ALLEGHENY COUNTY HEALTH DEPARTMENT
AIR QUALITY PROGRAM

January 28, 2021

SUBJECT: U.S. Steel Edgar Thomson Works
Installation Permit: No. 0051-I007

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EXISTING FACILITY DESCRIPTION

The U.S. Steel Mon Valley Works Edgar Thomson Plant (ET) is an integrated iron and steel making facility that produces mainly steel slabs. Raw materials such as coke, iron-bearing materials, and fluxes are charged to blast furnaces in the iron making process. Molten metal (iron) is tapped from the blast furnace at the casthouse into transfer ladles. The hot metal is then transferred to a hot metal mixer or direct pour station in preparation for desulfurization. For desulfurization, a reagent is added to the hot metal, causing sulfur and other impurities to form and rise to the surface. Desulfurized hot metal is then introduced into the basic oxygen process (BOP), where the hot metal is transformed into molten steel. Scrap, alloys, fluxes, and oxygen are also introduced at the BOP. The liquid steel is tapped from the BOP vessels and transferred to the ladle metallurgy facility (LMF) or Vacuum Degasser, where the properties of the steel can be more precisely refined according to customer specifications. To achieve this additional refining at the LMF or Vacuum Degasser, specific alloying materials are added to the process. The refined liquid steel is then charged to the dual strand continuous caster mold. The steel slabs are formed in continuous caster and are cut to length, ground, slit as necessary, and shipped offsite. There are three Riley Boilers are ET, which are used to generate steam, heat, and electricity for the plant. The three primary fuels for the boilers are Blast Furnace Gas (BFG), Coke Oven Gas (COG), and Natural Gas (NG).

PROPOSED INSTALLATION/EQUIPMENT

U.S. Steel will construct a new Endless Casting and Rolling (ECR) facility at the Edgar Thomson Plan. As part of this project, the existing continuous caster will be shut down. The project is part of the overarching Mon Valley Works modernization and emissions reduction strategy. The project emissions increase will be well below the Significant Emission Rate (SER) thresholds for triggering a major modification for all regulated New Source Review (NSR) Pollutants.

The proposed project involves the installation of an ECR facility at the Edgar Thomson Plant which is a thin slab caster process. The ECR facility will receive molten steel from the melt shop. Each heat will be transported to the ECR facility and poured out from the ladle via a tundish (an intermediate vessel) into a thin slab mold. The tundish vessel is rectangular in shape and is lined with high-temperature refractory. It functions as an intermediate reservoir for the molten steel, which allows for continuous flow to the caster at an even, controlled rate during ladle changes. The tundish bottom is equipped with a stopper rod to control the flow of liquid steel into the mold, and with a submerged entry nozzle (SEN) to eliminate re-oxidation of the steel. From the thin slab caster, the liquid steel will be cooled to a completely solidified strand before being directly fed into the High Reduction Mill (HRM), where it is rolled to a transfer bar with a thickness of about 8-20 mm. The transfer bar will be reheated up to desired temperatures by a compact inductive heating furnace, descaled in a high-pressure water descaler, and deformed to the final strip thickness by means of a 5-stand finishing train. As the strip exits out of the last finishing stand at the desired temperature, the strip material is cooled down to the target coiling temperatures on the laminar cooling line and coiled. The separation of the transfer bar/strip into single coils will be done either by the pendulum shear (semi-batch mode) or by the high-speed shear just in front of the first down coiler (endless mode). Following installation of the new ECR facility the existing continuous caster will not be needed and will be shut down.

New air emission sources to be installed with the proposed ECR facility include the following:

- Two (2) gas-fired tundish preheating stations, each with a heat input rating of 7.51 MMBtu/hr;
- Two (2) gas-fired SEN preheaters, each with a heat input rating of 0.82 MMBtu/hr;
- One (1) gas-fired tundish drying station, with a heat input rating of 3.41 MMBtu/hr; and
- Three (3) cooling towers, with a total water circulation rate of approximately 6.4 million gal/hr
- Ladle Metallurgical Facility (LMF) - LMF Furnace/Vessel & LMF Flux/Alloy Handling System, 225 metric tons capacity.

In addition to the new sources, there will be an associated small increase in emissions from paved and unpaved roadways at Edgar Thomson Plant due to transportation of finished coils from ECR facility to the warehouse, as well as shipping from the warehouse out of the plant. However, the overall fugitive emissions in the Mon Valley will be reduced as part of the modernization efforts.

While some existing infrastructure may be used to support the Project, there are no associated emissions increases from existing units that will occur as a result of this project. As noted, the existing dual strand caster operations at the Edgar Thomson Plant will be permanently shut down as part of this project. There will be a transition period to facilitate the initial startup and commissioning phase of the new ECR facility, which is expected to occur over approximately six months. During this time, the new ECR facility will begin taking heats from the steel making operations on the day shift and will gradually ramp up to two shifts, and eventually making full transition to full-time (three shift) operations when appropriate. Over the course of the six-month transition phase, the existing dual strand caster and the new thin slab caster will be operational.

Installation Emission Unit Summary:

I.D.	SOURCE DESCRIPTION	CAPACITY MMBtu/hr	CONTROL DEVICE(S)	STACK ID
P007-1	Tundish Preheating Station 1	7.51	Low NO_X Burners	n/a (exhausts inside the ECR Building)
P007-2	Tundish Preheating Station 2	7.51	Low NO_X Burners	n/a (exhausts inside the ECR Building)
P007-3	Submerged Entry Nozzle Preheater 1	0.82	Low NO_X Burners	n/a (exhausts inside the ECR Building)
P007-4	Submerged Entry Nozzle Preheater 2	0.82	Low NO_X Burners	n/a (exhausts inside the ECR Building)
P007-5	Tundish Drying Station	3.41	Low NO_X Burners	n/a (exhausts inside the ECR Building)

<u>PERMIT APPLICATION COMPONENTS</u>

1. Installation Permit Application received on May 3, 2019.
2. Update Installation Permit Application, received on January 30, 2020.

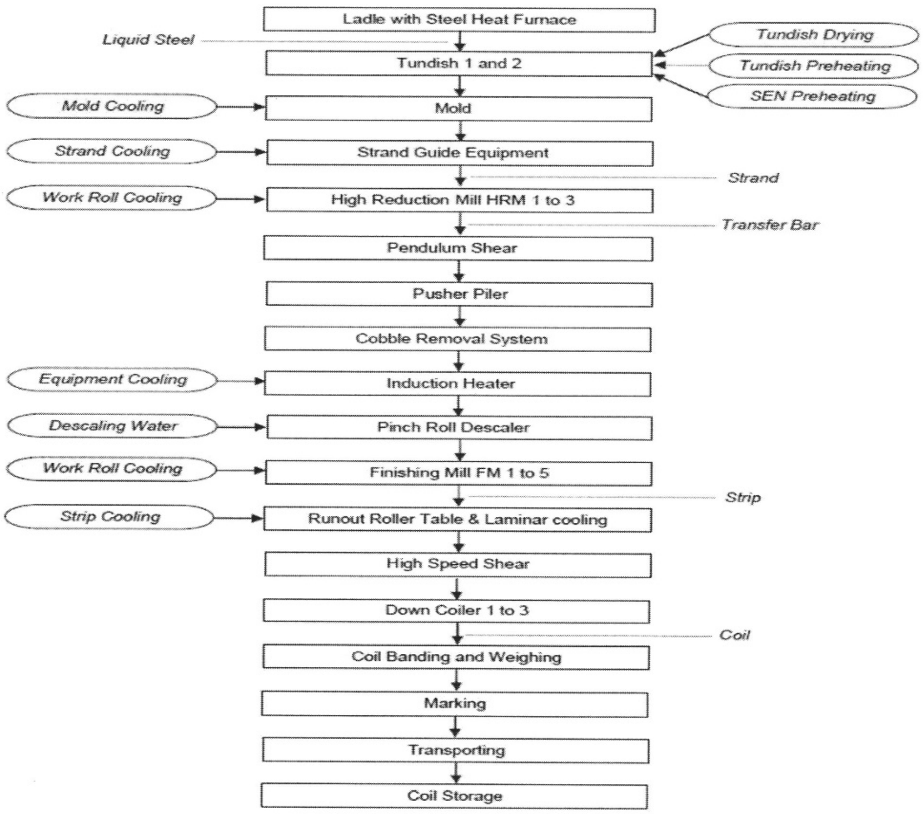
Table 1

Emission Limitations for Fuel Combustion Units

Pollutant	Tundish Preheating Stations 1 and 2 Annual Emissions Limit (tons/year) *	SEN Preheaters 1 and 2 Annual Emission Limit (tons/year)*	Tundish Drying Station Annual Emission (tons/year)*
PM/PM_{10} (filterable)	0.22	0.02	0.13
Sulfur Oxide	2.56	0.28	1.48
Nitrogen Oxide	1.3	0.48	0.28
Carbon Monoxide	0.30	0.16	0.16
Volatile Organic Compounds	0.10	0.02	0.05

*****A year is defined as any consecutive 12-month period

ECR Process Flow Diagram



PROCESS DESCRIPTIONS AND EMISSION CONTROLS

1.1 Tundish Preheating

The ECR facility will include two (2) tundish preheating stations which serve to preheat the tundish to operating temperature prior to casting. The preheaters will be direct-fired units capable of burning natural gas or a blend of coke oven gas with natural gas. Each preheater will be equipped with low-NO_X burners and will have a maximum heat input rating of 7.51 MMBtu/hr. The preheating stations will operate up to approximately five and a half hours per day (2,008 hours per year), each. Emissions from the tundish preheating stations will result from the combustion of 90% coke oven gas (COG) and 10% natural gas and will occur inside the caster building (i.e., the preheaters will not have stacks vented to the atmosphere). The NO_X and CO emissions limit are estimated based on manufacture's data and PM, SO_X, lead and VOC are based on AP-42 factors Table 1.4-2 (7/98), and Fire v6.25.

TABLE 1.1
Tundish Pre-Heating Emission Limitations (both units)

POLLUTANT**	Emission Factor NG (lb/MMscf)	Emission Factor COG (lb/MMscf)	Hourly Emissions Limit (lb/hr)	Annual Emissions Limit (tons/year)*
Particulate Matter	2.2	7.1	0.20	0.20
PM_{10}	8.7	7.6	0.22	0.22
$PM_{2.5}$	8.7	6.5	0.18	0.18
Nitrogen Oxide	Vendor data	Vendor data	0.30	1.30
Carbon Monoxide	Vendor data	Vendor data	0.06	0.30
Sulfur Dioxide	0.7	35 grains H_2S/100 scf	2.54	2.56
Volatile Organic Compound	6.3	1.4	0.10	0.10
Ammonia	3.7	0.155	0.06	0.06
Lead	5.75E-04	NA	0.0000086	0.0000086
CO_2e			1,806.76	1,813.54

*A year is defined as any consecutive 12-month period.
** NOx and CO Emissions are based on manufacture's data.

1.2 SEN Preheating

The ECR facility will include two (2) SEN preheating stations which serve to preheat the SEN before casting. The preheaters will be direct-fired units capable of burning natural gas or a blend of coke oven gas with natural gas. Each preheater will be equipped with low-NO_X burners and will have a maximum heat input rating of 0.82 MMBtu/hr. The preheating stations will operate up to approximately five and a half hours per day (2,008 hours per year), each. Emissions from the SEN preheating stations `will result from the combustion of 90% coke oven gas (COG) and 10% natural gas and will occur inside the caster building (i.e., the preheaters will not have stacks vented to the atmosphere). The NOx and CO emissions limit (Table 1.2 below) are estimated based on manufacture's data and PM, SOx, lead and VOC are based on AP-42 factors Table 1.4-2 (7/98), and Fire v6.25.

TABLE 1.2
SEN Pre-Heating Emission Limitations (both units)

POLLUTANT**	Emission Factor NG (lb/MMscf)	Emission Factor COG (lb/MMscf)	Hourly Emissions Limit (lb/hr)	Annual Emissions Limit (tons/year)*
Particulate Matter	2.2	7.1	0.02	0.02
PM_{10}	8.7	7.6	0.02	0.02
$PM_{2.5}$	8.7	6.5	0.02	0.02
Nitrogen Oxide	Vendor data	Vendor data	0.48	0.48
Carbon Monoxide	Vendor data	Vendor data	0.16	0.16
Sulfur Dioxide	0.7	35 grains H_2S/100 scf	0.28	0.28
Volatile Organic Compound	6.3	1.4	0.02	0.02
CO_2e			393.40	394.8

*A year is defined as any consecutive 12-month period.
** NOx and CO Emissions are based on manufacture's data.

1.3 Tundish Drying

The ECR facility will include one (1) tundish drying station which will serve to dry the tundish after repair of the refractory lining to make it ready for the next preheating cycle. The dryer will be direct-fired units capable of burning natural gas or a blend of coke oven gas with natural gas. The dryer will be equipped with low-NO_X burners and will have a maximum heat input rating of 3.41 MMBtu/hr. The tundish drying station will operate up to approximately 14 hours per day (5,110 hours per year). Emissions from the Tundish drying will result from the combustion of 90% coke oven gas (COG) and 10% natural gas and will occur inside the caster building (i.e., the dryer will not have stacks vented to the atmosphere). The NOx and CO emissions limit (Table 1.3 below) are estimated based on manufacture's data and PM, SOx, lead and VOC are based on AP-42 factors Table 1.4-2 (7/98), and Fire v6.25.

TABLE 1.3
Tundish Drying Station Emission Limitations

POLLUTANT**	Emission Factor NG (lb/MMscf)	Emission Factor COG (lb/MMscf)	Hourly Emissions Limit (lb/hr)	Annual Emissions Limit (tons/year)*
Particulate Matter	2.2	7.1	0.04	0.11
PM_{10}	8.7	7.6	0.05	0.13
$PM_{2.5}$	8.7	6.5	0.04	0.11
Nitrogen Oxide	Vendor Data	Vendor data	0.06	0.28
Carbon Monoxide	Vendor Data	Vendor data	0.04	0.16
Sulfur Dioxide	0.7	35 grains H_2S/100 scf	0.58	1.48
Volatile Organic Compound	6.3	1.4	0.02	0.05
CO_2e			370	945.3

*A year is defined as any consecutive 12-month period
** NOx and CO Emissions are based on manufacture's data.

1.4 Cooling Towers

The proposed ECR facility will include three (3) cooling towers to supply both contact and non-contact cooling water to various parts of the process. The capacity of the towers will range from 792,500 gallons per hour up to 4,279,600 gallons per hour. All of the cooling towers will be low-drift design (0.001% drift rate). They will operate on a full-time basis (8,760 hours per year, each). Emissions from the cooling towers is shown in Table 1.4 below.

TABLE 1.4
Cooling Towers Emission Limitations

POLLUTANT**	Hourly Emissions Limit (lb/hr)	Annual Emissions Limit (tons/year)*
Particulate Matter	0.80	3.50
PM_{10}	0.58	2.54
$PM_{2.5}$	0.002	0.01

*A year is defined as any consecutive 12-month period.

1.5 Roadways

As part of the project, U.S. Steel has accounted for the associated truck traffic that will occur as a result of the transporting finished coils form the caster building to warehouse storage, as well as from storage to the plant exit for delivery to customer. This traffic impacts both paved and unpaved road segments. U.S. Steel employs dust suppression/mitigation currently at the facility and will continue to do so for the roadways impacted by this project. The emissions in Tables 1.5 and 1.6 are estimated using AP-42, 13.2.1.3 (January 2011) - Eq 2 and AP-42 13.2.2.3 (November 2006) Eq 1a

TABLE 1.5
Paved Roadways Emission Limitations

POLLUTANT**	Hourly Emissions Limit (lb/hr)	Annual Emissions Limit (tons/year)*
Particulate Matter	0.01	0.02

*A year is defined as any consecutive 12-month period.

TABLE 1.6
Unpaved Emission Limitations

POLLUTANT**	Hourly Emissions Limit (lb/hr)	Annual Emissions Limit (tons/year)*
Particulate Matter	0.06	0.27
PM-10	0.02	0.07
PM-2.5	0.002	0.01

*A year is defined as any consecutive 12-month period.

1.6 Ladle Metallurgical Facility

The facility is currently operating one Ladle Metallurgical vessel, and due to the installation of a new ECR process (a thin slab caster) as a functional replacement for the existing dual strand caster, the facility will modify the LMF by installing a new Ladle Metallurgical vessel to accommodate the new ECR process.

The modifications for the LMF as part of this project would include building shell modifications, and installation of a second furnace with dedicated baghouse system, duct work, conveyor, extension of the existing control room, new ladle car track, and associated mechanical and electrical equipment. The new furnace would be fed with alloying materials via the existing storage bin and conveying system (and those systems would not be modified as part of the project). A diverter chute would be installed over the existing furnace to allow for materials to be delivered to either furnace. The conveying system would only have the capability to feed alloying material to one furnace at a time. After project completion, the modified LMF would have two operational furnaces with associated baghouses to support the operation of the ESP process.

The new furnace would have a capacity of approximately 225 metric tons of steel and would be equipped with a dedicated dust collection system (new ductwork and 6-module baghouse). The ductwork feeding into the baghouse system would directly exhaust emissions from the furnace hood, as well as dust collected from the alloy conveying system via pick up points located at the diverter chute above the existing furnace in addition to the chute above the new furnace.

There will be no increase in capacity or actual production/throughput as part of this project. (i.e., the production will simply be distributed across two furnaces/baghouses instead of one in the future operating configuration).

Emissions from the modified LMF would be comprised of particulate matter generated from alloy material handling and molten steel refinement in the furnaces. The two furnaces would be functionally equivalent/interchangeable in terms of feeding the new downstream ECR process. U.S. Steel estimates future annual (ton/yr) particulate emissions from the LMF based on an annual production rate of 3.0 million tons of steel and lb/ton emission factors derived from site-specific testing. Short-term (lb/hr) emissions are estimated based on a maximum outlet grain loading of 0.0052 gr/ dscf and total baghouse exhaust rate of 120,000 actual cubic feet per minute (acfm) and 84,000 dscfm. Finally, emissions of hazardous air pollutant (HAP) metals were estimated using the calculated particulate emission rates along with site-specific LMF baghouse dust analyses.

The LMF process in this IP7 covers both the new and existing (IP5) LMF furnace/vessel, and the associated baghouse. However, the installation permit IP#0051-I005 for the existing LMF process, issued in March 13, 2009 will be cancelled when installation IP#0051-I007 is installed and the conditions incorporated into IP#0051-I007.

PREVENTION OF SIGNIFICANT DETERIORATION AND NON-ATTAINMENT NEW SOURCE REVIEW APPLICABILITY ANALYSIS

2.1 Regulatory Background

Allegheny County is designated as attaining National Ambient Air Quality Standards (NAAQS) for PM_{10}, CO, NO_2, and non-attaining for $PM_{2.5}$, SO_2 and ozone. The pollutant SO_2 is considered a precursor of $PM_{2.5}$ and is therefore also likely to be treated as a non-attaining pollutant under forthcoming $PM_{2.5}$ regulations. Similarly, VOC is a precursor for ozone. NO_X is considered a precursor for both $PM_{2.5}$ and ozone. Both VOC and NO_X are treated as non-attainment pollutants for purposes of major new source review.

The Prevention of Significant Deterioration (PSD) regulations apply to new major sources and major modifications located in areas that are attaining the NAAQS. The PSD requirements as promulgated in 40 CFR §52.21 have been adopted by the Department in their entirety per §2102.07.a. Existing potential emissions from this facility exceed 100 tons per year for at least one pollutant. Therefore, the Edgar Thomson Plant is a major source.

For the ECR facility to be a major modification, that is, for it to undergo PSD review, the net change in emissions due to the Project plus other contemporaneous increases and decreases in actual emissions would have to exceed PSD significance levels (SER) for at least one pollutant. The proposed ECR project primarily involves the installation of new sources, with the exception of associated emissions from plant roadways. Therefore, PTE from the proposed new sources and the increases in roadway emissions associated with the project, as well as decreases form the shutdown of the existing continuous caster (P005), were used in determining the project emissions increase for comparison against the SERs. As shown in Table 2.4, project increases do not exceed the SER for any pollutant.

ACHD's Article XXI regulations adopt the Federal PSD permitting procedures from 40 CFR §52.21 and the state NNSR permitting procedures from 25 PA Code §127.203. To determine the major NSR applicability for the ESP project under these two programs, the steps outlined in the U.S. EPA's NSR Workshop Manual, pages A.46-49 were followed. A traditional NSR applicability analysis is based on two steps: (1) determining emissions increases from the proposed project; and (2) determining the net emissions increases form the proposed project and other contemporaneous changes at the facility. These steps are discussed in detail in the following sections.

2.2 Overview of Emissions Netting Procedures

In assessing PSD applicability, the procedures in 40 CFR 52, §52.21 and in assessing NNSR applicability, the procedures described in PADEP's Pennsylvania Code, Subchapter E, §127.203a were followed:

Only project-related emissions are evaluated in Step 1; any contemporaneous increases or decreases are considered in Step 2.

1. Calculate the future allowable emissions for the new units, using potential-to-emit (PTE). For existing sources that are modified or otherwise associated with the project, use projected actual emissions (PAE). If the future emissions from the new units exceed PSD significance levels, and for all NNSR pollutants, then

2. Calculate baseline actual emissions (BAE) from the highest 24-month average actuals over the last 10 years for PSD pollutants and the last 5 years for NNSR pollutants for existing units affected by the ECR Project, that is, existing units that will be shut down and units whose emissions will increase or decrease. The same 24-month period must be used for all sources affected by the project (existing sources that will be modified or will see an increase associated with the project). A different baseline period can be used for different pollutants, but must include all affected sources of that pollutant, and

3. Calculate contemporaneous emission changes associated with minor source permits;

4. Subtract emissions calculated in steps 2 and 3 from those in step 1 [PAE or (PTE) – BAE] to determine the net emissions change resulting from the Project. If the difference is less than the PSD and NNSR significance limits, the project is considered a minor modification and PSD and NNSR will not apply.

Table 2.1: PSD/NSR Pollutant

Pollutant[1]	PSD/NNSR	Significant Emission Rate (tpy)
PM (filt.)	PSD	25
PM_{10} (filt. + cond.)	PSD	15
$PM_{2.5}$ (filt. + cond.)	NNSR	10
Lead	PSD	1
SO_2	NNSR	40
NO_x	NNSR (Ozone & $PM_{2.5}$ precursor)	40
CO	PSD	100
VOC	NNSR (Ozone & $PM_{2.5}$ precursor)	40
Ammonia	NNSR ($PM_{2.5}$ precursor)	40
CO_2e	PSD	75,000

<u>**Project Emission Summary- PSD/NNSR Pollutant**</u>

TABLE 2.2

		Future (Potential) Emissions (tpy)[1]								
Emission Unit/Pollutant	**PM**	**PM_{10} filt+cond)**	**$PM_{2.5}$ (filt+cond)**	**NO_2**	**CO**	**SO_2**	**VOC**	**CO_2e**	**Ammonia**	**Lead**
Tundish Preheating Station 1	0.10	0.11	0.09	0.65	0.15	1.28	0.05	906.8	0.03	4.29E-06
Tundish Preheating Station 2	0.10	0.11	0.09	0.65	0.15	1.28	0.05	906.8	0.03	4.29E-06
SEN Preheater 1	0.01	0.01	0.01	0.24	0.08	0.14	0.01	197.40	0.00	4.68E-07
SEN Preheater 2	0.01	0.01	0.01	0.24	0.08	0.14	0.01	197.40	0.00	4.68E-07
Tundish Drying Station	0.11	0.13	0.11	0.28	0.16	1.48	0.05	945.30	0.03	4.47E-06
Cooling Towers	3.50	2.54	0.01							
Unpaved Roads	0.27	0.07	0.01							
Paved Roads	0.02	0.00	0.00							
Rolling Oil		0.00	0.00				0.84			
LMF Process	4.50	4.50	4.50	0.00	0.00	0.00	0.00	0.00	0.00	3.51E-03
Total	**8.62**	**7.49**	**4.83**	**2.05**	**0.61**	**4.31**	**0.99**	**3,153.7**	**0.09**	**3.52E-03**

[1]Future (potential) emissions from new units is potential to emit.

Baseline Emissions:

Baseline emissions are the highest 2-year average actual emissions from the last 10 years as reported by U. S. Steel as part of annual emissions inventories for PSD pollutants. For NNSR pollutants ($PM_{2.5}$, SO_2, VOC, and Ammonia), the baseline emissions are the highest 2-year average actual emissions from the last 5 years. U.S. Steel computed actual baseline emissions following this procedure and selected the following as baseline periods:

PM = 2017 and 2018;
PM10 = 2013 and 2014;
$PM_{2.5}$ =2017 and 2018;
CO = 2010 and 2011;
NO2 = 2017 and 2018;
SO_2 =2014 and 2015; and
VOC = 2017 and 2018

TABLE 2.3

		Baseline Emissions (tpy)[2]								
Emission Unit/Pollutant	**PM (filt)**	**PM_{10} (filt.+cond)**	**$PM_{2.5}$ (filt.+cond)**	**NO_2**	**CO**	**SO_2**	**VOC**	**CO_2e**	**Ammonia**	**Lead**
Dual Strand Continuous Caster (P005)-misc combustion	0.07	0.17	0.17	2.21	1.61	0.48	0.10	2,490.04	5.68E-02	8.10E-06
Existing LMF	1.70	3.07	1.87							1.97E-03
Total	**1.77**	**3.24**	**2.04**	**2.21**	**1.61**	**0.48**	**0.10**	**2,490.04**	**5.68E-02**	1.98E-03

Table 2.4
Potential Emissions from ESP and Total Project Emissions Increase

Pollutant	**PSD/NA NSR**	**Significant Emission Rate (tpy)**	***Project Increase*** **Total Potential Emissions from New Equipment (tpy)**	***Project Decrease*** **Baseline Actual Emissions (Shutdown Units) (tpy)**	**Total Project Emissions Increase (tpy)**	**Increase>SER?**
PM	PSD	25	8.62	1.77	6.85	NO
PM_{10}	PSD	25	7.49	3.24	4.25	NO
$PM_{2.5}$	NNSR	20	4.83	2.04	2.79	NO
NH_3	NNSR (precursor)	40	0.09	0.06	0.03	NO
Lead	PSD	6.0E-01	3.52E-02	1.98E-03	1.54E-03	NO
SO_2	NNSR	40	4.31	0.48	3.84	NO
NO_X	NNSR (precursor)	40	2.05	2.21	-0.15	NO
CO	PSD	100	0.61	1.61	-0.99	NO
VOC	NNSR (precursor)	40	0.99	0.10	0.89	NO
CO_2e	PSD	75,000	3,153.61	2,490.04	663.57	NO

REVIEW OF BEST AVAILABLE CONTROL TECHNOLOGY (BACT) ANALYSIS

BACT for the proposed equipment has been evaluated using a "top-down" approach for each pollutant of concern generally following U.S. EPA's guidance for conducting BACT analyses for PSD evaluations. The BACT analysis is based on the following five (5) steps:

Step 1. Identify all possible control technologies;
Step 2. Eliminate technically infeasible options;
Step 3. Rank the technically feasible control technologies based upon emission reduction potential;
Step 4. Evaluate ranked controls based on energy, environmental and/or economic considerations;
Step 5. Select BACT.

BACT analysis and selection is described in the following sections. Given the relatively small emissions from each of the proposed sources, the BACT analysis focuses on the primary pollutants of concerns for each source as follows:

- Combustion Units: NO_X, SO_2;
- Cooling Towers: PM; and
- Roadways: PM.
- LMF: PM

3.1 BACT for Combustion Units

The proposed combustion sources associated with this project are small direct-fired gas-fueled combustion units ranging in size from 0.82 MMBtu/hr to 7.51 MMBtu/hr. The units will all be equipped with low-NO_X burners inherent to their design. As a result, NO_X emissions from the units will be very low (approximately 2.1 tons per year from all sources). The larger sources (tundish preheaters and dryer) will have NO_X emissions less than 0.02 lb/MMBtu. Because these sources have the potential to be fueled with coke oven gas, there is potential for SO_2 emissions that are higher than the natural gas firing scenario. Total SO_2 emissions from all combustion sources are expected to be 4.6 tons per year and will be minimized by pretreatment of the coke oven gas that is burned.

Potentially applicable NO_X control technologies include:

- Selective Non-Catalytic Reduction (SNCR);
- Selective Catalytic Reduction (SCR);
- Low-NO_X or Ultra Low-NO_X Burners; and
- Good Combustion Practices

Both SNCR and SCR involve the injection of reagent into the combustion zone. Because the proposed combustion units are direct-fired, this could result in the reagent contacting the steel and affecting product quality (if there even was adequate space for injection). There are no known applications of these control measures on steel industry process heaters. For this reason, both SNCR and SCR are determined to be technically infeasible**.** The proposed units will be equipped with low-NO_X burners as is common for new sources of this type. In addition, combustion unit size (< 10 MMBtu/hr) can follow good combustion practices to minimize NO_X emissions. Both of these control strategies are widely cited and used for combustion units of this size and type. Therefore, U.S. Steel is proposing low-NO_X burners and good combustion practices in accordance with manufacturer's recommendations as BACT.

Because the proposed units will burn coke oven gas, there will be SO_2 related emissions. Based on a search of combustion units of this size in U.S. EPA's RBLC database, the only technologies used to reduce SO_2 is the use of low-sulfur fuels. While larger combustion units have employed post-combustion control strategies like scrubbing or sorbent injection to reduce SO_2 emissions, these are very costly controls which would be economically infeasible and technically infeasible in this application. The proposed units will have the capability of burning a 90/10 blend of coke oven gas/natural gas. The coke oven gas fuel will be pre-treated to remove sulfur compounds to no more than 35 grains of H_2S per 100 scf prior to its delivery to the combustion units. H_2S content of the coke oven gas is monitored continuously for compliance with this limit. Therefore, the pre-treatment and monitoring of sulfur compounds in the coke oven gas will constitute BACT for these combustion sources.

3.2 BACT for Cooling Towers

Particulate emissions from cooling towers are generated when water droplets are carried away from the tower, where the water then evaporates and leaves particulates behind. The emissions are a function of the cooling tower drift rate as well as the concentration and density of the total dissolved solids (TDS) in the water. Drift can be minimized through the use of high-efficiency drift/mist eliminators. TDS can be managed through monitoring and management/treatment of the cooling water supply. U.S. EPA's RBLC database identifies high-efficiency drift eliminators capable of reducing cooling tower drift down to ~0.001% U.S. Steel is proposing to install high-efficiency cooling towers with a drift rate of 0.001% as BACT for these new sources.

3.3 BACT for Roadways

Particulate emissions from paved and unpaved roadways occur when silt on the roadways becomes airborne. Emissions are a function of the silt content, moisture content, and vehicle miles traveled (VMT) of the roadway. The proposed project will result in a small increase in associated vehicle traffic on both paved and unpaved segments of plant roadways (much of the transportation will be done by rail, minimizing impacts to roadways). U.S. Steel routinely employs dust mitigation measures on roadways (e.g. application of water or chemical dust suppressant and/or use of street sweepers) as needed to mitigate dust. This constitutes BACT and U.S. Steel will continue this practice for the new roadways.

3.4 BACT for LMF

U.S. Steel has evaluated Best Available Control Technology (BACT) for the proposed LMF modifications. Baghouses, scrubbers, and electrostatic precipitators are all technically feasible particulate matter control strategies for BOP Shops and LMF's. The control efficiencies from each of these strategies are comparable. Given the existing infrastructure, monitoring systems (CPMS), and operating procedures that U. S. Steel has already implemented for the existing LMF, as well as the proposed operating configuration (i.e., interchangeable functionality of the two furnaces), a baghouse is the most cost-effective control device. Furthermore, the proposed modifications to the existing LMF will result in emission rates which meet or exceed the MACT requirements in 40 CFR Part 63, Subpart FFFFF for the control of particulate emissions, which U.S. Steel has demonstrated through several testing events.

Therefore, U. S. Steel is proposing a short-term maximum outlet grain loading limit from each baghouse of 0.0052 gr/dscf (total particulate matter, including condensable) as BACT. This is consistent with the current BACT limit on the existing LMF, and consistent with other steel industry baghouse BACT limits established by ACHD. Compliance with this limit will be demonstrated via stack testing of each baghouse outlet at least once every two years. Monitoring, recordkeeping, and reporting requirements for the existing LMF are already incorporated into the Plant's Title V Operating Permit, and U.S. Steel is proposing that these same requirements be extended to cover the new furnace/baghouse as applicable

AIR QUALITY IMPACTS – AIR TOXICS MODELING

U.S. Steel completed an analysis of potential air toxics to be emitted from the proposed sources in the Installation Permit in accordance with ACHD's "Policy for Air Toxic Review of Installation Permit Applications", hereafter referred to as the "Policy." As shown in the following section, the project does not trigger the Air Toxics Program as there is a *de minimis* net increase in air toxics as a result of the Project.

The Policy was adopted on November 7, 2012 by the Allegheny County Board of Health and amended on January 9, 2013. The Policy provides a definitive method of evaluating the potential impact of air emissions of toxic contaminants from projects that require the submittal of an Installation Permit application within Allegheny County. The Policy applies to an Installation Permit application within the Allegheny County that are expected to increase the net potential air toxic emissions from the facility into the ambient air and do not belong to any of the following categories:

- Projects resulting in emissions increase less than the *de minimis* levels;
- Projects that are solely for the installation or in-kind replacement of pollution control device;
- Exempt activities such as those in Article XXI 2102.03.a.5; or
- Projects that include equipment where EPA has published risk assessment guidance (e.g., Municipal Waste Combustors).

ACHD's 10-step Guide to Policy for Air Toxics Review of Installation Permit Applications was followed to ensure fulfillment of all requirements outlined in the Policy. The step-wise procedure followed by U.S. Steel according to the guidance document is below.

Step 1 – Determination of Air Toxic Pollutants to be Emitted

Each emission source from the proposed Installation Permit was evaluated for the potential to emit air toxics. Pollutants were designated as an air toxic based on toxicity information found in EPA's Integrated Risk Information System (IRIS), EPA's Provisional Peer Reviewed Toxicity Values (PPRTVs), California EPA's Toxicity Criteria Database, the Agency for Toxic Substances and Disease Registry (ATSDR), and Health Effects Assessment Summary Table (HEAST), per the guidance set forth in the Policy. Under the Policy, air toxics does not include any criteria pollutant or carbon dioxide.

Step 2 – Determination of Annual Potential Emissions

Potential annual emissions of air toxics were calculated for all point-sources associated with the Project. Emission rates were generally calculated using published emission factors and assuming maximum proposed operating schedule for each source. This procedure was done for new emissions sources as well as the existing emission sources being shut down as a result of this project.

Step 3 – Comparison of Net Potential Air Toxics Emissions to De Minimis Levels

The air toxic pollutants identified in Step 1 were classified as either Polychlorobiphenols (PCB), Polycyclic Organic Matter (POM), Mercury, Dioxins, Furans, Hazardous Air Pollutant Metals (MHAP), or All Other air toxins (Other). The sum of the potential annual emissions for each project source (new equipment and equipment to be shutdown) was calculated for each air toxics category. These emissions increase (net potential air toxics emissions) totals were then compared to the de minimis thresholds provided in ACHD's Air Toxic Guidelines Implementation Document.

Based on the comparison of the change in annual potential emissions to ACHD's *de minimis* thresholds for each Air Toxic category, it was determined that proposed project did not exceed *de minimis* levels. Since the project does not result in a change in the potential to emit air toxics in excess of *de minimis* levels, no further analysis is required under the Policy.

Table 3
Air Toxics Emissions Summary for Sources in Proposed Installation Permit

Classification	Air Toxic Potential Emissions from New Equipment (lb/yr)	Air Toxic Potential Emissions from Equipment to be Shutdown (lb/yr)	Net Potential Air Toxics Emissions Increase (lb/yr)	De Minimis Threshold (lb/yr)	Exceedence?
Polychlorobiphenols (PCBS)	0	0	0	20	No
Polycyclic Organic Matter (POM)	0.04	0.02	0.02	20	No
Mercury	0.01	0.01	0.01	20	No
Dioxins	0	0	0	0.02	No
Furans	0	0	0	0.02	No
Hazardous Air Pollutant Metals (MHAP)	288.80	1,436.2	-1147.4	20	No
All Other Air Toxics	472.20	243	229	500	No

SULFUR COMPOUND CONCENTRATION OF COKE OVEN GAS

The permittee shall not operate, or allow to be operated, any source in such manner that unburned coke oven gas is emitted into open air. In addition, the permittee shall not flare, mix, or combust coke oven gas, or allow such gas to be flared, mixed or combusted unless the concentration of sulfur compounds, measured as hydrogen sulfide, in such gas is less than or equal to 35 grains per hundred dry standard cubic feet of coke oven gas produced by the Clairton Plant, when all sulfur emissions from the Claus Sulfur Recovery Plant and the tail gas cleaning equipment thereon, expressed as equivalent H_2S. The concentration of sulfur compounds specified shall include the tail-gas sulfur, measured as hydrogen sulfide, emitted from the sulfur removal equipment.

METHODS OF DEMONSTRATING COMPLIANCE

Notations of visible emissions (Method 22) from the ECR Facility operations shall be performed once per week during normal daylight operations. A trained individual shall record whether any emissions are observed and whether these emissions extend beyond the facility property line. The permittee may skip monthly monitoring after six consecutive months of compliance with the weekly monitoring.

U.S. Steel will monitor the sulfur content (grains H_2S/100dscf) of the COG and the amount of gas combusted on a continuous basis (at least once every 15 minutes). The parameters will be monitored at each location sufficiently in order to determine the lb/hr emissions rate of sulfur dioxide to demonstrate compliance with the SO_2 limits.

U.S. Steel shall record and maintain the following:

1. The total amount and type of fuel used at the ECR Facility (monthly, 12-month);
2. ECR Facility production (daily, monthly, 12-month);
3. The COG sulfur concentration, as H_2S, measured at U.S. Steel Clairton Works

U.S. Steel shall operate the HRM with lubricating oil, which is an oil-water emulsion and does not exceed a maximum VOC content by weight of 4% at any time.

REGULATORY APPLICABILITY

Allegheny County Health Department Rules and Regulations (Article XXI)

See Permit Application No. 0051-I007, Section 5. The requirements of Article XXI, Parts B and C for the issuance of minor modification installation permits have been met for this facility. Article XXI, Part D, Part E and Part H will have the necessary sections addressed individually.

Testing Requirements

The Department reserves the right to require emissions testing sufficient to assure compliance with the terms and conditions of the permit.

New Source Performance Standards

- **NSPS Subpart D – Standards of Performance for Fossil Fuel-Fired Steam Generating Units**

NSPS Subpart D applies to fossil fuel fired steam generating units with heat input ratings greater than 250 MMBtu/hr, which were installed after August 17, 1971. The combustion sources proposed as part of the ECR facility are all direct-fired heaters and will not generate steam. Therefore, this subpart will not apply.

- **NSPS Subpart Db – Standards of Performance for Industrial-Commercial Steam Generating Units**

NSPS Subpart Db applies to steam generating units and process heaters with heat input ratings greater than 100 MMBtu/hr, which were installed after June 19, 1984. NSPS Subpart Db defines a process heater 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." The combustion sources proposed as part of the ECR facility are direct fired units that do not meet this definition and are well below the 100 MMBtu/hr applicability threshold, and therefore will not be subject to this subpart.

- **NSPS Subpart Dc – Standards of Performance for Small Industrial-Commercial- Institutional Steam Generating Units**

NSPS Subpart Dc applies to a steam generating units and process heaters for which construction, modification, or reconstruction is commenced after June 9, 1989 and that has a maximum design heat input capacity of 100 MBtu/hr or less, but greater than or equal to 10 MMBtu/hr. The combustion sources proposed as part of the ECR facility are direct-fired units that do not meet the definition of a process heater and will be below the 10 MMBtu/hr applicability threshold, and therefore will not be subject to this subpart.

- **NSPS Subpart AAa – Standards of Performance for Steel Plants: EAFs and Argon-Oxygen Decarburization Vessels Constructed After August 17, 1983**

NSPS Subpart AAa applies to electric arc furnaces (EAFs), argon-oxygen decarburization (AOD) vessels, and dust handling systems that commence construction, modification, or reconstruction after August 17, 1983. The proposed ECR facility will not include EAF or AOD sources; therefore, this subpart will not apply.

- **NSPS Subpart TT – Metal Coil Surface Coating**

NSPS Subpart TT applies to metal coil surface coating operations that commence construction, modification, or reconstruction after January 5, 1981. Affected facility operations include: each prime coat operation, each finish coat operation, and each prime and finish coat operation combined when the finish coat is applied wet on wet over the prime coat and both coatings are cured simultaneously. The proposed ECR facility will not involve the application or curing of coatings. As such, this subpart will not apply.

National Emission Standards for Hazardous Air Pollutants (NESHAP)

- **NESHAP Subpart MMMM – Surface Coating of Miscellaneous Metal Parts and Products**

NESHAP Subpart MMMM applies to facilities that conduct surface coating operations which coat miscellaneous metal parts as defined in 40 CFR 63.3881(a). The proposed ECR facility will not include any surface coating; therefore, this subpart will not apply.

- **NESHAP Subpart DDDDD – Industrial, Commercial, and Institutional Boilers**

40 CFR 63 Subpart DDDDD regulates HAP emissions from new, reconstructed and existing industrial, commercial, and institutional boilers and process heaters at major HAP sources. This subpart defines a process heater as "an enclosed device using controlled flame, and the unit's primary purpose is to transfer heat indirectly to a process material (liquid, gas, or solid) or to a heat transfer material (e.g., glycol or a mixture of glycol and water) for use in a process unit, instead of generating steam. Process heaters are devices in which the combustion gases do not come into direct contact with process materials." The combustion sources proposed as part of this project are which do not meet this definition. As such, this subpart will not apply

- **NESHAP Subpart Q – Industrial Process Cooling Towers**

40 CFR 63 Subpart Q regulates industrial cooling towers at certain types of facilities (including primary and secondary metal producers) which use chromium-based water treatment chemicals in the cooling towers. U. S. Steel does not use chromium-based water treatment chemicals currently and will not use them in the new proposed cooling towers. As such, this subpart will not apply.

- **NESHAP Subpart SSSS – Metal Coil Surface Coating**

This subpart applies to the use of toxics in metal coil surface coating operations at major sources. The proposed ECR facility will not involve the application or curing of coatings. As such, this subpart will not apply.

Risk Management Plan; CAA Section 112(r):

The installation and operation of the ECR facility will have no effect on the requirements for a Risk Management Plan.

Greenhouse Gas Reporting (40 CFR Part 98):

If the facility emits 25,000 metric tons or more of carbon dioxide equivalent (CO_2e) in any 12-month period, the facility shall submit reports to the US EPA in accordance with 40 CFR Part 98.

Air Toxics Guidelines:

The emissions increase associated with the project is less than the *de minimis* levels, therefore, the ATG does not apply.

EMISSIONS SUMMARY

TABLE 4
Emission Limitations Summary

POLLUTANT	ANNUAL EMISSIONS LIMIT SUMMARY (tons/year)*
Particulate Matter	8.62
Particulate Matter <10 µm (PM_{10})	7.49
Particulate Matter <2.5 µm ($PM_{2.5}$)	4.83
Nitrogen Oxides (NO_X)	2.05
Sulfur Oxides (SO_X)	4.31
Carbon Monoxide (CO)	0.61
Volatile Organic Compounds (VOC)	0.99

***A year is defined as any consecutive 12-month period.**

RECOMMENDATIONS

All applicable Federal, State, and County regulations have been addressed in the permit application, and the provisions of Article XXI, §2102.04.k relating to 'Restrictions on Sources with Violations' does not apply to this installation permit because paragraph §2102.04.k.1 states that: This subsection does not apply to sources installing air pollution control equipment, or project that do not increase total potential air emissions of any regulated pollutant at those sources. This project includes the shutdown of Dual Strand Continuous Caster (P005) and the installation of the Endless Casting and Rolling (ECR) Facility.

The Installation Permit for U.S. Steel, Edgar Thomson should be approved with the emission limitations and terms & conditions in Permit No. 0052-I007.