OKLAHOMA DEPARTMENT OF ENVIRONMENTAL QUALITY
AIR QUALITY DIVISION

MEMORANDUM **August 8, 2017**

TO: Phillip Fielder, P.E., Permits and Engineering Group Manager

THROUGH: Phil Martin, P.E., Manager, Existing Source Permits Section

THROUGH: Peer Review

FROM: David Schutz, P.E., New Source Permit Section

SUBJECT: Evaluation of Permit Application No. **2003-106-C (M-2)(PSD)**
Mid American Steel & Wire LLC.
Steel Billet and Wire-making Operation
Sec. 35 – 5S – 5E
Madill, Marshall County, Oklahoma
1327 Smiley Road
Latitude: 34.07114°, Longitude -96.75085°

SECTION I. INTRODUCTION

Mid American Steel & Wire (Mid American) has submitted an application for a modified PSD construction permit for a major modification to their existing Madill wire plant (SIC 3312). The facility commenced construction under Permit No. 2003-106-C issued March 25, 2003. The facility initially operated only a single 74 MMBTUH gas-fired furnace for softening steel billets so that they can be drawn into wire. The facility was expanded to include operations for melting scrap steel for casting as steel billets under Permit No. 2003-106-C (M-1)(PSD). This permit addresses differences between permitted and actual construction and ratifies the BACT determination for the facility as it was built.

In the initial PSD construction permit in 2008, Mid American proposed to install two electric arc steel melting furnaces. The proposed furnaces were to be capable of producing a total of approximately 80 tons/hr (640,000 tons per year) of "billet" (bar-shaped ingots) steel. The steel may be used on-site in the existing wire production unit or sold to other mills. One electric arc furnace (EAF) has been installed with operations commencing January 9, 2011. The revised capacity of the facility is 70 TPH and 480,000 TPY steel. Emissions of all pollutants on a TPY basis decrease.

The following changes were shown between the initial PSD construction permit and the facility as was constructed:

- The facility was permitted for two Electric Arc Furnaces (EAFs) with a capacity of 80 TPH and 640,000 TPY steel. The facility will operate a single EAF with a short-term capacity of 70 TPH and an annual capacity of 480,000 TPY.

- The expected flow from the Ladle Metallurgy Furnace (LMF) baghouse was initially 27,176 DSCFM; it is being revised to 37,176 DSCFM. This will impact PM emission rates from the unit which are based on gr/DSCF.

- The expected flow from the Caster and Cut-off Torch baghouse was initially 33,000 DSCFM; it is being revised to 23,000 DSCFM. This will impact PM emission rates from the unit which are based on gr/DSCF. The discharge is from a common stack with the LMF, and the combined total discharge flow rate and allowable PM emission does not change.

- The emergency generator was originally permitted as a 1,200-HP diesel engine, but a 1,850-HP engine was installed.

- NESHAP Subpart CCCCCC (gasoline dispensing facilities, compliance date January 10, 2011) will be added for a gasoline fueling tank.

- Differences in capacities were made for several cooling towers.

  - The EAF/LMF cooling tower was initially stated at 20,000 GPM with 1,000 ppm TDS; it is being revised to 10,000 GPM.

  - The Caster Spray Water cooling tower was initially stated at 2,000 GPM with 1,000 ppm TDS; it is being revised to 1,700 GPM with 2,000 ppm total dissolved solids (TDS).

  - The Rod Mill Contact Water cooling tower was initially stated at 4,150 GPM with 1,500 ppm TDS; it is being revised to 4,150 GPM with 2,000 ppm total dissolved solids (TDS).

  - The Hydraulic Pump NC cooling tower was initially stated at 50 GPM with 12,000 ppm TDS; it is being revised to 50 GPM with 4,000 ppm total dissolved solids (TDS).

- The EAF dust silo, permitted for construction, will not be built.

- Road dust fugitive emissions are being updated.

- Slag processing was initially based on 250 TPH and 78,000 TPY; it is being revised to 100 TPH and 63,360 TPY

- And the gasoline tank has been replaced and three diesel fuel tanks have been installed for mobile equipment and the standby diesel generator.

The initial PSD permit authorized construction of melting and alloying furnaces, billet casting, various small gas-fired heater, storage silos, cooling towers, fugitive dust sources, and an emergency generator. EPA's policy for modified PSD construction permits is stated in a document, "PSD Permit Modifications: Policy Statement on Changes to a Source, a Permit Application, or an Issued Permit and on Extensions to Construction Schedules" dated 6/85. That guidance divides changes into "fundamental," "significant," "minor," and "administrative" changes. The change category is based on emissions changes for the facility rather than unit capacities and do not address any changes in modeling (those will be dealt with in the Ambient Impacts section). The BACT determinations for the initial PSD permit are unchanged although the emission rates (lb/hr and TPY) decrease. The proposed changes qualify as "minor" changes to the PSD construction permit.

SECTION II. PROCESS DESCRIPTIONS

(a) Existing Rod Mill Billet Reheat Furnace (EUG-10)

The facility receives steel "billets" (bar-shaped ingots) and heats the steel to 2,200°F so that it is soft enough to draw into smaller diameters into wire. The facility processes up to 65 TPH of steel in a natural gas fired furnace rated at 74 MMBTUH.

(b) Existing Rod Mill Cooling Towers (EUG-11)

The facility previously operated six cooling tower systems for the existing operations. All cooling towers utilize drift eliminators. The rolling mill contact cooling water system previously used four cells, each with a capacity of 800 GPM (3,200 GPM total). Deteriorated cells were replaced, resulting in operation of a one cell tower with a 1,150-GPM capacity and a second tower having two cells with 1,500 GPM capacities (4,150-GPM total).

(c) Fuel Storage Tanks (EUG-12)

Two fuel tanks were existing, one 2,000-gallon tank for diesel fuel and one 300-gallon tank for gasoline. The fuels are used for on-site equipment and vehicles. The 300-gallon gasoline tank was replaced with a 2,000-gallon capacity tank, and diesel tanks with nominal capacities of 900-gallons, 2,000 gallons and 6,000-gallons were installed.

(d) New Melt Shop (EUG-01)

The manufacturing process begins at the steel melt shop where scrap steel, carbon, and lime are charged into one electric arc furnace (EAF). The EAF has an individual production capacity of 70 tons per hour. The furnace is normally operated leaving a liquid steel " heal" (some molten steel) in the furnace to assist the melt down of the following charge.

Scrap steel is purchased from outside suppliers and transported to the facility by truck and rail. The scrap arrives pre-processed and suitable for immediate melting. (The scrap will be inspected for plastics, lead, and free organic materials.) Scrap, flux (mostly lime), and reducing agent (carbon) will be loaded using charge buckets which are moved by overhead crane to the EAF. The EAF is a refractory-lined water-cooled vessel with a retractable roof. Graphite electrodes are inserted through the roof, and an electric current is passed between the electrodes, creating the "arc" which creates the heat for melting. The furnace also includes oxy-fuel burners and injection ports for oxygen and carbon. The steel melts and a layer of slag floats to the surface. Carbon is lanced into the slag layer, causing a foam of slag with carbon monoxide. The slag is first poured off, then the molten steel is poured into a ladle for the next process step. The pouring of molten steel is referred to as "tapping." In the ladle, additional refining is conducted to produce the desired metallurgy and final properties.

Emissions from the EAF occurs during charging, melting, and tapping; most emissions are produced in the melting stage. The furnace has a direct-shell evacuation control (DEC) and canopy hood. The DEC exhausts the EAF through a "fourth hole" in the furnace roof to maintain a negative pressure on the furnace. Both the canopy and DEC are vented to baghouses, processing discharges from the furnace and other activities in the vicinity of the furnace.

(e) Melt Ladle Metallurgical Furnace Refining (EUG-02)

Final metallurgy adjustments are made in the ladle metallurgy furnace (LMF). Lime, synthetic slag, and alloying materials are added at this furnace. The melt is stirred by argon gases, while oxygen and hydrogen are removed. The correct temperature is achieved here for subsequent operations.

The LMF also utilizes electric heating. Electrodes penetrate a close-fitting roof into the molten steel. Discharges from the furnace proceed to the LMF baghouse at a rate of approximately 37,176 DSCFM (~46,217 ACFM). The LMF baghouse ID fan discharges to a common stack with the billet casting baghouse exhaust.

(f) Melt Shop Billet Casting (EUG-03)

When ladle furnace operations are complete, the ladle is moved by overhead crane to the continuous casting machine. The caster is capable of casting three strands simultaneously, but normal operations cast two strands. A bottom slide-gate in the ladle is opened to allow a controlled flow of steel into water-cooled molds. (A small amount of mineral or vegetable oil is used for mold lubrication.) The billet shape is normally a 6-inch square cross-section. Partially-hardened steel is formed into billets, then cooled by water sprays. The steel is still soft and straightened on a horizontal run. Natural gas torches are used to cut the billets to length, then the billets are allowed to cool.

Capture hoods are used at the caster and cutting torches to collect PM and gaseous emissions. The hoods vent to a baghouse at a rate of approximately 23,000 DCFM.

(g) Melt Shop Natural Gas Burners (EUG-04)

A total of eight gas-fired burners are used: five 5.0 MMBTUH, two 3.0 MMBTUH, and one 1.5 MMBTUH.

- Three burners pre-heat ladles so that they are hot when steel is received. Emissions from each heater discharge to atmosphere through a natural draft stack.
- Two natural gas fired burner stations for refractory repair drying and/or heating are permitted. The refractory lining requires ongoing repair, so one heater cures the refractory repairs and replacements. A second heater is to be installed at the EAF/ladle transfer car location. Emissions from these heaters are captured with the EAF canopy hood exhaust and discharge through the EAF baghouses.
- Two burners are Tundish (bucket) preheaters. Emissions are captured by the caster hood.
- One is a Tundish dryer. Emissions are captured with the EAF canopy hood exhaust.

(h) Melt Shop Storage Silos (EUG-05)

Two silos are installed for lime, and a third silo is planned for carbon. Each silo has a dust filter. The anticipated flow is 600 ACFM during filling, but continuous operation will be assumed for emissions calculations purposes.

(i) Melt Dust Handling (EUG-06)

PM captured in the two EAF baghouses is conveyed by screw conveyor to the dust trailer enclosure, where it is loaded directly into dry bulk tanker trailers.

(j) Melt Shop Cooling Towers (EUG-07)

The EAFs, LMF, and caster are water-cooled. In addition, the caster uses a water spray on the billets. Three cooling tower systems were constructed to supply cooling water to these operations: EAF/LMF Cooling Tower, Caster Cooling Tower, and Caster Spray Water Cooling Tower. Drift eliminators are used to reduce PM emissions.

A total capacity of 15,700 GPM was installed.

(k) Fugitive Dust Sources (EUG-08)

There are two primary fugitive dust sources: unpaved roads and slag processing. Roads are treated with water or chemicals to minimize dust due to vehicle traffic.

The slag is comprised mostly of lime, and phosphorus and sulfur compounds (impurities in steel). Slag processing takes EAF and LMF slag from pits under the furnaces and removes steel so that the slag may be used as an aggregate byproduct. After steel is removed, the residual solids are crushed, screened, and conveyed to storage prior to shipment. The slag processing operation is stated at 100 TPH up to 63,600 TPY.

(l) Melt Shop Emergency Generator (EUG-09)

Mid American has installed an emergency generator. The original permit called for a 1,200-hp unit, but an 1,850-hp unit was ultimately installed. The manufacture date was 2002, which pre-dates NSPS Subpart IIII.

SECTION III. EQUIPMENT

EUG 01 Melt Shop

EU ID#	Point ID#	EU Name/Model	Construction Date
MEAF-2	EAFBH1 EAFBH2	Electric Arc Furnace (EAF) No. 2	2008
MFUG	MFUG	Melt Shop Uncaptured EAF emissions	2008

EUG 02 LMF Refining

EU ID#	Point ID#	EU Name/Model	Construction Date
MLMF	LMFBH	Ladle Metallurgy Furnace	2008

EUG 03 Billet Casting

EU ID#	Point ID#	EU Name/Model	Construction Date
MCAS	CASBH	Continuous Caster & Cut-off Torch	2008

The LMF baghouse and Caster baghouse discharge to a common stack.

EUG 04 Melt Shop Gas Burners

EU ID#	Point ID#	EU Name/Model	Construction Date
MLHTR	LHTR	Ladle Preheaters (Three 5.0 MMBTUH gas-fired)	2008
MLDRY	EAFBH1/2	Ladle Dryers/Heaters (Two 5.0 MMBTUH gas-fired)	2008
MTHTR	CASBH (common stack with LMFBH)	Tundish Preheaters (Two 3.0 MMBTUH gas-fired)	2010
MTDRY	EAFBH1/2	Ladle Preheaters (One 1.5 MMBTUH gas-fired)	2010

Each ladle preheater (MLHTR) discharges through its own natural draft stack, ladle dryers/heaters (MLDRY) and tundish dryer (MTDRY) discharge through the EAF baghouses, and tundish preheaters (MTHTR) discharge through the caster baghouse.

EUG 05 Melt Shop Materials Storage

EU ID#	Point ID#	EU Name/Model	Construction Date
MLSILO	SILO1	Lime Silos (Two)	2011
MCSILO	SILO2	Carbon Silo	2017 (planned)

EUG 06 Melt Shop Dust Handling

EU ID#	Point ID#	EU Name/Model	Construction Date
MDH	DHB	EAF Dust Handling & Trailer Enclosure	2010

EUG 07 Melt Shop Cooling Towers

EU ID#	Point ID#	EU Name/Model	Construction Date
MNCT-1	MCT1	EAF/LMF Cooling Tower (10,000 gpm)	2008
MNCT-2	MCT2	Caster Cooling Tower (4,000 gpm)	2008
MCCT-3	MCT3	Caster Spray Water Cooling Tower (1,700 gpm)	2008

EUG 08 Melt Shop Fugitive Dust

EU ID#	Point ID#	EU Name/Model	Construction Date
MURD-A	--	Unpaved Roads, Scrap Trucks	2008
MURD-B	--	Unpaved Roads, Commodity and Billet Trucks	2008
MURD-C	--	Unpaved Roads, Slag Haulers	2008
SLAG	--	Slag Processing	2008

EUG 09 Melt Shop Emergency Generator

EU ID#	Point ID#	EU Name/Model	Construction Date
EG-1	EG-1	1,850-hp Emergency Generator (Detroit Diesel Model T1237K16)	2010

EUG 10 Rod Mill Billet Reheat Furnace

EU ID#	Point ID#	EU Name/Model	Construction Date
RBRF	BRF	Rod Mill Billet Reheat Furnace (74 MMBTUH)	2003

EUG 11 Rod Mill Cooling Towers

EU ID#	Point ID#	EU Name/Model	Construction Date
RCCT-1	RCT-1	Rolling Mill Contact Water Cooling Towers (4,150 gpm total)	2003/2011
RNCT-2	RCT-2	Stelmor Conveyor Noncontact Water Cooling Tower (1,600 gpm)	2003
RNCT-3	RCT-3	Billet Reheat Furnace Cooling Tower (800 gpm)	2003
RNCT-4	RCT-4	Chiller Cooling Tower (800 gpm)	2003
RNCT-5	RCT-5	#1 Hydraulic Pump Cooling Tower (50 gpm)	2003
RNCT-6	RCT-6	Compactor Cooling Tower (90 gpm)	2003

EUG 12 Fuel Storage Tanks

EU ID#	Point ID#	EU Name/Model	Construction Date
T01-D	T01-D	Diesel Fuel Tank, 2000-gallons	2003
T02-G	T02-G	Gasoline Fuel Tank, 2,000-gallons	2011
T03-D	T03-D	Diesel Fuel Tank, 900-gallons	2010
T04-D	T04-D	Diesel Fuel Tank, 6,000-gallons	2011
T05-D	T05-D	Diesel Fuel Tank, 2,000-gallons	2012

SECTION IV. EMISSIONS

Emissions from the new and existing equipment were calculated using the following factors:

EUG 01 Melt Shop

Emission Point	Operation	Pollutant	Emission Factors	Factor Reference
EAFBH-1 EAFBH-2	Electric Arc Furnace (70 TPH 476,966 DSCFM)	PM_{10} / $PM_{2.5}$	0.0018 gr/DSCF	BACT
		CO	3.0 lb/ton	Emissions data from other mills and BACT determinations
		NOx	0.3 lb/ton	
		SO_2	0.3 lb/ton	
		VOC	0.3 lb/ton	
		Pb	2% of PM	
	Uncaptured PM	PM_{10}	1.4 lb/ton (0.5% uncaptured,76% PM_{10})	AP-42 (10/86) Section 12.5
		Pb	2% of PM	

EUG 02 LMF Refining

Emission Point	Operation	Pollutant	Emission Factors	Factor Reference
LMFBH (common stack with CASBH)	Ladle Metallurgical Furnace (70 TPH, 37,176 DSCFM)	PM_{10} / $PM_{2.5}$	0.002 gr/DSCF	BACT
		CO	0.10 lb/ton	Emissions data from other mills and BACT determinations
		NOx	0.05 lb/ton	
		SO_2	0.05 lb/ton	
		VOC	0.035 lb/ton	
		Pb	0.5% of PM	

EUG 03 Billet Casting

Emission Point	Operation	Pollutant	Emission Factors	Factor Reference
CASBH (common stack with LMFBH)	Caster & Cut-off Baghouse, Cut-off Torch (70 TPH, 23,000 DSCFM, 1.5 MMBTUH)	PM_{10} / $PM_{2.5}$	0.002 gr/DSCF	PM_{10}: baghouse manufacturer; combustion from AP-42 (7/00), Section 1.4; VOC from lubricant usage from stack testing
		CO	0.084 lb/MMBTU	
		NOx	0.10 lb/MMBTU	
		SO_2	0.0006 lb/MMBTU	
		VOC	0.0055 lb/MMBTU 8.1% of lube usage	
		Pb	0.5% of PM	

EUG 04 Melt Shop Gas Burners

Emission Point	Operation	Pollutant	Emission Factors	Factor Reference
LHTR	Ladle Preheaters (3 Heaters, Each 5.0 MMBTUH)	PM_{10} / $PM_{2.5}$	0.0076 lb/MMBTU	AP-42 (7/00), Section 1.4
		CO	0.084 lb/MMBTU	
		NOx	0.10 lb/MMBTU	
		SO_2	0.0006 lb/MMBTU	
		VOC	0.0055 lb/MMBTU	
EAFBH-1 EAFBH-2	Ladle Dryers/Heaters (2 Heaters, Each 5.0 MMBTUH)	PM_{10} / $PM_{2.5}$	0.0076 lb/MMBTU	AP-42 (7/00), Section 1.4
		CO	0.084 lb/MMBTU	
		NOx	0.10 lb/MMBTU	
		SO_2	0.0006 lb/MMBTU	
		VOC	0.0055 lb/MMBTU	
CASBH (common stack with LMFBH)	Tundish Preheaters (2 Heaters, Each 3.0 MMBTUH)	PM_{10} / $PM_{2.5}$	0.0076 lb/MMBTU	AP-42 (7/00), Section 1.4
		CO	0.084 lb/MMBTU	
		NOx	0.10 lb/MMBTU	
		SO_2	0.0006 lb/MMBTU	
		VOC	0.0055 lb/MMBTU	
EAFBH-1 EAFBH-2	Tundish Dryer (1.5 MMBTUH)	PM_{10} / $PM_{2.5}$	0.0076 lb/MMBTU	AP-42 (7/00), Section 1.4
		CO	0.084 lb/MMBTU	
		NOx	0.10 lb/MMBTU	
		SO_2	0.0006 lb/MMBTU	
		VOC	0.0055 lb/MMBTU	

EUG 05 Melt Shop Materials Storage

Emission Point	Operation	Pollutant	Emission Factors	Factor Reference
SILO1	Lime Silos (600 SCFM)	PM_{10} / $PM_{2.5}$	0.005 gr/DSCF	Bin vent guarantee
SILO2	Carbon Silo (600 SCFM)	PM_{10} / $PM_{2.5}$	0.005 gr/DSCF	Bin vent guarantee

EUG 06 Melt Shop Dust Handling

Emission Point	Operation	Pollutant	Emission Factor	Factor Reference
DHB	EAF Dust Handling & Trailer Enclosure	PM_{10} / $PM_{2.5}$	0.04 gr/DSCF	Performance estimate

EUG 07 Melt Shop Cooling Towers

Emission Point	Operation	Pollutant	Emission Factors	Factor Reference
MCT1	EAF/LMF Cooling Tower (10,000 gpm)	PM_{10} / $PM_{2.5}$	0.005% drift, 1,000 ppm TDS	Drift eliminator performance
MCT2	Caster Cooling Tower (4,000 gpm)	PM_{10} / $PM_{2.5}$	0.005% drift, 1,000 ppm TDS	Drift eliminator performance
MCT3	Caster Spray Water Cooling Tower (1,700 gpm)	PM_{10} / $PM_{2.5}$	0.005% drift, 2,000 ppm TDS	Drift eliminator performance

Note: some of the water is re-used, resulting in higher TDS concentrations for some operations.

EUG 08 Melt Shop Fugitive Dust

Emission Point	Operation	Pollutant	Emission Factors	Factor Reference
Unpaved Roads	Scrap Trucks (135 trips per day, 0.52 mile/trip)	PM_{10} / $PM_{2.5}$	0.21 lb/mile / 0.021 lb/mile	AP-42 (11/06), Section 13.2.2
	Commodity & Billet Trucks (155 trips per day, 0.37 mile/trip)	PM_{10} / $PM_{2.5}$	0.15 lb/mile / 0.015 lb/mile	
	Slag Haulers (46 trips per day, 0.22 mile/trip)	PM_{10} / $PM_{2.5}$	0.23 lb/mile / 0.023 lb/mile	
Slag Processing	100 TPH, 63,600 tons per year	PM_{10} / $PM_{2.5}$	0.0021 lb/ton / 0.0012 lb/ton	AP-42 (1/95), Section 11.19.2

EUG 09 Melt Shop Emergency Generator

Emission Point	Operation	Pollutant	Emission Factors	Factor Reference
EG-1	1,850-hp Diesel Engine (500 hours per year)	PM_{10} / $PM_{2.5}$	0.0007 lb/hp-hr	AP-42 (190/96), Section 3.4
		CO	0.0055 lb/ hp-hr	
		NOx	0.013 lb/ hp-hr	
		SO_2 *	0.00809 lb/ hp-hr*%S	
		VOC	0.00064 lb/ hp-hr	

* based on 15 ppm sulfur in fuel.

EUG 10 Rod Mill Billet Reheat Furnace

Emission Point	Operation	Pollutant	Emission Factors	Factor Reference
BRF	Reheat Furnace (74 MMBTUH)	PM_{10} / $PM_{2.5}$	0.0076 lb/MMBTU	AP-42 (7/00), Section 1.4 for all but NOx; NOx from Subch. 33 limit
		CO	0.084 lb/MMBTU	
		NOx	0.20 lb/MMBTU	
		SO_2	0.0006 lb/MMBTU	
		VOC	0.0055 lb/MMBTU	

EUG 11 Rod Mill Cooling Towers

Emission Point	Operation	Pollutant	Emission Factors	Factor Reference
RCT1	Rolling Mill Contact Water Cooling Tower (4,150 gpm)	PM_{10} / $PM_{2.5}$	0.005% drift, 2,000 ppm TDS	Drift eliminator performance
RCT2	Stelmor Conveyor Noncontact Water Cooling Tower (1,600 gpm)	PM_{10} / $PM_{2.5}$	0.005% drift, 1,000 ppm TDS	Drift eliminator performance
RCT3	Billet Reheat Furnace Cooling Tower (800 gpm)	PM_{10} / $PM_{2.5}$	0.005% drift, 1,000 ppm TDS	Drift eliminator performance
RCT4	Chiller Cooling Tower (800 gpm)	PM_{10} / $PM_{2.5}$	0.005% drift, 1,000 ppm TDS	Drift eliminator performance
RCT5	#1 Hydraulic Pump Cooling Tower (50 gpm)	PM_{10} / $PM_{2.5}$	0.005% drift, 4,000 ppm TDS	Drift eliminator performance
RCT6	Compactor Cooling Tower (90 gpm)	PM_{10} / $PM_{2.5}$	0.005% drift, 1,000 ppm TDS	Drift eliminator performance

EUG 12 Fuel Storage Tanks

Emission Point	Operation	Pollutant	Emission Factors	Factor Reference
T01-D	Diesel Fuel Tank, 2,000-gallons	VOC	TANKS4.0	TANKS4.0
T02-G	Gasoline Fuel Tank, 2,000-gallons	VOC	TANKS4.0	TANKS4.0
T03-D	Diesel Fuel Tank, 900-gallons	VOC	TANKS4.0	TANKS4.0
T04-D	Diesel Fuel Tank, 6,000-gallons	VOC	TANKS4.0	TANKS4.0
T05-D	Diesel Fuel Tank, 2,000-gallons	VOC	TANKS4.0	TANKS4.0

SUMMARY OF CRITERIA EMISSIONS

Emission Unit	PM_{10} / $PM_{2.5}$		SO_2		NOx		VOC		CO	
	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY
EAF No. 2	7.36	32.23	21.00	72.00	21.00	72.00	21.00	72.00	210.00	720.00
Uncaptured Meltshop PM	0.37	1.28	--	--	--	--	--	--	--	--
Ladle Metallurgical Furnace & Caster & Cut-off Torch	1.03	4.52	3.50	12.00	3.65	12.64	3.88	13.30	7.12	24.54
Ladle Preheaters	0.11	0.49	0.01	0.04	1.47	6.44	0.08	0.35	1.24	5.41
Ladle Dryer/Heater (to EAFBH)*	0.08	0.33	0.01	0.03	0.98	4.29	0.05	0.24	0.82	3.61
Tundish Preheaters (to CASBH)*	0.04	0.20	0.01	0.03	0.59	2.58	0.03	0.14	0.49	2.16
Tundish Dryer (to EAFBH)*	0.01	0.05	0.01	0.01	0.15	0.64	0.01	0.04	0.12	0.54
Lime Silo	0.03	0.11	--	--	--	--	--	--	--	--
Carbon Silo	0.03	0.11	--	--	--	--	--	--	--	--
EAF Dust Handling & Trailer Enclosure	0.01	0.01	--	--	--	--	--	--	--	--
EAF Cooling Tower	0.22	0.93	--	--	--	--	--	--	--	--
Caster Cooling Tower	0.09	0.37	--	--	--	--	--	--	--	--
Caster Spray Cooling Tower	0.06	0.24	--	--	--	--	--	--	--	--
MS Unpaved Roads	1.02	3.56	--	--	--	--	--	--	--	--
Slag Processing	0.19	0.07	--	--	--	--	--	--	--	--
Emergency Generator	1.30	0.32	0.02	0.01	24.05	6.01	1.19	0.3	10.18	2.54
Billet Reheat Furnace	0.55	2.42	0.04	0.19	16.06	64.82	0.4	1.75	6.09	26.69
Rolling Mill Cooling Tower	0.21	0.92	--	--	--	--	--	--	--	--
Stelmor Conveyor Cooling Tower	0.04	0.18	--	--	--	--	--	--	--	--

SUMMARY OF CRITERIA EMISSIONS

Emission Unit	PM_{10} / $PM_{2.5}$		SO_2		NOx		VOC		CO	
	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY
Billet Reheat Furnace Cooling Tower	0.02	0.09	--	--	--	--	--	--	--	--
Chiller Cooling Tower	0.02	0.09	--	--	--	--	--	--	--	--
Hydraulic Pump Cooling Tower	0.01	0.02	--	--	--	--	--	--	--	--
Compactor Cooling Tower	0.01	0.01	--	--	--	--	--	--	--	--
Fuel Storage	--	--	--	--	--	--	--	0.25	--	--
TOTALS*	**12.68**	**47.97**	**24.60**	**84.31**	**67.95**	**169.42**	**26.64**	**88.37**	**236.06**	**785.5**
Previous Totals	**12.29**	**48.61**	**28.56**	**112.37**	**61.68**	**189.5**	**31.78**	**124.35**	**262.38**	**1027.7**
NET CHANGES	**0.39**	**-0.64**	**-3.96**	**-28.06**	**6.27**	**-20.08**	**-5.14**	**-35.98**	**-26.32**	**-242.2**

* The heater PM emissions directed to baghouses are not additive to the baghouse PM rates, which are based on outlet grain loading performance. Heater gaseous pollutants are additive to the baghouse prime emission units.

Hazardous Air Pollutants

Since steel is cast into billets without sand molds, HAP emissions are minimal. Assuming a worst-case of 2% HAP in metal processed, 2% of the 37 TPY PM emissions from the metal furnaces would be HAP, or 0.7 TPY. This is less than the major source threshold of 10 TPY of any one HAP.

Total VOC emissions from the emergency generator are 0.30 TPY, which also is less than the major source threshold for formaldehyde of 10 TPY.

Greenhouse Gas Emissions

Greenhouse gas (GHG) emissions were calculated using the factors of 40 CFR Part 98, Subpart C for stationary fuel combustion and Subpart Q for iron and steel production. Potential emissions are 93,374 TPY CO_2e.

SECTION V. INSIGNIFICANT ACTIVITIES

Insignificant activities are listed in OAC 252:100-8, Appendix I. Insignificant activities identified and justified in the application are listed below.

- * Stationary reciprocating engines burning natural gas, gasoline, aircraft fuels, or diesel fuel which are either used exclusively for emergency power generation or for peaking power service not exceeding 500 hours/year. The facility includes a diesel-engine powered emergency generator rated at 1,850-hp. However, since this unit is subject to BACT and NESHAP Subpart ZZZZ, it will not be among the "insignificant activities."

- Space heaters, boilers, process heaters and emergency flares less than or equal to 5 MMBTU/hr heat input (commercial natural gas). The facility includes numerous gas-fired heaters which are smaller than 5 MMBTUH. However, since these units are subject to BACT, they will not be among the "insignificant activities."

- * Emissions from fuel storage/dispensing equipment operated solely for facility owned vehicles if fuel throughput is not more than 2,175 gallons/day, averaged over a 30-day period. The plant has equipment for dispensing gasoline and diesel. The facility operates diesel and gasoline storage tanks used to fuel plant vehicles/equipment. However, since NESHAP Subpart CCCCCC now affects the gasoline tank, it ceased to be an "insignificant activity."

- * Storage tanks with less than or equal to 10,000 gallons capacity that store volatile organic liquids with a true vapor pressure less than or equal to 1.0 psia at maximum storage temperature. The facility includes three small diesel storage tanks.

- Bulk gasoline or other fuel distribution with a daily average throughput less than 2,175 gallons per day, including dispensing, averaged over a 30-day period. This item re-states the gasoline and diesel fueling operation for company vehicles.

- * Emissions from storage tanks constructed with a capacity less than 39,894 gallons which store VOC with a vapor pressure less than 1.5 psia at maximum storage temperature . This category repeats the diesel storage tank.

- Cold degreasing operations utilizing solvents that are denser than air. However, degreasing is conducted as a part of routine maintenance and is considered a trivial activity and recordkeeping will not be required in the Specific Conditions.

- Welding and soldering operations utilizing less than 100 pounds of solder and 53 tons per year of electrodes. However, welding is conducted as a part of routine maintenance and is considered a trivial activity and recordkeeping will not be required in the Specific Conditions.

- Hazardous waste and hazardous materials drum staging areas. The facility includes a hazardous waste staging area for drummed waste.

- Sanitary sewage collection and treatment facilities other than incinerators and Publicly Owned Treatment Works (POTW). Stacks or vents for sanitary sewer plumbing traps are also included (i.e., lift station).

- Hand wiping and spraying of solvents from containers with less than or equal to 1 liter capacity used for spot cleaning and/or degreasing in ozone attainment areas. Spot cleaning is conducted as a part of routine maintenance and is considered a trivial activity and recordkeeping will not be required in the Specific Conditions.

- * Activities having the potential to emit no more than 5 TPY (actual emissions) of any criteria pollutant. None additional listed but may be used in the future.

SECTION V. BEST AVAILABLE CONTROL TECHNOLOGY REVIEW

OAC 252:100-8-31 states that BACT "*means an emissions limitation (including a visible emissions standard) based on the maximum degree of reduction for each regulated NSR pollutant which would be emitted from any proposed major stationary source or major modification which the Director, on a case-by-case basis, taking into account energy, environmental, and economic impacts or other costs, determines is achievable for such source or modification....*"

A BACT analysis was required for the initial construction permit to assess the appropriate level of control for each new or physically modified emissions unit for each pollutant that exceeds the applicable PSD Significant Emissions Rate (SER). Although as-built changes result in reductions of potential annual emissions for each regulated pollutant, as shown in Table V.I, emissions of NO_X, CO, VOC, SO_2, PM_{10} and lead do not fall below the applicable SER.

In addition, the applicant determined that HAP emissions of lead also exceed the SER. However, under the NSR Reform rules adopted by DEQ (OAC 252:100-8 Part 7), the definition of "Regulated NSR Pollutant" does not include HAP:

> "(B) Regulated NSR pollutant does not include:
>
> (i) any or all HAP either listed in section 112 of the Act or added to the list pursuant to section 112(b) of the Act, which have not been delisted pursuant to section 112(b) (3) of the Act, unless the listed HAP is also regulated as a constituent or precursor of a general pollutant listed under section 108 of the Act; or
>
> (ii) any pollutant that is regulated under section 112(r) of the Act, provided that such pollutant is not otherwise regulated under the Act."

Therefore, under PSD regulations, a BACT review for control of HAP emissions is not required.

Table V.I PSD Significance Levels (Tons/Year)

EUG Description	**NO_X**	**CO**	**SO_2**	**VOC**	**PM_{10}**	**Pb**
EUG 1. Melt Shop (EAF)	72.0	720.0	72.0	72.0	33.51	0.67
EUG 4: Melt Shop Gas Burners	13.96	11.72	0.08	0.77	1.06	
EUG 2. Ladle furnace	12.0	24.0	12.0	8.40	2.79	0.014
EUG 3. Caster & Cut-off Torch	0.64	0.54	0.004	4.90	1.73	
EUG 5. Raw materials silos					0.23	
EUG 6. EAF dust					0.002	0.0001
EUG 7. Melt Shop Cooling Towers					1.546	
EUG 8. Unpaved Roads					3.626	
EUG 9. Emergency Generator	6.01	2.54	0.0056	0.297	0.32	
Total Added Emissions	104.6	758.8	84.1	86.4	44.8	0.68
PSD Significance Level	40	100	40	40	15	0.6
PSD Review Required?	Yes	Yes	Yes	Yes	Yes	Yes

Other pollutants for which PSD significance levels are established are not expected to be emitted in other than negligible amounts from this type of facility.

The U.S. EPA has stated its preference for a "top-down" approach for determining BACT and that is the methodology used for this permit review. After determining whether any New Source Performance Standard (NSPS) is applicable, the first step in this approach is to determine, for the emission unit in question, the available control technologies, including the most stringent control technology, for a similar or identical source or source category. If the proposed BACT is equivalent to the most stringent emission limit, no further analysis is necessary.

If the most stringent emission limit is not selected, further analyses are required. Once the most stringent emission control technology has been identified, its technical feasibility must be determined; this leads to the reason for the term "available" in Best Available Control Technology. A technology that is available and is applicable to the source under review is considered technically feasible. A control technology is considered available if it has reached the licensing and commercial sales stage of development. In general, a control option is considered applicable if it has been, or is soon to be, developed on the same or similar source type. If the control technology is feasible, that control is considered to be BACT unless economic, energy, or environmental impacts preclude its use. This process defines the "best" term in Best Available Control Technology. If any of the control technologies are technically infeasible for the emission unit in question, that control technology is eliminated from consideration.

The remaining control technologies are then ranked by effectiveness and evaluated based on energy, environmental, and economic impacts beginning with the most stringent remaining technology. If it can be shown that this level of control should not be selected based on energy, environmental, or economic impacts, then the next most stringent level of control is evaluated. This process continues until the BACT level under consideration cannot be eliminated by any energy, environmental, or economic concerns.

The five basic steps of a top-down BACT review are summarized as follows:

- Step 1. Identify Available Control Technologies
- Step 2. Eliminate Technically Infeasible Options
- Step 3. Rank Remaining Control Technologies by Control Effectiveness
- Step 4. Evaluate Most Effective Controls Based on Energy, Environmental, and Economic impacts
- Step 5. Select BACT and Document the Selection as BACT

In addition, in accordance with EPA guidance, the BACT analysis will address emissions from startup and shutdown as they pertain to the proposed BACT limits. However, for the several emissions units, emissions during start-up and shutdown are lower than maximum operations.

Technologies and emissions limit data were identified by the applicant and by AQD through a review of EPA's RACT/BACT/LAER Clearinghouse (RBLC) as well as EPA's New Source Review (NSR) and Clean Air Technology Center (CATC) websites, recent state BACT determinations for similar facilities, and vendor-supplied information. Other sources of information include state agency contacts, recent articles, and contacts with vendors to help identify emission rates that have not yet been added to the RBLC.

A. Electric Arc Furnaces

(1) PM_{10} / $PM_{2.5}$ / Lead

The entire facility emits a total of 49 TPY of total particulate matter (PM), of which 2/3 is generated by the EAF. BACT for the PM emissions from the melting of the steel in an EAF involve two basic parts i.e., capture of the fugitives and control of the primary emissions. The facility proposed baghouses to achieve 0.0018 gr/DSCF PM emissions, front-half.

Emissions controls may be accomplished by fabric filters, electrostatic precipitator, high-energy wet scrubbers, or high efficiency cyclones. ESPs and baghouses are normally considered equivalent, and are both the most effective controls. (Wet controls make processing of the captured dust difficult for zinc reclamation.) NSPS Subpart AAa mandates control to at least 0.0052 gr/DSCF, while recent PSD permits are in the range of 0.0018 to 0.0032 gr/DSCF. The proposed BACT for the EAFs is equal to the most stringent, therefore is accepted without further analysis. The proposed level of control is approximately 99.7% reduction from uncontrolled emissions.

A further consideration is in capture efficiency. The proposed system utilizes both a direct evacuation control (DEC) and an overhead hood. The DEC captures essentially all emissions when the furnace roof is closed, and the overhead hood captures most of the remainder when the roof must be opened for charging, tapping, etc.

The initial BACT determination for PM_{10} of 0.0018 gr/DSCF (filterable PM) is being retained. The original PSD application was submitted in 2008, before the $PM_{2.5}$ standards were in effect. Since lead is a filterable PM, the same BACT affects lead emissions. The determination did not affect condensable PM, which must condense before a baghouse could control its emission; also, condensable PM is primarily sulfate and organic materials, very little of which would be discharged from the EAF.

(2) CO

Carbon monoxide emissions are generated in an EAF process by three ways:

(1) Incomplete combustion of organic contaminant materials on the surfaces of the furnace steel feed stock which is driven off by the heat of the melting process.
(2) Oxygen combining with the carbon from the degeneration of the furnace electric carbon rods.
(3) Metallurgical reaction of the carbon and oxygen in the molten steel itself.

The facility proposed a CO emission limit of 3.0 lb/ton as BACT.

There are two potential emissions control technologies: thermal and catalytic oxidizers. The process itself cannot be altered to reduce CO formation except by utilizing pre-cleaned scrap, and such is already required by NESHAP Subpart YYYYY. The design of the DEC system has built-in CO emission control. There is air intake into the EAF furnaces, resulting in the CO being mixed with air in the vicinity of molten steel; the mix should be well above the autoignition temperature of CO of 1,300°F.

All emissions levels are in the range of 2.0 to 6.0 lb/ton. The proposed BACT level, 3.0, is toward the low end of the national range.

The most efficient type of thermal oxidizer is a regenerative thermal oxidizer (RTO). However, contacts with vendors did not find any unit had ever been constructed of the size which is contemplated. The DEC flow is five times a high as the capacity of the largest current RTO in Oklahoma at Pan-Pacific Industries in Broken Bow. A check of EPA's RBLC did not show that any add-on controls have been required for EAFs. Therefore, RTOs cannot be considered "demonstrated technologies."

Using thermal incineration causes heat problems and associated costs are prohibitive. Downstream of the baghouse, the relatively cool temperatures required (the baghouse gas temperature should not exceed 275°F to avoid damaging the polyester bags) would necessitate an undue amount of fuel to raise the gas temperature to the high value required. At the calculated baghouse exhaust rate of 664,000 acfm at approximately 275°F, it is calculated that approximately 600 MMBTUH of heat would be required to raise the temperature to 1600°F. Heat recovery to lower the required heat input could be used, but a regenerative heat recovery system is infeasible due to the particulate loading (even after baghouse control).