Emission and Air Quality Trends Review 1999-2011

New Mexico

July 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 utility coal 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, NOx, SO_2, 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

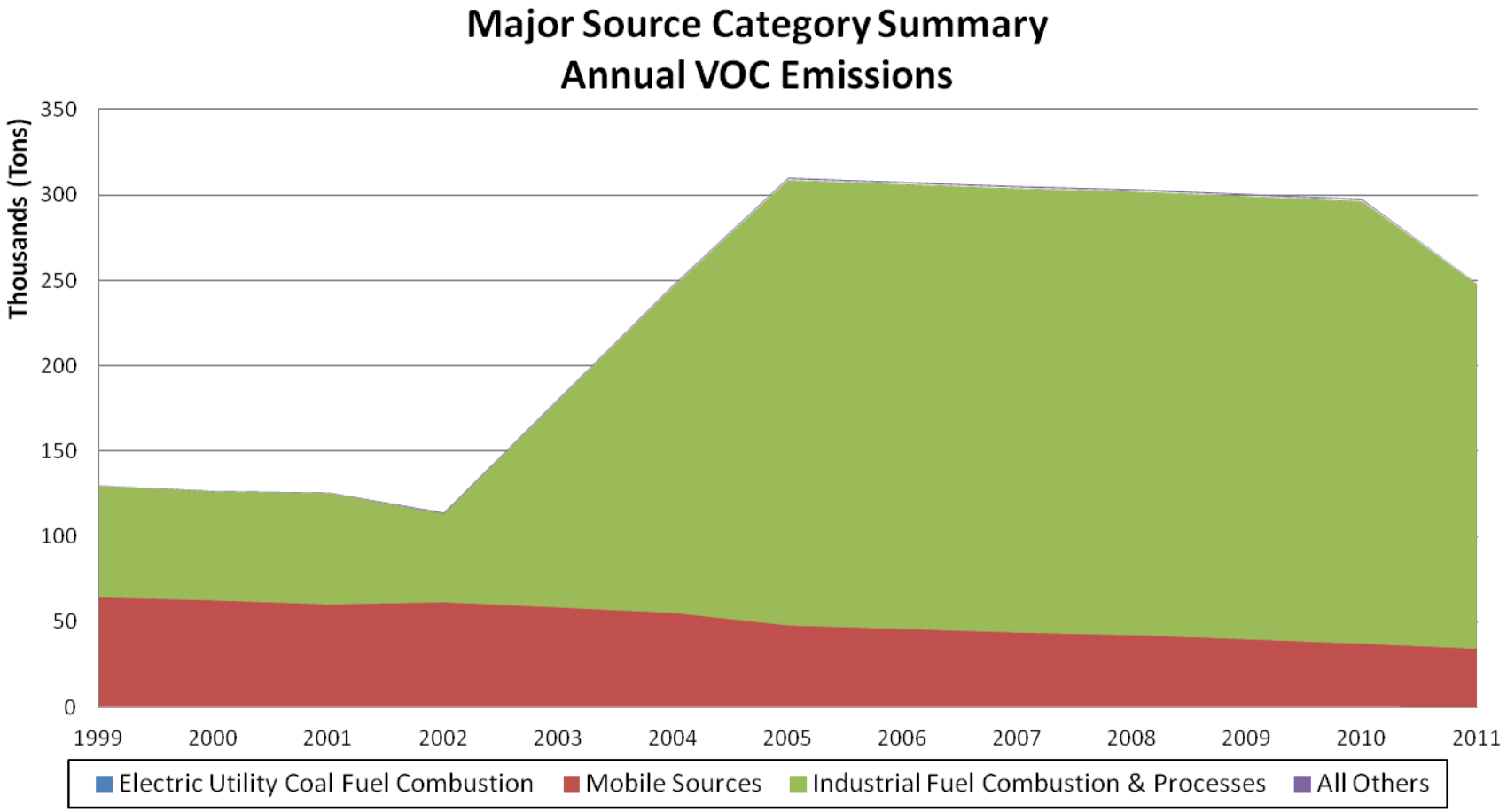
- Negative values indicate decrease in emissions, positive values indicate an increase

New Mexico Emission Trends (VOC)

	Annual Emissions (Tons)									
Source Category	**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**

	Annual Emissions Change (Percent since 1999)									
Source Category	**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)

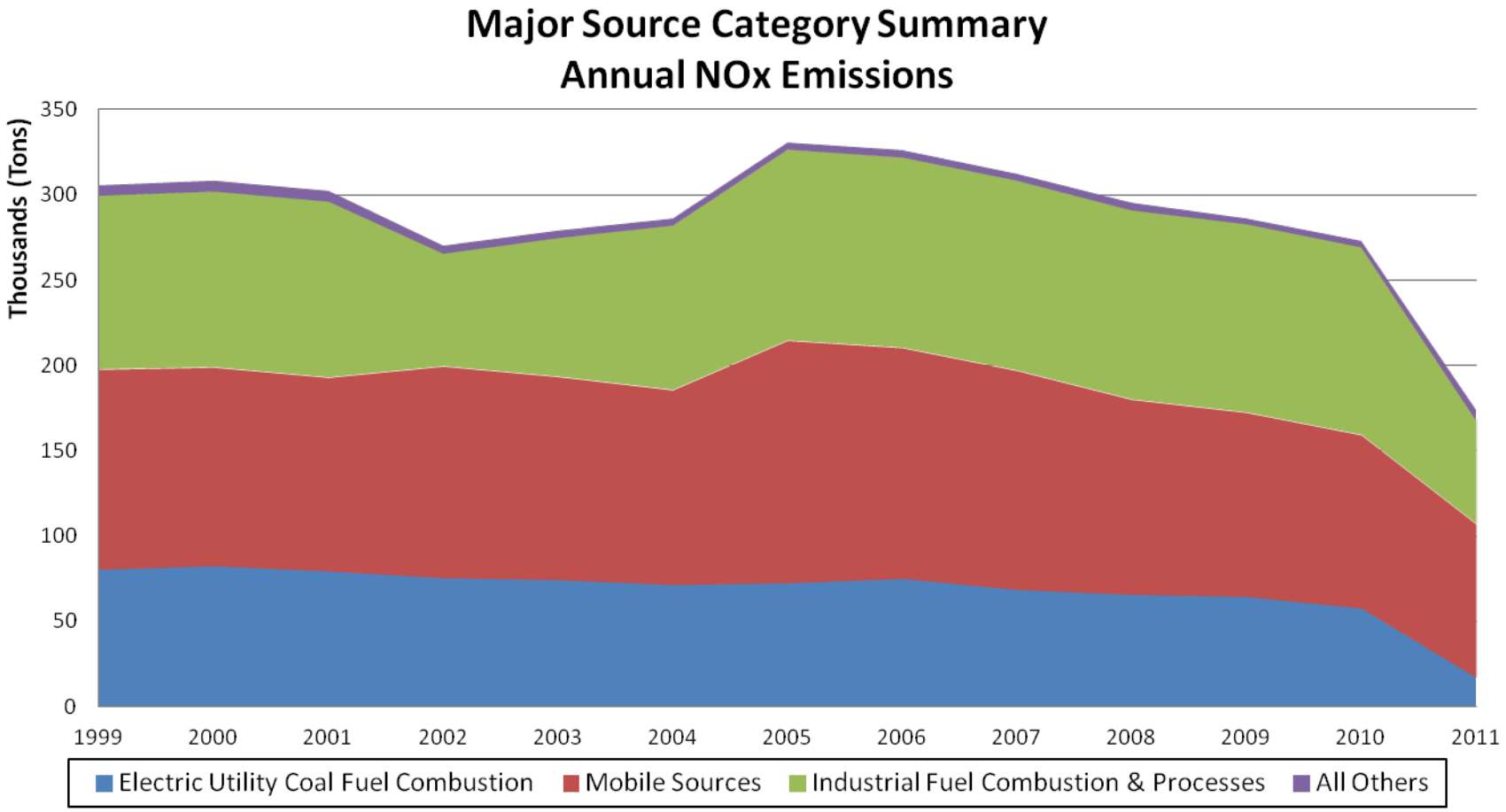


New Mexico Emission Trends (NOx)

	Annual Emissions (Tons)									
Source Category	**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**

	Annual Emissions Change (Percent since 1999)									
Source Category	**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 (NOx)

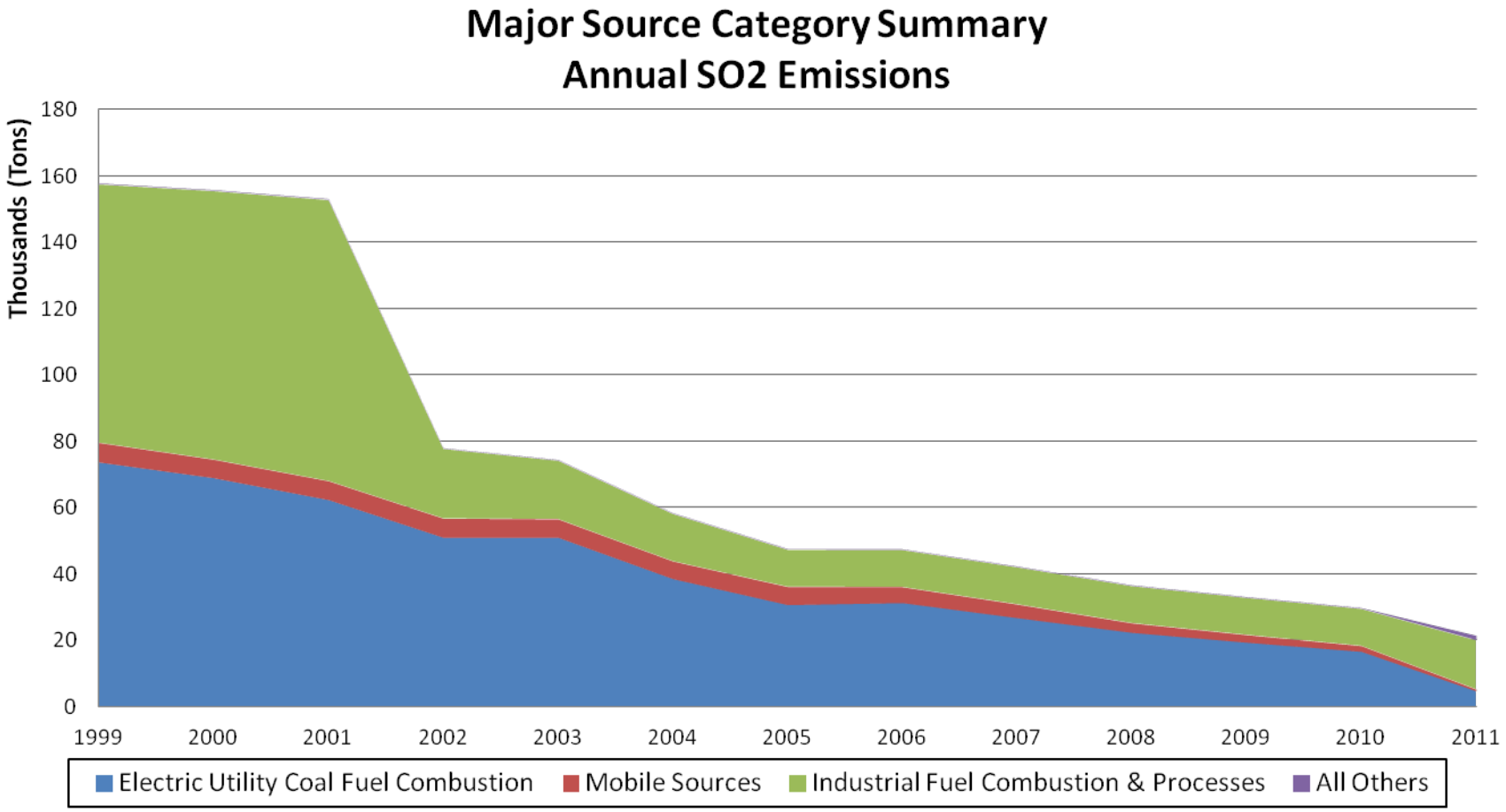


New Mexico Emission Trends (SO_2)

	Annual Emissions (Tons)									
Source Category	**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**

	Annual Emissions Change (Percent since 1999)									
Source Category	**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 (SO_2)

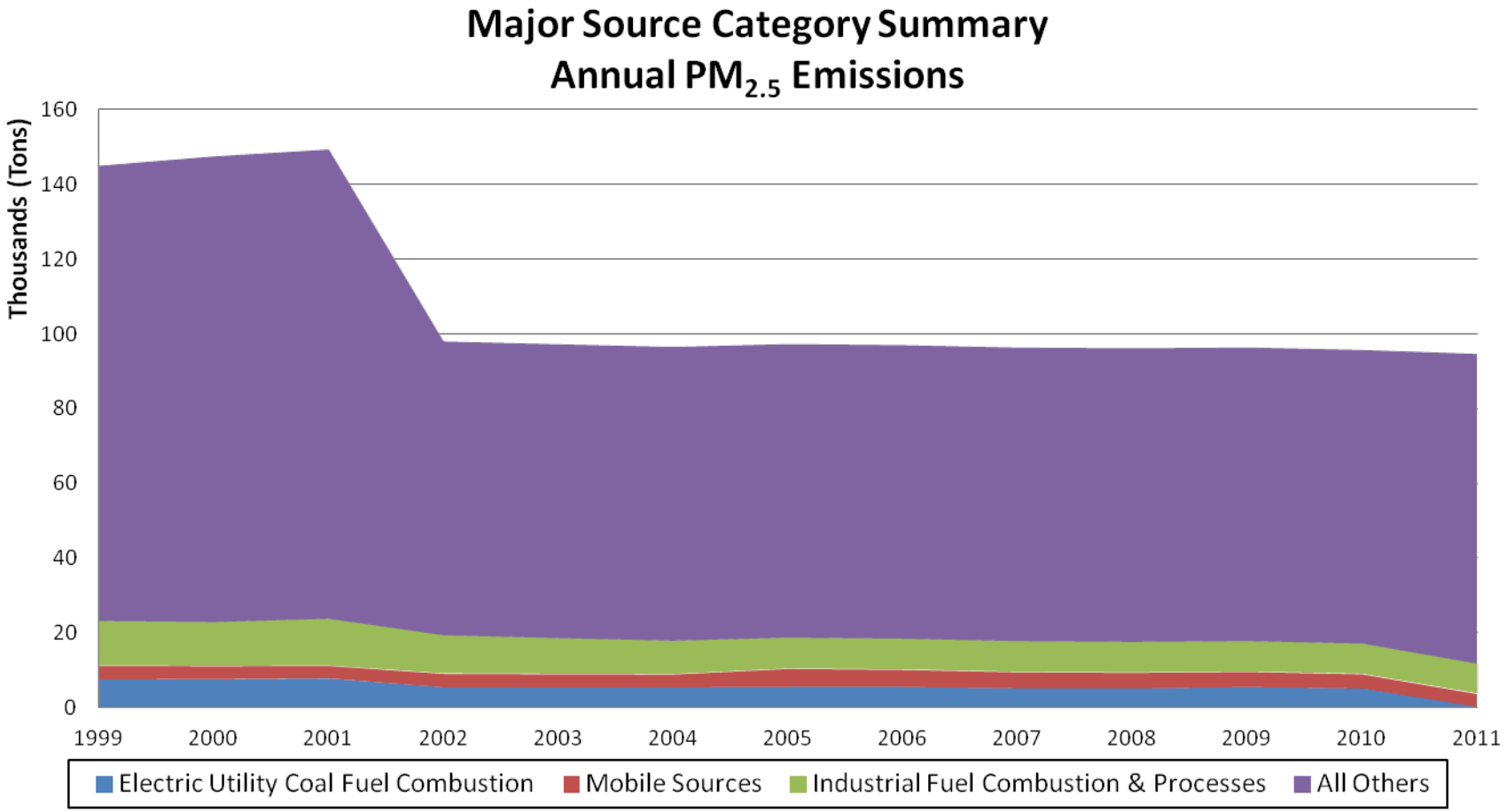


New Mexico Emission Trends ($PM_{2.5}$)

	Annual Emissions (Tons)									
Source Category	**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**

	Annual Emissions Change (Percent since 1999)									
Source Category	**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 ($PM_{2.5}$)



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
- NOx 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/m^3
- $PM_{2.5}$ 24-Hour
  - Annual 98th percentile of daily averages averaged over three consecutive years
  - Current standard = 35 ug/m^3

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

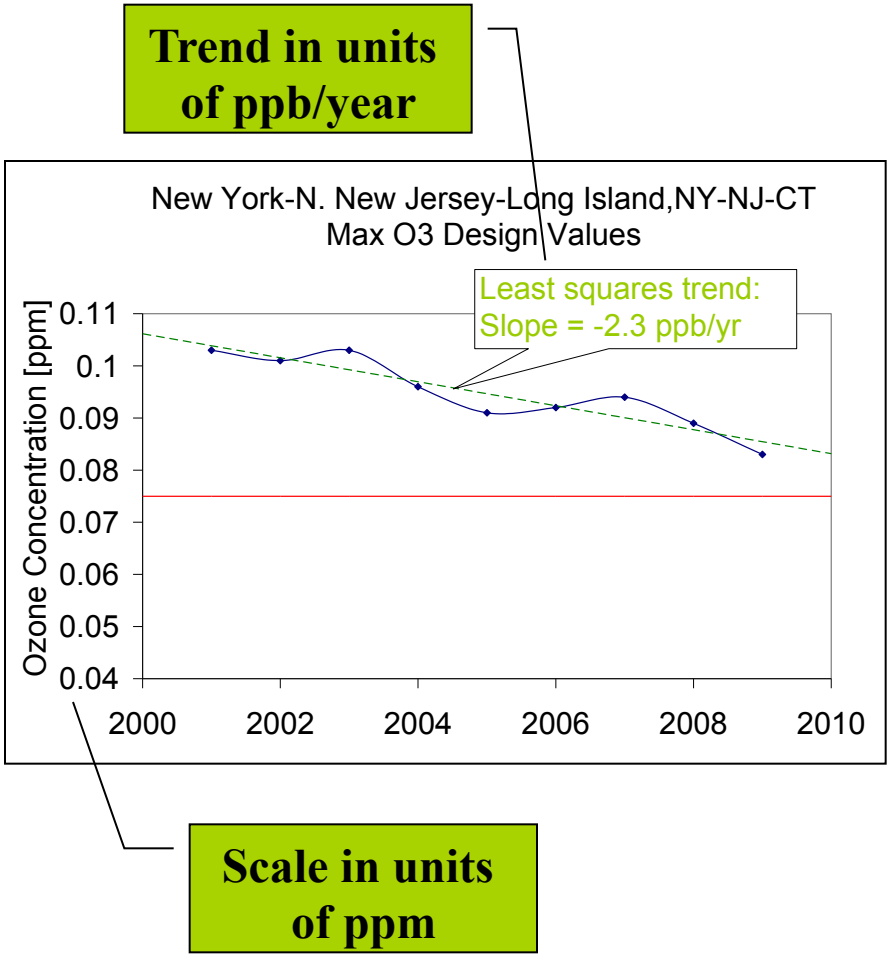
Data Handling Procedures

- O_3 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

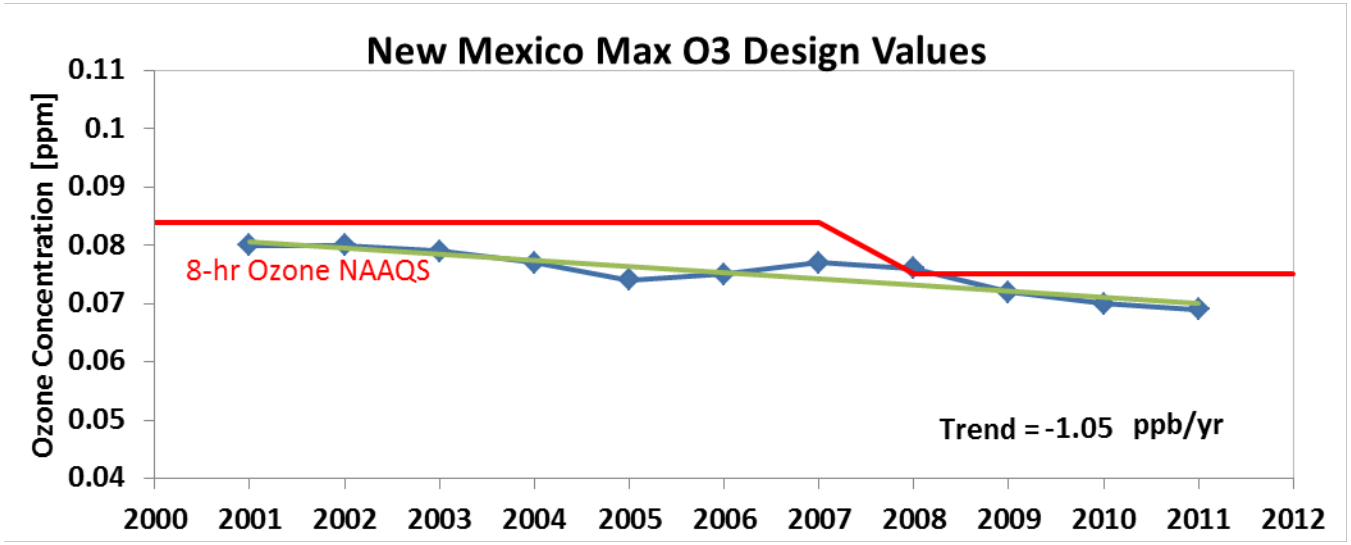
- Annual $PM_{2.5}$ DV and 24-hr $PM_{2.5}$ DV for each overlapping three-year period starting with 1999-2001 and ending with 2009-2011
  - DV calculations based on EPA data handling conventions
  - Data extracted from monitors that have a non-regulatory monitoring type are omitted
  - Selection of trend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

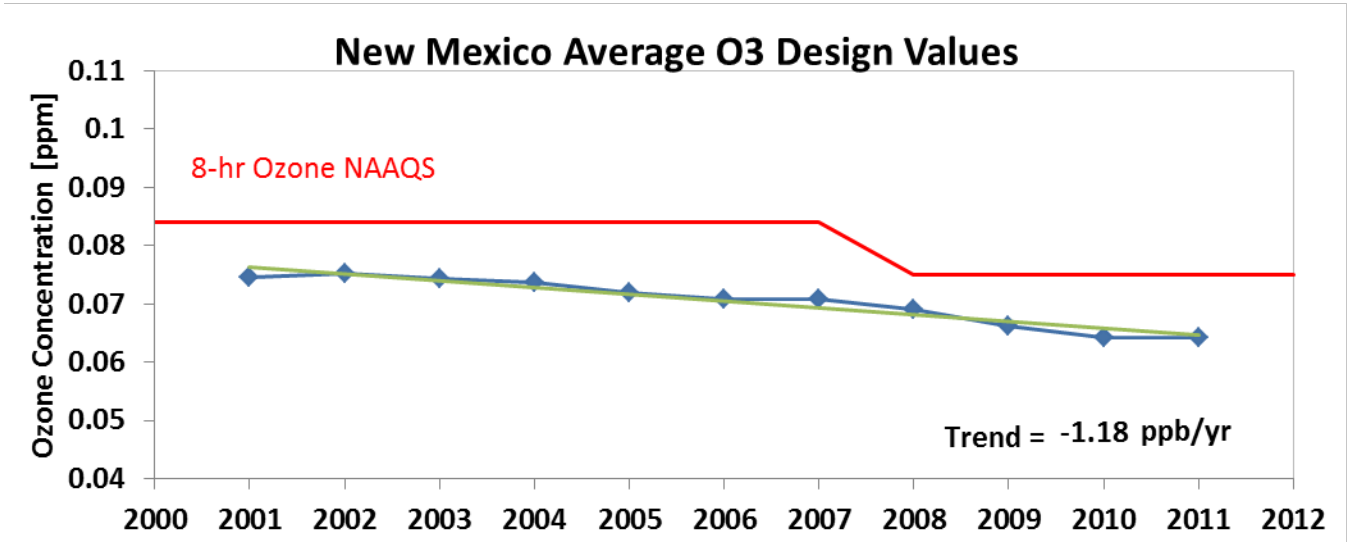
Trend Calculation



- 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 O_3 DVs and Trend



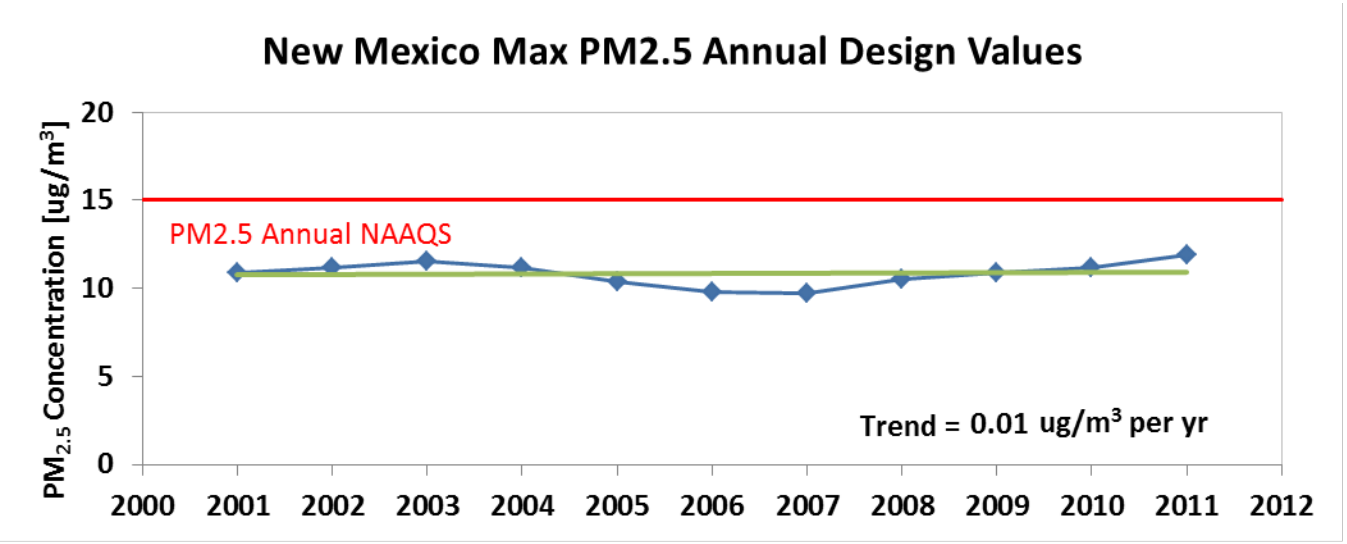


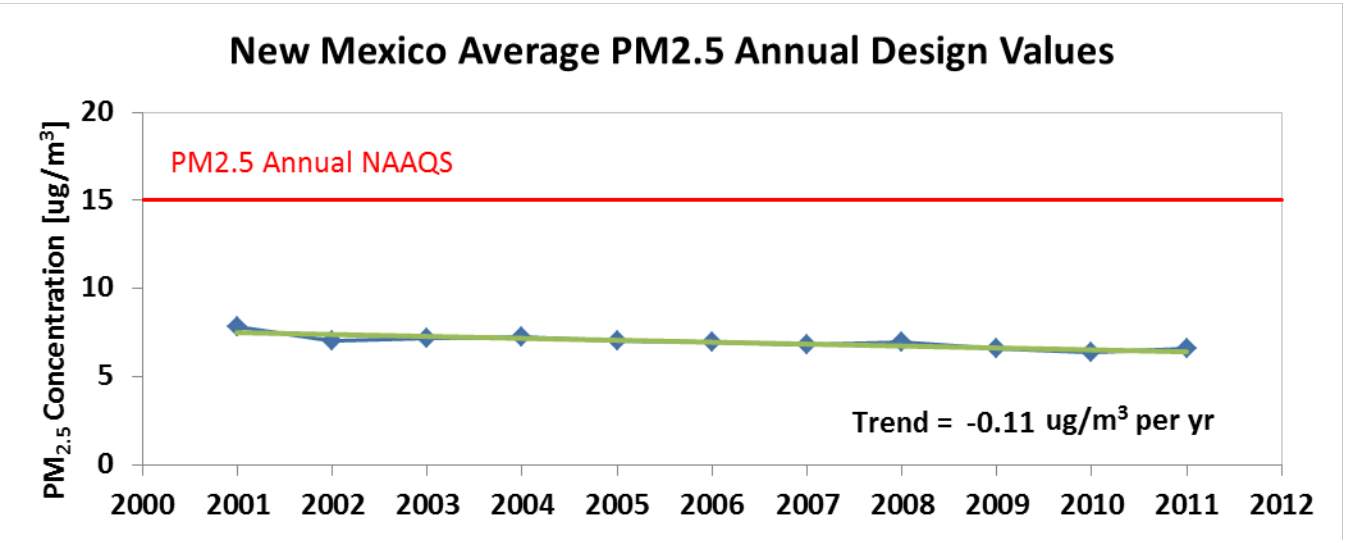
Ozone Trends by Site in New Mexico

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

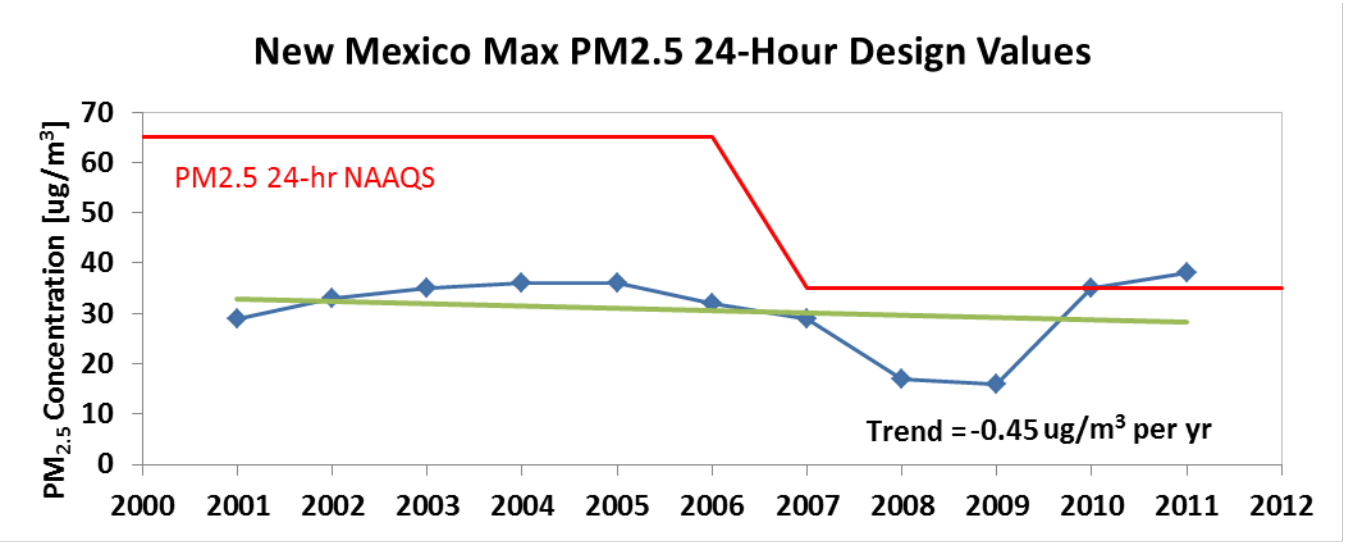
Note: Only monitoring sites meeting data completeness criteria listed

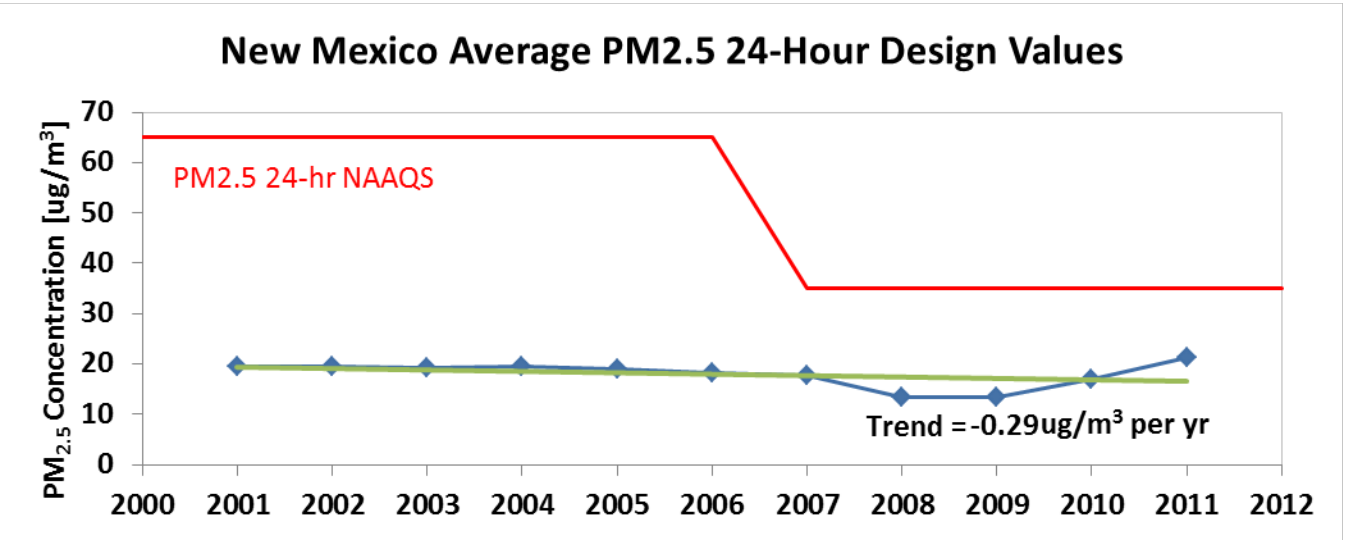
Max/Ave $PM_{2.5}$ Annual DVs and Trend





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





$PM_{2.5}$ Trends by Site in New Mexico

		2009-2011 DV [ug/m³]		Trend [ug/m³ per year]	
Monitoring Site	**County**	**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 O_3 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 O_3 or $PM_{2.5}$ non-attainment areas in New Mexico.