North Carolina Department of Environment and Natural Resources
Division of Air Quality

Beverly Eaves Perdue
Governor

Sheila C. Holman
Director

Dee Freeman
Secretary

October 1, 2010

EPA Docket Center, EPA West (Air Docket)
Attention Docket ID No. EPA–HQ-OAR-2009-0491
U.S. Environmental Protection Agency (EPA)
Mail code: 2822T
1200 Pennsylvania Avenue, NW
Washington, DC 20460

Subject: Comments on Proposed Rulemaking – Federal Implementation Plans to Reduce Interstate Transport of Fine Particulate Matter and Ozone

Dear Sir/Madam:

The North Carolina Division of Air Quality (NCDAQ), within the Department of Environment and Natural Resources (DENR), appreciates the opportunity to provide comments on the proposed rule "Federal Implementation Plans to Reduce Interstate Transport of Fine Particulate Matter and Ozone" (Federal Transport Rule, FTR throughout) published in the *Federal Register* on August 2, 2010 (40 CFR Parts 51, 52, 72, 78 and 97.). While the ultimate responsibility for attaining National Ambient Air Quality Standards (NAAQS) lies with state and local air agencies, timely federal control programs for nitrogen oxide (NO_X) and sulfur dioxide (SO_2) emissions are critical in this instance to ensure interstate transport is adequately addressed.

The State of North Carolina recognizes the importance of controlling NO_X and SO_2 emissions from electric generating units (EGUs) and as a result, the North Carolina General Assembly took the proactive approach of developing legislation that resulted in the North Carolina Clean Smokestacks Act (CSA) in 2002. This law put into place company-specific SO_2 and NO_X emissions caps for the two major electric generating companies in North Carolina. The CSA-related emissions reductions have well positioned North Carolina in terms of addressing interstate transport and achieving compliance with the NAAQS.

The NCDAQ appreciates EPA's efforts to thoughtfully address the court's concerns with the Clean Air Interstate Rule (CAIR). The NCDAQ is pleased that EPA has committed to quickly finalize a second FTR in recognition that much tighter NO_X caps will be necessary to address the pending revision to the 8-hour ozone standard. NCDAQ strongly supports EPA's pledge to review the FTR each time it revises an air quality standard. Further, NCDAQ appreciates EPA's attempts to expedite implementation of the FTR by proposing a Federal Implementation Plan (FIP). Due to the long delay since some of the interstate impacts to be addressed by the FIP were first identified, the needs of the impacted States are now uniquely pressing. But EPA must also recognize that under the Clean Air Act Congress has invested primary responsibility for air quality control with the States – both upwind

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and downwind States. Therefore, EPA should take care that the upwind States are permitted to exercise their right to tailor their own programs and should appropriate adequate resources to working constructively and expeditiously with States on their SIP submittals. While a FIP approach is satisfactory to NCDAQ for this FTR, it should not be construed as support for using this approach for the second FTR aimed at addressing the pending revision to the 8-hour ozone standard. NCDAQ suggests the simplest and most defensible way to effectuate the mandate in §110(a)(2)(D)(i)(I) is for EPA to determine each State's significant contribution level and then allow the State to determine how to reduce its emissions to a level below that.

The NCDAQ supports many aspects in the proposed FTR and appreciates the challenge EPA still faces in reaching a final decision on the rule. We respectfully submit the following general comments that benefit the needs of the states as well as the EPA. Attachment A contains detailed comments in specific areas for which comments were solicited in the proposed rule.

Preferred Option and Variability

EPA's decision to propose State budgets calculated on a state-by-state basis and to limit emissions to those budgets is a supported approach. Further, NCDAQ agrees in principle with EPA's attempts to address utility sector variability by allowing limited interstate trading. However, NCDAQ has concerns with the means EPA has chosen. Under EPA's proposed remedy, State X's relevant emissions may have been relatively low during the base year and State Y's may have been high. Theoretically, EPA's variability approach would allow for sources in State X to buy allowances from sources in State Y during a normal year in order to balance this variability. This presents two conceptual problems. First, it punishes sources in State X and provides a windfall for sources in State Y based solely on the variability of electricity production during the single year EPA chose as the base year (2005). That is, had EPA chosen 2006 instead of 2005 as the base year, sources in State X may have profited at the expense of sources in State Y instead of the other way around.

Second, and more significantly from an air quality perspective, sources in State Y could very well emit up to the maximum of their variability allowance for every one-year and three-year period, despite the fact that sources in State Y were already at the high end of their variability in the base year. Put another way, although the variability limits may have been calculated in a defensible manner – these Comments take no position on that technical issue – once the limits are allowed there is no legal assurance that the variability margins will be used by market participants to account for variability. The variability limits are simply a trading budget overage margin and are forever unmoored from their intended purpose. As such, the variability limits, although stemming from a defensible theory, are themselves not consistent with the Clean Air Act.

NCDAQ submits that if EPA is not able to resolve these issues with the variability limits, then interstate trading – as considered in the "proposed remedy option" - cannot be permitted. Instead, NCDAQ would propose the "first alternative remedy option" (option 1 throughout). It provides some flexibility while ensuring that a substantial portion of a state's assigned emissions reductions occur in that state. Option 1 most closely aligns with the CSA with respect to trading among only intrastate sources. Our experience with this type of approach shows that it is a feasible option. The CSA program has successfully reduced NO_X and SO_2 emissions with minimal agency oversight. We do not support the "second alternative remedy option" (option 2 throughout) and have concerns with its prescribed limits and feel that this offers sources little incentive to be more energy efficient and limits flexibility.

One-year vs. Three-year Exceedance

In the preamble, EPA states: "If the state emissions exceeded both the state budget with the 1-year and with the 3-year variability limit, then the 3-year variability limit would be used in determining the owner's share of the state budget." 75 Fed. Reg. at 45,313/2. However, the proposed rules provide that "the amount by which" the State's emissions during any control period "exceeds the State assurance level shall be the greater of the amounts of the exceedance calculated under paragraph[s]" requiring calculation of the State's one-year and three-year exceedances. *E.g.*, 75 Fed. Reg. at 45,374/2 (proposing §97.406(c) (2) (iii) (C)). The relationship between these two statements is unclear, as is the manner in which EPA will treat emissions should a State's sources exceed both the one- and three-year assurance levels. NCDAQ requests clarification on this issue in the final rule and suggests assurance provisions be based on the maximum exceedance.

Banking

The issue of the banking of allowances arises in two different situations: the use of pre-existing allowances (*e.g.*, title IV and CAIR NO_X allowances) and the use of allowances allocated under the Transport FIP.

EPA has proposed not to allow sources to use pre-existing Title IV SO_2 allowances to meet the compliance requirements of the Transport FIP. For the reasons stated by EPA, 75 Fed. Reg. at 45,338/3, NCDAQ concurs that the importation of banked Title IV allowances into the Transport FIP program would not be consistent with the Clean Air Act. Eliminating the use of the banked Title IV allowances ensures the caps in the FTR are not weakened.

EPA appears less certain regarding the fate of CAIR NO_X allowances. NCDAQ suggests that CAIR NO_X allowances should be eliminated. NCDAQ is concerned with the fact, as EPA readily concedes, that "the amounts of the banks are so large that they might significantly reduce the amount of emissions reductions that would otherwise be achieved in the proposed Transport Rule NO_X programs, particularly in the earlier years (*e.g.*, 2012 and 2013)." 75 Fed. Reg. at 45,339/1.

EPA has proposed to determine that emissions reductions by 2012 and 2014 are necessary in order to ensure that the reductions are both coordinated with the downwind nonattainment deadlines and achieved "as expeditiously as practicable," as required. Therefore, the budgets EPA has proposed in the Transport FIP define the breakpoint between lawful and unlawful emissions. Importing any allowances from outside those calculations, not to mention the concededly overwhelming bank of allowances remaining from the CAIR NO_X program, would allow sources to delay elimination of their unlawful emissions past the point required by the only relevant considerations: downwind attainment deadlines and the associated "as expeditiously as practicable" mandate. Thus, the importation of any pre-existing allowances violates the §110(a)(2)(D)(i)(I). Therefore, NCDAQ does not support the continued use of CAIR NO_X allowances once the Transport FIP becomes effective.

Emission Inventories

One of NCDAQ's major concerns is with the emissions inventories provided as part of the supporting technical analysis. While the magnitude and percent contribution per source sector in the EPA inventories appear to be reasonable for most source sectors, certain sectors emissions show significant differences. For example, the non-road mobile emissions provided by EPA are significantly higher for NO_X and SO_2 as compared to NCDAQ's estimates. The non-road mobile

SO_2 differences are particularly troubling, especially in the future years. While NCDAQ does not have emission inventories for the exact years of EPA's projections, we do have projections that bracket EPA's estimates. The latest NCDAQ non-road mobile SO_2 estimates for 2002 and 2009 are 7,693 tons and 1,892 tons, respectively. EPA's 2005 estimate is 42,743 tons – a clear outlier when compared to our estimates. The latest NCDAQ non-road mobile SO_2 estimate for 2018 is 905 tons, while EPA's 2020 estimate is 68,844 tons. EPA's non-road mobile SO_2 estimates increase from 2005, to 2014, to 2020, while NCDAQ's estimates decrease significantly with time from 2002, to 2009, to 2018. We have isolated the majority of the non-road mobile differences to the marine SO_2 emissions. However, NCDAQ has been unable to identify exactly how the EPA non-road mobile emissions were developed in this exercise and requests additional documentation.

In addition, for non-point (area) sources, EPA's NO_X emissions estimates for North Carolina are 2-3 times lower as compared to NCDAQ estimates, while EPA's SO_2 emissions estimates for North Carolina are approximately 4 times higher. A more detailed emissions inventory comparison is provided in Attachment B.

The NCDAQ is very concerned about the differences in the non-road emissions and seeks to better understand these differences. If the EPA non-road emissions are found to be unreasonable, it significantly alters the percent contribution of each source sector (the point source sector's SO_2 contribution is diminished) to the overall air quality concentrations predicted in the model. This, in turn, calls into question the overall modeling that supported the receptor identification analysis and the source contribution analysis which gets at the root of the purpose of this proposal.

Facilities Included

In reviewing the Technical Support Documentation (TSD) table entitled *Allocation Table* it appears that the NC EMC Anson Plant has been double counted by also listing it as Anson County Generation Facility. The table did not include several EGUs subject to CAIR, including; Craven County Wood Energy, Primary Energy Roxboro and Primary Energy Southport. Additionally, Progress Energy's Cape Fear Unit #5 has NO_X allocations, but no SO_2 allocations. It is our understanding this coal-fired unit will continue to operate in 2012 and 2014 and thus an SO_2 allocation is needed. We also note that the TSD assumes Duke Energy's Dan River 3 will install and operate an SCR system to control NOx in 2012. Duke has indicated that this unit will limit NOx emissions through the use of Low NOx burners in their CSA filings with North Carolina and not SCR as is indicated in the TSD. Finally, the table included 2 facilities (VACA NC Combustion Turbine and Wayne County) that are not subject to CAIR.

Handling of Biomass Units

Some sources are transitioning from fossil fuel to biomass to meet state Renewable Portfolio Standards. Some are cogeneration units and some are not. If the source has burned any amount of fossil fuel in 1990 or any year thereafter, and it meets the other applicability criteria, and does not meet the cogeneration exemption, it is subject to FTR. NCDAQ requests a clarification on how existing fossil-fuel fired units that convert to biomass are to be treated under the Transport Rule including what the allocations will be based on for such units (total heat input or just fossil fuel used for start-up). What if an existing fossil-fired unit converts completely to biomass (no fossil fuel for start-up)? Also, please clarify how new biomass units are treated and what the associated allocations methodology is. For instance, does it matter whether the source was previously a NOx SIP Call source that also later met the CAIR applicability criteria?

Non-EGUs Brought into CAIR as NO_X SIP Call Sources

EPA explains in 75 Fed. Reg. at 45,341 that because EPA is only covering EGUs under the proposal, any state that brought large non-EGUs into the CAIR NO_X ozone season program to meet the NOx SIP Call requirements would need to submit a SIP revision to address their NO_X SIP call obligations and that EPA will work with states to ensure those obligations continue to be met. Clarification is needed regarding how EPA envisions states addressing such sources and when related SIP revisions must be submitted to EPA, especially given the amount of time necessary for many states to complete rulemaking processes and the short timeframe between finalizing FTR and sun setting of CAIR at the end of December 2011.

We sincerely appreciate your consideration of these comments. If we can be of assistance regarding these comments, please contact Mrs. Heather Hildebrandt of my staff at 919-733-1498 or at heather.hildebrandt@ncdenr.gov.

Sincerely,

Sheila C. Holman

MAA/HH

c: Dee Freeman, Secretary, Department of Environment and Natural
Robin Smith, Assistant Secretary for Environment

Page Number of Request for Comment	Subject	NCDAQ Response
45215, Column 1 45299, column 2 45303, column 3 45303, column 3 – 45304, column 1 45330, column 1 – 45333, column 2	First and second alternative remedy options	The NCDAQ submits that if EPA is not able to resolve issues with the variability limits, then interstate trading – as considered in the "proposed remedy option" - cannot be permitted. Instead, NCDAQ would propose the "first alternative remedy option" (option 1 throughout). It provides some flexibility while ensuring that a substantial portion of a state's assigned emissions reductions occur in that state. Option 1 most closely aligns with the CSA with respect to trading among only intrastate sources. Our experience with this type of approach shows that it is a feasible option. The CSA program has successfully reduced NO_X and SO_2 emissions with minimal agency oversight. We do not support the "second alternative remedy option" (option 2 throughout) and have concerns with its prescribed limits and feel that this offers sources little incentive to be more energy efficient and limits flexibility.
45327, Column 3 – 45327, column 1	Air quality thresholds and rounding conventions	The NCDAQ supports the 1% threshold and encourages EPA to be consistent in the rounding and truncation conventions for all pollutants.
45273, Columns 2-3	Schedule for scrubber and SCR installations and the availability of boilermaker labor	Vendors and contractors specialized in the design and construction of SO_2 scrubbers and SCRs can more appropriately comment on and provide inputs on this issue. But, empirically, it can be said that it would be hard for the suppliers to provide their services (design and construction) at the same time to every owner/operator of power plant for installation of scrubbers and SCRs. For example, it is hard to imagine if many SO_2 scrubbers are required to be installed to comply with January 1, 2014 date in SO_2 Group 1 States, whether there are enough qualified suppliers available to design and construct this kind of scrubbers to meet this deadline.
45274, column 3 45283, column 1	EPA approach used to determine significant contribution. The modeling methodology and assessment tool.	While the overall methodology seems reasonable, it is hard to make an informed assessment given the information provided and the time allocated to review the tool.
45283, Column 1 45284, column 1	Issues concerning the use of the simplified air quality assessment tool, rather than actual air quality modeling, to identify air quality impacts of the options considered.	As an alternative approach, NCDAQ suggests using the Assessment Tool as a screening tool to narrow down the suite of alternatives. Then, apply a refined tool, such as CAMx, to indentify air quality impacts of these alternatives.

45283, Column 3	On SO_2 cost/ton threshold and use of the tool to determine reductions needed.	The NCDAQ thinks that $2000/ton of SO_2 is reasonable. EPA should be consistent in the use of the tool to determine reductions needed.
45292, column 1	Need for a longer ozone season, such as March through October	As standards are lowered, the need for a longer ozone season should be reassessed.
45294, columns 1-2 45295, column 3 – 45296, column 1	Regarding variability limits for SO_2 and NOx	Although the variability limits may have been calculated in a defensible manner, once the limits are allowed there is no legal assurance that the variability margins will be used by market participants to account for variability. The variability limits are simply a trading budget overage margin and are forever unmoored from their intended purpose. As such, the variability limits, although stemming from a defensible theory, are themselves not consistent with the Clean Air Act.
45299, column 3 – 45300, column 1	Requiring reductions in SO_2 and NOX emissions from only EGUs in the FIPs	On page 45341 EPA explains that because EPA is only covering EGUs under the proposal, any state that brought large non-EGUs into the CAIR NOx ozone season program to meet the NOx SIP Call requirements would need to submit a SIP revision to address their NOx SIP call obligations and that EPA will work with states to ensure those obligations continue to be met. Clarification is needed regarding how EPA envisions states addressing such sources and when related SIP revisions must be submitted to EPA, especially given the amount of time necessary for many states to complete rulemaking processes and the short timeframe between finalizing TR1 and sunsetting of CAIR at the end of December 2011.
45305, column 1	Appropriateness of the assurance provisions and confidence intervals	NCDAQ believes that the 95% confidence interval seems appropriate.
45307, column 1	Regarding exemption, efficiency standards, etc for cogeneration units	We concur with proposal to exempt cogeneration units on the basis of electrical generation and unit efficiency (although such units may choose to use the opt-in provisions discussed later). It appears beneficial to encourage such energy efficient designs through the exemption process. Furthermore, future projects and an increase in cogeneration projects would be reviewed under other regulatory programs such as PSD and MACT to address emissions control technology and strategies to minimize downwind impacts concerns of FTR, if only in an indirect way. Complete and accurate records for older units may provide data challenges, as noted in the preamble, back to the signing of the 1990 Clean Air Act Amendments and the nature of unit operation may have changed over time for much older units. There may be a wide discrepancy in the data quality where some records are complete and easily retrieved while for other units it may not. While we would tend to

		favor using the first complete set of operational data for a unit, selecting a later date may provide a more level regulatory basis for review of a cogeneration exemption. However, operational records from periods after 2000 and certainly after 2003 should be retrievable for most units. Use of this time period (or whenever startup is initiated, whichever is later) should provide a satisfactory basis reviewing the exemption status. Finally, calendar years without any operation should not count against a unit's annual efficiency calculation. EPA could consider a minimum hour threshold in the calendar year to determine if the unit operated during the year (e.g., 1000 hours).
45307, column 2	Regarding exemption for solid waste incinerator units	We concur with EPA's proposal to exempt solid waste incineration units on the basis of at least 80% of the heat input originating from non fossil fuel. We agree with EPA's definition of fossil and non fossil fuels in this context. NC has a small number of solid waste incinerators compared to the EGUs in the state. Any future projects would be reviewed in the context of other regulatory programs such as PSD and NSPS. As noted above, for cogeneration units, older data that predates the 1990 Amendments may be difficult to retrieve or may be incomplete. Choosing a date consistent with the cogeneration exemption may be appropriate to address data gaps.
45309, column 2-3	Allocation method	The allocation method relies on historical emissions. NCDAQ believes it would be beneficial to look at energy output as a way to promote energy efficiency. Heat input could also be used as an alternate allocation methodology.
45319, column 2	Use of remedy approach and proposed method for both existing NAAQS and further revisions to the NAAQS.	EPA's FIP approach using the "first alternative remedy option" is satisfactory to NCDAQ for this FTR, but it should not be construed as support for using this approach for the second FTR aimed at addressing the pending revision to the 8-hour ozone standard. The NCDAQ suggests the simplest and most defensible way to effectuate the mandate in §110(a)(2)(D)(i)(I) is for EPA to determine each State's significant contribution level and then allow the State to determine how to reduce its emissions to a level below that.
45319, column 3	Regulatory text structure	The NCDAQ appreciates the fact that all four subsections are structurally similar. This assists in ease of understanding the applicable requirements and implementation for regulators, the regulated community, and the public.
45344, column 1	EPA's analysis and conclusions for GHG-significant impacts from NSR for any pollution control projects resulting from the proposed rule such as low-NOX	Operation of FGD can generate large amounts carbon dioxide (one of the six gases defined as GHG). For example, a coal-fired electric generating unit

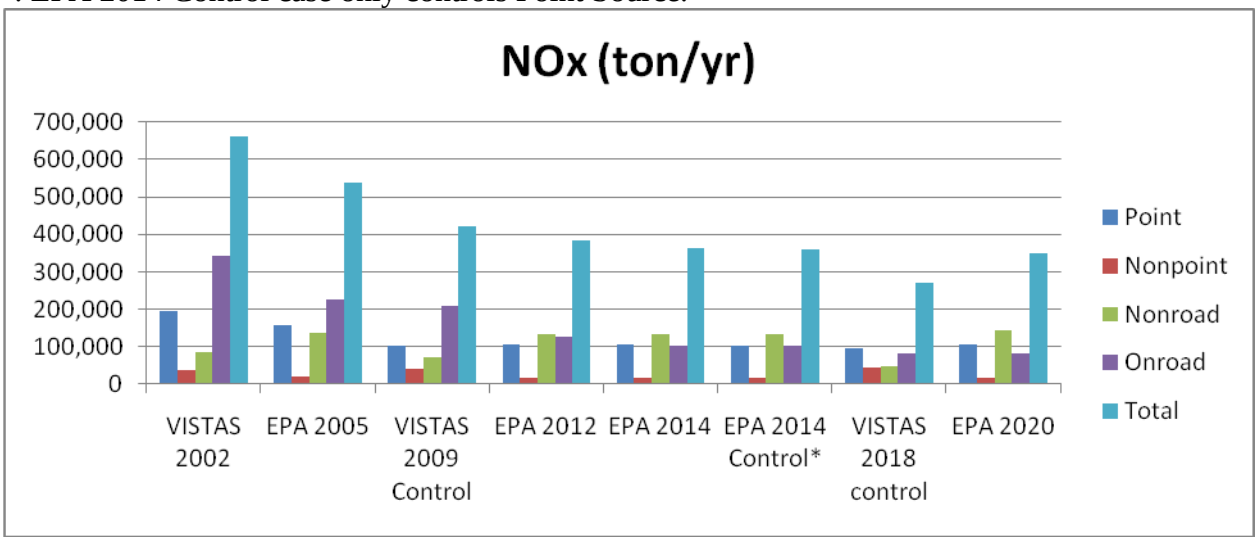
	burners, SO_2 scrubbers, or SCR.	(EGU) with a generating capacity of 800 MWe can emit approximately 118,000 tons/yr of CO_2[1], solely due to operation of a flue gas desulphurization system (FGD), thus, exceeding the PSD significance threshold of 75,000 tons/yr CO_2e. Therefore, such EGU with a FGD is required to obtain a PSD permit starting July 1, 2011; assuming that the facility's pre-modification status is "major" for GHG emissions (i.e., 100,000 tons/yr CO_2e for GHG). Separately, the impacts on PSD permitting due to operation of low-NOx burners, SCRs, etc. on traditional pollutants (non-GHG) cannot be underestimated. For example, emissions of $PM_{10}/PM_{2.5}$, CO, H_2SO_4, etc. can occur at high levels due to operation of these controls and can exceed their respective significance thresholds.
45353, column 3	Energy efficiency considerations in developing the allowance allocation methodology.	In general, it has been recognized that allocations based upon heat input could "penalize" high efficiency operations by granting less allowances due to lower heat input for a given heat output. It has been argued that allocations based upon output could and should force improvements in operations and increased operation efficiency. As noted, in future regulations where states are preparing SIPs to respond to new guidance and requirements, states may consider using output based allocations. However, it may require a transition period to convert from one method of allocation to another. In the end, both methods must address both local and downwind impacts

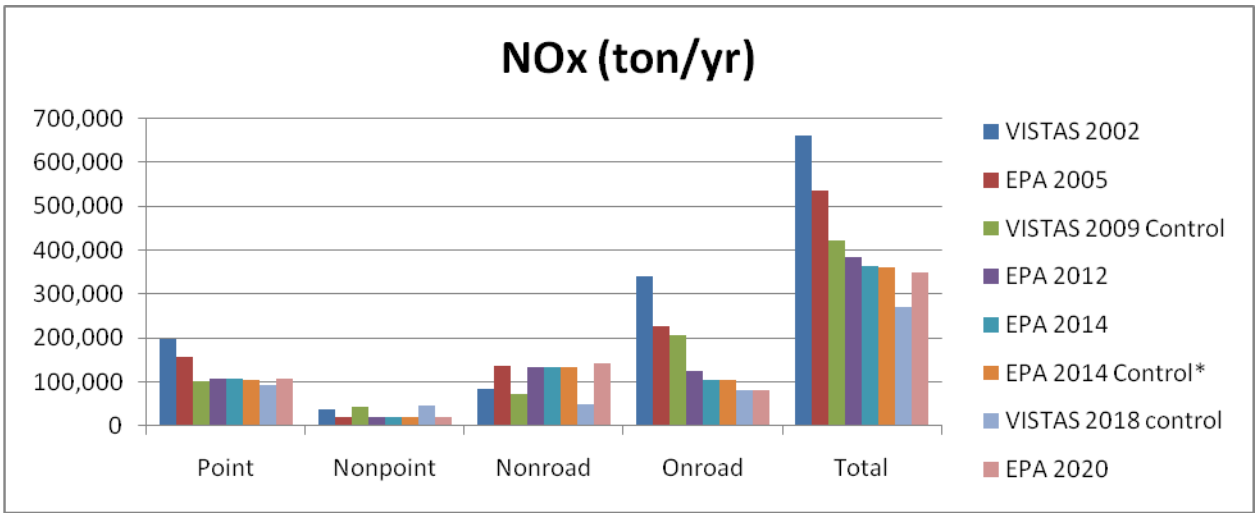
[1] Based upon 39,238 tons/yr uncontrolled SO_2 and mass balance resulting 1.375 lb CO_2 per lb of sulfur

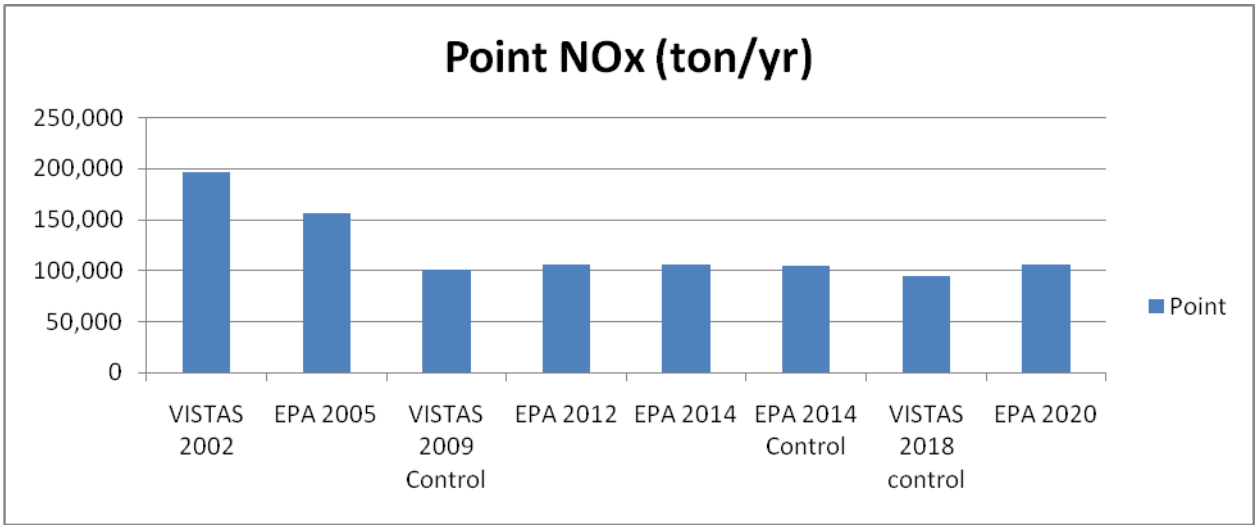
EPA, VISTAS , and SEMAP NOx Emission Comparison (ton/yr)

Sector	VISTAS 2002	EPA 2005	VISTAS 2009 Control	EPA 2012	EPA 2014	EPA 2014 Control*	VISTAS 2018 Control	EPA 2020	2007 SEMAP
Point	196,731	156,078	101,236	106,157	106,284	104,199	94,276	106,546	109,267
Nonpoint	38,078	18,869	42,002	18,715	18,669	18,669	46,235	18,591	39,317
Nonroad	84,284	135,936	70,997	133,476	133,455	133,455	49,046	142,195	75,066
Onroad	341,198	225,756	207,648	126,081	104,150	104,150	81,706	80,908	n/a
Total	660,291	536,639	421,883	384,429	362,558	360,473	271,263	348,240	n/a

*: EPA 2014 Control case only controls Point Source.






Point NOx (ton/yr)
250,000
200,000
150,000
100,000
50,000
0
VISTAS 2002
EPA 2005
VISTAS 2009 Control
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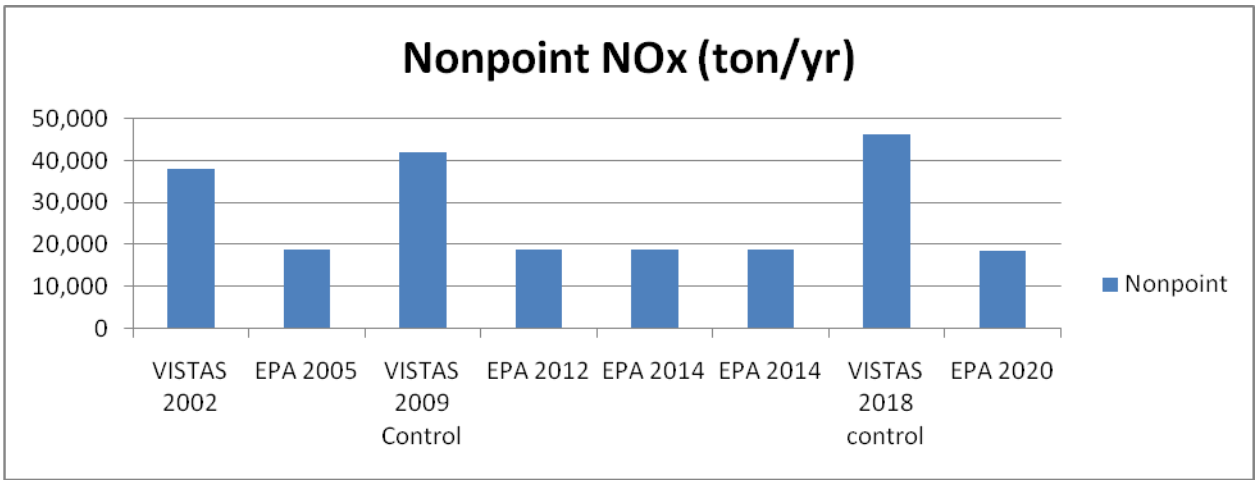
EPA 2014
EPA 2014 Control
VISTAS 2018 control
EPA 2020
Point


Nonpoint NOx (ton/yr)
50,000
40,000
30,000
20,000
10,000
0
VISTAS 2002
EPA 2005
VISTAS 2009 Control
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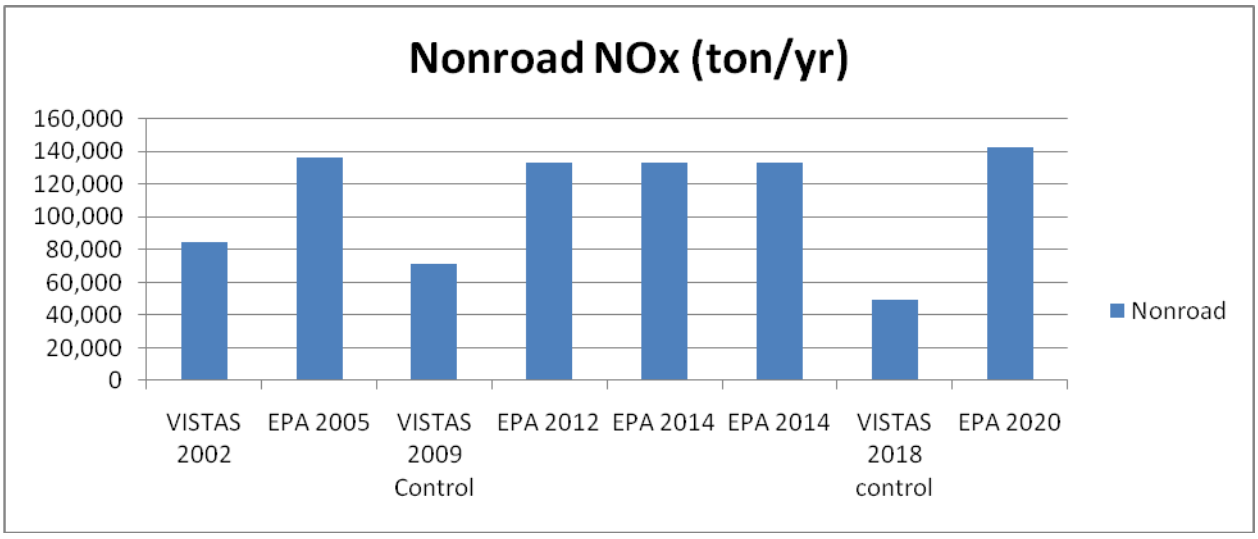
EPA 2014
EPA 2014
VISTAS 2018 control
EPA 2020
Nonpoint


Nonroad NOx (ton/yr)
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140,000
120,000
100,000
80,000
60,000
40,000
20,000
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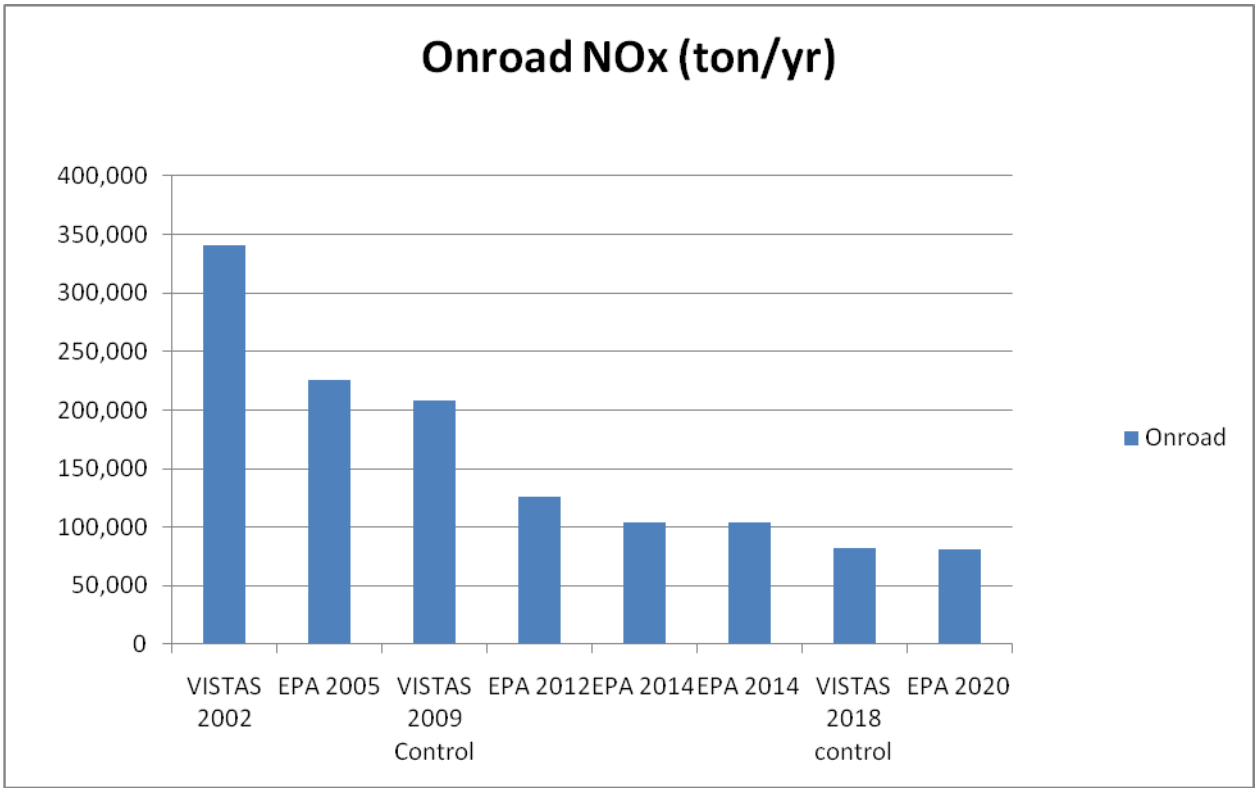
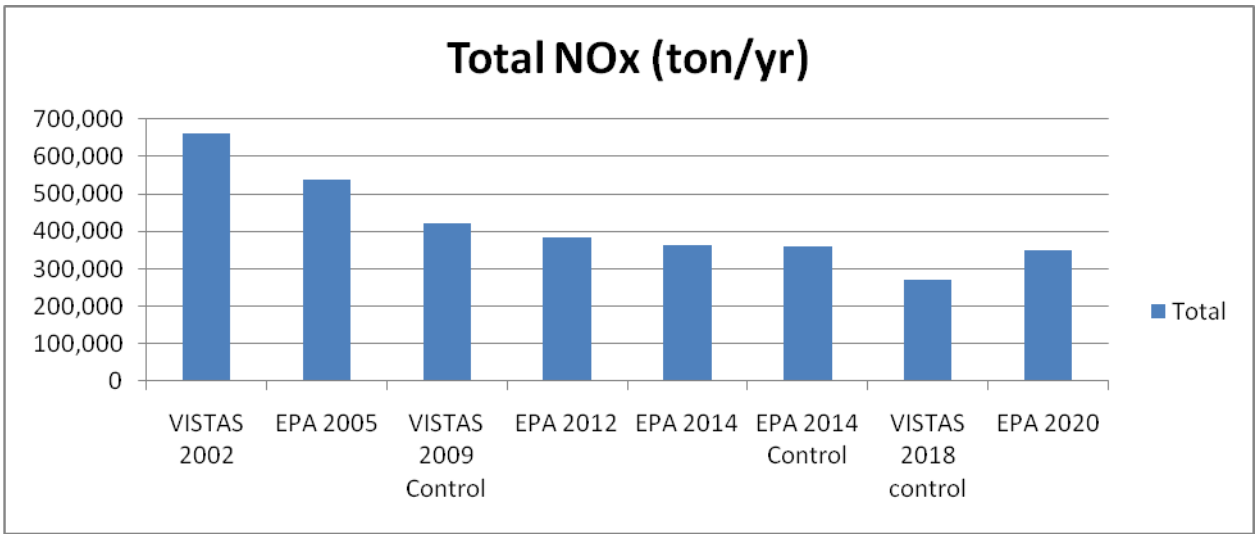
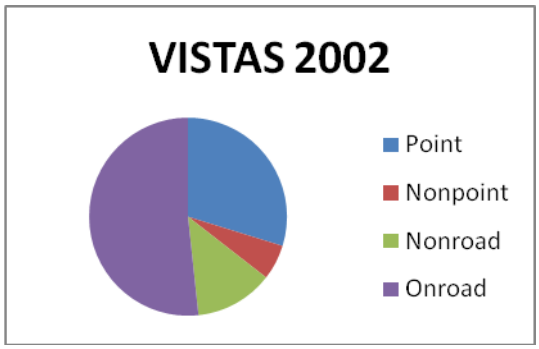
EPA 2020
Nonroad


Onroad NOx (ton/yr)
400,000
350,000
300,000
250,000
200,000
150,000
100,000
50,000
0
VISTAS 2002
EPA 2005
VISTAS 2009 Control
EPA 2012
EPA 2014
EPA 2014
VISTAS 2018 control
EPA 2020
Onroad


Total NOx (ton/yr)
700,000
600,000
500,000
400,000
300,000
200,000
100,000
0
VISTAS 2002
EPA 2005
VISTAS 2009 Control
EPA 2012
EPA 2014
EPA 2014 Control
VISTAS 2018 control
EPA 2020
Total

NOx (ton/yr)


VISTAS 2002
Point
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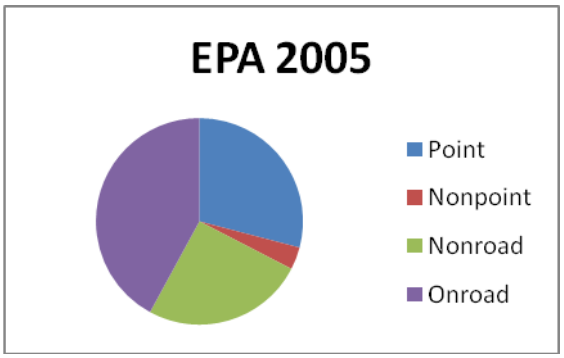
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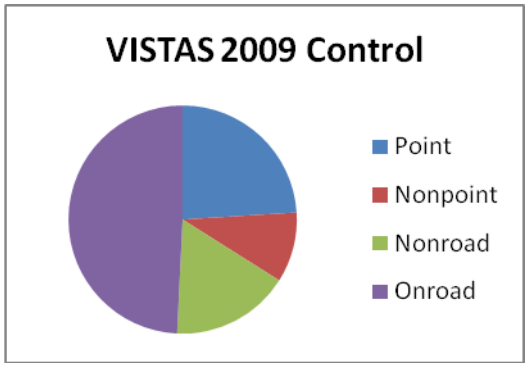
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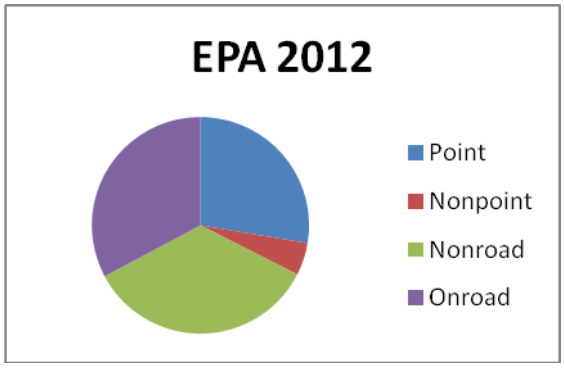
EPA 2012
Point
Nonpoint
Nonroad
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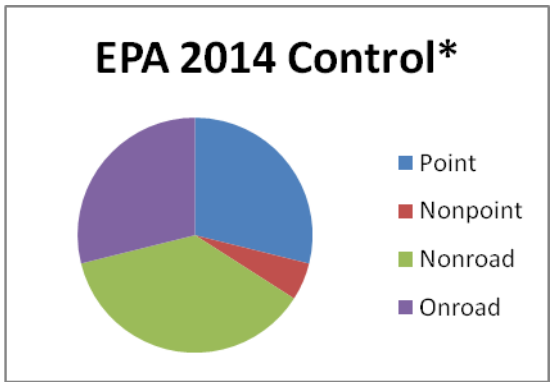
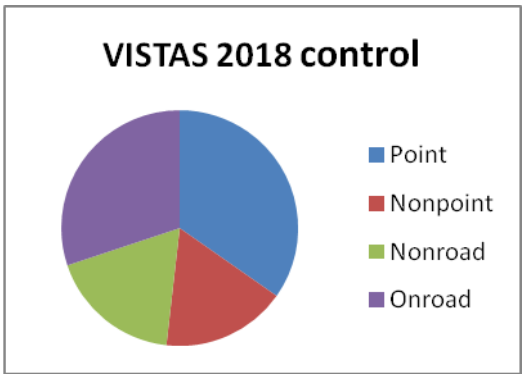
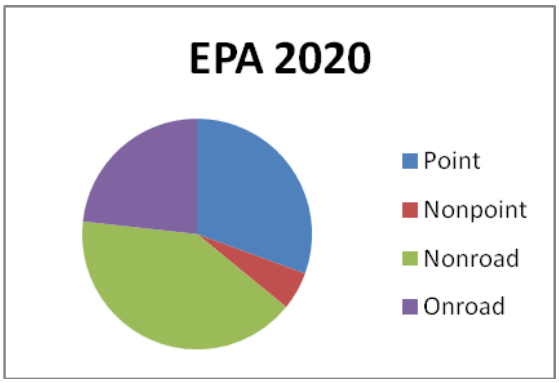

EPA 2014 Control*
Point
Nonpoint
Nonroad
Onroad

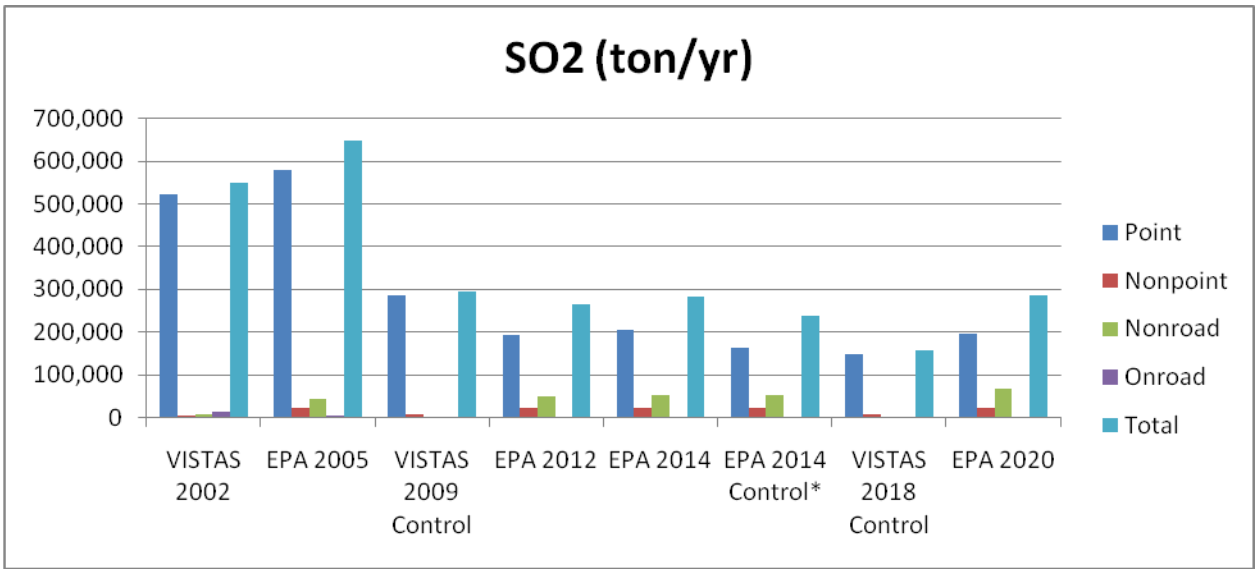


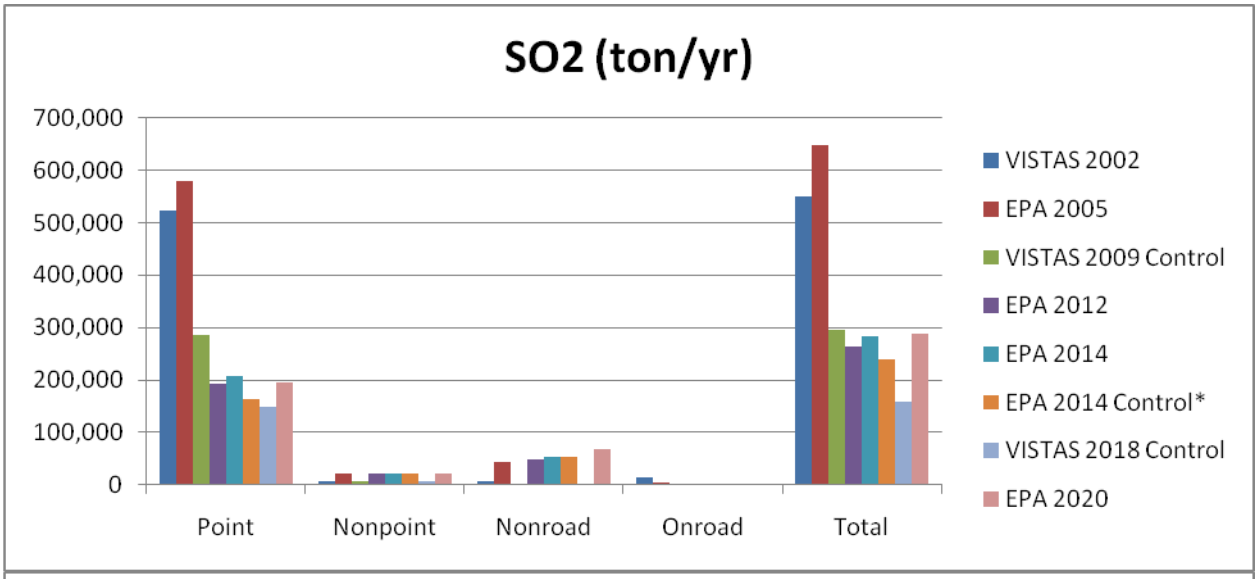


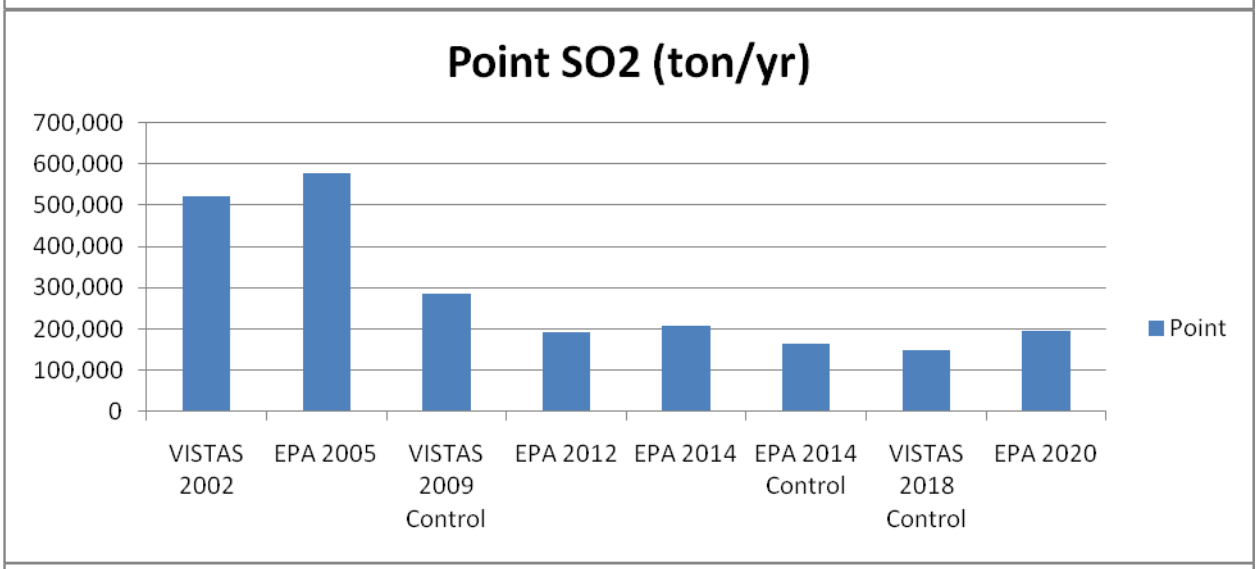
EPA, VISTAS, and SEMAP SO2 Emission Comparison (ton/yr)

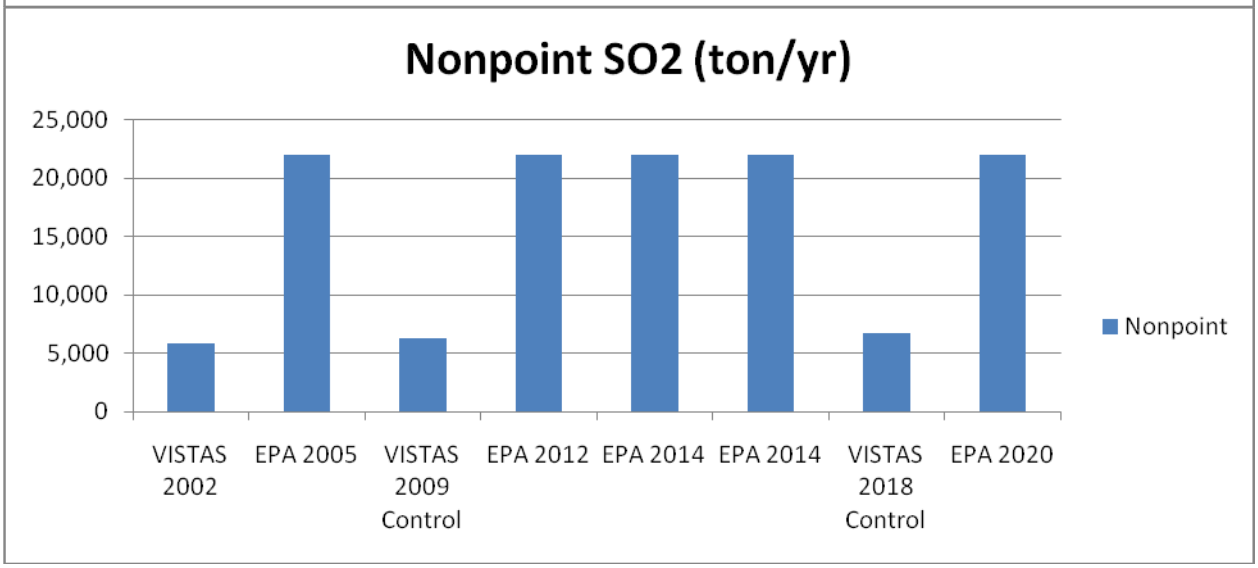
Sector	VISTAS 2002	EPA 2005	VISTAS 2009 Control	EPA 2012	EPA 2014	EPA 2014 Control*	VISTAS 2018 Control	EPA 2020	SEMAP 2007
Point	522,093	578,381	284802	192,748	206,631	162,970	148972	195,625	349,318
Nonpoint	5,826	22,020	6308	22,000	21,994	21,994	6730	21,984	55,959
Nonroad	7,693	42,743	1892	48,861	52,897	52,897	905	68,844	5,456
Onroad	13,343	5,341	1311	935	961	961	1323	988	n/a
Total	548,955	648,485	294,313	264,544	282,483	238,822	157,930	287,441	n/a

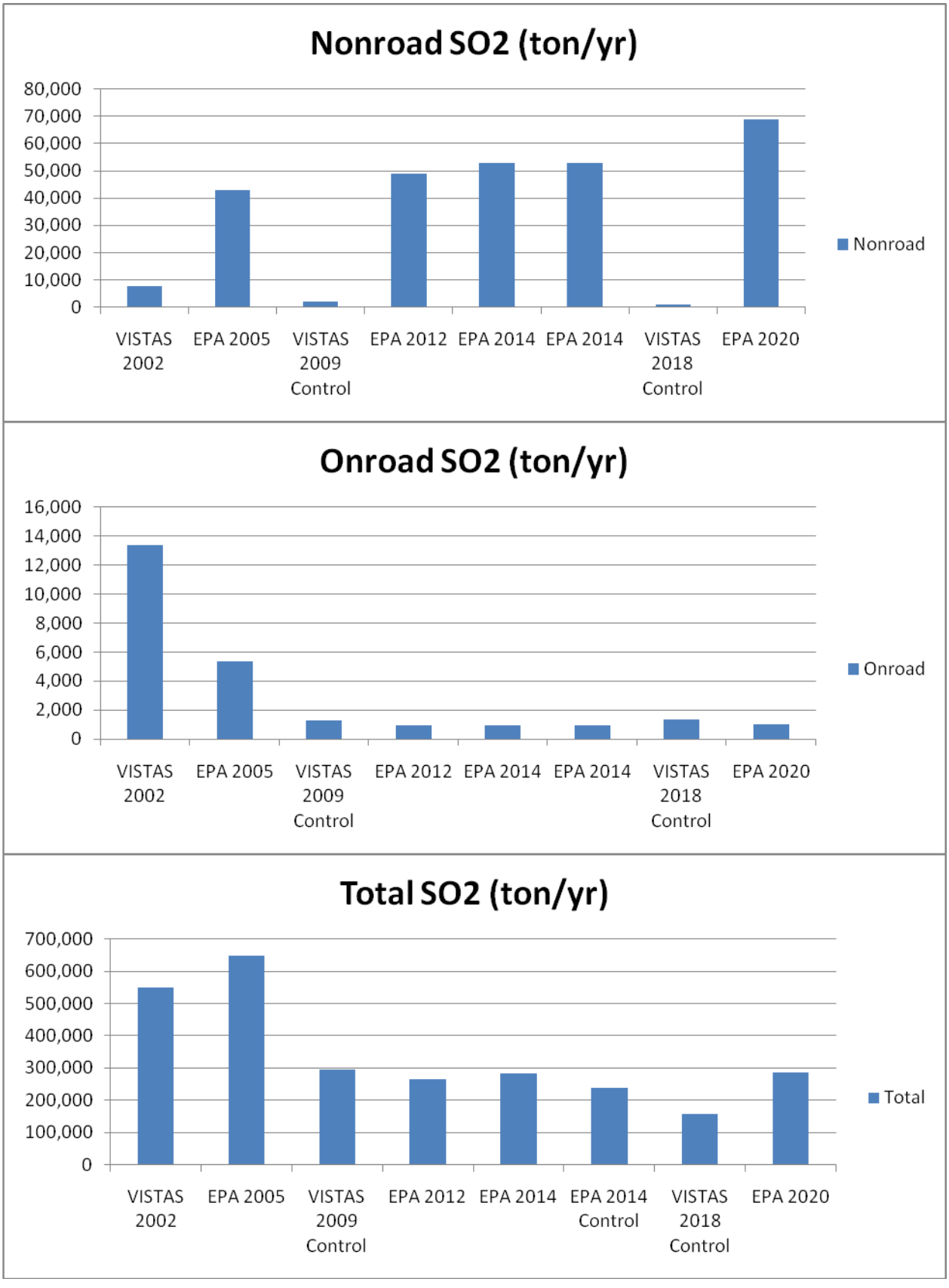
*: EPA 2014 Control case only controls Point Source.



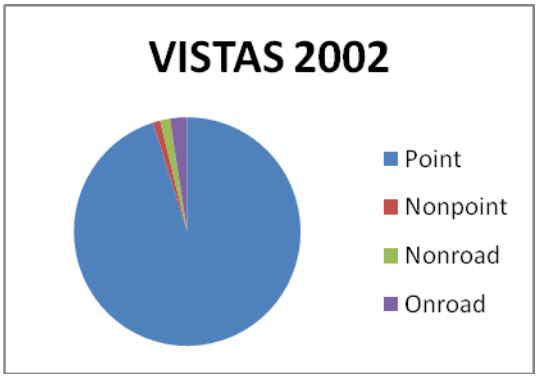

SO2 (ton/yr)
700,000
600,000
500,000
400,000
300,000
200,000
100,000
0
Point
Nonpoint
Nonroad
Onroad
Total
VISTAS 2002
EPA 2005
VISTAS 2009 Control
EPA 2012
EPA 2014
EPA 2014 Control*
VISTAS 2018 Control
EPA 2020

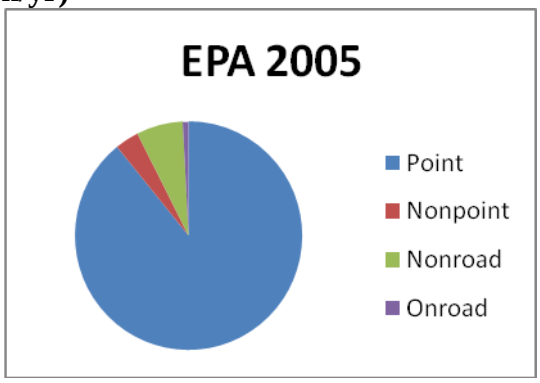

Point SO2 (ton/yr)
700,000
600,000
500,000
400,000
300,000
200,000
100,000
0
VISTAS 2002
EPA 2005
VISTAS 2009 Control
EPA 2012
EPA 2014
EPA 2014 Control
VISTAS 2018 Control
EPA 2020
Point

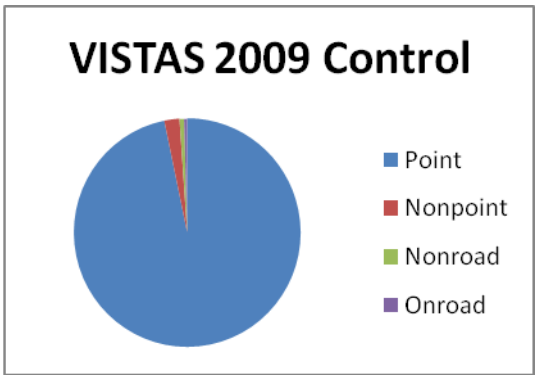

Nonpoint SO2 (ton/yr)
25,000
20,000
15,000
10,000
5,000
0
VISTAS 2002
EPA 2005
VISTAS 2009 Control
EPA 2012
EPA 2014
EPA 2014
VISTAS 2018 Control
EPA 2020
Nonpoint

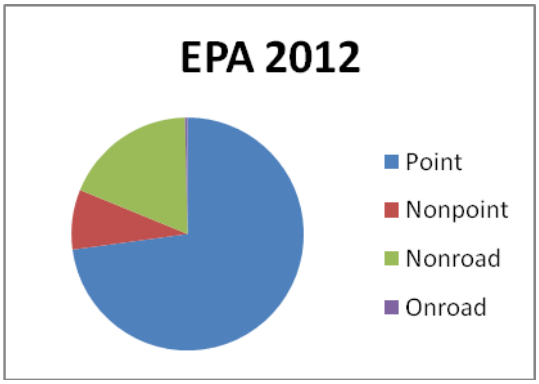

Nonroad SO2 (ton/yr)
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
VISTAS 2002
EPA 2005
VISTAS 2009 Control
EPA 2012
EPA 2014
EPA 2014
VISTAS 2018 Control
EPA 2020
Nonroad
Onroad SO2 (ton/yr)
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
VISTAS 2002
EPA 2005
VISTAS 2009 Control
EPA 2012
EPA 2014
EPA 2014
VISTAS 2018 Control
EPA 2020
Onroad
Total SO2 (ton/yr)
700,000
600,000
500,000
400,000
300,000
200,000
100,000
0
VISTAS 2002
EPA 2005
VISTAS 2009 Control
EPA 2012
EPA 2014
EPA 2014 Control
VISTAS 2018 Control
EPA 2020
Total

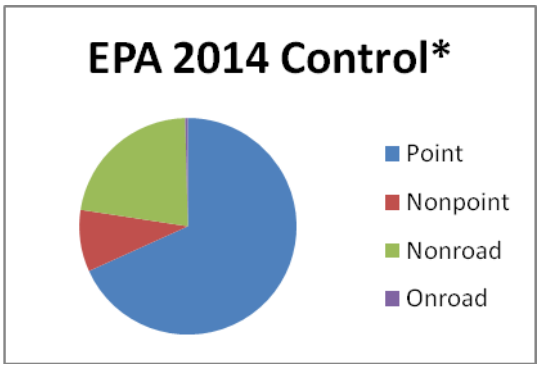
SO2 (ton/yr)

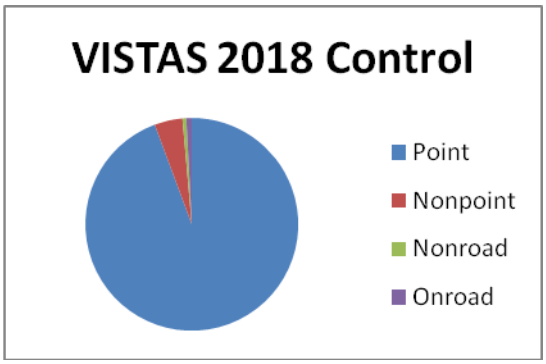

VISTAS 2002
Point
Nonpoint
Nonroad
Onroad

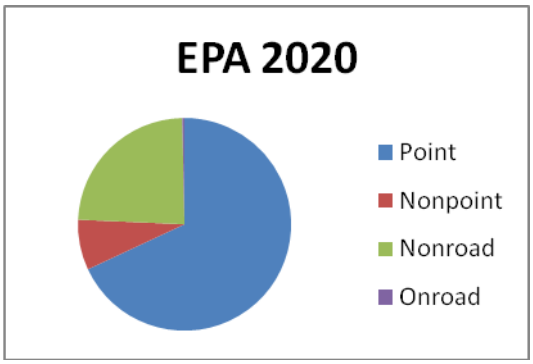

EPA 2005
Point
Nonpoint
Nonroad
Onroad


VISTAS 2009 Control
Point
Nonpoint
Nonroad
Onroad


EPA 2012
Point
Nonpoint
Nonroad
Onroad


EPA 2014 Control*
Point
Nonpoint
Nonroad
Onroad


VISTAS 2018 Control
Point
Nonpoint
Nonroad
Onroad


EPA 2020
Point
Nonpoint
Nonroad
Onroad

Comparison of 2005 Base Case Emissions Inventory for North Carolina and 2007 North Carolina SEMAP Inventory

2005 Base Case Inventory* for North Carolina Compared to 2007 North Carolina SEMAP Inventory

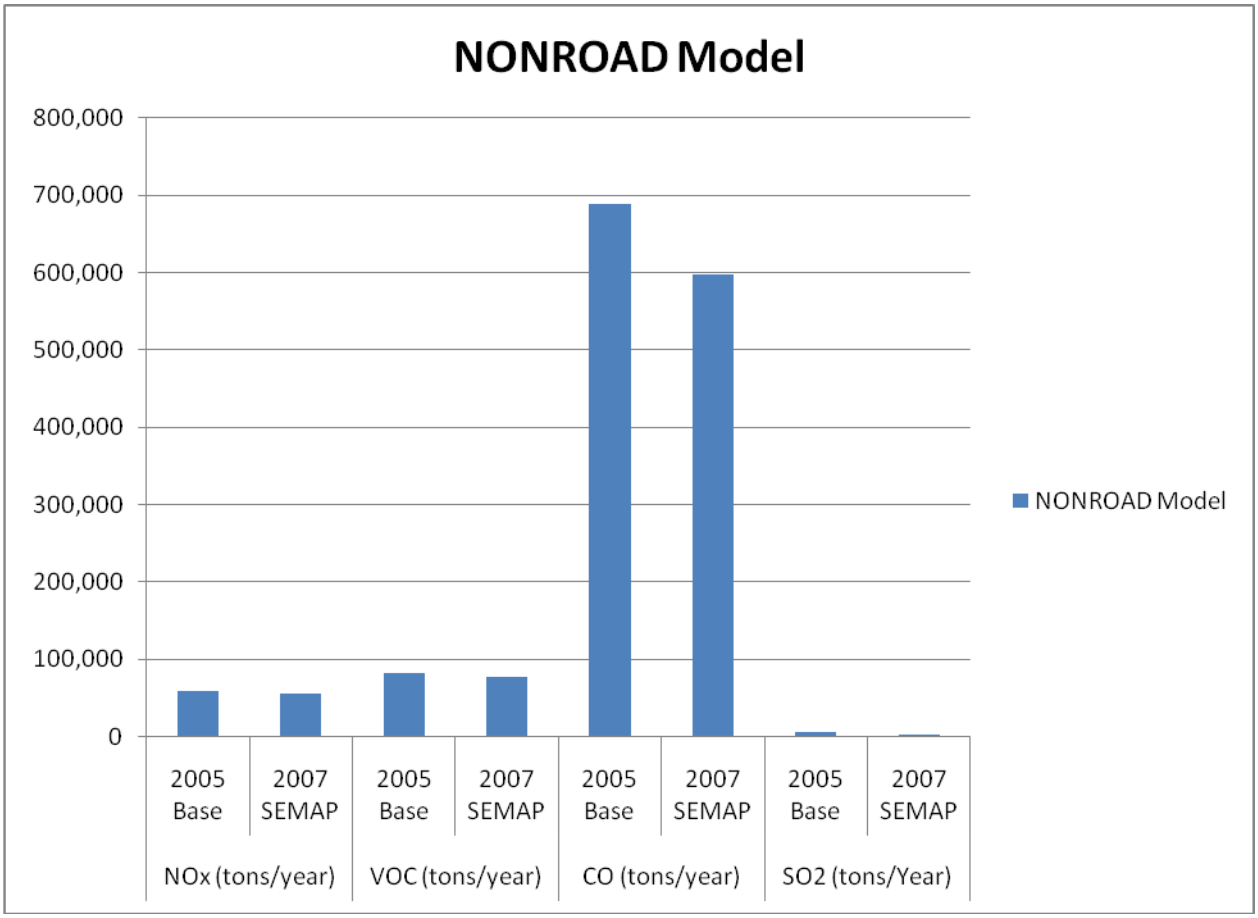
	NOx (tons/year)		
	2005 Base	2007 SEMAP	Percent Difference
NONROAD Model	58,514	55,743	5
Railroads	16,502	11,592	35
Marine	60,919	4,233	174
Aircraft	1,643	3,498	-72

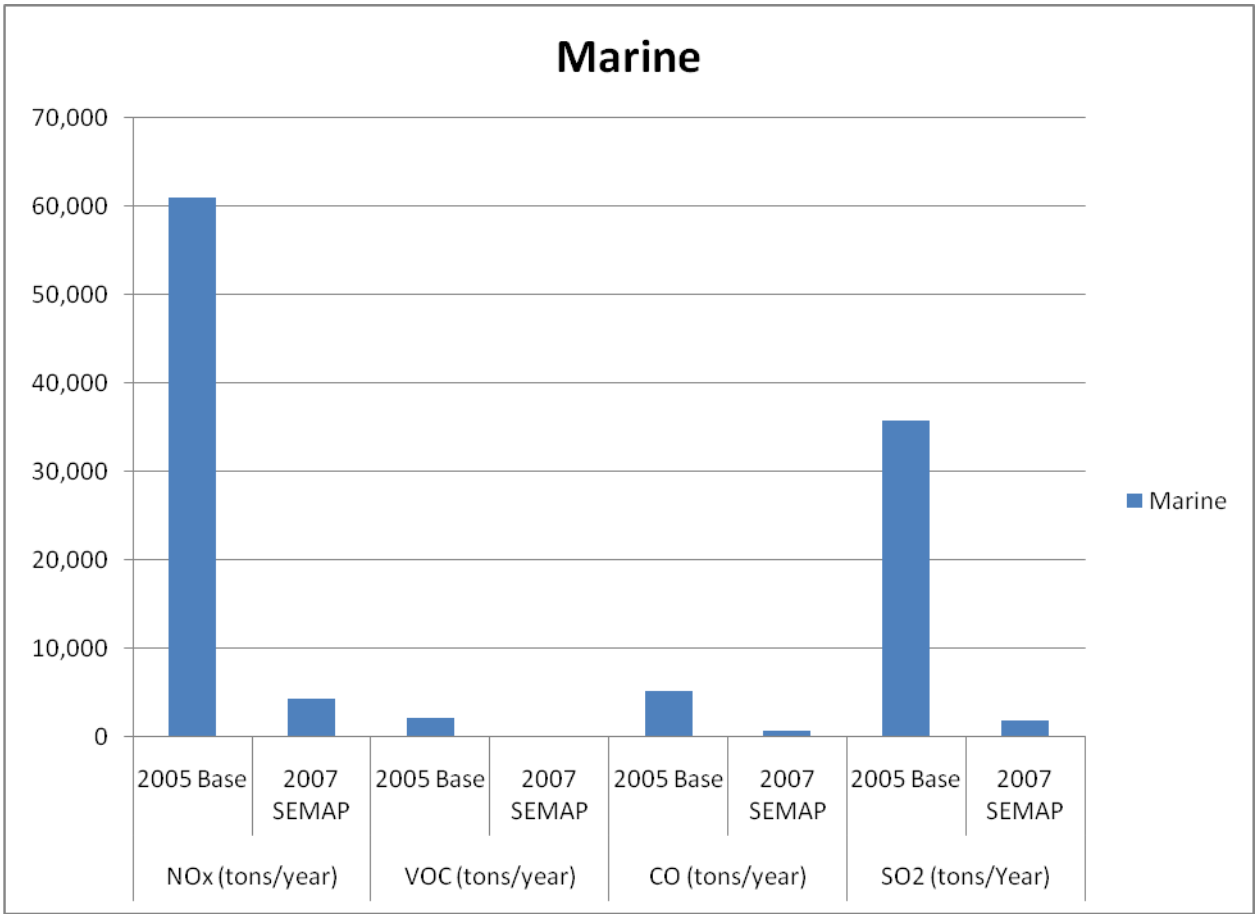
	VOC (tons/year)		
	2005 Base	2007 SEMAP	Percent Difference
NONROAD Model	81,620	76,568	6
Railroads	654	622	5
Marine	2,100	109	180
Aircraft	626	2,470	-119

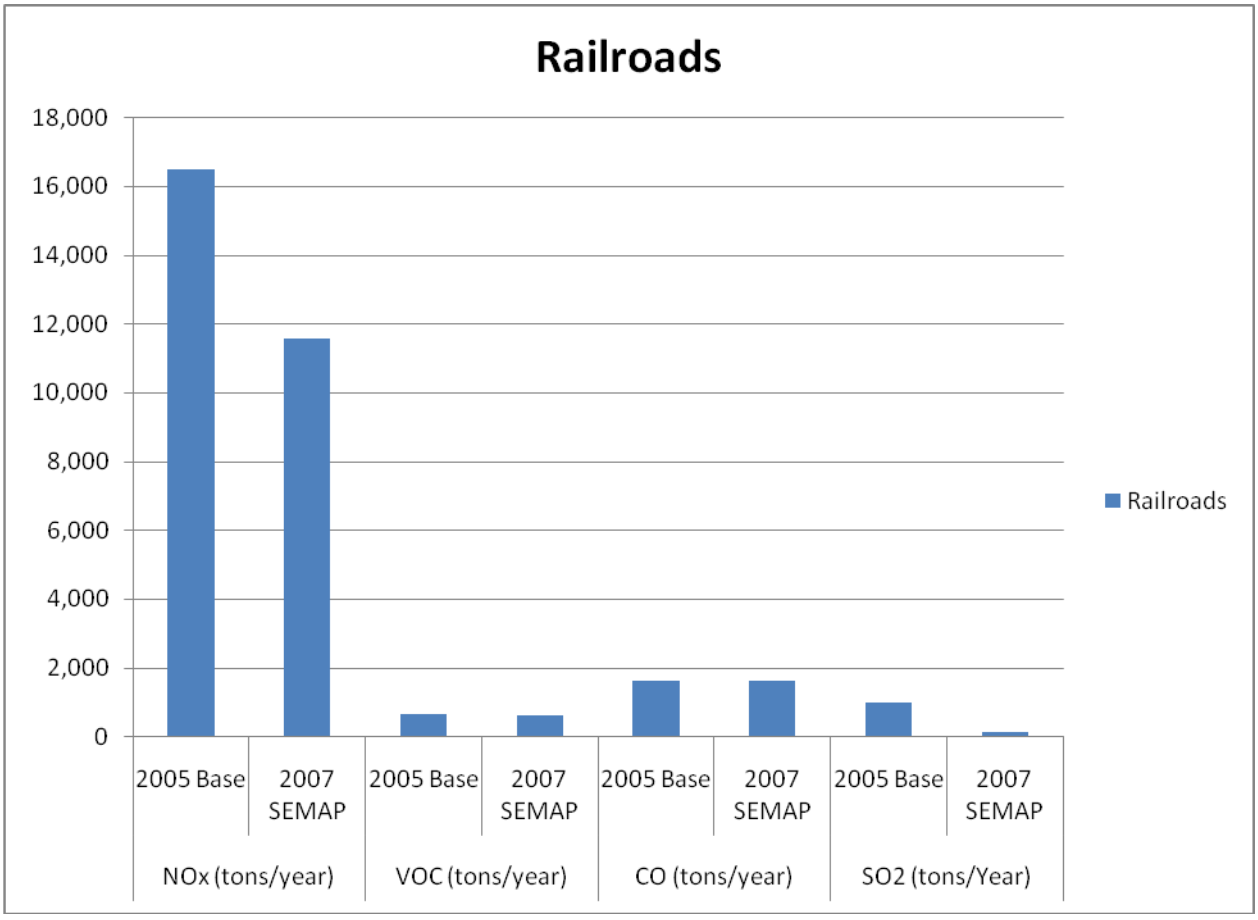
	CO (tons/year)		
	2005 Base	2007 SEMAP	Percent Difference
NONROAD Model	687,948	597,360	14
Railroads	1,638	1,610	2
Marine	5,156	670	154
Aircraft	11,202	22,292	-66

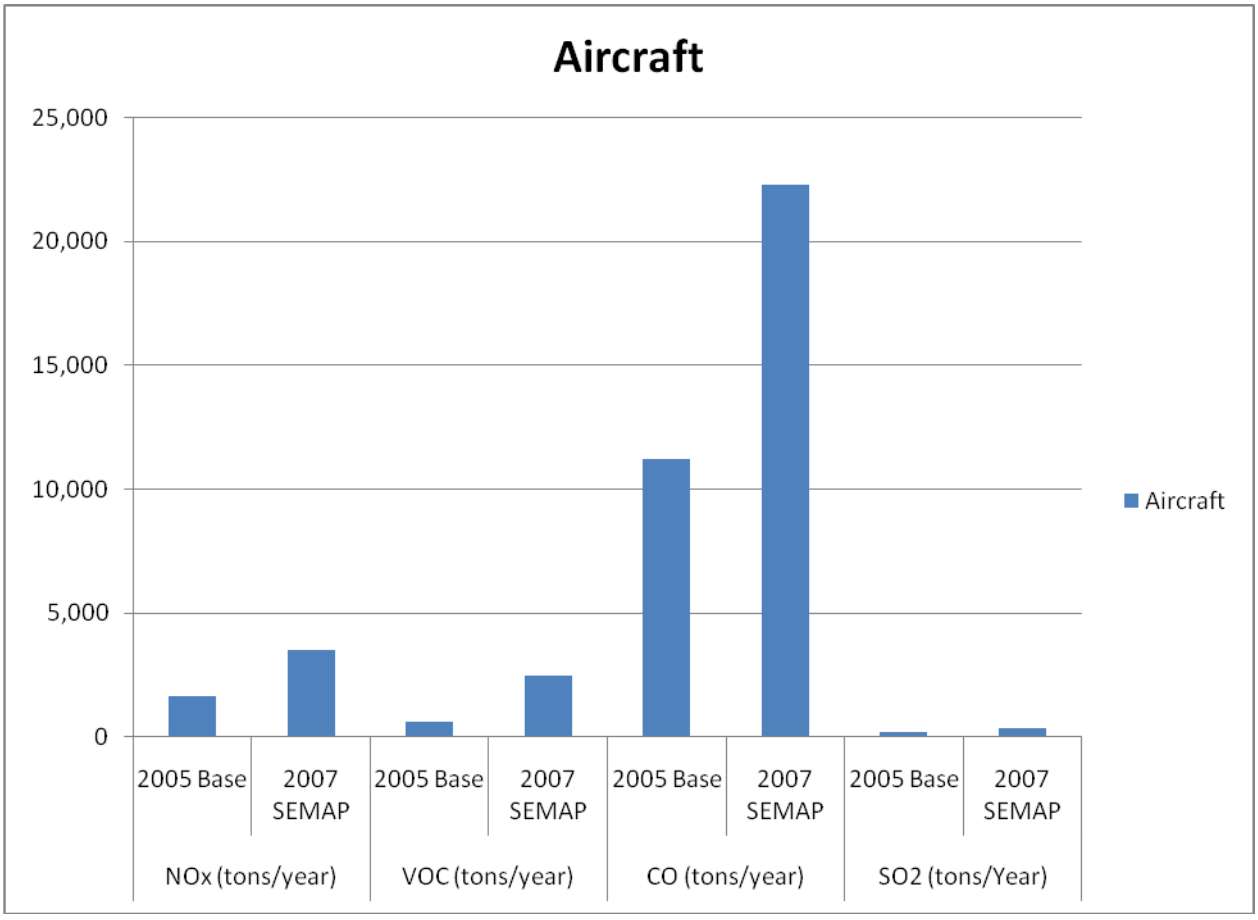
	SO2 (tons/Year)		
	2005 Base	2007 SEMAP	Percent Difference
NONROAD Model	6,050	3,111	64
Railroads	1,001	130	154
Marine	35,692	1,846	180
Aircraft	172	369	-73

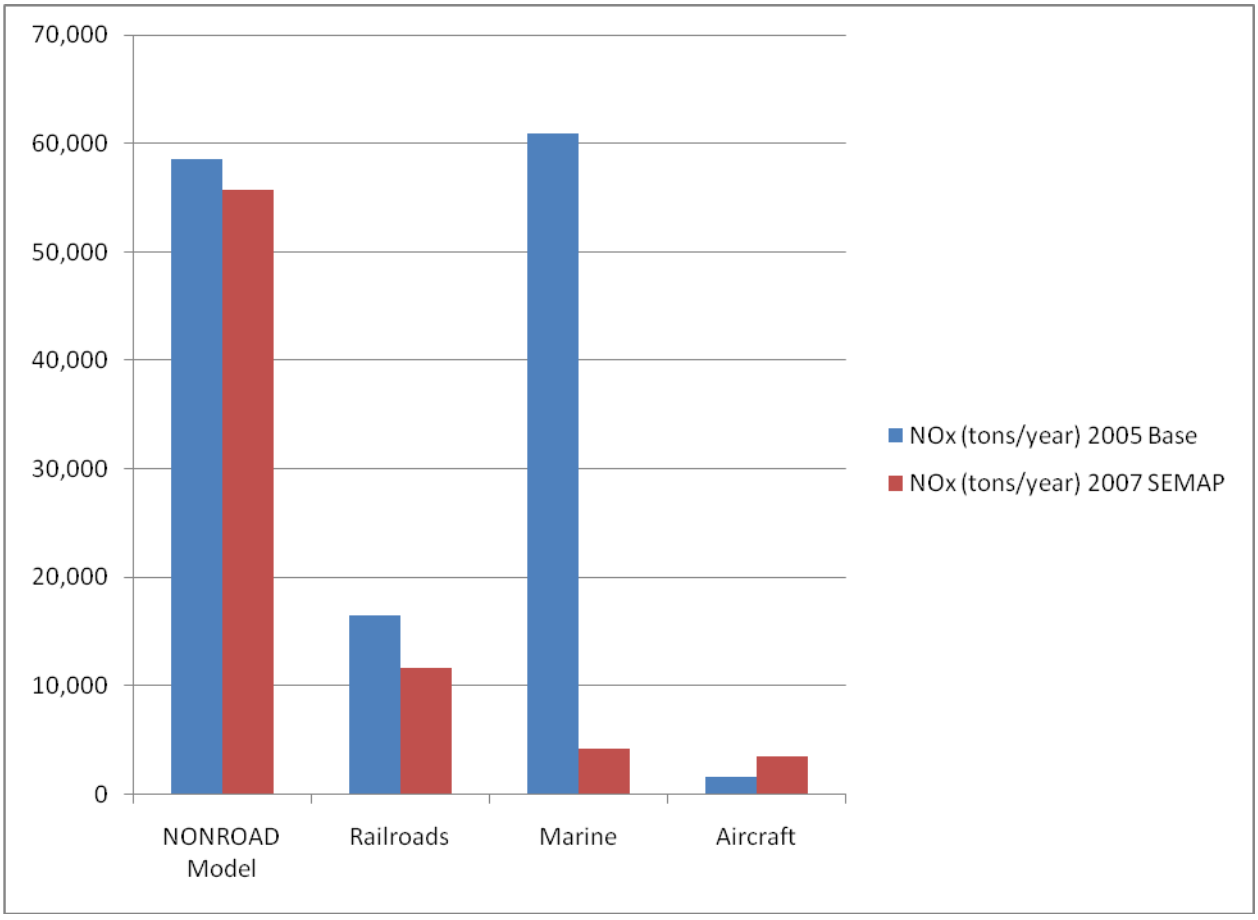
*Data Obtained from page 60 of the Technical Support Document: Tab tier2_2005ck from the summary file st_2005ck_2020ck1_tier1_tier2_new12.xls.

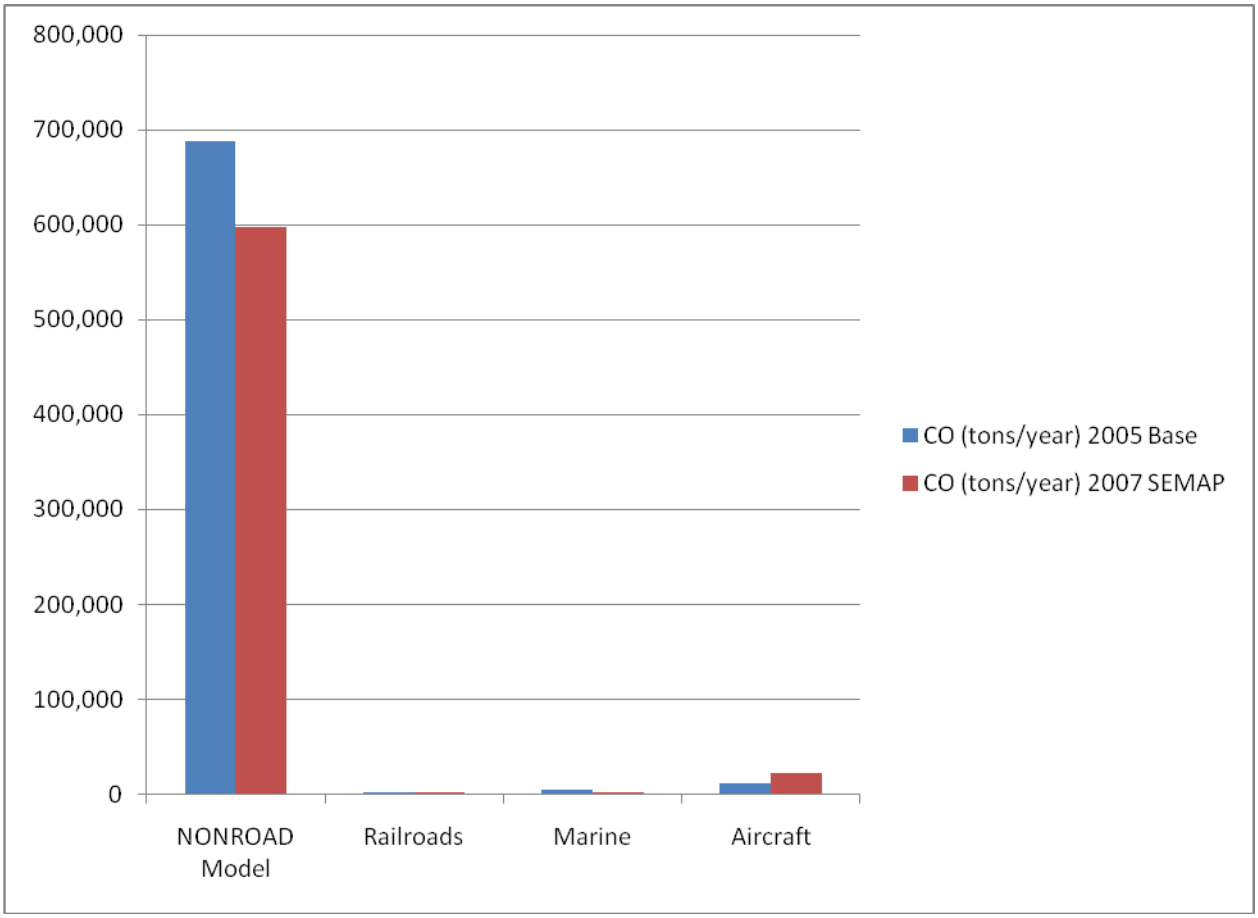

NONROAD Model
800,000
700,000
600,000
500,000
400,000
300,000
200,000
100,000
0
2005 Base
2007 SEMAP
2005 Base
2007 SEMAP
2005 Base
2007 SEMAP
2005 Base
2007 SEMAP
NOx (tons/year)
VOC (tons/year)
CO (tons/year)
SO2 (tons/Year)
NONROAD Model

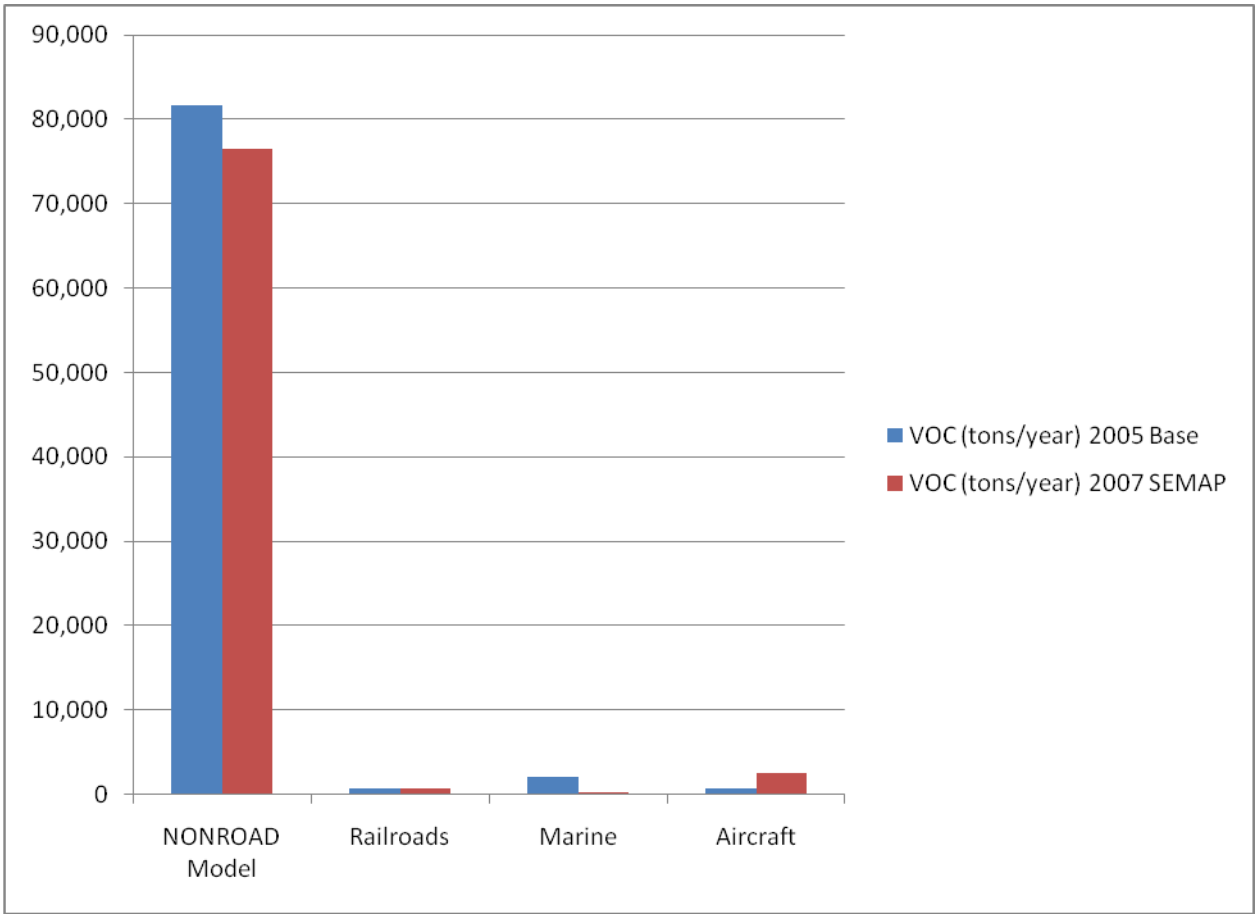

Marine
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
2005 Base
2007 SEMAP
2005 Base
2007 SEMAP
2005 Base
2007 SEMAP
2005 Base
2007 SEMAP
NOx (tons/year)
VOC (tons/year)
CO (tons/year)
SO2 (tons/Year)
Marine

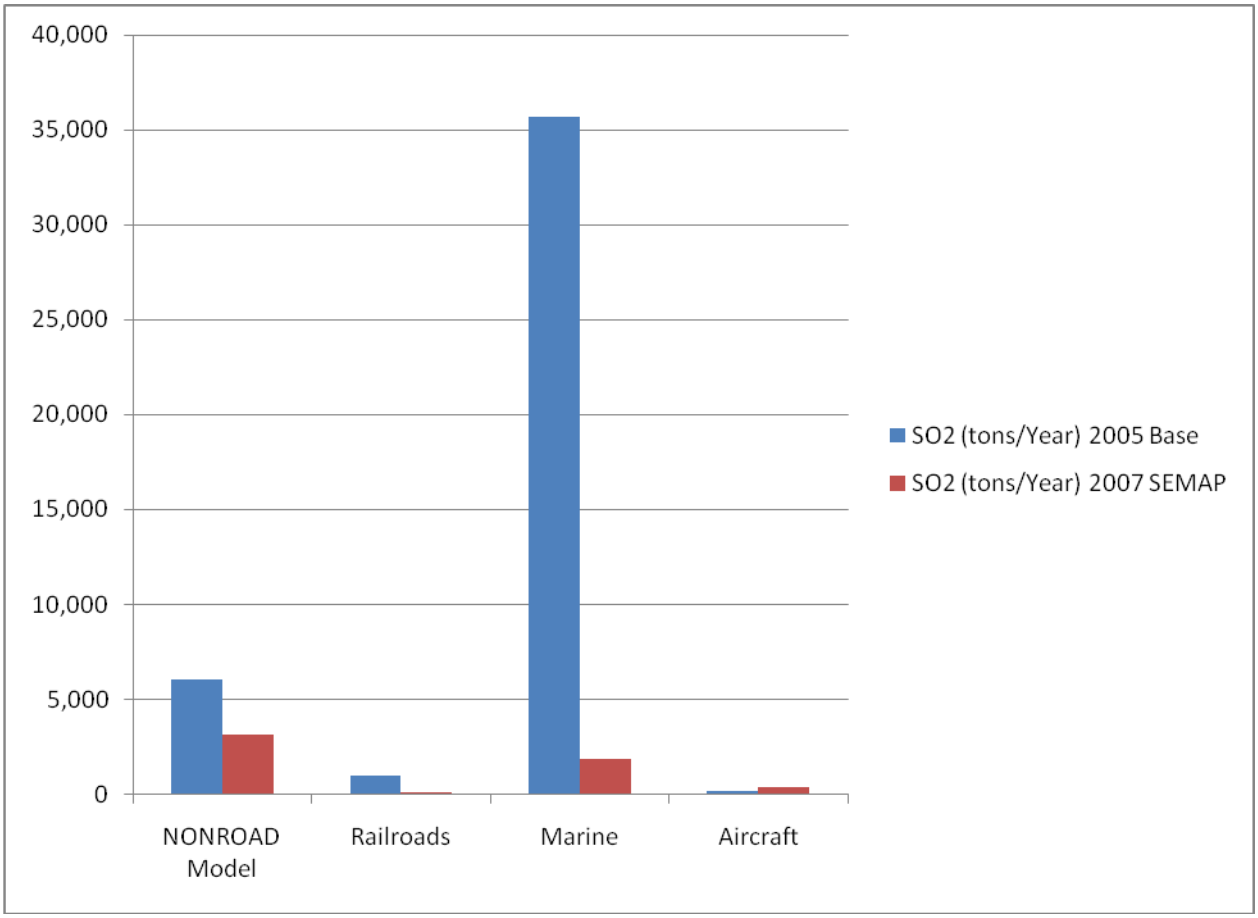

Railroads
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
2005 Base
2007 SEMAP
2005 Base
2007 SEMAP
2005 Base
2007 SEMAP
2005 Base
2007 SEMAP
NOx (tons/year)
VOC (tons/year)
CO (tons/year)
SO2 (tons/Year)
Railroads


Aircraft
25,000
20,000
15,000
10,000
5,000
0
2005 Base
2007 SEMAP
2005 Base
2007 SEMAP
2005 Base
2007 SEMAP
2005 Base
2007 SEMAP
NOx (tons/year)
VOC (tons/year)
CO (tons/year)
SO2 (tons/Year)
Aircraft


70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
NONROAD Model
Railroads
Marine
Aircraft
NOx (tons/year) 2005 Base
NOx (tons/year) 2007 SEMAP


800,000
700,000
600,000
500,000
400,000
300,000
200,000
100,000
0
NONROAD Model
Railroads
Marine
Aircraft
CO (tons/year) 2005 Base
CO (tons/year) 2007 SEMAP


90,000
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
NONROAD Model
Railroads
Marine
Aircraft
VOC (tons/year) 2005 Base
VOC (tons/year) 2007 SEMAP


40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
NONROAD Model
Railroads
Marine
Aircraft
SO2 (tons/Year) 2005 Base
SO2 (tons/Year) 2007 SEMAP