

Emission and Air Quality Trends Review

New Mexico

May 2013

Project Objective

- ❑ To develop and present publicly available information on trends in emissions and ambient air quality in the U.S. since 1999 in easy to understand visual and tabular formats

Emission Trends

- Study Team collected and processed U.S. EPA emission inventories for years within the study period of interest (1999-2011)

- By pollutant and source category
 - electric generation fuel combustion
 - mobile sources
 - industrial fuel combustion & industrial processes
 - all other

Emissions Data Summary

- Data Obtained from EPA National Emission Inventory (NEI) and Trends Websites
 - EPA's Trends reports and emission comparisons include interpolations of all categories between key years (1999, 2002, 2005, 2008, 2011) at county-pollutant level
 - Represented Pollutants: VOC, NO_x, SO₂, and PM_{2.5}
- Project Improvement
 - The Study Team augmented above data with year specific CEM emissions (2002 through 2011)

Emission Changes

- ❑ The following slides also include the tonnage-based emissions change from 1999 to 2011 for each pollutant
- ❑ Negative values indicate decrease in emissions, positive values indicate an increase

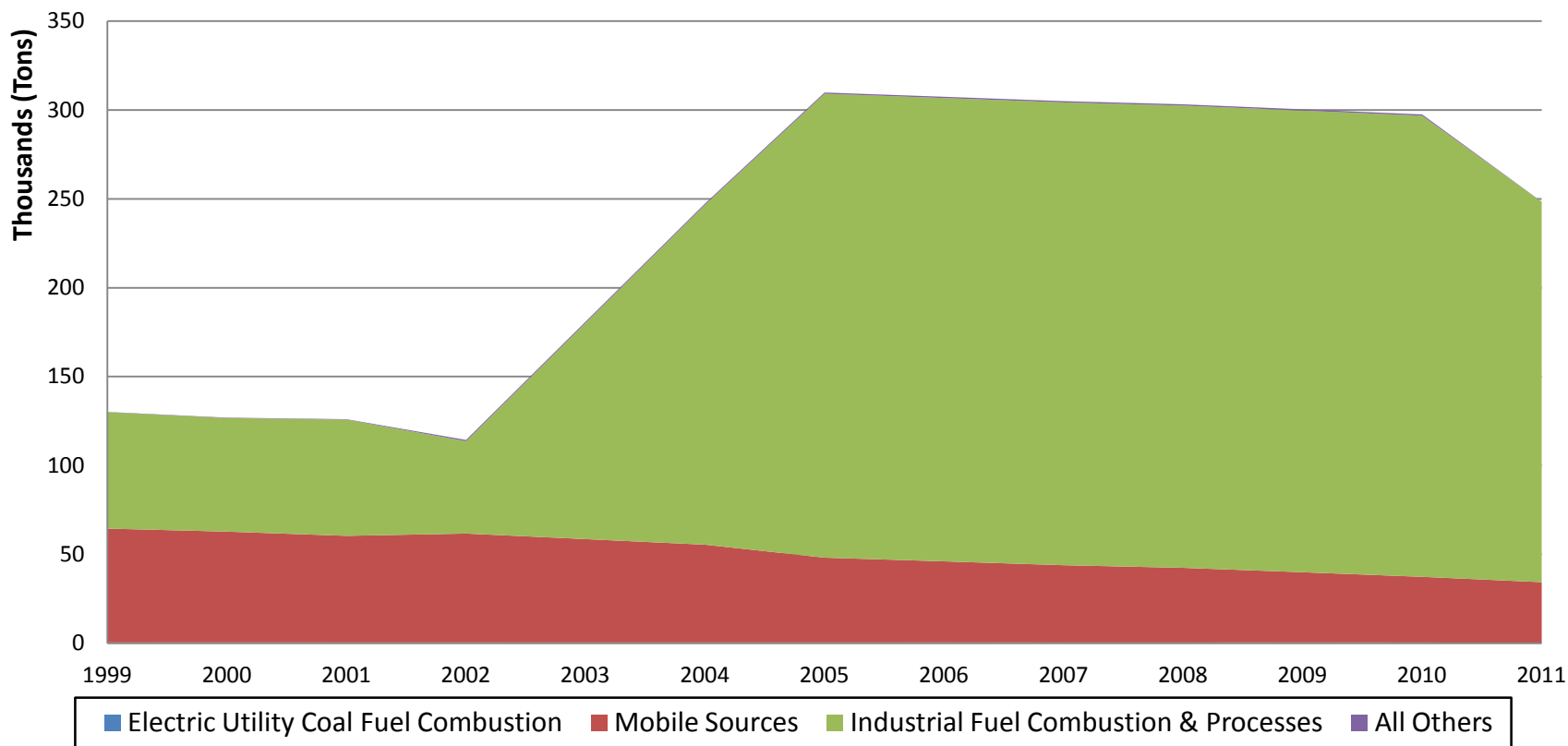
New Mexico Emission Trends (VOC)

Source Category	Annual Emissions (Tons)									
	1999	2001	2003	2005	2006	2007	2008	2009	2010	2011
Electric Utility Coal Fuel Combustion	480	484	479	479	491	439	438	483	441	192
Mobile Sources	64,030	59,939	58,112	47,681	45,577	43,472	41,991	39,459	36,928	34,170
Industrial Fuel Combustion & Processes	65,436	65,380	121,579	260,947	260,633	260,319	260,005	259,691	259,377	213,917
All Others	181	247	726	715	717	730	740	730	743	115
Total	130,128	126,051	180,896	309,821	307,417	304,959	303,173	300,363	297,488	248,394

Source Category	Annual Emissions Change (Percent since 1999)									
	1999	2001	2003	2005	2006	2007	2008	2009	2010	2011
Electric Utility Coal Fuel Combustion	0%	1%	0%	0%	2%	-9%	-9%	1%	-8%	-60%
Mobile Sources	0%	-6%	-9%	-26%	-29%	-32%	-34%	-38%	-42%	-47%
Industrial Fuel Combustion & Processes	0%	0%	86%	299%	298%	298%	297%	297%	296%	227%
All Others	0%	36%	300%	294%	295%	302%	308%	302%	310%	-37%
Total	0%	-3%	39%	138%	136%	134%	133%	131%	129%	91%

New Mexico Emission Trends (VOC)

**Major Source Category Summary
Annual VOC Emissions**



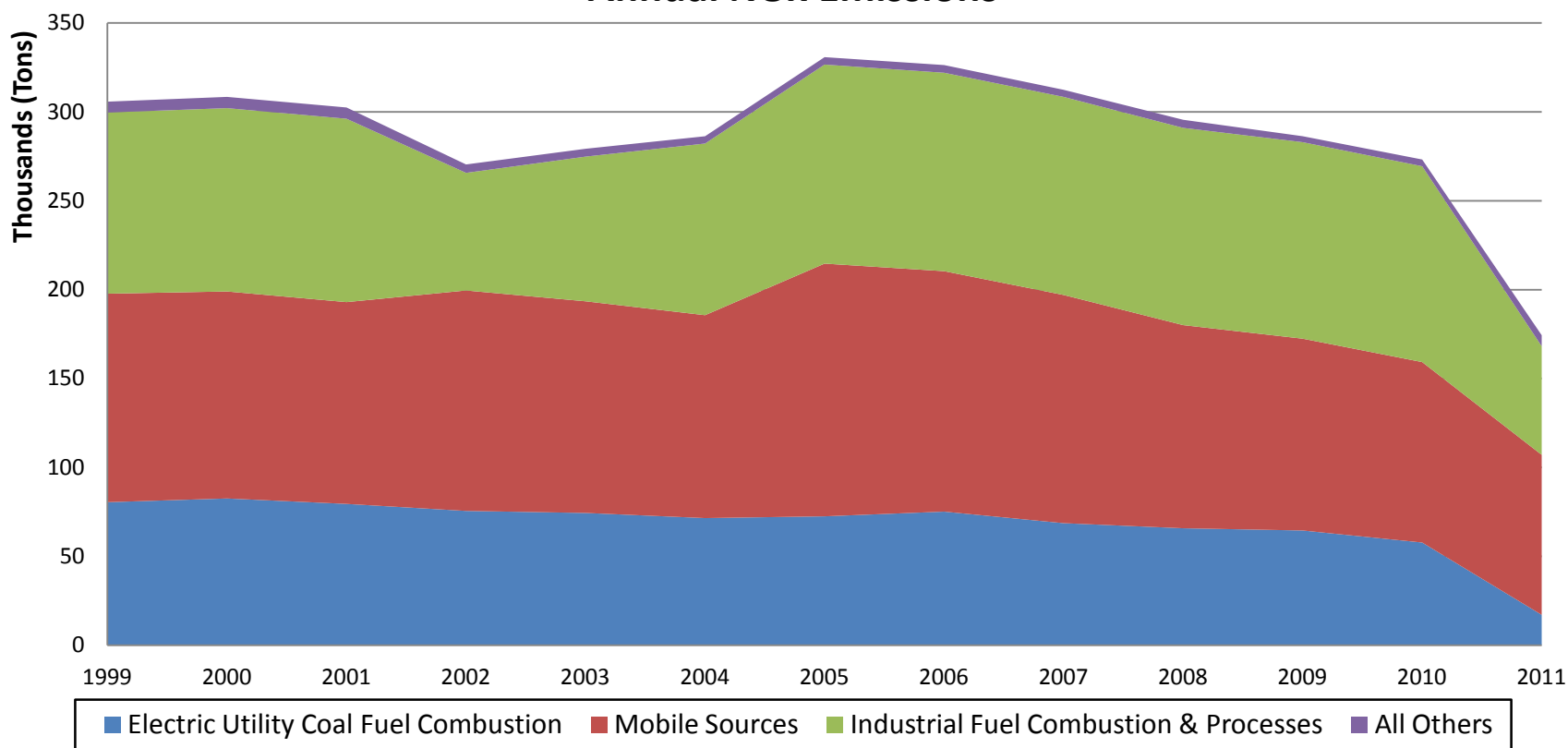
New Mexico Emission Trends (NO_x)

Source Category	Annual Emissions (Tons)									
	1999	2001	2003	2005	2006	2007	2008	2009	2010	2011
Electric Utility Coal Fuel Combustion	80,454	79,484	74,399	72,504	75,149	68,661	65,786	64,543	57,767	17,101
Mobile Sources	117,275	113,503	119,046	142,139	135,238	128,336	114,264	107,879	101,493	89,976
Industrial Fuel Combustion & Processes	101,893	103,129	81,357	111,929	111,590	111,400	110,928	110,504	110,138	61,086
All Others	6,101	6,325	4,415	4,179	4,321	3,984	4,550	3,353	3,790	6,190
Total	305,723	302,441	279,217	330,750	326,297	312,382	295,528	286,278	273,188	174,352

Source Category	Annual Emissions Change (Percent since 1999)									
	1999	2001	2003	2005	2006	2007	2008	2009	2010	2011
Electric Utility Coal Fuel Combustion	0%	-1%	-8%	-10%	-7%	-15%	-18%	-20%	-28%	-79%
Mobile Sources	0%	-3%	2%	21%	15%	9%	-3%	-8%	-13%	-23%
Industrial Fuel Combustion & Processes	0%	1%	-20%	10%	10%	9%	9%	8%	8%	-40%
All Others	0%	4%	-28%	-32%	-29%	-35%	-25%	-45%	-38%	1%
Total	0%	-1%	-9%	8%	7%	2%	-3%	-6%	-11%	-43%

New Mexico Emission Trends (NO_x)

**Major Source Category Summary
Annual NO_x Emissions**



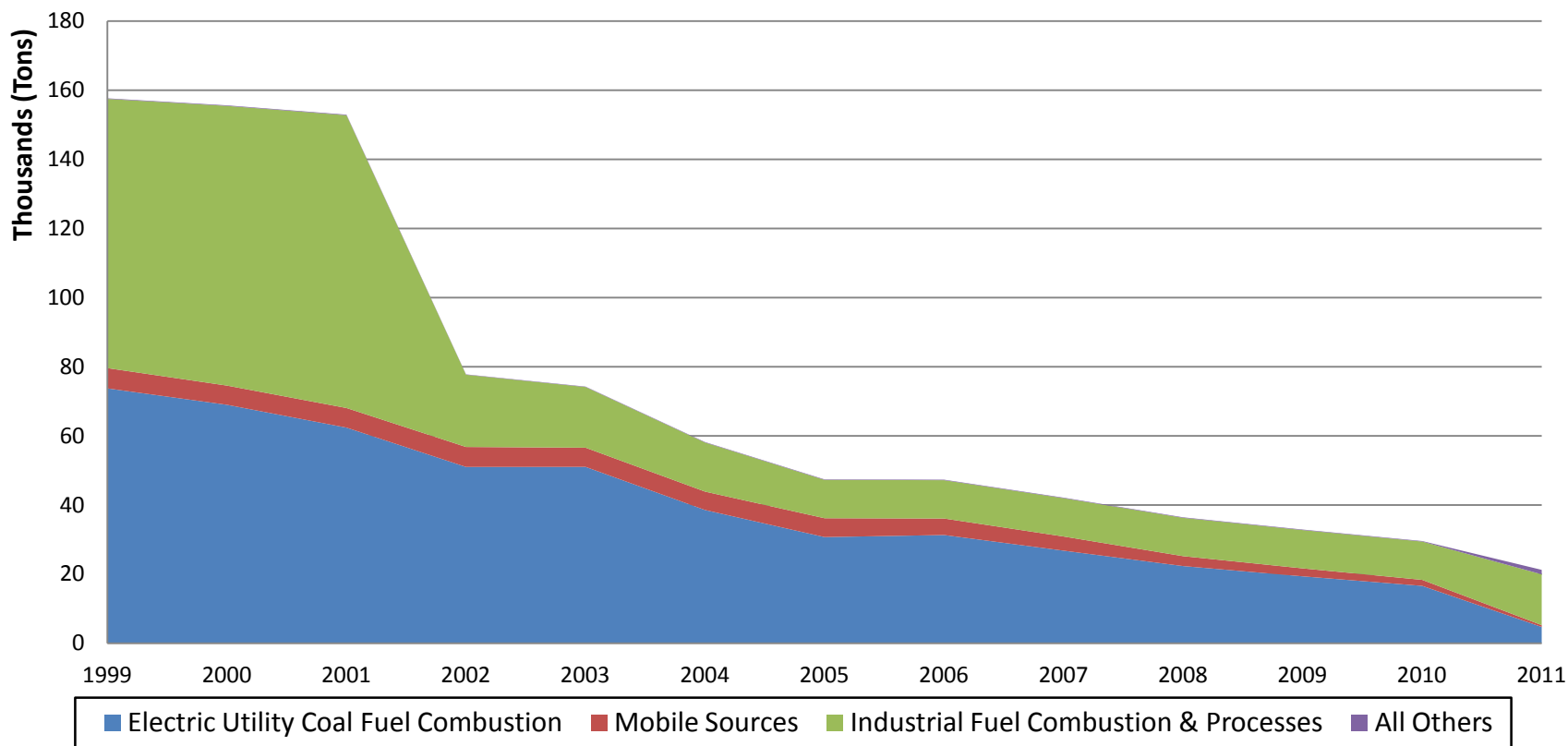
New Mexico Emission Trends (SO₂)

Source Category	Annual Emissions (Tons)									
	1999	2001	2003	2005	2006	2007	2008	2009	2010	2011
Electric Utility Coal Fuel Combustion	73,730	62,384	51,031	30,716	31,314	26,791	22,334	19,361	16,604	4,720
Mobile Sources	5,867	5,675	5,551	5,459	4,778	4,097	2,868	2,304	1,741	529
Industrial Fuel Combustion & Processes	77,891	84,701	17,553	11,085	11,084	11,085	11,084	11,083	11,082	14,696
All Others	161	167	118	144	146	152	153	148	149	1,289
Total	157,650	152,927	74,253	47,404	47,322	42,125	36,438	32,896	29,576	21,235

Source Category	Annual Emissions Change (Percent since 1999)									
	1999	2001	2003	2005	2006	2007	2008	2009	2010	2011
Electric Utility Coal Fuel Combustion	0%	-15%	-31%	-58%	-58%	-64%	-70%	-74%	-77%	-94%
Mobile Sources	0%	-3%	-5%	-7%	-19%	-30%	-51%	-61%	-70%	-91%
Industrial Fuel Combustion & Processes	0%	9%	-77%	-86%	-86%	-86%	-86%	-86%	-86%	-81%
All Others	0%	4%	-27%	-10%	-9%	-5%	-5%	-8%	-7%	702%
Total	0%	-3%	-53%	-70%	-70%	-73%	-77%	-79%	-81%	-87%

New Mexico Emission Trends (SO₂)

**Major Source Category Summary
Annual SO₂ Emissions**



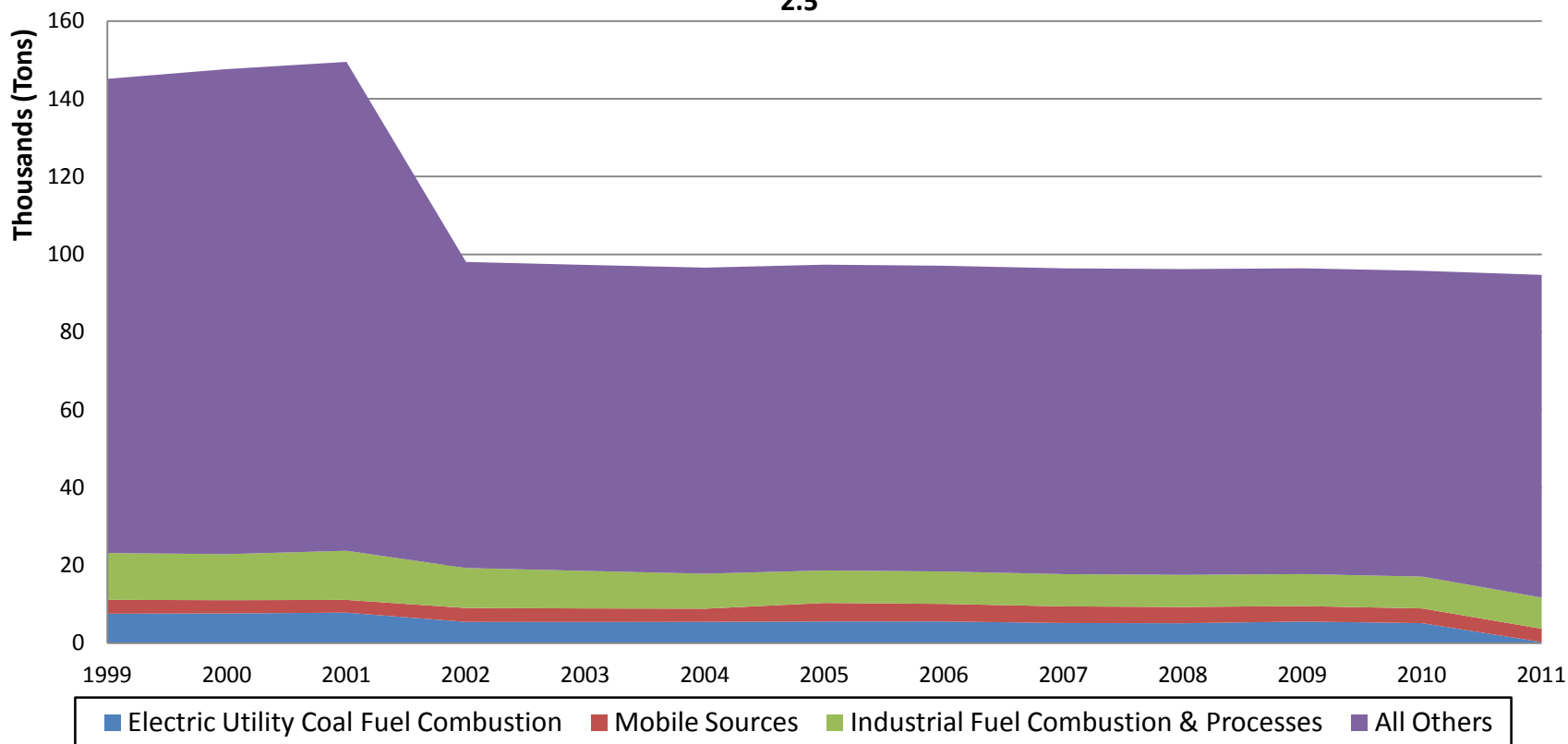
New Mexico Emission Trends (PM_{2.5})

Source Category	Annual Emissions (Tons)									
	1999	2001	2003	2005	2006	2007	2008	2009	2010	2011
Electric Utility Coal Fuel Combustion	7,571	7,839	5,439	5,574	5,570	5,172	5,117	5,554	5,145	289
Mobile Sources	3,563	3,281	3,485	4,761	4,520	4,279	4,181	3,980	3,779	3,406
Industrial Fuel Combustion & Processes	12,039	12,635	9,653	8,368	8,334	8,300	8,265	8,231	8,197	8,023
All Others	121,968	125,747	78,709	78,641	78,641	78,648	78,649	78,645	78,646	82,998
Total	145,141	149,503	97,286	97,344	97,065	96,398	96,212	96,410	95,767	94,716

Source Category	Annual Emissions Change (Percent since 1999)									
	1999	2001	2003	2005	2006	2007	2008	2009	2010	2011
Electric Utility Coal Fuel Combustion	0%	4%	-28%	-26%	-26%	-32%	-32%	-27%	-32%	-96%
Mobile Sources	0%	-8%	-2%	34%	27%	20%	17%	12%	6%	-4%
Industrial Fuel Combustion & Processes	0%	5%	-20%	-30%	-31%	-31%	-31%	-32%	-32%	-33%
All Others	0%	3%	-35%	-36%	-36%	-36%	-36%	-36%	-36%	-32%
Total	0%	3%	-33%	-33%	-33%	-34%	-34%	-34%	-34%	-35%

New Mexico Emission Trends (PM_{2.5})

**Major Source Category Summary
Annual PM_{2.5} Emissions**



Emission Trends Summary

- All pollutants with the exception of VOC have decreased since 1999 in aggregate across the Western States domain
 - VOC increases largely due to Industrial Process activity
- NO_x and SO₂ from Electric Utility Fuel Combustion sources show decrease over time as a result of participation in the Acid Rain Program
- Onroad emission step increase seen between 2004 and 2005 is the result of EPA's method change and MOVES model integration for estimating onroad mobile source emissions

Air Quality Design Values

□ Ozone

- Annual 4th highest daily maximum 8-hour average averaged over three consecutive years
- Current standard = 0.075 ppm

□ PM_{2.5} Annual

- Annual arithmetic mean of quarterly means averaged over three consecutive years
- Current standard = 12 ug/m³

□ PM_{2.5} 24-Hour

- Annual 98th percentile of daily averages averaged over three consecutive years
- Current standard = 35 ug/m³

State-Wide Design Value (DV) Trends

- Trends in state-wide maximum DV and average DV
 - Max DV: Maximum DVs over all valid trend monitoring sites in the state in each overlapping three year period
 - Average DV: Average of DVs over all valid trend monitoring sites in the state in each overlapping three year period
- Compute linear trend via least-squares regression

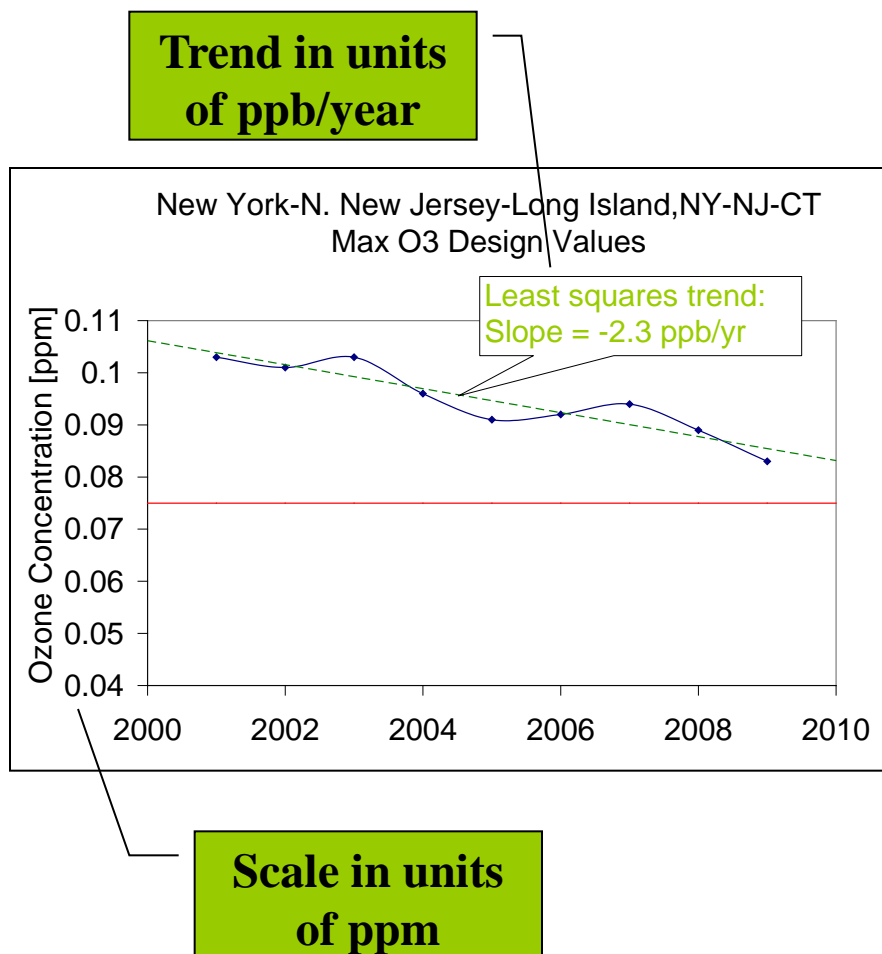
Data Handling Procedures

- O₃ design value (DV) for each overlapping three-year period starting with 1999-2001 and ending with 2009-2011
 - DV calculated using annual 4th highest daily max 8-hr averages and percent of valid observations, based on EPA data handling conventions
 - Data associated with exceptional events that have received EPA concurrence are omitted
 - Selection of trend sites require valid DV in 9 out of 11 three-year periods between 1999 and 2011
 - Identification of nonattainment areas is with respect to the 2008 8-hour standard only

Data Handling Procedures

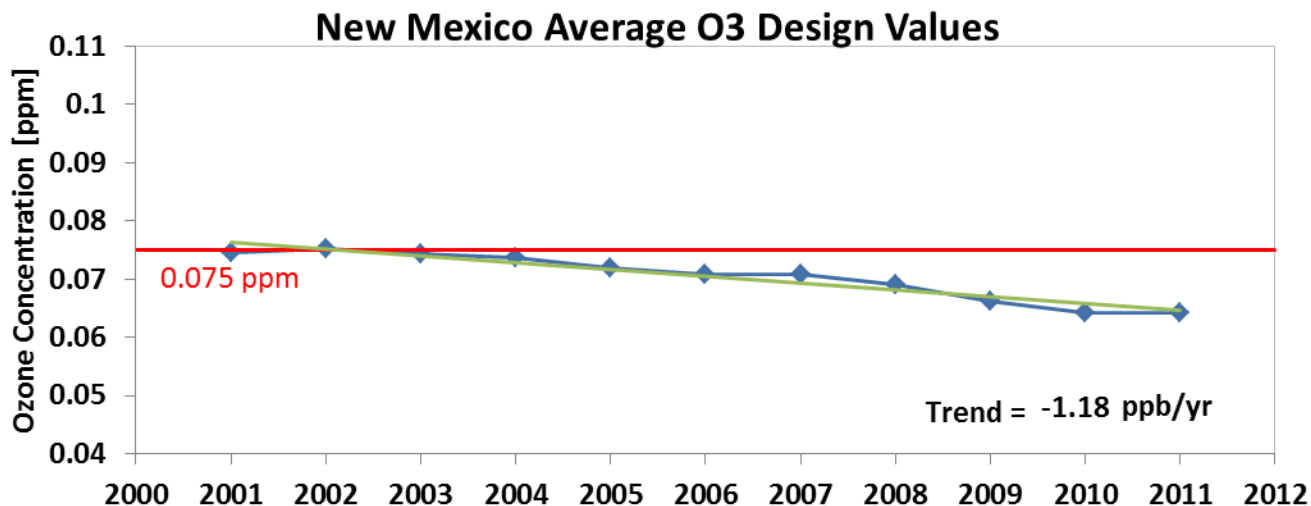
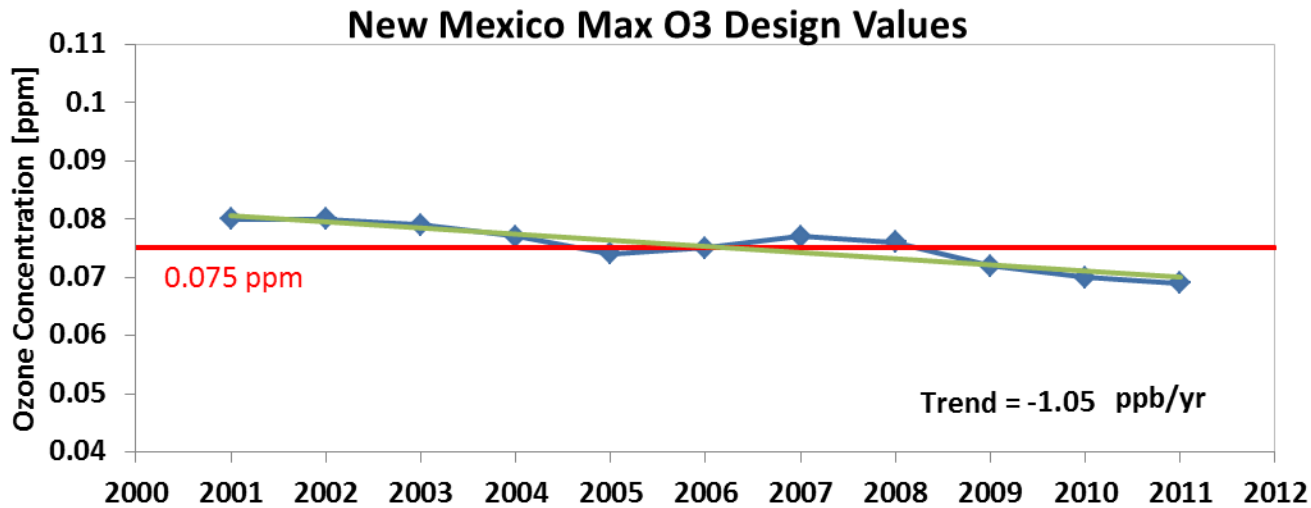
- Annual $PM_{2.5}$ DV and 24-hr $PM_{2.5}$ DV for each overlapping three-year period starting with 1999-2001 and ending with 2009-2011
 - DV calculations based on EPA data handling conventions
 - Data extracted from monitors that have a non-regulatory monitoring type are omitted
 - Selection of trend sites require valid DV in 9 out of 11 three-year periods between 1999 and 2011

Trend Calculation



- Trends based on linear least squares fit to rolling three year design values (DVs)
- Negative trend indicates improving air quality
- DVs based on each 3-year period: 1999-2001, 2000-2002, ... 2009-2011
- Notes
 - On plots, DVs are for three year period ending in year shown (i.e., 2009-2011 DV plotted as 2011 value)
 - Ozone trend values expressed as ppb/year (1,000 ppb = 1 ppm); DVs are plotted as ppm

Max/Ave O₃ DVs and Trend



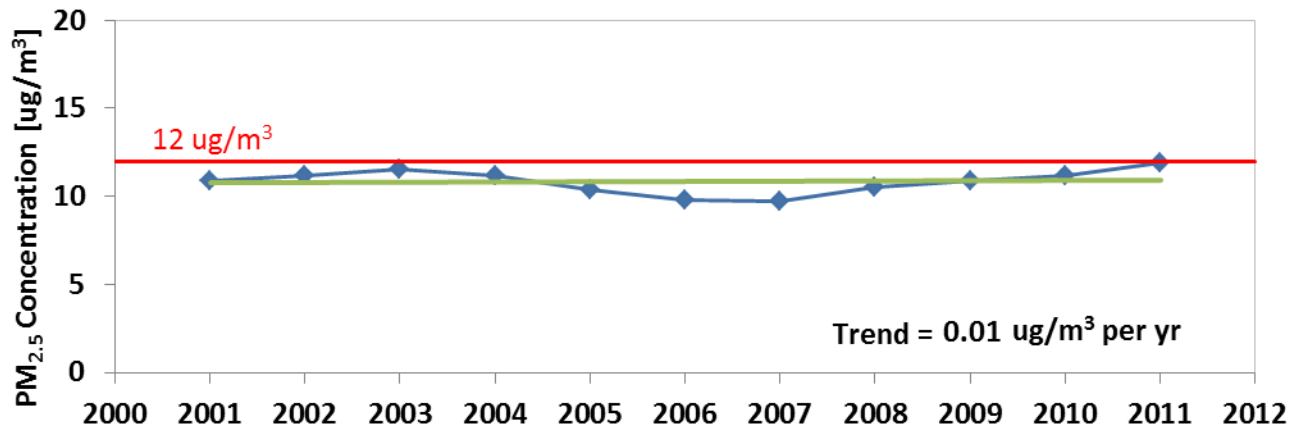
Ozone Trends by Site in New Mexico

Monitoring Sites	County	2009-2011 DV [ppm]	Trend [ppm/yr]
3501300084420102	Dona Ana, NM	0.062	-1.11
3501300174420101	Dona Ana, NM	0.065	-1.48
3501300204420101	Dona Ana, NM	0.067	-0.44
3501300214420101	Dona Ana, NM	0.069	-1.03
3501300224420101	Dona Ana, NM	0.066	-1.16
3504310014420101	Sandoval, NM	0.061	-1.39
3504500094420101	San Juan, NM	0.061	-1.87
3504510054420101	San Juan, NM	0.063	-1.15

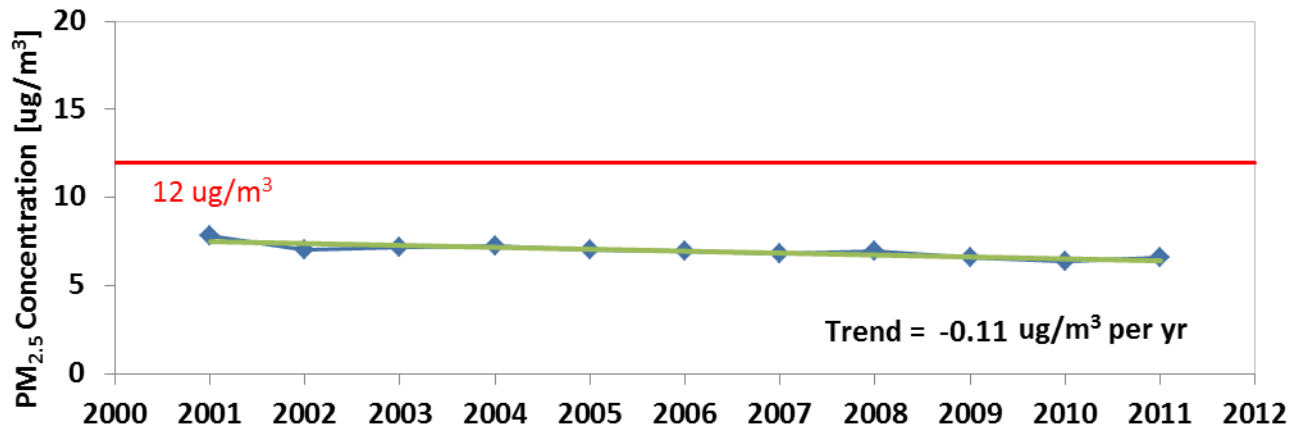
Note: Only monitoring sites meeting data completeness criteria listed

Max/Ave PM_{2.5} Annual DVs and Trend

New Mexico Max PM2.5 Annual Design Values

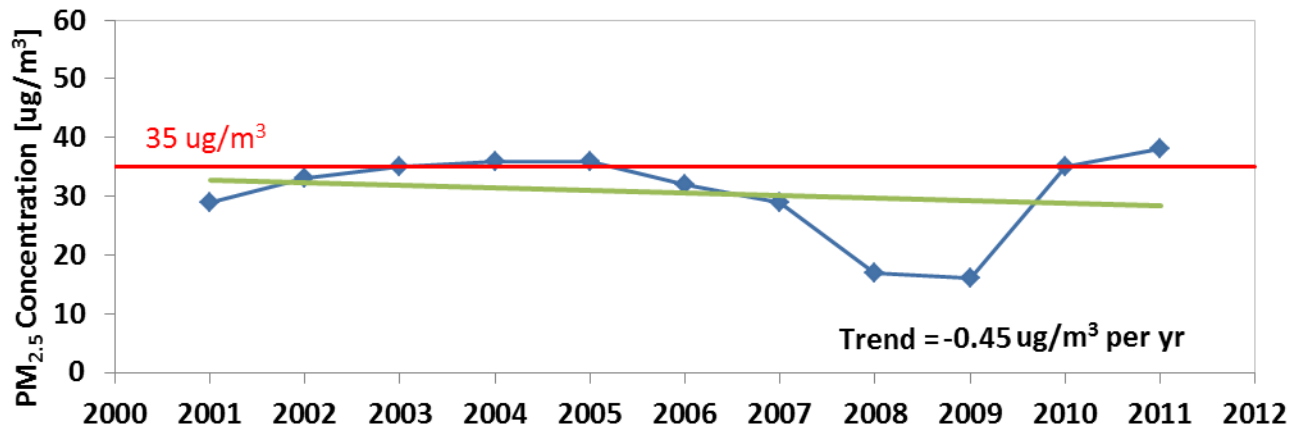


New Mexico Average PM2.5 Annual Design Values

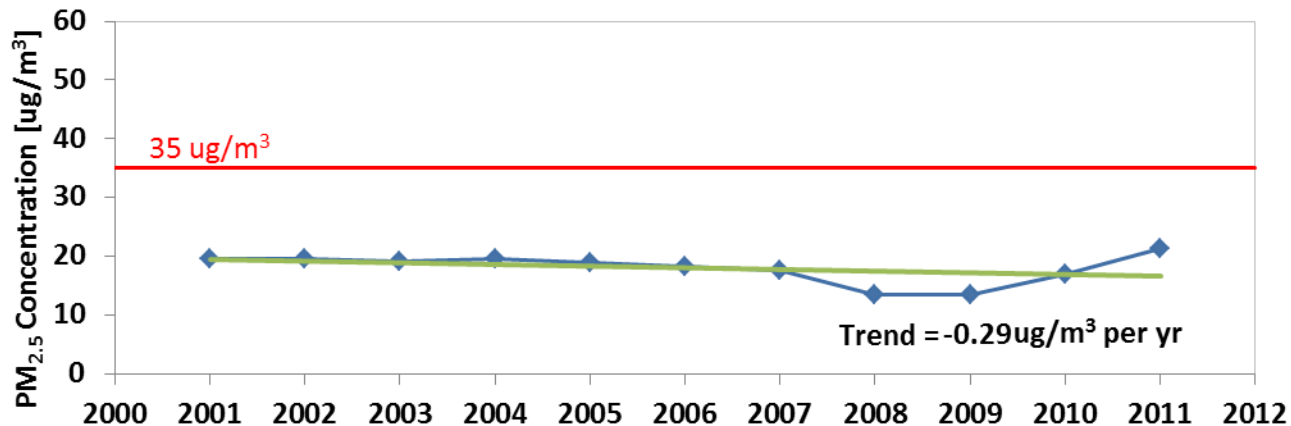


Max/Ave PM_{2.5} 24-Hour DVs and Trend

New Mexico Max PM_{2.5} 24-Hour Design Values



New Mexico Average PM_{2.5} 24-Hour Design Values



PM_{2.5} Trends by Site in New Mexico

Monitoring Site	County	2009-2011 DV [ug/m ³]		Trend [ug/m ³ per year]	
		Annual	24-Hr	Annual DV	24-Hr DV
350010023	Bernalillo	5.9	23	-0.09	-0.06
350010024	Bernalillo	5.7	24	-0.07	0.42
350130017	Doña Ana	11.9	38	0.01	0.40
350130025	Doña Ana	5.3	12	-0.16	-0.35
350490020	Santa Fe	4.2	9	-0.08	-0.29

Note: Only monitoring sites meeting data completeness criteria listed

Air Quality Trends Summary

- Average O₃ design values have decreased since 1999 in New Mexico; average annual and 24-hr PM_{2.5} design values have remained steady since 1999.
- There are no currently designated O₃ or PM_{2.5} non-attainment areas in New Mexico.