Note: This is a reference cited in *AP 42, Compilation of Air Pollutant Emission Factors, Volume I Stationary Point and Area Sources.* AP42 is located on the EPA web site at www.epa.gov/ttn/chief/ap42/

The file name refers to the reference number, the AP42 chapter and section. The file name "ref02_c01s02.pdf" would mean the reference is from AP42 chapter 1 section 2. The reference may be from a previous version of the section and no longer cited. The primary source should always be checked.

AP-42 Section 12.2
Reference
Report Sect. 4
Reference 178

BRADFORD K. PEASE, PE, CEM
Fuels and Combustion Consultant
2029 E. Columbia Street
Allentown, PA 18103
(215) 432-9344

June 9, 1993

Do not use
no production data

Mr. Thomas E. Kreichelt
Supt., Environment, Safety & Health
Bethlehem Steel Corporation
501 East Third Street
Bethlehem, PA 18016

Subject: Summary Report of Bethlehem Structural Products NO_x and VOC Emission Meassurements

Dear Tom:

Measurements of NO_x emissions in the stack gases from 11 fuel consuming units were made between November 30, 1992 and February 5, 1993 at Bethlehem Structural Products in Bethlehem, PA as part of the Corporate emission inventory. The units tested were Boiler Nos. 1 and 2 at No. 2 Boiler House (Boiler No. 3 was down), Boiler Nos. 2, 3, and 4 at the Coke Oven Boiler House (No. 1 Boiler was down), Coke Oven Batteries A, No. 2, and No. 3, the Coke Oven Gas Desulfurizer, Saucon Soaking Pit Battery No. 1, the Combination Mill West Furnace, and Ingot Mold Foundry Drying Oven No. 13. In January, Environmental Control purchased a non-methane hydrocarbon analyzer, and thus VOC measurements were included in the tests Coke Oven Battery Nos. 2 and 3 and at the soaking pits.

The measurements were made in accordance with EPA Method 3A - Determination of Oxygen Concentration in Emissions From Stationary Sources (Instrumental Analyzer Procedure) using a Teledyne Model 980 Oxygen/Combustibles Analyzer, EPA Method 7E - Determination of Nitrogen Oxides Emissions From Stationary Sources (Instrumental Analyzer Procedure using a Thermo Electron Model 10A Chemiluminescent NO/No_x Analyzer, and EPA Method 25A - Determination of Total Gaseous Organic Concentration Using a Flame Ionization Analyzer using a JUM Engineering Model 109A Flame Ionization Non-Methane Hydrocarbon Analyzer. An insulated heated sample line was used between the sampling probe in the stack and the analyzers. A sample dryer and filter was used ahead of the oxygen/combustibles analyzer, and sample conditioning systems which included heated filters were used before the other analyzers.

The test results are summarized in Table 1 and include emission concentrations and emission rates expressed as pounds of emission per million Btu of fuel fired.

Please call me if there are any questions or if any follow-up testing is needed.

Sincerely,

Bradford K. Pease

Bradford K. Pease, P.E.

BKP:bdr

Attachment

cc: L. M. Stuart
A. G. Ossman
W. J. Riley/J. E. Schindler

TABLE 1. EMISSION MEASUREMENTS - BETHLEHEM STRUCTURAL PRODUCTS

Test Date	Facility	Fuel Fired, Percent [1]			Average Oxygen	Average Comb.	Average NOx		Average VOCs	
					%	%	ppm	lbs/MBtu[4]	ppm	lbs/MBtu[3]
No. 2 Boiler House		BFG	Mixed COG	No. 6 Oil						
11/30/92	Boiler No. 1	30.9	49.1	20.0	6.0	trace	60	0.125	---	---
12/01/92	Boiler No. 1	-	67.1	32.9	7.6	trace	79	0.150	---	---
12/02/92	Boiler No. 2	48.0	39.9	12.1	5.0	trace	48	0.106	---	---
12/01/92	Boiler No. 2	-	55.6	44.4	7.2	trace	88	0.161	---	---

Test Date	Facility	Fuel Fired, Percent [1]	Average Oxygen	Average Comb.	Average NOx		Average VOC	
			%	%	ppm	lbs/MBtu[4]	ppm	lbs/MBtu[3]
Coke Oven Boiler House		Coke Oven Gas						
12/3/92	Boiler Nos. 2,3,4	100	7.8	0.65	108	0.193	--	--

Test Date	Facility	Fuel Fired, Percent [1]	Average Oxygen	Average Comb.	Average NOx		Average VOC	
			%	%	ppm	lbs/MBtu[4]	ppm	lbs/MBtu[3]
Coke Ovens		Coke Oven Gas						
12/15/92	Battery A	100	11.8	0.16	237	0.572	---	---
2/05/93	Battery No. 2	100	14.6	trace	53	0.179	0.6	0.002
2/05/93	Battery No. 3	100	13.9	trace	64	0.195	0.6	0.002
12/04/92	Desulfurizer	100	3.0	trace	43	0.058	---	---

Bethlehem Coke Oven Battery No. 2, 2/5/93

(Reversal every 20 min at :05, :25, :45)

Time	Oxy. %	Comb. %	NOx, ppm	SO_2, ppm	THC ppm	CH_4	Δ	No
								Gas Fl 94,
9:15 am	15.6	0.05	46	—	7.8	1.5	0.5	108
9:30 "	14.5	0.05	50	—	1.3 1.2	1.0 1.0	0.3 0.2	Amb
9:55 "	14.4	0.05	52	—	~~6.5~~ 6.8	~~5.5~~ 6.1	~~1.3~~ 0.7	
10:15 "	15.3	0.08	52-56	~30	2.2 1.1 1.1	1.5 0.9 5.5	0.7 0.2 0.6	Amb Red
10:35 "	14.5	0.06	52-53	~20	1.8	1.2	0.6	
10:55 "	14.1	0.07	57-57	~30	5.3	4.7	0.6	
11:15 "	14.9	0.03	52-52	~20	1.8	1.3	0.5	Y
11:35 "	14.1	0.07	53-56	~30	1.3 6.0	1.0 5.5	0.3 0.8	Amb
11:55 "	14.3	0.05	50-55	~20	1.9	1.4	0.5	Y
12:15 p.m.	14.3	0.05	58-57	~20	5.3 1.5	4.8 1.2	0.5 0.3	Amb

9.1 M AVG
10.4 M for shift

Gas flow 88K, 94K,

Bethlehem Coke Oven Battery No. 3, 2/5/93

(Reversal every 20 min at :15, :35, :55)

								Gas 99. 106.
12:25 pm	14.2	0.03	62	~20	4.8	4.0	0.8	Re
12:45 "	13.3	0.02	65-62	~20	5.0 3.7	4.0 3.0	1.0 0.7	Yel
1:05 "	13.7	0.04	66-64	—	~~4.9~~ 5.1 5.0	4.5 4.6	0.7 0.4	Re
1:25 "	13.3	0.13	66-61-63	—	14.2	14.2	0.0	Yel
1:45 "	13.3	0.08	67-64	—	11.8 11.3 5.8	10.8 9.3 5.0	0.94 1.9 0.9	R
2:05 "	13.3	0.1	60-64	~20	5.2 4.6	4.6 3.9	0.6 0.63	Ye
2:25 "	13.7	0.03	68-64-70	~20	5.9	5.3	0.5	R
2:45 "	15.1	0.1	70-63	~20	5.0 5.3	4.8 4.9	0.2 0.3	Ye
3:05 "	13.8	0.05	64-60-63	~20	6.0 1.2 4.4	5.8 0.9 4.2	0.2 0.3 0.2	R Amb
3:25 "	~~15.0~~ 14.8	0.05	60-62					4.1 0.3 97

Beth. Dept Mold Foundry - 12/14/92 Oven No. 13

Time	Oxy, %	Comb, %	NOx, ppm	Notes
1:20 pm	17.4	0.12	25	Oven at 600°
1:35 "	17.2	0.1	30	60% on COG
1:50 "	17.3	0.08	33	meter during warm up
2:05 "	17.6	0.09	25	
2:20 "	17.5	0.09	24	~40% on COG
2:35 "	17.7	0.08	20	meter for
2:50 "	17.7	0.07	20	Nos. 13 + 14
3:05 "	17.8	0.05	20	ovens
3:20 "	17.8	0.07	19	35% on CO
3:35 "	17.8	0.08	20	meter
3:50 "	17.6	0.06	21	
4:15 "	17.8	0.08	21	33% on CO
4:20 "	18.8	0.06	22	meter
				31% min at last shutdo
				at 20 minute

Beth. Coke Oven Battery A 12/15/92 Rev., 8, 28, 48

54,000 scfh C

3:20 pm	11.7	0.17	290	Green East f.
3:40 "	11.5	0.2	260	Red temp. 4
4:00 "	~~12.0~~ 18.8	0.15	265	Green West f. temp. 4
4:20 "	11.7	0.15	260	Red 545,00
4:40 "	12.2	0.18	220	Green COG
5:00 "	11.2	0.19	220	Red
5:20 "	12.0	0.14	205	Green
5:40 "	12.4	0.14	225	Red
6:00 "	11.6	0.17	220	Green 545,0
6:20 "	11.7	0.14	205	Red COG
	11.8		230 ppm	