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ENGINEERING EVALUATION / FACT SHEET

BACKGROUND INFORMATION

Application No.:	R14-0039A
Plant ID No.:	053-00085
Applicant:	Nucor Steel West Virginia LLC
Facility Name:	West Virginia Steel Mill
Location:	Near Apple Grove, Mason County
SIC/NAICS Code:	3312/331110
Application Type:	Minor Modification
Received Date:	July 25, 2024
Engineer Assigned:	Joseph R. Kessler, PE
Fee Amount:	$2,000
Date Received:	August 13, 2024
Complete Date:	November 15, 2024
Due Date:	February 13, 2024
Applicant Ad Date:	August 2, 2024
Newspaper:	*The River Cities Register*
UTM's:	Easting: 398.20 km • Northing: 4,278.87 km • Zone: 17
Latitude/Longitude:	38.65536/-82.16853
Description:	Addition of four (4) natural gas-fired boilers. Application is being reviewed as a minor modification but includes BACT and Air Dispersion Modeling re-validation.

On May 5, 2024, Nucor Steel West Virginia LLC (Nucor) was issued Permit Number R14-0039 for the new construction of a sheet steel mill to be located near the unincorporated community of Apple Grove, Mason County, WV. This permit was issued under the Prevention of Significant Deterioration (PSD) program administered under 45CSR14. A full discussion of the permit application review for that action is presented in the R14-0039 Engineering Evaluation/Fact Sheet (EE/FS). The facility began actual construction in early May 2022, and remains under construction at this time.

DESCRIPTION OF PROCESS/MODIFICATIONS

Existing Facility

On May 5, 2024, Nucor Steel West Virginia LLC (Nucor) was issued Permit Number R14-0039 for the new construction of a sheet steel mill to be located near the unincorporated community of Apple Grove, Mason County, WV. The facility, as permitted, will have the capacity to produce up to 3,000,000 tons of steel per year and the production process can be broken down into the following six (6) major components: Material Handling, Melt Shop, Hot Mill, Cold Mill, Slag Processing, and Auxiliary Processes/Equipment.

The basic steel producing process involves the melting of scrap steel (with other raw materials) in two (2) Electric Arc Furnaces (EAFs). The molten steel is then further refined in several additional processes prior to being sent to the casting area where the molten steel is formed into a continuous ribbon of steel and sent to the Hot Mill for sizing. In the Hot Mill, the ribbon of steel is cut and rolled (while heated) to achieve the desired size and thickness per customer specifications. As required, product refining can continue in the Cold Mill, where the cooled steel can be further sized, cleaned, annealed, and galvanized to meet additional customer specifications. Material handling and slag processing are needed at the facility to unload, store, and process feedstock materials and slag, respectively. Auxiliary operations and equipment include the use of storage tanks, cooling towers, an air separation unit, and emergency engines.

Proposed Modifications

Nucor is now proposing to add four (4) natural gas-fired boilers to the Cold Mill, with two (2) to be located in the Galvanizing Line, and two (2) to be located in the Pickling Line Tandem Cold Mill. There are no other changes proposed to the facility as part of this permitting action. The revised Natural Gas Combustion Devices table (provided under Table 3 in the R14-0039 EE/FS) is given below (the new boilers are highlighted):

Table 1: Natural Gas Combustion Devices

Emission Unit ID(s)	Emission Point ID(s)	Number of Units	Unit Description	MDHI[1] (mmBtu/hr)
LD	MSFUG[2]	1	Ladle Dryer	15.00
LPHTR1-5	MSFUG[2]	5	Horizontal Ladle Preheaters	15.00
LPHTR6-7	MSFUG[2]	2	Vertical Ladle Preheaters	15.00
TD	MSFUG[2]	1	Tundish Dryer	6.00
TPHTR1-2	MSFUG[2]	2	Tundish Preheaters	9.00
SENPHTR1-2	MSFUG[2]	2	Tundish Preheaters	1.00
GALVFN1-2	GALVFN(1-2)-ST	2	Galvanizing Furnaces	64.00
GALVBOILER1-2	CGLST1/3	2	Galvanizing Line Boilers	6.70

Emission Unit ID(s)	Emission Point ID(s)	Number of Units	Unit Description	MDHI[(1)] (mmBtu/hr)
PLTCBOILER1	PLTCMBLR	1	Pickling Line Tandem Cold Mill Boilers	74.00
PLTCBOILER2		1		71.64
GALFUG	BOXANN1-22	22	Box Annealing Furnaces	5.00
TF1	TFST-1	1	Hot Mill Tunnel Furnaces	150.00
SLAG-CUT	SLAG-CUT-NG	1	Slag Cutting Torch	2.40
ASP	ASP-1	1	Water Bath Vaporizer	11.00

(1) Individual unit MDHI. Aggregate MDHI of all units = 706.44 mmBtu/hr.
(2) Direct process heat: exhaust vents inside the Melt Shop.

SITE INSPECTION

On February 10, 2022, the writer conducted an inspection of the proposed location of Nucor's West Virginia Steel Mill. A full write-up of this inspection is included in the R14-0039 EE/FS. The permitted location has not yet received an inspection by the DAQ's Compliance & Enforcement (C/E) section.

AIR EMISSIONS AND CALCULATION METHODOLOGIES

Nucor included as Attachment N in the permit application emissions calculations for the proposed new boilers. As the calculation methodologies are the same as those for the For a full discussion of the air emissions and calculation methodologies of the existing facility as permitted, see the R14-0039 EE/FS.

Natural Gas Combustion Exhaust Emissions

Similar to the existing permitted natural gas combustion units at the facility, wth the exception of the NO_x emissions from the proposed new boilers, the emission factors were based on the emission factors provided for natural gas combustion as given in AP-42 Section 1.4. - "Natural Gas Combustion," Tables 1.4-1/2 (CO - 84 lbs/mmscf, $PM_{2.5}/PM_{10}$ (including condensables) - 7.6 lbs/mmscf, PM (filterable only) - 1.9 lbs/mmscf, SO_2 - 0.6 lb/mmscf, VOCs - 5.5 lb/mmscf, HAPs - various by speciated HAP), and 40 CFR Part 98 - "Mandatory Greenhouse Gas Reporting," Tables C-1 and C-2 (CO_2 - 116.98 lb/mmBtu, CH_4 - 0.0022 lb/mmBtu, N_2O - 0.00022 lb/mmBtu).

The AP-42 Section 1.4. emission factors were converted to lb/mmBtu using a natural gas heat content of 1,020 Btu/scf. A NO_x emission factor of 0.05 lb/mmBtu was used for the proposed new boiler and these emission factors were based on the Best Available Control Technology (BACT) emission limit for the units. Maximum hourly emissions for all units were based on the MDHI of the units and annual emissions were based on operation of 8,760 hours per year. Each proposed boiler will utilize Low-NO_x Burner (LNB) technology to limit NO_x emissions. The following table shows the individual emissions associated with new proposed boilers.

Table 2: Proposed New Boilers Maximum Potential-to-Emit

Boiler	Proposed New Boilers Maximum Hourly (lbs/hr) Emissions							
	CO	NO_x	PM[1]	PM_{FILT}[2]	SO_2	VOCs	HAPs	CO_2e
PLTCMBOILER1	6.09	3.70	0.55	0.14	0.044	0.40	0.137	8,665
PLTCMBOILER2	5.90	3.58	0.53	0.13	0.042	0.39	0.132	8,389
GALVBOILER1	0.55	0.34	0.05	0.01	0.004	0.04	0.012	785
GALVBOILER2	0.55	0.34	0.05	0.01	0.004	0.04	0.012	785
Boiler	**Proposed New Boilers Maximum Annual (tons/yr) Emissions**							
	CO	NO_x	PM[1]	PM_{FILT}[2]	SO_2	VOCs	HAPs	CO_2e
PLTCMBOILER1	26.69	16.21	2.42	0.60	0.191	1.75	0.598	37,954
PLTCMBOILER2	25.84	15.69	2.34	0.58	0.185	1.69	0.579	36,743
GALVBOILER1	2.42	1.47	0.22	0.06	0.017	0.16	0.054	3,436
GALVBOILER2	2.42	1.47	0.22	0.06	0.017	0.16	0.054	3,436
Annual Totals	***57.37***	***34.84***	***5.19***	***1.30***	***0.410***	***3.76***	***1.285***	***81,570***

(1) Total PM including condensables. All PM emissions are considered PM2.5 or less in size.
(2) Filterable Only.

Emissions Summary

Based on information in the permit application, the change in the facility-wide PTE of the Nucor steel mill as a result of the updates evaluated here are given in the following table:

Table 3: Change In Facility-Wide Potential-to-Emit

Pollutant	R14-0039[1]	Change	R14-0039A[1]
	tons/year	tons/year	tons/year
CO	3,262.61	57.37	3,319.98
NO_x	701.59	34.83	736.42
$PM_{2.5}$[1]	570.10	5.19	575.29
PM_{10}[1]	617.54	5.19	622.73
PM_{FILT}[2]	395.74	1.30	397.04
PM[3]	690.89	5.19	696.08
SO_2	361.48	0.41	361.89
VOCs	178.36	3.76	182.12
Total HAPs	7.46	1.29	8.75
CO_{2e}	673,848	81,570	755,418

(1) Existing emissions taken from Attachment N of the R14-0039 Application (final version) and the post-update emissions taken from Attachment N of Permit Application R14-0039A.

The following is a more detailed post-update facility-wide PTE:

Table 4: West Virginia Steel Mill Annual PTE

Sources	PTE (ton/year)									
	CO	NO_x	$PM_{2.5}$(1)	PM_{10}(1)	PM(2)	PM(3)	SO_2	VOC	HAPs(4)	GHGs
Material Handling(5)	0.00	0.00	16.34	30.59	74.98	74.98	0.00	0.00	0.000	0
Melt Shop	3,030.00	525.00	435.92	435.92	157.16	438.90	360.00	147.00	1.320	377,594
PNG Combustion	254.82	201.39	23.05	23.05	5.76	23.05	1.82	16.68	5.920	362,326
Hot & Cold Mill	29.87	7.38	96.42	129.61	155.58	155.58	0.06	15.19	1.090	15,007
Cooling Towers	0.00	0.00	3.36	3.36	3.36	3.36	0.00	0.00	0.000	0
Emergency Engines	5.29	2.65	0.20	0.23	0.20	0.20	0.003	1.32	0.340	492
Storage Tanks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.92	0.120	0
Total(6)	***3,319.98***	***736.42***	***575.29***	***622.76***	***397.04***	***696.07***	***361.88***	***182.11***	***8.790***	***755,419***

(1) Includes condensables where applicable.
(2) Filterable only.
(3) Includes filterable and condensable.
(4) As the PTE of all individual HAPs are less than 10 TPY (the highest individual HAP emission rate is 5.56 TPY for n-Hexane) and the PTE of total HAPs is less than 25 TPY, the proposed WV Steel Mill is defined as a minor (area) source of HAPs for purposes of 45CSR30, 40 CFR 61, and 40 CFR 63.
(5) Includes particulate emissions from the Slag Cutting operations.
(6) Some small difference in total emissions may occur in comparison with those in the permit application due to rounding.

REGULATORY APPLICABILITY

The permitted Nucor steel mill is subject to substantive requirements in the following state and federal air quality rules and regulations:

Table 5: Applicable State and Federal Air Quality Rules

State Air Quality Rules	
Emissions Standards	
45CSR2	To Prevent and Control Particulate Air Pollution from Combustion of Fuel in Indirect Heat Exchangers
45CSR6	To Prevent and Control Particulate Air Pollution from Combustion of Refuse
45CSR7	To Prevent and Control Particulate Air Pollution from Manufacturing Process Operations
45CSR10	To Prevent and Control Air Pollution from the Emission of Sulfur Oxides
Permitting Programs and Administrative Rules	
45CSR13	Permits for Construction, Modification, Relocation and Operation of Stationary Sources of Air Pollutants, Notification Requirements, Administrative Updates, Temporary Permits, General Permits, and Procedures for Evaluation

45CSR14	Permits for Construction and Major Modification of Major Stationary Sources of Air Pollution for the Prevention of Significant Deterioration
45CSR30	Requirements for Operating Permits
Federal Air Quality Rules	
New Source Performance Standards (NSPS) - 40 CFR 60	
Subpart Dc	Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units
Subpart AAa	Standards of Performance for Steel Plants: Electric Arc Furnaces and Argon-Oxygen Decarburization Vessels Constructed After August 17, 1983
Subpart IIII	Standards of Performance for Stationary Compression Ignition Internal Combustion Engines
Maximum Achievable Control Technology (MACT) - 40 CFR 63	
Subpart ZZZZ	National Emission Standard for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines
Subpart YYYYY	National Emission Standards for Hazardous Air Pollutants for Area Sources: Ferroalloys Production Facilities
Subpart CCCCCC	National Emission Standards for Hazardous Air Pollutants for Source Category: Gasoline Dispensing Facilities

Only those air quality rules and regulations that are applicable to emission units added or modified as a part of this permitting action (the new boilers) will be discussed herein. For a full discussion of all the rules and regulations that apply to the facility, see the EE/FS prepared in support of Permit Number R14-0039.

45CSR2: To Prevent and Control Particulate Air Pollution from Combustion of Fuel in Indirect Heat Exchangers

45CSR2 "*establishes emission limitations for smoke and particulate matter which are discharged from fuel burning units*." A fuel burning unit is defined under 45CSR2 as any "*furnace, boiler apparatus, device, mechanism, stack or structure used in the process of burning fuel or other combustible material for the primary purpose of producing heat or power by indirect heat transfer.*" Additionally, the definition of "indirect heat exchanger" specifically excludes process heaters, which are defined as "*a device that is primarily used to heat a material to initiate or promote a chemical reaction in which the material participates as a reactant or catalyst.*" Based on these definitions, 45CSR2 would potentially apply only to the existing permitted 11.00 mmBtu/hr Water Bath Vaporizer (ASP), the proposed new 74.00 mmBtu/hr Pickling Line Tandem Cold Mill Boiler #1, the 71.64 mmBtu/hr Pickling Line Tandem Cold Mill Boiler #2, and the two (2) 6.70 mmBtu/hr Galvanizing Line Boilers. The other combustion units at the proposed facility do not use indirect heat transfer and are, therefore, not defined as fuel burning units under 45CSR2. However, based on the exemption given under §45-2-11, "[*a]ny fuel burning unit(s) having a heat input under ten (10) million B.T.U.'s per hour will be exempt from sections 4, 5, 6, 8 and 9* [of 45CSR2]." Therefore, the two (2) 6.70 mmBtu/hr Galvanizing Line Boilers are only subject to the opacity standards under Section 3.1.

45CSR2 Opacity Standard - Section 3.1

Pursuant to 45CSR2, Section 3.1, each of the above identified units are subject to an opacity limit of 10%. Proper maintenance and operation of the units (and the use of natural gas as fuel) should keep the opacity of the units well below 10% during normal operations.

45CSR2 Weight Emission Standard - Section 4.1(b)

The facility-wide allowable particulate matter (PM) emission rate for the applicable fuel burning units noted above, identified as Type "b" fuel burning units, per 45CSR2, Section 4.1(b), is the product of 0.09 and the total aggregate design heat input of all the applicable units (as per the exemption noted above, the Galvanizing Line Boilers are exempt from Section 4) in million Btu per hour. As shown in Table 6 below, the maximum aggregate design heat input (short-term) of all of the applicable units will be 170.07 mmBtu/Hr. Using the above equation, the 45CSR2 aggregate PM emission limit of the units will be 15.30 lb/hr. This limit represents filterable PM only and does not include condensable PM. The exemption of condensable PM is located within the 45CSR2 Appendix - which establishes compliance test procedures - by not requiring measurement of the condensable PM. The maximum potential hourly PM emissions during normal operations from the units (*including* condensables) is estimated to be 1.27 lb/hr. This conservative emission rate is 8.3% of the 45CSR2 limit.

Table 6: 45CSR2 Compliance Demonstration

Emission Unit ID	Fuel Burning Unit Description	Design Capacity (mmBtu/hr)	Fuel Burning Unit PTE (lb-PM/hr)
PLTCMBOILER1	Pickling Line Tandem Cold Mill Boiler #1	74.00	0.55
PLTCMBOILER2	Pickling Line Tandem Cold Mill Boiler #2	71.67	0.53
ASP	Water Bath Vaporizer	11.00	0.08
	Totals ➜	***156.67***	***1.17***

45CSR2 Testing, Monitoring, Record-keeping, & Reporting (TMR&R) - Section 8

Section 8 of 45CSR2 requires testing for initial compliance with the limits under Section 3 and 4, monitoring for continued compliance, and record-keeping of that compliance. The TMR&R requirements are clarified under 45CSR2A and discussed below.

45CSR2A Applicability - Section 3

Pursuant to 45CSR2, Section 3.1(b), the owner or operator of a "*fuel burning unit(s) which combusts only natural gas shall be exempt from sections 5 and 6.*" Therefore, there are no substantive performance testing or monitoring requirements under 45CSR2 for the existing or proposed fuel burning units.

45CSR2A Record-keeping and Reporting Requirements - Section 7

Section 7 sets out the record-keeping requirements that Nucor will have to meet under 45CSR2A for the existing or proposed fuel burning units. For units that combust only natural gas, the record-keeping requirements (45CSR§2A-7.1(a)(1)) are limited to the date and time of start-up and shutdown, and the quantity of fuel consumed on a monthly basis.

45CSR10: To Prevent and Control Air Pollution from the Emission of Sulfur Oxides

The purpose of 45CSR10 is to "*prevent and control air pollution from the emission of sulfur oxides.*" 45CSR10 has requirements limiting SO_2 emissions from "fuel burning units," limiting in-stack SO_2 concentrations of "manufacturing process source operations," and limiting H_2S concentrations in "process gas" streams that are combusted. Only the substantive 45CSR10 requirements applicable to the proposed new boilers are discussed below.

45CSR10 Fuel Burning Units - Section 3

As noted under the discussion of 45CSR2 applicability, based on the same definitions and exemptions therein, the existing permitted 11.00 mmBtu/hr Water Bath Vaporizer (ASP), the proposed new 74.00 mmBtu/hr Pickling Line Tandem Cold Mill Boiler #1, and the 71.64 mmBtu/hr Pickling Line Tandem Cold Mill Boiler #2 are defined as a "fuel burning units" and subject to 45CSR10 under Section 3.

The allowable SO_2 emissions from the applicable fuel burning unit noted above, identified as a Type "b" fuel burning unit in a Priority III Region (which includes Mason County), per 45CSR10, Section 3.3(f), is the product of 3.2 and the total design heat input of all applicable units in million Btus per hour. The maximum aggregate design heat input (short-term) of all the applicable units (see Table 6 above) is 156.67 mmBtu/hr. Using the above equation results in a SO_2 limit of 501.34 pounds per hour. As each of the applicable units are fueled by natural gas, the aggregate PTE of these fuel burning units will be far below this limit at only 0.092 lbs-SO_2/hr. This emission rate represents only a trace of the 45CSR10 limit.

45CSR10 Testing, Monitoring, Record-keeping, & Reporting (TMR&R) - Section 8

Section 8 of Rule 10 requires performance testing for initial compliance with the limits therein, monitoring for continued compliance, and record-keeping of that compliance. The TMR&R requirements are clarified under 45CSR10A and discussed below.

45CSR10A Applicability - Section 3

Pursuant to §45-10A-3.1(b), for fuel burning units that combust "*natural gas, wood or distillate oil, alone or in combination,*" the units are not subject to the TMR&R Requirements under 45CSR10A. All the applicable fuel burning units under 45CSR10 combust natural gas and are, therefore, exempt from the TMR&R Requirements.

45CSR13: Permits for Construction, Modification, Relocation and Operation of Stationary Sources of Air Pollutants, Notification Requirements, Administrative Updates, Temporary Permits, General Permits, and Procedures for Evaluation

The proposed updates to the Nucor facility have a potential to increase the potential-to-emit (PTE) of a regulated pollutant at the facility in excess of six (6) lbs/hour and ten (10) TPY (see Table 2 and 3) and, therefore, pursuant to §45-13-2.17, the proposed changes are defined as a "modification" under 45CSR13. Pursuant to §45-13-5.1, "*[n]o person shall cause, suffer, allow or permit the . . . modification . . . and operation of any stationary source to be commenced without . . . obtaining a permit to . . . modify.*" Therefore, Nucor is required to obtain a modification permit under 45CSR13 for the proposed updates.

As required under §45-13-8.3 ("Notice Level A"), Nucor placed a Class I legal advertisement in a "*newspaper of general circulation in the area where the source is . . . located.*" The ad ran on August 2, 2024 in *The River Cities Register* and the affidavit of publication for this legal advertisement was submitted on August 8, 2024.

45CSR14: Permits for Construction and Major Modification of Major Stationary Sources of Air Pollution for the Prevention of Significant Deterioration - (Not Applicable)

WV Legislative Rule 45CSR14 provides the statutory framework to administer the Prevention of Significant Deterioration (PSD) program in West Virginia. This program provides for the permitting of new "major stationary sources" of air emissions and for the "major modification" of existing sources of air emissions. It is important to note that WV implements the PSD program as a State Implementation Plan (SIP)-approved state through 45CSR14. As a SIP-approved state, WV is the sole issuing authority for PSD permits. EPA has reviewed WV Legislative Rule 45CSR14 and concluded that it incorporates all the necessary requirements to successfully meet the goals of the PSD program as discussed above. EPA retains, however, an oversight role in WV's administration of the PSD program.

On May 5, 2024, Nucor was issued Permit Number R14-0039 for the construction and operation of their proposed sheet steel plant to be located near the unincorporated community of Apple Grove, Mason County, WV. The PSD review process most importantly includes (among many other requirements), pursuant to the requirements under 45CSR14, a full air dispersion modeling and Best Available Control Technology (BACT) review. Nucor fulfilled both of these requirements during the review process of R14-0039, and the DAQ reviewed and approved these analyses. The full review of Nucor's PSD permit application is available in the R14-0039 Engineering Evaluation/Fact Sheet (EE/FS).

As noted above, Nucor has began actual construction of the steel mill, but has not yet started operating the mill, and now is proposing to make some updates to the facility that have a result of increasing the PTE of the facility (see Table 2 above). The requested changes (the addition of the four boilers) are not defined as major - the PTE of the proposed new boilers in the aggregate do not exceed the thresholds that would define the proposed changes as a major modification as given under §45-14.2.74(a) (see Table 7).

Table 7: Potential Applicability of New Boilers to PSD

Pollutant	Potential-To-Emit (TPY)	Significance Level (TPY)	PSD (Y/N)
CO	57.37	100	N
NO_x	34.83	40	N
$PM_{2.5}$	5.19	10	N
PM_{10}	5.19	15	N
Filterable PM	1.30	25	N
SO_2	0.41	40	N
VOCs	3.76	40	N
GHGs (CO_2e)	81,570	75,000	N(1)
Lead	~0	0.6	N
Sulfuric Acid Mist	0.00	7	N
Flourides	0.00	3	N
Vinyl Chroloride	0.00	1	N
Total Reduced Sulfur	0.00	10	N
Reduced Sulfur Compounds	0.00	10	N

(1) On June 23, 2014 in Utility Air Regulatory Group v. Environmental Protection Agency, the Supreme Court of the United States (SCOTUS) ruled that GHGs alone could no longer define a source as a "major stationary source" or a modification as a "major modification" for the purposes of PSD review. This is codified in 45CSR14, Section 2.80(d)(2).

However, as noted above, as the proposed changes are at a PSD-permitted major source that is proposing changes after issuance of a PSD permit and prior to beginning operations, the DAQ is requiring a re-validation of the air dispersion modeling and the application of BACT on the proposed new emission units.

BACT

Natural Gas Combustion Sources

As noted above, although the application reviewed herein is being processed as a minor modification, the application of BACT was required on the proposed new boilers. Pursuant to USEPA and DAQ policy, the permit applicant determines an appropriate BACT emission limit by using a "top-down" analysis. The key steps in performing a "top-down" BACT analysis are the following: (1) Identification of all applicable control technologies; (2) Elimination of technically infeasible options; (3) Ranking remaining control technologies by control effectiveness; (4) Evaluation of most effective controls and documentation of results; and (5) the selection of BACT. Also

included in the BACT selection process is, where appropriate, the review of BACT determinations at similar facilities using the RACT/BACT/LAER Clearinghouse (RBLC). The RBLC is a database of RACT, BACT, and LAER determinations maintained by EPA and periodically updated by the individual permitting authorities (it is important to note, however, that the RBLC is not exhaustive as not all determinations are uploaded to the database).

Nucor's full BACT analysis for the proposed new boilers is given in Section 3-7 of the permit application. The most significant result of the BACT Analysis for the proposed new boilers was the determination that use of combustion exhaust technologies for control of NO_x (SCR, SNCR) and CO (oxidation catalysts) was either not technically feasible (for the small 6.7 mmBtu/hr Pickling Line Tandem Cold Mill Boilers #2) or was economically prohibitive (for the larger ~70 mmBtu/hr Galvanizing Line Boilers). BACT for the remaining pollutants were based on the conventional process and operational applications for almost all standard natural gas-fired boilers.

BACT emission rates for all of the proposed new boilers were based on the AP-42, Section 1.4 for all pollutants (excluding GHGs) with the exception of NO_x: a NO_x emission factor of 0.05 lb/mmBtu was used. These BACT emission limits were based on expected available vendor guarantees and consistency with recent RBLC data. GHG BACT was based on the TPY limits of the units in turn based on emission factors taken from 40 CFR Part 98 - "Mandatory Greenhouse Gas Reporting," Tables C-1 and C-2. See the following table for the BACT selection:

Table 8: Proposed New Boilers BACT

Pollutant	BACT Limit	BACT Technology(1)
CO	0.082 lb/mmBtu	Good Combustion Practices
NO_x	0.05 lb/mmBtu	LNB, Good Combustion Practices
$PM_{2.5}/PM_{10}$(2)	0.00745 lb/mmBtu	Use of PNG, Good Combustion Practices
PM(3)	0.00186 lb/mmBtu	
SO_2	0.00059 lb/mmBtu	Use of PNG
VOCs	0.0054 lb/mmBtu	Good Combustion Practices
CO_2e	TPY Limits in Table A-3 of Permit	Use of PNG, Good Combustion Practices

(1) LNB = Low-NO_x Burning Technology. For the purposes of this permit, "Good Combustion Practices" are defined to include, but are not limited to the following: (1) maintaining a proper oxidizing atmosphere to control emissions through proper combustion tuning, temperature, and air/fuel mixing and (2) activities such as maintaining operating logs and record-keeping, conducting training, ensuring maintenance knowledge, performing routine and preventive maintenance, conducting burner and control adjustments, monitoring fuel quality, etc.

(2) Includes Condensables.

(3) Filterable Only.

DAQ Conclusion on BACT Analysis

The DAQ has concluded that Nucor reasonably conducted a BACT analysis for the proposed new boilers using, where appropriate, the top-down analysis and eliminated technologies for valid

reasons as presented in Section 3-7 of the permit application. The DAQ concludes that the selected BACT emission rates given in the draft permit are achievable, are consistent where appropriate with recent applicable BACT determinations, and are accepted as BACT. Further, the DAQ accepts the selected control technologies and control strategies as BACT.

Air Dispersion Modeling

Sections §45-14-9 and §45-14-10 of 45CSR14 contain requirements relating to a proposed major source's impact on air quality (Section 9) and the requirements for the air dispersion modeling used to determine the potential impact (Section 10). Specifically, §45-14-9.1 requires subject sources to demonstrate that "*allowable emission increases from the proposed source or modification, in conjunction with all other applicable emission increases or reductions (including secondary emissions), would not cause or contribute to*" (1) a NAAQS violation or (2) an exceedance of a maximum allowable increase over the baseline concentration in any area (exceed the increment). Nucor successfully submitted this analysis and the modeling was verified as laid out under Attachment A of the R14-0039A EE/FS. As noted, as a result of the changes evaluated herein, Nucor was required to resubmit a new air dispersion analysis to again show the facility (as a whole, not just the new boilers) meets the requirement under 45CSR14. This new submission has again been reviewed and verified by the DAQ. This review is summarized under Attachment A of this document.

40 CFR 60, Subpart Dc: Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units

40 CFR 60, Subpart Dc is the federal NSPS for small industrial/commercial/institutional "steam generating units" for which (1) construction, modification, or reconstruction is commenced after June 19, 1984, (2) that have a MDHI between 10 and 100 mmBtu/hr, and (3) meet the definition of a "steam generating unit." Subpart Dc contains within it emission standards, compliance methods, monitoring requirements, and reporting and record-keeping procedures for affected facilities applicable to the rule. Pursuant to §60.41(c), "steam generating unit" under Subpart Dc means "*a device that combusts any fuel and produces steam or heats water or heats any heat transfer medium. . . This term does not include process heaters as defined in this subpart.*" Based on the MDHI and characteristics of the proposed new boilers, each unit is defined as an affected facility under Subpart Dc and is subject to the applicable requirements therein.

Subpart Dc does not, however, have any emission standards for units that combust only natural gas. Therefore, the proposed new boilers are only subject to the nominal record-keeping and reporting requirements given under §60.48c.

40 CFR 60, Subpart AAb, Standards of Performance for Steel Plants: Electric Arc Furnaces and Argon Oxygen Decarburization Vessels Constructed After May 16, 2022 (Non-Applicable)

On August 1, 2023, the U.S. Environmental Protection Agency (EPA) finalized new source performance standards (NSPS) for "Electric Arc Furnaces and Argon-Oxygen Decarburization Vessels Constructed After May 16, 2022" (40 CFR 60, Subpart AAb). However, Nucor began actual construction in May 2021 and, therefore, the facility remains applicable to 40 CFR 60, Subpart AAa - see the R14-0039 EE/FS for a full discussion of the Subpart AAa requirements as applicable to the Nucor facility. No changes to that applicability result from the changes evaluated herein.

40 CFR 63, Subpart DDDDD: National Emission Standards for Hazardous Air Pollutants for Hazardous Air Pollutants Air Pollutants for Industrial, Commercial, and Institutional Boilers and Process Heaters - (Non-Applicable)

40 CFR 63, Subpart DDDDD is a federal MACT rule that establishes national emission limitations and work practice standards for HAPs emitted from industrial, commercial, and institutional boilers and process heaters located at major sources of HAPs. As shown in Table 4, the proposed West Virginia Steel Mill is not defined as a major source of HAPs and, therefore, Subpart DDDDD does not apply.

TOXICITY ANALYSIS OF NON-CRITERIA REGULATED POLLUTANTS

This section provides information on those regulated pollutants that may be emitted from the Natrium Extraction and Fractionation Plant and that are not classified as "criteria pollutants." Criteria pollutants are defined as Carbon Monoxide (CO), Lead (Pb), Oxides of Nitrogen (NO_x), Ozone, Particulate Matter (PM_{10} and $PM_{2.5}$), and Sulfur Dioxide (SO_2). These pollutants have National Ambient Air Quality Standards (NAAQS) set for each that are designed to protect the public health and welfare. Other pollutants of concern, although designated as non-criteria *and without national concentration standards*, are regulated through various state and federal programs designed to limit their emissions and public exposure. These programs include federal source-specific HAP regulations promulgated under 40 CFR 61 and 40 CFR 63 (NESHAPS/MACT), and WV Legislative Rule 45CSR27 that regulates certain HAPs defined as Toxic Air Pollutants (TAPs). Any potential applicability to these programs were discussed above under REGULATORY APPLICABILITY.

The majority of non-criteria regulated pollutants fall under the definition of HAPs which are compounds identified under Section 112(b) of the Clean Air Act (CAA) as pollutants or groups of pollutants that EPA knows or suspects *may* cause cancer or other serious human health effects. These adverse health affects may be associated with a wide range of ambient concentrations and exposure times and are influenced by source-specific characteristics such as emission rates and local meteorological conditions. Health impacts are also dependent on multiple factors that affect variability in humans such as genetics, age, health status (e.g., the presence of pre-existing disease) and lifestyle. As stated previously, *there are no applicable federal or state ambient air quality standards for these specific chemicals*. For a complete discussion of the known health effects of each compound listed in this section, refer to the IRIS database located at www.epa.gov/iris. It is important to note that the USEPA does not divide the various HAPs into further classifications based on toxicity or if the compound is a suspected carcinogen.

There was an increase in the potential-to-emit of several HAPs associated with the combustion of natural gas as a result of the addition of the new boilers. Table 9 below (revised Table 15 given in the R14-0039 EE/FS) lists each HAP currently identified by Nucor as potentially emitted in an amount greater than 20 lbs/year (0.01 tons/year) from the facility and notes the changes in any identified compound. Additionally, information concerning the pollutant, and the associated carcinogenic risk (as based on analysis provided in the Integrated Risk Information System (IRIS)), and any potentially applicable MACT is provided in Attachment B.

Table 9: Hazardous Air Pollutants

Pollutant	CAS #	New PTE (tons/yr)	PTE Increase (tons/yr)
VOC-HAPs			
Acetaldehyde	75-07-0	0.035	n/a
Acrolein	107-02-8	0.033	n/a
Benzene	71-43-2	0.015	0.001
Formaldehyde	50-00-0	0.467	0.051
n-Hexane	110-54-3	5.657	1.230
Hydrochloric Acid (HCl)	7647-01-0	1.159	n/a
Methanol	67-56-1	0.013	n/a
Tetrachloroethylene	127-18-4	0.010	n/a
Toluene	108-88-3	0.015	0.002
PM-HAPs			
Lead(1)	7439-92-1	0.675	n/a
Manganese	7439-96-5	0.450	n/a
Mercury	7439-97-6	0.165	n/a

(1) Although Nucor has stated that the lead emitted from the Melt Shop sources will be almost all elemental lead (which is not defined as a HAP), to be conservative, all lead is assumed to fall in the category of "Lead Compounds," which are defined as HAPs.

AIR QUALITY IMPACT ANALYSIS

As noted in the discussion above concerning the 45CSR14 applicability, a new air impacts analysis was required as part of this permitting action. See Attachment A to this document for a full report on that analysis.

MONITORING, COMPLIANCE DEMONSTRATIONS, REPORTING, AND RECORDING OF OPERATIONS

There was no substantive change to the monitoring, compliance demonstration, reporting, and recording requirements (MRR) in the draft permit. The proposed new boilers have been included in the existence MRR where applicable.

PERFORMANCE TESTING OF OPERATIONS

As a result of the changes reviewed herein, Nucor shall be required to conduct a performance test on one of the new Pickling Line Tandem Cold Mill Boilers (PLTCBOILER1/2) in replacement of the Water Bath Vaporizer (ASP).

CHANGES TO PERMIT R14-0039

The substantive changes made to Permit R14-0039 are as follows:

- The proposed new boilers were added to the Emission Units Table 1.0;
- Section 4.1.5 was revised to include the proposed new boilers; and
- The proposed new boilers were added to the Visible Emissions Compliance Demonstrations Table (4.2.12(a)) and the Performance Testing Requirements Table (4.3.2).

RECOMMENDATION TO DIRECTOR

The information provided in permit application R14-0039A indicates that compliance with all applicable state and federal air quality regulations will be achieved. Therefore, I recommend to the Director that the DAQ go to public notice with a preliminary determination to issue Permit Number R14-0039A to Nucor Steel US, LLC for the proposed minor modification of their steel mill located near Apple Grove, Mason County, WV.

Joseph Kessler

Digitally signed by: Joseph Kessler
DN: CN = Joseph Kessler email = joseph.r.kessler@wv.gov C = US O = WV Department of Environmental Protection OU = Division of Air Quality
Date: 2025.01.14 11:29:05 -05'00'

Joe Kessler, PE
Engineer

MEMO

Jonathan D. McClung

Digitally signed by: Jonathan D. McClung
DN: CN = Jonathan D. McClung email = JON.D.MCCLUNG@WV.GOV C = AD O = Department of Environmental Protection OU = Division of Air Quality
Date: 2024.12.03 15:45:58 -05'00'

To: Joe Kessler
From: Jon McClung
CC: Laura Jennings, Ed Andrews, Steve Pursley, Rex Compston
Date: December 3, 2024
Re: Air Quality Impact Analysis Review
Nucor Steel West Virginia LLC
West Virginia Steel Mill
Permit Application: R14-0039A
Plant ID No.: 053-00085

I have completed my review and replication of the air quality impact analysis submitted by Nucor Steel West Virginia LLC (Nucor) in support of the minor modification permit application (R14-0039A) for changes to PSD permit R14-0039, which Nucor received in May 2022 for the construction of a steel making plant near Apple Grove, West Virginia, within Mason County. Review and replication of various components of the modeling analysis were performed by Ed Andrews, Joe Kessler, Steve Pursley, and Rex Compston. This dispersion modeling analysis was performed and submitted by Nucor to demonstrate that Nucor, along with the changes related to this minor permit application, will not cause or contribute to any violations of applicable NAAQS or increment standards.

On February 23, 2024, Trinity Consultants submitted an air dispersion modeling protocol in support of this permit application to the WV DAQ on behalf of Nucor. The WV DAQ provided comments on this protocol to Nucor on March 7, 2024. Nucor subsequently provided a revised modeling protocol on August 9, 2024. Additional clarifying information related to the modeling protocol was submitted by Nucor on October 17, 2024. The WV DAQ reviewed the revised modeling protocol and provided approval on November 14, 2024.

Nucor submitted permit application R14-0039A on July 25, 2024 and was assigned to Joe Kessler for review. A modeling report was included with the permit application. On July 26, 2024, the electronic modeling files were submitted. On August 26, 2024, additional modeling files (AERMAP/AERMET) were requested and these files were submitted on August 30, 2024. Finally, additional information concerning the stack parameters and a revised electronic modeling files package and a revised modeling report was submitted on October 17, 2024. The the permit application was deemed complete via e-mail from Joe Kessler on November 15, 2024.

Nucor is proposing to construct four natural gas-fired boilers that were not included in the initial PSD construction permit application. As part of this minor permitting process and to be conservative, the DAQ requested that Nucor perform a complete modeling analysis of the original PSD permit with the changes in this minor permit application added. Considering the recent issuance of the PSD permit and the minor changes in this permit application, it is appropriate to utilize the original PSD modeling procedures with updated input databases.

A key point in this review is that this revised modeling is intended to confirm that the original modeling analysis, including the minor changes in this application, continues to demonstrate that Nucor does not cause or contribute to any violations of applicable NAAQS or increments. The US EPA revised, effective May 6, 2024, the annual $PM_{2.5}$ standard from 12.0 $\mu g/m^3$ to 9.0 $\mu g/m^3$. Considering the intent to confirm the original modeling analysis with these recent and minor changes, the standards effective at the time of the original PSD permit issuance will be used to demonstrate compliance.

With this permit application, Nucor is proposing to include in their process operations the following equipment:

- Two (2) galvanizing (Galv) line boilers rated at 6.7 MMBtu/hr each (EU GALVBOILER1, EU GALVBOILER2);

- Two (2) pickling line tandem cold mill (PLTCM) boilers rated at 74 MMBtu/hr (EU PLCTMBOILER1) and 71.64 MMBtu/hr (EU PLTCMBOILER2), respectively.

Each boiler will be equipped with a Low-NOx burner. While the Galv Line boilers will have separate exhaust stacks, the PLTCM boilers will share a common exhaust stack.

The total potential to emit for the proposed boilers will not exceed the Significant Emission Rates (SERs) for any of the PSD regulated pollutants and therefore this permit application is not subject to formal PSD review and associated modeling analysis. Although this permit application is a minor modification and is not subject to PSD review, this revised modeling analysis has been conducted as if it were PSD and has been reviewed consistent with the PSD modeling procedures. As part of the review process, a permit applicant performs the air quality impact analysis and submits a report and the results to the DAQ. The DAQ then reviews and replicates the modeling analysis to confirm the modeling inputs, procedures, and results. This memo contains a synopsis of the modeling analysis. For a complete technical description of the modeling analysis, please consult the complete administrative record for both the original PSD modeling analysis and the modeling analysis for this permit application that contains communications with the applicant, the protocol, modeling analysis reports, and electronic modeling files submitted by the applicant.

This report will focus on the changes that are the subject of this minor modification permit application. The rest of the equipment that was the subject of the original PSD permit application remains unchanged. The modeling analysis for this application includes all of the originally permitted PSD equipment and the equipment changes in this minor permit application.

This review is for the Class II area surrounding the proposed project site. Class I areas within 300 km of the project site are: Dolly Sods Wilderness (WV), Otter Creek Wilderness (WV), James River Face Wilderness (Virginia), and Shenandoah National Park (Virginia). The Federal Land Managers (FLMs) responsible for evaluating potential affects on Air Quality Related

Values (AQRVs) for federally protected Class I areas were consulted for the original PSD permitting action. Based on the emissions from the original PSD project and the distances to the Class I areas, the National Park Service and U.S. Forest Service have stated a Class I analysis for that project was not required. The emissions-to-distance ratios for this project, along with the added emissions from the four additional boilers, remain below the FLM action threshold. The potential emissions from the proposed boilers are in Table 1.

Table 1. Proposed Boilers Potential Emissions Summary (from permit application, July 2024)

	NO_X (tpy)	CO (tpy)	SO_2 (tpy)	VOC (tpy)	PM (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)	Lead (tpy)	Total HAPs (tpy)	CO_2e (tpy)
Total Boiler PTE	34.83	57.37	0.41	3.76	1.30	5.19	5.19	3.41E-04	1.29	81,570

Mason County, WV is in attainment or unclassifiable/attainment status for all criteria pollutants. The following pollutants were evaluated though dispersion modeling: NO_x, CO, SO_2, PM_{10}, $PM_{2.5}$ and lead. Also, Nucor addressed secondary formation of $PM_{2.5}$ as a result of NO_x and SO_2 emissions as well as formation of ozone from NO_x and VOC emissions.

Table 2 presents a summary of the air quality standards that were addressed for the Nucor Project. The pollutants, averaging times, increments, significant impact levels (SILs) and National Ambient Air Quality Standards (NAAQS) are listed. The NAAQS are incorporated by reference in WV Legislative Rule 45CSR8 and the PSD increments are found in 45CSR14. The SIL for 1-hour NO_2 and 1-hour SO_2 represents the values the Division of Air Quality has implemented as described in the memorandum included in attachment to the DAQ's original PSD modeling memorandum for Nucor.

Table 2. Ambient Air Quality Standards, SILs, and PSD Increments (µg/m3)

Pollutant	Averaging Period	SIL	Class II PSD Increment	NAAQS
Ozone	8-hr	1 ppb	-	70 ppb
CO	1-hour	2000	-	40,000
	8-hour	500	-	10,000
SO_2	1-hr	7.8	-	196
	3-hr	25	512	-
	24-hr	5	91	-

	Annual	1	20	-
NO_2	1-hour	7.5	-	188
	Annual	1	25	100
PM_{10}	24-hour	5	30	150
	Annual	1	17	-
$PM_{2.5}$	24-hour	1.2	9	35
	Annual	0.2	4	12

An air quality impact analysis, as a part of the PSD review process, is a two tiered process. First, a proposed facility is modeled by itself, on a pollutant-by-pollutant and averaging-time basis, to determine if ambient air concentrations estimated by the model exceed the significant impact level (SIL). If ambient impacts are below the SIL then the proposed source is deemed to not have a significant impact and no further modeling is required. If ambient impacts exceed the SIL, then the modeling analysis proceeds to the second tier of cumulative modeling. The cumulative modeling analysis consists of modeling the proposed facility with existing off-site sources and adding representative background concentrations and comparing the results to PSD increments (increment consuming and expanding sources only, no background concentration) and NAAQS. To receive a PSD permit, the proposed source must not cause or contribute to an exceedance of the NAAQS or PSD increments. In cases where the PSD increments or NAAQS are predicted to be exceeded in the cumulative analysis, the proposed source would not be considered to cause or contribute to the exceedance if the project-only impacts are less than the SIL, and the applicant may still receive a permit if all other requirements are met.

On January 22, 2013, the U.S. Court of Appeals for the District of Columbia Circuit vacated two provisions in EPA's PSD regulations containing SILs for $PM_{2.5}$. The court granted the EPA's request to remand and vacate the SIL provisions in Sections 51.166(k)(2) and 52.21(k)(2) of the regulations so that EPA could address corrections. EPA's position remains that the court decision does not preclude the use of SILs for $PM_{2.5}$ but special care should be taken in applying the SILs for $PM_{2.5}$. This special care involves ensuring that the difference between the NAAQS and the representative measured background concentration is greater than the SIL. If this difference is greater than the SIL, then it is appropriate to use the SIL as a screening tool to inform the decision as to whether to require a cumulative air quality impact analysis. As shown in Table 3, for both the 24-hr and annual averaging time for $PM_{2.5}$, this difference is greater than the SIL and it is appropriate to use the SIL as a screening tool.

Table 3. NAAQS, Monitor Design Values, and Significant Impact Levels

Pollutant	Avg. Period	NAAQS ($\mu g/m^3$)	SIL ($\mu g/m^3$)	Background ($\mu g/m^3$)	NAAQS - Background difference ($\mu g/m^3$)	Greater than SIL?
$PM_{2.5}$	24-hr	35	1.2	16.20	18.8	Yes
$PM_{2.5}$	Annual	12	0.2	6.13	5.87	Yes

Modeling Basis

The modeling system used conforms to 40 CFR 51 Appendix W, applicable guidance, the approved protocol, and is summarized below:

- Nucor used the regulatory AERMOD modeling system (v23132).
- AERMET (v23132) was used to develop five years' (2018-2022) worth of surface data from the Huntington Tri-State Airport (KHTS, WBAN #3860) and five years' worth of upper air data from the Pittsburgh International Airport (KPIT, WBAN# 94823).
- The building downwash inputs were determined using BPIP-PRIME (v04274).
- AERMAP (v18081) was used to develop and process an appropriate nested receptor grid.
- Nucor developed an appropriate regional source inventory for use in the cumulative modeling analysis.
- The background monitoring data used in this cumulative modeling analysis is the is shown in Table 4.

Table 4. Background Monitor Design Values (from revised modeling report, October 2024)

Pollutant	Averaging Period	Monitor	Background Concentration ($\mu g/m^3$)
SO_2	1-Hour	Lakin DRR (54-053-0001)	96.85
NO_2	1-Hour	Ashland (21-019-0017)	Varies
	Annual	Ashland (21-019-0017)	11.01
$PM_{2.5}$	24-Hour	Athens (39-009-0003)	16.20
	Annual	Athens (39-009-0003)	6.13
PM_{10}	24-Hour	Ironton (39-087-0012)	35.33
Lead	Rolling 3-Month Avg.	Conservative modeling in lieu of background concentration	
Ozone	8-Hour	Huntington (54-011-0007)	62 ppb

Ozone Analysis and Secondary Formation of $PM_{2.5}$

As part of the prior PSD review, Nucor conducted an analysis of impacts of the project on the secondary formation of $PM_{2.5}$ and ozone. Nucor addressed secondary formation of $PM_{2.5}$ as a result of NO_x and SO_2 emissions as well as formation of ozone from NO_x and VOC emissions. Nucor updated the ozone and secondary formation of $PM_{2.5}$ analyses based on the emissions from the originally permitted PSD equipment with the new boilers from this minor permit application added. Table 5 shows the ozone SIL analysis (which identifies the project impacts) based on EPA's Modeled Emission Rates for Precursors (MERPs). Table 6 shows the ozone NAAQS analysis, which adds the Nucor Project's ozone impact to an appropriate background concentration, demonstrating compliance with the 8-hr ozone NAAQS.

Table 5. Ozone SIL Analysis/Project Impacts (from revised modeling report, October 2024)

Averaging Period	Precursor	Critical Air Quality Threshold (ppb)	Modeled Hypo. Source (tpy)	Modeled Impact from Hypo. Source (ppb)	Ozone MERP (tpy)	Facility Emissions (tpy)	% of Critical Air Quality Threshold	Secondary Impact (ppb)
8-Hr	NOx	1.00	1,000	3.313	302	736.42	243.98%	2.440
8-Hr	VOC	1.00	500	0.097	5,170	182.12	3.52%	0.035
							Total:	**2.475**

Table 6. Ozone NAAQS Analysis (from revised modeling report, October 2024)

Averaging Period	Pollutant	Ozone Project Impact (ppb)	Ozone Background Conc.[a] (ppb)	Cumulative Ozone Impact (ppb)	NAAQS (ppb)
8-hour	Ozone	2.48	62	**64.5**	**70**

[a] Three-year average for 2021-2023 of the annual 4th highest daily maximum 8-hour concentrations measured at the Huntington, KY monitor (54-011-0007).

Table 7 shows the results of the Class II Area secondary formation of $PM_{2.5}$ analysis from the Nucor Project emissions of NO_X and SO_2. This analysis is based on EPA's Modeled Emission Rates for Precursors (MERPs) guidance. These values are added to the AERMOD-modeled direct impact of 24-hr $PM_{2.5}$ and Annual $PM_{2.5}$, respectively, in the SIL, NAAQS, and increment analyses.

Table 7. Class II Area Secondary Formation of $PM_{2.5}$ from Nucor Project

Averaging Period	Precursor	Critical Air Quality Threshold ($\mu g/m^3$)	Modeled Hypo. Source (tpy)	Modeled Impact from Hypo. Source ($\mu g/m^3$)	PM2.5 MERP (tpy)	Facility Emissions (tpy)	% of Critical Air Quality Threshold	Secondary Impact ($\mu g/m^3$)
24-Hr	NOx	1.2	1,000	0.037	32,257	736.42	2.28%	0.027
24-Hr	SO2	1.2	500	0.056	10,802	361.89	3.35%	0.040
							24-HR Total Secondary PM2.5:	**0.068**
Annual	NOx	0.2	1,000	0.001	150,868	736.42	0.49%	0.0010
Annual	SO2	0.2	500	0.002	45,351	361.89	0.80%	0.0016
							Annual Total Secondary PM2.5:	**0.0026**

Class II SIL Analysis Results (Tier I)

The results of the Significant Impact Analysis for the Nucor Project sources (original PSD permitted equipment plus proposed boilers) are included in Table 8 (from Page 6-1 of revised modeling report, October 2024). Secondary impacts of $PM_{2.5}$ are added to the direct impacts of $PM_{2.5}$ to compare to the $PM_{2.5}$ SILs. Any pollutant/averaging time result exceeding the Significant Impact Level (SIL) must be addressed in a cumulative analysis. A pollutant/averaging time with a result below the SIL is considered insignificant and no further modeling analysis is required. A cumulative modeling analysis is required for the following pollutant(s)/averaging time(s): 1-hr and annual NO_2, 24-hr and annual PM_{10}, 24-hr and annual $PM_{2.5}$, and 1-hr and 24-hr SO_2. No further modeling is required for the pollutants below the respective SILs.

Table 8. Class II SIL Analysis (from revised modeling report, October 2024)

Pollutant	Averaging Period	SIL ($\mu g/m^3$)	Modeled Concentration ($\mu g/m^3$)	Secondary Impact [a] ($\mu g/m^3$)	Total Concentration ($\mu g/m^3$)	Exceed SIL?	SIA (km)
PM_{10}	24-hr	5	22.20	--	**22.20**	**Yes**	2.90
	Annual	1	6.31	--	**6.31**	**Yes**	2.69
$PM_{2.5}$	24-hr	1.2	8.81	0.068	**8.88**	**Yes**	8.86
	Annual	0.2	3.01	0.003	**3.01**	**Yes**	8.86
CO	1-hr	2,000	552.12	--	552.12	No	--
	8-hr	500	119.07	--	119.07	No	--
NO_2	1-hr	7.5	98.29	--	**98.29**	**Yes**	32.50
	Annual	1	6.44	--	**6.44**	**Yes**	3.64
SO_2	1-hr	7.8	25.94	--	**25.94**	**Yes**	2.97
	3-hr	25	17.55	--	17.55	No	--
	24-hr	5	5.49	--	**5.49**	**Yes**	0.72
	Annual	1	0.91	--	0.91	No	--

a. Secondary impact based on MERP analysis.

Cumulative Analysis Results (Tier II)

The cumulative analysis consists of both the NAAQS analysis and PSD increment analysis. The cumulative analysis for demonstrating compliance with the applicable NAAQS includes the modeled impacts from the Nucor Project sources, off-site existing sources, and representative monitored background concentrations. For off-site existing sources, the modeled emission rates represent the two-year average actual emissions. Nucor proposed and followed a procedure to identify the appropriate off-site sources to include in the NAAQS modeling source inventory. The background concentration data is summarized above with detailed information in the applicant's modeling report. Secondary impacts of $PM_{2.5}$ are added to the direct impacts of $PM_{2.5}$ to compare to the $PM_{2.5}$ NAAQS.

The SIL analysis is based on the highest-first-high modeled concentration. The cumulative analysis is based on the modeled concentration in the form of the standard for each pollutant and averaging time and varies for NAAQS and PSD increments. The results of the NAAQS analysis are included in Table 9 (From Page 6-2 of the Nucor revised modeling report, October 2024). No modeled violations of the NAAQS are predicted.

Table 9. Class II NAAQS Analysis Results (from revised modeling report, October 2024)

Pollutant	Averaging Period	Modeled Concentration (µg/m³)	Background Concentration (µg/m³)	Secondary Impact (µg/m³)	Total Concentration (µg/m³)	NAAQS (µg/m³)	Exceeds NAAQS?
PM_{10}	24-hr	46.85	35.33	--	82.18	150	No
$PM_{2.5}$	24-hr	14.51	16.20	0.068	30.78	35	No
	Annual	3.33	6.13	0.003	9.46	12	No
NO_2	1-hr	160.48	Incl. in Model	--	160.48	188	No
	Annual	21.48	11.01	--	32.48	100	No
SO_2	1-hr	14.00	96.85	--	110.85	196	No
Lead	Rolling 3-Month Avg.	2.37E-03	--	--	2.37E-03	0.15	No

Table 10 shows the results of the Class II PSD Increment Analysis (From Page 6-2 of the Nucor revised modeling report, October 2024). Pursuant to 45CSR14, actual emissions from any major stationary source on which construction commenced after the major source baseline date and actual emissions increases at any stationary source occurring after the minor source baseline date affect the baseline concentration by consuming increment. Nucor is the first major PSD source in the region and Nucor will set the minor source baseline date. Accordingly, Nucor is the only increment consuming source of emissions to be evaluated in the increment analysis. No increment standards have been proposed for 1-hr NO_2 and 1-hr SO_2. No modeled exceedances of applicable increment standards are predicted.

Table 10. PSD Class II Increment Analysis Results (from revised modeling report, October 2024)

Pollutant	Averaging Period	Cumulative Model Impact ($\mu g/m^3$)	Secondary Impact ($\mu g/m^3$)	Total Concentration ($\mu g/m^3$)	Class II PSD Increment ($\mu g/m^3$)	Exceeds PSD Increment?
PM_{10}	24-hr	21.38	--	21.38	30	No
	Annual	6.31	--	6.31	17	No
$PM_{2.5}$	24-hr	8.92	0.068	8.98	9	No
	Annual	3.20	0.003	3.20	4	No
NO_2	Annual	6.44	--	6.44	25	No
SO_2	24-hr	4.33	--	4.33	91	No

Summary

The air quality impact analysis prepared and submitted by Nucor to the DAQ has been reviewed and replicated and conforms to 40 CFR 51 Appendix W, applicable guidance, and the modeling protocol. No modeled violations are predicted for the applicable NAAQS and PSD increment standards, and, accordingly, Nucor does not cause or contribute to any violations of the applicable NAAQS or PSD increments. No further modeling is required by Nucor.