

4.0 EMISSIONS ANALYSIS

This section contains a summary of air pollutant emissions from MCC. Facility-wide emissions are summarized in Table 1-1. Plant operation will be continuous (8,760 hours/year). Annual emissions are based on the maximum design production rate of 912,000 tons/year of coal. Many of the processes are batch operations and do not operate continuously. Production and emissions are limited by the nature of the operation. The cycle time is 48 hours. Half the ovens are charged each day with each oven charged every other day.

Table 4-1 presents the annual stack and fugitive criteria pollutant (plus sulfuric acid) emissions by emissions unit. Note that the emissions from heat recovery coking represent potential to emit and overestimate actual emissions. For example, during annual spray dryer/baghouse maintenance, all emissions from coking will be exhausted from the waste heat stacks because the main stack will be offline. The emissions in Table 4-1 are calculated as though both main stack and waste heat stack emissions occur simultaneously. This results in a conservative estimate of emissions. NO_x, for example, is overestimated by 18.75 tons/year since emissions during maintenance will be emitted from either the waste heat stacks or the main stack – but not both simultaneously.

The majority of HAP emissions are from HCl. The total HAPs (except HCl and mercury) emissions include a 20% buffer that recognizes the emission factors are based on AP-42 emission factors that can change or limited actual test data. However, the 20% buffer still establishes a limit that maintains the facility total emissions of HAPs other than HCl at less than 5 tons/year. Table 4-2 summarizes the HAP emissions.

Table 4-1
Maximum MCC Emissions

Emissions Unit	Designation	Associated Control Device ^a	Filterable PM (tons/year)	Filterable PM ₁₀ (tons/year)	Total PM ₁₀ (tons/year)	Filterable PM _{2.5} (tons/year)	SO ₂ (tons/year)	NO _x (tons/year)	CO (tons/year)	VOCs (tons/year)	Lead (tons/year)	Sulfuric Acid (tons/year)
Fugitive emissions	Coal unloading, storage, handling and processing	WS, E	10.24	4.92	4.92	1.64	—	—	—	—	—	—
Coal charging	Charge	Traveling hood with baghouse	4.63	3.77	7.09	3.58	0.14	—	1.28	0.91	0.00005	—
Heat recovery coking	Coking (main stack)	Baghouse, common tunnel afterburner, and lime spray dryer	46.93	46.93	103.24	46.93	1091.35	456.25	95.54	20.47	0.12	11.13
Heat recovery coking	Coking (individual waste heat stacks)	Common tunnel afterburner	18.90	18.90	32.01	18.90	448.50	18.75	3.93	0.84	0.1	22.88
Coke pushing	Pushing	Flat push and traveling hood with multicyclone	13.09	13.09	26.18	13.09	44.71	8.67	28.74	9.13	0.008	2.28
Coke quenching	Quench	Baffles, with TDS control water	54.75	20.08	20.08	12.32	—	—	—	—	0.05	—
Coke screening	Processing	Baghouse, E	15.02	15.02	15.02	15.02	—	—	—	—	—	—
Fugitive emissions	Coke handling, storage, and loadout	WS, E	9.78	4.66	4.66	1.51	—	—	—	—	—	—
Fugitive emissions	Industrial roads	Paving, W, GH	21.57	4.21	4.21	1.05	—	—	—	—	—	—
Other fugitive emissions	FGD dust and lime silo	Bin vent	0.14	0.14	0.14	0.14	—	—	—	—	—	—
Total Emissions			195.04	131.71	217.54	114.19	1584.7	483.67	129.49	31.35	0.28	36.29

^a W = watering as needed, E = enclosure, GH = good housekeeping, WS = wet suppression or wet material

CO = Carbon Monoxide
 FGD = Flue Gas Desulfurization
 MCC = Middletown Coke Company
 NO_x = Nitrogen Oxides
 PM = Particulate Matter

PM_{2.5} = Particulate matter less than 2.5 micrometers in diameter
 PM₁₀ = Particulate matter less than 10 micrometers in diameter
 SO₂ = Sulfur Dioxide
 TDS = Total Dissolved Solids
 VOC = Volatile Organic Compound

Table 4-2
Summary of Maximum Annual HAP Emissions from MCC

Compound	Coking - Main and Waste Heat Stacks (tons/year)	Charging (tons/year)	Pushing (tons/year)	Quenching (tons/year)	Total Maximum Annual Emissions (tons/year)
Anthracene	Part of total PAHs	Part of total PAHs	NM	Part of total PAHs	Part of total PAHs
Benzene	2.28E-01	1.64E-02	NM	ND	2.44E-01
Benzo(a)pyrene	Part of total PAHs	Part of total PAHs	NM	Part of total PAHs	Part of total PAHs
Benzo(b,k)fluoranthene	Part of total PAHs	Part of total PAHs	NM	Part of total PAHs	Part of total PAHs
Bromoform	5.70E-04	ND/NR	NM	ND	5.70E-04
Bromomethane	2.66E-01	ND/NR	NM	ND	2.66E-01
Benzene Soluble Organics	ND/NR	ND/NR	9.58E-02	ND	9.58E-02
2-Butanone	2.99E-02	ND/NR	NM	ND	2.99E-02
Carbon disulfide	7.60E-03	9.58E-04	NM	ND	8.56E-03
Chlorobenzene	5.70E-04	ND/NR	NM	ND	5.70E-04
Chloroform	5.23E-03	ND/NR	NM	ND	5.23E-03
Chloromethane	3.61E-01	9.13E-04	NM	ND	3.62E-01
Chrysene	Part of total PAHs	Part of total PAHs	NM	Part of total PAHs	Part of total PAHs
Cumene	6.65E-04	ND/NR	NM	ND	6.65E-04
Ethylbenzene	1.52E-03	3.33E-04	NM	ND	1.85E-03
Fluoranthene	Part of total PAHs	Part of total PAHs	NM	Part of total PAHs	Part of total PAHs
Fluorene	Part of total PAHs	Part of total PAHs	NM	Part of total PAHs	Part of total PAHs
Hydrogen chloride	118.04	NM	NM	NM	118.04
Iodomethane	2.99E-03	ND/NR	NM	ND	2.99E-03
Isooctane	7.60E-03	ND/NR	NM	ND	7.60E-03
Methylene chloride	3.14E-01	ND/NR	NM	ND	3.14E-01
2-Methylnaphthalene	Part of total PAHs	Part of total PAHs	NM	Part of total PAHs	Part of total PAHs
4-Methyl-2-Pentanone	4.23E-03	ND/NR	NM	ND	4.23E-03
2-Methylphenol	ND/NR	ND/NR	NM	4.75E-03	4.75E-03
4-Methylphenol/3-Methylphenol	ND/NR	ND/NR	NM	1.53E-02	1.53E-02
Naphthalene	Part of total PAHs	Part of total PAHs	NM	Part of total PAHs	Part of total PAHs
n-Hexane	7.13E-03	ND/NR	NM	ND	7.13E-03
Phenanthrene	Part of total PAHs	Part of total PAHs	NM	Part of total PAHs	Part of total PAHs
Phenol	3.37E-02	ND/NR	NM	1.11E-02	4.49E-02
Pyrene	Part of total PAHs	Part of total PAHs	NM	Part of total PAHs	Part of total PAHs
Styrene	3.28E-03	ND/NR	NM	ND	3.28E-03
Tert-butyl methyl ether	2.23E-05	ND/NR	NM	ND	2.23E-05
Tetrachloroethane	1.95E-04	ND/NR	NM	ND	1.95E-04
1,1,2,2-Tetrachloroethane	9.50E-04	ND/NR	NM	ND	9.50E-04

Table 4-2
(Continued)

Compound	Coking - Main and Waste Heat Stacks (tons/year)	Charging (tons/year)	Pushing (tons/year)	Quenching (tons/year)	Total Maximum Annual Emissions (tons/year)
Toluene	2.42E-01	7.76E-03	NM	ND	2.50E-01
Total PAHs	1.29E-01	2.01E-02	NM	3.57E-03	1.52E-01
1,1,1-Trichloroethane	1.19E-03	ND/NR	NM	ND	1.19E-03
1,1,2-Trichloroethane	2.76E-04	ND/NR	NM	ND	2.76E-04
Trichloroethene	4.12E-03	ND/NR	NM	ND	4.13E-03
Vinyl acetate	3.28E-03	ND/NR	NM	ND	3.28E-03
Xylenes	7.70E-03	3.06E-03	NM	ND	1.08E-02
Antimony ^a	5.40E-03	ND/NR	ND	3.71E-03	9.12E-03
Arsenic	5.40E-02	1.10E-04	5.48E-03	7.36E-02	1.33E-01
Beryllium	8.31E-04	3.97E-06	ND	2.44E-04	1.08E-03
Cadmium	7.48E-03	ND/NR	ND	ND	7.48E-03
Chromium	2.62E-02	4.56E-05	ND	1.28E-03	2.75E-02
Cobalt	ND/NR	3.24E-05	ND	7.85E-04	8.18E-04
Lead	1.90E-01	4.56E-05	6.98E-03	3.96E-02	2.36E-01
Manganese	1.25E-02	2.10E-04	9.58E-04	1.48E-02	2.84E-02
Mercury ^b	8.15E-02	3.60E-07	ND	ND	8.15E-02
Nickel	2.41E-02	6.48E-05	ND	1.86E-03	2.60E-02
Phosphorus	5.82E-01	ND/NR	ND	3.53E-02	6.17E-01
Selenium	1.33E-02	ND/NR	ND	6.03E-03	1.93E-02
Total HAPs (tons/year)	120.70	0.05	0.11	0.21	121.07
Total HAPs without HCl (tons/year)	2.66	0.05	0.11	0.21	3.03
Total HAPs without HCl with buffer (tons/year)^c					3.64

^aEstimated 95% removal in spray dryer/baghouse for all metals except mercury.

^bEstimated 50% mercury removal in spray dryer/baghouse with carbon injection.

^cTotal HAPs (except HCl) emissions include 20% buffer that recognizes the emission factors are based on AP-42 emission factors that can change and limited test data.

HAP = Hazardous Air Pollutant

HCl = Hydrogen Chloride

Hg = Mercury

MCC = Middletown Coke Company

ND = Not Detected

NM = Not Measured

NR = Not Reported

PAH = Polynuclear Aromatic Hydrocarbon