

**PSD Initial Determination
Air Permit Review**

Region: Washington Regional Office
County: Hertford
NC Facility ID: 4600099
Inspector's Name: Betsy Huddleston
Date of Last Inspection: 05/18/2010
Compliance Code: 3 / Compliance - inspection

Permit Issue Date:

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: NSPS: NESHAP: PSD: CO BACT change PSD Avoidance: NC Toxics: 112(r): Other:
Contact Data			Application Data
Facility Contact Terry Hairston Environmental Engineer (252) 356-3707 1505 River Road Cofield, NC 27922	Authorized Contact Robert McCracken General Manager (252) 356-3700 1505 River Road Cofield, NC 27922	Technical Contact Terry Hairston Environmental Engineer (252) 356-3707 1505 River Road Cofield, NC 27922	Application Number: 4600099.10C Date Received: 11/18/2010 Application Type: Modification Application Schedule: PSD Existing Permit Data Existing Permit Number: 08680/T14 Existing Permit Issue Date: 06/28/2010 Existing Permit Expiration Date: 03/31/2014
Review Engineer: Joseph Voelker Review Engineer's Signature: _____ Date: _____		Comments / Recommendations: Issue 08680/T15 Permit Issue Date: Permit Expiration Date:	

I. Introduction and Purpose of Application

Nucor is requesting to relax its BACT limit for carbon monoxide (CO) as applied to the Electric Arc Furnace (**ID No. ES01**), the Ladle Metallurgy Station (**ID No. ES02**), and the Continuous Slab Caster (**ID No. ES03**), all controlled by the baghouse (**ID No. CD01**) from 2.3 to 2.6 pounds per ton of steel produced. Hertford County is currently designated as in attainment for all criteria pollutants.

Nucor is not requesting any other changes to the permit, process changes, or other modifications.

II. Chronology

Date	Description
November 18, 2010	A PSD application was received and assigned app. no 4600099.10C.
January 6, 2010	JMV sent Terry Hairston the following email: <i>My main question is do the CONSTEEL facilities presented in the application, which number only three, include all CONSTEEL processes or just those in the RBLC database. I am looking for confirmation of the statement made on page 10 of the application, that is "several sources were consulted....."</i>

Date	Description
January 11, 2010	Terry Hairston sent a revised Table 2-2 (permit application) to include a few more CONSTEEL processes identified with BACT limits.
MM DD YYYY	Permit went to concurrent Public/EPA Comment Period Newspaper: Roanoke-Chowan News Herald Date of publication for Public Notice: October 15, 2009 Public Comment period ends: November 14, 2009 EPA Comment period ends: November 29, 2009

III. Modification Description

As described in the permit application:

Nucor Steel's (Nucor's) stack test on the melt shop baghouse, conducted in May of 2009, had exceeded the present carbon monoxide (CO) limit of 2.3 lbs/ton. The stack test was 2.395 lbs/ton. As a result, Nucor is proposing to revise its CO emission limit for the melt shop baghouse from 2.3 to 2.6 lbs/ton. Based on estimated maximum potential emissions minus actual emissions (1025.8 tpy), the proposed modification will be subject to Prevention of Significant Deterioration (PSD) review.

In Nucor's original air permit issued in 1999 the BACT limit was 4.0 lb/ton. The BACT limit was subject to a 'ratcheting strategy' that essentially tightened the BACT limit down as a function of the results of the annual source testing. This CO BACT limit became 2.84 lb/ton in permit no. R05 issued November 4, 2001. This CO limit was further ratcheted down to 1.82 lb/ton in permit no. R06 issued on December 17, 2002.

Nucor's current CO BACT limit of 2.3 lb/ton was established in permit revision no. T 09 issued on November 23, 2004 in response to concerns that conditions beyond their control (scrap variability and product mix) would make it less likely they could meet the CO BACT limit. In that BACT analysis, the average BACT limit for steel mills was determined to be 2.6 lb/ton with a range between 0.6 and 6.0 lb/ton and did not differentiate between the differing types of steel manufacturing. Nucor proposed a CO limit of 2.3 lb/ton, which was subsequently approved and included in permit T09.

In this application Nucor has provided a revised BACT analysis that explicitly identifies the BACT limits of other facilities using the CONSTEEL process, which are more representative of the Nucor facility than the general population of various steel manufacturing facilities. Additionally, the requested limit of 2.6 lb/ton is equivalent to the 2004 average limit of steel manufacturing facilities. As such it is likely that if 2.6 lb/ton was requested in 2004 it would have been approved. It will be shown that the requested CO BACT limit of 2.6 lb/ton although an increase, is still the lowest BACT limit identified for a CONSTEEL process.

Given, that the only modification to the facility is a change in the CO BACT limit, no regulatory review other than for PSD will be necessary.

IV. Regulatory Review

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

Nucor has presented the emission increases associated with this change in the BACT limits in Table 2-1 of the application and reproduced here.

**Table 2-1
Pollutant Emission Rates Associated with the Proposed Modification**

EMISSION SOURCES	ESTIMATED POLLUTANT EMISSION RATES (tons per year)						
	SO ₂	NO _x	PM	PM ₁₀ /PM _{2.5}	CO	VOC	Pb
EAF (maximum potential emissions at 2,190,000 tpy and 2.6 lbs CO/ton)	--	--	--	--	2,847.0	--	--
EAF (stack test actual emissions and operating hours averaged over 2 years; 2006-2007 of 6,704.6 hours)	--	--	--	--	-1,856.5	--	--
Subtotal	--	--	--	--	990.5	--	--
Melt Shop Roof Monitor (fugitives)	--	--	--	--	35.28	--	--
Total	--	--	--	--	1,025.8	--	--
Significant Emission Rate	40	40	25	15	100	40	0.6
Subject to PSD Review	No	No	No	No	Yes	No	No

1. Nucor has elected to use maximum potential emissions in lieu of future actual emissions to avoid the conditional monitoring and record keeping requirements.

Clearly a PSD review is required for CO.

The elements of a PSD review are as follows:

- A) 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),
- B) An Air Quality Impacts Analysis including Class I and Class II analyses.
- C) 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.

¹The 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.

³North Carolina has full authority to implement the PSD program, 40 CFR Sec. 52.1770

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 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 is 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.

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 of the application (reproduced here) presents a summary of BACT emission limits for steel mills Nucor considered in its BACT analysis. Note the requested CO BACT limit is more stringent than other mills using the CONSTEEL process.

Table 2-2

STEEL MILL	CO EMISSION RATE (lbs/ton of steel)
STEEL MILLS WITH THE CONSTEEL PROCESS	
Nucor Steel – Hertford County, NC	2.3 (current)/ 2.6 (proposed)
Nucor Steel – Darlington, SC	2.76/3.13*
Gerdau Ameristeel – Charlotte, NC	4.4
New Jersey Steel – Sayreville, NJ	5.8
Gerdau AmeriSteel – Knoxville, TN	6.0
Severstal Wheeling Inc. – Mingo Junction, OH	4.0
Commercial Metals Company – Mesa, AZ	2.74
OTHER STEEL MILLS	
MidAmerican Steel & Wire Company – Marshall County, OK	3.0
SeverCorr – Columbus, MS	2.0
V&M Star – Ohio	4.0
New Steel International – Haverhill, OH	2.0
Minnesota Steel industries – Minnesota	2.0
Ellwood National Steel – Pennsylvania	6.0
Nucor Steel – Memphis, TN	2.0
Nucor Steel – Auburn, NY	2.0
Nucor Steel – Berkeley County, SC	2.0

STEEL MILL	CO EMISSION RATE (lbs/ton of steel)
Nucor Steel – Crawfordsville, IN	2.0
Nucor Steel – Hickman, AR	2.0
Nucor Steel – Jewett, TX	5.0214
Nucor Steel – Norfolk, NE	4.74
Nucor-Yamato Steel – Blytheville, AR	2.0
Nucor Steel – Plymouth, UT	(1200 lbs/hr – 1hr; 682.93 lbs/hr – 8hr; and 2800 tpy)
Nucor Steel Tuscaloosa, Inc.	2.0
Nucor Steel – Decatur, AL	2.3
IPSCO – Montpelier, IA	1.93
IPSCO – Axis, AL	2.0
SDI – Butler, IN	2.0
SDI – Columbia City, IN	2.0
SDI - Pittsboro	2.0
Gallatin – Ghent, KY	2.0
MacSteel – Fort Smith, AR	4.9
Beta Steel – IN	5.4
Chaparral Steel – Petersburg, VA	4.0
Arkansas Steel – Newport, AR	6.0
Roanoke Electric Steel – Roanoke, VA	2.88
Charter Steel – Saukville, WI	3.83
Gerdau AmeriSteel – Duval County, FL	2.0

BACT Analysis for Sources with Proposed BACT CO Limit Revision

The following sources are controlled by the baghouse (ID No. CD01) and are subject to the BACT CO limit of 2.3 lb/ton.

Emission Source ID No.	Emission Source Description	Control Device ID No.	Control Device Description
Melt Shop			
ES01	One DC Electric Arc Furnace (350 ton per hour maximum capacity, 2,190,000 ton per year annual 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		

Revisiting the BACT is necessary given that Nucor wants to increase the BACT limit from 2.3 to 2.6 lb/ton. Note that the hourly and annual throughput limitation of the EAF (and hence the other Melt Shop sources) will remain unchanged, which is 2,190,000 tons per year. The Melt shop also contains numerous other fugitive emission sources with BACT limits. The facility estimates that the fugitive CO emissions from the sources presented above are approximately 1% of the emissions from the baghouse. Thus, the existing BACT limit for the fugitive melt shop sources will also have to be adjusted.

Nucor has supplied a BACT analysis in the application addressing CO which reviews currently used technologies, feasible technologies, including “technology transfer” and review of the RBLC database. Nucor has shown that the current permitted BACT control strategy utilizing the direct evacuation control (DEC) is still valid for the EAF (and hence other Melt Shop sources). This detailed BACT analysis can be found in Section 2.2.2 of the application.

The NCDAQ agrees with this BACT recommendation of the current DEC control strategy with a revised CO BACT limit of 2.6 lb/ton, 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 will still have the most stringent CO BACT of all identified CONSTEEL processes.

B. NUCOR STEEL PREVENTION OF SIGNIFICANT DETERIORATION (PSD) AIR DISPERSION MODELING 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 3. A detailed description of the modeling and modeling methodology is described below.

Project Description / Significant Emission Rate (SER) Analysis

Nucor determined that it was currently exceeding the permitted CO limit (2.3 lbs/ton) at the Cofield facility and thus requested to permit and model CO emissions at a higher limit (2.6 lbs/ton).

A facility-wide pollutant netting analysis was accomplished and is documented in Table 1 below. That analysis showed that CO emissions did exceed the CO 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
CO	1,025.8	100	Yes

An air quality preliminary impact analysis was conducted for CO emission sources. Three sources (Melt shop bag house and 2 MS Roof Monitors) were modeling with the results then compared to applicable Significant Impact Levels (SIL) as defined in the NSR Workshop Manual to determine if a full impact air quality analysis would be required for that pollutant.

Preliminary Impact Air Quality Modeling Analysis

The Cofield facility located near Hertford County, North Carolina which 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. Full terrain elevations were included, as were normal regulatory defaults and representative land use data. The receptor grid began at the fence line an 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 shown in Table 4-1 of the analysis were then modeled at their specific grams/second emission rate to determine the maximum (H1H) impacts for the CO 1-hour and 8-hour averaging periods. The results shown in Table 2 indicate that CO did not exceed the Class II CO SIL; subsequently, no further modeling was required for CO.

Table 2 - Class II Significant Impact Results (ug/m³)

Pollutant	Averaging Period	Max Facility Impact	(SIL)	Full analysis required
CO	8-hour	53.4	500	No
	1-hour	177.9	2000	No

Non Regulated Pollutant Impact Analysis (North Carolina Air Toxics)

There were no North Carolina Air toxic pollutants that increased as part of this modification.

C. ADDITIONAL IMPACTS ANALYSIS

An additional impact analyses was conducted for growth, soils and vegetation, and visibility impairment.

Growth Impacts

This modification will not increase employment and thus no growth impact will result of this change.

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 SIL and thus impacts on soils and vegetation will be negligible.

Class II Visibility Impairment Analysis

A Level 1 visibility impairment analysis was performed using the EPA VISCREEN model to demonstrate visibility impairment was not exceeded in any Class II areas 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, 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 Refuges, 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 emissions provided, NUCOR was not required to provide a Class I AQRV 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 3 – NUCOR PSD AIR QUALITY MODELING RESULTS						
SER Evaluation						
Pollutant	Maximum Potential minus actual missions (Tons)	SER (Tons/yr)				
CO	1025.8	100				
Class II Area Analysis						
Pollutant	Avg. Period	Max facility Impact (ug/m ³)	SIL	Increment Impact (ug/m ³)	Increment	Compliance
CO	8-hour	53.4	500	N/A	N/A	Yes
	1-hour	177.9	2000	N/A	N/A	Yes

V. Table of Changes to Existing Air Permit

Old Condition	New Condition	Description of Change(s)
Cover letter	Cover letter	Revised as necessary (dates, etc.)
Permit page 1	Permit page 1	Revised as necessary (dates, permit no. etc.)
2.1.A.4.a.	Same	Revised CO BACT limit from 2.3 lb/ton/2518.5 tpy to 2.6 lb/ton/2847 tpy
2.1.A.4.b.	Same	Revised CO BACT limit from 28.12 lb/hr//113.1 tpy to 29.17 lb/hr/116.4 tpy
2.1.A.4.d.	same	Revised CO BACT limit from 2.3 lb/ton to 2.6 lb/ton
All 2D .0521 monitoring conditions	Same	Revised all 2D .0521 monitoring conditions to reference 2D .2610 instead of 2D .2601, as it is the specific regulation that addresses the use of Method 9 for opacity.
All testing conditions	Same	<ul style="list-style-type: none"> Revised regulatory citation from 2D .2601 to 2Q .0508(f) Simplified language in condition from <i>If emissions testing is required, the testing shall be performed in accordance with 15A NCAC 2D .2601 and General Condition JJ found in Section 3</i> To <i>If emissions testing is required, the testing shall be performed in accordance with General Condition JJ.</i> <p>No change in intent was made.</p>
General Conditions	Same	<p>Revised from version 3.1 to 3.3. Changes include:</p> <ul style="list-style-type: none"> Condition JJ – revised some minor language and removed the 15 day test notification requirement (it is already included in 2D.2602) Removing condition OO, which was the green house gas reporting rule requirement. It was determined that it was not a required condition under TV permitting rules.

VI. ~~Public Notice~~

~~See PSD Final Determination.~~

VII. ~~Comments and Conclusions~~

~~See PSD Final Determination.~~

VIII. ~~Recommendations~~

~~See PSD Final Determination.~~