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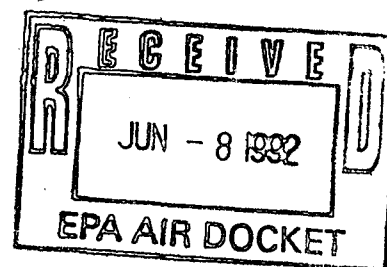
Iron and Steel Industry Source Categories

Coke Plant

1. Battery Stack
2. Pushing
3. Quenching
4. Coal Handling
5. Coke Handling

Blast Furnace

1. Casting
2. Stove Stack
3. Ore Handling
4. Slag Handling
5. Flux Handling



Sinter Plant

1. Stack
2. Cooler
3. Material Handling

BOF

1. Primary Emissions
2. Secondary Emissions
3. Hot Metal Desulfurization
4. Slag Handling
5. Material Handling

Electric Furnace

1. Primary Emissions
2. Secondary Emissions
3. Slag Handling
4. Material Handling

Ladle Metallurgy Facilities

Pickling

1. Carbon Steel Pickling
2. Specialty Steel Pickling

Scrap Cutting

Conditioning

1. Scarfing/Cutting
2. Grinding

- 2 -

Solvent Usage

1. Cold Rolling
2. General Plant Maintenance

Coating

1. Galvanizing
2. Tinning
3. Terne Coating
4. Tin Free Steel Coating
5. Organic Coating

<u>Clean Air Act Chemical</u>	<u>Concentration of Chemical (Units)</u>	<u>Emission Factor</u>	<u>Quantity Released (lbs/yr)</u>	<u>Reference</u>
Blast Furnace Casthouse - Fairfield O & B				
Antimony	7.1 ppm	0.06 lbs part/ton hot metal (Gary Works Study)	< 1	ET Casthouse
Arsenic	BDL		< 1	Baghouse Particulate
Cadmium	28 ppm		2	Analysis
Chromium	34 ppm		3	
Cobalt	8.3 ppm		< 1	
Cyanides	2.2 ppm		< 1	
Lead	450 ppm		37	
Manganese	10,800 ppm		898	
Mercury	1.1 ppm		< 1	
Nickel	41 ppm		3	
Blast Furnace Stoves - Fairfield O & B				
Antimony	0.11 mg/kg	Performance Study	< 1	BF Flue Dust
Cadmium	BDL		0	Analysis
Chromium	36.8 mg/kg		1	
Lead	12.8 mg/kg		< 1	
Manganese	9510 mg/kg		245	
Nickel	13.0 mg/kg		< 1	
Blast Furnace Slag Handling - Fairfield Works				
Antimony	0.35 mg/kg	0.24 lbs. part/ton slag (Ohio EPA Report)	0	Fairfield Works
Manganese	3,788.0 mg/kg		488	Analysis
Nickel	0.75 mg/kg		1	
Blast Furnace Burden Material Screening & Loading - Fairfield Works				
Manganese - Caste	0.018 %	Design Data (Air Permit Application)	2	Lorain Works Analysis
Manganese - Iron Ore Pellets	0.12 %		19	
Manganese - Ore	50.08 %		14	
Blast Furnace Casthouse - ET O 1 & 3				
Antimony	7.1 ppm	Design Data (Air Permit Application)	1	ET Casthouse
Arsenic	BDL		1	Baghouse Analysis
Cadmium	28 ppm		6	(total for 2 furnaces)
Chromium	34 ppm		7	
Cobalt	8.3 ppm		1	
Cyanides	2.2 ppm		< 1	
Lead	450 ppm		98	
Manganese	10,800 ppm		2,360	
Mercury	1.1 ppm		1	
Nickel	41 ppm		9	

<u>Clean Air Act Chemical</u>	<u>Concentration of Chemical (Units)</u>	<u>Emission Factor</u>	<u>Quantity Released (lbs/yr)</u>	<u>Reference</u>
Blast Furnace Stoves - ET 0 1 & 3				
Arsenic	1 mg/kg	Design Data	<1	ET BF Flue Dust
Cadmium	4.3 mg/kg	(Air Permit Application)	<1	Analysis
Cyanides	0.82 mg/kg		<1	(total for 2 furnaces)
Chromium	104 mg/kg		11	
Nickel	13 mg/kg		1	
Lead	17 mg/kg		2	
Blast Furnace Slag Handling - ET Works				
Manganese	0.47 %	2.24 lbs part/ton slag (Ohio EPA Report)	5,201	ET BF Slag Analysis
Blast Furnace Coothouse - Gary 013				
Chromium	1,100 ppm	0.15 lbs part/ton hot metal (Plant Data)	400	Jeffrey & McVay
Lead	2,100 ppm		763	(1988)
Manganese	40,000 ppm		17,706	
Blast Furnace Stoves - Gary 013				
Cadmium	2.28 mg/kg	17.14 lbs part./hr. (Plant Data)	0	Gary Works data
Chromium	43.6 mg/kg		0	Blast Furnace Sludge
Lead	340 mg/kg		40	
Manganese	800 mg/kg		116	
Nickel	2.62 mg/kg		0	
Blast Furnace Coothouse - Gary 04, 6, 7, 8				
Chromium	43.6 mg/kg	0.06 lbs part/ton hot metal (Plant Data)	226	Jeffrey & McVay
Lead	340 mg/kg		431	(1988)
Manganese	800 mg/kg		10,066	(total for 4 furnaces)
Blast Furnace Stoves - Gary 04, 6, 7, 8				
Cadmium	2.28 mg/kg	BF 04 - 5.53 lbs part./hr.	<1	Gary Works data
Chromium	43.6 mg/kg	BF 06 - 8.03 lbs part./hr.	7	Blast Furnace Sludge
Lead	340 mg/kg	BF 07 - 5.77 lbs part./hr.	54	(total for 4 furnaces)
Manganese	800 mg/kg	BF 08 - 5.47 lbs part./hr.	127	
Nickel	2.62 mg/kg	(Plant Data)	1	

Clean Air Act Chemical	Concentration of Chemical (Units)	Emission Factor	Quantity Released (lbs/yr)	Reference
Blot Furnace Slag Storage Pile - Gary Works				
Manganese	1.5 %	1.01 g/sec. (TSP Attainment Report)	1,054	Gary Works Slag Analysis
Blot Furnace Slag and Casthouse - Fabless # 2 & 3				
Arsenic	3.40 mg/kg	BF 02 - 11.1 lbs/hr	<1	Gary Works Analysis (total for 2 furnaces)
Cadmium	1.00 mg/kg	BF 03 - 11.5 lbs/hr (Plant Data)	<1	
Chromium	170 mg/kg		25	
Lead	164 mg/kg		24	
Manganese	600 mg/kg		118	
Nickel	5.0 mg/kg		<1	
Materials Handling: Iron Ore - Fabless Works				
Cadmium	0.20 mg/kg	0.0024 lbs. part/ton ore (AP-42)	0	Fabless Iron Ore Analysis
Chromium	4.0 mg/kg		<1	
Lead	13.0 mg/kg		<1	
Nickel	1.0 mg/kg		0	
Materials Handling: Coke - Fabless Works				
Arsenic	0.023 %	11.5 lbs part/hr (PA DER PEDS Report)	16	Lorain Coke Analysis
Cadmium	0.012 %		23	
Lead	0.021 %		12	
Manganese	0.016 %		202	
Materials Handling: BF Dust - Fabless Works				
Arsenic	3.4 mg/kg	6.6 lbs part/hr (PA DER PEDS Report)	0	Fabless BF Dust Analysis
Cadmium	1.0 mg/kg		0	
Chromium	170 mg/kg		13	
Lead	164 mg/kg		12	
Manganese	600 mg/kg		60	
Nickel	5.0 mg/kg		3	
Materials Handling: Limestone - Fabless Works				
Lead	0.051 %	2.3 lbs. part. /hr (AP-42)	10	Lorain Limestone Analysis
			5	

Clean Air Act Chemical	Concentration of Chemical (Units)	Emission Factor	Quantity Released (lbs/yr)	Reference
Sinter Plant - Fatsloss Works				
Antimony	0.012 %	82.8 lbs./hr. (1988 Stack Test)	90	Gary Works & ETC Analytical Data
Arsenic	0.01 %		75	
Beryllium	0.0002 %		1	
Cadmium	0.0016 %		12	
Chromium	0.1 %		748	
Cobalt	0.0017 %		13	
Hydrochloric Acid	4 mg/m3		43046	
Lead	0.1 %		748	
Manganese	0.2 %		1497	
Mercury	0.001 %		7	
Nickel	0.014 %	105		
Sinter Plant Stacks(2) - Gary Works				
Cadmium	0.0042 mg/m3	81.2 lbs. part./hr. (Plant Data)	28	Westbrook (1979)
Chromium	0.075 mg/m3		517	
Lead	0.657 mg/m3		453	
Manganese	7.93 mg/m3		54,674	
Nickel	0.038 mg/m3		262	
Sinter Plant Cooler(2) - Gary Works				
Cadmium	0.0042 mg/m3	154 lbs. part./hr. (Plant Data)	83	Westbrook (1979)
Chromium	0.075 mg/m3		1,475	
Lead	0.657 mg/m3		1,292	
Manganese	7.93 mg/m3		155,993	
Nickel	0.038 mg/m3		748	
Sinter Plant Discharge(2) - Gary Works				
Cadmium	0.0042 mg/m3	21.4 lbs. part./hr. (Plant Data)	14	Westbrook (1979)
Chromium	0.075 mg/m3		252	
Lead	0.657 mg/m3		220	
Manganese	7.93 mg/m3		26,587	
Nickel	0.038 mg/m3		127	
Sinter Plant Material Handling - Gary Works				
Cadmium	0.0042 mg/m3	3.4 lbs. part./hr. (Plant Data)	6	Westbrook (1979)
Chromium	0.075 mg/m3		101	
Lead	0.657 mg/m3		89	
Manganese	7.93 mg/m3		10,717	
Nickel	0.038 mg/m3		51	

<u>Clean Air Act Chemical</u>	<u>Concentration of Chemical (Units)</u>	<u>Emission Factor</u>	<u>Quantity Released (lbs/yr)</u>	<u>Reference</u>
Coke Oven Battery (Combustion) Stacks - Gary Works				
Benzene	1.20EE-4 lbs/ton coal		384	B Battery Stack Tests
Toluene	4.0EE-5 lbs/ton coal		118	Clariton Works
Ethylbenzene	3.0EE-8 lbs/ton coal		0	(ENSR Report)
Xylene	0.0EE-8 lbs/ton coal		27	(Total for 4 stacks)
Naphthalene	2.4EE-5 lbs/ton coal		72	

Coke Oven Battery (Combustion) Stacks - Clariton Works

Benzene	1.20EE-4 lbs/ton coal		729	B Battery Stack Tests
Toluene	4.0EE-5 lbs/ton coal		228	Clariton Works
Ethylbenzene	3.0EE-8 lbs/ton coal		17	(ENSR Report)
Xylene	0.0EE-8 lbs/ton coal		51	(Total for 12 stacks)
Naphthalene	2.4EE-5 lbs/ton coal		136	

Electric Arc Furnace - South Works (Scrubber Emissions)

Antimony	18 ppm	18 lbs part/hr per furnace	<1	Plant Analysis
Arsenic	20.5 ppm	(Engineering Judgment)	0.2	
Beryllium	0.5 ppm		<1	
Cadmium	207 ppm		80	
Chromium	2,340 ppm		480	
Lead	12,400 ppm		2,600	
Manganese	33,000 ppm		6,000	
Mercury	0.13 ppm		0	
Nickel	345 ppm		72	

BOP Primary Emissions - ET Works AAF Scrubber

Arsenic	1.1 mg/kg	21.5 lbs. part/hr	<1	1987 Stack Test Data
Cadmium	3.8 mg/kg	Stack Test Data 1989	1	(IT Corp.)
Chromium	200.0 mg/kg	(ENSR)	38	
Lead	1,600.0 mg/kg		301	
Nickel	111.0 mg/kg		21	

BOP Secondary Emissions - ET Works Secondary Baghouse

Arsenic	1.1 mg/kg	0.18 lbs. part/hr	<1	1987 Stack Test Data
Cadmium	3.8 mg/kg	Stack Test Data 1989	<1	(IT Corp.)
Chromium	200.0 mg/kg	(ENSR)	<1	
Lead	1,600.0 mg/kg		3	
			<1	

<u>Clean Air Act Chemical</u>	<u>Concentration of Chemical (Unit)</u>	<u>Emission Factor</u>	<u>Quantity Released (lbs/yr)</u>	<u>Reference</u>
BOP Hot Metal Desulfurization - ET Works Mixer Baghouse				
Arsenic	0.3 mg/kg	1.5 lbs. per L/hr	< 1	1987 Stack Test Data
Cadmium	3.1 mg/kg	Stack Test Data 1988	< 1	(IT Corp.)
Chromium	140.0 mg/kg	(ENSR)	2	
Lead	160.0 mg/kg		2	
Nickel	61.0 mg/kg		< 1	
BOP Slag Handling - ET Works				
Manganese	4.76 %	0.24 lbs. per L/ton slag (Ohio EPA Report)	3,884	ET BOP Slag Analysis
Q-BOP Primary Emissions - Fairfield Works: 3 Vessels				
Antimony	0.6 mg/kg	Scrubber Design Data	3	Analysis
Chromium	0.02 %	(Air Permit Application)	24	Westbrooke 1979
Lead	0.032 %		38	
Nickel	28.2 mg/kg		3	
Manganese	3,685 mg/kg		450	
Q-BOP Secondary Emissions (Monitor Release) - Fairfield Works: 2 Vessels				
Antimony	0.6 mg/kg	0.05 lbs. per L/ton steel	< 1	Analysis
Chromium	0.02 %	(AP - 42 Factor)	158	Westbrooke 1979
Lead	0.032 %		248	
Nickel	28.2 mg/kg		20	
Manganese	3,685 mg/kg		2,070	
Q-BOP Hot Metal Desulfurization - Fairfield Works (North Mixer Baghouse)				
Cadmium	4.43 ppm	Baghouse Design Data	< 1	Fairfield Works
Chromium	44.8 ppm	(Air Permit Application)	5	Analysis of Dust
Lead	47.3 ppm		5	
Manganese	0.28 %		274	
Q-BOP Hot Metal Desulfurization - Fairfield Works (South Mixer Baghouse) Includes Q-BOP Vessel "C" emissions				
Antimony	0.60 ppm	Baghouse Design Data	< 1	Fairfield Works
Cadmium	42.5 ppm	(Air Permit Application)	15	Analysis
Chromium	87.7 ppm		35	
Lead	2,480 ppm		887	
Manganese	3,685 ppm		1,329	
			9	

<u>Clean Air Act Chemical</u>	<u>Concentration of Chemical (Unit)</u>	<u>Emission Factor</u>	<u>Quantity Released (lb/yr)</u>	<u>Reference</u>
BOP Slag Handling - Fairfield Works				
Antimony	BDL	0.24 lbs. part./ton slag	0	Fairfield Works Analysis
Manganese	7,887 mg/kg	(Ohio EPA Report)	360	
Nickel	10.2 mg/kg		<1	
Q-BOP Flux Material Handling - Fairfield Works				
Manganese - Limonite	0.05 %	Design Data	<1	
Manganese - Flux Material C	0.02 %		<1	
BOP Primary Emissions - Gary Works (Stack Releases)				
Chromium	0.1 %	21.6 lbs. part./hr	180	Westbrook (1979)
Lead	0.0025 %	(Plant Data)	5	
Manganese	0.014 %		28	
Nickel	0.030 %		74	
BOP Secondary Emissions - Gary Works (Monitor Releases)				
Chromium	0.1 %	79.7 lbs. part./hr	698	Westbrook (1979)
Lead	0.0025 %	(Plant Data)	17	
Manganese	0.014 %		98	
Nickel	0.030 %		272	
Q-BOP Primary Emissions - Gary Works (Stack Releases)				
Chromium	0.02 %	65.8 lbs. part./hr	115	Westbrook (1979)
Lead	0.032 %	(Plant Data)	184	
Manganese	0.20 %		1,872	
Nickel	0.014 %		61	
Q-BOP Secondary Emissions - Gary Works (Monitor Releases)				
Chromium	0.02 %	288.82 lbs. part./hr	488	Westbrook (1979)
Lead	0.032 %	(Plant Data)	748	
Manganese	0.20 %		6,781	
Nickel	0.014 %		327	
BOP & Q-BOP Hot Metal Desulfurization - Gary Works				
Arsenic	28.1 ppm	1.4 lbs. part./hr.	0	1988 Analytical Test Gary Works
Cadmium	2.3 ppm	(Source Test FFLD Works)	0	
Chromium	43.8 ppm		0	
Lead	340 ppm		3	
Manganese	800 ppm		8	

<u>Clean Air Act Chemical</u>	<u>Concentration of Chemical (Units)</u>	<u>Emission Factor</u>	<u>Quantity Released (lbs/yr)</u>	<u>Reference</u>
BOP & Q-BOP Slag Storage Piles - Gary Works				
Manganese	3.5 %	BOP - 0.0375 g/sec Q-BOP - 0.072 g/sec (TSP Attainment Report)	288	
Hot Metal Decarburization - Fairless Works				
Arsenic	28.11 ppm	1.4 lbs. per/ton (PADER PEDS Report)	<1	1989 Analytical Test Gary Works
Cadmium	7.1 ppm		<1	
Chromium	25.4 ppm		<1	
Lead	34.0 ppm		<1	
Manganese	822 ppm		11	
Nickel	3.37 ppm		<1	
Ladle Metallurgy Facility (Includes Materials Handling) - Fairfield Works				
Antimony	10.1 ppm	Design Data	<1	Fairfield Works
Cadmium	7.22 ppm	(Air Permit Application)	<1	Analytical
Chromium	593 ppm		4	
Lead	170 ppm		1	
Manganese	41,224 ppm		285	
Nickel	41.5 ppm		<1	
Carbon Steel Pickling - Fairfield Works No. 4 Pickling Line				
Hydrochloric Acid		0.18 lbs HCl/ton steel (Uncontrolled Factor - USS Irvin Works)	58,740	
Carbon Steel Pickling - Fairless Works 56" & 60" Lines				
Hydrochloric Acid	55% APC Device Efficiency	0.18 lbs HCl/ton steel (Uncontrolled Factor - USS Irvin Works)	84,364	
Carbon Steel Pickling - Gary Works Continuous Pickling Lines				
Hydrochloric Acid	75% APC Device Efficiency	0.18 lbs HCl/ton steel (Uncontrolled Factor - USS Irvin Works)	118,859	