6.0 STATE AND CLASS I AREA SUMMARIES

As described in Section 2.0, each state is required to submit progress reports at interim points between submittals of Regional Haze Rule (RHR) State Implementation Plans (SIPs), which assess progress towards visibility improvement goals in each state's mandatory Federal Class I areas (CIAs). Data summaries for each CIA in each Western Regional Air Partnership (WRAP) state, which address Regional Haze Rule (RHR) requirements for visibility measurements and emissions inventories are provided in this section. These summaries are intended to provide individual states with the technical information they need to determine if current RHR implementation plan elements and strategies are sufficient to meet all established reasonable progress goals, as defined in their respective initial RHR implementation plans.

6.1 ALASKA

The goal of the Regional Haze Rule (RHR) is to ensure that visibility on the 20% most impaired, or worst, days continues to improve at each Federal Class I area (CIA), and that visibility on the 20% least impaired, or best, days does not get worse, as measured at representative Interagency Monitoring of Protected Visual Environments (IMPROVE) monitoring sites. Alaska has 4 mandatory Federal CIAs, which are depicted in Figure 6.1-1 and listed in Table 6.1-1, along with the associated IMPROVE monitor locations.

This section addresses differences between the 2000-2004 baseline and 2005-2009 period, for both monitored data and emission inventory estimates. Monitored data are presented for the 20% most impaired, or worst, days and for the 20% least impaired, or best, days, as per RHR requirements. Annual average trend statistics for the 2000-2009 10-year period are also presented here to support assessments of changes in each monitored species that contributes to visibility impairment. Some of the highlights regarding these comparisons are listed below, and more detailed state specific information is provided in monitoring and emissions sub-sections that follow.

- The largest contributors to aerosol extinction at the Alaska sites were ammonium sulfate, particulate organic mass, and sea salt.
- For the best days, the 5-year average remained unchanged at the DENA1 site, and increased at the other Alaska sites, and ammonium sulfate was the largest contributor to increases on the best days
- For the worst days, the 5-year average deciview metric increased at the DENA1 and TRCR1 sites, remained unchanged at the SIME1 site, and decreased at the TUXE1 site.
    - Ammonium sulfate was the largest contributor to increases on the worst days and annual averages of ammonium sulfate also showed increasing trends. Emissions inventory comparisons for baseline and progress years indicated that the largest increases in estimates of SO_2 emissions were in the area source inventories.
    - Average ammonium nitrate also increased at DENA1 on the worst days but decreased at TRCR1 and TUXE1. No statistically significant increasing or decreasing annual average trends were observed for ammonium nitrate at any of the Alaska sites.

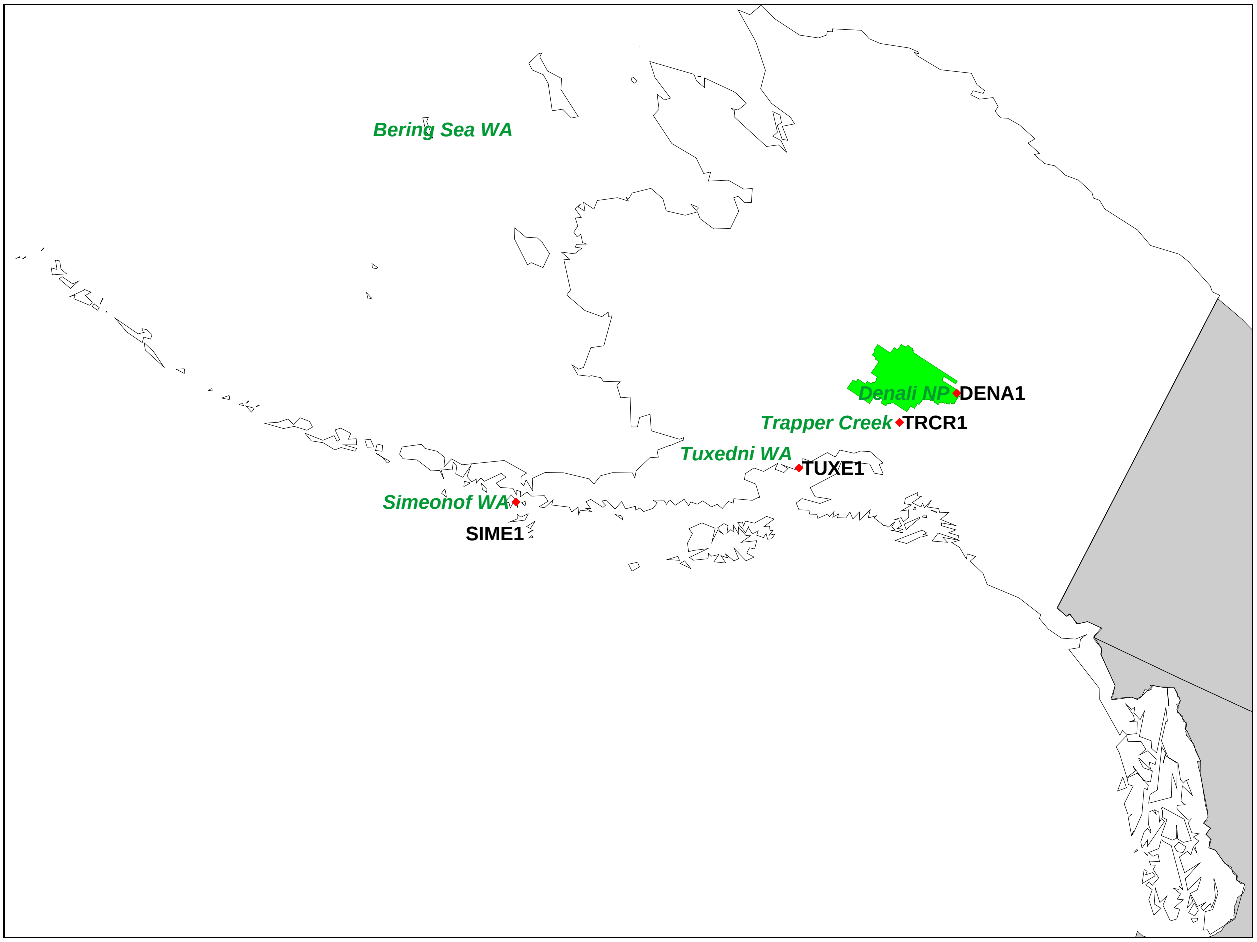

Figure 6.1-1. Map Depicting Federal CIAs and Representative IMPROVE Monitors in Alaska.

Table 6.1-1
Alaska CIAs and Representative IMPROVE Monitors

Class I Area	Representative IMPROVE Site	Latitude	Longitude	Elevation (m)
Denali NP	DENA1	63.72	-148.97	658
Simeonof WA	SIME1	55.33	-160.51	57
Tuxedni WA	TUXE1	59.99	-152.67	15
Bering Sea WA*	N/A			
Trapper Creek**	TRCR1	62.32	-150.32	155

*Federal Class I area with no IMPROVE monitoring site
**Not a Federal Class I area

6.1.1 Monitoring Data

This section addresses RHR regulatory requirements for monitored data as measured by IMPROVE monitors representing Federal CIAs in Alaska. These summaries are supported by regional data presented in Section 4.0 and by more detailed site specific tables and charts in Appendix A.

As described in Section 3.1, regional haze progress in Federal CIAs is tracked using calculations based on speciated aerosol mass as collected by IMPROVE monitors. The RHR calls for tracking haze in units of deciviews (dv), where the deciview metric was designed to be linearly associated with human perception of visibility. In a pristine atmosphere, the deciview metric is near zero, and a one deciview change is approximately equivalent to a 10% change in cumulative species extinction. To better understand visibility conditions, summaries here include both the deciview metric, and the apportionment of haze into extinction due to the various measured species in units of inverse megameters (Mm^{-1}).

6.1.1.1 Current Conditions

This section addresses the regulatory question, ***what are the current visibility conditions for the most impaired and least impaired days (40 CFR 51.308 (g)(3)(i))?*** RHR guidance specifies that 5-year averages be calculated over successive 5-year periods, i.e. 2000-2004, 2005-2009, 2010-2014, etc.[65] Current visibility conditions are represented here as the most recent successive 5-year average period available, or the 2005-2009 period average, although the most recent IMPROVE monitoring data currently available includes 2010 data.

Tables 6.1-2 and 6.1-3 present the calculated deciview values for current conditions at each site, along with the percent contribution to extinction from each aerosol species for the 20% most impaired, or worst, and 20% least impaired, or best, days, respectively, for each of the Federal CIA IMPROVE monitors in Alaska. Figure 6.1-2 presents 5-year average extinction for the current progress period for both the worst and best days. Note that percentages in the tables consider only the aerosol species which contribute to extinction, while the charts also show Rayleigh, or scattering due to background gases in the atmosphere.

Specific observations for the current visibility conditions on the 20% most impaired days are as follows:

- The largest contributors to aerosol extinction at Alaska sites were particulate organic mass and ammonium sulfate. Large contributions from sea salt were also measured at the SIME1 and TUXE1 sites.
- The highest aerosol extinction (18.6 dv) was measured at the SIME1 site, where sea salt was the largest contributor to aerosol extinction, followed by ammonium sulfate. The lowest aerosol extinction (10.6 dv) was measured at the DENA1 site.

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[65] EPA's September 2003 *Guidance for Tracking Progress Under the Regional Haze Rule* specifies that progress is tracked against the 2000-2004 baseline period using corresponding averages over successive 5-year periods, i.e. 2005-2009, 2010-2014, etc. (See page 4-2 in the Guidance document.)

Specific observations for the current visibility conditions on the 20% least impaired days are as follows:

- The aerosol contribution to total extinction on the best days was less than Rayleigh, or the background scattering that would occur in clear air. Average extinction (including Rayleigh) ranged from 2.4 deciview (DENA1) to 8.0 deciview (SIME1).
- For all sites, ammonium sulfate was the largest contributor to aerosol extinction on the best days.

Table 6.1-2
Alaska Class I Area IMPROVE Sites
Current Visibility Conditions
2005-2009 Progress Period, 20% Most Impaired Days

Site	Deciviews (dv)	Percent Contribution to Aerosol Extinction by Species (Excludes Rayleigh) (% of Mm^{-1}) and Rank*						
		Ammonium Sulfate	**Ammonium Nitrate**	**Particulate Organic Mass**	**Elemental Carbon**	**Soil**	**Coarse Mass**	**Sea Salt**
DENA1	10.6	34% (2)	3% (6)	**47% (1)**	6% (3)	1% (7)	5% (4)	4% (5)
SIME1	18.6	40% (2)	3% (4)	2% (5)	1% (6)	0% (7)	9% (3)	**43% (1)**
TRCR1	11.9	**44% (1)**	4% (5)	32% (2)	5% (4)	1% (7)	9% (3)	4% (6)
TUXE1	13.5	**46% (1)**	4% (5)	14% (3)	3% (6)	2% (7)	10% (4)	21% (2)

*Highest aerosol species contribution per site is highlighted in bold.

Table 6.1-3
Alaska Class I Area IMPROVE Sites
Current Visibility Conditions
2005-2009 Progress Period, 20% Least Impaired Days

Site	Deciviews (dv)	Percent Contribution to Aerosol Extinction by Species (Excludes Rayleigh) (% of Mm^{-1}) and Rank*						
		Ammonium Sulfate	**Ammonium Nitrate**	**Particulate Organic Mass**	**Elemental Carbon**	**Soil**	**Coarse Mass**	**Sea Salt**
DENA1	2.4	**49% (1)**	4% (6)	18% (2)	7% (4)	3% (7)	16% (3)	4% (5)
SIME1	8.0	**40% (1)**	5% (5)	3% (6)	5% (4)	0% (7)	11% (3)	36% (2)
TRCR1	3.9	**49% (1)**	7% (4)	17% (2)	7% (5)	2% (7)	13% (3)	4% (6)
TUXE1	4.1	**45% (1)**	8% (4)	8% (5)	3% (6)	1% (7)	15% (3)	20% (2)

*Highest aerosol species contribution per site is highlighted in bold.

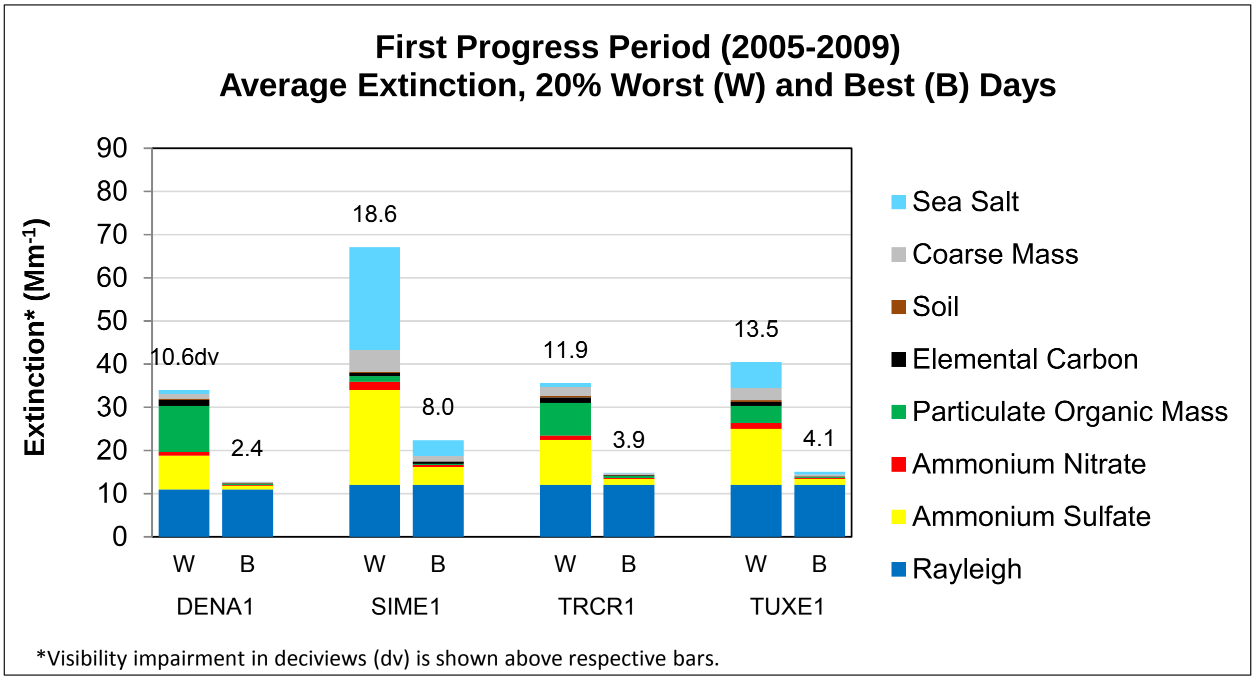

Figure 6.1-2. Average Extinction for Current Progress Period (2005-2009) for the Worst (Most Impaired) and Best (Least Impaired) Days Measured at Alaska Class I Area IMPROVE Sites.

6.1.1.2 Differences between Current and Baseline Conditions

This section addresses the regulatory question, ***what is the difference between current visibility conditions for the most impaired and least impaired days and baseline visibility conditions (40 CFR 51.308 (g)(3)(ii))?*** Included here are comparisons between the 5-year average baseline conditions (2000-2004) and current progress period extinction (2005-2009).

Table 6.1-4 presents the differences between the 2000-2004 baseline period average extinction and the 2005-2009 progress period average for each site in Alaska for the 20% most impaired or worst days, and Table 6.1-5 presents similar data for the least impaired or best days. Averages that increased are depicted in red text and averages that decreased in blue.

Figure 6.1-3 presents the 5-year average extinction for the baseline and current progress period averages for the worst days and Figure 6.1-4 presents the differences in averages by aerosol species, with increases represented above the zero line and decreases below the zero line. Figures 6.1-5 and 6.1-6 present similar plots for the best days.

For the 20% most impaired days, the 5-year average deciview metric decreased between the 2000-2004 and 2005-2009 periods at the TUXE1 site, remained the same at the SIME1 site, and increased at the DENA1 and TRCR1 sites. Notable differences for individual species averages were as follows:

- Ammonium sulfate increased at all sites on the worst days.
- Particulate organic mass and elemental carbon decreased at all sites, with the largest decreases measured at the SIME1 and TUXE1 sites.
- Ammonium nitrate increased slightly at the DENA1 site, but decreased slightly at the TRCR1 and TUXE1 sites.
- Coarse mass decreases slightly at the DENA1 site, and increased at the other Alaska sites.

For the 20% least impaired days, the 5-year average RHR deciview metric increased at all sites except DENA1, where the measured deciview average remained relatively unchanged. Notable differences for individual species averages on the 20% least impaired days were as follows:

- Increases in deciview were mostly due to increases in ammonium sulfate and coarse mass. Ammonium sulfate increased slightly at all sites except DENA1, and coarse mass increased slightly at all sites.

Table 6.1-4
Alaska Class I Area IMPROVE Sites
Difference in Aerosol Extinction by Species
2000-2004 Baseline Period to 2005-2009 Progress Period
20% Most Impaired Days

Site	Deciview (dv)			Change in Extinction by Species (Mm^{-1})*						
	2000-04 Baseline Period	2005-09 Progress Period	Change in dv*	Amm. Sulfate	Amm. Nitrate	POM	EC	Soil	CM	Sea Salt
DENA1	9.9	10.6	+0.7	+3.0	+0.2	-0.1	-0.3	0.0	-0.2	+0.4
SIME1	18.6	18.6	0.0	+6.7	0.0	-3.3	-1.1	0.0	+0.8	-1.4
TRCR1	11.6	11.9	+0.3	+2.9	-0.1	-1.5	-0.1	0.0	+0.5	+0.5
TUXE1	14.1	13.5	-0.6	+4.3	-0.5	-4.8	-0.3	+0.3	+0.4	-2.3

*Change is calculated as progress period average minus baseline period average. Values in red indicate increases in extinction and values in blue indicate decreases.

Table 6.1-5
Alaska Class I Area IMPROVE Sites
Difference in Aerosol Extinction by Species
2000-2004 Baseline Period to 2005-2009 Progress Period
20% Least Impaired Days

Site	Deciview (dv)			Change in Extinction by Species (Mm^{-1})*						
	2000-04 Baseline Period	2005-09 Progress Period	Change in dv*	Amm. Sulfate	Amm. Nitrate	POM	EC	Soil	CM	Sea Salt
DENA1	2.4	2.4	0.0	0.0	-0.1	0.0	-0.1	0.0	+0.1	0.0
SIME1	7.6	8.0	+0.4	+0.4	-0.1	-0.3	+0.1	0.0	+0.1	+0.5
TRCR1	3.5	3.9	+0.4	+0.4	0.0	+0.1	-0.1	0.0	+0.1	0.0
TUXE1	4.0	4.1	+0.1	+0.3	-0.1	-0.1	-0.1	0.0	+0.1	+0.1

*Change is calculated as progress period average minus baseline period average. Values in red indicate increases in extinction and values in blue indicate decreases.

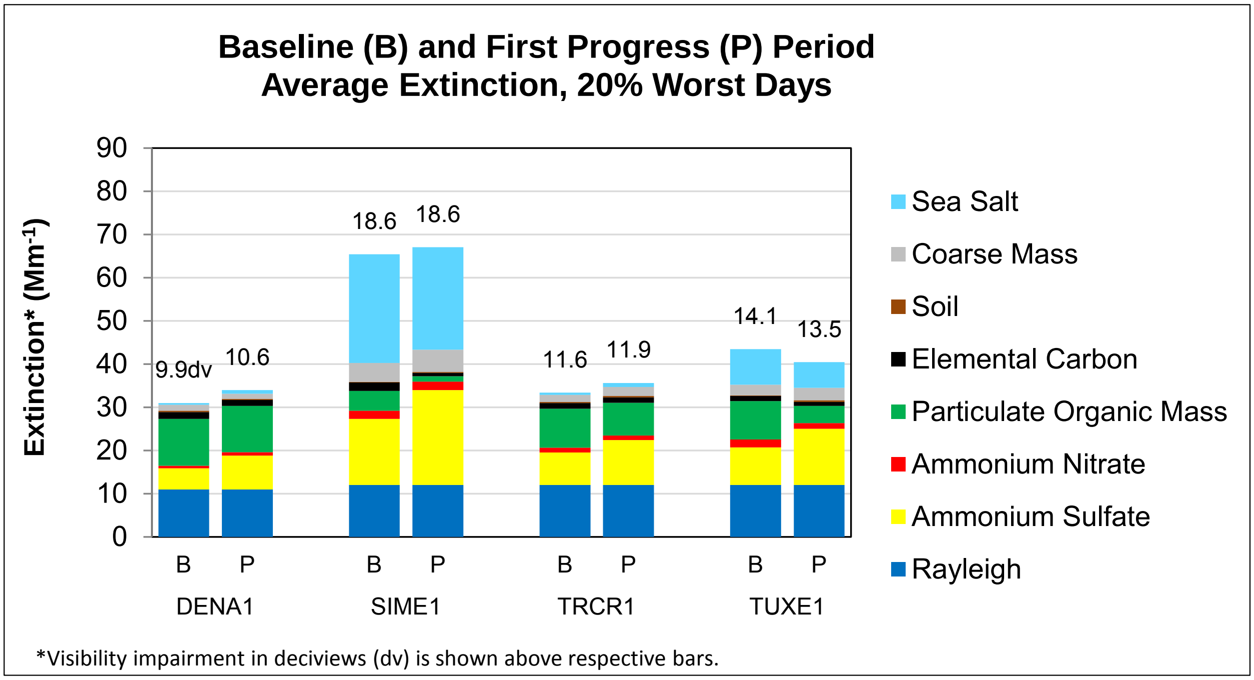

Figure 6.1-3. Average Extinction for Baseline and Progress Period Extinction for Worst (Most Impaired) Days Measured at Alaska Class I Area IMPROVE Sites.

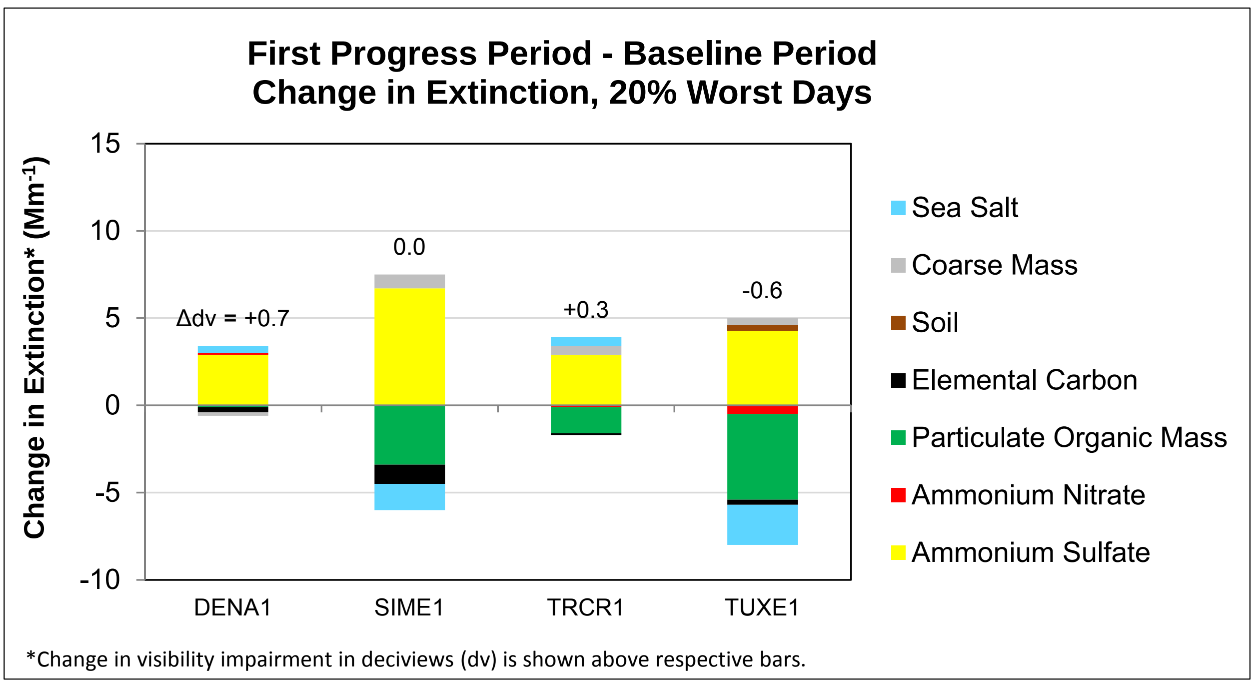

Figure 6.1-4. Difference between Average Extinction for Current Progress Period (2005-2009) and Baseline Period (2000-2004) for the Worst (Most Impaired) Days Measured at Alaska Class I Area IMPROVE Sites.

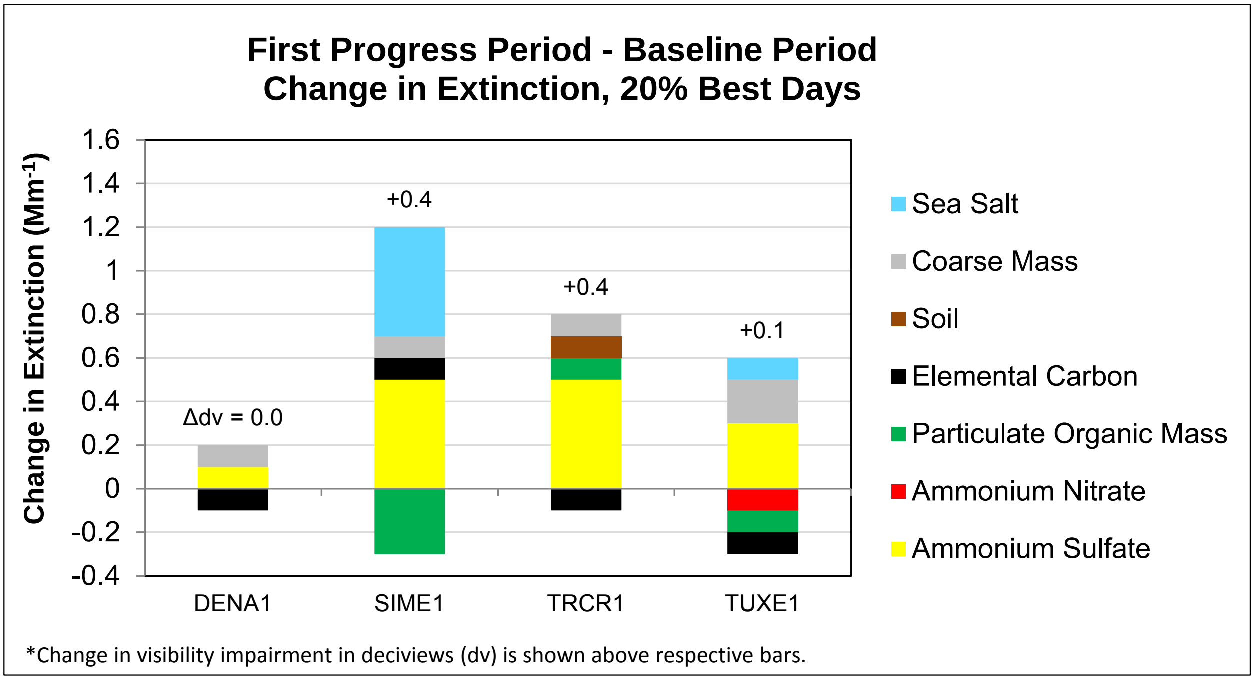

Figure 6.1-5. Average Extinction for Baseline and Progress Period Extinction for Best (Least Impaired) Days Measured at Alaska Class I Area IMPROVE Sites.

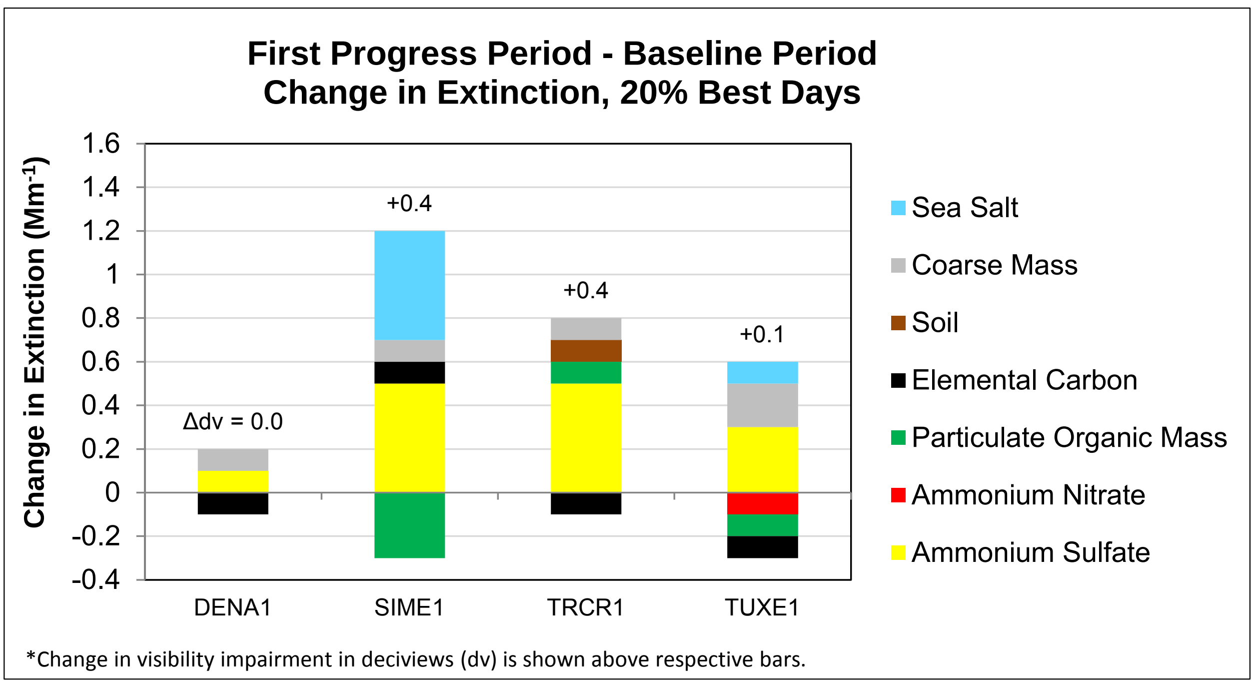

Figure 6.1-6. Difference between Average Extinction for Current Progress Period (2005-2009) and Baseline Period (2000-2004) for the Best (Least Impaired) Days Measured at Alaska Class I Area IMPROVE Sites.

6.1.1.3 Changes in Visibility Impairment

This section addresses the regulatory question, ***what is the change in visibility impairment for the most impaired and least impaired days over the past 5 years (40 CFR 51.308 (g)(3)(iii))?*** Included here are changes in visibility impairment as characterized by annual average trend statistics, and some general observations regarding local and regional events and outliers on a daily and annual basis that affected the current 5-year progress period. The regulatory requirement asks for a description of changes over the past 5-year period, but trend analysis is better suited to longer periods of time, so trends for the entire 10-year planning period are presented here.

Trend statistics for the years 2000-2009 for each species at each site in Alaska are summarized in Table 6.1-6, and regional trends were presented earlier in Section 4.1.1.[66] Only trends for aerosol species trends with p-value statistics less than 0.15 (85% confidence level) are presented in the table here, with increasing slopes in red and decreasing slopes in blue.[67] In some cases, trends may show decreasing tendencies while the difference between the 5-year averages do not (or vice versa), as discussed in Section 3.1.2.2. In these cases, the 5-year average for the best and worst days is the important metric for RHR regulatory purposes, but trend statistics may be of value to understand and address visibility impairment issues for planning purposes.

For each site, a more comprehensive list of all trends for all species, including the associated p-values, is provided in Appendix A. Additionally, this appendix includes plots depicting 5-year, annual, monthly, and daily average extinction for each site. These plots are intended to provide a fairly comprehensive compilation of reference information for individual states to investigate local and regional events and outliers that may have influenced changes in visibility impairment as tracked using the 5-year deciview metrics. Note that similar summary products are also available from the WRAP TSS website (http://vista.cira.colostate.edu/tss/). Some general observations regarding changes in visibility impairment at sites in Alaska are as follows:

- 5-year average ammonium sulfate increased at all Alaska sites, and all sites measured statistically significant increasing annual ammonium sulfate trends.
- For particulate organic mass and elemental carbon, the SIME1 and TUXE1 sites showed statistically significant decreasing annual trends.

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[66] Annual trends were calculated for the years 2000-2009, with a trend defined as the slope derived using Theil statistics. Trends derived from Theil statistics are useful in analyzing changes in air quality data because these statistics can show the overall tendency of measurements over long periods of time, while minimizing the effects of year-to-year fluctuations which are common in air quality data. Theil statistics are also used in EPA's National Air EPA's National Air Quality Trends Reports (http://www.epa.gov/airtrends/) and the IMPROVE program trend reports (http://vista.cira.colostate.edu/improve/Publications/improve_reports.htm)

[67] The significance of the trend is represented with p-values calculated using Mann-Kendall trend statistics. Determining a significance level helps to distinguish random variability in data from a real tendency to increase or decrease over time, where lower p-values indicate higher confidence levels in the computed slopes.

- As depicted in monthly and daily charts in Appendix A, large particulate organic events, likely due to wildfires, were measured at the TRCR1 site in August of 2005 and at the TRCR1 and DENA1 sites in July and August of 2009.

Table 6.1-6
Alaska Class I Area IMPROVE Sites
Change in Aerosol Extinction by Species
2000-2009 Annual Average Trends

Site	Group	Annual Trend* (Mm^{-1}/year)						
		Ammonium Sulfate	**Ammonium Nitrate**	**Particulate Organic Mass**	**Elemental Carbon**	**Soil**	**Coarse Mass**	**Sea Salt**
DENA1	20% Best	--	0.0	--	0.0	--	0.0	--
	20% Worst	**0.5**	0.0	--	--	--	--	**0.1**
	All Days	**0.1**	--	--	0.0	--	--	0.0
SIME1	20% Best	--	--	**-0.1**	--	0.0	--	**0.1**
	20% Worst	**1.7**	--	**-0.6**	**-0.2**	--	--	--
	All Days	**0.6**	0.0	**-0.2**	**-0.1**	--	--	--
TRCR1	20% Best	**0.1**	0.0	0.0	--	0.0	0.0	--
	20% Worst	**0.7**	--	--	--	--	--	--
	All Days	**0.2**	--	--	0.0	--	0.0	--
TUXE1	20% Best	**0.1**	0.0	0.0	0.0	--	--	--
	20% Worst	**1.0**	0.0	**-1.2**	**-0.1**	--	--	--
	All Days	**0.3**	0.0	**-0.3**	**-0.1**	--	--	--

*(--) Indicates statistically insignificant trend (<85% confidence level). Annual averages and complete trend statistics for all significance levels are included for each site in Appendix A.

6.1.2 Emissions Data

Included here are summaries depicting differences between two emission inventory years that are used to represent the 5-year baseline and current progress periods. The baseline period is represented using a 2002 inventory that originally represented baseline emissions for Alaska's initial RHR implementation plan. The progress period is represented using a 2008 inventory, which was assembled from various sources with assistance from Alaska's Air Quality Division, as referenced in Section 3.2.1. For reference, Table 6.1-7 lists the major emitted pollutants inventoried, the related aerosol species, some of the major sources for each pollutant, and some notes regarding implications of these pollutants. Differences between these baseline and progress period inventories are presented in this section.

Table 6.1-7
Alaska
Pollutants, Aerosol Species, and Major Sources

Emitted Pollutant	Related Aerosol	Major Sources	Notes
Sulfur Dioxide (SO_2)	Ammonium Sulfate	Point Sources; On- and Off-Road Mobile Sources	SO_2 emissions are generally associated with anthropogenic sources such as coal-burning power plants, other industrial sources such and refineries and cement plants, and both on- and off-road diesel engines.
Oxides of Nitrogen (NO_X)	Ammonium Nitrate	On- and Off-Road Mobile Sources; Point Sources; Area Sources	NO_X emissions are generally associated with anthropogenic sources. Common sources include virtually all combustion activities, especially those involving cars, trucks, power plants, and other industrial processes.
Ammonia (NH_3)	Ammonium Sulfate and Ammonium Nitrate	Area Sources; On-Road Mobile Sources	Gaseous NH_3 has implications in particle formation because it can form particulate ammonium. Ammonium is not directly measured by the IMPROVE program, but affects formation potential of ammonium sulfate and ammonium nitrate. All measured nitrate and sulfate is assumed to be associated with ammonium for IMPROVE reporting purposes.
Volatile Organic Compounds (VOCs)	Particulate Organic Mass (POM)	Biogenic Emissions; Vehicle Emissions; Area Sources	VOCs are gaseous emissions of carbon compounds, which are often converted to POM through chemical reactions in the atmosphere. Estimates for biogenic emissions of VOCs have undergone significant updates since 2002, so changes reported here are more reflective of methodology changes than actual changes in emissions (see Section 3.2.1).
Fine Soil	Soil	Windblown Dust; Fugitive Dust; Road Dust; Area Sources	Fine soil is reported here as the crustal or soil components of $PM_{2.5}$.
Coarse Mass (PMC)	Coarse Mass	Windblown Dust; Fugitive Dust	Coarse mass is reported by the IMPROVE Network as the difference between PM_{10} and $PM_{2.5}$ mass measurements. Coarse mass is not separated by species in the same way that $PM_{2.5}$ is speciated, but these measurements are generally associated with crustal components. Similar to crustal $PM_{2.5}$, natural windblown dust is often the largest contributor to PMC.

6.1.2.1 Changes in Emissions

This section addresses the regulatory question, ***what is the change over the past 5 years in emissions of pollutants contributing to visibility impairment from all sources and activities within the State (40 CFR 51.308 (g)(4))?*** For these summaries, emissions during the baseline and progress years are represented using 2002 and 2008 inventories, where the 2002 inventory was used in development of the original Alaska RHR SIP, and the 2008 inventory was assembled with assistance from the Alaska Department of Health, as referenced in Section 3.2.1. The differences between inventories are presented here for all major visibility impairing pollutants, and categorized by source for both anthropogenic and natural emissions.

Table 6.1-8 and Figure 6.1-7 present the differences between the 2002 and 2008 sulfur dioxide (SO_2) inventories by source category. Tables 6.1-9 and Figure 6.1-8 present data for oxides of nitrogen (NO_X), and subsequent tables and figures (Tables 6.1-10 through 6.1-13 and Figures 6.1-9 through 6.1-12) present data for ammonia (NH_3), volatile organic compounds (VOCs), fine soil, and coarse mass. Observations regarding emissions inventory comparisons are listed below.

- For all parameters, fire emission inventory estimates decreased. Note that these differences are not necessarily reflective of changes in monitored data, as the 5-year baseline period is represented by an average of 2003 fire emissions, and the 5-year progress period is represented by fires that occurred in 2008, as referenced in Section 3.2.1.
- Point source inventories showed decreases for all parameters, especially SO_2 and NO_X.
- Area source inventories showed increases in SO_2 and NO_X, but large decreases in VOCs, fine soil, and coarse mass. These changes may be due to a combination of population changes and differences in methodologies used to estimate these emissions. As references in Section 3.2.1, one methodology change was the reclassification of some off-road mobile sources (such as some types of marine vessels and locomotives) into the area source category (now termed non-point) in 2008, which may have contributed to increases in area source inventory totals, but decreases in off-road mobile totals.
- On-road mobile source inventory comparisons showed increases in SO_2, NO_X, fine soil, and coarse mass, but a decrease in VOCs.
- Off-road mobile source inventories showed decreases in NO_X, but increases in VOCs. As noted previously, one major methodology difference was the reclassification of some off-road mobile sources (such as some types of marine vessels and locomotives) into the area source category in 2008, which may have contributed to decreases in the off-road inventory totals, but increases in area source totals.
- Commercial marine sources showed large increases in NO_X inventories, and only small changes in other parameters.

Table 6.1-8
Alaska
Sulfur Dioxide Emissions by Category

Source Category	Sulfur Dioxide Emissions (tons/year)		
	2002 (State Inventory)	**2008 (WestJump2008)**	**Difference (Percent Change)**
Anthropogenic Sources			
Point	6,813	5,039	-1,774
Area	1,872	3,365	1,493
On-Road Mobile	324	490	166
Off-Road Mobile	49	395	346
Aviation	335	*	*
Commercial Marine	4,979	5,180	201
Total Anthropogenic	**14,037***	**14,469***	**432 (3%)***
Natural Sources			
Total Fire	34,304	4,482	-29,822
Total Natural	**34,304**	**4,482**	**-29,822 (-87%)**
All Sources			
Total Emissions	**48,341***	**18,951***	**-29,390 (-61%)***

*Sums and differences do not include aviation emissions, as 2008 inventory totals were not available from this source for comparison purposes.

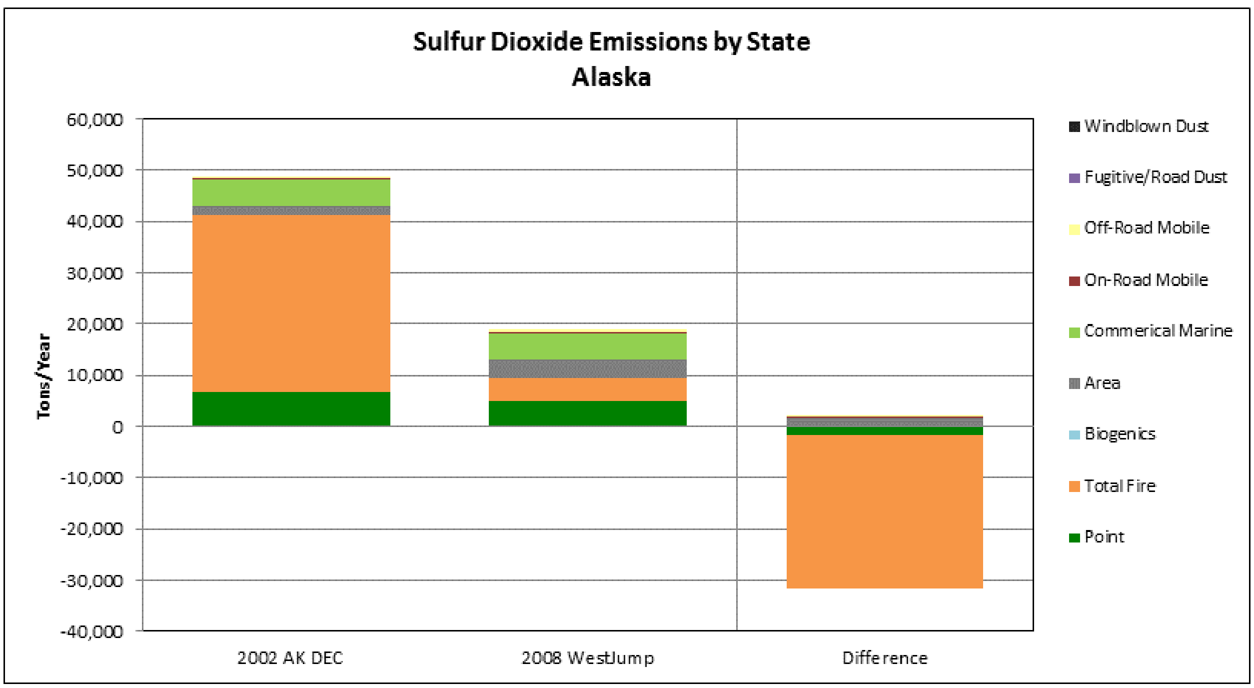

Figure 6.1-7. 2002 and 2008 Emissions, and Difference between Emissions Inventory Totals, for Sulfur Dioxide by Source Category for Alaska.

Table 6.1-9
Alaska
Oxides of Nitrogen Emissions by Category

Source Category	Oxides of Nitrogen Emissions (tons/year)		
	2002 (State Inventory)	2008 (WestJump2008)	Difference (Percent Change)
Anthropogenic Sources			
Point	74,471	68,564	-5,907
Area	14,742	19,404	4,662
On-Road Mobile	7,077	15,696	8,619
Off-Road Mobile	4,111	3,387	-724
Aviation	3,265	*	*
Commercial Marine	11,258	24,370	13,112
Total Anthropogenic	**111,659***	**131,421***	**19,762 (18%)***
Natural Sources			
Total Fire	125,110	16,344	-108,766
Total Natural	**125,110**	**16,344**	**-108,766 (-87%)**
All Sources			
Total Emissions	**236,769***	**147,765***	**-89,004 (-38%)***

*Sums and differences do not include aviation emissions, as 2008 inventory totals were not available from this source for comparison purposes.

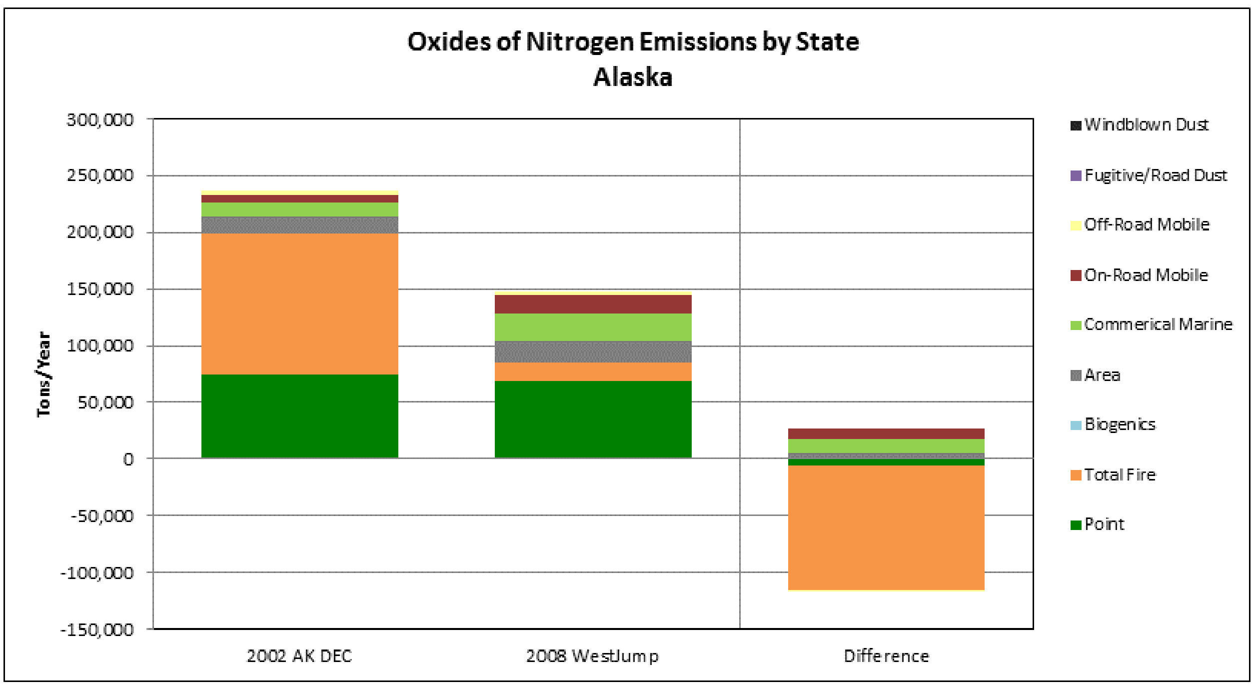

Figure 6.1-8. 2002 and 2008 Emissions, and Difference between Emissions Inventory Totals, for Oxides of Nitrogen by Source Category for Alaska.

Table 6.1-10
Alaska
Ammonia Emissions by Category

Source Category	Ammonia Emissions (tons/year)		
	2002 (State Inventory)	2008 (WestJump2008)	Difference (Percent Change)
Anthropogenic Sources			
Point	580	178	-402
Area	0	356	356
On-Road Mobile	307	230	-77
Off-Road Mobile	8	7	-1
Aviation	6	*	*
Commercial Marine	5	11	6
Total Anthropogenic	**900***	**782***	**-118 (-13%)***
Natural Sources			
Total Fire	26,233	3,417	-22,816
Total Natural	**26,233**	**3,417**	**-22,816 (-87%)**
All Sources			
Total Emissions	**27,133***	**4,199***	**-22,934 (-85%)***

*Sums and differences do not include aviation emissions, as 2008 inventory totals were not available from this source for comparison purposes.

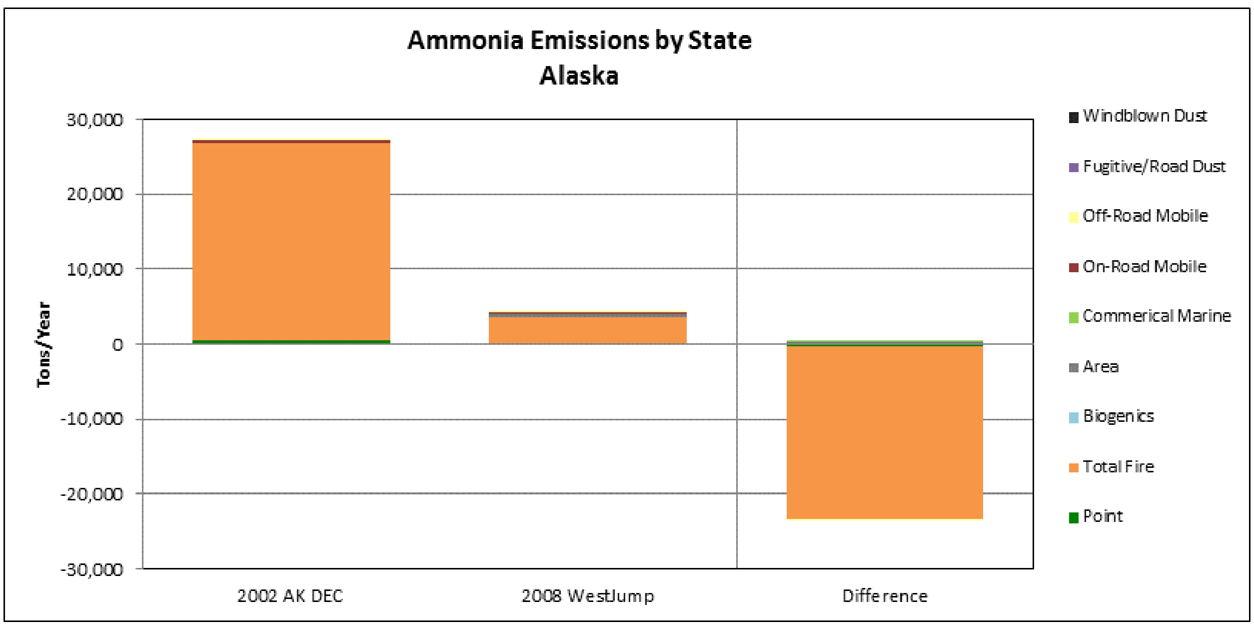

Figure 6.1-9. 2002 and 2008 Emissions, and Difference between Emissions Inventory Totals, for Ammonia by Source Category for Alaska.

Table 6.1-11
Alaska
Volatile Organic Compound Emissions by Category

Source Category	Volatile Organic Compounds Emissions (tons/year)		
	2002 (State Inventory)	**2008 (WestJump2008)**	**Difference (Percent Change)**
Anthropogenic Sources			
Point	5,697	4,582	-1,115
Area	128,271	10,890	-117,381
On-Road Mobile	7,173	6,740	-433
Off-Road Mobile	7,585	19,094	11,509
Aviation	1,566	*	*
Commercial Marine	356	609	253
Total Anthropogenic	**149,082***	**41,915***	**-107,167 (-72%)***
Natural Sources			
Total Fire	274,436	35,761	-238,675
Total Natural	**274,436**	**35,761**	**-238,675 (-87%)**
All Sources			
Total Emissions	**423,518***	**77,676***	**-345,842 (-82%)***

*Sums and differences do not include aviation emissions, as 2008 inventory totals were not available from this source for comparison purposes.

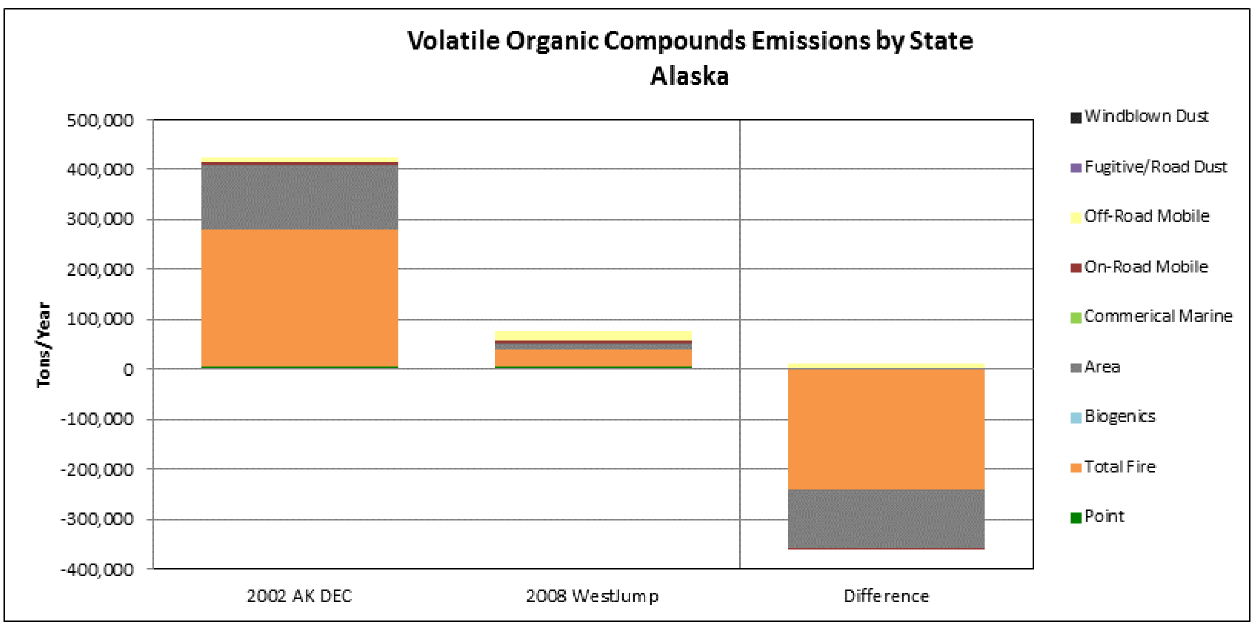

Figure 6.1-10. 2002 and 2008 Emissions, and Difference between Emissions Inventory Totals, for Volatile Organic Compounds by Source Category for Alaska.

Table 6.1-12
Alaska
Fine Soil Emissions by Category

Source Category	Fine Soil Emissions (tons/year)		
	2002 (State Inventory)	**2008 (WestJump2008)**	**Difference (Percent Change)**
Anthropogenic Sources			
Point	1,237	563	-674
Area	30,636	2,289	-28,347
On-Road Mobile	158	1,194	1,036
Off-Road Mobile	392	670	278
Aviation	667	*	*
Commercial Marine	643	1,114	471
Total Anthropogenic	**33,066***	**5,830***	**-27,236 (-82%)***
Natural Sources			
Total Fire	478,057	63,330	-414,727
Total Natural	**478,057**	**63,330**	**-414,727 (-87%)**
All Sources			
Total Emissions	**511,123***	**69,160***	**--441,963 (-86%)***

*Sums and differences do not include aviation emissions, as 2008 inventory totals were not available from this source for comparison purposes.

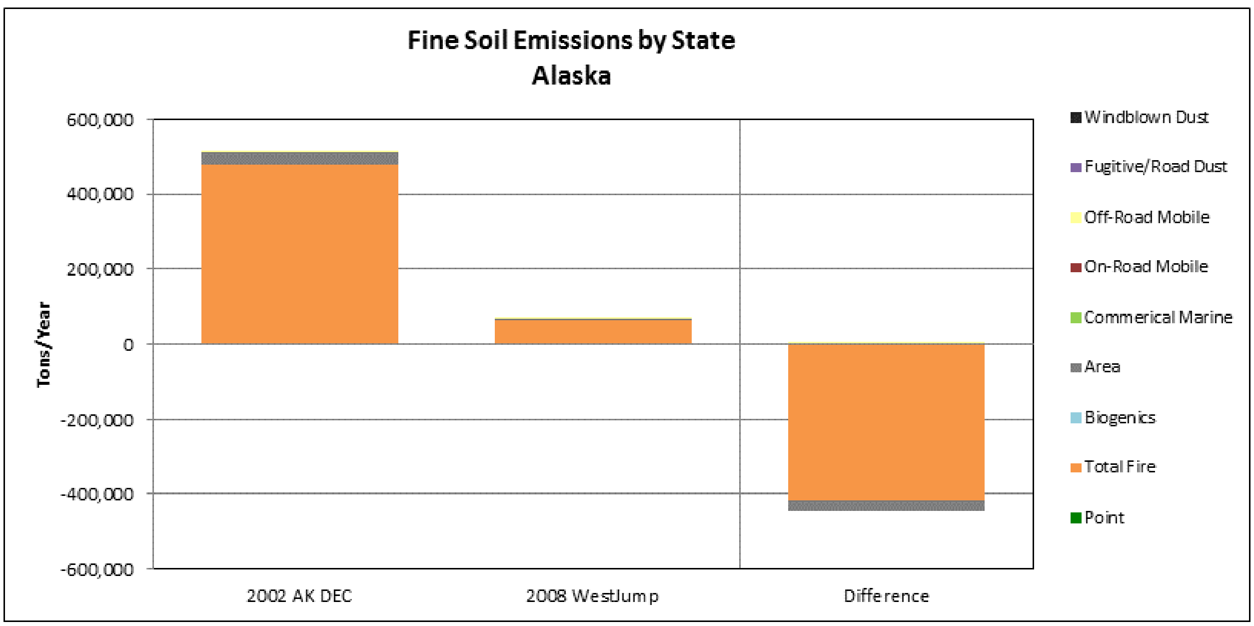

Figure 6.1-11. 2002 and 2008 Emissions, and Difference between Emissions Inventory Totals, for Fine Soil by Source Category for Alaska.

Table 6.1-13
Alaska
Coarse Mass Emissions by Category

Source Category	Coarse Mass Emissions (tons/year)		
	2002 (State Inventory)	**2008 (WestJump2008)**	**Difference (Percent Change)**
Anthropogenic Sources			
Point	4,696	2,392	-2,304
Area	76,349	121	-76,228
On-Road Mobile	46	164	118
Off-Road Mobile	24	46	22
Aviation	20	*	*
Commercial Marine	32	64	32
Total Anthropogenic	**81,147***	**2,787***	**-78,360 (-97%)***
Natural Sources			
Total Fire	79,346	10,495	-68,851
Total Natural	**79,346**	**10,495**	**-68,851 (-87%)**
All Sources			
Total Emissions	**160,493***	**13,282***	**-147,211 (-92%)***

*Sums and differences do not include aviation emissions, as 2008 inventory totals were not available from this source for comparison purposes.

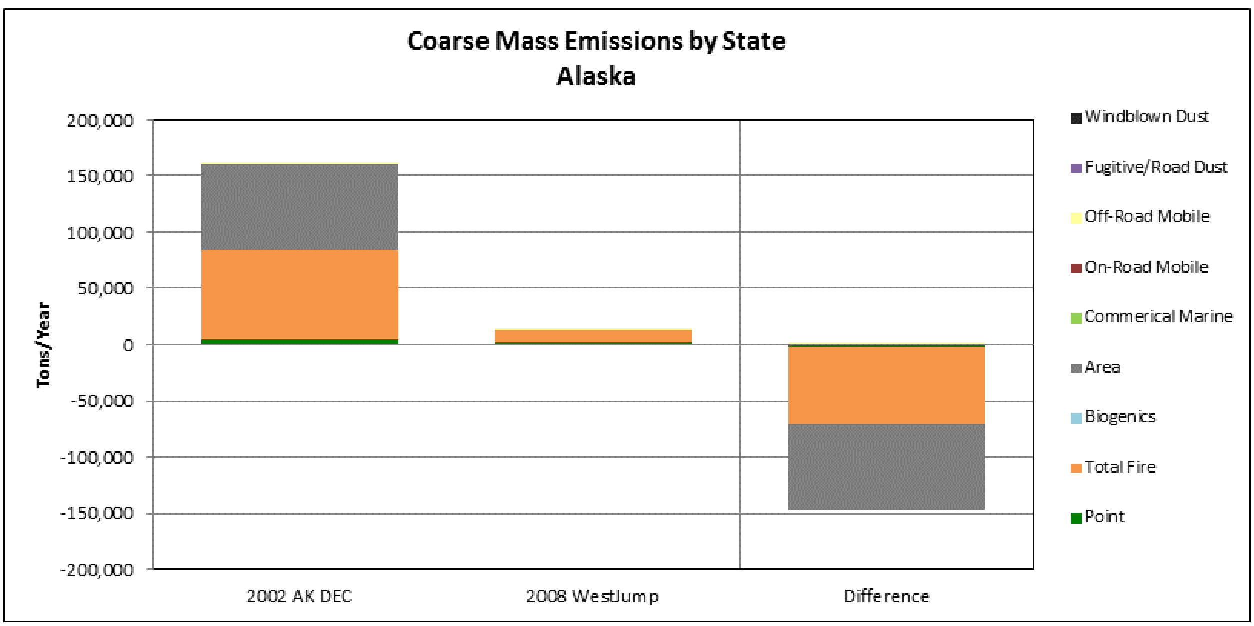

Figure 6.1-12. 2002 and 2008 Emissions, and Difference between Emissions Inventory Totals, for Coarse Mass by Source Category for Alaska.