ALLEGHENY COUNTY HEALTH DEPARTMENT
AIR QUALITY PROGRAM

June 14, 2010

SUBJECT: Review of Application
Title V Operating Permit
U. S. Steel Clairton Works
400 State Street
Clairton, PA 15025-1855

RE: Operating Permit No. 0052
Metallurgical Coke and Coke By-Products

TO: Sandra L. Etzel
Manager, Engineering

FROM: Hafeez A. Ajenifuja
Air Quality Engineer

FACILITY DESCRIPTION:

U.S. Steel Clairton Works is the largest by-products coke plant in North America. Clairton Works operated 12 coke batteries and produced approximately 13,000 tons of coke per day from the destructive distillation (carbonization) of more than 16,000 tons of coal. During the carbonization process, approximately 215 million cubic feet of coke oven gas are produced. The volatile products of coal contained in the coke oven gas are recovered in the by-products plant. In addition to the coke oven gas, daily production of these by-products include 145,000 gallons of crude coal tar, 55,000 gallons of light oil, 35 tons of elemental sulfur, and 50 tons of anhydrous ammonia.

Batteries 7-9 were placed on “Cold Idling” since April, 2009 and later shutdown on April 14, 2010, and due to the shutdown of batteries 7-9, Clairton Works now operates 9 batteries.

Battery 7 was last charged and pushed on April 15 and 16, 2009;
Battery 8 was last charged and pushed on April 14 and 15, 2009; and
Battery 9 was last charged and pushed on April 13 and 14, 2009.

Clairton Works is located approximately 20 miles south of Pittsburgh on 392 acres along 3.3 miles of the west bank of the Monongahela River. The plant was built by St Clair Steel Company in 1901 and bought by U.S. Steel in 1904. The first coke batteries were built in 1918. The coke produced is used in the blast furnace operations in the production of molten iron for steel making.

The Clairton Works is a major source of CO, NO_X, PM, PM-10, SO_2, VOCs and Hazardous Air Pollutants (HAPs). The emission units regulated by this permit are summarized in Table 1-1:

TABLE 1-1
Emission Unit Identification

I.D.	SOURCE DESCRIPTION	CONTROL DEVICE(S)	MAXIMUM CAPACITY	FUEL/RAW MATERIAL	STACK I.D.
P001, P002 & P003	Coke Battery Nos. 1, 2 & 3	Pushing Emission Control (PEC) Baghouse (P050 - Serves Batteries 1, 2 & 3)	517,935 tons of coal charged per year, each battery	Coal, recycled coke plant materials, and bulk density control additives such as diesel fuel.	S001, S002 & S003
P007, P008 & P009	Coke Battery Nos. 13, 14, 15	PEC Baghouse (P052 - Serves Batteries 13, 14 & 15)	545,675 tons of coal charged per year, each battery	Coal, recycled coke plant materials, and bulk density control additives such as diesel fuel.	S007, S008 & S009
P010 & P011	Coke Battery Nos. 19 & 20	PEC Baghouse (P053 - Serves Batteries 19 & 20)	1,002,290 tons of coal charged per year, each battery	Coal, recycled coke plant materials, and bulk density control additives such as diesel fuel.	S010 & S011
P012	Coke Battery B	PEC Baghouse (P054)	1,491,025 tons of coal charged per year	Coal, recycled coke plant materials, and bulk density control additives such as diesel fuel.	S012
P013	Quench Tower No. 1 (Serves Batteries 1, 2 and 3)	Baffles	1,553,805 tons of coal per year	Incandescent coke and water	S018
P015	Quench Tower No. 5 (Serves Batteries 13, 14 & 15)	Baffles	1,637,025 tons of coal per year	Incandescent coke and water	S020
P038	Quench Tower No. 6 (Alternate-serves Batteries 13, 14 & 15)	Baffles	1,637,025 tons of coal per year	Incandescent coke and water	S033
P016	Quench Tower No. 7 (Serves Batteries 19 & 20)	Baffles	2,004,580 tons of coal per year	Incandescent coke and water	S021
P039	Quench Tower No. 8 (Alternate-serves Batteries 19 & 20)	Baffles	2,004,580 tons of coal per year	Incandescent coke and water	S034
P017	Quench Tower B (Serves Battery B)	Baffles	1,491,025 tons of coal per year	Incandescent coke and water	S022

I.D.	SOURCE DESCRIPTION	CONTROL DEVICE(S)	MAXIMUM CAPACITY	FUEL/RAW MATERIAL	STACK I.D.
P040	Quench Tower B (Alternate-serves Battery B)	Baffles	1,491,025 tons of coal per year	Incandescent coke and water	S035
P019	Desulfurization Plant	Afterburner	6,394,800 tons of coke per year	Coke oven tail gas	S023
P020	Keystone Cooling Tower	Mist Eliminators	39,420,000,000 gallons of water cooled per year	Heated non-contact cooling water	NA
P021	Coke By-Product Recovery Plant	Gas Blanketing System	8,240,605 tons of coal charged per year	Raw coke oven gas	NA
P022	Continuous Barge Unloader No. 1	NA	4,598,635 tons of coal per year	Coal	NA
P023	Continuous Barge Unloader No. 2	NA	3,641,605 tons of coal per year	Coal	NA
P024	Pedestal Crane Unloader	NA	2,792,250 tons of coal per year	Coal	NA
P025	Clam Shell Unloader	NA	2,978,400 tons of coal per year	Coal	NA
P026	Coal Transfer	NA	8,240,605 tons of coal per year	Coal	NA
P027	No.1 Primary Pulverizer	NA	4,598,635 tons of coal per year	Coal	NA
P028	No. 1 Secondary Pulverizer	NA	4,598,635 tons of coal per year	Coal	NA
P029	No. 2 Primary Pulverizer	NA	3,641,605 tons of coal per year	Coal	NA
P030	No. 2 Secondary Pulverizer	NA	3,641,605 tons of coal per year	Coal	NA
P031	Surge Bins and Bunkers	NA	8,240,605 tons of coal per year	Coal	NA
P032	Coke Transfer	NA	3,568,240 tons of coke per year	Coke	NA
P033	Coke Transfer	NA	2,825,830 tons of coke per year	Coke	NA
P034	Coke Screening Station No. 1 (Batteries 1-3)	NA	2,411,190 tons of coke per year	Coke	NA
P035	Coke Screening Station No. 2 (Batteries 13-15, 19 and 20)	NA	2,825,830 tons of coke per year	Coke	NA
P036	Coke Screening Station No. 3 (Battery B)	Baghouse	1,157,050 tons of coke per year	Coke	S036
P041	Boom Conveyor (coal pile destocking)	NA	5,584,500 tons of coal per year	Coal	NA

I.D.	SOURCE DESCRIPTION	CONTROL DEVICE(S)	MAXIMUM CAPACITY	FUEL/RAW MATERIAL	STACK I.D.
P042	Coal and Coke Recycle Screening	NA	262,800 tons of coal and coke per year	Coal and Metallurgical Coke	NA
P043	Coke Screening-Peters Creek	NA	3,066,000 tons of coke per year	Metallurgical Coke	NA
P044	Light Oil Barge Loading	Vapor Recovery to Boiler	55,000,000 gallons per year	Light Oil, Tar, and Tar Distillates	NA
B001	Boiler No. 1 (Babcock & Wilcox)	NA	760 MMBtu/hour	Coke Oven Gas and Natural Gas	S024
B002	Boiler No. 2 (Combustion Engineering)	NA	481 MMBtu/hour	Coke Oven Gas and Natural Gas	S025
B005	R1 Boiler (Riley Stoker)	NA	229 MMBtu/hour	Coke Oven Gas and Natural Gas	S028
B006	R2 Boiler (Riley Stoker)	NA	229 MMBtu/hour	Coke Oven Gas and Natural Gas	S028
B007	T1 Boiler (Erie City Zurn)	NA	156 MMBtu/hour	Coke Oven Gas and Natural Gas	S030
B008	T2 Boiler (Erie City Zurn)	NA	156 MMBtu/hour	Coke Oven Gas and Natural Gas	S031
B010	Ammonia Flare	NA	12.5 MMBtu/hour	Propane (assist gas)	S033
E001	Coal Storage Piles	NA	164,000 tons of coal	Coal	NA
E002	Coal Storage Pile - Peters Creek	NA	60,000 tons of coal	Coal	NA
E003	Coke Storage Pile – South Yard	NA	20,000 tons of coal	Coal	NA
F001	Fugitive Emissions (Plant Roadways)	Road Dust Control Program	Paved roads = 7.8413 miles Unpaved roads = 1.1742 miles	NA	NA
G001	Misc. Fugitive Emissions (Abrasive blasting of coke oven doors)	NA	Approximately 18 coke oven doors per week	Black Beauty Abrasive Material	NA

Process flow diagrams for the sources listed in Table 1-1are contained in Section II of the Title V Operating Permit.

PROCESS DESCRIPTIONS:

The emission sources listed in Table 1-1 can be divided into four general categories

- Coke oven batteries and related equipment
- Coke By-Products and Desulfurization Plant
- Coal and coke handling facilities
- Miscellaneous facilities

1.1 Coke Oven Batteries and Related Equipment

The Clairton Works operates 9 by-product coke oven batteries. By-product coke ovens are designed and operated to permit collection of the volatile material evolved from coal during the coking process. Each battery contains from 64 to 87 ovens. Coal is charged through opening in the top of the ovens and during the coking cycle, refractory-lined doors seal both ends of each oven. Combustion chambers on each side of the coking chamber (oven) consist of a large number of flues which permit uniform heating of the entire length of the coking chamber. To permit escape of the volatile matter driven from the coal during coking, an opening is provided at the top of the oven at both ends of the coking chamber. Each opening is fitted with an offtake pipe, which connects the oven with the gas collecting main. The coking cycle normally takes between 16 to 18 hours. After the coking cycle is completed, a pusher ram pushes the incandescent coke into a quench car. The quench car is moved to the quench tower where a stationary array of water spays cool the incandescent coke. The quenched coke is then dumped on the coke wharf.

Pollutant emissions from the coke batteries are controlled by pollution control equipment, and maintenance and other work practices that minimize fugitive emissions. These work practices and/or emission control practices include:

1. Coal Charging - Charging emissions that escape during coal charging are controlled by:

    a. Volumetric controls to ensure the proper amount of coal is charged to the oven (extra coal would block gas passages);

    b. Stage charging, wherein not all of a Larry car's hoppers are emptied at once so the exhaust system is not overwhelmed; (Larry cars receive coal from coal storage bins and are equipped with two hoppers that discharge a measured volume of coal to the oven. They move along rails on top of the battery.)

    c. Use of steam aspirators in the battery offtakes to create exhaust suction to draw emissions into the collecting main;

    d. Automatic lid lifters on newer batteries to minimize the time that lids remain open;

    e. Use of a jumper pipe on older batteries that connects an oven being charged to an adjacent operating oven so that the latter provides suction to an adjacent oven; and

    f. After charging is completed, the charging holes are lidded and sealed and steam aspirators are turned off.

2. Coking Process

Once the ovens have been charged with coal, the coking process begins. The walls of the ovens contain heating flues, of which half burn COG and the other half transport the residual heat from the combustion flues to a heat exchanger called a regenerator. The waste gases coming out of the heat exchanger are discharged from the combustion stack. The destructive distillation of coal produces raw coke oven gas, which is cleaned and used as a fuel in the heating flues. To prevent the entry of air into the oven during coking, a slight positive pressure is maintained in the oven. The by-products of coking (gases) are carried through the offtake system to the collector main and then to the byproduct recovery plant. Any volatiles contained in the bulk density additives or other recycled coke plant materials are also carried to the byproducts plant. At the conclusion of the coking cycle, the doors are removed and the incandescent coke is pushed by a ram into the hot car. Atmospheric emissions during coking result from fugitive emissions (charging, offtake, door and lid leaks) and from the combustion stack.

3. Coke Pushing

Coke pushing begins when the coke side oven door is removed and ends when the hot car enters the quench tower. During the push, gases are drawn from the coke side door and hot car into the hood where they are channeled to the exhaust duct and then to a baghouse.

There are two types of pushing emission control (PEC) systems installed at the Clairton Works. A coke-side shed is installed on the coke-side of Battery B. The shed consists of two parts: the main shed and the secondary shed. The main shed covers all the ovens on the coke-side of the battery and is provided with blowers and a baghouse for collecting particulates emitted during pushing. The secondary shed covers the area of hot car travel from the end of the main shed to the quench tower. The main evacuation system is in operation at all times so that fugitive emissions from coke-side door leaks as well as emissions generated during the coke pushing operation are captured by the baghouse. The remainder of the batteries use a moveable hood/fixed duct system that consists of a hood that covers the quench car and mates with an enclosed guide. The hood connects to a duct which in turn is connected to a baghouse. During the push, gases are drawn from the coke guide and quench car into the hood where they are channeled to the exhaust duct. There are separate baghouses for each battery group (batteries 1-3, 13-15, and 19-20). The fan capacities on the moveable hood/fixed duct control systems have all been recently increased which has increased their capture efficiencies.

4. Travel

After receiving the hot coke, the hot car travels to the quench tower. During travel the hot car is uncovered. Emissions to the atmosphere consist mainly of particulate released as part of the hot air rising from the coke in the car. Smaller amounts of SO_2, NOx, CO and other pollutants are also released.

5. Quench Tower

Incandescent coke, after it is pushed from the ovens, is transported by means of a quench car or hot car to a quench tower. Quenching of coke minimizes it from burning due to further exposure to air.

6. Other Fugitive Emissions

Routine inspection and maintenance programs conducted by the Clairton Works result in minimizing fugitive emissions from the batteries and emissions from the combustion stacks.

1.2 Coke By-Products and Desulfurization Plant:

By-Products Plant

During the coking process, approximately 225 million cubic feet of raw coke oven gas are produced each day. The gases evolved leave the oven through standpipes, pass into goosenecks, and then into the gas collection main. The axi compressors are used to move the coke oven gases which are composed of water vapor, tar, light oils (primarily benzene, toluene and xylene), heavy hydrocarbons, and other chemical compounds. The raw COG exiting the ovens is shock cooled by spraying recycled flushing liquor in the gooseneck. This spray cools the gas and precipitates tar, condenses various vapors, and serves as the carry medium for the condensed compounds. Additional cooling of the gas in the final coolers precipitates most of the remaining tar. After leaving the final coolers, the gas carries approximately three-fourths of the ammonia and 95 percent of the light oil originally present in the raw coke oven gas. This gas enters the PhosAm Absorber where the ammonia is removed and further processing produces anhydrous ammonia. The remaining stream which contains light oil and other compounds is further processed to produce a light oil product. The daily production of these by-products includes approximately 145,000 gallons of crude coal tar, 55,000 gallons of light oil, 50 tons of anhydrous ammonia and 35 tons of elemental sulfur (produced in the desulfurization plant). Emissions of volatile organics from storage tanks and other equipment in the by-products plant are controlled by a gas blanketing system. The carrier gas in the blanketing system is clean coke oven gas (COG). Storage tank atmospheric vents and other equipment are connected to this blanketing system where the collected organic vapors are mixed with the coke oven gas. This coke oven gas is used as fuel for boilers, furnaces and other fuel burning equipment at the Clairton Works and the Irvin and Edgar Thomson Plants.

Desulfurization Plant

After the volatile products in the COG are removed, the COG is processed in the desulfurization plant to remove hydrogen sulfide (H_2S) and other sulfur compounds. There are two Claus Plants in the desulfurization plant and one is a backup in the event the primary Claus Plant is out of service. The Claus Plant converts the H_2S and other sulfur compounds in the COG to elemental sulfur. The elemental sulfur is sold. The Shell Claus Offgas Treatment (SCOT) Plant separates the gas from the Claus Plant into a concentrated hydrogen sulfide stream and acid offgas. The concentrated hydrogen sulfide stream is sent back to the Claus Plant for further sulfur removal and recovery. The acid offgas is incinerated by the SCOT Plant incinerator. The concentration of H_2S in the COG is normally reduced to approximately 10 grains per 100 dry standard cubic feet (dscf) of COG or approximately 0.045 percent sulfur. This is well below the allowable limit of 40 grains of H_2S per 100 dscf of COG per Article XXI, §2105.21.h.4.

1.3 Coal and Coke Handling Facilities

Coal is delivered to the plant in barges. Continuous barge unloaders remove the coal from the barge and conveyors transport the coal to the coal surge and blending bins. The blended coal is then transferred to the primary and secondary coal pulverizers and then to coal storage bunkers. From the bunkers, the pulverized coal is loaded onto Larry cars and then charged to the batteries.

After being quenched with water, coke is discharged onto an inclined surface called the coke wharf which allows for the drainage of excess water. The heat transfer during this time also brings the coke to a lower temperature making it safe to handle. Quenched coke is transferred from the coke wharf to one of three screening stations. Screening Station No. 1(P034) receives coke from Batteries 1-3, Screening Station No. 2 (P035) receives coke from Batteries 13-15 and 19 & 20, and Screening Station No. 3 receives coke from Battery B. Screening Station No. 3 is equipped with a baghouse to control particulate emissions from the screening operation. The screened coke is then transferred to rail cars for shipment or to coke storage areas.

1.4 Miscellaneous Facilities

Ammonia Flare (B010)

Atmospheric vents from three wastewater treatment surge tanks are connected to the ammonia flare to destroy volatile organic emissions from these vents. The flare also destroys the ammonia fumes that are generated during the loading of anhydrous ammonia into tank trucks.

Light Oil Loading Station

Light oil is loaded once a week into 400,000 gallon river transport barges. Light oil is pumped from the light oil storage tanks into the barge at a rate of 1,200 gpm. The vapors that are displaced by the light oil in the barge are removed by use of an eductor. The gas used to drive the eductor is 100 psig natural gas. The vapors from the barge combined with the natural gas are then routed to the down river gas system.

Boilers (B001, B002, and B005-B008)

These boilers produce process steam for various facilities at the coke plant. Desulfurized coke oven gas is the primary fuel used in these boilers; however, they are also equipped to fire natural gas or a combination of coke oven gas and natural gas.

2.0 Maximum Potential Emissions

The discussion below provides information on how the emission limits in the permit were derived. In some cases, the Department has designated the permit limits to be county-only enforceable because there is no specific federal requirement that provides a limit for those pollutants. However, the Department has been issuing installation and operating permits with pound per hour (lb/hr) and tons per year (tpy) emission limits for criteria pollutants and hazardous air pollutants for a long time (approximately 20 years). Because the Department intends to issue one permit that covers all equipment at the site, those pollutants for which there is no federal applicable requirement have been designated as county-only enforceable.

2.1 *Coke Battery Combustion Stack Emissions*

Emissions from the combustion stacks are due to the combustion of desulfurized coke oven gas (COG) and the leakage of raw COG from the oven into the heating flues.

Emissions from each of the combustion stack firing coke oven gas and natural gas are shown in the Table 2 below. The combustion stack NO_x emission was estimated based on the stack test performed from 2/22/2001 to 5/18/2006, and because of the variability in stack test result, the NO_x emissions were increase by 15%

Coke Batteries Combustion Stack Emissions

Pollutants	Emissions									
	Battery 1-3		Batteries 13-15		Battery 19		Battery 20		Battery B	
	Lbs/hr	Tons/yr[b]	Lbs/hr	Tons/yr[b]	Lbs/hr	Tons/yr[b]	Lbs/hr	Tons/yr[b]	Lbs/hr	Tons/yr[b]
PM/PM_{10}	13.57	59.45	6.06	26.55	24.01	105.17	12.01	52.59	12.35	54.08
NO_x	127.31	557.62	85.48	374.40	314.43	1,377.20	314.43	1,377.20	194.31	851.08
SO_X	31.84	139.84	33.45	146.52	61.53	269.48	61.52	269.48	91.54	400.93
CO	81.59	357.38	85.96	376.52	157.90	691.58	157.90	691.58	234.89	1,028.81
VOC	6.39	27.99	6.73	29.49	12.37	54.17	12.37	54.17	18.40	80.59

Coke Batteries Combustion Stacks Information

Batteries #	Coal Charged		COG Throughput		Flow Rate
	Coal Charge	Tons/yr	Mmcf/hr	Mmcf/yr	DSCFM
1-3	59.13	517,935	0.296	2,592.960	45,900
13-15	62.29	545,675	0.311	2,724.360	41,000
19	114.42	1,002,290	0.572	5,010.720	81,200
20	114.42	1,002,291	0.572	5.010.720	81,200
B	170.21	1,491,025	0.851	7,454.760	83,500

Coal charged and coke oven gas throughputs, and stack exhaust conditions are from the Title V Application

Emission Factors for the Battery Combustion Stack are shown below:

Pollutants	Emissions Factors									
	Battery 1-3		Batteries 13-15		Battery 19		Battery 20		Battery B	
	Emission Factor	Unit	Emission Factor	Unit	Emissio n Factor	Unit	Emission Factor	Unit	Emission Factor	Unit
[1]PM/PM_{10}	0.030	gr/dscf	0.015	gr/dscf	0.030	gr/dscf	0.015	gr/dscf	0.015	gr/dscf
[2]NO_x	403.50	lb/mmcf-COG	239.0	lb/mmcf-COG	478.0	lb/mmcf - COG	478.0	lb/mmcf-COG	198.55	lb/mmcf-COG
[3]SO_X	107.56	lb/mmcf-COG	107.56	lb/mmcf-COG	107.56	lb/mmcf -COG	107.56	lb/mmcf-COG	107.56	lb/mmcf-COG
[4]CO	1.38	lb/ton	1.38	lb/ton	1.38	lb/ton	1.38	lb/ton	1.38	lb/ton
[5]VOC	0.108	lb/ton	0.108	lb/ton	0.108	lb/ton	0.108	lb/ton	0.108	lb/ton

[1]PM emission factors from allowable emissions per §2105.21.f. Exhaust gas volume flow rates are the maximum rate measured for each battery group plus 10% and rounded up.

[2]Exhaust gas flow rates and NOx emission rates are based on stack tests performed from 2/22/2001 to 5/18/2006. Because of the variability in stack test results, NO_x emissions were increased by 15%.

[3]SO2 emissions based on 40 grains of H2S/100 cf-COG per §2105.21.h.4

[4]CO emission factor from AP-42, Draft Section 12.2 (July 2001), Table 12.2-16. CO emissions were increased by 15%.

[5]VOC emissions factor based on AP-42, Draft Section 12.2 (July 2001), Table 12.2-16.VOC emissions were increased by 15%.

Combustion Stack Test Summary

Battery No.	Test Date	ACFM	DSCFM	NOx		VOC		Max. Potential Flow Rates[1]
				lb/hr	Lb/MMBtu	lb/hr	lb/MMBtu	
1	2/26 -27/03	76,700	36,600	92.10	0.748			
1	4-/5-7/05	85,100	41,700	96.30	0.730			
2	3/3-4/03	83,300	38,700	97.60	0.701			
2	4/6-8/05	81,200	37,900	83.60	0.628	1.40	0.010	
3	5/22-23/02	85,200	39,200	101.30	0.697			
3	4/14-15/04	82,700	38,900	68.90	0.538	1.70	0.014	
3	2/9-10/06	77,100	37,600	89.10	0.677	5.60	0.043	
Max 1-3		**85,200**	**41,700**	**101.300**	**0.748**	**5.60**	**0.043**	
Max. Potential Flow Rate			**45,870**					**45,900**
13	1/23-24/02	77,400	34,600	73.60	0.478			
13	3/9-10/04	74,700	35,100	43.90	0.326	0.60	0.005	
13	4/10/2006	74000	37233	59.50	0.400	3.60	0.020	
14	2/13-14/02	77,000	36,400	58.00	0.402			
14	3/11-12/04	75,100	35,300	41.80	0.309	1.00	0.007	
14	4/12/2006	75,100	36,000	46.40	0.343	2.40	0.018	
15	6/4-5/03	70,600	32,300	39.70	0.298			
15	4/26-27/05	78,900	35,100	44.10	0.261	2.10	0.012	
Max 13-15		**78,900**	**37,233**	**73.60**	**0.478**	**3.6**	**0.020**	
Max. Potential Flow Rate			**40,956**					**41,000**
19	3/14/2002	135,000	63,700	143.10	0.604			
19	11/19/2004	129,000	65,300	96.90	0.518	142.50	0.761	
19	5/17/2006	144,000	67,000	122.60	0.530	107.20	0.463	
20	4/11/2002	160,000	73,200	230.10	0.854			
20	11/10/2004	145,100	71,100	147.50	0.656	140.70	0.625	
20	5/18/2006	163,000	73,800	252.90	0.956	168.50	0.635	
Max 19-20		**163,300**	**73,800**	**252,900**	**0.956**	**168.50**	**0.761**	
Max. Potential Flow Rate			**81,180**					**81,200**
B	2/22/2001	147,000	75,900					
B	5/7/2003	132,000	63,700		0.288			RATA performed 8/28/2003
B	8/10/2005	115,000	55,200			1.10	0.006	
Max B		**147,000**	**75,900**	**0.000**	**0.288**	**1.10**	**0.06**	
Max. Potential Flow Rate			**83,490**					**83,500**
	B-Battery NOx CEM Data							
	10/1-12/03				0.346			
	4/1-6/04				0.346			
	7/1-9/04				0.310			
	10/1-12/04				0.397			
Max B					**0.397**			

[1]Maximum potential exhaust gas flow were estimated by increasing the maximum flow rate by 10% and rounding up to the nearest 100 dscfm

Sample Calculation for combustion stack

NO_x emission factor =

0.748 lb/mmbtu (stack test)*500 btu/cf (COG heating value)

= **374 lb/mmcf-cog**

NO_x emissions

(374 lb/mmcf)*(0.296 mmcf/hr)*1.15 (15% factor increase)

= **127.31 lb/hr**

= (127.31 lb/hr)*(8760 hr/yr)*(tons/2000lb) = **557.6 ton/yr**

2.2 Coke Battery Fugitive Emissions

Pushing fugitives emissions occur when the pushing emission control (PEC) hood system is out of service due to routine maintenance or a breakdown and the emissions that are generated when the coke side door is removed and the coke is pushed. Fugitive emissions also occur when the PEC hood does not capture all the emissions that are generated during the pushing cycle.

The emission limitations contained in federal and ACHD regulations were used to estimate maximum potential fugitive emissions from the 9 coke batteries at the Clairton Works. These maximum potential emissions are listed in Table 2-1.

Table 2-1
Coke Battery Fugitive Emission Limitations

Coke Oven Batteries	Emission Limitation				
	40 CFR 63.304(b)(2)				§2105.21.a.1
	Charging Visible Emissions (V.E.) (seconds/charge)	Door Leaks (%)	Lid Leaks (%)	Offtake Leaks (%)	Charging V.E. (second/5-charges)*
1-3	12	3.8	0.4	2.5	-
13, 14 & 15	12	3.8	0.4	2.5	55
19 & 20	12	3.8	0.4	2.5	55
B	12	4.3	0.4	2.5	55

*A total of 55 seconds of visible emissions for 5 consecutive charges.

The above limitations in §63.304(b)(2) were used to estimate the Benzene Soluble Organic (BSO) emission rate according to the procedures in AP-42, Draft Section 12.2 (July 2001), Table 12.2-2, Footnote h. Table 3-2 below lists the information required to calculate the BSO emissions rate for each coke battery.

Table 2-2
Coke Battery Statistics

Coke Oven Batteries	Statistics per Battery			
	Charges/day	No. of Doors	No. of Lids	No. of Offtakes
1-3	89	128	256	128
13, 14 & 15	90	122	244	122
19 & 20	129	174	348	174
B	109	150	300	150

BSO emission rates were calculated as follows (AP-42, Table 12.2-2, and Footnote h):

Example Calculations for Battery No. 1

- **BSO Emission Rate for Charging**

BSO = (Avg. No. of charges/hr) x (seconds of emissions/10) x (0.0042) x 2.205lb/kg
= (89 Charges/24-hours) x (12 seconds/10) x 0.0042 x 2.205
= 0.0412 lbs/hr

- **BSO Emission Rate for Door Leaks***

BSO = (Avg. No. of doors visibly leaking (yard) x 0.019 + (Avg. No. of doors visibly leaking (bench) x 0.011 + Avg. No. of doors without leaks x 0.002
= (3.8/100 x 128 x 0.019) + (128 x 0.06 x 0.011) + (1 – 6/100 – 3.8/100) x (128 x 0.002)
= 0.408 kg/hr x 2.205 lb/kg
= 0.90 lb/hr

** The average number of doors with visible leaks as observed from the bench is 6 percent. The average BSO leak rate for doors without visible leaks is 0.002 kg/hr.*

- **BSO Emission Rate for Lid Leaks**

BSO = Average No. of lids leaking x 0.0033 x 2.205 lb/kg
= (256 x 0.4/100) x 0.0033 x 2.205
= 0.00745 lb/hr

- **BSO Emission Rate for Offtake Leaks**

BSO = Average No. of offtakes leaking x 0.0033 x 2.205 lbs/kg
= (128 x 2.5/100) x 0.0033 x 2.205 lb/kg
= 0.0233 lb/hr

Emission rates for criteria and hazardous air pollutants were derived from the ratio of other pollutants to the BSO emission factors presented in Table 12.2-4 of AP-42, Section 12.2. These factors are presented in the following table:

Table 2-3
Ratios of Other Pollutants to BSO

Pollutant	Ratio to BSO
Filterable PM (leaks)	0.9
Filterable PM (charging)	0.8
Carbon Monoxide	1.1
VOC	2.2
TOC	5.2
Ammonia	0.15
Benzene	0.5
Carbon Disulfide	0.001
Hydrogen Cyanide	0.035
Hydrogen Sulfide	0.15
Naphthalene	0.2
Phenol	0.0006
Toluene	0.04
Xylene	0.005

2.3 Boilers Emissions

Emissions from each of the six (6) boilers firing coke oven gas are shown below:

Pollutants	**Emissions**							
	Boiler 1 760 MMBtu/hr		**Boiler 2 481 MMBtu/hr**		**Boilers R1 & R2 229 MMBtu/hr Each**		**Boilers T1 & T2 156 MMBtu/hr Each**	
	Lbs/hr	**Tons/yr**	**Lbs/hr**	**Tons/yr**	**Lbs/hr**	**Tons/yr**	**Lbs/hr**	**Tons/yr**
[1]PM/PM_{10}	15.20	66.58	9.62	42.14	4.58	20.06	3.12	13.67
[2]NO_x	410.40	1,740	259.74	1285.0	123.66	525	84.24	358
[3]SO_X	163.50	716.11	103.48	453.22	49.26	215.78	33.56	146.99
[4]CO	32.16	140.87	20.36	89.16	9.69	42.45	6.60	28.92
[5]VOC	2.10	9.19	1.33	5.81	0.63	2.77	0.43	1.89

[1]Allowable particulate mass emissions for COG = 0.02 lb/MMBtu per §2104.02.a.4. PM-10 assumed to = PM.
[2]NO_x emission factor from Plan Approval Order and Agreement No. 234 Upon Consent (RACT Plan), 12/30/96.
[3]Allowable SO2 emissions for COG firing = 40 grains-H2S/100 dscf-COG per 2105.21.h.4 or 107.56 lb-SO2/mmcf-COG
[4]CO emission factor from AIRS, EPA 450/4-90-003, March 1990. Emission factor was increased by 15%.
[5]VOC emission factor for COG from AIRS, EPA 450/4-90-003, March 1990. Emission factor was increased by 15%.

Sample Calculation (PM for boiler firing coke oven gas)

PM: (0.02 lb/MMBTU)*(760 MMBtu/h) = 15.2 lb/hr

(15.2 lb/hr)*(8760 hr/yr)/(2000 lb/ton) = **66.58 tpy**

Sample Calculation (SO$_x$ for boiler firing coke oven gas)

SO$_x$ emission factor = 40 grains-H2S/100 dscf-COG per 2105.21.h.4 or

= (40/gr/100dscf)*[60(MW SO_2)/34(MW H_sS)]*(LB/7000gr)*1000000

= **107.56 lb/mmcf**

SO$_x$ emissions = (107 lb/mmcf)*1.52 mmcf/hr (COG fuel usage) = 163.50 lbs/hr

= (163.50 lb/hr)*(8760 hr/yr)/(2000 lb/ton) = **716.11 tpy**

Emissions from each of the six (6) boilers firing natural gas are shown below:

Pollutants	Emissions							
	Boiler 1 760 MMBtu/hr		Boiler 2 481 MMBtu/hr		Boilers R1 & R2 229 MMBtu/hr Each		Boilers T1 & T2 156 MMBtu/hr Each	
	Lbs/hr	Tons/yr[6]	Lbs/hr	Tons/yr[6]	Lbs/hr	Tons/yr[6]	Lbs/hr	Tons/yr[6]
[1]PM/PM_{10}	6.08	26.63	3.85	16.85	1.83	8.02	1.25	5.47
[2]NO_x	410.40	1,740	259.74	1285.0	123.66	525	84.24	358
[3]SO_X	0.46	2.0	0.29	1.26	0.14	0.60	0.09	0.41
[4]CO	73.42	321.56	46.46	203.51	22.12	96.89	15.07	66.0
[5]VOC	4.81	21.05	3.04	13.33	1.45	6.34	0.99	4.32

[1]Allowable PM emissions for natural gas = 0.008 lb/MMBtu per §2104.a.1. PM-10 = PM per AP-42, Section 1.4.3.
[2]NO_x emission factor from Plan Approval Order and Agreement No. 234 Upon Consent (RACT Plan), 12/30/96
[3]SO2 emission factor from AP-42, 5th Edition, Section 1.4, Table 1.4-2, July 1998.
[4]CO emission factor from AP-42, 5th Edition, Section 1.4, Table 1.4-1, July 1998. Emission factor was increased by 15%.
[5]VOC emission factor from AP-42, 5th Edition, Section 1.4, Table 1.4-2, July 1998. Emission factor was increased by 15%.
[6]A year is defined as any consecutive 12-month period

Sample Calculation (PM for boiler firing natural gas)

PM: (0.008 lb/MMBTU)*(760 MMBtu/h) = 6.08 lb/hr

(6.08 lb/hr)*(8760 hr/yr)/(2000 lb/ton) = 26.63 tpy

Emission factor for the boilers are shown below:

Pollutants	Emission Factors	
	Boilers 1, 2, R1, R2, T1 and T2	
	Firing COG	Firing NG
	Lbs/MMBtu	Lbs/MMBtu
PM/PM_{10}	0.02[a]	0.008[f]
NO_x	0.54[b]	0.145[g]
SO_X	107.56[c]	0.0006[h]
CO	21.16[d]	0.0824[i]
VOC	1.38[e]	0.0054[j]

[a]Allowable particulate mass emissions for COG = 0.02 lb/MMBtu per §2104.02.a.4. PM-10 assumed to = PM

[b,g]NO_x emission factor from Plan Approval Order and Agreement No. 234 Upon Consent (RACT Plan), 12/30/96.

[c]Allowable SO2 emissions for COG firing = 40 grains-H2S/100 dscf-COG per 2105.21.h.4 or 107.56 lb-SO2/mmcf-COG

[d]CO emission factor from AIRS, EPA 450/4-90-003, March 1990. Emission factor was increased by 15%.

[e]VOC emission factor for COG from AIRS, EPA 450/4-90-003, March 1990. Emission factor was increased by 15%.

[f]Allowable PM emissions for natural gas = 0.008 lb/MMBtu per §2104.a.1. PM-10 = PM per AP-42, Section 1.4.3.

[h]SO2 emission factor from AP-42, 5th Edition, Section 1.4, Table 1.4-2, July 1998.

[i]CO emission factor from AP-42, 5th Edition, Section 1.4, Table 1.4-1, July 1998. Emission factor was increased by 15%.

[j]VOC emission factor from AP-42, 5th Edition, Section 1.4, Table 1.4-2, July 1998. Emission factor was increased by 15%.

2.4 Desulfurization Plant Emissions

The desulfurization plant is used to remove hydrogen sulfide (H_2S) and other sulfur compounds, and it consists of two Claus Plants. One clause plant is use continuously and the other is use as a backup in the event the primary Claus Plant is out of service. The Claus Plant converts the H_2S and other sulfur compounds in the COG to elemental sulfur.

Emission from the Scot Plant is shown in the table below and it is estimated using the 12/14/2004 Scot Plant stack result.

POLLUTANT[a]	HOURLY EMISSION LIMIT (lb/hr)	ANNUAL EMISSION LIMIT (tons/year)*
PM	2.64	11.6
PM[b]-10	1.85	8.1
SO_2	36.0	157.7
CO[c]	1.65	7.2
NO_X	0.6	2.6
VOC	8.9	38.9

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

[a] PM, SO_x, NO_x and VOC were based on 12/14/2004 stack test result and increased by 20%

[b]PM_{10} is based on 70% of PM

[c]CO emission factor was from FIRE 6.01 for coke oven gas (COG) fired boiler, and increased by 15%

Sample Calculation (CO)

CO = 683 mmcf/yr (fuel usage)*(21.6 lbs/mmcf)/8760 = 1.65 lb/hr

(1.65 lb/hr)*(8760 hr/yr)/(2000 lb/ton) = 7.23 tpy

2.5 Coke By-Product Recovery Plant Emissions

During the coking process, approximately 225 million cubic feet of raw coke oven gas are produced each day. The gases evolved leave the oven through standpipes, pass into goosenecks, and then into the gas collection main.

Emissions from the Coke By-Product Recovery Plant is shown in the table below and they are estimated using the AP-42 Emission Factor, Final, Section 12.2. However a permit (91-I-0021-P) was issued on April 29, 1991 limiting emissions from the by-products plant to 54 tpy of benzene and 78 tpy of VOC. Those limits were used in the permit.

POLLUTANT	HOURLY EMISSION LIMIT (lb/hr)	ANNUAL EMISSION LIMIT (tons/year)*
VOC[a]	27.82	121.85
Benzene[b]	2.48	10.87
Toluene[c]	1.80	7.89
Xylene[d]	0.90	3.94

*A year is defined as any consecutive 12-month period.
[a]VOC emission factor from AP-42, 5th Edition, Section 12.2, Table 12.2-23, May 2008.
[b]Benzene emission factor from AP-42, 5th Edition, Section 12.2, Table 12.2-22, May 2008.
[c]Toluene emission factor from AP-42, 5th Edition, Section 12.2, Table 12.2-22, May 2008. Based on 26% of BTX. See footnote d
[d]Xylene emission factor from AP-42, 5th Edition, Section 12.2, Table 12.2-22, May 2008. Based on 13% of BTX. See footnote d.

Sample Calculation (VOC)

The VOC emission factor = 0.04148 lbs/ton -coke. It comprises of emission factor from Light Oil (0.00018 lb/ton), Tar Storage Tank (0.0086 lb/ton), Tar Decanter (0.0022 lb/ton), Light Oil Sump (0.0005 lb/ton), and Light Oil Condenser (0.03 lb/ton)

VOC = 671 ton/hr (coke pushed)*(0.04148 lb/ton) = 27.82 lb/hr

(5,874,919 ton/yr)*(0.004148lbs/ton)/(ton/2000 lb) = 121.85 tpy

Emission rates for each coke oven battery and each pollutant are contained in Appendix A, Table A-1.

Criteria and hazardous air pollution potential emission rates for the sources at the Clairton Works are presented in Appendix A.

3.0 PERMIT APPLICATION COMPONENTS

1. Revised Title V Operating Permit Application, received March 2001.
2. Partial revision of Title V Operating Permit Application, received May 2002.
3. Partial revision of Title V Operating Permit Application, dated October 21, 2003.
4. Partial revision of Title V Operating Permit Application, dated August 18, 2004.
5. Partial revision of Title V Operating Permit Application, dated January 28, 2005.
6. Partial revision of Title V Operating Permit Application, dated April 20, 2005.

4.0 METHODS OF DEMONSTRATING COMPLIANCE

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

4.1 Coke Oven Batteries (P001 – P012)

Daily visible emission observations using Method 303 per 40 CFR 63.04 (40 CFR 63 Subpart L) are used to demonstrate compliance for charging emissions, door leaks, lid leaks, offtake leaks and collector mains. Weekly visible emission observations are also performed for charging, door leaks, lid leaks, offtake leaks, combustion stack opacity, pushing emission opacity and hot car travel. Stack testing is also performed on the combustion stacks (see Section 6.0). Monthly records of coal charged to the batteries, coke produced, coke oven gas produced, sulfur content of the coal and coke, total number of pushes, number of controlled pushes, pushing outages and coke oven gas flaring incidents are submitted to the ACHD. The pushing emission control baghouses are tested every two years for particulate matter and opacity.

4.2 Quench Towers and Alternate Quench Towers (P013–P017 & P037- P040)

All quench towers are equipped with baffles and the water used for quenching the incandescent coke will be equivalent to or better than the water quality standards established for the Monongahela River per Article XXI, §2105.21.g. Quench towers are inspected on a periodic basis to determine the condition of the tower and baffles.

4.3 Desulfurization Plant (P019)

The concentration of sulfur compounds (expressed as hydrogen sulfide, H_2S) in the desulfurized coke oven gas are measured continuously to determine compliance with the limitation of 40 grains of H_2S per 100 dry standard cubic feet of COG. Emission testing of the SCOT plant incinerator is performed every two years (see Section 6.0).

4.4 Coke By-Products Recovery Plant (P021)

Emissions from the by-products plant are controlled by a gas-blanketing system that captures volatile organic compounds that are released through storage tank vents and from other equipment. Other measures, such as seals on pumps, compressors, etc. also control the release of VOCs. The gas blanketing system and other measures used to control VOC emissions are routinely checked for leaks and when leaks or equipment malfunctions are identified, repairs are initiated as soon as possible.

4.5 Coal and Coke Handling Facilities (P022-P036 and P041-P043)

Visible emission observations will be conducted in accordance with §2107.02 and /or §2107.11. Stack testing for PM-10 of the No. 3 Coke Screening Station (P036) baghouse outlet will be conducted at least once every five years. Monthly records of material throughput for these sources will be submitted to the ACHD every six months.

4.6 Boilers (B001, B002, B005-B008, and B010)

Boilers No.1 and 2 are equipped NO_X CEMS and stack testing is performed every two years to measure the SO_2 emission rate. These boilers combust COG and natural gas. Boilers R1, R2, T1 and T2 also combust COG and natural gas and stack testing is performed every two years to measure the NO_X and SO_2 emission rates.

5.0 TESTING REQUIREMENTS:

Initial compliance testing and routine testing (once every two years for most sources) of emission sources are listed in the operating permit along with the testing frequency and parameters to be tested and references to the applicable testing methods and procedures. A brief summary of the sources that are required to be tested, on a routine basis follows:

Source ID's	Source Name	Pollutants
P001 – P012	Coke Battery Combustion Stacks	NO_X CEMS, PM and SO_2
P019	SCOT Plant Incinerator	Sulfur Compounds
P036	No. 3 Coke Screening Station Baghouse	PM-10
P050 – P054	Pushing Emission Control Baghouses	PM and Opacity (Method 9)
B001 & B002	Boilers No. 1 and 2	NO_X CEMS and SO_2
B005-B008	Boilers R1, R2, T1 and T2	NO_X and SO_2

6.0 APPLICABLE REQUIREMENTS

1. Allegheny County Health Department Rules and Regulations

The requirements of Article XXI, Parts B and C for the issuance of this renewal permits have been met for this facility. Article XXI, Part D, Part E & Part H will have the necessary sections addressed individually.

2. Pennsylvania State Requirements

Title 25, Pennsylvania Code, Chapter 145: Interstate Pollution Transport Reduction has been addressed in Site Level Section of the permit,

3. New Source Performance Standards (NSPS)

a) 40 CFR Part 60, Subpart Y: Standards of Performance for Coal Preparation Plants

Continuous Barge Unloaded No. 2 (P023) is subject to the opacity standard in §60.252(c). The No. 1 Continuous Barge Unloader was constructed before the applicability date of Subpart Y which is October 24, 1974.

b) 40 CFR 60, Subpart D: Standards of Performance for Fossil-Fuel-Fired Steam Generators for which Construction is Commenced After August 17, 1971; and

c) 40 CFR 60, Subpart Db: Standards for Industrial-Commercial-Institutional Steam Generating Units**.**

Boiler Nos. 1 & 2 are not subject to Subpart D and Boilers R1, R2, T1 & T2 are not subject to Subpart Db because they were installed prior to the applicability dates of these standards.

4. National Emission Standards for Hazardous Air Pollutants (NESHAPS) & MACT

a) 40 CFR 61, Subpart M for Asbestos: 40 CFR 61.145 and 150 apply to the entire Clairton Works facility because the facility is involved in the demolition or renovation activity containing asbestos material.

b) 40 CFR Part 61, Subpart L for Benzene Emissions from Coke By-Product Recovery Plants:

These standards are applicable to the equipment associated with the by-products recovery plant (tar decanters, tar storage tanks, light-oil condensers, light-oil sumps, etc.) including pumps, valves, exhausters, pressure relief devices, sampling connection systems, open-ended valves or lines, flanges or other connectors, and control devices.

c) 40 CFR Part 61, Subpart V for Equipment Leaks (Fugitive Emission Sources)

The facility is subject to the provisions of NESHAP, Subpart V because it is applicable to equipment that is intended to operate in volatile hazardous air pollutant (VHAP) service such as pumps, compressors, pressure relief devices, sampling connection systems, open-ended valves or lines, valves, flanges, etc. VHAP service means that a piece of equipment either contains or contacts a fluid (liquid or gas) that is at least 10 percent by weight a VHAP.

d) 40 CFR Part 61, Subpart FF for Benzene Waste Operations

The provision of this subpart is applicable to the facility because the facility operates coke by-product recovery plant with benzene- containing hazardous waste. The monitoring, recordkeeping and reporting requirements have been included in the permit.

5. National Emission Standards for Hazardous Air Pollutants for Source Categories

a) 40 CFR Part 63, Subpart L for Coke Oven Batteries: The provisions of this subpart apply to the facility because the facility operates by-product coke oven batteries at a coke plant. Subpart L sets standards for fugitive emissions from coke oven doors, topside port lids, offtake systems, charging and collecting mains. The standard also requires the installation of a flare for each battery so that coke oven emissions shall not be vented to the atmosphere through by-pass bleeder stacks, except through the flare system. It also specifies work practice standards for the operation and maintenance of coke batteries. The requirements have been included in both the site level and source level section of the permit.

b) <u>40 CFR Part 63, Subpart Y for Marine Tank Vessel Loading Operations:</u>

Subpart Y applies to the loading of light-oil at the Clairton Works onto barges and requires that organic vapors that may be released during loading operations be captured and ducted to a control device. The description of the terminal vapor collection system for light oil loading provided by the Clairton Works meets the definition of a vapor balancing system as defined in §63.561.

The testing requirements of this subpart does not apply to the facility because the barge loading operation is own and operated by a different owner, but the United State Steel Corporation is required to make sure the owner or operator comply with all the testing and other requirements that is applicable to the owner or operator (e.g. vapor tightness pressure test, leak test etc) by providing a copy of the test report and supporting documentation before loading any product.

The applicable requirements have been included in the permit

c) <u>40 CFR Part 63, Subpart CCCCC for Coke Ovens: Pushing, Quenching, and Battery Stacks</u>

The facility is subject to this subpart because it operate a coke oven battery at a coke plant that is (or is part of) a major source of hazardous air pollutant (HAP) emissions. A major source of HAP is a plant site that emits or has the potential to emit any single HAP at a rate of 10 tons or more per year or any combination of HAP at a rate of 25 tons or more per year.

This subpart sets emission standards and work practice standards for coke pushing, coke quenching and coke battery combustion (underfire) stacks. These standards are effective April 14, 2006.

d) <u>40 CFR Part 68: Chemical Accident Prevention Provisions</u>

The Clairton Works recovers the ammonia evolved during the coking process and produces anhydrous ammonia. This process is therefore subject to the Part 68 provisions and requires the preparation of a Risk Management Plan.

e) <u>40 CFR Part 82: Protection of Stratospheric Ozone</u>**:**

These provisions apply to the entire Clairton Works facility.

6. <u>Enforcement Orders and Consent Decrees and Agreements</u>

a. *Section 202.E. Order Requiring Monthly Reports to Determine Compliance with Sections 520 and 530 of Article XX at USS Clairton Works, March 28, 1990.* Requires reporting to the ACHD of monthly coke plant operation.

b. *Enforcement Order No. 200 Upon Consent, November 18, 1999.* USS Clairton Works shall operate and maintain two Claus Plants, the HCN Destruct Unit, Vacuum Carbonate Unit, Heat Exchangers and Pumps, and report the breakdown or unavailability of these pieces of equipment.

c. *Enforcement Order and Agreement Upon Consent Number 234, Reasonably Available Control Technology (RACT), January 2, 1997*. This order includes requirements that coke batteries, pushing emission control systems, boilers, by-products plant clean coke oven gas blanketing system, SCOT plant incinerator and the wastewater treatment plant be properly maintained and operated according to good engineering and air pollution control practices. The order also sets NO_X emission limitations for the boilers and requires Boilers No. 1 and 2 to install and properly maintain and operate continuous emission monitoring systems (CEMS) for measuring NO_X emissions.

d. *Second Consent Decree, Civil Actions Nos*. 79-709, 91-329, December 11, 1992. This decree establishes compliance requirements for Batteries 1, 2, 3, 7, 8, 9, 13, 14, 15, 19, 20 and B. The decree includes requirements for charging, door areas, charging ports and charging port seals, offtake piping, pushing, combustion stacks, quenching, and coke oven gas desulfurization.

e. *Consent Order and Agreement for B Battery, June 1, 2007*. This consent order requires that U. S. Steel replace all heating walls on Battery B by June 30, 2010 and demonstrate compliance with the PEC baghouse stack emission limitation of 0.04 lbs of particulate per ton of coke set forth in §2105.21.e.3.

f. *Consent Order and Agreement (COA), March 17, 2008*. This order includes requirements for the Clairton Works Batteries 1, 2, 3, 7, 8, 9, 15, 19 & 20 and for the No. 3 Screening Station. Batteries 7, 8 & 9 are required to be shutdown by December 31, 2012 and Batteries 1, 2 & 3 are to be shutdown by December 31, 2014. Prior to the shutdown, the COA requires maintenance activities as described in Appendices A, B, C and D of the COA.

7.0 RECOMMENDATIONS

All applicable Federal, State and County regulations have been addressed in the permit. The Title V operating permit should be approved with the emission limitations, terms and conditions in the Title Operating Permit No. 0052.

APPENDIX A

MAXIMUM POTENTIAL EMISSIONS FOR CRITERIA AND HAZARDOUS AIR POLLUTANTS FOR THE U.S. STEEL CLAIRTON WORKS

Battery Fugitive Emissions

Table A-1

USS Clairton Works Coke Battery Allowable Limits					
	Allowable Limits				
	40 CFR 63.304(b)(2)				§2105.21.a.1.
	Door Leaks	Lid Leaks	Offtake Leaks	Charging VE's	Charging VE's 5 charges
Batteries	%	%	%	Seconds	Seconds
1, 2 & 3	3.8	0.4	2.5	12	55
13, 14 & 15	3.8	0.4	2.5	12	55
19 & 20	3.8	0.4	2.5	12	55
B	4.3	0.4	2.5	12	55

Table A-2

Coke Battery Statistics					
	Statistics per Battery				
Batteries	Charges/Day	Charges/hr	No. of Doors	No. of Lids	No. of Offtakes
1, 2 & 3	89	3.708	128	256	128
13, 14 & 15	90	3.750	122	244	122
19 & 20	129	5.375	174	348	174
B	109	4.542	150	300	150

Table A-3

Potential Emissions per Battery for Coke Batteries 1 - 3

Pollutant	Ratio to BSO*	Door Leaks		Lid Leaks		Offtake Leaks		Charging	
		lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr
BSO	1.0000	0.8992		0.0075		0.0233		0.0412	
PM (leaks)	0.9000	0.8093	3.5447	0.0067	0.0294	0.0210	0.0918		
PM (Charging)	0.8000							0.0330	0.1324
Carbon Monoxide	1.1000	0.9891	4.3324	0.0082	0.0359	0.0256	0.1122	0.0453	0.1820
VOC	2.2000	1.9783	8.6649	0.0164	0.0718	0.0512	0.2244	0.0907	0.3640
TOC	5.2000	4.6759	20.4806	0.0387	0.1697	0.1211	0.5303	0.2143	0.8604
Ammonia	0.1500	0.1349	0.5908	0.0011	0.0049	0.0035	0.0153	0.0062	0.0248
Benzene	0.5000	0.4496	1.9693	0.0037	0.0163	0.0116	0.0510	0.0206	0.0827
Carbon Disulfide	0.0010	0.0009	0.0039	0.0000	0.0000	0.0000	0.0001	0.0000	0.0002
Hydrogen Cyanide	0.0350	0.0315	0.1378	0.0003	0.0011	0.0008	0.0036	0.0014	0.0058
Hydrogen Sulfide	0.1500	0.1349	0.5908	0.0011	0.0049	0.0035	0.0153	0.0062	0.0248
Naphthalene	0.2000	0.1798	0.7877	0.0015	0.0065	0.0047	0.0204	0.0082	0.0331
Phenol	0.0006	0.0005	0.0024	0.0000	0.0000	0.0000	0.0001	0.0000	0.0001
Toluene	0.0400	0.0360	0.1575	0.0003	0.0013	0.0009	0.0041	0.0016	0.0066
Xylene	0.0050	0.0045	0.0197	0.0000	0.0002	0.0000	0.0002	0.0002	0.0008

* BSO = Benzene Soluble Organics

Potential Emissions per Battery for Coke Batteries 13, 14 & 15

Pollutant	Ratio to BSO*	Door Leaks		Lid Leaks		Offtake Leaks		Charging	
		lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr
BSO	1.0000	0.8571		0.0071		0.0222		0.0417	
PM (leaks)	0.9000	0.7714	3.3786	0.0064	0.0280	0.0200	0.0875		
PM (Charging)	0.8000							0.0333	0.1460
Carbon Monoxide	1.1000	0.9428	4.1293	0.0078	0.0342	0.0244	0.1069	0.0458	0.2008
VOC	2.2000	1.8855	8.2587	0.0156	0.0684	0.0488	0.2139	0.0917	0.4016
TOC	5.2000	4.4567	19.5205	0.0369	0.1618	0.1154	0.5055	0.2167	0.9492
Ammonia	0.1500	0.1286	0.5631	0.0011	0.0047	0.0033	0.0146	0.0063	0.0274
Benzene	0.5000	0.4285	1.8770	0.0036	0.0156	0.0111	0.0486	0.0208	0.0913
Carbon Disulfide	0.0010	0.0009	0.0038	0.0000	0.0000	0.0000	0.0001	0.0000	0.0002
Hydrogen Cyanide	0.0350	0.0300	0.1314	0.0002	0.0011	0.0008	0.0034	0.0015	0.0064
Hydrogen Sulfide	0.1500	0.1286	0.5631	0.0011	0.0047	0.0033	0.0146	0.0063	0.0274
Naphthalene	0.2000	0.1714	0.7508	0.0014	0.0062	0.0044	0.0194	0.0083	0.0365
Phenol	0.0006	0.0005	0.0023	0.0000	0.0000	0.0000	0.0001	0.0000	0.0001
Toluene	0.0400	0.0343	0.1502	0.0003	0.0012	0.0009	0.0039	0.0017	0.0073
Xylene	0.0050	0.0045	0.0197	0.0000	0.0002	0.0001	0.0005	0.0002	0.0009

Table A-3, Continued
Potential Emissions per Battery for Coke Batteries 19 & 20

Pollutant	Ratio to BSO*	Door Leaks		Lid Leaks		Offtake Leaks		Charging	
		lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr
BSO	1.0000	**1.2224**		**0.0101**		**0.0317**		**0.0597**	
PM (leaks)	0.9000	1.1001	4.8186	0.0091	0.0399	0.0285	0.1248		
PM (Charging)	0.8000							0.0478	0.2093
Carbon Monoxide	1.1000	1.3446	5.8894	0.0111	0.0488	0.0348	0.1525	0.0657	0.2878
VOC	2.2000	2.6892	11.7788	0.0223	0.0976	0.0696	0.3050	0.1314	0.5756
TOC	5.2000	6.3563	27.8408	0.0527	0.2307	0.1646	0.7209	0.3106	1.3605
Ammonia	0.1500	0.1834	0.8031	0.0015	0.0067	0.0047	0.0208	0.0090	0.0392
Benzene	0.5000	0.6112	2.6770	0.0051	0.0222	0.0158	0.0693	0.0299	0.1308
Carbon Disulfide	0.0010	0.0012	0.0054	0.0000	0.0000	0.0000	0.0001	0.0001	0.0003
Hydrogen Cyanide	0.0350	0.0428	0.1874	0.0004	0.0016	0.0011	0.0049	0.0021	0.0092
Hydrogen Sulfide	0.1500	0.1834	0.8031	0.0015	0.0067	0.0047	0.0208	0.0090	0.0392
Naphthalene	0.2000	0.2445	1.0708	0.0020	0.0089	0.0063	0.0277	0.0119	0.0523
Phenol	0.0006	0.0007	0.0032	0.0000	0.0000	0.0000	0.0001	0.0000	0.0002
Toluene	0.0400	0.0489	0.2142	0.0004	0.0018	0.0013	0.0055	0.0024	0.0105
Xylene	0.0050	0.0061	0.0268	0.0001	0.0002	0.0002	0.0007	0.0003	0.0013

Potential Emissions for Coke Battery B

Pollutant	Ratio to BSO*	Door Leaks		Lid Leaks		Offtake Leaks		Charging	
		lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr
BSO	1.0000	**1.0819**		**0.0087**		**0.0273**		**0.0505**	
PM (leaks)	0.9000	0.9737	4.2648	0.0079	0.0344	0.0246	0.1076		
PM (Charging)	0.8000							0.0404	0.1769
Carbon Monoxide	1.1000	1.1901	5.2125	0.0096	0.0421	0.0300	0.1315	0.0555	0.2432
VOC	2.2000	2.3801	10.4250	0.0192	0.0841	0.0600	0.2629	0.1110	0.4864
TOC	5.2000	5.6258	24.6410	0.0454	0.1989	0.1419	0.6215	0.2625	1.1496
Ammonia	0.1500	0.1623	0.7108	0.0013	0.0057	0.0041	0.0179	0.0076	0.0332
Benzene	0.5000	0.5409	2.3693	0.0044	0.0191	0.0136	0.0598	0.0252	0.1105
Carbon Disulfide	0.0010	0.0011	0.0047	0.0000	0.0000	0.0000	0.0001	0.0001	0.0002
Hydrogen Cyanide	0.0350	0.0379	0.1659	0.0003	0.0013	0.0010	0.0042	0.0018	0.0077
Hydrogen Sulfide	0.1500	0.1623	0.7108	0.0013	0.0057	0.0041	0.0179	0.0076	0.0332
Naphthalene	0.2000	0.2164	0.9477	0.0017	0.0076	0.0055	0.0239	0.0101	0.0442
Phenol	0.0006	0.0006	0.0028	0.0000	0.0000	0.0000	0.0001	0.0000	0.0001
Toluene	0.0400	0.0433	0.1895	0.0003	0.0015	0.0011	0.0048	0.0020	0.0088
Xylene	0.0050	0.0054	0.0237	0.0000	0.0002	0.0001	0.0006	0.0003	0.0011

HAPs Potential Emissions from Coke Battery Combustion Stacks

Table A-4

	Coal Charged		COG Throughput		Benzene [2]			Chlorine [3]		
Battery #	tons/hr	tons/yr	mmcf/hr	mmcf/yr	lb/ton	lb/hr	ton/yr	lb/mmcf-cog	lb/hr	ton/yr
1	59.13	517,935.00	0.296	2,592.960	0.015000	0.887	3.885	0.076	0.022	0.099
2	59.13	517,935.00	0.296	2,592.960	0.015000	0.887	3.885	0.078	0.023	0.101
3	59.13	517,935.00	0.296	2,592.960	0.015000	0.887	3.885	0.072	0.021	0.093
13	62.29	545,675.00	0.311	2,724.360	0.015000	0.934	4.093	0.098	0.030	0.133
14	62.29	545,675.00	0.311	2,724.360	0.015000	0.934	4.093	0.086	0.027	0.117
15	62.29	545,675.00	0.311	2,724.360	0.015000	0.934	4.093	0.092	0.029	0.125
19	114.42	1,002,290.00	0.572	5,010.720	0.015000	1.716	7.517	0.071	0.041	0.178
20	114.42	1,002,290.00	0.572	5,010.720	0.015000	1.716	7.517	0.050	0.029	0.125
B	170.21	1,491,025.00	0.851	7,454.760	0.015000	2.553	11.183	0.050	0.043	0.186

HCl [4]			Naphthalene [5]			Toluene [6]		
lb/mmcf-cog	lb/hr	ton/yr	lb/ton	lb/hr	ton/yr	lb/ton	lb/hr	ton/yr
3.21	0.950	4.162	8.29E-05	0.005	0.021	0.00660	0.390	1.709
4.98	1.474	6.456	8.29E-05	0.005	0.021	0.00660	0.390	1.709
7.19	2.128	9.322	8.29E-05	0.005	0.021	0.00660	0.390	1.709
4.74	1.474	6.457	8.29E-05	0.005	0.023	0.00660	0.411	1.801
3.50	1.089	4.768	8.29E-05	0.005	0.023	0.00660	0.411	1.801
4.12	1.281	5.612	8.29E-05	0.005	0.023	0.00660	0.411	1.801
4.98	2.849	12.477	8.29E-05	0.009	0.042	0.00660	0.755	3.308
4.15	2.374	10.397	8.29E-05	0.009	0.042	0.00660	0.755	3.308
3.42	2.910	12.748	8.29E-05	0.014	0.062	0.00660	1.123	4.920

Notes:

`1. Coal charged and coke oven gas throughputs, and stack exhaust conditions are from the Title V Application

2. Benzene emission factor from AP-42, Draft Section 12.2 (July 2001), Table 12.2-16.

3. & 4. The chlorine and hydrochloric acid emission factors were derived from the following stack tests:

Battery No. 1- Stack test conducted from April 19-20, 2000.
Battery No. 2- Stack test conducted from May 31 - June 1, 2000.
Battery No. 3- Stack test conducted from June 7-8, 2000.
Battery No. 13- Stack test conducted from July 12-13, 2000.
Battery No. 14- Stack test conducted from July 26-27, 2000.
Battery No. 15- Average of emission factors for Batteries 13 and 14.
Battery No. 19- Stack test conducted on Sept. 20, 2000.
Battery No. 20- Stack test conducted on Battery No. 19 on Sept. 20,2000.
Battery B - Stack test conducted from April 19-20, 2000.

5. Naphthalene emission factor from AP-42, Draft Section 12.2 (July 2001), Table 12.2-17.

6. Toluene emission factor from AP-42, Draft Section 12.2 (July 2001), Table 12.2-16.

Potential PM Emissions from the PEC Baghouse Stack

Battery Group	Baghouse Fan [1] ACFM	Exhaust Temperature Deg. F	Exhaust Moisture Vol. %	Baghouse Fan DSCFM	Baghouse Fan [1] Max. dscfm	# Ovens per Battery	Pushes/day per Battery	Pushes per Hour for Battery Group
1, 2 & 3	125,000	125	1.5	111,549.1	122,700.0	64	89	11.125
13, 14 &15	125,000	125	1.5	111,549.1	122,700.0	61	90	7.5
19 & 20	115,780	89	1.9	109,649.4	120,600.0	87	129	10.75
B						75	109	9.08

Total Coke Production for Battery Group			Minutes	Allowable Emissions		PM Emissions [5]	
tons/day	tons/yr	ton/hour	per Push	gr/dscf	lb/ton-coke	lb/hr	ton/yr
3,303	1,205,595	137.63	1.0	0.01		1.98	8.68
3,480	1,270,200	145.00	1.0		0.040	5.80	25.40
4,262	1,555,630	177.58	1.0	0.01		1.67	7.18
3,170	1,157,050	132.08	1.0		0.040	5.28	23.14
	5,188,475						

Table A-5, Continued
Potential PM Emissions for PEC Fugitive Emissions and Traveling Hot Car Emissions

Battery Group	Coal Charged ton/hr	PEC System Capture Efficiency	Uncontrolled Pushing [3] Emiss. Factor lb/ton-coal	Uncontrolled Pushing [3] PM Emissions lb/hr	Uncontrolled Pushing [3] PM Emissions ton/yr	PEC Fugitive Emissions PM Emissions lb/hr	PEC Fugitive Emissions PM Emissions ton/yr	Traveling Hot Car PM Emissions lb/hr	Traveling Hot Car PM Emissions ton/yr
1, 2 & 3	177.375	88%	0.58	102.88	450.60	12.35	54.07	10.29	45.06
13, 14 &15	186.875	88%	0.58	108.39	474.74	13.01	56.97	10.84	47.47
19 & 20	228.833	88%	0.58	132.72	581.33	15.93	69.76	13.27	58.13
B	170.208	95%	0.58	98.72	432.40	4.94	21.62	3.95	17.30

Notes:

1. Baghouse fan capacities for batteries 1-3, 7-9, 13-15 and 19 & 20 are from the the Installation Permit Applications for the fan upgrades.
   Maxuimum flow rate (DSCFM) = 1.1 x DSCFM.
2. Allowable PM emissions from §2105.21.e.2.A.-G. and e.3.
3. Uncontrolled pushing emission factor from AP-42, Section 12.2.2, Table 12.2-2 (SCC 3-03-003-08), Sep. 2000.
4. PM emissions from the traveling hot car are estimated to be 10 percent of uncontrolled pushing emissions.
5. PEC Baghouse PM/PM-10 emissions for batteries 1-3, 7-9, 13-15 and 19-20 are from IPs 0052-I006 (12/5/01), I007(12/5/01), I008(12/5/01) and I005(7/24/00), respectively.

Battery Group	# Ovens per Battery	Pushes/day per Battery	Pushes per Hour for Battery Group	Total Coal Charged for the Battery Group tons/day	Total Coal Charged for the Battery Group tons/yr	Total Coal Charged for the Battery Group ton/hour
1, 2 & 3	64	89	11.125	4,257	1,553,805	177.38
13, 14 &15	61	90	7.5	4,485	1,637,025	186.88
19 & 20	87	129	10.75	5,492	2,004,580	228.83
B*	75	109	9.08	4,085	1,491,025	170.21

Potential Emissions from the PEC Baghouse Stack

Table A-6
USS Clairton Works Coke Battery Capacities

Battery Group			# Ovens per Battery	Pushes/day per Battery	Pushes per Hour for Battery Group	Total Coal Charged for the Battery Group			PEC Capture Efficiency
						tons/day	tons/yr	ton/hour	
1, 2 & 3			64	89	11.125	4,257	1,553,805	177.375	88%
13, 14 &15			61	90	7.5	4,485	1,637,025	186.875	88%
19 & 20			87	129	10.75	5,492	2,004,580	228.833	88%
B*			75	109	9.08	4,085	1,491,025	170.208	95%

Table A-7
Potential Emissions for the PEC System Baghouse Stacks

Battery Group	Coal Charged ton/hr	PEC System Capture Efficiency	CO Emissions per Battery			NOx Emissions per Battery			SO2 Emissions per Battery			VOC Emissions per Battery		
			Emission Factor [1] lb/ton-coal	lb/hr	ton/yr	Emission Factor [2] lb/ton-coal	lb/hr	ton/yr	Emission Factor [3] lb/ton-coal	lb/hr	ton/yr	Emission Factor [4] lb/ton-coal	lb/hr	ton/yr
1, 2 & 3	177.375	88%	0.070	4.139	18.128	0.017	0.989	4.330	0.086	5.099	22.333	0.006	0.355	1.554
13, 14 &15	186.875	88%	0.070	4.360	19.099	0.017	1.042	4.562	0.086	5.372	23.530	0.006	0.374	1.637
19 & 20	228.833	88%	0.070	8.009	35.080	0.017	1.913	8.379	0.086	9.867	43.219	0.006	0.687	3.007
B	170.208	95%	0.070	11.915	52.186	0.018	3.072	13.457	0.093	15.846	69.407	0.006	1.021	4.473

Table A-7, Continued
Potential Emissions for the PEC System Baghouse Stacks

Battery Group	Coal Charged ton/hr	PEC System Capture Efficiency	Ammonia Emissions per Battery			Benzene Emissions per Battery			Styrene Emissions per Battery			Toluene Emissions per Battery		
			Emission Factor [5] lb/ton-coal	lb/hr	ton/yr	Emission Factor [6] lb/ton-coal	lb/hr	ton/yr	Emission Factor [7] lb/ton-coal	lb/hr	ton/yr	Emission Factor [7] lb/ton-coal	lb/hr	ton/yr
1, 2 & 3	177.375	88%	0.014	0.828	3.626	2.780E-04	0.016	0.072	5.800E-05	0.003	0.015	6.000E-05	0.004	0.016
13, 14 &15	186.875	88%	0.014	0.872	3.820	2.780E-04	0.017	0.076	5.800E-05	0.004	0.016	6.000E-05	0.004	0.016
19 & 20	228.833	88%	0.014	1.602	7.016	2.780E-04	0.032	0.139	5.800E-05	0.007	0.029	6.000E-05	0.007	0.030
B	170.208	95%	0.014	2.383	10.437	2.780E-04	0.047	0.207	5.800E-05	0.010	0.043	6.000E-05	0.010	0.045

Notes:

1. Emission factor from AP-42, Section 12.2, Table 12.2-2 (SCC-3-03-003-03), Sep. 2000.
   Baghouse stack CO emission factor = 0.07.

2. Emission factor from AP-42, Draft Section 12.2, Table 12.2-9 (SCC-3-03-003-03), July 2001. (See Note a to Table 12.2-9)
   Baghouse stack NOx emission factor = 0.019 lb/ton x PEC Capture efficiency / 0.741= 0.023 lb/ton.

3. Emission factor from AP-42, Draft Section 12.2, Table 12.2-9 (SCC-3-03-003-03), July 2001. (See Note a to Table 12.2-9)
   Baghouse stack SO2 emission factor = 0.098 lb/ton x PEC Capture efficiency / 0.741 = 0.116 lb/ton.

4. VOC emission factor derived from stack tests performed on Clairton PEC for Batteries 13-15 on May 11, 12 &13, 2004.
   Highest measured emission factor = 0.006 lb-VOC/ton-coke. Emiss. Fact = 0.006 lb/ton-coke x 0.8 ton-coke/ton-coal x 1.25 = 0.006 lb/ton-coal.

5. Emission factor from AP-42, Draft Section 12.2, Table 12.2-9 (SCC-3-03-003-03), July 2001. (See Note a to Table 12.2-9)
   Baghouse stack Ammonia emission factor = 0.012 lb/ton x PEC Capture efficiency / 0.741 = 0.014 lb/ton.

6. Emission factor for Benzene derived from PEC baghouse stack test in Jan. 1993 for Batteries 19 & 20.

7. Styrene and Toluene emission factors from AP-42, Draft Section 12.2, Table 12.2-9 (SCC-3-03-003-03), July 2001. (See Note a to Table 12.2-9)
   Styrene = 0.0000485 lb/ton x PEC Capture efficiency / 0.741 = 0.000058 lb/ton.
   Toluene = 0.0000502 lb/ton x PEC Capture efficiency / 0.741 = 0.00006 lb/ton.

Potential Emissions from the PEC System Travel Hot Car

Table A-8
Potential Emissions for the PEC System Traveling Hot Car [1]

Battery Group	Coal Charged ton/hr	PEC System Capture Efficiency	CO Emissions per Battery Emission Factor [1] lb/ton-coal	CO lb/hr	CO ton/yr	NOx Emissions per Battery Emission Factor [2] lb/ton-coal	NOx lb/hr	NOx ton/yr	SO2 Emissions per Battery Emission Factor [3] lb/ton-coal	SO2 lb/hr	SO2 ton/yr	VOC Emissions per Battery Emission Factor [4] lb/ton-coal	VOC lb/hr	VOC ton/yr
1, 2 & 3	177.375	88%	0.008	0.456	1.999	0.002	0.112	0.492	0.010	0.579	2.538	0.008	0.455	1.994
13, 14 &15	186.875	88%	0.008	0.481	2.106	0.002	0.118	0.518	0.010	0.610	2.674	0.008	0.480	2.101
19 & 20	228.833	88%	0.008	0.883	3.869	0.002	0.217	0.952	0.010	1.121	4.911	0.008	0.881	3.859
B	170.208	95%	0.003	0.526	2.302	0.001	0.129	0.567	0.004	0.667	2.922	0.003	0.524	2.296

Table A-8, Continued
Potential Emissions for the PEC System Traveling Hot Car [1]

Battery Group	Coal Charged ton/hr	PEC System Capture Efficiency	Ammonia Emissions per Battery Emission Factor [5] lb/ton-coal	Ammonia lb/hr	Ammonia ton/yr	Benzene Emissions per Battery Emission Factor [6] lb/ton-coal	Benzene lb/hr	Benzene ton/yr	Styrene Emissions per Battery Emission Factor [7] lb/ton-coal	Styrene lb/hr	Styrene ton/yr	Toluene Emissions per Battery Emission Factor [7] lb/ton-coal	Toluene lb/hr	Toluene ton/yr
1, 2 & 3	177.375	88%	0.0012	0.071	0.311	3.159E-05	0.002	0.008	4.850E-06	0.0003	0.001	5.020E-06	0.0003	0.001
13, 14 &15	186.875	88%	0.0012	0.075	0.327	3.159E-05	0.002	0.009	4.850E-06	0.0003	0.001	5.020E-06	0.0003	0.001
19 & 20	228.833	88%	0.0012	0.137	0.601	3.159E-05	0.004	0.016	4.850E-06	0.0006	0.002	5.020E-06	0.0006	0.003
B	170.208	95%	0.0005	0.082	0.358	1.264E-05	0.002	0.009	1.940E-06	0.0003	0.001	2.008E-06	0.0003	0.001

Notes:

1. Emissions from the traveling hot car for batteries 1-3, 13-15 and 19-20 are estimated to be 10 percent of the uncontrolled pushing emission factors in Notes 1 through 7 of Table A-7. The Battery B traveling hot car emissions are estimated to be 4 percent of the uncontrolled pushing emission factor.

Potential Emissions from the PEC System Fugitive Emissions

Table A-6
USS Clairton Works Coke Battery Capacities

Battery Group			# Ovens pe Battery	Pushes/day per Battery	Pushes per Hour for Battery Group	Total Coal Charged for the Battery Group			PEC Capture Efficiency
						tons/day	tons/yr	ton/hour	
1, 2 & 3			64	89	11.125	4,257	1,553,805	177.38	88%
13, 14 &15			61	90	7.5	4,485	1,637,025	186.88	88%
19 & 20			87	129	10.75	5,492	2,004,580	228.83	88%
B*			75	109	9.08	4,085	1,491,025	170.21	95%

Table A-9
Potential Emissions for the PEC System Fugitive Emissions [1]

Battery Group	Coal Charged ton/hr	PEC System Capture Efficiency	CO Emissions per Battery			NOx Emissions per Battery			SO2 Emissions per Battery			VOC Emissions per Battery		
			Emission Factor [1] lb/ton-coal	lb/hr	ton/yr	Emission Factor [2] lb/ton-coal	lb/hr	ton/yr	Emission Factor [3] lb/ton-coal	lb/hr	ton/yr	Emission Factor [4] lb/ton-coal	lb/hr	ton/yr
1, 2 & 3	177.375	88%	0.009	0.548	2.399	0.002	0.135	0.590	0.012	0.695	3.045	0.009	0.546	2.393
13, 14 &15	186.875	88%	0.009	0.577	2.528	0.002	0.142	0.622	0.012	0.733	3.209	0.009	0.576	2.521
19 & 20	228.833	88%	0.009	1.060	4.643	0.002	0.261	1.143	0.012	1.346	5.893	0.009	1.057	4.631
B	170.208	95%	0.004	0.657	2.878	0.001	0.162	0.708	0.005	0.834	3.653	0.004	0.655	2.870

Table A-9, Continued
Potential Emissions for the PEC System Fugitive Emissions [1]

Battery Group	Coal Charged ton/hr	PEC System Capture Efficiency	Ammonia Emissions per Battery			Benzene Emissions per Battery			Styrene Emissions per Battery			Toluene Emissions per Battery		
			Emission Factor [5] lb/ton-coal	lb/hr	ton/yr	Emission Factor [6] lb/ton-coal	lb/hr	ton/yr	Emission Factor [7] lb/ton-coal	lb/hr	ton/yr	Emission Factor [7] lb/ton-coal	lb/hr	ton/yr
1, 2 & 3	177.375	88%	0.001	0.085	0.373	3.791E-05	0.002	0.010	5.820E-06	0.0003	0.0015	6.024E-06	0.0004	0.0016
13, 14 &15	186.875	88%	0.001	0.090	0.393	3.791E-05	0.002	0.010	5.820E-06	0.0004	0.0016	6.024E-06	0.0004	0.0016
19 & 20	228.833	88%	0.001	0.165	0.722	3.791E-05	0.004	0.019	5.820E-06	0.0007	0.0029	6.024E-06	0.0007	0.0030
B	170.208	95%	0.001	0.102	0.447	1.463E-05	0.002	0.011	2.425E-06	0.0004	0.0018	2.510E-06	0.0004	0.0019

Notes:

1. Fugitive pushing emissions for batteries 1-3, 13-15 and 19-20 are estimated to be 12 percent of the uncontrolled pushing emission factors in Notes 1 through 7 of Table A-7. The Battery B fugitive pushing emissions are estimated to be 5 percent of the uncontrolled pushing emission factor. Battery fugitive pushing emissions are those emissions that escape the control device.

Table A-11
SCOT Plant Tail Gas Incinerator - Desulfurization Plant

	Fuel Use			Emissions	
Pollutant	mmcf/yr	Emission Factor [see Notes]		lb/hr	ton/yr
CO	683	21.16	lb/mmcf	1.65	7.23
NOx	683	0.6	lb/hr	0.60	2.63
PM-10	683	1.85	lb/hr	1.85	8.10
SO2	683	36	lb/hr	36.00	157.68
TSP	683	2.64	lb/hr	2.64	11.56
VOC	683	8.88	lb/hr	8.88	38.89
Benzene	683	0.00224	lb/mmcf	0.00017	0.0008
Ethylene	683	0.006567	lb/mmcf	0.00051	0.0022
Propylene	683	0.000789	lb/mmcf	0.00006	0.0003
Toluene	683	0.000395	lb/mmcf	0.00003	0.0001

Notes:

1. CO emission factor from FIRE 6.01 for coke oven gas (COG) fired boilers. Emission factor increased by 15%.

2. Particulate Matter (PM), NOx, SO2 and VOC emission limitations based on 12/14/2004 SCOT Plant stack test resul
   Maximum measured emission rates from the three test runs were increased by 20%.
   PM = 1.2 x 2.2 lb/hr = 2.64 lb/hr
   PM10 = 0.70 x 2.64 = 1.85 lb/hr
   NOx = 1.2 x 0.5 lb/hr = 0.6 lb/hr
   SO2 = 1.2 x 31.4 lb/hr = 37.68 lb/hr
   VOC = 1.2 x 7.4 = 8.88 lb/hr

3. Benzene emission factor based on raw COG MSDS VOC weight %; ratio of chemical weight % to total VOC weight %. Weight %'s (Ratio to total VOCs): Benzene 0.85 % (0.224%), Total VOC =3.8%.

4. Ethylene emission factor based on raw COG MSDS VOC weight %; ratio of chemical weight % to total VOC weight %. Weight %'s (Ratio to total VOCs): Ethylene 2.5% (0.657%), Total VOC =3.8%.

5. Propylene emission factor based on raw COG MSDS VOC weight %; ratio of chemical weight % to total VOC weight %. Weight %'s (Ratio to total VOCs): Propylene 0.3% (0.0789%), Total VOC =3.8%.

6. Toluene emission factor based on raw COG MSDS VOC weight %; ratio of chemical weight % to total VOC weight %. Weight %'s (Ratio to total VOCs): Toluene 0.15% (0.0395%), Total VOC =3.8%.

Coke-By-Product Recovery Plant

	Coal Throughput [1]		VOC [2]				Benzene [3]			
Product	ton/yr	tons/hr	Emission Factor [see Notes]		lbs/hr	ton/yr	Emission Factor [see Notes]		lbs/hr	tons/yr
Light Oil	5,874,919	671	0.00018	lbs/ton	0.120718	0.528743	0.00012	lbs/ton	0.080478	0.35249514
Tar Storage Tank	5,874,919	671	0.0086	lbs/ton	5.767615	25.26215	0.00036	lbs/ton	0.241435	1.05748542
Tar Decanter	5,874,919	671	0.0022	lbs/ton	1.475436	6.462411	0.001	lbs/ton	0.670653	2.9374595
Light Oil Sump	5,874,919	671	0.0005	lbs/ton	0.335326	1.46873	0.00032	lbs/ton	0.214609	0.93998704
Light Oil Condenser	5,874,919	671	0.03	lbs/ton	20.11959	88.12379	0.0019	lbs/ton	1.27424	5.58117305
					27.81868	121.8458			2.481416	10.8686002

BTX [4]				Toluene [5]		Xylene [6]	
Emission Factor [see Notes]		lbs/hr	ton/yr	lbs/hr	ton/yr	lbs/hr	ton/yr
0.00019	lbs/ton	0.12742404	0.5581173	0.03313	0.14511	0.016565	0.072555
0.001	lbs/ton	0.3755656	1.6449773	0.097647	0.427694	0.048824	0.213847
0.002	lbs/ton	1.05963151	4.641186	0.275504	1.206708	0.137752	0.603354
0.005	lbs/ton	3.35326427	14.687298	0.871849	3.818697	0.435924	1.909349
0.003	lbs/ton	2.01195856	8.8123785	0.523109	2.291218	0.261555	1.145609
		6.92784398	**30.343957**	**1.801239**	**7.889429**	**0.90062**	**3.944714**

NOTE:

1 Coke throughput is from the Title V Application

2 VOC emission factor from AP-42, Draft Section 12.2 (May 2008), Table 12.2-23.

3 Benzene emission factor from AP-42, Draft Section 12.2 (May 2008), Table 12.2-22.

4 BTX (Benzene, Toluene & Xylene) emission factor from AP-42, Draft Section 12.2 (May 2008), Table 12.2-22

5 Toluene emission is 26% of BTX from AP-42, Draft Section 12.2 (May 2008), Table 12.2-22, footnote d

6 Xylene emission is 13% of BTX from AP-42, Draft Section 12.2 (May 2008), Table 12.2-22, footnote d