NORTH CAROLINA DIVISION OF AIR QUALITY

Air Permit Review

Permit Issue Date:

Region: Washington Regional Office
County: Hertford
NC Facility ID: 4600099
Inspector's Name: Betsy Huddleston
Date of Last Inspection: 06/10/2009
Compliance Code: 3 / Compliance - inspection

Facility Data	Permit Applicability (this application only)
Applicant (Facility's Name): Nucor Steel **Facility Address:** Nucor Steel 1505 River Road SR 1400 Cofield, NC 27922 **SIC:** 3312 / Blast Furnaces And Steel Mills **NAICS:** 331111 / Iron and Steel Mills **Facility Classification: Before:** Title V **After:** Title V **Fee Classification: Before:** Title V **After:** Title V	**SIP:** YES **NSPS:** YES **NESHAP:** no change **PSD:** YES **PSD Avoidance:** no **NC Toxics:** YES **112(r):** **Other:**

Contact Data			Application Data
Facility Contact	**Authorized Contact**	**Technical Contact**	
Elizabeth Oliver Environmental Engineer (252) 356-3707 1505 River Road Cofield, NC 27922	Robert McCracken General Manager (252) 356-3700 1505 River Road Cofield, NC 27922	Terry Hairston Environmental Engineer (252) 356-3707 1505 River Road Cofield, NC 27922	**Application Number:** 4600099.08D **Date Received:** 10/24/2008 **Application Type:** Modification **Application Schedule:** PSD **Existing Permit Data** **Existing Permit Number:** 08680/T12 **Existing Permit Issue Date:** 04/27/2009 **Existing Permit Expiration Date:** 03/31/2014

Review Engineer: Joseph Voelker **Review Engineer's Signature:** **Date:**	**Comments / Recommendations:** **Issue** 08680/T13 **Permit Issue Date:** **Permit Expiration Date:**

I. Introduction and Purpose of Application

Nucor is proposing to modify its steel mill located in Cofield, Hertford County, North Carolina. Hertford County is currently designated attainment for all criteria pollutants.

The proposed modifications will not increase the number or severity of start-ups, shutdowns and malfunctions. Based on estimated maximum potential emissions minus baseline actual emissions, the proposed modification will be subject to Prevention of Significant Deterioration (PSD) review for each criteria pollutant. Criteria pollutants include sulfur dioxide (SO2), particulate matter less than 10 microns (PM10), particulate matter less than 2.5 microns (PM2.5), nitrogen dioxide (NO2), carbon monoxide (CO), ozone (O3), and lead (Pb). Emissions of asbestos, beryllium, mercury, vinyl chloride, fluorides, sulfuric acid mist, hydrogen sulfide, total reduced sulfur, and reduced sulfur compounds associated with the proposed modification are below the significant emission rates and, thus, are not subject to PSD review.

See the details of the modification in Section III.

II. Chronology

Date	Description
	A PSD application was received and assigned app. no 4600099.08D.
04/16/2009	Add info letter was sent to Terry Hairston requesting: ▪ Revised baseline actual emission estimates ▪ Regulatory review discussion ▪ Completed forms
05/13/2009	Letter was received with information requested on 04/16/2009. Nucor also requested to append the original application with additional emission sources.
5/20/2009	A meeting occurred with Don van der Vaart, Williiam Willets and JMV. It was agreed that an addendum application was necessary to address the revised emissions estimates and additional equipment.
06/15/2009	Revised PSD application received in the RCO and the "CLOCK" was restarted.
07/16/2009	Chuck Buckler sent an email to Nucor requesting a discussion regarding PM2.5 NAAQS compliance modeling. Recent policy changes at EPA (withdraw of PM10/PM2.5 equivalency policy) have led the DAQ to require primary PM2.5 NAAQS compliance modeling. Given the uncertainty regarding modeling, primary vs. secondary PM2.5, etc., the DAQ current policy is to require compliance with the PM2.5 NAAQS by modeling primary PM2.5 emissions over the background concentration data.
7/28/2009	JMV sent Nucor an email requesting a revised TAP modeling analysis. The submitted analysis was missing some TAP emission sources
08/14/2009	PM2.5 and TAP modeling requested on 07/16 and 07/28 was received in the RCO.

III. Modification Description

The modification consists of the following:

1. Install a plate heat treating facility that will have an annual capacity of 120,000 tons. This facility will have a natural gas-fired austenitizing furnace (36 mmBtu/hr), a natural gas-fired tempering furnace (37 mmBtu/hr), a shot blaster, and a cooling tower (3,000 gallons per minute). The furnaces will exhaust to two stacks and the shot blaster will exhaust into the existing building and subsequently through the existing building roof monovent.

2. Modify the carbon injection system for the electric arc furnace. The maximum annual steel production limit will remain at 2,190,000 tons. The peak production will increase from 250 tph to 350 tph.

3. Install two plate cutting bed systems. One will use 10 oxy-fuel burners and the other one will have 8 oxy-fuel burners and 2 plasma torches. The exhausts will be ducted to a baghouse.

4. Annual throughput for the slag processing operations will be increased from 262,800 tons per year (tpy) to 360,000 tpy.

5. Install a vacuum tank degasser (VTD) with a maximum steel production of 350 tph and 2,190,000 tpy.

6. Install a natural-gas fired boiler (50.213 mmBtu/hr) to serve the VTD.

The implications of the modification with respect to regulatory applicability will be discussed in Section IV.

IV. Regulatory Review

Regulatory applicability will be discussed on a source by source basis as necessary. Regulations that apply to the facility in aggregate will be discussed in the **Multiple Source Regulatory Discussion** section.

1. Plate heat treating process

The addition of this process will increase the capability of the facility to produce steel of different specifications which in the past or currently would have to be heat treated elsewhere. This equipment will reside in a new building on the north side of the finishing mill (See Appendix F of the application). The permitted operations will consist of the following:

Emission Source ID No.	Emission Source Description	Control Device ID No.	Control Device Description
Heat Treating Facility			
ES95	Shot blaster	CD06	Bagfilter (10:1 gas/cloth ratio)
ES96	Natural gas-fired austentizing furnace (36 mmBtu per hour maximum heat input capacity)	N/A	N/A
ES97	Natural gas-fired tempering furnace (37 mmBtu per hour maximum heat input capacity)	N/A	N/A
ES102	Two-cell cooling tower (3,000 gallon per minute maximum flow rate)	CD08	Mist eliminator (0.005 percent drift loss)

Regulatory review will be discussed for each source separately:

ES96

Emission Source ID No.	Emission Source Description	Control Device ID No.	Control Device Description
ES96	Natural gas-fired austenitizing furnace (36 mmBtu per hour maximum heat input capacity)	NA	NA

Nucor will add an austenitizing furnace as part of the new heat treat facility. The furnace is indirect fired with a nitrogen atmosphere to prevent scale formation and the resulting scale pickup that occurs of the roll surface. This is a state of the art design to ensure optimum plate surface quality. The burners are low NOx burners with an emission rate of 0.211 lb/mmBtu. Indirect fired burners have higher temperature; thus resulting in higher NOx emissions.

Regulatory Discussion

15A NCAC 2D .0515: PARTICULATES FROM MISCELLANEOUS INDUSTRIAL PROCESSES

This does not apply since 2D.0530 contains a PM standard in this situation.

15A NCAC 2D .0516: SULFUR DIOXIDE EMISSIONS FROM COMBUSTION SOURCES

SO2 emissions result from natural gas combustion. The allowable emission rate under 2D.0516 is 2.3 lb/mmBtu, which in this case would be 2.3 lb/mmBtu * 36 mmBtu/hr = 82.8 lb/hr. The permittee estimates SO2 emissions at 0.022 lb/hr which is based on combustion of natural gas. Compliance is expected with this regulation. No monitoring, recordkeeping, or reporting is required for sulfur dioxide emissions from this source.

15A NCAC 2D .0521: CONTROL OF VISIBLE EMISSIONS

The furnace will exhaust directly to the atmosphere and is subject to the 20% opacity limit in this rule. Based on similar sources compliance with this rule is expected for this source. As with the existing reheat furnace monitoring, recordkeeping and reporting will not be required.

15A NCAC 2D .1100: CONTROL OF TOXIC AIR POLLUTANTS

15A NCAC 2D .0530: PREVENTION OF SIGNIFICANT DETERIORATION

See the **Multiple Source Regulatory Discussion** section.

ES97

Emission Source ID No.	Emission Source Description	Control Device ID No.	Control Device Description
ES97	Natural gas-fired tempering furnace (37 mmBtu per hour maximum heat input capacity)	NA	NA

Nucor will add a tempering furnace as part of the new heat treat facility. The furnace is direct fired with a state of the art high convection system to provide optimum plate temperature uniformity. The burners are low NOx burners with an emission rate of 0.0702 lb/mmBtu.

Regulatory Discussion

15A NCAC 2D .0515: PARTICULATES FROM MISCELLANEOUS INDUSTRIAL PROCESSES

This does not apply since 2D.0530 contains a PM standard in this situation.

15A NCAC 2D .0516: SULFUR DIOXIDE EMISSIONS FROM COMBUSTION SOURCES

SO2 emissions result from natural gas combustion. The allowable emission rate under 2D.0516 is 2.3 lb/mmBtu, which in this case would be 2.3 lb/mmBtu * 37 mmBtu/hr = 85.1 lb/hr. The permittee estimates SO2 emissions at 0.022 lb/hr which is based on combustion of natural gas. Compliance is expected with this regulation. No monitoring, recordkeeping, or reporting is required for sulfur dioxide emissions from this source.

15A NCAC 2D .0521: CONTROL OF VISIBLE EMISSIONS

The furnace will exhaust directly to the atmosphere and is subject to the 20% opacity limit in this rule. Based on similar sources compliance with this rule is expected for this source. As with the existing reheat furnace, monitoring, recordkeeping and reporting will not be required.
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15A NCAC 2D .1100: CONTROL OF TOXIC AIR POLLUTANTS
15A NCAC 2D .0530: PREVENTION OF SIGNIFICANT DETERIORATION

See the **Multiple Source Regulatory Discussion** section.

ES95

Emission Source ID No.	Emission Source Description	Control Device ID No.	Control Device Description
ES95	Shot blaster	CD06	Bagfilter (10:1 gas/cloth ratio)

The shot blaster will be controlled by a bagfilter system and exhausted to the interior of the building . Typically such sources are considered insignificant sources under the 2Q.0300 and 2Q.500 permitting rules but given this is part of a PSD major modification it is subject to the permitting rules. The Permittee did not have specifications for the bagfilter. Thus, its was determined that as long as the bagfilter had at least a 10:0 gas/cloth ratio all other claims of compliance should be met.

Regulatory Discussion

15A NCAC 2D .0515: PARTICULATES FROM MISCELLANEOUS INDUSTRIAL PROCESSES

This does not apply since 2D.0530 contains a PM standard in this situation.

15A NCAC 2D .0521: CONTROL OF VISIBLE EMISSIONS

The source is subject to the 20% opacity limit. A visible plume in the outdoor environment associated with this shot blasting operation controlled by a bagfilter system and exhausting indoors is not expected.

No monitoring, recordkeeping and reporting will be included for this source.

15A NCAC 2D .0530: PREVENTION OF SIGNIFICANT DETERIORATION

See the **Multiple Source Regulatory Discussion** section.

ES102

Emission Source ID No.	Emission Source Description	Control Device ID No.	Control Device Description
ES102	Two-cell cooling tower (3,000 gallon per minute maximum flow rate)	CD08	Mist eliminator (0.005 percent drift loss)

Nucor will install a cooling tower for the heat treat facility. The tower is designed for a water circulation rate of 3,000 gallons per minute. The tower will be equipped with drift mist eliminators. Particulate emissions were estimated using the proposed drift loss rate of 0.005% and 500 ppm total dissolved solids (TDS). Maximum potential emissions for the cooling tower are 0.16 tpy. Due to the nature of the cooling tower operation and the nominal emissions from the process, any add-on controls are considered impractical and not feasible.

In general such a source would be placed on the insignificant activities list but since this installation is part of a PSD major modification it will be a permitted source.

Note that Nucor already has three cooling towers in the existing permit. Because the new cooling tower has similar regulatory and monitoring, recordkeeping and reporting requirements it will be included in the existing permit section, Section 2.1.E., which addresses cooling towers.

Regulatory Discussion

15A NCAC 2D .0515: PARTICULATES FROM MISCELLANEOUS INDUSTRIAL PROCESSES

This does not apply since 2D.0530 contains a PM standard in this situation.

15A NCAC 2D .0521: CONTROL OF VISIBLE EMISSIONS

The source is subject to the 20% opacity limit. Any visible plume from the cooling tower is expected to consist mainly water droplets, which are not subject to 2D.0521. Given the large expectation of compliance no monitoring, recordkeeping and reporting will be required.

15A NCAC 2D .0530: PREVENTION OF SIGNIFICANT DETERIORATION

See the **Multiple Source Regulatory Discussion** section.

2. Modify the carbon injection system for the electric arc furnace.

Nucor currently feeds carbon to the Consteel conveyor which is then fed into the furnace. Nucor would like to feed it directly to the furnace via a blower for better control of the carbon addition. This modification will result in a hourly peak production increase from 250 to 350 tph. However, the maximum annual steel production limit will remain at 2,190,000 tons. The source has already been permitted and has been operating in compliance with all applicable air regulations. Therefore compliance needs to be assessed with a %40 hourly increase in potential emissions.

Note that this increase in the production rate of the EAF effectively means an increase in the short term throughput and utilization in the sources downstream. However, the scope of all the modifications occurring at the facility will allow most of those sources to be addressed independently. In the end a BACT analysis for all the sources affected by the modification is included in this review/application. The existing sources which are most closely associated with the EAF modification however include the following:

Emission Source ID No.	Emission Source Description	Control Device ID No.	Control Device Description
ES01	One DC Electric Arc Furnace (250 ton per hour maximum capacity) equipped with a direct-shell evacuation control system and roof canopy hood	CD01	One negative pressure baghouse (530,620 square feet of filter area)
ES02	One Ladle Metallurgical Station consisting of two ladles with one set of AC electrodes alternately servicing both ladles equipped with a side draft hood		
ES03	One water-cooled continuous slab caster equipped with a canopy hood		
ES16	One dust transport and storage system		

Given that these sources share a common controlled emission point (CD01) and common uncontrolled emission points (EP03 and EP04) (including the fugitive components) and have similar regulatory applicability, this aspect of the modification will be discussed in context of all these affected sources. Note the permit is structured this way as well. The current permit has BACT limits for all of the sources listed above.

The permit also groups the numerous preheaters and dryers with the above sources, which also emit to the atmosphere via the roof monitors (EP03 and EP04).

Regulatory Discussion

15A NCAC 2D .0516: SULFUR DIOXIDE EMISSIONS FROM COMBUSTION SOURCES
This regulation affects the preheaters and dryers. Given that natural gas will continue to be fired in these units continued compliance is expected. No changes will be made to the permit.

15A NCAC 2D .0521: CONTROL OF VISIBLE EMISSIONS
The source is subject to the 20% opacity limit. The melt shop building has a passive monovent that runs the length of the building. The monovent is really two vents which are known as EP03 and EP04.This rule applies to melt shop roof monitor EP04 only since it is farther away from the NSPS affected EAF.. Roof monitor EP03 is Subject to the NSPS Aaa opacity limit because it is closer to the EAF and presumably would have more of the EAF's fugitive emissions. Technically 2D .0521 applies to ES02 and ES03 as well but the facility is configured such that the controlled emissions from these sources are exhausted from the CD 01 which controls the NSPS affected EAF. Continued compliance is expected. No changes will be made to this permit condition.

15A NCAC 2D .0524: NEW SOURCE PERFORMANCE STANDARDS
NSPS applies PM limits of 0.0052 grains/dsf and opacity limits to the EAF (ES01), fugitive emissions from the EAF and the dust transport system handling PM generated by the EAF. In a practical sense, the emissions from the EAF are commingled with the other sources identified in the permit condition 2.1.A.1 including the ES02, ES03 and ES16 described in the table above. As such these other sources, although not subject to NSPS are controlled to the NSPS limitations. The permit modification did not suggest an increase in baghouse airflow being required. Thus, it can be expected that an increase in the PM generation rate without an increase in airflow would create an increase in grain loading after controls. Additionally it is unclear what the increase in production rate will have on the opacity from the various emission points.

Given that PSD condition requires annual testing for a PM limitation that is more stringent that the one in this rule (0.0052 gra/dscf for PM10 vs. PM in this rule) no testing requirement will be imposed.
No permit changes are necessary.

15A NCAC 2D .0530: PREVENTION OF SIGNIFICANT DETERIORATION
See the **Multiple Source Regulatory Discussion** section.

15A NCAC 2D .0614: COMPLIANCE ASSURANCE MONITORING
The proposed modifications do not impose any new regulatory limits on this process. The current CAM in place will remain unchanged.

15A NCAC 2D .1111: MAXIMUM ACHIEVABLE CONTROL TECHNOLOGY
The Electric Arc Furnace (ID No. ES01) is currently subject to 40 CFR Part 63, Subpart YYYYY "National Emission Standards for Hazardous Air Pollutants for Area Sources: Electric Arc Furnace Steelmaking Facilities'. Although the increase in throughput of the EAF may result in an actual increase in emission, compliance with the PM limit of 0.0052 gr/dsf is expected. As discussed above, the PSD condition requires annual testing for a PM limitation that is more stringent that the one in this rule (0.0052 gra/dscf for PM10 vs. PM in this rule) no additional testing requirement is necessary.

No permit changes are necessary and continued compliance with Subpart YYYYY is expected

3. Two plate cutting bed systems

The facility would like additional capability with respect to cutting preexisting materials (extra material, over-production, off-spec, etc.) in order to find markets for current and previously unusable material. The addition of this equipment will not increase the production capacity of the facility overall.
One bed will use 10 oxy-fuel burners and the other one will have 8 oxy-fuel burners and 2 plasma torches. Both will be exhausted to a bagfilter which will then be exhausted directly outdoors.
These sources will appear in the permit as follows:

Emission Source ID No.	Emission Source Description	Control Device ID No.	Control Device Description
ES98	Natural gas-fired plate cutting bed consisting of ten oxy-fuel torches (0.4 mmBtu per hour total heat input rate)	CD07	Cartridge filter
ES99	Natural gas-fired plate cutting bed consisting of 8 oxy-fuel torches and two plasma torches (0.32 mmBtu per hour total heat input rate)		

<u>Regulatory Discussion</u>

15A NCAC 2D .0515: PARTICULATES FROM MISCELLANEOUS INDUSTRIAL PROCESSES

This does not apply since 2D.0530 contains a PM standard in this situation.

15A NCAC 2D .0516: SULFUR DIOXIDE EMISSIONS FROM COMBUSTION SOURCES

SO2 emissions result from natural gas combustion. The allowable emission rate under 2D.0516 is 2.3 lb/mmBtu, which is orders of magnitude greater than if all the sulfur in natural gas was emitted as SO2. Compliance is expected with this regulation. No monitoring, recordkeeping, or reporting is required for sulfur dioxide emissions from these sources.

15A NCAC 2D .0521: CONTROL OF VISIBLE EMISSIONS

The sources are subject to the 20% opacity limit. Unlike the current permitted cutting bed (ES91) these units will exhaust directly outdoors, and therefore are more likely to have visible emissions.

Typical monitoring, recordkeeping and reporting for PM sources will be required which will include a weekly VE reading and associated recordkeeping.

15A NCAC 2D .0530: PREVENTION OF SIGNIFICANT DETERIORATION

See the **<u>Multiple Source Regulatory Discussion</u>** section.

4. Annual throughput for the slag processing operations will be increased from 262,800 tons per year (tpy) to 360,000 tpy.

Slag pots are used to transport molten slag from the EAF to the slag processing area. PM emissions from slag handling are associated with slag pot dumping, screening and crushing operations, storage piles, slag cutting, and unpaved roadways. Emissions of fugitive PM from slag dumping and processing and storage piles are controlled by limited drop heights and the application of water. Emissions from the unpaved roadways are minimized through the application of an asphaltic emulsion, water application and posted speed limits. Nucor has implemented some changes in operation of the EAF that produces more slag, hence the need to account for an increase in the slag processing.

Regulatory Discussion

15A NCAC 2D .0521: CONTROL OF VISIBLE EMISSIONS

Nucor is currently subject to this rule and has monitoring, recordkeeping and reporting that are used to achieve compliance with this regulation. Continued compliance is expected. No changes will be made to this permit condition.

15A NCAC 2D .0530: PREVENTION OF SIGNIFICANT DETERIORATION

See the **Multiple Source Regulatory Discussion** section.

5. Install a vacuum tank degasser (VTD) with a maximum steel production of 350 tph and 2,190,000 tpy.

The degasser will appear in the permit as follows:

Emission Source ID No.	Emission Source Description	Control Device ID No.	Control Device Description
ES 100	Vacuum degasser (350 tons of steel per hour maximum production capacity)	N/A	N/A

As excerpted from the website for "Mechanical Engineering: The Magazine of ASME"

> *Steel companies are increasingly adopting the practice called vacuum degassing—subjecting molten metal to a vacuum to remove hydrogen or carbon—to improve the quality of their products and shorten processing cycles*

The VTD will result in emissions of PM(PM10), SO2, NOx, CO, VOC. The potential emissions from the VTD are as follows (see page 168 of 213 in the application):

Pollutant	Tons per year
PM/PM10	2
CO	104.3
SO2	7
NOx	7
VOC	7

<u>Regulatory discussion</u>

15A NCAC 2D .0515: PARTICULATES FROM MISCELLANEOUS INDUSTRIAL PROCESSES

This does not apply since 2D.0530 contains a PM standard in this situation.

15A NCAC 2D .0521: CONTROL OF VISIBLE EMISSIONS

The source is subject to the 20% opacity limit. Nucor expects it to be less than 20% based on operation of similar sources at other locations. Typical monitoring, recordkeeping and reporting will be required. The permittee will be required to make an observation once per week.

15A NCAC 2D .0530: PREVENTION OF SIGNIFICANT DETERIORATION

See the **Multiple Source Regulatory Discussion** section.

6. Install a natural-gas fired boiler (50.213 mmBtu/hr) to serve the vacuum tank degasser VTD.

The boiler is used to generate steam that is used in an ejector to create vacuum for the VTD. The boiler will appear in the permit as follows:

Emission Source ID No.	Emission Source Description	Control Device ID No.	Control Device Description
ES 101	Vacuum degasser boiler (natural gas-fired, 50.213 mmBtu per hour maximum heat input)	n/a	n/a

Regulatory discussion

15A NCAC 02D .0503: PARTICULATES FROM FUEL BURNING INDIRECT HEAT EXCHANGERS
This system has a heat input of 50.213 mmBtu/hr. There are no other indirect heat exchangers at the facility.
The equation in 2D.0503 yields 0.395 lb/mmBtu.
Given this unit fires only natural gas compliance with this PM standard is expected. No monitoring, recordkeeping and reporting/ will be required.

15A NCAC 2D .0516: SULFUR DIOXIDE EMISSIONS FROM COMBUSTION SOURCES
Because there is no NSPS SO2 standard that applies, the 2.3 lb/mmBtu limit applies. Compliance is expected through the use of natural gas.

15A NCAC 2D .0521: CONTROL OF VISIBLE EMISSIONS
The source is subject to the 20% opacity limit. Sources combusting solely natural gas are expected to comply with this regulations without monitoring. No monitoring, recordkeeping and reporting will be required.

15A NCAC 2D .0524: NEW SOURCE PERFORMANCE STANDARDS
The boiler is used to generate steam which is used in an ejector to create vacuum for the VTD. This boiler has a heat input of 50.213 mmBtu/hr via natural gas combustion. As such this system meets the definition of a steam generating unit in 40CFR60.41c and is subject to NSPS Subpart Dc. In general Subpart Dc imposes PM (and opacity) and SO2 standards. However, given that this unit can only combust natural gas it will only be subject to an initial notification and fuel recordkeeping requirements.

15A NCAC 2D .0530: PREVENTION OF SIGNIFICANT DETERIORATION
See the **Multiple Source Regulatory Discussion** section.

Multiple Source Regulatory Discussion

15A NCAC 2D .1100: CONTROL OF TOXIC AIR POLLUTANTS

The Permittee currently has the following limits in the air permit.

Emission Sources	Toxic Air Pollutants	Emission Limits	
Melt Shop baghouse (ID No. CD01)	arsenic	10.0	pounds per year
	beryllium	23.8	pounds per year
	cadmium	291.3	pounds per year
	chromium+6	25.0	pounds per year
	manganese	3.324	pounds per 24 hours
	mercury	4.22	pounds per 24 hours
	nickel	0.50	pounds per 24 hours
	benzene	17,885	pounds per year
Melt Shop roof monitors (ID Nos. EP03 and 04)	arsenic	1.2	pounds per year
	beryllium	0.64	pounds per year
	cadmium	35.0	pounds per year
	chromium+6	0.0114	pounds per year
	manganese	4.37	pounds per 24 hours
	mercury	0.006	pounds per 24 hours
	nickel	0.096	pounds per 24 hours
	benzene	89.42	pounds per year
Reheat Furnace (ID No. ES04)	arsenic	0.53	pounds per year
	beryllium	0.035	pounds per year
	cadmium	2.98	pounds per year
	chromium+6	0.38	pounds per year
	manganese	0.003	pounds per 24 hours
	mercury	0.002	pounds per 24 hours
	nickel	0.016	pounds per 24 hours
	benzene	5.7	pounds per year
Slag Processing (ID No. ES37)	arsenic	0.54	pounds per year
	beryllium	0.059	pounds per year
	cadmium	0.10	pounds per year
	chromium+6	0.05	pounds per year
	manganese	1.42	pounds per 24 hours
	mercury	0.000014	pounds per 24 hours
	nickel	0.0024	pounds per 24 hours

These rates represented emission rates from the respective sources emitting at their maximum production rate.

For the reheat furnace, the emission rates modeled remain unchanged as the existing rates represent emissions from the furnace operating at its maximum permitted rate and the modification does not affect the maximum rate of the reheat furnace.

For the slag processing, the maximum emission rates were increased by the ratio of the new annual production rate (360,000 tons per year) divided by its current maximum production rate (262,800 tons per year).

For the baghouse and melt shop fugitives, the only rates remodeled were the short-term pollutants, manganese, mercury, and nickel. These modeled rates were increased by the ratio of the requested maximum production rate (350 tph) divided by the existing maximum production rate (250 tph).

The new sources with non-exempt TAP emissions, the tempering furnace and austenitizing furnace, were modeled at their maximum production rate.

Note that in this revised modeling analysis, toluene, formaldehyde, hexane and benzo(a)pyrene were also included as they are emitted above their respective TPERs. For the furnaces the Permittee estimated emissions associated solely with natural gas fuel combustion.

The revised allowable emission rates are as follows:

Pollutant	Emission Rate Averaging Period	Emission Source Description: Melt Shop Baghouse (ID No. CD01)	Reheat Furnace (ID No. ES04)	Austenizing Furnace (ID No. ESXX)	Tempering Furnace (ID No. ESYY)	Melt Shop Fugitives (ID No. EP03 and EP04)	Slag Processing Area (ID no. ES37)
		Allowable Emission Rates					
Formaldehyde	pounds per hour	N/A	0.023	2.70E-03	2.78E-03	N/A	N/A
Hexane		N/A	0.56	0.065	0.067	N/A	N/A
Arsenic	pounds per year	10.01	0.53	0.063	0.065	1.20	0.74
Beryllium		23.78	0.035	3.78E-03	3.89E-03	1.28	0.081
Cadmium		291.30	2.98	0.35	0.36	34.97	0.14
Chorimium +6		25.03	0.38	0.44	0.45	1.14E-02	0.068
Benzene		17867.62	5.70	0.66	0.68	89.69	N/A
Benzo(a)pyrene		N/A	3.27E-03	3.78E-04	3.89E-04	N/A	N/A
Manganese	pounds per 24-hours	4.65	3.01E-03	3.28E-04	3.37E-04	6.11	1.94
Mercury		5.90	2.00E-03	2.25E-04	2.30E-04	8.40E-03	1.92E-05
Nickel		0.70	0.016	1.82E-03	1.86E-03	0.13	0.003
Toluene	pounds per hour	N/A	1.05E-03	1.22E-04	1.26E-04	N/A	N/A
	pounds per 24-hours	N/A	0.025	2.93E-03	3.03E-03	N/A	N/A

Given the large margin of compliance as evidenced in Table 6 of the application addendum, and the relatively small contributions to the emissions associated with the furnaces, no testing will be imposed for the new sources. The testing requirements in the existing permit condition will remain. Thus, the only changes will be the revised allowable emission rates.

15A NCAC 2D .0530: PREVENTION OF SIGNIFICANT DETERIORATION

The various modifications discussed above are considered by the Permittee to be a single project for PSD applicability. To determine PSD applicability, Nucor has determined emission increases associated with the modification as the sum of:

1. the potential controlled emissions from all new emission sources, and

2. the difference between the potential controlled emissions of the modified sources and the baseline actual emissions averaged over the 2006 and 2007 calendar years.

Note for the existing modified sources this methodology generates a very conservative emissions increase estimate associated with proposed modification. For example, the annual throughput of the EAF is not being increased (the permit limit will remain at 2,190,000 tpy), yet for purposes of this PSD review the hourly increase was annualized. For example the hourly EAF production increase from 250 tph to 350 tph results in an annual SO2 increase of f 139.9 tpy.
Table 2-1 on page 23 of 213 of the application presents a summary of the pollutant emission rates associated with this proposed project. Note that for the following pollutants, the project will result in significant net emission increases rates as defined under PSD and hence must undergo a PSD review.

Pollutant	SO2	NOx	PM	PM10/PM2.5	CO	VOC	Lead (Pb)
Net Emissions Increases Associated with the Proposed Modification	149.1	322.5	96.9	187.1	839.5	150.2	1.76
Significant Emission Rate	40	40	25	15	100	40	0.6

Emissions of asbestos, beryllium, mercury, vinyl chloride, fluorides, sulfuric acid mist, hydrogen sulfide, total reduced sulfur, and reduced sulfur compounds associated with the proposed modification are below the significant emission rates and, thus, are not subject to PSD review.

The elements of a PSD review are as follows:

1) A Best Available Control Technology (BACT) Determination as determined by the permitting agency on a case-by-case basis in accordance with 40 CFR 51.166(j),
2) An Air Quality Impacts Analysis including Class I and Class II analyses.
3) An Additional Impacts Analysis including effects on soils and vegetation, and impacts on local visibility1 in accordance with 40 CFR 51.166(o).

A. BEST AVAILABLE CONTROL TECHNOLOGY (BACT)

Under PSD regulations, the basic control technology requirement is the evaluation and application of BACT. BACT is defined as follows [40 CFR 51.155 (b)(12)]:

> ***An emissions limitation...based on the maximum degree of reduction for each pollutant... which would be emitted from any proposed major stationary source or major modification which the reviewing authority, on a case-by-case basis, taking into account energy, environment, and economic impacts and other costs, determines is achievable... for control of such a pollutant.***

As evidenced by the statutory definition of BACT, this technology determination must include a consideration of numerous factors. The structural and procedural framework upon which a decision should be made is not prescribed by Congress under the Act. This void in procedure has been filled by several guidance documents issued by the federal EPA. The only final guidance available is the October 1980 "Prevention of Significant Deterioration – Workshop Manual." As the EPA states on page II-B-1, "A BACT determination is dependent on the specific nature of the factors for that **particular case**. The depth of a BACT analysis should be based on the quantity and type of pollutants emitted and the **degree of expected air quality impacts**." (emphasis added). The EPA has issued additional DRAFT guidance suggesting the use of what they refer to as a "top-down" BACT determination method. While the EPA Environmental Appeals Board recognizes the top-down approach for delegated state agencies,[2] this procedure has never undergone rulemaking and as such, the process is not binding on fully approved states, including North Carolina.[3] The Division prefers to follow closely the statutory language when making a BACT determination and therefore bases the determination on an evaluation of the statutory factors contained in the definition of BACT in the Clean Air Act. As stated in the legislative history and in EPA's final October 1980 PSD Workshop Manual, each case is different and the State must decide how to weigh each of the various BACT factors. North Carolina is concerned that the application of EPA's DRAFT suggested a top-down process will result in decisions that are inconsistent with the Congressional intent of PSD and BACT. The following are passages from the legislative history of the Clean Air Act and provide valuable insight for state agencies when making BACT decisions.

> The decision regarding the actual implementation of best available technology is a key one, and the **committee places this responsibility with the State**, to be determined on a case-by-case judgment. It is recognized that the phrase has broad flexibility in how it should and can be interpreted, depending on site.
>
> In making this key decision on the technology to be used, the State is to take into account energy, environmental, and economic impacts and other costs of the application of best available control technology. **The weight to be assigned to such factors is to be determined by the State**. Such a flexible approach allows the adoption of improvements in technology to become widespread far more rapidly than would occur with a uniform Federal standard. The only Federal guidelines are the EPA new source performance and hazardous emissions standards, which represent a floor for the State=s decision.
>
> This directive enables the State to consider the size of the plant, the increment of air quality which will be absorbed by any particular major emitting facility, and such other considerations as anticipated and desired economic growth for the area. This allows the States and local communities judge how much of

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[1]The visibility impacts to be evaluated under this subparagraph of the PSD rules is distinct from the Class I AQRV analysis.
[2] See, http://es.epa.gov/oeca/enforcement/envappeal.html for various PSD appeals board decisions including standard for review.
[3]North Carolina has full authority to implement the PSD program, 40 CFR Sec. 52.1770

> the defined increment of significant deterioration will be devoted to any major emitting facility. If, under the design which a major facility proposes, the percentage of increment would effectively prevent growth after the proposed major facility was completed, the State or local community could refuse to permit construction, or limit its size. **This is strictly a State and local decision; this legislation provides the parameters for that decision.**
>
> One of the cornerstones of a policy to keep clean areas clean is to require that new sources use the best available technology available to clean up pollution. One objection which has been raised to requiring the use of the best available pollution control technology is that a technology demonstrated to be applicable in one area of the country in not applicable at a new facility in another area because of the differences in feedstock material, plant configuration, or other reasons. **For this and other reasons the Committee voted to permit emission limits based on the best available technology on a case-by-case judgement at the State level.** [**emphasis added**]. This flexibility should allow for such differences to be accommodated and still maximize the use of improved technology.

Legislative History of the Clean Air Act Amendments of 1977.

Nucor in its application, however, follows the USEPAs top-down approach. However, the NCDAQ does not and instead adheres to the statutory language

Nucor consulted several sources regarding recent steel mill operations and the associated controls implemented. These sources included the RBLC database, recent permit applications, USEPA air permitting authorities, and equipment vendors.

Table 2-2 on page 25 of 213 of the application presents a summary of BACT emission limits for steel mills Nucor considered in its BACT analysis.

As each pollutant subject to a BACT analysis is emitted from a number of sources, each pollutant will be discussed on a source by source basis as necessary. To make cross-referencing easier with the submitted application, the paragraph numbering system used in the application will be included in the following BACT discussions.

BACT Analysis for Electric Arc Furnace

The EAF is currently subject to BACT limits, which effectively apply to all the sources known collectively as the Melt Shop. Revisiting the BACT is necessary given that Nucor wants to increase the hourly throughput of the EAF (and by extension other sources in the process) from 250 to 350 tph. Note that the annual throughput limitation of the EAF (and hence the other Melt Shop sources) will remain unchanged, which is 2,190,000 tons per year. This annual production is equivalent to the currently hourly production rate of 250 tph times 8760 hours per year. Thus, the hourly production (and hence hourly emissions) will increase. In summary then the potential annual emissions from the EAF (melt shop) do not change with this modification, rather it's the methodology chosen for PSD purposes, annualizing short term increases, that triggers PSD review.

Nucor has supplied a BACT analysis in the application addressing each of the affected pollutants which reviews currently used technologies, feasible technologies, including "technology transfer" and review of the RBLC database. Nucor has shown that the current permitted BACT limits and control strategies are still valid for the modified EAF (and hence other Melt Shop sources). . This detailed BACT analysis can be found in Section 2.2.2 of the application. The BACT limits on the fugitive sources will not change. . The hourly BACT values for PM10/PM2.5, SO2 and CO were revised to reflect the new maximum hourly rates. The other hourly values are simply annualized values (VOC, lead and NOx). Since the maximum hourly rates (or short term rates) are not of concern with respect to the increments and NAAQS these hourly rates did not change.

2.2.3 BACT Analysis for Ladle Metallurgy Furnace (LMF)

PM10/PM2.5

The throughput of the caster is a direct function of the throughput of the EAF. Thus, a reevaluation of BACT is necessary. The LMF is controlled by side draft hoods, not a fourth hole evacuation system as indicated in the application, which exhausts to the baghouse (ID No. CD01). Nucor claims 99% capture with these side drafts hoods, which has not been confirmed experimentally. The increase in the EAF throughput (and hence throughput of the LMF) will not result in any changes to the existing control system other than short term pollutant loading rates.

The use of fabric filtration in a process is generally accepted as the top rated control alternative for BACT so no detailed analysis is necessary. By the nature of the process 100% capture is not possible/practical in this application. The actual numerical limits for PM-10 BACT will be the same as for the EAF, given that they are controlled by the same control device (see the EAF BACT discussion). Similarly, the numerical BACT limit for the LMF fugitive emissions will be the same as for all the other sources that emit from the monovent in what is known as the Melt Shop.

Other PSD Pollutants

Nucor claims 99% capture with the side drafts hoods. The exact magnitude of the pollutant emissions are unknown from these sources as the emissions are commingled with the EAF furnace. The previous BACT limits and source testing for the EAF historically have included emissions from the LMF as well as the caster and any other source emissions from the Melt Shop. Thus any EAF BACT determination made for these pollutants will apply to the LMF as well.

2.2.4 BACT Analysis for Caster

PM10/PM2.5

The throughput of the caster is a direct function of the throughput of the EAF. Thus, a reevaluation of BACT is necessary. Emissions from the caster are emitted indoors and are either captured by the hood and controlled by the baghouse (ID No. CD01) or are emitted as fugitives through the monovent (estimated to be 2% by Nucor). The use of fabric filtration is generally accepted as the top rated control alternative for BACT so no detailed analysis is necessary. By the nature of the process 100% capture is not possible. The actual numerical limits for PM10/PM2.5 BACT will be the same as for the EAF, given that they are controlled by the same control device (see the EAF BACT discussion). Similarly, the numerical BACT limit for the caster fugitive emissions will be the same as for all the other sources that emit from the monovent in what is known as the Melt Shop.

Other PSD Pollutants

Nucor claims 98% capture with the hood. The exact magnitude of the pollutant emissions are unknown from these sources as the emissions are commingled with the EAF furnace and LMF. Previous BACT limits and source testing for the EAF historically have included emissions from the LMF as well as the caster and any other source emissions from the Melt Shop. Thus any EAF BACT determination made for these pollutants will apply to the caster as well.

2.2.5 BACT Analysis for Austenitizing Furnace

As stated in the permit application

> Nucor will add an austenitizing furnace as part of the new heat treat facility. The furnace is indirect fired with a nitrogen atmosphere to prevent scale formation and the resulting scale pickup that occurs of the roll surface. This is a state of the art design to ensure optimum plate surface quality. The burners are low NOx burners with an emission rate of 0.211 lb/mmBtu. Indirect fired burners have higher temperature; thus resulting in higher NOx emissions.

2.2.5.1 Control of Oxides of Nitrogen (NOx) Emissions

As stated in the permit application

> NOx emissions from the austenitizing furnace primarily result from combustion by-product of the fuel. Due to the relatively small emissions from natural gas combustion (33.3 tpy), the application of add-on controls is considered impractical and will be precluded from further consideration in this BACT analysis. A review of the RBLC database did not indicate the application of add-on control alternatives for NOx control from austenitizing furnaces.

The Permittee proposes to use low NOx burners with a NOx BACT limit of 0.211 lb/mmBtu. Note that the existing reheat furnace has a BACT limit of 0.128 lb/mmBtu or 60% of the proposed BACT limit for the new austenitizing furnace. However, this furnace will utilize a nitrogen atmosphere that is anticipated to result in an increase in NOx emissions over what would be expected with the utilization of an air atmosphere.

The NCDAQ agrees that the NOx controls in addition to the use of low NOx burners would not make sense considering the goals of BACT which takes " ***into account energy, environment, and economic impacts and other costs, determines is achievable... for control of such a pollutant."***

In conclusion, BACT for controlling NOx emissions is proposed as the use of natural gas-fired burners employing good combustion practices per manufacturer's guidance to meet a NOx emission rate of 0.211 lb/mmBtu.

2.2.5.2 Control of Carbon Monoxide (CO) Emissions

As stated in the permit application

> CO emissions from the austenitizing furnace primarily result from combustion by-product of the fuel. Due to the relatively small emissions from natural gas combustion (13.25 tpy), the application of add-on controls is considered impractical and will be precluded from further consideration in this BACT analysis. A review of the RBLC database did not indicate the application of add-on control alternatives for CO control from austenitizing furnaces.
>
> Based on a review of similar natural gas-fired applications, the proposed emission limit represents the best available control technology for the proposed austenitizing furnace.
>
> In conclusion, BACT for controlling CO emissions is proposed as the use of natural gas-fired burners employing good combustion practices per manufacturer's guidance to meet a CO emission rate of 0.084 lbs/mmBtu.

The NCDAQ agrees with this BACT recommendation and that additional CO controls in addition to the use of good combustion practices would not make sense considering the goals of BACT which takes " ***into account energy, environment, and economic impacts and other costs, determines is achievable... for control of such a pollutant."*** Nucor confirmed that, although the of 0.084 lbs/mmBtu BACT limit is identical to the AP-42 emission factor for natural gas combustion, which represents a wide range of combustion sources, it is the value supplied by the vendor and hence is the best estimate for the equipment to be installed.

2.2.5.3 Control of Volatile Organic Compound Emissions

As stated in the permit application

> VOC emissions from the austenitizing furnace primarily result from combustion by-product of the fuel. Due to the relatively small emissions from natural gas combustion (0.87 tpy), the application of add-on controls is considered

impractical and will be precluded from further consideration in this BACT analysis. A review of the RBLC database did not indicate the application of add-on control alternatives for VOC control from austenitizing furnaces.

Based on a review of similar natural gas-fired applications, the proposed emission limit represents the best available control technology for the proposed austenitizing furnace.

In conclusion, BACT for controlling VOC emissions is proposed as the use of natural gas-fired burners employing good combustion practices per manufacturer's guidance to meet a VOC emission rate of 0.0055 lbs/mmBtu.

The NCDAQ agrees with this BACT recommendation and that additional VOC controls in addition to the use of good combustion practices would not make sense considering the goals of BACT which takes " ***into account energy, environment, and economic impacts and other costs, determines is achievable... for control of such a pollutant."***

Nucor confirmed that, although the of 0.0055 lbs/mmBtu BACT limit is identical to the AP-42 emission factor for natural gas combustion, which represents a wide range of combustion sources, it is the value supplied by the vendor and hence is the best estimate for the equipment to be installed.

2.2.5.4 Control of Particulate Matter (PM10/PM2.5) Emissions

As stated in the permit application

Particulate matter emissions from the austenitizing furnace primarily result from carryover of non-combustible trace constituents in the fuel. Based on a heat input rate of 36 mmBtu/hr, the estimated particulate emissions are 1.2 tpy. Typically, particulates are hard to detect with natural gas firing due to the low ash content. The USEPA reference AP-42 recommends that all particulate emissions from natural gas combustion are less than 1 micron in aerodynamic diameter, therefore, they are classified as PM10 and PM2.5.

Based on a review of the previously listed information resources including the RBLC database, it was revealed that with the exception of natural gas as fuel and good combustion practices, no other control technologies for particulate abatement have been successfully implemented for austenitizing furnace emissions.

Based on a review of similar natural gas-fired applications, the proposed emission limit (1.2 tpy) represents the best available control technology for the proposed austenitizing furnace. In conclusion, BACT for controlling **PM10/PM2.5** emissions from the proposed austenitizing furnace is proposed as the use of natural gas combustion with good combustion practices per manufacturer's guidance to meet a PM/**PM10/PM2.5** emission rate of 0.0076 lbs/mmBtu.

The NCDAQ agrees with this BACT recommendation and that additional PM10/PM2.5 controls in addition to the use of good combustion practices would not make sense considering the goals of BACT which takes " ***into account energy, environment, and economic impacts and other costs, determines is achievable... for control of such a pollutant."*** Nucor confirmed that, although the of 0.0076 lbs/mmBtu BACT limit is identical to the AP-42 emission factor for natural gas combustion, which represents a wide range of combustion sources, it is the value supplied by the vendor and hence is the best estimate for the equipment to be installed.

2.2.5.5 Control of Sulfur Dioxide (SO2) Emissions

As stated in the permit application

Sulfur dioxide emissions from the austenitizing furnace primarily result from combustion by-product of the nominal sulfur content in the fuel. Due to the relatively small emissions (0.1 tpy) from natural gas combustion, the application of add-on controls is considered impractical and will be precluded from further consideration in this BACT analysis.

A review of the RBLC database did not indicate the application of add-on control alternatives for SO2 control from austenitizing furnaces.

A review of the RBLC database revealed that an emission limit of 0.0006 lb/mmBtu was the most stringent. In conclusion, BACT for controlling SO2 emissions is proposed as the use of natural gas-fired burners employing good combustion practices per manufacturer's guidance to meet an SO2 emission rate of 0.0006 lbs/mmBtu.

The NCDAQ agrees with this BACT recommendation and that additional SO2 controls in addition to the use of good combustion practices would not make sense considering the goals of BACT which takes " ***into account energy, environment, and economic impacts and other costs, determines is achievable... for control of such a pollutant."*** Nucor confirmed that, although the of 0.0006 lbs/mmBtu BACT limit is identical to the AP-42 emission factor for natural gas combustion, which represents a wide range of combustion sources, it is the value supplied by the vendor and hence is the best estimate for the equipment to be installed.

2.2.6 BACT Analysis for Tempering Furnace

As stated in the permit application

Nucor will add a tempering furnace as part of the new heat treat facility. The furnace is direct fired with a state of the art high convection system to provide optimum plate temperature uniformity. The burners are low NOx burners with an emission rate of 0.0702 lb/mmBtu. The RBLC had a heat treat furnace listed for MacSteel in Fort Smith, Arkansas. The furnace was rated at 65 mmBtu/hr. This was permitted in 1998 and the NOx emission rate was 0.0761 lb/mmBtu/hr, which is higher than the proposed emission rate.

2.2.6.1 Control of Oxides of Nitrogen (NOx) Emissions

As stated in the permit application

NOx emissions from the tempering furnace primarily result from combustion by-product of the fuel. Due to the relatively small emissions from natural gas combustion (11.4 tpy), the application of add-on controls is considered impractical and will be precluded from further consideration in this BACT analysis. A review of the RBLC database did not indicate the application of add-on control alternatives for NOx control from tempering furnaces.

Based on a review of similar natural gas-fired applications, the proposed emission limit represents the best available control technology for the proposed tempering furnace.

In conclusion, for the proposed tempering furnace, BACT for controlling NOx emissions is proposed as the use of natural gas-fired burners employing good combustion practices per manufacturer's guidance to meet an NOx emission rate of 0.0702 lbs/mmBtu.

The NCDAQ agrees with this BACT recommendation and that additional NOx controls in addition to the use of low NOx burners and good combustion practices would not make sense considering the goals of BACT which takes " ***into account energy, environment, and economic impacts and other costs, determines is achievable... for control of such a pollutant."***

Nucor confirmed the of 0.0702 lbs/mmBtu BACT limit is the value supplied by the vendor and hence is the best estimate for the equipment to be installed.

2.2.6.2 Control of Carbon Monoxide (CO) Emissions

As stated in the permit application

CO emissions from the tempering furnace primarily result from combustion by-product of the fuel. Due to the relatively small emissions from natural gas combustion (13.6 tpy), the application of add-on controls is considered impractical and will be precluded from further consideration in this BACT analysis. A review of the RBLC database did analysis. A review of the RBLC database did not indicate the application of add-on control alternatives for CO control from similar sized natural gas-fired combustion equipment in other industries. Based on a review of similar natural gas-fired applications, the current emission limit represents the best available control technology.

In conclusion, for the proposed torch cutting, BACT for controlling CO emissions is proposed as the use of a natural gas-fired burner employing good combustion practices per manufacturer's guidance to meet a CO emission rate of 0.084 lb/mmBtu.

The NCDAQ agrees with this BACT recommendation and that additional CO controls in addition to the use of good combustion practices would not make sense considering the goals of BACT which takes " ***into account energy, environment, and economic impacts and other costs, determines is achievable... for control of such a pollutant."***

Nucor confirmed that, although the of 0.084 lbs/mmBtu BACT limit is identical to the AP-42 emission factor for natural gas combustion, which represents a wide range of combustion sources, it is the value supplied by the vendor and hence is the best estimate for the equipment to be installed.

2.2.6.3 Control of Volatile Organic Compound Emissions

As stated in the permit application

> VOC emissions from the tempering furnace primarily result from combustion by-product of the fuel. Due to the relatively small emissions from natural gas combustion (0.9 tpy), the application of add-on controls is considered impractical and will be precluded from further consideration in this BACT analysis. A review of the RBLC database did not indicate the application of add-on control alternatives for VOC control from tempering furnaces.
>
> Based on a review of similar natural gas-fired applications, the proposed emission limit represents the best available control technology for the proposed tempering furnace.
>
> In conclusion, BACT for controlling VOC emissions is proposed as the use of natural gas-fired burners employing good combustion practices per manufacturer's guidance to meet a VOC emission rate of 0.0055 lbs/mmBtu.

The NCDAQ agrees with this BACT recommendation and that additional VOC controls in addition to the use of good combustion practices would not make sense considering the goals of BACT which takes "***into account energy, environment, and economic impacts and other costs, determines is achievable... for control of such a pollutant.***"

Nucor confirmed that, although the of 0.0055 lbs/mmBtu BACT limit is identical to the AP-42 emission factor for natural gas combustion, which represents a wide range of combustion sources, it is the value supplied by the vendor and hence is the best estimate for the equipment to be installed.

2.2.6.4 Control of Particulate Matter (PM10/PM2.5) Emissions

As stated in the permit application

> Particulate matter emissions from the tempering furnace primarily result from carryover of non-combustible trace constituents in the fuel. Based on a heat input rate of 37 mmBtu/hr, the estimated particulate emissions are 1.23 tpy. Typically, particulates are hard to detect with natural gas firing due to the low ash content. The USEPA reference AP-42 recommends that all particulate emissions from natural gas combustion are less than 1 micron in aerodynamic diameter, therefore, they are classified as PM10 and PM2.5.
>
> Based on a review of the previously listed information resources including the RBLC database, it was revealed that with the exception of natural gas as fuel and good combustion practices, no other control technologies for particulate abatement have been successfully implemented for tempering furnace emissions.
>
> Based on a review of similar natural gas-fired applications, the proposed emission limit (1.23 tpy) represents the best available control technology for the proposed tempering furnace. In conclusion, BACT for controlling **PM10/PM2.5** emissions from the tempering furnace is proposed as the use of natural gas combustion with good combustion practices per manufacturer's guidance to meet a PM10/PM2.5 emission rate of 0.0076 lbs/mmBtu.

The NCDAQ agrees with this BACT recommendation and that additional VOC controls in addition to the use of good combustion practices would not make sense considering the goals of BACT which takes "***into account energy, environment, and economic impacts and other costs, determines is achievable... for control of such a pollutant.***" Nucor confirmed that, although the of 0.0076 lbs/mmBtu BACT limit is identical to the AP-42 emission factor for natural gas combustion, which represents a wide range of combustion sources, it is the value supplied by the vendor and hence is the best estimate for the equipment to be installed.

2.2.6.5 Control of Sulfur Dioxide (SO2) Emissions

As stated in the permit application

> Sulfur dioxide emissions from the tempering furnace primarily result from combustion by-product of the nominal sulfur content in the fuel. Due to the relatively small emissions (0.1 tpy) from natural gas combustion, the application of add-on controls is considered impractical and will be precluded from further consideration in this BACT analysis.

A review of the RBLC database did not indicate the application of add-on control alternatives for SO2 control from tempering furnaces.

A review of the RBLC database revealed that an emission limit of 0.0006 lb/mmBtu was the most stringent. In conclusion, BACT for controlling SO2 emissions is proposed as the use of natural gas-fired burners employing good combustion practices per manufacturer's guidance to meet an SO2 emission rate of 0.0006 lbs/mmBtu.

The NCDAQ agrees with this BACT recommendation and that additional SO2 controls in addition to the use of good combustion practices would not make sense considering the goals of BACT which takes " ***into account energy, environment, and economic impacts and other costs, determines is achievable... for control of such a pollutant."***

Nucor confirmed that, although the of 0.0006 lbs/mmBtu BACT limit is identical to the AP-42 emission factor for natural gas combustion, which represents a wide range of combustion sources, it is the value supplied by the vendor and hence is the best estimate for the equipment to be installed.

2.2.7 BACT Analysis for Plate Cutting Beds

As stated in the permit application

> Nucor is proposing to install two plate cutting beds. One will consist of 10 oxy-fuel torches with a total heat input rate of 0.4 mmBtu/hr. The other cutting bed will consist of eight oxy-fuel torches (total of 0.32 mmBtu/hr and two plasma torches. Both plate cutting bed emissions will be ducted to a baghouse.

The potential emissions estimates of the pollutants from the cutting beds subject to PSD review are as follows:

	tpy		
Pollutant	**Bed 1**	**Bed 2**	**Total**
SO2	0.001	0.001	0.002
NOx	0.18	8.64	8.82
PM	0.013	0.005	0.018
PM10/PM2.5	0.013	0.005	0.018
CO	0.15	0.12	0.27
VOC	0.01	0.008	0.018

Clearly the emissions from the beds are small. With the exception of PM and NOx emission estimates are identical to AP-42 emission factors for natural gas combustion.

2.2.7.1 Control of Oxides of Nitrogen (NOx) Emissions

As stated in the permit application

> NOx emissions from the torch cutting will result from combustion byproduct of the natural gas. Due to the relatively small emissions from natural gas combustion (8.82 tpy), the application of add-on controls is considered impractical and will be precluded from further consideration in this BACT analysis.
>
> A review of the RBLC database did not indicate the application of add-on control alternatives for NOx control from similar sized natural gas-fired combustion equipment in other industries. Based on a review of similar natural gas-fired applications, the proposed emission limit represents the best available control technology for the torch cutting.
>
> In conclusion, for the proposed torch cutting, BACT for controlling NOx emissions is proposed as the use of a natural gas-fired burner employing good combustion practices per manufacturer's guidance to meet a NOx emission rate of 0.1 lb/mmBtu/hr.

The NCDAQ agrees with this BACT recommendation and that additional NOx controls in addition to the use of low NOx burners and good combustion practices would not make sense considering the goals of BACT which takes " ***into account energy, environment, and economic impacts and other costs, determines is achievable... for control of such a pollutant."***

Nucor confirmed that, although the of 0.1 lbs/mmBtu BACT limit is identical to the AP-42 emission factor for natural gas combustion, which represents a wide range of combustion sources, it is the value supplied by the vendor and hence is the best estimate for the equipment to be installed.

2.2.7.2 Control of Particulate Matter (PM10/PM2.5) Emissions

As stated in the permit application

> Particulate matter emissions (0.018 tpy) primarily from the cutting operations. The fumes generated by both cutting beds will be ducted to a baghouse. The existing plate cutting bed at the mill uses the plasma torches and is controlled by a baghouse.

> In conclusion, BACT for controlling PM10/PM2.5 emissions from the torch cutting is proposed as the use of a baghouse.

The NCDAQ concurs with this conclusion. The use of filtration in a process is generally accepted as the top rate control alternative for BACT so no detailed analysis is necessary. The Permittee claims to have 99% plus control efficiency.

Thus, BACT for the new cutting beds will be the use of a bagfilter system with a 99.99% control efficiency. Typical monitoring, recordkeeping and reporting will be imposed to insure the control system is operating properly.

2.2.7.3 Control of Sulfur Dioxide (SO2) Emissions

As stated in the permit application

> SO2 emissions from the torch cutting primarily result from combustion byproduct of the fuel. Due to the relatively small emissions (0.002 tpy) from natural gas combustion, the application of add-on controls is considered impractical and will be precluded from further consideration in this BACT analysis.
>
> A review of the RBLC database did not indicate the application of add-on control alternatives for SO2 control from similar sized natural gas-fired combustion equipment in other industries. Based on a review of similar natural gas-fired applications, the current emission limit represents the best available control technology for the proposed torch cutting.
>
> In conclusion, for the proposed torch cutting, BACT for controlling SO2 emissions is proposed as the use of a natural gas-fired burner employing good combustion practices per manufacturer's guidance to meet an SO2 emission rate of 0.0006 lb/mmBtu.

The NCDAQ agrees with this BACT recommendation and that additional SO2 controls in addition to the use of good combustion practices would not make sense considering the goals of BACT which takes " ***into account energy, environment, and economic impacts and other costs, determines is achievable... for control of such a pollutant."***

Nucor confirmed that, although the of 0.0006 lbs/mmBtu BACT limit is identical to the AP-42 emission factor for natural gas combustion, which represents a wide range of combustion sources, it is the value supplied by the vendor and hence is the best estimate for the equipment to be installed.

2.2.7.4 Control of Carbon Monoxide (CO) Emissions

As stated in the permit application

> CO emissions from the torch cutting primarily result from combustion byproduct of the fuel. Due to the relatively small emissions (0.27 tpy) from natural gas combustion, the application of add-on controls is considered impractical and will be precluded from further consideration in this BACT analysis.
>
> A review of the RBLC database did not indicate the application of add-on control alternatives for CO control from similar sized natural gas-fired combustion equipment in other industries. Based on a review of similar natural gas-fired applications, the current emission limit represents the best available control technology.
>
> In conclusion, for the proposed torch cutting, BACT for controlling CO emissions is proposed as the use of a natural gas-fired burner employing good combustion practices per manufacturer's guidance to meet a CO emission rate of 0.084 lb/mmBtu.

The NCDAQ agrees with this BACT recommendation and that additional CO controls in addition to the use of good combustion practices would not make sense considering the goals of BACT which takes " ***into account energy, environment, and economic impacts and other costs, determines is achievable... for control of such a pollutant."***

Nucor confirmed that, although the of 0.084 lbs/mmBtu BACT limit is identical to the AP-42 emission factor for natural gas combustion, which represents a wide range of combustion sources, it is the value supplied by the vendor and hence is the best estimate for the equipment to be installed.

2.2.7.5 Control of Volatile Organic Compound Emissions

As stated in the permit application

> VOC emissions from the proposed torch cutting primarily result from combustion by-product of the fuel. Due to the relatively small emissions (0.25 tpy) from natural gas combustion, the application of add-on controls is considered impractical and will be precluded from further consideration in this BACT analysis.
>
> A review of the RBLC database did not indicate the application of add-on control alternatives for VOC control from similar sized natural gas-fired combustion equipment in other industries. Based on a review of similar natural gas-fired applications, the proposed emission limit represents the best available control technology for the proposed torch cutting.
>
> In conclusion, for the torch cutting, BACT for controlling VOC emissions is proposed as the use of a natural gas-fired burner employing good combustion practices per manufacturer's guidance to meet a VOC emission rate of 0.0055 lb/mmBtu.

The NCDAQ agrees with this BACT recommendation and that additional VOC controls in addition to the use of good combustion practices would not make sense considering the goals of BACT which takes " ***into account energy, environment, and economic impacts and other costs, determines is achievable... for control of such a pollutant."***

Nucor confirmed that, although the of 0.0055 lbs/mmBtu BACT limit is identical to the AP-42 emission factor for natural gas combustion, which represents a wide range of combustion sources, it is the value supplied by the vendor and hence is the best estimate for the equipment to be installed.

2.2.8 BACT Analysis for Slag Processing

As stated in the permit application

> An estimate of the increase of PM10/PM2.5 emissions for slag processing is based on the ratio of the maximum potential to permitted annual slag throughput (360,000/262,800 = 1.37). This ratio is applied to the annual PM10 emission rate of 5.58 tpy to get a maximum of 7.64 tpy. The increase in emissions was determined using the maximum potential emissions (7.64 tpy) minus actual emissions (3.97 tpy) for an increase of 3.67 tpy. The slag operations will continue to apply water sprays to maintain BACT for PM10 emissions.

This operation produces only PM10/PM2.5emissions. The Permittee also calculated the $PM_{2.5}$ emissions at a maximum potential of 0.777 tpy using the same methodology used for the PM_{10} estimates. (AP-42). The emissions are fugitive in nature and as such is impractical to apply techniques involving control and capture (other than the current BACT). The NCDAQ concurs with the continued use of the existing BACT. The BACT limit will revised to indicate that BACT is the work practices.

2.2.9 BACT Analysis for Cooling Tower

PM10/PM2.5
The new cooling tower is similar to existing to currently permitted cooling towers which have the following BACT:

> *The Permittee shall not operate the Cooling Towers* ***(ID Nos. ES38, ES39 and ES40)*** *without the concurrent operation of the associated mist eliminators with a 0.008 percent drift loss.*

These BACT limits are based on the estimated PM emissions associated with the towers utilizing mist eliminators. Note the PM emissions are any dissolved solids that would be contained in the cooling water that were picked up during the water's direct contact with the steel (not scrap metal).

The only emissions from the cooling tower are expected to be PM10/PM2.5 The estimated annual PM/PM10/PM2.5 emissions from the new tower assuming a dissolved solids content of 500 ppm, a circulation rate of 3,000 gallons per minute and a drift loss rate of 0.005% is 0.16 tpy, clearly a very minor contributor to PM emissions.

The Permittee states in the application:

> Due to the nature of the cooling tower operation and the nominal emissions from the process, any add-on controls are considered impractical and not feasible. In addition, a review of the RBLC database did not reveal any add-on controls besides drift eliminators for similar process applications.

The NCDAQ concurs with this conclusion. Thus, BACT for the new cooling tower will be similar to the BACT for the existing cooling towers with the exception that the drift loss will be 0.005%.

2.2.10 BACT Analysis for Shot Blaster

PM10/PM2.5
As stated in the permit application

> Nucor will add a small shot blasting unit in the heat treat facility. The process will be controlled with a baghouse having an outlet grain loading of 0.001 grain/dscf. The volume flow rate is 15,786 dscfm, thus, the PM10/PM2.5 emissions are 0.6 tpy. This emission limit is low due to the exhaust being emitted inside with subsequent release to the atmosphere through the building roof monovent. This level of control is at or below other similar baghouse units for shot blasting operations.

The NCDAQ concurs with this conclusion. The only anticipated emissions from this source are PM10/PM2.5. The use of filtration in a process is generally accepted as the top rate control alternative for BACT so no detailed analysis is necessary. The Permittee claims to have 99% plus control efficiency. In addition, this source will emit indoors.

Thus, BACT for the new shot blaster will be the use of a bagfilter system with a PM10/PM2.5 with a 99% control efficiency. Typical monitoring, recordkeeping and reporting will be imposed to insure the control system is operating properly.

2.2.11 BACT Analysis for Vacuum Degasser

Nucor will install a vacuum degasser that will process the molten steel in the melt shop. The exhaust gas is ducted to the atmosphere through its own stack. Note that the combustion emissions associated with the boiler do not commingle with the degasser emissions and are handled in a separate BACT analysis.

An emissions estimate for the pollutants subject to BACT are as follows:

Pollutant	Tpy	Emission Factor (lb/metric ton)	Proposed BACT Limit
SO2	7.0	0.005	Same
NOx	7.0	0.005	Same
PM	2.0	0.008 gr/dscf	Same
PM10	2.0	0.008 gr/dscf	Same
PM2.5	2.0	0.008 gr/dscf	N/A
CO	104.3	0.075	Same
VOC	7.0	0.005	Same

Note that, with the exception of CO, emissions from this source are low. The emissions factors were obtained from the manufacturer.

2.2.11.1 Control of Oxides of Nitrogen (NOx) Emissions
2.2.11.2 Control of Carbon Monoxide (CO) Emissions
2.2.11.3 Control of Particulate Matter (PM/PM10/PM2.5) Emissions
2.2.11.4 Control of Sulfur Dioxide (SO2) Emissions
2.2.11.5 Control of Volatile Organic Compounds Emissions

Nucor proposes no add on controls as BACT because the application of add-on controls is considered impractical and review of the RBLC database did not indicate the application of add-on control alternatives for these pollutants in similar applications. Thus, the emission factors as presented above will be included as BACT in the permit.

2.2.11.2 Control of Carbon Monoxide (CO) Emissions

Regarding CO, Nucor requests a BACT limit based on other facilities BACT limits. Nucor supplied a list of 6 other facilities with a similar process.

Facility	Production Rate (tons per hour)	CO emission limit (lb/ton)
Nucor – Memphis, Inc	180	0.075
Minnesota Steel industries, LLC	205	.038
Nucor, Huger, SC	300	0.075
Nucor, Crawfordsville, IN	270	0.075
Nucor, Decatur, AL	440	0.075
Nucor, Hickman, AR	270	0.075

The Crawfordsville facility conducted source testing in 2005 and obtained an emission factor of 0.028 lb/ton. Nucor is requesting however that BACT to be 0.075 lb/ton since " BACT must be met for the lifetime of the equipment, the limit should be 0.075 lb/ton." For the proposed modification, CO was modeled and was determined to be below the significant impact increments. Thus, CO is not a major concern at this location.

In summary, the NCDAQ agrees with this BACT recommendation and that additional CO controls in addition would not make sense considering the goals of BACT which takes " ***into account energy, environment, and economic impacts and other costs, determines is achievable... for control of such a pollutant."***

2.2.12 BACT Analysis for Vacuum Degasser Boiler
The proposed vacuum degasser boiler will have a maximum heat input rate of 50.213 mmBtu/hr. An emissions estimate for the pollutants subject to BACT are as follows:

Pollutant	Tpy	Emission Factor (lb/mmBtu)
SO2	0.13	0.0006
NOx	7.70	0.035
PM	1.70	0.0076
PM10/PM2.5	1.70	0.0076
CO	13.40	0.061
VOC	0.570	0.0026

Note that the emissions associated with the combustion of natural gas in this boiler are relatively small. The emission factors used for PM, SO2 and VOC are identical to those AP-42 emission factors for natural gas combustion. Nucor confirmed that, although these emission factors (and proposed BACT limits) are identical to the AP-42 emission factors for natural gas combustion, which represents a wide range of combustion sources, it is the value supplied by the vendor and hence is the best estimate for the equipment to be installed. It will be shown that given the relatively low emission rates add-on control technologies would not be necessary to meet the goals of BACT. In general good combustion practices will be implemented as BACT with numerical emission limits.

2.2.12.1 Control of Oxides of Nitrogen (NOx) Emissions

The Permittee maintains that the proposed NOx BACT limit 0.035 lb/mmBtu equals the lowest permitted vacuum degasser boiler as determined the RBLC database. A list of boiler BACT limits for NOx is presented in the application on page 57. The discussion also lists available control technologies for control of NOx from boilers.

However, the Permittee states:

> Based on a review of the RBLC database (see table below), it was revealed that with the exception of low-NOx burners, other control technologies for NOx abatement have not been successfully implemented for vacuum degasser boilers.
>
> Due to the small emission rate (7.7 tpy), these controls are excluded from further consideration in this BACT analysis. The proposed NOx limit of 0.035 lb/mmBtu equals the lowest permitted vacuum degasser boiler.

The NCDAQ agrees with this BACT recommendation and that additional NOx controls in addition to the use of good combustion practices would not make sense considering the goals of BACT which takes "***into account energy, environment, and economic impacts and other costs, determines is achievable... for control of such a pollutant.***"

In conclusion, for the vacuum degasser boiler, BACT for controlling NOx emissions is proposed as the use of low-NOx natural gas-fired burners to meet a NOx emission rate of 0.035 lb/mmBtu.

2.2.12.2 Control of Carbon Monoxide (CO) Emissions

As stated in the permit application:

> Various control alternatives were reviewed for technical feasibility in controlling CO emissions from a vacuum degasser boiler. With the exception of natural gas combustion with good combustion practice, the applicability of the remaining control options was determined to be technically infeasible. Based on a review of the information resources referenced earlier, it is revealed that these control alternatives have not been successfully implemented to reduce CO emissions from similar vacuum degasser boilers.
>
> In conclusion, BACT for controlling CO emissions from the vacuum degasser boiler is proposed as the use of natural gas combustion with good combustion practices per manufacturer's guidance to meet a CO emission rate of 0.061 lb/mmBtu.

The NCDAQ agrees with this BACT recommendation and that additional CO controls in addition to the use of good combustion practices would not make sense considering the goals of BACT which takes " ***into account energy, environment, and economic impacts and other costs, determines is achievable... for control of such a pollutant."***

Nucor presented a list of boiler BACT limits for CO in the application on page 59. The discussion also includes available control technologies for control of CO from boilers. None of which makes practical sense given the relatively low emission rate (13.40 tpy).

2.2.12.3 Control of Particulate Matter (PM10/PM2.5) Emissions

PM-10 emissions from natural gas combustion in general are low and this application is no exception. Nucor presented a list of boiler BACT limits for PM/PM10/PM2.5 in the application on page 64. The discussion also includes available control technologies for control of PM from boilers, none of which makes practical sense given the relatively low emission rate (1.7 tpy). and considering the goals of BACT which takes " ***into account energy, environment, and economic impacts and other costs, determines is achievable... for control of such a pollutant."***

In conclusion, BACT for controlling PM10/PM2.5 emissions from the vacuum degasser boiler is proposed as the use of natural gas combustion with good combustion practices per manufacturer's guidance to meet a PM10/PM2.5 emission rate of 0.0076 lbs/mmBtu.

2.2.12.4 Control of Sulfur Dioxide (SO2) Emissions

SO2 emissions from natural gas combustion in general are low and this application is no exception. Nucor presented a list of boiler BACT limits for SO2 in the application on page 65. The discussion also includes available control technologies for control of SO2 from boilers, none of which makes practical sense given the relatively low emission rate (0.13 tpy). and considering the goals of BACT which takes " ***into account energy, environment, and economic impacts and other costs, determines is achievable... for control of such a pollutant."***

In conclusion, BACT for controlling SO2 emissions from the vacuum degasser boiler is the use of natural gas combustion with good combustion practices per manufacturer's guidance to meet a SO2 emission rate of 0.0006 lb/mmBtu.

2.2.12.5 Control of Volatile Organic Compound Emissions

VOC emissions from natural gas combustion in general are low and this application is no exception. Nucor presented a list of boiler BACT limits for VOC in the application on page 66. The discussion also includes available control technologies for control of VOC from boilers, none of which makes practical sense given the relatively low emission rate (0.55 tpy). and considering the goals of BACT which takes " ***into account energy, environment, and economic impacts and other costs, determines is achievable... for control of such a pollutant."***

In conclusion, BACT for controlling VOC emissions from the vacuum degasser boiler is the use of natural gas combustion with good combustion practices per manufacturer's guidance to meet a VOC emission rate of 0.0026 lb/mmBtu.

B. AIR QUALITY ANALYSIS

Introduction

The PSD modeling analysis described in this section was conducted in accordance with current PSD directives and modeling guidance. Numerous references are made to the draft October 1990 EPA New Source Review Workshop Manual, Prevention of Significant Deterioration and Non-attainment Area Permitting which will herein be referred to as the NSR Workshop Manual.

A summary of the modeling results is presented in the last topic, PSD Air Quality Modeling Result Summary and in table 6. A detailed description of the modeling and modeling methodology is described below.

Project Description / Significant Emission Rate (SER) Analysis

The planned modifications to the NUCOR Cofield facility include the following:

- installation of a plate heat treating facility with an annual capacity of 120,00 tons to run by a 36 mmBtu/hr natural gas-fired austenitizing furnace, a 37 mmBtu/hr natural gas-fired tempering furnace, a shot blaster, and a cooling tower (3,000 gallons per minute);
- modification of their carbon injection system for the electric arc furnace;
- installation of two plate cutting bed systems with one using 10 oxy-fuel burners and the other using 8 oxy-fuel burners and 2 plasma torches.
- increase in annual slag processing operations throughput from 262,800 to 360,000 tons per year (tpy);
- installation of a vacuum tank degreaser (VTD) with a maximum steel production of 350 tph and 2,190,000 tpy;
- installation of a 50.213 mmBtu/hr natural-gas fired boiler to serve the VTD.

The maximum annual steel production limit will, however, remain at 2,190,000; the peak production will increase to 350 tph.

A facility-wide pollutant netting analysis was accomplished and is documented in Table 1 below. PM10, SO2, CO, NOx, VOC and lead emissions did exceed their PSD Significant Emission Rate (SER) and thus require a PSD analysis.

Table 1 - Pollutant Netting Analysis

Pollutant	Annual Emission Rate (tons/yr)	Significant Emission Rate (tons/yr)	Analysis Required
NO_x	322.4	40	Yes
PM_{10}	187.1	40	Yes
$PM_{2.5}$	n/a	n/a	Yes
PM[1]	96.9	25	Yes
SO_2	149.1	40	Yes
CO	839.5	100	Yes
VOC	150.2	40	Yes
Pb	1.76	.6	Yes

1. PM modeling is required to demonstrate compliance with the North Carolina PM Air Quality Standard (AQS).

Preliminary Impact Air Quality Modeling Analysis

An air quality preliminary impact analysis was conducted for the pollutants exceeding the corresponding SER. The modeling results were then compared to applicable Significant Impact Levels (SILs) as defined in the NSR Workshop Manual to determine if a full impact air quality analysis would be required for that pollutant.

The Cofield facility located near Hertford County, North Carolina. This is a coastal area with predominantly flat terrain and is generally agricultural, industrial, and forestland. For modeling purposes, the area is classified rural based on the land use type scheme established by Auer 1978.

Nucor evaluated the pollutant significant emissions using the EPA AERMOD model and one year of onsite (1996) surface and upper air (Morehead City, NC) meteorological data. As listed in Table 4.1 of the modeling report, numerous point, volume, and area sources were modeled at the facility. Full terrain elevations were included, as were normal regulatory defaults and representative land use data. The receptor grid began at the fence line and extended outwards at 100-meter spacing to 1.5 kilometer, 250-meter spacing from 1.5 kilometer to 3 kilometer, 500-meter spacing from 3 kilometer to 5 kilometer and 1 kilometer spacing from 5 kilometers to 10 kilometers.

Maximum potential emission rates listed in Table 2-1 of the analysis were then modeled to determine the maximum (H1H) impacts for each pollutant and pollutant averaging period. The results are shown in Table 2 and indicate that NOx and PM10 were above the applicable Class II SIL; subsequently, further modeling was required for these pollutants.

Table 2 - Class II Significant Impact Results (ug/m^3)

Pollutant	Averaging Period	Max Facility Impact	(SIL)	Full analysis required
NO_x	**Annual**	**4.3**	1	Yes
PM_{10}	**Annual**	**2.2**	1	Yes
	24-hour	**10.3**	5	Yes
SO_2	Annual	.26	1	No
	24-hour	3.0	5	No
	3-hour	11.2	25	No
CO	8-hour	53.2	500	No
	1-hour	197	2000	No

Note: Pb and $PM_{2.5}$ do not have established SIL's

Full Impact Air Quality Modeling Analysis

The full impact air quality analysis is more comprehensive then the preliminary analysis and includes offsite source emissions (NAAQS and PSD increment, excluding PM2.5) and appropriate background concentrations (NAAQS analysis). The NOx and PM10 full impact analysis was conducted using the same models and modeling methodology as described in the preliminary impact analysis.

Background values were selected from North Carolinas' monitoring network, thus no pre construction monitoring was required. All NOx and PM10 offsite sources within 60 kilometers (SIA plus 50 km screening area) of the facility were evaluated using the North Carolina based "Screening Threshold" (Q (emissions)/D (Distance) <=20)) to determine the appropriate NAAQS and PSD increment inventories for modeling inclusion. The results of the modeling are presented in Table 3 (NAAQS) and Table 4 (PSD increment) and show compliance with the respective pollutant air quality standards.

Table 3 – NAAQS Modeling Results

Pollutant	Averaging Period	Modeled Impact (ug/m3)[1]	Background	Total (ug/m3)	NAAQS	% NAAQS
NOx	Annual	7.4	20.7	28.1	100	28.1
PM_{10}	Annual	7.5	20	27.5	50	55
	24-hr	26.3 (see footnote 4)	43	69.3	150	46
$PM_{2.5}$	Annual	2.40	10.0	12.40	15	85
	24-hr	8.98	21.1	30.08	35	86
Pb	Quarter	.02	N/A	.02	.15	13.3

1. Combined on-site and offsite sources.

Table 4 – PSD Increment Modeling Results

Pollutant	Averaging Period	Modeled Impact (ug/m3)[1]	Background	Total (ug/m3)	Class II Increment	% of Increment
NOx	Annual	7.4	N/A	7.4	25	30

PM_{10}	Annual 24-hr	7.3 26.3[4]	N/A N/A	7.3 26.3	17 30	43 88

1. Combined on-site and offsite sources.

Non Regulated Pollutant Impact Analysis (North Carolina Air Toxics)

Nucor modeled several North Carolina air toxic pollutants using AERMOD with the same receptor array and meteorology as in the NAAQS analysis. A list of the facility sources and emission rates used are attached to this document. All the modeled pollutants demonstrated compliance on a source-by-source basis with the NC Acceptable Ambient Levels (AALs). The maximum concentrations as shown in Table 5 occurred along the fence line.

Table 5 - Toxics Modeling Results

Pollutant	Averaging Period	Max Impact (ug/m^3)	AAL (ug/m^3)	% AAL
Arsenic	Annual	.00003	.00023	13
Beryllium	Annual	.00001	.0041	.24
Cadmium	Annual	.00021	.0055	3.8
Chromium	Annual	.00002	.000083	24
Manganese	24-hour	.16	31	.5
Mercury	24-hour	.0055	.6	.9
Nickel	24-hour	.0015	6	<1
Benzene	Annual	.0023	.12	1.9
Benzo(a)pyrene	Annual	.00001	.033	<1
Formaldehyde	1-hour	.12	150	<1
Hexane	1-hour	2.95	360000	<1
Toluene	24-hour 1-hour	.00051 .0056	4700 56000	<1 <1

[4] On October 5, 2009 Nucor submitted a letter discussing PM-10 increment consumption. In that letter Nucor proposed revising the ambient impact modeling based on revised emission estimates from the cooling towers and from the haul roads and slag processing. The NCDAQ reviewed the proposal and concluded that there was insufficient information to support Nucor's emission rate revision for the cooling towers but did agree with the proposed revision to the emission estimates from the haul roads and slag processing. As noted in this letter the emission factor used by Nucor to estimate emissions from slag processing was from AP-42 (Table 13.2.2-1). That factor is based in part on the silt content of the material. The silt content for used in the initial emissions estimate was for quarries where the silt content is approximately 8.3 percent. However, the silt content for the materials at Nucor is approximately 7 percent. This change in emission rate, because of the slag process's impact on the maximum receptor, results in a decrease of 3.17 ug/m3 from the initial modeling result.

C. ADDITIONAL IMPACTS ANALYSIS

Additional impact analyses were conducted for growth, soils and vegetation, and visibility impairment.

Growth Impacts

Since this modification is only expected to minimally increase employment, Nucor does not expect a population growth increase because of this project. There are sufficient employable residents for the small job growth being created.

Soils and Vegetation

The facility is located in the coastal area of North Carolina. The local geography consists of flat terrain with a mix of forests, pasture lands, agricultural crops, and coastal type vegetation. As demonstrated in the NAAQS analyses, the facility pollutant impacts were below the established standards. Nucor contends and DAQ agrees, that the secondary standards are conservative and were inclusive of impacts on soils and vegetation when they were established.

Class II Visibility Impairment Analysis

A Level 1 visibility impairment analysis was performed using the EPA VISCREEN model to demonstrate screening criteria were not exceeded in any Class II areas that are designated as special visibility protection areas. With background visibility set to 62 km, the facility determined that the screening visibility parameter thresholds of perceptibility (Delta E) and plume contrast (Cp) did not exceed the established thresholds beyond 50 km. Within that radius, there are no special protected visibility areas within the state, thus no further visibility analysis was required.

Class I Area - Additional Requirements

The closest Class I areas to the facility site is Swanquarter National Wildlife Refuge, approximately 105 km distance. DAQ discussed emissions and distance to each Class I area with the Federal Land Manager (FLM) representative Jill Webster. Based on the FLM 'screening" criteria, NUCOR was not required to provide a Class I Increment analysis.

PSD Air Quality Modeling Result Summary

Based on the PSD air quality ambient impact analysis, the proposed Nucor project will not cause or contribute to any violation of the Class II NAAQS, PSD increments, Class I Increments, or any FLM AQRVs. A summary of the modeling results is presented below.

TABLE 6 – NUCOR PSD AIR QUALITY MODELING RESULTS

SER Evaluation

Pollutant	Annual E/R (Tons)	SER (Tons/yr)
NO_x	322.4	40
PM_{10}	187.1	15
$PM_{2.5}$	174.5	N/A
SO_2	149.1	40
CO	839.5	100
VOC's	150.2	40
Pb	1.76	.6

Class II Area SIL Analysis

Pollutant	Averaging Period	Maximum Impact (ug/m^3)	SIL (ug/m^3)	SIL Exceeded
NO_x	Annual	4.3	1	Yes
SO_2	Annual	.26	1	No
	24-hour	3.0	5	No
	3-hour	11.2	25	No
PM_{10}	Annual	2.2	1	Yes
	24-hour	10.3	5	Yes
$PM_{2.5}$	Annual	N/A	N/A	N/A
	24-hour	N/A	N/A	N/A
CO	8-hour	82	500	No
	1-hour	206	2000	No

Class II NAAQS Analysis

Pollutant	Averaging Period	Maximum Onsite & Offsite Source Impacts (ug/m^3)	Back Ground Conc (ug/m^3)	Total Impact (ug/m^3)	NAAQS (ug/m^3)	% NAAQS
NOx	Annual	7.4	20.7	28.1	100	28.1
PM_{10}	Annual	7.5	20	27.5	50	55
	24-hour	26.3	43	69.3	150	46
$PM_{2.5}$	Annual	2.40	10.0	12.40	15	85
	24-hour	8.98	21.1	30.08	35	86
Pb	Quarter	.02	N/A	.02	.15	13.3

Class II PSD Increment Analysis

Pollutant	Averaging Period	Maximum Onsite & Offsite Source Impacts (ug/m^3)	Back Ground (ug/m^3)	Total Impact (ug/m^3)	PSD Increment (ug/m^3)	% of Increment
NOx	Annual	7.4	N/A	7.4	20	30
PM_{10}	Annual	11	N/A	7.3	17	43
	24-hour	26.3	N/A	26.3	30	88

NC Toxic Pollutants							
Pollutant	**Averaging Period**	**Maximum Impact (ug/m^3)**	**AAL (ug/m^3)**	**% AAL**			
Arsenic	Annual	.0003	.00023	13			
Beryllium	Annual	.0001	.0041	.24			
Cadmium	Annual	.00021	.0055	3.8			
Chromium	Annual	.00002	.000083	24			
Manganese	24-hour	.16	31	.5			
Mercury	24-hour	.0055	.6	.9			
Nickel	24-hour	.0015	6	<1			
Benzene	Annual	.0023	.12	1.9			
Benzo(a)pyrene	Annual	.00001	.033	<1			
Formaldehyde	1-Hour	.12	150	<1			
Hexane	1-hour	2.95	360000	<1			
Tolune	24-hour 1-hour	.00051 .0056	4700 56000	<1 <1			

Class 1 Area SIL Analysis						
	Averaging	**Maximum Impact**		**EPA**	**% SIL**	
Pollutant	**Period**	**Cape Romain**	**Swanquarter**	**SIL**	**CR**	**SQ**
NO_x	Annual	.004	.0096	0.1	4	9.6
SO2	Annual	.0047	.0114	0.08	6	14
	24-hour	.135	.192	0.2	68	96
	3-hour	.408	.569	1	41	57
PM_{10}	24-hr	.066	.105	0.3	22	35
	Annual	.003	.0065	0.16	2	4

Class 1 Area Regional Haze / Deposition Analysis					
	Facility Impact			**% Threshold**	
Analysis	**Cape Romain**	**Swanquarter**	**Threshold**	**CR**	**SQ**
Regional Haze (dV)	.27	.49	.5	54	98
Deposition (kg/ha/yr)					
Sulfate	.0053	.0128	.01	53	128
Nitrate	.0025	.0044	.01	25	44

V. Changes to Existing Title V Air Permit

VI. Compliance Status

The facility was most recently inspected on 02/25/09 by Robert Bright and Betsy Huddleston of WaRO and David Putney of RCO and appeared to be operating in compliance with DAQ requirements during that inspection.

On May 25, 2009 Nucor exceeded its PSD CO limit of 2.3 lb/ton on the EAF. There appeared to be some process issues that led to the exceedance (See stack test observation report dated (09/02/2009). The test has been rescheduled. No compliance determination has been made on this issue to date.

VII. Public Notice

TBD

VIII. Comments and Conclusions

TBD

IX. Recommendations

TBD