ALLEGHENY COUNTY HEALTH DEPARTMENT
AIR QUALITY PROGRAM

August 1, 2023

SUBJECT: Review of Application
Title V Operating Permit
U.S. Steel Edgar Thomson Plant
13th Street and Braddock Avenue
Braddock, PA 15104

RE: Operating Permit File No. 0051-OP23
Iron and Steel Making Facility

TO: JoAnn Truchan, PE
Program Manager, Engineering

FROM: Hafeez Ajenifuja
Air Quality Engineer

FACILITY DESCRIPTION:

The U.S. Steel Edgar Thomson Plant (ET) is an 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 the continuous caster and are cut to length, ground, slit as necessary, and shipped offsite.

There are three Riley Boilers at 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). The facility will also burn No. 2 fuel oil only during emergency condition.

The facility has two (2) processes that are operated by an outside contractor:

1. BOP Slag Processing; and
2. Waste Product Recycling and Briquetting.

The BOP slag handling system is being operated by TMS International, LLC, while the Waste Product Recycling and Briquette Process is operated by Magnus Products, LLC.

Both TMS (#0225) and Magnus Products (#0265) are located on U.S. Steel-Edgar Thomson property. TMS is a major source of HAP and has its own Title V Operating Permit. Magnus meets the definition of a single source as it is located on the property (adjacency), has the same SIC code (33 – Primary Metal Industries), and is under common control with U.S. Steel. Magnus has its own Title V Operating Permit, and is considered a single source with U.S. Steel-Edgar Thomson for Title V and New Source Review purposes.

In addition, Messer LLC (#0385) is another support facility that is located outside U.S. Steel-Edgar Thomson compound, but supplies oxygen to U.S. Steel-Edgar Thomson Plant. Messer is also supplying gases to other companies, and is therefore not considered a single-source Title V facility at this time.

U.S. Steel-Edgar Thomson Plant, which is located in Braddock, Pennsylvania, is a major source of particulate matter (PM), particulate matter less than 10 microns in diameter (PM_{10}), particulate matter less than 2.5 microns in diameter ($PM_{2.5}$), sulfur dioxide (SO_2), carbon monoxide (CO), nitrogen oxides (NO_X), volatile organic compounds (VOC), and Hazardous Air Pollutants (HAPs), as defined in Section 2101.20 of Article XXI.

PERMIT RENEWAL DESCRIPTION:

This is a Title V renewal application for U.S. Steel-Edgar Thomson Plant located in Braddock Township, Allegheny County. The facility's operations, processes and emissions are still the same as in the original operating permit and as highlighted in Appendix A of this document.

The following changes were made during the Title V renewal:

1) Conditions V.A.1.f and V.B.1.c. The condition, which required the facility to combust COG with concentration of sulfur compounds, measured as hydrogen sulfide, less than or equal to 35 grains per hundred dry standard cubic feet was deleted because it is redundant with site level Condition IV.32.d and replaced with requirement that referenced the site level Condition IV.32.d;
2) Condition V.A.1.k. The condition was deleted because it was an initial compliance condition, which has been satisfied. Continuous compliance is referenced in the monitoring section;
3) Conditions V.A.1.m, V.A.1.o, V.A.1.p, V.A.4.d.2, V.A.5.c, V.A.5.d, V.A.5.j, V.A.5.k, V.A.5.h.4, V.D.1.k, V.D.1.l; V.D.4.e.2, V.D.5.c, V.D.5.d; V.D.5.h; V.D.5.j; V.D.5.m; V.E.1.k; V.E.4.d.2, V.E.5.c; V.E.5.d; V.E.5.j; V.E.5.k; V.E.5.m. All references to startup, shutdown and malfunction have been removed because the US EPA has revised the NESHAP, Subpart FFFFF by eliminating startup, shutdown and malfunction requirements, effective January 11, 2021.
4) Condition V.A.2.c. The condition was deleted because it was a requirement for the facility to perform emissions testing and evaluation to determine emissions factors, which has been fulfilled.
5) Added applicable conditions V.A.5.h.9, V.D.5h.9, V.E.5.i.8 from §63.7841(b)(13).
6) RACT IP #0052-I008a requirements, issued in April 21, 2020 and amended in December 7, 2020 have been incorporated into the Title V permit.
7) Conditions V.D.1.m, V.D.1.n, V.D.1.o. The conditions were deleted because they were initial compliance demonstrations, which have been satisfied. Continuous compliance is referenced in the monitoring section;
8) Condition V.D.1.q: Emissions limit for BOP shop combustion units (P003-011a & b for NG & COG) were incorporated;
9) Conditions V.H.6.d and V.I.6.b-d were added to incorporate the requirements of the December 16, 2022 consent decree.

The emission units regulated by this permit are summarized in Table 1:

TABLE 1 - Emission Unit Identification

I.D.	SOURCE DESCRIPTION	CONTROL DEVICE(S)	MAXIMUM CAPACITY	FUEL/RAW MATERIAL	STACK I.D.
P001a	Blast Furnace No. 1 Casthouse	Casthouse Baghouse	1,752,000 TPY (Production)	Coke, Iron-Bearing Materials, Fluxes	S002
P001b	Blast Furnace No. 1 Stoves	None	495 MMBtu/hour (total)	BFG, COG & Natural Gas	S001
P001c	BFG Flare	N/A	3 MMcfh	BFG	S003
P002a	Blast Furnace No. 3 Casthouse	Casthouse Baghouse	1,752,000 TPY (Production)	Coke, Iron-Bearing Materials, Fluxes	S002
P002b	Blast Furnace No. 3 Stoves	None	495 MMBtu/hour (total)	BFG, COG & Natural Gas	S004

I.D.	SOURCE DESCRIPTION	CONTROL DEVICE(S)	MAXIMUM CAPACITY	FUEL/RAW MATERIAL	STACK I.D.
P003	Basic Oxygen Process (BOP) Shop	Mixer Baghouse, Primary Scrubber, Secondary Baghouse	3, 467,500 TPY (Production)	Hot Metal (Iron), Fluxes, Scrap, Alloy Additives	S005-S008
P004	Ladle Metallurgy Facility (LMF)	LMF Baghouse	3, 467,500 TPY (Production)	Steel (Liquid), Fluxes, Scrap, Alloy Additives	S009
P005	Dual Strand Caster	Dust Collectors	3, 467,500 TPY (Production)	Steel (Liquid), Fluxes	N/A
P006	Vacuum Degasser	CO Flare	1,200,000 TPY (Production)	Steel (Liquid), Alloying Materials, Fluxes	S011
B001	Riley Boiler No. 1	None	525 MMBtu/hr	Blast Furnace Gas, Coke Oven Gas & Natural Gas	S015
B002	Riley Boiler No. 2	None	525 MMBtu/hr	Blast Furnace Gas, Coke Oven Gas & Natural Gas	
B003	Riley Boiler No. 3	None	525 MMBtu/hr	Blast Furnace Gas, Coke Oven Gas & Natural Gas	
F001	Blast Furnace Slag Pits	N/A	581,565 TPY	Blast Furnace Slag	N/A
F002	Plant Roads	Wet Suppression; Chemical Treatment; Paved Road Sweeping	N/A	N/A	N/A
F003	Storage Piles	Dust Control (moisture content >1.5%)	2 acres	Steel Slag	NA
F004	Paints/Thinners & Solvent Degreaser	None	795 gal /yr & 2,949 gal/yr	NA	NA
F005	Pot Coat- Antifreeze	None	911,138 pound/yr	Antifreeze	NA
GEN-1	Emergency Generator 1	None	2,922 HP	Diesel Fuel	S001
GEN-1	Emergency Generator 2	None	2,922 HP	Diesel Fuel	S002
N/A	WSAC (Mold Water) Cooling Tower	N/A	4,100 gpm	NA	NA
NA	WSAC (Blast Furnace Closed Loop) Cooling Tower	NA	2,145 gpm	N/A	N/A
N/A	Blast Furnace Recycling Cooling Tower	Drift Eliminator	15,000 gpm	NA	NA
N/A	Caster Internal Machine Cooling Tower	Drift Eliminator	14,316 gpm	NA	NA
N/A	Degasser Cooling Tower	Drift Eliminator	5,250 gpm	NA	NA
N/A	BOP Hood Cooling Tower	Drift Eliminator	12,000 gpm	NA	NA

I.D.	SOURCE DESCRIPTION	CONTROL DEVICE(S)	MAXIMUM CAPACITY	FUEL/RAW MATERIAL	STACK I.D.
N/A	BOP Gas Cleaning Cooling Tower	Drift Eliminator	12,000 gpm	NA	NA
N/A	Caster Spray Water Cooling Tower	Drift Eliminator	7,000 gpm	NA	NA

The emission sources listed in Table 1 above can be divided into the following general categories

- Blast Furnace and Stoves (Iron Making)
- Basic Oxygen Process (Steel Making)
- Ladle Metallurgy Facility (LMF)
- Vacuum Degasser
- Dual Strand Continuous Caster
- Combustion Units (Boilers and Space heaters)
- Circulating Cooling Waters

1.0 OPERATIONS SUMMARY

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) where the properties of the steel can be more precisely refined according to customer specifications. To achieve this additional refining step at the LMF, 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 the continuous caster and are cut to length, ground, slit as necessary, and shipped offsite.

1.1 Blast Furnace and Stoves (Iron Making)

Molten Iron is manufactured by charging raw materials into blast furnace where they are reacted with hot air to form molten iron, slag, and blast furnace gas (BFG). Blast furnace gases, coke oven gas (COG) and natural gas (NG) are used as fuels at the blast furnaces. The primary pollutants from this operation are particulate matter (PM), Sulfur Oxide (SO_2), carbon monoxide (CO), nitrogen oxides (NO_x) and volatile organic compounds (VOC) from the casthouse and product of combustion from the blast furnace stoves. Other activities conducted at the blast furnaces which result in low or insignificant emissions include raw materials handling, blast furnace slag handling, blast furnace wastewater treatment and recycle systems, and the blast furnace gas flare.

After hot metal from the blast furnace is tapped from the furnace at the casthouse and transferred to the charging aisle, it is desulfurized by adding reagent to the vessel causing sulfur and other impurities to form, solidify and rise to the surface of the vessel to be skimmed. The primary pollutant from hot metal transferring and slag skimming is PM.

1.2 Basic Oxygen Process (Steel Making)

Hot metal is charged into the basic oxygen process (BOP) steel making vessels after the desulfurization process. The hot metal, along with steel scrap, fluxing agents, and alloying materials are reacted with high priority oxygen which is blown into the vessel vial lances. Once the desired steel metallurgy is obtained, the molten steel is tapped into a ladle for transport to the LMF. The primary pollutant from this steel making operation is PM. Significant emissions occur during charging, oxygen blowing, tapping and slag dumping. Other activities conducted at the BOP Shop which result in low or insignificant emissions include flux materials handling, BOP slag handling, material storage, and wastewater treatment and recycle systems. Additional fuel is used for ladle pre-heaters and space heating.

1.3 Ladle Metallurgy Facility (LMF)

Molten Steel is tapped from BOP vessels and transferred to the LMF vessel where the steel is further refined. At the LMF alloying materials are added to the vessel to enhance the metallurgical properties of the heat. Electrodes are submerged in the vessel to maintain molten/liquid steel. The primary pollutant from the LMF operation is PM. The alloy material handling system and the LMF vessel itself are the primary contributors of the PM emissions.

1.4 Vacuum Degasser

A vacuum degasser is used to remove oxygen (as CO), hydrogen, and nitrogen from molten steel in preparation for casting. Alloy materials handling system and CO Flare are integral parts of the degasser.

1.5 Dual Strand Continuous Caster

The caster receives molten steel from the BOP shop or LMF. Molten steel is poured into the caster mold, which is accompanied by a series of water sprays to produce steel slabs. As the steel slabs are processed, they are cut to length, ground, and slit as appropriate. Minor fugitive emissions are associated with the caster and its related operations. Additional fuel is used at the caster and LMF area tundish pre-heaters, nozzle heaters, driers, and space heating. An oxygen lance is used in the caster area to clean the caster shroud approximately once every heat, resulting in minor fugitive emissions.

1.6 Combustion Units (Boilers and Space Heaters)

There are three (3) Riley Boilers rated at 525 MMBtu/hr each at the facility, which is used to generate steam, heat and electricity for the plant. The three primary fuels for the boilers are BFG, COG and NG. The boilers are also designed to burn No. 2 fuel oil during emergency conditions. Emissions from the boilers include PM, SO_2, NO_X, CO and VOC.

1.7 Fugitive Emission Sources:

The following sources are considered source of fugitive emissions

a. Blast Furnace Slag Pits
b. Bulk Materials Storage and Handling
c. Plant Paved and Unpaved Roads

2.0 MAXIMUM POTENTIAL EMISSIONS:

2.1 Blast Furnace Stack Emissions:

Emissions from the blast furnaces are due to the combustion from the blast furnace and casthouse and are shown in the table below and in Appendix B of this document:

TABLE 2
Blast Furnace No. 1 Emission Limitations (Casthouse Baghouse Emissions)

POLLUTANT	Emissions Factor (lbs/ton)	Hourly Emission Limit (lb/hr)	Annual Emission Limit (tons/year)*
Particulate Matter (filterable)	$A = 0.76E^{+0.42}$	48.67	213.17
PM_{10} (filterable)	$A = 0.76E^{+0.42}$	48.67	213.17
$PM_{2.5}$ (filterable)	$A = 0.76E^{+0.42}$	48.67	213.17
PM (condensable)	0.009	1.84	8.05
Nitrogen Oxides (NO_X)	0.004	0.88	3.38
Carbon Monoxide (CO)	0.888	177.63	778.03
Volatile Organic Compounds (VOC)	0.017	3.37	14.75

*A year is defined as any consecutive 12-month period.
PM emissions are based on Article 21, Section §2104.02.c.9.A $A = 0.76E^{+0.42}$
NO_X, CO and VOC limits are based on the highest of 2016-2018 Emission Factor Development Testing Result and 15% operational variability or compliance margin.

The total emissions including fugitives from the Blast Furnace #1 and Casthouse are shown in Table 2a below:

TABLE 2a
Blast Furnace No. 1 and Casthouse Emission Limitations (Stack & Fugitive Emissions)

BF 1 Casthouse	PM (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)	PM_{CON} (tpy)	NO_X (tpy)	SO_X (tpy)	CO (tpy)	VOC (tpy)
Casthouse Baghouse	213.17	213.17	213.17	8.05	3.83	197.54	778.03	14.75
Casthouse Fugitive	0.00	0.00	0.00	0.89	0.43	23.0	86.45	1.64
NG Combustion	3.86	3.86	3.86	11.57	202.98	1.22	170.50	11.16
COG Combustion	10.05	7.05	5.22	5.27	129.72	132.71	29.84	1.95
Fume Suppression	0.37	0.26	0.19	0.19	4.77	8.80	1.10	0.07
Total Emissions	**227.45**	**224.34**	**222.44**	**25.97**	**341.73**	**363.27**	**1,065.91**	**29.57**

TABLE 3
Blast Furnace No. 3 Emission Limitations (Casthouse Baghouse Emissions)

POLLUTANT	Emissions Factor (lbs/ton)	Hourly Emission Limit (lb/hr)	Annual Emission Limit (tons/year)*
Particulate Matter (filterable)	$A = 0.76E^{+0.42}$	40	175
PM_{10} (filterable)	$A = 0.76E^{+0.42}$	40	175
$PM_{2.5}$ (filterable)	$A = 0.76E^{+0.42}$	40	175
Nitrogen Oxides (NO_X)	0.004	0.88	3.83
Carbon Monoxide (CO)	0.888	177.63	778.03
Volatile Organic Compounds (VOC)	0.017	3.37	14.75

*A year is defined as any consecutive 12-month period.
PM emissions are based on Article 21, Section §2104.02.c.9.A $A = 0.76E^{+0.42}$
NO_X, CO, and VOC L emissions limits are based on the highest of 2016-2018 Emission Factor Development Testing Result and 15% operational variability or compliance margin.

The total emissions including fugitives from the Blast Furnace #3 and Casthouse are shown in Table 3a below:

TABLE 3a
Blast Furnace No. 3 Emission Limitations (Stack & Fugitive Emissions)

	PM	PM_{10}	$PM_{2.5}$	PM_{CON}	NO_X	SO_X	CO	VOC
BF 1 Casthouse	**(tpy)**	**(tpy)**	**(tpy)**	**(tpy)**	**(tpy)**	**(tpy)**	**(tpy)**	**(tpy)**
Casthouse Baghouse	175	175	175	8.05	3.83	197.54	778.03	14.75
Casthouse Fugitive	0.00	0.00	0.00	0.89	0.43	23.0	86.45	1.64
NG Combustion	3.86	3.86	3.86	11.57	202.98	1.22	170.50	11.16
COG Combustion	10.05	7.05	5.22	5.27	129.72	30.30	29.84	1.95
Fume Suppression	0.37	0.26	0.19	0.19	4.77	7.40	1.10	0.07
Total Emissions	**190.08**	**186.17**	**184.27**	**25.97**	**341.73**	**259.45**	**1,065.91**	**29.57**

TABLE 4
Emission Limitations for the No. 1 or No. 3 Blast Furnace Stoves

Pollutant	Emissions factors	Hourly Emission Limit For each set of Stoves (lb/hr)	Annual Emission Limit For each set of Stoves (tons/year)*
Particulate Matter (filterable)	$A = 0.76E^{+0.42}$	24.75	108.41
PM_{10} (filterable)	$A = 0.76E^{+0.42}$	24.75	108.41
$PM_{2.5}$ (filterable)	$A = 0.76E^{+0.42}$	24.75	108.41
PM (condensable)		3.25	14.24
Nitrogen Oxide (NO_X)	0.03 lb/MMBtu	14.85	65.04
Carbon Monoxide (CO)	1.3 lb/MMBtu	650.65	2,849.86
Volatile Organic Compound	0.01 lb/MMBtu	3.24	14.21

*A year is defined as any consecutive 12-month
PM emissions are based on Article 21, Section §2104.02.c.9.A $A = 0.76E^{+0.42}$
PM condensable is based on 2018 BF stove stack test
NO_X emissions based on RACT IP8a
CO,and VOC emissions limits are based on the highest of 2018-2020 Emission Factor Development Testing Result and 15% operational variability or compliance margin.

2.1.1 Blast Furnace Raw Material Handling

Fugitive emissions from the blast furnace raw material handling are shown in Table 5a below and in Appendix B of this document:

TABLE 5a

Material	Max Usage (tons/yr)	Moisture Content (%)	Number of Transfers	Control Efficiency (%)	PM EF (lb/ton)	PM_{10} EF (lb/ton	$PM_{2.5}$ EF (lb/ton	PM Emissions (tpy)	PM_{10} Emissions (tpy	$PM_{2.5}$ Emissions (tpy
Pellets - Dumped to Ore Yard	101,508	2.20	6	70	0.003368	0.001593	0.000241	0.31	0.15	0.02
Pellets	5,351431	2.20	4	70	0.003368	0.001593	0.000241	10.82	5.12	0.77
Dololime	0	0.20	6	70	0.096688	0.045731	0.006925	0.00	0.00	0.00
Blast Furnace Trim	71,409	2.20	6	70	0.003368	0.001593	0.000241	0.22	0.10	0.02
Briquettes	144,915	2.20	6	70	0.003368	0.001593	0.000241	0.44	0.21	0.03
Calcite Lime	0	0.20	6	70	0.096688	0.045731	0.006925	0.00	0.00	0.00
B Scrap	152,312	0.92	-	-	-	-	-	-	-	-
BOP Slag Reverts	33,852	0.92	6	70	0.011416	0.005399	0.000818	0.35	0.16	0.02
Screened Flue	0	7.0	6	70	0.000666	0.000315	0.000048	0.00	0.00	0.00
C-Mix	121,281	7.80	6	70	0.000573	0.000271	0.000041	0.06	0.03	0.00
Coke	1438,570	7.80	4	70	0.000573	0.000271	0.000041	0.49	0.23	0.04

Material	Max Usage (tons/yr)	Moisture Content (%)	Number of Transfers	Control Efficiency (%)	PM EF (lb/ton)	PM_{10} EF (lb/ton	$PM_{2.5}$ EF (lb/ton	PM Emissions (tpy)	PM_{10} Emissions (tpy	$PM_{2.5}$ Emissions (tpy
Total Emissions:								**12.683**	**6.00**	**0.91**

2.1.2 Blast Furnace Flue Dust Handling from Dust Catcher

Fugitive emissions from the blast furnace flue dust handling from dust catcher is shown in Table 5b below:

TABLE 5b
BF Flue Dust Handling Emissions

Material	Max Dust (tons/yr)	Moisture Content (%)	Number of Transfers	Control Efficiency	PM EF (lb/ton)	PM_{10} EF (lb/ton	$PM_{2.5}$ EF (lb/ton	PM Emissions (tpy)	PM_{10} Emissions (tpy	$PM_{2.5}$ Emissions (tpy
Dust	13,769	11.60	1	0	0.000329	0.000155	0.000024	**0.0023**	**0.0011**	**0.0002**

Notes:
[1]Material moisture contents obtained from AP-42, Fifth Ed., Table 13.2.4-1 (Aggregate Handling and Storage Piles), November 2006 or from site specific samples where available
[2]Emission factors for Tables 4 & 5 are calculated using equation from AP-42, Fifth Ed., Section 13.2.4 (Aggregate Handling and Storage Piles), November 2006. Wind speed data obtained from National Climatic Data Center for Pittsburgh/Allegheny County region.

TABLE 6
Blast Furnace No. 1 & 3 Casthouse and Blast Furnace No. 1 & 3 Stoves Throughput

Sources	Steel Production		COG Throughput		NG Throughput		BFG Throughput	
	tons/hr	Tons/yr	Mmcf/hr	Mmcf/yr	Mmcf/hr	Mmcf/yr	Mmcf/hr	Mmcf/yr
Blast Furnace 1	200	1,752,000	0.322	2,820	0.403	3,530	NA	NA
Blast Furnace 3	200	1,752,000	0.322	2,820	0.338	2,960	NA	NA
BF #1 Stove	NA	NA	0.96	8,399	0.47	4,095	5.5	48,180
BF #3 Stove	NA	NA	0.96	8,399	0.47	4,095	5.5	48,180

<u>Sample PM Calculation for Blast Furnace No. 1</u>

The blast furnace PM emission is estimated using the formula in Article 21, Section §2104.02.c.9.A

$A = 0.76E^{+0.42}$

Where:
A = allowable emissions in pounds per hour, and
E = emission index of (F) x (W) pounds per hour,
F = process factor in pounds per unit as listed below,
W= production or charging rate in units per hour and the units for F and W shall be compatible.
$A = 0.76\ [(200\ \text{ton/hr})*(100\ \text{lbs/tons})]^{0.42}$

= **<u>48.67 lbs/hr</u>**

= (48.67 lbs/hr)*(8760 hr/yr)*(tons/2000lbs)
= <u>213.17 tons/yr</u>

2.2 Blast Furnace Gas Flare Emissions (P001c):

Blast furnace gas (BFG) is a by-product of blast furnaces that is generated when the iron ore is reduced with coke to metallic iron. Blast furnace gas flare is designed to flare excess blast furnace gas that is not consumed internally and it also functions as a safety device.

2.3 Basic Oxygen Process (Steel Making) Scrubber Emissions (P003-7 & P003-9):

Basic Oxygen Process (BOP) emissions occur during charging, oxygen blowing, tapping and slag dumping. The total BOP emission is the sum of all emissions from hot metal transfer and desulfurization, slag skim after desulfurization, BOP charging, BOP tapping, BOP slag dumping, BOP flux handling, BOP fuel usage and BOP fugitive. The emissions from the BOP operations are shown in the table below and in Appendix B of this document:

TABLE 8
Basic Oxygen Process Shop Emissions

POLLUTANT	Emission Factors Lbs/ton	Hourly Emission Limit (lb/hr)	Annual Emission Limit (tons/year)*
Particulate Matter (filterable)*		44.12	193.24
PM_{10} (filterable)*		44.12	193.24
$PM_{2.5}$ (filterable)		44.12	193.24
Nitrogen Oxides (NO_X)	0.105	41.45	181.55
Carbon Monoxide (CO)	6.506	2,575.44	11,280
Sulfur Dioxide (SO_2)	0.007	2.71	11.88
Volatile Organic Compounds (VOC)	0.010	3.80	16.63

*A year is defined as any consecutive 12-month period.
NO_X, CO, and VOC emissions limits are based on the highest of 2018-2020 Emission Factor Development Testing Result and 15% operational variability or compliance margin.

2.3.1. The emission from the Basic Oxygen Process Furnace (BOPF) Secondary Emission Control Baghouse from IP-0051-I004a are shown below and in Appendix B of this document:

TABLE 8a
F & R Vessel Basic BOPF Secondary Emission (P003-5; P003-6 & P003-8)

Process Component	Stack ID	Pollutant	Hourly Emission Limit (lb/hr)	Annual Emission Limit (ton/year)*
Vessel F/R BOP Shop Secondary Emission Control System	S006	PM (filterable)	24.90	109.10
		PM_{10} (filterable)	24.90	109.10
		$PM_{2.5}$(filterable)	24.90	109.10
		VOC	2.33	10.22

*A year is defined as any consecutive 12-month period.
[1]PM emissions Include emissions from hot metal slag skimming, vessels F & R furnace charging, steel tapping and slag dumping.
[2]VOC emissions Iron Slag Skimming After Desul, Furnace Charging, Furnace Tapping, Steel Slag Dumping & Slag Skimming Before BOP & Tapping/Dumping

2.3.2. The emissions from the BOP Hot Metal Transfer & Desulfurization at Mixer, Reladling Pit, and Direct Pour Station (P003-1; P003-2, P003-3, P003-4 & Stack S005) are shown in the table below and in Appendix B of this document:

TABLE 8b
Hot Metal Transfer & Desulfurization at Mixer, Reladling Pit, and Direct Pour Station

POLLUTANT	Hourly Emission Limit (lb/hr)	Daily Emission Lbs/day	Annual Emission Limit (tons/year)*
Particulate Matter (filterable)*	7.0	100	18.25
PM_{10} (filterable)*	7.0	100	18.25
Volatile Organic Compounds (VOC)	0.46		2.01

*A year is defined as any consecutive 12-month period.
**PM/PM_{10} emission based on §2104.02.b

2.3.3. The emissions from the BOP Shop flux Material Rail Car Unloading, Transfer Tower, Flux Handling Systems #1 & #2 (P003-10a; P003-10b, P003-10c, P003-10d & Stack ID BH1, BH2, BH2 & BH4) are shown in the table below and in Appendix B of this document:

TABLE 8c
Hot Metal Transfer & Desulfurization at Mixer, Reladling Pit, and Direct Pour Station

POLLUTANT	Emission Factors (lb/ton)	Hourly Emission Limit (lb/hr)	Annual Emission Limit (tons/year)*
Particulate Matter (filterable)*	20	1.01	4.42
PM_{10} (filterable)*	7	0.35	1.55
Volatile Organic Compounds (VOC)	1.06	0.05	1.06

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

2.4 <u>Ladle Metallurgy Facility (LMF) & Dual Strand Continuous Caster Emission:</u>

The LMF emissions occur during alloy material handling and from the LMF vessel itself. The LMF emissions are derived through Installation Permit #0051-I005, issued March 13, 2009. The Dual Strand Continuous Caster emissions are derived through Installation Permit No. 7035003-002-93900, issued March 1, 1994.

TABLE 9
Ladle Metallurgy Facility (LMF)

Pollutant	lbs/hr	tons/yr [1]
Particulate Matter (filterable)	5.12	22.43
PM_{10} (filterable)	5.12	22.43
$PM_{2.5}$ (filterable)	5.12	22.43
PM (condensable)	0.25	1.10

[1]A year is defined as any 12 consecutive months

2.4.1 Dual Strand Continuous Caster

TABLE 9a
Caster Tundish Preheaters Emission Limitations

Pollutant	Annual Emission Limit (tons/year)*
PM/ PM_{10} (filterable)	1.0
PM-condensable	0.86
Sulfur Oxide	23
Nitrogen Oxide	12.0
Carbon Monoxide	3.0
Volatile Organic Compounds	1.0

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

2.5 Vacuum Degasser:

TABLE 10
Vacuum Degasser Emission Limitations

Pollutant	Emission Factor	Hourly Emission Limit (lbs/hr)	Annual Emission Limit (tons/year)*
PM/PM_{10}	0.245	0.14	0.61
Carbon Monoxide	0.007	0.99	4.32

*A year is defined as any consecutive 12-month period.
PM Emission Factor is based on Manufacturer's Data (0.13 lb/heat from process + 0.115 lb/heat from KTB lance)
CO emission factor assumes 60% conversion of carbon to CO & 99% control efficiency for flare

2.6 Boilers Emissions:

Emissions from each of the three (3) boilers firing blast furnace gas are shown below

TABLE 11
Riley Boilers Emission Limitations

Pollutant	Hourly Emission Limit Per Boiler (lb/hr)	Annual Emission Limit (Per Boiler) (TPY)[(1)]
Particulate Matter (filterable)	26.25	114.98
PM_{10} (filterable)	26.25	114.98
Sulfur Oxides[2]	556.91	2,439.27
Nitrogen Oxide	36.75	114.98
Carbon Monoxide (CO)	1.09	4.76
Volatile Organic Compounds (VOC)	0.42	1.85

[1]A year is defined as any consecutive 12-month period.
[2]SO_2 SIP IP 0051-I006, Condition V.A.1.c, based on a combined stack basis
NO_X (lbs/hr & tons/yr) are based on 0.07 lb/MMBtu & 0.05 lbs/MMBtu on a 30-day and 12-month rolling average Continuous Emission Monitoring (CEM) data (RACT IP8a).

2.7 Blast Furnace Slag Pits:

Emissions from the slag pit is fugitive PM and it is shown in the table below:

TABLE 12
Blast Furnace Slag Pit Emission Limitations

Pollutant	Hourly Emission Limit (lbs/hr)	Annual Emission Limit (tons/year)*
Particulate Matter (filterable)	0.07	0.32
PM_{10} (filterable)	0.03	0.15
$PM_{2.5}$ (filterable)	0.01	0.02

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

2.8 Circulating Water Cooling Towers:

Emissions from the cooling towers are PM and are estimated using the Reisman and Frisbie method based on cooling tower drift rates and total dissolved solids (TDS) concentration limits.

TABLE 13
Cooling Towers Emission Limitations

Pollutant	Hourly Emission Limit (lbs/hr)	Annual Emission Limit (tons/year)*
Particulate Matter (filterable)	10.31	45.15
PM_{10} (filterable)	8.22	36.01
$PM_{2.5}$ (filterable)	0.03	0.11

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

2.9 Pot Coat–Antifreeze:

The Pot Cot is a material that is sprayed onto items that are lined with refractory brick and hold molten (liquid) material. Steel and Iron Ladles, the Mixer Vessel, and slag pots are where it is used. The pot coat helps prevent the molten material from adhering to the refractory brick. If it adheres to the brick it must be chipped off, which could damage the brick. Every time a slag pot is dumped it gets sprayed with the pot coat. The pot coat contains methanol, which is a HAP. Emissions from the pot coat usage is shown in the Table below and in Appendix B of this document. The facility uses 911,138 pounds per twelve (12) month consecutive period. The pot coat contains 7% by weight of methanol.

TABLE 14
Pot Coat Usage Emission Limitations

Pollutant	Hourly Emission Limit (lbs/hr)	Annual Emission Limit (tons/year)[1]
VOC/HAPs (Methanol)	7.28	31.89

[1]A year is defined as any consecutive 12-month period

2.10 Paints/Thinners & Solvent Degreasers:

The painting/thinners and solvent degreasers are used as part of the facility's maintenance activities. Emissions from the maintenance activity are shown in the tables below.

TABLE 15a
Degreaser Emission Limitations

Pollutant	Throughput (gal/yr)	Solvent Density (lbs/gal)	Hourly Emission Limit (lbs/hr)	Annual Emission Limit (tons/year)*
VOC	2949	6.55	0.18	0.19

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

TABLE 15b
Paints/Thinners Emission Limitations

Pollutant	Throughput (gal/yr)	Paint/Thinner Density (lbs/gal)	Hourly Emission Limit (lbs/hr)	Annual Emission Limit (tons/year)*
VOC	795	9.33	2.14	2.23
Toluene			0.46	0.48

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

2.11 Plant Roads

Emissions from the plant paved and unpaved roads are fugitive PM and are estimated using the AP-42, Fifth Edition, Section 13.2.1 (January 2011) for industrial paved roads and AP-42, Fifth Edition, Section 13.2.2 for industrial unpaved roads (November 2006). Emissions from the roads activity are shown in the tables below.

TABLE 16a
Paved Road Emission Limitations

Pollutant	Annual Emission Limit (tons/year)*
Particulate Matter	0.51
PM_{10} (filterable)	0.10
$PM_{2.5}$ (filterable)	0.03

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

TABLE 16b
Unpaved Road Emission Limitations

Pollutant	Annual Emission Limit (tons/year)*
Particulate Matter	119.85
PM_{10} (filterable)	31.94
$PM_{2.5}$ (filterable)	3.19

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

3.0 EMISSION SOURCES OF MINOR SIGNIFICANCE:

The following sources are insignificant, and there are no applicable requirements for these sources.

1. Air conditioning equipment for human comfort

2. Non-regulated ventilation equipment
3. Electrically heated furnaces, heaters, and ovens
4. On-site food preparation
5. Office equipment and products
6. Janitorial services and products
7. Garbage containers and waste barrels
8. Bathroom/toilet vents
9. Tobacco smoking rooms
10. Repair and maintenance shop activities
11. Hand-held power tools
12. Routine calibration of laboratory or other testing equipment
13. Equipment used for QA/QC or inspection purposes
14. Fire suppression systems, fire training, and accidental open burning
15. Repair and maintenance of cooling and air conditioning equipment
16. Laboratory exhaust hoods and associated activities
17. Collection and ventilation systems required for industrial hygiene purposes

The wastewater treatment process was listed as part of insignificant activities because the wastewater emissions of VOCs are insignificant.

As part of the NPDES permit renewal process, PADEP requires that facilities conduct sampling of the influent water to and the effluent water from a wastewater treatment system in order to verify the treatment efficiency. The testing required covers a wide range of parameters, including volatile and semi-volatile organic compounds. Sampling conducted by U. S. Steel in 2006 verified that the influent and effluent wastewaters did not contain any appreciable amounts of volatile and semi-volatile organics.

In developing the Effluent Limit Guidelines for iron-making and steelmaking wastewater treatment operations, USEPA determined that organics were not present in significant quantities to be detectable, and thus did not establish them as pollutants of concern. USEPA's determination is supported by the NPDES sampling conducted at the Edgar Thomson Plant and further supports the designation of wastewater as an insignificant source of emissions.

Result of the wastewater sampling analysis is provided in Appendix A of this document.

4.0 <u>EMISSION CONTROLS:</u>

a) Blast Furnaces Nos. 1 and 3 share a four-compartment Wheelabrator Frye Baghouse to control casthouse particulate emissions. Each blast furnace has a Double Bell and Hopper system designed to capture and control all blast furnace raw material charging emissions, a Dust Catcher designed to collect particulate matter from blast furnace exhaust gas, and a Venturi Scrubber designed to clean the Dust Catcher exhaust gas. In addition, there is a Blast Furnace Flare common to both blast furnaces that burns excess BFG.

b) The BOP Shop is controlled by: 1) a Merrick 12-compartment BOP Shop Mixer and Desulfurization Baghouse; 2) a Wheelabrator Frye 7-compartment BOP Shop Secondary (fugitive) Baghouse; 3) four Pangborn materials handling Baghouses to control particulate matter emissions from railcar unloading at the flux house, the BOP flux material transfer tower, the BOP flux material internal conveying/transfer No.1, and the BOP flux material internal conveying/transfer No.2; and 4) a BOP gas cleaning Venturi Scrubber.

c) The LMF is controlled by an Amerex four-compartment pulse jet Baghouse. There are also two small baghouses for the LMF tripper car (conveyor system) and for the pneumatic lime bin feeder system which are located and vent inside the LMF building.

d) The Dual Strand Caster Cutting Station uses high pressure oxygen (with natural gas fired pilots) to cut steel slabs to length. Because of the high inherent efficiency of the cutting operation, emissions have been determined to be negligible from this operation. A high volume water spray trough below the process line collects particulate from the Cutting Station. Caster Shroud Cleaning is performed following approximately every heat. A hood and small industrial hygiene vacuum collects dust from this operation. The dust collector is vented inside the building. A Grinding Facility removes surface defects from slabs. This facility uses a small dust collector to recover revert which is recycled as raw material feed. The dust collector is vented inside the building. During routine Tundish Maintenance, a small, insignificant amount of dust is generated by cleaning tundish parts. A small dust collector is utilized during the maintenance process for industrial hygiene purposes. The dust collector is vented to the atmosphere. Caster mold flux is added to the caster by use of an automatic flux feeder system. A small, insignificant amount of fugitive emissions are created by this operation. The fugitive emissions generated by this operation are vented through a dust collector, which then discharges to the spray chamber inside the caster building.

e) The Vacuum Degasser utilizes a John Zink Flare Stack to control CO emissions.

f) Riley Boilers Nos. 1-3 do not employ any control devices.

g) PM emissions from the slag pits are controlled by wet suppression. Per the consent order and agreement dated December 16, 2022, the wet suppression is to be enhanced with an oxidizing chemical additive such as potassium permanganate or hydrogen peroxide to reduce emissions of hydrogen sulfide (H_2S).

h) Fugitive PM emissions from bulk materials storage and handling are controlled by wet suppression. Fugitive PM emissions from plant paved and unpaved roads are controlled by wet suppression, chemical treatment, and paved road sweeping.

5.0 <u>REGULATORY APPLICABILITY:</u>

1) Allegheny County Health Department Rules and Regulations (Article XXI)

The requirements of Article XXI, Parts B and C for the issuance of major source operating permits have been met for this facility. Article XXI, Part D, Part E & Part H will have the necessary sections addressed individually in the operating permit. Some Article XXI sections are addressed below:

a. ***Article XXI, ACHD Coke Ovens and Coke Oven Gas (§2105.21)***

This source does not contain any coke ovens, but does receive coke oven gas (COG) from the US Steel Plant in Clairton for use as fuel in multiple process and combustion units. As such, this source is subject to the requirements of §2105.21.h.4 for each subject unit that combusts COG, whereby the sulfur compound concentration, measured as H_2S, is limited to no greater than 35 grains per hundred dry standard cubic feet of COG. The source shall measure the concentration of the COG combusted a minimum of once per each successive twenty-four hour time period to demonstrate compliance with this limit. This requirement and corresponding record keeping are incorporated into the permit.

b. ***Article XXI, ACHD Slag Quenching (§2105.20.b)***

The source performs slag quenching operations in association with the blast furnace slag. The permittee has specified that the slag is not granulated. and that they do not use ladles to transfer the slag to the pits; rather, the slag is poured directly into the slag pits using troughs that are located in the floors of the furnace cast houses that run directly to the pits. As such, the requirements of §2105.20.a (granulated slag) and §2105.20.c (hard slag ladle pits) do not apply, but the requirements of §2105.20.b (hard slag facility), which does not reflect only the use of ladles for slag transfer, does apply. Such requirements are incorporated into the major source operating permit for the affected activities.

c. ***§2105.15 (Degreasing Operations)***

Solvent based parts cleaning tanks are used at the plant to clean soiled or greasy machinery parts and components. The source operates machine shop parts cleaners and mobile equipment repair area parts cleaners. The permittee has specified that the facility does not use degreasing fluids that contain VOCs and that each parts cleaner at the plant has opening less than 10 square feet in surface area. Therefore, the requirements of §2105.15 do not apply.

d. ***§2105.48 Miscellaneous Fugitive Sources:***

The requirements of Sections 2105.40, 2105.41, 2105.42, 2105.43, 2105.44, 2105.45, and 2105.47 apply to the source because the source meets the geographic criteria specified in §2105.45.a.1 and a.2. The requirements contain opacity and visibility limits for material transported within the source, parking lot fugitives, construction, demolition and internal traffic. Section 2105.43 prohibits any visible emissions, leaks, spills, or other escape of material during the transport of any solid or liquid material outside the boundary line of the source. The requirements of each rule are incorporated into the permit at the Site Level Terms and Conditions section.

e. ***Permit Section IV – Site Level Requirements:***

The conditions in the site level section of the permit also apply to emission sources in the Emission Unit Section, as appropriate. For example, the visible emissions requirements of §2104.01 (Condition IV.1) apply in addition to the visible emissions requirement of 40CFR Part 63 Subpart FFFFF.

f. ***Cold Start, §2108.01.d***

Pursuant to the cold start waiver letter dated April 12, 2002, U.S.S-ET has been granted a waiver from the 24-hour reporting for cold starts for the Riley Boilers 1, 2 and 3, and instead, will require semi-annual reports listing the date and time of all cold starts for each boiler.

g. ***Regulated Pollutants With No Established Regulatory Emission Limitation***

Section 2103.12.a.2.B of Article XXI requires that RACT be applied to pollutants regulated by Article XXI without established regulatory emission limitations. RACT for PM/PM_{10}, CO, SO_2, and VOC emissions from the facility emission units has been determined to be proper operation and maintenance of the equipment according to good engineering and air pollution control practices. Therefore, the emission limitations for these pollutants will be the maximum potential emissions under proper operation of the emission units as shown in the above emission summary.

2) Pennsylvania State Requirements

NO_X Budget Trading Program (25 Pa Code Chapter 145 Subchapter A; 40 CFR part 96 subparts BBBB, FFFF, HHHH)

The permittee shall meet the requirements of the PA NO_X Budget Trading Program (25 PA Code §145 Subchapter A) for non-EGUs.

The NO_X Budget Trading Program has been addressed in Site Level Section of the permit.

3) <u>NESHAP and MACT Standards:</u>

a. ***40 CFR Part 63 Subpart DDDDD: National Emission Standards for Hazardous Air Pollutants for Industrial, Commercial, and Institutional Boilers and Process Heaters:***

Pursuant to 40 CFR 63.7491(g) & 40 CFR 63.7491(k)), the Blast furnace stoves and Riley Boilers Nos. 1-3 are not subject to the boiler MACT because the boilers are blast furnace gas fired (based 63.7575 -definition; blast furnace gas fuel-fired boiler or peocess heater meant an industrial/commercial/institutional boiler or process heater that receives 90 percent or more of its total annual gas volume from blast furnace gas.

b. ***40 CFR Part 63 Subpart FFFFF: National Emission Standards for Hazardous Air Pollutants for Integrated Iron and Steel:***

The facility is subject to this subpart because it operates a steel plant. This subpart establishes national emission standards for hazardous air pollutants for integrated iron and steel manufacturing facilities. The affected sources at the Edgar Thomson Works are the No. 1 and No. 3 Blast Furnace Casthouses and the BOPF and shop ancillary operations (hot metal transfer, hot metal desulfurization, slag skimming, and ladle metallurgy). The Subpart FFFFF requirements have been added to this permit.

<u>40 CFR 63 Subparts A and FFFFF [§63.7800(b); §63.7831(a) and §63.7810(c)]</u>

a. The permittee shall implement the following plans established in October 19, 2015 or the most recent developed plans:

   i. Operation and maintenance plan [40 CFR 63.7800(b)]
   ii. Site-specific monitoring plan [63.7831(a)]
   iii. Startup, shutdown and malfunction plan [40 CFR 63.7810(c)]

b. The established plan required in condition (a) above shall apply to the following processes

   i. #1 and #3 Blast Furnace Emission System
   ii. “F” and “R” BOP Furnace Emission System
   iii. LMF Emission System
   iv. Mixer Emission System

c. ***40 CFR Part 63, Subpart Q: National Emission Standards for Hazardous Air Pollutants for Industrial Process Cooling Towers.***

The requirements of this subpart are not applicable to the cooling towers because the cooling towers are not operated with chromium-based water treatment chemicals.

d. ***40 CFR Part 63 Subpart ZZZZ: National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines:***

The generators are subject to this subpart. However, per §63.6590(c), the generators meet the requirements of this subpart by meeting the requirements of 40 CFR Part 60, Subpart IIII, and no further requirements of Part 63, Subpart ZZZZ apply.

4) <u>Risk Management Program (§2104.08, 40 CFR Part 68):</u>

The facility currently does not store a listed regulated material above the threshold quantities specified by the regulation. Should the facility, as defined in 40 CFR Part 68.3, become subject to Part 68, then the owner or operator shall submit a risk management plan (RMP) by the date specified in Part 68.10

and shall certify compliance with the requirements of Part 68 as part of the facility's annual compliance certification.

5) Greenhouse Gas Reporting (40 CFR Part 98):

The facility is subject to this mandatory greenhouse gas (GHG) reporting requirements because it has the potential to emits 25,000 metric tons or more of carbon dioxide equivalent (CO_2e). Pursuant to 40 CFR §98.2.a.2, the facility shall submit reports to the US EPA in accordance with 40 CFR Part 98.

6) New Source Performance Standards (NSPS)

a. 40 CFR Part 60, Subpart N: (Standards of Performance for Primary Emissions from Basic Oxygen Process Furnaces for Which Construction is Commenced After June 11, 1973)

The requirements of this subpart is not applicable to the operations of the Basic Oxygen Process (BOP) Shop because the BOP shop was constructed prior to the construction commencement applicability dates in the regulations, and there have been no modification or reconstruction approvals issued to the sources for these units.

b. 40 CFR Part 60, Subpart Na: Standards of Performance for Secondary Emissions from Basic Oxygen Process Steelmaking Facilities for Which Construction is Commenced After January 20, 1983

The requirements of this subpart is not applicable to the operations of the Basic Oxygen Process (BOP) Shop because the BOP shop was constructed prior to the construction commencement applicability dates in the regulations, and there have been no modification or reconstruction approvals issued to the sources for these units.

c. 40 CFR Part 60, Subpart D: Standards of Performance for Fossil-Fuel-Fired Steam generators for Which Construction is Commenced After August 17, 1971

The requirements of this subpart is not applicable to the Riley Boilers Nos. 1-3 because these units were installed in 1943, prior to the construction commencement applicability dates in the regulations, and there have been no modification or reconstruction approvals issued to the source for these units.

d. 40 CFR Part 60, Subpart K: Standards of Performance for Storage Vessels for Petroleum Liquids for Which Construction, Reconstruction, or Modification Commenced After June 11, 1973, and Prior to May 19, 1978.

The requirements of this subpart are not applicable to the storage tanks because these vessels do not meet the 40,000 gallons tank capacity criteria specified in the regulations.

e. ***40 CFR Part 60, Subpart Ka: Standards of Performance for Storage Vessels for Petroleum Liquids for Which Construction, Reconstruction, or Modification Commenced After May 18, 1978, and Prior to July 23, 1984.***

The requirements of this subpart are not applicable to the storage tanks because these vessels do not meet the 40,000 gallons tank capacity criteria specified in the regulations.

f. 40 CFR Part 60, Subpart Kb: Standards of Performance for Volatile Organic Liquid Storage Vessels Including Petroleum Liquid Storage Vessels.

The requirements of this subpart are not applicable to the storage tanks because these vessels do not meet the 75 cubic meter (19,812.90 gallons) tank capacity criteria specified in the regulations.

g. ***40 CFR Part 60, Subpart IIII:*** ***Standards of Performance for Stationary Compression Ignition Internal Combustion Engines***

The facility is subject to this subpart because the stationary compression ignition (CI) engines were constructed, reconstructed, or modified after July 11, 2005. The applicable requirements have been incorporated in the permit.

7) Compliance Assurance Monitoring (40 CFR PART 64):

Blast Furnace No. 1, Blast Furnace No. 3, and BOP Shop have potential emissions greater 100 tons per year and uses control device to control the emissions. However, the emission units are not subject to the Compliance Assurance Monitoring (CAM) requirements pursuant to 40 CFR 64.2(b)(i) which says that facility that subject to "*emission limitations or standards proposed by the Administrator after November 15, 1990 pursuant to section 111 or 112 of the Act*". The facility (Blast Furnace 1 & 3 and BOP Shop) is already subject to the 40 CFR Part 63 Subpart FFFFF--National Emission Standards for Hazardous Air Pollutants for Integrated Iron and Steel promulgated on April 22, 2004. No other emission units utilize a control device for any other pollutants whose emissions exceed 100% of the amount (in tons per year) required for classification as a major source.

8) Environmental Justice:

Braddock, PA is considered an environmental justice (EJ) area, defined by the Pennsylvania DEP as "any census tract where 20 percent or more individuals live at or below the federal poverty line, and/or 30 percent or more of the population identifies as a non-white minority, based on data from the U.S. Census Bureau and the federal guidelines for poverty". Because this is an existing facility, alternative site location is not feasible. The operating permit contains all testing, monitoring, recordkeeping, and reporting requirements (as required under §70.6(a)(3)).

9) Enforcement and Compliance History:

The sulfur dioxide violation leading to the high priority violation (HPV) is related to the December 24, 2018, fire that rendered the U.S. Steel-Clairton desulfurization plant inoperable. The desulfurization plant was put back online in April 2019, returning the Clairton Plant (and all other facilities burning coke oven gas generated at the Clairton Plant) to compliance with the H_2S concentration and SO_2 emission limits. The Enforcement case remains in litigation and/or negotiation due to the civil penalty to be agreed on or awarded in court.

A Resolution date is entered for the Addressing Action only when all requirements have been completed, that is the facility has completed the activities specified under the compliance plan or in the Consent Agreement/Decree, and in this case the facility has completed the activities specified in the compliance plan. The only pending issue is the penalty, which could take months or years to resolve. Until a resolution date is entered on the linked Enforcement Action that shows up in the Case File pathway as the Addressing Action for the violation, the violation will remain unresolved in ECHO.

The May 17, 2022, consent decree is between the Department of Justice/ACHD and U.S. Steel to resolve the notification requirements violation, opacity, record keeping and certain NESHAP Subpart FFFFF provisions. And based on the consent decree and as of the date of lodging of this Consent Decree, U.S. Steel has performed certain actions to address the violations alleged in the Complaint. However, as refenced above, a resolution date is entered for the Addressing Action only when all requirements have been completed, that is the facility has completed the activities specified under in the Consent Decree.

6.0 PERMIT APPLICATION COMPONENTS:

Enforcement Orders and Consent Decrees and Agreements
The facility is currently in compliance with all applicable requirements of the permit. All conditions of the consent order have been addressed or are being addressed to the satisfaction of the Department.

a) Reasonable Available Control Technology (RACT)- RACT IP 0051-I008 & I008a:

The facility is major for Nitrogen Oxide (NO_X) and therefore subject to Reasonable Available Control Technology (RACT). Section 2105.06 of Article XXI requires that RACT be applied to all major sources of NO_X and VOC. Plan Approval Order and Agreement Upon Consent Number 235, dated December 30, 1996, submitted to the US EPA as a site specific SIP revision to Allegheny County's portion of the PA SIP.

The facility's RACT was re-evaluated and RACT II, IP 0051-I008 was issued in April 21, 2020 and amended (IP 0051-I008a) in December 7, 2020, and it established the following NO_X and VOC RACT requirements:

NO_X RACT

a) The permittee shall at no time operate the following equipment unless it is being properly operated and maintained in accordance with good engineering and air pollution control practices, with the exception of actions to mitigate emergency conditions:

1) Blast Furnace No. 1 Casthouse
2) Blast Furnace No. 3 Casthouse
3) BFG Flare
4) Basic Oxygen Process (BOP) Shop
5) Ladle Metallurgy Facility (LMF)
6) Dual Strand Caster

b) At no time shall Boilers 1-3 exceed the following limits for NO_X emissions, with the exception of actions to mitigate emergency situations:

RACT NO_X Emission Limitations

Process	Hourly Emission Limit** lbs/MMBtu	Annual Emission*** Limit lbs/MMBtu	Annual Emission*** Limit Tons/yr
Boiler 1	0.07	0.05	114.98
Boiler 2	0.07	0.05	114.98
Boiler 3	0.07	0.05	114.98

*A year is defined as any consecutive 12-month period.
**Based on 30-day rolling average Continuous Emission Monitoring (CEM) data.
***Based on 12-month rolling average Continuous Emission Monitoring (CEM) data

c) The facility shall not exceed, at any time, with the exception of actions to mitigate emergency conditions, the following natural gas capacity factors for Boilers 1-3:

Boiler	Capacity Factor
1	78.4%
2	78.4%
3	78.4%

d) Boilers 1-3 shall have properly maintained and operated Continuous Monitoring Systems (CEM) or approved alternatives, meeting all requirements of Section 2108.03 of Article XX at all times with the exception of emergency or planned outages, repairs, or maintenance.

e) The NO_X emission limitations for Boilers 1-3 shall be determined by a thirty day rolling average and by a twelve month rolling average of CEM data for the lbs/MMBtu and TPY emission limitations, respectively.

f) At no time shall Blast Furnace Stoves 1 & 3 exceed the following limits for NO_X emissions, with the exception of actions to mitigate emergency situations:

RACT NO_X Emission Limitations

Process	Emission Limit (Lbs/MMBtu)	Annual Emission Limit (Tons/yr) *
Blast Furnace Stove 1	0.03	65.04
Blast Furnace Stove 3	0.03	65.04

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

g) The permittee shall at all times maintain all appropriate records to provide sufficient data and calculations to clearly demonstrate compliance with Section 2105.06 of Article XXI and the RACT Order.

h) The permittee shall make all of the above records available to the Department upon request.

VOC RACT ANALYSIS

1) **Blast Furnace No. 1 and No. 3 Casthouses**

The VOC concentration in the casthouse baghouse exhaust is quite low and is not amenable to any cost effective control technology that would reduce VOC emissions. Therefore, RACT for the blast furnace casthouses is proper maintenance and operation according to good engineering and air pollution control practices at all times.

2) **Blast Furnaces No. 1 and No. 3 Stoves**

Potential VOC emissions from the blast furnace stoves is low and VOC control for the blast furnace stoves are not practical and cost-prohibitive. Therefore, RACT for the blast furnace stoves is proper maintenance and operation according to good engineering and air pollution control practices at all times.

3) **Basic Oxygen Process (BOP) Furnace**

RACT for the BOP shop is proper maintenance and operation according to good engineering and air pollution control practices at all times.

4) **Riley Boilers No.1, 2 and 3**

This Evaluation of RACT concluded that good combustion practices will minimize VOC and these practices constitute RACT for boilers 1, 2 and 3.

b) *Second Consent Decree (Civil Action Nos. 79-709 and 91-329) and Subsequent Order (Civil Action No. 99-1783)*

The Second Consent Decree outlined a compliance program for the Edgar Thomson Works Blast Furnace No. 3 and BOP Shop, shutdown provisions for certain equipment at the plant, and a road dust control program. Portions of this Consent Decree, namely Section VI.B (Compliance Program – Edgar Thomson Works BOP

Shop), Appendix 5 (Edgar Thomson BOP Shop Operating and Maintenance Practices), and Appendix 6 (Road Dust Control Program), were later terminated by an order (Civil Action No. 99-1783) issued on March 3, 2000. This order required a number of compliance requirements for the BOP Shop, including new equipment installations and an ACHD Opacity Regulation compliance demonstration (EPA Method 9 observations) at the BOP Shop Roof Monitor and Primary Emission Control System Scrubber Stacks. The March, 2000 order (Civil Action No. 99-1783) also required recordkeeping and reporting, as well as the implementation of five (5) Supplemental Environmental Projects:

1. Continuous Caster Flux Baghouse,
2. BOP Shop Gas Suppression System,
3. Roadway Paving and Scrap Storage Area Upgrade,
4. BOP Shop Gas Cleaning Equipment Upgrades (Venturi Scrubbers), and
5. PCB Transformer Replacement. These actions were undertaken by the facility as required.

The remaining requirements of the Second Consent Decree that were not terminated by Action No. 99-1783 are incorporated into this major source operating permit, as summarized below.

The Blast Furnace No. 3 equipment requirements, as listed in the Second Consent Decree, include the following:

1. A local hood that extends over a portion of the iron trough to cover, at a minimum, the entire maximum trajectory of hot metal into the trough (this local hood is to be located below the bustle pipe and is evacuated both in front of and behind the bustle pipe at a normal flow rate of 140,000 acfm; the collected particulate emissions are to be exhausted to the Blast Furnace Baghouse);
2. An air “curtain” designed to direct emissions toward the local hood and operate whenever hot metal or slag is flowing from the taphole (the curtain is to consist of 18 air jets positioned on a stationary, inverted U-shaped pipe);
3. Gas lances located at each iron spout to direct gas into the iron ladle;
4. Gas lances located at the iron diverters to suppress emissions escaping from this open area of the runner system; and
5. A cumulative meter to monitor the amount of gas used per cast.

The Blast Furnace No. 3 operating and maintenance requirements, to be employed for each cast (with the exception of unusual or abnormal operating conditions), as listed in the Second Consent Decree, include the following:

1. Trough area:

   a. The trough hood shall be evacuated during every cast. At all times when the trough is drained after a cast, the hood shall be evacuated during the times that hot metal is being blown out of the trough.
   b. The air curtain shall be operated during all casts.

2. Iron Ladle Area and Diverter Area:

   a. Gas shall be used at all iron ladles just prior to and during the filling of every ladle at every cast.
   b. Gas shall be used at the iron diverter at all times when hot metal is flowing through the diverter.
   c. Gas usage meters shall be operable at all times and the consumption of gas shall be recorded daily. The meters will record only the gas consumed to suppress emissions during casting.

3. The permittee may experiment with existing techniques or any future development techniques for emission suppression provided that the compliance is maintained and only after prior notice has been given to the Department. The initial notice may be verbal, but must be confirmed in writing and should include the duration of the experimentation period.

c) ***Consent Decree (Civil Action No. 2:22-cv-00729-CB-CRE in the U.S. District Ct. for the W.D. of PA), December 16, 2022***

In addition to requiring studies on the Casthouse baghouse and BOP shop roof ventilation systems, the following requirements were included in the operating permit:

1. Installation of SO_2 CEMS on the Riley Boilers.
2. Addition of an oxidizing agent in the wet suppression system of the slag pits to reduce H_2S.

d) ***Installation Permits:***

a) ***ACHD Installation Permit No. 84-I-0008-P, Issued March 20, 1984*****:**

This permit, which allowed for the reactivation of the No. 1 Blast Furnace, requires that casthouse emission control be achieved by utilizing a hood above the main iron trough which is connected to a 140,000 SCFM baghouse, by covering the runners, and by utilizing fume suppression techniques. The permit was issued subject to the condition that there be continued use of the venturi scrubber on the furnace offgas and that the facility demonstrate compliance with ACHD visible emission limitations, as well as applicable requirements of the then-existing Consent Decree.

b) ***ACHD Installation Permit No. 87-I-0021-P, Issued August 5, 1987*****:**

This permit, which allowed for the reactivation of the No. 3 Blast Furnace, required that the facility comply with Appendix 7 of the then-existing Amended Mon Valley Consent Decree. The requirements for Blast Furnace No. 3 listed in Appendix 7 are consistent with the requirements specified in the Second Consent Decree, summarized earlier.

c) ***ACHD Installation Permit 93-I-0039-P, Issued August 18, 1993*****:**

The operation of the Waste Product Recycling and Briquetting Process at the plant, which is an Alternative Operating Scenario, is subject to the following conditions:

1. Emissions from the installation shall not exceed, at any time, the following limits, based on 5,000 hours of operation per year:

Pollutant	Hourly Emission Limit (lbs/hr)	Annual Emissions Limit (tpy)
PM/PM_{10}	1.3	3.25
SO_2	5.3	13.25
CO	1.1	2.75
NO_X	4.1	10.25
VOC	0.8	2.00

2. If the Bureau determines that material handling operations require hooding and dust controls, such items shall be installed promptly by the company.

d) ***ACHD Installation Permit No. 0051-I004 and 0051-I004a, Issued August 31, 2006***

This installation permit was initially issued in August 31, 2006 and modified in January 1, 2007. It was for the F & R Vessel Basic Oxygen Process Furnace (BOPF) Secondary Emission. The modification (IP-0051-I004a) was to revised PM_{10} emission rate from 11.2 lb/hr and 49.1 tons/yr to 24.9 lb/hr and 109.1 tons/yr; $PM_{2.5}$ emission rate revised from 5.5 lb/hr and 24.0 tons/yr to 24.9 lb/hr and 109.1 tons/yr. Condition V.A.3.a: “3-month” changed to “6-month.” The emission summary section VII for PM_{10} and PM2/5 were changed from 49.1 and 24.0 tons/yr to 109.1 tons/yr.

e) ***ACHD Installation Permits No. 0051-I005, Issued March 13, 2009*:**

This installation permit is for the modification of the LMF Baghouse and Flux/Alloy Handling System, and it includes the following:

1. Increase the capacity of the existing baghouse from approximately 93,000 acfm to 120,000 acfm by adding two new baghouse modules (four existing modules plus two new modules for a total of six modules after modification). The air flow to each module after the upgrade will drop from approximately 23,333 acfm per compartment to 20,000 acfm per compartment, which will reduce the A/C ratio from 5.53:1 to 4.71:1.

2. Most of the ductwork will be increased to a 52 inch diameter from the current 42 inch diameter. Additionally, the spark box will be modified for the increased volume and components will be added for more effective cooling and dust drop out. The booster fan for the additive system will be eliminated and the additive system ductwork will be rerouted to by-pass the spark box as no sparks are generated by its operation. Thus, the spark box will only serve the direct evacuation of the LMF hood. To accommodate the additional 2 modules the baghouse inlet plenum will be modified or replaced.

3. The 4 existing belt driven fans will be replaced with direct drive motors of an identical horse power. The 2 new fans will also have direct drive motors and will have the same horse power as the existing motors.

4. The upgraded baghouse will comply with all applicable requirements of 40 CFR 63 Subpart FFFFF (National Emission Standards for Hazardous Air Pollutants: Integrated Iron and Steel Manufacturing).

The installation permit conditions have be incorporated into the Title V Operating Permit under the LMF source.

f) ***ACHD Installation Permits 94-I-0026-P and 94-I-0027-P*:**

These installation permits were for the construction of new blast furnace slag pits designed to allow slag from Blast Furnaces Nos. 1 and 3 to be run directly into the respective slag pits. This replaced the old slag pit arrangement whereby the slag was loaded into slag pots and transferred by train to remote pits. These permits require the following:

1. Emissions from the slag pits comply with all applicable emission standards of Articles XX and XXI;
2. Pouring practices shall be as outlined in a September 6, 1994 letter; and
3. The existing slag pits be deactivated upon activation of the new pits.

g) ***Installation* Permit 0051-I006, Issued September 14, 2017**

This installation permit is for the SO_2 SIP.

h) ***Installation* Permit 0051-I007- Not Issued**

This permit is for the installation an Endless Casting and Rolling (ECR) facility to replace the existing dual strand continuous caster (P005). The project was cancelled.

i) ***Installation* Permit 0051-I008, Issued April 21, 2020**

This installation permit is for the Reasonable Available Control Technology (RACT II), pursuant to Article XXI, section 2105.06. There are no new units being added to the facility as part of this permitting action.

j) ***Installation* Permit 0051-I009, Issued May 25, 2021**

This permit is for the installation for two 2,922 bhp emergency generators. The emergency generators are Cummins EPA-certified Tier 1 non-road diesel emergency generators.

e) Operating Permits:

a) ***ACHD Operating Permit No. 7035003-004-90105, Issued July 7, 1986:***

This operating permit specifies the following equipment requirements for Blast Furnace No. 1:

1. A local hood designed to evacuate the iron notch and trough area;
2. An air "curtain" designed to direct emissions toward the local hood and operate whenever hot metal or slag is flowing from the taphole;
3. Iron runner covers which cover the iron runner system whenever iron flows from the taphole, but allow openings for iron gates;
4. Moveable steam or gas lances, one located at each iron spout to direct steam or gas into the iron ladle;
5. Gas lances, one located at each iron and slag gate to suppress emissions escaping from these open areas of the runner system; and
6. Two cumulative meters, one to monitor the amount of steam used per cast and the other to monitor the amount of natural gas used per cast.

This permit requires the following operation and maintenance procedures:

1. The trough hood shall be evacuated during every cast. At all times when the trough is drained after a cast, the hood shall be evacuated during the times that hot metal is being blown out of the trough.
2. The air curtain shall be operated during all casts.
3. All runner covers shall be in place on active runners at all times during each cast.
4. A complete set of spare runner covers shall be kept available for use at the casthouse.
5. Runner bed materials shall be selected to minimize emissions.
6. Steam or gas shall be used at all slag and iron ladles just prior to and during the filling of every ladle at every cast.
7. Steam and gas usage meters at the iron and slag ladle area shall be operable at all times and the consumption of steam and/or gas shall be recorded daily. The meters will record only the gas and/or steam consumed to suppress emissions during casting.
8. Gas lances shall be used just prior to and during the flow of hot metal or slag through each gate, to suppress emissions generated from these open areas.
9. Gas usage meters at the iron and slag gates shall be operable at all times and consumption of gas used during casting shall be recorded daily.

b) ***ACHD Operating Permit No. 7035003-002-93800, Issued January 10, 1991:***

This permit requires that the BOP Shop be properly maintained and operated in accordance with the following:

1. Emissions from the hot metal mixer, direct pour station, charging ladle and metal desulfurization station shall be captured by movable hood car and mixer fixed hood and directed to the BOP Mixer & Desulfurization Baghouse;
2. Emissions from hot metal slag skimming and BOP Vessel F and R charging, tapping and slag dumping shall be collected by the charging aisle and furnace aisle roof canopies and directed to the BOP Secondary Baghouse;

3. Emissions from flux railcar unloading, BOP flux material transfer tower, BOP flux material internal conveying/transfer No.1, and BOP flux material internal conveying/transfer No.2 shall be collected and directed to a respective dedicated baghouse;
4. Emissions from oxygen blowing at BOP Vessels F and R shall be captured by a water cooled hood above each Vessel and directed to the BOP Shop Gas Cleaning Venturi Scrubber.

The permittee shall maintain and operate the BOP Shop Venturi Scrubber in accordance with the following at all times of Vessel F and R oxygen blowing:

1. The scrubber shall have a minimum scrubbing liquid flow rate of 3,203 gpm;
2. The scrubber shall operate at an average pressure drop of 75.96" w.c.; and
3. The scrubber shall operate at a design total particulate control efficiency of 99.5 percent.

c) ***<u>ACHD Operating Permit No. 7035003-002-90107, Issued February 18, 1993:</u>***

This operating permit limits the particulate matter emissions from the No. 3 Blast Furnace to 40 lbs/hr and 175 TPY. The permit also called for the following emission control technology to control particulate emissions from the iron trough, the iron runners, the iron spouts, and the iron ladles:

1. A local hood that extends over a portion of the iron trough to cover, at a minimum, the entire maximum trajectory of hot metal into the trough. This local hood is to be located below the bustle pipe and is evacuated both in front of and behind the bustle pipe at a normal flow rate of 140,000 acfm. The collected particulate emissions are to be exhausted to a baghouse.
2. An air "curtain" designed to direct emissions toward the local hood and operate whenever hot metal or slag is flowing from the taphole. The curtain is to consist of 18 air jets positioned on a stationary, inverted U-shaped pipe.
3. Iron runner covers which cover the iron runner system whenever iron flows from the taphole, but allow openings for iron gates.
4. Slag runner covers which cover the slag runner system whenever slag is flowing in the runners, but allow openings for slag gates.
5. Gas lances located at each iron spout to direct gas into the iron ladle.
6. Gas lances located at the iron diverters (or iron gates/dam) to suppress emissions escaping from this open area of the runner system.
7. A cumulative meter to monitor the amount of gas used per cast.
8. Installed instrumentation and computer monitoring equipment.

The following operation and maintenance procedures are required:

1. The trough hood shall be evacuated during every cast. At all times when the trough is drained after a cast, the hood shall be evacuated during the times that hot metal is being blown out of the trough.
2. The air curtain shall be operated during all casts.
3. All runner covers shall be in place on active runners at all times during each cast.
4. A complete set of spare runner covers shall be kept available for use at the casthouse.
5. Runner bed materials shall be selected to minimize emissions.
6. Gas flames shall be used at all iron ladles prior to and during the filling of every ladle at every cast.
7. Gas flames shall be used at the iron diverter at all times when hot metal is flowing through the diverter.
8. Gas usage meters at the iron ladle area and diverter area shall be operable at all times and the consumption of gas shall be recorded daily. The meters will record only the gas consumed to suppress emissions during casting.
9. All ladles shall be maintained so as to minimize emissions.

d) ***<u>ACHD Operating Permit 7035003-002-93900, Issued March 1, 1994:</u>***

The operation of the Ladle Metallurgy Facility (LMF) and the Dual Strand Caster is subject to the following:

1. The permittee shall at no time conduct LMF process operations while generating particulate emissions unless the LMF Baghouse is properly maintained and operated.

2. The outlet grain loading from the LMF Baghouse shall not exceed at any time 0.0052 grains per dry standard cubic foot of exhaust air.

3. The LMF Flux/Alloy Handling System and the LMF shall not be operated, nor allow to be operated, in such manner that visible emissions from any related air pollution control equipment, excluding uncombined water, equal or exceed an opacity of 15% at any time.

4. The LMF Flux/Alloy Handling System, the LMF, the Continuous Caster Shop, and all related operations, activities, and facilities including all equipment preparation and repair shops, shall not be operated, nor allowed to be operated, in such manner that visible fugitive emissions from any of these operations or activities, excluding uncombined water: a) Equal or exceed an opacity of 15% for a period or periods aggregating more than two and one half (2.5) minutes in any sixty (60) minute period; or b) equal or exceed an opacity of 45% at any time.

5. All emissions from the transfer of lime materials from transport vehicles to the LMF Flux/Alloy Handling System shall be collected and exhausted to the LMF Baghouse.

6. The automatic fume damper on the LMF emission control system shall maintain a negative pressure within the collection hood at all times so as to minimize any emissions that may escape the control system. Pressure measurements shall be recorded and retained for a period of two years and shall be made available upon request by the Department for inspection and copying.

7. The power input to the electrodes shall be automatically reduced upon the opening of the emergency bleeder valve as necessary to minimize the emissions which escape the hood.

8. No processing activities other than slag raking and argon bubbling related to slag raking shall be conducted at the LMF slag raking station located in the tapping aisle of the basic oxygen process (BOP) Shop. Other processing activities shall not be conducted at this station unless approved by the Department in a permit that specifically allows such additional processing activities following a demonstration, in a manner approved by the Department in advance that such activities do not cause or contribute to any violations of the applicable emissions standards.

9. No wire feeding shall be made at the LMF station at any time when power is being supplied to the electrodes.

7.0 METHODS OF DEMONSTRATING COMPLIANCE:

Various methods are used to demonstrate compliance with ACHD and federal regulations. These methods are summarized below:

a) Monitoring Requirements

1. Blast Furnaces, Basic Oxygen Process Shop (BOP), LMF Baghouses and Dual Strand Caster Dust Collectors

The permittee shall conduct an inspection once per week, check and record the fan motor amperes and damper positions for the emission control systems on a once-per-shift basis.

The permittee shall, at all times, have instrumentation to continuously monitor the differential pressure drop across each compartment of the Blast Furnace, BOP Shop, and LMF baghouses during process operations. Such instrumentation shall measure the pressure drop to within ½" w.c. and be properly operated, calibrated, and maintained according to manufacturer's specifications. The permittee shall also inspect the BOP Shop Venturi Scrubber on a daily basis and check and record the exhaust fan motor amperes and scrubbing liquid flow rates for the Venturi Scrubber once per shift per day. The Hydrogen Sulfide (H_2S) content of the Coke Oven Gas (COG) combusted at the plant shall be measured at least once per hour and the monthly average H_2S content recorded.

In addition, a bag leak detector will be use to demonstrate compliance with the VE requirements for the LMF baghouse and Mixer baghouse.

2. Blast Furnaces Baghouse; BOP Shop Baghouse and Venturi Scrubber Stack; LMF Baghouse Stack; Dual Strand Caster Tundish Baghouse; the Vacuum Degasser CO Flare and the Boiler stacks:

Notations of visible emissions from the Blast Furnace Baghouse stack; BOP Shop Baghouse and Venturi Scrubber stacks; LMF Baghouse stack; Dual Strand Caster Tundish Baghouse; the Vacuum Degasser CO Flare, and the Boiler stacks shall be made on a periodic basis, using EPA Method 9 of Appendix A of 40 CFR Part 60, or other methods approved by the Department. Visible emission notations shall also be made during normal daylight operations of other plant activities, such as BOP Slag Processing, Waste Product Recycling and Briquetting, and plant roads, which generate fugitive PM emissions. A trained individual shall record whether any emissions are observed and whether these emissions extend beyond the facility property line.

The permittee shall install, calibrate, maintain, and operate a NO_X CEM for each of the Riley Boilers Nos. 1-3 and record the output of the system, for measuring nitrogen oxide emissions discharged to the atmosphere. The CEM data recorder shall convert the data to the required reporting units in compliance with 25 PA Code §§139.101-139.111 relating to requirements for continuous in-stack monitoring for stationary sources (§2108.03.b.2, RACT Order No. 235, Condition 1.4 & RACT IP8a). Additionally, per the consent decree signed on December 16, 2022, US Steel is required to install SO_2 CEMs on the Riley Boilers.

3. Review of Existing Monitoring

To review if monitoring is sufficient, the Department looked at the five factors outlined in the 2007 US EPA response to petition for CITGO Refining and Chemicals (Petition No. VI-2007-01). These factors are:

a) Variability of emissions
b) Likelihood of violation
c) Presence of add-on controls
d) Type of monitoring, process, maintenance, or control equipment data available
e) Type and frequency of monitoring requirements for similar emission units at other facilities

See Appendix C for the analysis.

For the Blast Furnaces, Basic Oxygen Process (BOP) Shop, LMF, Dual Strand Caster, Caster Tundish, flares, and boilers, there is not much variability in process emissions. Even though some operations, particularly the BOP Shop and casters, are batch processes, the emissions cycle is consistent under normal operation.

There are no violations of existing stack test results for any of these processes. The limits in this permit were based on testing done for the purpose of establishing emissions limits plus a factor for operational flexibility, so the likelihood of violation is low.

Both the Blast Furnaces and BOP Shop have baghouses, and the primary collection system of the BOP Shop has a venturi scrubber. The baghouses have continuous parametric monitoring systems (CPMS). Although the venturi scrubber is primarily for PM control, it will control some gaseous emissions.

In all cases, fuel usage is required to be recorded, as well as all production records, and visible emissions records. The Riley Boilers already have NO_X CEMS, and per the December 16, 2022 Consent Order, will be required to install SO_2 CEMS. All coke oven gas used for fuel from the US Steel Clairton facility is monitored for sulfur content. For the emergency generators, monitoring of hours of operation and fuel sulfur limits is required. For the cooling towers, monitoring of total dissolved solids is required. All processes require proper operation and maintenance.

The Department reviewed the type and frequency of monitoring requirements for other steelmaking facilities in Allegheny County. There are no other blast furnaces or BOP shops. However, the monitoring in this permit is consistent with other steelmaking facilities.

Based on the above analysis, the Department believes that the current monitoring and proper operating practices is sufficient to demonstrate ongoing compliance. Additional monitoring on supplementary processes (such as the Tundish Preheaters, Vacuum Degasser and storage pile) is not necessary.

b) Record Keeping Requirements

Data and information required to determine compliance with the requirements of this permit include:

1. Production and material throughput data for each process unit (daily, monthly, and 12-month);
2. The PM/PM_{10} emission rates determined from biennial source testing at the Blast Furnace Baghouse, Blast Furnace Stoves, BOP Shop Mixer and Desulfurization Baghouse and Secondary Baghouse, and BOP Shop Venturi Scrubber;
3. Continuous measurements of the differential pressure drops across each compartment of the above baghouses;
4. Measurements of the BOP Shop Venturi Scrubber exhaust fan motor amperes and scrubbing liquid flow rates;
5. Daily recordings of the amount of gas used by the gas lances at the iron ladle area and diverter area;
6. The total amount of fuel used at the Blast Furnaces and Stoves, BOP Shop, LMF, Dual Strand Caster, Vacuum Degasser, Waste Product Recycling and Briquetting process, and each of the Boilers, recorded on a monthly basis for each fuel type;
7. The hourly and monthly average H_2S content of the COG used at the plant;
8. Stack test protocols and reports;
9. Visible emission notations for all process and combustion equipment;
10. Records of boiler cold starts (date, time and duration of each occurrence);
11. Boiler operating hours (hours/day, monthly, and 12-month);
12. NO_X continuous emissions data for each boiler;
13. Records of operation, maintenance, inspection, calibration and/or replacement of combustion equipment;

14. Records of the date, time, locations, amount of undiluted chemical dust suppressant, and the dilution ratio of each application of chemical dust suppressant to plant roads and other areas; and
15. Daily records of the odometer readings of trucks used to apply chemical dust suppressant and of the engine clock (i.e., run time), odometer readings, and locations swept by the plant road vacuum sweepers.

The permittee shall maintain records of control system inspections and performance evaluations and all records of calibration checks, adjustments, and maintenance performed on all equipment that is subject to this permit. (§2103.12.j)

The permittee shall record all instances of non-compliance with the conditions of this permit upon occurrence along with corrective action taken to restore compliance. (§2103.12.h.1) All records shall be retained by the facility for at least five (5) years. These records shall be made available to the Department upon request for inspection and/or copying. (§2103.12.j.2)

c) ***Reporting Requirements***

The permittee shall report the following information semiannually to the Department:

1. Outages and repairs of air pollution control equipment;
2. Total monthly fuel use, per fuel type, for each process unit and boiler;
3. The monthly average H_2S content of the COG fired;
4. Biennial source testing results (to be reported every two years under separate cover);
5. Boiler cold start information (date, time, and duration of each occurrence);
6. Results of visible emission notations;
7. Identification of any maintenance, repairs, patching, or repaving of paved roads or areas;
8. The dates on which chemical dust suppressant was applied to plant roads and other areas, as well as the locations, amounts, and dilution ratios of the applications; and
9. Any non-compliance information.

d) ***Testing Requirements:***

Article XXI §2103.12.h.1 and §2108.02

The permittee shall perform emission tests for PM/PM_{10} concentrations (gr/dscf) and equivalent emission rates (lb/hr) and plume opacity at the following:

1. The Blast Furnace Nos. 1 and 3 Casthouse Baghouse;
2. The Blast Furnace Nos. 1 and 3
3. The BOP Shop Mixer and Desulfurization Baghouse;
4. The BOP Shop Secondary Baghouse;
5. The BOP Shop Venturi Scrubber; and
6. The LMF Baghouse to demonstrate compliance with the Blast Furnace, BOP Shop, and LMF emission limitations of this permit. The permittee shall conduct visible emissions testing of plume opacity at the Continuous Caster Shop and the Vacuum Degasser Smokeless CO Flare.

The permittee shall perform sulfur oxides and nitrogen oxides emissions testing on the Riley Boilers Nos. 1-3 under normal (i.e., mixed fuel) operating conditions in order to demonstrate compliance with the boiler SO_2 and NO_X limitations of this permit. During this testing, the permittee shall compute the F-factor for BFG.

The permittee shall perform emission tests on the following sources:

1. Blast Furnaces 1 & 3 – (NO_X, SO_X, CO, and VOC)
2. Blast Furnace No. 1 Stoves and Blast Furnace No. 3 Stoves – (NO_x, CO, VOC)
3. Basic Oxygen Process (BOP) Shop (NOX, SOX, CO and VOC)
4. Riley Boilers Nos. 1-3 - (CO, and VOC)

All testing shall be conducted in accordance with applicable U.S. EPA approved test methods, Article XXI §2108.02, and as approved by the Department. The appropriate test methods are specified in the permit. (§2103.12.h.1; §2108.02.b, §2108.02.e)

All testing shall be repeated at least once every two years from the date of the prior valid test.

8.0 FACILITY EMISSIONS SUMMARY:

TABLE 16
Emission Limitations Summary

POLLUTANT	ANNUAL EMISSION LIMIT (tons/year)*
Particulate Matter	1,525.71
PM_{10}	1,434.76
$PM_{2.5}$	1,367.84
Nitrogen Oxides (NO_X)	1,356.54
Sulfur Dioxide (SO_2)	3,858.04
Carbon Monoxide (CO)	19,157.94
Volatile Organic Compound (VOC)	166.69
Lead	1.18
Total HAP	174.53
GHGs (CO2e)	11,525,879

***A year is defined as any consecutive 12-month period.**
All PM species shown above are total PM (filterable + condensable).

9.0 RECOMMENDATION:

All applicable Federal, State and County regulations have been addressed in the permit. The facility is currently in compliance with all applicable requirements of the permit. The Renewal Title V Operating Permit should be approved with the emission limitations, terms and conditions in the Title Operating Permit No. 0051-OP23.

APPENDIX A: Emission Unit Data

Emission Unit Data

Unit: **Blast Furnace No. 1 & Casthouse**
Max. Capacity: 1,752,000 TPY
Date installed: Unknown
Fuel/Raw Material: Coke, Iron-Bearing Materials, Fluxes
Exhaust Stack S002 (Blast Furnace Baghouse); 284,000 SCFM
Emission controls: Blast Furnace Nos. 1 & 3 Baghouse; Double Bell and Hopper, Dust Catcher/Venturi Scrubber and Cooling Tower for BFG Cleaning

Unit: **Blast Furnace No. 1 Stoves**
Max. Capacity: 495 MMBtu/hr Rated Capacity (Total for 3 Stoves)
Date Installed: Unknown
Fuel/Raw Material: Blast Furnace Gas, Supplemented with Coke Oven Gas and Natural Gas
Exhaust Stack S001; 171,000 SCFM
Emission controls: None

Unit: **Blast Furnace No. 3 & Casthouse**
Max. Capacity: 1,752,000 TPY
Date installed: Unknown
Fuel/Raw Material: Coke, Iron-Bearing Materials, Fluxes
Exhaust Stack S002 (Blast Furnace Baghouse); 284,000 SCFM
Emission controls: Blast Furnace Nos. 1 & 3 Baghouse; Double Bell and Hopper, Dust Catcher/Venturi Scrubber and Cooling Tower for BFG Cleaning

Unit: **Blast Furnace No. 3 Stoves**
Max. Capacity: 495 MMBtu/hr Rated Capacity (Total for 3 Stoves)
Date Installed: Unknown
Fuel/Raw Material: Blast Furnace Gas, Supplemented with Coke Oven Gas and Natural Gas
Exhaust Stack S004; 170,174 SCFM
Emission controls: None

Unit: **Blast Furnace Gas Flare**
Max. Capacity: 26,280 MMCF/yr; 270 MMBtu/hr
Date Installed: Unknown
Fuel/Raw Material: Blast Furnace Gas
Exhaust Stack S003; 105,000 SCFM
Emission controls: N/A

Unit: **BOP Shop**
Max. Capacity: 3, 467,500 TPY
Date Installed: Unknown
Fuel/Raw Material: Hot Metal (Iron), Flux Material, Alloy Additives
Exhaust Stack S005 (Hot Metal Transfer/Desulfur. Baghouse); 220,000 ACFM
Stack S006 (BOP Secondary (Fugitive) Baghouse); 497,000 ACFM
Stacks S007, S008 (BOP Shop Venturi Scrubber Stacks); 280,000 ACFM

Emission controls: Hot Metal Transfer/Desulfurization Baghouse; BOP Shop Secondary (Fugitive) Baghouse; BOP Shop Venturi Scrubber; Four (4) Material Handling Baghouses

Emission Unit Data

Unit:	**Ladle Metallurgy Facility and Dual Strand Caster**
Max. Capacity:	3, 467,500 TPY
Date Installed:	1992
Fuel/Raw Material:	Liquid (Molten) Steel, Fluxes
Exhaust	Stack S009 (LMF Baghouse); 70,000 ACFM
Emission controls:	LMF Baghouse; Baghouse for LMF Tripper Car (Conveyor System); Baghouse for Pneumatic Lime Bin Feeder System; Small Dust Collectors to Control PM Emissions from Caster Shroud Cleaning, Slab Grinding, Tundish Maintenance, and the Caster Mold Flux Feeder System

Unit:	**Vacuum Degasser**
Max. Capacity:	1,200,000 TPY
Date Installed:	1996
Fuel/Raw Material:	Liquid (Molten) Steel, Alloying Materials
Exhaust	Stack S011 (CO Flare)
Emission controls:	Smokeless CO Flare

Unit:	**Riley Boiler No. 1**
Max. Capacity:	525 MMBtu/hr Rated Capacity
Date Installed:	1943
Fuel/Raw Material:	BFG, COG, NG
Exhaust	Stack S012
Emission controls:	N/A

Unit:	**Riley Boiler No. 2**
Max. Capacity:	525 MMBtu/hr Rated Capacity
Date Installed:	1943
Fuel/Raw Material:	BFG, COG, NG
Exhaust	Stack S013
Emission controls:	N/A

Unit:	**Riley Boiler No. 3**
Max. Capacity:	525 MMBtu/hr Rated Capacity
Date Installed:	1943
Fuel/Raw Material:	BFG, COG, NG
Exhaust	Stack S014
Emission controls:	N/A

Unit:	**Blast Furnace Slag Pits**
Max. Capacity:	581,565 TPY
Date Installed:	1995
Fuel/Raw Material:	Blast Furnace Slag
Exhaust	N/A
Emission controls:	N/A

Emission Unit Data

Unit:	**Bulk Materials Storage and Handling**
Max. Capacity:	5,070,265 TPY Throughput Capacity
Date Installed:	N/A
Fuel/Raw Material:	Blast Furnace Raw Materials (i.e., Coke, Iron-Bearing Materials, Fluxes), Blast Furnace Flue Dust
Exhaust	N/A
Emission controls:	Wet Suppression

Unit:	**Plant Roads**
Max. Capacity:	2.22 mi. Paved roads; 0.82 mi. Unpaved Roads; 8 acres Parking Lots
Date Installed:	N/A
Fuel/Raw Material:	N/A
Exhaust	N/A
Emission controls:	Wet Suppression; Chemical Treatment; Paved Road Sweeping

Result of the Wastewater Treatment Analysis

PARAMETER	METHOD	DL	UNITS	River Intake	005	006	006	006	008	009	009	009	106	INFLUENT 106	EFFLUENT 106	106	109	INFLUENT 109	EFFLUENT 109	109	209	INFLUENT 209	EFFLUENT 209	209
				3/21/2006	3/21/2006	3/21/2006	3/24/2006	3/25/2006	3/21/2006	3/21/2006	3/24/2006	3/25/2006	3/21/2006	3/24/2006	3/24/2006	3/25/2006	3/21/2006	3/24/2006	3/24/2006	3/25/2006	3/21/2006	3/24/2006	3/24/2006	3/25/2006
NPDES Pollutants, 1M-28M 03/24/06 CMC																								
Mercury	EPA 245.1	0.2	ug/L	<0.2		<0.2	<0.2	<0.2		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Total Volatiles (NPDES) EPA 624 03/22/06 LAM																								
Acrolein		100 ug/L	ug/L	<100		<100	<100	<100		<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
Acrylonitrile		100 ug/L	ug/L	<100		<100	<100	<100		<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
Benzene		5ug/L	ug/L	<5		<5	<5	<5		<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Bromoform		5ug/L	ug/L	<5		<5	<5	<5		<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	15	<5	<5	50
Carbon Tetrachloride		5ug/L	ug/L	<5		<5	<5	<5		<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Chlorobenzene		5ug/L	ug/L	<5		<5	<5	<5		<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Chlorodibromomethane		5ug/L	ug/L	<5		<5	<5	<5		<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	32	<5	<5	19
Chloroethane		10 ug/L	ug/L	<10		<10	<10	<10		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
2-Chloroethylvinyl ether		10 ug/L	ug/L	<10		<10	<10	<10		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Chloroform		5ug/L	ug/L	<5		<5	<5	<5		<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	15	<5	<5	<5
Dichlorobromomethane		5ug/L	ug/L	<5		<5	<5	<5		<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	19	<5	<5	7
1,1-Dichloroethane		5ug/L	ug/L	<5		<5	<5	<5		<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
1,2-Dichloroethane		5ug/L	ug/L	<5		<5	<5	<5		<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
1,1-Dichloroethylene		5ug/L	ug/L	<5		<5	<5	<5		<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
1,2-Dichloropropane		5ug/L	ug/L	<5		<5	<5	<5		<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
1,3-Dichloropropylene		5ug/L	ug/L	<5		<5	<5	<5		<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Ethylbenzene		5ug/L	ug/L	<5		<5	<5	<5		<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Methyl Bromide		10 ug/L	ug/L	<10		<10	<10	<10		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Methyl Chloride		10 ug/L	ug/L	<10		<10	<10	<10		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Methylene Chloride		5ug/L	ug/L	<5		<5	<5	<5		<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
1,1,2,2-Tetrachloroethane		5ug/L	ug/L	<5		<5	<5	<5		<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Tetrachloroethylene		5ug/L	ug/L	<5		<5	<5	<5		<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Toluene		5ug/L	ug/L	<5		<5	<5	<5		<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
1,2-trans-Dichloroethylene		5ug/L	ug/L	<5		<5	<5	<5		<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
1,1,1-Trichloroethane		5ug/L	ug/L	<5		<5	<5	<5		<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
1,1,2-Trichloroethane		5ug/L	ug/L	<5		<5	<5	<5		<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Trichloroethylene		5ug/L	ug/L	<5		<5	<5	<5		<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Vinyl Chloride		10 ug/L	ug/L	<10		<10	<10	<10		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Total Semivolatiles (NPDES) EPA 625 03/30/06 MSM																								
2-Chlorophenol		10 ug/L	ug/L	<10		<10	<10	<10		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
2,4-Dichlorophenol		10 ug/L	ug/L	<10		<10	<10	<10		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
2,4-Dimethylphenol 1		10 ug/L	ug/L	<10		<10	<10	<10		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
4,6-Dinitro-o-cresol		50 ug/L	ug/L	<50		<50	<50	<50		<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
2,4-Dinitrophenol		50 ug/L	ug/L	<50		<50	<50	<50		<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
2-Nitrophenol		10 ug/L	ug/L	<10		<10	<10	<10		<10	<10	<10	<10	<10	<10	<10	15	<10	<10	<10	<10	<10	<10	<10
4-Nitrophenol		50 ug/L	ug/L	<50		<50	<50	<50		<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
p-Chloro-m-cresol		10 ug/L	ug/L	<10		<10	<10	<10		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Pentachlorophenol		50 ug/L	ug/L	<50		<50	<50	<50		<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
Phenol		10 ug/L	ug/L	<10		<10	<10	<10		<10	<10	<10	<10	<10	<10	<10	48	22	23	<10	<10	<10	<10	<10
2,4,6-Trichlorophenol		10 ug/L	ug/L	<10		<10	<10	<10		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Acenaphthene		10 ug/L	ug/L	<10		<10	<10	<10		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Acenaphthylene		10 ug/L	ug/L	<10		<10	<10	<10		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Anthracene		10 ug/L	ug/L	<10		<10	<10	<10		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Benzidine		50 ug/L	ug/L	<50		<50	<50	<50		<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
Benzo(a)anthracene		10 ug/L	ug/L	<10		<10	<10	<10		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Benzo(a)pyrene		10 ug/L	ug/L	<10		<10	<10	<10		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
3,4-Benzofluoranthene		10 ug/L	ug/L	<10		<10	<10	<10		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Benzo(g,h,i)perylene		10 ug/L	ug/L	<10		<10	<10	<10		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Benzo(k)fluoranthene		10 ug/L	ug/L	<10		<10	<10	<10		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Bis(2-chloroethoxy)methane		10 ug/L	ug/L	<10		<10	<10	<10		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Bis(2-chloroethyl)ether		10 ug/L	ug/L	<10		<10	<10	<10		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Bis(2-chloroisopropyl)ether		10 ug/L	ug/L	<10		<10	<10	<10		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Bis(2-ethylhexyl)phthalate		10 ug/L	ug/L	<10		<10	<10	<10		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
4-Bromophenyl phenyl ether		10 ug/L	ug/L	<10		<10	<10	<10		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Butylbenzyl phthalate		10 ug/L	ug/L	<10		<10	<10	<10		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
2-Chloronaphthalene		10 ug/L	ug/L	<10		<10	<10	<10		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
4-Chlorophenyl phenyl ether		10 ug/L	ug/L	<10		<10	<10	<10		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Chrysene		10 ug/L	ug/L	<10		<10	<10	<10		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Dibenzo(a,h)anthracene		10 ug/L	ug/L	<10		<10	<10	<10		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
1,2-Dichlorobenzene		10 ug/L	ug/L	<10		<10	<10	<10		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
1,3-Dichlorobenzene		10 ug/L	ug/L	<10		<10	<10	<10		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
1,4-Dichlorobenzene		10 ug/L	ug/L	<10		<10	<10	<10		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
3,3'-Dichlorobenzidine		50 ug/L	ug/L	<50		<50	<50	<50		<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
Diethyl phthalate		10 ug/L	ug/L	<10		<10	<10	<10		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Dimethyl phthalate		10 ug/L	ug/L	<10		<10	<10	<10		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Di-(n-butyl)phthalate		10 ug/L	ug/L	<10		<10	<10	<10		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
2,4-Dinitrotoluene		10 ug/L	ug/L	<10		<10	<10	<10		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
2,6-Dinitrotoluene		10 ug/L	ug/L	<10		<10	<10	<10		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Di-(n-octyl)phthalate		10 ug/L	ug/L	<10		<10	<10	<10		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
1,2-Diphenylhydrazine		10 ug/L	ug/L	<10		<10	<10	<10		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Fluoranthene		10 ug/L	ug/L	<10		<10	<10	<10		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Fluorene		10 ug/L	ug/L	<10		<10	<10	<10		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Hexachlorobenzene		10 ug/L	ug/L	<10		<10	<10	<10		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Hexachlorobutadiene		10 ug/L	ug/L	<10		<10	<10	<10		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Hexachlorocyclopentadiene		10 ug/L	ug/L	<10		<10	<10	<10		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Hexachloroethane		10 ug/L	ug/L	<10		<10	<10	<10		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Indeno(1,2,3-cd)pyrene		10 ug/L	ug/L	<10		<10	<10	<10		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Isophorone		10 ug/L	ug/L	<10		<10	<10	<10		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Naphthalene		10 ug/L	ug/L	<10		<10	<10	<10		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Nitrobenzene		10 ug/L	ug/L	<10		<10	<10	<10		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
N-Nitroso-dimethylamine		10 ug/L	ug/L	<10		<10	<10	<10		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
N-Nitroso-di-n-propylamine		10 ug/L	ug/L	<10		<10	<10	<10		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
N-Nitroso-diphenylamine		10 ug/L	ug/L	<10		<10	<10	<10		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Phenanthrene		10 ug/L	ug/L	<10		<10	<10	<10		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Pyrene		10 ug/L	ug/L	<10		<10	<10	<10		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
1,2,4-Trichlorobenzene		10 ug/L	ug/L	<10		<10	<10	<10		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
* DL was 10 ug/L																								

APPENDIX B: Potential Emissions

(Detailed emission calculations are contained in the attached spreadsheets below)

Blast Furnace #1 Casthouse Emissions (P001a)

Company Name:	**U. S. Steel Corp.**				
Site Name:	**Edgar Thomson Plant**				
Description:	**Title V Permit Renewal**				
Date:	**10/7/2020 - DRAFT**				
Table 1. Blast Furnace No. 1 & Casthouse					
Emission Unit	**Blast Furnace No. 1 and Casthouse**				
Emission Unit ID	**P001a**				
Stack ID	**S002**				
Hours of Operation	8,760	hrs/yr			
Control Device	Casthouse Baghouse				
Exhaust Flow Rate	140,000	acfm			
Baghouse Outlet Grain Loading	0.01	gr/dscf			
Hot Metal Production Rate	1,752,000	tons/yr			
Natural Gas Combustion	3,530	MMscf/yr			
Coke Oven Gas Combustion	2,820	MMscf/yr			
Coke Oven Gas Fume Suppression	104	MMscf/yr			

Process Emissions (Casthouse Baghouse)

Pollutant	**Potential Emissions (lb/hr)**	**Potential Emissions (tpy)**	**Emission Factor**	**Emission Factor Units**	**Emission Factor Source**
Criteria Pollutants:					
Filterable Particulate Matter (PM)	48.67	213.17	---	---	Title V Permit Limit (Table V-A-1)
Filterable Particulate Matter <10 microns (PM_{10})	48.67	213.17	---	---	Title V Permit Limit (Table V-A-1)
Filterable Particulate Matter < 2.5 microns ($PM_{2.}$	48.67	213.17	---	---	Title V Permit Limit (Table V-A-1)
Condensable Particulate Matter (CPM)	1.84	8.05	0.009	lb/ton	Emission Factor Development Testing (Max + 15% Compliance Margin)
Nitrogen Oxides (NO_X)	0.88	3.83	0.004	lb/ton	Emission Factor Development Testing (Max + 15% Compliance Margin)
Carbon Monoxide (CO)	177.63	778.03	0.888	lb/ton	Emission Factor Development Testing (Max + 15% Compliance Margin)
Sulfur Dioxide (SO_2)	45.10	197.54	---	---	SO2 NAAQS IP-6 Permit Limit (Table V-A-2)
Volatile Organic Compounds (VOC)	3.37	14.75	0.017	lb/ton	Emission Factor Development Testing (Max + 15% Compliance Margin)
Hydrochloric Acid (HCl)	0.46	2.03	0.002	lb/ton	Emission Factor Development Testing (Max + 15% Compliance Margin)
Hazardous Air Pollutants:					
Metal HAPs					
Antimony Compounds	5.98E-04	2.62E-03	1.23E-03	wt%	Blast Furnace Dust Analyses
Arsenic Compounds	5.91E-05	2.59E-04	1.21E-04	wt%	Blast Furnace Dust Analyses
Beryllium Compounds	6.09E-05	2.67E-04	1.25E-04	wt%	Blast Furnace Dust Analyses
Cadmium Compounds	2.23E-04	9.78E-04	4.59E-04	wt%	Blast Furnace Dust Analyses
Chromium Compounds	6.53E-03	2.86E-02	1.34E-02	wt%	Blast Furnace Dust Analyses
Cobalt Compounds	3.19E-04	1.40E-03	6.56E-04	wt%	Blast Furnace Dust Analyses
Lead	2.84E-03	1.24E-02	5.83E-03	wt%	Blast Furnace Dust Analyses
Manganese Compounds	4.35E-01	1.91E+00	8.95E-01	wt%	Blast Furnace Dust Analyses
Mercury Compounds	1.43E-06	6.26E-06	2.94E-06	wt%	Blast Furnace Dust Analyses
Nickel Compounds	5.42E-04	2.37E-03	1.11E-03	wt%	Blast Furnace Dust Analyses
Selenium Compounds	3.79E-03	1.66E-02	7.79E-03	wt%	Blast Furnace Dust Analyses
Phosphorous	1.85E-01	8.10E-01	3.80E-01	wt%	Blast Furnace Dust Analyses

Process Emissions (Casthouse Fugitives)

Pollutant	Potential Emissions (lb/hr)	Potential Emissions (tpy)	Emission Factor	Emission Factor Units	Emission Factor Source
Criteria Pollutants:					
Filterable Particulate Matter (PM)	5.41	23.69	---	---	Assumes 90% capture/control of Casthouse Baghouse
Filterable Particulate Matter <10 microns (PM_{10})	5.41	23.69	---	---	Assumes 90% capture/control of Casthouse Baghouse
Filterable Particulate Matter < 2.5 microns ($PM_{2.}$	5.41	23.69	---	---	Assumes 90% capture/control of Casthouse Baghouse
Condensable Particulate Matter (CPM)	0.20	0.89	---	---	Assumes 90% capture/control of Casthouse Baghouse
Nitrogen Oxides (NO_X)	0.10	0.43	---	---	Assumes 90% capture/control of Casthouse Baghouse
Carbon Monoxide (CO)	19.74	86.45	---	---	Assumes 90% capture/control of Casthouse Baghouse
Sulfur Dioxide (SO_2)	5.25	23.00	---	---	SO2 NAAQS IP-6 Permit Limit (Table V-A-2)
Volatile Organic Compounds (VOC)	0.37	1.64	---	---	Assumes 90% capture/control of Casthouse Baghouse
Hydrochloric Acid (HCl)	0.05	0.23	---	---	Assumes 90% capture/control of Casthouse Baghouse
Hazardous Air Pollutants:					
Metal HAPs					
Antimony Compounds	6.65E-05	2.91E-04	1.23E-03	wt%	Blast Furnace Dust Analyses
Arsenic Compounds	6.57E-06	2.88E-05	1.21E-04	wt%	Blast Furnace Dust Analyses
Beryllium Compounds	6.77E-06	2.97E-05	1.25E-04	wt%	Blast Furnace Dust Analyses
Cadmium Compounds	2.48E-05	1.09E-04	4.59E-04	wt%	Blast Furnace Dust Analyses
Chromium Compounds	7.26E-04	3.18E-03	1.34E-02	wt%	Blast Furnace Dust Analyses
Cobalt Compounds	3.55E-05	1.55E-04	6.56E-04	wt%	Blast Furnace Dust Analyses
Lead	3.15E-04	1.38E-03	5.83E-03	wt%	Blast Furnace Dust Analyses
Manganese Compounds	4.84E-02	2.12E-01	8.95E-01	wt%	Blast Furnace Dust Analyses
Mercury Compounds	1.59E-07	6.96E-07	2.94E-06	wt%	Blast Furnace Dust Analyses
Nickel Compounds	6.02E-05	2.64E-04	1.11E-03	wt%	Blast Furnace Dust Analyses
Selenium Compounds	4.21E-04	1.84E-03	7.79E-03	wt%	Blast Furnace Dust Analyses
Phosphorous	2.05E-02	9.00E-02	3.80E-01	wt%	Blast Furnace Dust Analyses

Combustion Emissions (Natural Gas)

Pollutant	Potential Emissions (lb/hr)	Potential Emissions (tpy)	Emission Factor	Emission Factor Units	Emission Factor Source
Criteria Pollutants:					
Filterable Particulate Matter (PM)	0.88	3.86	2.2	lb/MMscf	AP-42 Table 1.4-2 (filterable), July 1998
Filterable Particulate Matter <10 microns (PM_{10})	0.88	3.86	2.2	lb/MMscf	AP-42 Table 1.4-2 (filterable), July 1998
Filterable Particulate Matter < 2.5 microns ($PM_{2.}$	0.88	3.86	2.2	lb/MMscf	AP-42 Table 1.4-2 (filterable), July 1998
Condensable Particulate Matter (CPM)	2.64	11.57	6.6	lb/MMscf	AP-42 Table 1.4-2 (condensable), July 1999
Nitrogen Oxides (NO_X)	46.34	202.98	115	lb/MMscf	AP-42 Table 1.4-1, July 1998
Volatile Organic Compounds (VOC)	2.55	11.16	6.3	lb/MMscf	AP-42 Table 1.4-2, July 1998
Sulfur Dioxide (SO_2)	0.28	1.22	0.7	lb/MMscf	AP-42 Table 1.4-2, July 1998
Carbon Monoxide (CO)	38.93	170.50	97	lb/MMscf	AP-42 Table 1.4-1, July 1998
Hazardous Air Pollutants:					
Organics					
2-Methylnaphthalene	1.11E-05	4.87E-05	2.76E-05	lb/MMscf	AP-42 Table 1.4-3, July 1998
3-Methylchloranthrene	8.34E-07	3.65E-06	2.07E-06	lb/MMscf	AP-42 Table 1.4-3, July 1998
7,12-Dimethylbenz(a)anthracene	7.41E-06	3.25E-05	1.84E-05	lb/MMscf	AP-42 Table 1.4-3, July 1998
Acenaphthene	8.34E-07	3.65E-06	2.07E-06	lb/MMscf	AP-42 Table 1.4-3, July 1998
Acenaphthylene	8.34E-07	3.65E-06	2.07E-06	lb/MMscf	AP-42 Table 1.4-3, July 1998
Anthracene	1.11E-06	4.87E-06	2.76E-06	lb/MMscf	AP-42 Table 1.4-3, July 1998
Benz(a)anthracene	8.34E-07	3.65E-06	2.07E-06	lb/MMscf	AP-42 Table 1.4-3, July 1998
Benzene	9.73E-04	4.26E-03	2.42E-03	lb/MMscf	AP-42 Table 1.4-3, July 1998
Benzo(a)pyrene	5.56E-07	2.44E-06	1.38E-06	lb/MMscf	AP-42 Table 1.4-3, July 1998
Benzo(b)fluoranthene	8.34E-07	3.65E-06	2.07E-06	lb/MMscf	AP-42 Table 1.4-3, July 1998
Benzo(g,h,i)perylene	5.56E-07	2.44E-06	1.38E-06	lb/MMscf	AP-42 Table 1.4-3, July 1998
Benzo(k)fluoranthene	8.34E-07	3.65E-06	2.07E-06	lb/MMscf	AP-42 Table 1.4-3, July 1998
Chrysene	8.34E-07	3.65E-06	2.07E-06	lb/MMscf	AP-42 Table 1.4-3, July 1998
Dibenzo(a,h)anthracene	5.56E-07	2.44E-06	1.38E-06	lb/MMscf	AP-42 Table 1.4-3, July 1998
Dichlorobenzene	5.56E-04	2.44E-03	1.38E-03	lb/MMscf	AP-42 Table 1.4-3, July 1998
Fluoranthene	1.39E-06	6.09E-06	3.45E-06	lb/MMscf	AP-42 Table 1.4-3, July 1998
Fluorene	1.30E-06	5.68E-06	3.22E-06	lb/MMscf	AP-42 Table 1.4-3, July 1998
Formaldehyde	3.48E-02	1.52E-01	8.63E-02	lb/MMscf	AP-42 Table 1.4-3, July 1998
n-Hexane	8.34E-01	3.65E+00	2.07E+00	lb/MMscf	AP-42 Table 1.4-3, July 1998
Inorganics					
Ammonia	1.29	5.65	3.20	lb/MMscf	WebFIRE 6.25
Metal HAPs					
Lead	2.32E-04	1.01E-03	5.75E-04	lb/MMscf	AP-42 Table 1.4-2, July 1998
Mercury	1.20E-04	5.28E-04	2.99E-04	lb/MMscf	AP-42 Table 1.4-4, July 1998
Nickel	8.46E-04	3.71E-03	2.10E-03	lb/MMscf	AP-42 Table 1.4-4, July 1998
Selenium	1.11E-05	4.87E-05	2.76E-05	lb/MMscf	AP-42 Table 1.4-4, July 1998
Greenhouse Gas Pollutants:					
Carbon Dioxide (CO_2)	49,919	218,646	116.98	lb/MMBtu	40 CFR 98, Subpart C, Tble C-1 for Natural Gas
Methane (CH_4)	0.94	4.12	0.002	lb/MMBtu	40 CFR 98, Subpart C, Table C-2 for Natural Gas
Nitrous Oxides (N_2O)	0.09	0.41	0.0002	lb/MMBtu	40 CFR 98, Subpart C, Table C-2 for Natural Gas
Carbon Dioxide Equivalent (CO_2e)	49,971	218,872	-	-	40 CFR 98, Subpart A, Table A-1

Combustion Emissions (Coke Oven Gas)

Pollutant	Potential Emissions (lb/hr)	Potential Emissions (tpy)	Emission Factor	Emission Factor Units	Emission Factor Source
Criteria Pollutants:					
Filterable Particulate Matter (PM)	2.30	10.05	7.1	lb/MMscf	WebFIRE 6.25 (1-02-007-07)
Filterable Particulate Matter <10 microns (PM_{10})	1.61	7.05	5.0	lb/MMscf	WebFIRE 6.25 (1-02-007-07)
Filterable Particulate Matter < 2.5 microns ($PM_{2.}$	1.19	5.22	3.7	lb/MMscf	WebFIRE 6.25 (1-02-007-07)
Condensable Particulate Matter (CPM)	1.20	5.27	3.7	lb/MMscf	ACME Steel Staff Correspondence, Sep-1997
Nitrogen Oxides (NO_X)	29.62	129.72	92	lb/MMscf	WebFIRE 6.25 (1-02-007-07)
Volatile Organic Compounds (VOC)	0.44	1.95	1.4	lb/MMscf	WebFIRE 6.25 (1-02-007-07)
Sulfur Dioxide (SO_2)	30.30	132.71	94.1	lb/MMscf	TV Permit Limit of 35 gr H_2S per 100 dscf
Carbon Monoxide (CO)	6.81	29.84	21.2	lb/MMscf	WebFIRE 6.25 (1-02-007-07)
Hazardous Air Pollutants:					
Organics					
Benzene	9.71E-03	4.25E-02	3.02E-02	lb/MMscf	EPA 450/2-90-011 (Uncontrolled COG Combustion = 1.90% wt of VOC)
Inorganics					
Hydrochloric Acid (HCl)	1.47	6.43	4.56	lb/MMscf	Clairton Stack Test (Jun-2000)
Carbon Disulfide (CS_2)	1.06E-02	4.65E-02	3.30E-02	lb/MMscf	Clairton Stack Test (Jun-2000)
Chlorine (Cl)	2.09E-02	9.17E-02	6.50E-02	lb/MMscf	Clairton Stack Test (Jun-2000)
Ammonia (NH_3)	4.99E-02	2.19E-01	1.55E-01	lb/MMscf	Clairton Stack Test (Jun-2000)
Greenhouse Gas Pollutants:					
Carbon Dioxide (CO_2)	17,167	75,191	103.29	lb/MMBtu	40 CFR 98, Subpart C, Tble C-1 for Coke Oven Gas
Methane (CH_4)	0.18	1	0.001	lb/MMBtu	40 CFR 98, Subpart C, Table C-2 for Coke Oven Gas
Nitrous Oxides (N_2O)	0.04	0	0.0002	lb/MMBtu	40 CFR 98, Subpart C, Table C-2 for Coke Oven Gas
Carbon Dioxide Equivalent (CO_2e)	17,182	75,258	-	-	40 CFR 98, Subpart A, Table A-1

Fume Suppression (Coke Oven Gas)

Pollutant	Potential Emissions (lb/hr)	Potential Emissions (tpy)	Emission Factor	Emission Factor Units	Emission Factor Source
Criteria Pollutants:					
Filterable Particulate Matter (PM)	0.08	0.37	7.1	lb/MMscf	WebFIRE 6.25 (1-02-007-07)
Filterable Particulate Matter <10 microns (PM_{10})	0.06	0.26	5.0	lb/MMscf	WebFIRE 6.25 (1-02-007-07)
Filterable Particulate Matter < 2.5 microns ($PM_{2.}$	0.04	0.19	3.7	lb/MMscf	WebFIRE 6.25 (1-02-007-07)
Condensable Particulate Matter (CPM)	0.04	0.19	3.7	lb/MMscf	ACME Steel Staff Correspondence, Sep-1997
Nitrogen Oxides (NO_X)	1.09	4.77	92	lb/MMscf	WebFIRE 6.25 (1-02-007-07)
Volatile Organic Compounds (VOC)	0.02	0.07	1.4	lb/MMscf	WebFIRE 6.25 (1-02-007-07)
Sulfur Dioxide (SO_2)	2.01	8.80	---	---	SO2 NAAQS IP-6 Permit Limit (Table V-A-2)
Carbon Monoxide (CO)	0.25	1.10	21.2	lb/MMscf	WebFIRE 6.25 (1-02-007-07)
Hazardous Air Pollutants:					
Organics					
Benzene	3.10E-04	1.36E-03	2.62E-02	lb/MMscf	EPA 450/2-90-011 (Uncontrolled COG Combustion = 1.90% wt of VOC)
Inorganics					
Hydrochloric Acid (HCl)	0.05	0.24	4.56	lb/MMscf	Clairton Stack Test (Jun-2000)
Carbon Disulfide (CS_2)	3.91E-04	0.00	3.30E-02	lb/MMscf	Clairton Stack Test (Jun-2000)
Chlorine (Cl)	7.69E-04	0.00	6.50E-02	lb/MMscf	Clairton Stack Test (Jun-2000)
Ammonia (NH_3)	1.83E-03	0.01	1.55E-01	lb/MMscf	Clairton Stack Test (Jun-2000)
Greenhouse Gas Pollutants:					
Carbon Dioxide (CO_2)	631	2,765	103.29	lb/MMBtu	40 CFR 98, Subpart C, Tble C-1 for Coke Oven Gas
Methane (CH_4)	0.01	0	0.001	lb/MMBtu	40 CFR 98, Subpart C, Table C-2 for Coke Oven Gas
Nitrous Oxides (N_2O)	0.00	0	0.0002	lb/MMBtu	40 CFR 98, Subpart C, Table C-2 for Coke Oven Gas
Carbon Dioxide Equivalent (CO_2e)	632	2,767	-	-	40 CFR 98, Subpart A, Table A-1

Blast Furnace No. 3 and Casthouse (P002a)

Company Name:	**U. S. Steel Corp.**	
Site Name:	**Edgar Thomson Plant**	
Description:	**Title V Permit Renewal**	
Date:	**10/7/2020 - DRAFT**	

Table 4. Blast Furnace No. 3 & Casthouse

Emission Unit	**Blast Furnace No. 3 and Casthouse**	
Emission Unit ID	**P002a**	
Stack ID	**S002**	
Hours of Operation	8,760	hrs/yr
Control Device	Casthouse Baghouse	
Exhaust Flow Rate	140,000	acfm
Baghouse Outlet Grain Loading	0.01	gr/dscf
Hot Metal Production Rate	1,752,000	tons/yr
Natural Gas Combustion	3,530	MMscf/yr
Coke Oven Gas Combustion	2,820	MMscf/yr
Coke Oven Gas Fume Suppression	104	MMscf/yr

Process Emissions (Casthouse Baghouse)

Pollutant	Potential Emissions (lb/hr)	Potential Emissions (tpy)	Emission Factor	Emission Factor Units	Emission Factor Source
Criteria Pollutants:					
Filterable Particulate Matter (PM)	40.00	175.00	---	---	Title V Permit Limit (Table V-A-2)
Filterable Particulate Matter <10 microns (PM_{10})	40.00	175.00	---	---	Title V Permit Limit (Table V-A-2)
Filterable Particulate Matter < 2.5 microns ($PM_{2.}$	40.00	175.00	---	---	Title V Permit Limit (Table V-A-2)
Condensable Particulate Matter (CPM)	1.84	8.05	0.009	lb/ton	Emission Factor Development Testing (Max + 20% Compliance Margin)
Nitrogen Oxides (NO_X)	0.88	3.83	0.004	lb/ton	Emission Factor Development Testing (Max + 20% Compliance Margin)
Carbon Monoxide (CO)	177.63	778.03	0.888	lb/ton	Emission Factor Development Testing (Max + 20% Compliance Margin)
Sulfur Dioxide (SO_2)	45.10	197.54	---	---	SO2 NAAQS IP-6 Permit Limit (Table V-A-2)
Volatile Organic Compounds (VOC)	3.37	14.75	0.017	lb/ton	Emission Factor Development Testing (Max + 20% Compliance Margin)
Hydrochloric Acid (HCl)	0.46	2.03	0.002	lb/ton	Emission Factor Development Testing (Max + 20% Compliance Margin)
Hazardous Air Pollutants:					
Metal HAPs					
Antimony Compounds	4.92E-04	2.15E-03	1.23E-03	wt%	Blast Furnace Dust Analyses
Arsenic Compounds	4.86E-05	2.12E-04	1.21E-04	wt%	Blast Furnace Dust Analyses
Beryllium Compounds	5.01E-05	2.19E-04	1.25E-04	wt%	Blast Furnace Dust Analyses
Cadmium Compounds	1.83E-04	8.03E-04	4.59E-04	wt%	Blast Furnace Dust Analyses
Chromium Compounds	5.37E-03	2.35E-02	1.34E-02	wt%	Blast Furnace Dust Analyses
Cobalt Compounds	2.63E-04	1.15E-03	6.56E-04	wt%	Blast Furnace Dust Analyses
Lead	2.33E-03	1.02E-02	5.83E-03	wt%	Blast Furnace Dust Analyses
Manganese Compounds	3.58E-01	1.57E+00	8.95E-01	wt%	Blast Furnace Dust Analyses
Mercury Compounds	1.17E-06	5.14E-06	2.94E-06	wt%	Blast Furnace Dust Analyses
Nickel Compounds	4.46E-04	1.95E-03	1.11E-03	wt%	Blast Furnace Dust Analyses
Selenium Compounds	3.11E-03	1.36E-02	7.79E-03	wt%	Blast Furnace Dust Analyses
Phosphorous	1.52E-01	6.65E-01	3.80E-01	wt%	Blast Furnace Dust Analyses

Process Emissions (Casthouse Fugitives)

Pollutant	Potential Emissions (lb/hr)	Potential Emissions (tpy)	Emission Factor	Emission Factor Units	Emission Factor Source
Criteria Pollutants:					
Filterable Particulate Matter (PM)	4.44	19.44	---	---	Assumes 90% capture/control of Casthouse Baghouse
Filterable Particulate Matter <10 microns (PM_{10})	4.44	19.44	---	---	Assumes 90% capture/control of Casthouse Baghouse
Filterable Particulate Matter < 2.5 microns ($PM_{2.}$	4.44	19.44	---	---	Assumes 90% capture/control of Casthouse Baghouse
Condensable Particulate Matter (CPM)	0.20	0.89	---	---	Assumes 90% capture/control of Casthouse Baghouse
Nitrogen Oxides (NO_X)	0.10	0.43	---	---	Assumes 90% capture/control of Casthouse Baghouse
Carbon Monoxide (CO)	19.74	86.45	---	---	Assumes 90% capture/control of Casthouse Baghouse
Sulfur Dioxide (SO_2)	5.25	23.00	---	---	SO2 NAAQS IP-6 Permit Limit (Table V-A-2)
Volatile Organic Compounds (VOC)	0.37	1.64	---	---	Assumes 90% capture/control of Casthouse Baghouse
Hydrochloric Acid (HCl)	0.05	0.23	---	---	Assumes 90% capture/control of Casthouse Baghouse
Hazardous Air Pollutants:					
Metal HAPs					
Antimony Compounds	5.46E-05	2.39E-04	1.23E-03	wt%	Blast Furnace Dust Analyses
Arsenic Compounds	5.39E-06	2.36E-05	1.21E-04	wt%	Blast Furnace Dust Analyses
Beryllium Compounds	5.56E-06	2.43E-05	1.25E-04	wt%	Blast Furnace Dust Analyses
Cadmium Compounds	2.04E-05	8.92E-05	4.59E-04	wt%	Blast Furnace Dust Analyses
Chromium Compounds	5.96E-04	2.61E-03	1.34E-02	wt%	Blast Furnace Dust Analyses
Cobalt Compounds	2.91E-05	1.28E-04	6.56E-04	wt%	Blast Furnace Dust Analyses
Lead	2.59E-04	1.13E-03	5.83E-03	wt%	Blast Furnace Dust Analyses
Manganese Compounds	3.97E-02	1.74E-01	8.95E-01	wt%	Blast Furnace Dust Analyses
Mercury Compounds	1.30E-07	5.71E-07	2.94E-06	wt%	Blast Furnace Dust Analyses
Nickel Compounds	4.95E-05	2.17E-04	1.11E-03	wt%	Blast Furnace Dust Analyses
Selenium Compounds	3.46E-04	1.51E-03	7.79E-03	wt%	Blast Furnace Dust Analyses
Phosphorous	1.69E-02	7.39E-02	3.80E-01	wt%	Blast Furnace Dust Analyses

Combustion Emissions (Natural Gas)

Pollutant	Potential Emissions (lb/hr)	Potential Emissions (tpy)	Emission Factor	Emission Factor Units	Emission Factor Source
Criteria Pollutants:					
Filterable Particulate Matter (PM)	0.88	3.86	2.2	lb/MMscf	AP-42 Table 1.4-2 (filterable), July 1998
Filterable Particulate Matter <10 microns (PM_{10})	0.88	3.86	2.2	lb/MMscf	AP-42 Table 1.4-2 (filterable), July 1998
Filterable Particulate Matter < 2.5 microns ($PM_{2.}$	0.88	3.86	2.2	lb/MMscf	AP-42 Table 1.4-2 (filterable), July 1998
Condensable Particulate Matter (CPM)	2.64	11.57	6.6	lb/MMscf	AP-42 Table 1.4-2 (condensable), July 1999
Nitrogen Oxides (NO_X)	46.34	202.98	115	lb/MMscf	AP-42 Table 1.4-1, July 1998
Volatile Organic Compounds (VOC)	2.55	11.16	6.3	lb/MMscf	AP-42 Table 1.4-2, July 1998
Sulfur Dioxide (SO_2)	0.28	1.22	0.7	lb/MMscf	AP-42 Table 1.4-2, July 1998
Carbon Monoxide (CO)	38.93	170.50	97	lb/MMscf	AP-42 Table 1.4-1, July 1998
Hazardous Air Pollutants:					
Organics					
n-Hexane	8.34E-01	3.65E+00	2.07E+00	lb/MMscf	AP-42 Table 1.4-3, July 1998
Inorganics					
Ammonia	1.48	6.50	3.68	lb/MMscf	WebFIRE 6.25
Metal HAPs					
Lead	2.32E-04	1.01E-03	5.75E-04	lb/MMscf	AP-42 Table 1.4-2, July 1998
Mercury	1.20E-04	5.28E-04	2.99E-04	lb/MMscf	AP-42 Table 1.4-4, July 1998
Greenhouse Gas Pollutants:					
Carbon Dioxide (CO_2)	49,919	218,646	116.98	lb/MMBtu	40 CFR 98, Subpart C, Tble C-1 for Natural Gas
Methane (CH_4)	0.94	4	0.002	lb/MMBtu	40 CFR 98, Subpart C, Table C-2 for Natural Gas
Nitrous Oxides (N_2O)	0.09	0.41	0.0002	lb/MMBtu	40 CFR 98, Subpart C, Table C-2 for Natural Gas
Carbon Dioxide Equivalent (CO_2e)	49,971	218,872	-	-	40 CFR 98, Subpart A, Table A-1

Combustion Emissions (Coke Oven Gas)

Pollutant	Potential Emissions (lb/hr)	Potential Emissions (tpy)	Emission Factor	Emission Factor Units	Emission Factor Source
Criteria Pollutants:					
Filterable Particulate Matter (PM)	2.00	8.74	6.2	lb/MMscf	WebFIRE 6.25 (1-02-007-07)
Filterable Particulate Matter <10 microns (PM_{10})	1.40	6.13	4.4	lb/MMscf	WebFIRE 6.25 (1-02-007-07)
Filterable Particulate Matter < 2.5 microns ($PM_{2.}$	1.04	4.54	3.2	lb/MMscf	WebFIRE 6.25 (1-02-007-07)
Condensable Particulate Matter (CPM)	1.05	4.58	3.3	lb/MMscf	ACME Steel Staff Correspondence, Sep-1997
Nitrogen Oxides (NO_X)	25.75	112.80	80	lb/MMscf	WebFIRE 6.25 (1-02-007-07)
Volatile Organic Compounds (VOC)	0.39	1.69	1.2	lb/MMscf	WebFIRE 6.25 (1-02-007-07)
Sulfur Dioxide (SO_2)	30.30	132.71	94.1	lb/MMscf	TV Permit Limit of 35 gr H_2S per 100 dscf
Carbon Monoxide (CO)	5.92	25.94	18.4	lb/MMscf	WebFIRE 6.25 (1-02-007-07)
Hazardous Air Pollutants:					
Organics					
Benzene	7.34E-03	3.21E-02	2.28E-02	lb/MMscf	EPA 450/2-90-011 (Uncontrolled COG Combustion = 1.90% wt of VOC)
Inorganics					
Hydrochloric Acid (HCl)	1.47	6.43	4.56	lb/MMscf	Clairton Stack Test (Jun-2000)
Carbon Disulfide (CS_2)	1.06E-02	4.65E-02	3.30E-02	lb/MMscf	Clairton Stack Test (Jun-2000)
Chlorine (Cl)	2.09E-02	9.17E-02	6.50E-02	lb/MMscf	Clairton Stack Test (Jun-2000)
Ammonia (NH_3)	4.99E-02	2.19E-01	1.55E-01	lb/MMscf	Clairton Stack Test (Jun-2000)
Greenhouse Gas Pollutants:					
Carbon Dioxide (CO_2)	17,167	75,191	103.29	lb/MMBtu	40 CFR 98, Subpart C, Tble C-1 for Coke Oven Gas
Methane (CH_4)	0.18	1	0.001	lb/MMBtu	40 CFR 98, Subpart C, Table C-2 for Coke Oven Gas
Nitrous Oxides (N_2O)	0.04	0.16	0.0002	lb/MMBtu	40 CFR 98, Subpart C, Table C-2 for Coke Oven Gas
Carbon Dioxide Equivalent (CO_2e)	17,182	75,258	-	-	40 CFR 98, Subpart A, Table A-1

Fume Suppression (Coke Oven Gas)

Pollutant	Potential Emissions (lb/hr)	Potential Emissions (tpy)	Emission Factor	Emission Factor Units	Emission Factor Source
Criteria Pollutants:					
Filterable Particulate Matter (PM)	0.08	0.37	7.1	lb/MMscf	WebFIRE 6.25 (1-02-007-07)
Filterable Particulate Matter <10 microns (PM_{10})	0.06	0.26	5.0	lb/MMscf	WebFIRE 6.25 (1-02-007-07)
Filterable Particulate Matter < 2.5 microns ($PM_{2.}$	0.04	0.19	3.7	lb/MMscf	WebFIRE 6.25 (1-02-007-07)
Condensable Particulate Matter (CPM)	0.04	0.19	3.7	lb/MMscf	ACME Steel Staff Correspondence, Sep-1997
Nitrogen Oxides (NO_X)	1.09	4.77	92	lb/MMscf	WebFIRE 6.25 (1-02-007-07)
Volatile Organic Compounds (VOC)	0.02	0.07	1.4	lb/MMscf	WebFIRE 6.25 (1-02-007-07)
Sulfur Dioxide (SO_2)	1.69	7.40	---	---	SO2 NAAQS IP-6 Permit Limit (Table V-A-2)
Carbon Monoxide (CO)	0.25	1.10	21.2	lb/MMscf	WebFIRE 6.25 (1-02-007-07)
Hazardous Air Pollutants:					
Organics					
Benzene	3.10E-04	1.36E-03	2.62E-02	lb/MMscf	EPA 450/2-90-011 (Uncontrolled COG Combustion = 1.90% wt of VOC)
Inorganics					
Hydrochloric Acid (HCl)	0.05	0.24	4.56	lb/MMscf	Clairton Stack Test (Jun-2000)
Carbon Disulfide (CS_2)	3.91E-04	0.00	3.30E-02	lb/MMscf	Clairton Stack Test (Jun-2000)
Chlorine (Cl)	7.69E-04	0.00	6.50E-02	lb/MMscf	Clairton Stack Test (Jun-2000)
Ammonia (NH_3)	1.83E-03	0.01	1.55E-01	lb/MMscf	Clairton Stack Test (Jun-2000)
Greenhouse Gas Pollutants:					
Carbon Dioxide (CO_2)	631	2,765	103.29	lb/MMBtu	40 CFR 98, Subpart C, Tble C-1 for Coke Oven Gas
Methane (CH_4)	0.01	0.03	0.001	lb/MMBtu	40 CFR 98, Subpart C, Table C-2 for Coke Oven Gas
Nitrous Oxides (N_2O)	0.00	0.01	0.0002	lb/MMBtu	40 CFR 98, Subpart C, Table C-2 for Coke Oven Gas
Carbon Dioxide Equivalent (CO_2e)	632	2,767	-	-	40 CFR 98, Subpart A, Table A-1

Blast Furnace No. 1 Stoves (P0001b)

Company Name:	**U. S. Steel Corp.**				
Site Name:	**Edgar Thomson Plant**				
Description:	**Title V Permit Renewal**				
Date:	**10/7/2020 - DRAFT**				
Table 2. Blast Furnace No. 1 Stoves					
Emission Unit	**Blast Furnace No. 1 Stoves**				
Emission Unit ID	**P001b**				
Stack ID	**S001**				
Hours of Operation	8,760	hrs/yr			
Control Device	None				
Max. Heat Input Rating	495	MMBtu/hr			
Natural Gas Combustion	4,095	MMscf/yr			
Coke Oven Gas Combustion	8,399	MMscf/yr			
Blast Furnace Gas Combustion	48,180	MMscf/yr			

Combustion Emissions (All Fuels)

Pollutant	Potential Emissions (lb/hr)	Potential Emissions (tpy)	Emission Factor	Emission Factor Units	Emission Factor Source
Criteria Pollutants:					
Filterable Particulate Matter (PM)	24.75	108.41	---	---	Title V Permit Limit (Table V-B-1)
Filterable Particulate Matter <10 microns (PM_{10})	24.75	108.41	---	---	Title V Permit Limit (Table V-B-1)
Filterable Particulate Matter < 2.5 microns ($PM_{2.}$	24.75	108.41	---	---	Title V Permit Limit (Table V-B-1)
Condensable Particulate Matter (CPM)	3.25	14.24	3.251	lb/hr	March 2018 Stack Test (+ 15% Compliance Margin)
Nitrogen Oxides (NO_X)	7.06	30.92	0.01	lb/MMBtu	Emission Factor Development Testing (Max + 15% Compliance Margin)
Volatile Organic Compounds (VOC)	3.24	14.21	0.01	lb/MMBtu	Emission Factor Development Testing (Max + 15% Compliance Margin)
Sulfur Dioxide (SO_2)	98.50	431.43	---	---	SO2 NAAQS IP-6 Permit Limit (Table V-A-1)
Carbon Monoxide (CO)	650.65	2,849.86	1.3	lb/MMBtu	Emission Factor Development Testing (Max + 15% Compliance Margin)
Hydrochloric Acid (HCl)	0.74	3.24	0.001	lb/MMBtu	Emission Factor Development Testing (Max + 15% Compliance Margin)
Hazardous Air Pollutants:					
Organics					
n-Hexane	0.97	4.24	2.07	lb/MMscf	Max from All Fuels (see below)
Inorganics					
Hydrochloric Acid (HCl)	4.37	19.15	4.56	lb/MMscf	Max from All Fuels (see below)
Carbon Disulfide (CS_2)	3.16E-02	1.39E-01	3.30E-02	lb/MMscf	Max from All Fuels (see below)
Chlorine (Cl)	6.23E-02	2.73E-01	6.50E-02	lb/MMscf	Max from All Fuels (see below)
Ammonia	1.72	7.53	3.68	lb/MMscf	Max from All Fuels (see below)
Metal HAPs					
Lead	2.69E-04	1.18E-03	5.75E-04	lb/MMscf	Max from All Fuels (see below)
Mercury	1.40E-04	6.12E-04	2.99E-04	lb/MMscf	Max from All Fuels (see below)
Greenhouse Gas Pollutants:					
Carbon Dioxide (CO_2)	299,362	1,311,206	604.77	lb/MMBtu	Max from All Fuels (see below)
Methane (CH_4)	1.09	5	0.002	lb/MMBtu	Max from All Fuels (see below)
Nitrous Oxides (N_2O)	0.11	0	0.0002	lb/MMBtu	Max from All Fuels (see below)
Carbon Dioxide Equivalent (CO_2e)	299,422	1,311,468	-	-	40 CFR 98, Subpart A, Table A-1

Combustion Emissions (Natural Gas)

Pollutant	Potential Emissions (lb/hr)	Potential Emissions (tpy)	Emission Factor	Emission Factor Units	Emission Factor Source
Hazardous Air Pollutants:					
Organics					
n-Hexane	0.97	4.24	2.07	lb/MMscf	AP-42 Table 1.4-3, July 1998
Inorganics					
Ammonia	1.72	7.53	3.68	lb/MMscf	WebFIRE 6.25
Metal HAPs					
Lead	2.69E-04	1.18E-03	5.75E-04	lb/MMscf	AP-42 Table 1.4-2, July 1998
Mercury	1.40E-04	6.12E-04	2.99E-04	lb/MMscf	AP-42 Table 1.4-4, July 1998
Greenhouse Gas Pollutants:					
Carbon Dioxide (CO_2)	57,904	253,618	116.98	lb/MMBtu	40 CFR 98, Subpart C, Tble C-1 for Natural Gas
Methane (CH_4)	1.09	5	0.002	lb/MMBtu	40 CFR 98, Subpart C, Table C-2 for Natural Gas
Nitrous Oxides (N_2O)	0.11	0	0.0002	lb/MMBtu	40 CFR 98, Subpart C, Table C-2 for Natural Gas
Carbon Dioxide Equivalent (CO_2e)	57,964	253,880	-	-	40 CFR 98, Subpart A, Table A-1

Combustion Emissions (Coke Oven Gas)

Pollutant	Potential Emissions (lb/hr)	Potential Emissions (tpy)	Emission Factor	Emission Factor Units	Emission Factor Source
Hazardous Air Pollutants:					
Organics					
Benzene	2.89E-02	1.27E-01	3.02E-02	lb/MMscf	EPA 450/2-90-011 (Uncontrolled COG Combustion = 1.90% wt of VOC)
Inorganics					
Hydrochloric Acid (HCl)	4.37	19.15	4.56	lb/MMscf	Clairton Stack Test (Jun-2000)
Carbon Disulfide (CS_2)	3.16E-02	1.39E-01	3.30E-02	lb/MMscf	Clairton Stack Test (Jun-2000)
Chlorine (Cl)	6.23E-02	2.73E-01	6.50E-02	lb/MMscf	Clairton Stack Test (Jun-2000)
Ammonia (NH_3)	1.49E-01	6.51E-01	1.55E-01	lb/MMscf	Clairton Stack Test (Jun-2000)
Greenhouse Gas Pollutants:					
Carbon Dioxide (CO_2)	51,127	223,936	103.29	lb/MMBtu	40 CFR 98, Subpart C, Tble C-1 for Coke Oven Gas
Methane (CH_4)	0.52	2	0.001	lb/MMBtu	40 CFR 98, Subpart C, Table C-2 for Coke Oven Gas
Nitrous Oxides (N_2O)	0.11	0	0.0002	lb/MMBtu	40 CFR 98, Subpart C, Table C-2 for Coke Oven Gas
Carbon Dioxide Equivalent (CO_2e)	51,172	224,135	-	-	40 CFR 98, Subpart A, Table A-1

Combustion Emissions (Blast Furnace Gas)

Pollutant	Potential Emissions (lb/hr)	Potential Emissions (tpy)	Emission Factor	Emission Factor Units	Emission Factor Source
Hazardous Air Pollutants:					
Metal HAPs					
Antimony Compounds	3.18E-09	1.39E-08	9.70E-04	wt%	Blast Furnace Dust Analyses
Arsenic Compounds	3.93E-10	1.72E-09	1.20E-04	wt%	Blast Furnace Dust Analyses
Beryllium Compounds	3.93E-10	1.72E-09	1.20E-04	wt%	Blast Furnace Dust Analyses
Cadmium Compounds	1.08E-09	4.74E-09	3.30E-04	wt%	Blast Furnace Dust Analyses
Chromium Compounds	5.34E-08	2.34E-07	1.63E-02	wt%	Blast Furnace Dust Analyses
Cobalt Compounds	8.85E-10	3.88E-09	2.70E-04	wt%	Blast Furnace Dust Analyses
Lead	2.28E-08	1.00E-07	6.96E-03	wt%	Blast Furnace Dust Analyses
Manganese Compounds	1.10E-06	4.80E-06	3.34E-01	wt%	Blast Furnace Dust Analyses
Mercury Compounds	1.11E-12	4.84E-12	3.37E-07	wt%	Blast Furnace Dust Analyses
Nickel Compounds	5.57E-10	2.44E-09	1.70E-04	wt%	Blast Furnace Dust Analyses
Selenium Compounds	3.93E-10	1.72E-09	1.20E-04	wt%	Blast Furnace Dust Analyses
Phosphorous	6.94E-07	3.04E-06	2.12E-01	wt%	Blast Furnace Dust Analyses
Greenhouse Gas Pollutants:					
Carbon Dioxide (CO_2)	299,362	1,311,206	604.77	lb/MMBtu	40 CFR 98, Subpart C, Tble C-1 for Blast Furnace Gas
Methane (CH_4)	0.02	0	0.0000	lb/MMBtu	40 CFR 98, Subpart C, Table C-2 for Blast Furnace Gas
Nitrous Oxides (N_2O)	0.11	0	0.0002	lb/MMBtu	40 CFR 98, Subpart C, Table C-2 for Blast Furnace Gas
Carbon Dioxide Equivalent (CO_2e)	299,395	1,311,351	-	-	40 CFR 98, Subpart A, Table A-1

Blast Furnace No. 3 Stoves

Company Name:	U. S. Steel Corp.
Site Name:	Edgar Thomson Plant
Description:	Title V Permit Renewal
Date:	10/7/2020 - DRAFT

Table 5. Blast Furnace No. 3 Stoves

Emission Unit	Blast Furnace No. 3 Stoves	
Emission Unit ID	P002b	
Stack ID	S004	
Hours of Operation	8,760	hrs/yr
Control Device	None	
Max. Heat Input Rating	495	MMBtu/hr
Natural Gas Combustion	4,095	MMscf/yr
Coke Oven Gas Combustion	8,399	MMscf/yr
Blast Furnace Gas Combustion	48,180	MMscf/yr

Combustion Emissions (All Fuels)

Pollutant	Potential Emissions (lb/hr)	Potential Emissions (tpy)	Emission Factor	Emission Factor Units	Emission Factor Source
Criteria Pollutants:					
Filterable Particulate Matter (PM)	24.75	108.41	---	---	Title V Permit Limit (Table V-B-1)
Filterable Particulate Matter <10 microns (PM_{10})	24.75	108.41	---	---	Title V Permit Limit (Table V-B-1)
Filterable Particulate Matter < 2.5 microns ($PM_{2.}$	24.75	108.41	---	---	Title V Permit Limit (Table V-B-1)
Condensable Particulate Matter (CPM)	3.25	14.24	3.251	lb/hr	March 2018 Stack Test (+ 20% Compliance Margin)
Nitrogen Oxides (NO_X)	7.06	30.92	0.01	lb/MMBtu	Emission Factor Development Testing (Max + 20% Compliance Margin)
Volatile Organic Compounds (VOC)	3.24	14.21	0.01	lb/MMBtu	Emission Factor Development Testing (Max + 20% Compliance Margin)
Sulfur Dioxide (SO_2)	90.00	394.20	---	---	SO2 NAAQS IP-6 Permit Limit (Table V-A-1)
Carbon Monoxide (CO)	650.65	2,849.86	1.3	lb/MMBtu	Emission Factor Development Testing (Max + 20% Compliance Margin)
Hydrochloric Acid (HCl)	0.74	3.24	0.001	lb/MMBtu	Emission Factor Development Testing (Max + 20% Compliance Margin)
Hazardous Air Pollutants:					
Organics					
n-Hexane	0.97	4.24	2.07	lb/MMscf	Max from All Fuels (see below)
Inorganics					
Hydrochloric Acid (HCl)	4.37	19.15	4.56	lb/MMscf	Max from All Fuels (see below)
Carbon Disulfide (CS_2)	3.16E-02	1.39E-01	3.30E-02	lb/MMscf	Max from All Fuels (see below)
Chlorine (Cl)	6.23E-02	2.73E-01	6.50E-02	lb/MMscf	Max from All Fuels (see below)
Ammonia	1.72	7.53	3.68	lb/MMscf	Max from All Fuels (see below)
Metal HAPs					
Lead	2.69E-04	1.18E-03	5.75E-04	lb/MMscf	Max from All Fuels (see below)
Mercury	1.40E-04	6.12E-04	2.99E-04	lb/MMscf	Max from All Fuels (see below)
Greenhouse Gas Pollutants:					
Carbon Dioxide (CO_2)	299,362	1,311,206	604.77	lb/MMBtu	Max from All Fuels (see below)
Methane (CH_4)	1.09	5	0.002	lb/MMBtu	Max from All Fuels (see below)
Nitrous Oxides (N_2O)	0.11	0	0.0002	lb/MMBtu	Max from All Fuels (see below)
Carbon Dioxide Equivalent (CO_2e)	299,422	1,311,468	-	-	40 CFR 98, Subpart A, Table A-1

Combustion Emissions (Natural Gas)

Pollutant	Potential Emissions (lb/hr)	Potential Emissions (tpy)	Emission Factor	Emission Factor Units	Emission Factor Source
Hazardous Air Pollutants:					
Organics					
n-Hexane	0.97	4.24	2.07	lb/MMscf	AP-42 Table 1.4-3, July 1998
Inorganics					
Ammonia	1.72	7.53	3.68	lb/MMscf	WebFIRE 6.25
Metal HAPs					
Lead	2.69E-04	1.18E-03	5.75E-04	lb/MMscf	AP-42 Table 1.4-2, July 1998
Mercury	1.40E-04	6.12E-04	2.99E-04	lb/MMscf	AP-42 Table 1.4-4, July 1998
Greenhouse Gas Pollutants:					
Carbon Dioxide (CO_2)	57,904	253,618	116.98	lb/MMBtu	40 CFR 98, Subpart C, Tble C-1 for Natural Gas
Methane (CH_4)	1.09	5	0.002	lb/MMBtu	40 CFR 98, Subpart C, Table C-2 for Natural Gas
Nitrous Oxides (N_2O)	0.11	0	0.0002	lb/MMBtu	40 CFR 98, Subpart C, Table C-2 for Natural Gas
Carbon Dioxide Equivalent (CO_2e)	57,964	253,880	-	-	40 CFR 98, Subpart A, Table A-1

Combustion Emissions (Coke Oven Gas)

Pollutant	Potential Emissions (lb/hr)	Potential Emissions (tpy)	Emission Factor	Emission Factor Units	Emission Factor Source
Hazardous Air Pollutants:					
Organics					
Benzene	2.89E-02	1.27E-01	3.02E-02	lb/MMscf	EPA 450/2-90-011 (Uncontrolled COG Combustion = 1.90% wt of VOC)
Inorganics					
Hydrochloric Acid (HCl)	4.37	19.15	4.56	lb/MMscf	Clairton Stack Test (Jun-2000)
Carbon Disulfide (CS_2)	3.16E-02	1.39E-01	3.30E-02	lb/MMscf	Clairton Stack Test (Jun-2000)
Chlorine (Cl)	6.23E-02	2.73E-01	6.50E-02	lb/MMscf	Clairton Stack Test (Jun-2000)
Ammonia (NH_3)	1.49E-01	6.51E-01	1.55E-01	lb/MMscf	Clairton Stack Test (Jun-2000)
Greenhouse Gas Pollutants:					
Carbon Dioxide (CO_2)	51,127	223,936	103.29	lb/MMBtu	40 CFR 98, Subpart C, Tble C-1 for Coke Oven Gas
Methane (CH_4)	0.52	2	0.001	lb/MMBtu	40 CFR 98, Subpart C, Table C-2 for Coke Oven Gas
Nitrous Oxides (N_2O)	0.11	0	0.0002	lb/MMBtu	40 CFR 98, Subpart C, Table C-2 for Coke Oven Gas
Carbon Dioxide Equivalent (CO_2e)	51,172	224,135	-	-	40 CFR 98, Subpart A, Table A-1

Combustion Emissions (Blast Furnace Gas)

Pollutant	Potential Emissions (lb/hr)	Potential Emissions (tpy)	Emission Factor	Emission Factor Units	Emission Factor Source
Hazardous Air Pollutants:					
Metal HAPs					
Antimony Compounds	3.18E-09	1.39E-08	9.70E-04	wt%	Blast Furnace Dust Analyses
Arsenic Compounds	3.93E-10	1.72E-09	1.20E-04	wt%	Blast Furnace Dust Analyses
Beryllium Compounds	3.93E-10	1.72E-09	1.20E-04	wt%	Blast Furnace Dust Analyses
Cadmium Compounds	1.08E-09	4.74E-09	3.30E-04	wt%	Blast Furnace Dust Analyses
Chromium Compounds	5.34E-08	2.34E-07	1.63E-02	wt%	Blast Furnace Dust Analyses
Cobalt Compounds	8.85E-10	3.88E-09	2.70E-04	wt%	Blast Furnace Dust Analyses
Lead	2.28E-08	1.00E-07	6.96E-03	wt%	Blast Furnace Dust Analyses
Manganese Compounds	1.10E-06	4.80E-06	3.34E-01	wt%	Blast Furnace Dust Analyses
Mercury Compounds	1.11E-12	4.84E-12	3.37E-07	wt%	Blast Furnace Dust Analyses
Nickel Compounds	5.57E-10	2.44E-09	1.70E-04	wt%	Blast Furnace Dust Analyses
Selenium Compounds	3.93E-10	1.72E-09	1.20E-04	wt%	Blast Furnace Dust Analyses
Phosphorous	6.94E-07	3.04E-06	2.12E-01	wt%	Blast Furnace Dust Analyses
Greenhouse Gas Pollutants:					
Carbon Dioxide (CO_2)	299,362	1,311,206	604.77	lb/MMBtu	40 CFR 98, Subpart C, Tble C-1 for Blast Furnace Gas
Methane (CH_4)	0.02	0.11	0.00005	lb/MMBtu	40 CFR 98, Subpart C, Table C-2 for Blast Furnace Gas
Nitrous Oxides (N_2O)	0.11	0.48	0.0002	lb/MMBtu	40 CFR 98, Subpart C, Table C-2 for Blast Furnace Gas
Carbon Dioxide Equivalent (CO_2e)	299,395	1,311,351	-	-	40 CFR 98, Subpart A, Table A-1

BFG Flare (P001c)

Company Name:	**U. S. Steel Corp.**				
Site Name:	**Edgar Thomson Plant**				
Description:	**Title V Permit Renewal**				
Date:	**10/7/2020 - DRAFT**				
Table 3. BFG Flare					
Emission Unit	**BFG Flare**				
Emission Unit ID	**P001c**				
Stack ID	**S003**				
Hours of Operation	8760	hrs/yr			
Control Device	None				
Fuel Type	Blast Furnace Gas				
BFG Capacity	26,280	MMscf/yr			
Annual Blast Furnace Gas Usage	2,365,200	MMBtu/yr			
Average Heating Value of BFG	90	Btu/scf			

Pollutant	**Potential Emissions (lb/hr)**	**Potential Emissions (tpy)**	**Emission Factor**	**Emission Factor Units**	**Emission Factor Source**
Criteria Pollutants:					
Particulate Matter (PM)	0.64	2.82	0.214	lb/MMscf	2012 Stove Stack Test (+ 15% Compliance Margin)
Particulate Matter <10 microns (PM_{10})	0.33	1.44	0.109	lb/MMscf	AP-42, Table 12.5-2. PM10 equal to 51% of PM
Particulate Matter <2.5 microns ($PM_{2.5}$)	0.15	0.65	0.049	lb/MMscf	AP-42, Table 12.5-2. PM2.5 equal to 23% of PM
Nitrogen Oxides (NOx)	18.36	80.42	0.068	lb/MMBtu	AP-42, Table 13.5-1
Volatile Organic Compounds (VOC)					No Factor
Carbon Monoxide (CO)	83.70	366.61	0.31	lb/MMBtu	AP-42, Table 13.5-2
Sulfur Dioxide (SO_2)	45.90	201.04	0.17	lb/MMBtu	2011 Boiler Stack Test (+ 15% Compliance Margin)
Hazardous Air Pollutants:					
Metal HAPs					
Antimony Compounds	6.24E-06	2.73E-05	9.70E-04	wt%	Blast Furnace Dust Analyses
Arsenic Compounds	7.71E-07	3.38E-06	1.20E-04	wt%	Blast Furnace Dust Analyses
Beryllium Compounds	7.71E-07	3.38E-06	1.20E-04	wt%	Blast Furnace Dust Analyses
Cadmium Compounds	2.12E-06	9.29E-06	3.30E-04	wt%	Blast Furnace Dust Analyses
Chromium Compounds	1.05E-04	4.59E-04	1.63E-02	wt%	Blast Furnace Dust Analyses
Cobalt Compounds	1.74E-06	7.60E-06	2.70E-04	wt%	Blast Furnace Dust Analyses
Lead	4.47E-05	1.96E-04	6.96E-03	wt%	Blast Furnace Dust Analyses
Manganese Compounds	2.15E-03	9.41E-03	3.34E-01	wt%	Blast Furnace Dust Analyses
Mercury Compounds	2.17E-09	9.49E-09	3.37E-07	wt%	Blast Furnace Dust Analyses
Nickel Compounds	1.09E-06	4.79E-06	1.70E-04	wt%	Blast Furnace Dust Analyses
Selenium Compounds	7.71E-07	3.38E-06	1.20E-04	wt%	Blast Furnace Dust Analyses
Phosphorous	1.36E-03	5.96E-03	2.12E-01	wt%	Blast Furnace Dust Analyses
Greenhouse Gas Pollutants:					
Carbon Dioxide (CO_2)	163,288	715,203	604.77	lb/MMBtu	40 CFR 98, Subpart C, Tble C-1 for Blast Furnace Gas
Methane (CH_4)	0.01	0.06	0.0000	lb/MMBtu	40 CFR 98, Subpart C, Table C-2 for Blast Furnace Gas
Nitrous Oxides (N_2O)	0.06	0.26	0.0002	lb/MMBtu	40 CFR 98, Subpart C, Table C-2 for Blast Furnace Gas
Carbon Dioxide Equivalent (CO_2e)	163,307	715,283	-	-	40 CFR 98, Subpart A, Table A-1

Hot Metal Transfer & Desulfurization at Mixer, Reladling Pit, and Direct Pour Station (P003-1; P003-2; P003-3 & P003-4)

Company Name:	**U. S. Steel Corp.**
Site Name:	**Edgar Thomson Plant**
Description:	**Title V Permit Renewal**
Date:	**10/7/2020 - DRAFT**

Table 6. BOP Shop - Hot Metal Transfer & Desulfurization Baghouse

Emission Unit	**Hot Metal Transfer & Desulfurization at Mixer, Reladling Pit, and Direct Pour Station**	
Emission Unit ID	**P003-1, P003-2, P003-3, P003-4**	
Stack ID	**S005**	
Hours of Operation	8,760	hrs/yr
Control Device	BOP Mixer & Desulfurization Baghouse	
Maximum Throughput	3,504,000	tons of hot metal transferred

Pollutant	**Potential Emissions (lb/hr)**	**Potential Emissions (tpy)**	**Emission Factor**	**Emission Factor Units**	**Emission Factor Source**
Criteria Pollutants:					
Filterable Particulate Matter (PM)	7.00	18.25	---	---	Title V Permit Limit (Table V-D-3)
Filterable Particulate Matter <10 microns (PM_{10})	7.00	18.25	---	---	Title V Permit Limit (Table V-D-3)
Filterable Particulate Matter < 2.5 microns ($PM_{2.5}$)	7.00	18.25	---	---	Assumed $PM_{2.5}$ = PM_{10}
Volatile Organic Compounds (VOC)	0.46	2.01	0.0012	lb/ton	WebFIRE 6.25 (3-03-009-15)
Hazardous Air Pollutants:					
Metal HAPs					
Antimony Compounds	7.29E-05	1.90E-04	1.04E-03	wt%	Mixer Baghouse Dust Analyses
Arsenic Compounds	1.02E-04	2.66E-04	1.46E-03	wt%	Mixer Baghouse Dust Analyses
Beryllium Compounds	8.48E-06	2.21E-05	1.21E-04	wt%	Mixer Baghouse Dust Analyses
Cadmium Compounds	2.93E-05	7.65E-05	4.19E-04	wt%	Mixer Baghouse Dust Analyses
Chromium Compounds	5.67E-04	1.48E-03	8.10E-03	wt%	Mixer Baghouse Dust Analyses
Cobalt Compounds	2.50E-05	6.51E-05	3.57E-04	wt%	Mixer Baghouse Dust Analyses
Lead	1.53E-04	3.99E-04	2.19E-03	wt%	Mixer Baghouse Dust Analyses
Manganese Compounds	1.75E-02	4.55E-02	2.49E-01	wt%	Mixer Baghouse Dust Analyses
Mercury Compounds	2.60E-07	6.78E-07	3.71E-06	wt%	Mixer Baghouse Dust Analyses
Nickel Compounds	2.69E-05	7.01E-05	3.84E-04	wt%	Mixer Baghouse Dust Analyses
Selenium Compounds	8.62E-06	2.25E-05	1.23E-04	wt%	Mixer Baghouse Dust Analyses
Phosphorous	1.54E-02	4.02E-02	2.20E-01	wt%	Mixer Baghouse Dust Analyses

Hot Metal Slag Skimming, Vessels F & R Charging, Tapping & Slag Dumping
(P003-5, P003-6, P003-8)

Company Name:	U. S. Steel Corp.				
Site Name:	Edgar Thomson Plant				
Description:	Title V Permit Renewal				
Date:	10/7/2020 - DRAFT				
Table 7. BOP Shop - Secondary Baghouse					
Emission Unit	**Hot Metal Slag Skimming, Vessels F & R Charging, Tapping & Slag Dumping**				
Emission Unit ID	**P003-5, P003-6, P003-8**				
Stack ID	**S006**				
Hours of Operation	8,760	hrs/yr			
Control Device	BOP Secondary Baghouse				
Maximum Throughput (BOP Vessel)	3,467,500	tons of hot metal			
Maximum Throughput (Slag)	66,749	tons of BOP slag			

Pollutant	**Potential Emissions (lb/hr)**	**Potential Emissions (tpy)**	**Emission Factor**	**Emission Factor Units**	**Emission Factor Source**
Criteria Pollutants:					
Filterable Particulate Matter (PM)	24.90	109.10	---	---	Title V Permit Limit (Table V-D-2)
Filterable Particulate Matter <10 microns (PM_{10})	24.90	109.10	---	---	Title V Permit Limit (Table V-D-2)
Filterable Particulate Matter < 2.5 microns ($PM_{2.5}$)	24.90	109.10	---	---	Title V Permit Limit (Table V-D-2)
Sulfur Dioxide (SO_2)	6.64	29.08	---	---	SO2 NAAQS IP-6 Permit Limit (Table V-A-2)
Volatile Organic Compounds (VOC)	2.33	10.22			
Iron Slag Skimming After Desulf	0.01	0.04	0.0012	lb/ton slag	WebFIRE 6.25 (3-03-009-15)
Furnace Charging	0.02	0.10	0.0001	lb/ton metal	WebFIRE 6.25 (3-03-009-16)
Furnace Tapping	2.28	9.97	0.0058	lb/ton metal	WebFIRE 6.25 (3-03-009-17)
Steel Slag Dumpting	0.02	0.08	0.0023	lb/ton slag	WebFIRE 6.25 (3-03-009-23)
Slag Skimming Before BOP & Tapping/Dumping	0.01	0.04	0.0012	lb/ton slag	WebFIRE 6.25 (3-03-009-15)
Hazardous Air Pollutants:					
Metal HAPs					
Antimony Compounds	1.85E-03	8.10E-03	7.42E-03	wt%	BOP Secondary Baghouse Dust Analyses
Arsenic Compounds	7.37E-04	3.23E-03	2.96E-03	wt%	BOP Secondary Baghouse Dust Analyses
Beryllium Compounds	1.27E-05	5.56E-05	5.10E-05	wt%	BOP Secondary Baghouse Dust Analyses
Cadmium Compounds	7.62E-03	3.34E-02	3.06E-02	wt%	BOP Secondary Baghouse Dust Analyses
Chromium Compounds	8.03E-03	3.52E-02	3.23E-02	wt%	BOP Secondary Baghouse Dust Analyses
Cobalt Compounds	2.34E-04	1.03E-03	9.40E-04	wt%	BOP Secondary Baghouse Dust Analyses
Lead	2.40E-01	1.05E+00	9.65E-01	wt%	BOP Secondary Baghouse Dust Analyses
Manganese Compounds	3.39E-01	1.48E+00	1.36E+00	wt%	BOP Secondary Baghouse Dust Analyses
Mercury Compounds	3.48E-05	1.53E-04	1.40E-04	wt%	BOP Secondary Baghouse Dust Analyses
Nickel Compounds	1.86E-03	8.15E-03	7.47E-03	wt%	BOP Secondary Baghouse Dust Analyses
Selenium Compounds	3.09E-05	1.35E-04	1.24E-04	wt%	BOP Secondary Baghouse Dust Analyses
Phosphorous	8.96E-02	3.93E-01	3.60E-01	wt%	BOP Secondary Baghouse Dust Analyses

Vessel F & Vessel R Oxygen Blowing
(P003-7 & P003-9)
(S007 & S008)

Company Name:	**U. S. Steel Corp.**				
Site Name:	**Edgar Thomson Plant**				
Description:	**Title V Permit Renewal**				
Date:	**10/7/2020 - DRAFT**				
Table 8. BOP Shop - Venturi Scrubber					
Emission Unit	**Vessel F & Vessel R Oxygen Blowing**				
Emission Unit ID	**P003-7 & P003-9**				
Stack ID	**S007 & S008**				
Hours of Operation	8,760	hrs/yr			
Control Device	BOP Venturi Scrubber				
Maximum Throughput	3,467,500	tons of hot metal			

Pollutant	**Potential Emissions (lb/hr)**	**Potential Emissions (tpy)**	**Emission Factor**	**Emission Factor Units**	**Emission Factor Source**
Criteria Pollutants:					
Filterable Particulate Matter (PM)	19.22	84.14	---	---	Title V Permit Limit (Table V-D-1 minus Table V-D-2)
Filterable Particulate Matter <10 microns (PM_{10})	19.22	84.14	---	---	Title V Permit Limit (Table V-D-1 minus Table V-D-2)
Filterable Particulate Matter < 2.5 microns ($PM_{2.5}$)	19.22	84.14	---	---	Title V Permit Limit (Table V-D-1 minus Table V-D-2)
Nitrogen Oxides (NO_X)	41.45	181.55	0.105	lb/ton	Emission Factor Development Testing (Max + 15% Compliance Margin)
Volatile Organic Compounds (VOC)	3.80	16.63	0.010	lb/ton	Emission Factor Development Testing (Max + 15% Compliance Margin)
Sulfur Dioxide (SO_2)	2.71	11.88	0.007	lb/ton	Emission Factor Development Testing (Max + 15% Compliance Margin)
Carbon Monoxide (CO)	2,575.44	11,280.42	6.506	lb/ton	Emission Factor Development Testing (Max + 15% Compliance Margin)
Hazardous Air Pollutants:					
Metal HAPs					
Antimony Compounds	6.06E-04	2.65E-03	3.15E-03	wt%	BOP Filtercake & Classifier Sludge Analyses
Arsenic Compounds	4.58E-05	2.01E-04	2.38E-04	wt%	BOP Filtercake & Classifier Sludge Analyses
Beryllium Compounds	2.28E-05	9.96E-05	1.18E-04	wt%	BOP Filtercake & Classifier Sludge Analyses
Cadmium Compounds	1.44E-03	6.30E-03	7.49E-03	wt%	BOP Filtercake & Classifier Sludge Analyses
Chromium Compounds	1.11E-02	4.86E-02	5.78E-02	wt%	BOP Filtercake & Classifier Sludge Analyses
Cobalt Compounds	1.73E-04	7.58E-04	9.01E-04	wt%	BOP Filtercake & Classifier Sludge Analyses
Lead	1.71E-02	7.49E-02	8.90E-02	wt%	BOP Filtercake & Classifier Sludge Analyses
Manganese Compounds	2.63E-01	1.15E+00	1.37E+00	wt%	BOP Filtercake & Classifier Sludge Analyses
Mercury Compounds	6.81E-07	2.98E-06	3.54E-06	wt%	BOP Filtercake & Classifier Sludge Analyses
Nickel Compounds	7.71E-04	3.37E-03	4.01E-03	wt%	BOP Filtercake & Classifier Sludge Analyses
Selenium Compounds	2.28E-05	9.96E-05	1.18E-04	wt%	BOP Filtercake & Classifier Sludge Analyses
Phosphorous	8.73E-02	3.82E-01	4.54E-01	wt%	BOP Filtercake & Classifier Sludge Analyses
Greenhouse Gas Pollutants:					
Carbon Dioxide (CO_2)	1,133,869	4,966,348	1.43	ton CO_2/ton	Site-specific emission factor (Max + 20% Compliance Margin)
Methane (CH_4)	0.00	0	---	---	No methane from this process
Nitrous Oxides (N_2O)	0.00	0	---	---	No nitrous oxide from this process
Carbon Dioxide Equivalent (CO_2e)	1,133,869	4,966,348	-	-	40 CFR 98, Subpart A, Table A-1

BOP Shop flux Material Rail Car Unloading, Transfer Tower, Flux Handling Systems #1 & #2 (P003-10a, P003-10b, P003-10c, P003-10d)

Company Name:	**U. S. Steel Corp.**
Site Name:	**Edgar Thomson Plant**
Description:	**Title V Permit Renewal**
Date:	**10/7/2020 - DRAFT**

Table 9. BOP Shop - Flux Handling

Emission Unit	**BOP Shop flux Material Rail Car Unloading, Transfer Tower, Flux Handling Systems #1 & #2**	
Emission Unit ID	**P003-10a, P003-10b, P003-10c, P003-10d**	
Stack ID	**BH1, BH2, BH3, BH4**	
Hours of Operation	8,760	hrs/yr
Control Device	Baghouse	
Control Efficiency	99	%
Maximum Throughput	442	tons of flux

Pollutant	Potential Emissions (lb/hr)	Potential Emissions (tpy)	Emission Factor	Emission Factor Units	Emission Factor Source
Criteria Pollutants:					
Filterable Particulate Matter (PM)	1.01	4.42	20.0	lb/ton	Assumes 99% control efficiency of baghouse
Filterable Particulate Matter <10 microns (PM_{10})	0.35	1.55	7.0	lb/ton	AP-42, Chapter 13.2.4. PM10 multiplier is 0.35.
Filterable Particulate Matter < 2.5 microns ($PM_{2.5}$)	0.05	0.23	1.06	lb/ton	AP-42, Chapter 13.2.4. PM2.5 multiplier is 0.053.
Hazardous Air Pollutants:					
Metal HAPs					
Antimony Compounds	9.31E-07	4.08E-06	2.64E-04	wt%	Flux Handling Baghouse Dust Analyses
Arsenic Compounds	3.34E-07	1.46E-06	9.47E-05	wt%	Flux Handling Baghouse Dust Analyses
Beryllium Compounds	4.02E-07	1.76E-06	1.14E-04	wt%	Flux Handling Baghouse Dust Analyses
Cadmium Compounds	5.27E-06	2.31E-05	1.49E-03	wt%	Flux Handling Baghouse Dust Analyses
Chromium Compounds	9.00E-06	3.94E-05	2.55E-03	wt%	Flux Handling Baghouse Dust Analyses
Cobalt Compounds	1.45E-06	6.35E-06	4.10E-04	wt%	Flux Handling Baghouse Dust Analyses
Lead	4.25E-05	1.86E-04	1.20E-02	wt%	Flux Handling Baghouse Dust Analyses
Manganese Compounds	1.22E-03	5.33E-03	3.44E-01	wt%	Flux Handling Baghouse Dust Analyses
Mercury Compounds	1.22E-09	5.35E-09	3.46E-07	wt%	Flux Handling Baghouse Dust Analyses
Nickel Compounds	2.20E-06	9.65E-06	6.24E-04	wt%	Flux Handling Baghouse Dust Analyses
Selenium Compounds	4.13E-07	1.81E-06	1.17E-04	wt%	Flux Handling Baghouse Dust Analyses
Phosphorous	3.53E-04	1.55E-03	1.00E-01	wt%	Flux Handling Baghouse Dust Analyses

Basic Oxygen Process (BOP) Shop Combustion Emissions
(P003-011a & b)

Company Name:	**U. S. Steel Corp.**
Site Name:	**Edgar Thomson Plant**
Description:	**Title V Permit Renewal**
Date:	**10/7/2020 - DRAFT**

Table 10. BOP Shop Combustion

Emission Unit	**Basic Oxygen Process (BOP) Shop Combustion**	
Emission Unit ID	**P003-011a & b**	
Stack ID	**Fugitive**	
Hours of Operation	8,760	hrs/yr
Control Device	None	
Natural Gas Combustion	275	MMscf/yr
Coke Oven Gas Combustion	410	MMscf/yr

Combustion Emissions (Natural Gas)

Pollutant	Potential Emissions (lb/hr)	Potential Emissions (tpy)	Emission Factor	Emission Factor Units	Emission Factor Source
Criteria Pollutants:					
Filterable Particulate Matter (PM)	0.07	0.30	2.2	lb/MMscf	AP-42 Table 1.4-2 (filterable), July 1998
Filterable Particulate Matter <10 microns (PM_{10})	0.07	0.30	2.2	lb/MMscf	AP-42 Table 1.4-2 (filterable), July 1998
Filterable Particulate Matter < 2.5 microns ($PM_{2.}$	0.07	0.30	2.2	lb/MMscf	AP-42 Table 1.4-2 (filterable), July 1998
Condensable Particulate Matter (CPM)	0.21	0.90	6.6	lb/MMscf	AP-42 Table 1.4-2 (condensable), July 1999
Nitrogen Oxides (NO_X)	3.61	15.81	115	lb/MMscf	AP-42 Table 1.4-1, July 1998
Volatile Organic Compounds (VOC)	0.20	0.87	6.3	lb/MMscf	AP-42 Table 1.4-2, July 1998
Sulfur Dioxide (SO_2)	0.02	0.09	0.7	lb/MMscf	AP-42 Table 1.4-2, July 1998
Carbon Monoxide (CO)	3.03	13.28	97	lb/MMscf	AP-42 Table 1.4-1, July 1998
Hazardous Air Pollutants:					
Organics					
n-Hexane	6.50E-02	2.85E-01	2.07E+00	lb/MMscf	AP-42 Table 1.4-3, July 1998
Inorganics					
Ammonia	0.12	0.51	3.68	lb/MMscf	WebFIRE 6.25
Metal HAPs					
Lead	1.81E-05	7.91E-05	5.75E-04	lb/MMscf	AP-42 Table 1.4-2, July 1998
Mercury	9.39E-06	4.11E-05	2.99E-04	lb/MMscf	AP-42 Table 1.4-4, July 1998
Greenhouse Gas Pollutants:					
Carbon Dioxide (CO_2)	3,889	17,033	116.98	lb/MMBtu	40 CFR 98, Subpart C, Tble C-1 for Natural Gas
Methane (CH_4)	0.07	0	0.002	lb/MMBtu	40 CFR 98, Subpart C, Table C-2 for Natural Gas
Nitrous Oxides (N_2O)	0.01	0	0.0002	lb/MMBtu	40 CFR 98, Subpart C, Table C-2 for Natural Gas
Carbon Dioxide Equivalent (CO_2e)	3,893	17,051	-	-	40 CFR 98, Subpart A, Table A-1

LMF Flux/Alloy Handling, LMF Vessel, Tripper Car Conveyor System, Lime Bin Feeder System (P004) (P004-1, P004-2, P004-3, P004-4)

Company Name:	**U. S. Steel Corp.**				
Site Name:	**Edgar Thomson Plant**				
Description:	**Title V Permit Renewal**				
Date:	**10/7/2020 - DRAFT**				
Table 11. Ladle Metallurgy Facility (LMF)					
Emission Unit	**LMF Flux/Alloy Handling, LMF Vessel, Tripper Car Conveyor System, Lime Bin Feeder System**				
Emission Unit ID	**P004-1, P004-2, P004-3, P004-4**				
Stack ID	**S009**				
Hours of Operation	8,760	hrs/yr			
Control Device	Baghouse				
Control Efficiency					
Maximum Throughput	3,467,500	tons of steel charged			

Pollutant	**Potential Emissions (lb/hr)**	**Potential Emissions (tpy)**	**Emission Factor**	**Emission Factor Units**	**Emission Factor Source**
Criteria Pollutants:					
Filterable Particulate Matter (PM)	5.12	22.43	---	---	Title V Permit Limit (Table V-E-1)
Filterable Particulate Matter <10 microns (PM_{10})	5.12	22.43	---	---	Title V Permit Limit (Table V-E-1)
Filterable Particulate Matter < 2.5 microns ($PM_{2.5}$)	5.12	22.43	---	---	Title V Permit Limit (Table V-E-1)
Condensable Particulate Matter (CPM)	0.25	1.10	0.001	lb/ton	Site-Specific Stack Testing (Max + 20% Compliance Margin)
Hazardous Air Pollutants:					
Metal HAPs					
Antimony Compounds	1.20E-04	5.24E-04	2.34E-03	wt%	LMF Baghouse Dust Analyses
Arsenic Compounds	8.71E-06	3.81E-05	1.70E-04	wt%	LMF Baghouse Dust Analyses
Beryllium Compounds	6.38E-06	2.80E-05	1.25E-04	wt%	LMF Baghouse Dust Analyses
Cadmium Compounds	5.98E-04	2.62E-03	1.17E-02	wt%	LMF Baghouse Dust Analyses
Chromium Compounds	2.42E-03	1.06E-02	4.72E-02	wt%	LMF Baghouse Dust Analyses
Cobalt Compounds	4.69E-05	2.06E-04	9.17E-04	wt%	LMF Baghouse Dust Analyses
Lead	3.99E-03	1.75E-02	7.79E-02	wt%	LMF Baghouse Dust Analyses
Manganese Compounds	1.57E-01	6.86E-01	3.06E+00	wt%	LMF Baghouse Dust Analyses
Mercury Compounds	3.13E-08	1.37E-07	6.11E-07	wt%	LMF Baghouse Dust Analyses
Nickel Compounds	1.95E-04	8.54E-04	3.81E-03	wt%	LMF Baghouse Dust Analyses
Selenium Compounds	6.38E-06	2.80E-05	1.25E-04	wt%	LMF Baghouse Dust Analyses
Phosphorous	1.95E-02	8.52E-02	3.80E-01	wt%	LMF Baghouse Dust Analyses

Continuous Caster – Combustion (P005)

Company Name:	**U. S. Steel Corp.**				
Site Name:	**Edgar Thomson Plant**				
Description:	**Title V Permit Renewal**				
Date:	**10/7/2020 - DRAFT**				
Table 12. Dual Strand Continuous Caster					
Emission Unit	**Continuous Caster - Combustion**				
Emission Unit ID	**P005**				
Stack ID	**N/A**	(exhausts inside caster building)			
Hours of Operation	8760	hrs/yr			
Control Device	None				
Natural Gas Combustion	263	MMscf/yr			
Coke Oven Gas Combustion	263	MMscf/yr			
Combustion Emissions (All Fuels)					

Pollutant	**Potential Emissions (lb/hr)**	**Potential Emissions (tpy)**	**Emission Factor**	**Emission Factor Units**	**Emission Factor Source**
Criteria Pollutants:					
Filterable Particulate Matter (PM)	0.23	1.00	---	---	Title V Permit Limit (Table V-F-1)
Filterable Particulate Matter <10 microns (PM_{10})	0.23	1.00	---	---	Title V Permit Limit (Table V-F-1)
Filterable Particulate Matter < 2.5 microns ($PM_{2.5}$)	0.23	1.00	---	---	Title V Permit Limit (Table V-F-1)
Condensable Particulate Matter (CPM)	0.20	0.86	6.56	lb/MMscf	Max from All Fuels (see below)
Nitrogen Oxides (NO_X)	2.74	12.00	---	---	Title V Permit Limit (Table V-F-1)
Volatile Organic Compounds (VOC)	0.23	1.00	---	---	Title V Permit Limit (Table V-F-1)
Sulfur Dioxide (SO_2)	2.83	12.38	94.12	lb/MMscf	Max from All Fuels (see below)
Carbon Monoxide (CO)	0.68	3.00	---	---	Title V Permit Limit (Table V-F-1)
Hazardous Air Pollutants:					
Organics					
n-Hexane	0.06	0.27	2.07	lb/MMscf	Max from All Fuels (see below)
Inorganics					
Hydrochloric Acid (HCl)	0.00	0.00	4.56	lb/MMscf	Max from All Fuels (see below)
Carbon Disulfide (CS_2)	0.00E+00	0.00E+00	3.30E-02	lb/MMscf	Max from All Fuels (see below)
Chlorine (Cl)	0.00E+00	0.00E+00	6.50E-02	lb/MMscf	Max from All Fuels (see below)
Ammonia	0.11	0.48	3.68	lb/MMscf	Max from All Fuels (see below)
Metal HAPs					
Lead	1.73E-05	7.56E-05	5.75E-04	lb/MMscf	Max from All Fuels (see below)
Mercury	8.98E-06	3.93E-05	2.99E-04	lb/MMscf	Max from All Fuels (see below)
Greenhouse Gas Pollutants:					
Carbon Dioxide (CO_2)	3,719	16,290	116.98	lb/MMBtu	Max from All Fuels (see below)
Methane (CH_4)	0.07	0	0.002	lb/MMBtu	Max from All Fuels (see below)
Nitrous Oxides (N_2O)	0.01	0	0.0003	lb/MMBtu	Max from All Fuels (see below)
Carbon Dioxide Equivalent (CO_2e)	3,723	16,308	-	-	40 CFR 98, Subpart A, Table A-1

P005 Continue

Combustion Emissions (Natural Gas)

Pollutant	Potential Emissions (lb/hr)	Potential Emissions (tpy)	Emission Factor	Emission Factor Units	Emission Factor Source
Criteria Pollutants:					
Condensable Particulate Matter (CPM)	0.00	0.00	6.56	lb/MMscf	AP-42 Table 1.4-2, July 1998
Sulfur Dioxide (SO_2)	0.02	0.09	0.7	lb/MMscf	AP-42 Table 1.4-2, July 1998
Hazardous Air Pollutants:					
Organics					
n-Hexane	0.06	0.27	2.07	lb/MMscf	AP-42 Table 1.4-3, July 1998
Inorganics					
Ammonia	0.11	0.48	3.68	lb/MMscf	WebFIRE 6.25
Metal HAPs					
Lead	1.73E-05	7.56E-05	5.75E-04	lb/MMscf	AP-42 Table 1.4-2, July 1998
Mercury	8.98E-06	3.93E-05	2.99E-04	lb/MMscf	AP-42 Table 1.4-4, July 1998
Greenhouse Gas Pollutants:					
Carbon Dioxide (CO_2)	3,719	16,290	116.98	lb/MMBtu	40 CFR 98, Subpart C, Tble C-1 for Natural Gas
Methane (CH_4)	0.07	0	0.002	lb/MMBtu	40 CFR 98, Subpart C, Table C-2 for Natural Gas
Nitrous Oxides (N_2O)	0.01	0	0.0002	lb/MMBtu	40 CFR 98, Subpart C, Table C-2 for Natural Gas
Carbon Dioxide Equivalent (CO_2e)	3,723	16,307	-	-	40 CFR 98, Subpart A, Table A-1

Combustion Emissions (Coke Oven Gas)

Pollutant	Potential Emissions (lb/hr)	Potential Emissions (tpy)	Emission Factor	Emission Factor Units	Emission Factor Source
Criteria Pollutants:					
Condensable Particulate Matter (CPM)	3.25	14.24	3.25	lb/MMscf	ACME Steel Staff Correspondence (Sep-1997)
Sulfur Dioxide (SO_2)	0.00	0.00	94.1	lb/MMscf	TV Permit Limit of 35 gr H_2S per 100 dscf
Hazardous Air Pollutants:					
Organics					
Benzene	0.00E+00	0.00E+00	3.02E-02	lb/MMscf	EPA 450/2-90-011 (Uncontrolled COG Combustion = 1.90% wt of VOC)
Inorganics					
Hydrochloric Acid (HCl)	0.00	0.00	4.56	lb/MMscf	Clairton Stack Test (Jun-2000)
Carbon Disulfide (CS_2)	0.00E+00	0.00E+00	3.30E-02	lb/MMscf	Clairton Stack Test (Jun-2000)
Chlorine (Cl)	0.00E+00	0.00E+00	6.50E-02	lb/MMscf	Clairton Stack Test (Jun-2000)
Ammonia (NH_3)	0.00E+00	0.00E+00	1.55E-01	lb/MMscf	Clairton Stack Test (Jun-2000)
Greenhouse Gas Pollutants:					
Carbon Dioxide (CO_2)	1,601	7,012	103.29	lb/MMBtu	40 CFR 98, Subpart C, Tble C-1 for Coke Oven Gas
Methane (CH_4)	0.02	0	0.001	lb/MMBtu	40 CFR 98, Subpart C, Table C-2 for Coke Oven Gas
Nitrous Oxides (N_2O)	0.00	0	0.0003	lb/MMBtu	40 CFR 98, Subpart C, Table C-2 for Coke Oven Gas
Carbon Dioxide Equivalent (CO_2e)	1,603	7,020	-	-	40 CFR 98, Subpart A, Table A-1

Vacuum Degasser Flare - Natural Gas Combustion (P006)

Company Name:	**U. S. Steel Corp.**				
Site Name:	**Edgar Thomson Plant**				
Description:	**Title V Permit Renewal**				
Date:	**10/7/2020 - DRAFT**				
Table 13. Vacuum Degasser					
Emission Unit	**Vacuum Degasser Flare - Natural Gas Combustion**				
Emission Unit ID	**P006**				
Stack ID	**S011**				
Hours of Operation	8,760	hrs/yr			
Control Device	CO Flare				
Control Efficiency	99	%			
Steel Processed Per Year	1,200,000	tons/yr			
Max. Heats Per Year	5,000	(assumes 240 tons/heat)			

Pollutant	Potential Emissions (lb/hr)	Potential Emissions (tpy)	Emission Factor	Emission Factor Units	Emission Factor Source
Criteria Pollutants:					
Filterable Particulate Matter (PM)	0.14	0.61	0.245	lb/heat	Manufacturer's Data (0.13 lb/heat from process + 0.115 lb/heat from KTB lance)
Filterable Particulate Matter <10 microns (PM_{10})	0.14	0.61	0.245	lb/heat	Assume 100% of PM
Filterable Particulate Matter < 2.5 microns ($PM_{2.5}$)	0.14	0.61	0.245	lb/heat	Assume 100% of PM
Carbon Monoxide (CO)	0.99	4.32	0.007	lb/ton	Assumes 60% conversion of carbon to CO & 99% control efficiency for flare
Hazardous Air Pollutants:					
Metal HAPs					
Antimony Compounds	1.40E-06	6.13E-06	1.00E-03	wt%	LMF Baghouse Dust Analyses
Arsenic Compounds	6.99E-08	3.06E-07	5.00E-05	wt%	LMF Baghouse Dust Analyses
Beryllium Compounds	1.40E-07	6.13E-07	1.00E-04	wt%	LMF Baghouse Dust Analyses
Cadmium Compounds	1.64E-06	7.18E-06	1.17E-03	wt%	LMF Baghouse Dust Analyses
Chromium Compounds	2.06E-05	9.03E-05	1.48E-02	wt%	LMF Baghouse Dust Analyses
Cobalt Compounds	3.22E-06	1.41E-05	2.30E-03	wt%	LMF Baghouse Dust Analyses
Lead	1.32E-04	5.79E-04	9.45E-02	wt%	LMF Baghouse Dust Analyses
Manganese Compounds	1.78E-03	7.81E-03	1.28E+00	wt%	LMF Baghouse Dust Analyses
Mercury Compounds	1.96E-09	8.58E-09	1.40E-06	wt%	LMF Baghouse Dust Analyses
Nickel Compounds	1.68E-05	7.35E-05	1.20E-02	wt%	LMF Baghouse Dust Analyses
Selenium Compounds	4.81E-07	2.11E-06	3.44E-04	wt%	LMF Baghouse Dust Analyses
Phosphorous	2.37E-05	1.04E-04	1.70E-02	wt%	LMF Baghouse Dust Analyses
Greenhouse Gas Pollutants:					
Carbon Dioxide (CO_2)	1,289	5,647	0.005	ton CO_2/ton	
Methane (CH_4)	0.00	0	---	---	No methane from this process
Nitrous Oxides (N_2O)	0.00	0	---	---	No nitrous oxide from this process
Carbon Dioxide Equivalent (CO_2e)	1,289	5,647	-	-	40 CFR 98, Subpart A, Table A-1

Riley Boiler No. 1, No. 2, No. 3 (B001-B003)

Company Name:	**U. S. Steel Corp.**		
Site Name:	**Edgar Thomson Plant**		
Description:	**Title V Permit Renewal**		
Date:	**10/7/2020 - DRAFT**		

Table 14. Riley Boilers

Emission Unit	**Riley Boiler No. 1, No. 2, No. 3**		
Emission Unit ID	**B001, B002, B003**		
Stack ID	**S012, S013, S014**		
Hours of Operation	8,760	hrs/yr	*each*
Control Device	None		
Max. Heat Input Rating	525	MMBtu/hr	*each*
Natural Gas Combustion	10,214	MMscf/yr	*total*
Coke Oven Gas Combustion	26,723	MMscf/yr	*total*
Blast Furnace Gas Combustion	153,300	MMscf/yr	*total*

Combustion Emissions (All Fuels)

Pollutant	Potential Emissions (lb/hr)	Potential Emissions (tpy)	Emission Factor	Emission Factor Units	Emission Factor Source
Criteria Pollutants:					
Filterable Particulate Matter (PM)	78.75	344.94	---	---	Title V Permit Limit (Table V-H-1) - All Boilers
Filterable Particulate Matter <10 microns (PM_{10})	78.75	344.94	---	---	Title V Permit Limit (Table V-H-1) - All Boilers
Filterable Particulate Matter < 2.5 microns ($PM_{2.}$	78.75	344.94	---	---	Assumes PM2.5 = PM10
Condensable Particulate Matter (CPM)	9.91	43.42	6.6	lb/MMscf	Max from All Fuels (see below)
Nitrogen Oxides (NO_X)	110.25	344.93	0.050	lb/MMscf	RACT IP8a (for tons/yr limit) & Title V Permit Limit (Table V-H-2) - All Boilers
Volatile Organic Compounds (VOC)	0.42	1.85	0.001	lb/MMBtu	Emission Factor Development Testing (Max + 20% Compliance Margin)
Sulfur Dioxide (SO_2)	556.91	2,439.27	---	---	SO2 NAAQS IP-6 Limit (Table V-A-1) - All Boilers
Carbon Monoxide (CO)	1.09	4.76	0.002	lb/MMBtu	Emission Factor Development Testing (Max + 20% Compliance Margin)
Hydrochloric Acid (HCl)	1.39	6.08	0.003	lb/MMBtu	Emission Factor Development Testing (Max + 20% Compliance Margin)
			0.07	lb/MMscf	RACT IP8a (for lbs/hr limit) & Title V Permit Limit (Table V-H-2) - All Boilers
Hazardous Air Pollutants:					
Organics					
n-Hexane	2.41	10.57	2.07	lb/MMscf	Max from All Fuels (see below)
Inorganics					
Carbon Disulfide (CS_2)	1.01E-01	4.41E-01	3.30E-02	lb/MMscf	Max from All Fuels (see below)
Chlorine (Cl)	1.98E-01	8.68E-01	6.50E-02	lb/MMscf	Max from All Fuels (see below)
Ammonia	4.29	18.79	3.68	lb/MMscf	Max from All Fuels (see below)
Metal HAPs					
Lead	6.70E-04	2.94E-03	5.75E-04	lb/MMscf	Max from All Fuels (see below)
Mercury	3.49E-04	1.53E-03	2.99E-04	lb/MMscf	Max from All Fuels (see below)
Greenhouse Gas Pollutants:					
Carbon Dioxide (CO_2)	746,773	3,270,864	604.77	lb/MMBtu	Max from All Fuels (see below)
Methane (CH_4)	2.72	12	0.002	lb/MMBtu	Max from All Fuels (see below)
Nitrous Oxides (N_2O)	0.27	1	0.0002	lb/MMBtu	Max from All Fuels (see below)
Carbon Dioxide Equivalent (CO_2e)	746,922	3,271,517	-	-	40 CFR 98, Subpart A, Table A-1

Combustion Emissions (Natural Gas)

Pollutant	Potential Emissions (lb/hr)	Potential Emissions (tpy)	Emission Factor	Emission Factor Units	Emission Factor Source
Criteria Pollutants:					
Condensable Particulate Matter (CPM)	7.64	33.48	6.6	lb/MMscf	AP-42 Table 1.4-2, July 1998
Hazardous Air Pollutants:					
Organics					
n-Hexane	2.41	10.57	2.07	lb/MMscf	AP-42 Table 1.4-3, July 1998
Inorganics					
Ammonia	4.29	18.79	3.68	lb/MMscf	WebFIRE 6.25
Metal HAPs					
Lead	6.70E-04	2.94E-03	5.75E-04	lb/MMscf	AP-42 Table 1.4-2, July 1998
Mercury	3.49E-04	1.53E-03	2.99E-04	lb/MMscf	AP-42 Table 1.4-4, July 1998
Greenhouse Gas Pollutants:					
Carbon Dioxide (CO_2)	144,444	632,663	116.98	lb/MMBtu	40 CFR 98, Subpart C, Tble C-1 for Natural Gas
Methane (CH_4)	2.72	12	0.002	lb/MMBtu	40 CFR 98, Subpart C, Table C-2 for Natural Gas
Nitrous Oxides (N_2O)	0.27	1	0.0002	lb/MMBtu	40 CFR 98, Subpart C, Table C-2 for Natural Gas
Carbon Dioxide Equivalent (CO_2e)	144,593	633,316	-	-	40 CFR 98, Subpart A, Table A-1

Combustion Emissions (Coke Oven Gas)

Pollutant	Potential Emissions (lb/hr)	Potential Emissions (tpy)	Emission Factor	Emission Factor Units	Emission Factor Source
Criteria Pollutants:					
Condensable Particulate Matter (CPM)	9.91	43.42	3.25	lb/MMscf	ACME Steel Staff Correspondence (Sep-1997)
Hazardous Air Pollutants:					
Organics					
Benzene	9.20E-02	4.03E-01	3.02E-02	lb/MMscf	EPA 450/2-90-011 (Uncontrolled COG Combustion = 1.90% wt of VOC)
Inorganics					
Hydrochloric Acid (HCl)	13.91	60.93	4.56	lb/MMscf	Clairton Stack Test (Jun-2000)
Carbon Disulfide (CS_2)	1.01E-01	4.41E-01	3.30E-02	lb/MMscf	Clairton Stack Test (Jun-2000)
Chlorine (Cl)	1.98E-01	8.68E-01	6.50E-02	lb/MMscf	Clairton Stack Test (Jun-2000)
Ammonia (NH_3)	4.73E-01	2.07E+00	1.55E-01	lb/MMscf	Clairton Stack Test (Jun-2000)
Greenhouse Gas Pollutants:					
Carbon Dioxide (CO_2)	162,676	712,522	103.29	lb/MMBtu	40 CFR 98, Subpart C, Tble C-1 for Coke Oven Gas
Methane (CH_4)	1.67	7	0.001	lb/MMBtu	40 CFR 98, Subpart C, Table C-2 for Coke Oven Gas
Nitrous Oxides (N_2O)	0.35	2	0.0002	lb/MMBtu	40 CFR 98, Subpart C, Table C-2 for Coke Oven Gas
Carbon Dioxide Equivalent (CO_2e)	162,821	713,158	-	-	40 CFR 98, Subpart A, Table A-1

Combustion Emissions (Blast Furnace Gas)

Pollutant	Potential Emissions (lb/hr)	Potential Emissions (tpy)	Emission Factor	Emission Factor Units	Emission Factor Source
Criteria Pollutants:					
Condensable Particulate Matter (CPM)	0.18	0.78	0.01	lb/MMscf	ACME Steel Staff Correspondence (Sep-1997)
Hazardous Air Pollutants:					
Metal HAPs					
Antimony Compounds	7.93E-09	3.48E-08	9.70E-04	wt%	Blast Furnace Dust Analyses
Arsenic Compounds	9.82E-10	4.30E-09	1.20E-04	wt%	Blast Furnace Dust Analyses
Beryllium Compounds	9.82E-10	4.30E-09	1.20E-04	wt%	Blast Furnace Dust Analyses
Cadmium Compounds	2.70E-09	1.18E-08	3.30E-04	wt%	Blast Furnace Dust Analyses
Chromium Compounds	1.33E-07	5.84E-07	1.63E-02	wt%	Blast Furnace Dust Analyses
Cobalt Compounds	2.21E-09	9.67E-09	2.70E-04	wt%	Blast Furnace Dust Analyses
Lead	5.69E-08	2.49E-07	6.96E-03	wt%	Blast Furnace Dust Analyses
Manganese Compounds	2.73E-06	1.20E-05	3.34E-01	wt%	Blast Furnace Dust Analyses
Mercury Compounds	2.76E-12	1.21E-11	3.37E-07	wt%	Blast Furnace Dust Analyses
Nickel Compounds	1.39E-09	6.09E-09	1.70E-04	wt%	Blast Furnace Dust Analyses
Selenium Compounds	9.82E-10	4.30E-09	1.20E-04	wt%	Blast Furnace Dust Analyses
Phosphorous	1.73E-06	7.59E-06	2.12E-01	wt%	Blast Furnace Dust Analyses
Greenhouse Gas Pollutants:					
Carbon Dioxide (CO_2)	952,516	4,172,020	604.77	lb/MMBtu	40 CFR 98, Subpart C, Tble C-1 for Blast Furnace Gas
Methane (CH_4)	0.08	0	0.0000	lb/MMBtu	40 CFR 98, Subpart C, Table C-2 for Blast Furnace Gas
Nitrous Oxides (N_2O)	0.35	2	0.0002	lb/MMBtu	40 CFR 98, Subpart C, Table C-2 for Blast Furnace Gas
Carbon Dioxide Equivalent (CO_2e)	952,621	4,172,482	-	-	40 CFR 98, Subpart A, Table A-1

Blast Furnace No.1 & No. 3 Slag Pits (F001) Emissions

Company Name:	**U. S. Steel Corp.**				
Site Name:	**Edgar Thomson Plant**				
Description:	**Title V Permit Renewal**				
Date:	**10/7/2020 - DRAFT**				
Table 15. Blast Furnace Slag Pits					
Emission Unit	**Blast Furnace No.1 & No. 3 Slag Pits**				
Emission Unit ID	**F001**				
Stack ID	**Fugitive**				
Hours of Operation	8,760	hrs/yr			
Maximum Throughput	581,565	tons of slag produced			
Transferring from Slag Pit to Trucks					
Moisture Content	4.94	%			
Mean wind speed	6.525	mph			
K Factor (Particle Size Multiplier)	0.74	AP-42 Chapter 13.2.4, Aerodynamic particle size multiplier for particles < 30 µm in diamater			
K Factor (Particle Size Multiplier)	0.35	AP-42 Chapter 13.2.4, Aerodynamic particle size multiplier for particles < 10 µm in diamater			
K Factor (Particle Size Multiplier)	0.053	AP-42 Chapter 13.2.4, Aerodynamic particle size multiplier for particles < 2.5 µm in diamater			
Control Device	None				
Control Efficiency	0	%			

Pollutant	**Potential Emissions (lb/hr)**	**Potential Emissions (tpy)**	**Emission Factor**	**Emission Factor Units**	**Emission Factor Source**
Criteria Pollutants:					
Particulate Matter (PM)	0.07	0.32	0.0011	lbs/ton	AP-42 Chpater 13.2.4. (November 2006), Equation 1
Particulate Matter <10 microns (PM_{10})	0.03	0.15	0.0005	lbs/ton	AP-42 Chpater 13.2.4. (November 2006), Equation 1
Particulate Matter < 2.5 microns ($PM_{2.5}$)	0.01	0.02	0.0001	lbs/ton	AP-42 Chpater 13.2.4. (November 2006), Equation 1
Hazardous Air Pollutants:					
Metal HAPs					
Antimony Compounds	1.26E-07	5.52E-07	1.75E-04	wt%	Blast Furnace Slag Analyses
Arsenic Compounds	8.63E-08	3.78E-07	1.20E-04	wt%	Blast Furnace Slag Analyses
Beryllium Compounds	8.03E-07	3.52E-06	1.11E-03	wt%	Blast Furnace Slag Analyses
Cadmium Compounds	8.44E-08	3.70E-07	1.17E-04	wt%	Blast Furnace Slag Analyses
Chromium Compounds	1.57E-06	6.89E-06	2.18E-03	wt%	Blast Furnace Slag Analyses
Cobalt Compounds	8.44E-08	3.70E-07	1.17E-04	wt%	Blast Furnace Slag Analyses
Lead	7.81E-07	3.42E-06	1.08E-03	wt%	Blast Furnace Slag Analyses
Manganese Compounds	1.91E-04	8.35E-04	2.65E-01	wt%	Blast Furnace Slag Analyses
Mercury Compounds	1.48E-10	6.47E-10	2.05E-07	wt%	Blast Furnace Slag Analyses
Nickel Compounds	3.11E-07	1.36E-06	4.32E-04	wt%	Blast Furnace Slag Analyses
Selenium Compounds	8.44E-08	3.70E-07	1.17E-04	wt%	Blast Furnace Slag Analyses

Plant Roads (F002) Emissions

Site Name: Edgar Thomson Plant
Description: Title V Permit Renewal
Date: 10/7/2020 - DRAFT

Table 16. Plant Roadways

Emission Unit	**Plant Roads**	
Emission Unit ID	**F002**	
Stack ID	**Fugitive**	
Hours of Operation	8,760	hrs/yr
Control Device	Wet Suppression, Chemical Treatment, Paved Road Sweeping	
Control Efficiency	90	%
Maximum Throughput	3,467,500	tons of steel produced

Paved Roads - TSP

Vehicle Type	k	sL	W	(lb/VMT) E	Road Traffic (VMT/yr)	Uncontrolled Emissions (lb/yr)	Uncontrolled Emissions (ton/yr)	Control Efficiency (%)	Controlled Emissions (ton/yr)
Slagaway Haulers (Loaded)	0.011	0.30	100	0.47	3,364	1,568	0.78	90	0.08
Slagaway Haulers (Unloaded)	0.011	0.30	75	0.35	3,364	1,169	0.58	90	0.06
Euclid Trucks	0.011	0.30	70	0.32	1,682	545	0.27	90	0.03
Broker Triaxles	0.011	0.30	35	0.16	9,459	1,511	0.76	90	0.08
Broker Tractor Trailers	0.011	0.30	37.5	0.17	2,365	405	0.20	90	0.02
Komatsu Road Grader	0.011	0.30	20	0.09	1,182	107	0.05	90	0.01
CAT 992C Loader	0.011	0.30	47.5	0.22	2,759	602	0.30	90	0.03
CAT 988B Loader	0.011	0.30	44	0.20	5,912	1,193	0.60	90	0.06
CAT 980C Loader	0.011	0.30	30	0.14	1,971	269	0.13	90	0.01
CAT 988B Loader	0.011	0.30	45	0.21	1,971	407	0.20	90	0.02
John Deere Backhoe	0.011	0.30	20	0.09	1,971	178	0.09	90	0.01
CAT Water Wagon	0.011	0.30	35	0.16	1,971	315	0.16	90	0.02
CJL Triaxles (Loaded)	0.011	0.30	35	0.16	8,986	1,435	0.72	90	0.07
CJL Triaxles (Unloaded)	0.011	0.30	14	0.06	8,986	564	0.28	90	0.03
Total - Paved TSP					**55,941**	**10,267**	**5.13**		**0.51**

Paved Roads - PM_{10}

Vehicle Type	k	sL	W	(lb/VMT) E	Road Traffic (VMT/yr)	Uncontrolled Emissions (lb/yr)	Uncontrolled Emissions (ton/yr)	Control Efficiency (%)	Controlled Emissions (ton/yr)
Slagaway Haulers (Loaded)	0.0022	0.30	100	0.093	3,364	314	0.16	90	0.016
Slagaway Haulers (Unloaded)	0.0022	0.30	75	0.070	3,364	234	0.12	90	0.012
Euclid Trucks	0.0022	0.30	70	0.065	1,682	109	0.05	90	0.005
Broker Triaxles	0.0022	0.30	35	0.032	9,459	302	0.15	90	0.015
Broker Tractor Trailers	0.0022	0.30	37.5	0.034	2,365	81	0.04	90	0.004
Komatsu Road Grader	0.0022	0.30	20	0.018	1,182	21	0.01	90	0.001
CAT 992C Loader	0.0022	0.30	47.5	0.044	2,759	120	0.06	90	0.006
CAT 988B Loader	0.0022	0.30	44	0.040	5,912	239	0.12	90	0.012
CAT 980C Loader	0.0022	0.30	30	0.027	1,971	54	0.03	90	0.003
CAT 988B Loader	0.0022	0.30	45	0.041	1,971	81	0.04	90	0.004
John Deere Backhoe	0.0022	0.30	20	0.018	1,971	36	0.02	90	0.002
CAT Water Wagon	0.0022	0.30	35	0.032	1,971	63	0.03	90	0.003
CJL Triaxles (Loaded)	0.0022	0.30	35	0.032	8,986	287	0.14	90	0.014
CJL Triaxles (Unloaded)	0.0022	0.30	14	0.013	8,986	113	0.06	90	0.006
Total - Paved PM10					**55,941**	**2,053**	**1.03**		**0.10**

Paved Roads - $PM_{2.5}$

Vehicle Type	k	sL	W	(lb/VMT) E	Road Traffic (VMT/yr)	Uncontrolled Emissions (lb/yr)	Uncontrolled Emissions (ton/yr)	Control Efficiency (%)	Controlled Emissions (ton/yr)
Slagaway Haulers (Loaded)	0.00054	0.30	100	0.023	3,364	77	0.04	90	0.004
Slagaway Haulers (Unloaded)	0.00054	0.30	75	0.017	3,364	57	0.03	90	0.003
Euclid Trucks	0.00054	0.30	70	0.016	1,682	27	0.01	90	0.001
Broker Triaxles	0.00054	0.30	35	0.008	9,459	74	0.04	90	0.004
Broker Tractor Trailers	0.00054	0.30	37.5	0.008	2,365	20	0.01	90	0.001
Komatsu Road Grader	0.00054	0.30	20	0.004	1,182	5	0.00	90	0.000
CAT 992C Loader	0.00054	0.30	47.5	0.011	2,759	30	0.01	90	0.001
CAT 988B Loader	0.00054	0.30	44	0.010	5,912	59	0.03	90	0.003
CAT 980C Loader	0.00054	0.30	30	0.007	1,971	13	0.01	90	0.001
CAT 988B Loader	0.00054	0.30	45	0.010	1,971	20	0.01	90	0.001
John Deere Backhoe	0.00054	0.30	20	0.004	1,971	9	0.00	90	0.000
CAT Water Wagon	0.00054	0.30	35	0.008	1,971	15	0.01	90	0.001
CJL Triaxles (Loaded)	0.00054	0.30	35	0.008	8,986	70	0.04	90	0.004
CJL Triaxles (Unloaded)	0.00054	0.30	14	0.003	8,986	28	0.01	90	0.001
Total - Paved PM2.5					**55,941**	**504**	**0.25**		**0.03**

Unpaved Roads - TSP

Vehicle Type	k	s	W	a	b	(lb/VMT) E	Road Traffic (VMT/yr)	Uncontrolled Emissions (lb/yr)	Uncontrolled Emissions (ton/yr)	Control Efficiency (%)	Controlled Emissions (ton/yr)
Slagaway Haulers (Loaded)	4.9	6	100	0.7	0.45	16.81	2,019	33,926	16.96	0	16.96
Slagaway Haulers (Unloaded)	4.9	6	75	0.7	0.45	14.77	2,019	29,806	14.90	0	14.90
Euclid Trucks	4.9	6	70	0.7	0.45	14.31	1,009	14,447	7.22	0	7.22
Slagaway Haulers (Loaded)	4.9	6	100	0.7	0.45	16.81	13,188	221,647	110.82	90	11.08
Slagaway Haulers (Unloaded)	4.9	6	75	0.7	0.45	14.77	13,188	194,733	97.37	90	9.74
Euclid Trucks	4.9	6	70	0.7	0.45	14.31	6,594	94,390	47.20	90	4.72
Kress Carriers (Loaded)	4.9	6	60	0.7	0.45	13.35	47,749	637,672	318.84	90	31.88
Kress Carriers (Unloaded)	4.9	6	30	0.7	0.45	9.78	47,749	466,803	233.40	90	23.34
Total - Unpaved TSP							**133,515**	**1,693,424**	**846.71**		**119.85**

Unpaved Roads - PM_{10}

Vehicle Type	k	s	W	a	b	(lb/VMT) E	Road Traffic (VMT/yr)	Uncontrolled Emissions (lb/yr)	Uncontrolled Emissions (ton/yr)	Control Efficiency (%)	Controlled Emissions (ton/yr)
Slagaway Haulers (Loaded)	1.5	6	100	0.9	0.45	4.48	2,019	9,041	4.52	0	4.52
Slagaway Haulers (Unloaded)	1.5	6	75	0.9	0.45	3.93	2,019	7,943	3.97	0	3.97
Euclid Trucks	1.5	6	70	0.9	0.45	3.81	1,009	3,850	1.93	0	1.93
Slagaway Haulers (Loaded)	1.5	6	100	0.9	0.45	4.48	13,188	59,068	29.53	90	2.95
Slagaway Haulers (Unloaded)	1.5	6	75	0.9	0.45	3.93	13,188	51,895	25.95	90	2.59
Euclid Trucks	1.5	6	70	0.9	0.45	3.81	6,594	25,154	12.58	90	1.26
Kress Carriers (Loaded)	1.5	6	60	0.9	0.45	3.56	47,749	169,936	84.97	90	8.50
Kress Carriers (Unloaded)	1.5	6	30	0.9	0.45	2.61	47,749	124,401	62.20	90	6.22
Total - Unpaved PM10							**133,515**	**451,289**	**225.64**		**31.94**

Unpaved Roads - $PM_{2.5}$

Vehicle Type	k	s	W	a	b	(lb/VMT) E	Road Traffic (VMT/yr)	Uncontrolled Emissions (lb/yr)	Uncontrolled Emissions (ton/yr)	Control Efficiency (%)	Controlled Emissions (ton/yr)
Slagaway Haulers (Loaded)	0.15	6	100	0.9	0.45	0.45	2,019	904	0.45	0	0.45
Slagaway Haulers (Unloaded)	0.15	6	75	0.9	0.45	0.39	2,019	794	0.40	0	0.40
Euclid Trucks	0.15	6	70	0.9	0.45	0.38	1,009	385	0.19	0	0.19
Slagaway Haulers (Loaded)	0.15	6	100	0.9	0.45	0.45	13,188	5,907	2.95	90	0.30
Slagaway Haulers (Unloaded)	0.15	6	75	0.9	0.45	0.39	13,188	5,190	2.59	90	0.26
Euclid Trucks	0.15	6	70	0.9	0.45	0.38	6,594	2,515	1.26	90	0.13
Kress Carriers (Loaded)	0.15	6	60	0.9	0.45	0.36	47,749	16,994	8.50	90	0.85
Kress Carriers (Unloaded)	0.15	6	30	0.9	0.45	0.26	47,749	12,440	6.22	90	0.62
Total - Unpaved PM2.5							**133,515**	**45,129**	**22.56**		**3.19**

Notes:

For paved roads, emission estimation equation is from AP-42, Fifth Edition, Section 13.2.1 (January 2011) for industrial paved roads.

$E = k (sL)^{0.91} (W)^{1.02}$, where:
- E = particulate emission factor (lb/VMT)
- k = base emission factor for particle size range and units of interest. From Table 13.2.1-1, the base emission factors are 0.011 lb/VMT (TSP), 0.0022 lb/VMT (PM10), and 0.00054 lb VMT for PM2.5.
- sL = road surface silt loading (g/m^2), value obtained from AP-42 Background Information Document.
- W = average weight (tons) of the vehicles traveling the road

For unpaved roads, emission estimation equation is from AP-42, Fifth Edition, Section 13.2.2 for industrial unpaved roads (November 2006).

$E = k (s/12)^a (W/3)^b$, where:
- E = particulate emission factor (lb/VMT)
- k, a, b = empirical constants from Table 13.2.2-2
- s = silt content of road surface material (%)
- W = mean vehicle weight (ton)

Slag Storage Piles (F003)

Company Name:	**U. S. Steel Corp.**				
Site Name:	**Edgar Thomson Plant**				
Description:	**Title V Permit Renewal**				
Date:	**10/7/2020 - DRAFT**				

Table 20. Storage Pile Wind Erosion

Emission Unit	**Storage Piles**				
Emission Unit ID	**F003**				
Stack ID	**Fugitive**				
Hours of Operation	365	days/yr			
Maximum Area	2	acres			

Slag Storage Piles

Silt Content	5.3	%			
Precipitation Days	160	per year			
Time when Wind > 12 mph	20	%			

Pollutant	Potential Emissions (lb/hr)	Potential Emissions (tpy)	Emission Factor	Emission Factor Units	Emission Factor Source
Criteria Pollutants:					
Particulate Matter (PM)	0.67	2.93	8.03	lbs/day/acre	Air Pollution Engineering Manual, AWMA (1992)
Particulate Matter <10 microns (PM_{10})	0.32	1.39	3.80	lbs/day/acre	AP-42 Ch. 13.2.4. (November 2006)
Particulate Matter < 2.5 microns ($PM_{2.5}$)	0.100	0.436	1.194	lbs/day/acre	AP-42 Ch. 13.2.4. (November 2006)

Paints/Thinners, & Solvent Degreasers (F004)

Company Name:	U. S. Steel Corp.	
Site Name:	Edgar Thomson Plant	
Description:	Title V Permit Renewal	
Date:	10/7/2020 - DRAFT	

Table 21. Paints & Solvents

Emission Unit	**Paints, Thinners, Solvent Degreasers**	
Emission Unit ID	---	
Stack ID	**Fugitive**	
Hours of Operation	2,080	hours/yr

Paints & Thinners

Average Density	9.33	lb/gal
Max Usage Amount	795	gal/yr

Pollutant	Potential Emissions (lb/hr)	Potential Emissions (tpy)	VOC/HAP Content	Units	Emission Factor Source
Criteria Pollutants:					
VOC	2.14	2.23	60	% wt	SDS - Conservatively assume all is emitted
Hazardous Air Pollutants:					
Ethylbenzene	0.02	0.02	0.5	% wt	SDS - Conservatively assume all is emitted
Ethylene Glycol	0.07	0.07	2.0	% wt	SDS - Conservatively assume all is emitted
Glycol Ethers	0.13	0.13	3.5	% wt	SDS - Conservatively assume all is emitted
Toluene	0.46	0.48	13.0	% wt	SDS - Conservatively assume all is emitted
Xylene	0.02	0.02	0.6	% wt	SDS - Conservatively assume all is emitted

Solvent Degreasers

Average Density	6.55	lb/gal
Max Usage Amount	2949	gal/yr
Used Solvent Recovery Rate	95	%

Pollutant	Potential Emissions (lb/hr)	Potential Emissions (tpy)	VOC/HAP Content	Units	Emission Factor Source
Criteria Pollutants:					
VOC	0.18	0.19	100	% wt	SDS - Conservatively assume all is emitted
Hazardous Air Pollutants:					
None					

Solvent Degreaser VOC emissions = C35*C36*E44%/2000*(100-C37)

Pot Coat- Antifreeze (F005)

Methanol Usage

Maximum Usage	911,138	lbs	Pot Coat Winter Grade		
Methanol Content	7	% wt.			

Pollutant	**Potential Emissions (lb/hr)**	**Potential Emissions (tpy)**	**Emission Factor**	**Emission Factor Units**	**Emission Factor Source**
Criteria Pollutants:					
VOC	7.28	31.89	100	% loss	Conservative Assumption
Hazardous Air Pollutants:					
Methanol	7.28	31.89	100	% loss	Conservative Assumption

Circulating Water Cooling Towers

Company Name:	**U. S. Steel Corp.**
Site Name:	**Edgar Thomson Plant**
Description:	**Title V Permit Renewal**
Date:	**10/7/2020 - DRAFT**

Table 17. Cooling Towers

Emission Unit	**Cooling Towers**	
Emission Unit ID	**N/A**	
Stack ID	**Fugitive**	
Hours of Operation	8,760	hrs/yr

Paved Roads - TSP

Cooling Tower	Water Circulation Rate			Drift Rate	TDS	PM		PM_{10}		$PM_{2.5}$	
	(gpm)	(gal/hr)	(lb/hr)	(%)	(ppmw)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)
WSAC (Mold Water)	4,100	246,000	2,051,640	0.02	1,200	0.49	2.16	0.39	1.72	0.00	0.01
Caster Internal Machine	14,316	858,960	7,163,726	0.005	1,200	0.43	1.88	0.34	1.50	0.00	0.00
Caster Spray Water	7,000	420,000	3,502,800	0.005	1,200	0.21	0.92	0.17	0.73	0.00	0.00
Degasser	5,250	315,000	2,627,100	0.005	1,200	0.16	0.69	0.13	0.55	0.00	0.00
BOP Open Hood Tower	12,000	720,000	6,004,800	0.001	1,200	0.07	0.32	0.06	0.25	0.00	0.00
BOP Gas Cooling Tower	12,000	720,000	6,004,800	0.02	1,200	1.44	6.31	1.15	5.03	0.00	0.02
BFCE Recycle	15,000	900,000	7,506,000	0.02	5,000	7.51	32.88	5.99	26.22	0.02	0.08
TOTAL	**69,666**	**4,179,960**	**34,860,866**			**10.31**	**45.15**	**8.22**	**36.01**	**0.03**	**0.11**

Calculations

Cooling Tower Particulate Emissions Size Distribution
(based on paper by Reisman and Frisbie, "Calculating Realistic PM10 Emissions from Cooling Tower")

Volume of drift droplet = $(4/3)\pi(D_d/2)^3$ [Eq. 1]

Mass of solids in drift droplet = $(TDS)(\rho_w)$(Volume of drift droplet) [Eq. 2]

Solid particle volume = (Particle mass of solids) / (ρ_{TDS}) [Eq. 3]

$D_p = D_d\,[(TDS)(\rho_w/\rho_{TDS})]^{1/3}$ [Eq. 4]

where:

D_d = diameter of drift droplet (µm)

ρ_w = density of water = 1E-6 µg/µm^3

ρ_{TDS} = density of solid particles (assume NaCl)

Size Distribution for Cooling Tower Particulate Emissions

EPRI Droplet Diameter [1] (µm)	Droplet Volume [2] (µm^3)	Particle Mass (Solids) [3] (µg)	Solid Particle Volume [4] (µm^3)	Solid Particle Diameter [5] (µm)	EPRI % Mass Smaller [1]
10	524	6.28.E-07	0.29	0.82	0.00
20	4189	5.03.E-06	2.28	1.63	0.20
30	14137	1.70.E-05	7.71	2.45	0.23
40	33510	4.02.E-05	18.28	3.27	0.51
50	65450	7.85.E-05	35.70	4.09	1.82
60	113097	1.36.E-04	61.69	4.90	5.70
70	179594	2.16.E-04	97.96	5.72	21.35
90	381704	4.58.E-04	208.20	7.35	49.81
110	696910	8.36.E-04	380.13	8.99	70.51
130	1150347	1.38.E-03	627.46	10.62	82.02
150	1767146	2.12.E-03	963.90	12.26	88.01
180	3053628	3.66.E-03	1665.62	14.71	91.03
210	4849048	5.82.E-03	2644.94	17.16	92.47
240	7238229	8.69.E-03	3948.13	19.61	94.09
270	10305995	1.24.E-02	5621.45	22.06	94.69
300	14137167	1.70.E-02	7711.18	24.51	96.29
350	22449298	2.69.E-02	12245.07	28.60	97.01
400	33510322	4.02.E-02	18278.36	32.68	98.34
450	47712938	5.73.E-02	26025.24	36.77	99.07
500	65449847	7.85.E-02	35699.92	40.85	99.07
600	113097336	1.36.E-01	61689.46	49.02	100.00

[1] Based on particle size distrubution test data in Reisman, J. and Frisbie, G., "Calculating Realistic PM10 Emissions from Cooling Towers".
[2] Calculated using Equation 1.
[3] Calculated using Equation 2.
[4] Calculated using Equation 3.
[5] Calculated using Equation 4.

PM_{10} and $PM_{2.5}$ Fractions Interpolated from Size Distribution

$PM_{2.5}$ Fraction of Total PM (%)	PM_{10} Fraction of Total PM (%)
0.24	79.7

Particulate Emission Rates

PM Emission Rate (lb/hr) = Water Circulation Rate (lb/hr) x Drift x TDS / 1,000,000

PM_{10} Emission Rate (lb/hr) = PM Emission Rate x PM_{10} Fraction

$PM_{2.5}$ Emission Rate (lb/hr) = PM Emission Rate x $PM_{2.5}$ Fraction

Annual Emission Rates (tons/yr) = Short-term Emission Rates (lbs/hr) x 8,760 hours/year / 2,000 lbs per ton

APPENDIX C: Monitoring Analysis

The five-factor analysis used to review monitoring includes: 1) Variability of emissions; 2) Likelihood of violation; 3) Presence of add-onn controls; 4) Type of monitoring, process, maintenance, or control equipment data available; and 5) Type and frequency of monitoring requirements for similar emission units at other facilities.

<table>
<tr><th>Process/Pollutant</th><th>Monitoring Analysis</th></tr>
<tr><td>P001a and P002a
Control Device</td><td>Blast Furnace No. 1 and Blast Furnace No. 3
Casthouse Baghouse</td></tr>
<tr><td>PM</td><td>There is no variability in the process emissions.

The PM emissions is based on Article XXI standard, §2104.02.c for Iron production and the throughput, and the likelihood of violating the limit is very low. In addition, the emission inventory for the past three years is significantly lower than the limit.

Biennial stack testing is required to demonstrate compliance with the limit.

The Blast Furnaces No.1 and casthouse & No. 3 and casthouse have a baghouse.
The baghouse has a continuous parametric monitoring system (CPMS). And the facility is required to:

• Perform daily inspection of the compressed air supply for the pulse jet baghouse
• Perform daily monitoring of the baghouse pressure drops.
• Perform weekly visible emission monitoring using method 22. And continuous monitoring (every 15 min) of the COG H_2S concentration and blast furnace gas H_2S content.
• Monitor the hoppers weekly to ensure dust is being removed.
• Monthly inspection of the bag cleaning mechanism
• Quarterly inspection to confirm the baghouse physical integrity and air leaks
• Quarterly inspection of fans for wear, material buildup and corrosion.

There are no other blast furnaces in Allegheny County.</td></tr>
<tr><td>NO_X</td><td>There is no variability in the emissions. The NO_X emission is based on stack testing and AP-42.

The likelihood of violating the limit is significantly low, and the emission inventory for the past three years is significantly lower than the potential limit.

Biennial Stack testing is required to demonstrate compliance with the NO_X limit.

There is no control for NO_X. The baghouse is meant to control PM emissions.

The content of criteria pollutants in the exhaust gas is consistent, so monitoring of fuel use can be used as parametric continuous monitoring of NO_X.

The facility is required to record and report the amount of fuel combusted.

There are no other blast furnaces in Allegheny County.</td></tr>
<tr><td>SO_X</td><td>There is no variability in the process emissions.

The SO_X emission is based on SIP IP 0051-I006, issued on September 14, 2017.

The likelihood of violating the limit is low the emission inventory for the past three years is lower than the potential limit.
Biennial stack testing is required to demonstrate compliance with the SO_X limit.

The facility is required to:
▪ Continuously monitor (every 15 min) the COG H_2S concentration.
▪ Monitor the hourly H_2S concentration of the mixed gas.
▪ Monitor the quarterly H_2S content of the blast furnace gas.</td></tr>
</table>

Process/Pollutant	Monitoring Analysis
	There are no other blast furnaces in Allegheny County.
CO	There is no variability in the process emissions. The CO emission is based on stack testing, AP-42, fuel consumption and hot metal production. The likelihood of violating the limit is significantly low because the last three years of emission inventory indicates CO emission is significantly lower than the limits. The facility is required to keep records of the daily and monthly fuel combusted, and metal produced. The content of criteria pollutants in the exhaust gas is consistent, so monitoring of fuel use can be used as parametric continuous monitoring of CO. There are no other blast furnaces in Allegheny County.
VOC	There is no variability in the process emissions. The VOC emission is based on stack testing, AP-42, fuel consumption and hot metal production. The likelihood of violating the limit is significantly low because the last three years of emission inventory indicates VOC emission is significantly lower compared to the limit. The facility is required to keep records of the daily and monthly fuel combusted, and metal produced. The content of criteria pollutants in the exhaust gas is consistent, so monitoring of fuel use can be used as parametric continuous monitoring of VOC. There are no other blast furnaces in Allegheny County.
P001b and P002B Control Device	**Blast Furnace No. 1 Stoves and Blast Furnace No. 3 Stoves. None**
PM	There is no variability in the process emissions. The PM emissions is based on Article XXI standard, §2104.02.a.1 and the blast furnaces stoves heat input capacity. The likelihood of violating the limit is very low because the emission inventory for the past three years is significantly lower than the limit. There is no add-on control. Biennial stack testing is required to demonstrate compliance with the limit. The content of criteria pollutants in the exhaust gas is consistent, so monitoring of fuel use can be used as parametric continuous monitoring of PM. The facility is required to: ▪ Perform weekly Method 22 visible emission ▪ Record hourly, daily, monthly, and 12-month fuel consumption. ▪ Conduct annual adjustment and tune-up on the blast furnaces stoves ▪ Annual Inspection, adjustment, cleaning, or replacement of fuel-burning control system equipment for proper operation ▪ Inspection of the air-to-fuel ratio control system and adjustments necessary to ensure proper calibration and operation. There are no other blast furnaces in Allegheny County.
NO_X	There is no variability in the process emissions. The NO_X limit is based on RACT II permit, issued on April 21, 2020. The likelihood of violating the limit is very low because the emission inventory for the past three years is significantly lower than the limit. The facility is required to: ▪ Perform biennial stack testing to demonstrate compliance with the NO_X limit ▪ Record hourly, daily, monthly, and 12-month fuel consumption.

Process/Pollutant	Monitoring Analysis
	▪ Conduct annual adjustment and tune-up on the blast furnaces stoves ▪ Conduct annual Inspection, adjustment, cleaning, or replacement of fuel-burning control system equipment for proper operation ▪ Conduct annual Inspection of the air-to-fuel ratio control system and adjustments necessary to ensure proper calibration and operation ▪ Operate and maintain the blast furnace stoves according to good engineering and proper operating practices at all times. ▪ Calibrate, maintain, and operate all instrumentation, process equipment, and control equipment according to the applicable terms and conditions of this permit The content of criteria pollutants in the exhaust gas is consistent, so monitoring of fuel use can be used as parametric continuous monitoring of NO_X. There are no other blast furnaces in Allegheny County.
SO_X	There is no variability in the process emissions. The SO_X limit is based on SIP IP 0051-I006, issued on September 14, 2017. Therefore, the likelihood of violating the limit is very low and the emission inventory for the past three years is much lower than the potential limit. The facility is required to perform bi-annual stack testing to demonstrate compliance with the SO_X limit. • The facility is required to: ▪ Monitor the hourly H_2S concentration of the mixed gas ▪ Measure the H_2S content of the blast furnace gas combusted at the facility at least once every calendar quarter ▪ Continuously (every 15 minutes) monitor and record the H_2S concentration (in grains(gr)/100 dscf) of the COG combusted and the fuel flow rate. ▪ Conduct annual Inspection, adjustment, cleaning, or replacement of fuel-burning control system equipment for proper operation ▪ Operate and maintain the blast furnaces stoves according to good engineering and proper operating practices at all times. There are no other blast furnaces in Allegheny County.
CO	There is no variability in the process emissions. The CO limit is based on stack testing done for the purpose of establishing emissions limits plus a factor for operational flexibility. Therefore, the likelihood of violating the limit is very low, and the emission inventory for the past three years is significantly lower than the potential limit. The facility is required to: ▪ Record hourly, daily, monthly, and 12-month fuel consumption. ▪ Perform biennial stack testing to demonstrate compliance with the CO limit. ▪ Conduct annual adjustment and tune-up on the blast furnaces stoves ▪ Conduct annual Inspection, adjustment, cleaning, or replacement of fuel-burning control system equipment for proper operation. The content of criteria pollutants in the exhaust gas is consistent, so monitoring of fuel use can be used as parametric continuous monitoring of CO. There are no other blast furnaces in Allegheny County.
VOC	There is no variability in the process emissions. The VOC limit is based on stack testing done for the purpose of establishing emissions limits plus a factor for operational flexibility. Therefore, the likelihood of violating the limit is very low, and the emission inventory for the past three years is significantly lower than the potential limit. The facility is required to: ▪ Record hourly, daily, monthly, and 12-month fuel consumption.

Process/Pollutant	Monitoring Analysis
	▪ Conduct annual adjustment and tune-up on the blast furnaces stoves ▪ Annual Inspection, adjustment, cleaning, or replacement of fuel-burning control system equipment for proper operation. The content of criteria pollutants in the exhaust gas is consistent, so monitoring of fuel use can be used as parametric continuous monitoring of VOC. There are no other blast furnaces in Allegheny County.
P001c	**Blast Furnace Gas (BFG) Flare**
PM, NO_X, SO_X, CO & VOC	The blast furnace flare is used to combust excess BFG generated by the blast furnace 1 & 3. There is no potential emissions limit for the flare because it is impossible to limit the amount of excess gas to combust. The facility is required to: ▪ Perform weekly visible emission notation using EPA Method 22. ▪ Follow flare minimization plan to operate the flare in such a manner that minimizes all flaring except during emergencies shutdowns, startups, turnarounds, or essential operational needs ▪ Keep and maintain records of the total amount of BFG combusted at the flare (daily and 12-month) The content of criteria pollutants in the exhaust gas is consistent, so monitoring of fuel use can be used as parametric continuous monitoring of all criteria pollutants. There are no other blast furnaces in Allegheny County.
P003 **Control Device**	**Basic Oxygen Process (BOP) Shop** **Vessel F & R Capture Hood/BOP Gas Cleaning Venturi Scrubber.** **Secondary Baghouse; BOP Mixer & Desulfurization Baghouse**
PM	There is no variability in the process emissions. The PM emissions is based on Article XXI standard, §2104.02.c.1 and the basic oxygen process steel throughput, and the likelihood of violating the limit is very low. In addition, the emission inventory for the past three years is significantly lower than the limit. • The BOP baghouse has a continuous parametric monitoring system (CPMS). • The mixer baghouse is equipped with a bag leak detector to continuously monitor the relative change in PM • The permittee is required to: ▪ Monitor the pressure drop across each baghouse cell daily ▪ Inspect the hoppers weekly and remove the dust ▪ Check the compressed air supply for the pulse-jet baghouses daily ▪ Check the bag cleaning mechanisms for proper functioning monthly ▪ Quarterly inspection of the fans, material buildup and corrosion. ▪ monitor the hourly average pressure drop and water flow rate of the venturi scrubber ▪ Operate the scrubber's continuous parametric monitoring system (CPMS). ▪ Monitor the visible emissions of the BOP shop operations weekly during normal operation. ▪ Inspect the scrubber vessel hoods monthly ▪ Monitor the scrubber ductwork from quencher to the damper monthly ▪ Monthly inspection of the scrubber hood spray system There are no other BOP Steelmaking facilities in Allegheny County.
NO_X, CO & VOC	• There is no variability in the process emissions. • The NO_X, CO & VOC limits are based on the emission factor development testing for the purpose of establishing emissions limits plus a factor for operational flexibility. Therefore, the likelihood of violating the limit is very low, and the emission inventory for the past three years is significantly lower than the potential limit. • The facility is required to:

Process/Pollutant	Monitoring Analysis
	▪ Perform biennial stack testing to demonstrate compliance with the NO_X, CO & VOC limits. ▪ Keep and maintain records of the number of BOP Shop heats and steel production (daily, monthly, 12-month) ▪ Record the total amount and type of fuel used at the BOP Shop (hourly, monthly, 12-month) • The content of criteria pollutants from steel production is consistent, so monitoring of production and fuel use can be used as parametric continuous monitoring of criteria pollutants. • There are no other BOP Steelmaking facilities in Allegheny County.
SO_X	There is no variability in the process emissions. The SO_X limit is based on SIP IP 0051-I006, issued on September 14, 2017. Therefore, the likelihood of violating the limit is very low and the emission inventory for the past three years is much lower than the potential limit. The facility is required to perform biennial stack testing to demonstrate compliance with the SO_X limit. The facility is required to: ▪ Continuously (every 15 minutes) monitor and record the H_2S concentration (in grains(gr)/100 dscf) of the COG combusted and the fuel flow rate. ▪ Record the COG sulfur concentration, as H_2S. There are no other BOP Steelmaking facilities in Allegheny County.
P004 **Control Device**	**Ladle Metallurgical Facility (LMF)** **LMF Baghouse**
PM	There is no variability in the process emissions. The PM emissions is based on the Installation Permit #0051-I005, issued March 13, 2009. Therefore, the likelihood of violating the limit is very low. In addition, the emission inventory for the past three years is significantly lower than the limit. • The LMF baghouse has a continuous parametric monitoring system (CPMS). • The permittee is required to: ▪ Monitor the daily pressure drop across each baghouse cell ▪ Inspect the hoppers weekly and remove the dust ▪ Check the compressed air supply for the pulse-jet baghouses daily ▪ Check the bag cleaning mechanisms for proper functioning monthly ▪ Monthly inspection of the bag cleaning mechanism for proper functioning. ▪ Quarterly inspection of the integrity of the baghouse ▪ Quarterly inspection of the fans, material buildup and corrosion. ▪ Monitor the automatic fume damper on the LMF emission control system to ensure negative pressure. ▪ Quarterly inspections of the LMF dust collectors to ensure proper operation. ▪ Weekly monitor of the LMF operation visible emissions using Method 22 ▪ Operate the Ladle Metallurgy Facility (LMF) according to good engineering and air pollution control practices. There are no other LMF operations in the Allegheny County.
P005 **Control Device**	**Dual Strand Continuous Caster** **None**
PM, NO_X, SO_X, CO & VOC	There is no variability in the process emissions. • The emissions are based on the Permit No. 7035003-002-93900, issued March 1, 1994. • The permittee is required to: ▪ Measure the monthly quantity of natural gas and coke oven gas combusted ▪ Measure the sulfur concentration of all coke oven gas used for combustion ▪ Perform weekly visible emission during normal daylight operations using EPA Method 22 ▪ Record the total amount and type of fuel used at the Caster Tundish Preheaters

Process/Pollutant	Monitoring Analysis
	▪ Record the Dual Strand Caster production (daily, monthly, 12-month) ▪ Operate and maintain according to good engineering and air pollution control practices The content of criteria pollutants from the caster is consistent, so monitoring of production and fuel use can be used as parametric continuous monitoring of criteria pollutants. There is no other Dual Strand Continuous Caster operation in the Allegheny County.
Process P006 **Control Device**	**Vacuum Degasser** **CO Flare**
PM, NO_X, SO_X, CO & VOC	There is no variability in the process emissions. • The permittee is required to: ▪ Measure the monthly quantity of natural gas and coke oven gas combusted ▪ Measure the sulfur concentration of all coke oven gas used for combustion or flaring ▪ Perform weekly visible emission during normal daylight operations using EPA Method 22 ▪ Monthly visual inspection of the exhaust system and control/safety device to ensure proper operation and sound integrity of the control equipment exhaust systems. ▪ Record the monthly amount and type of fuel used. ▪ Record the Vacuum Degasser steel production (daily, monthly, 12-month) ▪ Record the COG sulfur concentration, as H_2S. ▪ Operate and maintain according to good engineering and air pollution control practices The content of criteria pollutants from vacuum degasser is consistent, so monitoring of production and fuel use can be used as parametric continuous monitoring of criteria pollutants. There is no other Vacuum Degasser operation in the Allegheny County.
B001; B002; B003 **Control Device**	**Riley Boiler** **None**
PM, NO_X, SO_X, CO & VOC	There is no variability in the process emissions. The PM emissions is based on Article XXI standard, §2104.02.a.3 and the boiler heat capacity. The SO_X limit is based on SIP IP 0051-I006, issued on September 14, 2017. The NO_X limit is based on RACT II Limit, issued on April 21, 2020. The likelihood of violating the limits is very low. In addition, the emission inventory for the past three years is significantly lower than the limit. The boilers are equipped with NO_X CEM to continuously measure the NO_X emission. The facility is required to: ▪ Maintain and operate the NO_X CEM for Riley Boilers No. 1, 2 and 3, and record the output of each system ▪ Install SO_X CEM to continuously measure the SO_X emissions. ▪ Continuously measure the sulfur concentration of coke oven gas ▪ Measure the H_2S content of the blast furnace gas combusted ▪ Perform weekly visible emissions during normal daylight operations using EPA Method 22 ▪ Perform biennial stack testing to demonstrate compliance with the NO_X, CO & VOC limits ▪ Record the monthly amount and type of fuel used ▪ Operate and maintain the boilers according to good engineering and air pollution control practices Boilers at other facilities in Allegheny County operate similarly. However, there are no boilers in the county that combust coke oven gas and blast furnace gas. Other boilers in the county typically record fuel use as parametric monitoring for criteria pollutants as most do not have CEMs.
V.I **Control Device**	**Blast Furnace Slag Pits** **None**
PM Fugitives	Variability of emissions is not known at this time therefore likelihood of violation is unknown. The content of slag, however, tends to be consistent.

Process/Pollutant	Monitoring Analysis
	The permittee is required to: • Perform weekly visible emissions at the property line attributable to the slag pit digging and slag handling operations during normal daylight operations using EPA Method 22 • Apply potassium permanganate or hydrogen peroxide into the Slag Pit quench water spray system, to enhance the suppression of H2S emissions at the Slag Pit There are no other slag pits in operation in the Allegheny County.
V.K **Control Device**	**Circulating Water Cooling Towers** **Mist Eliminators**
PM	The cooling towers are equipped with mist eliminator. The PM emissions is based on the total dissolve solids (TDS) and the drift rate. The likelihood of violating the limits is very low. In addition, the emission inventory for the past three years is significantly lower than the limit The permittee is required to: ▪ Monitor the total dissolve solids (TDS) of the recirculating water. ▪ Quarterly inspection of the cooling towers for biological activity ▪ Annual Inspection of the drift eliminators for proper installation and spacing ▪ Annual Inspection of the towers water flow and distribution ▪ Annual Inspection of the cooling towers fill for blockage ▪ Record and maintain the records of the TDS Other cooling towers in Allegheny County typically demonstrate compliance by monitoring TDS or conductivity of the water.