5}$ Nonattainment Area Receptors



Therefore, based on the above-described information, and previous analyses by U.S. EPA and other western states, we believe it is reasonable to assume that emissions from California do not significantly contribute to nonattainment nor interfere with maintenance of the 35 $\mu g/m^3$ $PM_{2.5}$ NAAQS receptors in the Salt Lake City $PM_{2.5}$ Nonattainment Area.

Provo $PM_{2.5}$ Nonattainment Area: Utah County Nonattainment Receptors, AQS IDs 49-049-0002, 49-049-4001, and 49-49-5010

Figure A.52: Provo $PM_{2.5}$ Nonattainment Area, Utah

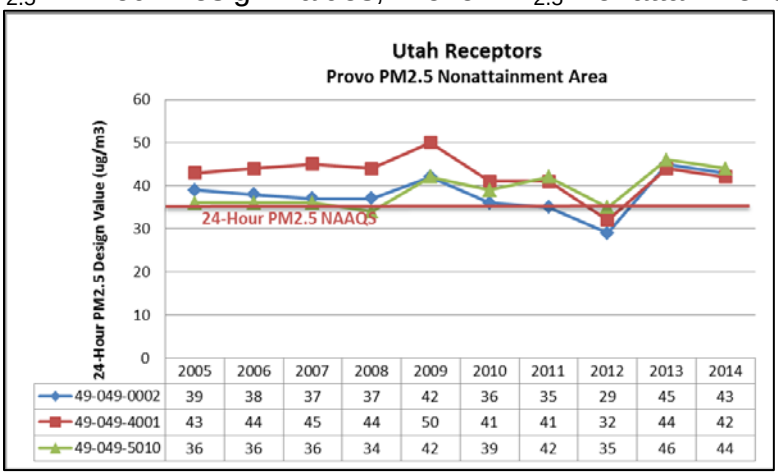


The Provo $PM_{2.5}$ Nonattainment Area is situated in what is known as the Utah Valley (Figure A.52). To the east, the Wasatch Mountains rise abruptly to approximately 7,000 to 9,000 feet, while to the west are the Oquirrh Mountains, rising to a similar height. To the north, the Wasatch Mountains curve and continue to act as a barrier with smaller ranges acting in a similar capacity to the south. As previously noted, although the Salt

Lake County and Utah County share an airshed, these two nonattainment areas are separated based on jurisdictional boundaries.[70]

$PM_{2.5}$ 24-hour design values for the potential receptor sites in the Provo $PM_{2.5}$ Nonattainment Area have generally been above the standard and were steadily declining since 2009, before experiencing an increase in 2013 and 2014 (Figure A.53). None of the data from these sites were flagged as possibly being impacted by wildfires. Daily mean concentrations at these sites show that $PM_{2.5}$ concentrations are highest in the winter months (Figure A.54), with the highest concentrations in 2013.

Figure A.53: $PM_{2.5}$ 24-Hour Design Values, Provo $PM_{2.5}$ Nonattainment Area Receptors



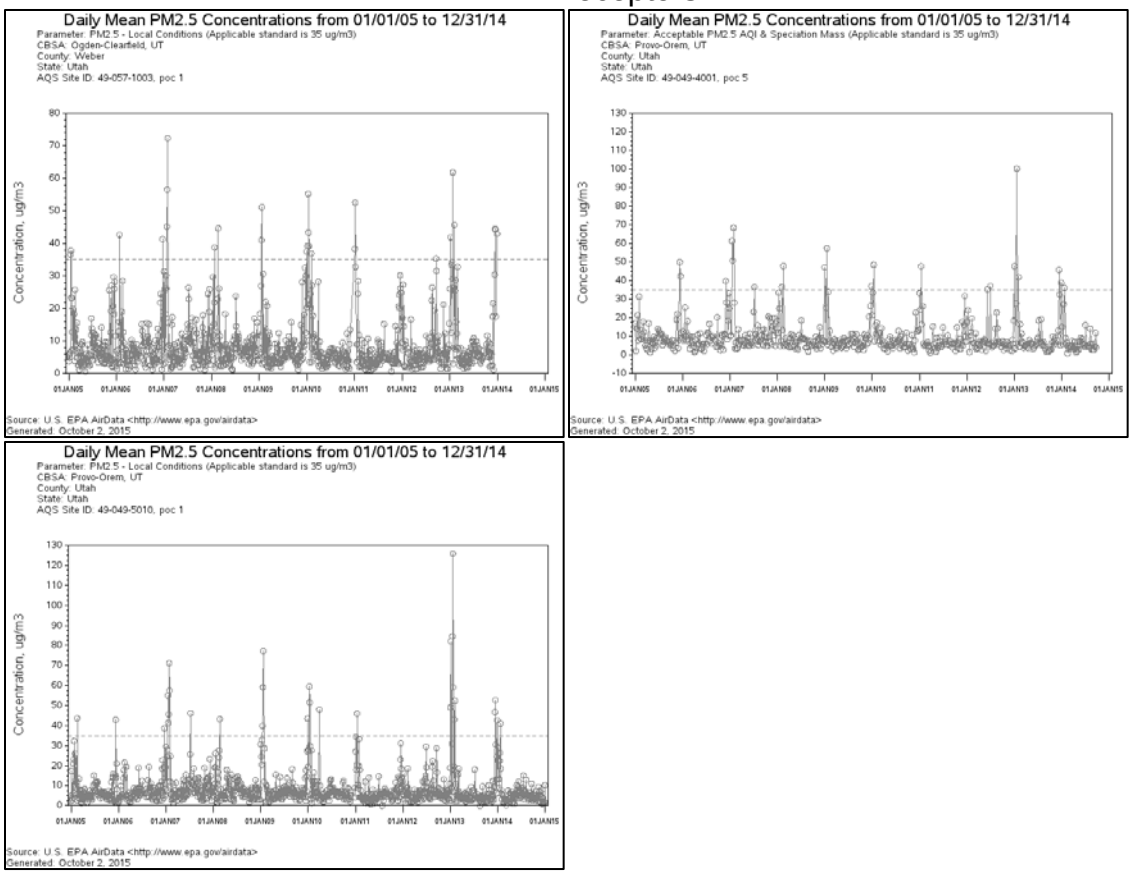
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
49-049-0002	39	38	37	37	42	36	35	29	45	43
49-049-4001	43	44	45	44	50	41	41	32	44	42
49-049-5010	36	36	36	34	42	39	42	35	46	44

As the Provo $PM_{2.5}$ Nonattainment Area shares an airshed with the Salt Lake City Nonattainment Area, the same factors contribute to its $PM_{2.5}$ exceedances. Elevated levels of $PM_{2.5}$ at these receptors occur primarily in the winter months.[71] The levels of elevated $PM_{2.5}$ at these receptors are driven by inversion meteorology which traps locally emitted pollutants and leads to exceedances.[72] During this same time period, levels of $PM_{2.5}$ at background monitoring sites located north and west of this receptor (IMPROVE sites at Craters of the Moon, ID, Sawtooth National Forest, ID, and Jarbridge Wilderness Area, NV) are very low, generally below 3 $\mu g/m^3$ (Appendix E.1). The vast majority of the $PM_{2.5}$ in the urban area is generated locally and trapped during winter inversion meteorology.[73] Transport between the Salt Lake City and Provo receptors can occur during inversions, as there is a gap in the mountains separating these airsheds. U.S. EPA concluded, in its technical analysis for the 35 $\mu g/m^3$ $PM_{2.5}$ NAAQS, it is likely that Salt Lake County contributes to Utah County's $PM_{2.5}$ violations

[70] U.S. EPA Technical Support Document, Utah and Utah/Idaho, Area Designation for the 2006 24-hour Fine Particle National Ambient Air Quality Standard, August 18, 2008
[71] Ibid.
[72] Ibid.
[73] U.S. EPA Technical Support Document, State Implementation Plan and Interstate Transport Requirements for the 2006 24-hour Fine Particulate Matter National Ambient Air Quality Standards; Idaho, January 22 2015; Oregon, November 19, 2014.; Washington, May 13, 2015.

and that Utah County contributes to Salt Lake County's high concentration $PM_{2.5}$ violations.[74]

Figure A.54: $PM_{2.5}$ Daily Mean Concentrations, Provo $PM_{2.5}$ Nonattainment Area Receptors



Based on the meteorology, topography, and characteristics of the $PM_{2.5}$ levels during time periods when the standard is exceeded, as well as the low levels of background $PM_{2.5}$ during these time periods at IMPROVE monitors near these receptors and between Idaho, Oregon, Washington, and Utah (Appendix E.1), U.S EPA concluded that emissions from Idaho, Oregon, or Washington do not significantly contribute to nonattainment of the 35 $\mu g/m^3$ $PM_{2.5}$ NAAQS at these receptors.[75]

[74] U.S. EPA Technical Support Document, Utah and Utah/Idaho, Area Designation for the 2006 24-hour Fine Particle National Ambient Air Quality Standard, August 18, 2008

[75] U.S. EPA Technical Support Document, State Implementation Plan and Interstate Transport Requirements for the 2006 24-hour Fine Particulate Matter National Ambient Air Quality Standards; Idaho, January 22 2015; Oregon, November 19, 2014.; Washington, May 13, 2015.

Therefore, based on the above-described information, and previous analyses by U.S. EPA and other western states, we believe it is reasonable to assume that emissions from California do not significantly contribute to nonattainment nor interfere with maintenance of the 35 $\mu g/m^3$ $PM_{2.5}$ NAAQS receptors in the Provo $PM_{2.5}$ Nonattainment Area.