

WRAP 2018 PRP Emission Inventory Analysis – Point and Area Sources

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Lee Gribovicz

WRAP Air Quality Project Manager

WRAP PRP 2018 EI Update

- Objective
 - Provide PRP18 emission inventory for Preliminary Reasonable Progress model run **approximating 2018 controlled emissions** as a “first cut” at quantifying reasonable progress which may be expected at individual Class I areas
- Scope
 - Point and Area Sources (ERG)
 - Area Source Field O&G Operations (ENVIRON)
 - Point Source O&G Gas Plants for SO₂ (ENVIRON)
- Priority – focused on SO₂ & NO_x
- Excluded other area source fugitives (dust from wind erosion, paved/unpaved roads, fires ammonia & onroad/nonroad mobile sources)

ERG Tasks

- Produce Point/Area Top 80% (most significant sources) spreadsheets & draft Proposed Changes
- Shared with all S/L agencies during March 9-19, 2007 series of calls
- Received comments/data/BART limits
- Made appropriate changes to the PRP 18 Inventory
- Final Report -- Spreadsheet of Agency Comments/ERG Actions, both posted at:
<http://www.wrapair.org/forums/ssjf/documents/eictts/projections.html>
- Revised 2002 & 2018 Pivot Tables summarizing emissions posted at:
<http://www.wrapair.org/forums/ssjf/pivot.html>

Environ Tasks

- Revise/Improve the WRAP Region Phase I O&G Field Operations EI for current (2002 & NEW 2005) & 2018 future year operations (primarily NOx)
- Identify potential O&G Field operation control measures w/ emission reduction potential, cost assessment & effectiveness
- Revise selected point source Natural Gas Processing Plant SO2 emissions from previous 2018 projections
- Control “White Papers” and Draft Final Report (when completed – expected by June 22nd) posted at:
<http://www.wrapair.org/forums/ssjf/documents/eictts/oilgas.html>

Future EGU Changes

- Updated coal-fired EGU projections using 2007 EIA Projections for generation data (2018 required generation increased ~7%)
- Subtracted current generation capacity to obtain required new capacity in the WRAP
- w/ input from S/L agencies, determined total capacity currently being permitted
- Remainder required to be constructed: 11 coal fired plants @ 500 MW each

Future EGU Changes

- 11 new 500 MW plants allocated to states based on proportion of existing WRAP region generation
- located within the states in counties w/ existing units
 - 2 Arizona
 - 2 Colorado
 - 1 Montana
 - 1 New Mexico
 - 1 Nevada
 - 2 Utah
 - 2 Wyoming

Future EGU Changes

emissions based on analysis of current permitting levels

Emission Profile for a "Future Placeholder Coal-Fired EGU

	<u>NOx</u>	<u>SO2</u>	<u>VOC</u>	<u>CO</u>	<u>PM10</u>
Emission Factors from Table 5 (lb/MM Btu)	0.072	0.078	0.0022	0.143	0.014
500 MW Unit Annual Emissions (TPY)*	1,340	1,452	41	2,662	261

* 500 MW Unit fired at approximately 5,000 MM Btu/hr @ 10,000 Btu/KW-Hr conversion factor (85% capacity factor)

BART Changes: Major Focus

- Applied BART limits to EGU's "Subject to BART" where limits already known
- Applied "presumptive" 0.15 lb/MMBtu BART SO₂ limits to "Subject" & "Eligible" coal fired EGU's
- No presumptive NO_x limits applied to EGU's (given regional limitations & NO_x control uncertainty, estimates not determined prudent)
- No BART limits applied to non-utility sources as potential emissions rates are highly variable

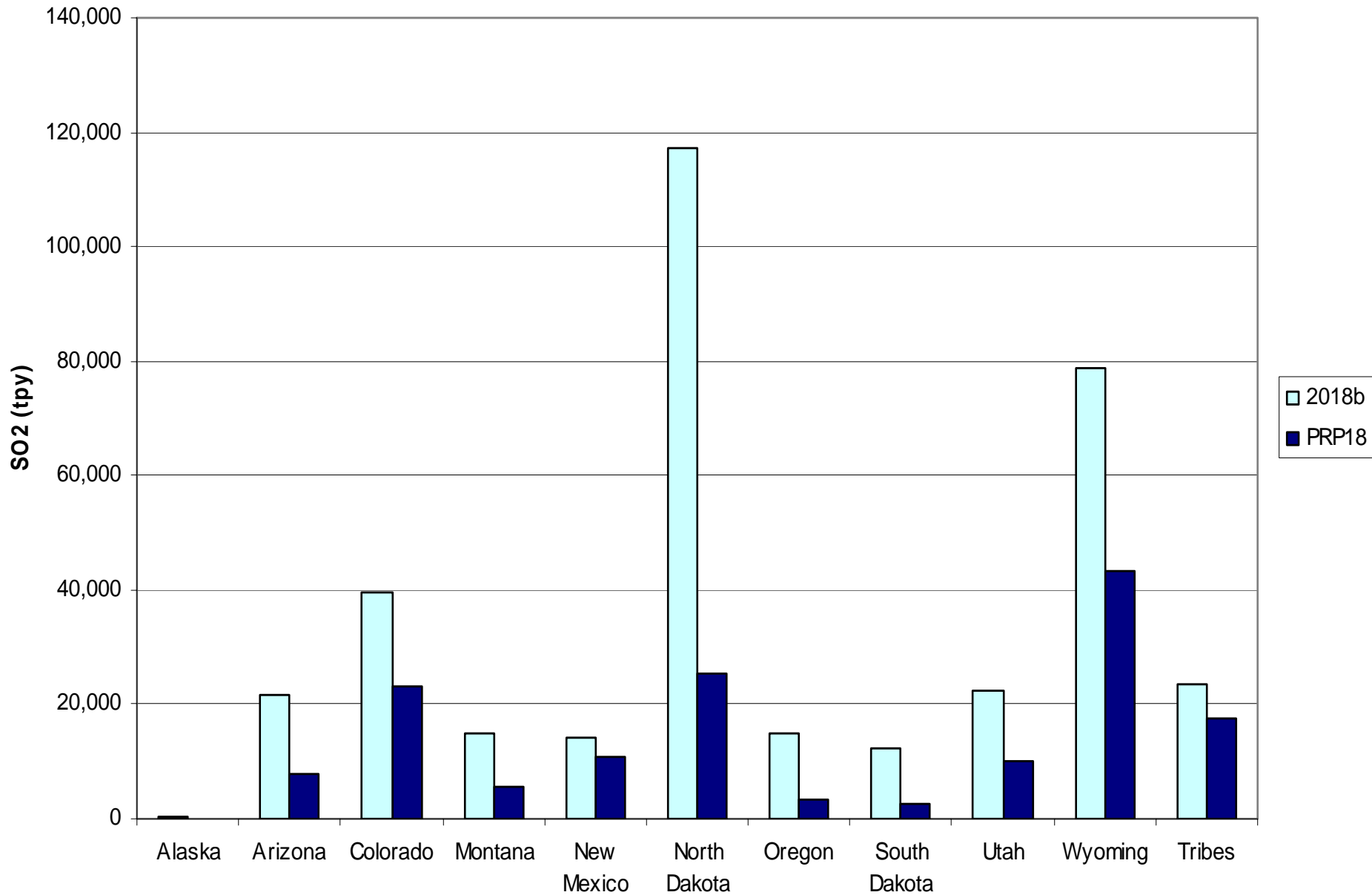
Information Sources for BART and Presumptive BART Limits for SO₂

- Information on specific BART limits was obtained from state agencies for all subject BART sources in CO, ND, and UT, as well as for Oregon's PGE/Boardman plant.
- Additional information on presumptive BART limits was obtained from Pacificorp (WY EGU's) and U.S. EPA (Four Corners Units 1-5)

Estimating PRP18 using BART and Presumptive BART Limits

- BART limits in tons/year as provided became the PRP18 estimate for those EGU's
- Projected 2018 heat input (MMBtu) was multiplied by the Presumptive BART rates to estimate the PRP18 emissions for those EGU's
- Reduced SO₂ from 359,531 Tons, down to 149,368 Tons
- **210,163 Tons Reduction** due to Presumptive & BART Limits

Reductions Between 2018b and PRP18 Due to BART and Presumptive BART



CAMD Changes

- Added missing non-CAMD emissions to PRP18
 - NEI replaces S/L data w/ Acid Rain Data
 - Caused problems with duplicate source ID's in the database
 - Also some NOx and SO2 emission records deleted for non- CAMD units operating at facilities with CAMD units (emissions under reported in resulting dataset)
 - ERG replaced the CAMD “EGU” facility IDs with the S/L agency facility ID's And
 - replaced the dropped NOx and SO2 emission records in the 2002 inventory database and project these to 2018. These corrections are now reflected in the draft emissions inventory.

Other 2002 Database Changes

- Added and/or changed point source SCC's where necessary
- Changed facility/plant IDs and/or names
- Fixed tribal codes on some point sources
- Modified BART flags to reflect current status
- Added new PM10 and PM2.5 records for 6 facilities in Nevada
- Added new SO2 and NOx records for 1 refinery in Wyoming
- Added new area source fuel combustion emissions in South Dakota

Point Source SO₂ Changes

- EH Pechan produced a Projection of Non-Utility point sources for the five §309 states in October, 2006 posted at: <http://www.wrapair.org/forums/ssjf/documents/eictts/projections.html>
- Environ was given the contract for updating the WRAP O&G Inventory
- One task: look at 2018 Point Source SO₂ emission rate for 19 Natural Gas Processing plants in New Mexico & Wyoming (data has been included in §309 milestone revision talks)
- Updated SO₂ predictions were based on conversations with Plant Operators, along with their data on field reserves, market and expected controls

Area Source O&G Changes

- Another of Environ's tasks was to update the Emission Inventory for Area Source O&G Field Operations
- Have completed that inventory, and presented a May 8th Summary in an Informational Call to the SSJF O&G Workgroup & Contributing Producers
- NIF and IDA files were completed for inclusion in the PRP18 modeling effort
- Primary change was that NO_x was reduced from the previous inventory about 100K in 2018 to approximately 186,000 tons

Area Source O&G Emission Reductions

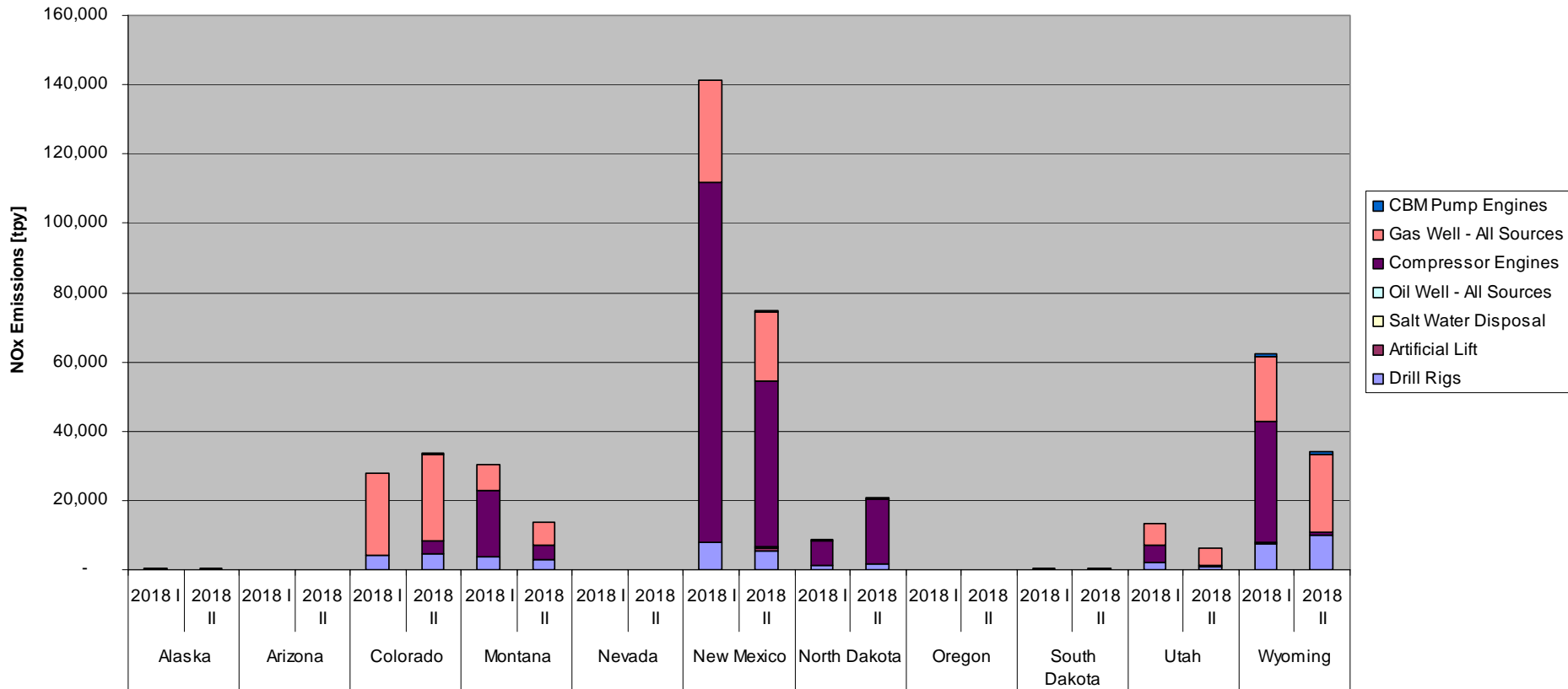
- 100,000 ton NO_x reduction from Phase I to Phase II due to:
 - Major decrease in compressor engine emissions inventory estimate – due to improved regional data
 - Phase I analysis for compressors relied on data from NMOGA survey in San Juan basin and adapted this analysis for entire WRAP region
 - Phase II analysis relied on specific data for each basin
 - Oil vs. Gas wells – corrected the Phase I assumption of emissions based on all gas production, no gas equipment on oil wells.
 - Decrease in drilling rig emissions inventory estimate
 - Phase I was scaled from regional survey in Jonah-Pinedale area of Wyoming and applied to entire WRAP region
 - Drilling activity in Phase II developed using specific data for each basin
- Also a slight 19 ton reduction in O&G Field SO₂ in Phase II due primarily to improved estimates of actual drilling times

Area Source O&G Controls

- Environ also is developing potential emission control measures for O&G field operations, along with expected control effectiveness and cost assessment (May 30th SSJF O&G Workgroup Informational Call)
- Presentations for both the May 8th & May 30th Informational Calls are posted at:
<http://www.wrapair.org/forums/ssjf/documents/eictts/oilgas.html>

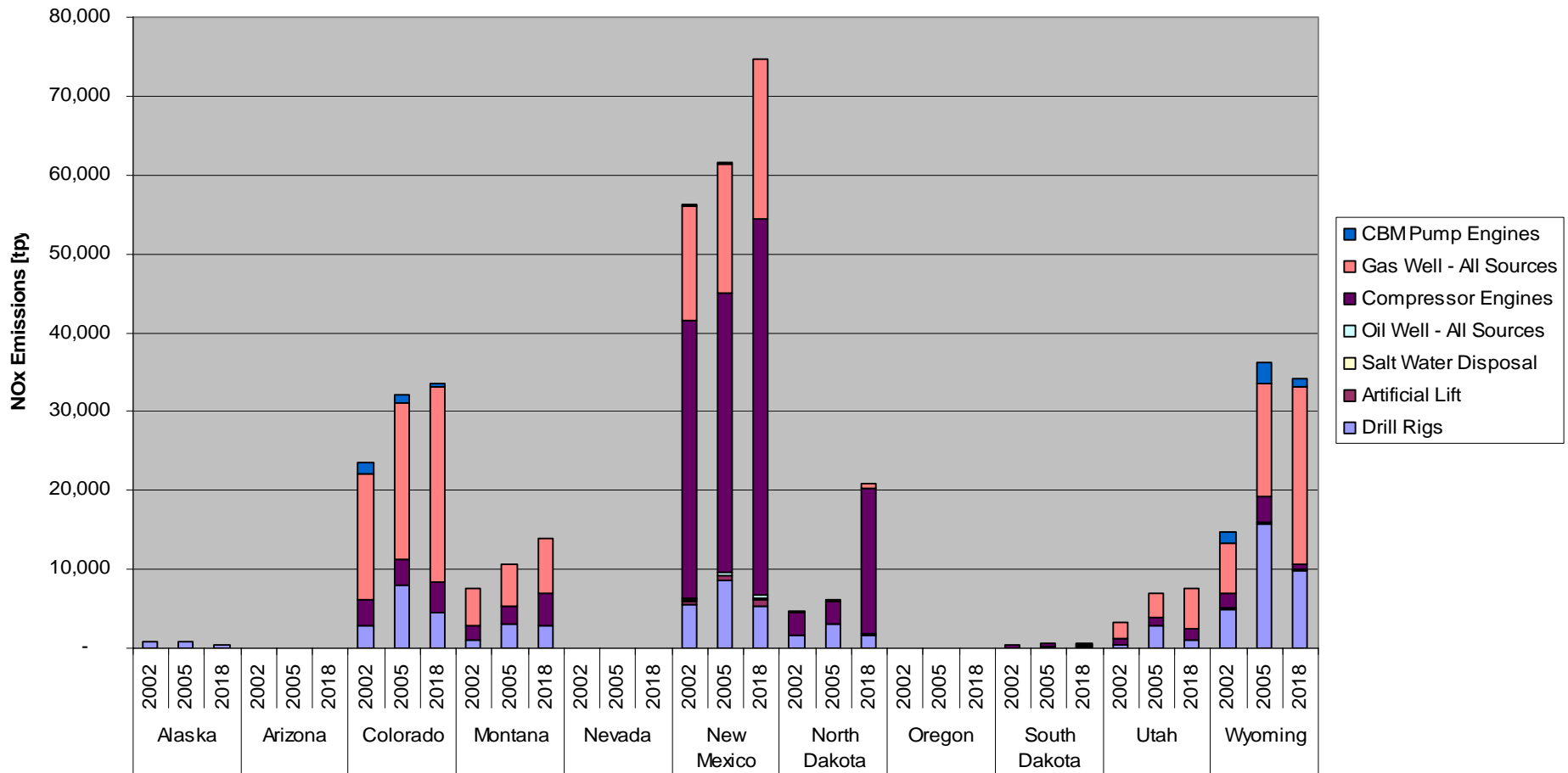
Comparison of Phase I with Phase II NOx Emissions for 2018

WRAP Phase I and Phase II NOx Emissions for 2018



WRAP Phase II NOx Emissions for 2002, 2005 and 2018

WRAP Phase II NOx Emissions for 2002, 2005, 2018



Changes to the WRAP 2018 PRP Emission Inventory from 2002 (Base 02c)

- Point Sources
 - On-Road Mobile
 - Non-Road Mobile
 - Area Sources
 - Fire
-
- For both SO₂ and NO_x

SO2 WRAP Region Emissions Change: 2002 to 2018 (TPY)

States	2002 Point	2018 Point	2002 On-Road Mobile	2018 On-Road Mobile	2002 Non-Road Mobile	2018 Non-Road Mobile	2002 Area	2018 Area	2002 Fire	2018 Fire
AK	6,811	7,555	655	56	611	347	5,466	6,044	61,404	61,404
AZ	94,716	70,337	2,715	762	4,226	546	2,677	3,408	8,821	8,821
CA	42,120	49,632	4,034	1,897	7,540	1,889	8,314	9,772	9,399	9,399
CO	97,979	56,979	4,149	568	2,472	371	6,299	7,501	8,307	8,307
ID	17,597	9,945	1,590	177	3,411	102	2,916	3,053	1,711	1,711
MT	36,879	36,480	1,770	195	4,206	61	3,072	3,430	1,398	1,398
ND	156,668	67,079	771	68	6,852	62	5,389	5,858	592	592
NM	37,436	32,380	1,951	281	3,528	89	5,115	15,749	1,613	1,613
NV	50,720	28,167	455	286	1,403	261	12,953	14,194	417	417
OR	17,594	7,952	3,448	461	6,338	152	9,932	8,422	19,171	19,171
SD	14,024	5,834	873	108	5,756	50	3,255	4,085	279	279
UT	41,864	37,938	1,777	368	4,514	153	3,434	3,583	2,353	2,353
WA	52,972	37,444	5,539	679	8,584	263	7,388	8,667	2,307	2,307
WY	119,918	95,144	960	81	5,871	65	16,689	23,097	2,173	2,173
Tribes	39,388	28,400					1	2		
WRAP	826,684	571,266	30,688	5,988	65,314	4,411	92,901	116,865	119,946	119,946

% WRAP
Change = -31%

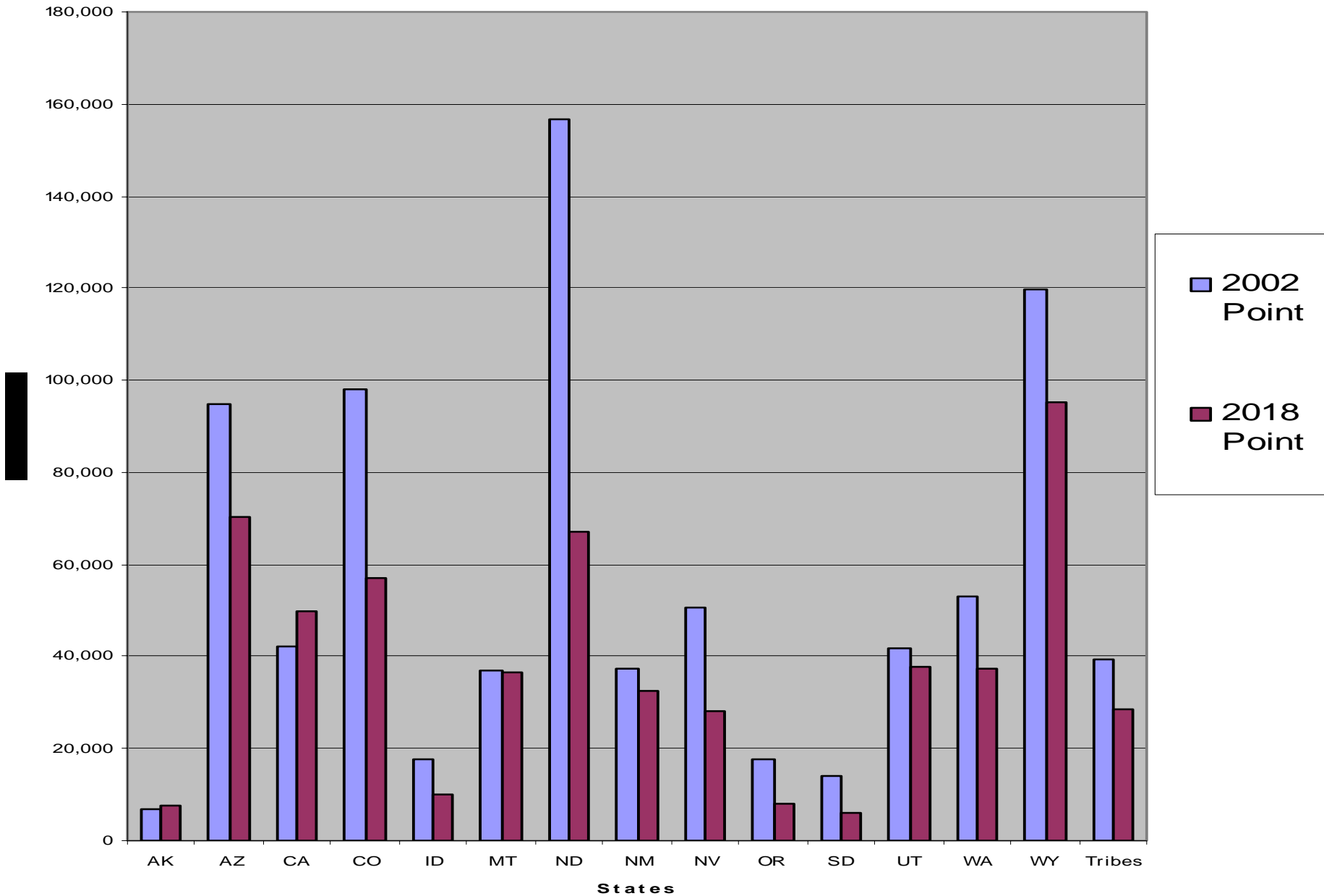
% WRAP
Change = -80%

% WRAP
Change = -93%

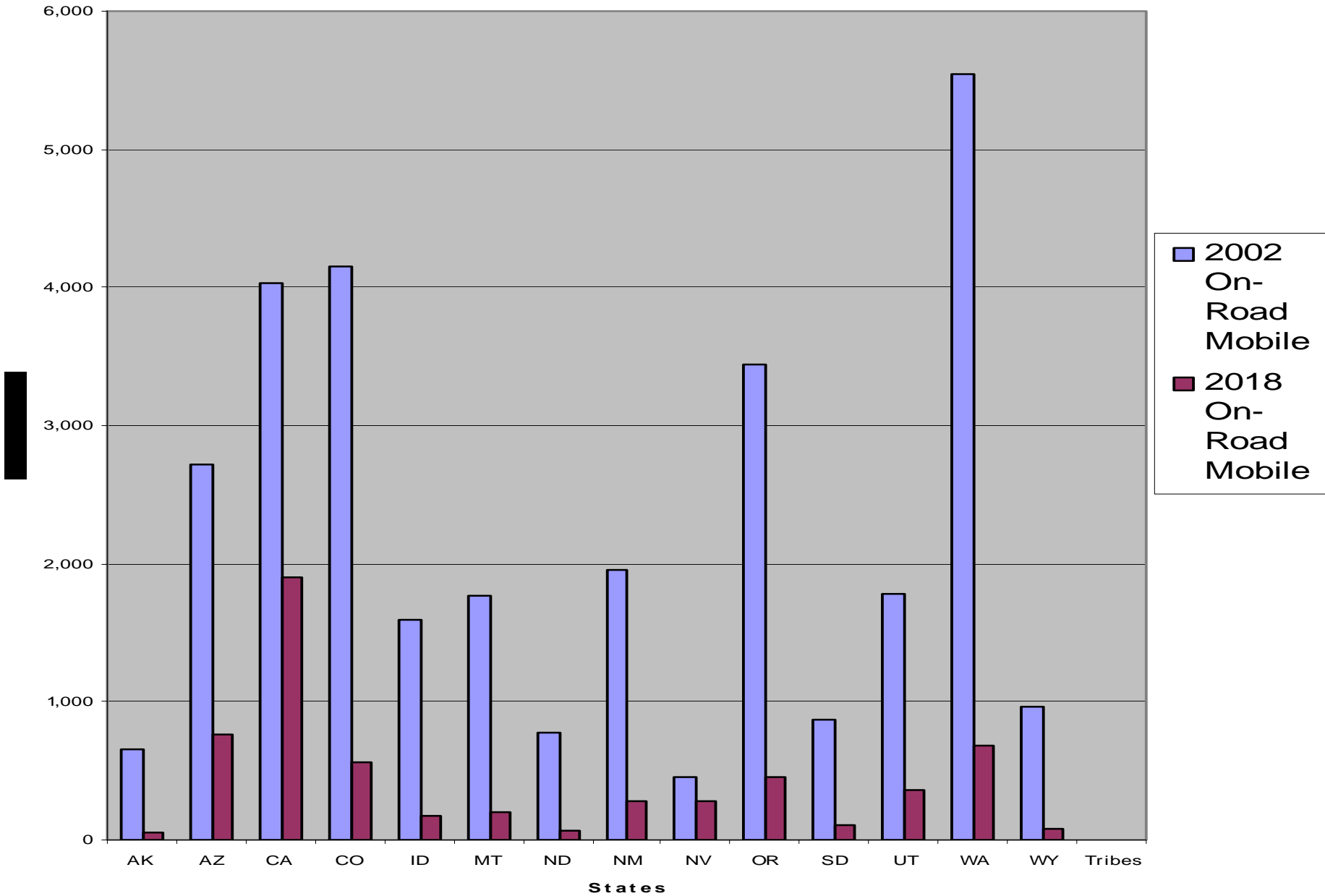
% WRAP
Change = 26%

% WRAP
Change = 0%

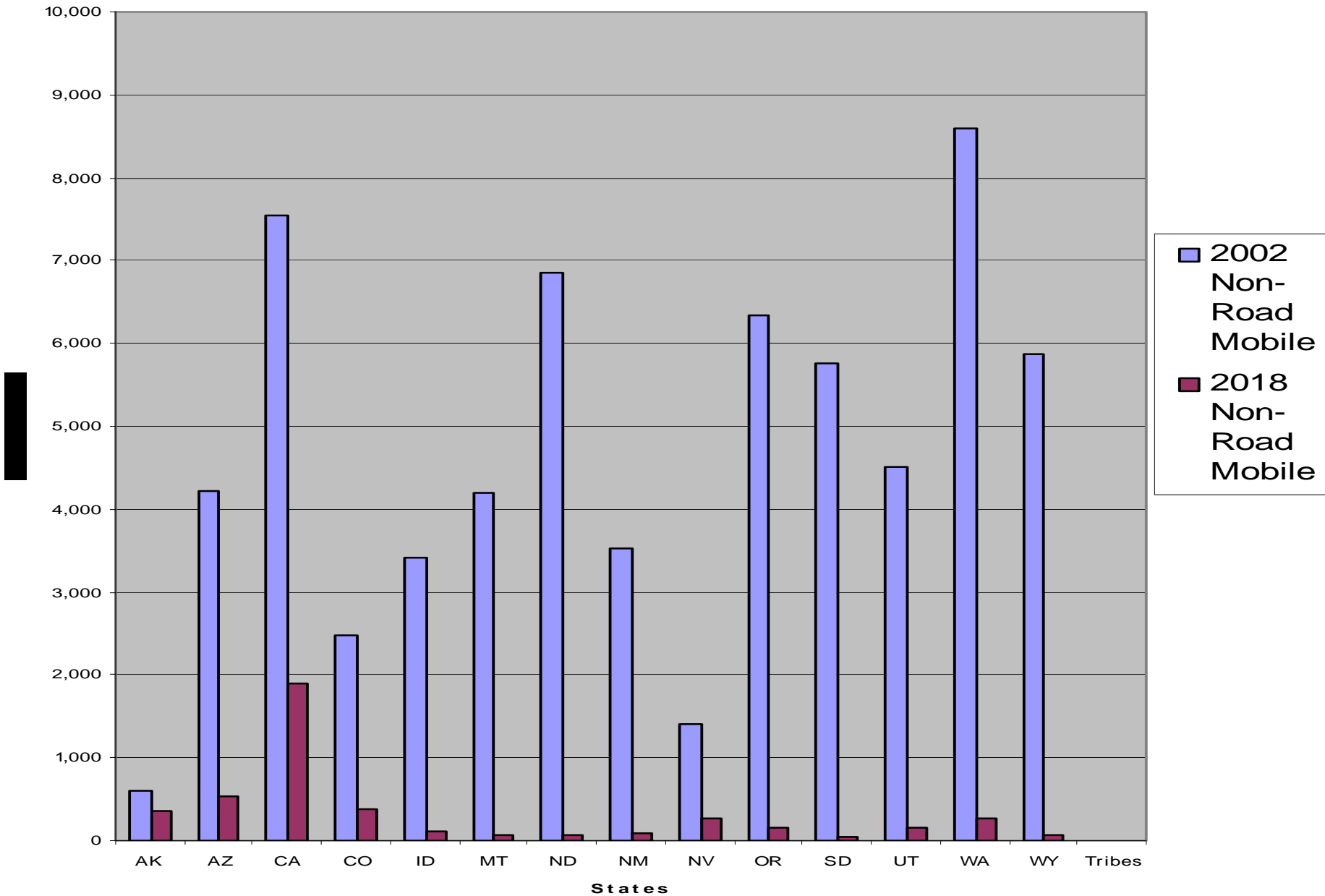
WRAP Point Source SO2 Change to 2018 (Base 02c - PRP 18)



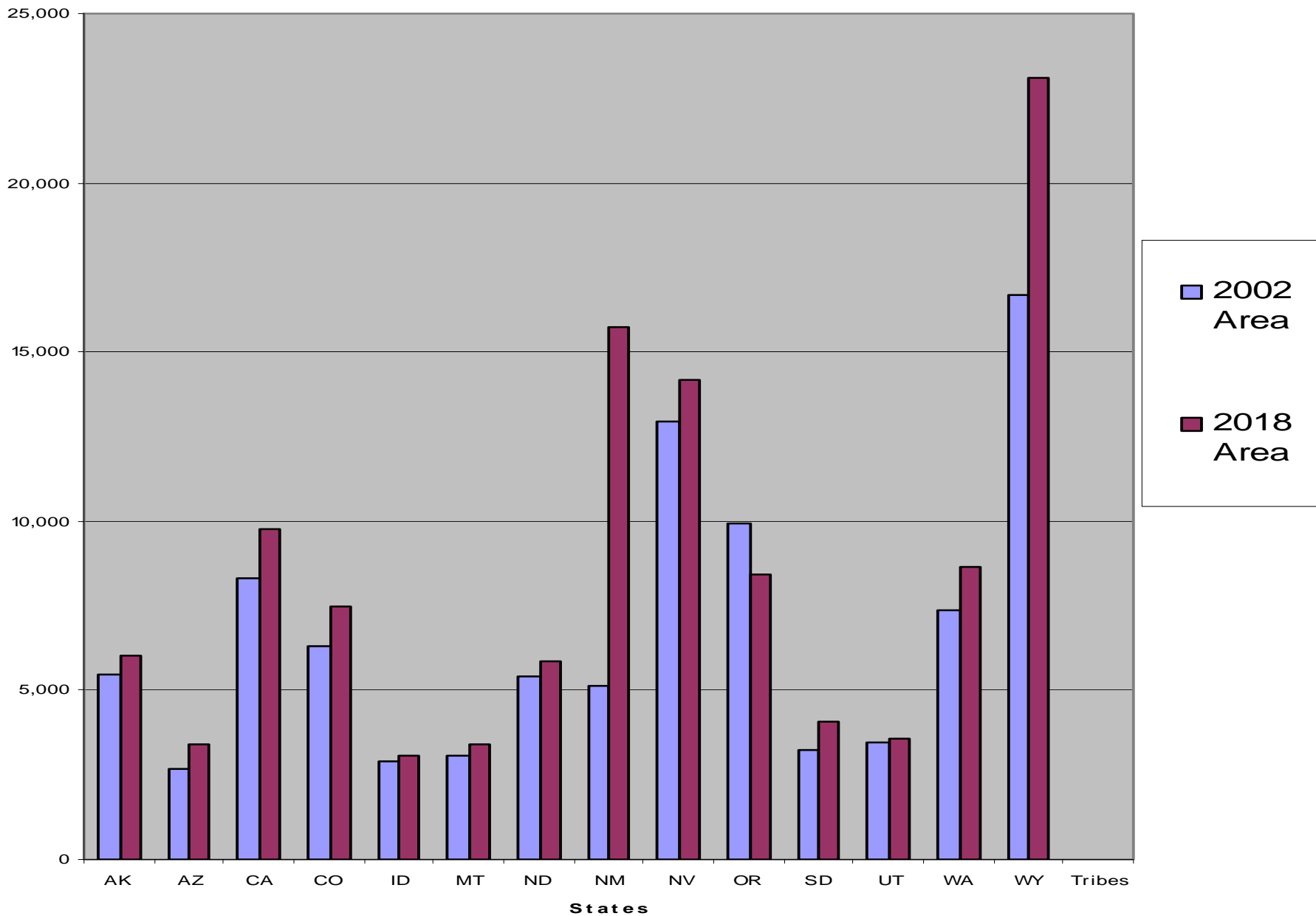
WRAP Onroad Mobile SO2 Change to 2018 (Base 02c - PRP 18)



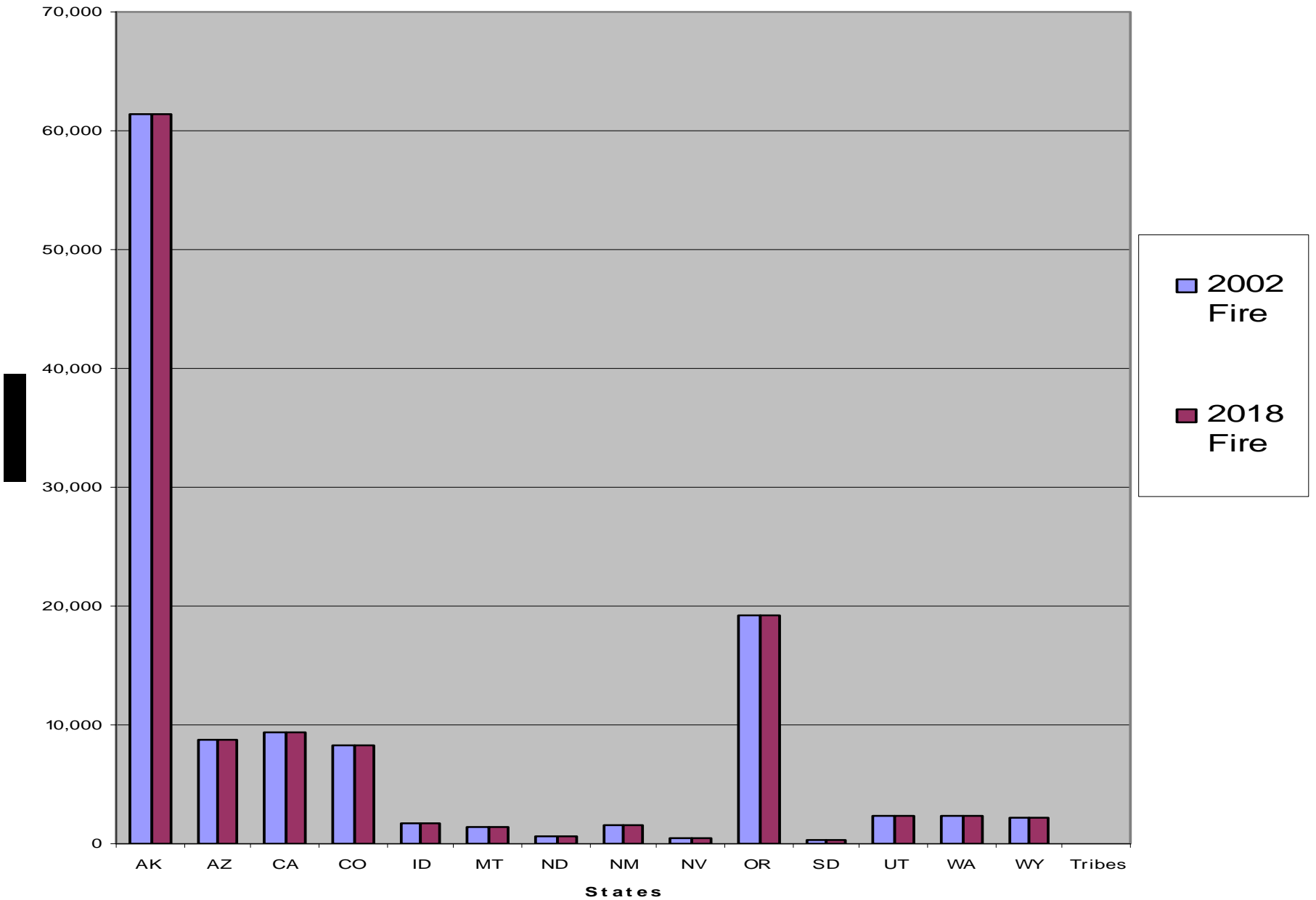
WRAP Non-Road Mobile SO2 Change to 2018 (Base 02c - PRP 18)



WRAP Area Source SO2 Change to 2018 (Base 02c - PRP 18)



WRAP All Fire (WF & Rx) SO2 Change to 2018 (Base 02c - PRP 18)



NOx WRAP Region Emissions Change: 2002 to 2018 (TPY)

States	2002 Point	2018 Point	2002 On-Road Mobile	2018 On-Road Mobile	2002 Non-Road Mobile	2018 Non-Road Mobile	2002 Area	2018 Area	2002 Fire	2018 Fire
AK	74,471	67,959	16,197	4,088	8,876	7,765	7,601	9,178	223,946	223,946
AZ	65,528	73,071	177,974	53,489	66,467	47,858	9,049	12,799	32,766	32,766
CA	104,435	109,515	581,081	203,060	328,320	167,312	114,471	117,717	37,760	37,760
CO	118,666	113,361	141,825	45,226	62,581	40,877	11,700	49,849	30,507	30,507
ID	11,486	12,373	44,590	12,320	27,951	18,144	30,318	42,068	7,117	7,117
MT	53,416	62,365	53,598	22,035	50,696	36,552	4,280	19,404	5,466	5,466
ND	87,425	71,056	24,728	4,902	55,659	37,432	10,826	33,320	2,232	2,232
NM	100,387	74,600	67,820	19,739	45,338	33,191	25,130	108,415	6,127	6,127
NV	59,866	67,625	41,081	15,044	32,606	22,203	5,725	7,478	1,522	1,522
OR	24,963	24,947	111,599	42,122	52,583	32,485	14,740	17,023	71,105	71,105
SD	20,698	24,727	29,206	8,053	39,187	24,474	3,927	5,004	1,378	1,378
UT	84,348	79,761	77,352	27,350	47,197	28,461	6,146	15,935	8,702	8,702
WA	43,640	49,456	201,987	55,908	74,103	46,619	18,355	22,746	10,110	10,110
WY	117,806	133,216	38,554	9,731	76,675	59,400	15,192	53,805	8,111	8,111
Tribes	94,130	100,503					57	6,639		
WRAP	1,061,264	1,064,536	1,607,593	523,067	968,241	602,773	277,516	521,380	446,848	446,848

% WRAP Change = 0.3%

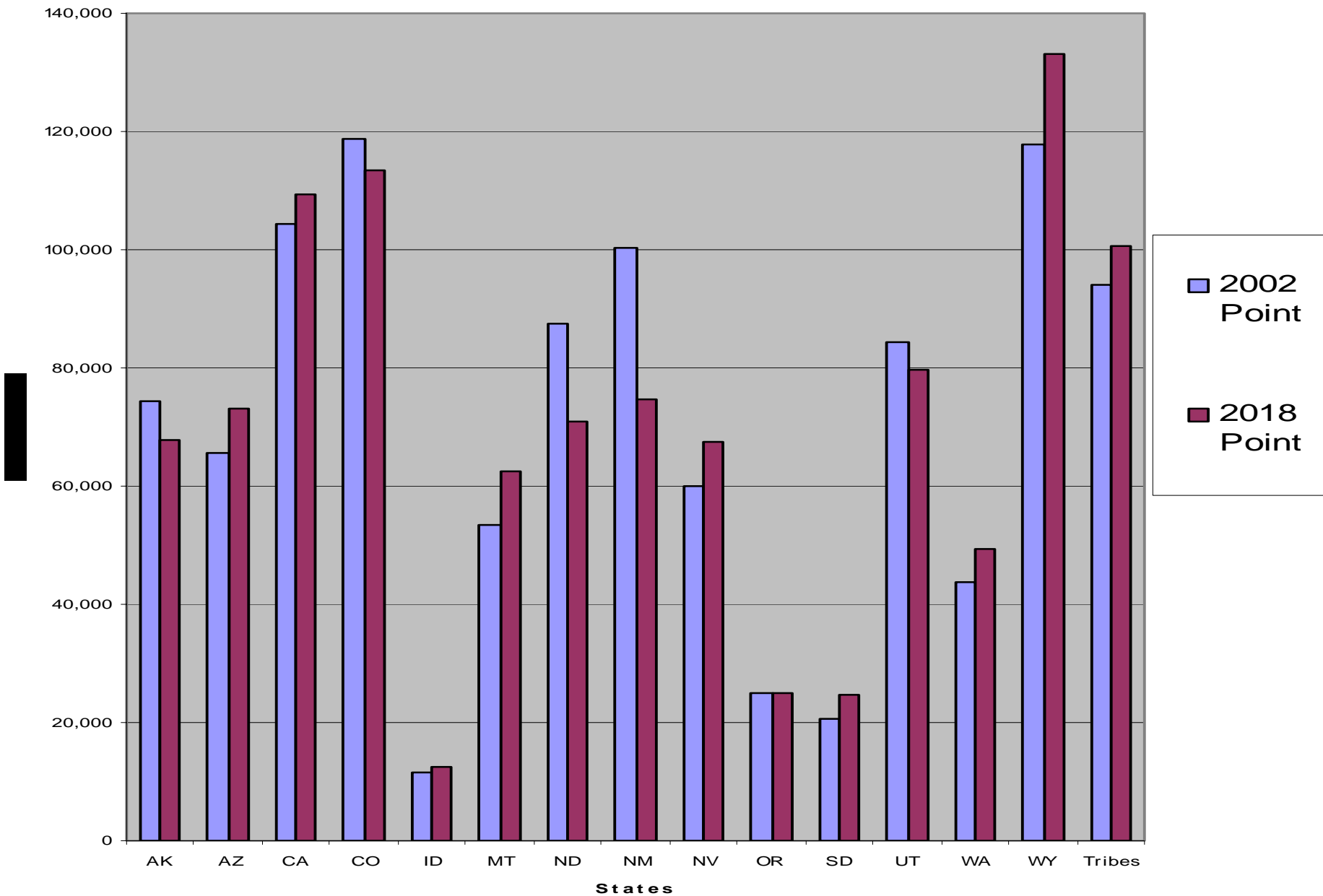
% WRAP Change = -67%

% WRAP Change = -38%

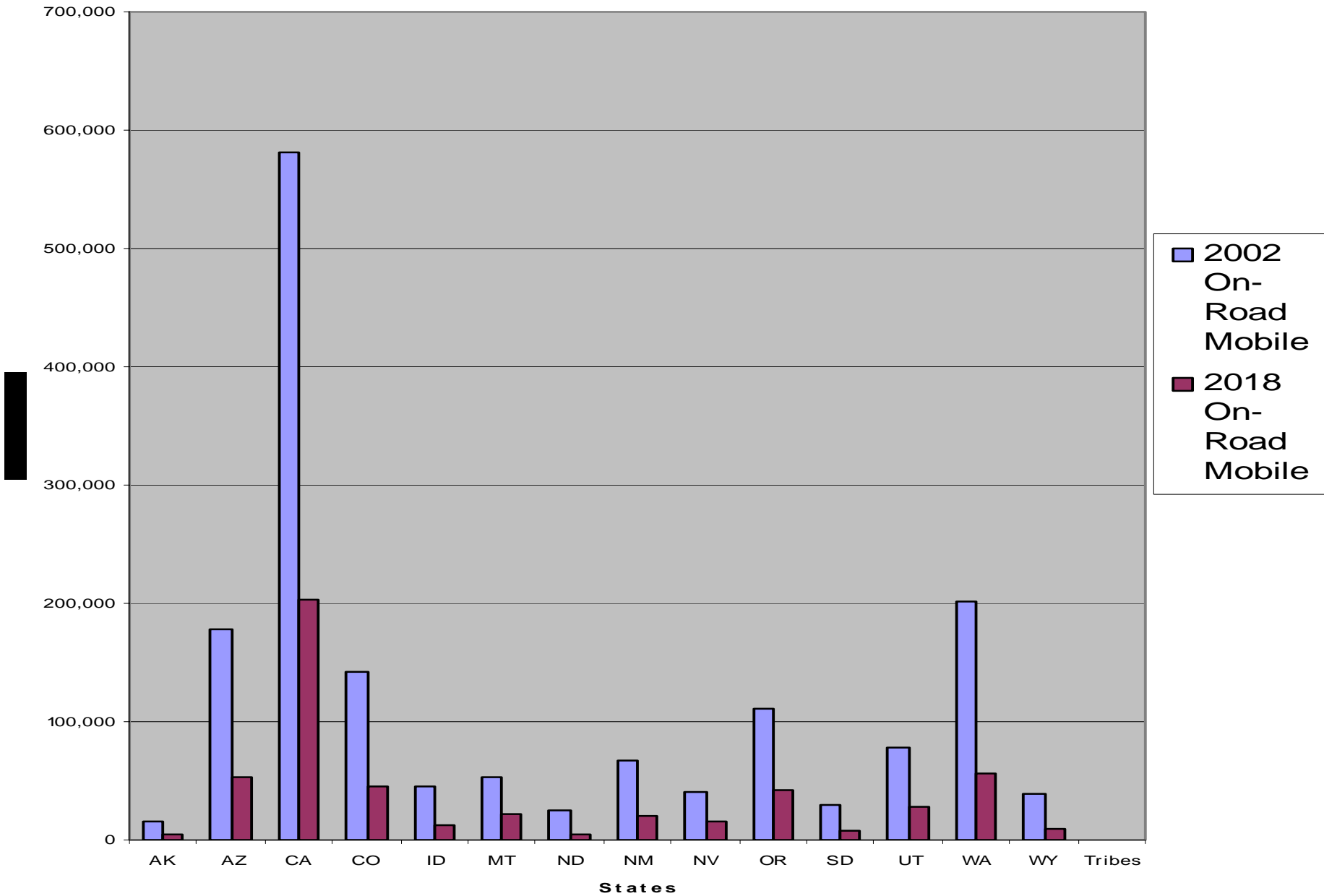
% WRAP Change = 88%

% WRAP Change = 0%

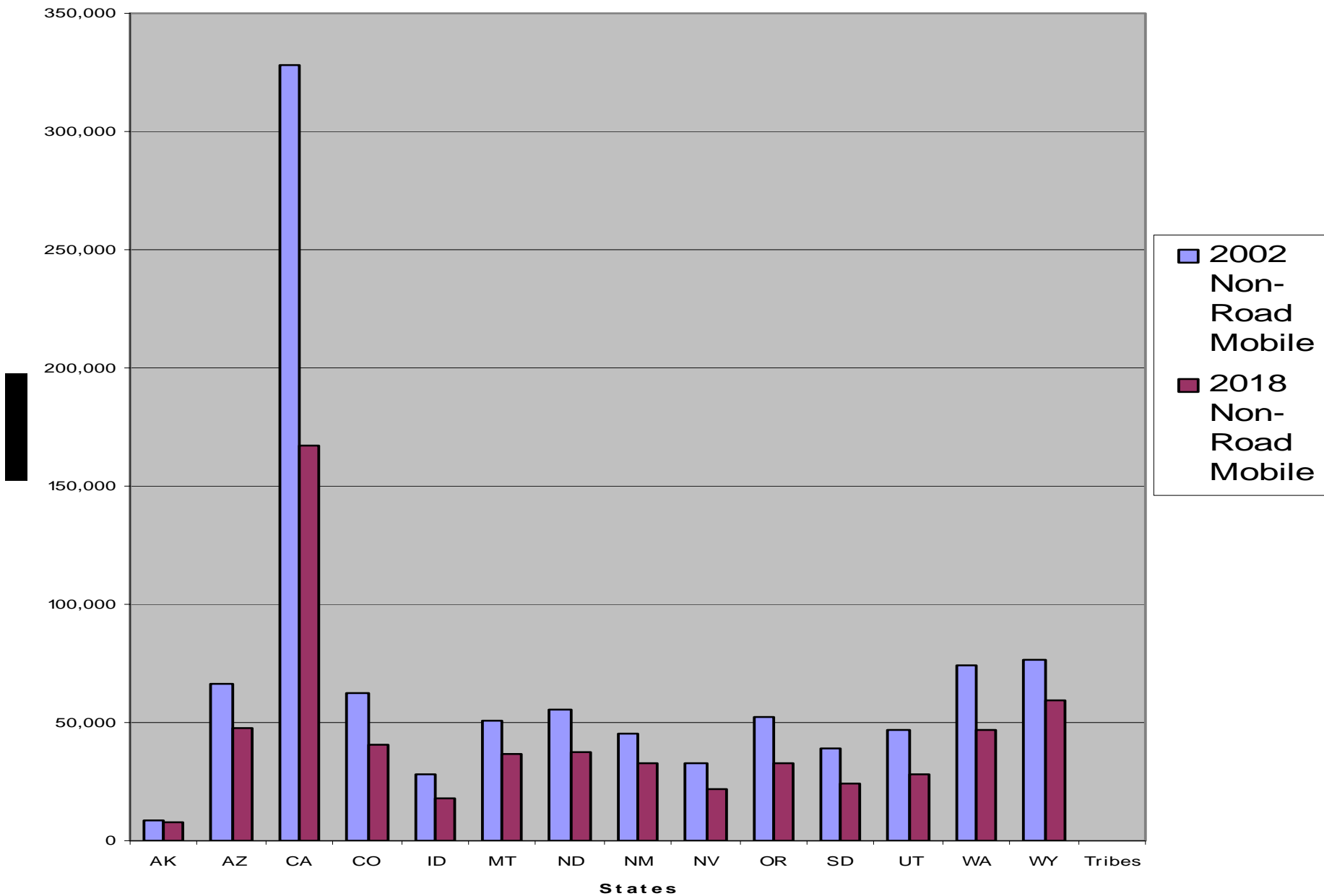
WRAP Point Source NOx Change to 2018 (Base 02c - PRP 18)



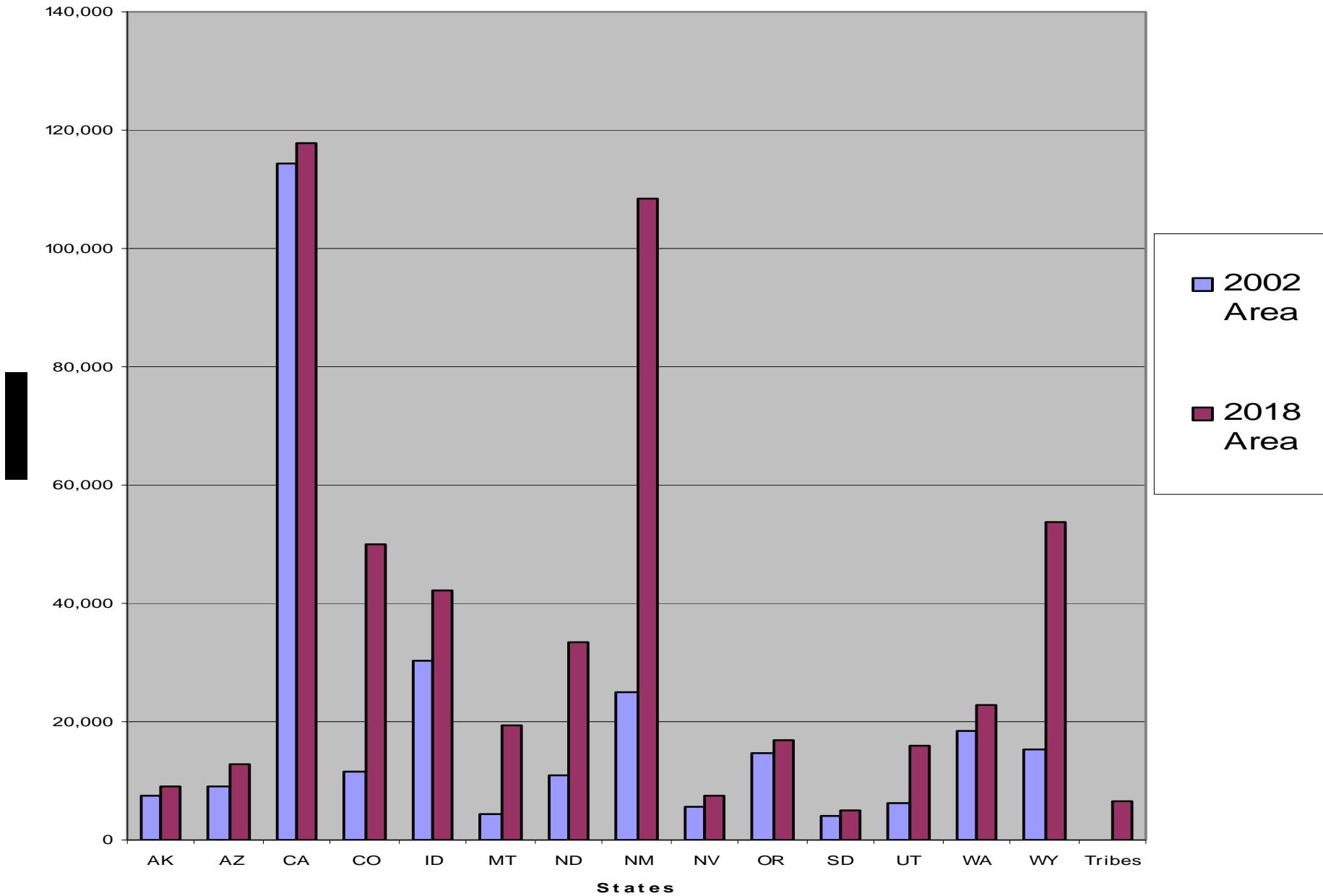
WRAP Onroad Mobile NOx Change to 2018 (Base 02c - PRP 18)



WRAP Non-Road Mobile NOx Change to 2018 (Base 02c - PRP 18)



WRAP Area Source NOx Change to 2018 (Base 02c - PRP 18)



WRAP All Fire (WF & Rx) NOx Change to 2018 (Base 02c - PRP 18)

