

# ENVIRON

## DRAFT TECHNICAL MEMORANDUM

**To:** Thomas Moore and Lee Gribovicz, WRAP  
**From:** John Grant, Alison Pollack, and Allison DenBleyker  
**Date:** March 3, 2009  
**Subject:** WRAP PRP18b NONROAD model equipment emissions assessment

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### INTRODUCTION

ENVIRON has been asked to review for potential update all on-road and off-road mobile source emissions estimates for use in the 2018 PRP18b air quality modeling. ENVIRON originally developed a comprehensive mobile source emission inventory, including emissions from on-road vehicles, off-road equipment, locomotives, commercial marine vessels, and aircraft, in 2005<sup>1</sup>. This memo addresses the emissions effects of two recently promulgated standards for nonroad engines, as well as emissions effects from updates to the EPA NONROAD model since the 2005 mobile source emissions estimates were prepared.

The 2005 WRAP off-road equipment emissions estimates<sup>1</sup> were generated with an older version of EPA's NONROAD model, version NONROAD2004. Since that time, EPA has updated the model with new input data and revised emissions calculations, and released a model for air quality planners to use; this version is called NONROAD2005a and is the version currently available on EPA's NONROAD modeling web page (<http://www.epa.gov/otaq/nonrdmdl.htm>). As part of their most recent rulemaking, EPA has also prepared an updated version of the model, NONROAD2005d, that is in the rulemaking docket but is not available on EPA's web page.

ENVIRON has generated 2018 off-road equipment emission estimates for select areas using EPA's NONROAD model, versions NONROAD2005a and NONROAD2005d, and compared these results to the previous WRAP off-road equipment emissions estimates generated with the NONROAD2004 version. Based upon this comparison, ENVIRON has estimated the changes in emissions resulting from the use of the most recent EPA NONROAD model and evaluated the significance of the changes in the context of the overall WRAP emission inventory. Results of that analysis are provided below, first for EPA's model update and then for updates to account for the latest rulemaking, along with our recommendations on what to use in PRP18b modeling.

### EPA NONROAD2005A MODEL UPDATE

For off-road equipment emissions previously generated by ENVIRON<sup>1</sup>, the latest model at the time was EPA's draft NONROAD2004. In February 2006, EPA released the "final" NONROAD2005a model. There were a number of changes made by the EPA in the

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<sup>1</sup> Pollack, A.K., L. Chan, P. Chandraker, J. Grant, C. Lindhjem, S. Rao, J. Russell, C. Tran. 2006. "WRAP MOBILE Source Emission Inventories Update." Prepared for Western Governors' Association, Denver, CO. May.

NONROAD2005a model from the draft NONROAD2004 model. The most important changes were:

- New evaporative emissions for tank permeation, hose permeation, hot soak, and running loss emissions;
- Revision of diurnal emissions calculations;
- Revision of equipment population growth factors; and
- Update of equipment population allocation files based on the latest U.S. Census County Business Patterns data.

With these and other more minor updates, emissions estimates changed for all pollutants and most source categories. ENVIRON compared emission results generated by the older draft NONROAD2004 model and the NONROAD2005a model in the following five geographical areas:

- The entire state of Arizona to evaluate statewide effects;
- Maricopa and Pinal Counties in Arizona to evaluate effects in urban counties;
- Garfield County, in Colorado, in order to evaluate effects in a rural county with significant oil and gas activities and a major road, I70, through it; and
- Sublette County, in Wyoming, to evaluate effects in a rural county without a major road through it.

These model runs were all made for summer 2018, as the largest effects of the model changes were expected in the summer season when temperatures are highest and activity is typically highest.

Changes to the draft NONROAD2004 model to create the NONROAD2005a model affect the WRAP inventory emissions with varying magnitudes by pollutant and geographic area. Emissions comparisons between NONROAD2004 and NONROAD2005a are presented in Appendix B for volatile organic compounds (VOC), carbon monoxide (CO), nitrogen oxides (NO<sub>x</sub>) and particulate matter (PM<sub>10</sub> and PM<sub>2.5</sub>).

Relative to the draft NONROAD2004 model, VOC emissions estimated with the NONROAD2005a model increased in four of the five geographical areas due to the addition of evaporative modes in the final model. The exception, Garfield County, showed emissions decreases across all pollutants, indicating that a VOC increase due to additional evaporative modes may have been offset by decreased equipment population resulting from updated Census data in the allocation data files. Pinal County also appears to have been affected by Census changes; emissions from the NONROAD2005a model showed large increases across all pollutants relative to the draft NONROAD2004 results. CO emissions changes were small (less than 2%) between model versions, with the exception of Garfield and Pinal Counties, where changes in population allocation were significant.

Relative to the draft NONROAD2004 model, NO<sub>x</sub> emissions estimated with the NONROAD2005a model decreased by about 9% for both the state of Arizona and Maricopa



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County. NOx increased by 40% for Pinal County, decreased by 19% in Garfield County, and increased by 10% in Sublette County. At the county level, a 40% increase could be significant; however, the Arizona statewide emissions show a more moderate 9% increase in NOx emissions.

Relative to the draft NONROAD2004 model, PM10 and PM2.5 emissions estimated with the NONROAD2005a model increased negligibly for Maricopa County at 0.2% and 0.8%, respectively. There were also relatively small changes for the state of Arizona, with decreases of 7.6% and 7% for PM10 and PM2.5, respectively. There were very large increases in particulate emissions for Pinal County just as there were for the other pollutants, with PM10 and PM2.5 up 109% and 108%, respectively. Garfield County emissions decreased 29% and 28%, for PM10 and PM2.5, respectively.

While there were large changes to emissions from the draft NONROAD2004 model to the final 2005 model for some counties (Pinal, Garfield), the differences between model versions are more moderate for the state of Arizona, in particular for pollutants of interest to visibility concerns. The state of Arizona exhibited modest decreases of NOx and PM2.5 emissions at 9% and 7%, respectively.

## NEW EPA REGULATIONS

Subsequent to the release of the NONROAD2005a model, two standards were finalized for nonroad engines. These regulations are described below, along with emissions reductions expected from the new standards.

### Emissions Standards for Small SI Engines and Marine SI Engines

In September 2008, EPA finalized regulations for new exhaust emissions standards for small SI engines and marine SI engines (<http://www.epa.gov/OMS/regs/nonroad/marinesiequipld/420f08013.htm>). The ruling covers SI engines rated less than 25 horsepower used in household and commercial applications. This is primarily lawn and garden equipment, but also includes a variety of other construction, farm, and industrial equipment. The rule also covers SI engines used recreational in marine vessels, including outboard engines, personal watercraft, and sterndrive/inboard engines.

While there are significant emissions reductions for these engines, the contribution of these engines to the overall anthropogenic emission inventory is not large, so the overall percent reduction is small. The reductions (small and marine SI combined) shown in Table 1, projected for year 2020, are derived from EPA's Regulatory Impact Analysis (RIA, available at <http://www.epa.gov/OMS/equip-ld.htm>):

**Table 1.** Emission reductions to small spark ignition (SI) engines and marine SI engines.

2020 Emissions Reductions	VOC	NOx	PM10
Reduction as percent of baseline small and marine SI engines	39%	38%	11%
Reduction as percent of baseline total mobile sources	12.3%	1.8%	1.3%
Reduction as percent of baseline total anthropogenic sources	3.9%	0.9%	0.1%

To estimate these reductions, EPA developed a modified version of their NONROAD model. The model version that is on EPA's NONROAD web page is NONROAD2005a; EPA's version NONROAD2005d was developed for this rule. The updated version of the model is not posted on the NONROAD web page, but is available in the rule docket (not electronically); ENVIRON obtained a copy directly from EPA's Office of Transportation and Air Quality.

ENVIRON used the same five scenarios as described above in the comparison of NONROAD2004 with NONROAD2005a to evaluate the effects on emissions of the new rule. We compared the NONROAD2005d model to the NONROAD2005a model for the five geographic areas to evaluate the estimated effects of the latest SI rule, and we also compared the NONROAD2005d model to the NONROAD2004 model in these areas to evaluate the combined effects of the model change and the SI rule.

Changes in emissions between the NONROAD2005a model and the NONROAD2005d version are presented in Appendix B for each of the five geographic areas. The broad effect of the NONROAD2005d model was to decrease emissions of all pollutants. The largest decreases from the EPA ruling were for VOC and CO, as expected. Decreases ranged from 22% to 48% for VOC and 26% to 51% for CO. Decreases to NOx and PM were small or moderate for each of the five areas. Decreases of NOx emissions were 7% for Maricopa County, 11% for the state of Arizona, 1% for Pinal County, 7% for Garfield County, and 2% for Sublette County. PM2.5 emissions decreased by 3.5% for Maricopa County, 9.2% for the state of Arizona, 3.1% for Garfield County, and 3.8% for Sublette County, while the increased by 0.4% for Pinal County. Changes to PM10 emissions were very similar to changes in PM2.5 emissions.

### **Snowmobile Emissions Standards Rule**

In June 2008 there was a minor change to the snowmobiles emissions standards rule (<http://www.epa.gov/otaq/recveh.htm>). That action removed the Phase 3 NOx standards for the 2012 and later model year snowmobiles in response to a court decision. This rule change is *not* reflected in the NONROAD2005d model, nor has EPA implemented this rule in any version of the model (personal communication with Craig Harvey, EPA OTAQ).

The effect on emissions of the recent change to snowmobile emission standards is to increase emissions for model year 2012 and later snowmobiles. Table 2 shows 2018 NOx emissions from snowmobiles in the current WRAP 2018 emission inventory (based on NONROAD2004). As shown for the winter season, when snowmobiles are most active, snowmobiles make up 4% of total off-road equipment emissions in the WRAP domain. As a fraction of total statewide off-road equipment emissions, snowmobiles contribute less than ten percent of winter off-road emissions in most states and a higher proportion of emissions in Alaska, Wyoming, and Idaho. Annually, snowmobiles contribute only 1% of all off-road equipment NOx emissions over the entire WRAP domain, and from 0% to 13% of off-road equipment NOx emissions by state.

In NONROAD2005, snowmobiles have a median life of 252 hours at full load, which translates to a median life of 13 years at the NONROAD2005 default average load of 0.34 and default annual use of 57 hours per year. Per NONROAD2005 growth estimates, the snowmobile population is expected to grow by 17% from 2012 and 2018. Even with the 17% growth rate,

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given the 13 year median life, a large fraction of the snowmobile population will be of model years prior to 2012 in calendar year 2018 and thus unaffected by the rescinding of NOx emissions standards beginning in model year 2012.

**Table 2.** 2018 snowmobile NOx emissions in current WRAP inventory<sup>1</sup>.

State	2018 NOx Emissions (tons per winter day)		
	Snowmobile Emissions	Total Off-road Equipment Emissions	Fraction of Off-road Equipment Emissions from Snowmobiles
<b>Winter</b>			
Alaska	3.7	6.5	58%
Arizona	0.7	28.7	2%
California	1.0	296.3	0%
Colorado	2.4	27.7	9%
Idaho	2.4	13.2	18%
Montana	1.0	11.2	9%
Nevada	0.0	12.9	0%
New Mexico	0.1	10.6	1%
North Dakota	1.3	17.8	7%
Oregon	1.1	22.8	5%
South Dakota	1.1	16.9	6%
Utah	1.6	23.4	7%
Washington	1.8	32.7	6%
Wyoming	2.3	7.5	30%
<b>Total</b>	<b>20.3</b>	<b>528.2</b>	<b>4%</b>
<b>Annual</b>			
Alaska	0.9	7.2	13%
Arizona	0.2	45.7	0%
California	0.5	296.3	0%
Colorado	0.6	60.0	1%
Idaho	0.6	33.3	2%
Montana	0.2	33.8	1%
Nevada	0.0	22.6	0%
New Mexico	0.0	19.2	0%
North Dakota	0.3	60.7	1%
Oregon	0.3	52.9	0%
South Dakota	0.3	57.9	0%
Utah	0.4	40.7	1%
Washington	0.5	73.1	1%
Wyoming	0.6	17.1	3%
<b>Total</b>	<b>5.3</b>	<b>820.5</b>	<b>1%</b>

## New Source Performance Standards

The New Source Performance Standard (NSPS) for stationary SI engines was promulgated in January 2009. This rulemaking does not apply to mobile sources, which are defined as being moved once per year or more. This rulemaking covers compressors and other oil and gas engines, and those reductions are being taken into account in the IPAMS/WRAP Phase III oil and gas emission inventory now being conducted by ENVIRON.



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## ANALYSIS AND RECOMMENDATIONS

The cumulative effects of the change from the draft NONROAD2004 model to the NONROAD2005a model and the EPA rulemaking for new exhaust emissions standards for small SI engines and marine SI engines (NONROAD2005a to NONROAD2005d) are additive in some cases and have offsetting effects in others. All of the percent changes previously discussed are in the context of changes to total off-road equipment emissions. Appendix A shows the by-sector 2018 (PRP18a) WRAP emissions inventory<sup>1</sup>, and also shows the fraction of the overall inventory from NONROAD model sources. The net change in emissions from the use of the most recent NONROAD2005d model relative to the NONROAD2004 model used in the previous WRAP emission inventory<sup>1</sup> is placed into context of overall emissions in Table 3 for each of the five geographical areas modeled. That table shows that NONROAD model equipment emissions are only 8.5% of total NO<sub>x</sub> emissions, 1.3% of total PM<sub>2.5</sub> emissions, and 0.1% of total SO<sub>2</sub> emissions. Table 3 expresses the percent reductions for each of the five geographical areas seen in the changes from NONROAD2004 to NONROAD2005d as a function of the overall 2018 emission inventory as shown in Appendix A. As an example of the calculations, Maricopa County NO<sub>x</sub> emissions decreased 15.5% between NONROAD2004 and NONROAD2005d, and NONROAD equipment emissions contribute only 8.5% of all 2018 NO<sub>x</sub> emissions in WRAP states. The multiplicative effect is just a 1.3% decrease in the overall 2018 emissions inventory as shown in Table 3. While the NONROAD equipment emissions' percent of overall emissions will clearly vary by region, the table provides an indication of the very small overall changes in emissions that would result with updating the 2018 NONROAD equipment emissions.

**Table 3.** Emissions changes from NONROAD model updates and small SI regulations expressed as a percent of total 2018 emissions across all categories.

Area	VOC	CO	NO <sub>x</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>
Maricopa County	-0.4%	-8.6%	-1.3%	0.0%	0.0%
State of Arizona	-0.4%	-8.2%	-1.6%	-0.1%	-0.2%
Pinal County	1.0%	3.2%	3.3%	0.5%	1.4%
Garfield County	-0.5%	-10.4%	-2.1%	-0.2%	-0.4%
Sublette County	-0.2%	-4.4%	0.6%	0.0%	0.1%

The net changes to emissions as shown in Table 3 for the key visibility-related pollutants are very small, at most a few percent. Updating all 2018 nonroad emissions using the latest model from EPA would require significant resources (budget and time). Another factor to consider is that the EPA model changes from version NONROAD2004 to NONROAD2005a affect not only the 2018 future year, but also the 2002 base year. The direction and size of these differences would not be the same as shown for the effects of the model change in 2018 as shown in Appendix B, because fleet turnover from 2002 to 2018 shifts the distribution of emissions by pollutant and source category. We did not have the resources to so an evaluation as we did for 2002, but we estimated the effects of the model change on State of Arizona emissions in 2002 as about 8% increase in NO<sub>x</sub> emissions, 2% increase in PM<sub>2.5</sub> emissions, and 27% increase in VOC emissions. Those estimates are very different in both magnitude and direction from the same comparison for year 2018 as shown in Appendix B.

Given the very small effect the NONROAD model updates and small SI rule effects are likely to have on the overall emission inventory, the significant resources that would be required to exercise the model in all WRAP states for all seasons, and the fact that there would then be an apples and oranges comparison if the 2002 emissions were also not updated, ENVIRON recommends that WRAP not update the NONROAD equipment emissions inventory using the latest NONROAD2005d model for the PRP18b inventory.

We do, however, recommend that States use the latest EPA model, incorporating the small SI rule and previous model changes, in any local air quality planning efforts.

ENVIRON has two additional recommendations in regards to updating the 2018 nonroad emissions:

- Snowmobile emissions contribute only 1% of 2018 WRAP region-wide annual off-road equipment NO<sub>x</sub> emissions, and less than 0,1% of the total region-wide NO<sub>x</sub> emissions shown in Appendix A. Given these very small contribution of snowmobile emissions to total 2018 NO<sub>x</sub> emissions, and the fact that EPA has not updated the NONROAD model for the minor amendments to the snowmobile emissions standards, ENVIRON recommends not updating the WRAP PRP18b emission inventory to account for the amended rule.
- All NONROAD oil field equipment emissions from the WRAP off-road equipment modeling inventories outside of California should be removed from the current PRP18b inventories. NONROAD oil field equipment emissions are estimated by the NONROAD model for SCCs 2260010010, 2265010010, 2267010010, 2268010010, 2270010010; the NONROAD emissions estimates for such equipment are extremely small as they are based on inappropriate activity data. ENVIRON has estimated oil field equipment emissions in a separate project for WRAP and these are currently in the PRP18a emission inventories; excluding the small amount of emissions from these sources in the NONROAD model will avoid double-counting.

## APPENDIX A

**Table A1.** PRP18a WRAP total annual emissions by sector<sup>2</sup>, with NONROAD category detail added.

Sector	VOC	CO	NOX	PM10	PM2.5	SO2	NH3
<b>Fires</b>	436,714	8,928,013	202,217	726,518	627,618	53,856	45,263
<b>Area</b>	1,860,528	1,446,307	320,345	240,738	211,012	110,772	25,430
<b>Point</b>	299,700	752,028	895,549	190,862	58,607	535,055	14,031
<b>Non Road</b>	328,247	4,367,813	594,397	43,367	39,320	4,074	1,409
<i>Off-Road Equipment</i>	320,477	4,106,348	299,491	23,172	21,111	722	702
<i>Aircraft &amp; Locom.</i>	7,770	261,465	294,906	20,195	18,209	3,352	707
<b>Onroad</b>	400,626	5,708,505	519,090	36,368	23,618	5,933	71,408
<b>Biogenic</b>	18,197,340	2,624,814	286,996	0	0	0	0
<b>WOG</b>	749,979	68,260	191,728	0	0	89	0
<b>Road Dust</b>	0	0	0	689,599	72,821	0	0
<b>Fugitive Dust</b>	0	0	0	1,123,032	166,125	0	0
<b>Wind-Blown Dust</b>	0	0	0	1,962,165	431,676	0	0
<b>Offshore Platforms</b>	0	0	0	0	0	0	0
<b>Offshore Shipping</b>	367,468	40,868	524,797	36,352	35,220	280,561	149
<b>Ag Ammonia</b>	0	0	0	0	0	0	817,256
<b>Total</b>	22,640,603	23,936,606	3,535,119	5,049,001	1,666,017	990,341	974,946

**Table A2.** PRP18a WRAP off-road equipment fractions of total emissions.

Sector	VOC	CO	NOX	PM10	PM2.5	SO2	NH3
<b>Off-road Equipment Fractions</b>	<b>1.4%</b>	<b>17.2%</b>	<b>8.5%</b>	<b>0.1%</b>	<b>1.3%</b>	<b>0.1%</b>	<b>0.1%</b>

<sup>2</sup> WRAP, 2007. WRAP Regional Modeling Center - Simulation Specifications.  
[http://pah.cert.ucr.edu/aqm/308/spec\\_sheets/SpecSheet\\_PRP18a\\_11\\_03\\_2008.pdf](http://pah.cert.ucr.edu/aqm/308/spec_sheets/SpecSheet_PRP18a_11_03_2008.pdf) April.

**APPENDIX B**

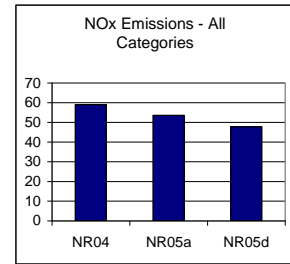
**NONROAD MODELING RESULTS BY GEOGRAPHICAL AREA**

## State of Arizona NONROAD modeling results

### NOx Emissions (tpd) for Arizona, 2018 summer season average day

Emission Source Category	Model Version		
	NR04	NR05a	NR05d
Agricultural Equipment	7.99	7.70	7.76
Airport Ground Support Equipment	0.49	0.54	0.55
Commercial Equipment	4.01	3.79	3.35
Construction and Mining Equipment	22.13	19.61	19.74
Industrial Equipment	2.96	3.35	3.35
Lawn and Garden Equipment (Com)	7.80	7.70	5.95
Lawn and Garden Equipment (Res)	1.18	1.18	0.68
Logging Equipment	0.04	0.04	0.04
Pleasure Craft	11.34	8.67	5.59
Railroad Equipment	0.10	0.10	0.10
Recreational Equipment	0.95	0.88	0.77
<b>Grand Total</b>	<b>59.00</b>	<b>53.57</b>	<b>47.87</b>

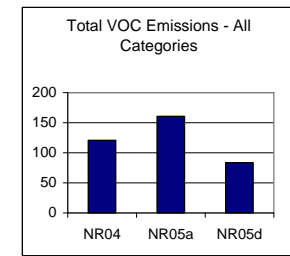
% Difference by Category		
NR04 to NR05a	NR04 to NR05d	NR05a to NR05d
-3.6%	-2.9%	0.8%
11.5%	12.4%	0.8%
-5.6%	-16.5%	-11.6%
-11.4%	-10.8%	0.7%
13.0%	13.0%	0.0%
-1.3%	-23.8%	-22.8%
0.1%	-42.6%	-42.7%
1.4%	-2.7%	-4.0%
-23.5%	-50.7%	-35.6%
-5.3%	-4.0%	1.4%
-7.6%	-19.5%	-13.0%
<b>-9.2%</b>	<b>-18.9%</b>	<b>-10.6%</b>



### Total VOC Emissions (tpd) for Arizona, 2018 summer season average day

Emission Source Category	Model Version		
	NR04	NR05a	NR05d
Agricultural Equipment	0.93	0.92	0.87
Airport Ground Support Equipment	0.06	0.06	0.06
Commercial Equipment	5.59	9.48	4.99
Construction and Mining Equipment	4.53	4.15	3.71
Industrial Equipment	0.36	0.41	0.40
Lawn and Garden Equipment (Com)	33.99	40.45	29.63
Lawn and Garden Equipment (Res)	9.93	22.90	9.03
Logging Equipment	0.13	0.15	0.12
Pleasure Craft	50.06	59.69	12.94
Railroad Equipment	0.02	0.02	0.02
Recreational Equipment	15.15	22.48	21.74
<b>Grand Total</b>	<b>120.77</b>	<b>160.73</b>	<b>83.50</b>

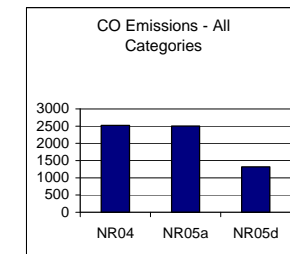
% Difference by Category		
NR04 to NR05a	NR04 to NR05d	NR05a to NR05d
-0.6%	-6.7%	-6.1%
6.5%	-0.8%	-6.9%
69.5%	-10.8%	-47.4%
-8.4%	-18.1%	-10.6%
14.8%	10.3%	-3.9%
19.0%	-12.8%	-26.7%
130.6%	-9.1%	-60.6%
9.9%	-7.7%	-16.0%
19.2%	-74.2%	-78.3%
9.7%	-8.5%	-16.5%
48.4%	43.5%	-3.3%
<b>33.1%</b>	<b>-30.9%</b>	<b>-48.0%</b>



### CO Emissions (tpd) for Arizona, 2018 summer season average day

Emission Source Category	Model Version		
	NR04	NR05a	NR05d
Agricultural Equipment	10.97	9.96	7.97
Airport Ground Support Equipment	0.78	0.80	0.51
Commercial Equipment	305.00	312.53	148.19
Construction and Mining Equipment	66.20	55.80	33.88
Industrial Equipment	7.46	8.70	7.74
Lawn and Garden Equipment (Com)	1307.61	1327.39	637.16
Lawn and Garden Equipment (Res)	359.84	365.19	176.78
Logging Equipment	1.88	1.92	1.24
Pleasure Craft	293.29	247.99	176.89
Railroad Equipment	0.49	0.49	0.27
Recreational Equipment	167.46	172.87	130.80
<b>Grand Total</b>	<b>2520.98</b>	<b>2503.66</b>	<b>1321.42</b>

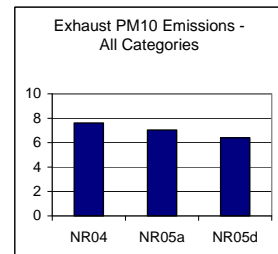
% Difference by Category		
NR04 to NR05a	NR04 to NR05d	NR05a to NR05d
-9.2%	-27.4%	-20.1%
2.5%	-34.8%	-36.4%
2.5%	-51.4%	-52.6%
-15.7%	-48.8%	-39.3%
16.6%	3.7%	-11.1%
1.5%	-51.3%	-52.0%
1.5%	-50.9%	-51.6%
2.8%	-33.8%	-35.5%
-15.4%	-39.7%	-28.7%
2.0%	-45.1%	-46.2%
3.2%	-21.9%	-24.3%
<b>-0.7%</b>	<b>-47.6%</b>	<b>-47.2%</b>



### Exhaust PM10 Emissions (tpd) for Arizona, 2018 summer season average day

Emission Source Category	Model Version		
	NR04	NR05a	NR05d
Agricultural Equipment	0.43	0.57	0.57
Airport Ground Support Equipment	0.01	0.04	0.04
Commercial Equipment	0.33	0.32	0.33
Construction and Mining Equipment	1.27	1.71	1.71
Industrial Equipment	0.08	0.15	0.15
Lawn and Garden Equipment (Com)	2.34	2.43	2.51
Lawn and Garden Equipment (Res)	0.28	0.29	0.31
Logging Equipment	0.01	0.02	0.02
Pleasure Craft	2.36	0.90	0.14
Railroad Equipment	0.01	0.01	0.01
Recreational Equipment	0.49	0.60	0.60
<b>Grand Total</b>	<b>7.62</b>	<b>7.04</b>	<b>6.39</b>

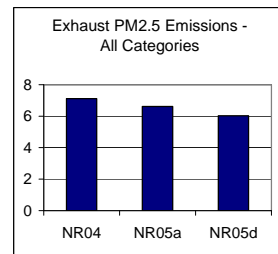
% Difference by Category		
NR04 to NR05a	NR04 to NR05d	NR05a to NR05d
32.5%	32.5%	0.0%
172.6%	173.0%	0.2%
-3.1%	1.2%	4.5%
34.6%	34.8%	0.1%
82.3%	82.5%	0.1%
4.0%	7.2%	3.1%
3.1%	10.7%	7.3%
14.7%	14.7%	0.0%
-61.8%	-94.0%	-84.2%
2.1%	2.2%	0.1%
21.1%	21.2%	0.1%
<b>-7.6%</b>	<b>-16.1%</b>	<b>-9.2%</b>



### Exhaust PM2.5 Emissions (tpd) for Arizona, 2018 summer season average day

Emission Source Category	Model Version		
	NR04	NR05a	NR05d
Agricultural Equipment	0.42	0.55	0.55
Airport Ground Support Equipment	0.01	0.04	0.04
Commercial Equipment	0.31	0.30	0.31
Construction and Mining Equipment	1.22	1.65	1.65
Industrial Equipment	0.08	0.15	0.15
Lawn and Garden Equipment (Com)	2.16	2.25	2.32
Lawn and Garden Equipment (Res)	0.26	0.27	0.29
Logging Equipment	0.01	0.01	0.01
Pleasure Craft	2.17	0.83	0.13
Railroad Equipment	0.01	0.01	0.01
Recreational Equipment	0.45	0.55	0.55
<b>Grand Total</b>	<b>7.12</b>	<b>6.62</b>	<b>6.02</b>

% Difference by Category		
NR04 to NR05a	NR04 to NR05d	NR05a to NR05d
32.5%	32.5%	0.0%
172.7%	173.1%	0.2%
-3.2%	1.0%	4.4%
35.0%	35.1%	0.1%
80.9%	81.1%	0.1%
4.0%	7.3%	3.1%
3.1%	10.7%	7.3%
15.5%	15.5%	0.0%
-61.7%	-94.0%	-84.2%
2.1%	2.2%	0.1%
20.8%	21.0%	0.1%
<b>-7.0%</b>	<b>-15.4%</b>	<b>-9.0%</b>

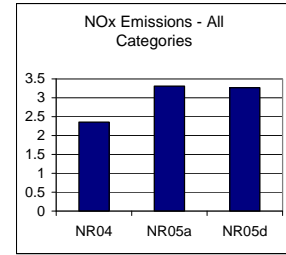


## Pinal County, Arizona NONROAD modeling results

### NOx Emissions (tpd) for Pinal County, 2018 summer season average day

Emission Source Category	Model Version		
	NR04	NR05a	NR05d
Agricultural Equipment	1.84	1.80	1.82
Airport Ground Support Equipment	0.00	0.00	0.00
Commercial Equipment	0.06	0.05	0.05
Construction and Mining Equipment	0.30	1.13	1.14
Industrial Equipment	0.08	0.08	0.08
Lawn and Garden Equipment (Com)	0.00	0.14	0.11
Lawn and Garden Equipment (Res)	0.03	0.05	0.03
Pleasure Craft	0.01	0.00	0.01
Railroad Equipment	0.00	0.01	0.01
Recreational Equipment	0.04	0.04	0.03
<b>Grand Total</b>	<b>2.36</b>	<b>3.31</b>	<b>3.27</b>

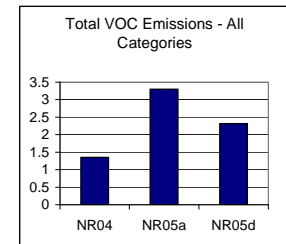
% Difference by Category		
NR04 to NR05a	NR04 to NR05d	NR05a to NR05d
-2.0%	-1.3%	0.8%
100.0%	100.0%	0.8%
-13.1%	-23.2%	-11.7%
282.1%	284.7%	0.7%
3.8%	3.8%	0.0%
100.0%	100.0%	-22.9%
42.8%	-18.1%	-42.7%
-37.5%	-21.1%	26.2%
163.1%	166.9%	1.4%
0.4%	-18.1%	-18.4%
<b>40.5%</b>	<b>38.7%</b>	<b>-1.3%</b>



### Total VOC Emissions (tpd) for Pinal County, 2018 summer season average day

Emission Source Category	Model Version		
	NR04	NR05a	NR05d
Agricultural Equipment	0.22	0.22	0.21
Airport Ground Support Equipment	0.00	0.00	0.00
Commercial Equipment	0.09	0.14	0.07
Construction and Mining Equipment	0.06	0.24	0.22
Industrial Equipment	0.01	0.01	0.01
Lawn and Garden Equipment (Com)	0.00	0.76	0.55
Lawn and Garden Equipment (Res)	0.29	0.93	0.37
Pleasure Craft	0.07	0.09	0.02
Railroad Equipment	0.00	0.00	0.00
Recreational Equipment	0.62	0.91	0.87
<b>Grand Total</b>	<b>1.35</b>	<b>3.30</b>	<b>2.32</b>

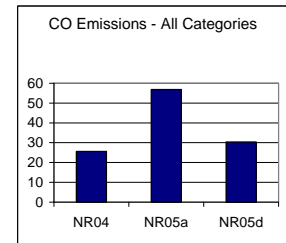
% Difference by Category		
NR04 to NR05a	NR04 to NR05d	NR05a to NR05d
2.4%	-4.0%	-6.3%
100.0%	100.0%	-7.0%
58.9%	-16.0%	-47.1%
297.7%	254.1%	-10.9%
-8.0%	-11.0%	-3.3%
100.0%	100.0%	-27.0%
221.2%	29.0%	-59.8%
27.5%	-76.6%	-81.7%
208.9%	156.1%	-17.1%
47.6%	40.7%	-4.7%
<b>144.1%</b>	<b>71.6%</b>	<b>-29.7%</b>



### CO Emissions (tpd) for Pinal County, 2018 summer season average day

Emission Source Category	Model Version		
	NR04	NR05a	NR05d
Agricultural Equipment	2.51	2.32	1.85
Airport Ground Support Equipment	0.00	0.00	0.00
Commercial Equipment	4.39	4.21	1.99
Construction and Mining Equipment	0.87	3.20	1.95
Industrial Equipment	0.18	0.15	0.14
Lawn and Garden Equipment (Com)	0.00	24.34	11.68
Lawn and Garden Equipment (Res)	9.31	13.69	6.63
Pleasure Craft	0.35	0.23	0.20
Railroad Equipment	0.02	0.04	0.02
Recreational Equipment	7.99	8.63	5.90
<b>Grand Total</b>	<b>25.62</b>	<b>56.82</b>	<b>30.36</b>

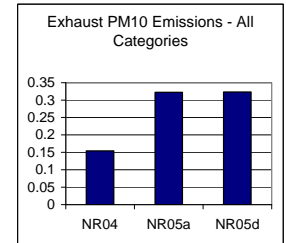
% Difference by Category		
NR04 to NR05a	NR04 to NR05d	NR05a to NR05d
-7.7%	-26.1%	-20.0%
100.0%	100.0%	-36.3%
-4.1%	-54.5%	-52.6%
266.2%	122.5%	-39.2%
-16.2%	-25.1%	-10.6%
100.0%	100.0%	-52.0%
47.1%	-28.8%	-51.6%
-34.9%	-44.3%	-14.4%
185.1%	53.6%	-46.1%
8.0%	-26.2%	-31.6%
<b>121.8%</b>	<b>18.5%</b>	<b>-46.6%</b>



### Exhaust PM10 Emissions (tpd) for Pinal County, 2018 summer season average day

Emission Source Category	Model Version		
	NR04	NR05a	NR05d
Agricultural Equipment	0.10	0.13	0.13
Airport Ground Support Equipment	0.00	0.00	0.00
Commercial Equipment	0.00	0.00	0.00
Construction and Mining Equipment	0.02	0.10	0.10
Industrial Equipment	0.00	0.00	0.00
Lawn and Garden Equipment (Com)	0.00	0.04	0.05
Lawn and Garden Equipment (Res)	0.01	0.01	0.01
Pleasure Craft	0.00	0.00	0.00
Railroad Equipment	0.00	0.00	0.00
Recreational Equipment	0.02	0.02	0.02
<b>Grand Total</b>	<b>0.15</b>	<b>0.32</b>	<b>0.32</b>

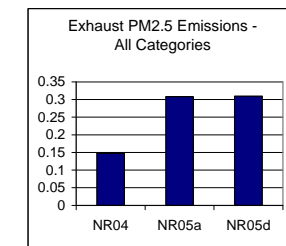
% Difference by Category		
NR04 to NR05a	NR04 to NR05d	NR05a to NR05d
34.7%	34.7%	0.0%
100.0%	100.0%	0.2%
-10.3%	-6.3%	4.5%
480.7%	481.3%	0.1%
70.8%	71.0%	0.1%
100.0%	100.0%	3.1%
48.7%	59.5%	7.3%
-63.5%	-96.6%	-90.6%
183.9%	184.2%	0.1%
21.3%	21.6%	0.2%
<b>108.9%</b>	<b>109.7%</b>	<b>0.4%</b>



### Exhaust PM2.5 Emissions (tpd) for Pinal County, 2018 summer season average day

Emission Source Category	Model Version		
	NR04	NR05a	NR05d
Agricultural Equipment	0.10	0.13	0.13
Airport Ground Support Equipment	0.00	0.00	0.00
Commercial Equipment	0.00	0.00	0.00
Construction and Mining Equipment	0.02	0.10	0.10
Industrial Equipment	0.00	0.00	0.00
Lawn and Garden Equipment (Com)	0.00	0.04	0.04
Lawn and Garden Equipment (Res)	0.01	0.01	0.01
Pleasure Craft	0.00	0.00	0.00
Railroad Equipment	0.00	0.00	0.00
Recreational Equipment	0.02	0.02	0.02
<b>Grand Total</b>	<b>0.15</b>	<b>0.31</b>	<b>0.31</b>

% Difference by Category		
NR04 to NR05a	NR04 to NR05d	NR05a to NR05d
34.7%	34.7%	0.0%
100.0%	100.0%	0.2%
-10.4%	-6.5%	4.4%
482.1%	482.7%	0.1%
69.0%	69.2%	0.1%
100.0%	100.0%	3.1%
48.6%	59.5%	7.3%
-63.5%	-96.6%	-90.6%
183.6%	183.9%	0.1%
21.0%	21.3%	0.2%
<b>108.4%</b>	<b>109.1%</b>	<b>0.4%</b>

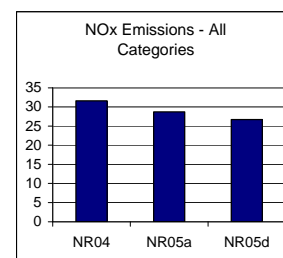


## Maricopa County, Arizona NONROAD modeling results

### NOx Emissions (tpd) for Maricopa County, 2018 summer season average day

Emission Source Category	Model Version		
	NR04	NR05a	NR05d
Agricultural Equipment	2.36	2.01	2.03
Airport Ground Support Equipment	0.45	0.46	0.46
Commercial Equipment	2.73	2.68	2.38
Construction and Mining Equipment	15.25	13.37	13.46
Industrial Equipment	2.02	2.22	2.22
Lawn and Garden Equipment (Com)	5.96	5.76	4.49
Lawn and Garden Equipment (Res)	0.68	0.65	0.37
Logging Equipment	0.02	0.00	0.00
Pleasure Craft	1.93	1.40	1.18
Railroad Equipment	0.06	0.01	0.01
Recreational Equipment	0.13	0.14	0.08
<b>Grand Total</b>	<b>31.59</b>	<b>28.71</b>	<b>26.70</b>

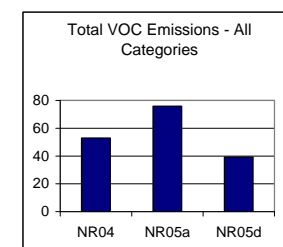
% Difference by Category		
NR04 to NR05a	NR04 to NR05d	NR05a to NR05d
-14.8%	-14.1%	0.8%
1.2%	2.0%	0.8%
-1.7%	-12.6%	-11.1%
-12.3%	-11.7%	0.7%
10.2%	10.2%	0.0%
-3.3%	-24.8%	-22.2%
-4.2%	-45.0%	-42.6%
-100.0%	-100.0%	0.0%
-27.4%	-38.6%	-15.5%
-79.2%	-78.9%	1.5%
7.1%	-35.5%	-39.8%
<b>-9.1%</b>	<b>-15.5%</b>	<b>-7.0%</b>



### Total VOC Emissions (tpd) for Maricopa County, 2018 summer season average day

Emission Source Category	Model Version		
	NR04	NR05a	NR05d
Agricultural Equipment	0.27	0.24	0.23
Airport Ground Support Equipment	0.06	0.06	0.05
Commercial Equipment	3.84	7.31	3.60
Construction and Mining Equipment	3.13	2.87	2.53
Industrial Equipment	0.26	0.28	0.27
Lawn and Garden Equipment (Com)	26.19	31.92	22.86
Lawn and Garden Equipment (Res)	5.95	14.96	5.25
Logging Equipment	0.07	0.00	0.00
Pleasure Craft	12.15	16.65	3.22
Railroad Equipment	0.01	0.00	0.00
Recreational Equipment	1.05	1.59	1.32
<b>Grand Total</b>	<b>52.97</b>	<b>75.89</b>	<b>39.34</b>

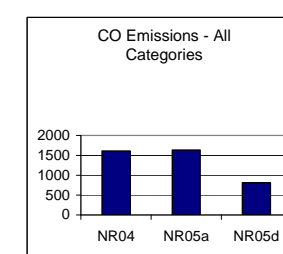
% Difference by Category		
NR04 to NR05a	NR04 to NR05d	NR05a to NR05d
-9.8%	-16.3%	-7.2%
-2.9%	-10.0%	-7.3%
90.2%	-6.4%	-50.8%
-8.2%	-19.0%	-11.8%
10.8%	6.0%	-4.4%
21.9%	-12.7%	-28.4%
151.4%	-11.7%	-64.9%
-100.0%	-100.0%	0.0%
37.1%	-73.5%	-80.7%
-75.6%	-79.9%	-17.7%
51.8%	26.4%	-16.8%
<b>43.3%</b>	<b>-25.7%</b>	<b>-48.2%</b>



### CO Emissions (tpd) for Maricopa County, 2018 summer season average day

Emission Source Category	Model Version		
	NR04	NR05a	NR05d
Agricultural Equipment	3.30	2.65	2.11
Airport Ground Support Equipment	0.73	0.69	0.44
Commercial Equipment	211.73	229.83	108.93
Construction and Mining Equipment	46.13	38.75	23.43
Industrial Equipment	5.53	6.17	5.47
Lawn and Garden Equipment (Com)	1012.89	1044.99	500.88
Lawn and Garden Equipment (Res)	218.73	215.85	104.43
Logging Equipment	1.00	0.00	0.00
Pleasure Craft	71.63	53.09	41.29
Railroad Equipment	0.29	0.07	0.04
Recreational Equipment	40.09	44.24	21.83
<b>Grand Total</b>	<b>1612.05</b>	<b>1636.32</b>	<b>808.84</b>

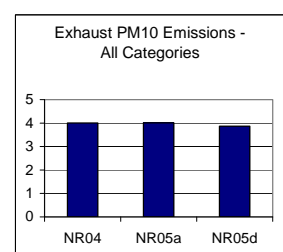
% Difference by Category		
NR04 to NR05a	NR04 to NR05d	NR05a to NR05d
-19.7%	-36.0%	-20.2%
-5.6%	-40.3%	-36.7%
8.5%	-48.6%	-52.6%
-16.0%	-49.2%	-39.5%
11.6%	-1.0%	-11.3%
3.2%	-50.5%	-52.1%
-1.3%	-52.3%	-51.6%
-100.0%	-100.0%	0.0%
-25.9%	-42.4%	-22.2%
-77.5%	-87.9%	-46.3%
10.4%	-45.5%	-50.7%
<b>1.5%</b>	<b>-49.8%</b>	<b>-50.6%</b>



### Exhaust PM10 Emissions (tpd) for Maricopa County, 2018 summer season average day

Emission Source Category	Model Version		
	NR04	NR05a	NR05d
Agricultural Equipment	0.13	0.15	0.15
Airport Ground Support Equipment	0.01	0.03	0.03
Commercial Equipment	0.22	0.23	0.24
Construction and Mining Equipment	0.88	1.17	1.17
Industrial Equipment	0.06	0.10	0.10
Lawn and Garden Equipment (Com)	1.80	1.87	1.93
Lawn and Garden Equipment (Res)	0.17	0.17	0.18
Logging Equipment	0.01	0.00	0.00
Pleasure Craft	0.69	0.26	0.03
Railroad Equipment	0.01	0.00	0.00
Recreational Equipment	0.03	0.03	0.03
<b>Grand Total</b>	<b>4.00</b>	<b>4.01</b>	<b>3.87</b>

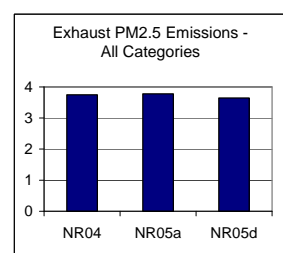
% Difference by Category		
NR04 to NR05a	NR04 to NR05d	NR05a to NR05d
17.2%	17.2%	0.0%
147.5%	147.9%	0.2%
1.4%	5.8%	4.4%
1.5%	6.1%	4.5%
33.2%	33.4%	0.1%
67.6%	67.8%	0.1%
4.0%	7.2%	3.1%
-0.3%	7.0%	7.3%
-100.0%	-100.0%	0.0%
-62.8%	-95.6%	-88.0%
-77.6%	-77.6%	0.1%
19.7%	21.4%	1.4%
<b>0.2%</b>	<b>-3.4%</b>	<b>-3.6%</b>



### Exhaust PM2.5 Emissions (tpd) for Maricopa County, 2018 summer season average day

Emission Source Category	Model Version		
	NR04	NR05a	NR05d
Agricultural Equipment	0.12	0.14	0.14
Airport Ground Support Equipment	0.01	0.03	0.03
Commercial Equipment	0.21	0.22	0.23
Construction and Mining Equipment	0.84	1.13	1.13
Industrial Equipment	0.06	0.10	0.10
Lawn and Garden Equipment (Com)	1.66	1.73	1.78
Lawn and Garden Equipment (Res)	0.16	0.15	0.17
Logging Equipment	0.01	0.00	0.00
Pleasure Craft	0.64	0.24	0.03
Railroad Equipment	0.01	0.00	0.00
Recreational Equipment	0.03	0.03	0.03
<b>Grand Total</b>	<b>3.75</b>	<b>3.78</b>	<b>3.64</b>

% Difference by Category		
NR04 to NR05a	NR04 to NR05d	NR05a to NR05d
17.2%	17.2%	0.0%
147.5%	147.9%	0.2%
1.4%	5.8%	4.4%
1.5%	6.1%	4.5%
33.2%	33.7%	0.1%
66.3%	66.5%	0.1%
4.0%	7.2%	3.1%
-0.3%	7.0%	7.3%
-100.0%	-100.0%	0.0%
-62.8%	-95.5%	-88.0%
-77.6%	-77.6%	0.1%
19.5%	21.2%	1.4%
<b>0.8%</b>	<b>-2.8%</b>	<b>-3.5%</b>

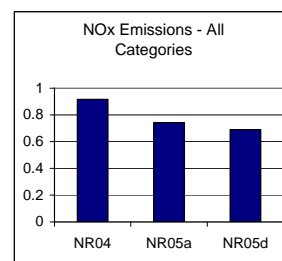


## Garfield County, Colorado NONROAD modeling results

### NOx Emissions (tpd) for Garfield County, 2018 summer season average day

Emission Source Category	Model Version		
	NR04	NR05a	NR05d
Sum of NOx	0.36	0.12	0.12
Agricultural Equipment	0.00	0.00	0.00
Airport Ground Support Equipment	0.00	0.00	0.00
Commercial Equipment	0.04	0.04	0.04
Construction and Mining Equipment	0.16	0.32	0.32
Industrial Equipment	0.11	0.04	0.04
Lawn and Garden Equipment (Com)	0.11	0.06	0.05
Lawn and Garden Equipment (Res)	0.02	0.02	0.01
Logging Equipment	0.00	0.00	0.00
Pleasure Craft	0.10	0.12	0.10
Railroad Equipment	0.00	0.00	0.00
Recreational Equipment	0.04	0.01	0.01
<b>Grand Total</b>	<b>0.92</b>	<b>0.74</b>	<b>0.69</b>

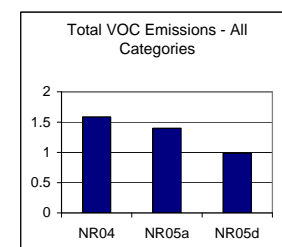
% Difference by Category		
NR04 to NR05a	NR04 to NR05d	NR05a to NR05d
-67.2%	-66.9%	0.9%
100.0%	100.0%	0.8%
10.8%	-3.7%	-13.1%
104.9%	106.3%	0.7%
-64.4%	-65.5%	-3.1%
-39.9%	-54.8%	-24.8%
30.4%	-25.8%	-43.1%
100.0%	100.0%	-4.8%
20.1%	-2.0%	-18.3%
222.0%	226.3%	1.3%
-60.0%	-67.5%	-18.7%
<b>-19.0%</b>	<b>-24.8%</b>	<b>-7.1%</b>



### Total VOC Emissions (tpd) for Garfield County, 2018 summer season average day

Emission Source Category	Model Version		
	NR04	NR05a	NR05d
Sum of VOC*	1.59	1.40	0.99
Agricultural Equipment	0.04	0.01	0.01
Airport Ground Support Equipment	0.00	0.00	0.00
Commercial Equipment	0.05	0.08	0.05
Construction and Mining Equipment	0.03	0.06	0.06
Industrial Equipment	0.05	0.01	0.01
Lawn and Garden Equipment (Com)	0.39	0.27	0.20
Lawn and Garden Equipment (Res)	0.09	0.19	0.10
Logging Equipment	0.00	0.00	0.00
Pleasure Craft	0.43	0.47	0.26
Railroad Equipment	0.00	0.00	0.00
Recreational Equipment	0.51	0.29	0.28
<b>Grand Total</b>	<b>1.59</b>	<b>1.40</b>	<b>0.99</b>

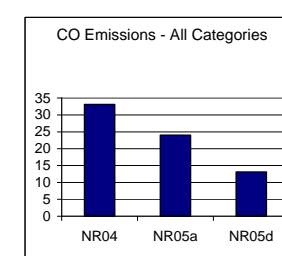
% Difference by Category		
NR04 to NR05a	NR04 to NR05d	NR05a to NR05d
-67.7%	-69.3%	-4.7%
100.0%	100.0%	-6.1%
69.8%	1.2%	-40.4%
104.1%	88.7%	-7.5%
-78.3%	-83.0%	-21.5%
-30.0%	-46.9%	-24.1%
115.9%	16.9%	-45.8%
100.0%	100.0%	-9.9%
9.3%	-38.8%	-44.0%
257.5%	208.6%	-13.7%
-42.9%	-44.8%	-3.3%
<b>-11.9%</b>	<b>-37.8%</b>	<b>-29.4%</b>



### CO Emissions (tpd) for Garfield County, 2018 summer season average day

Emission Source Category	Model Version		
	NR04	NR05a	NR05d
Sum of CO	33.11	24.01	13.12
Agricultural Equipment	0.52	0.17	0.13
Airport Ground Support Equipment	0.00	0.00	0.00
Commercial Equipment	2.57	3.12	1.48
Construction and Mining Equipment	0.45	0.86	0.53
Industrial Equipment	3.81	0.68	0.31
Lawn and Garden Equipment (Com)	14.88	9.51	4.55
Lawn and Garden Equipment (Res)	3.65	4.91	2.37
Logging Equipment	0.00	0.04	0.02
Pleasure Craft	1.91	2.01	1.81
Railroad Equipment	0.00	0.01	0.01
Recreational Equipment	5.33	2.72	1.91
<b>Grand Total</b>	<b>33.11</b>	<b>24.01</b>	<b>13.12</b>

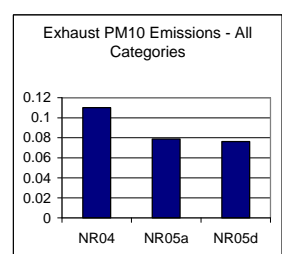
% Difference by Category		
NR04 to NR05a	NR04 to NR05d	NR05a to NR05d
-67.8%	-74.8%	-21.8%
100.0%	100.0%	-35.8%
21.6%	-42.3%	-52.5%
91.9%	18.5%	-38.3%
-82.2%	-91.8%	-53.9%
-36.1%	-69.5%	-52.2%
34.3%	-35.0%	-51.6%
100.0%	100.0%	-35.0%
5.2%	-4.9%	-9.6%
248.3%	88.9%	-45.8%
-49.1%	-64.3%	-29.8%
<b>-27.5%</b>	<b>-60.4%</b>	<b>-45.3%</b>



### Exhaust PM10 Emissions (tpd) for Garfield County, 2018 summer season average day

Emission Source Category	Model Version		
	NR04	NR05a	NR05d
Sum of PM10	0.11	0.08	0.08
Agricultural Equipment	0.02	0.01	0.01
Airport Ground Support Equipment	0.00	0.00	0.00
Commercial Equipment	0.00	0.00	0.00
Construction and Mining Equipment	0.01	0.03	0.03
Industrial Equipment	0.00	0.00	0.00
Lawn and Garden Equipment (Com)	0.03	0.02	0.02
Lawn and Garden Equipment (Res)	0.00	0.00	0.00
Logging Equipment	0.00	0.00	0.00
Pleasure Craft	0.03	0.01	0.00
Railroad Equipment	0.00	0.00	0.00
Recreational Equipment	0.02	0.01	0.01
<b>Grand Total</b>	<b>0.11</b>	<b>0.08</b>	<b>0.08</b>

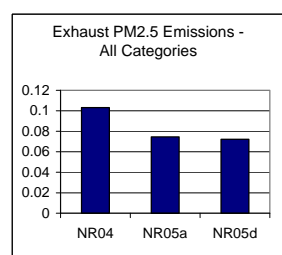
% Difference by Category		
NR04 to NR05a	NR04 to NR05d	NR05a to NR05d
-60.2%	-60.2%	0.0%
100.0%	100.0%	0.2%
13.5%	18.6%	4.5%
213.5%	213.0%	-0.1%
-17.9%	-16.9%	1.2%
-35.4%	-33.2%	3.5%
35.7%	46.2%	7.8%
100.0%	100.0%	0.0%
-72.4%	-85.0%	-45.5%
244.9%	245.3%	0.1%
-54.2%	-54.1%	0.2%
<b>-28.5%</b>	<b>-30.7%</b>	<b>-3.1%</b>



### Exhaust PM2.5 Emissions (tpd) for Garfield County, 2018 summer season average day

Emission Source Category	Model Version		
	NR04	NR05a	NR05d
Sum of PM2.5	0.10	0.07	0.07
Agricultural Equipment	0.02	0.01	0.01
Airport Ground Support Equipment	0.00	0.00	0.00
Commercial Equipment	0.00	0.00	0.00
Construction and Mining Equipment	0.01	0.03	0.03
Industrial Equipment	0.00	0.00	0.00
Lawn and Garden Equipment (Com)	0.02	0.02	0.02
Lawn and Garden Equipment (Res)	0.00	0.00	0.00
Logging Equipment	0.00	0.00	0.00
Pleasure Craft	0.03	0.01	0.00
Railroad Equipment	0.00	0.00	0.00
Recreational Equipment	0.02	0.01	0.01
<b>Grand Total</b>	<b>0.10</b>	<b>0.07</b>	<b>0.07</b>

% Difference by Category		
NR04 to NR05a	NR04 to NR05d	NR05a to NR05d
-60.2%	-60.2%	0.0%
100.0%	100.0%	0.2%
13.4%	18.3%	4.4%
214.3%	213.8%	-0.1%
-17.2%	-16.3%	1.1%
-35.4%	-33.2%	3.4%
35.7%	46.2%	7.8%
100.0%	100.0%	0.0%
-72.3%	-84.9%	-45.4%
246.0%	246.4%	0.1%
-54.3%	-54.2%	0.2%
<b>-27.8%</b>	<b>-30.0%</b>	<b>-3.1%</b>

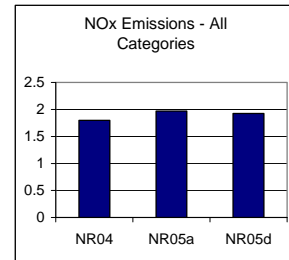


## Sublette County, Wyoming NONROAD modeling results

### NOx Emissions (tpd) for Sublette County, 2018 summer season average day

Emission Source Category	Model Version		
	NR04	NR05a	NR05d
Agricultural Equipment	1.18	1.42	1.43
Airport Ground Support Equipment	0.00	0.00	0.00
Commercial Equipment	0.01	0.01	0.01
Construction and Mining Equipment	0.07	0.06	0.06
Industrial Equipment	0.03	0.01	0.01
Lawn and Garden Equipment (Com)	0.00	0.01	0.00
Lawn and Garden Equipment (Res)	0.00	0.00	0.00
Logging Equipment	0.00	0.00	0.00
Pleasure Craft	0.49	0.45	0.39
Railroad Equipment	0.00	0.00	0.00
Recreational Equipment	0.02	0.02	0.02
<b>Grand Total</b>	<b>1.80</b>	<b>1.97</b>	<b>1.93</b>

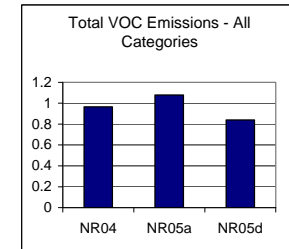
% Difference by Category		
NR04 to NR05a	NR04 to NR05d	NR05a to NR05d
20.0%	21.0%	0.8%
100.0%	100.0%	0.8%
16.1%	-0.2%	-14.0%
-12.8%	-12.3%	0.6%
-74.4%	-75.5%	-4.2%
100.0%	100.0%	-25.8%
-5.7%	-46.4%	-43.2%
100.0%	100.0%	-5.3%
-8.5%	-18.9%	-11.4%
-100.0%	-100.0%	0.0%
-2.2%	-9.5%	-7.5%
<b>9.6%</b>	<b>7.1%</b>	<b>-2.3%</b>



### Total VOC Emissions (tpd) for Sublette County, 2018 summer season average day

Emission Source Category	Model Version		
	NR04	NR05a	NR05d
Agricultural Equipment	0.14	0.17	0.17
Airport Ground Support Equipment	0.00	0.00	0.00
Commercial Equipment	0.01	0.01	0.01
Construction and Mining Equipment	0.01	0.01	0.01
Industrial Equipment	0.01	0.00	0.00
Lawn and Garden Equipment (Com)	0.00	0.02	0.02
Lawn and Garden Equipment (Res)	0.02	0.03	0.02
Logging Equipment	0.00	0.00	0.00
Pleasure Craft	0.46	0.44	0.24
Railroad Equipment	0.00	0.00	0.00
Recreational Equipment	0.30	0.38	0.37
<b>Grand Total</b>	<b>0.97</b>	<b>1.08</b>	<b>0.84</b>

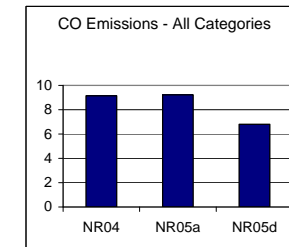
% Difference by Category		
NR04 to NR05a	NR04 to NR05d	NR05a to NR05d
20.2%	17.0%	-2.6%
100.0%	100.0%	-5.9%
67.7%	4.1%	-37.9%
-13.7%	-19.8%	-7.1%
-82.7%	-86.5%	-21.9%
100.0%	100.0%	-23.4%
42.3%	-16.0%	-41.0%
100.0%	100.0%	-7.9%
-4.7%	-47.8%	-45.2%
-100.0%	-100.0%	0.0%
26.8%	23.9%	-2.3%
<b>11.7%</b>	<b>-13.0%</b>	<b>-22.1%</b>



### CO Emissions (tpd) for Sublette County, 2018 summer season average day

Emission Source Category	Model Version		
	NR04	NR05a	NR05d
Agricultural Equipment	1.77	2.04	1.71
Airport Ground Support Equipment	0.00	0.00	0.00
Commercial Equipment	0.36	0.46	0.22
Construction and Mining Equipment	0.19	0.16	0.10
Industrial Equipment	1.12	0.16	0.08
Lawn and Garden Equipment (Com)	0.00	0.84	0.40
Lawn and Garden Equipment (Res)	1.00	0.97	0.47
Logging Equipment	0.00	0.01	0.01
Pleasure Craft	2.49	2.05	1.76
Railroad Equipment	0.00	0.00	0.00
Recreational Equipment	2.23	2.54	2.06
<b>Grand Total</b>	<b>9.15</b>	<b>9.23</b>	<b>6.80</b>

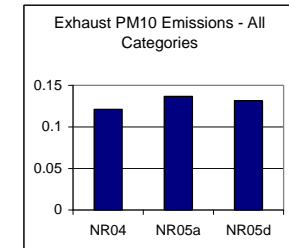
% Difference by Category		
NR04 to NR05a	NR04 to NR05d	NR05a to NR05d
15.3%	-3.2%	-16.1%
100.0%	100.0%	-35.4%
27.8%	-39.4%	-52.6%
-16.4%	-48.5%	-38.5%
-85.3%	-93.2%	-54.0%
100.0%	100.0%	-52.2%
-2.8%	-53.0%	-51.6%
100.0%	100.0%	-34.8%
-17.4%	-29.2%	-14.2%
-100.0%	-100.0%	0.0%
13.9%	-7.6%	-18.9%
<b>1.0%</b>	<b>-25.7%</b>	<b>-26.4%</b>



### Exhaust PM10 Emissions (tpd) for Sublette County, 2018 summer season average day

Emission Source Category	Model Version		
	NR04	NR05a	NR05d
Agricultural Equipment	0.07	0.11	0.11
Airport Ground Support Equipment	0.00	0.00	0.00
Commercial Equipment	0.00	0.00	0.00
Construction and Mining Equipment	0.00	0.01	0.01
Industrial Equipment	0.00	0.00	0.00
Lawn and Garden Equipment (Com)	0.00	0.00	0.00
Lawn and Garden Equipment (Res)	0.00	0.00	0.00
Logging Equipment	0.00	0.00	0.00
Pleasure Craft	0.03	0.01	0.01
Railroad Equipment	0.00	0.00	0.00
Recreational Equipment	0.01	0.01	0.01
<b>Grand Total</b>	<b>0.12</b>	<b>0.14</b>	<b>0.13</b>

% Difference by Category		
NR04 to NR05a	NR04 to NR05d	NR05a to NR05d
46.9%	47.0%	0.0%
100.0%	100.0%	0.2%
19.0%	24.4%	4.5%
32.5%	32.6%	0.1%
-38.6%	-37.7%	1.4%
100.0%	100.0%	3.5%
-1.8%	5.8%	7.8%
100.0%	100.0%	0.0%
-63.0%	-78.8%	-42.6%
-100.0%	-100.0%	0.0%
8.8%	8.9%	0.1%
<b>12.8%</b>	<b>8.5%</b>	<b>-3.9%</b>



### Exhaust PM2.5 Emissions (tpd) for Sublette County, 2018 summer season average day

Emission Source Category	Model Version		
	NR04	NR05a	NR05d
Agricultural Equipment	0.07	0.10	0.10
Airport Ground Support Equipment	0.00	0.00	0.00
Commercial Equipment	0.00	0.00	0.00
Construction and Mining Equipment	0.00	0.00	0.00
Industrial Equipment	0.00	0.00	0.00
Lawn and Garden Equipment (Com)	0.00	0.00	0.00
Lawn and Garden Equipment (Res)	0.00	0.00	0.00
Logging Equipment	0.00	0.00	0.00
Pleasure Craft	0.03	0.01	0.01
Railroad Equipment	0.00	0.00	0.00
Recreational Equipment	0.01	0.01	0.01
<b>Grand Total</b>	<b>0.12</b>	<b>0.13</b>	<b>0.13</b>

% Difference by Category		
NR04 to NR05a	NR04 to NR05d	NR05a to NR05d
47.0%	47.0%	0.0%
100.0%	100.0%	0.2%
18.4%	23.6%	4.4%
32.8%	33.0%	0.1%
-38.0%	-37.2%	1.3%
100.0%	100.0%	3.4%
-1.8%	5.8%	7.8%
100.0%	100.0%	0.0%
-62.5%	-78.4%	-42.4%
-100.0%	-100.0%	0.0%
8.3%	8.4%	0.1%
<b>13.8%</b>	<b>9.5%</b>	<b>-3.8%</b>

