

**Supplement to the
Redesignation Demonstration and Maintenance Plan
for the
Hickory (Catawba County) and
Greensboro/Winston-Salem/High Point
(Davidson and Guilford Counties)
Fine Particulate Matter Nonattainment Areas**



**Prepared by
North Carolina Department of Environment and Natural Resources
Division of Air Quality**

December 22, 2010

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INTRODUCTION

This document is intended to supplement the Redesignation Demonstration and Maintenance Plan for the Hickory (Catawba County) and Greensboro/Winston-Salem/High Point (Davidson and Guilford Counties) Fine Particulate Matter Nonattainment Areas that was submitted to the United States Environmental Protection Agency (USEPA) on December 18, 2009. This document revises the on-road mobile source emissions and the motor vehicle emission budgets (MVEBs) using the new USEPA mobile model Motor Vehicle Emission Simulator (MOVES). In March 2010, the USEPA announced in the Federal Register (FR) that the new MOVES model was required for State Implementation Plan purposes and would be required for transportation conformity purposes starting March 2012 (40 FR 9411). The North Carolina Division of Air Quality (NCDAQ) committed to the transportation partners to revise the MVEBs once the new mobile model was released.

REVISED SECTIONS

Attached are the revised sections to the Redesignation Demonstration and Maintenance Plan for the Hickory and Greensboro/Winston-Salem/High Point Fine Particulate Matter Nonattainment Areas. To appropriately revise the original package, replace the pages as outlined below:

Narrative Replacements

Replace December 18, 2009 page 3-6 with the attached December 22, 2010 page 3-6. (Note that Errata December 22, 2010 page 3-7 has been included for ease of substitution.)

Replace December 18, 2009 pages 3-13 through 3-17 with the attached December 22, 2010 pages 3-12 through 3-17. (Note that Errata December 22, 2010 page 3-12 has been included for ease of substitution.)

Replace December 18, 2009 pages 4-8 through 4-11 with the attached December 22, 2010 pages 4-8 through 4-11.

Appendix C Replacements

Replace all of December 18, 2009 Appendix C.3 “On-Road Mobile Source Emission Inventory Documentation” with the attached December 22, 2010 Appendix C.3 “On-Road Mobile Source Emission Inventory Documentation”.

Appendix E Replacements

Replace December 18, 2009 Appendix E “Public Notice Report, Comments Received and Responses” page i with the attached December 22, 2010 Appendix E page i. (Note that December 18, 2009 Appendix E page ii has been included for ease of substitution.)

Add December 22, 2010 Appendix E pages 15 through 23 to end of December 18, 2009 Appendix E.

Table 3-1 OBDII Phase-in Effective Dates

<u>County</u>	<u>Date</u>
Catawba	July 1, 2003
Davidson	July 1, 2003
Guildford	July 1, 2002

These emission reductions are state enforceable. The expected NO_x benefits for the maintenance years are listed in Table 3-2 below.

Table 3-2 I/M NO_x Benefits by County

NO_x I/M Benefit (Tons/year)	2008	2011	2014	2017	2021
Catawba County	171	136	132	122	111
Davidson County	180	166	139	129	114
Guilford County	541	505	403	358	318

NO_x SIP Call Rule/CAIR

In response to the USEPA's NO_x SIP call, North Carolina adopted rules to control the emissions of NO_x from large stationary combustion sources. These rules cover (1) fossil fuel-fired stationary boilers, combustion turbines, and combined cycle systems serving a generator with a nameplate capacity greater than 25 MW and selling any amount of electricity, (2) fossil fuel-fired stationary boilers, combustion turbines, and combined cycle systems having a maximum design heat input greater than 250 million British thermal units per hour, and (3) reciprocating stationary internal combustion engines rated at equal to or greater than 2400 brake horsepower (3000 brake horsepower for diesel engines and 4400 brake horsepower for dual fuel engines). As part of the NO_x SIP Call, the USEPA rules established a NO_x budget for sources in North Carolina and other states. North Carolina has a Phase II budget (i.e., emission allowance) of 165,022 tons NO_x per ozone season.

Besides amending existing NO_x rules and adopting new NO_x rules specifically to address the USEPA NO_x SIP Call, the North Carolina rules also require new sources to control emissions of NO_x. The objective of this requirement is (1) to aid in meeting the NO_x budget for North Carolina for minor sources and (2) to aid in attaining and maintaining the ambient air quality standard for ozone in North Carolina. North Carolina's NO_x SIP Call rule was predicted to reduce summertime NO_x emissions from power plants and other industries by 68% by 2006. In October 2000, the North Carolina Environmental Management Commission (EMC) adopted rules requiring the reductions.

In 2009, the NO_x SIP Call program was replaced with the CAIR, a cap-and-trade program that will achieve reductions of emissions of SO₂ and NO_x in the eastern United States. NO_x sources that were regulated under the NO_x SIP Call are now regulated under the CAIR program. North Carolina adopted the CAIR rules in 2006 (amended in 2008). North Carolina's CAIR rules set annual SO₂ allowances as well as both ozone season and annual NO_x allowances for coal-fired electric generating units and other large combustion sources. These regulations are due to a Federal program and thus are both State and Federally enforceable.

Due to the Court challenges of CAIR in 2008, the USEPA will be making changes to this program soon. However, the existing CAIR rules will remain in place until the USEPA promulgates changes to the program.

Clean Smokestacks Act

In June 2002, the North Carolina General Assembly enacted the NCCSA, which requires coal-fired power plants in North Carolina to reduce annual NO_x emissions by 77% by 2009. These power plants must also reduce annual SO₂ emissions by 49% by 2009 and 73% by 2013. It is significant to note that this law sets a cap on NO_x and SO₂ emissions for the State which the North Carolina public utilities cannot meet by purchasing credits from sources outside of North Carolina. With requiring year-round NO_x controls and not allowing the purchase of NO_x credits to meet the caps, the NCCSA reduces NO_x emissions beyond the requirements of the NO_x SIP Call Rule. One of the first state laws of its kind in the nation, this legislation provides a model for other states in controlling multiple air pollutants from older coal-fired power plants. These emissions reductions are state enforceable.

Prevention of Significant Deterioration

All new major sources of SO₂ and NO_x will be evaluated under the prevention of significant deterioration program and are required to use best available control technology. These emissions reductions are state enforceable.

Open Burning

The North Carolina open burning regulation prohibits the burning of man-made materials statewide. In June 2004, the EMC approved revisions to the open burning regulation banning open burning of yard waste and land clearing debris on forecasted Code Orange or higher "air quality action days," for those counties that the NCDAQ or local air programs forecast ozone or fine particulate matter. The following counties in the Hickory area are subject to this rule: Alexander, Catawba, southeastern Burke and southeastern Caldwell. The following counties in

Table 3-5 Point Source SO₂ Emissions (tons per year)

County	2008	2011	2014	2017	2021
Catawba	6,189	6,187	6,186	6,184	6,183
Davidson	286	289	292	295	299
Guilford	449	451	453	455	458
Triad Total	735	740	745	750	757

Table 3-6. Point Source PM_{2.5} Emissions (tons per year)

County	2008	2011	2014	2017	2021
Catawba	6,976	6,975	6,975	6,973	6,971
Davidson	179	178	177	176	175
Guilford	62	62	62	63	63
Triad Total	241	240	239	239	238

Area sources are those stationary sources whose emissions are relatively small but due to the large number of these sources, the collective emissions could be significant (i.e., dry cleaners, service stations, etc.). For area sources, emissions are estimated by multiplying an emission factor by some known indicator of collective activity such as production, number of employees, or population. These types of emissions are estimated on the county level. For the projected year's inventory, area source emissions are changed by population growth, projected production growth, or when applicable, by E-GAS 5.0 growth factors. For detailed discussion on how the area source emission inventory was developed, see Appendix C.2. A summary of the area source emissions are presented in Tables 3-7 to 3-9.

Table 3-7. Area Source NO_x Emissions (tons per year)

County	2008	2011	2014	2017	2021
Catawba	662	614	566	520	454
Davidson	583	551	516	486	438
Guilford	1,243	1,210	1,177	1,146	1,099
Triad Total	1,826	1,816	1,693	1,632	1,537

Table 3-8. Area Source SO₂ Emissions (tons per year)

County	2008	2011	2014	2017	2021
Catawba	2,263	2,037	1,808	1,580	1,277
Davidson	983	838	692	548	353
Guilford	4,129	3,905	3,683	3,460	3,164
Triad Total	5,112	4,743	4,375	4,008	3,517

Table 3-9. Area Source PM_{2.5} Emissions (tons per year)

County	2008	2011	2014	2017	2021
Catawba	682	658	629	606	559
Davidson	1,071	1,028	979	937	857
Guilford	697	663	623	590	524
Triad Total	1,768	1,691	1,602	1,527	1,381

For mobile sources, the USEPA's Motor Vehicle Emission Simulator (MOVES) mobile model is run to generate emissions. The MOVES model includes the road class vehicle miles traveled (VMT) as an input file and can directly output the estimated emissions. For the projected years' inventories, the on-road mobile sources emissions are calculated by running the MOVES mobile model for the future year with the projected VMT to generate emissions that take into consideration expected Federal tailpipe standards, fleet turnover and new fuels. For detailed discussion on how the on-road mobile emission inventory was developed, see Appendix C.3. A summary of the on-road mobile source emissions are presented in Tables 3-10 to 3-12.

Table 3-10. On-road Mobile Source NO_x Emissions (tons per year)

County	2008	2011	2014	2017	2021
Catawba	4,982	4,005	3,240	2,591	2,054
Davidson	5,267	4,095	3,227	2,536	1,974
Guilford	14,499	11,157	8,882	7,143	5,796
Triad Total	19,766	15,252	12,109	9,679	7,770

Table 3-11. On-road Mobile Source SO₂ Emissions (tons per year)

County	2008	2011	2014	2017	2021
Catawba	35	20	18	19	20
Davidson	36	19	17	18	18
Guilford	111	62	55	59	63
Triad Total	147	81	72	77	81

Table 3-12. On-road Mobile Source PM_{2.5} Emissions (tons per year)

County	2008	2011	2014	2017	2021
Catawba	166	127	107	89	73
Davidson	169	121	97	77	60
Guilford	465	330	272	221	183
Triad Total	634	451	369	298	243

Nonroad mobile sources are equipment that can move but do not use the roadways, i.e., lawn mowers, construction equipment, railroad locomotives, aircraft, etc. The emissions from this category are calculated using the USEPA's NONROAD2008a nonroad mobile model, with the exception of the railroad locomotives and aircraft engine. The railroad locomotive and aircraft engine emissions are estimated by taking activity data, such as landings and takeoffs, and multiply by an emission factor. These emissions are also estimated at the county level. For the projected years' inventories, the emissions are estimated using the USEPA's NONROAD2008a nonroad mobile model, E-GAS 5.0 growth factors or projected landing and takeoff data for aircraft. For detailed discussion on how the nonroad mobile emission inventory was developed, see Appendix C.4. A summary of the nonroad mobile source emissions are presented in Tables 3-13 to 3-15.

Table 3-13. Nonroad Mobile Source NO_x Emissions (tons per year)

County	2008	2011	2014	2017	2021
Catawba	1,173	922	700	551	453
Davidson	1,831	1,632	1,467	1,275	1,115
Guilford	3,864	3,371	2,816	2,350	1,980
Triad Total	5,695	5,003	4,283	3,625	3,095

Table 3-14. Nonroad Mobile Source SO₂ Emissions (tons per year)

County	2008	2011	2014	2017	2021
Catawba	18	6	4	3	4
Davidson	25	17	2	2	2
Guilford	96	51	42	42	43
Triad Total	121	68	44	44	45

Table 3-15. Nonroad Mobile Source PM_{2.5} Emissions (tons per year)

County	2008	2011	2014	2017	2021
Catawba	70	67	57	46	38
Davidson	71	67	58	46	40
Guilford	264	252	220	186	157
Triad Total	335	319	278	232	197

3.3.3 Summary of Emissions

The sum total of these man-made emissions for the PM_{2.5} nonattainment areas is tabulated in Tables 3-16 through 3-18.

Table 3-16. Total Man-Made NO_x Emissions (tons per year)

County	2008	2011	2014	2017	2021
Catawba	20,127	16,090	15,054	14,210	13,509
Davidson	8,522	7,143	6,102	5,217	4,488
Guilford	19,837	15,969	13,107	10,872	9,112
Triad Total	28,359	23,112	19,209	16,089	13,600

Table 3-17. Total Man-Made SO₂ Emissions (tons per year)

County	2008	2011	2014	2017	2021
Catawba	8,505	8,250	8,016	7,786	7,484
Davidson	1,330	1,163	1,003	863	672
Guilford	4,785	4,469	4,233	4,016	3,728
Triad Total	6,115	5,632	5,236	4,879	4,400

Table 3-18. Total Man-Made PM_{2.5} Emissions (tons per year)

County	2008	2011	2014	2017	2021
Catawba	7,894	7,827	7,768	7,714	7,641
Davidson	1,490	1,394	1,311	1,236	1,132
Guilford	1,488	1,307	1,177	1,060	927
Triad Total	2,978	2,701	2,488	2,296	2,059

3.3.4 Maintenance Demonstration

As discussed above, maintenance is demonstrated when the future years total man-made emissions are less than the 2008 baseline emissions. The following tables summarized the SO₂, NO_x, and primary PM_{2.5} emissions for both the Hickory and Triad nonattainment areas. The difference between the base year and the final year of the plan illustrates that the continued maintenance of the annual fine particulate matter NAAQS is expected.

Table 3-19 Maintenance Demonstration for Hickory PM_{2.5} Nonattainment Area

Year	NO _x (tons per year)	SO ₂ (tons per year)	PM _{2.5} (tons per year)
2008	20,127	8,505	7,894
2011	16,090	8,250	7,827
2014	15,054	8,016	7,768
2017	14,210	7,786	7,714
2021	13,509	7,484	7,641
Difference from 2008 to 2021	-6,618	-1,021	- 253

Table 3-20 Maintenance Demonstration for Triad PM_{2.5} Nonattainment Area

Year	NO _x (tons per year)	SO ₂ (tons per year)	PM _{2.5} (tons per year)
2008	28,359	6,115	2,978
2011	23,112	5,632	2,701
2014	19,209	5,236	2,488
2017	16,089	4,879	2,296
2021	13,600	4,400	2,059
Difference from 2008 to 2021	-14,759	-1,715	- 919

The difference between the attainment level of emissions (2008) from all man-made sources and the projected level of emissions from all man-made sources in the nonattainment areas are considered the “safety margin”. The safety margin for each projected year is listed below in Table 3-21 and 3-22.

Table 3-21 Safety Margin for Hickory PM_{2.5} Nonattainment Area

Year	NO _x (tons per year)	SO ₂ (tons per year)	PM _{2.5} (tons per year)
2011	-4,037	-255	-67
2014	-5,073	-489	-126
2017	-5,917	-719	-180
2021	-6,618	-1,021	-253

Table 3-22 Safety Margin for Triad PM_{2.5} Nonattainment Area

Year	NO _x (tons per year)	SO ₂ (tons per year)	PM _{2.5} (tons per year)
2011	-5,247	-483	-277
2014	-9,150	-879	-490
2017	-12,270	-1,236	-682
2021	-14,759	-1,715	-919

For both nonattainment areas, there are significant safety margins from 2011 to 2021. In addition to the above safety margins within the PM_{2.5} nonattainment areas, SO₂ emissions from nearby coal-fired power plants will be significantly reduced due to the NCCSA. This effectively gives the PM_{2.5} nonattainment areas an even larger safety margin for SO₂. Table 2-5 shows the SO₂ reductions at nearby coal-fired power plants. These reductions will benefit both the Triad and Hickory nonattainment areas and will provide large safety margins through 2021.

3.4 CONTINGENCY PLAN

3.4.1 Overview

The two main elements of the North Carolina contingency plan are tracking and triggering mechanisms to determine when contingency measures are needed and a process of developing and adopting appropriate control measures. There will be three potential triggers for the contingency plan. The primary trigger of the contingency plan will be a violation of the annual PM_{2.5} NAAQS at any of the monitors in either PM_{2.5} nonattainment area. The secondary trigger

copy of the letter can be found in Appendix B. In the letter, the NCDAQ expressed its preference for setting county level budgets and the reasons why the NCDAQ believed county level budgets were appropriate.

The NCDAQ received comments from the Greensboro Urban Area Metropolitan Planning Organization (GUAMPO) regarding the geographic extent of the MVEBs. The GUAMPO was in favor of having county level MVEBs. A copy of the letter received can be found in Appendix B. Therefore, the NCDAQ decided to move forward with setting county-by-county MVEBs.

Additionally, there was discussion through the interagency consultation process on the years to set MVEBs for the Hickory and Triad PM_{2.5} maintenance plans. According to Section 93.118 of the transportation conformity rule, a maintenance plan must establish MVEBs for the last year of the maintenance plan (in this case, 2021). Through the interagency consultation process, it was decided that MVEBs would be set for the year 2011 for both the Hickory and Triad PM_{2.5} nonattainment areas.

Although the emissions up to this point have been expressed in terms of tons per year, the MVEBs will be set in terms of kilograms (kg) per year. In past conformity exercises, there have been some issues with conversion to tons, as well as concerns with how the MVEBs were rounded to the hundredth place. Setting MVEBs in kilograms will avoid these issues in future conformity determinations. Additionally, setting the MVEBs in kilograms was agreed to as part of the interagency consultation process.

The table below shows the counties with their on-road mobile PM_{2.5} and NO_x emissions expressed in kilograms per year and the corresponding tons per year values for 2011 and 2021.

Table 4-1. On-Road Mobile Source PM_{2.5} Emissions

County	Kilograms/year		Tons/year	
	2011	2021	2011	2021
Davidson	109,769	54,431	121	60
Guilford	299,371	166,015	330	183
Triad Total	409,140	220,446	451	243

Table 4-2. On-Road Mobile Source NO_x Emissions

County	Kilograms/year		Tons/year	
	2011	2021	2011	2021
Catawba	3,633,274	1,863,357	4,005	2,054
Davidson	3,714,921	1,790,782	4,095	1,974
Guilford	10,121,459	5,258,042	11,157	5,796
Triad Total	13,836,380	7,048,824	15,252	7,770

The NCDAQ will set MVEB, for transportation conformity purposes, as county budgets within the Hickory and Triad maintenance areas for 2011 and 2021. Tables 4-3 through 4-5 below list out the MVEBs in kilograms per year, for transportation conformity purposes, by county for the years 2011 and 2021. Upon the USEPA’s affirmative adequacy finding for these county level sub-area MVEBs, these MVEBs will become the applicable MVEBs for each county.

Table 4-3 Catawba County MVEB

	2011	2021
<i>NO_x Emissions (kg/year)</i>		
Base Emissions	3,633,274	1,863,357
Safety Margin Allocated to MVEB	363,327	372,671
NO_x Conformity MVEB	3,996,601	2,236,028

Table 4-4 Davidson County MVEB

	2011	2021
<i>NO_x Emissions (kg/year)</i>		
Base Emissions	3,714,921	1,790,782
Safety Margin Allocated to MVEB	371,492	358,156
NO_x Conformity MVEB	4,086,413	2,148,938
<i>PM_{2.5} Emissions (kg/year)</i>		
Base Emissions	109,769	54,431
Safety Margin Allocated to MVEB	43,544	98,882
PM_{2.5} Conformity MVEB	153,313	153,313

Table 4-5 Guilford County MVEB

	2011	2021
<i>NO_x Emissions (kg/year)</i>		
Base Emissions	10,121,459	5,258,042
Safety Margin Allocated to MVEB	1,012,146	1,051,608
NO_x Conformity MVEB	11,133,605	6,309,650
<i>PM_{2.5} Emissions (kg/year)</i>		
Base Emissions	299,371	166,015
Safety Margin Allocated to MVEB	122,470	255,826
PM_{2.5} Conformity MVEB	421,841	421,841

4.5 NEW SAFETY MARGINS

For the Hickory nonattainment area, a total of 363,327 kg/year (400 tons/year) and 372,671 kg/year (411 tons/year) of the 2011 and 2021 NO_x safety margins, respectively, were added to the NO_x MVEBs.

For the Triad nonattainment area, a total of 1,383,638 kg/year (1,525 tons/year) and 1,409,764 kg/year (1,554 tons/year) of the 2011 and 2021 NO_x safety margins, respectively, were added to the Triad NO_x MVEBs. For PM_{2.5}, a total of 166,014 kg/year (183 tons/year) and 354,708 kg/year (391 tons/year) of the 2011 and 2021 PM_{2.5} safety margins, respectively, were added to the Triad PM_{2.5} MVEBs.

Table 4-6 New Safety Margins for the Hickory PM_{2.5} nonattainment area

Year	NO _x (tons/year)	PM _{2.5} (tons/year)
2011	-3,637	-67
2014	-5,073	-126
2017	-5,917	-180
2021	-6,207	-253

Table 4-7 New Safety Margins for the Triad PM_{2.5} nonattainment area

Year	NO _x (tons/year)	PM _{2.5} (tons/year)
2011	-3,722	-94
2014	-9,150	-490
2017	-12,270	-682
2021	-13,205	-528