# TECHNICAL SUPPORT DOCUMENT
# FOR THE PREVENTION OF SIGNIFICANT DETERIORATION PERMIT
# PSD-07-02
# NUCOR STEEL, SEATTLE, INC.
# KING COUNTY, WASHINGTON
# OCTOBER 12, 2007

## 1. EXECUTIVE SUMMARY

The Washington State Department of Ecology (Ecology) has determined the applicant, Nucor Steel, Seattle, Inc. (Nucor), has satisfied all of the requirements of Prevention of Significant Deterioration (PSD). An air quality analysis was performed to demonstrate the construction and operation of the scrapyard crane project would not cause or contribute to significant deterioration in any Class I Area. Ecology now finds the project will have no significant adverse impact on air quality. Below is the technical analysis performed by Ecology.

## 2. INTRODUCTION

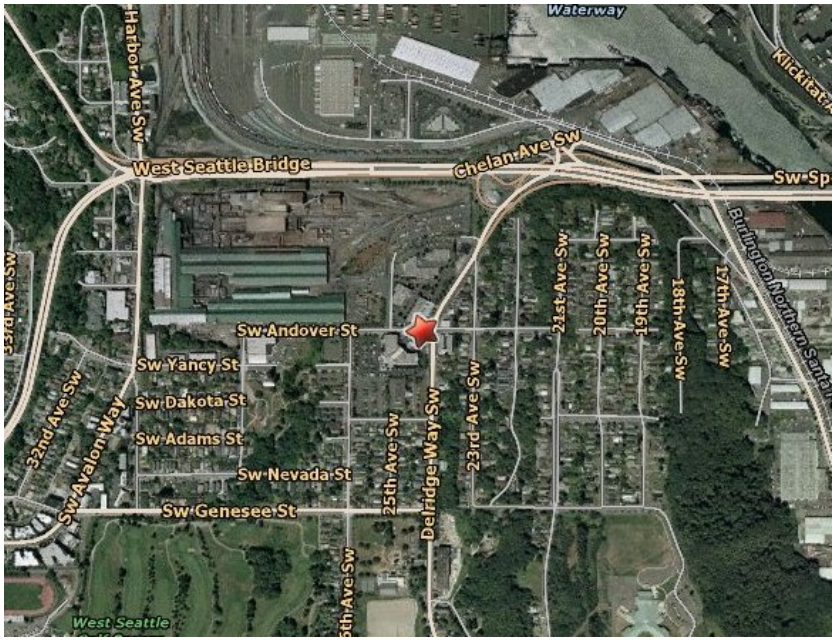
### 2.1 The Permitting Process

The PSD requirements are established in Title 40, Code of Federal Regulations (CFR), Part 52.21. Federal rules require PSD review of all new or modified stationary sources that meet certain overall size, and pollution rate criteria. The objective of the PSD program is to prevent serious adverse environmental impact from emissions into the atmosphere by a new or modified stationary source. The program limits degradation of air quality to that which is not considered "significant" as defined by the federal regulations listed above. To meet the goal of limiting degradation of air quality, the PSD rules require that an applicant utilize the most effective air pollution control equipment and procedures after considering environmental, economic, and energy factors. The program sets up a mechanism for evaluating and controlling air emissions from a proposed source to minimize the impacts on air quality, visibility, soils, and vegetation.

### 2.2 The Project

#### 2.2.1 The Site

Nucor operates a steel mini-mill in Seattle, Washington. Nucor acquired the facility from Birmingham Steel in 2002. The facility's Universal Transverse Mercator (UTM) coordinates are 547658E, 526847N NAD 27. The mill was originally constructed in 1904. They accept scrap steel and melt it in an electric arc furnace. The molten steel is cast into steel billets and then rolled in to a finished product, such as rebar.




### 2.2.2 The Proposed Project

Nucor currently operates its Electric Arc Furnace (EAF) on average five days a week. In order to keep it running the two dual hoist cranes are devoted to loading scrap into the charge buckets. When the EAF is not in operation the cranes are used to unload scrap from trucks and rail cars into storage.

Nucor proposes to upgrade one of the older single hoist cranes and reconfigure the rail spurs in the scrapyard (scrapyard crane project). With an upgraded crane, the facility will be able to increase the annual steel production rate by increasing the number of hours the EAF operates.

## 2.3 New Source Performance Standards and National Emission Standards for Hazardous Air Pollutants

New Source Performance Standards (NSPS) apply to certain types of equipment that are newly constructed, modified, or reconstructed after a given applicability date. The National Emission Standards for Hazardous Air Pollutants (NESHAP) apply to categories of equipment with hazardous air pollutant emissions. The applicability of the following NSPS and NESHAPs are presented below:

- New Source Performance Standard 40 CFR 60, Subpart AAa

### 2.3.1 New Source Performance Standards

NSPS Subpart AAa, (Standards of Performance for Steel Plants: Electric Arc furnaces and Argon-Oxygen Decarburization Vessels Constructed After August 7, 1983)

40 CFR 60.270a through 60.276a, otherwise known as Subpart AAa sets forth provisions for plants that produce carbon alloy, or specialty steels. The facility is currently subject to this Subpart and no new requirements will be triggered by this modification.

#### 2.3.2 National Emission Standards for Hazardous Air Pollutants

There are no applicable NESHAP's for this modification.

### 2.4 The PSD Application

The PSD application was received on July 2, 2007. Additional information was received on July 18, 2007. The application was found to be complete on July 31, 2007.

### 2.5 PSD Applicability

This stationary source will be subject to PSD review for emissions of carbon monoxide (CO) because:

- Nucor is one of the 28 listed industries that becomes a "major stationary source" when the potential to emit exceeds100 tons per year of any regulated PSD pollutant.
- Existing emissions of nitrogen oxides ($NO_X$) and carbon monoxide (CO) from the stationary source are each greater than 100 tons per year.
- Proposed increases in emissions of CO are above the PSD significance rate of 100 tons per year.
- The site of the proposed project is in an area that has been designated as in attainment or unclassifiable with national and state ambient air quality standards.

### 2.6 Emissions and Emissions Control

All emissions increases above the emission rates that the PSD program refers to as "significant" must undergo PSD review. When evaluating emissions against the PSD significance levels, a new source's potential or allowable emissions are used. Potential emissions, or a source's Potential to Emit (PTE), are based on the theoretical operation 24 hours a day, 365 days per year (8,760 hours) or some other physical limitation of the equipment.

When evaluating a modification at an existing emission unit, a baseline actual to projected actual applicability test is performed. Baseline actual emissions mean the average rate, in tons per year, at which the emission unit actually emitted the pollutant during any 24-month period within the last 10 years. Projected actual emissions means the maximum annual rate in tons per year at which an existing emissions unit is projected to emit a regulated pollutant in any one of the five

years following the date the unit resumes regular operation after the project. If the unit's design capacity is increased, then the maximum annual rate in any 10-year period is used.

Sometimes a source may elect to utilize the potential minus actual calculation. If they do, it is not necessary to monitor and report as stringently as would be required under the baseline actual to projected actual test. These calculations are performed separately for each regulated pollutant.

In addition to the significant emission increase described above, a source must also have a significant net emissions increase in order to be subject to PSD review. In the significant net emission increase calculation, all creditable increases and decreases over a 5-year contemporaneous period are added and subtracted to the project increase to determine if the resultant emissions increase is greater than the PSD SER.

### 2.7 All Pollutants Except CO

The only pollutant that exceeds the PSD Significant Emission Rate (SER) is CO. Table 1 compares the projected actual emissions to the baseline emissions and the SER's.

Table 1

| Pollutant | Projected Actual Emissions (tpy) | Baseline Emissions (tpy) | Net Emissions Increase (tpy) | PSD SER (tpy) | Exceeds Threshold |
|---|---|---|---|---|---|
| $PM_{10}$ | 42.6 | 32.6 | 10.1 | 15 | N |
| $SO_2$ | 55.3 | 39.6 | 15.7 | 40 | N |
| $NO_X$ | 210.4 | 171.4 | 38.9 | 40 | N |
| VOC | 33.8 | 24.7 | 9.1 | 40 | N |
| Lead | 0.15 | 0.11 | 0.04 | 0.6 | N |
| CO | 923.8 | 662.8 | 261.0 | 100 | Y |

The source of the projected actual CO emissions and baseline CO emissions are shown in Table 2 below:

Table 2

| Source | Baseline CO Emissions (tpy) | Projected Future Actual CO Emissions (tpy) |
|---|---|---|
| Baumco | 463.9 | 649.3 |
| Wheelabrator | 189.3 | 265.0 |
| Reheat furnace | 9.1 | 9.5 |
| Total | 662.4 | 923.8 |

The baseline period was March 2005 to February 2007. The CO emission factors (lb/ton) were based on the average of two stack tests (January 2006 and April 2007) conducted on the Baumco

(high temperature) baghouse and the Wheelabrator (low temperature) baghouse. The reheat furnace emission factor was based on the AP-42 factor for a reheat furnace with low NOx Burners (Section 12.5.1).

### 2.8 Netting Analysis

Nucor elected not to perform a netting analysis for this project. Since the project exceeded the SER for CO they submitted an application for PSD.

### 2.9 Operational Limitations

Nucor has elected to take a federally enforceable limit of 1.1 million tons of steel billets per year. This limit is an approximation of the production capacity of the EAF, as opposed to a limit taken to avoid major stationary source requirements for pollutants other than CO.

## 3. DETERMINATION OF BEST AVAILABLE CONTROL TECHNOLOGY

### 3.1 Definitions

Best Available Control Technology (BACT) is an emission limitation based on the most stringent level of emission control that is technically and economically feasible, and that has been applied at similar sources.

In a BACT analysis, the applicant must rank all control options from highest level of control to the lowest. If the applicant can show the highest level of control is technically or economically infeasible for the proposed source, then the next most stringent level of control is evaluated. Ultimately, the burden is on the applicant to prove why the most stringent level of control should not be used.

BACT is only applied to emission units that have an increase in emissions and that undergo a physical modification.

### 3.2 Regulatory Requirements

Federal and state laws require an applicant to use BACT for any pollutant that will have an emission increase due to the installation of a new source or a modification to an existing stationary source. An applicant is required by Washington State regulations to use BACT for any pollutant that will have increased emissions, if the emission unit was physically modified.

### 3.3 Best Available Control Technology

No emission units emitting CO are being physically modified; therefore, BACT is not required for this project. All of the CO emissions increases result from debottlenecking the EAF as a result of upgrading the equipment that delivers scrap to the EAF.

# 4. AMBIENT AIR QUALITY ANALYSIS

The PSD permitting program requires an ambient Air Quality Impacts Analysis (AQIA) be performed for pollutants (PM, $PM_{10}$, $NO_X$, CO, and lead) with significant net emissions increases.

An air quality analysis can include up to three parts: Significant Impact analysis, National Ambient Air Quality Standards (NAAQS) analysis, and PSD Increment analysis. The first step in the air quality analysis is to determine if emissions from the proposed project result in impacts greater than the Modeling Significant Impact Level (MSL). Then, for those pollutants that have impacts greater than the MSL, a NAAQS analysis is used to determine if the proposed project will cause or contribute to an exceedance of a NAAQS. The PSD Increment analysis is used to determine if the change in the air quality since the applicable baseline dates is greater than the Class I and Class II PSD increment levels.

This section will discuss the Air Quality Impacts Assessment (AQIA) of the nearby Class II Area. The AQIA for the Class I areas will be discussed along with the Air Quality Related Values (AQRVs) in Chapter 5.

## 4.1 Modeling Methodology

The air dispersion model used to conduct the attainment air quality impact evaluation is Version 07026 of the American Meteorological Society/Environmental Protection Agency Regulatory Model (AERMOD). AERMOD is the preferred model according to *USEPA's Guidelines on Air Quality Models*.

Terrain evaluations were incorporated into the modeling based on local land use and land characteristics data, using version 06341 of AERMAP, AERMOD's terrain preprocessor. Terrain elevation data for the entire modeling domain were extracted from 7.5-minute DEM files with a 30-meter grid spacing produced by the United States Geological Survey.

Building downwash algorithms incorporated into AERMOD account for the plume dispersion effects of the aerodynamic wakes and eddies produced by buildings and structures. The Plume Rise Model enhancements (PRIME) model was used to determine the direction-specific building downwash parameters.

For air dispersion modeling purposes, EPA recommends using a minimum of one year of on-site meteorological data or five years of nearby meteorological data. Local meteorological data from 1983 to 2002 were evaluated and the most recent and complete set of eight years of data was used to provide a comprehensive representation of potential meteorological conditions, as approved by Ecology.

## 4.2 Impacts Assessment

Table 3 compares the projects maximum emissions to the monitoring de minimis levels and the modeling significant levels.

Table 3

| Pollutant | Averaging Period | Maximum Concentration | Monitoring de Minimis Level (µg/m$^3$) | Modeling Significant Impact Level (µg/m$^3$) |
|---|---|---|---|---|
| CO | 1-hour | 2,662 (µg/m$^3$) | --- | 2,000 |
| | 8-hour | 810 (µg/m$^3$) | 575 | 500 |

The 8-hour monitoring deminimus lever and the 1-hour and 8-hour modeling significant impact levels have been exceeded.

### 4.2.1 Monitoring Deminimus Exceedance

There are three Puget Sound Clean Air Agency (PSCAA) CO monitoring stations in the general vicinity of the Nucor plant. Beacon Hill Reservoir is approximately 4 km east of the facility. The monitor at 4$^{th}$ and Pike is about 5 km NNE of the facility and the University District monitor is approximately 10.5 km NNE of the facility. The maximum 1-hour CO and maximum 8-hour CO measured at any of these three monitors in the last three years were used to represent "background" conditions. The maximum values were added to the maximum-modeled concentrations resulting from the facility sources to find the maximum-modeled plus background concentrations for comparison to the NAAQS. The data collected at these monitors is QA'd by PSCAA and available to the public on the PSCAA website. The data collected at these three monitors meets the criteria for acceptable background monitoring. These three monitors adequately characterize the background conditions in the vicinity of the facility. Hence, additional pre-construction monitoring would not be required to characterize the air quality prior to implementing the proposed project.

### 4.2.2 Modeling Significant Impact Level Exceedance

Significance modeling was not conducted for this project since Ecology requested a full impact analysis.

## 4.3 NAAQS Analysis

An analysis of NAAQS compliance comprises modeling the maximum off-site concentration due to the facility's total emissions post-project and adding it to the maximum background concentration of CO. Dispersion modeling was performed using eight years of recent, local hourly meteorology, local terrain data and the USEPA model AERMOD to estimate the maximum off-site CO concentrations for the 1-hour and 8-hour averaging periods. The results of

this analysis are conservative for two reasons. First, the location of the maximum-modeled concentration and the location of the background monitor are not the same; hence, summing these two values for comparison to the applicable NAAQS is a conservative estimate of the maximum total ambient air quality post-project. Secondly, the background monitoring contains contribution from Nucor's existing carbon monoxide emissions. Hence, adding this background concentration to the maximum total facility concentration is partially double-counting Nucor's existing impact on local air quality.

The total facility future potential emissions were modeled. The maximum-modeled 1-hour CO concentration is 2,662 $\mu g/m^3$ or 2.1 ppm (1994). The maximum 1-hour background concentration of CO for the past three years (2004-2006) is 4.9 ppm (2004). The sum of the maximum-modeled concentration and the maximum background concentration is 7.0 ppm. The 1-hour NAAQS is 40,000 $\mu g/m^3$ or 35 ppm.

The maximum-modeled 8-hour CO concentration is 810 $\mu g/m^3$ or 0.6 ppm (1997). The maximum background concentration of CO for the past three years (2004-2006) is 3.8 ppm (2005). The sum of the maximum-modeled concentration and the maximum background concentration is 4.4 ppm. The 8-hour NAAQS is 10,000 $\mu g/m^3$ or 9 ppm. The total facility's projected future actual emissions of CO will not adversely impact the region's air quality.

Table 4

| Averaging Period | NAAQS (ppm) | Highest Modeled COImpacts (ppm) | Background CO (ppm) | Total CO Impacts (ppm) | UTM East (m) | UTM North (m) |
|---|---|---|---|---|---|---|
| 1-hour | 35 | 2.1 | 4.9 | 7.0 | 547 728.1 | 5 268 673 |
| 8-hour | 9 | 0.6 | 3.8 | 4.4 | 547 828.1 | 5 268 672 |

### 4.4 Increment Consumption

There are no PSD increments specified for CO, hence a PSD increment consumption analysis was not required.

### 4.5 Toxic Air Pollutants

This modification is not subject to any Maximum Achievable Control Technology or New Emission Standards for Hazardous Air Pollutants. Any increase in toxic air pollutants will be addressed by PSCAA.

## 5. AIR QUALITY RELATED VALUES

The PSD regulations require an evaluation of the effects of the anticipated emissions from the proposed source on visibility, soils, and vegetation in Class I areas. The distances to the Class I areas are shown in Table 5.

Table 5

| Class I Area | Distance in kilometers |
|---|---|
| Olympic National Park | 57 |
| Alpine Lakes Wilderness Area | 60 |
| Mount Rainer National Park | 70 |
| Glacier Peak Wilderness Area | 110 |

### 5.1 Impacts on Visibility

Carbon monoxide does not affect visibility; hence, a visibility impacts analysis was not required.

### 5.2 Other Air Quality Related Issues

CO does not have deposition effects at the predicted modeled concentrations, nor does it adversely affect vegetation or soils at the concentrations modeled at the maximum impact point immediately adjacent to the plant.

### 5.3 Construction and Growth Impacts

The facility is located within the Seattle metropolitan area. The facility's personnel reside and commute from within the metropolitan area. An additional 20 employees will be required as a result of the project; however, the additional employees will likely reside and commute from within the Seattle area as well. Therefore, there would not be any net growth in residential areas as a result of the proposed project. Emissions resulting from construction of the proposed project will be minimal since the main phase of the project is the installation of a new crane. Emissions resulting from construction would be temporary and fugitive in nature and addressed by PSCAA.

### 5.4 Impacts on Soils and Vegetation

Carbon monoxide does not adversely affect soils and vegetation at the modeled ambient air concentration levels resulting from the facility. The maximum-modeled concentrations are well below the applicable NAAQS.

## 6. CONCLUSION

The project will have no significant adverse impact on air quality. The Washington State Department of Ecology finds the applicant, Nucor Steel, Seattle, Inc., has satisfied all requirements for PSD.

For additional information, please contact:

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