United States
Environmental Protection
Agency

EPA-600/R-93-080a

May 1993

EPA

Research and Development

KRESS INDIRECT DRY COOLING SYSTEM, BETHLEHEM STEEL'S COKE PLANT DEMONSTRATION AT SPARROWS POINT, MARYLAND

Volume 1. Technical Report and Appendices A-F

Prepared for

Office of Environmental Engineering and Technology Demonstration

Prepared by

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TECHNICAL REPORT DATA
(Please read Instructions on the reverse before complet

1. REPORT NO	2.	3. PB93-191302
EPA-600/R-93-080a		

4. TITLE AND SUBTITLE	5. REPORT DATE
Kress Indirect Dry Cooling System, Bethlehem Steel's Coke Plant Demonstration at Sparrows Point, Maryland, Vol. 1. Technical Report and Appendices A-F	May 1993
	6. PERFORMING ORGANIZATION CODE
7. AUTHOR(S) A. George Ossman	8. PERFORMING ORGANIZATION REPORT NO.
9. PERFORMING ORGANIZATION NAME AND ADDRESS Bethlehem Steel Corporation Bethlehem, Pennsylvania 18016-7699	10. PROGRAM ELEMENT NO.
	11. CONTRACT/GRANT NO. 68-DC-0128
12. SPONSORING AGENCY NAME AND ADDRESS EPA, Office of Research and Development Air and Energy Engineering Research Laboratory Research Triangle Park, NC 27711	13. TYPE OF REPORT AND PERIOD COVERED Final; 2/90 - 2/92
	14. SPONSORING AGENCY CODE EPA/600/13

15. SUPPLEMENTARY NOTES AEERL project officer is Chester A. Vogel, Mail Drop 61, 919/541-2827. Volume 2 consists of Appendices G-N.

16. ABSTRACT The report evaluates the Kress Indirect Dry Cooling (KIDC) process, an innovative system for handling and cooling coke produced from a slot-type by-product coke oven battery. The report is based on the test work and demonstration of the system at Bethlehem Steel Corporation's Sparrows Point (Maryland) facility in 1991. The report covers both environmental and operational impacts of the KIDC process. Areas covered in the report include opacity levels, quenching emissions, and the impact of the KIDC coke on blast furnace operations. Also evaluated were various performance characteristics of the KIDC system, including reliability, cycle time, coke cooling requirements, and costs. Unfortunately, abbreviation of the test program, caused by the idling of coke production at Sparrows Point, limited the experience gained and data collected during the demonstration. The report data have not been thoroughly audited, and the conclusions are neither approved nor endorsed by EPA. Because of the sudden termination of the project and the associated quality assurance effort, it was not possible to perform the detailed laboratory and data audits that had been planned.

The report contains appendices A-F.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
Pollution	Pollution Control	13B
Coke	Stationary Sources	21D
Coking	Kress Indirect Dry Cooling (KIDC) Process	13H
Blast Furnaces		11F

18. DISTRIBUTION STATEMENT	19. SECURITY CLASS (This Report)	21. NO. OF PAGES
Release to Public	Unclassified	277
	20. SECURITY CLASS (This page) Unclassified	22. PRICE

EPA Form 2220-1 (9-73)

EPA-600/R-93-080a
May 1993

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Volume 1. Technical Report and Appendices A-F

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ABSTRACT

This report provides an evaluation of the Kress Indirect Dry Cooling (KIDC) process. The KIDC process is an innovative system for the handling and cooling of coke produced from a slot type by-product coke oven battery. The report is based on the test work and demonstration of the system at Bethlehem Steel Corporation's Sparrows Point facility in 1991. The report covers both environmental and operational impacts of the KIDC process. Areas covered in the report include opacity levels, quenching emissions, and the impact of the KIDC coke on blast furnace operations. Also evaluated were various performance characteristics of the KIDC system. These included reliability, cycle time, coke cooling requirements, and costs. Unfortunately, the shortened duration of the test program as a result of the idling of coke production at Sparrows Point limited the experience and data collected during the demonstration.

DISCLAIMER

The data presented in this report have not been thoroughly audited and the conclusions are not approved or endorsed by the Agency. Because of the sudden termination of the project and the associated Quality Assurance effort, it was not possible to perform the detailed laboratory and data audits that had been planned.

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1.0 INTRODUCTION

On September 29, 1990, Bethlehem Steel Corporation (Bethlehem) entered into a contract with EPA to conduct a demonstration of a pollution control process that largely eliminates the particulate emissions and water pollution normally associated with the uncontrolled pushing and quenching operations inherent in the production of metallurgical coke. The demonstration was to include the design, construction, operation, and evaluation of this system on one or more commercial byproduct metallurgical coke oven batteries. The system chosen for this demonstration was the Kress Indirect Dry Cooling (KIDC) system which controls both the pushing and quenching emissions from coke production. Bethlehem provided as a host coke oven site, Battery 11, at Sparrows Point, Maryland, with ancillary facilities as well as all equipment and labor required to conduct this demonstration.

The successful application of the KIDC system to an existing coke oven battery(ies) was expected to demonstrate that (a) almost all the particulate emissions normally associated with the pushing operation are eliminated; (b) all of the particulate and the gaseous emissions associated with the direct contact water quenching operation are eliminated; (c) this technology costs less and is more effective than technologies that need to be combined to control pushing and quenching emissions; (d) this technology produces a better grade coke with less raw coal usage than alternative approaches; and (e) any problems resulting from this dry quenched coke as produced by KIDC such as increased dustiness or adsorbed gas retention can be resolved in a cost effective manner.

The KIDC system was selected by Bethlehem over other control alternatives for its potential to supply superior control of pushing emissions, and at the same time, provide superior coke quality at less operating costs. In addition, the elimination of quenching emissions was seen as another potential environmental benefit to the KIDC system. The goal of the testing program was to evaluate these factors to determine if the KIDC system is a viable and cost effective alternative to other conventional control methods currently in use at other coke oven operations.

The KIDC Indirect Dry Cooling (KIDC) concept had been under development by the Kress Corporation since the early 1980's. On June 6, 1987, the first prototype testing started at National Steel Corporation's Granite City Division in Granite City, Illinois. During this testing 27 pushes were successfully taken by the KIDC system. In December 1988, the first demonstration of the KIDC prototype occurred at the Bethlehem's Sparrows Point plant with the successful demonstration of 12 pushes. Following this testing, Bethlehem signed a contract with the Kress Corporation to install a full scale production system. The installation occurred in two phases. Phase I was the installation and demonstration of the new technology on coke oven battery No. 11, and Phase II was an extension of the system to include controls on battery No. 12.

The KIDC system was contracted to start testing in May, 1990, but delays prevented start-up of the system until June 7, 1991. Start-up testing of the system continued for approximately three and a half months until the start of the performance demonstration at the beginning of October, 1991. This performance demonstration continued through October and was extended into November, 1991.

The demonstration test program originally called for 30 weeks of testing consisting of; (1) a Performance Test Program lasting about four weeks, and (2) an Operational Test Program lasting about 26 weeks. However, on September 16, 1991, Bethlehem Steel announced that for a variety of reasons, it was necessary to temporarily discontinue all coke making at the Sparrows Point plant by the end of the 1991. As a result, all EPA related testing of the KIDC system was concluded by the end of November. Overall the KIDC system accepted a total of 321 pushes from June to the end of November and a total of 270 pushes during the two month performance demonstration.

1.1 Process Description

1.1.1 The KIDC System

The KIDC system is a patented process of the Kress Corp. for the cooling of coke after removal from a coke oven. It was designed to control emissions during both the pushing and quenching operations. The KIDC process attempts to confine the emissions completely during the push, unlike previous emission control technologies which typically rely on filtering or scrubbing the emissions after they have escaped. The conventional pushing technologies used for the baseline testing reported here utilized a water spray during the push to reduce particulate emissions or a Chemico control car.

The KIDC system completely eliminates the wet quenching process and relies instead on an indirect dry cooling process. The hot coke never comes into direct contact with the cooling water, thus eliminating the vigorous evolution of steam and consequent entrainment of particulate matter.

The KIDC carrier is an impressively large piece of equipment, weighing approximately 400,000 lbs (180,000 kg), with 8 ft (2.4 m) rubber tires. It is designed to carry and manipulate one 50 ft (15.2 m) long, 13 ft (4 m) high, and 3 ft (0.9 m) wide KIDC container (box). It has two dozen or more separate hydraulic cylinders to handle the intricate operations described below. These hydraulic cylinders have computer/electronic sensors for exact positioning and control. Auxiliary equipment includes 10 or more KIDC boxes, a support rail, a maintenance building, a quench station, and a fueling station. The support rail is used to balance the carriers weight, counteract pushing forces, and maintain the carrier at a precise distance from the oven. Other functions of the KIDC Carrier include door removal/replacement, door and jamb cleaning, and the catching of coke debris upon door handling.

The KIDC box, which is slightly wider and deeper than the coke charge, is positioned flush against the coke oven and receives the push. The KIDC process utilizes the conventional push-side apparatus. After the push is completed and the pusher ram is withdrawn, the KIDC box's guillotine door closes. The VOCs are controlled by a flare at the rear of the box, which is ignited during the push or start of travel. During the pushing operation, the KIDC carrier is also designed to clean the coke-side door and door jamb, which should facilitate the meeting of the proposed NESHAP regulations on door leaks. The jamb cleaner was, however, not operable during the demonstration. After the push, the box is transferred to the quenching station. During travel, VOCs also evolve and burn through small leaks at the guillotine door. The carrier runs cooling water on the outside of the box during the push and travel primarily to protect the box from overheating.

At the quench station, the carrier moves the box from the carrier into one of the nine cooling racks. Cooling water runs over the box to cool the coke. A recirculation fan, which derives power from a drive wheel in the quench rack, aids this cooling. During the first part of the quenching process, VOCs still evolve and burn at the guillotine door. After cooling, the carrier removes the box from the rack, carries it to the receiving station, where the guillotine door is opened and the box is emptied by tilting.

Figures showing the carrier performing some of these operations are in Appendix F.

1.1.2 Coke Oven Battery Nos. 11 and 12

Battery Nos. 11 and 12 are underjet four meter batteries with 65 ovens each. These batteries were constructed by Koppers and commissioned in 1955 and 1957 respectively. The condition of the batteries had, however, deteriorated significantly with age. At the time that testing began in 1991, a total of 22 ovens were in service on battery No. 11 with coking times which ranged from 23 to 48 hours. In general, production on No. 11 battery was 18 ovens pushed per day. This production was scheduled during two shifts, 11pm - 7am and 11am - 7pm. This was done because of the small number of ovens available and to balance gas flows in order to obtain a consistent coke oven operation.

2.0 CONCLUSIONS

The report data have not been thoroughly audited, and the conclusions are neither approved nor endorsed by the Environmental Protection Agency. Because of the sudden termination of the project and the associated quality assurance effort, it was not possible to perform the detailed laboratory and data audits that had been planned. The test program at Sparrows Point did not demonstrate the long term viability of the KIDC system. The KIDC system was not operated nearly long enough and did not take enough pushes to be able to state with confidence that this system is or is not a reliable and an economically viable pushing emission control system.

1. The test program at Sparrows Point demonstrated that the KIDC concept is technically viable and (a) can lead to a significant reduction in emissions related to the coke pushing and quenching operation, and (b) produce high quality coke with significantly less moisture than wet quenched coke.

2. The KIDC system effectively controlled pushing emissions to a maximum average opacity level of approximately 20% which was generally related to emissions from the box flare stack before ignition. This represents a significant improvement over the conventional control systems utilized at Sparrows Point to control pushing emissions. The added benefit of the KIDC system is that it eliminated quench tower emissions. This was somewhat offset by emissions during the box dumping procedure which showed an increase over the conventional coke discharge operation.

3. Coke quality improvements were seen in the areas of coke moisture and stability. No improvements could be substantiated in other coke quality characteristics such as an increased size, lower Bethlehem reactivity, or improvements in CRI/CSR. It is felt, however, that these characteristics were not adversely impacted by the KIDC system. These characteristics could not, however, be directly compared to the conventional coke produced because of differences in the coke handling systems before sampling.

4. The receiving station design adversely effected the size of the KIDC coke as a result of the extended free fall of the coke into the hopper.

5. The door extractor performance was good. This along with the Geotronics spotting system provided reliable operation which would minimize production delays and prevent door damage which can occur if not performed properly.

6. The automatic door cleaner worked well.

It should be emphasized that the KIDC concept is in the early stages of development and although it has had some successes and some failures in its demonstration at Sparrows Point it is a concept which deserves further evaluation.

3.0 TEST PROGRAM

The basis for carrying out this test program was the experimental and quality assurance plans approved by the EPA in early 1991. The EPA Project Officer and AEERL Quality Assurance Officer provided guidelines for preparing these plans during meeting with Bethlehem Steel Corporation personnel.

As originally described in the test plan, the KIDC program consisted of (1) evaluation of the operational impact of the KIDC system on the Coke Oven facilities and operations, and (2) evaluating the impact of the KIDC system on pushing emissions, quenching emissions, top side and door emissions, coke quality, blast furnace operations and general area air quality.

The demonstration test program was scheduled for a 30 week period which included a Performance Test lasting four weeks and an Operational Test Program lasting an additional 26 weeks. The test program was cut short, however, as a result of the stopping of all coke oven production at Sparrows Point at the beginning of December of 1991.

The first KIDC push occurred on June 7, 1991 and was followed by a start-up program which lasted until October 1, 1991. During this start-up period 51 pushes were accepted by the KIDC system. On October 1, the performance demonstration was started and lasted through the end of November. The performance demonstration consisted of 9 KIDC pushes per day which represented approximately 50% of the total production on No. 11 battery at that time. This limited performance demonstration was due to a one (1) shift operation of the KIDC equipment.

3.1 Baseline Program

The baseline program was designed to provide an understanding of where the existing operations was with respect to a number of parameters which might change from the implementation of the KIDC system. The baseline parameters to be measured were established in the experimental and quality assurance plans approved by the EPA in early 1991. Some of the parameters included as part of the baseline and demonstration test programs are presented in Table 3.1.

Additional information on the test methods used to evaluate these parameters is given in the original test plan.

Table 3.1

BASELINE AND DEMONSTRATION TEST PROGRAM PARAMETERS

Coal Quality

Moisture
Bulk Density
Size Analysis
Volatile Matter
Fixed Carbon
Sulfur
Ash
Free Swelling Index

Coke Quality

Moisture
Volatile Matter
Sulfur
Ash
Fixed Carbon
Stability & Hardness
Drop Shatter Test
Coke Reactivity (Bethlehem)
Coke Reactivity Index (CRI)
Coke Strength after Reaction (CSR)

Coke Pushing, Travel and Handling Emissions

Visible Emission Observations (Methods 9 & 22)
- Pushing Emissions - Cokeside
- Pushing Emissions - Topside
- Pushing Emissions - Pushside
- Discharge & Handling

Video Tape Recordings

Door Emissions

Percent door leaks by EPA Method 109 equivalent

Quench & Make-up Water Analysis

Total Cyanide	Sulfate	pH
Arsenic	Chloride	Temperature
Lead	Oil & Grease	TCLP
Mercury	Ammonia	
Calcium	Phenol	
Hardness	Sodium	
Total Suspended Solids	Sulfide	
Total Dissolved Solids		

Area Monitoring of Cokeside Machinery

Total Particulates
Benzene Soluble Fraction of Total Particulate
GC/MS - Volatile & Semi-volatile Scan

Blast Furnace Operations

Balwax Model

3.2 Demonstration Program

The Demonstration Program was designed to (1) evaluate the operational impact of the KIDC system on the Coke Oven facilities and operations, (2) evaluate the impact of the KIDC system on pushing emissions, quenching emissions, topside and door emissions, and general area air quality, and (3) evaluate the impact of coke quality on blast furnace operations.

During the demonstration, the coke ovens were operated in a normal manner with the same coal blends used during the baseline period leading up to the demonstration test.

The demonstration test was originally scheduled over a 30 week period and consisted of (1) a Performance Test Program lasting about four weeks, and (2) an Operational Test Program lasting about 26 weeks. This testing was, however, performed over a two month period because of the cessation of coke making.

3.3 QA/QC Program

An EPA approved QA/QC plan was developed and implemented for this project to assure the quality and validity of data acquired throughout the test program and to assist in the interpretation of that data. This QA/QC program consisted of a number of parts which were each designed to identify potential problem areas and to establish a means for follow-up. Some of the key items included in this program are given as follows:

- A well defined organizational structure with a clear division of responsibilities for each person. A copy of the organizational chart developed for this program is presented in Appendix L.

- Both internal and external audits with a procedure for follow up and corrective action of deficiencies. A copy of various internal audit reports performed at the plant during the demonstration are provided in Appendix L.

- Monthly progress reports and updates on the project status. These reports included a section for update of various QA/QC activities. These reports are also provided in Appendix L.

- A number of procedures were utilized to test the accuracy and precision of various analytical methods and other testing procedures utilized throughout the project. These procedures included multiple runs on the same sample, spiked samples, and simultaneous side-by-side samples.

3.3.1 Quality Assurance of Visible Emission Observation (VEO) Data

All VEOs were performed by BCM Engineers, Inc. under a contract with Bethlehem. Observers were trained and certified in emission observation techniques as required by EPA Method 9. Copies of these certifications are provided in Appendix L.

EPA Method 9 was utilized for the determination of the maximum opacity during the push and EPA Method 22 was utilized for the determination of the total duration of visible emissions. These methods were utilized for observation from the cokeside, the topside, and the pusherside of the battery during the pushing operation. In addition, observation of the coke discharge and handling emissions were made from both the conventional and KIDC systems. Readings were performed in a similar manner for both the conventional pushing operation and the KIDC system. Cokeside observations for the KIDC system were, however, more specific so that emissions could be evaluated based on the different operations and areas from which emissions occur in the system.

Observation of door leakage was performed in accordance with the state of Maryland door observation procedure. This method is very similar to the EPA proposed Method 109. The state method differs from the EPA Method in that jamb leaks are excluded from the percent leaking door calculation, and three doors (cokeside, pushside, and chuck) are counted per oven.

Some of the problems encountered in making the cokeside observations included steam interference from the dust suppression sprays on the Shenango conventional control car and the scrubber control on the Chemico control car. Steam interference was less of a problem when performing observations on the KIDC system, but steam from the water cooling sprays on the box did at times interfere with readings at the box to jamb interface. The observers were aware of these interferences and compensated by making observations after the steam had dissipated or in areas of the plume where steam was not evident.

Problems were also encountered in following precisely the requirement of Method 9 which calls for the sun angle to be within a 140 degree sector behind the observer. This was unavoidable due to the orientation of the battery in an east to west direction with the cokeside yard north of the battery. The observers were aware of this problem, however, and positioned themselves in a way which minimized the impact from sun angle.

Multiple observer side-by-side readings were performed at each of the different areas of observation. Table 3-2 presents pushing emission data from three observers performing simultaneous readings of the conventional pushing operation. These readings were made from the cokeside yard on the north side of the battery. Table 3-3 presents similar data from observation of the KIDC system during the push and travel operation. Tables 3-4 and 3-5 present multiple observer data from the pushside and topside of the batteries respectively. These readings were obtained during the conventional pushing operation. Tables 3-6 and 3-7 present multiple observer data for the conventional and KIDC discharge and handling emissions respectively. Table 3-8 presents multiple observer data of door observations. All of this data shows good agreement between observers.

3.3.2 Quality Assurance of Quench Water Analysis

A report of the results of spiked samples and multiple runs on the same sample is provided in the Monthly Progress Reports in Appendix L. This report shows good accuracy and precision of the analytical methods utilized to determine the constituents in these waters. Spikes were not run for total dissolved solids (TDS), total suspended solids (TSS), or oil/grease since appropriate standards are generally unavailable for the spike procedure.

Except as noted in the two following paragraphs, sampling was performed in accordance with the procedures set forth in the original sampling and testing plan dated January 10, 1991 and revisions to that plan dated March 28, 1991. Sample preparation was performed according to the methods described in EPA publication SW 846.

TABLE 3-2

CONVENTIONAL PUSHING EMISSION OBSERVATION QUALITY ASSURANCE DATA
11/29/91 - Shenango Control Car

OPACITY

OVEN NO.	OBSERVER 1	OBSERVER 2	OBSERVER 3	AVERAGE
	Max. Opacity During Push %	Max. Opacity During Travel %		
1151	85/50	80/45	75/45	80.0/46.7
1135	100/65	100/60	100/65	100/63.3
1153	50/35	50/30	55/30	51.7/31.7
1222	85/100	85/100	80/100	83.3/100
1232	35/0	30/0	30/0	31.7/0.0
AVERAGE	71.0/50.0	69.0/47.0	68.0/48.0	69.3/48.3

CUMULATIVE TIME OF EMISSIONS

OVEN NO.	OBSERVER 1	OBSERVER 2	OBSERVER 3	AVERAGE
	Seconds During Push	Seconds During Travel		
1151	107/105	107/105	105/107	106.3/105.7
1135	60/90	65/85	67/88	64.0/87.7
1153	59/35	60/30	71/48	63.3/37.7
1222	103/52	103/52	89/52	98.3/52.0
1232	41/0	41/0	43/0	41.7/0
AVERAGE	74.0/56.4	75.2/54.4	75.0/59.0	74.7/56.6

TABLE 3-3

KIDC PUSHING EMISSION OBSERVATION QUALITY ASSURANCE DATA
11/25/91

OPACITY

OVEN NO.	OBSERVER 1	OBSERVER 2	OBSERVER 3	AVERAGE
	Max. Stack Opacity Before Ignition	Max. Stack Opacity After Ignition	Max. Opacity Box/Jamb Interface	
1148	25/5/25	20/10/25	25/5/20	23.3/6.7/23.3
1151*	40/-/-	40/-/-	40/-/-	40/--/--
1153	20/10/10	15/10/10	10/10/15	15/10/11.7
1149	15/5/5	10/10/10	15/5/10	13.3/6.7/8.3
1172	20/10/10	15/15/10	15/10/10	16.7/11.7/10
AVERAGE	24/7.5/12.5	20/11.2/13.8	21/7.5/13.8	21.7/8.8/13.3

CUMULATIVE TIME OF EMISSIONS

OVEN NO.	OBSERVER 1	OBSERVER 2	OBSERVER 3	AVERAGE
	Seconds During Push	Seconds During Travel		
1148	60/40	66/43	67/40	64.3/41
1151	71/203	75/200	74/200	73.3/201
1153	107/85	110/85	109/83	108.7/84.3
1149	108/149	79/152	90/150	92.3/150.3
1172	91/165	83/175	90/170	88/170
AVERAGE	87.4/128.4	82.6/131	86/128.6	85.3/129.33

* Note: On push 1151, no ignition of the stack occurred and steam interference prevented readings at the box/jamb interface.

TABLE 3-4

PUSHSIDE PUSHING EMISSION QUALITY ASSURANCE DATA
CONVENTIONAL PUSHING EMISSION CONTROL - 7/29/91

Cum. Time of Emissions | Max. Opacity %

OVEN NO.	OBSERVER 1	OBSERVER 2	OBSERVER 3	AVERAGE
1242	20/20	20/25	20/25	20.0/23.3
1262	24/65	20/55	20/55	21.3/58.3
1272	124/30	122/30	122/30	122.7/30.0
1168	37/40	40/45	40/45	39.0/43.3
1214	105/60	110/50	110/50	108.3/53.3
AVERAGE	62.0/43.0	62.4/41.0	62.4/41.0	62.3/41.7

TABLE 3-5

TOPSIDE PUSHING EMISSION QUALITY ASSURANCE DATA
CONVENTIONAL PUSHING EMISSION CONTROL - 7/31/91

Cum. Time of Emissions | Max. Opacity %

OVEN NO.	OBSERVER 1	OBSERVER 2	OBSERVER 3	AVERAGE
1222	50/95	52/90	52/90	51.3/91.7
1232	35/15	46/15	45/15	42.0/15.0
1242	42/15	20/45	40/20	34.0/26.7
1262	27/15	22/15	25/15	24.7/15.0
1272	58/15	55/20	58/15	57.0/16.7
AVERAGE	42.4/31.0	39.0/37.0	44.0/31.0	41.8/33.0

TABLE 3-6

DISCHARGE AND HANDLING EMISSION QUALITY ASSURANCE DATA
CONVENTIONAL PUSHING EMISSION CONTROL - 7/29/91

	Cum. Time of Emissions	Max. Opacity %		
TIME	OBSERVER 1	OBSERVER 2	OBSERVER 3	AVERAGE
11:54am	10/8	10/10	7/10	9.0/9.3
12:04	10/5	10/5	8/5	9.3/5.0
12:32	0/0	0/0	0/0	0.0/0.0
12:50	0/0	0/0	0/0	0.0/0.0
13:09	22/5	22/5	11/15	18.3/8.3
AVERAGE	8.4/3.6	8.4/4.0	5.2/6.0	7.3/4.5

TABLE 3-7

DISCHARGE AND HANDLING EMISSION QUALITY ASSURANCE DATA
KIDC PUSHING EMISSION CONTROL - 11/25/91

	Cum. Time of Emissions	Max. Opacity %		
TIME	OBSERVER 1	OBSERVER 2	OBSERVER 3	AVERAGE
12:55pm	23/5	20/5	25/5	22.7/5.0
13:51	11/5	15/5	15/5	13.7/5.0
14:13	5/5	0/0	0/0	1.7/1.7
AVERAGE	13.0/5.0	11.7/3.3	13.3/3.3	12.7/3.9

TABLE 3-8

DOOR OBSERVATION QUALITY ASSURANCE DATA
AUGUST 1, 1991

NUMBER OF DOOR LEAKS OBSERVED

Door Type	Observer 1	Observer 2	Observer 3	Average
Battery No. 11				
Pushside	10	9	10	9.7
Cokeside	9	10	9	9.3
Chuck	4	3	3	3.3
Battery No. 12				
Pushside	5	5	5	5.0
Cokeside	14	15	15	14.7
Chuck	1	1	1	1.0
Total	43	43	43	43

Modifications to the original test plan occurred in a number of areas. The first was a change in the sampling location of the quench waters. The original sampling plan called for samples to be obtained of the return water to the quench pit following the quench. This was changed on August 29, 1991 to the water feed to the quench sprays during quench. In addition, a change was made to the analytical procedure for TDS analysis on October 4. This change involved running the analysis at 103-105°F vs. 180°C. These changes were made following the recommendations of J. Jeffery of Alliance Corp. (See report in Appendix E).

The number of samples obtained was reduced due to the shortened duration of the testing program. In addition, water samples from the KIDC recirculated water system were not obtained so that efforts could be focused on other testing activities. The make-up water to this system was sampled on three occasions, however, to ensure that its quality was essentially the same as that used in the conventional quenching process.

3.3.3 Quality Assurance of Coke Quality Data

All of the coke physical and proximate testing was performed in accordance with the ASTM standards provided in the original sampling and testing program. This testing was performed by the Sparrows Point Plant Laboratory. The testing of Coke Reactivity Index (CRI) and Coke Strength after Reaction (CSR) was performed by Hampton Roads Testing Lab. Sampling followed the plant key variable standard operating procedures (KVSOP) provided in the original test plan.

Additional samples were submitted to Consol Coal Company in Library, PA. The purpose of this testing was to assure that the physical and chemical test results obtained at the Sparrows Point Laboratory were repeatable and accurate when compared to another facility. The results of this testing are presented in Appendix G. Table 3-9 presents a comparison of Consol Coal Company test results with results obtained from the Sparrows Point Laboratory during the same time period. It should be noted that these are not split samples and would therefore, include variability from different samples and possibly different ovens.

Physical differences observed between the two coke populations could be partially due to differences in the material handling systems. The KIDC coke was discharged into a receive station which was designed to handle higher production levels than were experienced during the demonstration. As a result, the KIDC coke experienced a free fall of approximately 30 ft. Other differences such as the collection of breeze (i.e., - ½") by the KIDC system which are not normally collected or are washed out in the conventional pushing and quenching operation may have also affected the results of the data obtained.

TABLE 3-9

COMPARISON OF COKE ANALYSIS BY LABORATORY

CONVENTIONAL COKE

Laboratory	Moisture	Volatile Matter	Ash	S	Stability	Hardness	CRI	CSR
Sparrows Point Ave. of 2 Analyses 10/28/91	1.67	0.65	8.15	0.56	60.0	68.6	----	----
Hampton Roads Ave. of 2 Analyses 10/27 & 10/29	----	----	----	----	----	----	24.9	63.0
Consol Coal One Analysis 10/28/91	7.2	1.06	8.74	0.57	60.0	67.2	29.3	52.4
Absolute Difference	5.53	0.41	0.59	0.01	0.0	1.4	4.4	10.6

KIDC COKE

Laboratory	Moisture	Volatile Matter	Ash	S	Stability	Hardness	CRI	CSR
Sparrows Point Ave. of 2 Analyses 10/29/91	0.52	0.37	8.03	0.55	64.0	69.2	----	----
Hampton Roads Ave. of 2 Analyses 10/29/91	----	----	----	----	----	----	25.0	63.8
Consol Coal Ave. of 5 Analyses 10/28 & 10/29	0.5	1.10	8.90	0.58	63.1	68.6	25.9	62.0
Absolute Difference	0.02	0.73	0.87	0.03	0.9	0.6	0.9	1.8

3.3.4 Quality Assurance of Area Monitoring

Area Monitoring was performed to determine the concentrations of a number of air contaminants in the area around the cokeside bench of the coke ovens. This sampling was performed by industrial hygiene methods over eight hour periods.

In order to evaluate the accuracy and precision of these methods, side-by-side samples were obtained on four occasions to evaluate the variability of the results during the same time period. The results of these side-by-side tests are presented in Table 3-10 and show a high degree of variability. Samples were also obtained at some distance upwind of the coke ovens in order to determine to what extent ambient levels of the air contaminants might effect the results obtained at the coke oven operation. The results of this testing are given in Appendix D and show that ambient levels of particulates and Benzene Soluble Organics (BSO) are below the detection limits of the method used. All laboratory analyses were performed by American Medical Laboratories, Inc. Documentation on their quality assurance program is included in Appendix L.

A GC/MS identification scan was performed on three (3) samples. These samples were obtained by adsorption onto Carbotrap 300 tubes over periods of 5, 10, and 15 minutes. These samples were obtained side-by-side with the same starting time. The pump utilized for sampling was calibrated just prior to use to give a sampling rate of 175 ml/min. The GC/MS used for the analysis of the samples is calibrated daily by American Medical Laboratories, Inc. The calibration is performed using the GC/MS autotune function and a perflourotributylamine standard.

3.3.5 Quality Assurance of Kress Box Gas Sampling

A report and description of the QA/QC procedures utilized by Keystone Environmental Resources, Inc. in the performance of the Kress box sampling is included in Appendix L. Some of the procedures utilized included:

- Sorbent Traps in Series
- Field Blanks
- Surrogates Added to Extracts
- A schedule for Concurrent Calibration

TABLE 3-10

CONVENTIONAL PUSHING COKE OVEN AREA SAMPLE QA

DATE	TOTAL PARTICULATE MATTER (MG/M3)	BENZENE SOLUBLE ORGANICS (MG/M3)
5/13/91	13.90	5.44
5/13/91	8.22	5.00
Difference	5.68	0.44
7/31/91	22.35	1.10
7/31/91	16.66	0.84
Difference	5.69	0.26
8/01/91	7.64	1.28
8/01/91	3.76	1.67
Difference	3.88	0.39
9/13/91	5.68	0.90
9/13/91	8.23	1.11
Difference	2.55	0.21
Average Conc.	10.80	2.17
Ave. Difference	4.45	0.32

4.0 TEST PROGRAM RESULTS

4.1 Environmental Observations

Visible emission observations (VEO) were performed to compare the emission levels during the pushing operation of the KIDC system versus the conventional pushing systems. The VEO readings were performed in accordance with EPA Method 9 to determine the maximum opacity during the push and in accordance with EPA Method 22 to determine the total duration of visible emissions. All observers were properly trained and certified in opacity readings by Method 9. These observations were performed from three locations: the cokeside yard, the topside of the battery, and the pusherside of the battery. A summary table of the results of all VEOs performed as part of this demonstration is given in Appendix A and B. In addition to the VEOs, video tapes of conventional and KIDC pushes were recorded as described in the original test plan for EPA. Copies of these video tapes have been provided to EPA under a separate cover.

4.1.1 Cokeside Pushing Emission Observations

Summary tables presented in Appendix A show the averages and standard deviations of opacity readings performed for both the conventional pushing operation and the KIDC system. As shown, these data indicate a substantial reduction in visible emissions with the KIDC vs. the conventional controls typically utilized by Sparrows Point.

The observations from the cokeside yard were initiated at the movement of the coke mass and ended with the start of the quenching cycle or for the KIDC system with the placement of the box into the cooling rack. Emissions which may have resulted from removal of the door and before the movement of the coke mass were not observed as they were uncontrolled for both the conventional and the KIDC systems.

In many cases, the readings from the coke side yard did not conform precisely to the requirement of EPA Method 9 which calls for the sun angle to be within a 140° sector behind the observer. This was unavoidable because of the orientation of the batteries in the east to west direction with the coke side yard on the north side of the battery. The observers were aware of this problem, however, and positioned themselves in a way which minimized the impact from sun angle. This problem existed for both the conventional and KIDC observations so any bias in the readings from sun angle would be reflected in both sets of readings. Valid comparisons between the two sets of readings can therefore be made. In addition, the considerable amount of steam generated during the conventional pushing operation from the dust suppression sprays on the Shenango control car made opacity readings difficult at times. The opacity readers were aware of this problem and attempted to perform readings either after the steam dissipated or in areas where steam was not evident.

Steam interference was less of a problem with the KIDC system, but readings at the box to jamb interface were difficult at times due to steam from the non-contact cooling water cascading over the box surface.

As a result of the condition of Battery No. 11 during the demonstration many of the pushes observed would be considered "green". This means that portions of the coke were not fully carbonized and resulted in coke from certain areas of the oven (eg. the ends) being higher in volatile matter than is sometimes achieved. This may have resulted in higher opacity readings for both the conventional and KIDC pushing operations than would be expected from "non-green" pushes.

4.1.1.1 Conventional Control System

The VEO data for the conventional systems show a maximum average opacity of 69 percent overall during the push and 32.1 percent overall during travel with standard deviations of 28.7 and 24.4 respectively. The cumulative time of visible emissions for the conventional systems shows an average of 71.6 sec. during pushing and 46.9 sec. during travel to the quench tower.

4.1.1.2 KIDC System

The VEO readings of the KIDC system show emissions from the box flare stack both before and after ignition and at the box to jamb interface. The overall maximum average opacity levels for these areas were 20.4, 12.2, and 9.1 percent respectively. The standard deviation of these emission levels are 10.6, 6.9, and 5.9 percent respectively. The cumulative time of emissions indicates an average of 72.1 seconds during the pushing cycle and 120.6 seconds during the travel cycle. The longer cumulative time of emissions during travel for the KIDC system vs. the conventional system does not necessarily indicate an increase in the total particulate emissions for the KIDC system because of the significantly reduced magnitude of the emissions. The longer emission time is primarily due to long travel times caused by low carrier speeds during the demonstration. Significant increases in travel speed projected by Kress Corporation for future testing would reduce these emissions. Table 4-1 shows a comparison of the average VEO results for the conventional and KIDC pushing emission control systems. A Student T-test comparison of the maximum opacity during the push for the conventional system vs. the maximum opacity from the KIDC flare stack before ignition shows that emission levels from the KIDC system are statistically less. The results of this T-test analysis can be found in Appendix A.

After ignition of the flare stack and during travel to the coke receiver station, there are visible emissions from the flare stack on the KIDC box. These emissions averaged 12.2%. While these emissions are not directly comparable, they are substantially less than the average maximum opacity of travel emissions from the conventional systems of 32.1%. Student T-test results provided in Appendix A show the difference between these emission levels to be statistically significant.

Burning was often noted from seals at the box door. This burning often continued for an hour or so while the box was in the cooling rack. This burning was not, however, a source of visible emissions.

4.1.1.3 Relative Mass of Pushing Emissions

The KIDC system clearly produces substantially less emissions than the conventional systems. It was not possible to quantify the total mass of the pushing emissions, but as shown on the video tapes the mass of the emissions from the KIDC system was substantially less than that of the conventional pushing emission control systems observed.

Pushing emission increases from the topside and pushside of the battery from the use of the KIDC system are minimal when compared with the large reduction in cokeside emissions. In addition, the elimination of quenching emissions from the use of the KIDC system clearly offsets any increase in emissions from discharge and handling. Overall, the KIDC system substantially reduced emissions versus the conventional controls typically used on Sparrows Point No. 11 and 12 batteries.

4.1.2 Topside Observations

The topside VEO readings concentrated on emissions which emanated from charging ports and standpipes as a result of the movement of the coke mass through the oven on pushing. The inherent sun angle problem with the cokeside readings was not a problem for the topside readings. Table 4-2 summarizes the average data for these observations.

These data show that both the conventional and the KIDC systems result in considerable visible emissions from the topside of the battery. The average maximum opacity levels for the conventional systems were 48.3% and 43.6% for the Shenango and Chemico control cars respectively. The KIDC system had an average maximum opacity level of 80.5%. These differences are statistically different when a Student T-test is applied at a 99% confidence level. The conventional reading included observations from both No. 11 and No. 12 batteries which when analyzed by battery show no statistical difference. The results of these T-test analyses can be found in Appendix B.

The cumulative time of visible emissions from the topside averaged 51.8 seconds and 54.2 seconds for the Shenango and Chemico control cars respectively. The cumulative time of visible emissions from the topside for the KIDC system averaged 73.0 seconds.

4.1.3 Pusherside Emissions

The pusherside VEO readings concentrated on emissions which emanated from the door area of the oven being pushed as the pusher ram was extended into the oven and withdrawn. These readings were performed in accordance with methods 9 and 22. Generally, no problems were noted in following these methods with regard to sun angle or steam interference. Table 4-3 shows the average results of these observations.

VEO levels in this area appear to be somewhat higher for the KIDC systems versus the conventional pushing operation. The average maximum opacities observed for the conventional systems were 53.0% and 45.1% for the Shenango and Chemico control cars respectively. The KIDC system had an average maximum opacity level of 61.9%. This shows a statistical difference between the conventional and KIDC systems when a Student T-test is applied at a 99% confidence level. The conventional readings include observations from both 11 and 12 batteries. An analysis of these readings by battery show average maximum opacity levels of 52.8% and 50.7% for No. 11 and No. 12 batteries respectively. This indicates no statistical difference between the readings on the two batteries when a T-test is applied. The results of these T-test analyses can be found in Appendix B.

TABLE 4-1

COMPARISON OF VISIBLE EMISSION OBSERVATIONS FOR PUSHING EMISSION CONTROL SYSTEMS
(Average Readings)

Operation	Shenango Car	Chemico Car	KIDC
Pushing - Ave. Max. % Opacity	69.5%	67.6%	NA
Jamb Interface	NA	NA	9.1%
Flare Stack			
Before Ignition	NA	NA	20.4%
After Ignition and Travel	NA	NA	12.2%
Travel - Ave. Max. % Opacity	33.1%	29.0%	NA
Cumulative Time of Emissions-sec.			
Pushing	74.7	61.9	72.1
Travel	46.7	47.5	120.6
Relative Quantity of Emissions (Engineering Judgement)*	Large	Large	Small

NA - Not Applicable

* Observation of video tapes will provide the reader with a better comparison of the relative magnitude of the quality of emissions released by the respective pushing emission control systems.

TABLE 4-2

COMPARISON OF TOPSIDE VISIBLE EMISSION OBSERVATIONS FOR*
PUSHING EMISSION CONTROL SYSTEMS
(Average Readings)

Operation	Shenango Car	Chemico Car	KIDC
Pushing - Ave. Max. % Opacity	48.3%	43.6%	80.5%
Cumulative Time of Emissions-sec.	51.8	54.2	73.0

TABLE 4-3

COMPARISON OF PUSHERSIDE VISIBLE EMISSION OBSERVATIONS FOR*
PUSHING EMISSION CONTROL SYSTEMS
(Average Readings)

Operation	Shenango Car	Chemico Car	KIDC
Pushing - Ave. Max. % Opacity	53.0%	45.1%	61.9%
Cumulative Time of Emissions-sec.	57.3	57.7	59.0

* Note: These emissions are small compared to conventional controlled cokeside emissions.

The average cumulative times of emissions for the conventional systems were 57.3 seconds and 57.7 seconds for the Shenango and Chemico control cars respectively. The KIDC system had an average cumulative time of emissions of 59.0 seconds. This shows no statistical difference between the conventional and KIDC systems when a Student T-test is applied at a 99% confidence level. The conventional reading included observations from both No. 11 and No. 12 batteries. An analysis of these readings by battery shows an average cumulative time of emissions of 58.2 seconds and 56.9 seconds for No. 11 and No. 12 batteries respectively. This indicates no statistical difference between the readings on the two batteries. The results of these T-test analyses can be found in Appendix B.

4.1.4 Discharge Emissions

VEO readings of the coke discharge and handling operation were recorded for both the conventional and KIDC systems. All reading were performed in accordance with EPA Methods 9 and 22. In some instances, the observers were unable to locate themselves so that the sun was in the required location at their back, and steam interference made readings of these emissions difficult at times. The observers were aware of these difficulties, however, and attempted to minimize these effects. Table 4-4 shows the average results of these observations.

The average maximum opacity of emissions for the conventional systems were 2.4% and 0.0% for October and November respectively. The KIDC system had an average maximum opacity level of 15.7% and 9.0% for October and November respectively. These readings indicate somewhat higher emission levels for the KIDC system vs. the conventional system. The overall average maximum opacity for the conventional system on discharge to the wharf was 1.6%. This compares to an overall average maximum opacity for the KIDC system of 13.1%. These differences are statistically different when a Student T-test is applied at a 99% confidence level. The results of this T-test analysis can be found in Appendix B.

The average cumulative time of emissions for the conventional systems was 4.5 seconds and 0.0 seconds for October and November respectively. The KIDC system had an average cumulative time of emissions of 66.5 seconds and 29.2 seconds for October and November respectively. These readings indicate an increase in the duration of emissions for the KIDC system vs. the conventional.

These readings indicate that the emissions levels for the discharge of coke for the conventional pushing operation were minor. For the KIDC system, however, these emissions were significant at times. Although a water curtain is used to suppress emissions from this operation, other factors such as the temperature of the coke in the box can significantly affect the performance of this system. When coke at a measured temperature of greater than 500°F is discharged into the receiving station, water sprays are triggered to cool the coke. This temperature is measured by two Ircon temperature sensors mounted after the coke receiving hopper (see Section 11.0). These sensors were calibrated by the manufacturer on October 2, 1992. A report of this calibration is included in Appendix K. This is done to protect the hopper and the transfer belts from too high a temperature. The discharge of cool coke into the receiving station could result in significantly reduced emission levels from this operation.

TABLE 4-4

COMPARISON OF VISIBLE EMISSION OBSERVATIONS FOR*
COKE DISCHARGE AND HANDLING OPERATIONS

	Conventional	KIDC
Ave. Max. % Opacity		
October	2.4%	15.7%
November	0.0%	9.0%
Cumulative Time of Emissions - sec.		
October	4.5	66.5
November	0.0	29.2

* Note: These emissions are small compared to conventional controlled cokeside emissions.

4.1.5 Door Emissions

Daily monitoring of coke oven doors emissions were conducted on battery No. 11 throughout 1991. These observations were conducted in accordance with the state of Maryland door observation procedure. This procedure is very similar to the EPA proposed Method 109. The state method differs from the EPA method in that jamb leaks are excluded from the percent leaking door calculations, and three doors (cokeside, pushside, and chuck) are counted per oven.

The original reasoning for including this type of information as part of the initial sampling and testing program for the KIDC project was to evaluate any impacts on door emissions which might have resulted from the change in operation. The changes which might have been anticipated could have resulted from a number of factors as follows:

- Jamb damage from the pressing of the KIDC box against the jamb.
- Door damage from improper spotting or handling in the extraction or replacement process.
- Improved door performance from operation of the automatic door and jamb cleaners.

The KIDC door extractor removed and cleaned a total of 139 doors during the demonstration. The KIDC jamb cleaner was not operational during the demonstration. The short duration of the testing period along with the limited number of pushes taken by the KIDC system during the demonstration prevented any reasonable conclusion from being made with respect to the impact of the KIDC system on door performance. These data have been included for Battery Nos. 11 and 12 for all of 1991 in Appendix M.

4.2 KIDC Box Gas Sampling

Sampling and analysis of the gases contained within a KIDC box was performed by Keystone Environmental Resources, Inc. on October 30, 1991. The purpose of this testing was to provide both a qualitative and quantitative analysis of the gases which are held within the KIDC box at the start and the end of the cooling cycle. Analysis for a number of volatile and semi-volatile compounds were performed including a library scan to identify the most prominent components. Three tests were performed during two cooling cycles. The sampling took place at five minutes and at two hours into the cooling cycle. A report from Keystone Environmental Resources, Inc. which details the methods and results of this testing is provided in Appendix C.

The results of these analyses show that volatile organic compound (VOC) concentrations are extremely low for the gases held within the box. The semi-volatile compounds (SVOCs) investigated included three groups: polynuclear aromatic hydrocarbons (PAHs); phenols and cresols; and phthalates. Many of the targeted PAHs were found above the detection level but at very low levels. The analysis for phenols and cresols indicated the presence of two out of the six targeted compounds. None of the targeted phthalate compounds were found above detection levels. Table 4-5 presents a list of all of the targeted compounds with an indication of those compounds found in concentrations equal to or greater than the detection level in at least one of the three tests. In addition to the analysis performed for the specific targeted compounds, identification scans were run to determine the presence of other compounds. A listing of the compounds found from these scans is presented in Table 4-6.

The coke produced on No. 11 battery during this testing although generally of good quality by industry standards for blast furnace performance would have been considered "green". This means that portions of the coke were not fully carbonized and resulted in coke from certain areas of the oven (e.g. the ends) being higher in volatile matter than is sometimes achieved. The VOC and SVOC levels found in this testing would, therefore, be higher than what would be expected from a typical push of non-green coke. In addition, the burning which occurs during the conventional pushing operation until the start of quench destructs many of these constituents as they are evolved. These results should, therefore, not be taken as an indication of VOC and SVOC emissions from a conventional pushing operation.

The KIDC system incorporates a flare which ignites emissions from the box as it receives coke from the oven and during travel to the cooling station. Once the box is placed in the cooling station, the flare stack is closed off and gases are contained within the box. The VOC and SVOC's would, therefore, not be emitted from the KIDC system at the levels measured during the testing.

TABLE 4-5

KIDC BOX SAMPLING TARGETED COMPOUNDS

Volatile Organic Compounds

Acrylonitrile - ND
* Benzene
Chloroform - ND
* 2,4-Dinitrotoluene
2,6-Dinitrotoluene - ND
* Ethyl Benzene
Isophorone - ND
Styrene - ND
Toluene - ND
* m/p-Xylene
o-Xylene - ND

Semi-Volatile Organic Compounds (Polynuclear Aromatic Hydrocarbons)

* Acenaphthene
* Acenaphthylene
* Anthracene
* Benzo(a)anthracene
* Benzo(a)pyrene
* Benzo(b)fluoranthene
* Benzo(k)fluoranthene
* Benzo(g,h,i)perylene
* Carbazole
* Chrysene
* Dibenzo(a,h)anthracene
* Fluoranthene
* Fluorene
* Indeno(1,2,3-c,d)pyrene
* Naphthalene
* Phenanthrene
* Pyrene

Semi-Volatile Organic Compounds (Phenols and Cresols)

* 2,4-Dimethylphenol
4,6-Dinitro-o-Cresol - ND
Parachlorometacresol - ND
Pentachlorophenol - ND
* Phenol
2,4,6-Trichlorophenol - ND

Semi-Volatile Organic Compounds (Phthalates)

Bis(2-ethylhexyl)phthalate - ND
Butyl Benzyl Phthalate - ND
Di-n-Butyl Phthalate - ND
Di-n-Octyl-Phthalate - ND
Diethyl Phthalate - ND
Dimethyl Phthalate - ND

* Compounds found at/or above detection levels in at least one test.

ND - Not detected

TABLE 4-6

COMPOUNDS FOUND IN IDENTIFICATION SCAN
OF KIDC BOX SAMPLES

Volatile Organic Compounds

1,1-Dibromo-2-Chloro-2-Fluoro
-Cyclopropane
Carbon Monoxide
Ethyl Benzene
m/p Xylene
2,4-Dinitrotoluene
2-(2-(Ethenyloxy)Ethonxy)-Ethanol
2,4-Imidazolidinedione
n-Methyl-1-Octanamine
Benzene
1,3-Dioxolane-2-Methanol
1,1-Oxybis(2-Ethoxy)-Ethane
Thieno(3,2-C)Pyridine

Semi-Volatile Organic Compounds
(Phenols, Cresols and Other Compounds)

Benzonitrile
Benzothiopene
Dibenzothiopene
Dimethylnaphthalene
Ethylphenol
1H-Indene
Isoquinoline
Methyldibenzofuran
Methylnaphthalene
C14H10 Substituant Methyl
C3 Substituant Phenol
Trimethylphenol
Unknown Aliphatic Hydrocarbon

Semi-Volatile Organic Compounds
(Polynuclear Aromatic Hydrocarbons
and Other Compounds)

Benothiopene
Dibenzofuran
Dimethylnaphthalene
Dimethylphenol
1H-Indene
Methylnaphthalene
Methylphenol
Phenol
Styrene
Thiopene
Unknown Aliphatic Hydrocarbon
Unknown Aromatic Hydrocarbon
Unknown Hydrocarbons

4.3 Area Monitoring

4.3.1 Samples for Total Nuisance Particulate and Benzene Soluble Organics

Area monitoring of the ambient air quality in the area of the coke oven bench of battery Nos. 11 & 12 was performed. Samples were obtained in accordance with personnel hygiene methods. The constituents sampled for were total nuisance particulate and the benzene soluble fraction of total particulate matter (BSFTPM). This constituent is also sometimes referred to as benzene soluble organics (BSO). These samples were obtained over an eight hour period in the area of the conventional coke oven door machine. This area was chosen because of its close proximity to the pushing operation. Each sample was converted to a time weighted average concentration (TWA).

Sampling of the total nuisance particulate and BSO in the area of the KIDC carrier was performed in a similar manner to samples which were obtained for the background analysis. Some modifications to the general procedure needed to be made, however, to avoid biasing results due to significant non-production periods. For this reason, sampling was performed only during production periods and not over a full eight hour period.

The results of these area monitoring studies are shown in Appendix D. It is emphasized that data from the background area monitoring tests and the KIDC area monitoring tests are not directly comparable because of the inherent differences in the sampling locations and methods. Laboratory analyses were performed by American Medical Laboratories, Inc. Documentation on their quality assurance program is included in Appendix L.

4.3.2 GC/MS Identification Scan

On October 9, 1992, three samples of gases in the area of the conventional coke oven door machine were obtained for an organics scan by GC/MS. Samples were adsorbed using a Carbotrap 300 tube over periods of 5, 10, and 15 minutes. The sampling rate was set at 175 ml/minute using the same personnel hygiene pumps used for the other area monitoring samples. The flow rate was calibrated just prior to sampling and the samples were obtained side by side with the same starting time for all three samples. The GC/MS is calibrated daily using the GC/MS autotune function and a perflourotributylamine standard. Table 4-7 indicates the compounds identified in the scans and the probability of a match. A report of analysis for this testing from American Medical Laboratories, Inc. is provided in Appendix D.

TABLE 4-7

GC/MS IDENTIFIED COMPOUNDS FROM AREA SAMPLES
COLLECTED FROM CONVENTIONAL COKE OVEN DOOR MACHINE

Compound	Probability of Match
5 Minute Sample	
Hexane	91%
Benzene	94%
2,2,3,3-Tetramethyl Butane	74%
Toluene	83%
10 Minute Sample	
Benzene	95%
Toluene	90%
Xylene	95%
Ethyl Benzene	76%
15 Minute Sample	
Methylene Chloride	90%
Hexane	78%
Benzene	94%

4.4 Quenching Emissions

One of the environmental benefits of the KIDC system is the elimination of quench tower emissions. This testing program attempted to estimate the magnitude of the current quenching emissions from the operation of No. 11 & 12 batteries at Sparrows Point. A sampling program was undertaken to determine a number of the constituents in the quench water which might be evolved in the quenching process.

4.4.1 Particulate Emissions

In general, it has been shown that one of the most reliable indicators of total particulate emissions is the amount of total dissolved solids (TDS) in the quench water. With the assistance of EPA, a consultant (J. Jeffery) from Alliance Corp. was hired to evaluate the specific design of the quench tower utilized for the 11 & 12 battery quenching operation and to assess the potential emissions from them. This report is provided in Appendix E.

Based on previous testing at other steel mills which appear to have similar physical design characteristics as Sparrows Point's 11 & 12 battery quenching operation, an equation was developed by Alliance Corp. to provide a correlation between TDS and pounds of particulate emissions per ton of coal charged. This equation is presented below:

$$E = 1.31 + 0.000144Y$$

where:

E = Particulate emissions in lbs. per ton of coal charged
Y = TDS (mg/l)

The Sparrows Point quench tower is a cylindrical brick tower approximately 100 feet tall with a diameter of 16.5 feet. Approximately, 8450 gallons of water are sprayed on 10.4 tons of coke over a 47 second period. Baffles for the control of quenching emissions are installed at the discharge of the tower. These baffles are constructed of reinforced fiberglass and are spaced between 4 to 6 inches at an angle of 45 degrees. As reported by J. Jeffery of Alliance Corp., this design is estimated to be 50 to 60% efficient in the removal of particulate emissions.

21 samples of quench and make-up waters were collected from March through November 1991. These analyses are presented in Appendix E. The high TDS levels indicated on March 19 and November 26 are believed to be the result of a cross connection of the quench water make-up line with an emergency salt water line which may have resulted in the leaking of salt water into the make-up water system. The make-up water is supplied by the plant industrial water system which originates from the treated effluent from Baltimore City's Back River municipal waste water treatment plant. This water is pumped to the Sparrows Point plant where it is chlorinated and distributed throughout the plant for use as cooling and process water.

Original sampling occurred at two points. The make-up water from a line just upstream of where the make-up water addition occurs. The initial quench water samples were obtained from the return waters after the commence of the quenching cycle as it returns to the quench water reservoir where suspended solids are removed.

At the request of J. Jeffery, the water sampling location was changed on August 29 to the water feed line just before the spray nozzles. This sampling location is believed to be the more representative of the water which actually hits the coke and should therefore provide a better estimate of quench tower emissions when used with the equation given above. TDS analysis were performed in accordance with EPA Method 160.1 except that on August 29 the procedure was modified at the request of J. Jeffery to be run at 103-105 F vs. 180 C as called for in the procedure. This change was made because prior testing work on which the equation used to estimate emissions was based used this lower temperature. The average TDS level to be used in the above equation is therefore 988 mg/l based on the average of seven (7) samples obtained from August 29 to October 31, 1991. The sample on November 26 is excluded from this average because of apparent salt water contamination of the system on this date which represents an abnormal operating condition. This yields an emission factor of 1.45 lbs per ton of coal charged. This factor is higher than that reported in AP-42 for clean water quenching with baffle controls of 0.54 lbs. per ton of coal charged. The factor developed specifically for the Sparrows Point quench tower should, however, more closely represent the actual emissions which could be offset from the use of the KIDC system. This factor would be specific to this installation and would have to be re-evaluated to be applied to other installations.

4.4.2 Quench Water TCLP Analysis

Three separate Toxicity Characteristic Leaching Procedure (TCLP) tests were performed on samples obtained of both the quench waters and the makeup waters. A report of the results of these tests performed by Bethlehem Steel's Homer Research Laboratory is presented in Appendix E. These results indicate that this water does not demonstrate the toxicity characteristics of a hazardous waste as defined by EPA. In fact, the only constituents noted above the detection level were chloroform and O, M&P Cresols. Chloroform is a contaminant found in many treated waters and is a disinfection by-product of the normal water supply disinfection chlorination process. This contaminant is one in the class of compounds known as trihalomethanes (THM).

5.0 COKE QUALITY & YIELD

A major objective of the KIDC test program was to determine the quality and yield of the coke produced by the KIDC system and to compare these results to the coke produced by the conventional wet quenched process during the same time period.

5.1 Coal Mix

The types and mix of individual coals used for the cokemaking process are the most important criteria in the production of a high quality, consistent product. Bethlehem designs an overall coal blend to have a consistent content of sulfur, volatile matter, ash, and size. Individual coals are varied by type and percent of blend to attain a coal mix that meets this criteria for proper oven operation and coke quality.

Individual coals used and the blend percentages have been evaluated to properly compare coke quality between conventionally quenched coke and that produced by the KIDC system. Baseline comparison data for the conventionally quenched coke began in January 1991.

During 1991, the individual coals comprising the Sparrows Point blend was in two distinct periods; January - March was a consistent blend, April was a transition month and May - October was another consistent period. The coal mix percentage was altered slightly in November 1991 as a result of the announced facility shutdown. The monthly blend mix percentages are shown in Appendix N.

Tables and Graphs presented in Appendix N demonstrate the blended coal mix chemistry using monthly averages of daily samples taken from conveyor belt #17 located immediately prior to oven charging.

Despite the two coal mix changes made in 1991, the coal blend chemistry remained consistent throughout the period. Coal mix bulk density and -1/8" coal size, major contributors to final coke quality, were especially well controlled throughout 1991.

Coal quality is judged consistent for the comparative analysis of KIDC and conventionally quenched coke. Furthermore, since coke sample comparisons were made only for conventional and KIDC coke produced on the same day, any slight blend irregularities occurring on a day to day basis would be negated.

5.2 Coke Quality

Table 5-1 shows a summary comparison of the physical qualities of the KIDC coke samples taken during the test and the conventional coke (K-6) produced on both 11 & 12 batteries.

TABLE 5-1

COMPARISON OF KIDC COKE WITH CONVENTIONALLY QUENCHED COKE

	% > 4"	% > 2"	% < ½"	Moisture	Stability	Hardness	BethReact	CRI	CSR	Shatter Test Coeff.
KIDC COKE										
MEAN	21.5	88.5	1.5	1.4	62.8	69.1	13.7	25.7	60.9	2.7
St. Dev.	12.2	10.4	1.6	1.1	1.4	1.3	1.9	2.0	3.5	0.5
N	86	87	87	86	85	85	86	92	92	73
CONV. COKE										
MEAN	34.6	93.2	0.8	2.5	60.4	69.2	12.9	26.6*	59.6*	2.2
St. Dev.	7.0	5.3	0.5	1.8	0.9	1.0	1.3	2.2	4.1	0.2
N	43	43	43	43	43	43	42	35	53	39
KIDC COKE DIFFERENCE	-13.10%	-4.70%	0.07%	-1.10%	2.4	-0.1	0.8	-0.9	1.3	0.5
T-test ANALYSIS										
T Value	7.7	3.4	3.7	3.5	12	0.5	2.9	2.14	1.9	8.3
CONFIDENCE	99%	99%	99%	99%	99%	NO DIFF.	99%	95%	90%	99%

* Data from September, October, November - Blast Furnace Data.

In order to provide a valid comparative analysis, KIDC coke produced on specific days is compared only to conventional coke produced on the same specific day. All of the data for each population is compared using the Student's T-test analysis for the "difference between means" method. This value determines if the mean and standard deviation values of the two populations are statistically different at a given confidence level.

By using only the sample data for coke produced on the same day for the two groups it is possible to minimize other operational factors such as coal mix, coking and pushing schedules that could also affect coke quality.

The Student T values shown in Table 5-1 demonstrates that the difference in mean values for each physical characteristic of the two populations are statistically significant at the indicated confidence level.

The results of the comparative study are as follows:

1. KIDC coke mean values for size are smaller for all values (% > 4", % > 2", and % < 1/2") than conventional coke at a 99% confidence level.
2. KIDC coke contains 1.4% moisture compared to 2.5% moisture for the conventionally quenched coke produced at Battery Nos. 11 & 12. This is a 1.1% reduction in moisture (about a 50% reduction in moisture). It should be noted that the 2.5% moisture content of the conventionally quenched coke at Sparrows Point is lower than general industry averages which typically contain 3 to 8% moisture. Thus, KIDC coke would contain substantially less moisture than typical wet quenched coke.
3. The stability of the KIDC processed coke averaged 62.8 compared to 60.4 for the conventionally processed coke. This is an increase of 2.5 points or 4%.
4. There is no statistical difference in the hardness of the coke between the two populations. KIDC coke averaged 69.1 and conventional coke averaged 69.2.
5. KIDC coke, in the Bethlehem reactivity test, shows significantly higher values than conventional coke at a 99% confidence level.
6. Coke reactivity index (CRI) and Coke strength after reaction (CSR) are statistically different for the populations but only at 95% and 90% confidence levels respectively. In these tests, the lower the value of CRI, the better. For CSR, the higher the value, the better. The KIDC coke shows a lower value for CRI and a higher value for CSR than the conventional coke.
7. KIDC coke is more resistant than conventional coke to degradation due to material handling as measured by the Drop-Shatter test.

The physical differences observed in the two coke populations does warrant some comment based on a specific difference in the coke handling systems of the KIDC coke and the conventional coke. During the design stage of the KIDC system, a coke receiver station was built to accommodate the discharge of coke from the cooling boxes when high production periods were reached. The coke was to discharge into the receiver, falling onto a large reservoir of previously pushed coke. During the trial, high production periods were not realized thus causing the KIDC discharged coke to free fall approximately 30 feet without a cushion, into wear tile lined receiver. The conventional coke, in contrast, was <u>not</u> dropped any appreciable distance when it was loaded onto the wharf.

Another consideration is the inherent difference in the KIDC system which results in the collection of the coke breeze (i.e. -1/2"). On a well operated battery these breeze losses can range from 4 to 10%. Some of the areas of breeze losses with the conventional system may have been reduced by the KIDC system include:

- Losses on the cokeside bench upon door removal and pushing.
- Burn-up losses during pushing and transport.
- Particulate releases during quenching.
- Losses due to water wash to the quench sump.
- Losses during transfer to the wharf.
- Losses due to shattering of incandescent coke during water quench.

The considerable fall of the KIDC coke could explain the smaller size fraction observed in the samples. Previous work performed by the Bethlehem research lab showed that every drop coke receives, there is a distinct reduction of coke size and a resultant increase in stability. As mentioned, this mechanical degradation could account for a portion of the increase in stability and better results in the shatter test exhibited by the KIDC coke samples.

In addition to the summary results in Table 5-1, all of the individual data used for the analysis are presented in Appendix G.

5.2.1 Quality Assurance of Coke Data

In addition to the routine samples of the KIDC coke, samples were taken by Bethlehem research personnel and submitted to Consol Coal Company in Library, PA for testing. The purpose of this testing was to assure that the physical and chemical test results obtained at the Sparrows Point Laboratory were repeatable and accurate when compared to another facility. The results of this testing are presented in Appendix G along with the other coke data. This data shows comparable results for all coke properties tested with the results obtained at the Sparrows Point Laboratory and at the Hampton Roads Testing Labs where CRI and CSR testing was performed.

6.0 IMPACT OF KIDC COKE ON BLAST FURNACE OPERATIONS

Bethlehem has developed a computer model which has been used successfully to evaluate the impact of various burden changes on blast furnace operations. This model is referred to as the Primary Facilities (BALWAX) model. It is used to predict the technical and economic benefits of using the KIDC coke in the blast furnace. A description of the BALWAX model is provided in Appendix H. The inputs to the BALWAX model include the results of the KIDC coke quality analysis presented in section 5.

Some of the key baseline inputs and assumptions used in the BALWAX analysis in order to evaluate the impact on Sparrows Point's 'L' Blast Furnace are as follows:

'L' Blast Furnace Production	9000 NTHM/day
Coke Rate	860 LB/NTHM
Oxygen Enrichment	1 %
Natural Gas	70 LBS/NTHM

A report of the results of this BALWAX model study is presented in Appendix H. A summary of the effects of the quality changes noted in the report are as follows:

Moisture Effect

- The decrease in the average coke moisture from 2.5% to 1.4% or an approximate one percentage point decrease in moisture could result in a reduction of the coke rate of 7 lbs per net ton of hot metal (NTHM). This would permit an increase in the hot metal production of 73 NTHM/day if demand for the hot metal increased. It should be noted, however, that for the base case used in the model these benefits might not be realized due to a furnace top temperature high enough to drive off the additional moisture in the conventionally quenched coke. Higher coke moisture levels typically found in the industry of 3 to 8%, however, could result in a realization of these benefits.

Stability Effect

- The increase in coke stability from 60.4 to 62.8 or an increase of 2.4 points could be partially due to the excessive drop received by the KIDC coke which has a stabilizing effect. A one point increase in stability is projected to give a decrease in the coke rate of 5 lbs/NTHM and an increase in the wind volume of 1%. The increase in wind volume is the result of an increase in the porosity of the burden in the furnace which would allow more wind to pass through. The combined effect of the decreased coke rate and the increase in wind volume could give a production gain of 146 NTHM/day if demand for production warranted.

Size Effect

- The decrease in coke size would tend to decrease the production capabilities of the furnace, but since the size difference experienced in this testing program are believed to have occurred from the specific coke handling characteristics of the system rather than from the process itself, these differences are not included as an effect on blast furnace performance.

Reactivity Effect

- The conflicting results on the two reactivity tests which show an increase in the Bethlehem reactivity and a decrease in the Coke Reactivity Index (CRI) suggest that these changes may not be significant. Therefore, no change in this parameter is assumed in the model.

The overall effect of a one percentage point decrease in coke moisture and a one point increase in stability would be to reduce annual coke consumption from 1,414,000 of net tons per year to 1,394,000 net tons per year. This is a decrease in total coke consumption of 20,000 net tons per year for a constant production rate of 9,000 tons of hot metal per day.

7.0 KIDC OPERATING COSTS

The KIDC system did not operate in a sustained production mode. Thus, no reliable production cost data are available. For a fully operationally system, Bethlehem anticipated cost saving in the areas of:

- Labor;
- Improved coke quality with subsequent improvements in blast furnace performance; and
- Increased coke yield.

Anticipated savings would be site specific for each installation.

The Kress Corp. did compile a detailed set of costs, for the period October 1, 1991 to November 26, 1992, for carrier and box maintenance costs. These data are presented in Appendix I.

8.0 KIDC BOXES

The original estimate of KIDC operating costs included an assumption for the economic life of the boxes. This estimate assumed the life of each box to be about one year. Based on a production level for both Nos. 11 & 12 batteries of 132 pushes per day with 20 boxes, each box would have had to last approximately 2300 pushes. An attempt was made to verify this estimate by collecting box thickness data both before and after the demonstration. However, because of the small number of pushes on each box and the unreliability of the data obtained, it is not possible to make reliable estimates of erosion/corrosion effects on the box metal thickness.

8.1 Erosion/Corrosion of Steel Plates

KIDC box wear data was obtained with the use of an ultrasonic thickness gauge. Surface preparation consisted of scraping with a putty knife and/or a wire brush. A glycerin gel "couplant" supplied with the gauge was used to obtain reliable readings. In some cases, the surface pitting on the exterior required extensive surface preparation with the scrapers to get a reading. In order to minimize any bias to the data, no grinder or emery cloth was used to prepare the surface.

Initial readings were obtained on box Nos. 8 & 9 before any pushes had been accepted by these boxes. The intent of obtaining this information was to get initial readings to compare with readings after the boxes had been in service for an extended period of time. Boxes 8 and 9, however, did not receive enough pushes to reliably determine the extent of erosion and corrosion that could be expected on the boxes over an extended period of time. A summary Table in Appendix J presents the number of pushes accepted by each box along with erosion and corrosion that was measured.

Original thickness readings were not obtained on any of the other boxes. Readings obtained at the conclusion of the demonstration in the front and middle sections of the box were compared with readings obtained at the back end of the box. Erosion and corrosion should have been minimal at the back of the box since the coke never penetrates into this region. The reliability of this data is limited, however, because of the broad range of the original mill tolerances which were reported to be 0.240 to 0.290 inches. In addition, paint thicknesses measured were in the range of 0.006 to 0.008 inches. This paint generally pealed off in the front and middle sections but remained intact at the far end of the box. These factors all contribute to the poor reliability of the data obtained.

All of the thickness readings taken are presented in Appendix J. A summary of the erosion/corrosion on each box was developed by taking the differences between the average thickness reading at the end of each box and the thickness at in the front and middle of the boxes. These readings show no correlation between the number of pushes on each box and the erosion/corrosion measured. This is illustrated graphically in Appendix J which shows the erosion and corrosion on each box vs. the number of pushes. No conclusion with respect to box life can therefore be made from this data.

8.2 Maintenance Observations

Visual observation of the boxes following the demonstration showed the external pitting to be the worst on box #3 which logged the highest number of pushes, ninety (90). Other boxes also showed pitting but to a lesser degree than box #3.

Operating experience with the boxes revealed that several boxes required exterior bracing to correct "hourglassing" in the center after a relatively few number of pushes. In addition, many of the boxes required replacement of the internal gas ductwork. These items along with the adjustment and replacement of seals at the funnel section would be routine maintenance items that could be expected. The funnel section is the open portion of the box which is aligned with the oven. This is referred to as the "front" of the box and it is the first part of the box that the coke passes through as it is pushed from the oven. Other items performed during the demonstration such as changes to the spatula design were non-routine. The spatula is a ram inside the rear of the box which is activated by an arm outside of the box during the dump cycle and is used to assist in the removal of coke by pushing against the coke mass. A picture and diagram of the KIDC carrier and box is provided in a Kress Bulletin in Appendix I. Additional items which could not be evaluated due to the shortness of the test period, but might be expected to impact the box maintenance cost are:

- Maintenance of box circulating fans
- Replacement of box bottom plates
- Periodic grit blasting and painting of box exteriors

A listing of all of the maintenance items performed on the boxes during the demonstration period which indicates items which would be considered to be routine has been provided by the Kress Corporation and is presented in Appendix I. Also presented in Appendix I is a listing of all maintenance performed on each box and the associated cost.

8.3 KIDC Water System Treatment

The KIDC cooling water system was not treated during the demonstration because of the limited operational time period anticipated. A report by Betz MetChem presented in Appendix J provides an analysis of the water during the demonstration. This report indicates that the system was running at 4.3 cycles of concentration which is higher than their recommended level of 3 cycles. The recommendations of Betz MetChem for treatment and the anticipated costs are also presented in Appendix J. The anticipated annual treatment cost for this system was $28,000.

9.0 KIDC RELIABILITY

The long term reliability of the KIDC system cannot be adequately projected from the short demonstration testing performed at Sparrows Point. Many of the maintenance items which needed to be addressed during the testing program were items which when corrected initially would not be expected to re-occur due to fundamental design corrections. Other maintenance items which might impact on the reliability of the carrier over the long term could not be evaluated in such a short time frame. A list of the maintenance items and the associated costs performed on both the carrier and the boxes during the demonstration testing is presented in Appendix I. This list also attempts to indicate which items are considered to be regular maintenance items.

10.0 KIDC CYCLE TIME

The average cycle time for the KIDC system during the two month demonstration was derived from the push times recorded by the VEO readers. These data indicate an overall average of 27.75 minutes between pushes for the two month demonstration. On a monthly basis, the cycle times were 28.58 minutes and 21.36 minutes for October and November respectively. This compares to an average of 15.15 minutes for the conventional pushing systems over the same time period. On a monthly basis, the conventional cycle time was 18.06 minutes and 10.20 minutes for October and November respectively. It should be noted that these cycle times reflect the total time between pushes. This would include delays caused by coke oven operations on occasion. In addition, these cycle times in some instances are influenced by removal of the coke oven door by Bethlehem's door machine, and the use of an empty box from the cooling rack without having to unload. The KIDC carrier never achieved operation in its fully automated mode and as a result the average cycle time observed was longer than originally anticipated. In addition, significant increases in the travel speed of the carrier projected by Kress Corporation for future testing could reduce average cycle times further.

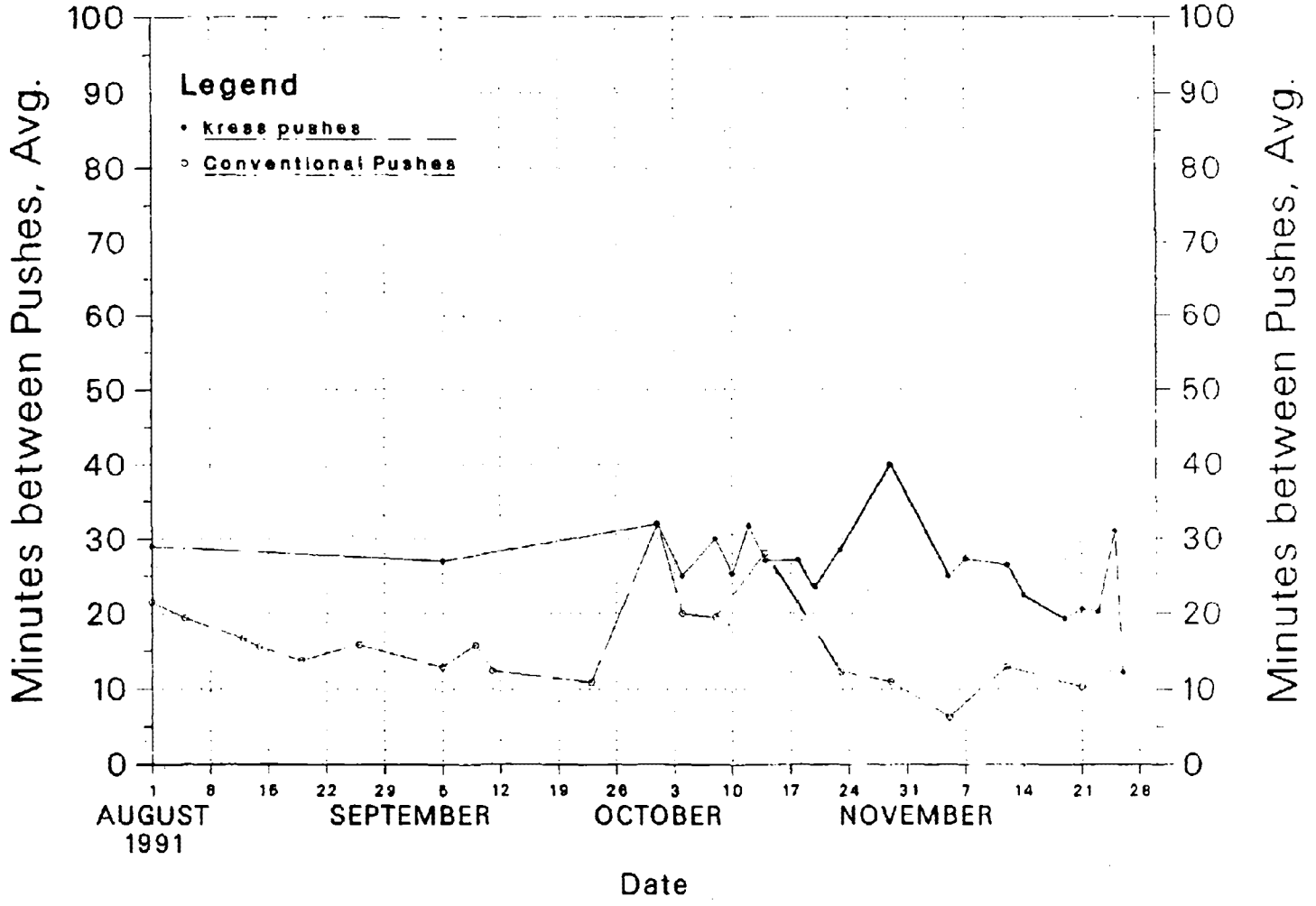
For analysis, all cycle times greater than one hour were eliminated from the data set as these times could include down time due to the scheduling of production or extended maintenance delays. Table 10.1 presents a summary of the cycle times for the KIDC system and the conventional pushing systems. These data are also presented graphically in Figure 10.2.

TABLE 10-1

CYCLE TIMES FOR THE KIDC AND CONVENTIONAL PUSHING SYSTEMS

	OCTOBER	NOVEMBER	OVERALL
KIDC			
AVERAGE (MINUTES)	28.58	21.36	24.75
STANDARD DEVIATION	7.34	6.43	7.74
CONVENTIONAL			
AVERAGE (MINUTES)	18.06	10.20	15.15
STANDARD DEVIATION	11.01	3.43	9.68

Figure 10-2
Average Time Between Push Comparison
Kress and Conventional Pushes
Sparrows Point 11 & 12 Battery
08/01/91 - 11/26/91



11.0 COOLING TIMES

A satisfactory cooling time is established by the temperature of the coke when unloaded. The temperature standard established by Bethlehem to ensure the protection of related processing equipment was 400 F. The specific process equipment of concern are the conveyor belts which are used to move the coke from the receiving coke hopper to the blast furnace. These belts are rubber which when exposed to excessive temperatures will melt resulting in premature failure. It has also been found that coke if not cooled sufficiently when left in a pile or in a hopper will reignite.

The temperature of the coke was measured by two Ircon temperature sensors which were mounted after the receiving coke hopper. The sensor noted as FS-1 indicates the temperature of the coke at the bottom of the K-6A conveyor belt which is the first point that the coke contacts after being discharged from the coke receiving hopper vibrating feeder. The sensor noted as FS-2 indicates the temperature of the coke at the tail end of the K-6A belt just before the belt water sprays. These sensors were calibrated by the manufacturer on October 2, 1991, and a report of that calibration is included in Appendix K. All available strip chart recordings showing the temperature vs. time for various pushes are provided in Appendix K. Table 11-1 shows the cooling times and the estimated peak and average temperatures from each of the charts. A plot of the overall estimated average temperatures vs. cooling time is shown in Figure 11-2. The temperature used for this plot is the average of FS-1 and FS-2 taken from Table II-1. For graphical purposes, all average temperatures which were >600 F or <250 F are presented as 600 and 250 F respectively. In addition, all data which indicated overnight cooling was assumed to have cooled for 20 hours. FS-1 temperature readings are in general higher than the readings from FS-2 because of the location at which the readings are made. This suggests that rapid cooling of the coke is occurring as it is run out onto the conveyor belt.

From this data, it appears that a cooling time of approximately 4.5 hours would be required to achieve an average temperature of 400 F. A longer time period would be required to achieve Bethlehem's internally accepted standard of 90% of the coke less than 400 F and a maximum temperature of 550 F.

The greenness of the coke experienced during the demonstration is not believed to have adversely affected the KIDC cooling times, but in the absence of comparative test data, no conclusion can be made as to the impact, if any, this might have had on the cooling operation.

Surface pyrometer temperatures of the coke were taken in addition to the temperatures obtained from the sensors mounted after the receiving hopper. These temperatures were in general considerably lower. The reasons for this difference were never fully explained but may have been partially due to the rapid surface cooling of the individual coke pieces once removed from the coke pile. These data have not been included in this report due to questions regarding the quality and representativeness of the data.

11.1 Three-Dimensional Heat Transfer Modeling

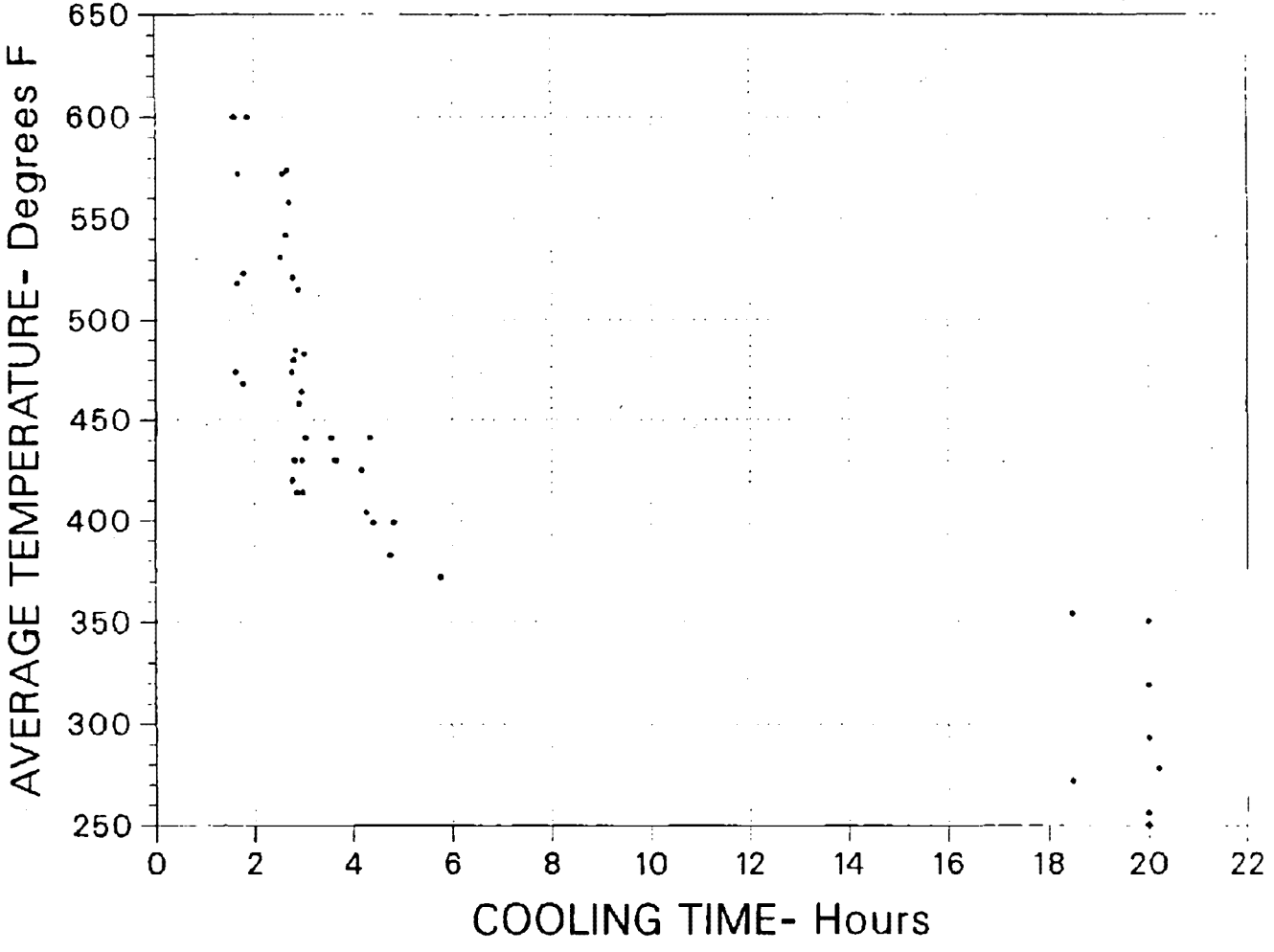
Heat transfer modeling was performed to provide an indication of the theoretical cooling times required to cool the coke mass within the KIDC box. The results of this modeling indicate that an average temperature of 400°F can be achieved after about six hours of cooling. A discussion of the methods used in this modeling and the results are provided in Appendix K.

TABLE 11-1

KIDC COOLING TIMES AND DISCHARGE TEMPERATURES

DATE	PUSH	OVEN#	BOX#	COOLING TIME	FS-1/FS-2 MAX. TEMP	FS-1/FS-2 AVE. TEMP
10/18	130	1153	5	2:38	>600/> 600 F	>600/>600
10/18	131	1149	8	2:40	>600/ 600	545/ 491
10/18	132	1152	3	2:41	>600/ >600	>600/ 545
10/18	133	1154	5	2:52	>600/ >600	>600/ 600
10/19	137	1148	3	2:47	>600/ >600	>600/ 447
10/19	138	1151	8	2:38	>600/ 600	589/ 359
10/19	139	1153	5	2:55	>600/ >600	>600/ 545
10/19	140	1149	3	3:00	>600/ 462	458/ 370
10/19	141	1152	6	2:47	>600/ 526	545/ 392
10/19	142	1154	5	20:12	324/ 303	294/ 261
10/19	143	1135	3	18:28	388/ 579	338/ 370
10/19	144	1171	6	18:29	314/ 324	272/ 272
10/20	145	1151	5	2:55	>600/ 452	578/ 338
10/20	146	1148	3	2:58	579/ 568	491/ 436
10/20	147	1153	6	2:51	>600/ 324	556/ 414
10/20	148	1149	5	2:48	>600/ 579	502/ 458
10/20	149	1152	3	2:46	579/ 590	447/ 502
11/7	228	1148	2	2:53	>600/ 600	473/ 356
11/7	229	1151	5	2:49	600/ 600	483/ 377
11/7	230	1153	3	2:47	600/ 600	462/ 377
11/7	231	1149	6	2:47	>600/ >600	568/ 473
11/7	232	1172	2	2:41	>600/ >600	590/ 558
11/7	233	1152	5	2:32	>600/ >600	547/ 515
11/19	249	1148	3	2:54	>600/ >600	536/ 494
11/19	250	1151	9	2:43	>600/ >600	568/ 547
11/19	251	1153	5	2:39	>600/ >600	600/ 483
11/19	252	1149	6	Overnight	<250/ 348	<250/ 250
11/19	253	1172	4	Overnight	425/ 600	324/ 377
11/19	254	1152	8	Overnight	260/ 359	<250/ 250
11/19	255	1135	7	Overnight	523/ 600	314/ 324
11/19	256	1154	1	Overnight	469/ 600	271/ 314
11/19	257	1171	2	Overnight	<250/ 381	<250/ 261
11/20	258	1148	3	4:27	>600/ >600	388/ 420
11/20	259	1151	9	4:25	>600/ >600	399/ 399
11/20	260	1153	5	4:21	578 600	441/ 441
11/20	262	1172	4	Overnight	<250/ <250	<250/ <250
11/21	267	1148	3	5:46	480/ 600	356/ 388
11/21	268	1151	9	4:50	502/ 523	377/ 420
11/21	269	1153	5	4:46	512/ 556	377/ 388
11/22	276	1148	3	3:39	>600/ >600	473/ 388
11/22	277	1151	9	3:41	>600/ 600	452/ 409
11/22	278	1153	5	3:34	>600/ 589	494/ 388
11/23	288	1148	7	3:01	>600/ >600	579/ 388
11/23	289	1151	3	3:03	>600/ 556	515/ 367
11/23	290	1153	9	2:59	>600/ 545	473/ 388
11/25	306	1148	7	4:11	578/ 567	441/ 409

FIGURE 11-2
KIDC COKE TEMPERATURE VS. COOLING TIME
Sparrows Point 11 Battery



12.0 CAPITAL COSTS

The system was to have been demonstrated first on No. 11 Battery. If successful, the system would have expanded to include No. 12 Battery. Both internal Bethlehem capital appropriation procedures and Bethlehem's contract with EPA recognized this two step process.

12.1 Phase I Concept Costs

The capital cost for the first phase was estimated and approved by Bethlehem's Board of Directors to be $10 million. The $10 million included a $6,685,840 firm price contract with the Kress Corporation.

Included in the $6,685,840 was:

1. 1 coke Receiver Station
2. 1 coke Container Cooling Rack
3. Maintenance Building
4. a rail guide system
5. electrical facilities
6. 1 carrier
7. KIDC Engineering
8. 10 coke containers

Additional capital costs included:

Aids to construction	$ 200,000
Site Preparation	738,600
Construction Management	258,000
Bethlehem Engineering	1,020,000
Spares	200,000
Other	905,560
	$3,314,160

Actual Phase I costs were $11 million. The higher than estimated costs resulted from: design and construction of the receiver station; reinforcement of coke bench and carrier guide rail due to increased weight of the carrier; labor premium time to meet obligated schedule dates and reinforcement of the roadway network. KIDC contract costs were those as negotiated and settled by the parties. Such costs were based upon the specific physical characteristics/constraints of Sparrows Point's Eleven Battery.

12.2 Phase II Concept Costs

Phase II of this project was never done because of the idling of the coke batteries in December 1991. Had Phase II been implemented the additional estimated costs were:

Additional Equipment/Engineering	$6,000,000
Project Management	13,000
Demonstration	370,000
Testing	69,000
Operating (14 months)	2,608,000
Total	$9,060,000

The additional equipment would have been:

- two additional carriers
- ten additional boxes
- one coke container cooling rack

This estimate was based on the original scope of the project prior to the Phase I tests. These costs would need to be reviewed and updated based on new information and any change in scope. The shortened test period; however, makes it difficult to assess the need for the additional equipment which was originally assumed.

13.0 SUGGESTIONS FOR FUTURE WORK

The limited scope and time frame of the testing at Sparrows Point prevented determination of the overall long-term viability of the KIDC system. Although the performance of the KIDC system showed promise, many key parameters could not be evaluated with confidence. There also appears to be the potential for improvement in many areas as the KIDC system evolves. For these reasons, additional testing is recommended in the following areas:

- Confirm the results of all testing performed to date.

- Test a new coke receiving station design or operate the existing receiving station in a mode which would not degrade coke quality and re-evaluate the KIDC coke quality vs. conventionally quenched coke.

- Test improved burner designs and controls to minimize emissions from the box flare stack. Even though the emissions from KIDC pushes were significantly lower than conventional pushes, further improvements could be obtained by improvement to this flare.

- Evaluate new designs to minimize further any leakage from the box to jamb interface. New jambs which may be within closer tolerances than what was experienced on Battery No. 11 during the testing may provide an easier application for the sealing and alignment of the KIDC boxes to the oven.

- Develop long-term operating cost information.

- Obtain more extensive information on box wear characteristics (both inside and outside the box).

- Additional testing on the amount of cooling time needed to adequately cool the coke. This would include an evaluation of the effect of "green" coke, gas recirculation, changes in box design and other factors which might impact cooling times. All of these factors would need to be taken into consideration in order to optimize the number of boxes and cooling rack stations for engineering and cost evaluations.

- Determination of the reliability of the total system over an extended time frame and over wide ranging seasonal conditions.

- Visible emission observations should attempt to evaluate average opacity levels rather than maximum opacity to give a better approximation of true overall emissions.

REFERENCES

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3. Chmielewski, D.F., and Serdy, J. R., "The Determination of Variability within a Commercial Coke Oven Via Repeated Excavation of a Dry Quenched Charge," AIME, Ironmaking Proceedings, Volume 46 (1989).

4. Carpenter, G. C., "KIDC - A Major Breakthrough in Emission Control", Kress Corporation, October 25, 1991.

Appendix A
Visible Emission Observation Data & Summary Tables

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Section 1

KIDC Box Flare Stack and Pushing Observations vs. Conventional Pushing Emissions - Overall & Monthly

KIDC BOX FLARE STACK AND PUSHING STATISTICS
OVERALL STATISTICS
OCTOBER - NOVEMBER, 1991

	AVERAGE VALUE	STANDARD DEVIATION	MAXIMUM VALUE	MINIMUM VALUE	NUMBER OF OBS
IGNITION DELAY, SECONDS	21.3	28.9	240	0	196
PUSH EMISSION TIME, SECONDS	72.1	39.2	443	10	232
TRAVEL EMISSION TIME, SECONDS	120.6	83.0	492	0	242
MAXIMUM OPACITY BEFORE IGN., %	20.4	10.6	55	0	245
MAXIMUM OPACITY AFTER IGN., %	12.2	6.9	40	5	217
MAXIMUM OPACITY AT BOX/JAMB CONN.,	9.1	5.9	40	0	228

KIDC BOX FLARE STACK AND PUSHING STATISTICS
MONTHLY STATISTICS

	AVERAGE VALUE	STANDARD DEVIATION	MAXIMUM VALUE	MINIMUM VALUE	NUMBER OF OBS
OCT91					
IGNITION DELAY, SECONDS	26.5	26.9	150	2	119
PUSH EMISSION TIME, SECONDS	77.8	43.9	443	10	125
TRAVEL EMISSION TIME, SECONDS	114.6	91.4	492	0	137
MAXIMUM OPACITY BEFORE IGN., %	22.3	11.5	55	0	138
MAXIMUM OPACITY AFTER IGN., %	12.7	7.2	40	5	120
MAXIMUM OPACITY AT BOX/JAMB CONN.,	8.5	5.2	25	0	125
NOV91					
IGNITION DELAY, SECONDS	13.2	30.2	240	0	77
PUSH EMISSION TIME, SECONDS	65.4	31.6	256	12	107
TRAVEL EMISSION TIME, SECONDS	128.4	70.3	360	0	105
MAXIMUM OPACITY BEFORE IGN., %	17.9	8.9	40	5	107
MAXIMUM OPACITY AFTER IGN., %	11.6	6.5	30	5	97
MAXIMUM OPACITY AT BOX/JAMB CONN.,	9.7	6.7	40	0	103

CONVENTIONAL CONTROLS
PUSHING EMISSIONS CONTROL STATISTICS
OVERALL STATISTICS
MARCH - NOVEMBER, 1991

	AVERAGE VALUE	STANDARD DEVIATION	MAXIMUM VALUE	MINIMUM VALUE	NUMBER OF OBS
PUSHING EMISSION TIME, SECONDS	71.6	52.1	737	0	628
TRAVEL EMISSION TIME, SECONDS	46.9	20.3	121	0	626
TOTAL EMISSION TIME, SECONDS	118.4	57.6	791	0	627
OPACITY DURING PUSH, MAX. %	69.0	28.7	100	0	629
OPACITY DURING TRAVEL, MAX. %	32.1	24.4	100	0	624

CONVENTIONAL CONTROLS
PUSHING EMISSIONS CONTROL STATISTICS
MONTHLY STATISTICS

	AVERAGE VALUE	STANDARD DEVIATION	MAXIMUM VALUE	MINIMUM VALUE	NUMBER OF OBS
MAR91					
PUSHING EMISSION TIME, SECONDS	81.3	63.5	440	42	38
TRAVEL EMISSION TIME, SECONDS	58.9	23.1	121	17	38
TOTAL EMISSION TIME, SECONDS	139.9	64.5	486	73	38
OPACITY DURING PUSH, MAX. %	62.2	32.4	100	0	38
OPACITY DURING TRAVEL, MAX. %	23.9	22.4	85	0	38
APR91					
PUSHING EMISSION TIME, SECONDS	53.9	20.4	121	0	79
TRAVEL EMISSION TIME, SECONDS	38.6	25.8	112	0	79
TOTAL EMISSION TIME, SECONDS	92.6	40.2	174	0	79
OPACITY DURING PUSH, MAX. %	58.9	31.6	100	0	79
OPACITY DURING TRAVEL, MAX. %	18.9	16.8	60	0	79
MAY91					
PUSHING EMISSION TIME, SECONDS	68.3	45.8	452	19	90
TRAVEL EMISSION TIME, SECONDS	43.1	17.3	82	0	90
TOTAL EMISSION TIME, SECONDS	111.4	51.6	515	41	90
OPACITY DURING PUSH, MAX. %	70.7	29.3	100	5	90
OPACITY DURING TRAVEL, MAX. %	31.1	20.3	100	0	89
JUN91					
PUSHING EMISSION TIME, SECONDS	81.6	83.8	572	41	70
TRAVEL EMISSION TIME, SECONDS	44.4	15.4	80	21	70
TOTAL EMISSION TIME, SECONDS	125.8	82.7	596	69	70
OPACITY DURING PUSH, MAX. %	65.2	27.5	100	10	70
OPACITY DURING TRAVEL, MAX. %	26.1	22.0	100	0	70
JUL91					
PUSHING EMISSION TIME, SECONDS	65.7	22.8	209	0	108
TRAVEL EMISSION TIME, SECONDS	49.8	22.2	107	0	108
TOTAL EMISSION TIME, SECONDS	115.4	34.6	249	0	108
OPACITY DURING PUSH, MAX. %	68.6	27.4	100	0	109
OPACITY DURING TRAVEL, MAX. %	35.1	27.4	100	0	107
AUG91					
PUSHING EMISSION TIME, SECONDS	70.8	27.9	226	39	80
TRAVEL EMISSION TIME, SECONDS	52.2	21.7	98	0	78
TOTAL EMISSION TIME, SECONDS	122.2	39.0	307	40	79
OPACITY DURING PUSH, MAX. %	72.5	27.5	100	10	80
OPACITY DURING TRAVEL, MAX. %	37.0	25.9	100	0	78
SEP91					
PUSHING EMISSION TIME, SECONDS	71.6	12.4	116	52	76
TRAVEL EMISSION TIME, SECONDS	50.3	15.4	86	0	76
TOTAL EMISSION TIME, SECONDS	122.0	22.3	201	52	76
OPACITY DURING PUSH, MAX. %	76.4	25.8	100	10	76
OPACITY DURING TRAVEL, MAX. %	47.8	26.1	100	0	76

CONVENTIONAL CONTROLS
PUSHING EMISSIONS CONTROL STATISTICS
MONTHLY STATISTICS

	AVERAGE VALUE	STANDARD DEVIATION	MAXIMUM VALUE	MINIMUM VALUE	NUMBER OF OBS
OCT91					
PUSHING EMISSION TIME, SECONDS	81.4	92.2	737	31	55
TRAVEL EMISSION TIME, SECONDS	44.9	17.8	101	10	55
TOTAL EMISSION TIME, SECONDS	125.8	96.8	791	41	55
OPACITY DURING PUSH, MAX. %	71.8	28.3	100	10	55
OPACITY DURING TRAVEL, MAX. %	31.7	21.5	100	5	55
NOV91					
PUSHING EMISSION TIME, SECONDS	96.7	79.5	420	38	32
TRAVEL EMISSION TIME, SECONDS	42.3	9.7	67	20	32
TOTAL EMISSION TIME, SECONDS	139.0	79.9	463	77	32
OPACITY DURING PUSH, MAX. %	76.1	25.5	100	15	32
OPACITY DURING TRAVEL, MAX. %	31.4	19.3	100	5	32

Section 2

Analysis of Conventional Controls - Chemico Car vs. Shenango Car

PUSHING EMISSIONS CONTROL STATISTICS
OVERALL STATISTICS BY EMISSION CONTROL
MARCH - NOVEMBER, 1991

CHEMICO CAR

	AVERAGE VALUE	STANDARD DEVIATION	MAXIMUM VALUE	MINIMUM VALUE	NUMBER OF OBS
PUSHING EMISSION TIME, SECONDS	61.9	19.8	209	0	153
TRAVEL EMISSION TIME, SECONDS	47.5	21.9	121	0	152
TOTAL EMISSION TIME, SECONDS	108.9	33.2	255	0	153
OPACITY DURING PUSH, MAX. %	67.6	28.6	100	0	153
OPACITY DURING TRAVEL, MAX. %	29.0	20.9	90	0	152

SHENANGO CAR

	AVERAGE VALUE	STANDARD DEVIATION	MAXIMUM VALUE	MINIMUM VALUE	NUMBER OF OBS
PUSHING EMISSION TIME, SECONDS	74.7	58.5	737	10	475
TRAVEL EMISSION TIME, SECONDS	46.7	19.8	113	0	474
TOTAL EMISSION TIME, SECONDS	121.4	63.2	791	10	474
OPACITY DURING PUSH, MAX. %	69.5	28.8	100	0	476
OPACITY DURING TRAVEL, MAX. %	33.1	25.3	100	0	472

PUSHER SIDE OVEN EMISSIONS OBSERVATIONS STATISTICS

CHEMICO PUSHES
OVERALL STATISTICS
MARCH - NOVEMBER, 1991

	AVERAGE VALUE	STANDARD DEVIATION	MAXIMUM VALUE	MINIMUM VALUE
NUMBER OF OBSERVATIONS = 58				
CUMULATIVE EMISSION TIME, SECONDS	57.7	26.1	95	5
MAXIMUM OPACITY, %	45.1	33.4	100	5

SHENANGO PUSHES
OVERALL STATISTICS
MARCH - NOVEMBER, 1991

	AVERAGE VALUE	STANDARD DEVIATION	MAXIMUM VALUE	MINIMUM VALUE
NUMBER OF OBSERVATIONS = 225				
CUMULATIVE EMISSION TIME, SECONDS	57.3	30.4	165	5
MAXIMUM OPACITY, %	53.0	32.4	100	5

COKE OVEN TOPSIDE EMISSIONS OBSERVATIONS STATISTICS

CHEMICO PUSHES
OVERALL STATISTICS

	AVERAGE VALUE	STANDARD DEVIATION	MAXIMUM VALUE	MINIMUM VALUE
NUMBER OF OBSERVATIONS= 76				
CUMULATIVE EMISSION TIME, SECONDS	54.2	36.3	210	0
MAXIMUM OPACITY, %	43.6	31.1	100	0

SHENANGO PUSHES
OVERALL STATISTICS

	AVERAGE VALUE	STANDARD DEVIATION	MAXIMUM VALUE	MINIMUM VALUE
NUMBER OF OBSERVATIONS= 236				
CUMULATIVE EMISSION TIME, SECONDS	54.0	56.0	585	0
MAXIMUM OPACITY, %	48.3	34.2	100	0

Section 3

KIDC Box Flare Stack and Pushing Observations & Conventional Pushing Emissions - Database

KRESS BOX FLARE & PUSHING OBSERVATIONS
KRESS DEMONSTRATION PROJECT - BETHLEHEM STELL CORPORATION
SPARROWS POINT, MARYLAND

10:40 Tuesday, March 31, 1992 1

OBS	DATE	COKE BATTERY	OBSERVERS INITIALS	WEATHER	WIND DIRECTION	WIND SPEED, MPH	OBSERVER LOCATION	OVEN PUSHED	KRESS BOX NO.	TIME OF PUSH	TIME OF FLARE IGNITION
1	09/10/91	11/12	GW	CLEAR	SW	10-15	NORTH	1148	2	1124	.
2	09/10/91	11/12	GW	CLEAR	SW	10-15	NORTH	1151	3	1205	.
3	10/01/91	11	GW	OVERCAST	SW	6-12	NORTH	1148	3	1119	.
4	10/01/91	11	GW	OVERCAST	SW	6-12	NORTH	1151	6	1148	.
5	10/01/91	11	GW	OVERCAST	SW	6-12	NORTH	1153	2	1223	.
6	10/01/91	11	GW	OVERCAST	SW	6-12	NORTH	1149	3	1437	.
7	10/01/91	11	GW	OVERCAST	SW	6-12	NORTH	1154	6	1612	.
8	10/02/91	11	GW	CLEAR	SW	5-10	NORTH	1149	3	1413	.
9	10/02/91	11	GW	CLEAR	SW	5-10	NORTH	1152	6	1440	.
10	10/02/91	11	GW	CLEAR	SW	5-10	NORTH	1154	2	1506	.
11	10/02/91	11	GW	CLEAR	SW	5-10	NORTH	1101	3	1712	.
12	10/02/91	11	GW	CLEAR	SW	5-10	NORTH	1147	6	1815	.
13	10/02/91	11	GW	CLEAR	SW	5-10	NORTH	1171	2	1854	.
14	10/04/91	11	RLA	CLEAR	SE	5	NORTH	1148	6	1117	.
15	10/04/91	11	RLA	CLEAR	SE	5	NORTH	1151	2	1145	.
16	10/08/91	11	GW	CLEAR	NW	6-12	NORTH	1148	2	1148	1148
17	10/08/91	11	GW	CLEAR	NW	6-12	NORTH	1151	6	1212	1213
18	10/08/91	11	GW	CLEAR	NW	6-12	NORTH	1153	3	1239	1240
19	10/08/91	11	GW	CLEAR	NW	6-12	NORTH	1149	2	1433	1433
20	10/08/91	11	GW	CLEAR	NW	6-12	NORTH	1152	6	1503	1504
21	10/08/91	11	GW	CLEAR	NW	6-12	NORTH	1154	3	1542	1542

OBS	IGNITION DELAY, SECONDS	EMISSION TIME DURING PUSH, SECONDS	EMISSION TIME DURING TRAVEL, SECONDS	MAXIMUM STACK OPACITY BEFORE IGNITION, %	MAXIMUM STACK OPACITY AFTER IGNITION, %	MAXIMUM OPACITY AT BOX/JAMB INTERFACE,	COMMENTS
1		32	315	20	5	.	
2		84	350	35	5	.	NO IGNITION
3		.	87	5	.	.	
4	.	.	168	20	.	.	
5	.	.	112	5	.	.	
6	49	.	143	30	5	.	
7	49		134	10		.	
8	.	.	326	20	5	.	
9	120	.	192	20	5	.	
10	150	.	256	25	5		
11	63	.	153	35	10		
12		.	46	35		.	NO IGNITION
13	56	.	129	45	25	.	
14			101	40	40	.	
15	.	.	103	0	15	.	
16	35	64	135	25	15	10	
17	68	172	96	40	15	5	
18	34	123	49	25	15	10	
19	24	97	183	30	20	15	
20	71	131	157	25	20	20	
21	46	57	58	20	10	5	

OBS	DATE	COKE BATTERY	OBSERVERS INITIALS	WEATHER	WIND DIRECTION	WIND SPEED, MPH	OBSERVER LOCATION	OVEN PUSHED	KRESS BOX NO	TIME OF PUSH	TIME OF FLARE IGNITION
22	10/09/91	11	GW	CLEAR	SE	5-10	NORTH	1148	2	1146	1147
23	10/09/91	11	GW	CLEAR	SE	5-10	NORTH	1151	6	1209	.
24	10/09/91	11	GW	CLEAR	SE	5-10	NORTH	1153	3	1238	1239
25	10/09/91	11	GW	CLEAR	SE	5-10	NORTH	1149	5	1414	1415
26	10/09/91	11	GW	CLEAR	SE	5-10	NORTH	1152	2	1500	1502
27	10/09/91	11	GW	CLEAR	SE	5-10	NORTH	1154	3	1529	1530
28	10/09/91	11	GW	CLEAR	SE	5-10	NORTH	1101	5	1743	1745
29	10/09/91	11	GW	CLEAR	SE	5-10	NORTH	1135	2	1802	1803
30	10/09/91	11	GW	CLEAR	SE	5-10	NORTH	1171	3	1622	1622
31	10/10/91	11	GW	CLEAR	SW	4-8	NORTH	1148	5	1157	1157
32	10/10/91	11	GW	CLEAR	SW	4-8	NORTH	1151	2	1224	1224
33	10/10/91	11	GW	CLEAR	SW	4-8	NORTH	1153	3	1252	1253
34	10/10/91	11	GW	CLEAR	SW	4-8	NORTH	1149	6	1410	1411
35	10/10/91	11	GW	CLEAR	SW	4-8	NORTH	1152	4	1430	1431
36	10/11/91	11	GW	OVERCAST	NW/NE	5-10	NORTH	1148	5	1159	1200
37	10/11/91	11	GW	OVERCAST	NW/NE	5-10	NORTH	1151	2	1240	1242
38	10/11/91	11	GW	OVERCAST	NW/NE	5-10	NORTH	1153	3	1330	
39	10/11/91	11	GW	OVERCAST	NW/NE	5-10	NORTH	1149	4	1448	1449
40	10/11/91	11	GW	OVERCAST	NW/NE	5-10	NORTH	1152	5	1529	1530
41	10/11/91	11	GW	OVERCAST	NW/NE	5-10	NORTH	1154	2	1604	1605
42	10/11/91	11	GW	OVERCAST	NW/NE	5-10	NORTH	1135	3	1751	1751

OBS	IGNITION DELAY, SECONDS	EMISSION TIME DURING PUSH, SECONDS	EMISSION TIME DURING TRAVEL, SECONDS	MAXIMUM STACK OPACITY BEFORE IGNITION, %	MAXIMUM STACK OPACITY AFTER IGNITION, %	MAXIMUM OPACITY AT BOX/JAMB INTERFACE,	COMMENTS
22	71	85	32	15	5	10	
23	.	78	159	25	.	15	NO IGNITION
24	52	66	37	20	5	5	
25	57	92	124	35	20	20	
26	75	112	137	35	20	15	
27	62	88	92	50	15	20	
28	81	126	73	45	25	10	
29	86	74	61	35	15	5	
30	42	112	86	25	20	10	PROBLEM WITH IGN
31	25	71	51	25	10	5	
32	22	65	47	15	5	5	
33	72	88	34	20	10	10	PROBLEM WITH IGN
34	63	76	171	25	15	25	
35	43	58	56	15	5	10	PROB W/BOX IN RACK
36	56	91	0	15	5	10	
37	64	113	28	15	5	5	
38		44	271	20		10	IGN LATER W/EXPLSN
39	48	37	31	15	5	5	
40	37	49	54	10	10	0	
41	40	52	25	15	5	5	
42	32	10	10	10	.	0	FLARE WENT OUT

OBS	DATE	COKE BATTERY	OBSERVERS INITIALS	WEATHER	WIND DIRECTION	WIND SPEED, MPH	OBSERVER LOCATION	OVEN PUSHED	KRESS BOX NO.	TIME OF PUSH	TIME OF FLARE IGNITION
43	10/12/91	11	GW	CLEAR	NW	5-10	NORTH	1148	5	1132	1132
44	10/12/91	11	GW	CLEAR	NW	5-10	NORTH	1151	2	1212	1212
45	10/12/91	11	GW	CLEAR	NW	5-10	NORTH	1153	3	1245	1245
46	10/12/91	11	GW	CLEAR	NW	5-10	NORTH	1149	6	1415	1415
47	10/12/91	11	GW	CLEAR	NW	5-10	NORTH	1152	4	1446	1446
48	10/12/91	11	GW	CLEAR	NW	5-10	NORTH	1154	5	1521	.
49	10/12/91	11	GW	CLEAR	NW	5-10	NORTH	1147	2	1727	1729
50	10/12/91	11	GW	CLEAR	NW	5-10	NORTH	1135	3	1748	1750
51	10/12/91	11	GW	CLEAR	NW	5-10	NORTH	1171	6	1817	1819
52	10/13/91	11	GW	CLEAR	NW	6-12	NORTH	1148	4	1123	1125
53	10/13/91	11	GW	CLEAR	NW	6-12	NORTH	1151	5	1156	1156
54	10/13/91	11	GW	CLEAR	NW	6-12	NORTH	1153	2	1232	1234
55	10/13/91	11	GW	CLEAR	NW	6-12	NORTH	1149	3	1424	1426
56	10/13/91	11	GW	CLEAR	NW	6-12	NORTH	1152	6	1446	1448
57	10/13/91	11	GW	CLEAR	NW	6-12	NORTH	1154	4	1515	1516
58	10/13/91	11	GW	CLEAR	NW	6-12	NORTH	1147	5	1716	1718
59	10/13/91	11	GW	CLEAR	NW	6-12	NORTH	1135	2	1741	1742
60	10/13/91	11	GW	CLEAR	NW	6-12	NORTH	1171	3	1810	1810
61	10/14/91	11	GW	CLEAR	SE		NORTH	1148	6	1131	.
62	10/14/91	11	GW	CLEAR	SE		NORTH	1151	4	1203	1205
63	10/14/91	11	GW	CLEAR	SE		NORTH	1153	5	1246	1247

OBS	IGNITION DELAY, SECONDS	EMISSION TIME DURING PUSH, SECONDS	EMISSION TIME DURING TRAVEL, SECONDS	MAXIMUM STACK OPACITY BEFORE IGNITION, %	MAXIMUM STACK OPACITY AFTER IGNITION, %	MAXIMUM OPACITY AT BOX/JAMB INTERFACE,	COMMENTS
43	39	45	33	15	10	5	
44	10	62	41	10	10	10	
45	53	65	27	10	5	5	
46	32	72	53	10	15	5	
47	43	53	36	10	10	5	
48	.	126		20	.	10	NO IGNITION
49	15	42	47	10	10	10	
50	9	38	40	25	25	5	
51	8	50	35	10	30	0	
52	12	96	32	5	5	10	
53	22	87	42	10	15	10	
54	9	46	48	10	5	10	
55	6	38	51	20	15	10	
56	11	53	27	15	5	20	
57	9	42	34	10	5	5	
58	6	56	31	20	25	10	
59	4	46	28	15	10	5	
60	7	62	36	10	5	5	
61	.	48	132	15	.	5	NO IGNITION
62	12	136	112	35	5	10	
63	8	126	87	20	15	10	

KRESS BOX FLARE & PUSHING OBSERVATIONS
KRESS DEMONSTRATION PROJECT - BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

OBS	DATE	COKE BATTERY	OBSERVERS INITIALS	WEATHER	WIND DIRECTION	WIND SPEED, MPH	OBSERVER LOCATION	OVEN PUSHED	KRESS BOX NO.	TIME OF PUSH	TIME OF FLARE IGNITION
64	10/14/91	11	GW	CLEAR	SE		NORTH	1149	2	1421	1422
65	10/14/91	11	GW	CLEAR	SE		NORTH	1152	3	1444	1444
66	10/14/91	11	GW	CLEAR	SE		NORTH	1154	7	1507	1508
67	10/14/91	11	GW	CLEAR	SE		NORTH	1147	4	1717	1718
68	10/14/91	11	GW	CLEAR	SE		NORTH	1135	5	1738	1739
69	10/14/91	11	GW	CLEAR	SE		NORTH	1171	2	1759	1800
70	10/17/91	11	GW	RAIN	NW	15 20	NORTH	1148	8	1147	1148
71	10/18/91	11	GW	CLEAR	NW	10-15	NORTH	1151	3	1203	1205
72	10/18/91	11	GW	CLEAR	NW	10-15	NORTH	1153	5	1228	1229
73	10/18/91	11	GW	CLEAR	NW	10 15	NORTH	1149	8	1420	1421
74	10/18/91	11	GW	CLEAR	NW	10-15	NORTH	1152	3	1449	1451
75	10/18/91	11	GW	CLEAR	NW	10-15	NORTH	1154	5	1512	1514
76	10/18/91	11	GW	CLEAR	NW	10 15	NORTH	1135	8	1713	1715
77	10/18/91	11	GW	CLEAR	NW	10-15	NORTH	1147	3	1752	1754
78	10/18/91	11	GW	CLEAR	NW	10-15	NORTH	1171	5	1813	1814
79	10/19/91	11	GW	CLEAR	SE	5-10	NORTH	1148	3	1129	
80	10/19/91	11	GW	CLEAR	SE	5-10	NORTH	1151	8	1200	1202
81	10/19/91	11	GW	CLEAR	SE	5 10	NORTH	1153	5	1222	1223
82	10/19/91	11	GW	CLEAR	SE	5 10	NORTH	1149	3	1425	1427
83	10/19/91	11	GW	CLEAR	SE	5 10	NORTH	1152	6	1501	1503
84	10/19/91	11	GW	CLEAR	SE	5-10	NORTH	1154	5	1523	1524

OBS	IGNITION DELAY, SECONDS	EMISSION TIME DURING PUSH, SECONDS	EMISSION TIME DURING TRAVEL, SECONDS	MAXIMUM STACK OPACITY BEFORE IGNITION, %	MAXIMUM STACK OPACITY AFTER IGNITION, %	MAXIMUM OPACITY AT BOX/LAMB INTERFACE,	COMMENTS
64	5	89	123	25	25	5	
65	10	62	148	40	30	25	
66	13	74	93	25	15	10	
67	11	65	57	20	10	25	
68	5	82	38	25	20	10	
69	14	117	44	20	15	15	
70	23	81	26	15	5	0	
71	15	38	17	5	5	5	
72	21	53	56	10	5	0	
73	9	42	61	10	5	0	
74	4	104	73	20	10	5	
75	13	46	32	15	5	10	
76	7	137	92	30	20	0	
77	11	37	26	10	5	5	
78	14	51	38	10	5	5	
79		125	492	45		10	PROBLEM W/OVN DOOR
80	112	103	52	40	5	5	
81	18	86	65	20	10	10	
82	9	49	268	35	20	5	
83	5	52	78	20	25	20	
84	13	66	76	20	15	5	

KRESS DEMONSTRATION PROJECT BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

OBS	DATE	COKE BATTERY	OBSERVERS INITIALS	WEATHER	WIND DIRECTION	WIND SPEED, MPH	OBSERVER LOCATION	OVEN PUSHED	KRESS BOX NO.	TIME OF PUSH	TIME OF FLARE IGNITION
85	10/19/91	11	GW	CLEAR	SE	5-10	NORTH	1135	3	1735	1736
86	10/19/91	11	GW	CLEAR	SE	5-10	NORTH	1171	6	1758	1800
87	10/20/91	11	GW	CLEAR	NE	6-12	NORTH	1151	5	1148	1149
88	10/20/91	11	GW	CLEAR	NE	6-12	NORTH	1148	3	1211	1212
89	10/20/91	11	GW	CLEAR	NE	6-12	NORTH	1153	6	1238	1241
90	10/20/91	11	GW	CLEAR	NE	6-12	NORTH	1149	5	1449	1454
91	10/20/91	11	GW	CLEAR	NE	6-12	NORTH	1152	3	1515	1516
92	10/20/91	11	GW	CLEAR	NE	6-12	NORTH	1154	6	1540	.
93	10/20/91	11	GW	CLEAR	NE	6-12	NORTH	1135	5	1750	1751
94	10/20/91	11	GW	CLEAR	NE	6-12	NORTH	1171	3	1809	1813
95	10/21/91	11	GW		SE	5-10	NORTH	1148	6	1143	1144
96	10/22/91	11	GW	CLEAR	SE	5-10	NORTH	1148	6	1151	1153
97	10/22/91	11	GW	CLEAR	SE	5-10	NORTH	1151	8	1220	1222
98	10/22/91	11	GW	CLEAR	SE	5-10	NORTH	1153	3	1250	1252
99	10/22/91	11	GW	CLEAR	SE	5-10	NORTH	1149	6	1501	1503
100	10/22/91	11	GW	CLEAR	SE	5-10	NORTH	1172	8	1550	1552
101	10/22/91	11	GW	CLEAR	SE	5-10	NORTH	1152	3	1626	1627
102	10/22/91	11	GW	CLEAR	SE	5-10	NORTH	1135	5	1717	1719
103	10/22/91	11	GW	CLEAR	SE	5-10	NORTH	1154	6	1739	1740
104	10/22/91	11	GW	CLEAR	SE	5-10	NORTH	1171	8	1758	1800
105	10/23/91	11	GW	OVERCAST	SE	5-10		1148	5	1153	1154

OBS	IGNITION DELAY, SECONDS	EMISSION TIME DURING PUSH, SECONDS	EMISSION TIME DURING TRAVEL, SECONDS	MAXIMUM STACK OPACITY BEFORE IGNITION, %	MAXIMUM STACK OPACITY AFTER IGNITION, %	MAXIMUM OPACITY AT BOX/JAMB INTERFACE,	COMMENTS
85	10	51	97	15	10	10	
86	7	78	62	10	5	0	
87	5	67	51	5	5	5	
88	7	46	55	15	5	10	
89	38	117	46	40	5	0	
90	4	48	39	10	5	0	
91	8	56	52	10	5	5	
92	.	63	78	35	.	5	NO IGNITION
93	4	50	31	30	10	10	
94	32	114	42	30	5	5	
95	11	72	46	25	15	10	
96	11	70	164	25	10	10	
97	8	67	228	20	10	5	
98	2	85	126	20	15	10	
99	3	58	385	25	15	5	
100	7	78	147	15	20	10	
101	13	63	177	35	15	10	
102	46	75	311	50	20	10	
103	15	54	195	40	25	10	
104	.	70	88	45	.	10	NO IGNITION
105	8	53	172	20	25	10	

KRESS DEMONSTRATION PROJECT - BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

OBS	DATE	COKE BATTERY	OBSERVERS INITIALS	WEATHER	WIND DIRECTION	WIND SPEED, MPH	OBSERVER LOCATION	OVEN PUSHED	KRESS BOX NO.	TIME OF PUSH	TIME OF FLARE IGNITION
106	10/23/91	11	GW	OVERCAST	SE	5-10		1151	3	1222	1222
107	10/23/91	11	GW	OVERCAST	SE	5-10		1153	6	1258	1300
108	10/23/91	11	GW	OVERCAST	SE	5-10		1149	8	1430	1431
109	10/23/91	11	GW	OVERCAST	SE	5-10		1172	5	1459	1501
110	10/23/91	11	GW	OVERCAST	SE	5-10		1152	3	1522	1523
111	10/23/91	11	GW	CLEAR	SE	5-10	NORTH	1135	6	1717	1719
112	10/23/91	11	GW	CLEAR	SE	5-10	NORTH	1154	5	1751	1752
113	10/23/91	11	GW	CLEAR	SE	5-10	NORTH	1171	3	1812	1814
114	10/23/91	11	GW	CLEAR	SE	5-10	NORTH	1171	3	1812	1814
115	10/24/91	11	GW	HAZY/OC	SE	5-10	NORTH	1148	6	1136	.
116	10/24/91	11	GW	HAZY/OC	SE	5-10	NORTH	1151	5	1200	1202
117	10/24/91	11	GW	HAZY/OC	SE	5-10	NORTH	1153	3	1235	1236
118	10/24/91	11	GW	HAZY/OC	SE	5-10	NORTH	1149	6	1433	1435
119	10/24/91	11	GW	HAZY/OC	SE	5-10	NORTH	1172	5	1459	1501
120	10/24/91	11	GW	HAZY/OC	SE	5-10	NORTH	1152	3	1526	1530
121	10/24/91	11	GW	CLEAR	SE	5-10	NORTH	1135	6	1740	1742
122	10/24/91	11	GW	CLEAR	SE	5-10	NORTH	1154	5	1806	1806
123	10/29/91	11	GW	CLEAR	NE	8-12	NORTH	1148	3	1149	1150
124	10/29/91	11	GW	CLEAR	NE	8-12	NORTH	1151	5	1217	.
125	10/29/91	11	GW	CLEAR	NE	8-12	NORTH	1153	6	1310	.
126	10/29/91	11	GW	CLEAR	NE	8-12	NORTH	1149	2	1406	1407

OBS	IGNITION DELAY, SECONDS	EMISSION TIME DURING PUSH, SECONDS	EMISSION TIME DURING TRAVEL, SECONDS	MAXIMUM STACK OPACITY BEFORE IGNITION, %	MAXIMUM STACK OPACITY AFTER IGNITION, %	MAXIMUM OPACITY AT BOX/JAMB INTERFACE,	COMMENTS
106	16	64	246	20	10	10	
107	56	52	158	20	10	5	
108	2	78	137	45	30	10	IGN LOST 68 SECS
109	21	57	153	35	15	10	
110	5	62	209	30	20	10	
111	67	76	132	45	15	10	
112	15	55	104	40	20	5	
113	24	65	87	30	10	10	
114	24	65	87	30	10	10	
115	.	62	315	20	.	10	NO IGNITION
116	17	57	96	15	10	5	
117	23	72	164	35	15	10	
118	17	55	252	20	25	10	
119	13	83	191	55	15	10	
120	23	66	128	45	15	10	
121	27	75	197	30	20	5	
122	15	69	152	30	15	15	
123	10	126	135	20	15	15	
124	6	119	339	20	10	10	
125	.	96	287	15	.	10	NO IGNITION
126	13	132	252	20	15	10	

KRESS BOX FLARE & PUSHING OBSERVATIONS
KRESS DEMONSTRATION PROJECT - BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

OBS	DATE	COKE BATTERY	OBSERVERS INITIALS	WEATHER	WIND DIRECTION	WIND SPEED, MPH	OBSERVER LOCATION	OVEN PUSHED	KRESS BOX NO.	TIME OF PUSH	TIME OF FLARE IGNITION
127	10/29/91	11	GW	CLEAR	NE	8-12	NORTH	1152	8	1422	1423
128	10/29/91	11	GW	CLEAR	NE	8-12	NORTH	1135	3	1714	.
129	10/30/91	11	GW	CLEAR	NE	15-20	NORTH	1148	3	1128	.
130	10/30/91	11	GW	CLEAR	NE	15-20	NORTH	1151	2	1202	1203
131	10/30/91	11	GW	CLEAR	NE	15-20	NORTH	1153	8	1229	1230
132	10/30/91	11	GW	CLEAR	NE	15-20	NORTH	1149	3	1416	1417
133	10/30/91	11	GW	CLEAR	NE	15-20	NORTH	1172	5	1434	1435
134	10/30/91	11	GW	CLEAR	NE	15-20	NORTH	1152	6	1450	1451
135	10/31/91	11	GW	CLEAR	NE	15 20	NORTH	1148	2	1159	.
136	10/31/91	11	GW	CLEAR	NE	15 20	NORTH	1151	3	1227	1228
137	10/31/91	11	GW	CLEAR	NE	15-20	NORTH	1153	5	1249	1250
138	10/31/91	11	GW	CLEAR	NE	15-20	NORTH	1149	6	1415	1416
139	10/31/91	11	GW	CLEAR	NE	15 20	NORTH	1172	2	1443	1445
140	10/31/91	11	GW	CLEAR	NE	15 20	NORTH	1152	3	1504	1505
141	11/05/91	11	GW	CLEAR	NE	6-12	NORTH	1148	8	1133	1134
142	11/05/91	11	GW	CLEAR	NE	6 12	NORTH	1151	3	1155	1156
143	11/05/91	11	GW	CLEAR	NE	6 12	NORTH	1153	6	1229	.
144	11/05/91	11	GW	CLEAR	NE	6 12	NORTH	1149	8	1418	1419
145	11/05/91	11	GW	CLEAR	NE	6 12	NORTH	1172	3	1447	.
146	11/05/91	11	GW	CLEAR	NE	6-12	NORTH	1152	6	1501	.
147	11/06/91	11	GW	CLEAR	SE	6-12	NORTH	1148	5	1128	1129

OBS	IGNITION DELAY, SECONDS	EMISSION TIME DURING PUSH, SECONDS	EMISSION TIME DURING TRAVEL, SECONDS	MAXIMUM STACK OPACITY BEFORE IGNITION, %	MAXIMUM STACK OPACITY AFTER IGNITION, %	MAXIMUM OPACITY AT BOX/JAMB INTERFACE,	COMMENTS
127	4	107	412	30	20	10	
128	.	131	284	20	.	5	NO IGNITION
129	.	92	70	10	.	5	NO IGNITION
130	7	83	119	10	5	25	
131	5	54	95	10	5	5	
132	10	10	42	10	15	10	
133	2	24	32	20	10	10	
134	6	126	219	15	10	5	
135		443	114	10	.	5	NO IGNITION
136	9	88	118	15	10	5	
137	8	97	213	25	10	5	
138	12	82	217	15	10	5	
139	7	76	98	20	10	10	
140	9	111	171	25	15	5	
141	5	96	42	15	10	5	
142	9	63	54	15	15	5	
143		52	113	25		10	NO IGNITION
144	13	55	141	20	10	0	
145	117	48	176	35	.	5	IGN DURING TRAVEL
146	67	57	72	30	5	5	IGN DURING TRAVEL
147	14	98	42	15	10	5	

KRESS BOX FLARE & PUSHING OBSERVATIONS
KRESS DEMONSTRATION PROJECT - BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

OBS	DATE	COKE BATTERY	OBSERVERS INITIALS	WEATHER	WIND DIRECTION	WIND SPEED, MPH	OBSERVER LOCATION	OVEN PUSHED	KRESS BOX NO	TIME OF PUSH	TIME OF FLARE IGNITION
148	11/06/91	11	GW	CLEAR	SE	6-12	NORTH	1151	8	1155	.
149	11/06/91	11	GW	CLEAR	SE	6 12	NORTH	1153	3	1230	1231
150	11/06/91	11	GW	CLEAR	SE	6 12	NORTH	1149	2	1413	1414
151	11/06/91	11	GW	CLEAR	SE	6-12	NORTH	1172	5	1435	.
152	11/06/91	11	GW	CLEAR	SE	6-12	NORTH	1152	3	1458	1459
153	11/07/91	11	GW	OVERCAST	NE/SE	4-8	NORTH	1148	2	1147	1149
154	11/07/91	11	GW	OVERCAST	NE/SE	4 8	NORTH	1151	5	1210	1212
155	11/07/91	11	GW	OVERCAST	NE/SE	4 8	NORTH	1153	3	1241	.
156	11/07/91	11	GW	OVERCAST	NE/SE	4-8	NORTH	1149	6	1416	1417
157	11/07/91	11	GW	OVERCAST	NE/SE	4-8	NORTH	1172	2	1445	1447
158	11/07/91	11	GW	OVERCAST	NE/SE	4-8	NORTH	1152	5	1514	1515
159	11/12/91	11	REA	OVERCAST	NW	7-10	NORTH	1148	4	1139	1141
160	11/12/91	11	REA	OVERCAST	NW	7-10	NORTH	1151	8	1209	1210
161	11/12/91	11	REA	OVERCAST	NW	7-10	NORTH	1153	3	1246	1248
162	11/12/91	11	REA	OVERCAST	NW	7-10	NORTH	1149	4	1440	1441
163	11/12/91	11	REA	OVERCAST	NW	7-10	NORTH	1172	8	1500	1501
164	11/12/91	11	REA	OVERCAST	NW	7 10	NORTH	1152	3	1520	1521
165	11/13/91	11	REA	CLEAR	WEST	5-10	NORTH	1148	6	1145	1146
166	11/13/91	11	REA	CLEAR	WEST	5-10	NORTH	1151	5	1209	1211
167	11/13/91	11	REA	CLEAR	WEST	5-10	NORTH	1153	8	1239	1240
168	11/14/91	11	REA	CLEAR	WEST	5	NW	1148	2	1130	1131

OBS	IGNITION DELAY, SECONDS	EMISSION TIME DURING PUSH, SECONDS	EMISSION TIME DURING TRAVEL, SECONDS	MAXIMUM STACK OPACITY BEFORE IGNITION, %	MAXIMUM STACK OPACITY AFTER IGNITION, %	MAXIMUM OPACITY AT BOX/JAMB INTERFACE,	COMMENTS
148	.	64	156	25	.	10	NO IGNITION
149	11	52	56	15	5	0	
150	6	67	42	15	5	10	
151	15	54	135	10	5	10	
152	8	86	51	20	10	10	
153	9	119	75	20	15	5	
154	13	98	85	25	15	10	
155		130	48	20		0	NO IGNITION
156	15	127	54	15	10	5	
157	5	131	46	10	10	10	
158	4	103	.	20	15	10	
159	.	35	240	10	5	15	
160		40	250	15	5	15	
161	.	30	240	10	5	5	
162		35	360	15	5	5	
163	.	76	180	10	5	5	
164	.	35	180	5	5	5	
165		40	90	15	5	5	
166		35	70	10	5	5	
167		35	.	15	.	5	
168	.	58	106	10	5	20	

OBS	DATE	COKE BATTERY	OBSERVERS INITIALS	WEATHER	WIND DIRECTION	WIND SPEED, MPH	OBSERVER LOCATION	OVEN PUSHED	KRESS BOX NO.	TIME OF PUSH	TIME OF FLARE IGNITION
169	11/14/91	11	REA	CLEAR	WEST	5	NW	1151	6	1149	1150
170	11/14/91	11	REA	CLEAR	WEST	5	NW	1153	5	1209	1210
171	11/14/91	11	REA	CLEAR	WEST	5	NW	1149	2	1505	1509
172	11/14/91	11	REA	CLEAR	WEST	5	NW	1172	6	1531	1532
173	11/14/91	11	REA	CLEAR	WEST	5	NW	1152	5	1555	1556
174	11/19/91	11	GW	CLEAR	SE	6-10	NORTH	1148	.	.	.
175	11/19/91	11	GW	CLEAR	SE	6-10	NORTH	1151	9	1320	1322
176	11/19/91	11	GW	CLEAR	SE	6-10	NORTH	1153	5	1337	.
177	11/19/91	11	GW	CLEAR	SE	6-10	NORTH	1149	6	1402	1403
178	11/19/91	11	GW	CLEAR	SE	6-10	NORTH	1172	4	1420	1422
179	11/19/91	11	GW	CLEAR	SE	6-10	NORTH	1152	8	1436	1438
180	11/19/91	11	GW	CLEAR	SE	6-10	NORTH	1135	7	1456	1459
181	11/19/91	11	GW	CLEAR	SE	6-10	NORTH	1154	1	1515	1516
182	11/19/91	11	GW	CLEAR	SE	6-10	NORTH	1171	2	15	153
183	11/20/91	11	REA	CLEAR	SW	10-15	NORTH	1148	.	.	.
184	11/20/91	11	REA	CLEAR	SW	10-15	NORTH	1151	9	1304	1307
185	11/20/91	11	REA	CLEAR	SW	10-15	NORTH	1153	5	1320	1322
186	11/20/91	11	REA	CLEAR	SW	10-15	NORTH	1149	6	1343	1344
187	11/20/91	11	REA	CLEAR	SW	10-15	NORTH	1172	4	1403	1404
188	11/20/91	11	REA	CLEAR	SW	10-15	NORTH	1152	8	1428	1429
189	11/20/91	11	GW	CLEAR	SW	10-15	NORTH	1135	7	1502	1503

OBS	IGNITION DELAY, SECONDS	EMISSION TIME DURING PUSH, SECONDS	EMISSION TIME DURING TRAVEL, SECONDS	MAXIMUM STACK OPACITY BEFORE IGNITION, %	MAXIMUM STACK OPACITY AFTER IGNITION, %	MAXIMUM OPACITY AT BOX/JAMB INTERFACE,	COMMENTS
169	.	48	256	15	5	20	
170	.	47	145	15	5	10	
171	.	40	300	40	5	25	
172	.	37	240	30	15	15	
173	.	15	126	15	10	10	
174	.	.	.	.	.	.	PUSHED BEFORE 1300
175	7	52	135	10	5	5	
176	.	64	18	5	5	0	NO IGNITION
177	8	76	227	25	20	5	
178	19	53	58	15	10	5	
179	13	59	163	30	20	5	
180	9	17	268	20	20	5	
181	5	85	62	10	10	15	
182	.	256	69	30	15	5	
183	.	.	.	.	.	.	
184	.	25	240	20	5	20	
185	.	49	99	10	5	10	
186	.	23	107	20	15	10	
187	.	15	156	10	10	10	
188	.	29	171	10	5	5	
189	4	74	225	20	30	10	

OBS	DATE	COKE BATTERY	OBSERVERS INITIALS	WEATHER	WIND DIRECTION	WIND SPEED, MPH	OBSERVER LOCATION	OVEN PUSHED	KRESS BOX NO.	TIME OF PUSH	TIME OF FLARE IGNITION
190	11/20/91	11	GW	CLEAR	SW	10-15	NORTH	1154	1	1539	1540
191	11/20/91	11	GW	CLEAR	SW	10-15	NORTH	1171	2	1558	1600
192	11/21/91	11	GW	CLR/OCST	SE	4 8	NORTH	1148	3	1253	1254
193	11/21/91	11	GW	CLR/OCST	SE	4-8	NORTH	1151	9	1315	1316
194	11/21/91	11	GW	CLR/OCST	SE	4-8	NORTH	1153	5	1332	1333
195	11/21/91	11	GW	CLR/OCST	SE	4 8	NORTH	1149	6	1353	1354
196	11/21/91	11	GW	CLR/OCST	SE	4 8	NORTH	1172	4	1411	1412
197	11/21/91	11	GW	CLR/OCST	SE	4 8	NORTH	1152	8	1428	1429
198	11/21/91	11	GW	CLR/OCST	SE	4-8	NORTH	1135	7	1553	1554
199	11/21/91	11	GW	CLR/OCST	SE	4 8	NORTH	1154	1	1622	1623
200	11/21/91	11	GW	CLR/OCST	SE	4-8	NORTH	1171	2	1643	1644
201	11/22/91	11	GW	OC/RAIN	SOUTH	10-15	NORTH	1148	3	1255	1257
202	11/22/91	11	GW	OC/RAIN	SOUTH	10-15	NORTH	1151	9	1312	1314
203	11/22/91	11	GW	OC/RAIN	SOUTH	10-15	NORTH	1153	5	1331	1333
204	11/22/91	11	GW	OC/RAIN	SOUTH	10-15	NORTH	1149	6	1352	1353
205	11/22/91	11	GW	OC/RAIN	SOUTH	10-15	NORTH	1172	4	1414	1416
206	11/22/91	11	GW	OC/RAIN	SOUTH	10 15	NORTH	1152	8	1441	1445
207	11/22/91	11	GW	OC/RAIN	SOUTH	10 15	NORTH	1135	7	1537	1538
208	11/22/91	11	GW	OC/RAIN	SOUTH	10 15	NORTH	1154	2	1623	1623
209	11/22/91	11	GW	OC/RAIN	SOUTH	10-15	NORTH	1171	3	1641	.
210	11/23/91	11	GW	CLEAR	SE	5 10	NORTH	1148	7	1332	1333

OBS	IGNITION DELAY, SECONDS	EMISSION TIME DURING PUSH, SECONDS	EMISSION TIME DURING TRAVEL, SECONDS	MAXIMUM STACK OPACITY BEFORE IGNITION, %	MAXIMUM STACK OPACITY AFTER IGNITION, %	MAXIMUM OPACITY AT BOX/JAMB INTERFACE,	COMMENTS
190	9	76	43	10	10	5	
191	3	52	195	10	25	10	
192	3	66	139	20	10	20	
193	2	52	152	10	15	5	
194	7	60	167	5	20	10	
195	5	85	152	30	25	15	
196	0	82	146	10	15	15	
197	6	93	161	15	20	15	
198	12	82	115	25	10	20	
199	4	77	126	15	10	5	
200	5	69	108	10	20	20	
201	10	78	152	20	15	5	
202	3	86	201	20	20	10	
203	17	76	227	25	30	5	
204	5	70	193	25	30	25	
205	0	83	208	10	20	20	
206	240	68	211	30	15	10	
207	9	81	142	40	20	10	
208	5	65	151	15	20	5	
209	.	.	.			.	TOO DARK TO SEE
210	7	65	142	20	10	5	

KRESS BOX FLARE & PUSHING OBSERVATIONS 10:40 Tuesday, March 31, 1992 11
KRESS DEMONSTRATION PROJECT - BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

OBS	DATE	COKE BATTERY	OBSERVERS INITIALS	WEATHER	WIND DIRECTION	WIND SPEED, MPH	OBSERVER LOCATION	OVEN PUSHED	KRESS BOX NO.	TIME OF PUSH	TIME OF FLARE IGNITION
211	11/23/91	11	GW	CLEAR	SE	5-10	NORTH	1151	3	1356	1358
212	11/23/91	11	GW	CLEAR	SE	5-10	NORTH	1153	9	1413	1414
213	11/23/91	11	GW	CLEAR	SE	5-10	NORTH	1149	5	1431	1432
214	11/23/91	11	GW	CLEAR	SE	5-10	NORTH	1172	6	1450	1450
215	11/23/91	11	GW	CLEAR	SE	5-10	NORTH	1152	4	1515	1516
216	11/23/91	11	GW	CLEAR	SE	5-10	NORTH	1135	8	1539	1540
217	11/23/91	11	GW	CLEAR	SE	5-10	NORTH	1154	2	1558	1539
218	11/23/91	11	GW	CLEAR	SE	5-10	NORTH	1171	7	.	.
219	11/24/91	11	GW	CLEAR	NW	8-12	NORTH	1148	7	1250	1251
220	11/24/91	11	GW	CLEAR	NW	8-12	NORTH	1151	3	1315	1317
221	11/24/91	11	GW	CLEAR	NW	8-12	NORTH	1153	9	1331	1333
222	11/24/91	11	GW	CLEAR	NW	8-12	NORTH	1149	5	1352	1353
223	11/24/91	11	GW	CLEAR	NW	8-12	NORTH	1172	6	1409	1411
224	11/24/91	11	GW	CLEAR	NW	8-12	NORTH	1152	4	1429	1431
225	11/24/91	11	GW	CLEAR	NW	8-12	NORTH	1135	8	1445	1446
226	11/24/91	11	GW	CLEAR	NW	8-12	NORTH	1154	2	1507	1508
227	11/24/91	11	GW	CLEAR	NW	8-12	NORTH	1171	7	1631	.
228	11/25/91	11	SBP	CLEAR	NW	15-20	NORTH	1148	7	1304	1305
229	11/25/91	11	SBP	CLEAR	NW	15-20	NORTH	1151	3	1321	.
230	11/25/91	11	SBP	CLEAR	NW	15-20	NORTH	1153	9	1337	1339
231	11/25/91	11	SBP	CLEAR	NW	15-20	NORTH	1149	5	1359	.

OBS	IGNITION DELAY, SECONDS	EMISSION TIME DURING PUSH, SECONDS	EMISSION TIME DURING TRAVEL, SECONDS	MAXIMUM STACK OPACITY BEFORE IGNITION, %	MAXIMUM STACK OPACITY AFTER IGNITION, %	MAXIMUM OPACITY AT BOX/JAMB INTERFACE,	COMMENTS
211	15	73	134	30	15	5	
212	5	62	119	15	15	10	
213	3	58	97	15	15	5	
214	5	51	149	25	15	10	
215	2	96	136	20	15	5	
216	9	73	184	25	20	15	
217	12	48	115	15	10	5	
218	.	.	.	.	.	.	TOO DARK TO SEE
219	8	82	125	30	15	5	
220	4	58	91	15	10	5	
221	14	18	24	5	5	0	
222	9	56	123	20	20	5	
223	12	31	54	5	5	5	
224	6	12	0	10	5	5	
225	5	18	41	5	5	5	
226	9	22	33	5	5	5	
227	5	36	15	5	5	5	
228	6	60	40	25	5	25	
229	.	71	203	40	.	.	NO IGNITION
230	20	107	85	20	10	10	
231	5	108	140	15	5	5	

OBS	DATE	COKE BATTERY	OBSERVERS INITIALS	WEATHER	WIND DIRECTION	WIND SPEED, MPH	OBSERVER LOCATION	OVEN PUSHED	KRESS BOX NO.	TIME OF PUSH	TIME OF FLARE IGNITION
232	11/25/91	11	SBP	CLEAR	NW	15 20	NORTH	1172	6	1417	1418
233	11/25/91	11	GW	CLEAR	NW	10 15	NORTH	1148	7	1304	1305
234	11/25/91	11	GW	CLEAR	NW	10-15	NORTH	1151	3	1321	.
235	11/25/91	11	GW	CLEAR	NW	10-15	NORTH	1153	9	1337	1339
236	11/25/91	11	GW	CLEAR	NW	10-15	NORTH	1149	5	1359	1400
237	11/25/91	11	GW	CLEAR	NW	10-15	NORTH	1172	6	1417	1418
238	11/25/91	11	GW	CLEAR	NW	10-15	NORTH	1152	4	1448	1449
239	11/25/91	11	GW	CLEAR	NW	10 15	NORTH	1135	8	1512	1513
240	11/25/91	11	GW	CLEAR	NW	10-15	NORTH	1154	2	1539	1540
241	11/25/91	11	GW	CLEAR	NW	10-15	NORTH	1171	.	.	.
242	11/25/91	11	RJA	CLEAR	NW	10-20	NORTH	1148	7	1304	1305
243	11/25/91	11	RJA	CLEAR	NW	10-20	NORTH	1151	3	1321	.
244	11/25/91	11	RJA	CLEAR	NW	10 20	NORTH	1153	9	1337	1339
245	11/25/91	11	RJA	CLEAR	NW	10-20	NORTH	1149	5	1359	1400
246	11/25/91	11	RJA	CLEAR	NW	10-20	NORTH	1172	6	1417	1418
247	11/26/91	11	GW	CLEAR	NW	8-12	NORTH	1148	.	.	.
248	11/26/91	11	GW	CLEAR	NW	8 12	NORTH	1151	9	1302	.
249	11/26/91	11	GW	CLEAR	NW	8-12	NORTH	1153	6	1313	1314
250	11/26/91	11	GW	CLEAR	NW	8-12	NORTH	1149	4	1325	1327
251	11/26/91	11	GW	CLEAR	NW	8-12	NORTH	1172	8	1337	1338

OBS	IGNITION DELAY, SECONDS	EMISSION TIME DURING PUSH, SECONDS	EMISSION TIME DURING TRAVEL, SECONDS	MAXIMUM STACK OPACITY BEFORE IGNITION, %	MAXIMUM STACK OPACITY AFTER IGNITION, %	MAXIMUM OPACITY AT BOX/JAMB INTERFACE,	COMMENTS
232	8	91	165	20	10	10	
233	4	66	43	20	10	25	
234		75	200	40	.	.	NO IGNITION
235	23	110	85	15	10	10	
236	2	79	152	10	10	10	
237	8	83	175	15	15	10	
238	5	52	35	20	10	5	
239	0	64	75	10	10	10	EARLY IGNITION
240	14	38	21	5	5	.	
241							TOO DARK TO SEE
242	5	67	40	25	5	20	
243		74	200	40			NO IGNITION
244	22	109	83	10	10	15	
245	4	90	150	15	5	10	
246	8	90	170	15	10	10	
247	.	.	.	.			PUSHED BEFORE 1300
248		28	135	10	.	5	NO IGNITION
249	9	57	147	35	10	5	
250	2	72	129	20	20	15	
251	0	80	47	35	10	20	

KRESS BOX FLARE & PUSHING OBSERVATIONS 10:40 Tuesday, March 31, 1992 13
KRESS DEMONSTRATION PROJECT - BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

OBS	DATE	COKE BATTERY	OBSERVERS INITIALS	WEATHER	WIND DIRECTION	WIND SPEED, MPH	OBSERVER LOCATION	OVEN PUSHED	KRESS BOX NO.	TIME OF PUSH	TIME OF FLARE IGNITION
252	11/26/91	11	GW	CLEAR	NW	8-12	NORTH	1152	7	1347	1349
253	11/26/91	11	GW	CLEAR	NW	8-12	NORTH	1154	2	1400	

OBS	IGNITION DELAY, SECONDS	EMISSION TIME DURING PUSH, SECONDS	EMISSION TIME DURING TRAVEL, SECONDS	MAXIMUM STACK OPACITY BEFORE IGNITION, %	MAXIMUM STACK OPACITY AFTER IGNITION, %	MAXIMUM OPACITY AT BOX/JAMB INTERFACE,	COMMENTS
252	17	62	98	25	20	10	
253	.	67	126	10	.	40	NO IGNITION

PUSHING EMISSIONS CONTROL DATA 11/12 BATTERY 10:48 Tuesday, March 31, 1992 1
KIDC DEMONSTRATION PROJECT - BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

OBS	DATE	OBSERVERS INITIALS	WEATHER	WIND DIRECTION	WIND SPEED	OBSERVER LOCATION	EMISSION CONTROL SYSTEM	OVEN PUSHED	TIME OF PUSH	EMISSIONS DURING PUSH SECONDS	EMISSIONS DURING TRAVEL SECONDS	TOTAL EMISSION TIME SECONDS	MAXIMUM OPACITY DURING PUSH, %	MAXIMUM OPACITY DURING TRAVEL, %
1	03/19/91	GW	CLEAR	WEST	15 20	NE	SHENANGO	1167	1212	105	42	147	65	45
2	03/19/91	GW	CLEAR	WEST	15 20	NE	SHENANGO	1207	1224	102	64	166	10	10
3	03/19/91	GW	CLEAR	WEST	15-20	NE	SHENANGO	1217	1238	122	43	165	65	35
4	03/19/91	GW	CLEAR	WEST	15-20	NE	SHENANGO	1237	1255	102	61	163	85	40
5	03/19/91	GW	CLEAR	WEST	15-20	NE	SHENANGO	1247	1325	440	46	486	35	0
6	03/19/91	GW	CLEAR	WEST	15-20	NE	SHENANGO	1257	1346	65	41	106	30	5
7	03/19/91	GW	CLEAR	WEST	15 20	NE	SHENANGO	1267	1402	135	51	186	100	45
8	03/22/91	GW	OC/RAIN	NE	10-15	NE	SHENANGO	1125	1217	73	84	157	35	0
9	03/22/91	GW	OC/RAIN	NE	10-15	NE	SHENANGO	1205	1245	75	61	136	20	0
10	03/22/91	GW	OC/RAIN	NE	10-15	NE	SHENANGO	1215	1252	68	71	139	25	0
11	03/22/91	GW	OC/RAIN	NE	10 15	NE	SHENANGO	1225	1326	45	78	123	50	0
12	03/22/91	GW	OC/RAIN	NE	10-15	NE	SHENANGO	1235	1333	51	67	121	0	0
13	03/22/91	GW	OC/RAIN	NE	10-15	NE	SHENANGO	1245	1344	67	53	120	15	0
14	03/22/91	GW	OC/RAIN	NE	10 15	NE	SHENANGO	1127	1407	46	65	111	40	15
15	03/22/91	GW	OC/RAIN	NE	10-15	NE	SHENANGO	1147	1416	89	113	202	25	10
16	03/22/91	GW	OC/RAIN	NE	10-15	NE	SHENANGO	1207	1425	49	89	138	15	0
17	03/22/91	GW	OC/RAIN	NE	10-15	NE	SHENANGO	1217	1436	56	71	127	45	10
18	03/26/91	GW	OVERCAST	SE	10-15	NORTH	CHEMICO	1208	1136	61	74	135	30	10
19	03/26/91	GW	OVERCAST	SE	10-15	NORTH	CHEMICO	1248	1210	70	52	122	100	10
20	03/26/91	GW	OVERCAST	SE	10 15	NORTH	CHEMICO	1258	1224	49	53	102	85	55
21	03/26/91	GW	OVERCAST	SE	10-15	NORTH	CHEMICO	1268	1238	54	29	83	65	45
22	03/26/91	GW	OVERCAST	SE	10-15	NORTH	CHEMICO	1121	1252	76	86	162	50	20
23	03/26/91	GW	OVERCAST	SE	10-15	NORTH	CHEMICO	1131	1302	58	121	169	80	25
24	03/26/91	GW	OVERCAST	SE	10-15	NORTH	CHEMICO	1109	1315	63	65	128	55	15
25	03/26/91	GW	OVERCAST	SE	10-15	NORTH	CHEMICO	1151	1330	76	71	147	75	45
26	03/26/91	GW	OVERCAST	SE	10-15	NORTH	CHEMICO	1171	1339	71	86	157	100	85
27	03/26/91	GW	OVERCAST	SE	10-15	NORTH	CHEMICO	1101	1351	68	67	135	100	70
28	03/26/91	GW	OVERCAST	SE	10-15	NORTH	CHEMICO	1201	1402	42	48	90	100	55
29	03/27/91	GW	OVERCAST			NORTH	CHEMICO	1171	1314	57	61	118	75	25
30	03/27/91	GW	OVERCAST			NORTH	CHEMICO	1201	1324	84	58	142	100	70
31	03/27/91	GW	OVERCAST			NORTH	CHEMICO	1211	1330	72	49	121	100	20
32	03/27/91	GW	OVERCAST			NORTH	CHEMICO	1221	1345	81	45	126	100	15
33	03/27/91	GW	OVERCAST			NORTH	CHEMICO	1231	1359	43	34	77	100	25
34	03/29/91	GW	RAIN	NW		NORTH	SHENANGO	1208	1122	73	48	121	80	15
35	03/29/91	GW	RAIN	NW		NORTH	SHENANGO	1228	1134	47	26	73	35	20
36	03/29/91	GW	RAIN	NW		NORTH	SHENANGO	1238	1142	83	22	105	100	35
37	03/29/91	GW	RAIN	NW		NORTH	SHENANGO	1248	1149	91	17	108	75	20
38	03/29/91	GW	RAIN	NW		NORTH	SHENANGO	1258	1157	79	25	104	100	15
39	04/01/91	GW	OVERCAST	NW	10-15	NORTH	SHENANGO	1238	1144	48	29	77	85	60
40	04/01/91	GW	OVERCAST	NW	10-15	NORTH	SHENANGO	1248	1153	41	33	74	100	25
41	04/01/91	GW	OVERCAST	NW	10-15	NORTH	SHENANGO	1258	1215	44	31	75	75	45
42	04/01/91	GW	OVERCAST	NW	10 15	NORTH	SHENANGO	1268	1224	42	22	64	100	55
43	04/01/91	GW	OVERCAST	NW	10-15	NORTH	SHENANGO	1101	1324	62	112	174	30	15
44	04/01/91	GW	OVERCAST	NW	10-15	NORTH	SHENANGO	1121	1338	39	107	146	0	25
45	04/01/91	GW	OVERCAST	NW	10-15	NORTH	SHENANGO	1131	1354	67	78	145	45	10
46	04/01/91	GW	OVERCAST	NW	10-15	NORTH	SHENANGO	1151	1403	58	73	131	15	5
47	04/01/91	GW	OVERCAST	NW	10-15	NORTH	SHENANGO	1171	1412	59	76	135	100	25
48	04/01/91	GW	OVERCAST	NW	10-15	NORTH	SHENANGO	1201	1429	65	37	102	75	15
49	04/02/91	GW	CLEAR	NW	10 15	NORTH	CHEMICO	1228	1331	53	39	92	45	10
50	04/09/91	SBP	OVERCAST	NW	10	NE	SHENANGO	1206	1136	58	48	106	100	45
51	04/09/91	SBP	OVERCAST	NW	10	NE	SHENANGO	1216	1147	60	58	118	100	30

OBS	DATE	OBSERVERS INITIALS	WEATHER	WIND DIRECTION	WIND SPEED	OBSERVER LOCATION	EMISSION CONTROL SYSTEM	OVEN PUSHED	TIME OF PUSH	EMISSIONS DURING PUSH SECONDS	EMISSIONS DURING TRAVEL SECONDS	TOTAL EMISSION TIME SECONDS	MAXIMUM OPACITY DURING PUSH, %	MAXIMUM OPACITY DURING TRAVEL, %
52	04/09/91	SBP	OVERCAST	NW	10	NE	SHENANGO	1226	1206	85	45	130	100	10
53	04/09/91	SBP	OVERCAST	NW	10	NE	SHENANGO	1236	1220	70	55	125	100	25
54	04/09/91	SBP	OVERCAST	NW	10	NE	SHENANGO	1246	1234	65	45	110	85	10
55	04/09/91	SBP	OVERCAST	NW	10	NE	SHENANGO	1256	1241	60	40	100	35	5
56	04/09/91	SBP	OVERCAST	NW	10	NE	SHENANGO	1148	1301	70	95	165	100	40
57	04/09/91	SBP	OVERCAST	NW	10	NE	SHENANGO	1208	1311	65	60	125	30	5
58	04/09/91	SBP	OVERCAST	NW	10	NE	SHENANGO	1218	1320	45	45	90	25	0
59	04/09/91	SBP	OVERCAST	NW	10	NE	SHENANGO	1238	1340	70	45	115	100	30
60	04/10/91	SBP	CLEAR	NW	15 20	NE	SHENANGO	1241	1121	70	40	110	100	30
61	04/10/91	SBP	CLEAR	NW	15-20	NE	SHENANGO	1108	1141	65	65	130	45	5
62	04/10/91	SBP	CLEAR	NW	15 20	NE	SHENANGO	1206	1154	75	40	115	100	20
63	04/10/91	SBP	CLEAR	NW	15-20	NE	SHENANGO	1216	1209	70	70	140	75	30
64	04/10/91	SBP	CLEAR	NW	15-20	NE	SHENANGO	1226	1216	78	60	138	55	15
65	04/10/91	SBP	CLEAR	NW	15-20	NE	SHENANGO	1236	1226	45	55	100	65	25
66	04/10/91	SBP	CLEAR	NW	15-20	NE	SHENANGO	1246	1240	57	55	112	85	15
67	04/10/91	SBP	CLEAR	NW	15 20	NE	SHENANGO	1148	1257	80	68	148	25	10
68	04/10/91	SBP	CLEAR	NW	15 20	NE	SHENANGO	1168	1311	15	0	15	15	0
69	04/10/91	SBP	CLEAR	NW	15-20	NE	SHENANGO	1208	1320	10	0	10	20	0
70	04/15/91	GW	RAIN	SE	6-12	NORTH	SHENANGO	1126	1144	73	15	88	15	5
71	04/15/91	GW	RAIN	SE	6-12	NORTH	SHENANGO	1206	1204	51	0	51	30	0
72	04/15/91	GW	RAIN	SE	6-12	NORTH	SHENANGO	1216	1223	36	18	54	45	10
73	04/15/91	GW	RAIN	SE	6-12	NORTH	SHENANGO	1226	1228	44	0	44	55	0
74	04/15/91	GW	RAIN	SE	6-12	NORTH	SHENANGO	1236	1246	61	0	61	50	0
75	04/15/91	GW	RAIN	SE	6-12	NORTH	SHENANGO	1246	1259	19	0	19	20	0
76	04/15/91	GW	RAIN	SE	6-12	NORTH	SHENANGO	1256	1309	13	0	13	10	0
77	04/15/91	GW	RAIN	SE	6 12	NORTH	SHENANGO	1148	1338	20	0	20	15	0
78	04/15/91	GW	RAIN	SE	6-12	NORTH	SHENANGO	1208	1354	18	0	18	5	0
79	04/15/91	GW	RAIN	SE	6 12	NORTH	SHENANGO	1248	1403	23	0	23	15	0
80	04/16/91	GW	CLEAR	NW	15-20	NORTH	CHEMICO	1244	1125	56	35	91	65	45
81	04/16/91	GW	CLEAR	NW	15-20	NORTH	CHEMICO	1126	1141	81	18	99	35	15
82	04/16/91	GW	CLEAR	NW	15-20	NORTH	CHEMICO	1146	1204	0	0	0	0	0
83	04/16/91	GW	CLEAR	NW	15-20	NORTH	CHEMICO	1206	1212	26	33	59	40	25
84	04/16/91	GW	CLEAR	NW	15-20	NORTH	CHEMICO	1216	1229	50	31	81	75	60
85	04/16/91	GW	CLEAR	NW	15-20	NORTH	CHEMICO	1226	1244	54	63	117	95	55
86	04/16/91	GW	CLEAR	NW	15-20	NORTH	CHEMICO	1236	1300	69	37	106	85	30
87	04/16/91	GW	CLEAR	NW	15 20	NORTH	CHEMICO	1246	1313	87	28	115	55	15
88	04/16/91	GW	CLEAR	NW	15-20	NORTH	CHEMICO	1109	1332	121	46	167	15	5
89	04/24/91	GW	RAIN	SE	8-12	NORTH	CHEMICO	1206	1248	62	38	100	45	25
90	04/24/91	GW	RAIN	SE	8 12	NORTH	CHEMICO	1216	1302	71	62	133	100	20
91	04/24/91	GW	RAIN	SE	8-12	NORTH	CHEMICO	1226	1311	66	34	100	65	10
92	04/24/91	GW	RAIN	SE	8 12	NORTH	CHEMICO	1236	1324	62	41	103	75	10
93	04/24/91	GW	RAIN	SE	8-12	NORTH	CHEMICO	1246	1334	75	32	107	70	15
94	04/24/91	GW	RAIN	SE	8-12	NORTH	CHEMICO	1148	1400	57	28	85	65	10
95	04/24/91	GW	RAIN	SE	10-15	NORTH	CHEMICO	1208	1417	32	29	61	10	5
96	04/24/91	GW	RAIN	SE	10 15	NORTH	CHEMICO	1228	1426	27	0	27	25	0
97	04/24/91	GW	RAIN	SE	10-15	NORTH	CHEMICO	1238	1434	63	34	107	55	10
98	04/24/91	GW	RAIN	SE	10-15	NORTH	CHEMICO	1248	1445	58	27	85	75	10
99	04/25/91	GW	CLEAR	SE	5 10	NORTH	CHEMICO	1206	1238	66	15	81	90	5
100	04/25/91	GW	CLEAR	SE	5-10	NORTH	CHEMICO	1216	1301	54	29	83	75	15
101	04/25/91	GW	CLEAR	SE	5 10	NORTH	CHEMICO	1226	1309	72	34	106	100	25
102	04/25/91	GW	CLEAR	SE	5-10	NORTH	CHEMICO	1236	1317	81	87	168	100	45

OBS	DATE	OBSERVERS INITIALS	WEATHER	WIND DIRECTION	WIND SPEED	OBSERVER LOCATION	EMISSION CONTROL SYSTEM	OVEN PUSHED	TIME OF PUSH	EMISSIONS DURING PUSH SECONDS	EMISSIONS DURING TRAVEL SECONDS	TOTAL EMISSION TIME SECONDS	MAXIMUM OPACITY DURING PUSH, %	MAXIMUM OPACITY DURING TRAVEL, %
103	04/25/91	GW	CLEAR	SE	5-10	NORTH	CHEMICO	1246	1331	59	57	116	70	45
104	04/25/91	GW	CLEAR	SE	5 10	NORTH	CHEMICO	1148	1415	48	52	100	85	35
105	04/25/91	GW	CLEAR	SE	5 10	NORTH	CHEMICO	1208	1432	22	0	22	15	0
106	04/25/91	GW	CLEAR	SE	5-10	NORTH	CHEMICO	1238	1447	48	54	102	90	55
107	04/25/91	GW	CLEAR	SE	5-10	NORTH	CHEMICO	1248	1500	53	49	102	95	40
108	04/29/91	GW	OVERCAST	NE	5-10	NORTH	SHENANGO	1256	1309	32	27	59	30	10
109	04/29/91	GW	OVERCAST	NE	5-10	NORTH	SHENANGO	1148	1327	43	34	77	65	5
110	04/29/91	GW	OVERCAST	NE	5-10	NORTH	SHENANGO	1208	1344	40	32	72	25	0
111	04/29/91	GW	OVERCAST	NE	5-10	NORTH	SHENANGO	1238	1350	68	31	99	90	45
112	04/29/91	GW	OVERCAST	NE	5-10	NORTH	SHENANGO	1248	1400	52	36	88	60	25
113	04/29/91	GW	OVERCAST	NE	5 10	NORTH	SHENANGO	1258	1412	42	29	71	70	15
114	04/29/91	GW	OVERCAST	NE	5 10	NORTH	SHENANGO	1208	1421	54	19	73	40	20
115	04/29/91	GW	OVERCAST	NE	5 10	NORTH	SHENANGO	1101	1455	63	67	130	65	25
116	04/29/91	GW	OVERCAST	NE	5-10	NORTH	SHENANGO	1131	1510	41	53	94	90	35
117	04/29/91	GW	OVERCAST	NE	5-10	NORTH	SHENANGO	1151	1519	55	66	121	55	25
118	05/01/91	GW	CLEAR	SE	4-9	NORTH	SHENANGO	1126	1250	57	61	118	85	25
119	05/01/91	GW	CLEAR	SE	4 9	NORTH	SHENANGO	1206	1316	71	47	118	90	35
120	05/01/91	GW	CLEAR	SE	4-9	NORTH	SHENANGO	1216	1332	74	38	112	70	40
121	05/01/91	GW	CLEAR	SE	4-9	NORTH	SHENANGO	1226	1340	66	36	102	85	30
122	05/01/91	GW	CLEAR	SE	4 9	NORTH	SHENANGO	1236	1347	58	41	99	90	40
123	05/01/91	GW	CLEAR	SE	4-9	NORTH	SHENANGO	1246	1405	72	28	100	95	15
124	05/01/91	GW	CLEAR	SE	4-9	NORTH	SHENANGO	1256	1421	32	21	53	45	25
125	05/01/91	GW	CLEAR	SE	4-9	NORTH	SHENANGO	1148	1505	46	39	85	40	30
126	05/01/91	GW	CLEAR	SE	4-9	NORTH	SHENANGO	1208	1525	19	34	53	20	5
127	05/01/91	GW	CLEAR	SE	4-9	NORTH	SHENANGO	1238	1532	72	38	110	75	40
128	05/06/91	GW	OVERCAST	SW	5-10	NORTH	CHEMICO	1102	1145	73	82	155	80	40
129	05/06/91	GW	OVERCAST	SW	5-10	NORTH	CHEMICO	1152	1200	48	74	112	55	15
130	05/06/91	GW	OVERCAST	SW	5-10	NORTH	CHEMICO	1172	1215	59	76	135	100	40
131	05/06/91	GW	OVERCAST	SW	5-10	NORTH	CHEMICO	1229	1227	58	46	104	35	15
132	05/06/91	GW	OVERCAST	SW	5-10	NORTH	CHEMICO	1212	1250	45	23	68	20	5
133	05/06/91	GW	OVERCAST	SW	5-10	NORTH	CHEMICO	1222	1312	52	48	100	25	20
134	05/06/91	GW	OVERCAST	SW	5 10	NORTH	CHEMICO	1232	1319	41	0	41	25	0
135	05/06/91	GW	OVERCAST	SW	5 10	NORTH	CHEMICO	1242	1332	44	26	70	30	10
136	05/06/91	GW	OVERCAST	SW	5-10	NORTH	CHEMICO	1262	1343	61	32	93	55	40
137	05/06/91	GW	OVERCAST	SW	5-10	NORTH	CHEMICO	1272	1359	72	19	91	90	25
138	05/07/91	GW	CLEAR	SW	10-15	NORTH	SHENANGO	1152	1137	75	54	129	55	30
139	05/07/91	GW	CLEAR	SW	10 15	NORTH	SHENANGO	1172	1150	68	57	125	75	25
140	05/07/91	GW	CLEAR	SW	10 15	NORTH	SHENANGO	1212	1200	57	46	103	95	45
141	05/07/91	GW	CLEAR	SW	10-15	NORTH	SHENANGO	1222	1224	66	37	103	80	55
142	05/07/91	GW	CLEAR	SW	10-15	NORTH	SHENANGO	1232	1235	72	42	114	65	10
143	05/07/91	GW	CLEAR	SW	10-15	NORTH	SHENANGO	1242	1252	65	35	100	60	25
144	05/07/91	GW	CLEAR	SW	10 15	NORTH	SHENANGO	1262	1302	61	23	84	100	30
145	05/07/91	GW	CLEAR	SW	10-15	NORTH	SHENANGO	1272	1310	73	47	120	100	35
146	05/07/91	GW	CLEAR	SW	10-15	NORTH	SHENANGO	1134	1323	58	76	134	100	20
147	05/07/91	GW	CLEAR	SW	10-15	NORTH	SHENANGO	1154	1336	71	68	139	85	35
148	05/13/91	GW	CLEAR	SE	3-6	NORTH	SHENANGO	1167	1118	58	47	105	85	15
149	05/13/91	GW	CLEAR	SE	3-6	NORTH	SHENANGO	1267	1128	65	22	87	100	10
150	05/13/91	GW	CLEAR	SE	3-6	NORTH	SHENANGO	1209	1143	76	28	104	100	40
151	05/13/91	GW	CLEAR	SE	3-6	NORTH	SHENANGO	1229	1158	36	41	77	90	15
152	05/13/91	GW	CLEAR	SE	3 6	NORTH	SHENANGO	1239	1209	71	32	103	100	30
153	05/13/91	GW	CLEAR	SE	3 6	NORTH	SHENANGO	1249	1220	82	29	111	100	35

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154	05/13/91	GW	CLEAR	SE	3-6	NORTH	SHENANGO	1259	1230	68	23	91	55	20
155	05/13/91	GW	CLEAR	SE	3-6	NORTH	SHENANGO	1269	1251	73	18	91	80	35
156	05/13/91	GW	CLEAR	SE	3-6	NORTH	SHENANGO	1102	1315	82	73	155	75	25
157	05/13/91	GW	CLEAR	SE	3-6	NORTH	SHENANGO	1152	1324	57	61	118	65	.
158	05/14/91	GW	CLEAR	NW	6-12	NORTH	SHENANGO	1146	1129	54	63	117	65	45
159	05/14/91	GW	CLEAR	NW	6-12	NORTH	SHENANGO	1168	1139	31	68	99	25	10
160	05/14/91	GW	CLEAR	NW	6-12	NORTH	SHENANGO	1267	1149	62	35	97	75	50
161	05/14/91	GW	CLEAR	NW	6-12	NORTH	SHENANGO	1209	1156	56	58	114	100	15
162	05/14/91	GW	CLEAR	NW	6-12	NORTH	SHENANGO	1229	1229	61	43	104	90	25
163	05/14/91	GW	CLEAR	NW	6-12	NORTH	SHENANGO	1239	1245	56	27	83	50	35
164	05/14/91	GW	CLEAR	NW	6-12	NORTH	SHENANGO	1239	1245	56	27	83	50	35
165	05/14/91	GW	CLEAR	NW	6-12	NORTH	SHENANGO	1249	1256	83	36	119	85	65
166	05/14/91	GW	CLEAR	NW	6-12	NORTH	SHENANGO	1269	1318	35	25	60	45	15
167	05/14/91	GW	CLEAR	NW	6-12	NORTH	SHENANGO	1102	1334	74	78	152	90	35
168	05/21/91	GW	CLEAR	SE	6-12	NORTH	SHENANGO	1147	1145	205	61	266	100	25
169	05/21/91	GW	CLEAR	SE	6-12	NORTH	SHENANGO	1245	1203	58	26	84	30	10
170	05/21/91	GW	CLEAR	SE	6-12	NORTH	SHENANGO	1255	1221	47	31	88	15	5
171	05/21/91	GW	CLEAR	SE	6-12	NORTH	SHENANGO	1167	1242	39	43	82	10	0
172	05/21/91	GW	CLEAR	SE	6-12	NORTH	SHENANGO	1207	1306	48	34	82	5	0
173	05/21/91	GW	CLEAR	SE	6-12	NORTH	SHENANGO	1217	1316	64	42	106	100	45
174	05/21/91	GW	CLEAR	SE	6-12	NORTH	SHENANGO	1237	1331	57	34	91	35	35
175	05/21/91	GW	CLEAR	SE	6-12	NORTH	SHENANGO	1247	1345	46	37	83	85	20
176	05/21/91	GW	CLEAR	SE	6-12	NORTH	SHENANGO	1267	1355	52	40	92	70	25
177	05/21/91	GW	CLEAR	SE	6-12	NORTH	SHENANGO	1111	1414	64	76	140	30	15
178	05/22/91	GW	CLEAR	SE	4-8	NORTH	SHENANGO	1257	1320	52	31	83	15	5
179	05/22/91	GW	CLEAR	SE	4-8	NORTH	SHENANGO	1267	1345	48	22	70	40	20
180	05/22/91	GW	CLEAR	SE	4-8	NORTH	SHENANGO	1209	1405	57	19	76	30	5
181	05/23/91	GW	CLEAR	SE	6-12	NORTH	SHENANGO	1215	1253	62	33	95	25	30
182	05/23/91	GW	CLEAR	SE	6-12	NORTH	SHENANGO	1225	1303	88	52	140	100	40
183	05/23/91	GW	CLEAR	SE	6-12	NORTH	SHENANGO	1235	1313	71	37	108	35	5
184	05/23/91	GW	CLEAR	SE	6-12	NORTH	SHENANGO	1245	1320	62	29	91	50	10
185	05/23/91	GW	CLEAR	SE	6-12	NORTH	SHENANGO	1255	1335	73	23	96	40	15
186	05/23/91	GW	CLEAR	SE	6-12	NORTH	SHENANGO	1125	1350	56	74	130	30	15
187	05/23/91	GW	CLEAR	SE	6-12	NORTH	SHENANGO	1127	1407	65	77	142	95	45
188	05/28/91	GW	OVERCAST	NW	4-9	NORTH	SHENANGO	1135	1124	73	62	135	100	100
189	05/28/91	GW	OVERCAST	NW	4-9	NORTH	SHENANGO	1233	1219	87	38	125	100	80
190	05/28/91	GW	OVERCAST	NW	4-9	NORTH	SHENANGO	1243	1238	94	34	128	100	45
191	05/28/91	GW	OVERCAST	NW	4-9	NORTH	SHENANGO	1263	1247	97	51	148	100	40
192	05/28/91	GW	OVERCAST	NW	4-9	NORTH	SHENANGO	1205	1303	79	34	113	100	25
193	05/28/91	GW	OVERCAST	NW	4-9	NORTH	SHENANGO	1215	1315	58	47	105	100	55
194	05/28/91	GW	OVERCAST	NW	4-9	NORTH	SHENANGO	1225	1330	66	40	106	100	100
195	05/29/91	GW	CLEAR	SE	6-12	NORTH	SHENANGO	1127	1441	61	63	124	100	45
196	05/29/91	GW	CLEAR	SE	6-12	NORTH	SHENANGO	1147	1453	58	66	124	100	65
197	05/29/91	GW	CLEAR	SE	6-12	NORTH	SHENANGO	1167	1507	68	59	127	75	25
198	05/29/91	GW	CLEAR	SE	6-12	NORTH	SHENANGO	1207	1523	54	62	116	65	75
199	05/29/91	GW	CLEAR	SE	6-12	NORTH	SHENANGO	1217	1530	71	44	125	100	75
200	05/29/91	GW	CLEAR	SE	6-12	NORTH	SHENANGO	1237	1538	89	32	121	100	40
201	05/29/91	GW	CLEAR	SE	6-12	NORTH	SHENANGO	1247	1549	78	38	116	100	45
202	05/29/91	GW	CLEAR	SE	6-12	NORTH	SHENANGO	1267	1600	66	29	95	75	30
203	05/29/91	GW	CLEAR	SE	6-12	NORTH	SHENANGO	1209	1614	59	41	100	55	25
204	05/29/91	GW	CLEAR	SE	6-12	NORTH	SHENANGO	1229	1623	57	46	103	100	45

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205	05/30/91	GW	CLEAR	SE	3-6	NORTH	SHENANGO	1135	1127	452	63	515	100	45
206	05/30/91	GW	CLEAR	SE	3-6	NORTH	SHENANGO	.	1143	67	45	112	100	25
207	05/30/91	GW	CLEAR	SE	3-6	NORTH	SHENANGO	.	1200	74	33	107	100	55
208	06/04/91	GW	CLEAR	NE	9-15	NORTH	SHENANGO	1135	1141	70	67	137	100	85
209	06/04/91	GW	CLEAR	NE	9-15	NORTH	SHENANGO	1153	1207	59	64	123	100	35
210	06/04/91	GW	CLEAR	NE	9 15	NORTH	SHENANGO	1223	1244	56	28	84	20	20
211	06/04/91	GW	CLEAR	NE	9 15	NORTH	SHENANGO	1253	1254	61	25	86	100	45
212	06/04/91	GW	CLEAR	NE	9 15	NORTH	SHENANGO	1263	1307	49	27	76	90	15
213	06/04/91	GW	CLEAR	NE	9 15	NORTH	SHENANGO	1205	1323	572	24	596	100	15
214	06/04/91	GW	CLEAR	NE	9 15	NORTH	SHENANGO	1215	1346	45	39	84	100	30
215	06/04/91	GW	CLEAR	NE	9-15	NORTH	SHENANGO	1225	1359	56	37	93	75	20
216	06/04/91	GW	CLEAR	NE	9-15	NORTH	SHENANGO	1235	1411	48	32	80	65	25
217	06/04/91	GW	CLEAR	NE	9-15	NORTH	SHENANGO	1245	1420	52	28	80	65	15
218	06/10/91	GW		NW	5-10	NORTH	SHENANGO	1102	1124	431	56	487	40	10
219	06/10/91	GW		NW	5-10	NORTH	SHENANGO	1135	1151	54	67	121	100	100
220	06/10/91	GW		NW	5-10	NORTH	SHENANGO	1153	1202	57	61	118	10	5
221	06/10/91	GW		NW	5-10	NORTH	SHENANGO	1205	1218	49	63	112	10	5
222	06/10/91	GW		NW	5-10	NORTH	SHENANGO	1223	1243	46	52	98	70	15
223	06/10/91	GW		NW	5-10	NORTH	SHENANGO	1233	1258	66	39	105	30	10
224	06/10/91	GW		NW	5-10	NORTH	SHENANGO	1243	1305	58	62	120	35	30
225	06/10/91	GW		NW	5 10	NORTH	SHENANGO	1253	1314	73	21	94	65	15
226	06/10/91	GW		NW	5-10	NORTH	SHENANGO	1215	1330	64	35	99	75	15
227	06/10/91	GW		NW	5-10	NORTH	SHENANGO	1225	1338	43	41	84	100	30
228	06/13/91	GW	CLEAR	NW	6 12	NORTH	SHENANGO	1271	1130	58	21	69	100	100
229	06/13/91	GW	CLEAR	NW	6-12	NORTH	SHENANGO	1135	1150	63	69	132	25	5
230	06/13/91	GW	CLEAR	NW	6-12	NORTH	SHENANGO	1153	1158	74	80	154	75	30
231	06/13/91	GW	CLEAR	NW	6-12	NORTH	SHENANGO	1213	1213	78	31	109	85	35
232	06/13/91	GW	CLEAR	NW	6-12	NORTH	SHENANGO	1223	1245	59	42	101	45	45
233	06/13/91	GW	CLEAR	NW	6-12	NORTH	SHENANGO	1233	1254	72	34	106	80	80
234	06/13/91	GW	CLEAR	NW	6-12	NORTH	SHENANGO	1243	1304	63	30	93	10	5
235	06/13/91	GW	CLEAR	NW	6-12	NORTH	SHENANGO	1263	1312	284	25	309	100	15
236	06/13/91	GW	CLEAR	NW	6-12	NORTH	SHENANGO	1273	1321	58	27	85	75	10
237	06/13/91	GW	CLEAR	NW	6-12	NORTH	SHENANGO	1225	1346	288	32	320	100	0
238	06/17/91	GW	CLEAR	NE	6 12	NORTH	SHENANGO	1268	1132	77	26	103	100	45
239	06/17/91	GW	CLEAR	NE	6 12	NORTH	SHENANGO	1135	1150	86	49	135	65	50
240	06/17/91	GW	CLEAR	NE	6-12	NORTH	SHENANGO	1102	1200	151	23	174	50	5
241	06/17/91	GW	CLEAR	NE	6-12	NORTH	SHENANGO	1153	1224	64	42	106	55	20
242	06/17/91	GW	CLEAR	NE	6-12	NORTH	SHENANGO	1201	1233	43	39	82	30	10
243	06/17/91	GW	CLEAR	NE	6-12	NORTH	SHENANGO	1211	1246	72	43	115	85	30
244	06/17/91	GW	CLEAR	NE	6-12	NORTH	SHENANGO	1221	1255	78	41	119	65	60
245	06/17/91	GW	CLEAR	NE	6-12	NORTH	SHENANGO	1231	1303	46	37	83	45	25
246	06/17/91	GW	CLEAR	NE	6-12	NORTH	SHENANGO	1241	1325	75	35	110	40	30
247	06/17/91	GW	CLEAR	NE	6-12	NORTH	SHENANGO	1251	1346	88	31	119	100	40
248	06/18/91	GW	OVERCAST	SE	5-10	NORTH	SHENANGO	1258	1120	69	28	97	65	25
249	06/18/91	GW	OVERCAST	SE	5-10	NORTH	SHENANGO	1268	1138	64	34	98	75	45
250	06/18/91	GW	OVERCAST	SE	5-10	NORTH	SHENANGO	1255	1201	65	23	88	60	5
251	06/18/91	GW	OVERCAST	SE	5-10	NORTH	SHENANGO	1135	1222	53	56	109	80	80
252	06/18/91	GW	OVERCAST	SE	5-10	NORTH	SHENANGO	1153	1240	58	62	120	10	10
253	06/18/91	GW	OVERCAST	SE	5-10	NORTH	SHENANGO	1201	1258	63	69	132	65	20
254	06/18/91	GW	OVERCAST	SE	5-10	NORTH	SHENANGO	1211	1330	59	44	103	85	15
255	06/18/91	GW	OVERCAST	SE	5-10	NORTH	SHENANGO	1221	1340	66	48	114	85	10

OBS	DATE	OBSERVERS INITIALS	WEATHER	WIND DIRECTION	WIND SPEED	OBSERVER LOCATION	EMISSION CONTROL SYSTEM	OVEN PUSHED	TIME OF PUSH	EMISSIONS DURING PUSH SECONDS	EMISSIONS DURING TRAVEL SECONDS	TOTAL EMISSION TIME SECONDS	MAXIMUM OPACITY DURING PUSH, %	MAXIMUM OPACITY DURING TRAVEL, %
256	06/18/91	GW	OVERCAST	SE	5-10	NORTH	SHENANGO	1231	1400	61	45	106	75	15
257	06/18/91	GW	OVERCAST	SE	5-10	NORTH	SHENANGO	1241	1421	58	33	91	60	30
258	06/24/91	GW	CLEAR	SW&NW	5-10	NORTH	CHEMICO	1111	1119	65	76	141	30	10
259	06/24/91	GW	CLEAR	SW&NW	5-10	NORTH	CHEMICO	1135	1132	57	72	129	100	15
260	06/24/91	GW	CLEAR	SW&NW	5-10	NORTH	CHEMICO	1153	1140	63	68	131	45	20
261	06/24/91	GW	CLEAR	SW&NW	5-10	NORTH	CHEMICO	1226	1201	68	61	129	75	25
262	06/24/91	GW	CLEAR	SW&NW	5-10	NORTH	CHEMICO	1246	1241	52	37	89	35	5
263	06/24/91	GW	CLEAR	SW&NW	5-10	NORTH	CHEMICO	1208	1258	56	49	105	30	5
264	06/24/91	GW	CLEAR	SW&NW	5-10	NORTH	CHEMICO	1248	1311	61	46	107	80	15
265	06/24/91	GW	CLEAR	SW&NW	5-10	NORTH	CHEMICO	1258	1322	73	44	117	10	5
266	06/24/91	GW	CLEAR	SW&NW	5-10	NORTH	CHEMICO	1268	1328	46	49	95	65	35
267	06/24/91	GW	CLEAR	SW&NW	5-10	NORTH	CHEMICO	1101	1347	54	73	127	75	30
268	06/26/91	GW		SE	8-12	NORTH	CHEMICO	1238	1250	41	38	78	75	15
269	06/26/91	GW		SE	8-12	NORTH	CHEMICO	1248	1300	68	39	107	55	35
270	06/26/91	GW		SE	8-12	NORTH	CHEMICO	1255	1318	42	38	80	25	15
271	06/26/91	GW		SE	8-12	NORTH	CHEMICO	1258	1330	54	43	97	60	20
272	06/26/91	GW		SE	8-12	NORTH	CHEMICO	1268	1342	73	37	110	80	50
273	06/26/91	GW		SE	8-12	NORTH	CHEMICO	1101	1355	57	62	119	50	15
274	06/26/91	GW		SE	8-12	NORTH	CHEMICO	1164	1416	61	53	114	100	25
275	06/26/91	GW		SE	8-12	NORTH	CHEMICO	1201	1428	70	63	133	70	5
276	06/26/91	GW		SE	8-12	NORTH	CHEMICO	1211	1436	76	48	124	90	20
277	06/26/91	GW		SE	8-12	NORTH	CHEMICO	1221	1445	71	43	114	75	25
278	07/01/91	GW	OVERCAST	NE	9-15	NORTH	SHENANGO	1151	1120	54	49	103	55	10
279	07/01/91	GW	OVERCAST	NE	9-15	NORTH	SHENANGO	1135	1132	62	59	121	85	60
280	07/01/91	GW	OVERCAST	NE	9-15	NORTH	SHENANGO	1153	1144	55	51	106	70	30
281	07/01/91	GW	OVERCAST	NE	9-15	NORTH	SHENANGO	1126	1157	43	56	99	45	15
282	07/01/91	GW	OVERCAST	NE	9-15	NORTH	SHENANGO	1236	1218	51	48	99	40	20
283	07/01/91	GW	OVERCAST	NE	9-15	NORTH	SHENANGO	1246	1224	46	32	78	15	5
284	07/01/91	GW	OVERCAST	NE	9-15	NORTH	SHENANGO	1208	1246	50	47	97	20	15
285	07/01/91	GW	OVERCAST	NE	9-15	NORTH	SHENANGO	1228	1302	58	35	93	45	5
286	07/01/91	GW	OVERCAST	NE	9-15	NORTH	SHENANGO	1238	1312	47	41	88	75	35
287	07/01/91	GW	OVERCAST	NE	9-15	NORTH	SHENANGO	1248	1319	44	38	82	80	20
288	07/02/91	GW	OVERCAST	SE	6-12	NORTH	SHENANGO	1231	1440	68	41	109	85	20
289	07/02/91	GW	OVERCAST	SE	6-12	NORTH	SHENANGO	1241	1502	77	32	109	70	10
290	07/02/91	GW	OVERCAST	SE	6-12	NORTH	SHENANGO	1251	1510	64	43	107	75	65
291	07/02/91	GW	OVERCAST	SE	6-12	NORTH	SHENANGO	1261	1517	81	37	118	80	80
292	07/02/91	GW	OVERCAST	SE	6-12	NORTH	SHENANGO	1271	1524	73	33	106	80	80
293	07/02/91	GW	OVERCAST	SE	6-12	NORTH	SHENANGO	1125	1552	78	73	151	75	10
294	07/02/91	GW	OVERCAST	SE	6-12	NORTH	SHENANGO	1154	1612	66	69	135	60	10
295	07/02/91	GW	OVERCAST	SE	6-12	NORTH	SHENANGO	1167	1621	61	67	128	35	10
296	07/02/91	GW	OVERCAST	SE	6-12	NORTH	SHENANGO	1213	1636	72	44	116	85	15
297	07/02/91	GW	OVERCAST	SE	6-12	NORTH	SHENANGO	1223	1642	68	41	109	100	45
298	07/08/91	GW	CLEAR	NW	6-12	NORTH	SHENANGO	1151	1116	63	70	133	45	25
299	07/08/91	GW	CLEAR	NW	6-12	NORTH	SHENANGO	1135	1131	91	65	156	100	100
300	07/08/91	GW	CLEAR	NW	6-12	NORTH	SHENANGO	1153	1140	82	61	143	55	20
301	07/08/91	GW	CLEAR	NW	6-12	NORTH	SHENANGO	1226	1156	162	33	195	100	15
302	07/08/91	GW	CLEAR	NW	6-12	NORTH	SHENANGO	1236	1210	57	36	113	40	25
303	07/08/91	GW	CLEAR	NW	6-12	NORTH	SHENANGO	1246	1223	76	39	115	100	15
304	07/08/91	GW	CLEAR	NW	6-12	NORTH	SHENANGO	1255	1239	52	31	83	45	10
305	07/08/91	GW	CLEAR	NW	6-12	NORTH	SHENANGO	1208	1254	47	33	80	25	5
306	07/08/91	GW	CLEAR	NW	6-12	NORTH	SHENANGO	1238	1303	88	37	125	100	70

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307	07/08/91	GW	CLEAR	NW	6-12	NORTH	SHENANGO	1248	1311	81	32	113	100	
308	07/09/91	GW	CLEAR	NW	5-10	NORTH	SHENANGO	1135	1137	68	69	137	100	100
309	07/09/91	GW	CLEAR	NW	5-10	NORTH	SHENANGO	1153	1146	59	84	143	50	45
310	07/09/91	GW	CLEAR	NW	5-10	NORTH	SHENANGO	1226	1211	209	40	249	100	5
311	07/09/91	GW	CLEAR	NW	5-10	NORTH	SHENANGO	1236	1246	76	46	122	100	30
312	07/09/91	GW	CLEAR	NW	5 10	NORTH	SHENANGO	1246	1255	57	38	95	100	50
313	07/09/91	GW	CLEAR	NW	5-10	NORTH	SHENANGO	1208	1314	68	41	109	40	20
314	07/09/91	GW	CLEAR	NW	5 10	NORTH	SHENANGO	1228	1328	61	42	103	45	10
315	07/09/91	GW	CLEAR	NW	5-10	NORTH	SHENANGO	1238	1344	58	46	104	100	35
316	07/09/91	GW	CLEAR	NW	5-10	NORTH	SHENANGO	1248	1352	75	39	114	100	100
317	07/09/91	GW	CLEAR	NW	5 10	NORTH	SHENANGO	1258	1403	67	35	102	55	25
318	07/15/91	GW	CLEAR	NE&SE	5-10	NORTH	SHENANGO	1232	1153	59	31	90	50	10
319	07/15/91	GW	CLEAR	NE&SE	5-10	NORTH	SHENANGO	1151	1213	57	62	119	80	25
320	07/15/91	GW	CLEAR	NE&SE	5-10	NORTH	SHENANGO	1135	1231	64	88	152	100	70
321	07/15/91	GW	CLEAR	NE&SE	5-10	NORTH	SHENANGO	1153	1238	56	91	147	65	10
322	07/15/91	GW	CLEAR	NE&SE	5-10	NORTH	SHENANGO	1168	1247	50	85	135	15	5
323	07/15/91	GW	CLEAR	NE&SE	5-10	NORTH	SHENANGO	1242	1304	55	34	89	20	5
324	07/15/91	GW	CLEAR	NE&SE	5-10	NORTH	SHENANGO	1262	1312	52	29	81	100	25
325	07/15/91	GW	CLEAR	NE&SE	5-10	NORTH	SHENANGO	1272	1327	54	30	84	90	35
326	07/15/91	GW	CLEAR	NE&SE	5-10	NORTH	SHENANGO	1214	1345	62	36	88	95	40
327	07/15/91	GW	CLEAR	NE&SE	5-10	NORTH	SHENANGO	1224	1353	.	.	.	80	.
328	07/18/91	GW	CLEAR	SE&SW	4 9	NORTH	CHEMICO	1151	1123	66	92	158	65	45
329	07/18/91	GW	CLEAR	SE&SW	4 9	NORTH	CHEMICO	1135	1145	58	95	153	100	60
330	07/18/91	GW	CLEAR	SE&SW	4-9	NORTH	CHEMICO	1153	1156	62	87	149	40	15
331	07/18/91	GW	CLEAR	SE&SW	4-9	NORTH	CHEMICO	1222	1228	65	47	112	55	30
332	07/18/91	GW	CLEAR	SE&SW	4-9	NORTH	CHEMICO	1262	1316	62	38	100	100	50
333	07/18/91	GW	CLEAR	SE&SW	4-9	NORTH	CHEMICO	1272	1325	65	31	96	90	35
334	07/18/91	GW	CLEAR	SE&SW	4-9	NORTH	CHEMICO	1242	1400	57	38	95	35	15
335	07/18/91	GW	CLEAR	SE&SW	4-9	NORTH	CHEMICO	1214	1406	59	43	102	100	55
336	07/18/91	GW	CLEAR	SE&SW	4-9	NORTH	CHEMICO	1224	1423	52	46	98	65	40
337	07/18/91	GW	CLEAR	SE&SW	4 9	NORTH	CHEMICO	1234	1431	65	50	115	100	55
338	07/22/91	GW		SE	5 10	NORTH	SHENANGO	1148	1124	61	67	128	100	55
339	07/22/91	GW		SE	5 10	NORTH	SHENANGO	1151	1152	52	63	115	100	100
340	07/22/91	GW		SE	5-10	NORTH	SHENANGO	1135	1216	57	79	136	100	100
341	07/22/91	GW		SE	5-10	NORTH	SHENANGO	1153	1231	48	66	114	25	15
342	07/22/91	GW		SE	5-10	NORTH	SHENANGO	1222	1243	64	31	95	45	15
343	07/22/91	GW		SE	5-10	NORTH	SHENANGO	1232	1301	46	33	79	40	10
344	07/22/91	GW		SE	5-10	NORTH	SHENANGO	1242	1316	57	30	87	60	15
345	07/22/91	GW		SE	5 10	NORTH	SHENANGO	1262	1324	54	27	81	100	30
346	07/22/91	GW		SE	5-10	NORTH	SHENANGO	1272	1335	62	26	88	100	35
347	07/22/91	GW		SE	5 10	NORTH	SHENANGO	1214	1345	49	42	91	80	25
348	07/25/91	GW	OC,RAIN	SW	4 10	NORTH	SHENANGO	1153	1157	61	83	144	50	40
349	07/25/91	GW	OC,RAIN	SW	4 10	NORTH	KIDC	1151	1232	.	.	.	10	20
350	07/25/91	GW	OC,RAIN	SW	4-10	NORTH	SHENANGO	1229	1245	63	44	107	55	20
351	07/25/91	GW	OC,RAIN	SW	4 10	NORTH	SHENANGO	1242	1256	57	40	97	70	15
352	07/25/91	GW	OC,RAIN	SW	4-10	NORTH	SHENANGO	1262	1303	66	38	94	45	25
353	07/25/91	GW	OC,RAIN	SW	4-10	NORTH	SHENANGO	1272	1315	61	35	96	60	20
354	07/25/91	GW	OC,RAIN	SW	4 10	NORTH	SHENANGO	1135	1335	71	68	139	85	45
355	07/25/91	GW	OC,RAIN	SW	4-10	NORTH	SHENANGO	1168	1348	59	66	125	90	35
356	07/25/91	GW	OC,RAIN	SW	4-10	NORTH	SHENANGO	1214	1402	74	42	116	30	30
357	07/25/91	GW	OC,RAIN	SW	4-10	NORTH	SHENANGO	1224	1409	65	40	105	80	25

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358	07/29/91	REA	RAIN	NE	10	NORTH	SHENANGO	1151	1146	107	105	212	85	50
359	07/29/91	SBP	RAIN	NE	5-10	NORTH	SHENANGO	1151	1146	107	105	212	80	45
360	07/29/91	GW	OC,RAIN	NE	5-10	NORTH	SHENANGO	1151	1146	105	107	212	75	45
361	07/29/91	REA	RAIN	NE	10	NORTH	SHENANGO	1135	1157	60	90	150	100	65
362	07/29/91	SBP	RAIN	NE	5-10	NORTH	SHENANGO	1135	1157	65	85	150	100	60
363	07/29/91	GW	OC,RAIN	NE	5-10	NORTH	SHENANGO	1135	1158	67	88	155	100	65
364	07/29/91	REA	RAIN	NE	10	NORTH	SHENANGO	1153	1224	59	35	94	50	35
365	07/29/91	SBP	RAIN	NE	5 10	NORTH	SHENANGO	1153	1224	60	30	90	50	30
366	07/29/91	GW	OC,RAIN	NE	5-10	NORTH	SHENANGO	1153	1225	71	48	119	55	30
367	07/29/91	REA	RAIN	NE	10	NORTH	SHENANGO	1222	1244	103	52	155	85	100
368	07/29/91	SBP	RAIN	NE	5-10	NORTH	SHENANGO	1222	1244	103	52	155	85	100
369	07/29/91	GW	OC,RAIN	NE	5-10	NORTH	SHENANGO	1222	1244	89	52	141	80	100
370	07/29/91	REA	RAIN	NE	10	NORTH	SHENANGO	1232	1256	41	0	41	35	0
371	07/29/91	SBP	RAIN	NE	5-10	NORTH	SHENANGO	1232	1256	41	0	41	30	0
372	07/29/91	GW	OC,RAIN	NE	5 10	NORTH	SHENANGO	1232	1257	43	0	43	30	0
373	07/29/91	GW	OC,RAIN	NE	5-10	NORTH	SHENANGO	1101	1422	56	68	124	80	40
374	07/29/91	GW	OC,RAIN	NE	5-10	NORTH	SHENANGO	1224	1436	86	42	128	90	45
375	07/29/91	GW	OC,RAIN	NE	5 10	NORTH	SHENANGO	1234	1444	82	48	130	100	100
376	07/29/91	GW	OC,RAIN	NE	5 10	NORTH	SHENANGO	1244	1454	76	43	119	40	15
377	07/29/91	GW	OC,RAIN	NE	5 10	NORTH	SHENANGO	1216	1509	59	40	99	45	10
378	07/30/91	GW	OVERCAST	SE	5-10	NORTH	CHEMICO	1151	1139	58	66	124	65	40
379	07/30/91	GW	OVERCAST	SE	5-10	NORTH	CHEMICO	1135	1146	63	72	135	100	70
380	07/30/91	GW	OVERCAST	SE	5 10	NORTH	CHEMICO	1153	1202	44	69	113	40	25
381	07/30/91	GW	OVERCAST	SE	5 10	NORTH	CHEMICO	1218	1221	0	0	0	0	0
382	07/30/91	GW	OVERCAST	SE	5 10	NORTH	CHEMICO	1232	1255	67	45	112	25	5
383	07/30/91	GW	OVERCAST	SE	5 10	NORTH	CHEMICO	1242	1325	70	40	110	15	5
384	07/30/91	GW	OVERCAST	SE	5-10	NORTH	CHEMICO	1222	1340	68	53	121	100	30
385	07/30/91	GW	OVERCAST	SE	5 10	NORTH	CHEMICO	1262	1357	78	33	111	90	35
386	07/30/91	GW	OVERCAST	SE	5-10	NORTH	CHEMICO	1272	1408	57	31	88	75	20
387	07/30/91	GW	OVERCAST	SE	5-10	NORTH	CHEMICO	1214	1423	46	52	98	35	45
388	08/01/91	GW	CLEAR	SE/SW	5 10	NORTH	KIDC	1148	1115	89	.	89	30	25
389	08/01/91	GW	CLEAR	SE/SW	5 10	NORTH	SHENANGO	1135	1125	56	71	127	100	100
390	08/01/91	GW	CLEAR	SE/SW	5-10	NORTH	KIDC	1151	1143	116	34	150	55	40
391	08/01/91	GW	CLEAR	SE/SW	5-10	NORTH	SHENANGO	1222	1158	71	73	144	65	60
392	08/01/91	GW	CLEAR	SE/SW	5-10	NORTH	SHENANGO	1153	1207	49	68	117	55	30
393	08/05/91	GW	CLEAR	NW	7 12	NORTH	SHENANGO	1148	1124	84	72	156	100	30
394	08/05/91	GW	CLEAR	NW	7-12	NORTH	SHENANGO	1151	1210	77	85	162	35	20
395	08/05/91	GW	CLEAR	NW	7-12	NORTH	SHENANGO	1135	1232	82	86	168	100	100
396	08/05/91	GW	CLEAR	NW	7 12	NORTH	SHENANGO	1153	1240	79	76	155	30	15
397	08/05/91	GW	CLEAR	NW	7-12	NORTH	SHENANGO	1217	1301	81	54	135	75	35
398	08/05/91	GW	CLEAR	NW	7-12	NORTH	SHENANGO	1229	1310	68	38	106	25	10
399	08/05/91	GW	CLEAR	NW	7-12	NORTH	SHENANGO	1237	1325	75	51	126	100	45
400	08/05/91	GW	CLEAR	NW	7 12	NORTH	SHENANGO	1247	1341	80	35	115	100	25
401	08/05/91	GW	CLEAR	NW	7 12	NORTH	SHENANGO	1149	1403	59	82	141	100	45
402	08/05/91	GW	CLEAR	NW	7-12	NORTH	SHENANGO	1209	1420	74	48	122	25	10
403	08/06/91	GW	CLEAR	SE	5 10	NORTH	SHENANGO	1144	1132	61	89	150	100	100
404	08/06/91	GW	CLEAR	SE	5-10	NORTH	KIDC	1151	1152	126	50	176	20	5
405	08/06/91	GW	CLEAR	SE	5 10	NORTH	SHENANGO	1217	1215	74	98	172	90	50
406	08/06/91	GW	CLEAR	SE	5-10	NORTH	SHENANGO	1153	1226	42	65	117	50	20
407	08/06/91	GW	CLEAR	SE	5-10	NORTH	SHENANGO	1237	1258	66	51	117	85	45
408	08/06/91	GW	CLEAR	SE	5-10	NORTH	SHENANGO		1304	63	62	125	100	60

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409	08/06/91	GW	CLEAR	SE	5-10	NORTH	SHENANGO	1247	1314	57	40	97	65	45
410	08/06/91	GW	CLEAR	SE	5-10	NORTH	SHENANGO	1257	1324	51	0	51	15	0
411	08/06/91	GW	CLEAR	SE	5-10	NORTH	SHENANGO	1209	1349	47	25	72	25	10
412	08/06/91	GW	CLEAR	SE	5-10	NORTH	SHENANGO	1239	1357	54	42	96	75	15
413	08/12/91	GW	CLEAR	SE	5-15	NORTH	SHENANGO	1135	1126	226	81	307	100	75
414	08/12/91	GW	CLEAR	SE	5 15	NORTH	SHENANGO	1151	1149	85	86	171	100	70
415	08/12/91	GW	CLEAR	SE	5-15	NORTH	SHENANGO	1201	1203	68	71	139	100	25
416	08/12/91	GW	CLEAR	SE	5 15	NORTH	SHENANGO	1153	1222	83	76	159	40	20
417	08/13/91	GW	OVERCAST	SE	4-8	NORTH	KIDC	1148	1130	83	379	462	20	0
418	08/13/91	GW	OVERCAST	SE	4 8	NORTH	CHEMICO	1135	1151	89	95	184	100	60
419	08/13/91	GW	OVERCAST	SE	4-8	NORTH	KIDC	1151	1201	61	627	688	30	30
420	08/13/91	GW	OVERCAST	SE	4-8	NORTH	CHEMICO	1248	1219	89	51	140	70	20
421	08/13/91	GW	OVERCAST	SE	4-8	NORTH	CHEMICO	1153	1229	72	57	129	50	10
422	08/13/91	GW	OVERCAST	SE	4-8	NORTH	CHEMICO	1267	1238	64	36	100	65	25
423	08/13/91	GW	CLEAR	SE	4-8	NORTH	CHEMICO	1258	1300	78	36	114	95	45
424	08/13/91	GW	CLEAR	SE	4-8	NORTH	CHEMICO	1268	1330	82	39	121	70	45
425	08/13/91	GW	CLEAR	SE	4-8	NORTH	CHEMICO	1238	1345	87	49	136	85	75
426	08/13/91	GW	CLEAR	SE	4 8	NORTH	CHEMICO	1201	1400	209	46	255	60	10
427	08/14/91	GW	OVERCAST	SE	5-10	NORTH	SHENANGO	1208	1305	74	50	124	50	25
428	08/14/91	GW	OVERCAST	SE	5-10	NORTH	SHENANGO	1248	1321	72	40	112	30	25
429	08/14/91	GW	OVERCAST	SE	5-10	NORTH	SHENANGO	1258	1335	69	42	111	45	35
430	08/14/91	GW	OVERCAST	SE	5-10	NORTH	SHENANGO	1268	1352	66	36	102	50	30
431	08/14/91	GW	OVERCAST	SE	5-10	NORTH	SHENANGO	1201	1415	77	49	126	65	25
432	08/14/91	GW	OVERCAST	SE	5-10	NORTH	SHENANGO	1211	1424	91	.	.	30	.
433	08/19/91	GW	OVERCAST	NW	10-15	NORTH	CHEMICO	1135	1119	69	34	103	45	20
434	08/19/91	GW	OVERCAST	NW	10 15	NORTH	CHEMICO	1217	1127	73		73	30	10
435	08/19/91	GW	OVERCAST	NW	10 15	NORTH	CHEMICO	1148	1138	44	68	112	100	35
436	08/19/91	GW	OVERCAST	NW	10 15	NORTH	CHEMICO	1151	1209	53	73	126	85	70
437	08/19/91	GW	OVERCAST	NW	10 15	NORTH	CHEMICO	1153	1227	48	15	63	20	5
438	08/19/91	GW	OVERCAST	NW	10-15	NORTH	CHEMICO	1236	1244	65	50	115	90	65
439	08/19/91	GW	OVERCAST	NW	10-15	NORTH	CHEMICO	1246	1251	53	18	71	85	10
440	08/19/91	GW	OVERCAST	NW	10-15	NORTH	CHEMICO	1208	1303	69	0	69	10	0
441	08/19/91	GW	OVERCAST	NW	10-15	NORTH	CHEMICO	1238	1314	58	33	91	100	35
442	08/19/91	GW	OVERCAST	NW	10 15	NORTH	CHEMICO	1248	1323	61	46	107	100	40
443	08/20/91	GW	OVERCAST	NW	10-15	NORTH	CHEMICO	1148	1223	56	65	121	90	15
444	08/20/91	GW	OVERCAST	NW	10-15	NORTH	CHEMICO	1151	1244	63	68	131	75	50
445	08/20/91	GW	OVERCAST	NW	10-15	NORTH	CHEMICO	1135	1250	52	94	146	100	85
446	08/20/91	GW	OVERCAST	NW	10-15	NORTH	CHEMICO	1153	1302	50	38	88	75	10
447	08/20/91	GW	OVERCAST	NW	10 15	NORTH	CHEMICO	1126	1313	68	94	162	20	10
448	08/20/91	GW	OVERCAST	NW	10-15	NORTH	CHEMICO	1236	1329	97	44	141	85	25
449	08/20/91	GW	OVERCAST	NW	10 15	NORTH	CHEMICO	1246	1340	61	41	102	35	10
450	08/20/91	GW	OVERCAST	NW	10 15	NORTH	CHEMICO	1208	1355	40	0	40	30	0
451	08/20/91	GW	OVERCAST	NW	10 15	NORTH	CHEMICO	1238	1411	71	38	109	85	80
452	08/20/91	GW	OVERCAST	NW	10 15	NORTH	CHEMICO	1248	1423	69	34	103	90	25
453	08/26/91	GW	CLEAR	SE	5 10	NORTH	SHENANGO	1148	1119	119	64	183	75	25
454	08/26/91	GW	CLEAR	SE	5-10	NORTH	SHENANGO	1135	1140	89	68	157	100	100
455	08/26/91	GW	CLEAR	SE	5-10	NORTH	SHENANGO	1151	1147	74	62	136	100	100
456	08/26/91	GW	CLEAR	SE	5-10	NORTH	SHENANGO	1153	1157	56	65	121	80	45
457	08/26/91	GW	CLEAR	SE	5-10	NORTH	SHENANGO	1236	1238	76	40	116	100	40
458	08/26/91	GW	CLEAR	SE	5-10	NORTH	SHENANGO	1246	1247	62	35	97	100	20
459	08/26/91	GW	CLEAR	SE	5 10	NORTH	SHENANGO	1208	1304	58	43	101	50	25

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460	08/26/91	GW	CLEAR	SE	5 10	NORTH	SHENANGO	1238	1333	99	37	136	100	45
461	08/26/91	GW	CLEAR	SE	5-10	NORTH	SHENANGO	1248	1340	71	35	106	100	30
462	08/26/91	GW	CLEAR	SE	5-10	NORTH	SHENANGO	1258	1354	66	40	106	55	35
463	08/27/91	GW	OVERCAST	SE	5 10	NORTH	CHEMICO	1153	1152	66	60	126	90	35
464	08/27/91	GW	OVERCAST	SE	5-10	NORTH	CHEMICO	1226	1203	54	42	96	85	15
465	08/27/91	GW	OVERCAST	SE	5-10	NORTH	CHEMICO	1236	1215	61	68	129	70	35
466	08/27/91	GW	OVERCAST	SE	5-10	NORTH	CHEMICO	1246	1227	39	44	83	75	10
467	08/27/91	GW	OVERCAST	SE	5-10	NORTH	CHEMICO	1208	1234	67	41	108	100	35
468	08/27/91	GW	OVERCAST	SE	5-10	NORTH	CHEMICO	1228	1241	46	49	95	100	45
469	08/27/91	GW	OVERCAST	SE	5 10	NORTH	CHEMICO	1238	1252	53	47	100	100	55
470	08/27/91	GW	OVERCAST	SE	5-10	NORTH	CHEMICO	1248	1300	52	40	92	85	45
471	08/27/91	GW	OVERCAST	SE	5-10	NORTH	CHEMICO	1258	1309	47	36	83	85	55
472	08/27/91	GW	OVERCAST	SE	5-10	NORTH	CHEMICO	1208	1331	55	50	105	80	
473	09/04/91	GW	OVERCAST	SOUTH	10-20	NORTH	SHENANGO	1231	1449	66	41	107	65	35
474	09/04/91	GW	OVERCAST	SOUTH	10-20	NORTH	SHENANGO	1241	1456	72	44	116	95	25
475	09/04/91	GW	OVERCAST	SOUTH	10-20	NORTH	SHENANGO	1251	1509	59	47	106	75	45
476	09/04/91	GW	OVERCAST	SOUTH	10-20	NORTH	SHENANGO	1257	1516	62	40	102	30	15
477	09/04/91	GW	OVERCAST	SOUTH	10-20	NORTH	SHENANGO	1261	1525	78	36	114	100	35
478	09/04/91	GW	OVERCAST	SOUTH	10-20	NORTH	SHENANGO	1271	1533	83	29	112	100	65
479	09/04/91	GW	OVERCAST	SOUTH	10-20	NORTH	SHENANGO	1134	1615	58	74	132	35	20
480	09/04/91	GW	OVERCAST	SOUTH	10-20	NORTH	SHENANGO	1154	1630	65	81	146	80	55
481	09/04/91	GW	OVERCAST	SOUTH	10 20	NORTH	SHENANGO	1213	1640	71	42	113	75	40
482	09/04/91	GW	OVERCAST	SOUTH	10-20	NORTH	SHENANGO	1223	1650	63	46	109	85	45
483	09/05/91	GW	CLEAR	NE/NW	10 15	NORTH	KIDC	1148	1125	23	31	54	20	10
484	09/05/91	GW	CLEAR	NE/NW	10-15	NORTH	CHEMICO	1135	1139	86	78	164	100	60
485	09/05/91	GW	CLEAR	NE/NW	10-15	NORTH	KIDC	1151	1152	28	49	77	10	20
486	09/05/91	GW	CLEAR	NE/NW	10 15	NORTH	CHEMICO	1236	1203	95	86	181	95	20
487	09/05/91	GW	CLEAR	NE/NW	10 15	NORTH	CHEMICO	1153	1214	62	43	105	100	40
488	09/05/91	GW	CLEAR	NE/NW	10 15	NORTH	CHEMICO	1246	1236	52	0	52	10	0
489	09/05/91	GW	CLEAR	NE/NW	10-15	NORTH	CHEMICO	1208	1242	77	46	123	55	30
490	09/05/91	GW	CLEAR	NE/NW	10 15	NORTH	CHEMICO	1238	1251	55	48	103	90	40
491	09/05/91	GW	CLEAR	NE/NW	10 15	NORTH	CHEMICO	1248	1300	66	45	111	60	45
492	09/05/91	GW	CLEAR	NE/NW	10-15	NORTH	CHEMICO	1258	1309	57	38	95	80	35
493	09/09/91	GW	CLEAR	SE/SW	5 10	NORTH	CHEMICO	1148	1129	73	61	134	100	30
494	09/09/91	GW	CLEAR	SE/SW	5-10	NORTH	CHEMICO	1135	1153	82	73	155	100	40
495	09/09/91	GW	CLEAR	SE/SW	5 10	NORTH	CHEMICO	1151	1203	57	66	123	55	35
496	09/09/91	GW	CLEAR	SE/SW	5-10	NORTH	CHEMICO	1236	1219	78	34	112	100	45
497	09/09/91	GW	CLEAR	SE/SW	5-10	NORTH	CHEMICO	1153	1241	63	74	137	30	10
498	09/09/91	GW	CLEAR	SE/SW	5-10	NORTH	CHEMICO	1246	1253	59	38	97	60	10
499	09/09/91	GW	CLEAR	SE/SW	5-10	NORTH	CHEMICO	1208	1315	61	52	113	40	30
500	09/09/91	GW	CLEAR	SE/SW	5 10	NORTH	CHEMICO	1238	1325	75	42	117	100	90
501	09/09/91	GW	CLEAR	SE/SW	5-10	NORTH	CHEMICO	1248	1334	68	49	117	70	25
502	09/09/91	GW	CLEAR	SE/SW	5 10	NORTH	CHEMICO	1258	1350	70	35	105	75	75
503	09/10/91	GW	OVERCAST	SW	15 20	NORTH	SHENANGO	1135	1138	63	65	128	100	100
504	09/10/91	GW	OVERCAST	SW	15 20	NORTH	SHENANGO	1236	1148	60	53	113	70	35
505	09/10/91	GW	OVERCAST	SW	15-20	NORTH	SHENANGO	1246	1221	68	31	99	65	35
506	09/10/91	GW	OVERCAST	SW	15-20	NORTH	SHENANGO	1153	1232	72	50	122	55	30
507	09/10/91	GW	OVERCAST	SW	15-20	NORTH	SHENANGO	1208	1245	81	39	120	100	40
508	09/10/91	GW	OVERCAST	SW	15-20	NORTH	SHENANGO	1238	1308	56	43	99	75	100
509	09/10/91	GW	OVERCAST	SW	15-20	NORTH	SHENANGO	1248	1321	61	37	98	75	30
510	09/10/91	GW	OVERCAST	SW	15-20	NORTH	SHENANGO	1258	1329	53	47	100	90	60

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511	09/17/91	GW	CLEAR	SW/NW	6-12	NORTH	SHENANGO	1148	1121	78	62	140	100	80
512	09/17/91	GW	CLEAR	SW/NW	6-12	NORTH	SHENANGO	1135	1144	67	65	132	100	75
513	09/17/91	GW	CLEAR	SW/NW	6-12	NORTH	SHENANGO	1151	1154	74	70	144	100	55
514	09/17/91	GW	CLEAR	SW/NW	6-12	NORTH	SHENANGO	1200	1216	60	43	103	100	65
515	09/17/91	GW	CLEAR	SW/NW	6-12	NORTH	SHENANGO	1150	1228	73	66	139	75	45
516	09/17/91	GW	CLEAR	SW/NW	6-12	NORTH	SHENANGO	1206	1245	68	39	107	100	50
517	09/17/91	GW	CLEAR	SW/NW	6-12	NORTH	SHENANGO	1208	1255	66	49	115	85	45
518	09/17/91	GW	CLEAR	SW/NW	6-12	NORTH	SHENANGO	1238	1303	77	45	122	100	100
519	09/17/91	GW	CLEAR	SW/NW	6-12	NORTH	SHENANGO	1248	1313	82	37	119	100	65
520	09/17/91	GW	CLEAR	SW/NW	6-12	NORTH	SHENANGO	1258	1324	71	40	111	100	40
521	09/18/91	GW	OVERCAST	SE	6-12	NORTH	SHENANGO	1258	1313	67	44	111	100	100
522	09/18/91	GW	OVERCAST	SE	6-12	NORTH	SHENANGO	1268	1321	83	31	114	100	100
523	09/18/91	GW	OVERCAST	SE	6-12	NORTH	SHENANGO	1201	1329	62	46	108	55	30
524	09/18/91	GW	OVERCAST	SE	6-12	NORTH	SHENANGO	1211	1338	55	48	103	50	40
525	09/18/91	GW	OVERCAST	SE	6-12	NORTH	SHENANGO	1221	1347	58	54	112	100	65
526	09/18/91	GW	OVERCAST	SE	6-12	NORTH	SHENANGO	1231	1356	67	37	104	80	55
527	09/18/91	GW	OVERCAST	SE	6-12	NORTH	SHENANGO	1241	1404	78	43	121	100	40
528	09/18/91	GW	OVERCAST	SE	6-12	NORTH	SHENANGO	1251	1418	63	41	104	100	100
529	09/18/91	GW	OVERCAST	SE	6-12	NORTH	SHENANGO	1255	1433	58	35	93	45	35
530	09/18/91	GW	OVERCAST	SE	6-12	NORTH	SHENANGO	1261	1448	65	42	107	70	40
531	09/20/91	GW	OVERCAST	SW	15-20	NORTH	SHENANGO	1148	1120	58	72	130	75	60
532	09/23/91	GW	OVERCAST	SW	15-20	NORTH	SHENANGO	1135	1129	81	78	159	100	100
533	09/23/91	GW	OVERCAST	SW	15-20	NORTH	SHENANGO	1151	1138	83	71	154	65	35
534	09/23/91	GW	OVERCAST	SW	15-20	NORTH	SHENANGO	1236	1151	76	46	122	75	55
535	09/23/91	GW	OVERCAST	SW	15-20	NORTH	SHENANGO	1153	1200	65	67	132	50	20
536	09/23/91	GW	OVERCAST	SW	15-20	NORTH	SHENANGO	1246	1211	89	42	131	100	60
537	09/23/91	GW	OVERCAST	SW	15-20	NORTH	SHENANGO	1171	1223	91	62	153	30	25
538	09/23/91	GW	OVERCAST	SW	15-20	NORTH	SHENANGO	1208	1238	85	48	123	75	45
539	09/23/91	GW	OVERCAST	SW	15-20	NORTH	SHENANGO	1238	1246	97	47	154	65	30
540	09/23/91	GW	OVERCAST	SW	15-20	NORTH	SHENANGO	1248	1259	83	39	122	20	15
541	09/24/91	GW	CLEAR	EAST	10-15	NORTH	SHENANGO	1151	1144	83	65	148	95	65
542	09/24/91	GW	CLEAR	EAST	10-15	NORTH	SHENANGO	1236	1159	78	47	125	100	35
543	09/24/91	GW	CLEAR	EAST	10-15	NORTH	SHENANGO	1153	1212	88	69	157	45	25
544	09/24/91	GW	CLEAR	EAST	10-15	NORTH	SHENANGO	1246	1229	97	36	133	15	15
545	09/24/91	GW	CLEAR	EAST	10-15	NORTH	SHENANGO	1171	1238	116	85	201	100	100
546	09/24/91	GW	CLEAR	EAST	10-15	NORTH	SHENANGO	1208	1251	74	63	137	55	30
547	09/24/91	GW	CLEAR	EAST	10-15	NORTH	SHENANGO	1229	1302	95	43	148	10	5
548	09/25/91	GW	CLDY	NW	5-10	NORTH	SHENANGO	1171	1333	68	59	127	100	75
549	09/25/91	GW	CLDY	NW	5-10	NORTH	SHENANGO	1208	1352	72	54	126	85	40
550	09/25/91	GW	CLDY	NW	5-10	NORTH	SHENANGO	1238	1400	61	38	99	100	100
551	10/01/91	GW	CLEAR	SW	6-12	NORTH	SHENANGO	1222	1130	57	34	91	15	10
552	10/01/91	GW	CLEAR	SW	6-12	NORTH	SHENANGO	1135	1202	88	66	154	100	100
553	10/02/91	GW	CLEAR	SW	5-10	NORTH	CHEMICO	1208	1432	31	10	41	10	5
554	10/02/91	GW	CLEAR	SW	5-10	NORTH	CHEMICO	1229	1452	54	33	87	40	20
555	10/04/91	REA	CLEAR	S	5	NORTH	SHENANGO	1135	1210	121	101	221	100	75
556	10/04/91	REA	CLEAR	S	5	NORTH	SHENANGO	1153	1218	113	57	170	80	55
557	10/04/91	REA	CLEAR	S	5	NORTH	SHENANGO	1244	1236	130	33	133	80	20
558	10/04/91	REA	CLEAR	S	5	NORTH	SHENANGO	1216	1250	105	49	154	100	80
559	10/04/91	REA	CLEAR	S	5	NORTH	SHENANGO	1226	1310	103	47	150	65	50
560	10/04/91	REA	CLEAR	S	5	NORTH	SHENANGO	1236	1321	61	101	162	90	80
561	10/08/91	GW	CLEAR	NW	6-12	NORTH	SHENANGO	1134	1116	737	54	791	100	15

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562	10/08/91	GW	CLEAR	NW	6-12	NORTH	SHENANGO	1224	1159	86	45	131	70	30
563	10/08/91	GW	CLEAR	NW	6-12	NORTH	SHENANGO	1234	1208	66	41	107	75	15
564	10/08/91	GW	CLEAR	NW	6 12	NORTH	SHENANGO	1244	1217	73	48	121	75	10
565	10/08/91	GW	CLEAR	NW	6 12	NORTH	SHENANGO	1216	1234	82	50	132	90	55
566	10/09/91	GW	CLEAR	SE	5-10	NORTH	SHENANGO	1134	1132	84	68	152	85	25
567	10/09/91	GW	CLEAR	SE	5-10	NORTH	SHENANGO	1224	1157	56	52	108	65	20
568	10/09/91	GW	CLEAR	SE	5-10	NORTH	SHENANGO	1234	1211	78	61	139	90	40
569	10/09/91	GW	CLEAR	SE	5-10	NORTH	SHENANGO	1244	1225	58	43	101	45	20
570	10/09/91	GW	CLEAR	SE	5-10	NORTH	SHENANGO	1216	1244	62	50	112	50	25
571	10/14/81	GW	CLEAR	SE	10-15	NORTH	SHENANGO	1224	1144	63	51	114	65	55
572	10/14/91	GW	CLEAR	SE	10-15	NORTH	SHENANGO	1234	1212	84	45	129	100	40
573	10/14/91	GW	CLEAR	SE	10-15	NORTH	SHENANGO	1256	1703	48	35	83	15	10
574	10/14/91	GW	CLEAR	SE	10 15	NORTH	SHENANGO	1261	1728	86	43	129	75	15
575	10/15/91	GW	OVERCAST	SE	5 12	NORTH	SHENANGO	1134	1118	85	71	156	100	80
576	10/15/91	GW	OVERCAST	SE	5-12	NORTH	SHENANGO	1148	1132	73	52	125	65	25
577	10/15/91	GW	OVERCAST	SE	5-12	NORTH	SHENANGO	1224	1141	57	37	94	25	15
578	10/15/91	GW	OVERCAST	SE	5 12	NORTH	SHENANGO	1151	1155	86	53	139	100	30
579	10/15/91	GW	OVERCAST	SE	5-12	NORTH	SHENANGO	1234	1209	78	39	117	100	55
580	10/15/91	GW	OVERCAST	SE	5 12	NORTH	SHENANGO	1153	1224	64	57	121	100	35
581	10/22/91	GW	CLEAR	SE	5-10	NORTH	SHENANGO	1201	1606	48	56	104	65	50
582	10/22/91	GW	CLEAR	SE	5-10	NORTH	SHENANGO	1211	1614	53	55	108	100	40
583	10/22/91	GW	CLEAR	SE	5-10	NORTH	SHENANGO	1221	1628	64	48	112	70	35
584	10/23/91	GW	OVERCAST	SE	5-10	NORTH	SHENANGO	1134	1136	65	15	80	85	10
585	10/23/91	GW	OVERCAST	SE	5-10	NORTH	SHENANGO	1224	1155	71	38	109	75	25
586	10/23/91	GW	OVERCAST	SE	5-10	NORTH	SHENANGO	1234	1205	54	45	99	100	35
587	10/23/91	GW	OVERCAST	SE	5 10	NORTH	SHENANGO	1258	1442	77	35	112	50	15
588	10/23/91	GW	OVERCAST	SE	5 10	NORTH	SHENANGO	1268	1449	58	41	99	35	10
589	10/24/91	GW	HAZY/OC	SE	5 10	NORTH	SHENANGO	1234	1144	65	41	106	45	15
590	10/24/91	GW	HAZY/OC	SE	5 10	NORTH	SHENANGO	1258	1442	54	43	97	100	30
591	10/28/91	GW	CLEAR	NE	8-12	NORTH	SHENANGO	1228	1443	35	10	45	30	5
592	10/28/91	GW	CLEAR	NE	8-12	NORTH	SHENANGO	1238	1452	57	36	93	100	25
593	10/28/91	GW	CLEAR	NE	8-12	NORTH	SHENANGO	1248	1500	55	25	80	100	10
594	10/28/91	GW	CLEAR	NE	8 12	NORTH	SHENANGO	1256	1511	61	38	99	40	40
595	10/28/91	GW	CLEAR	NE	8 12	NORTH	SHENANGO	1268	1526	58	27	85	100	20
596	10/29/91	GW	CLEAR	NE	8-12	NORTH	SHENANGO	1228	1443	35	10	45	30	5
597	10/29/91	GW	CLEAR	NE	8-12	NORTH	SHENANGO	1238	1452	57	36	93	100	25
598	10/29/91	GW	CLEAR	NE	8 12	NORTH	SHENANGO	1248	1500	55	25	80	100	10
599	10/29/91	GW	CLEAR	NE	8-12	NORTH	SHENANGO	1258	1511	61	38	99	40	40
600	10/29/91	GW	CLEAR	NE	8-12	NORTH	SHENANGO	1268	1526	58	27	85	100	20
601	10/30/91	GW	CLEAR	NW	6-12	NORTH	SHENANGO	1258	1509	57	36	93	75	35
602	10/30/91	GW	CLEAR	NW	6-12	NORTH	SHENANGO	1268	1515	71	42	113	80	40
603	10/30/91	GW	CLEAR	NW	6-12	NORTH	SHENANGO	1201	1531	84	73	157	100	35
604	10/30/91	GW	CLEAR	NW	6-12	NORTH	SHENANGO	1211	1540	89	47	136	30	30
605	10/30/91	GW	CLEAR	NW	6-12	NORTH	SHENANGO	1221	1548	68	58	126	30	30
606	11/05/91	GW	CLEAR	NE	6 12	NORTH	SHENANGO	1234	1152	420	43	463	80	20
607	11/05/91	GW	CLEAR	NE	6-12	NORTH	SHENANGO	1268	1408	64	33	97	100	25
608	11/05/91	GW	CLEAR	NE	6-12	NORTH	SHENANGO	1201	1517	50	57	107	70	10
609	11/05/91	GW	CLEAR	NE	6-12	NORTH	SHENANGO	1211	1524	67	52	119	65	50
610	11/05/91	GW	CLEAR	NE	6-12	NORTH	SHENANGO	1221	1531	61	55	116	85	30
611	11/05/91	GW	CLEAR	NE	6-12	NORTH	SHENANGO	1231	1538	72	42	114	100	45
612	11/06/91	GW	CLEAR	SE	6-12	NORTH	SHENANGO	1224	1123	240	41	281	90	10

KIDC DEMONSTRATION PROJECT - BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

OBS	DATE	OBSERVERS INITIALS	WEATHER	WIND DIRECTION	WIND SPEED	OBSERVER LOCATION	EMISSION CONTROL SYSTEM	OVEN PUSHED	TIME OF PUSH	EMISSIONS DURING PUSH SECONDS	EMISSIONS DURING TRAVEL SECONDS	TOTAL EMISSION TIME SECONDS	MAXIMUM OPACITY DURING PUSH, %	MAXIMUM OPACITY DURING TRAVEL, %
613	11/06/91	GW	CLEAR	SE	6-12	NORTH	SHENANGO	1201	1525	63	44	107	100	30
614	11/06/91	GW	CLEAR	SE	6-12	NORTH	SHENANGO	1211	1533	59	37	96	20	10
615	11/07/91	GW	OVERCAST	SE	4 8	NORTH	SHENANGO	1216	1250	94	43	137	100	30
616	11/07/91	GW	OVERCAST	SE	4-8	NORTH	SHENANGO	1226	1257	81	41	122	80	100
617	11/12/91	REA	OVERCAST	NE	5-10	WEST	SHENANGO	1224	1128	95	67	162	60	35
618	11/12/91	REA	OVERCAST	NE	5-10	WEST	SHENANGO	1244	1141	60	40	100	50	25
619	11/12/91	REA	OVERCAST	NE	5-10	WEST	SHENANGO	1216	1158	45	37	82	35	25
620	11/12/91	REA	OVERCAST	NE	5 10	WEST	SHENANGO	1226	1202	65	41	106	85	60
621	11/12/91	REA	OVERCAST	NE	5-10	WEST	SHENANGO	1236	1221	56	30	86	65	40
622	11/13/91	REA		WEST	5-10	NORTH	SHENANGO	1134	1128	40	47	87	50	15
623	11/13/91	REA		WEST	5-10	NORTH	SHENANGO	1224	1142	152	20	172	15	5
624	11/13/91	REA		WEST	5-10	NORTH	SHENANGO	1244	1152	116	30	146	60	25
625	11/13/91	REA		WEST	5-10	NORTH	SHENANGO	1216	1206	108	60	168	30	10
626	11/13/91	REA		WEST	5-10	NORTH	SHENANGO	1226	1224	56	34	90	65	15
627	11/21/91	GW					SHENANGO	1236	1234	72	34	106	75	35
628	11/21/91	GW					SHENANGO	1246	1246	64	28	92	100	25
629	11/21/91	GW					SHENANGO	1238	1453	72	48	120	100	60
630	11/21/91	GW					SHENANGO	1248	1502	81	53	134	100	50
631	11/21/91	GW					SHENANGO	1258	1512	76	42	118	100	45
632	11/22/91	GW	OVERCAST	SE	10-15	NORTH	SHENANGO	1224	1150	112	41	153	100	30
633	11/22/91	GW	OVERCAST	SE	10-15	NORTH	SHENANGO	1234	1200	292	44	336	100	35
634	11/22/91	GW	OVERCAST	SE	10-15	NORTH	SHENANGO	1234	1232	38	39	77	100	15
635	11/22/91	GW	OVERCAST	SE	10 15	NORTH	SHENANGO	1244	1245	91	45	136	100	45
636	11/22/91	GW	OVERCAST	SE	10-15	NORTH	SHENANGO	1226	1250	74	40	114	75	20
637	11/22/91	GW	OVERCAST	SE	10 15	NORTH	SHENANGO	1236	1325	57	46	103	80	30

Section 4

Pushing Emissions T-test Comparison of the Conventional Control Systems vs. the KIDC System

PUSHING EMISSIONS OPACITY T TEST 12:07 Thursday, July 2, 1992 1
KIDC VS ALL CONVENTIONAL PUSHES
MAX OPACITY DURING PUSH VS. MAX OPACITY BEFORE IGNITION (COMPV1)
MAX OPACITY DURING TRAVEL VS. MAX OPACITY AFTER IGNITION (COMPV2)

TTEST PROCEDURE

Variable: COMPV1

TYPE	N	Mean	Std Dev	Std Error	Minimum	Maximum	Variances	T	DF	Prob>|T|
CONV	629	69.01430843	28.72389070	1.14529652	0	100.00000000	Unequal	36.4860	670.4	0.0001
KIDC	245	20.42040816	10.64049217	0.67979611	0	55.00000000	Equal	25.7923	872.0	0.0000

For HO Variances are equal, F' = 7.29 DF (628,244) Prob>F' = 0.0000

****

Variable: COMPV2

TYPE	N	Mean	Std Dev	Std Error	Minimum	Maximum	Variances	T	DF	Prob>|T|
CONV	624	32.07532051	24.36142584	0.97523754	0.00000E+00	100.00000000	Unequal	18.3290	818.5	0.0001
KIDC	217	12.23502304	6.91918088	0.46970460	5.00000E+00	40.00000000	Equal	11.8281	839.0	0.0000

For HO Variances are equal, F' = 12.40 DF = (623,216) Prob>F' = 0.0000

TIME OF EMISSIONS T TEST 12:07 Thursday, July 2, 1992 2
KIDC VS. ALL CONVENTIONAL PUSHES
TIME OF EMISSIONS DURING PUSH (EDP)
TIME OF EMISSIONS DURING TRAVEL (EDT)

TTEST PROCEDURE

Variable: EDP

TYPE	N	Mean	Std Dev	Std Error	Minimum	Maximum	Variances	T	DF	Prob>|T|
CONV	628	71.60668790	52.10515456	2.07922202	0.00000E+00	737.00000000	Unequal	0.1424	545.8	0.8868
KIDC	232	72.07758621	39.16756120	2.57147637	1.00000E+01	443.00000000	Equal	-0.1252	858.0	0.9004

For HO: Variances are equal, F' = 1.77 DF = (627,231) Prob>F' = 0.0000

****

Variable: EDT

TYPE	N	Mean	Std Dev	Std Error	Minimum	Maximum	Variances	T	DF	Prob>|T|
CONV	626	46.89776358	20.34539582	0.81316556	0	121.00000000	Unequal	10.6517	252.3	0.0001
KIDC	242	120.61157025	83.04019643	5.33802600	0	492.00000000	Equal	-20.6789	866.0	0.0000

For HO: Variances are equal, F' = 16.66 DF (241,625) Prob>F' = 0.0000

Appendix B
Visible Emission Observation Data & Summary Tables - Pushside, Topside, and Discharge & Handling Emissions

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Section 1

Pushside Emission Observations Conventional vs. KIDC - Overall & Monthly

PUSHER SIDE OVEN EMISSIONS OBSERVATIONS STATISTICS

CONVENTIONAL PUSHES
OVERALL STATISTICS
MARCH - NOVEMBER, 1991

	AVERAGE VALUE	STANDARD DEVIATION	MAXIMUM VALUE	MINIMUM VALUE
NUMBER OF OBSERVATIONS = 283				
CUMULATIVE EMISSION TIME, SECONDS	57.4	29.6	165	5
MAXIMUM OPACITY, %	51.4	32.7	100	5

KIDC PUSHES
OVERALL STATISTICS
OCTOBER - NOVEMBER, 1991

	AVERAGE VALUE	STANDARD DEVIATION	MAXIMUM VALUE	MINIMUM VALUE
NUMBER OF OBSERVATIONS = 125				
CUMULATIVE EMISSION TIME, SECONDS	59.0	21.3	109	5
MAXIMUM OPACITY, %	61.9	35.9	100	10

PUSHER SIDE OVEN EMISSIONS OBSERVATIONS STATISTICS
CONVENTIONAL PUSHES
MONTHLY STATISTICS

	AVERAGE VALUE	STANDARD DEVIATION	MAXIMUM VALUE	MINIMUM VALUE
MAR91 # OF OBS.= 10				
CUMULATIVE EMISSION TIME, SECONDS	84.7	8.6	95	65
MAXIMUM OPACITY, %	35.5	14.2	55	10
APR91 # OF OBS.= 49				
CUMULATIVE EMISSION TIME, SECONDS	69.0	29.0	135	10
MAXIMUM OPACITY, %	50.7	33.9	100	5
MAY91 # OF OBS.= 30				
CUMULATIVE EMISSION TIME, SECONDS	55.2	27.4	90	5
MAXIMUM OPACITY, %	56.2	33.3	100	5
JUN91 # OF OBS.= 10				
CUMULATIVE EMISSION TIME, SECONDS	70.5	39.0	145	10
MAXIMUM OPACITY, %	67.5	36.8	100	15
JUL91 # OF OBS.= 61				
CUMULATIVE EMISSION TIME, SECONDS	55.6	30.9	124	10
MAXIMUM OPACITY, %	51.2	29.9	100	5
AUG91 # OF OBS.= 43				
CUMULATIVE EMISSION TIME, SECONDS	45.1	23.1	113	6
MAXIMUM OPACITY, %	51.6	34.5	100	5
SEP91 # OF OBS.= 39				
CUMULATIVE EMISSION TIME, SECONDS	43.8	20.8	79	5
MAXIMUM OPACITY, %	44.6	35.5	100	5
OCT91 # OF OBS.= 26				
CUMULATIVE EMISSION TIME, SECONDS	66.7	30.3	165	16
MAXIMUM OPACITY, %	50.4	29.7	100	15
NOV91 # OF OBS.= 15				
CUMULATIVE EMISSION TIME, SECONDS	57.9	36.7	127	5
MAXIMUM OPACITY, %	63.3	35.0	100	15

PUSHER SIDE OVEN EMISSIONS OBSERVATIONS STATISTICS
KIDC PUSHES
MONTHLY STATISTICS

	AVERAGE VALUE	STANDARD DEVIATION	MAXIMUM VALUE	MINIMUM VALUE
OCT91 # OF OBS.= 67				
CUMULATIVE EMISSION TIME, SECONDS	56.7	18.7	89	16
MAXIMUM OPACITY, %	65.2	33.7	100	10
NOV91 # OF OBS.= 58				
CUMULATIVE EMISSION TIME, SECONDS	61.6	23.8	109	5
MAXIMUM OPACITY, %	58.1	38.2	100	10

Section 2

Topside Emission Observation Conventional vs. KIDC -
Overall & Monthly

COKE OVEN TOPSIDE EMISSIONS OBSERVATIONS STATISTICS

CONVENTIONAL PUSHES
MONTHLY STATISTICS

	AVERAGE VALUE	STANDARD DEVIATION	MAXIMUM VALUE	MINIMUM VALUE
MAR91 # OF OBS.= 17				
CUMULATIVE EMISSION TIME, SECONDS	50.2	34.7	90	1
MAXIMUM OPACITY, %	50.0	31.6	100	5
APR91 # OF OBS.= 34				
CUMULATIVE EMISSION TIME, SECONDS	54.2	45.0	210	2
MAXIMUM OPACITY, %	43.4	27.9	100	5
MAY91 # OF OBS.= 50				
CUMULATIVE EMISSION TIME, SECONDS	56.4	24.4	95	0
MAXIMUM OPACITY, %	39.4	30.2	100	0
JUN91 # OF OBS.= 30				
CUMULATIVE EMISSION TIME, SECONDS	93.5	79.2	480	25
MAXIMUM OPACITY, %	41.8	31.1	100	5
JUL91 # OF OBS.= 65				
CUMULATIVE EMISSION TIME, SECONDS	46.0	29.7	170	0
MAXIMUM OPACITY, %	44.6	32.4	100	0
AUG91 # OF OBS.= 37				
CUMULATIVE EMISSION TIME, SECONDS	40.6	22.8	116	0
MAXIMUM OPACITY, %	52.6	34.7	100	0
SEP91 # OF OBS.= 38				
CUMULATIVE EMISSION TIME, SECONDS	40.5	18.9	81	0
MAXIMUM OPACITY, %	56.8	40.5	100	0
OCT91 # OF OBS.= 25				
CUMULATIVE EMISSION TIME, SECONDS	49.7	46.2	259	14
MAXIMUM OPACITY, %	50.4	34.8	100	10
NOV91 # OF OBS.= 16				
CUMULATIVE EMISSION TIME, SECONDS	46.9	57.8	251	0
MAXIMUM OPACITY, %	56.9	39.4	100	0

COKE OVEN TOPSIDE EMISSIONS OBSERVATIONS STATISTICS

CONVENTIONAL PUSHES
OVERALL STATISTICS

	AVERAGE VALUE	STANDARD DEVIATION	MAXIMUM VALUE	MINIMUM VALUE
NUMBER OF OBSERVATIONS= 312				
CUMULATIVE EMISSION TIME, SECONDS	54.1	51.8	585	0
MAXIMUM OPACITY, %	47.1	33.5	100	0

KIDC PUSHES
OVERALL STATISTICS

	AVERAGE VALUE	STANDARD DEVIATION	MAXIMUM VALUE	MINIMUM VALUE
NUMBER OF OBSERVATIONS= 97				
CUMULATIVE EMISSION TIME, SECONDS	73.0	32.8	329	38
MAXIMUM OPACITY, %	80.5	25.4	100	20

COKE OVEN TOPSIDE EMISSIONS OBSERVATIONS STATISTICS

CONVENTIONAL PUSHES
MONTHLY STATISTICS

	AVERAGE VALUE	STANDARD DEVIATION	MAXIMUM VALUE	MINIMUM VALUE
MAR91 # OF OBS.= 17				
CUMULATIVE EMISSION TIME, SECONDS	50.2	34.7	90	1
MAXIMUM OPACITY, %	50.0	31.6	100	5
APR91 # OF OBS.= 34				
CUMULATIVE EMISSION TIME, SECONDS	54.2	45.0	210	2
MAXIMUM OPACITY, %	43.4	27.9	100	5
MAY91 # OF OBS.= 50				
CUMULATIVE EMISSION TIME, SECONDS	56.4	24.4	95	0
MAXIMUM OPACITY, %	39.4	30.2	100	0
JUN91 # OF OBS.= 30				
CUMULATIVE EMISSION TIME, SECONDS	93.5	79.2	480	25
MAXIMUM OPACITY, %	41.8	31.1	100	5
JUL91 # OF OBS.= 65				
CUMULATIVE EMISSION TIME, SECONDS	54.1	73.2	585	0
MAXIMUM OPACITY, %	44.6	32.4	100	0
AUG91 # OF OBS.= 37				
CUMULATIVE EMISSION TIME, SECONDS	40.6	22.8	116	0
MAXIMUM OPACITY, %	52.6	34.7	100	0
SEP91 # OF OBS.= 38				
CUMULATIVE EMISSION TIME, SECONDS	40.5	18.9	81	0
MAXIMUM OPACITY, %	56.8	40.5	100	0
OCT91 # OF OBS.= 25				
CUMULATIVE EMISSION TIME, SECONDS	49.7	46.2	259	14
MAXIMUM OPACITY, %	50.4	34.8	100	10
NOV91 # OF OBS.= 16				
CUMULATIVE EMISSION TIME, SECONDS	46.9	57.8	251	0
MAXIMUM OPACITY, %	56.9	39.4	100	0

COKE OVEN TOPSIDE EMISSIONS OBSERVATIONS STATISTICS

KIDC PUSHES
MONTHLY STATISTICS

	AVERAGE VALUE	STANDARD DEVIATION	MAXIMUM VALUE	MINIMUM VALUE
OCT91 # OF OBS.= 63				
CUMULATIVE EMISSION TIME, SECONDS	74.6	39.8	329	41
MAXIMUM OPACITY, %	78.7	25.9	100	20
NOV91 # OF OBS.= 34				
CUMULATIVE EMISSION TIME, SECONDS	70.0	12.1	90	38
MAXIMUM OPACITY, %	83.8	24.5	100	25

COKE OVEN TOPSIDE EMISSIONS OBSERVATIONS STATISTICS

CONVENTIONAL PUSHES
OVERALL STATISTICS

	AVERAGE VALUE	STANDARD DEVIATION	MAXIMUM VALUE	MINIMUM VALUE
NUMBER OF OBSERVATIONS= 312				
CUMULATIVE EMISSION TIME, SECONDS	52.4	42.2	480	0
MAXIMUM OPACITY, %	47.1	33.5	100	0

KIDC PUSHES
OVERALL STATISTICS

	AVERAGE VALUE	STANDARD DEVIATION	MAXIMUM VALUE	MINIMUM VALUE
NUMBER OF OBSERVATIONS= 97				
CUMULATIVE EMISSION TIME, SECONDS	73.0	32.8	329	38
MAXIMUM OPACITY, %	80.5	25.4	100	20

COKE OVEN TOPSIDE EMISSIONS OBSERVATIONS STATISTICS

CHEMICO PUSHES
OVERALL STATISTICS

	AVERAGE VALUE	STANDARD DEVIATION	MAXIMUM VALUE	MINIMUM VALUE
NUMBER OF OBSERVATIONS= 76				
CUMULATIVE EMISSION TIME, SECONDS	54.2	36.3	210	0
MAXIMUM OPACITY, %	43.6	31.1	100	0

SHENANGO PUSHES
OVERALL STATISTICS

	AVERAGE VALUE	STANDARD DEVIATION	MAXIMUM VALUE	MINIMUM VALUE
NUMBER OF OBSERVATIONS= 236				
CUMULATIVE EMISSION TIME, SECONDS	51.8	43.9	480	0
MAXIMUM OPACITY, %	48.3	34.2	100	0

COKE OVEN TOPSIDE EMISSIONS OBSERVATIONS STATISTICS

CONVENTIONAL PUSHES
MONTHLY STATISTICS

	AVERAGE VALUE	STANDARD DEVIATION	MAXIMUM VALUE	MINIMUM VALUE
MAR91 # OF OBS.= 17				
CUMULATIVE EMISSION TIME, SECONDS	50.2	34.7	90	1
MAXIMUM OPACITY, %	50.0	31.6	100	5
APR91 # OF OBS.= 34				
CUMULATIVE EMISSION TIME, SECONDS	54.2	45.0	210	2
MAXIMUM OPACITY, %	43.4	27.9	100	5
MAY91 # OF OBS.= 50				
CUMULATIVE EMISSION TIME, SECONDS	56.4	24.4	95	0
MAXIMUM OPACITY, %	39.4	30.2	100	0
JUN91 # OF OBS.= 30				
CUMULATIVE EMISSION TIME, SECONDS	93.5	79.2	480	25
MAXIMUM OPACITY, %	41.8	31.1	100	5
JUL91 # OF OBS.= 65				
CUMULATIVE EMISSION TIME, SECONDS	46.0	29.7	170	0
MAXIMUM OPACITY, %	44.6	32.4	100	0
AUG91 # OF OBS.= 37				
CUMULATIVE EMISSION TIME, SECONDS	40.6	22.8	116	0
MAXIMUM OPACITY, %	52.6	34.7	100	0
SEP91 # OF OBS.= 38				
CUMULATIVE EMISSION TIME, SECONDS	40.5	18.9	81	0
MAXIMUM OPACITY, %	56.8	40.5	100	0
OCT91 # OF OBS.= 25				
CUMULATIVE EMISSION TIME, SECONDS	49.7	46.2	259	14
MAXIMUM OPACITY, %	50.4	34.8	100	10
NOV91 # OF OBS.= 16				
CUMULATIVE EMISSION TIME, SECONDS	46.9	57.8	251	0
MAXIMUM OPACITY, %	56.9	39.4	100	0

COKE OVEN TOPSIDE EMISSIONS OBSERVATIONS STATISTICS

KIDC PUSHES
MONTHLY STATISTICS

	AVERAGE VALUE	STANDARD DEVIATION	MAXIMUM VALUE	MINIMUM VALUE
OCT91 # OF OBS.= 63				
CUMULATIVE EMISSION TIME, SECONDS	74.6	39.8	329	41
MAXIMUM OPACITY, %	78.7	25.9	100	20
NOV91 # OF OBS.= 34				
CUMULATIVE EMISSION TIME, SECONDS	70.0	12.1	90	38
MAXIMUM OPACITY, %	83.8	24.5	100	25

Section 3

Quenched Coke Discharge & Handling Emissions
Conventional vs. KIDC - Overall & Monthly

QUENCHED COKE DISCHARGE/HANDLING EMISSIONS STATISTICS

CONVENTIONAL COKE
OVERALL STATISTICS

	AVERAGE VALUE	STANDARD DEVIATION	MAXIMUM VALUE	MINIMUM VALUE
NUMBER OF OBSERVATIONS= 546				
CUMULATIVE EMISSION TIME, SECONDS	2.8	8.6	121	0
MAXIMUM OPACITY, %	1.6	4.0	20	0

KIDC COKE
OVERALL STATISTICS

	AVERAGE VALUE	STANDARD DEVIATION	MAXIMUM VALUE	MINIMUM VALUE
NUMBER OF OBSERVATIONS= 166				
CUMULATIVE EMISSION TIME, SECONDS	54.1	107.8	840	0
MAXIMUM OPACITY, %	13.5	12.8	50	0

QUENCHED COKE DISCHARGE/HANDLING EMISSIONS STATISTICS

CONVENTIONAL COKE
MONTHLY STATISTICS

	AVERAGE VALUE	STANDARD DEVIATION	MAXIMUM VALUE	MINIMUM VALUE
MAR91 # OF OBS.= 35				
CUMULATIVE EMISSION TIME, SECONDS	13.6	25.6	121	0
MAXIMUM OPACITY, %	3.7	5.3	15	0
APR91 # OF OBS.= 62				
CUMULATIVE EMISSION TIME, SECONDS	1.4	5.8	34	0
MAXIMUM OPACITY, %	0.6	2.9	20	0
MAY91 # OF OBS.= 90				
CUMULATIVE EMISSION TIME, SECONDS	1.4	5.3	27	0
MAXIMUM OPACITY, %	1.1	4.0	20	0
JUN91 # OF OBS.= 80				
CUMULATIVE EMISSION TIME, SECONDS	1.8	5.3	26	0
MAXIMUM OPACITY, %	1.3	3.8	20	0
JUL91 # OF OBS.= 100				
CUMULATIVE EMISSION TIME, SECONDS	1.8	4.5	22	0
MAXIMUM OPACITY, %	1.5	3.8	20	0
AUG91 # OF OBS.= 48				
CUMULATIVE EMISSION TIME, SECONDS	3.7	5.8	17	0
MAXIMUM OPACITY, %	2.3	4.8	15	0
SEP91 # OF OBS.= 75				
CUMULATIVE EMISSION TIME, SECONDS	2.5	5.0	20	0
MAXIMUM OPACITY, %	2.2	4.2	15	0
OCT91 # OF OBS.= 37				
CUMULATIVE EMISSION TIME, SECONDS	4.5	6.1	18	0
MAXIMUM OPACITY, %	2.4	3.7	10	0
NOV91 # OF OBS.= 19				
CUMULATIVE EMISSION TIME, SECONDS	0.0	0.0	0	0
MAXIMUM OPACITY, %	0.0	0.0	0	0

QUENCHED COKE DISCHARGE/HANDLING EMISSIONS STATISTICS

KIDC PUSHES
MONTHLY STATISTICS

	AVERAGE VALUE	STANDARD DEVIATION	MAXIMUM VALUE	MINIMUM VALUE
OCT91 # OF OBS.= 111				
CUMULATIVE EMISSION TIME, SECONDS	66.5	125.6	840	0
MAXIMUM OPACITY, %	15.7	13.5	60	0
NOV91 # OF OBS.= 55				
CUMULATIVE EMISSION TIME, SECONDS	29.2	49.2	264	0
MAXIMUM OPACITY, %	9.0	10.1	45	0

Section 4

Pushside Emission Observations Conventional & KIDC -Database

PUSHER SIDE OVEN EMISSIONS OBSERVATIONS
DURING PUSHING OPERATIONS ONLY
KRISS DEMONSTRATION PROJECT - BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

OBS	DATE	BATTERY	OBSERVERS INITIALS	WEATHER	WIND DIRECTION	WIND SPEED, MPH	OBSERVER LOCATION	BACKGROUND
1	03/26/91	11/12	SBP	OVERCAST	SE	10-15	SOUTH	
2	03/26/91	11/12	SBP	OVERCAST	SE	10-15	SOUTH	
3	03/26/91	11/12	SBP	OVERCAST	SE	10-15	SOUTH	
4	03/26/91	11/12	SBP	OVERCAST	SE	10-15	SOUTH	
5	03/26/91	11/12	SBP	OVERCAST	SE	10-15	SOUTH	
6	03/26/91	11/12	SBP	OVERCAST	SE	10-15	SOUTH	
7	03/26/91	11/12	SBP	OVERCAST	SE	10-15	SOUTH	
8	03/26/91	11/12	SBP	OVERCAST	SE	10-15	SOUTH	
9	03/26/91	11/12	SBP	OVERCAST	SE	10-15	SOUTH	
10	03/26/91	11/12	SBP	OVERCAST	SE	10-15	SOUTH	
11	04/01/91	11/12	SBP	OVERCAST	NW	10-15	SOUTH	
12	04/01/91	11/12	SBP	OVERCAST	NW	10-15	SOUTH	
13	04/01/91	11/12	SBP	OVERCAST	NW	10-15	SOUTH	
14	04/01/91	11/12	SBP	OVERCAST	NW	10-15	SOUTH	
15	04/01/91	11/12	SBP	OVERCAST	NW	10-15	SOUTH	
16	04/01/91	11/12	SBP	OVERCAST	NW	10-15	SOUTH	
17	04/01/91	11/12	SBP	OVERCAST	NW	10-15	SOUTH	
18	04/01/91	11/12	SBP	OVERCAST	NW	10-15	SOUTH	
19	04/01/91	11/12	SBP	OVERCAST	NW	10-15	SOUTH	
20	04/01/91	11/12	SBP	OVERCAST	NW	10-15	SOUTH	
21	04/10/91	11/12	FRC	OVERCAST	NW	18	SWEST	BATTERY
22	04/10/91	11/12	FRC	OVERCAST	NW	18	SWEST	BATTERY

OBS	EMISSION CONTROL SYSTEM	OVEN NUMBER	TIME OF DAY	SOURCE OF EMISSIONS	CUMULATIVE TIME OF EMISSIONS SECONDS	MAXIMUM OPACITY %	COMMENTS
1	CHEMICO	1208	11:36		65	35	
2	CHEMICO	1248	12:10		95	40	
3	CHEMICO	1258	12:23		82	25	
4	CHEMICO	1268	12:35		85	30	
5	CHEMICO	1121	12:50		85	55	
6	CHEMICO	1131	13:01		85	20	
7	CHEMICO	1109	13:14		95	45	PUSHED TWICE
8	CHEMICO	1151	13:29		85	50	
9	CHEMICO	1171	13:37		80	10	
10	CHEMICO	1101	13:50		90	45	
11	SHENANGO	1238	11:43		75	45	
12	SHENANGO	1248	11:52		80	25	
13	SHENANGO	1258	12:14		70	20	
14	SHENANGO	1268	12:23		75	50	
15	SHENANGO	1101	13:24		75	40	
16	SHENANGO	1121	13:36		80	15	
17	SHENANGO	1131	13:52		70	5	
18	SHENANGO	1151	14:01		15	35	@ END PUSH
19	SHENANGO	1171	14:11		75	15	
20	SHENANGO	1201	14:28		10	100	@ END PUSH
21	SHENANGO	1244	11:20		65	70	
22	SHENANGO	1108	11:40		82	40	

PUSHER SIDE OVEN EMISSIONS OBSERVATIONS
DURING PUSHING OPERATIONS ONLY
KRESS DEMONSTRATION PROJECT BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

OBS	DATE	BATTERY	OBSERVERS INITIALS	WEATHER	WIND DIRECTION	WIND SPEED, MPH	OBSERVER LOCATION	BACKGROUND
23	04/10/91	11/12	FRC	OVERCAST	NW	18	SWEST	BATTERY
24	04/10/91	11/12	FRC	OVERCAST	NW	18	SWEST	BATTERY
25	04/10/91	11/12	FRC	OVERCAST	NW	18	SWEST	BATTERY
26	04/10/91	11/12	FRC	OVERCAST	NW	18	SWEST	BATTERY
27	04/10/91	11/12	FRC	OVERCAST	NW	18	SWEST	BATTERY
28	04/10/91	11/12	FRC	OVERCAST	NW	18	SWEST	BATTERY
29	04/10/91	11/12	FRC	OVERCAST	NW	18	SWEST	BATTERY
30	04/15/91	11/12	SBP	RAIN	SE	5-10	SOUTH	
31	04/15/91	11/12	SBP	RAIN	SE	5-10	SOUTH	
32	04/15/91	11/12	SBP	RAIN	SE	5-10	SOUTH	
33	04/15/91	11/12	SBP	RAIN	SE	5-10	SOUTH	
34	04/15/91	11/12	SBP	RAIN	SE	5-10	SOUTH	
35	04/15/91	11/12	SBP	RAIN	SE	5-10	SOUTH	
36	04/15/91	11/12	SBP	RAIN	SE	5-10	SOUTH	
37	04/15/91	11/12	SBP	RAIN	SE	5-10	SOUTH	
38	04/15/91	11/12	SBP	RAIN	SE	5-10	SOUTH	
39	04/15/91	11/12	SBP	RAIN	SE	5-10	SOUTH	
40	04/24/91	11/12	SBP	OC/RAIN	SE	10-15	SOUTH	
41	04/24/91	11/12	SBP	OC/RAIN	SE	10-15	SOUTH	
42	04/24/91	11/12	SBP	OC/RAIN	SE	10-15	SOUTH	
43	04/24/91	11/12	SBP	OC/RAIN	SE	10-15	SOUTH	
44	04/24/91	11/12	SBP	OC/RAIN	SE	10-15	SOUTH	

OBS	EMISSION CONTROL SYSTEM	OVEN NUMBER	TIME OF DAY	SOURCE OF EMISSIONS	CUMULATIVE TIME OF EMISSIONS SECONDS	MAXIMUM OPACITY %	COMMENTS
23	SHENANGO	1206	11:54		63	60	
24	SHENANGO	1216	12:09		67	80	
25	SHENANGO	1226	12:15		74	70	
26	SHENANGO	1236	12:26		71	85	
27	SHENANGO	1246	12:39		66	65	
28	SHENANGO	1148	12:56		79	75	
29	SHENANGO	1158	13:10		66	25	
30	SHENANGO	1126	11:43		110	65	
31	SHENANGO	1206	12:03		75	45	
32	SHENANGO	1216	12:23		135	100	
33	SHENANGO	1226	12:33		115	100	
34	SHENANGO	1236	12:45		80	100	
35	SHENANGO	1246	12:58		80	30	
36	SHENANGO	1256	13:08		15	15	
37	SHENANGO	1148	13:38		20	15	
38	SHENANGO	1208	13:54		25	10	
39	SHENANGO	1248	14:03		15	15	
40	CHEMICO	1206	12:48		90	35	
41	CHEMICO	1216	13:02		70	100	
42	CHEMICO	1226	13:11		70	100	
43	CHEMICO	1236	13:24		90	100	
44	CHEMICO	1246	13:33		90	25	

PUSHER SIDE OVEN EMISSIONS OBSERVATIONS
DURING PUSHING OPERATIONS ONLY
KRESS DEMONSTRATION PROJECT - BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

OBS	DATE	BATTERY	OBSERVERS INITIALS	WEATHER	WIND DIRECTION	WIND SPEED, MPH	OBSERVER LOCATION	BACKGROUND
45	04/24/91	11/12	SBP	OC/RAIN	SE	10-15	SOUTH	
46	04/24/91	11/12	SBP	OC/RAIN	SE	10-15	SOUTH	
47	04/24/91	11/12	SBP	OC/RAIN	SE	10-15	SOUTH	
48	04/24/91	11/12	SBP	OC/RAIN	SE	10-15	SOUTH	
49	04/24/91	11/12	SBP	OC/RAIN	SE	10-15	SOUTH	
50	04/29/91	11/12	SBP	OC/RAIN	SE	7-12	SOUTH	
51	04/29/91	11/12	SBP	OC/RAIN	SE	7-12	SOUTH	
52	04/29/91	11/12	SBP	OC/RAIN	SE	7-12	SOUTH	
53	04/29/91	11/12	SBP	OC/RAIN	SE	7-12	SOUTH	
54	04/29/91	11/12	SBP	OC/RAIN	SE	7-12	SOUTH	
55	04/29/91	11/12	SBP	OC/RAIN	SE	7-12	SOUTH	
56	04/29/91	11/12	SBP	OC/RAIN	SE	7-12	SOUTH	
57	04/29/91	11/12	SBP	OC/RAIN	SE	7-12	SOUTH	
58	04/29/91	11/12	SBP	OC/RAIN	SE	7-12	SOUTH	
59	04/29/91	11/12	SBP	OC/RAIN	SE	7-12	SOUTH	
60	05/06/91	11/12	SBP	RAIN	SOUTH	5-10	SOUTH	
61	05/06/91	11/12	SBP	RAIN	SOUTH	5-10	SOUTH	
62	05/06/91	11/12	SBP	RAIN	SOUTH	5-10	SOUTH	
63	05/06/91	11/12	SBP	RAIN	SOUTH	5-10	SOUTH	
64	05/06/91	11/12	SBP	RAIN	SOUTH	5-10	SOUTH	
65	05/06/91	11/12	SBP	RAIN	SOUTH	5-10	SOUTH	
66	05/06/91	11/12	SBP	RAIN	SOUTH	5-10	SOUTH	

OBS	EMISSION CONTROL SYSTEM	OVEN NUMBER	TIME OF DAY	SOURCE OF EMISSIONS	CUMULATIVE TIME OF EMISSIONS SECONDS	MAXIMUM OPACITY %	COMMENTS
45	CHEMICO	1148	14:03		75	5	
46	CHEMICO	1208	14:17		65	5	
47	CHEMICO	1228	14:26		10	20	
48	CHEMICO	1238	14:33		85	100	
49	CHEMICO	1248	14:41		80	80	
50	SHENANGO	1256	13:08		90	75	
51	SHENANGO	1148	13:27		110	15	
52	SHENANGO	1208	13:42		85	10	
53	SHENANGO	1238	13:49		85	100	
54	SHENANGO	1248	14:00		10	50	
55	SHENANGO	1258	14:12		65	35	
56	SHENANGO	1268	14:20		80	80	
57	SHENANGO	1101	14:54		85	100	
58	SHENANGO	1111	15:10		20	20	
59	SHENANGO	1151	15:19		80	15	
60	CHEMICO	1102	11:45		80	100	
61	CHEMICO	1152	11:58		85	10	
62	CHEMICO	1172	12:15		60	100	
63	CHEMICO	1229	12:27		70	5	PUSHED 3X
64	CHEMICO	1212	12:55		20	60	
65	CHEMICO	1222	13:11		70	70	
66	CHEMICO	1232	13:18		5	15	

PUSHER SIDE OVEN EMISSIONS OBSERVATIONS
DURING PUSHING OPERATIONS ONLY
KRESS DEMONSTRATION PROJECT - BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

OBS	DATE	BATTERY	OBSERVERS INITIALS	WEATHER	WIND DIRECTION	WIND SPEED, MPH	OBSERVER LOCATION	BACKGROUND
67	05/06/91	11/12	SBP	RAIN	SOUTH	5-10	SOUTH	
68	05/06/91	11/12	SBP	RAIN	SOUTH	5-10	SOUTH	
69	05/06/91	11/12	SBP	RAIN	SOUTH	5-10	SOUTH	
70	05/13/91	11/12	SBP	CLEAR	NW/SE	3-15	SOUTH	
71	05/13/91	11/12	SBP	CLEAR	NW/SE	3-15	SOUTH	
72	05/13/91	11/12	SBP	CLEAR	NW/SE	3-15	SOUTH	
73	05/13/91	11/12	SBP	CLEAR	NW/SE	3-15	SOUTH	
74	05/13/91	11/12	SBP	CLEAR	NW/SE	3-15	SOUTH	
75	05/13/91	11/12	SBP	CLEAR	NW/SE	3-15	SOUTH	
76	05/13/91	11/12	SBP	CLEAR	NW/SE	3-15	SOUTH	
77	05/13/91	11/12	SBP	CLEAR	NW/SE	3-15	SOUTH	
78	05/13/91	11/12	SBP	CLEAR	NW/SE	3-15	SOUTH	
79	05/13/91	11/12	SBP	CLEAR	NW/SE	3-15	SOUTH	
80	05/21/91	11/12	SBP	CLEAR	SE	5-10	SOUTH	
81	05/21/91	11/12	SBP	CLEAR	SE	5-10	SOUTH	
82	05/21/91	11/12	SBP	CLEAR	SE	5-10	SOUTH	
83	05/21/91	11/12	SBP	CLEAR	SE	5-10	SOUTH	
84	05/21/91	11/12	SBP	CLEAR	SE	5-10	SOUTH	
85	05/21/91	11/12	SBP	CLEAR	SE	5-10	SOUTH	
86	05/21/91	11/12	SBP	CLEAR	SE	5-10	SOUTH	
87	05/21/91	11/12	SBP	CLEAR	SE	5-10	SOUTH	
88	05/21/91	11/12	SBP	CLEAR	SE	5-10	SOUTH	

OBS	EMISSION CONTROL SYSTEM	OVEN NUMBER	TIME OF DAY	SOURCE OF EMISSIONS	CUMULATIVE TIME OF EMISSIONS SECONDS	MAXIMUM OPACITY %	COMMENTS
67	CHEMICO	1242	13.32		30	25	
68	CHEMICO	1262	13.43		70	35	
69	CHEMICO	1272	13.58		25	20	
70	SHENANGO	1167	11:17		30	35	PUSH 85 SEC
71	SHENANGO	1267	11.28		80	50	
72	SHENANGO	1209	11 42		15	30	PUSH 80 SEC
73	SHENANGO	1229	11:58		90	40	
74	SHENANGO	1239	12 09		70	100	
75	SHENANGO	1249	12 19		75	90	
76	SHENANGO	1259	12:29		75	45	
77	SHENANGO	1269	12 50		75	100	
78	SHENANGO	1102	13 14		85	100	
79	SHENANGO	1152	13:23		70	100	
80	SHENANGO	1147	11 48		70	75	
81	SHENANGO	1245	12.03		65	55	
82	SHENANGO	1255	12.20		10	20	70 SEC PUSH
83	SHENANGO	1167	12 41		25	30	75 SEC PUSH
84	SHENANGO	1207	13 04		35	50	75 SEC PUSH
85	SHENANGO	1217	13 15		80	75	
86	SHENANGO	1237	13.31		80	100	
87	SHENANGO	1247	13:44		25	20	75 SEC PUSH
88	SHENANGO	1267	13.54		70	100	

PUSHER SIDE OVEN EMISSIONS OBSERVATIONS
DURING PUSHING OPERATIONS ONLY
KRFSS DEMONSTRATION PROJECT BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

OBS	DATE	BATTERY	OBSERVERS INITIALS	WEATHER	WIND DIRECTION	WIND SPEED, MPH	OBSERVER LOCATION	BACKGROUND
89	05/21/91	11/12	SBP	CLEAR	SE	5-10	SOUTH	
90	06/03/91	11/12	SBP	RAIN	NE	5 10	SOUTH	
91	06/03/91	11/12	SBP	RAIN	NE	5-10	SOUTH	
92	06/03/91	11/12	SBP	RAIN	NE	5-10	SOUTH	
93	06/03/91	11/12	SBP	RAIN	NE	5 10	SOUTH	
94	06/03/91	11/12	SBP	RAIN	NE	5-10	SOUTH	
95	06/03/91	11/12	SBP	RAIN	NE	5-10	SOUTH	
96	06/03/91	11/12	SBP	RAIN	NE	5-10	SOUTH	
97	06/03/91	11/12	SBP	RAIN	NE	5 10	SOUTH	
98	06/03/91	11/12	SBP	RAIN	NE	5 10	SOUTH	
99	06/03/91	11/12	SBP	RAIN	NE	5 10	SOUTH	
100	07/01/91	11/12	SBP	OVERCAST	NE	10-15	SOUTH	BATTERY/SKY
101	07/01/91	11/12	SBP	OVERCAST	NE	10-15	SOUTH	BATTERY/SKY
102	07/01/91	11/12	SBP	OVERCAST	NE	10-15	SOUTH	BATTERY/SKY
103	07/01/91	11/12	SBP	OVERCAST	NE	10-15	SOUTH	BATTERY/SKY
104	07/01/91	11/12	SBP	OVERCAST	NE	10 15	SOUTH	BATTERY/SKY
105	07/01/91	11/12	SBP	OVERCAST	NE	10 15	SOUTH	BATTERY/SKY
106	07/01/91	11/12	SBP	OVERCAST	NE	10-15	SOUTH	BATTERY/SKY
107	07/01/91	11/12	SBP	OVERCAST	NE	10-15	SOUTH	BATTERY/SKY
108	07/01/91	11/12	SBP	OVERCAST	NE	10-15	SOUTH	BATTERY/SKY
109	07/01/91	11/12	SBP	OVERCAST	NE	10 15	SOUTH	BATTERY/SKY
110	07/08/91	11/12	SBP	CLEAR	WEST	15 20	SOUTH	BATTERY/SKY

OBS	EMISSION CONTROL SYSTEM	OVEN NUMBER	TIME OF DAY	SOURCE OF EMISSIONS	CUMULATIVE TIME OF EMISSIONS SECONDS	MAXIMUM OPACITY %	COMMENTS
89	SHENANGO	1111	14:13		15	30	
90	SHENANGO	1135	11:29		75	100	
91	SHENANGO	1153	11:49		40	15	70 SEC PUSH
92	SHENANGO	1223	12 06		20	100	110 SEC PUSH
93	SHENANGO	1238	12 18		90	100	
94	SHENANGO	1243	12 32		90	30	
95	SHENANGO	1205	12:47		10	20	70 SEC PUSH
96	SHENANGO	1263	13 01		145	100	PUSHED 3X
97	SHENANGO	1215	13 35		80	45	
98	SHENANGO	1225	13:56		75	100	
99	SHENANGO	1235	14 05		80	65	
100	SHENANGO	1151	11 19	DOOR	55	100	
101	SHENANGO	1135	11 31	DOOR	35	100	
102	SHENANGO	1153	11 43	DOOR	75	40	
103	SHENANGO	1126	11:56	DOOR	70	75	
104	SHENANGO	1236	12 17	DOOR	65	100	
105	SHENANGO	1246	12:24	DOOR	40	60	
106	SHENANGO	1208	12:46	DOOR	70	25	
107	SHENANGO	1228	13:01	DOOR	85	45	
108	SHENANGO	1238	13 12	DOOR	80	100	
109	SHENANGO	1248	13 19	DOOR	25	15	
110	SHENANGO	1151	11 16	DOOR	20	25	

PUSHER SIDE OVEN EMISSIONS OBSERVATIONS
DURING PUSHING OPERATIONS ONLY
KRESS DEMONSTRATION PROJECT BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

OBS	DATE	BATTERY	OBSERVERS INITIALS	WEATHER	WIND DIRECTION	WIND SPEED, MPH	OBSERVER LOCATION	BACKGROUND
111	07/08/91	11/12	SBP	CLEAR	WEST	15-20	SOUTH	BATTERY/SKY
112	07/08/91	11/12	SBP	CLEAR	WEST	15-20	SOUTH	BATTERY/SKY
113	07/08/91	11/12	SBP	CLEAR	WEST	15-20	SOUTH	BATTERY/SKY
114	07/08/91	11/12	SBP	CLEAR	WEST	15-20	SOUTH	BATTERY/SKY
115	07/08/91	11/12	SBP	CLEAR	WEST	15-20	SOUTH	BATTERY/SKY
116	07/08/91	11/12	SBP	CLEAR	WEST	15-20	SOUTH	BATTERY/SKY
117	07/08/91	11/12	SBP	CLEAR	WEST	15-20	SOUTH	BATTERY/SKY
118	07/08/91	11/12	SBP	CLEAR	WEST	15-20	SOUTH	BATTERY/SKY
119	07/08/91	11/12	SBP	CLEAR	WEST	15-20	SOUTH	BATTERY/SKY
120	07/15/91	11/12	SBP	CLEAR	NE/SE	5-10	SOUTH	BATTERY
121	07/15/91	11/12	SBP	CLEAR	NE/SE	5-10	SOUTH	BATTERY
122	07/15/91	11/12	SBP	CLEAR	NE/SE	5-10	SOUTH	BATTERY
123	07/15/91	11/12	SBP	CLEAR	NE/SE	5-10	SOUTH	BATTERY
124	07/15/91	11/12	SBP	CLEAR	NE/SE	5-10	SOUTH	BATTERY
125	07/15/91	11/12	SBP	CLEAR	NE/SE	5-10	SOUTH	BATTERY
126	07/15/91	11/12	SBP	CLEAR	NE/SE	5-10	SOUTH	BATTERY
127	07/15/91	11/12	SBP	CLEAR	NE/SE	5-10	SOUTH	BATTERY
128	07/15/91	11/12	SBP	CLEAR	NE/SE	5-10	SOUTH	BATTERY
129	07/15/91	11/12	SBP	CLEAR	NE/SE	5-10	SOUTH	BATTERY
130	07/22/91	11/12	SBP	CLEAR	SE	15-20	SOUTH	BATTERY/SKY
131	07/22/91	11/12	SBP	CLEAR	SE	15-20	SOUTH	BATTERY/SKY
132	07/22/91	11/12	SBP	CLEAR	SE	15-20	SOUTH	BATTERY/SKY

OBS	EMISSION CONTROL SYSTEM	OVEN NUMBER	TIME OF DAY	SOURCE OF EMISSIONS	CUMULATIVE TIME OF EMISSIONS SECONDS	MAXIMUM OPACITY %	COMMENTS
111	SHENANGO	1135	11:31	DOOR	35	100	90 SEC PUSH
112	SHENANGO	1153	11:40	DOOR	25	35	
113	SHENANGO	1226	11:54	DOOR	55	45	180 SEC PUSH
114	SHENANGO	1236	12:08	DOOR	85	100	
115	SHENANGO	1246	12:23	DOOR	80	20	
116	SHENANGO	1255	12:38	DOOR	20	15	85 SEC PUSH
117	SHENANGO	1208	12:52	DOOR	65	65	
118	SHENANGO	1238	13:02	DOOR	80	100	
119	SHENANGO	1248	13:11	DOOR	15	55	
120	SHENANGO	1232	11:56	DOOR	25	20	85 SEC PUSH
121	SHENANGO	1151	12:10	DOOR	15	10	
122	SHENANGO	1135	12:31	DOOR	70	100	
123	SHENANGO	1153	12:37	DOOR	10	5	
124	SHENANGO	1168	12:46	DOOR	65	10	FLAMES
125	SHENANGO	1242	13:04	DOOR	75	20	
126	SHENANGO	1262	13:11	DOOR	20	85	
127	SHENANGO	1272	13:26	DOOR	50	25	
128	SHENANGO	1214	13:44	DOOR	75	45	
129	SHENANGO	1224	13:52	DOOR	45	50	
130	SHENANGO	1148	11:23	DOOR	75	100	
131	SHENANGO	1151	11:51	DOOR	80	25	
132	SHENANGO	1135	12:16	DOOR	35	100	

PUSHER SIDE OVEN EMISSIONS OBSERVATIONS
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KRESS DEMONSTRATION PROJECT - BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

OBS	DATE	BATTERY	OBSERVERS INITIALS	WEATHER	WIND DIRECTION	WIND SPEED, MPH	OBSERVER LOCATION	BACKGROUND
133	07/22/91	11/12	SBP	CLEAR	SE	15-20	SOUTH	BATTERY/SKY
134	07/22/91	11/12	SBP	CLEAR	SE	15-20	SOUTH	BATTERY/SKY
135	07/22/91	11/12	SBP	CLEAR	SE	15-20	SOUTH	BATTERY/SKY
136	07/22/91	11/12	SBP	CLEAR	SE	15-20	SOUTH	BATTERY/SKY
137	07/22/91	11/12	SBP	CLEAR	SE	15-20	SOUTH	BATTERY/SKY
138	07/22/91	11/12	SBP	CLEAR	SE	15-20	SOUTH	BATTERY/SKY
139	07/22/91	11/12	SBP	CLEAR	SE	15-20	SOUTH	BATTERY/SKY
140	07/22/91	11/12	SBP	CLEAR	SE	15-20	SOUTH	BATTERY/SKY
141	07/29/91	11/12	GW	OC/RAIN	NE	5-10	SOUTH	CLOUDY
142	07/29/91	11/12	GW	OC/RAIN	NE	5-10	SOUTH	CLOUDY
143	07/29/91	11/12	GW	OC/RAIN	NE	5-10	SOUTH	CLOUDY
144	07/29/91	11/12	GW	OC/RAIN	NE	5-10	SOUTH	CLOUDY
145	07/29/91	11/12	GW	OC/RAIN	NE	5-10	SOUTH	CLOUDY
146	07/29/91	11/12	REA	RAIN	EAST	10	SOUTH	BATTERY/SKY
147	07/29/91	11/12	REA	RAIN	EAST	10	SOUTH	BATTERY/SKY
148	07/29/91	11/12	REA	RAIN	EAST	10	SOUTH	BATTERY/SKY
149	07/29/91	11/12	REA	RAIN	EAST	10	SOUTH	BATTERY/SKY
150	07/29/91	11/12	REA	RAIN	EAST	10	SOUTH	BATTERY/SKY
151	07/29/91	11/12	SBP	RAIN	EAST	5-10	SOUTH	BATTERY/SKY
152	07/29/91	11/12	SBP	RAIN	EAST	5-10	SOUTH	BATTERY/SKY
153	07/29/91	11/12	SBP	RAIN	EAST	5-10	SOUTH	BATTERY/SKY
154	07/29/91	11/12	SBP	RAIN	EAST	5-10	SOUTH	BATTERY/SKY

OBS	EMISSION CONTROL SYSTEM	OVEN NUMBER	TIME OF DAY	SOURCE OF EMISSIONS	CUMULATIVE TIME OF EMISSIONS SECONDS	MAXIMUM OPACITY %	COMMENTS
133	SHENANGO	1153	12:30	DOOR	50	85	
134	SHENANGO	1222	12:42	DOOR	15	10	
135	SHENANGO	1229	12:50	DOOR	30	20	STICKER
136	SHENANGO	1232	13:00	DOOR	20	30	
137	SHENANGO	1242	13:14	DOOR	45	25	
138	SHENANGO	1262	13:23	DOOR	55	55	
139	SHENANGO	1272	13:35	DOOR	70	45	85 SEC PUSH
140	SHENANGO	1214	13:45	DOOR	70	65	
141	SHENANGO	1242	13:10	DOOR	20	20	QA/QC
142	SHENANGO	1262	13:17	DOOR	24	65	QA/QC
143	SHENANGO	1272	13:27	DOOR	124	30	QA/QC
144	SHENANGO	1168	13:40	DOOR	37	40	QA/QC
145	SHENANGO	1214	14:09	DOOR	105	80	QA/QC
146	SHENANGO	1242	13:10	DOOR	20	25	QA/QC
147	SHENANGO	1262	13:17	DOOR	20	55	QA/QC
148	SHENANGO	1272	13:27	DOOR	122	30	QA/QC
149	SHENANGO	1168	13:40	DOOR	40	45	QA/QC
150	SHENANGO	1214	14:08	DOOR	110	50	QA/QC
151	SHENANGO	1242	13:10	DOOR	20	25	QA/QC
152	SHENANGO	1262	13:17	DOOR	20	55	QA/QC
153	SHENANGO	1272	13:27	DOOR	122	30	QA/QC
154	SHENANGO	1168	13:40	DOOR	40	45	QA/QC

PUSHER SIDE OVEN EMISSIONS OBSERVATIONS
DURING PUSHING OPERATIONS ONLY
KRESS DEMONSTRATION PROJECT BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

OBS	DATE	BATTERY	OBSERVERS INITIALS	WEATHER	WIND DIRECTION	WIND SPEED, MPH	OBSERVER LOCATION	BACKGROUND
155	07/29/91	11/12	SBP	RAIN	EAST	5-10	SOUTH	BATTERY/SKY
156	07/29/91	11/12	SBP	RAIN	EAST	5 10	SOUTH	BATTERY/SKY
157	07/29/91	11/12	SBP	RAIN	EAST	5 10	SOUTH	BATTERY/SKY
158	07/29/91	11/12	SBP	RAIN	EAST	5-10	SOUTH	BATTERY/SKY
159	07/29/91	11/12	SBP	RAIN	EAST	5-10	SOUTH	BATTERY/SKY
160	07/29/91	11/12	SBP	RAIN	EAST	5-10	SOUTH	BATTERY/SKY
161	08/01/91	11/12	SBP	CLEAR	SE/W	7-12	SOUTH	BATTERY/SKY
162	08/01/91	11/12	SBP	CLEAR	SE/W	7-12	SOUTH	BATTERY/SKY
163	08/01/91	11/12	SBP	CLEAR	SE/W	7-12	SOUTH	BATTERY/SKY
164	08/01/91	11/12	SBP	CLEAR	SE/W	7 12	SOUTH	BATTERY/SKY
165	08/01/91	11/12	SBP	CLEAR	SE/W	7-12	SOUTH	BATTERY/SKY
166	08/05/91	11/12	SBP	CLEAR	NW	10 15	SOUTH	BATTERY/SKY
167	08/05/91	11/12	SBP	CLEAR	NW	10 15	SOUTH	BATTERY/SKY
168	08/05/91	11/12	SBP	CLEAR	NW	10 15	SOUTH	BATTERY/SKY
169	08/05/91	11/12	SBP	CLEAR	NW	10 15	SOUTH	BATTERY/SKY
170	08/05/91	11/12	SBP	CLEAR	NW	10-15	SOUTH	BATTERY/SKY
171	08/05/91	11/12	SBP	CLEAR	NW	10-15	SOUTH	BATTERY/SKY
172	08/05/91	11/12	SBP	CLEAR	NW	10 15	SOUTH	BATTERY/SKY
173	08/05/91	11/12	SBP	CLEAR	NW	10-15	SOUTH	BATTERY/SKY
174	08/05/91	11/12	SBP	CLEAR	NW	10 15	SOUTH	BATTERY/SKY
175	08/05/91	11/12	SBP	CLEAR	NW	10 15	SOUTH	BATTERY/SKY
176	08/12/91	11/12	SBP	CLEAR	SOUTH	5 10	SOUTH	BATTERY

OBS	EMISSION CONTROL SYSTEM	OVEN NUMBER	TIME OF DAY	SOURCE OF EMISSIONS	CUMULATIVE TIME OF EMISSIONS SECONDS	MAXIMUM OPACITY %	COMMENTS
155	SHENANGO	1214	14:08	DOOR	110	50	QA/QC
156	SHENANGO	1101	14:21	DOOR	80	100	
157	SHENANGO	1224	14:35	DOOR	85	70	
158	SHENANGO	1234	14:43	DOOR	90	80	
159	SHENANGO	1244	14:53	DOOR	55	65	90 SEC PUSH
160	SHENANGO	1216	15:08	DOOR	75	35	
161	KIDC	1148	11:13	DOOR	52	45	
162	SHENANGO	1135	11:23	DOOR	54	100	HEAVY SMOKE
163	KIDC	1151	11:42	DOOR	130	100	
164	SHENANGO	1222	11:57	DOOR	19	100	
165	SHENANGO	1153	12:06	DOOR	39	15	
166	SHENANGO	1148	11:23	DOOR	62	20	
167	SHENANGO	1151	12:10	DOOR	34	85	HVY SMOKE
168	SHENANGO	1135	12:32	DOOR	57	100	HVY SMOKE
169	SHENANGO	1153	12:40	DOOR	08	50	HVY SMOKE
170	SHENANGO	1217	13:00	DOOR	25	10	HVY SMOKE
171	SHENANGO	1229	13:09	DOOR	17	20	STICKER
172	SHENANGO	1237	13:24	DOOR	81	100	HVY SMOKE
173	SHENANGO	1247	13:40	DOOR	6	5	
174	SHENANGO	1149	14:02	DOOR	63	70	
175	SHENANGO	1209	14:18	DOOR	12	10	
176	SHENANGO	1135	11:31	DOOR	45	100	

PUSHER SIDE OVEN EMISSIONS OBSERVATIONS
DURING PUSHING OPERATIONS ONLY
KRESS DEMONSTRATION PROJECT - BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

OBS	DATE	BATTERY	OBSERVERS INITIALS	WEATHER	WIND DIRECTION	WIND SPEED, MPH	OBSERVER LOCATION	BACKGROUND
177	08/12/91	11/12	SBP	CLEAR	SOUTH	5-10	SOUTH	BATTERY
178	08/12/91	11/12	SBP	CLEAR	SOUTH	5-10	SOUTH	BATTERY
179	08/12/91	11/12	SBP	CLEAR	SOUTH	5-10	SOUTH	BATTERY
180	08/14/91	11/12	SBP	OVERCAST	SW	15-20	SOUTH	BATTERY
181	08/14/91	11/12	SBP	OVERCAST	SW	15-20	SOUTH	BATTERY
182	08/14/91	11/12	SBP	OVERCAST	SW	15-20	SOUTH	BATTERY
183	08/14/91	11/12	SBP	OVERCAST	SW	15-20	SOUTH	BATTERY
184	08/14/91	11/12	SBP	OVERCAST	SW	15-20	SOUTH	BATTERY
185	08/14/91	11/12	SBP	OVERCAST	SW	15-20	SOUTH	BATTERY
186	08/19/91	11/12	SBP	OVERCAST	NW	10-15	SOUTH	BATTERY
187	08/19/91	11/12	SBP	OVERCAST	NW	10-15	SOUTH	BATTERY
188	08/19/91	11/12	SBP	OVERCAST	NW	10-15	SOUTH	BATTERY
189	08/19/91	11/12	SBP	OVERCAST	NW	10-15	SOUTH	BATTERY
190	08/19/91	11/12	SBP	OVERCAST	NW	10-15	SOUTH	BATTERY
191	08/19/91	11/12	SBP	OVERCAST	NW	10-15	SOUTH	BATTERY
192	08/19/91	11/12	SBP	OVERCAST	NW	10-15	SOUTH	BATTERY
193	08/19/91	11/12	SBP	OVERCAST	NW	10-15	SOUTH	BATTERY
194	08/19/91	11/12	SBP	OVERCAST	NW	10-15	SOUTH	BATTERY
195	08/19/91	11/12	SBP	OVERCAST	NW	10-15	SOUTH	BATTERY
196	08/26/91	11/12	SBP	OVERCAST	SE	10-15	SOUTH	BATTERY
197	08/26/91	11/12	SBP	OVERCAST	SE	10-15	SOUTH	BATTERY
198	08/26/91	11/12	SBP	OVERCAST	SE	10-15	SOUTH	BATTERY

OBS	EMISSION CONTROL SYSTEM	OVEN NUMBER	TIME OF DAY	SOURCE OF EMISSIONS	CUMULATIVE TIME OF EMISSIONS SECONDS	MAXIMUM OPACITY %	COMMENTS
177	SHENANGO	1151	11:47	DOOR	113	80	
178	SHENANGO	1201	12:03	DOOR	50	35	
179	SHENANGO	1153	12:21	DOOR	32	35	
180	SHENANGO	1208	13:05	DOOR	42	25	
181	SHENANGO	1248	13:20	DOOR	12	65	
182	SHENANGO	1258	13:35	DOOR	48	50	
183	SHENANGO	1268	13:51	DOOR	26	40	
184	SHENANGO	1201	14:15	DOOR	33	15	
185	SHENANGO	1211	14:23	DOOR	8	10	
186	CHEMICO	1135	11:18	DOOR	52	75	
187	CHEMICO	1217	11:26	DOOR	42	35	PUSH3X STKR
188	CHEMICO	1148	11:38	DOOR	23	45	
189	CHEMICO	1151	12:08	DOOR	86	40	
190	CHEMICO	1153	12:26	DOOR	63	100	
191	CHEMICO	1236	12:43	DOOR	45	100	
192	CHEMICO	1246	12:50	DOOR	36	15	
193	CHEMICO	1208	13:02	DOOR	41	25	
194	CHEMICO	1238	13:14	DOOR	72	100	
195	CHEMICO	1248	13:22	DOOR	51	35	
196	SHENANGO	1148	11:17	DOOR	62	40	
197	SHENANGO	1135	11:38	DOOR	14	30	
198	SHENANGO	1151	11:47	DOOR	76	85	

PUSHER SIDE OVEN EMISSIONS OBSERVATIONS
DURING PUSHING OPERATIONS ONLY
KRESS DEMONSTRATION PROJECT - BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

OBS	DATE	BATTERY	OBSERVERS INITIALS	WEATHER	WIND DIRECTION	WIND SPEED, MPH	OBSERVER LOCATION	BACKGROUND
199	08/26/91	11/12	SBP	OVERCAST	SE	10-15	SOUTH	BATTERY
200	08/26/91	11/12	SBP	OVERCAST	SE	10-15	SOUTH	BATTERY
201	08/26/91	11/12	SBP	OVERCAST	SE	10-15	SOUTH	BATTERY
202	08/26/91	11/12	SBP	OVERCAST	SE	10-15	SOUTH	BATTERY
203	08/26/91	11/12	SBP	OVERCAST	SE	10-15	SOUTH	BATTERY
204	08/26/91	11/12	SBP	OVERCAST	SE	10-15	SOUTH	BATTERY
205	08/26/91	11/12	SBP	OVERCAST	SE	10-15	SOUTH	BATTERY
206	09/05/91	11/12	SBP	CLEAR	NE&S	10-15	SOUTH	BATTERY
207	09/05/91	11/12	SBP	CLEAR	NE&S	10-15	SOUTH	BATTERY
208	09/05/91	11/12	SBP	CLEAR	NE&S	10-15	SOUTH	BATTERY
209	09/05/91	11/12	SBP	CLEAR	NE&S	10-15	SOUTH	BATTERY
210	09/05/91	11/12	SBP	CLEAR	NE&S	10-15	SOUTH	BATTERY
211	09/05/91	11/12	SBP	CLEAR	NE&S	10-15	SOUTH	BATTERY
212	09/05/91	11/12	SBP	CLEAR	NE&S	10-15	SOUTH	BATTERY
213	09/05/91	11/12	SBP	CLEAR	NE&S	10-15	SOUTH	BATTERY
214	09/05/91	11/12	SBP	CLEAR	NE&S	10-15	SOUTH	BATTERY
215	09/05/91	11/12	SBP	CLEAR	NE&S	10-15	SOUTH	BATTERY
216	09/09/91	11/12	SBP	CLEAR	SW/SE	5-20	SOUTH	BATTERY
217	09/09/91	11/12	SBP	CLEAR	SW/SE	5-20	SOUTH	BATTERY
218	09/09/91	11/12	SBP	CLEAR	SW/SE	5-20	SOUTH	BATTERY
219	09/09/91	11/12	SBP	CLEAR	SW/SE	5-20	SOUTH	BATTERY
220	09/09/91	11/12	SBP	CLEAR	SW/SE	5-20	SOUTH	BATTERY

OBS	EMISSION CONTROL SYSTEM	OVEN NUMBER	TIME OF DAY	SOURCE OF EMISSIONS	CUMULATIVE TIME OF EMISSIONS SECONDS	MAXIMUM OPACITY %	COMMENTS
199	SHENANGO	1153	11:55	DOOR	69	10	
200	SHENANGO	1236	12:36	DOOR	45	100	
201	SHENANGO	1246	12:47	DOOR	58	5	
202	SHENANGO	1208	13:03	DOOR	37	25	
203	SHENANGO	1229	13:07	DOOR	26	80	
204	SHENANGO	1238	13:32	DOOR	32	100	
205	SHENANGO	1248	13:40	DOOR	65	35	
206	KIDC	1148	11:23	DOOR	40	85	KRESS
207	CHEMICO	1135	11:37	DOOR	57	100	
208	KIDC	1151	11:50	DOOR	101	55	KRESS
209	CHEMICO	1236	12:02	DOOR	18	75	
210	CHEMICO	1153	12:13	DOOR	22	15	
211	CHEMICO	1246	12:34	DOOR	27	20	
212	CHEMICO	1208	12:41	DOOR	29	35	
213	CHEMICO	1238	12:49	DOOR	45	100	
214	CHEMICO	1248	12:58	DOOR	55	15	
215	CHEMICO	1258	13:07	DOOR	27	10	
216	CHEMICO	1148	11:27	DOOR	73	55	
217	CHEMICO	1135	11:53	DOOR	49	65	
218	CHEMICO	1151	12:02	DOOR	63	20	
219	CHEMICO	1236	12:17	DOOR	16	15	
220	CHEMICO	1153	12:40	DOOR	10	5	

PUSHER SIDE OVEN EMISSIONS OBSERVATIONS
DURING PUSHING OPERATIONS ONLY
KRESS DEMONSTRATION PROJECT - BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

OBS	DATE	BATTERY	OBSERVERS INITIALS	WEATHER	WIND DIRECTION	WIND SPEED, MPH	OBSERVER LOCATION	BACKGROUND
221	09/09/91	11/12	SBP	CLEAR	SW/SE	5-20	SOUTH	BATTERY
222	09/09/91	11/12	SBP	CLEAR	SW/SE	5 20	SOUTH	BATTERY
223	09/09/91	11/12	SBP	CLEAR	SW/SE	5 20	SOUTH	BATTERY
224	09/09/91	11/12	SBP	CLEAR	SW/SE	5-20	SOUTH	BATTERY
225	09/09/91	11/12	SBP	CLEAR	SW/SE	5-20	SOUTH	BATTERY
226	09/11/91	11/12	SBP	OVERCAST	SW	10 15	SOUTH	BATTERY
227	09/11/91	11/12	SBP	OVERCAST	SW	10 15	SOUTH	BATTERY
228	09/11/91	11/12	SBP	OVERCAST	SW	10-15	SOUTH	BATTERY
229	09/11/91	11/12	SBP	OVERCAST	SW	10 15	SOUTH	BATTERY
230	09/11/91	11/12	SBP	OVERCAST	SW	10-15	SOUTH	BATTERY
231	09/11/91	11/12	SBP	OVERCAST	SW	10-15	SOUTH	BATTERY
232	09/11/91	11/12	SBP	OVERCAST	SW	10 15	SOUTH	BATTERY
233	09/11/91	11/12	SBP	OVERCAST	SW	10-15	SOUTH	BATTERY
234	09/11/91	11/12	SBP	OVERCAST	SW	10-15	SOUTH	BATTERY
235	09/11/91	11/12	SBP	OVERCAST	SW	10-15	SOUTH	BATTERY
236	09/11/91	11/12	SBP	OVERCAST	SW	10 15	SOUTH	BATTERY
237	09/23/91	11/12	SBP	OVERCAST	SW	15 20	SOUTH	BATTERY
238	09/23/91	11/12	SBP	OVERCAST	SW	15-20	SOUTH	BATTERY
239	09/23/91	11/12	SBP	OVERCAST	SW	15-20	SOUTH	BATTERY
240	09/23/91	11/12	SBP	OVERCAST	SW	15-20	SOUTH	BATTERY
241	09/23/91	11/12	SBP	OVERCAST	SW	15 20	SOUTH	BATTERY
242	09/23/91	11/12	SBP	OVERCAST	SW	15-20	SOUTH	BATTERY

OBS	EMISSION CONTROL SYSTEM	OVEN NUMBER	TIME OF DAY	SOURCE OF EMISSIONS	CUMULATIVE TIME OF EMISSIONS SECONDS	MAXIMUM OPACITY %	COMMENTS
221	CHEMICO	1246	12:52	DOOR	68	15	
222	CHEMICO	1208	13:14	DOOR	61	25	
223	CHEMICO	1238	13:23	DOOR	35	90	
224	CHEMICO	1248	13:33	DOOR	45	10	
225	CHEMICO	1258	13:49	DOOR	28	10	
226	SHENANGO	1148	11:21	DOOR	63	50	
227	SHENANGO	1135	11:43	DOOR	31	100	
228	SHENANGO	1151	11:54	DOOR	64	15	
229	SHENANGO	1229	11:57	DOOR	5	5	STICKER
230	SHENANGO	1236	12:15	DOOR	46	100	
231	SHENANGO	1153	12:27	DOOR	14	30	
232	SHENANGO	1246	12:45	DOOR	40	10	
233	SHENANGO	1208	12:55	DOOR	59	15	
234	SHENANGO	1238	13:02	DOOR	79	100	
235	SHENANGO	1248	13:13	DOOR	64	45	
236	SHENANGO	1258	13:25	DOOR	26	35	
237	SHENANGO	1148	11:18	DOOR	66	100	
238	SHENANGO	1135	11:28	DOOR	54	35	
239	SHENANGO	1151	11:37	DOOR	42	45	
240	SHENANGO	1236	11:51	DOOR	27	100	
241	SHENANGO	1153	12:00	DOOR	47	15	
242	SHENANGO	1246	12:10	DOOR	20	35	

PUSHER SIDE OVEN EMISSIONS OBSERVATIONS
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KRESS DEMONSTRATION PROJECT - BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

OBS	DATE	BATTERY	OBSERVERS INITIALS	WEATHER	WIND DIRECTION	WIND SPEED, MPH	OBSERVER LOCATION	BACKGROUND
243	09/23/91	11/12	SBP	OVERCAST	SW	15-20	SOUTH	BATTERY
244	09/23/91	11/12	SBP	OVERCAST	SW	15-20	SOUTH	BATTERY
245	09/23/91	11/12	SBP	OVERCAST	SW	15-20	SOUTH	BATTERY
246	09/23/91	11/12	SBP	OVERCAST	SW	15-20	SOUTH	BATTERY
247	10/01/91	11/12	SBP	OVERCAST	SW	15-20	SOUTH	BATTERY
248	10/01/91	11/12	SBP	OVERCAST	SW	15-20	SOUTH	BATTERY
249	10/01/91	11/12	SBP	OVERCAST	SW	15-20	SOUTH	BATTERY
250	10/01/91	11/12	SBP	OVERCAST	SW	15-20	SOUTH	BATTERY
251	10/01/91	11/12	SBP	OVERCAST	SW	15-20	SOUTH	BATTERY
252	10/01/91	11/12	SBP	OVERCAST	SW	15-20	SOUTH	BATTERY
253	10/01/91	11/12	SBP	OVERCAST	SW	15-20	SOUTH	BATTERY
254	10/04/91	11/12	SBP	CLEAR	NW	0-5	SOUTH	BATTERY
255	10/04/91	11/12	SBP	CLEAR	NW	0-5	SOUTH	BATTERY
256	10/04/91	11/12	SBP	CLEAR	NW	0-5	SOUTH	BATTERY
257	10/04/91	11/12	SBP	CLEAR	NW	0-5	SOUTH	BATTERY
258	10/04/91	11/12	SBP	CLEAR	NW	0-5	SOUTH	BATTERY
259	10/04/91	11/12	SBP	CLEAR	NW	0-5	SOUTH	BATTERY
260	10/08/91	11/12	SBP	CLEAR	NW	15-20	SOUTH	BATTERY
261	10/08/91	11/12	SBP	CLEAR	NW	15-20	SOUTH	BATTERY
262	10/08/91	11/12	SBP	CLEAR	NW	15-20	SOUTH	BATTERY
263	10/08/91	11/12	SBP	CLEAR	NW	15-20	SOUTH	BATTERY
264	10/08/91	11/12	SBP	CLEAR	NW	15-20	SOUTH	BATTERY

OBS	EMISSION CONTROL SYSTEM	OVEN NUMBER	TIME OF DAY	SOURCE OF EMISSIONS	CUMULATIVE TIME OF EMISSIONS SECONDS	MAXIMUM OPACITY %	COMMENTS
243	SHENANGO	1171	12:23	DOOR	21	90	
244	SHENANGO	1208	12:37	DOOR	71	25	
245	SHENANGO	1238	12:47	DOOR	61	100	
246	SHENANGO	1248	12:57	DOOR	79	10	
247	KIDC	1148	11:18	DOOR	41	35	
248	SHENANGO	1222	11:30	DOOR	33	50	
249	KIDC	1151	11:48	DOOR	50	100	
250	SHENANGO	1135	12:02	DOOR	70	55	
251	KIDC	1153	12:22	DOOR	48	100	
252	KIDC	1149	14:35	DOOR	72	60	
253	KIDC	1154	16:10	DOOR	30	25	
254	KIDC	1148	11:20	DOOR	61	35	
255	SHENANGO	1224	11:35	DOOR	66	40	
256	KIDC	1151	11:45	DOOR	46	20	
257	SHENANGO	1135	12:09	DOOR	55	85	HEAVY AT END
258	SHENANGO	1153	12:17	DOOR	77	15	
259	SHENANGO	1244	12:35	DOOR	54	25	
260	SHENANGO	1134	11:16	DOOR	126	85	
261	KIDC	1148	11:47	DOOR	69	90	HEAVY AT END
262	SHENANGO	1224	11:59	DOOR	86	100	
263	SHENANGO	1234	12:07	DOOR	85	35	
264	KIDC	1151	12:12	DOOR	42	25	

PUSHER SIDE OVEN EMISSIONS OBSERVATIONS 10:50 Tuesday, March 31, 1992 13
DURING PUSHING OPERATIONS ONLY
KRESS DEMONSTRATION PROJECT - BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

OBS	DATE	BATTERY	OBSERVERS INITIALS	WEATHER	WIND DIRECTION	WIND SPEED, MPH	OBSERVER LOCATION	BACKGROUND
265	10/08/91	11/12	SBP	CLEAR	NW	15-20	SOUTH	BATTERY
266	10/08/91	11/12	SBP	CLEAR	NW	15-20	SOUTH	BATTERY
267	10/08/91	11/12	SBP	CLEAR	NW	15-20	SOUTH	BATTERY
268	10/08/91	11/12	SBP	CLEAR	NW	15-20	SOUTH	BATTERY
269	10/08/91	11/12	SBP	CLEAR	NW	15-20	SOUTH	BATTERY
270	10/08/91	11/12	SBP	CLEAR	NW	15-20	SOUTH	BATTERY
271	10/10/91	11/12	SBP	CLEAR	SW	15-20	SOUTH	BATTERY
272	10/10/91	11/12	SBP	CLEAR	SW	15-20	SOUTH	BATTERY
273	10/10/91	11/12	SBP	CLEAR	SW	15-20	SOUTH	BATTERY
274	10/10/91	11/12	SBP	CLEAR	SW	15-20	SOUTH	BATTERY
275	10/10/91	11/12	SBP	CLEAR	SW	15-20	SOUTH	BATTERY
276	10/12/91	11	SBP	CLEAR	NW	10-15	SOUTH	BATTERY
277	10/12/91	11	SBP	CLEAR	NW	10-15	SOUTH	BATTERY
278	10/12/91	11	SBP	CLEAR	NW	10-15	SOUTH	BATTERY
279	10/12/91	11	SBP	CLEAR	NW	10-15	SOUTH	BATTERY
280	10/12/91	11	SBP	CLEAR	NW	10 15	SOUTH	BATTERY
281	10/12/91	11	SBP	CLEAR	NW	10-15	SOUTH	BATTERY
282	10/12/91	11	SBP	CLEAR	NW	10-15	SOUTH	BATTERY
283	10/12/91	11	SBP	CLEAR	NW	10-15	SOUTH	BATTERY
284	10/12/91	11	SBP	CLEAR	NW	10-15	SOUTH	BATTERY
285	10/14/91	11/12	SBP	CLEAR	SE	15-20	SOUTH	BATTERY
286	10/14/91	11/12	SBP	CLEAR	SE	15 20	SOUTH	BATTERY

OBS	EMISSION CONTROL SYSTEM	OVEN NUMBER	TIME OF DAY	SOURCE OF EMISSIONS	CUMULATIVE TIME OF EMISSIONS SECONDS	MAXIMUM OPACITY %	COMMENTS
265	SHENANGO	1244	12:18	DOOR	44	20	
266	SHENANGO	1216	12:34	DOOR	64	40	
267	KIDC	1153	12:38	DOOR	56	90	
268	KIDC	1149	14:32	DOOR	59	25	
269	KIDC	1152	15:03	DOOR	56	30	
270	KIDC	1154	15:41	DOOR	64	100	
271	KIDC	1148	11:56	DOOR	33	100	
272	KIDC	1151	12:21	DOOR	78	30	
273	KIDC	1153	12:51	DOOR	59	10	
274	KIDC	1149	14:09	DOOR	61	100	
275	KIDC	1152	14:30	DOOR	48	10	
276	KIDC	1148	11:30	DOOR	51	100	
277	KIDC	1151	12:11	DOOR	74	45	
278	KIDC	1153	12:45	DOOR	25	10	
279	KIDC	1149	14:15	DOOR	76	100	
280	KIDC	1152	14:45	DOOR	60	100	
281	KIDC	1154	15:21	DOOR	39	100	
282	KIDC	1147	17:27	DOOR	43	100	
283	KIDC	1135	17:48	DOOR	65	100	
284	KIDC	1171	18:17	DOOR	23	100	
285	KIDC	1148	11:31	DOOR	78	25	
286	SHENANGO	1224	11:42	DOOR	88	35	

PUSHER SIDE OVEN EMISSIONS OBSERVATIONS
DURING PUSHING OPERATIONS ONLY
KRESS DEMONSTRATION PROJECT - BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

OBS	DATE	BATTERY	OBSERVERS INITIALS	WEATHER	WIND DIRECTION	WIND SPEED, MPH	OBSERVER LOCATION	BACKGROUND
287	10/14/91	11/12	SBP	CLEAR	SE	15-20	SOUTH	BATTERY
288	10/14/91	11/12	SBP	CLEAR	SE	15-20	SOUTH	BATTERY
289	10/14/91	11/12	SBP	CLEAR	SE	15-20	SOUTH	BATTERY
290	10/14/91	11/12	SBP	CLEAR	SE	15 20	SOUTH	BATTERY
291	10/14/91	11/12	SBP	CLEAR	SE	15-20	SOUTH	BATTERY
292	10/14/91	11/12	SBP	CLEAR	SE	15-20	SOUTH	BATTERY
293	10/14/91	11/12	SBP	CLEAR	SE	15-20	SOUTH	BATTERY
294	10/14/91	11/12	SBP	CLEAR	SE	15 20	SOUTH	BATTERY
295	10/14/91	11/12	SBP	CLEAR	SOUTH	15-20	SOUTH	BATTERY
296	10/14/91	11/12	SBP	CLEAR	SOUTH	15-20	SOUTH	BATTERY
297	10/14/91	11/12	SBP	CLEAR	SOUTH	15-20	SOUTH	BATTERY
298	10/15/91	11/12	SBP	OVERCAST	SE	15-20	SOUTH	BATTERY
299	10/17/91	11	SBP	RAIN	NORTH	15-20	SOUTH	BATTERY
300	10/18/91	11	SBP	CLEAR	NW/SW	15-20	SOUTH	BATTERY
301	10/18/91	11	SBP	CLEAR	NW/SW	15 20	SOUTH	BATTERY
302	10/18/91	11	SBP	CLEAR	NW/SW	15-20	SOUTH	BATTERY
303	10/18/91	11	SBP	CLEAR	NW/SW	15 20	SOUTH	BATTERY
304	10/18/91	11	SBP	CLEAR	NW/SW	15-20	SOUTH	BATTERY
305	10/18/91	11	SBP	CLEAR	NW/SW	15 20	SOUTH	BATTERY
306	10/18/91	11	SBP	CLEAR	NW/SW	15-20	SOUTH	BATTERY
307	10/18/91	11	SBP	CLEAR	NW/SW	15-20	SOUTH	BATTERY
308	10/20/91	11	SBP	CLEAR	NORTH	15-20	SOUTH	BATTERY

OBS	EMISSION CONTROL SYSTEM	OVEN NUMBER	TIME OF DAY	SOURCE OF EMISSIONS	CUMULATIVE TIME OF EMISSIONS SECONDS	MAXIMUM OPACITY %	COMMENTS
287	KIDC	1151	12:03	DOOR	71	30	
288	SHENANGO	1234	12:12	DOOR	82	35	
289	KIDC	1153	12:46	DOOR	58	65	
290	KIDC	1149	14:19	DOOR	54	75	
291	KIDC	1152	14:43	DOOR	64	90	
292	KIDC	1154	15:04	DOOR	47	50	
293	SHENANGO	1256	17:02	DOOR	52	20	
294	KIDC	1149	17:16	DOOR	76	100	
295	SHENANGO	1261	17:28	DOOR	65	75	
296	KIDC	1135	17:38	DOOR	71	100	
297	KIDC	1171	17:58	DOOR	50	90	
298	SHENANGO	1153	12:22	DOOR	49	50	
299	KIDC	1148	11:46	DOOR	21	25	
300	KIDC	1151	12:02	DOOR	67	30	
301	KIDC	1153	12:27	DOOR	74	35	
302	KIDC	1149	14:18	DOOR	71	20	
303	KIDC	1152	14:48	DOOR	63	55	
304	KIDC	1154	15:11	DOOR	76	100	
305	KIDC	1135	17:13	DOOR	65	100	
306	KIDC	1147	17:52	DOOR	17	100	
307	KIDC	1171	18:11	DOOR	16	100	
308	KIDC	1151	11:48	DOOR	69	100	

PUSHER SIDE OVEN EMISSIONS OBSERVATIONS
DURING PUSHING OPERATIONS ONLY
KRESS DEMONSTRATION PROJECT - BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

OBS	DATE	BATTERY	OBSERVERS INITIALS	WEATHER	WIND DIRECTION	WIND SPEED, MPH	OBSERVER LOCATION	BACKGROUND
309	10/20/91	11	SBP	CLEAR	NORTH	15-20	SOUTH	BATTERY
310	10/20/91	11	SBP	CLEAR	NORTH	15-20	SOUTH	BATTERY
311	10/20/91	11	SBP	CLEAR	NORTH	15-20	SOUTH	BATTERY
312	10/20/91	11	SBP	CLEAR	NORTH	15-20	SOUTH	BATTERY
313	10/20/91	11	SBP	CLEAR	NORTH	15-20	SOUTH	BATTERY
314	10/20/91	11	SBP	CLEAR	NORTH	15-20	SOUTH	BATTERY
315	10/20/91	11	SBP	CLEAR	NORTH	15-20	SOUTH	BATTERY
316	10/23/91	11/12	SBP	CLEAR	SW/SE	10-15	SOUTH	BATTERY
317	10/23/91	11/12	SBP	CLEAR	SW/SE	10-15	SOUTH	BATTERY
318	10/23/91	11/12	SBP	CLEAR	SW/SE	10-15	SOUTH	BATTERY
319	10/23/91	11/12	SBP	CLEAR	SW/SE	10-15	SOUTH	BATTERY
320	10/23/91	11/12	SBP	CLEAR	SW/SE	10-15	SOUTH	BATTERY
321	10/23/91	11/12	SBP	CLEAR	SW/SE	10-15	SOUTH	BATTERY
322	10/23/91	11/12	SBP	CLEAR	SW/SE	10-15	SOUTH	BATTERY
323	10/23/91	11/12	SBP	CLEAR	SW/SE	10-15	SOUTH	BATTERY
324	10/23/91	11/12	SBP	CLEAR	SW/SE	10-15	SOUTH	BATTERY
325	10/23/91	11/12	SBP	CLEAR	SW/SE	10-15	SOUTH	BATTERY
326	10/23/91	11/12	SBP	CLEAR	SOUTH	10-15	SOUTH	BATTERY
327	10/23/91	11/12	SBP	CLEAR	SOUTH	10-15	SOUTH	BATTERY
328	10/23/91	11/12	SBP	CLEAR	SOUTH	10-15	SOUTH	BATTERY
329	10/23/91	11/12	SBP	CLEAR	SOUTH	10-15	SOUTH	BATTERY
330	10/23/91	11/12	SBP	CLEAR	NE	10-15	SOUTH	BATTERY

OBS	EMISSION CONTROL SYSTEM	OVEN NUMBER	TIME OF DAY	SOURCE OF EMISSIONS	CUMULATIVE TIME OF EMISSIONS SECONDS	MAXIMUM OPACITY %	COMMENTS
309	KIDC	1148	12:11	DOOR	73	100	
310	KIDC	1153	12:37	DOOR	76	65	
311	KIDC	1149	14:51	DOOR	89	75	
312	KIDC	1152	15:15	DOOR	78	35	
313	KIDC	1154	15:40	DOOR	73	100	
314	KIDC	1135	17:49	DOOR	48	100	
315	KIDC	1171	18:09	DOOR	27	100	
316	SHENANGO	1134	11:35	DOOR	69	100	
317	KIDC	1148	11:52	DOOR	65	25	
318	SHENANGO	1224	11:54	DOOR	61	55	
319	SHENANGO	1234	12:04	DOOR	165	100	
320	KIDC	1151	12:21	DOOR	71	35	
321	KIDC	1153	12:56	DOOR	91	45	
322	KIDC	1149	14:29	DOOR	84	35	
323	SHENANGO	1258	14:40	DOOR	57	25	
324	SHENANGO	1268	14:48	DOOR	70	70	
325	KIDC	1172	15:00	DOOR	75	100	
326	KIDC	1152	15:20	DOOR	63	30	
327	KIDC	1135	17:15	DOOR	29	55	
328	KIDC	1154	17:50	DOOR	35	35	
329	KIDC	1171	18:11	DOOR	57	100	
330	KIDC	1148	11:50	DOOR	73	25	

PUSHER SIDE OVEN EMISSIONS OBSERVATIONS
DURING PUSHING OPERATIONS ONLY
KRESS DEMONSTRATION PROJECT - BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

OBS	DATE	BATTERY	OBSERVERS INITIALS	WEATHER	WIND DIRECTION	WIND SPEED, MPH	OBSERVER LOCATION	BACKGROUND
331	10/29/91	11/12	SBP	CLEAR	NE	10-15	SOUTH	BATTERY
332	10/29/91	11/12	SBP	CLEAR	NE	10 15	SOUTH	BATTERY
333	10/29/91	11/12	SBP	CLEAR	NE	10-15	SOUTH	BATTERY
334	10/29/91	11/12	SBP	CLEAR	NE	10-15	SOUTH	BATTERY
335	10/29/91	11/12	SBP	CLEAR	NE	10-15	SOUTH	BATTERY
336	10/29/91	11/12	SBP	CLEAR	NE	10-15	SOUTH	BATTERY
337	10/29/91	11/12	SBP	CLEAR	NE	10-15	SOUTH	BATTERY
338	10/29/91	11/12	SBP	CLEAR	NE	10 15	SOUTH	BATTERY
339	10/29/91	11/12	SBP	CLEAR	NE	10 15	SOUTH	BATTERY
340	11/05/91	11/12	SBP	CLEAR	NE/NW	15-20	SOUTH	BATTERY
341	11/05/91	11/12	SBP	CLEAR	NE/NW	15 20	SOUTH	BATTERY
342	11/05/91	11/12	SBP	CLEAR	NE/NW	15-20	SOUTH	BATTERY
343	11/05/91	11/12	SBP	CLEAR	NE/NW	15-20	SOUTH	BATTERY
344	11/05/91	11/12	SBP	CLEAR	NE/NW	15-20	SOUTH	BATTERY
345	11/05/91	11/12	SBP	CLEAR	NE/NW	15-20	SOUTH	BATTERY
346	11/05/91	11/12	SBP	CLEAR	NE/NW	15-20	SOUTH	BATTERY
347	11/05/91	11/12	SBP	CLEAR	NE/NW	15-20	SOUTH	BATTERY
348	11/05/91	11/12	SBP	CLEAR	NE/NW	15-20	SOUTH	BATTERY
349	11/05/91	11/12	SBP	CLEAR	NE/NW	15 20	SOUTH	BATTERY
350	11/05/91	11/12	SBP	CLEAR	NE/NW	15 20	SOUTH	BATTERY
351	11/07/91	11/12	SBP	OVERCAST	NE	5-10	SOUTH	BATTERY
352	11/07/91	11/12	SBP	OVERCAST	NE	5-10	SOUTH	BATTERY

OBS	EMISSION CONTROL SYSTEM	OVEN NUMBER	TIME OF DAY	SOURCE OF EMISSIONS	CUMULATIVE TIME OF EMISSIONS SECONDS	MAXIMUM OPACITY %	COMMENTS
331	KIDC	1151	12:18	DOOR	60	35	
332	KIDC	1153	13:10	DOOR	18	45	
333	KIDC	1152	14:21	DOOR	74	100	
334	SHENANGO	1228	14:43	DOOR	36	20	
335	SHENANGO	1238	14:53	DOOR	22	100	
336	SHENANGO	1248	15:00	DOOR	67	15	
337	SHENANGO	1258	15:11	DOOR	16	15	
338	SHENANGO	1268	15:27	DOOR	75	45	
339	KIDC	1135	17:13	DOOR	72	100	
340	KIDC	1148	11:33	DOOR	63	70	
341	SHENANGO	1234	11:53	DOOR	121	100	
342	KIDC	1151	11.55	DOOR	66	100	
343	KIDC	1153	12.30	DOOR	89	20	
344	KIDC	1149	14.19	DOOR	72	55	
345	KIDC	1172	14:41	DOOR	21	100	
346	KIDC	1152	15.02	DOOR	61	30	
347	SHENANGO	1201	15.20	DOOR	25	15	
348	SHENANGO	1211	15.25	DOOR	5	20	
349	SHENANGO	1221	15:32	DOOR	56	100	
350	SHENANGO	1231	15:39	DOOR	58	60	
351	KIDC	1148	11.49	DOOR	34	30	
352	KIDC	1151	12:11	DOOR	109	25	

PUSHER SIDE OVEN EMISSIONS OBSERVATIONS
DURING PUSHING OPERATIONS ONLY
KRESS DEMONSTRATION PROJECT - BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

OBS	DATE	BATTERY	OBSERVERS INITIALS	WEATHER	WIND DIRECTION	WIND SPEED, MPH	OBSERVER LOCATION	BACKGROUND
353	11/07/91	11/12	SBP	OVERCAST	NE	5-10	SOUTH	BATTERY
354	11/07/91	11/12	SBP	OVERCAST	NE	5-10	SOUTH	BATTERY
355	11/07/91	11/12	SBP	OVERCAST	NE	5-10	SOUTH	BATTERY
356	11/07/91	11/12	SBP	OVERCAST	NE	5-10	SOUTH	BATTERY
357	11/12/91	11/12	SBP	OVERCAST	NW	15-20	SOUTH	BATTERY
358	11/12/91	11/12	SBP	OVERCAST	NW	15-20	SOUTH	BATTERY
359	11/12/91	11/12	SBP	OVERCAST	NW	15-20	SOUTH	BATTERY
360	11/12/91	11/12	SBP	OVERCAST	NW	15-20	SOUTH	BATTERY
361	11/12/91	11/12	SBP	OVERCAST	NW	15-20	SOUTH	BATTERY
362	11/12/91	11/12	SBP	OVERCAST	NW	15-20	SOUTH	BATTERY
363	11/12/91	11/12	SBP	OVERCAST	NW	15-20	SOUTH	BATTERY
364	11/12/91	11/12	SBP	OVERCAST	NW	15-20	SOUTH	BATTERY
365	11/12/91	11/12	SBP	OVERCAST	NW	15-20	SOUTH	BATTERY
366	11/12/91	11/12	SBP	OVERCAST	NW	15-20	SOUTH	BATTERY
367	11/12/91	11/12	SBP	OVERCAST	NW	15-20	SOUTH	BATTERY
368	11/14/91	11/12	SBP	CLEAR	NW/SE	5-15	SOUTH	BATTERY
369	11/14/91	11/12	SBP	CLEAR	NW/SE	5-15	SOUTH	BATTERY
370	11/14/91	11/12	SBP	CLEAR	NW/SE	5-15	SOUTH	BATTERY
371	11/14/91	11/12	SBP	CLEAR	NW/SE	5-15	SOUTH	BATTERY
372	11/14/91	11/12	SBP	CLEAR	NW/SE	5-15	SOUTH	BATTERY
373	11/14/91	11/12	SBP	CLEAR	NW/SE	5-15	SOUTH	BATTERY
374	11/19/91	11/12	SBP	CLEAR	SW	10-15	SOUTH	BATTERY

OBS	EMISSION CONTROL SYSTEM	OVEN NUMBER	TIME OF DAY	SOURCE OF EMISSIONS	CUMULATIVE TIME OF EMISSIONS SECONDS	MAXIMUM OPACITY %	COMMENTS
353	KIDC	1153	12:42	DOOR	65	35	
354	KIDC	1149	14:18	DOOR	69	25	
355	KIDC	1172	14:47	DOOR	81	100	
356	KIDC	1152	15:14	DOOR	41	100	
357	SHENANGO	1224	11:29	DOOR	19	20	
358	KIDC	1148	11:40	DOOR	51	15	
359	SHENANGO	1244	11:42	DOOR	35	65	
360	SHENANGO	1216	11:58	DOOR	82	100	
361	SHENANGO	1226	12:08	DOOR	127	100	
362	KIDC	1151	12:10	DOOR	62	100	
363	SHENANGO	1236	12:21	DOOR	91	100	
364	KIDC	1153	12:47	DOOR	67	35	
365	KIDC	1149	14:41	DOOR	64	100	
366	KIDC	1172	15:01	DOOR	102	100	
367	KIDC	1152	15:20	DOOR	70	20	
368	KIDC	1148	11:30	DOOR	65	10	
369	KIDC	1151	11:49	DOOR	71	100	
370	KIDC	1153	12:10	DOOR	65	10	
371	KIDC	1149	15:05	DOOR	22	15	
372	KIDC	1172	15:30	DOOR	84	100	
373	KIDC	1152	15:55	DOOR	.	20	
374	KIDC	1151	13:19	DOOR	92	10	

PUSHER SIDE OVEN EMISSIONS OBSERVATIONS
DURING PUSHING OPERATIONS ONLY
KRESS DEMONSTRATION PROJECT - BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

OBS	DATE	BATTERY	OBSERVERS INITIALS	WEATHER	WIND DIRECTION	WIND SPEED, MPH	OBSERVER LOCATION	BACKGROUND
375	11/19/91	11/12	SBP	CLEAR	SW	10-15	SOUTH	BATTERY
376	11/19/91	11/12	SBP	CLEAR	SW	10-15	SOUTH	BATTERY
377	11/19/91	11/12	SBP	CLEAR	SW	10-15	SOUTH	BATTERY
378	11/19/91	11/12	SBP	CLEAR	SW	10-15	SOUTH	BATTERY
379	11/19/91	11/12	SBP	CLEAR	SW	10-15	SOUTH	BATTERY
380	11/19/91	11/12	SBP	CLEAR	SW	10-15	SOUTH	BATTERY
381	11/19/91	11/12	SBP	CLEAR	SW	10-15	SOUTH	BATTERY
382	11/21/91	11/12	SBP	OVERCAST	SW	15-20	SOUTH	BATTERY
383	11/21/91	11/12	SBP	OVERCAST	SW	15-20	SOUTH	BATTERY
384	11/21/91	11/12	SBP	OVERCAST	SW/SE	5-20	SOUTH	BATTERY
385	11/21/91	11/12	SBP	OVERCAST	SW/SE	5-20	SOUTH	BATTERY
386	11/21/91	11/12	SBP	OVERCAST	SW/SE	5-20	SOUTH	BATTERY
387	11/21/91	11/12	SBP	OVERCAST	SW/SE	5-20	SOUTH	BATTERY
388	11/21/91	11/12	SBP	OVERCAST	SW/SE	5-20	SOUTH	BATTERY
389	11/21/91	11/12	SBP	OVERCAST	SW/SE	5-20	SOUTH	BATTERY
390	11/21/91	11/12	SBP	OVERCAST	SW	15-20	SOUTH	BATTERY
391	11/21/91	11/12	SBP	OVERCAST	SW	15-20	SOUTH	BATTERY
392	11/21/91	11/12	SBP	OVERCAST	SW	15-20	SOUTH	BATTERY
393	11/21/91	11/12	SBP	OVERCAST	SW/SE	5-20	SOUTH	BATTERY
394	11/21/91	11/12	SBP	OVERCAST	SW/SE	5-20	SOUTH	BATTERY
395	11/21/91	11/12	SBP	OVERCAST	SW/SE	5-20	SOUTH	BATTERY
396	11/23/91	11/12	SBP	CLEAR	SE	10-15	SOUTH	BATTERY

OBS	EMISSION CONTROL SYSTEM	OVEN NUMBER	TIME OF DAY	SOURCE OF EMISSIONS	CUMULATIVE TIME OF EMISSIONS SECONDS	MAXIMUM OPACITY %	COMMENTS
375	KIDC	1150	13:36	DOOR	73	20	
376	KIDC	1149	14:03	DOOR	70	10	
377	KIDC	1172	14:21	DOOR	69	100	
378	KIDC	1152	14:36	DOOR	68	25	
379	KIDC	1135	14:58	DOOR	26	100	
380	KIDC	1154	15:15	DOOR	18	45	
381	KIDC	1171	15:34	DOOR	67	100	
382	SHENANGO	1236	12:34	DOOR	49	30	
383	SHENANGO	1246	12:46	DOOR	61	25	
384	KIDC	1148	12:53	DOOR	78	20	
385	KIDC	1151	13:15	DOOR	83	30	
386	KIDC	1153	13:33	DOOR	25	15	
387	KIDC	1149	13:53	DOOR	79	100	
388	KIDC	1172	14:11	DOOR	36	100	
389	KIDC	1152	14:27	DOOR	63	60	
390	SHENANGO	1238	14:54	DOOR	23	45	
391	SHENANGO	1248	15:02	DOOR	34	100	
392	SHENANGO	1258	15:13	DOOR	82	70	
393	KIDC	1135	15:53	DOOR	32	100	
394	KIDC	1154	16:24	DOOR	5	10	
395	KIDC	1171	16:43	DOOR	65	100	
396	KIDC	1148	13:36	DOOR	69	25	

PUSHER SIDE OVEN EMISSIONS OBSERVATIONS
DURING PUSHING OPERATIONS ONLY
KRESS DEMONSTRATION PROJECT - BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

OBS	DATE	BATTERY	OBSERVERS INITIALS	WEATHER	WIND DIRECTION	WIND SPEED, MPH	OBSERVER LOCATION	BACKGROUND
397	11/23/91	11/12	SBP	CLEAR	SE	10-15	SOUTH	BATTERY
398	11/23/91	11/12	SBP	CLEAR	SE	10-15	SOUTH	BATTERY
399	11/23/91	11/12	SBP	CLEAR	SE	10-15	SOUTH	BATTERY
400	11/23/91	11/12	SBP	CLEAR	SE	10-15	SOUTH	BATTERY
401	11/23/91	11/12	SBP	CLEAR	SE	10-15	SOUTH	BATTERY
402	11/23/91	11/12	SBP	CLEAR	SE	10-15	SOUTH	BATTERY
403	11/23/91	11/12	SBP	CLEAR	SE	10-15	SOUTH	BATTERY
404	11/25/91	11/12	SBP	CLEAR	NW	15-20	SOUTH	BATTERY
405	11/25/91	11/12	SBP	CLEAR	NW	15-20	SOUTH	BATTERY
406	11/25/91	11/12	SBP	CLEAR	NW	15-20	SOUTH	BATTERY
407	11/25/91	11/12	SBP	CLEAR	NW	15-20	SOUTH	BATTERY
408	11/26/91	11/12	SBP	CLEAR	NW	10-15	SOUTH	BATTERY
409	11/26/91	11/12	SBP	CLEAR	NW	10-15	SOUTH	BATTERY
410	11/26/91	11/12	SBP	CLEAR	NW	10-15	SOUTH	BATTERY
411	11/26/91	11/12	SBP	CLEAR	NW	10-15	SOUTH	BATTERY
412	11/26/91	11/12	SBP	CLEAR	NW	10-15	SOUTH	BATTERY
413	11/26/91	11/12	SBP	CLEAR	NW	10-15	SOUTH	BATTERY
414	11/26/91	11/12	SBP	CLEAR	NW	10-15	SOUTH	BATTERY

OBS	EMISSION CONTROL SYSTEM	OVEN NUMBER	TIME OF DAY	SOURCE OF EMISSIONS	CUMULATIVE TIME OF EMISSIONS SECONDS	MAXIMUM OPACITY %	COMMENTS
397	KIDC	1151	13:57	DOOR	75	20	
398	KIDC	1153	14:13	DOOR	80	35	
399	KIDC	1149	14:32	DOOR	90	15	
400	KIDC	1172	14:51	DOOR	10	100	
401	KIDC	1152	15:16	DOOR	85	20	
402	KIDC	1135	15:41	DOOR	39	100	
403	KIDC	1154	15:58	DOOR	85	100	
404	KIDC	1171	.				TOO DARK
405	KIDC	1152	14:38	DOOR	58	100	
406	KIDC	1135	15:12	DOOR	38	40	
407	KIDC	1154	15:40	DOOR	22	20	
408	KIDC	1148	12:47	DOOR	63	100	
409	KIDC	1151	13:02	DOOR	90	100	
410	KIDC	1153	13:13	DOOR	86	25	
411	KIDC	1149	13:26	DOOR	66	70	
412	KIDC	1172	13:37	DOOR	32	100	
413	KIDC	1152	13:48	DOOR	64	100	
414	KIDC	1154	14:00	DOOR	74	100	

Section 5

Topside Emission Observation Conventional & KIDC - Database

COKE OVEN TOPSIDE EMISSIONS OBSERVATIONS
KIOC DEMONSTRATION PROJECT - BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

OBS	DATE	BATTERY	OBSERVERS INITIALS	WEATHER	WIND DIRECTION	WIND SPEED MPH	OBSERVER LOCATION	BACKGROUND	PUSHING EMISSION CONTROL SYSTEM
1	03/19/91	11&12	CR	PTL CLDY	WEST			SKY	SHENANG
2	03/19/91	11&12	CR	PTL CLDY	WEST			SKY	SHENANG
3	03/19/91	11&12	CR	PTL CLDY	WEST			SKY	SHENANG
4	03/19/91	11&12	CR	PTL CLDY	WEST			SKY	SHENANG
5	03/19/91	11&12	CR	PTL CLDY	WEST			SKY	SHENANG
6	03/19/91	11&12	CR	PTL CLDY	WEST			SKY	SHENANG
7	03/19/91	11&12	CR	PTL CLDY	WEST			SKY	SHENANG
8	03/19/91	11&12	CR	PTL CLDY	WEST			SKY	SHENANG
9	03/27/91	11&12	SBP	OVERCAST	SE	10-15	AT SITE	CLOUDY	CHEMICO
10	03/27/91	11&12	SBP	OVERCAST	SE	10-15	AT SITE	CLOUDY	CHEMICO
11	03/27/91	11&12	SBP	OVERCAST	SE	10-15	AT SITE	CLOUDY	CHEMICO
12	03/27/91	11&12	SBP	OVERCAST	SE	10-15	AT SITE	CLOUDY	CHEMICO
13	03/27/91	11&12	SBP	OVERCAST	SE	10-15	AT SITE	CLOUDY	CHEMICO
14	03/29/91	11&12	SBP	RAIN			AT SITE	RAIN	SHENANG
15	03/29/91	11&12	SBP	RAIN			AT SITE	RAIN	SHENANG
16	03/29/91	11&12	SBP	RAIN			AT SITE	RAIN	SHENANG
17	03/29/91	11&12	SBP	RAIN			AT SITE	RAIN	SHENANG
18	03/29/91	11&12	SBP	RAIN			AT SITE	RAIN	SHENANG
19	04/02/91	11&12	SBP	CLEAR	NW	10-15	AT SITE	BATTERY	CHEMICO
20	04/05/91	11&12	FRC	OC,RAIN	SW	10	NE		SHENANG
21	04/05/91	11&12	FRC	OC,RAIN	SW	10	NE		SHENANG
22	04/05/91	11&12	FRC	OC,RAIN	SW	10	NE		SHENANG

OBS	CHARGING HOLE LIDS OFF	OVEN NUMBER	TIME OF PUSH	CHG HOLE #1	CHG HOLE #2	CHG HOLE #3	CHG HOLE #4	STAND-PIPE CAP	CUM. TIME OF EMISSIONS, SECONDS	MAXIMUM OPACITY, %
1	ALL	1147	12:08			100	100	100	4	100
2	ALL	1167		.	.	.	.	.	.	.
3	ALL	1207	12:20	100	100	100	100	100	12	100
4	ALL	1217	12:36	100	.	100	100	100	16	100
5	ALL	1237	12:56	50	.	50	50	.	15	50
6	ALL	1247	13:22			35	35	.	9	35
7	ALL	1257	13:43	20	.	.		20	1	20
8	ALL	1267		80	80	80	80	80	17	80
9	ALL	1171	13:14	5	5	35	10	20	75	20
10	ALL	1201	13:22	5	5	5	60	50	85	60
11	ALL	1211	13:29	5	5	5	25	25	90	25
12	ALL	1221	13:38	10	15	20	50	35	80	50
13	ALL	1231	13:58	5	5	5	5	.	70	5
14	ALL	1208	11:22	10	0	10	30	20	70	30
15	ALL	1228	11:33	0	0	0	0	20	75	20
16	ALL	1238	11:41	10	50	70	80	20	80	80
17	ALL	1248	11:48	10	10	10	25	0	80	25
18	ALL	1258	11:56	0	0	0	0	50	75	50
19	ALL	1228	13:29	10	10	20	40	15	75	40
20	ALL	1148	13:07	0	25	25	25	0	9	25
21	ALL	1208	13:16	0	0	0	15	0	2	15
22	ALL	1238	13:32	0	0	30	30	0	11	30

COKE OVEN TOPSIDE EMISSIONS OBSERVATIONS
KIDC DEMONSTRATION PROJECT - BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

OBS	DATE	BATTERY	OBSERVERS INITIALS	WEATHER	WIND DIRECTION	WIND SPEED MPH	OBSERVER LOCATION	BACKGROUND	PUSHING EMISSION CONTROL SYSTEM
23	04/05/91	11&12	FRC	OC,RAIN	SW	10	N-		SHENANG
24	04/09/91	11&12	FRC	OVERCAST	NW	8-10	NE		SHENANG
25	04/09/91	11&12	FRC	OVERCAST	NW	8 10	NE		SHENANG
26	04/09/91	11&12	FRC	OVERCAST	NW	8 10	NE		SHENANG
27	04/09/91	11&12	FRC	OVERCAST	NW	8 10	NE		SHENANG
28	04/09/91	11&12	FRC	OVERCAST	NW	8-10	NE		SHENANG
29	04/09/91	11&12	FRC	OVERCAST	NW	8 10	NE		SHENANG
30	04/09/91	11&12	FRC	OVERCAST	NW	8-10	NE		SHENANG
31	04/09/91	11&12	FRC	OVERCAST	NW	8-10	NE		SHENANG
32	04/09/91	11&12	FRC	OVERCAST	NW	8-10	NE		SHENANG
33	04/09/91	11&12	FRC	OVERCAST	NW	8-10	NE		SHENANG
34	04/16/91	11&12	SBP	CLEAR	WEST	12-18	SOUTH	BATTERY	CHEMICO
35	04/16/91	11&12	SBP	CLEAR	WEST	12-18	SOUTH	BATTERY	CHEMICO
36	04/16/91	11&12	SBP	CLEAR	WEST	12-18	SOUTH	BATTERY	CHEMICO
37	04/16/91	11&12	SBP	CLEAR	WEST	12 18	SOUTH	BATTERY	CHEMICO
38	04/16/91	11&12	SBP	CLEAR	WEST	12 18	SOUTH	BATTERY	CHEMICO
39	04/16/91	11&12	SBP	CLEAR	WEST	12-18	SOUTH	BATTERY	CHEMICO
40	04/16/91	11&12	SBP	CLEAR	WEST	12-18	SOUTH	BATTERY	CHEMICO
41	04/16/91	11&12	SBP	CLEAR	WEST	12-18	SOUTH	BATTERY	CHEMICO
42	04/16/91	11&12	SBP	CLEAR	NW	20 25	SOUTH	BATTERY	CHEMICO
43	04/16/91	11&12	SBP	CLEAR	NW	20 25	SOUTH	BATTERY	CHEMICO
44	04/25/91	11&12	SBP	CLEAR	SE	5-10	SOUTH	BATTERY	CHEMICO

OBS	CHARGING HOLE LIDS OFF	OVEN NUMBER	TIME OF PUSH	CHG HOLE #1	CHG HOLE #2	CHG HOLE #3	CHG HOLE #4	STAND-PIPE CAP	CUM. TIME OF EMISSIONS, SECONDS	MAXIMUM OPACITY, %
23	ALL	1248	13 43	0	50	50	50	50	15	50
24	ALL	1206	11.35	0	0	30	30	30	14	30
25	ALL	1216	11:47	0	60	60	60	0	28	60
26	ALL	1226	12.05	0	0	40	40	0	9	40
27	ALL	1236	12.21	0	50	50	50	0	15	50
28	ALL	1246	12:33	0	70	0	70	70	17	70
29	ALL	1256	12 41	80	0	80	60	80	26	80
30	ALL	1148	13 01	50	0	50	50	0	20	50
31	ALL	1208	13:12	25	25	25	25	0	15	25
32	ALL	1218	13 20	75	75	75	75	75	36	75
33	ALL	1238	13 39	40	0	40	40	0		40
34		1244	11 25	10	5	15	20	25	85	25
35		1126	11 40		10	10	35	35	115	35
36		1146	12 03	15	5	20	30	30	85	30
37		1206	12.13	10	10	15	35	25	70	35
38		1216	12.29	5	5	20	70	30	105	70
39		1226	12 43	0	10	40	70	35	105	70
40		1236	13 00	10	15	30	30	40	85	40
41		1246	13 14	5	5	5	5	5	75	5
42		1109	13 31	20	10	40	100	35	210	100
43		1148	13 50	10	15	25	30	30	85	30
44	ALL	1206	12.37	5	5	5	5	25	35	25

COKE OVEN TOPSIDE EMISSIONS OBSERVATIONS
KIDC DEMONSTRATION PROJECT - BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

OBS	DATE	BATTERY	OBSERVERS INITIALS	WEATHER	WIND DIRECTION	WIND SPEED MPH	OBSERVER LOCATION	BACKGROUND	PUSHING EMISSION CONTROL SYSTEM
45	04/25/91	11&12	SBP	CLEAR	SE	5-10	SOUTH	BATTERY	CHEMICO
46	04/25/91	11&12	SBP	CLEAR	SE	5-10	SOUTH	BATTERY	CHEMICO
47	04/25/91	11&12	SBP	CLEAR	SE	5-10	SOUTH	BATTERY	CHEMICO
48	04/25/91	11&12	SBP	CLEAR	SE	5-10	SOUTH	BATTERY	CHEMICO
49	04/25/91	11&12	SBP	CLEAR	SE	5-10	SOUTH	BATTERY	CHEMICO
50	04/25/91	11&12	SBP	CLEAR	SE	5-10	SOUTH	BATTERY	CHEMICO
51	04/25/91	11&12	SBP	CLEAR	SE	5-10	SOUTH	BATTERY	CHEMICO
52	04/25/91	11&12	SBP	CLEAR	SE	5-10	SOUTH	BATTERY	CHEMICO
53	04/25/91	11&12	SBP	CLEAR	SE	5-10	SOUTH	BATTERY	CHEMICO
54	05/01/91	11&12	SBP	CLEAR	SE	10-15	SOUTH	BATTERY	SHENANG
55	05/01/91	11&12	SBP	CLEAR	SE	10-15	SOUTH	BATTERY	SHENANG
56	05/01/91	11&12	SBP	CLEAR	SE	10-15	SOUTH	BATTERY	SHENANG
57	05/01/91	11&12	SBP	CLEAR	SE	10-15	SOUTH	BATTERY	SHENANG
58	05/01/91	11&12	SBP	CLEAR	SE	10-15	SOUTH	BATTERY	SHENANG
59	05/01/91	11&12	SBP	CLEAR	SE	10-15	SOUTH	BATTERY	SHENANG
60	05/01/91	11&12	SBP	CLEAR	SE	10-15	SOUTH	BATTERY	SHENANG
61	05/01/91	11&12	SBP	CLEAR	SE	10-15	SOUTH	BATTERY	SHENANG
62	05/01/91	11&12	SBP	CLEAR	SE	10-15	SOUTH	BATTERY	SHENANG
63	05/01/91	11&12	SBP	CLEAR	SE	10-15	SOUTH	BATTERY	SHENANG
64	05/07/91	11&12	SBP	CLEAR	NW	10-15	SOUTH	BATTERY	SHENANG
65	05/07/91	11&12	SBP	CLEAR	NW	10-15	SOUTH	BATTERY	SHENANG
66	05/07/91	11&12	SBP	CLEAR	NW	10-15	SOUTH	BATTERY	SHENANG

OBS	CHARGING HOLE LIDS OFF	OVEN NUMBER	TIME OF PUSH	CHG HOLE #1	CHG HOLE #2	CHG HOLE #3	CHG HOLE #4	STAND PIPE CAP	CUM. TIME OF EMISSIONS, SECONDS	MAXIMUM OPACITY, %
45	ALL	1216	13:00	15	20	30	70	80	80	80
46	ALL	1226	13:08	5	5	10	25	50	80	50
47	ALL	1236	13:17	40	35	60	100	85	80	100
48	ALL	1246	13:31	5	5	5	10	10	85	10
49	ALL	1256	13:46	5	5	0	.	.	40	15
50	ALL	1148	14:14	0	0	0	5	.	5	5
51	ALL	1208	14:32	5	0	0	5	10	25	10
52	ALL	1238	14:47	5	0	40	95	100	75	100
53	ALL	1248	14:59	5	0	0	5	.	15	5
54		1126	12:49	5	5	5	5	10	95	10
55		1206	13:16	5	5	15	10	0	75	15
56		1216	13:32	10	10	5	45	50	75	50
57		1226	13:40	5	5	5	15	.	80	15
58		1236	13:47	5	0	0	10	.	25	10
59		1246	14:05	10	10	10	5	15	40	15
60		1256	14:21	5	5	5	20	.	30	20
61		1148	15:05	0	0	0	5	10	15	10
62		1208	15:25	10	0	10	10	10	65	10
63		1238	15:31	15	35	10	15	70	75	70
64		1152	11:36	10	5	.	.	10	80	10
65		1172	11:48	.	.	.	.	25	15	25
66		1212	11:59	10	15	5	5	80	70	80

COKE OVEN TOPSIDE EMISSIONS OBSERVATIONS
KIDC DEMONSTRATION PROJECT - BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

OBS	DATE	BATTERY	OBSERVERS INITIALS	WEATHER	WIND DIRECTION	WIND SPEED MPH	OBSERVER LOCATION	BACKGROUND	PUSHING EMISSION CONTROL SYSTEM
67	05/07/91	11&12	SBP	CLEAR	NW	10-15	SOUTH	BATTERY	SHENANG
68	05/07/91	11&12	SBP	CLEAR	NW	10-15	SOUTH	BATTERY	SHENANG
69	05/07/91	11&12	SBP	CLEAR	NW	10-15	SOUTH	BATTERY	SHENANG
70	05/07/91	11&12	SBP	CLEAR	NW	10-15	SOUTH	BATTERY	SHENANG
71	05/07/91	11&12	SBP	CLEAR	NW	10-15	SOUTH	BATTERY	SHENANG
72	05/07/91	11&12	SBP	CLEAR	NW	10-15	SOUTH	BATTERY	SHENANG
73	05/07/91	11&12	SBP	CLEAR	NW	10-15	SOUTH	BATTERY	SHENANG
74	05/14/91	11&12	SBP	OVERCAST	NW/SE	12-18	SOUTH	BATTERY	SHENANG
75	05/14/91	11&12	SBP	OVERCAST	NW/SE	12-18	SOUTH	BATTERY	SHENANG
76	05/14/91	11&12	SBP	OVERCAST	NW/SE	12-18	SOUTH	BATTERY	SHENANG
77	05/14/91	11&12	SBP	OVERCAST	NW/SE	12-18	SOUTH	BATTERY	SHENANG
78	05/14/91	11&12	SBP	OVERCAST	NW/SE	12-18	SOUTH	BATTERY	SHENANG
79	05/14/91	11&12	SBP	OVERCAST	NW/SE	12-18	SOUTH	BATTERY	SHENANG
80	05/14/91	11&12	SBP	OVERCAST	NW/SE	12-18	SOUTH	BATTERY	SHENANG
81	05/14/91	11&12	SBP	OVERCAST	NW/SE	12-18	SOUTH	BATTERY	SHENANG
82	05/14/91	11&12	SBP	OVERCAST	NW/SE	12-18	SOUTH	BATTERY	SHENANG
83	05/14/91	11&12	SBP	OVERCAST	NW/SE	12-18	SOUTH	BATTERY	SHENANG
84	05/22/91	11&12	SBP	CLEAR	SE	10-15	SOUTH	BATTERY	SHENANG
85	05/22/91	11&12	SBP	CLEAR	SE	10-15	SOUTH	BATTERY	SHENANG
86	05/22/91	11&12	SBP	CLEAR	SE	10-15	SOUTH	BATTERY	SHENANG
87	05/23/91	11&12	SBP	CLEAR	SE	15-20	SOUTH	BATTERY	SHENANG
88	05/23/91	11&12	SBP	CLEAR	SE	15-20	SOUTH	BATTERY	SHENANG

OBS	CHARGING HOLE LIDS OFF	OVEN NUMBER	TIME OF PUSH	CHG HOLE #1	CHG HOLE #2	CHG HOLE #3	CHG HOLE #4	STAND-PIPE CAP	CUM. TIME OF EMISSIONS, SECONDS	MAXIMUM OPACITY, %
67		1222	12:24	10	15	10	5	15	50	15
68		1232	12:36	0	0	10	5		25	10
69		1242	12:52	20	5	5	5	35	70	35
70		1262	13:01	10	5	5	35	10	80	35
71		1272	13:10	0	5	10	45	20	85	45
72		1134	13:22	60	75	100	80	70	70	100
73		1154	13:34	5	0	5	10	10	65	10
74	ALL	1146	11:29	5	0	10	45	0	20	45
75	ALL	1168	11:38			0	25	20	30	25
76	ALL	1167	11:48	0	0	0	0		0	0
77	ALL	1209	11:55	10	5	10	15	70	35	70
78	ALL	1229	12:29	5	15	5	30	10	65	30
79	ALL	1239	12:45	15	10	5	10		60	15
80	ALL	1249	12:55	10	20	15	5	55	45	55
81	ALL	1259	13:03	5	10	10	15	5	80	15
82	ALL	1269	13:17	15	10	100	100	60	70	100
83	ALL	1102	13:33	50	20	35	80	90	80	90
84		1257	13:20	5	5	10	25	25	40	25
85		1267	13:44	15	35	5	10	25	55	35
86	0	1209	14:04	0	0	0	0	0	0	0
87		1215	12:58	10	25	10	15	25	55	25
88		1225	13:03	10	10	15	5		25	15

COKE OVEN TOPSIDE EMISSIONS OBSERVATIONS
KIDC DEMONSTRATION PROJECT - BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

OBS	DATE	BATTERY	OBSERVERS INITIALS	WEATHER	WIND DIRECTION	WIND SPEED MPH	OBSERVER LOCATION	BACKGROUND	PUSHING EMISSION CONTROL SYSTEM
89	05/23/91	11&12	SBP	CLEAR	SE	15-20	SOUTH	BATTERY	SHENANG
90	05/23/91	11&12	SBP	CLEAR	SE	15-20	SOUTH	BATTERY	SHENANG
91	05/23/91	11&12	SBP	CLEAR	SE	15-20	SOUTH	BATTERY	SHENANG
92	05/23/91	11&12	SBP	CLEAR	SE	15-20	SOUTH	BATTERY	SHENANG
93	05/23/91	11&12	SBP	CLEAR	SE	15-20	SOUTH	BATTERY	SHENANG
94	05/29/91	11&12	SBP	CLEAR	SE	15-20	SOUTH	BATTERY	SHENANG
95	05/29/91	11&12	SBP	CLEAR	SE	15-20	SOUTH	BATTERY	SHENANG
96	05/29/91	11&12	SBP	CLEAR	SE	15-20	SOUTH	BATTERY	SHENANG
97	05/29/91	11&12	SBP	CLEAR	SE	15-20	SOUTH	BATTERY	SHENANG
98	05/29/91	11&12	SBP	CLEAR	SE	15-20	SOUTH	BATTERY	SHENANG
99	05/29/91	11&12	SBP	CLEAR	SE	15-20	SOUTH	BATTERY	SHENANG
100	05/29/91	11&12	SBP	CLEAR	SE	15-20	SOUTH	BATTERY	SHENANG
101	05/29/91	11&12	SBP	CLEAR	SE	15-20	SOUTH	BATTERY	SHENANG
102	05/29/91	11&12	SBP	CLEAR	SE	15-20	SOUTH	BATTERY	SHENANG
103	05/29/91	11&12	SBP	CLEAR	SE	15-20	SOUTH	BATTERY	SHENANG
104	06/04/91	11&12	SBP	CLEAR	NE	15-20	SOUTH	BATTERY	SHENANG
105	06/04/91	11&12	SBP	CLEAR	NE	15-20	SOUTH	BATTERY	SHENANG
106	06/04/91	11&12	SBP	CLEAR	NE	15-20	SOUTH	BATTERY	SHENANG
107	06/04/91	11&12	SBP	CLEAR	NE	15-20	SOUTH	BATTERY	SHENANG
108	06/04/91	11&12	SBP	CLEAR	NE	15-20	SOUTH	BATTERY	SHENANG
109	06/04/91	11&12	SBP	CLEAR	NE	15-20	SOUTH	BATTERY	SHENANG
110	06/04/91	11&12	SBP	CLEAR	NE	15-20	SOUTH	BATTERY	SHENANG

OBS	CHARGING HOLE LIDS OFF	OVEN NUMBER	TIME OF PUSH	CHG HOLE #1	CHG HOLE #2	CHG HOLE #3	CHG HOLE #4	STAND PIPE CAP	CUM. TIME OF EMISSIONS, SECONDS	MAXIMUM OPACITY, %
89		1235	13:12	10	15	10	15	35	80	35
90		1245	13:20	20	15	5	30	25	45	30
91		1255	13:34	25	15	5	25	50	95	50
92		1127	13:59	15	50	30	25	15	50	50
93		1147	14:07	70	85	80	40	90	70	90
94		1127	14:41	10	5	20	30	30	70	30
95		1147	14:52	80	80	80	80	40	60	80
96		1167	15:06	25	50	70	90	50	80	90
97		1207	15:23	10	5	10	10	25	35	25
98		1217	15:30	70	70	75	80	100	50	100
99		1237	15:37	100	60	40	30	70	70	100
100		1247	15:48	10	5	10	10	.	40	10
101		1267	15:59	10	10	10	10	45	75	45
102		1209	16:13	30	5	10	15	65	80	65
103		1229	16:22	15	10	10	5	35	75	35
104		1135	11:40	100	70	80	80	100	95	100
105		1153	12:06	15	5	5	15	40	40	40
106		1233	12:42	15	10	5	5	35	50	35
107		1243	12:53	5	10	5	10	25	45	25
108		1263	13:06	20	30	10	25	45	95	45
109		1205	13:19	20	70	50	60	100	480	100
110		1215	13:42	30	70	85	100	35	90	100

COKE OVEN TOPSIDE EMISSIONS OBSERVATIONS
KIDC DEMONSTRATION PROJECT - BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

OBS	DATE	BATTERY	OBSERVERS INITIALS	WEATHER	WIND DIRECTION	WIND SPEED MPH	OBSERVER LOCATION	BACKGROUND	PUSHING EMISSION CONTROL SYSTEM
111	06/04/91	11&12	SBP	CLEAR	NE	15-20	SOUTH	BATTERY	SHENANG
112	06/04/91	11&12	SBP	CLEAR	NE	15-20	SOUTH	BATTERY	SHENANG
113	06/04/91	11&12	SBP	CLEAR	NE	15-20	SOUTH	BATTERY	SHENANG
114	06/13/91	11&12	REA	CLEAR	NE	20	TOPSIDE	CLEAR	SHENANG
115	06/13/91	11&12	REA	CLEAR	NE	20	TOPSIDE	CLEAR	SHENANG
116	06/13/91	11&12	REA	CLEAR	NE	20	TOPSIDE	CLEAR	SHENANG
117	06/13/91	11&12	REA	CLEAR	NE	20	TOPSIDE	CLEAR	SHENANG
118	06/13/91	11&12	REA	CLEAR	NE	20	TOPSIDE	CLEAR	SHENANG
119	06/13/91	11&12	REA	CLEAR	NE	20	TOPSIDE	CLEAR	SHENANG
120	06/13/91	11&12	REA	CLEAR	NE	20	TOPSIDE	CLEAR	SHENANG
121	06/13/91	11&12	REA	CLEAR	NE	20	TOPSIDE	CLEAR	SHENANG
122	06/13/91	11&12	REA	CLEAR	NE	20	TOPSIDE	CLEAR	SHENANG
123	06/13/91	11/12	REA	CLEAR	NE	20	TOPSIDE	CLEAR	SHENANG
124	06/18/91	11/12	SBP	RAIN	EAST	13-18	SOUTH	BATTERY	SHENANG
125	06/18/91	11/12	SBP	RAIN	EAST	13-18	SOUTH	BATTERY	SHENANG
126	06/18/91	11/12	SBP	RAIN	EAST	13-18	SOUTH	BATTERY	SHENANG
127	06/18/91	11/12	SBP	RAIN	EAST	13-18	SOUTH	BATTERY	SHENANG
128	06/18/91	11/12	SBP	RAIN	EAST	13-18	SOUTH	BATTERY	SHENANG
129	06/18/91	11/12	SBP	RAIN	EAST	13-18	SOUTH	BATTERY	SHENANG
130	06/18/91	11/12	SBP	RAIN	EAST	13-18	SOUTH	BATTERY	SHENANG
131	06/18/91	11/12	SBP	RAIN	EAST	13-18	SOUTH	BATTERY	SHENANG
132	06/18/91	11/12	SBP	RAIN	EAST	13-18	SOUTH	BATTERY	SHENANG

OBS	CHARGING HOLE LIDS OFF	OVEN NUMBER	TIME OF PUSH	CHG HOLE #1	CHG HOLE #2	CHG HOLE #3	CHG HOLE #4	STAND-PIPE CAP	CUM. TIME OF EMISSIONS, SECONDS	MAXIMUM OPACITY, %
111		1225	13:58	100	65	65	85	65	80	100
112		1235	14:10	80	100	100	100	85	75	100
113		1245	14:20	5	5	10	5	15	80	15
114		1271	11:30	.	.	.	.	.	70	20
115		1135	11:49	.	.		.	.	110	15
116		1153	11:58			.	.	.	75	5
117		1213	12:13	.	.	.	.	.	119	25
118		1223	12:45		.	.	.	.	122	30
119		1233	12:55	.				.	118	35
120		1243	13:04	.				.	82	10
121		1263	13:11						156	55
122		1215	13:46						127	20
123		1225	14:07			.		.	112	15
124		1258	11:18	5	10	5	10	20	80	20
125		1268	11:38	5	5	15	10	40	75	40
126		1255	12:00	5	0	0	20	10	45	20
127		1135	12:21	20	30	50	70	35	75	70
128		1153	12:40	15	10	30	30	10	40	30
129		1201	12:57	5	5	15	0	0	25	15
130		1211	13:30	5	15	15	20	0	40	20
131		1221	13:39	10	15	10	10	20	85	20
132		1231	14:00	5	5	10	70	30	50	70

COKE OVEN TOPSIDE EMISSIONS OBSERVATIONS
KIDC DEMONSTRATION PROJECT BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

OBS	DATE	BATTERY	OBSERVERS INITIALS	WEATHER	WIND DIRECTION	WIND SPEED MPH	OBSERVER LOCATION	BACKGROUND	PUSHING EMISSION CONTROL SYSTEM
133	06/18/91	11/12	SBP	RAIN	EAST	15-18	SOUTH	BATTERY	SHENANG
134	07/02/91	11/12	SBP	OVERCAST	SE	10 15	SOUTH	BATTERY	SHENANG
135	07/02/91	11/12	SBP	OVERCAST	SE	10 15	SOUTH	BATTERY	SHENANG
136	07/02/91	11/12	SBP	OVERCAST	SE	10-15	SOUTH	BATTERY	SHENANG
137	07/02/91	11/12	SBP	OVERCAST	SE	10-15	SOUTH	BATTERY	SHENANG
138	07/02/91	11/12	SBP	OVERCAST	SE	10-15	SOUTH	BATTERY	SHENANG
139	07/02/91	11/12	SBP	OVERCAST	SE	10-15	SOUTH	BATTERY	SHENANG
140	07/02/91	11/12	SBP	OVERCAST	SE	10-15	SOUTH	BATTERY	SHENANG
141	07/02/91	11/12	SBP	OVERCAST	SE	10 15	SOUTH	BATTERY	SHENANG
142	07/02/91	11/12	SBP	OVERCAST	SE	10-15	SOUTH	BATTERY	SHENANG
143	07/02/91	11/12	SBP	OVERCAST	SE	10-15	SOUTH	BATTERY	SHENANG
144	07/09/91	11/12	SBP	CLEAR	NW	15-20	SOUTH	BATTERY	SHENANG
145	07/09/91	11/12	SBP	CLEAR	NW	15-20	SOUTH	BATTERY	SHENANG
146	07/09/91	11/12	SBP	CLEAR	NW	15-20	SOUTH	BATTERY	SHENANG
147	07/09/91	11/12	SBP	CLEAR	NW	15 20	SOUTH	BATTERY	SHENANG
148	07/09/91	11/12	SBP	CLEAR	NW	15-20	SOUTH	BATTERY	SHENANG
149	07/09/91	11/12	SBP	CLEAR	NW	15-20	SOUTH	BATTERY	SHENANG
150	07/09/91	11/12	SBP	CLEAR	NW	15 20	SOUTH	BATTERY	SHENANG
151	07/09/91	11/12	SBP	CLEAR	NW	15-20	SOUTH	BATTERY	SHENANG
152	07/09/91	11/12	SBP	CLEAR	NW	15-20	SOUTH	BATTERY	SHENANG
153	07/09/91	11/12	SBP	CLEAR	NW	15 20	SOUTH	BATTERY	SHENANG
154	07/18/91	11/12	SBP	CLEAR	SW	10 15	SOUTH	BATTERY	CHEMICO

OBS	CHARGING HOLE LIDS OFF	OVEN NUMBER	TIME OF PUSH	CHG HOLE #1	CHG HOLE #2	CHG HOLE #3	CHG HOLE #4	STAND-PIPE CAP	CUM TIME OF EMISSIONS, SECONDS	MAXIMUM OPACITY, %
133		1241	14:20	20	15	15	60	50	70	60
134	ALL	1231	14:39	0	0	85	85	85	70	85
135	ALL	1241	15:01	15	15	15	15	.	20	15
136	ALL	1251	15.10	45	45	45	45	45	35	45
137	ALL	1261	15:17	70	70	70	70	.	65	70
138	ALL	1271	15.22	100	100	100	100	.	50	100
139	ALL	1125	15:52	100	100	100	100	100	55	100
140	ALL	1154	16.11	100	100	100	100	100	75	100
141	ALL	1167	16:20	20	20	20	20	20	25	20
142	ALL	1213	16:35	35	35	35	35	35	35	35
143	ALL	1223	16.41	25	25	25	25	25	30	25
144	3	1135	11.35		65	65	65	65	85	65
145	0	1153	11.46					20	15	20
146	3	1226	12:10		100	100	100	100	170	100
147	3	1236	12:46		85	85	85	85	110	85
148	3	1246	12:54		15	15	15	0	20	15
149	2	1208	13:13		.	5	5	.	10	5
150	1	1228	13:27		.	.	75	75	60	75
151	3	1238	13:43		45	45	45	45	40	45
152	3	1248	13:52		40	40	40	.	30	40
153	ALL	1258	14:02	100	100	100	100	100	50	100
154	ALL	1151	11.22	25	25	25	25	25	45	25

COKE OVEN TOPSIDE EMISSIONS OBSERVATIONS
KIDC DEMONSTRATION PROJECT - BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

OBS	DATE	BATTERY	OBSERVERS INITIALS	WEATHER	WIND DIRECTION	WIND SPEED MPH	OBSERVER LOCATION	BACKGROUND	PUSHING EMISSION CONTROL SYSTEM
155	07/18/91	11/12	SBP	CLEAR	SW	10-15	SOUTH	BATTERY	CHEMICO
156	07/18/91	11/12	SBP	CLEAR	SW	10-15	SOUTH	BATTERY	CHEMICO
157	07/18/91	11/12	SBP	CLEAR	SW	10-15	SOUTH	BATTERY	CHEMICO
158	07/18/91	11/12	SBP	CLEAR	SW	10 15	SOUTH	BATTERY	CHEMICO
159	07/18/91	11/12	SBP	CLEAR	SW	10 15	SOUTH	BATTERY	CHEMICO
160	07/18/91	11/12	SBP	CLEAR	SW	10 15	SOUTH	BATTERY	CHEMICO
161	07/18/91	11/12	SBP	CLEAR	SW	10-15	SOUTH	BATTERY	CHEMICO
162	07/18/91	11/12	SBP	CLEAR	SW	10-15	SOUTH	BATTERY	CHEMICO
163	07/18/91	11/12	SBP	CLEAR	SW	10-15	SOUTH	BATTERY	CHEMICO
164	07/25/91	11/12	SBP	RAIN	SW	5 10	SOUTH	BATTERY	SHENANG
165	07/25/91	11/12	SBP	RAIN	SW	5 10	SOUTH	BATTERY	SHENANG
166	07/25/91	11/12	SBP	RAIN	SW	5 10	SOUTH	BATTERY	SHENANG
167	07/25/91	11/12	SBP	RAIN	SW	5-10	SOUTH	BATTERY	SHENANG
168	07/25/91	11/12	SBP	RAIN	SW	5-10	SOUTH	BATTERY	SHENANG
169	07/25/91	11/12	SBP	RAIN	SW	5-10	SOUTH	BATTERY	SHENANG
170	07/25/91	11/12	SBP	RAIN	SW	5-10	SOUTH	BATTERY	SHENANG
171	07/25/91	11/12	SBP	RAIN	SW	5-10	SOUTH	BATTERY	SHENANG
172	07/25/91	11/12	SBP	RAIN	SW	5 10	SOUTH	BATTERY	SHENANG
173	07/25/91	11/12	SBP	RAIN	SW	5 10	SOUTH	BATTERY	SHENANG
174	07/30/91	11/12	SBP	OVERCAST	SE	10-15	SOUTH	BATTERY	CHEMICO
175	07/30/91	11/12	SBP	OVERCAST	SE	10 15	SOUTH	BATTERY	CHEMICO
176	07/30/91	11/12	SBP	OVERCAST	SE	10-15	SOUTH	BATTERY	CHEMICO

OBS	CHARGING HOLE LIDS OFF	OVEN NUMBER	TIME OF PUSH	CHG HOLE #1	CHG HOLE #2	CHG HOLE #3	CHG HOLE #4	STAND PIPE CAP	CUM TIME OF EMISSIONS, SECONDS	MAXIMUM OPACITY, %
155	ALL	1135	11:44	30	30	30	30	30	25	30
156	ALL	1153	11:54	20	20	20	20	20	20	20
157	ALL	1222	12:27	25	25	25	25	25	15	25
158	ALL	1262	13:16	55	55	55	55	55	75	55
159	ALL	1272	13:24	45	45	45	45	45	90	45
160	ALL	1242	13:58	35	35	35	35	35	20	35
161	ALL	1214	14:06	80	80	80	80	80	35	80
162	ALL	1224	14:22	15	15	15	15	15	25	15
163	ALL	1234	14:31	40	40	40	40	40	40	40
164	ALL	1153	11:55	30	30	30	30	30	25	30
165	ALL	1151	12:32	100	100	100	100	100	90	100
166	0	1229	12:41	0	0	0	0	30	40	30
167	ALL	1242	12:54	25	25	25	25		30	25
168	ALL	1262	13:02	20	20	20	20	20	35	20
169	3	1272	13:15		15	15	15	15	45	15
170	ALL	1135	13:34	100	100	100	100	100	40	100
171	ALL	1168	13:47	95	95	95	95	95	95	95
172	ALL	1214	14:01	15	15	15	15		20	15
173	ALL	1224	14:07	55	55	55	55	55	30	55
174	1	1151	11:38				20	20	35	20
175	3	1135	11:45		30	30	30		43	30
176	0	1153	12:02					0	0	0

COKE OVEN TOPSIDE EMISSIONS OBSERVATIONS
KIDC DEMONSTRATION PROJECT - BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

OBS	DATE	BATTERY	OBSERVERS INITIALS	WEATHER	WIND DIRECTION	WIND SPEED MPH	OBSERVER LOCATION	BACKGROUND	PUSHING EMISSION CONTROL SYSTEM
177	07/30/91	11/12	SBP	OVERCAST	SE	10-15	SOUTH	BATTERY	CHEMICO
178	07/30/91	11/12	SBP	OVERCAST	SE	10-15	SOUTH	BATTERY	CHEMICO
179	07/30/91	11/12	SBP	OVERCAST	SE	10-15	SOUTH	BATTERY	CHEMICO
180	07/30/91	11/12	SBP	OVERCAST	SE	10-15	SOUTH	BATTERY	CHEMICO
181	07/30/91	11/12	SBP	OVERCAST	SE	10-15	SOUTH	BATTERY	CHEMICO
182	07/30/91	11/12	SBP	OVERCAST	SE	10-15	SOUTH	BATTERY	CHEMICO
183	07/30/91	11/12	SBP	OVERCAST	SE	10-15	SOUTH	BATTERY	CHEMICO
184	07/31/91	11/12	GW	OVERCAST	SE	5-10	TOPSIDE	CLEAR	SHENANG
185	07/31/91	11/12	GW	OVERCAST	SE	5-10	TOPSIDE	CLEAR	SHENANG
186	07/31/91	11/12	GW	OVERCAST	SE	5-10	TOPSIDE	CLEAR	SHENANG
187	07/31/91	11/12	GW	OVERCAST	SE	5-10	TOPSIDE	CLEAR	SHENANG
188	07/31/91	11/12	GW	OVERCAST	SE	5-10	TOPSIDE	CLEAR	SHENANG
189	07/31/91	11/12	REA	OC/CLEAR	SE	10	SOUTH	BATTERY	SHENANG
190	07/31/91	11/12	REA	OC/CLEAR	SE	10	SOUTH	BATTERY	SHENANG
191	07/31/91	11/12	REA	OC/CLEAR	SE	10	SOUTH	BATTERY	SHENANG
192	07/31/91	11/12	REA	OC/CLEAR	SE	10	SOUTH	BATTERY	SHENANG
193	07/31/91	11/12	REA	OC/CLEAR	SE	10	SOUTH	BATTERY	SHENANG
194	07/31/91	11/12	SBP	OC/CLEAR	SE	5-10	SOUTH	BATTERY	SHENANG
195	07/31/91	11/12	SBP	OC/CLEAR	SE	5-10	SOUTH	BATTERY	SHENANG
196	07/31/91	11/12	SBP	OC/CLEAR	SE	5-10	SOUTH	BATTERY	SHENANG
197	07/31/91	11/12	SBP	OC/CLEAR	SE	5-10	SOUTH	BATTERY	SHENANG
198	07/31/91	11/12	SBP	OC/CLEAR	SE	5-10	SOUTH	BATTERY	SHENANG

OBS	CHARGING HOLE LIDS OFF	OVEN NUMBER	TIME OF PUSH	CHG HOLE #1	CHG HOLE #2	CHG HOLE #3	CHG HOLE #4	STAND-PIPE CAP	CUM TIME OF EMISSIONS, SECONDS	MAXIMUM OPACITY, %
177	ALL	1218	12:19	75	75	75	75	75	155	75
178	ALL	1232	12:54	15	15	15	15	15	25	15
179	3	1242	13:25	.	30	30	30	30	45	30
180	ALL	1222	13:39	100	100	100	100	100	80	100
181	ALL	1262	13:56	80	80	80	80	80	51	80
182	ALL	1272	14:07	20	20	20	20	20	41	20
183	1	1214	14:22	.	.	.	35	35	37	35
184	ALL	1222	13:31	95	95	95	95	95	50	95
185	ALL	1232	13:52	0	15	15	15	15	35	15
186	ALL	1242	14:18	15	15	15	15	15	42	15
187	3	1262	14:26	.	15	15	15	15	27	15
188	ALL	1272	14:40	15	15	15	15	15	58	15
189	ALL	1222	13:31	90	90	90	90	90	52	90
190	ALL	1232	13:52	0	15	15	15	15	46	15
191	ALL	1242	14:19	45	45	45	45	45	20	45
192	3	1262	14:26	.	15	15	15	15	22	15
193	ALL	1272	14:40	20	20	20	20	20	55	20
194	ALL	1222	13:31	90	90	90	90	90	52	90
195	ALL	1232	13:52	0	15	15	15	15	45	15
196	ALL	1242	14:18	20	20	20	20	20	40	20
197	3	1262	14:26	.	15	15	15	15	25	15
198	ALL	1272	14:40	15	15	15	15	15	585	15

COKE OVEN TOPSIDE EMISSIONS OBSERVATIONS
KIDC DEMONSTRATION PROJECT - BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

10:53 Tuesday, March 31, 1992 10

OBS	DATE	BATTERY	OBSERVERS INITIALS	WEATHER	WIND DIRECTION	WIND SPEED MPH	OBSERVER LOCATION	BACKGROUND	PUSHING EMISSION CONTROL SYSTEM
199	08/06/91	11/12	SBP	CLEAR	NW/SE	0-15	SOUTH	BATTERY	SHENANG
200	08/06/91	11/12	SBP	CLEAR	NW/SE	0-15	SOUTH	BATTERY	KIDC
201	08/06/91	11/12	SBP	CLEAR	NW/SE	0-15	SOUTH	BATTERY	SHENANG
202	08/06/91	11/12	SBP	CLEAR	NW/SE	0-15	SOUTH	BATTERY	SHENANG
203	08/06/91	11/12	SBP	CLEAR	NW/SE	0-15	SOUTH	BATTERY	SHENANG
204	08/06/91	11/12	SBP	CLEAR	NW/SE	0-15	SOUTH	BATTERY	SHENANG
205	08/06/91	11/12	SBP	CLEAR	NW/SE	0-15	SOUTH	BATTERY	SHENANG
206	08/06/91	11/12	SBP	CLEAR	NW/SE	0-15	SOUTH	BATTERY	SHENANG
207	08/06/91	11/12	SBP	CLEAR	NW/SE	0-15	SOUTH	BATTERY	SHENANG
208	08/06/91	11/12	SBP	CLEAR	NW/SE	0-15	SOUTH	BATTERY	SHENANG
209	08/13/91	11/12	SBP	OVERCAST	SOUTH	10-15	SOUTH	BATTERY	KIDC
210	08/13/91	11/12	SBP	OVERCAST	SOUTH	10-15	SOUTH	BATTERY	CHEMICO
211	08/13/91	11/12	SBP	OVERCAST	SOUTH	10-15	SOUTH	BATTERY	KIDC
212	08/13/91	11/12	SBP	OVERCAST	SOUTH	10-15	SOUTH	BATTERY	CHEMICO
213	08/13/91	11/12	SBP	OVERCAST	SOUTH	10-15	SOUTH	BATTERY	CHEMICO
214	08/13/91	11/12	SBP	OVERCAST	SOUTH	10-15	SOUTH	BATTERY	CHEMICO
215	08/13/91	11/12	SBP	OVERCAST	SOUTH	10-15	SOUTH	BATTERY	CHEMICO
216	08/13/91	11/12	SBP	OVERCAST	SOUTH	10-15	SOUTH	BATTERY	CHEMICO
217	08/13/91	11/12	SBP	OVERCAST	SOUTH	10-15	SOUTH	BATTERY	CHEMICO
218	08/13/91	11/12	SBP	OVERCAST	SOUTH	10-15	SOUTH	BATTERY	CHEMICO
219	08/20/91	11/12	SBP	OVERCAST	NORTH	5-10	SOUTH	BATTERY	CHEMICO
220	08/20/91	11/12	SBP	OVERCAST	NORTH	5-10	SOUTH	BATTERY	CHEMICO

OBS	CHARGING HOLE LIDS OFF	OVEN NUMBER	TIME OF PUSH	CHG HOLE #1	CHG HOLE #2	CHG HOLE #3	CHG HOLE #4	STAND-PIPE CAP	CUM. TIME OF EMISSIONS, SECONDS	MAXIMUM OPACITY, %
199	ALL	1135	11:30	.	.	.	.	.	33	100
200	ALL	1151	11:50	.	.	.	.	.	155	100
201	ALL	1217	12:15	.	.	.	.	.	38	35
202	ALL	1153	12:25	.	.	.	.	.	52	15
203	ALL	1237	12:52	.	.	.	.	.	65	100
204	ALL	1247	13:15	.	.	.	.	.	37	25
205	ALL	1257	13:24	.	.	.	.	.	29	65
206	ALL	1209	13:47	.	.	.	.	.	31	15
207	ALL	1239	13:55	.	.	.	.	.	42	100
208	ALL	1249	14:03	.	.	.	.	.	32	25
209	ALL	1148	11:29	.	.	.	.	.	65	90
210	ALL	1135	11:47	.	.	.	.	.	43	100
211	ALL	1151	12:00	.	.	.	.	.	72	100
212	ALL	1248	12:19	.	.	.	.	.	13	15
213	ALL	1153	12:28	.	.	.	.	.	30	35
214	ALL	1267	12:37	.	.	.	.	.	72	40
215	ALL	1258	12:59	.	.	.	.	.	28	60
216	ALL	1268	13:29	.	.	.	.	.	100	30
217	ALL	1238	13:43	.	.	.	.	.	40	90
218	ALL	1201	14:08	.	.	.	.	.	26	25
219	3	1148	12:21	0	.	.	.	.	27	20
220	3	1151	12:41	0	.	.	.	.	62	30

COKL OVEN TOPSIDE EMISSIONS OBSERVATIONS
KIDC DEMONSTRATION PROJECT - BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

OBS	DATE	BATTERY	OBSERVERS INITIALS	WEATHER	WIND DIRECTION	WIND SPEED MPH	OBSERVER LOCATION	BACKGROUND	PUSHING EMISSION CONTROL SYSTEM
221	08/20/91	11/12	SBP	OVERCAST	NORTH	5 10	SOUTH	BATTERY	CHEMICO
222	08/20/91	11/12	SBP	OVERCAST	NORTH	5 10	SOUTH	BATTERY	CHEMICO
223	08/20/91	11/12	SBP	OVERCAST	NORTH	5-10	SOUTH	BATTERY	CHEMICO
224	08/20/91	11/12	SBP	OVERCAST	NORTH	5-10	SOUTH	BATTERY	CHEMICO
225	08/20/91	11/12	SBP	OVERCAST	NORTH	5-10	SOUTH	BATTERY	CHEMICO
226	08/20/91	11/12	SBP	OVERCAST	NORTH	5-10	SOUTH	BATTERY	CHEMICO
227	08/20/91	11/12	SBP	OVERCAST	NORTH	5-10	SOUTH	BATTERY	CHEMICO
228	08/20/91	11/12	SBP	OVERCAST	NORTH	5-10	SOUTH	BATTERY	CHEMICO
229	08/27/91	11/12	SBP	OVERCAST	SE	5 10	SOUTH	BATTERY	CHEMICO
230	08/27/91	11/12	SBP	OVERCAST	SE	5-10	SOUTH	BATTERY	CHEMICO
231	08/27/91	11/12	SBP	OVERCAST	SE	5-10	SOUTH	BATTERY	CHEMICO
232	08/27/91	11/12	SBP	OVERCAST	SE	5 10	SOUTH	BATTERY	CHEMICO
233	08/27/91	11/12	SBP	OVERCAST	SE	5 10	SOUTH	BATTERY	CHEMICO
234	08/27/91	11/12	SBP	OVERCAST	SE	5 10	SOUTH	BATTERY	CHEMICO
235	08/27/91	11/12	SBP	OVERCAST	SE	5-10	SOUTH	BATTERY	CHEMICO
236	08/27/91	11/12	SBP	OVERCAST	SE	5-10	SOUTH	BATTERY	CHEMICO
237	08/27/91	11/12	SBP	OVERCAST	SE	5-10	SOUTH	BATTERY	CHEMICO
238	08/27/91	11/12	SBP	OVERCAST	SE	5-10	SOUTH	BATTERY	CHEMICO
239	09/04/91	11/12	SBP	OVERCAST	SOUTH	15 20	SOUTH	BATTERY	SHENANG
240	09/04/91	11/12	SBP	OVERCAST	SOUTH	15-20	SOUTH	BATTERY	SHENANG
241	09/04/91	11/12	SBP	OVERCAST	SOUTH	15-20	SOUTH	BATTERY	SHENANG
242	09/04/91	11/12	SBP	OVERCAST	SOUTH	15-20	SOUTH	BATTERY	SHENANG

OBS	CHARGING HOLE LIDS OFF	OVEN NUMBER	TIME OF PUSH	CHG HOLE #1	CHG HOLE #2	CHG HOLE #3	CHG HOLE #4	STAND PIPE CAP	CUM. TIME OF EMISSIONS, SECONDS	MAXIMUM OPACITY, %
221	ALL	1135	12 50	.	.	.	.	.	26	35
222	0	1150	13 01	0	0	0	0		0	0
223	3	1126	13:12	.	0		.		116	80
224	ALL	1236	13:28	.	.	.	.		60	100
225	ALL	1246	13:40	.	.	.	.		35	40
226	3	1208	13:54	0		.	.		44	80
227	3	1238	14:10	0	.	.	.		49	90
228	3	1248	14 24	0	.	.	.	.	53	70
229	ALL	1151	11 50						40	100
230	ALL	1236	12 02						19	100
231	ALL	1153	12 14						27	15
232	ALL	1246	12 28						41	35
233	ALL	1208	12 33	.		.	.		38	25
234	0	1238	12 40	0	0	0	0	0	0	0
235	0	1248	12 51	0	0	0	0	.	8	60
236	3	1258	13:00	0	.	.	.	.	37	80
237	ALL	1268	13:07	.		.	.	.	38	100
238	ALL	1201	13 30						41	10
239	ALL	1231	14:48						15	10
240	ALL	1241	14:55	.		.	.		10	15
241	ALL	1251	15:07	.	.			.	19	15
242	ALL	1257	15 15			.	.		14	10

COKE OVEN TOPSIDE EMISSIONS OBSERVATIONS
KIDC DEMONSTRATION PROJECT - BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

OBS	DATE	BATTERY	OBSERVERS INITIALS	WEATHER	WIND DIRECTION	WIND SPEED MPH	OBSERVER LOCATION	BACKGROUND	PUSHING EMISSION CONTROL SYSTEM
243	09/04/91	11/12	SBP	OVERCAST	SOUTH	15-20	SOUTH	BATTERY	SHENANG
244	09/04/91	11/12	SBP	OVERCAST	SOUTH	15-20	SOUTH	BATTERY	SHENANG
245	09/04/91	11/12	SBP	OVERCAST	SOUTH	15-20	SOUTH	BATTERY	SHENANG
246	09/04/91	11/12	SBP	OVERCAST	SOUTH	15-20	SOUTH	BATTERY	SHENANG
247	09/04/91	11/12	SBP	OVERCAST	SOUTH	15-20	SOUTH	BATTERY	SHENANG
248	09/04/91	11/12	SBP	OVERCAST	SOUTH	15-20	SOUTH	BATTERY	SHENANG
249	09/10/91	11/12	SBP	OVERCAST	SW	15-20	SOUTH	BATTERY	KIDC
250	09/10/91	11/12	SBP	OVERCAST	SW	15-20	SOUTH	BATTERY	SHENANG
251	09/10/91	11/12	SBP	OVERCAST	SW	15-20	SOUTH	BATTERY	SHENANG
252	09/10/91	11/12	SBP	OVERCAST	SW	15-20	SOUTH	BATTERY	KIDC
253	09/10/91	11/12	SBP	OVERCAST	SW	15-20	SOUTH	BATTERY	SHENANG
254	09/10/91	11/12	SBP	OVERCAST	SW	15-20	SOUTH	BATTERY	SHENANG
255	09/10/91	11/12	SBP	OVERCAST	SW	15-20	SOUTH	BATTERY	SHENANG
256	09/10/91	11/12	SBP	OVERCAST	SW	15-20	SOUTH	BATTERY	SHENANG
257	09/10/91	11/12	SBP	OVERCAST	SW	15-20	SOUTH	BATTERY	SHENANG
258	09/10/91	11/12	SBP	OVERCAST	SW	15-20	SOUTH	BATTERY	SHENANG
259	09/18/91	11/12	SBP	OVERCAST	SE	15-20	SOUTH	BATTERY	SHENANG
260	09/18/91	11/12	SBP	OVERCAST	SE	15-20	SOUTH	BATTERY	SHENANG
261	09/18/91	11/12	SBP	OVERCAST	SE	15-20	SOUTH	BATTERY	SHENANG
262	09/18/91	11/12	SBP	OVERCAST	SE	15-20	SOUTH	BATTERY	SHENANG
263	09/18/91	11/12	SBP	OVERCAST	SE	15-20	SOUTH	BATTERY	SHENANG
264	09/18/91	11/12	SBP	OVERCAST	SE	15-20	SOUTH	BATTERY	SHENANG

OBS	CHARGING HOLE LIDS OFF	OVEN NUMBER	TIME OF PUSH	CHG HOLE #1	CHG HOLE #2	CHG HOLE #3	CHG HOLE #4	STAND-PIPE CAP	CUM. TIME OF EMISSIONS, SECONDS	MAXIMUM OPACITY, %
243	1	1261	15:24	0	0	0	.	0	40	80
244	ALL	1271	15:32	.	.	.	.	.	53	85
245	ALL	1134	16:13	.	.	.	.	.	22	35
246	ALL	1154	16:28	.	.	.	.	.	34	75
247	ALL	1213	16:39	.	.	.	.	.	61	100
248	ALL	1223	16:48	.	.	.	.	.	51	.
249	ALL	1148	11:23	.	.	.	.	.	61	100
250	ALL	1135	11:36	.	.	.	.	.	53	100
251	ALL	1236	11:46	.	.	.	.	.	65	100
252	ALL	1151	12:05	.	.	.	.	.	63	55
253	3	1246	12:20	0	.	.	.	.	39	15
254	ALL	1153	12:31	.	.	.	.	.	49	45
255	3	1208	12:43	0	.	.	.	.	48	100
256	3	1238	13:06	0	.	.	.	.	60	100
257	0	1248	13:19	0	0	0	0	0	0	0
258	3	1258	13:28	0	.	.	.	.	58	100
259	ALL	1258	13:13	.	.	.	.	.	62	100
260	ALL	1268	13:20	.	.	.	.	.	41	100
261	ALL	1201	13:29	.	.	.	.	.	50	75
262	ALL	1211	13:38	.	.	.	.	.	58	45
263	ALL	1221	13:47	.	.	.	.	.	28	100
264	ALL	1231	13:56	.	.	.	.	.	25	10

COKE OVEN TOPSIDE EMISSIONS OBSERVATIONS
KIDC DEMONSTRATION PROJECT - BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

OBS	DATE	BATTERY	OBSERVERS INITIALS	WEATHER	WIND DIRECTION	WIND SPEED MPH	OBSERVER LOCATION	BACKGROUND	PUSHING EMISSION CONTROL SYSTEM
265	09/18/91	11/12	SBP	OVERCAST	SE	15-20	SOUTH	BATTERY	SHENANG
266	09/18/91	11/12	SBP	OVERCAST	SE	15-20	SOUTH	BATTERY	SHENANG
267	09/18/91	11/12	SBP	OVERCAST	SE	15-20	SOUTH	BATTERY	SHENANG
268	09/18/91	11/12	SBP	OVERCAST	SE	15-20	SOUTH	BATTERY	SHENANG
269	09/24/91	11/12	SBP	OVERCAST	NE	12-15	SOUTH	BATTERY	SHENANG
270	09/24/91	11/12	SBP	OVERCAST	NE	12-15	SOUTH	BATTERY	SHENANG
271	09/24/91	11/12	SBP	OVERCAST	NE	12-15	SOUTH	BATTERY	SHENANG
272	09/24/91	11/12	SBP	OVERCAST	NE	12-15	SOUTH	BATTERY	SHENANG
273	09/24/91	11/12	SBP	OVERCAST	NE	12-15	SOUTH	BATTERY	SHENANG
274	09/24/91	11/12	SBP	OVERCAST	NE	12-15	SOUTH	BATTERY	SHENANG
275	09/24/91	11/12	SBP	OVERCAST	NE	12-15	SOUTH	BATTERY	SHENANG
276	09/25/91	11/12	SBP	RAIN	WEST	15-20	SOUTH	BATTERY	SHENANG
277	09/25/91	11/12	SBP	RAIN	WEST	15-20	SOUTH	BATTERY	SHENANG
278	09/25/91	11/12	SBP	RAIN	WEST	15-20	SOUTH	BATTERY	SHENANG
279	10/02/91	11/12	SBP	OVERCAST	SOUTH	15-20	SOUTH	BATTERY	KIDC
280	10/02/91	11/12	SBP	OVERCAST	SOUTH	15-20	SOUTH	BATTERY	CHEMICO
281	10/02/91	11/12	SBP	OVERCAST	SOUTH	15-20	SOUTH	BATTERY	KIDC
282	10/02/91	11/12	SBP	OVERCAST	SOUTH	15-20	SOUTH	BATTERY	CHEMICO
283	10/02/91	11/12	SBP	OVERCAST	SOUTH	15-20	SOUTH	BATTERY	KIDC
284	10/02/91	11/12	SBP	OVERCAST	SOUTH	15-20	SOUTH	BATTERY	KIDC
285	10/02/91	11/12	SBP	OVERCAST	SOUTH	15-20	SOUTH	BATTERY	KIDC
286	10/02/91	11/12	SBP	OVERCAST	SOUTH	15-20	SOUTH	BATTERY	KIDC

OBS	CHARGING HOLE LIDS OFF	OVEN NUMBER	TIME OF PUSH	CHG HOLE #1	CHG HOLE #2	CHG HOLE #3	CHG HOLE #4	STAND-PIPE CAP	CUM TIME OF EMISSIONS, SECONDS	MAXIMUM OPACITY, %
265	ALL	1241	14:03	.	.	.	.	.	37	20
266	ALL	1251	14:18	.	.	.	.	.	24	15
267	ALL	1255	14:32	.	.	.	.	.	21	10
268	ALL	1261	14:48	.	.	.	.	.	49	100
269	ALL	1151	11:44	.	.	.	.	.	48	75
270	ALL	1236	11:59	.	.	.	.	.	57	100
271	ALL	1153	12:12	.	.	.	.	.	17	15
272	ALL	1246	12:28	.	.	.	.	.	29	10
273	ALL	1171	12:37	.	.	.	.	.	81	100
274	ALL	1208	12:50	.	.	.	.	.	22	10
275	ALL	1229	13:01	.	.	.	.	.	57	15
276	ALL	1171	13:32	.	.	.	.	.	69	100
277	ALL	1208	13:52	.	.	.	.	.	31	15
278	ALL	1238	13:59	.	.	.	.	.	41	100
279	ALL	1119	14:14	.	.	.	.	.	85	90
280	ALL	1208	14:31	.	.	.	.	.	26	20
281	1	1152	14:40	0	0	0	.	.	62	60
282	ALL	1229	14:50	.	.	.	.	.	23	15
283	ALL	1154	15:05	.	.	.	.	.	70	100
284	3	1101	17:11	0	.	.	.	.	63	100
285	3	1147	18:14	0	.	.	.	.	43	100
286	3	1171	18:53	0	.	.	.	.	72	85

COKE OVEN TOPSIDE EMISSIONS OBSERVATIONS
KIDC DEMONSTRATION PROJECT - BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

OBS	DATE	BATTERY	OBSERVERS INITIALS	WEATHER	WIND DIRECTION	WIND SPEED MPH	OBSERVER LOCATION	BACKGROUND	PUSHING EMISSION CONTROL SYSTEM
287	10/04/91	11/12	SBP	CLEAR	SE	0-5	SOUTH	BATTERY	SHENANG
288	10/04/91	11/12	SBP	CLEAR	SE	0-5	SOUTH	BATTERY	SHENANG
289	10/04/91	11/12	SBP	CLEAR	SE	0-5	SOUTH	BATTERY	SHENANG
290	10/09/91	11/12	SBP	CLEAR	SW	15-20	SOUTH	BATTERY	SHENANG
291	10/09/91	11/12	SBP	CLEAR	SW	15-20	SOUTH	BATTERY	KIDC
292	10/09/91	11/12	SBP	CLEAR	SW	15-20	SOUTH	BATTERY	SHENANG
293	10/09/91	11/12	SBP	CLEAR	SW	15-20	SOUTH	BATTERY	KIDC
294	10/09/91	11/12	SBP	CLEAR	SW	15-20	SOUTH	BATTERY	SHENANG
295	10/09/91	11/12	SBP	CLEAR	SW	15-20	SOUTH	BATTERY	SHENANG
296	10/09/91	11/12	SBP	CLEAR	SW	15-20	SOUTH	BATTERY	KIDC
297	10/09/91	11/12	SBP	CLEAR	SW	15-20	SOUTH	BATTERY	SHENANG
298	10/09/91	11/12	SBP	CLEAR	SOUTH	15-20	SOUTH	BATTERY	KIDC
299	10/09/91	11/12	SBP	CLEAR	SOUTH	15-20	SOUTH	BATTERY	KIDC
300	10/09/91	11/12	SBP	CLEAR	SOUTH	15-20	SOUTH	BATTERY	KIDC
301	10/09/91	11/12	SBP	CLEAR	SOUTH	15-20	SOUTH	BATTERY	KIDC
302	10/09/91	11/12	SBP	CLEAR	SOUTH	15-20	SOUTH	BATTERY	KIDC
303	10/09/91	11/12	SBP	CLEAR	SOUTH	15-20	SOUTH	BATTERY	KIDC
304	10/11/91	11	SBP	RAIN	NE	0-5	SOUTH	BATTERY	KIDC
305	10/11/91	11	SBP	RAIN	NE	0-5	SOUTH	BATTERY	KIDC
306	10/11/91	11	SBP	RAIN	NE	0-5	SOUTH	BATTERY	KIDC
307	10/11/91	11	SBP	RAIN	NE	0-5	SOUTH	BATTERY	KIDC
308	10/11/91	11	SBP	RAIN	NE	0-5	SOUTH	BATTERY	KIDC

OBS	CHARGING HOLE LIDS OFF	OVEN NUMBER	TIME OF PUSH	CHG HOLE #1	CHG HOLE #2	CHG HOLE #3	CHG HOLE #4	STAND-PIPE CAP	CUM. TIME OF EMISSIONS, SECONDS	MAXIMUM OPACITY, %
287	ALL	1216	12:48	.	.	.	.	.	44	55
288	ALL	1226	13:09	.	.	.	.		25	25
289	ALL	1236	13:20	.	.	.	.	.	51	100
290	ALL	1134	11:31	.	.	.	.	.	57	45
291	ALL	1148	11:46	.	.	.	.	.	63	85
292	3	1224	11:55	.	.	0	.	.	38	65
293	ALL	1151	12:07	.	.	.	.	.	79	35
294	ALL	1234	12:11	.	.	.	.	.	47	20
295	ALL	1244	12:24	.	.	.	.	.	28	25
296	ALL	1153	12:37	.	.	.	.	.	61	100
297	ALL	1216	12:42	.	.	.	.	.	36	100
298	ALL	1149	14:14	.	.	.	.	.	63	100
299	ALL	1152	15:00	.	.	.	.	.	58	100
300	ALL	1154	15:28	.	.	.	.	.	61	100
301	ALL	1101	17:42	.	.	.	.	.	59	70
302	ALL	1135	18:01	.	.	.	.	.	61	100
303	ALL	1171	18:21	.	.	.	.	.	89	100
304	ALL	1148	11:59	.	.	.	.	.	329	100
305	ALL	1151	12:39	.	.	.	.	.	70	100
306	ALL	1153	13:30	.	.	.	.	.	58	90
307	ALL	1149	14:48	.	.	.	.	.	41	100
308	ALL	1152	15:28	.	.	.	.	.	230	75

COKE OVEN TOPSIDE EMISSIONS OBSERVATIONS
KIDC DEMONSTRATION PROJECT - BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

OBS	DATE	BATTERY	OBSERVERS INITIALS	WEATHER	WIND DIRECTION	WIND SPEED MPH	OBSERVER LOCATION	BACKGROUND	PUSHING EMISSION CONTROL SYSTEM
309	10/11/91	11	SBP	RAIN	NE	0-5	SOUTH	BATTERY	KIDC
310	10/11/91	11	SBP	RAIN	NE	0-5	SOUTH	BATTERY	KIDC
311	10/13/91	11	SBP	OVERCAST	NORTH	10-15	SOUTH	BATTERY	KIDC
312	10/13/91	11	SBP	OVERCAST	NORTH	10-15	SOUTH	BATTERY	KIDC
313	10/13/91	11	SBP	OVERCAST	NORTH	10-15	SOUTH	BATTERY	KIDC
314	10/13/91	11	SBP	OVERCAST	NORTH	10-15	SOUTH	BATTERY	KIDC
315	10/13/91	11	SBP	OVERCAST	NORTH	10-15	SOUTH	BATTERY	KIDC
316	10/13/91	11	SBP	OVERCAST	NORTH	10-15	SOUTH	BATTERY	KIDC
317	10/13/91	11	SBP	OVERCAST	NORTH	10-15	SOUTH	BATTERY	KIDC
318	10/13/91	11	SBP	OVERCAST	NORTH	10-15	SOUTH	BATTERY	KIDC
319	10/13/91	11	SBP	OVERCAST	NORTH	10-15	SOUTH	BATTERY	KIDC
320	10/15/91	11/12	SBP	OC/RAIN	SE	15-20	SOUTH	BATTERY	SHENANG
321	10/15/91	11/12	SBP	OC/RAIN	SE	15-20	SOUTH	BATTERY	SHENANG
322	10/15/91	11/12	SBP	OC/RAIN	SE	15-20	SOUTH	BATTERY	SHENANG
323	10/15/91	11/12	SBP	OC/RAIN	SE	15-20	SOUTH	BATTERY	SHENANG
324	10/15/91	11/12	SBP	OC/RAIN	SE	15-20	SOUTH	BATTERY	SHENANG
325	10/19/91	11	SBP	CLEAR/OC	SW/NW	5-20	SOUTH	BATTERY	KIDC
326	10/19/91	11	SBP	CLEAR/OC	SW/NW	5-20	SOUTH	BATTERY	KIDC
327	10/19/91	11	SBP	CLEAR/OC	SW/NW	5-20	SOUTH	BATTERY	KIDC
328	10/19/91	11	SBP	CLEAR/OC	SW/NW	5-20	SOUTH	BATTERY	KIDC
329	10/19/91	11	SBP	CLEAR/OC	SW/NW	5-20	SOUTH	BATTERY	KIDC
330	10/19/91	11	SBP	CLEAR/OC	SW/NW	5-20	SOUTH	BATTERY	KIDC

OBS	CHARGING HOLE LIDS OFF	OVEN NUMBER	TIME OF PUSH	CHG HOLE #1	CHG HOLE #2	CHG HOLE #3	CHG HOLE #4	STAND-PIPE CAP	CUM TIME OF EMISSIONS, SECONDS	MAXIMUM OPACITY, %
309	ALL	1154	16:02	.	.	.	.	.	63	100
310	ALL	1135	17:49				.	.	71	100
311	ALL	1148	11:23	.	.	.	.	.	58	85
312	ALL	1151	11:55	.	.	.	.	.	61	100
313	ALL	1153	12:32	.					66	100
314	ALL	1149	14:24	.	.	.	.	.	79	100
315	ALL	1152	14:47	.	.	.	.	.	71	65
316	ALL	1154	15:14				.	.	75	100
317	ALL	1147	17:16	.	.		.	.	66	100
318	ALL	1135	17:41	.			.		75	75
319	ALL	1171	18:10				.	.	85	100
320	ALL	1134	11:17				.	.	51	35
321	ALL	1148	11:31	.			.	.	38	40
322	ALL	1224	11:40	.					28	25
323	ALL	1151	11:55				.	.	67	100
324	ALL	1234	12:08				.		35	20
325	ALL	1148	11:29	.	.	.	.	.	72	40
326	ALL	1151	12:00	.	.	.	.	.	74	35
327	ALL	1153	12:20	.	.	.	.	.	83	45
328	ALL	1149	14:24	.	.	.	.	.	63	85
329	ALL	1152	15:01	.	.	.	.	.	73	100
330	ALL	1154	15:23	.	.	.	.	.	76	100

COKE OVEN TOPSIDE EMISSIONS OBSERVATIONS
KIDC DEMONSTRATION PROJECT - BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

OBS	DATE	BATTERY	OBSERVERS INITIALS	WEATHER	WIND DIRECTION	WIND SPEED MPH	OBSERVER LOCATION	BACKGROUND	PUSHING EMISSION CONTROL SYSTEM
331	10/19/91	11	SBP	CLEAR/OC	SW/NW	5-20	SOUTH	BATTERY	KIDC
332	10/19/91	11	SBP	CLEAR/OC	SW/NW	5-20	SOUTH	BATTERY	KIDC
333	10/21/91	11	SBP	OVERCAST	SE	10-15	SOUTH	BATTERY	KIDC
334	10/22/91	11	SBP	OVERCAST	NW	5-10	SOUTH	BATTERY	KIDC
335	10/22/91	11	SBP	OVERCAST	NW	5-10	SOUTH	BATTERY	KIDC
336	10/22/91	11	SBP	OVERCAST	NW	5-10	SOUTH	BATTERY	KIDC
337	10/22/91	11	SBP	OVERCAST	NW	5-10	SOUTH	BATTERY	KIDC
338	10/22/91	11	SBP	OVERCAST	NW	5-10	SOUTH	BATTERY	KIDC
339	10/22/91	11	SBP	OVERCAST	NW	5-10	SOUTH	BATTERY	KIDC
340	10/22/91	11	SBP	OVERCAST	NW	5-10	SOUTH	BATTERY	KIDC
341	10/22/91	11	SBP	OVERCAST	NW	5-10	SOUTH	BATTERY	KIDC
342	10/22/91	11	SBP	OVERCAST	NW	5-10	SOUTH	BATTERY	KIDC
343	10/22/91	12	SBP	CLEAR	SE	10-15	SOUTH	BATTERY	SHENANG
344	10/22/91	12	SBP	CLEAR	SE	10-15	SOUTH	BATTERY	SHENANG
345	10/22/91	12	SBP	CLEAR	SE	10-15	SOUTH	BATTERY	SHENANG
346	10/24/91	11/12	SBP	OVERCAST	SE	15-20	SOUTH	BATTERY	KIDC
347	10/24/91	11/12	SBP	OVERCAST	SE	15-20	SOUTH	BATTERY	SHENANG
348	10/24/91	11/12	SBP	OVERCAST	SE	15-20	SOUTH	BATTERY	KIDC
349	10/24/91	11/12	SBP	OVERCAST	SE	15-20	SOUTH	BATTERY	KIDC
350	10/24/91	11/12	SBP	OVERCAST	SE	15-20	SOUTH	BATTERY	KIDC
351	10/24/91	11/12	SBP	OVERCAST	SE	15-20	SOUTH	BATTERY	SHENANG
352	10/24/91	11/12	SBP	OVERCAST	SE	15-20	SOUTH	BATTERY	KIDC

OBS	CHARGING HOLE LIDS OFF	OVEN NUMBER	TIME OF PUSH	CHG HOLE #1	CHG HOLE #2	CHG HOLE #3	CHG HOLE #4	STAND PIPE CAP	CUM TIME OF EMISSIONS, SECONDS	MAXIMUM OPACITY, %
331	ALL	1135	17:34	.	.	.	.	.	59	65
332	ALL	1171	17:57	.	.	.	.	.	80	95
333	ALL	1148	11:42	.	.	.	.	.	69	55
334	ALL	1148	11:51	.	.	.	.	.	71	75
335	ALL	1151	12:19		.				48	45
336	ALL	1153	12:50	.	.	.	.	.	75	55
337	ALL	1149	15:00	.	.	.		.	88	45
338	ALL	1172	15:49	.	.	.		.	70	100
339	ALL	1152	16:25		.				73	100
340	ALL	1135	17:17						45	60
341	ALL	1154	17:39						61	100
342	ALL	1171	17:57					.	72	100
343	ALL	1201	16:05		.				28	20
344	ALL	1211	16:13		.			.	31	45
345	ALL	1221	16:27		.			.	68	100
346	ALL	1148	11:35	.	.	.			58	70
347	ALL	1234	11:43					.	259	100
348	ALL	1151	11:59	.	.			.	80	40
349	ALL	1153	12:34	.	.			.	71	20
350	ALL	1149	14:33		.				64	25
351	3	1258	14:42	0	.	.	.	.	51	20
352	ALL	1172	14:59		.	.	.	.	64	100

OBS	DATE	BATTERY	OBSERVERS INITIALS	WEATHER	WIND DIRECTION	WIND SPEED MPH	OBSERVER LOCATION	BACKGROUND	PUSHING EMISSION CONTROL SYSTEM
353	10/24/91	11/12	SBP	OVERCAST	SE	15-20	SOUTH	BATTERY	KIDC
354	10/24/91	11/12	SBP	OVERCAST	SE	15-20	SOUTH	BATTERY	KIDC
355	10/24/91	11	SBP	OVERCAST	SOUTH	10 15	SOUTH	BATTERY	KIDC
356	10/24/91	11	SBP	OVERCAST	SOUTH	10-15	SOUTH	BATTERY	KIDC
357	10/30/91	11/12	SBP	CLEAR	NE	5 10	SOUTH	BATTERY	KIDC
358	10/30/91	11/12	SBP	CLEAR	NE	5-10	SOUTH	BATTERY	KIDC
359	10/30/91	11/12	SBP	CLEAR	NE	5-10	SOUTH	BATTERY	KIDC
360	10/30/91	11/12	SBP	CLEAR	NE	5-10	SOUTH	BATTERY	KIDC
361	10/30/91	11/12	SBP	CLEAR	NE	5-10	SOUTH	BATTERY	KIDC
362	10/30/91	11/12	SBP	CLEAR	NE	5-10	SOUTH	BATTERY	KIDC
363	10/30/91	11/12	SBP	CLEAR	N	15-20	SOUTH	BATTERY	SHENANG
364	10/30/91	11/12	SBP	CLEAR	N	15-20	SOUTH	BATTERY	SHENANG
365	10/30/91	11/12	SBP	CLEAR	N	15-20	SOUTH	BATTERY	SHENANG
366	10/30/91	11/12	SBP	CLEAR	N	15-20	SOUTH	BATTERY	SHENANG
367	10/30/91	11/12	SBP	CLEAR	N	15 20	SOUTH	BATTERY	SHENANG
368	11/06/91	11	SBP	CLEAR	SW/SE	15 20	SOUTH	BATTERY	KIDC
369	11/06/91	11	SBP	CLEAR	SW/SE	15-20	SOUTH	BATTERY	KIDC
370	11/06/91	11	SBP	CLEAR	SW/SE	15-20	SOUTH	BATTERY	KIDC
371	11/06/91	11	SBP	CLEAR	SW/SE	15-20	SOUTH	BATTERY	KIDC
372	11/06/91	11	SBP	CLEAR	SW/SE	15 20	SOUTH	BATTERY	KIDC
373	11/06/91	11	SBP	CLEAR	SW/SE	15 20	SOUTH	BATTERY	KIDC
374	11/06/91	12	SBP	CLEAR	SW/SE	15-20	SOUTH	BATTERY	SHENANG

OBS	CHARGING HOLE LIDS OFF	OVEN NUMBER	TIME OF PUSH	CHG HOLE #1	CHG HOLE #2	CHG HOLE #3	CHG HOLE #4	STAND-PIPE CAP	CUM. TIME OF EMISSIONS, SECONDS	MAXIMUM OPACITY, %
353	3	1152	15:28	0	.	.	.	.	59	35
354	ALL	1135	17:38	.	.	.	.	.	60	55
355	ALL	1154	18:05	.	.	.	.	.	59	55
356	ALL	1171	18:20	.	.	.	.	.	.	.
357	ALL	1148	11:27	.	.	.	.	.	82	100
358	ALL	1151	12:01	.	.	.	.	.	68	25
359	ALL	1153	12:28	.	.	.	.	.	65	30
360	ALL	1149	14:13	.	.	.	.	.	83	85
361	ALL	1172	14:30	.	.	.	.	.	73	100
362	ALL	1152	14:50	.	.	.	.	.	69	100
363	ALL	1258	15:09	.	.	.	.	.	66	100
364	ALL	1268	15:16	.	.	.	.	.	43	65
365	ALL	1201	15:32	.	.	.	.	.	25	10
366	2	1221	15:41	.	0	0	.	0	14	10
367	ALL	1221	15:49	.	.	.	.	.	61	100
368	ALL	1148	11:29	.	.	.	.	.	56	100
369	3	1151	11:56	.	0	.	.	.	67	100
370	ALL	1153	12:30	.	.	.	.	.	45	40
371	3	1149	14:15	.	0	.	.	.	76	65
372	ALL	1172	14:36	.	.	.	.	.	73	100
373	ALL	1152	14:58	.	.	.	.	.	63	100
374	ALL	1224	11:23	.	.	.	.	.	61	100

COKE OVEN TOPSIDE EMISSIONS OBSERVATIONS
KIDC DEMONSTRATION PROJECT BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

OBS	DATE	BATTERY	OBSERVERS INITIALS	WEATHER	WIND DIRECTION	WIND SPEED MPH	OBSERVER LOCATION	BACKGROUND	PUSHING EMISSION CONTROL SYSTEM
375	11/06/91	12	SBP	CLEAR	SW/SE	15 20	SOUTH	BATTERY	SHENANG
376	11/06/91	12	SBP	CLEAR	SW/SE	15 20	SOUTH	BATTERY	SHENANG
377	11/07/91	12	SBP	OVERCAST	NE	5 10	SOUTH	BATTERY	SHENANG
378	11/07/91	12	SBP	OVERCAST	NE	5-10	SOUTH	BATTERY	SHENANG
379	11/13/91	11/12	SBP	OVERCAST	NW	15-20	SOUTH	BATTERY	SHENANG
380	11/13/91	11/12	SBP	OVERCAST	NW	15-20	SOUTH	BATTERY	SHENANG
381	11/13/91	11/12	SBP	OVERCAST	NW	15-20	SOUTH	BATTERY	SHENANG
382	11/13/91	11/12	SBP	OVERCAST	NW	15-20	SOUTH	BATTERY	SHENANG
383	11/13/91	11/12	SBP	OVERCAST	NW	15-20	SOUTH	BATTERY	SHENANG
384	11/13/91	11	SBP	OVERCAST	NW	15-20	SOUTH	BATTERY	KIDC
385	11/13/91	11	SBP	OVERCAST	NW	15-20	SOUTH	BATTERY	KIDC
386	11/13/91	11	SBP	OVERCAST	NW	15 20	SOUTH	BATTERY	KIDC
387	11/20/91	11	SBP	CLEAR	NW	20 25	SOUTH	BATTERY	KIDC
388	11/20/91	11	SBP	CLEAR	NW	20 25	SOUTH	BATTERY	KIDC
389	11/20/91	11	SBP	CLEAR	NW	20-25	SOUTH	BATTERY	KIDC
390	11/20/91	11	SBP	CLEAR	NW	20-25	SOUTH	BATTERY	KIDC
391	11/20/91	11	SBP	CLEAR	NW	20-25	SOUTH	BATTERY	KIDC
392	11/20/91	11	SBP	CLEAR	NW	20-25	SOUTH	BATTERY	KIDC
393	11/20/91	11	SBP	CLEAR	NW	20 25	SOUTH	BATTERY	KIDC
394	11/20/91	11	SBP	CLEAR	NW	20 25	SOUTH	BATTERY	KIDC
395	11/22/91	11	SBP	RAIN	SOUTH	15-20	SOUTH	BATTERY	KIDC
396	11/22/91	11	SBP	RAIN	SOUTH	15-20	SOUTH	BATTERY	KIDC

OBS	CHARGING HOLE LIDS OFF	OVEN NUMBER	TIME OF PUSH	CHG HOLE #1	CHG HOLE #2	CHG HOLE #3	CHG HOLE #4	STAND PIPE CAP	CUM. TIME OF EMISSIONS, SECONDS	MAXIMUM OPACITY, %
375	2	1201	15:26		0	0	.	.	15	5
376	0	1211	15:34	0	0	0	0	.	3	5
377	ALL	1216	12:51	.	.	.	.	.	35	100
378	ALL	1226	12:58		.	.	.	.	27	65
379	ALL	1134	11:28	.	.	.	.	.	58	100
380	ALL	1234	11:42	.	.	.	.	.	33	65
381	ALL	1244	11:53		.	.	.	.	23	100
382	ALL	1216	12:06			.			51	100
383	ALL	1226	12:20		.	.	.	.	21	35
384	ALL	1148	11:45		.	.	.	.	80	75
385	3	1151	12:10		0	.	.	.	78	60
386	ALL	1153	12:39			.			62	25
387	ALL	1151	13:05			.	.		61	100
388	ALL	1153	13:21		.	.	.	.	81	45
389	ALL	1149	13:43			.			83	100
390	ALL	1172	14:08		.	.			76	100
391	ALL	1152	14:28		.	.	.	.	72	55
392	ALL	1135	15:02	.	.	.	.	.	85	60
393	ALL	1154	15:39		.	.			71	85
394	ALL	1171	16:00		.	.	.	.	66	100
395	ALL	1148	12:56						69	100
396	3	1151	13:14	0		.		.	75	100

COKE OVEN TOPSIDE EMISSIONS OBSERVATIONS
KIDC DEMONSTRATION PROJECT - BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

OBS	DATE	BATTERY	OBSERVERS INITIALS	WEATHER	WIND DIRECTION	WIND SPEED MPH	OBSERVER LOCATION	BACKGROUND	PUSHING EMISSION CONTROL SYSTEM
397	11/22/91	11	SBP	RAIN	SOUTH	15-20	SOUTH	BATTERY	KIDC
398	11/22/91	11	SBP	RAIN	SOUTH	15-20	SOUTH	BATTERY	KIDC
399	11/22/91	11	SBP	RAIN	SOUTH	15-20	SOUTH	BATTERY	KIDC
400	11/22/91	11	SBP	RAIN	SOUTH	15-20	SOUTH	BATTERY	KIDC
401	11/22/91	11	SBP	RAIN	SOUTH	15-20	SOUTH	BATTERY	KIDC
402	11/22/91	11	SBP	RAIN	SOUTH	15-20	SOUTH	BATTERY	KIDC
403	11/22/91	11/12	SBP	RAIN	SE	15-20	SOUTH	BATTERY	SHENANG
404	11/22/91	11/12	SBP	RAIN	SE	15-20	SOUTH	BATTERY	SHENANG
405	11/22/91	11/12	SBP	RAIN	SE	15-20	SOUTH	BATTERY	SHENANG
406	11/22/91	11/12	SBP	RAIN	SE	15-20	SOUTH	BATTERY	SHENANG
407	11/22/91	11/12	SBP	RAIN	SE	15-20	SOUTH	BATTERY	SHENANG
408	11/22/91	11/12	SBP	RAIN	SE	15-20	SOUTH	BATTERY	SHENANG
409	11/24/91	11	SBP	OVERCAST	NW	15-20	SOUTH	BATTERY	KIDC
410	11/24/91	11	SBP	OVERCAST	NW	15-20	SOUTH	BATTERY	KIDC
411	11/24/91	11	SBP	OVERCAST	NW	15-20	SOUTH	BATTERY	KIDC
412	11/24/91	11	SBP	OVERCAST	NW	15-20	SOUTH	BATTERY	KIDC
413	11/24/91	11	SBP	OVERCAST	NW	15-20	SOUTH	BATTERY	KIDC
414	11/24/91	11	SBP	OVERCAST	NW	15-20	SOUTH	BATTERY	KIDC
415	11/24/91	11	SBP	OVERCAST	NW	15-20	SOUTH	BATTERY	KIDC
416	11/24/91	11	SBP	OVERCAST	NW	15-20	SOUTH	BATTERY	KIDC
417	11/24/91	11	SBP	OVERCAST	NW	15-20	SOUTH	BATTERY	KIDC

OBS	CHARGING HOLE LIDS OFF	OVEN NUMBER	TIME OF PUSH	CHG HOLE #1	CHG HOLE #2	CHG HOLE #3	CHG HOLE #4	STAND-PIPE CAP	CUM. TIME OF EMISSIONS, SECONDS	MAXIMUM OPACITY, %
397	3	1153	13:31	0	.	.	.	.	38	25
398	3	1149	13:52	0	.	.	.	.	61	100
399	ALL	1172	14:16	.	.	.	.	.	85	100
400	3	1152	14:42	0	.	.	.	.	51	100
401	3	1135	15:38	0	.	.	.	.	80	85
402	2	1154	16:23	.	.	0	0	.	71	100
403	ALL	1224	11:49	.	.	.	.	.	44	45
404	3	1234	11:59	0	.	.	.	.	251	100
405	2	1234	12:32	0	0	.	.	.	32	10
406	1	1244	12:44	0	0	0	.	.	28	35
407	0	1226	12:50	0	0	0	0	0	0	0
408	1	1236	13:25	0	0	0	.	.	69	45
409	ALL	1148	12:50	.	.	.	.	.	65	100
410	ALL	1151	13:17	.	.	.	.	.	61	100
411	ALL	1153	13:32	.	.	.	.	.	50	100
412	ALL	1149	13:53	.	.	.	.	.	75	100
413	ALL	1172	14:10	.	.	.	.	.	87	85
414	ALL	1152	14:30	.	.	.	.	.	69	100
415	ALL	1135	14:46	.	.	.	.	.	85	100
416	ALL	1154	15:08	.	.	.	.	.	68	45
417	ALL	1171	16:32	.	.	.	.	.	90	100

Section 6

Quenched Coke Discharge & Handling Emissions - Conventional & KIDC - Database

QUENCHED COKE DISCHARGE/HANDLING EMISSIONS DATA — 10:56 Tuesday, March 31, 1992 — 1
KRESS DEMONSTRATION PROJECT — BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

OBS	DATE	BATTERY	OBSERVERS INITIALS	WEATHER	WIND DIRECTION	WIND SPEED MPH	OBSERVER LOCATION	BACKGROUND	COKE DISCHARGE LOCATION
1	03/19/91	11	GW	CLEAR	WEST	10-20	N EAST	CLEAR	WHARF
2	03/19/91	11	GW	CLEAR	WEST	10-20	N EAST	CLEAR	WHARF
3	03/19/91	11	GW	CLEAR	WEST	10-20	N EAST	CLEAR	WHARF
4	03/19/91	11	GW	CLEAR	WEST	10-20	N EAST	CLEAR	WHARF
5	03/19/91	11	GW	CLEAR	WEST	10-20	N EAST	CLEAR	WHARF
6	03/22/91	11	GW	OC/RAIN		10-15		CLOUDY	WHARF
7	03/22/91	12	GW	OC/RAIN		10-15		CLOUDY	WHARF
8	03/22/91	12	GW	OC/RAIN		10-15		CLOUDY	WHARF
9	03/22/91	12	GW	OC/RAIN		10-15		CLOUDY	WHARF
10	03/22/91	12	GW	OC/RAIN		10-15		CLOUDY	WHARF
11	03/22/91	12	GW	OC/RAIN		10-15		CLOUDY	WHARF
12	03/22/91	11	GW	OC/RAIN		10-15		CLOUDY	WHARF
13	03/22/91	12	GW	OC/RAIN		10-15		CLOUDY	WHARF
14	03/22/91	12	GW	OC/RAIN		10-15		CLOUDY	WHARF
15	03/26/91	12	GW	OVERCAST	SE	10-15	NORTH		WHARF
16	03/26/91	12	GW	OVERCAST	SE	10-15	NORTH		WHARF
17	03/26/91	12	GW	OVERCAST	SE	10-15	NORTH		WHARF
18	03/26/91	12	GW	OVERCAST	SE	10-15	NORTH		WHARF
19	03/26/91	11	GW	OVERCAST	SE	10-15	NORTH		WHARF
20	03/26/91	11	GW	OVERCAST	SE	10-15	NORTH		WHARF
21	03/26/91	11	GW	OVERCAST	SE	10-15	NORTH		WHARF
22	03/26/91	11	GW	OVERCAST	SE	10-15	NORTH		WHARF

OBS	OBSERVATION START TIME	OBSERVATION END TIME	KRESS BOX NUMBER	CUMULATIVE EMISSION TIME SECONDS	MAXIMUM OPACITY %	KIDC COOLING TIME HR MIN	HOT SPOTS Y/N	COMMENTS
1	1300	1301		68	0			STEAM ONLY
2	1338	1339		121	0			STEAM ONLY
3	1354	1355		49	10			
4	1410	1411		43	10			
5	1438	1439		56	15			
6	1219	1220		0	0			
7	1248	1249		0	0			
8	1254	1255		0	0			
9	1328	1330		0	0			
10	1335	1336		0	0			
11	1346	1348		0	0			
12	1409	1410		0	0			
13	1426	1428		0	0			
14	1439	1442		0	0			
15	1138	1139		16	5			
16	1212	1213		18	10			
17	1228	1230		10	5			
18	1240	1241		12	5			
19	1256	1257		0	0			
20	1305	1306		0	0			
21	1322	1323		0	0			
22	1332	1333		14	10			

OBS	DATE	BATTERY	OBSERVERS INITIALS	WEATHER	WIND DIRECTION	WIND SPEED MPH	OBSERVER LOCATION	BACKGROUND	COKE DISCHARGE LOCATION
23	03/26/91	11	GW	OVERCAST	SE	10-15	NORTH		WHARF
24	03/26/91	11	GW	OVERCAST	SE	10-15	NORTH		WHARF
25	03/26/91	12	GW	OVERCAST	SE	10-15	NORTH		WHARF
26	03/27/91	11	GW	OVERCAST	SE	10-15	NORTH	CLOUDY	WHARF
27	03/27/91	12	GW	OVERCAST	SE	10-15	NORTH	CLOUDY	WHARF
28	03/27/91	12	GW	OVERCAST	SE	10-15	NORTH	CLOUDY	WHARF
29	03/27/91	12	GW	OVERCAST	SE	10-15	NORTH	CLOUDY	WHARF
30	03/27/91	12	GW	OVERCAST	SE	10-15	NORTH	CLOUDY	WHARF
31	03/29/91	12	GW				NORTH		WHARF
32	03/29/91	12	GW				NORTH		WHARF
33	03/29/91	12	GW				NORTH		WHARF
34	03/29/91	12	GW				NORTH		WHARF
35	03/29/91	12	GW				NORTH		WHARF
36	04/01/91	11/12	GW	OVERCAST	NW	10-15	NORTH		WHARF
37	04/01/91	11/12	GW	OVERCAST	NW	10-15	NORTH		WHARF
38	04/01/91	11/12	GW	OVERCAST	NW	10-15	NORTH		WHARF
39	04/01/91	11/12	GW	OVERCAST	NW	10-15	NORTH		WHARF
40	04/01/91	11/12	GW	OVERCAST	NW	10-15	NORTH		WHARF
41	04/01/91	11/12	GW	OVERCAST	NW	10-15	NORTH		WHARF
42	04/01/91	11/12	GW	OVERCAST	NW	10-15	NORTH		WHARF
43	04/01/91	11/12	GW	OVERCAST	NW	10-15	NORTH		WHARF
44	04/01/91	11/12	GW	OVERCAST	NW	10-15	NORTH		WHARF

OBS	OBSERVATION START TIME	OBSERVATION END TIME	KRESS BOX NUMBER	CUMULATIVE EMISSION TIME SECONDS	MAXIMUM OPACITY %	KIDC COOLING TIME HR:MIN	HOT SPOTS Y/N	COMMENTS
23	1342	1343		0	0			
24	1353	1354		21	10			
25	1404	1405		17	15			
26	1316	1317		0	0			
27	1326	1328		0	0			
28	1332	1333		10	15			
29	1349	1350		0	0			
30	1402	1403		0	0			
31	1124	1126		0	0			
32	1136	1139		12	10			
33	1144	1147		0	0			
34	1151	1153		8	10			
35	1200	1202		0	0			
36	1146	1148		0	0			
37	1156	1157		0	0			
38	1221	1221		0	0			
39	1228	1229		0	0			
40	1330	1331		0	0			
41	1341	1342		0	0			
42	1358	1359		0	0			
43	1406	1407		0	0			
44	1416	1416		0	0			

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OBS	DATE	BATTERY	OBSERVERS INITIALS	WEATHER	WIND DIRECTION	WIND SPEED MPH	OBSERVER LOCATION	BACKGROUND	COKE DISCHARGE LOCATION
45	04/01/91	11/12	GW	OVERCAST	NW	10-15	NORTH		WHARF
46	04/02/91	11/12	GW	CLEAR	NW	10 15	NORTH	CLEAR	WHARF
47	04/15/91	11/12	GW	OC/RAIN	SE	6-12	NORTH		WHARF
48	04/15/91	11/12	GW	OC/RAIN	SE	6-12	NORTH		WHARF
49	04/15/91	11/12	GW	OC/RAIN	SE	6-12	NORTH		WHARF
50	04/15/91	11/12	GW	OC/RAIN	SE	6-12	NORTH		WHARF
51	04/15/91	11/12	GW	OC/RAIN	SE	6-12	NORTH		WHARF
52	04/15/91	11/12	GW	OC/RAIN	SE	6-12	NORTH		WHARF
53	04/15/91	11/12	GW	OC/RAIN	SE	6 12	NORTH		WHARF
54	04/15/91	11/12	GW	OC/RAIN	SE	6-12	NORTH		WHARF
55	04/15/91	11/12	GW	OC/RAIN	SE	6-12	NORTH		WHARF
56	04/15/91	11/12	GW	OC/RAIN	SE	6-12	NORTH		WHARF
57	04/16/91	11/12	GW	CLEAR	NW	15 20	NORTH	CLEAR	WHARF
58	04/16/91	11/12	GW	CLEAR	NW	15-20	NORTH	CLEAR	WHARF
59	04/16/91	11/12	GW	CLEAR	NW	15-20	NORTH	CLEAR	WHARF
60	04/16/91	11/12	GW	CLEAR	NW	15-20	NORTH	CLEAR	WHARF
61	04/16/91	11/12	GW	CLEAR	NW	15-20	NORTH	CLEAR	WHARF
62	04/16/91	11/12	GW	CLEAR	NW	15 20	NORTH	CLEAR	WHARF
63	04/16/91	11/12	GW	CLEAR	NW	15 20	NORTH	CLEAR	WHARF
64	04/16/91	11/12	GW	CLEAR	NW	15-20	NORTH	CLEAR	WHARF
65	04/16/91	11/12	GW	CLEAR	NW	15 20	NORTH	CLEAR	WHARF
66	04/16/91	11/12	GW	CLEAR	NW	15-20	NORTH	CLEAR	WHARF

OBS	OBSERVATION START TIME	OBSERVATION END TIME	KRESS BOX NUMBER	CUMULATIVE EMISSION TIME SECONDS	MAXIMUM OPACITY %	KIDC COOLING TIME HR:MIN	HOT SPOTS Y/N	COMMENTS
45	1431	1432		0	0			
46	1334	1335		0	0			
47	1147	1148		0	0			
48	1206	1208		0	0			
49	1226	1228		0	0			
50	1234	1236		0	0			
51	1252	1253		0	0			
52	1304	1305		0	0			
53	1313	1314		0	0			
54	1341	1342		0	0			
55	1356	1358		0	0			
56	1405	1406		0	0			
57	1129	1130		0	0			
58	1146	1147		0	0			
59	1207	1208		0	0			
60	1218	1219		0	0			
61	1234	1235		0	0			
62	1248	1249		0	0			
63	1308	1309		0	0			
64	1318	1319		0	0			
65	1337	1338		0	0			
66	1353	1354		0	0			

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OBS	DATE	BATTERY	OBSERVERS INITIALS	WEATHER	WIND DIRECTION	WIND SPEED MPH	OBSERVER LOCATION	BACKGROUND	COKE DISCHARGE LOCATION
67	04/24/91	11/12	GW	CLEAR	SE	8-12	NORTH		WHARF
68	04/24/91	11/12	GW	CLEAR	SE	8-12	NORTH		WHARF
69	04/24/91	11/12	GW	CLEAR	SE	8-12	NORTH		WHARF
70	04/24/91	11/12	GW	CLEAR	SE	8-12	NORTH		WHARF
71	04/24/91	11/12	GW	CLEAR	SE	8 12	NORTH		WHARF
72	04/24/91	11/12	GW	CLEAR	SE	8 12	NORTH		WHARF
73	04/24/91	11/12	GW	CLEAR	SE	8 12	NORTH		WHARF
74	04/24/91	11/12	GW	CLEAR	SE	8-12	NORTH		WHARF
75	04/24/91	11/12	GW	CLEAR	SE	8-12	NORTH		WHARF
76	04/24/91	11/12	GW	CLEAR	SE	8-12	NORTH		WHARF
77	04/25/91	11/12	GW	CLEAR	SE	5-10	NORTH	CLEAR	WHARF
78	04/25/91	11/12	GW	CLEAR	SE	5-10	NORTH	CLEAR	WHARF
79	04/25/91	11/12	GW	CLEAR	SE	5 10	NORTH	CLEAR	WHARF
80	04/25/91	11/12	GW	CLEAR	SE	5-10	NORTH	CLEAR	WHARF
81	04/25/91	11/12	GW	CLEAR	SE	5-10	NORTH	CLEAR	WHARF
82	04/25/91	11/12	GW	CLEAR	SE	5-10	NORTH	CLEAR	WHARF
83	04/25/91	11/12	GW	CLEAR	SE	5-10	NORTH	CLEAR	WHARF
84	04/25/91	11/12	GW	CLEAR	SE	5 10	NORTH	CLEAR	WHARF
85	04/25/91	11/12	GW	CLEAR	SE	5 10	NORTH	CLEAR	WHARF
86	04/25/91	11/12	GW	CLEAR	SE	5 10	NORTH	CLEAR	WHARF
87	04/25/91	11/12	GW	CLEAR	SE	5 10	NORTH	CLEAR	WHARF
88	04/29/91	11/12	GW	OVERCAST	NE	5 10	NORTH	CLDY,OC	WHARF

OBS	OBSER VATION START TIME	OBSER VATION END TIME	KRESS BOX NUMBER	CUMULATIVE EMISSION TIME SECONDS	MAXIMUM OPACITY %	KIDC COOLING TIME HR:MIN	HOT SPOTS Y/N	COMMENTS
67	1253	1254	.	0	0	.		
68	1309	1310	.	0	0	.		
69	1315	1316	.	0	0	.		
70	1328	1329	.	0	0	.		
71	1345	1346	.	0	0	.		
72	1409	1410	.	0	0			
73	1421	1422		0	0	.		
74	1431	1432	.	0	0			
75	1439	1440	.	0	0	.		
76	1448	1449		0	0			
77	1254	1255		0	0			
78	1306	1307		0	0	.		
79	1313	1314		34	20			
80	1324	1325		26	10			
81	1338	1339	.	0	0	.		
82	1355	1356	.	0	0	.		
83	1424	1425	.	0	0			
84	1445	1446	.	15	5	.		
85	1458	1459	.	12	5			
86	1505	1506	.	0	0	.		
87	1505	1506	.	0	0	.		
88	1313	1314	.	0	0			

OBS	DATE	BATTERY	OBSERVERS INITTIALS	WEATHER	WIND DIRECTION	WIND SPEED MPH	OBSERVER LOCATION	BACKGROUND	COKE DISCHARGE LOCATION
89	04/29/91	11/12	GW	OVERCAST	NE	5-10	NORTH	CLDY,OC	WHARF
90	04/29/91	11/12	GW	OVERCAST	NE	5-10	NORTH	CLDY,OC	WHARF
91	04/29/91	11/12	GW	OVERCAST	NE	5-10	NORTH	CLDY,OC	WHARF
92	04/29/91	11/12	GW	OVERCAST	NE	5-10	NORTH	CLDY,OC	WHARF
93	04/29/91	11/12	GW	OVERCAST	NE	5-10	NORTH	CLDY,OC	WHARF
94	04/29/91	11/12	GW	OVERCAST	NE	5-10	NORTH	CLDY,OC	WHARF
95	04/29/91	11/12	GW	OVERCAST	NE	5-10	NORTH	CLDY,OC	WHARF
96	04/29/91	11/12	GW	OVERCAST	NE	5-10	NORTH	CLDY,OC	WHARF
97	04/29/91	11/12	GW	OVERCAST	NE	5-10	NORTH	CLDY,OC	WHARF
98	05/01/91	11/12	GW	CLEAR	SE	4-9	NORTH		WHARF
99	05/01/91	11/12	GW	CLEAR	SE	4-9	NORTH		WHARF
100	05/01/91	11/12	GW	CLEAR	SE	4-9	NORTH		WHARF
101	05/01/91	11/12	GW	CLEAR	SE	4-9	NORTH		WHARF
102	05/01/91	11/12	GW	CLEAR	SE	4-9	NORTH		WHARF
103	05/01/91	11/12	GW	CLEAR	SE	4-9	NORTH		WHARF
104	05/01/91	11/12	GW	CLEAR	SE	4-9	NORTH		WHARF
105	05/01/91	11/12	GW	CLEAR	SE	4-9	NORTH		WHARF
106	05/01/91	11/12	GW	CLEAR	SE	4-9	NORTH		WHARF
107	05/01/91	11/12	GW	CLEAR	SE	4-9	NORTH		WHARF
108	05/06/91	11/12	GW	OVERCAST	SW	5-10	NORTH	CLOUDY	WHARF
109	05/06/91	11/12	GW	OVERCAST	SW	5-10	NORTH	CLOUDY	WHARF
110	05/06/91	11/12	GW	OVERCAST	SW	5-10	NORTH	CLOUDY	WHARF

OBS	OBSERVATION START TIME	OBSERVATION END TIME	KRESS BOX NUMBER	CUMULATIVE EMISSION TIME SECONDS	MAXIMUM OPACITY %	KIDC COOLING TIME HR:MIN	HOT SPOTS Y/N	COMMENTS
89	1332	1333		0	0			
90	1348	1349		0	0			
91	1354	1355		0	0			
92	1403	1404		0	0			
93	1417	1418		0	0			
94	1425	1426		0	0			
95	1459	1500		0	0			
96	1516	1517		0	0			
97	1523	1523		0	0			
98	1313	1314		0	0			
99	1323	1324		0	0			
100	1330	1331		0	0			
101	1338	1339		0	0			
102	1352	1353		0	0			
103	1411	1412		0	0			
104	1426	1426		0	0			
105	1510	1511		0	0			
106	1530	1530		0	0			
107	1534	1535		0	0			
108	1152	1153		0	0			
109	1205	1206		0	0			
110	1225	1226		0	0			

OBS	DATE	BATTERY	OBSERVERS INITIALS	WEATHER	WIND DIRECTION	WIND SPEED MPH	OBSERVER LOCATION	BACKGROUND	COKE DISCHARGE LOCATION
111	05/06/91	11/12	GW	OVERCAST	SW	5 10	NORTH	CLOUDY	WHARF
112	05/06/91	11/12	GW	OVERCAST	SW	5 10	NORTH	CLOUDY	WHARF
113	05/06/91	11/12	GW	OVERCAST	SW	5 10	NORTH	CLOUDY	WHARF
114	05/06/91	11/12	GW	OVERCAST	SW	5 10	NORTH	CLOUDY	WHARF
115	05/06/91	11/12	GW	OVERCAST	SW	5 10	NORTH	CLOUDY	WHARF
116	05/06/91	11/12	GW	OVERCAST	SW	5 10	NORTH	CLOUDY	WHARF
117	05/06/91	11/12	GW	OVERCAST	SW	5 10	NORTH	CLOUDY	WHARF
118	05/07/91	11/12	GW	CLEAR			NORTH	CLEAR	WHARF
119	05/07/91	11/12	GW	CLEAR			NORTH	CLEAR	WHARF
120	05/07/91	11/12	GW	CLEAR			NORTH	CLEAR	WHARF
121	05/07/91	11/12	GW	CLEAR			NORTH	CLEAR	WHARF
122	05/07/91	11/12	GW	CLEAR			NORTH	CLEAR	WHARF
123	05/07/91	11/12	GW	CLEAR			NORTH	CLEAR	WHARF
124	05/07/91	11/12	GW	CLEAR			NORTH	CLEAR	WHARF
125	05/07/91	11/12	GW	CLEAR			NORTH	CLEAR	WHARF
126	05/07/91	11/12	GW	CLEAR			NORTH	CLEAR	WHARF
127	05/07/91	11/12	GW	CLEAR			NORTH	CLEAR	WHARF
128	05/13/91	11/12	GW	CLEAR	SE	3 6	NORTH	CLEAR	WHARF
129	05/13/91	11/12	GW	CLEAR	SE	3 6	NORTH	CLEAR	WHARF
130	05/13/91	11/12	GW	CLEAR	SE	3-6	NORTH	CLEAR	WHARF
131	05/13/91	11/12	GW	CLEAR	SE	3 6	NORTH	CLEAR	WHARF
132	05/13/91	11/12	GW	CLEAR	SE	3 6	NORTH	CLEAR	WHARF

OBS	OBSER VATION START TIME	OBSER VATION END TIME	KRESS BOX NUMBER	CUMULATIVE EMISSION TIME SECONDS	MAXIMUM OPACITY %	KIDC COOLING TIME HR:MIN	HOT SPOTS Y/N	COMMENTS
111	1246	1247	.	0	0	.		
112	1302	1302	.	0	0	.		
113	1317	1318	.	0	0			
114	1328	1329	.	0	0	.		
115	1338	1338	.	0	0	.		
116	1348	1349	.	0	0	.		
117	1404	1404	.	0	0	.		
118	1146	1147	.	0	0			
119	1158	1158	.	0	0	.		
120	1205	1206		0	0			
121	1229	1230		0	0			
122	1240	1241		0	0			
123	1256	1257		0	0			
124	1306	1307		0	0			
125	1314	1315	.	0	0			
126	1335	1336		0	0			
127	1342	1343		0	0	.		
128	1124	1125		0	0	.		
129	1133	1134		0	0	.		
130	1148	1149		0	0			
131	1203	1203	.	0	0			
132	1214	1214	.	0	0			

QUENCHED COKE DISCHARGE/HANDLING EMISSIONS DATA
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OBS	DATE	BATTERY	OBSERVERS INITIALS	WEATHER	WIND DIRECTION	WIND SPEED MPH	OBSERVER LOCATION	BACKGROUND	COKE DISCHARGE LOCATION
133	05/13/91	11/12	GW	CLEAR	SE	3-6	NORTH	CLEAR	WHARF
134	05/13/91	11/12	GW	CLEAR	SE	3 6	NORTH	CLEAR	WHARF
135	05/13/91	11/12	GW	CLEAR	SE	3-6	NORTH	CLEAR	WHARF
136	05/13/91	11/12	GW	CLEAR	SE	3-6	NORTH	CLEAR	WHARF
137	05/13/91	11/12	GW	CLEAR	SE	3 6	NORTH	CLEAR	WHARF
138	05/14/91	11/12	GW	CLEAR	NW	6-12	NE	CLEAR	WHARF
139	05/14/91	11/12	GW	CLEAR	NW	6-12	NE	CLEAR	WHARF
140	05/14/91	11/12	GW	CLEAR	NW	6-12	NE	CLEAR	WHARF
141	05/14/91	11/12	GW	CLEAR	NW	6-12	NE	CLEAR	WHARF
142	05/14/91	11/12	GW	CLEAR	NW	6-12	NE	CLEAR	WHARF
143	05/14/91	11/12	GW	CLEAR	NW	6-12	NE	CLEAR	WHARF
144	05/14/91	11/12	GW	CLEAR	NW	6 12	NE	CLEAR	WHARF
145	05/14/91	11/12	GW	CLEAR	NW	6 12	NE	CLEAR	WHARF
146	05/14/91	11/12	GW	CLEAR	NW	6 12	NE	CLEAR	WHARF
147	05/14/91	11/12	GW	CLEAR	NW	6-12	NE	CLEAR	WHARF
148	05/21/91	11/12	GW	CLEAR	SE	6-12	NORTH	CLEAR	WHARF
149	05/21/91	11/12	GW	CLEAR	SE	6-12	NORTH	CLEAR	WHARF
150	05/21/91	11/12	GW	CLEAR	SE	6 12	NORTH	CLEAR	WHARF
151	05/21/91	11/12	GW	CLEAR	SE	6-12	NORTH	CLEAR	WHARF
152	05/21/91	11/12	GW	CLEAR	SE	6 12	NORTH	CLEAR	WHARF
153	05/21/91	11/12	GW	CLEAR	SE	6-12	NORTH	CLEAR	WHARF
154	05/21/91	11/12	GW	CLEAR	SE	6 12	NORTH	CLEAR	WHARF

OBS	OBSERVATION START TIME	OBSERVATION END TIME	KRESS BOX NUMBER	CUMULATIVE EMISSION TIME SECONDS	MAXIMUM OPACITY %	KIDC COOLING TIME HR:MIN	HOT SPOTS Y/N	COMMENTS
133	1223	1224	.	0	0			
134	1233	1234	.	0	0			
135	1254	1255	.	0	0			
136	1320	1320	.	0	0	.		
137	1328	1328	.	0	0	.		
138	1135	1136	.	0	0	.		
139	1144	1145	.	0	0	.		
140	1154	1155	.	0	0	.		
141	1202	1202	.	0	0			
142	1235	1235	.	0	0			
143	1249	1249		0	0			
144	1302	1303		0	0			
145	1308	1308	.	0	0			
146	1315	1315		0	0	.		
147	1339	1340	.	0	0			
148	1154	1154		0	0			
149	1208	1209		0	0	.		
150	1226	1226	.	0	0	.		
151	1246	1247		0	0	.		
152	1310	1311	.	0	0	.		
153	1321	1321	.	0	0	.		
154	1336	1337	.	0	0			

OBS	DATE	BATTERY	OBSERVERS INITIALS	WEATHER	WIND DIRECTION	WIND SPEED MPH	OBSERVER LOCATION	BACKGROUND	COKE DISCHARGE LOCATION
155	05/21/91	11/12	GW	CLEAR	SE	6-12	NORTH	CLEAR	WHARF
156	05/21/91	11/12	GW	CLEAR	SE	6-12	NORTH	CLEAR	WHARF
157	05/21/91	11/12	GW	CLEAR	SE	6-12	NORTH	CLEAR	WHARF
158	05/22/91	11/12	GW		SE	6-12	NORTH		WHARF
159	05/22/91	11/12	GW		SE	6-12	NORTH		WHARF
160	05/22/91	11/12	GW		SE	6-12	NORTH		WHARF
161	05/23/91	11/12	GW		SE	4-8	NORTH		WHARF
162	05/23/91	11/12	GW		SE	4-8	NORTH		WHARF
163	05/23/91	11/12	GW		SE	4-8	NORTH		WHARF
164	05/23/91	11/12	GW		SE	4-8	NORTH		WHARF
165	05/23/91	11/12	GW		SE	4-8	NORTH		WHARF
166	05/23/91	11/12	GW		SE	4-8	NORTH		WHARF
167	05/23/91	11/12	GW		SE	4-8	NORTH		WHARF
168	05/28/91	11/12	GW	OVERCAST	NW	4-9	NORTH	HAZY	WHARF
169	05/28/91	11/12	GW	OVERCAST	NW	4-9	NORTH	HAZY	WHARF
170	05/28/91	11/12	GW	OVERCAST	NW	4-9	NORTH	HAZY	WHARF
171	05/28/91	11/12	GW	OVERCAST	NW	4-9	NORTH	HAZY	WHARF
172	05/28/91	11/12	GW	OVERCAST	NW	4-9	NORTH	HAZY	WHARF
173	05/28/91	11/12	GW	OVERCAST	NW	4-9	NORTH	HAZY	WHARF
174	05/28/91	11/12	GW	OVERCAST	NW	4-9	NORTH	HAZY	WHARF
175	05/29/91	11/12	GW	CLEAR	SE	6-12	NORTH	CLEAR	WHARF
176	05/29/91	11/12	GW	CLEAR	SE	6-12	NORTH	CLEAR	WHARF

OBS	OBSERVATION START TIME	OBSERVATION END TIME	KRESS BOX NUMBER	CUMULATIVE EMISSION TIME SECONDS	MAXIMUM OPACITY %	KIDC COOLING TIME HR:MIN	HOT SPOTS Y/N	COMMENTS
155	1350	1350		0	0			
156	1358	1359		0	0			
157	1418	1418		0	0			
158	1323	1324		0	0			
159	1349	1350		0	0			
160	1409	1409		0	0			
161	1258	1259		0	0			
162	1308	1308		0	0			
163	1317	1317		0	0			
164	1324	1325		0	0			
165	1339	1340		0	0			
166	1405	1405		0	0			
167	1411	1412		0	0			
168	1130	1131		0	0			
169	1228	1229		21	10			
170	1245	1246		0	0			
171	1253	1253		0	0			
172	1310	1311		0	0			
173	1319	1319		0	0			
174	1334	1335		0	0			
175	1445	1446		0	0			
176	1458	1458		15	15			

OBS	DATE	BATTERY	OBSERVERS INITIALS	WEATHER	WIND DIRECTION	WIND SPEED MPH	OBSERVER LOCATION	BACKGROUND	COKE DISCHARGE LOCATION
177	05/29/91	11/12	GW	CLEAR	SE	6-12	NORTH	CLEAR	WHARF
178	05/29/91	11/12	GW	CLEAR	SE	6-12	NORTH	CLEAR	WHARF
179	05/29/91	11/12	GW	CLEAR	SE	6-12	NORTH	CLEAR	WHARF
180	05/29/91	11/12	GW	CLEAR	SE	6-12	NORTH	CLEAR	WHARF
181	05/29/91	11/12	GW	CLEAR	SE	6-12	NORTH	CLEAR	WHARF
182	05/29/91	11/12	GW	CLEAR	SE	6-12	NORTH	CLEAR	WHARF
183	05/29/91	11/12	GW	CLEAR	SE	6-12	NORTH	CLEAR	WHARF
184	05/29/91	11/12	GW	CLEAR	SE	6-12	NORTH	CLEAR	WHARF
185	05/30/91	11/12	GW	CLEAR	SE	3-6	NORTH	HAZY	WHARF
186	05/30/91	11/12	GW	CLEAR	SE	3-6	NORTH	HAZY	WHARF
187	05/30/91	11/12	GW	CLEAR	SE	3-6	NORTH	HAZY	WHARF
188	06/03/91	11/12	GW	OVERCAST	SE/NE	7-12	NORTH	OC/CLDY	WHARF
189	06/03/91	11/12	GW	OVERCAST	SE/NE	7-12	NORTH	OC/CLDY	WHARF
190	06/03/91	11/12	GW	OVERCAST	SE/NE	7-12	NORTH	OC/CLDY	WHARF
191	06/03/91	11/12	GW	OVERCAST	SE/NE	7-12	NORTH	OC/CLDY	WHARF
192	06/03/91	11/12	GW	OVERCAST	SE/NE	7-12	NORTH	OC/CLDY	WHARF
193	06/03/91	11/12	GW	OVERCAST	SE/NE	7-12	NORTH	OC/CLDY	WHARF
194	06/03/91	11/12	GW	OVERCAST	SE/NE	7-12	NORTH	OC/CLDY	WHARF
195	06/03/91	11/12	GW	OVERCAST	SE/NE	7-12	NORTH	OC/CLDY	WHARF
196	06/03/91	11/12	GW	OVERCAST	SE/NE	7-12	NORTH	OC/CLDY	WHARF
197	06/03/91	11/12	GW	OVERCAST	SE/NE	7-12	NORTH	OC/CLDY	WHARF
198	06/04/91	11/12	GW	CLEAR	NE	9-15	NORTH	CLEAR	WHARF

OBS	OBSER VATION START TIME	OBSER VATION END TIME	KRESS BOX NUMBER	CUMULATIVE EMISSION TIME SECONDS	MAXIMUM OPACITY %	KIDC COOLING TIME HR:MIN	HOT SPOTS Y/N	COMMENTS
177	1511	1512	.	0	0			
178	1528	1528	.	0	0			
179	1536	1536	.	26	20			
180	1543	1544	.	0	0			
181	1555	1556	.	0	0			
182	1604	1604	.	0	0			
183	1618	1618		10	15			
184	1628	1628		0	0			
185	1142	1143	.	27	15			
186	1148	1148		18	10			
187	1203	1203	.	13	15			
188	1137	1138		0	0			
189	1155	1156	.	0	0			
190	1216	1216	.	0	0			
191	1225	1226		0	0			
192	1237	1238		0	0			
193	1249	1249		0	0			
194	1306	1306	.	0	0			
195	1342	1342	.	0	0			
196	1402	1403		0	0			
197	1409	1410		0	0			
198	1146	1146	.	0	0			

OBS	DATE	BATTERY	OBSERVERS INITIALS	WEATHER	WIND DIRECTION	WIND SPEED MPH	OBSERVER LOCATION	BACKGROUND	COKE DISCHARGE LOCATION
199	06/04/91	11/12	GW	CLEAR	NE	9-15	NORTH	CLEAR	WHARF
200	06/04/91	11/12	GW	CLEAR	NE	9-15	NORTH	CLEAR	WHARF
201	06/04/91	11/12	GW	CLEAR	NE	9-15	NORTH	CLEAR	WHARF
202	06/04/91	11/12	GW	CLEAR	NE	9-15	NORTH	CLEAR	WHARF
203	06/04/91	11/12	GW	CLEAR	NE	9-15	NORTH	CLEAR	WHARF
204	06/04/91	11/12	GW	CLEAR	NE	9-15	NORTH	CLEAR	WHARF
205	06/04/91	11/12	GW	CLEAR	NE	9-15	NORTH	CLEAR	WHARF
206	06/04/91	11/12	GW	CLEAR	NE	9-15	NORTH	CLEAR	WHARF
207	06/04/91	11/12	GW	CLEAR	NE	9-15	NORTH	CLEAR	WHARF
208	06/10/91	11/12	GW	CLEAR	NW	5-10	NORTH	CLEAR	WHARF
209	06/10/91	11/12	GW	CLEAR	NW	5-10	NORTH	CLEAR	WHARF
210	06/10/91	11/12	GW	CLEAR	NW	5-10	NORTH	CLEAR	WHARF
211	06/10/91	11/12	GW	CLEAR	NW	5-10	NORTH	CLEAR	WHARF
212	06/10/91	11/12	GW	CLEAR	NW	5-10	NORTH	CLEAR	WHARF
213	06/10/91	11/12	GW	CLEAR	NW	5-10	NORTH	CLEAR	WHARF
214	06/10/91	11/12	GW	CLEAR	NW	5-10	NORTH	CLEAR	WHARF
215	06/10/91	11/12	GW	CLEAR	NW	5-10	NORTH	CLEAR	WHARF
216	06/10/91	11/12	GW	CLEAR	NW	5-10	NORTH	CLEAR	WHARF
217	06/10/91	11/12	GW	CLEAR	NW	5-10	NORTH	CLEAR	WHARF
218	06/13/91	11/12	GW	CLEAR	NW	6-12	NORTH	CLEAR	WHARF
219	06/13/91	11/12	GW	CLEAR	NW	6-12	NORTH	CLEAR	WHARF
220	06/13/91	11/12	GW	CLEAR	NW	6-12	NORTH	CLEAR	WHARF

OBS	OBSERVATION START TIME	OBSERVATION END TIME	KRESS HOX NUMBER	CUMULATIVE EMISSION TIME SECONDS	MAXIMUM OPACITY %	KIDC COOLING TIME HR:MIN	HOT SPOTS Y/N	COMMENTS
199	1211	1212		0	0			
200	1249	1250		0	0			
201	1301	1301		0	0			
202	1312	1312		0	0			
203	1328	1329		0	0			
204	1354	1355		0	0			
205	1406	1407		0	0			
206	1415	1415		0	0			
207	1425	1426		0	0			
208	1132	1133		0	0			
209	1156	1156		0	0			
210	1208	1208		0	0			
211	1225	1225		18	10			
212	1249	1250		0	0			
213	1303	1304		0	0			
214	1310	1311		0	0			
215	1319	1319		26	20			
216	1335	1336		14	10			
217	1342	1343		16	10			
218	1134	1135		0	0			
219	1155	1155		0	0			
220	1203	1204		0	0			

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OBS	DATE	BATTERY	OBSERVERS INITIALS	WEATHER	WIND DIRECTION	WIND SPEED MPH	OBSERVER LOCATION	BACKGROUND	COKE DISCHARGE LOCATION
221	06/13/91	11/12	GW	CLEAR	NW	6-12	NORTH	CLEAR	WHARF
222	06/13/91	11/12	GW	CLEAR	NW	6-12	NORTH	CLEAR	WHARF
223	06/13/91	11/12	GW	CLEAR	NW	6-12	NORTH	CLEAR	WHARF
224	06/13/91	11/12	GW	CLEAR	NW	6-12	NORTH	CLEAR	WHARF
225	06/13/91	11/12	GW	CLEAR	NW	6-12	NORTH	CLEAR	WHARF
226	06/13/91	11/12	GW	CLEAR	NW	6-12	NORTH	CLEAR	WHARF
227	06/13/91	11/12	GW	CLEAR	NW	6-12	NORTH	CLEAR	WHARF
228	06/17/91	11/12	GW	CLEAR	NE	6-12	NORTH	SCT CLDS	WHARF
229	06/17/91	11/12	GW	CLEAR	NE	6-12	NORTH	SCT CLDS	WHARF
230	06/17/91	11/12	GW	CLEAR	NE	6-12	NORTH	SCT CLDS	WHARF
231	06/17/91	11/12	GW	CLEAR	NE	6-12	NORTH	SCT CLDS	WHARF
232	06/17/91	11/12	GW	CLEAR	NE	6-12	NORTH	SCT CLDS	WHARF
233	06/17/91	11/12	GW	CLEAR	NE	6-12	NORTH	SCT CLDS	WHARF
234	06/17/91	11/12	GW	CLEAR	NE	6-12	NORTH	SCT CLDS	WHARF
235	06/17/91	11/12	GW	CLEAR	NE	6-12	NORTH	SCT CLDS	WHARF
236	06/17/91	11/12	GW	CLEAR	NE	6-12	NORTH	SCT CLDS	WHARF
237	06/17/91	11/12	GW	CLEAR	NE	6-12	NORTH	SCT CLDS	WHARF
238	06/18/91	11/12	GW	OVERCAST	SE	5-10	NORTH	CLOUDY	WHARF
239	06/18/91	11/12	GW	OVERCAST	SE	5-10	NORTH	CLOUDY	WHARF
240	06/18/91	11/12	GW	OVERCAST	SE	5-10	NORTH	CLOUDY	WHARF
241	06/18/91	11/12	GW	OVERCAST	SE	5-10	NORTH	CLOUDY	WHARF
242	06/18/91	11/12	GW	OVERCAST	SE	5-10	NORTH	CLOUDY	WHARF

OBS	OBSERVATION START TIME	OBSERVATION END TIME	KRESS BOX NUMBER	CUMULATIVE EMISSION TIME SECONDS	MAXIMUM OPACITY %	KIDC COOLING TIME HR:MIN	HOT SPOTS Y/N	COMMENTS
221	1217	1218	.	0	0	.		
222	1249	1250	.	0	0	.		
223	1259	1259	.	0	0	.		
224	1308	1309	.	0	0	.		
225	1319	1319	.	0	0	.		
226	1323	1324	.	0	0	.		
227	1354	1355	.	0	0	.		
228	1137	1138	.	0	0	.		
229	1146	1148	.	0	0	.		
230	1207	1208	.	0	0	.		
231	1230	1230	.	0	0	.		
232	1237	1236	.	0	0	.		
233	1250	1250	.	13	10	.		
234	1301	1301	.	9	15	.		
235	1309	1309	.	0	0	.		
236	1332	1332	.	0	0	.		
237	1354	1354	.	0	0	.		
238	1127	1128	.	0	0	.		
239	1144	1144	.	0	0	.		
240	1206	1206	.	0	0	.		
241	1227	1228	.	0	0	.		
242	1246	1246	.	0	0	.		

OBS	DATE	BATTERY	OBSERVERS INITIALS	WEATHER	WIND DIRECTION	WIND SPEED MPH	OBSERVER LOCATION	BACKGROUND	COKE DISCHARGE LOCATION
243	06/18/91	11/12	GW	OVERCAST	SE	5-10	NORTH	CLOUDY	WHARF
244	06/18/91	11/12	GW	OVERCAST	SE	5 10	NORTH	CLOUDY	WHARF
245	06/18/91	11/12	GW	OVERCAST	SE	5 10	NORTH	CLOUDY	WHARF
246	06/18/91	11/12	GW	OVERCAST	SE	5-10	NORTH	CLOUDY	WHARF
247	06/18/91	11/12	GW	OVERCAST	SE	5-10	NORTH	CLOUDY	WHARF
248	06/24/91	11/12	GW	CLEAR	NW	5-10	NORTH		WHARF
249	06/24/91	11/12	GW	CLEAR	NW	5-10	NORTH		WHARF
250	06/24/91	11/12	GW	CLEAR	NW	5 10	NORTH		WHARF
251	06/24/91	11/12	GW	CLEAR	NW	5-10	NORTH		WHARF
252	06/24/91	11/12	GW	CLEAR	NW	5-10	NORTH		WHARF
253	06/24/91	11/12	GW	CLEAR	NW	5-10	NORTH		WHARF
254	06/24/91	11/12	GW	CLEAR	NW	5 10	NORTH		WHARF
255	06/24/91	11/12	GW	CLEAR	NW	5-10	NORTH		WHARF
256	06/24/91	11/12	GW	CLEAR	NW	5-10	NORTH		WHARF
257	06/24/91	11/12	GW	CLEAR	NW	5-10	NORTH		WHARF
258	06/26/91	11/12	GW	CLEAR	SE	8-12	NORTH	CLEAR	WHARF
259	06/26/91	11/12	GW	CLEAR	SE	8 12	NORTH	CLEAR	WHARF
260	06/26/91	11/12	GW	CLEAR	SE	8-12	NORTH	CLEAR	WHARF
261	06/26/91	11/12	GW	CLEAR	SE	8-12	NORTH	CLEAR	WHARF
262	06/26/91	11/12	GW	CLEAR	SE	8 12	NORTH	CLEAR	WHARF
263	06/26/91	11/12	GW	CLEAR	SE	8-12	NORTH	CLEAR	WHARF
264	06/26/91	11/12	GW	CLEAR	SE	8-12	NORTH	CLEAR	WHARF

OBS	OBSER VATION START TIME	OBSER VATION END TIME	KRESS BOX NUMBER	CUMULATIVE EMISSION TIME SECONDS	MAXIMUM OPACITY %	KIDC COOLING TIME HR:MIN	HOT SPOTS Y/N	COMMENTS
243	1303	1303	.	0	0			
244	1337	1337	.	0	0	.		
245	1345	1345	.	0	0	.		
246	1405	1405	.	0	0	.		
247	1426	1426	.	0	0	.		
248	1127	1127	.	0	0	.		
249	1138	1138	.	0	0	.		
250	1146	1146	.	0	0	.		
251	1206	1206	.	0	0	.		
252	1246	1246	.	0	0	.		
253	1304	1304		0	0	.		
254	1313	1313		0	0			
255	1327	1327		0	0	.		
256	1336	1336		0	0			
257	1353	1353	.	0	0	.		
258	1256	1256	.	15	5	.		
259	1307	1307	.	20	10	.		
260	1325	1325		0	0			
261	1336	1336		0	0	.		
262	1349	1349		0	0	.		
263	1403	1403	.	0	0	.		
264	1424	1424	.	0	0	.		

OBS	DATE	BATTERY	OBSERVERS INITIALS	WEATHER	WIND DIRECTION	WIND SPEED MPH	OBSERVER LOCATION	BACKGROUND	COKE DISCHARGE LOCATION
265	06/26/91	11/12	GW	CLEAR	SE	8-12	NORTH	CLEAR	WHARF
266	06/26/91	11/12	GW	CLEAR	SE	8 12	NORTH	CLEAR	WHARF
267	06/26/91	11/12	GW	CLEAR	SE	8-12	NORTH	CLEAR	WHARF
268	07/01/91	11/12	GW	OVERCAST	NE	9 15	NORTH	CLOUDY	WHARF
269	07/01/91	11/12	GW	OVERCAST	NE	9-15	NORTH	CLOUDY	WHARF
270	07/01/91	11/12	GW	OVERCAST	NE	9-15	NORTH	CLOUDY	WHARF
271	07/01/91	11/12	GW	OVERCAST	NE	9 15	NORTH	CLOUDY	WHARF
272	07/01/91	11/12	GW	OVERCAST	NE	9 15	NORTH	CLOUDY	WHARF
273	07/01/91	11/12	GW	OVERCAST	NE	9-15	NORTH	CLOUDY	WHARF
274	07/01/91	11/12	GW	OVERCAST	NE	9-15	NORTH	CLOUDY	WHARF
275	07/01/91	11/12	GW	OVERCAST	NE	9-15	NORTH	CLOUDY	WHARF
276	07/01/91	11/12	GW	OVERCAST	NE	9 15	NORTH	CLOUDY	WHARF
277	07/01/91	11/12	GW	OVERCAST	NE	9 15	NORTH	CLOUDY	WHARF
278	07/02/91	11/12	GW	OVERCAST	SE	6-12	NORTH	HAZY, OC	WHARF
279	07/02/91	11/12	GW	OVERCAST	SE	6-12	NORTH	HAZY, OC	WHARF
280	07/02/91	11/12	GW	OVERCAST	SE	6-12	NORTH	HAZY, OC	WHARF
281	07/02/91	11/12	GW	OVERCAST	SE	6-12	NORTH	HAZY, OC	WHARF
282	07/02/91	11/12	GW	OVERCAST	SE	6-12	NORTH	HAZY, OC	WHARF
283	07/02/91	11/12	GW	OVERCAST	SE	6-12	NORTH	HAZY, OC	WHARF
284	07/02/91	11/12	GW	OVERCAST	SE	6 12	NORTH	HAZY, OC	WHARF
285	07/02/91	11/12	GW	OVERCAST	SE	6-12	NORTH	HAZY, OC	WHARF
286	07/02/91	11/12	GW	OVERCAST	SE	6-12	NORTH	HAZY, OC	WHARF

OBS	OBSERVATION START TIME	OBSERVATION END TIME	KRESS BOX NUMBER	CUMULATIVE EMISSION TIME SECONDS	MAXIMUM OPACITY %	KIDC COOLING TIME HR:MIN	HOT SPOTS Y/N	COMMENTS
265	1435	1435	.	0	0			
266	1442	1442	.	10	10			
267	1452	1452	.	0	0			
268	1125	1126	.	0	0	.		
269	1139	1140	.	0	0	.		
270	1150	1150	.	10	10	.		
271	1204	1204	.	0	0	.		
272	1223	1223	.	10	15			
273	1229	1229	.	0	0	.		
274	1252	1252	.	0	0	.		
275	1306	1306	.	0	0			
276	1318	1318	.	0	0	.		
277	1324	1324	.	0	0	.		
278	1446	1446	.	0	0			
279	1507	1507	.	0	0	.		
280	1515	1515	.	0	0			
281	1522	1522	.	0	0	.		
282	1529	1530	.	0	0	.		
283	1558	1558	.	0	0	.		
284	1615	1615	.	0	0	.		
285	1626	1626	.	0	0	.		
286	1640	1640	.	0	0	.		

OBS	DATE	BATTERY	OBSERVERS INITIALS	WEATHER	WIND DIRECTION	WIND SPEED MPH	OBSERVER LOCATION	BACKGROUND	COKE DISCHARGE LOCATION
287	07/02/91	11/12	GW	OVERCAST	SE	6-12	NORTH	HAZY, OC	WHARF
288	07/08/91	11/12	GW	CLEAR	NW	6-12	NORTH		WHARF
289	07/08/91	11/12	GW	CLEAR	NW	6-12	NORTH		WHARF
290	07/08/91	11/12	GW	CLEAR	NW	6-12	NORTH		WHARF
291	07/08/91	11/12	GW	CLEAR	NW	6-12	NORTH		WHARF
292	07/08/91	11/12	GW	CLEAR	NW	6-12	NORTH		WHARF
293	07/08/91	11/12	GW	CLEAR	NW	6-12	NORTH		WHARF
294	07/08/91	11/12	GW	CLEAR	NW	6-12	NORTH		WHARF
295	07/08/91	11/12	GW	CLEAR	NW	6-12	NORTH		WHARF
296	07/08/91	11/12	GW	CLEAR	NW	6-12	NORTH		WHARF
297	07/08/91	11/12	GW	CLEAR	NW	6-12	NORTH		WHARF
298	07/09/91	11/12	GW	CLEAR	NW	5-10	NORTH		WHARF
299	07/09/91	11/12	GW	CLEAR	NW	5-10	NORTH		WHARF
300	07/09/91	11/12	GW	CLEAR	NW	5-10	NORTH		WHARF
301	07/09/91	11/12	GW	CLEAR	NW	5-10	NORTH		WHARF
302	07/09/91	11/12	GW	CLEAR	NW	5-10	NORTH		WHARF
303	07/09/91	11/12	GW	CLEAR	NW	5-10	NORTH		WHARF
304	07/09/91	11/12	GW	CLEAR	NW	5-10	NORTH		WHARF
305	07/09/91	11/12	GW	CLEAR	NW	5-10	NORTH		WHARF
306	07/09/91	11/12	GW	CLEAR	NW	5-10	NORTH		WHARF
307	07/15/91	11/12	GW	CLEAR	NE	5-10	NORTH	CLEAR	WHARF
308	07/15/91	11/12	GW	CLEAR	NE	5-10	NORTH	CLEAR	WHARF

OBS	OBSERVATION START TIME	OBSERVATION END TIME	KRESS BOX NUMBER	CUMULATIVE EMISSION TIME SECONDS	MAXIMUM OPACITY %	KIDC COOLING TIME HR:MIN	HOT SPOTS Y/N	COMMENTS
287	1648	1648	.	0	0	.		
288	1122	1122	.	0	0			
289	1138	1139	.	0	0			
290	1145	1146		0	0	.		
291	1202	1202	.	10	10	.		
292	1214	1214	.	0	0	.		
293	1229	1229	.	0	0			
294	1243	1244	.	0	0			
295	1259	1300	.	0	0			
296	1310	1310		0	0			
297	1317	1317		0	0			
298	1144	1144		0	0			
299	1152	1152		5	10			
300	1219	1220		0	0	.		
301	1254	1254		0	0			
302	1301	1301	.	0	0			
303	1334	1334	.	0	0	.		
304	1349	1349	.	0	0	.		
305	1359	1359	.	0	0	.		
306	1406	1407	.	0	0			
307	1200	1200		0	0			
308	1218	1218		0	0	.		

QUENCHED COKE DISCHARGE/HANDLING EMISSIONS DATA
KRESS DEMONSTRATION PROJECT - BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

OBS	DATE	BATTERY	OBSERVERS INITIALS	WEATHER	WIND DIRECTION	WIND SPEED MPH	OBSERVER LOCATION	BACKGROUND	COKE DISCHARGE LOCATION
309	07/15/91	11/12	GW	CLEAR	NE	5-10	NORTH	CLEAR	WHARF
310	07/15/91	11/12	GW	CLEAR	NE	5-10	NORTH	CLEAR	WHARF
311	07/15/91	11/12	GW	CLEAR	NE	5-10	NORTH	CLEAR	WHARF
312	07/15/91	11/12	GW	CLEAR	NE	5 10	NORTH	CLEAR	WHARF
313	07/15/91	11/12	GW	CLEAR	NE	5 10	NORTH	CLEAR	WHARF
314	07/15/91	11/12	GW	CLEAR	NE	5 10	NORTH	CLEAR	WHARF
315	07/15/91	11/12	GW	CLEAR	NE	5-10	NORTH	CLEAR	WHARF
316	07/15/91	11/12	GW	CLEAR	NE	5-10	NORTH	CLEAR	WHARF
317	07/18/91	11/12	GW	CLEAR	SW	4 9	NORTH		WHARF
318	07/18/91	11/12	GW	CLEAR	SW	4 9	NORTH		WHARF
319	07/18/91	11/12	GW	CLEAR	SW	4 9	NORTH		WHARF
320	07/18/91	11/12	GW	CLEAR	SW	4-9	NORTH		WHARF
321	07/18/91	11/12	GW	CLEAR	SW	4-9	NORTH		WHARF
322	07/18/91	11/12	GW	CLEAR	SW	4 9	NORTH		WHARF
323	07/18/91	11/12	GW	CLEAR	SW	4 9	NORTH		WHARF
324	07/18/91	11/12	GW	CLEAR	SW	4-9	NORTH		WHARF
325	07/18/91	11/12	GW	CLEAR	SW	4 9	NORTH		WHARF
326	07/18/91	11/12	GW	CLEAR	SW	4-9	NORTH		WHARF
327	07/22/91	11/12	GW	CLEAR	SE	5-10	NORTH	HAZY	WHARF
328	07/22/91	11/12	GW	CLEAR	SE	5-10	NORTH	HAZY	WHARF
329	07/22/91	11/12	GW	CLEAR	SE	5-10	NORTH	HAZY	WHARF
330	07/22/91	11/12	GW	CLEAR	SE	5-10	NORTH	HAZY	WHARF

OBS	OBSERVATION START TIME	OBSERVATION END TIME	KRESS BOX NUMBER	CUMULATIVE EMISSION TIME SECONDS	MAXIMUM OPACITY %	KIDC COOLING TIME HR:MIN	HOT SPOTS Y/N	COMMENTS
309	1237	1237		0	0			
310	1243	1243		0	0			
311	1250	1250		0	0			
312	1309	1309		0	0			
313	1316	1317		0	0			
314	1332	1332		0	0			
315	1349	1349		0	0			
316	1359	1400		0	0			
317	1127	1128		0	0			
318	1151	1151		0	0			
319	1204	1204		0	0			
320	1234	1234		0	0			
321	1321	1322		0	0			
322	1331	1331		0	0			
323	1404	1404		0	0			
324	1412	1412		0	0			
325	1429	1430		0	0			
326	1438	1438		0	0			
327	1130	1130		0	0			
328	1157	1157		0	0			
329	1222	1222		0	0			
330	1237	1239		0	0			

OBS	DATE	BATTERY	OBSERVERS INITIALS	WEATHER	WIND DIRECTION	WIND SPEED MPH	OBSERVER LOCATION	BACKGROUND	COKE DISCHARGE LOCATION
331	07/22/91	11/12	GW	CLEAR	SE	5-10	NORTH	HAZY	WHARF
332	07/22/91	11/12	GW	CLEAR	SE	5-10	NORTH	HAZY	WHARF
333	07/22/91	11/12	GW	CLEAR	SE	5-10	NORTH	HAZY	WHARF
334	07/22/91	11/12	GW	CLEAR	SE	5-10	NORTH	HAZY	WHARF
335	07/22/91	11/12	GW	CLEAR	SE	5-10	NORTH	HAZY	WHARF
336	07/22/91	11/12	GW	CLEAR	SE	5-10	NORTH	HAZY	WHARF
337	07/25/91	11/12	GW	OC,RAIN	SW	4-10	NORTH	OC,CLDY	KIDC
338	07/25/91	11/12	GW	OC,RAIN	SW	4-10	NORTH	OC,CLDY	WHARF
339	07/25/91	11/12	GW	OC,RAIN	SW	4-10	NORTH	OC,CLDY	WHARF
340	07/25/91	11/12	GW	OC,RAIN	SW	4-10	NORTH	OC,CLDY	WHARF
341	07/25/91	11/12	GW	OC,RAIN	SW	4-10	NORTH	OC,CLDY	WHARF
342	07/25/91	11/12	GW	OC,RAIN	SW	4-10	NORTH	OC,CLDY	WHARF
343	07/25/91	11/12	GW	OC,RAIN	SW	4-10	NORTH	OC,CLDY	WHARF
344	07/25/91	11/12	GW	OC,RAIN	SW	4-10	NORTH	OC,CLDY	WHARF
345	07/25/91	11/12	GW	OC,RAIN	SW	4-10	NORTH	OC,CLDY	WHARF
346	07/25/91	11/12	GW	OC,RAIN	SW	4-10	NORTH	OC,CLDY	WHARF
347	07/29/91	11/12	SBP	RAIN	NE	5-10	NORTH	BATTERY	WHARF
348	07/29/91	11/12	RLA	RAIN	NE	10	NORTH	BATTERY	WHARF
349	07/29/91	11/12	GW	OC,RAIN	NE	5-10	NORTH	CLOUDY	WHARF
350	07/29/91	11/12	SBP	RAIN	NE	5-10	NORTH	BATTERY	WHARF
351	07/29/91	11/12	RLA	RAIN	NE	10	NORTH	BATTERY	WHARF
352	07/29/91	11/12	GW	OC,RAIN	NE	5-10	NORTH	CLOUDY	WHARF

OBS	OBSERVATION START TIME	OBSERVATION END TIME	KRESS BOX NUMBER	CUMULATIVE EMISSION TIME SECONDS	MAXIMUM OPACITY %	KIDC COOLING TIME HR:MIN	HOT SPOTS Y/N	COMMENTS
331	1247	1248	.	0	0	.		
332	1306	1306	.	0	0	.		
333	1319	1319	.	0	0			
334	1329	1330	.	0	0	.		
335	1340	1340	.	0	0	.		
336	1350	1351	.	0	0			
337	.	.	.	0	0			
338	1204	1205		0	0			
339	1251	1251	.	0	0			
340	1301	1301		0	0			
341	1308	1308	.	0	0			
342	1320	1320		0	0	.		
343	1341	1341	.	0	0			
344	1354	1354		0	0	.		
345	1407	1408	.	0	0			
346	1415	1415		0	0			
347	1153	1154	.	10	8	.		
348	1154	1155	.	10	10	.		
349	1154	1154	.	7	10	.		
350	1204	1204	.	10	5	.		
351	1204	1204		10	5	.		
352	1204	1204	.	8	5			

QUENCHED COKE DISCHARGE/HANDLING EMISSIONS DATA
KRESS DEMONSTRATION PROJECT - BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

OBS	DATE	BATTERY	OBSERVERS INITIALS	WEATHER	WIND DIRECTION	WIND SPEED MPH	OBSERVER LOCATION	BACKGROUND	COKE DISCHARGE LOCATION
353	07/29/91	11/12	SBP	RAIN	NE	5-10	NORTH	BATTERY	WHARF
354	07/29/91	11/12	REA	RAIN	NE	10	NORTH	BATTERY	WHARF
355	07/29/91	11/12	GW	OC.RAIN	NE	5-10	NORTH	CLOUDY	WHARF
356	07/29/91	11/12	SBP	RAIN	NE	5-10	NORTH	BATTERY	WHARF
357	07/29/91	11/12	REA	RAIN	NE	10	NORTH	BATTERY	WHARF
358	07/29/91	11/12	GW	OC.RAIN	NE	5-10	NORTH	CLOUDY	WHARF
359	07/29/91	11/12	SBP	RAIN	NE	5-10	NORTH	BATTERY	WHARF
360	07/29/91	11/12	REA	RAIN	NE	10	NORTH	BATTERY	WHARF
361	07/29/91	11/12	GW	OC.RAIN	NE	5-10	NORTH	CLOUDY	WHARF
362	07/29/91	11/12	GW	OC.RAIN	NE	5-10	NORTH	CLOUDY	WHARF
363	07/29/91	11/12	GW	OC.RAIN	NE	5-10	NORTH	CLOUDY	WHARF
364	07/29/91	11/12	GW	OC.RAIN	NE	5-10	NORTH	CLOUDY	WHARF
365	07/29/91	11/12	GW	OC.RAIN	NE	5-10	NORTH	CLOUDY	WHARF
366	07/29/91	11/12	GW	OC.RAIN	NE	5-10	NORTH	CLOUDY	WHARF
367	07/30/91	11/12	GW	OVERCAST	SE	5-10	NORTH	CLOUDY	WHARF
368	07/30/91	11/12	GW	OVERCAST	SE	5-10	NORTH	CLOUDY	WHARF
369	07/30/91	11/12	GW	OVERCAST	SE	5-10	NORTH	CLOUDY	WHARF
370	07/30/91	11/12	GW	OVERCAST	SE	5-10	NORTH	CLOUDY	WHARF
371	07/30/91	11/12	GW	OVERCAST	SE	5-10	NORTH	CLOUDY	WHARF
372	07/30/91	11/12	GW	OVERCAST	SE	5-10	NORTH	CLOUDY	WHARF
373	07/30/91	11/12	GW	OVERCAST	SE	5-10	NORTH	CLOUDY	WHARF
374	07/30/91	11/12	GW	OVERCAST	SE	5-10	NORTH	CLOUDY	WHARF

OBS	OBSERVATION START TIME	OBSERVATION END TIME	KRESS BOX NUMBER	CUMULATIVE EMISSION TIME SECONDS	MAXIMUM OPACITY %	KIDC COOLING TIME HR.MIN	HOT SPOTS Y/N	COMMENTS
353	1232	1232	.	0	0	.		
354	1232	1232	.	0	0	.		
355	1232	1232	.	0	0	.		
356	1250	1250	.	0	0	.		
357	1250	1250	.	0	0	.		
358	1250	1250	.	0	0	.		
359	1309	1309	.	22	5	.		
360	1309	1309	.	22	5	.		
361	1309	1309	.	11	15	.		
362	1428	1429	.	0	0	.		
363	1442	1442		14	5	.		
364	1448	1448		10	20	.		
365	1500	1500		0	0	.		
366	1514	1514		0	0	.		
367	1144	1144	.	0	0	.		
368	1152	1153	.	11	10	.		
369	1206	1207	.	.	.	.		
370	1236	1237	.	.	.	.		
371	1330	1330	.	.	.	.		
372	1345	1345	.	.	.	.		
373	1401	1402	.	.	.	.		
374	1412	1413				.		

QUENCHED COKE DISCHARGE/HANDLING EMISSIONS DATA
KRESS DEMONSTRATION PROJECT - BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

OBS	DATE	BATTERY	OBSERVERS INITIALS	WEATHER	WIND DIRECTION	WIND SPEED MPH	OBSERVER LOCATION	BACKGROUND	COKE DISCHARGE LOCATION
375	07/30/91	11/12	GW	OVERCAST	SE	5-10	NORTH	CLOUDY	WHARF
376	08/01/91	11/12	GW	CLEAR	SE/SW	5-10	NORTH	CLEAR	KIDC
377	08/01/91	11/12	GW	CLEAR	SE/SW	5-10	NORTH	CLEAR	KIDC
378	08/01/91	11/12	GW	CLEAR	SE/SW	5-10	NORTH	CLEAR	WHARF
379	08/01/91	11/12	GW	CLEAR	SE/SW	5-10	NORTH	CLEAR	WHARF
380	08/01/91	11/12	GW	CLEAR	SE/SW	5-10	NORTH	CLEAR	WHARF
381	08/05/91	11/12	GW	CLEAR	NW	7-12	NORTH	CLEAR	WHARF
382	08/05/91	11/12	GW	CLEAR	NW	7-12	NORTH	CLEAR	WHARF
383	08/05/91	11/12	GW	CLEAR	NW	7-12	NORTH	CLEAR	WHARF
384	08/05/91	11/12	GW	CLEAR	NW	7-12	NORTH	CLEAR	WHARF
385	08/05/91	11/12	GW	CLEAR	NW	7-12	NORTH	CLEAR	WHARF
386	08/05/91	11/12	GW	CLEAR	NW	7-12	NORTH	CLEAR	WHARF
387	08/05/91	11/12	GW	CLEAR	NW	7-12	NORTH	CLEAR	WHARF
388	08/05/91	11/12	GW	CLEAR	NW	7-12	NORTH	CLEAR	WHARF
389	08/05/91	11/12	GW	CLEAR	NW	7-12	NORTH	CLEAR	WHARF
390	08/05/91	11/12	GW	CLEAR	NW	7-12	NORTH	CLEAR	WHARF
391	08/06/91	11/12	GW	CLEAR	SE	5-10	NORTH	CLEAR	KIDC
392	08/06/91	11/12	GW	CLEAR	SE	5-10	NORTH	CLEAR	WHARF
393	08/06/91	11/12	GW	CLEAR	SE	5-10	NORTH	CLEAR	WHARF
394	08/06/91	11/12	GW	CLEAR	SE	5-10	NORTH	CLEAR	WHARF
395	08/06/91	11/12	GW	CLEAR	SE	5-10	NORTH	CLEAR	WHARF
396	08/06/91	11/12	GW	CLEAR	SE	5-10	NORTH	CLEAR	WHARF

OBS	OBSERVATION START TIME	OBSERVATION END TIME	KRESS BOX NUMBER	CUMULATIVE EMISSION TIME SECONDS	MAXIMUM OPACITY %	KIDC COOLING TIME HR:MIN	HOT SPOTS Y/N	COMMENTS
375	1427	1428	.	.	.	.		
376	.	.	.	.	.	.		
377			.	.	.	.		
378	1130	1131	.	.	0			
379	1204	1204	.	.	0	.		
380	1212	1212		.	0			
381	1129	1129	.	.	0			
382	1216	1216	.	.	0			
383	1238	1238	.	13	10	.		
384	1245	1245	.		0	.		
385	1306	1306			0			
386	1321	1321			0	.		
387	1340	1340	.	.	0	.		
388	1346	1346	.	15	10	.		
389	1409	1409			0	.		
390	1425	1425	.		0	.		
391	.	.	.		.	.		
392	1138	1138	.	10	10	.		
393	1223	1223	.	13	10	.		
394	1234	1234		.	0			
395	1303	1303	.	.	0	.		
396	1310	1310	.	.	0			

QUENCHED COKE DISCHARGE/HANDLING EMISSIONS DATA
KRESS DEMONSTRATION PROJECT - BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

OBS	DATE	BATTERY	OBSERVERS INITIALS	WEATHER	WIND DIRECTION	WIND SPEED MPH	OBSERVER LOCATION	BACKGROUND	COKE DISCHARGE LOCATION
397	08/06/91	11/12	GW	CLEAR	SE	5 10	NORTH	CLEAR	WHARF
398	08/06/91	11/12	GW	CLEAR	SE	5-10	NORTH	CLEAR	WHARF
399	08/06/91	11/12	GW	CLEAR	SE	5 10	NORTH	CLEAR	WHARF
400	08/06/91	11/12	GW	CLEAR	SE	5-10	NORTH	CLEAR	WHARF
401	08/12/91	11/12	GW	CLEAR	SE	5 15	NORTH	CLEAR	WHARF
402	08/12/91	11/12	GW	CLEAR	SE	5-15	NORTH	CLEAR	WHARF
403	08/12/91	11/12	GW	CLEAR	SE	5-15	NORTH	CLEAR	WHARF
404	08/12/91	11/12	GW	CLEAR	SE	5 15	NORTH	CLEAR	WHARF
405	08/13/91	11/12	GW	CLEAR	SE	4-8	NORTH	CLEAR	KIDC
406	08/13/91	11/12	GW	CLEAR	SE	4 8	NORTH	CLEAR	WHARF
407	08/13/91	11/12	GW	CLEAR	SE	4-8	NORTH	CLEAR	KIDC
408	08/13/91	11/12	GW	CLEAR	SE	4-8	NORTH	CLEAR	WHARF
409	08/13/91	11/12	GW	CLEAR	SE	4-8	NORTH	CLEAR	WHARF
410	08/13/91	11/12	GW	CLEAR	SE	4 8	NORTH	CLEAR	WHARF
411	08/13/91	11/12	GW	CLEAR	SE	4 8	NORTH	CLEAR	WHARF
412	08/13/91	11/12	GW	CLEAR	SE	4 8	NORTH	CLEAR	WHARF
413	08/13/91	11/12	GW	CLEAR	SE	4-8	NORTH	CLEAR	WHARF
414	08/14/91	11/12	GW	OVERCAST	SE	5-10	NORTH	HAZY	WHARF
415	08/14/91	11/12	GW	OVERCAST	SE	5 10	NORTH	HAZY	WHARF
416	08/14/91	11/12	GW	OVERCAST	SE	5-10	NORTH	HAZY	WHARF
417	08/14/91	11/12	GW	OVERCAST	SE	5-10	NORTH	HAZY	WHARF
418	08/14/91	11/12	GW	OVERCAST	SE	5-10	NORTH	HAZY	WHARF

OBS	OBSERVATION START TIME	OBSERVATION END TIME	KRESS BOX NUMBER	CUMULATIVE EMISSION TIME SECONDS	MAXIMUM OPACITY %	KIDC COOLING TIME HR:MIN	HOT SPOTS Y/N	COMMENTS
397	1320	1320	.	14	10			
398	1329	1330			0			
399	1355	1355			0			
400	1404	1405	.	9	10			
401	1140	1141	.	.	0			
402	1154	1154	.	.	0			
403	1208	1208	.	.	0			
404	1228	1228		.	0			
405					0			
406	1204	1204			0			
407	1204	1204			0			
408	1224	1224			0			
409	1234	1234	.		0			
410	1309	1309			0			
411	1337	1337		.	0			
412	1355	1355			0			
413	1416	1416			0			
414	1311	1311	.		0			
415	1325	1325			0			
416	1342	1342		17	15			
417	1357	1357		8	10			
418	1422	1422		0	0			

QUENCHED COKE DISCHARGE/HANDLING EMISSIONS DATA
KRESS DEMONSTRATION PROJECT BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

OBS	DATE	BATTERY	OBSERVERS INITIALS	WEATHER	WIND DIRECTION	WIND SPEED MPH	OBSERVER LOCATION	BACKGROUND	COKE DISCHARGE LOCATION
419	08/14/91	11/12	GW	OVERCAST	SE	5-10	NORTH	HAZY	WHARF
420	08/19/91	11/12	GW	OVERCAST	NW	10-15	NORTH	CLOUDY	WHARF
421	08/19/91	11/12	GW	OVERCAST	NW	10-15	NORTH	CLOUDY	WHARF
422	08/19/91	11/12	GW	OVERCAST	NW	10-15	NORTH	CLOUDY	WHARF
423	08/19/91	11/12	GW	OVERCAST	NW	10-15	NORTH	CLOUDY	WHARF
424	08/19/91	11/12	GW	OVERCAST	NW	10-15	NORTH	CLOUDY	WHARF
425	08/19/91	11/12	GW	OVERCAST	NW	10-15	NORTH	CLOUDY	WHARF
426	08/19/91	11/12	GW	OVERCAST	NW	10-15	NORTH	CLOUDY	WHARF
427	08/19/91	11/12	GW	OVERCAST	NW	10-15	NORTH	CLOUDY	WHARF
428	08/19/91	11/12	GW	OVERCAST	NW	10-15	NORTH	CLOUDY	WHARF
429	08/20/91	11/12	GW	OVERCAST	NW	5-10	NORTH	CLOUDY	WHARF
430	08/20/91	11/12	GW	OVERCAST	NW	5-10	NORTH	CLOUDY	WHARF
431	08/20/91	11/12	GW	OVERCAST	NW	5-10	NORTH	CLOUDY	WHARF
432	08/20/91	11/12	GW	OVERCAST	NW	5-10	NORTH	CLOUDY	WHARF
433	08/20/91	11/12	GW	OVERCAST	NW	5-10	NORTH	CLOUDY	WHARF
434	08/20/91	11/12	GW	OVERCAST	NW	5-10	NORTH	CLOUDY	WHARF
435	08/20/91	11/12	GW	OVERCAST	NW	5-10	NORTH	CLOUDY	WHARF
436	08/20/91	11/12	GW	OVERCAST	NW	5-10	NORTH	CLOUDY	WHARF
437	08/20/91	11/12	GW	OVERCAST	NW	5-10	NORTH	CLOUDY	WHARF
438	08/20/91	11/12	GW	OVERCAST	NW	5-10	NORTH	CLOUDY	WHARF
439	08/26/91	11/12	GW	CLEAR	SE	5-10	NORTH	CLEAR	WHARF
440	08/26/91	11/12	GW	CLEAR	SE	5-10	NORTH	CLEAR	WHARF

OBS	OBSERVATION START TIME	OBSERVATION END TIME	KRESS BOX NUMBER	CUMULATIVE EMISSION TIME SECONDS	MAXIMUM OPACITY %	KIDC COOLING TIME HR:MIN	HOT SPOTS Y/N	COMMENTS
419	1429	1430		0	0	.		
420	1124	1124		0	0	.		
421	1145	1145		0	0	.		
422	1215	1216		0	0	.		
423	1232	1232		0	0	.		
424	1250	1250		13	10	.		
425	1256	1257		0	0	.		
426	1309	1310		0	0	.		
427	1319	1319		8	15			
428	1328	1328		12	15			
429	1229	1230		0	0			
430	1253	1253		0	0			
431	1257	1257		16	15			
432	1309	1310		0	0			
433	1318	1318		0	0			
434	1335	1335		10	10			
435	1347	1348		0	0	.		
436	1401	1401		0	0	.		
437	1416	1417		0	0	.		
438	1429	1429		7	10			
439	1125	1125		0	0			
440	1145	1145		0	0			

OBS	DATE	BATTERY	OBSERVERS INITIALS	WEATHER	WIND DIRECTION	WIND SPEED MPH	OBSERVER LOCATION	BACKGROUND	COKE DISCHARGE LOCATION
441	08/26/91	11/12	GW	CLEAR	SE	5-10	NORTH	CLEAR	WHARF
442	08/26/91	11/12	GW	CLEAR	SE	5-10	NORTH	CLEAR	WHARF
443	08/26/91	11/12	GW	CLEAR	SE	5-10	NORTH	CLEAR	WHARF
444	08/26/91	11/12	GW	CLEAR	SE	5-10	NORTH	CLEAR	WHARF
445	08/26/91	11/12	GW	CLEAR	SE	5-10	NORTH	CLEAR	WHARF
446	08/26/91	11/12	GW	CLEAR	SE	5-10	NORTH	CLEAR	WHARF
447	08/26/91	11/12	GW	CLEAR	SE	5-10	NORTH	CLEAR	WHARF
448	08/27/91	11/12	GW	OVERCAST	SE	5-10	NORTH	HAZY	WHARF
449	08/27/91	11/12	GW	OVERCAST	SE	5-10	NORTH	HAZY	WHARF
450	08/27/91	11/12	GW	OVERCAST	SE	5-10	NORTH	HAZY	WHARF
451	08/27/91	11/12	GW	OVERCAST	SE	5-10	NORTH	HAZY	WHARF
452	08/27/91	11/12	GW	OVERCAST	SE	5-10	NORTH	HAZY	WHARF
453	08/27/91	11/12	GW	OVERCAST	SE	5-10	NORTH	HAZY	WHARF
454	08/27/91	11/12	GW	OVERCAST	SE	5-10	NORTH	HAZY	WHARF
455	08/27/91	11/12	GW	OVERCAST	SE	5-10	NORTH	HAZY	WHARF
456	08/27/91	11/12	GW	OVERCAST	SE	5-10	NORTH	HAZY	WHARF
457	08/27/91	11/12	GW	OVERCAST	SE	5-10	NORTH	HAZY	WHARF
458	09/04/91	11/12	GW	OVERCAST	SOUTH	10-20	NORTH	CLOUDY	KIDC
459	09/04/91	11/12	GW	OVERCAST	SOUTH	10-20	NORTH	CLOUDY	KIDC
460	09/04/91	11/12	GW	OVERCAST	SOUTH	10-20	NORTH	CLOUDY	WHARF
461	09/04/91	11/12	GW	OVERCAST	SOUTH	10-20	NORTH	CLOUDY	WHARF
462	09/04/91	11/12	GW	OVERCAST	SOUTH	10-20	NORTH	CLOUDY	WHARF

OBS	OBSERVATION START TIME	OBSERVATION END TIME	KRESS BOX NUMBER	CUMULATIVE EMISSION TIME SECONDS	MAXIMUM OPACITY %	KIDC COOLING TIME HR:MIN	HOT SPOTS Y/N	COMMENTS
441	1153	1153		0	0			
442	1202	1203		0	0			
443	1243	1244		0	0			
444	1253	1253		0	0			
445	1315	1315		0	0			
446	1339	1339		0	0			
447	1345	1346		14	15			
448	1157	1158		0	0			
449	1209	1209		0	0			
450	1221	1221		0	0			
451	1232	1232		0	0			
452	1240	1240		0	0			
453	1247	1247		0	0			
454	1258	1258		0	0			
455	1306	1306		0	0			
456	1314	1315		0	0			
457	1336	1336		0	0			
458				0	0			
459				0	0			
460	1146	1146		0	0			
461	1209	1209		0	0			
462	1221	1221		20	10			

OBS	DATE	BATTERY	OBSERVERS INITIALS	WEATHER	WIND DIRECTION	WIND SPEED MPH	OBSERVER LOCATION	BACKGROUND	COKE DISCHARGE LOCATION
463	09/04/91	11/12	GW	OVERCAST	SOUTH	10-20	NORTH	CLOUDY	WHARF
464	09/04/91	11/12	GW	OVERCAST	SOUTH	10-20	NORTH	CLOUDY	WHARF
465	09/04/91	11/12	GW	OVERCAST	SOUTH	10-20	NORTH	CLOUDY	WHARF
466	09/04/91	11/12	GW	OVERCAST	SOUTH	10-20	NORTH	CLOUDY	WHARF
467	09/04/91	11/12	GW	OVERCAST	SOUTH	10-20	NORTH	CLOUDY	WHARF
468	09/04/91	11/12	GW	OVERCAST	SOUTH	10-20	NORTH	CLOUDY	WHARF
469	09/04/91	11/12	GW	OVERCAST	SOUTH	10-20	NORTH	CLOUDY	WHARF
470	09/04/91	11/12	GW	OVERCAST	SOUTH	10-20	NORTH	CLOUDY	WHARF
471	09/04/91	11/12	GW	OVERCAST	SOUTH	10-20	NORTH	CLOUDY	WHARF
472	09/04/91	11/12	GW	OVERCAST	SOUTH	10-20	NORTH	CLOUDY	WHARF
473	09/04/91	11/12	GW	OVERCAST	SOUTH	10-20	NORTH	CLOUDY	WHARF
474	09/04/91	11/12	GW	OVERCAST	SOUTH	10-20	NORTH	CLOUDY	WHARF
475	09/04/91	11/12	GW	OVERCAST	SOUTH	10-20	NORTH	CLOUDY	WHARF
476	09/04/91	11/12	GW	OVERCAST	SOUTH	10-20	NORTH	CLOUDY	WHARF
477	09/04/91	11/12	GW	OVERCAST	SOUTH	10-20	NORTH	CLOUDY	WHARF
478	09/09/91	11/12	GW	CLEAR	S/SW	5-10	NORTH		WHARF
479	09/09/91	11/12	GW	CLEAR	S/SW	5-10	NORTH		WHARF
480	09/09/91	11/12	GW	CLEAR	S/SW	5-10	NORTH		WHARF
481	09/09/91	11/12	GW	CLEAR	S/SW	5-10	NORTH		WHARF
482	09/09/91	11/12	GW	CLEAR	S/SW	5-10	NORTH		WHARF
483	09/09/91	11/12	GW	CLEAR	S/SW	5-10	NORTH		WHARF
484	09/09/91	11/12	GW	CLEAR	S/SW	5-10	NORTH		WHARF

OBS	OBSERVATION START TIME	OBSERVATION END TIME	KRESS BOX NUMBER	CUMULATIVE EMISSION TIME SECONDS	MAXIMUM OPACITY %	KIDC COOLING TIME HR:MIN	HOT SPOTS Y/N	COMMENTS
463	1241	1241		0	0			
464	1249	1249		0	0			
465	1257	1257		12	10			
466	1305	1305		0	0			
467	1315	1316		0	0			
468	1455	1455		16	10			
469	1501	1502		0	0			
470	1515	1515		0	0			
471	1521	1522		12	10			
472	1530	1530		15	10			
473	1538	1538		0	0			
474	1621	1621		0	0			
475	1637	1638		0	0			
476	1646	1646		8	15			
477	1656	1656		0	0			
478	1136	1136		0	0			
479	1200	1201		0	0			
480	1209	1209		0	0			
481	1228	1228		0	0			
482	1247	1248		0	0			
483	1258	1300		0	0			
484	1322	1322		0	0			

QUENCHED COKE DISCHARGE/HANDLING EMISSIONS DATA
KRESS DEMONSTRATION PROJECT - BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

OBS	DATE	BATTERY	OBSERVERS INITIALS	WEATHER	WIND DIRECTION	WIND SPEED MPH	OBSERVER LOCATION	BACKGROUND	COKE DISCHARGE LOCATION
485	09/09/91	11/12	GW	CLEAR	S/SW	5-10	NORTH		WHARF
486	09/09/91	11/12	GW	CLEAR	S/SW	5-10	NORTH		WHARF
487	09/09/91	11/12	GW	CLEAR	S/SW	5-10	NORTH		WHARF
488	09/10/91	11/12	GW	OVERCAST		15-20	NORTH	CLOUDY	WHARF
489	09/10/91	11/12	GW	OVERCAST		15-20	NORTH	CLOUDY	WHARF
490	09/10/91	11/12	GW	OVERCAST		15-20	NORTH	CLOUDY	WHARF
491	09/10/91	11/12	GW	OVERCAST		15-20	NORTH	CLOUDY	WHARF
492	09/10/91	11/12	GW	OVERCAST		15-20	NORTH	CLOUDY	WHARF
493	09/10/91	11/12	GW	OVERCAST		15-20	NORTH	CLOUDY	WHARF
494	09/10/91	11/12	GW	OVERCAST		15-20	NORTH	CLOUDY	WHARF
495	09/10/91	11/12	GW	OVERCAST		15-20	NORTH	CLOUDY	WHARF
496	09/17/91	11/12	GW	CLEAR	SW&NW	6-12	NORTH	CLEAR	WHARF
497	09/17/91	11/12	GW	CLEAR	SW&NW	6-12	NORTH	CLEAR	WHARF
498	09/17/91	11/12	GW	CLEAR	SW&NW	6-12	NORTH	CLEAR	WHARF
499	09/17/91	11/12	GW	CLEAR	SW&NW	6-12	NORTH	CLEAR	WHARF
500	09/17/91	11/12	GW	CLEAR	SW&NW	6-12	NORTH	CLEAR	WHARF
501	09/17/91	11/12	GW	CLEAR	SW&NW	6-12	NORTH	CLEAR	WHARF
502	09/17/91	11/12	GW	CLEAR	SW&NW	6-12	NORTH	CLEAR	WHARF
503	09/17/91	11/12	GW	CLEAR	SW&NW	6-12	NORTH	CLEAR	WHARF
504	09/17/91	11/12	GW	CLEAR	SW&NW	6-12	NORTH	CLEAR	WHARF
505	09/17/91	11/12	GW	CLEAR	SW&NW	6-12	NORTH	CLEAR	WHARF
506	09/18/91	11/12	GW	OVERCAST	SE	6-12	NORTH	CLOUDY	WHARF

OBS	OBSERVATION START TIME	OBSERVATION END TIME	KRESS BOX NUMBER	CUMULATIVE EMISSION TIME SECONDS	MAXIMUM OPACITY %	KIDC COOLING TIME HR.MIN	HOT SPOTS Y/N	COMMENTS
485	1332	1332		10	10			
486	1342	1342		0	0			
487	1357	1357		0	0			
488	1146	1146		0	0			
489	1154	1155		0	0			
490	1228	1228		0	0			
491	1239	1240		0	0			
492	1252	1252		0	0			
493	1314	1315		0	0			
494	1328	1328		0	0			
495	1336	1336		0	0			
496	1129	1129		0	0			
497	1152	1152		0	0			
498	1201	1201		8	10			
499	1223	1223		10	10			
500	1235	1236		0	0			
501	1251	1251		0	0			
502	1302	1302		0	0			
503	1309	1310		10	5			
504	1320	1320		0	0			
505	1331	1331		0	0			
506	1319	1319		0	0			

QUENCHED COKE DISCHARGE/HANDLING EMISSIONS DATA
KRESS DEMONSTRATION PROJECT - BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

OBS	DATE	BATTERY	OBSERVERS INITIALS	WEATHER	WIND DIRECTION	WIND SPEED MPH	OBSERVER LOCATION	BACKGROUND	COKE DISCHARGE LOCATION
507	09/18/91	11/12	GW	OVERCAST	SE	6-12	NORTH	CLOUDY	WHARF
508	09/18/91	11/12	GW	OVERCAST	SE	6-12	NORTH	CLOUDY	WHARF
509	09/18/91	11/12	GW	OVERCAST	SE	6-12	NORTH	CLOUDY	WHARF
510	09/18/91	11/12	GW	OVERCAST	SE	6-12	NORTH	CLOUDY	WHARF
511	09/18/91	11/12	GW	OVERCAST	SE	6-12	NORTH	CLOUDY	WHARF
512	09/18/91	11/12	GW	OVERCAST	SE	6-12	NORTH	CLOUDY	WHARF
513	09/18/91	11/12	GW	OVERCAST	SE	6-12	NORTH	CLOUDY	WHARF
514	09/18/91	11/12	GW	OVERCAST	SE	6-12	NORTH	CLOUDY	WHARF
515	09/18/91	11/12	GW	OVERCAST	SE	6-12	NORTH	CLOUDY	WHARF
516	09/23/91	11/12	GW	OVERCAST	SW	15-20	NORTH	CLOUDY	WHARF
517	09/23/91	11/12	GW	OVERCAST	SW	15-20	NORTH	CLOUDY	WHARF
518	09/23/91	11/12	GW	OVERCAST	SW	15-20	NORTH	CLOUDY	WHARF
519	09/23/91	11/12	GW	OVERCAST	SW	15-20	NORTH	CLOUDY	WHARF
520	09/23/91	11/12	GW	OVERCAST	SW	15-20	NORTH	CLOUDY	WHARF
521	09/23/91	11/12	GW	OVERCAST	SW	15-20	NORTH	CLOUDY	WHARF
522	09/23/91	11/12	GW	OVERCAST	SW	15-20	NORTH	CLOUDY	WHARF
523	09/23/91	11/12	GW	OVERCAST	SW	15-20	NORTH	CLOUDY	WHARF
524	09/23/91	11/12	GW	OVERCAST	SW	15-20	NORTH	CLOUDY	WHARF
525	09/23/91	11/12	GW	OVERCAST	SW	15-20	NORTH	CLOUDY	WHARF
526	09/24/91	11/12	GW	CLEAR	EAST	10-15	NORTH		WHARF
527	09/24/91	11/12	GW	CLEAR	EAST	10-15	NORTH		WHARF
528	09/24/91	11/12	GW	CLEAR	EAST	10-15	NORTH		WHARF

OBS	OBSER VATION START TIME	OBSER VATION END TIME	KRESS BOX NUMBER	CUMULATIVE EMISSION TIME SECONDS	MAXIMUM OPACITY %	KIDC COOLING TIME HR:MIN	HOT SPOTS Y/N	COMMENTS
507	1328	1328		0	0			
508	1336	1336		10	10			
509	1346	1347		0	0			
510	1354	1354		15	5			
511	1400	1401		0	0			
512	1411	1412		0	0			
513	1426	1427		0	0			
514	1441	1441		0	10			
515	1456	1456		0	0			
516	1127	1127		0	0			
517	1136	1137		0	0			
518	1146	1146		0	0			
519	1157	1157		0	0			
520	1207	1208		0	0			
521	1216	1216		10	10			
522	1229	1229		0	0			
523	1243	1244		6	10			
524	1253	1253		0	0			
525	1306	1307		0	0			
526	1151	1151		10	10			
527	1205	1206		0	0			
528	1217	1218		0	0			

OBS	DATE	BATTERY	OBSERVERS INITIALS	WEATHER	WIND DIRECTION	WIND SPEED MPH	OBSERVER LOCATION	BACKGROUND	COKE DISCHARGE LOCATION
529	09/24/91	11/12	GW	CLEAR	EAST	10-15	NORTH		WHARF
530	09/24/91	11/12	GW	CLEAR	EAST	10-15	NORTH		WHARF
531	09/25/91	11/12	GW	CLEAR	EAST	10-15	NORTH		WHARF
532	09/25/91	11/12	GW	CLEAR	EAST	10-15	NORTH		WHARF
533	09/25/91	11/12	GW	CLEAR	EAST	10-15	NORTH		WHARF
534	09/25/91	11/12	GW	CLEAR	EAST	10-15	NORTH		WHARF
535	10/01/91	11	GW	CLEAR			NORTH	CLEAR	WHARF
536	10/01/91	11	GW	CLEAR			NORTH	CLEAR	WHARF
537	10/01/91	11	GW	CLEAR			NORTH	CLEAR	KIDC
538	10/01/91	11	GW	CLEAR			NORTH	CLEAR	KIDC
539	10/01/91	11	GW	CLEAR			NORTH	CLEAR	KIDC
540	10/02/91	11	GW	CLEAR	SW	5-10	NORTH	CLEAR	WHARF
541	10/02/91	11	GW	CLEAR	SW	5-10	NORTH	CLEAR	WHARF
542	10/02/91	11	GW	CLEAR	SW	5-10	NORTH	CLEAR	KIDC
543	10/02/91	11	GW	CLEAR	SW	5-10	NORTH	CLEAR	KIDC
544	10/02/91	11	GW	CLEAR	SW	5-10	NORTH	CLEAR	KIDC
545	10/08/91	11/12	GW		SE/NW	6-12	NORTH	CLEAR	WHARF
546	10/08/91	11/12	GW		SE/NW	6-12	NORTH	CLEAR	WHARF
547	10/08/91	11/12	GW		SE/NW	6-12	NORTH	CLEAR	WHARF
548	10/08/91	11/12	GW		SE/NW	6-12	NORTH	CLEAR	WHARF
549	10/08/91	11/12	GW		SE/NW	6-12	NORTH	CLEAR	KIDC
550	10/08/91	11/12	GW		SE/NW	6-12	NORTH	CLEAR	KIDC

OBS	OBSERVATION START TIME	OBSERVATION END TIME	KRESS BOX NUMBER	CUMULATIVE EMISSION TIME SECONDS	MAXIMUM OPACITY %	KIDC COOLING TIME HR:MIN	HOT SPOTS Y/N	COMMENTS
529	1237	1238	.	0	0			
530	1245	1245	.	0	0			
531	1309	1309	.	0	0	.		
532	1340	1340	.	0	0			
533	1358	1358	.	8	10			
534	1406	1406	.	0	0			
535	1135	1135		0	0			
536	1208	1208	.	7	10			
537	1418	1419	3	52	15	2:59	N	
538	1541	1543	6	123	25	3:53	N	C PAN HNG UP
539	1559	1600	2	58	15	3:06		
540	1435	1436		6	5			
541	1456	1456	.	0	0			
542	1659	1659	3	17	30			
543	1802	1802	6	21	35			
544	1846	1847	2	38	55			
545	1121	1122		0	0	.		
546	1205	1205	.	0	0	.		
547	1216	1216	.	0	0	.		
548	1224	1224		0	0	.		
549	1422	.	2	.				INTERFERENCE
550	1453	1453	6	154	0	.		BALL OF FIRE

OBS	DATE	BATTERY	OBSERVERS INITIALS	WEATHER	WIND DIRECTION	WIND SPEED MPH	OBSERVER LOCATION	BACKGROUND	COKE DISCHARGE LOCATION
551	10/08/91	11/12	GW		SE/NW	5-10	NORTH	CLEAR	KIDC
552	10/09/91	11/12	GW	CLEAR	SE	5-10	NORTH	CLEAR	WHARF
553	10/09/91	11/12	GW	CLEAR	SE	5-10	NORTH	CLEAR	WHARF
554	10/09/91	11/12	GW	CLEAR	SE	5-10	NORTH	CLEAR	WHARF
555	10/09/91	11/12	GW	CLEAR	SE	5 10	NORTH	CLEAR	WHARF
556	10/09/91	11/12	GW	CLEAR	SE	5-10	NORTH	CLEAR	KIDC
557	10/09/91	11/12	GW	CLEAR	SE	5 10	NORTH	CLEAR	KIDC
558	10/09/91	11/12	GW	CLEAR	SE	5-10	NORTH	CLEAR	KIDC
559	10/09/91	11/12	GW	CLEAR	SE	5 10	NORTH	CLEAR	KIDC
560	10/10/91	11/12	GW	CLEAR	SW	4 8	NORTH	CLEAR	KIDC
561	10/10/91	11/12	GW	CLEAR	SW	4 8	NORTH	CLEAR	KIDC
562	10/10/91	11/12	GW	CLEAR	SW	4-8	NORTH	CLEAR	KIDC
563	10/11/91	11	GW	OVERCAST	NE	5 10	NORTH	CLOUDY	KIDC
564	10/11/91	11	GW	OVERCAST	NE	5-10	NORTH	CLOUDY	KIDC
565	10/11/91	11	GW	OVERCAST	NE	5-10	NORTH	CLOUDY	KIDC
566	10/11/91	11	GW	OVERCAST	NE	5 10	NORTH	CLOUDY	KIDC
567	10/11/91	11	GW	OVERCAST	NE	5-10	NORTH	CLOUDY	KIDC
568	10/11/91	11	GW	OVERCAST	NE	5 10	NORTH	CLOUDY	KIDC
569	10/11/91	11	GW	OVERCAST	NE	5 10	NORTH	CLOUDY	KIDC
570	10/11/91	11	GW	OVERCAST	NE	5-10	NORTH	CLOUDY	KIDC
571	10/12/91	11	GW	CLEAR	NW	5 10	NORTH	CLEAR	KIDC
572	10/12/91	11	GW	CLEAR	NW	5-10	NORTH	CLEAR	KIDC

OBS	OBSERVATION START TIME	OBSERVATION END TIME	KRESS BOX NUMBER	CUMULATIVE EMISSION TIME SECONDS	MAXIMUM OPACITY %	KIDC COOLING TIME HR:MIN	HOT SPOTS Y/N	COMMENTS
551	1532	1533	3	62	45			
552	1137	1138		14	10			
553	1203	1203		12	10			
554	1218	1219			0			
555	1231	1231		7	10			
556	1451	1501	2	624	35			
557	1517	1521	3	252	35			
558	1756	1757	2	43	40			
559	1813	1814	3	62	35			
560	1112	1112	5	23	15			
561	1214	1215	2	65	15			
562	1242	1242	3	43	10			
563	1124	1126	6	0	0			
564	1146	1147	5	0	0			
565	1225	1226	2	21	40			BALL OF FIRE
566	1305	1306	3	12	10			
567	1430	1431	4	14	5			
568	1515	1517	5	8	5			
569	1555	1557	2	93	35			
570	1737	1739	3	87	35			
571	1123	1126	5	18	10			
572	1155	1157	2	15	5			

OBS	DATE	BATTERY	OBSERVERS INITIALS	WEATHER	WIND DIRECTION	WIND SPEED MPH	OBSERVER LOCATION	BACKGROUND	COKE DISCHARGE LOCATION
573	10/12/91	11	GW	CLEAR	NW	5-10	NORTH	CLEAR	KIDC
574	10/12/91	11	GW	CLEAR	NW	5-10	NORTH	CLEAR	KIDC
575	10/12/91	11	GW	CLEAR	NW	5-10	NORTH	CLEAR	KIDC
576	10/12/91	11	GW	CLEAR	NW	5-10	NORTH	CLEAR	KIDC
577	10/12/91	11	GW	CLEAR	NW	5-10	NORTH	CLEAR	KIDC
578	10/12/91	11	GW	CLEAR	NW	5-10	NORTH	CLEAR	KIDC
579	10/13/91	11	GW	CLEAR	NW	6-12	NORTH	CLEAR	KIDC
580	10/13/91	11	GW	CLEAR	NW	6-12	NORTH	CLEAR	KIDC
581	10/13/91	11	GW	CLEAR	NW	6-12	NORTH	CLEAR	KIDC
582	10/13/91	11	GW	CLEAR	NW	6-12	NORTH	CLEAR	KIDC
583	10/13/91	11	GW	CLEAR	NW	6-12	NORTH	CLEAR	KIDC
584	10/13/91	11	GW	CLEAR	NW	6-12	NORTH	CLEAR	KIDC
585	10/13/91	11	GW	CLEAR	NW	6-12	NORTH	CLEAR	KIDC
586	10/13/91	11	GW	CLEAR	NW	6-12	NORTH	CLEAR	KIDC
587	10/13/91	11	GW	CLEAR	NW	6-12	NORTH	CLEAR	KIDC
588	10/14/91	11/12	GW	CLEAR	SE	5-10	NORTH		KIDC
589	10/14/91	11/12	GW	CLEAR	SE	5-10	NORTH		WHARF
590	10/14/91	11/12	GW	CLEAR	SE	5-10	NORTH		KIDC
591	10/14/91	11/12	GW	CLEAR	SE	5-10	NORTH		WHARF
592	10/14/91	11/12	GW	CLEAR	SE	5-10	NORTH		KIDC
593	10/14/91	11/12	GW	CLEAR	SE	5-10	NORTH		KIDC
594	10/14/91	11/12	GW	CLEAR	SE	5-10	NORTH		KIDC

OBS	OBSERVATION START TIME	OBSERVATION END TIME	KRESS BOX NUMBER	CUMULATIVE EMISSION TIME SECONDS	MAXIMUM OPACITY %	KIDC COOLING TIME HR:MIN	HOT SPOTS Y/N	COMMENTS
573	1228	1230	3	17	10			
574	1430	1432	4	22	10			DUMP 2X
575	1510	1512	5	134	20			
576	1716	1718	2	67	10			
577	1741	1742	3	41	10			
578	1810	1812	6	26	10			2D EMS PIT
579	1112	1113	4	12	5			
580	1140	1147	5	15	5			
581	1215	1215	2	10	5			
582	1412	1413	3	49	35			
583	1441	1441	6	9	5			
584	1507	1509	4	13	5			
585	1708	1710	5	8	5			
586	1734	1736	2	14	5			
587	1758	1800	3	10	5			
588	1121	1124	6	0	0			
589	1148	1149		0	0			
590	1154	1156	4	15	5			
591	1217	1218		0	0			
592	1235	1237	5	10	5			
593	1411	1413	2	19	5			
594	1438	1440	3	35	15			

OBS	DATE	BATTERY	OBSERVERS INITIALS	WEATHER	WIND DIRECTION	WIND SPEED MPH	OBSERVER LOCATION	BACKGROUND	COKE DISCHARGE LOCATION
595	10/14/91	11/12	GW	CLEAR	SE	5-10	NORTH		KIDC
596	10/14/91	11/12	GW	CLEAR	SE	5-10	NORTH		WHARF
597	10/14/91	11/12	GW	CLEAR	SE	5-10	NORTH		KIDC
598	10/14/91	11/12	GW	CLEAR	SE	5-10	NORTH		WHARF
599	10/14/91	11/12	GW	CLEAR	SE	5-10	NORTH		KIDC
600	10/15/91	11/12	GW	OVERCAST	SE	5-10	NORTH	CLOUDY	WHARF
601	10/15/91	11/12	GW	OVERCAST	SE	5-10	NORTH	CLOUDY	WHARF
602	10/15/91	11/12	GW	OVERCAST	SE	5-10	NORTH	CLOUDY	WHARF
603	10/15/91	11/12	GW	OVERCAST	SE	5-10	NORTH	CLOUDY	WHARF
604	10/15/91	11/12	GW	OVERCAST	SE	5-10	NORTH	CLOUDY	WHARF
605	10/15/91	11/12	GW	OVERCAST	SE	5-10	NORTH	CLOUDY	WHARF
606	10/18/91	11	GW	CLEAR	NW	5-10	NORTH	CLEAR	KIDC
607	10/18/91	11	GW	CLEAR	NW	5-10	NORTH	CLEAR	KIDC
608	10/18/91	11	GW	CLEAR	NW	5-10	NORTH	CLEAR	KIDC
609	10/18/91	11	GW	CLEAR	NW	5-10	NORTH	CLEAR	KIDC
610	10/18/91	11	GW	CLEAR	NW	5-10	NORTH	CLEAR	KIDC
611	10/18/91	11	GW	CLEAR	NW	5-10	NORTH	CLEAR	KIDC
612	10/19/91	11	GW	CLEAR	SE	5-10	NORTH	CLEAR	KIDC
613	10/19/91	11	GW	CLEAR	SE	5-10	NORTH	CLEAR	KIDC
614	10/19/91	11	GW	CLEAR	SE	5-10	NORTH	CLEAR	KIDC
615	10/19/91	11	GW	CLEAR	SE	5-10	NORTH	CLEAR	KIDC
616	10/19/91	11	GW	CLEAR	SE	5-10	NORTH	CLEAR	KIDC

OBS	OBSERVATION START TIME	OBSERVATION END TIME	KRESS BOX NUMBER	CUMULATIVE EMISSION TIME SECONDS	MAXIMUM OPACITY %	KIDC COOLING TIME HR:MIN	HOT SPOTS Y/N	COMMENTS
595	1706	1709	4	18	20	.		
596	1711	1712	.	0	0			
597	1732	1733	5	15	5			
598	1735	1736	.	0	0			
599	1753	1754	2	46	60	.		
600	1125	1125		0	0	.		
601	1139	1139	.	0	0			
602	1149	1150	.	0	0			
603	1203	1204		0	0			
604	1215	1216		0	0			
605	1230	1231	.	0	0	.		
606	1405	1406	8	5	5	.		
607	1441	1441	3	96	35			
608	1507	1508	5	55	40	.		
609	1659	1701	8	35	20	.		BALL OF FIRE
610	1730	1732	3	102	30			
611	1805	1807	5	81	30	.		
612	1104	1104	3	17	5	.		
613	1152	1154	8	28	15	.		
614	1215	1215	5	8	5	.		
615	1417	1419	3	23	15	.		
616	1438	1440	8	84	20	.		BALL OF FIRE

QUENCHED COKE DISCHARGE/HANDLING EMISSIONS DATA
KRESS DEMONSTRATION PROJECT - BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

OBS	DATE	BATTERY	OBSERVERS INITIALS	WEATHER	WIND DIRECTION	WIND SPEED MPH	OBSERVER LOCATION	BACKGROUND	COKE DISCHARGE LOCATION
617	10/19/91	11	GW	CLEAR	SE	5-10	NORTH	CLEAR	KIDC
618	10/19/91	11	GW	CLEAR	SE	5-10	NORTH	CLEAR	KIDC
619	10/19/91	11	GW	CLEAR	SE	5 10	NORTH	CLEAR	KIDC
620	10/20/91	11	GW	CLEAR	NE	6-12	NORTH	CLEAR	KIDC
621	10/20/91	11	GW	CLEAR	NE	6-12	NORTH	CLEAR	KIDC
622	10/20/91	11	GW	CLEAR	NE	6 12	NORTH	CLEAR	KIDC
623	10/20/91	11	GW	CLEAR	NE	6-12	NORTH	CLEAR	KIDC
624	10/20/91	11	GW	CLEAR	NE	6 12	NORTH	CLEAR	KIDC
625	10/20/91	11	GW	CLEAR	NE	6-12	NORTH	CLEAR	KIDC
626	10/20/91	11	GW	CLEAR	NE	6 12	NORTH	CLEAR	KIDC
627	10/20/91	11	GW	CLEAR	NE	6-12	NORTH	CLEAR	KIDC
628	10/21/91	11	GW	OVERCAST	SE	5-10	NORTH	CLOUDY	KIDC
629	10/21/91	11	GW	OVERCAST	SE	5-10	NORTH	CLOUDY	KIDC
630	10/22/91	11	GW	CLEAR	SE	5 10	NORTH	CLEAR	KIDC
631	10/22/91	11	GW	CLEAR	SE	5-10	NORTH	CLEAR	KIDC
632	10/22/91	11	GW	CLEAR	SE	5-10	NORTH	CLEAR	KIDC
633	10/22/91	11	GW	CLEAR	SE	5 10	NORTH	CLEAR	KIDC
634	10/22/91	11	GW	CLEAR	SE	5-10	NORTH	CLEAR	KIDC
635	10/22/91	11/12	GW	CLEAR	SE	5-10	NORTH	CLEAR	WHARF
636	10/22/91	11	GW	CLEAR	SE	5 10	NORTH	CLEAR	KIDC
637	10/22/91	11/12	GW	CLEAR	SE	5-10	NORTH	CLEAR	WHARF
638	10/22/91	11/12	GW	CLEAR	SE	5-10	NORTH	CLEAR	WHARF

OBS	OBSERVATION START TIME	OBSERVATION END TIME	KRESS BOX NUMBER	CUMULATIVE EMISSION TIME SECONDS	MAXIMUM OPACITY %	KIDC COOLING TIME HR:MIN	HOT SPOTS Y/N	COMMENTS
617	1516	1518	5	25	5	.		
618	1725	1728	3	14	5	.		
619	1748	1751	6	12	10	.		
620	1137	1139	5	17	5	.		
621	1204	1206	3	10	5	.		
622	1228	1229	6	22	5	.		
623	1444	1446	5	35	10	.		BALL OF FIRE
624	1509	1510	3	0	0	.		
625	1529	1531	6	13	5	.		
626	1741	1743	5	28	10	.		
627	1802	1803	3	20	10	.		
628	1135	1136	6	10	5	.		
629	1203	1203	5	0	0	.		
630	1125	1138	6	5	5	.		
631	1209	1210	8	0	0	.		
632	1238	1238	3	19	10	.		
633	1450	1451	6	24	10	.		
634	1523	1524	8	29	15	.		BALL OF FIRE
635	1611	1612	.	15	5	.		
636	1619	1621	3	34	10	.		
637	1621	1621	.	10	5	.		
638	1635	1637	.	0	0	.		

OBS	DATE	BATTERY	OBSERVERS INITIALS	WEATHER	WIND DIRECTION	WIND SPEED MPH	OBSERVER LOCATION	BACKGROUND	COKE DISCHARGE LOCATION
639	10/22/91	11	GW	CLEAR	SE	5-10	NORTH	CLEAR	KIDC
640	10/22/91	11	GW	CLEAR	SE	5-10	NORTH	CLEAR	KIDC
641	10/23/91	11/12	GW	OVERCAST	SE	5-10	NORTH	HAZY	WHARF
642	10/23/91	11/12	GW	OVERCAST	SE	5-10	NORTH	HAZY	KIDC
643	10/23/91	11/12	GW	OVERCAST	SE	5-10	NORTH	HAZY	WHARF
644	10/23/91	11/12	GW	OVERCAST	SE	5-10	NORTH	HAZY	KIDC
645	10/23/91	11/12	GW	OVERCAST	SE	5-10	NORTH	HAZY	WHARF
646	10/23/91	11/12	GW	OVERCAST	SE	5-10	NORTH	HAZY	KIDC
647	10/23/91	11/12	GW	OVERCAST	SE	5-10	NORTH	HAZY	KIDC
648	10/23/91	11/12	GW	OVERCAST	SE	5-10	NORTH	HAZY	KIDC
649	10/23/91	11/12	GW	OVERCAST	SE	5-10	NORTH	HAZY	WHARF
650	10/23/91	11/12	GW	OVERCAST	SE	5-10	NORTH	HAZY	KIDC
651	10/23/91	11/12	GW	OVERCAST	SE	5-10	NORTH	HAZY	KIDC
652	10/23/91	11/12	GW	OVERCAST	SE	5-10	NORTH	HAZY	KIDC
653	10/23/91	11/12	GW	OVERCAST	SE	5-10	NORTH	HAZY	KIDC
654	10/23/91	11/12	GW	OVERCAST	SE	5-10	NORTH	HAZY	KIDC
655	10/23/91	11/12	GW	OVERCAST	SE	5-10	NORTH	HAZY	KIDC
656	10/24/91	11/12	GW	OVERCAST	SE	5-10	NORTH	HAZY	KIDC
657	10/24/91	11/12	GW	OVERCAST	SE	5-10	NORTH	HAZY	KIDC
658	10/24/91	11/12	GW	OVERCAST	SE	5-10	NORTH	HAZY	KIDC
659	10/24/91	11/12	GW	OVERCAST	SE	5-10	NORTH	HAZY	WHARF
660	10/24/91	11/12	GW	OVERCAST	SE	5-10	NORTH	HAZY	KIDC

OBS	OBSERVATION START TIME	OBSERVATION END TIME	KRESS BOX NUMBER	CUMULATIVE EMISSION TIME SECONDS	MAXIMUM OPACITY %	KIDC COOLING TIME HR:MIN	HOT SPOTS Y/N	COMMENTS
639	1735	1737	6	46	25			BALL OF FIRE
640	1752	1754	8	.	.			INTERFERENCE
641	1143	1144		0	0			
642	1145	1146	5	28	10			
643	1201	1202		12	5			
644	1209	1210	3	14	10			
645	1212	1213		18	5			
646	1240	1241	6	31	10			
647	1421	1422	8	5	5			
648	1445	1504	5	417	35			FIRE BALL
649	1457	1458		0	0			
650	1515	1516	3	36	10			
651	1707	1708	6	24	15			
652	1732	1734	8	67	10			
653	1746	1748	5	53	20			FIRE BALL
654	1804	1805	3	48	20			
655	1128	1130	6	10	5			
656	1150	1152	5	5	5			
657	1224	1225	3	0	0			
658	1424	1424	6	.	.			INTERFERENCE
659	1447	1448	.	0	0			
660	1451	1452	5	.	.			INTERFERENCE

OBS	DATE	BATTERY	OBSERVERS INITIALS	WEATHER	WIND DIRECTION	WIND SPEED MPH	OBSERVER LOCATION	BACKGROUND	COKE DISCHARGE LOCATION
661	10/24/91	11/12	GW	OVERCAST	SE	5-10	NORTH	HAZY	KIDC
662	10/24/91	11/12	GW	CLEAR	SE	5-10	NORTH	CLEAR	KIDC
663	10/24/91	11/12	GW	CLEAR	SE	5-10	NORTH	CLEAR	KIDC
664	10/24/91	11/12	GW	CLEAR	SE	5-10	NORTH	CLEAR	KIDC
665	10/28/91	11/12	GW	CLEAR		8-12	NORTH	CLEAR	WHARF
666	10/28/91	11/12	GW	CLEAR		8-12	NORTH	CLEAR	WHARF
667	10/28/91	11/12	GW	CLEAR		8-12	NORTH	CLEAR	WHARF
668	10/28/91	11/12	GW	CLEAR		8-12	NORTH	CLEAR	KIDC
669	10/28/91	11/12	GW	CLEAR		8-12	NORTH	CLEAR	WHARF
670	10/28/91	11/12	GW	CLEAR		8-12	NORTH	CLEAR	KIDC
671	10/28/91	11/12	GW	CLEAR		8-12	NORTH	CLEAR	KIDC
672	10/29/91	11/12	GW	CLEAR		8-12	NORTH	CLEAR	WHARF
673	10/29/91	11/12	GW	CLEAR		8-12	NORTH	CLEAR	WHARF
674	10/29/91	11/12	GW	CLEAR		8-12	NORTH	CLEAR	WHARF
675	10/29/91	11/12	GW	CLEAR		8-12	NORTH	CLEAR	KIDC
676	10/29/91	11/12	GW	CLEAR		8-12	NORTH	CLEAR	WHARF
677	10/29/91	11/12	GW	CLEAR		8-12	NORTH	CLEAR	KIDC
678	10/29/91	11/12	GW	CLEAR		8-12	NORTH	CLEAR	KIDC
679	10/30/91	11/12	GW	CLEAR	NE	15-20	NORTH	CLEAR	AXKIDC
680	10/30/91	11/12	GW	CLEAR	NE	15-20	NORTH	CLEAR	KIDC
681	10/30/91	11/12	GW	CLEAR	NE	15-20	NORTH	CLEAR	KIDC
682	10/30/91	11/12	GW	CLEAR	NE	15-20	NORTH	CLEAR	KIDC

OBS	OBSERVATION START TIME	OBSERVATION END TIME	KRESS BOX NUMBER	CUMULATIVE EMISSION TIME SECONDS	MAXIMUM OPACITY %	KIDC COOLING TIME HR:MIN	HOT SPOTS Y/N	COMMENTS
661	1515	1517	3	32	25			
662	1729	1731	6	25	35			BALL OF FIRE
663	1802	1803	5	33	35			BALL OF FIRE
664	1817	1819	3	24	15			
665	1449	1449		16	10			
666	1458	1459		10	5			
667	1509	1510			0			
668	1520	1520			0			
669	1524	1525			0			
670	1533	1537		265	15			FIRE BALL
671	1555			492	45			FIRE BALL
672	1449	1449		16	10			1228
673	1458	1459		10	5			1238
674	1509	1510		0	0			1248
675	1520	1520		0	0			1148
676	1524	1525		0	0			1258
677	1533	1537		265	15			1151FIREBALL
678	1555			492	45			1153FIREBALL
679	1120	1121	3	26	15			
680	1153	1154	2	88	15			
681	1219	1220	8	41	5			
682	1408	1409	3	25	15			

OBS	DATE	BATTERY	OBSERVERS INITIALS	WEATHER	WIND DIRECTION	WIND SPEED MPH	OBSERVER LOCATION	BACKGROUND	COKE DISCHARGE LOCATION
683	10/30/91	11/12	GW	CLEAR	NE	15-20	NORTH	CLEAR	KIDC
684	10/30/91	11/12	GW	CLEAR	NE	15-20	NORTH	CLEAR	WHARF
685	10/30/91	11/12	GW	CLEAR	NE	15-20	NORTH	CLEAR	WHARF
686	10/30/91	11/12	GW	CLEAR	NE	15-20	NORTH	CLEAR	KIDC
687	10/30/91	11/12	GW	CLEAR	NE	15-20	NORTH	CLEAR	WHARF
688	10/30/91	11/12	GW	CLEAR	NE	15-20	NORTH	CLEAR	WHARF
689	10/30/91	11/12	GW	CLEAR	NE	15-20	NORTH	CLEAR	WHARF
690	10/31/91	11/12	GW	CLEAR	NE	15-20	NORTH	CLEAR	KIDC
691	10/31/91	11/12	GW	CLEAR	NE	15-20	NORTH	CLEAR	KIDC
692	10/31/91	11/12	GW	CLEAR	NE	15-20	NORTH	CLEAR	KIDC
693	10/31/91	11/12	GW	CLEAR	NE	15-20	NORTH	CLEAR	KIDC
694	10/31/91	11/12	GW	CLEAR	NE	15-20	NORTH	CLEAR	KIDC
695	11/05/91	11/12	GW	CLEAR	NE	6-12	NORTH	CLEAR	WHARF
696	11/05/91	11/12	GW	CLEAR	NE	6-12	NORTH	CLEAR	KIDC
697	11/05/91	11/12	GW	CLEAR	NE	6-12	NORTH	CLEAR	WHARF
698	11/05/91	11/12	GW	CLEAR	NE	6-12	NORTH	CLEAR	KIDC
699	11/05/91	11/12	GW	CLEAR	NE	6-12	NORTH	CLEAR	KIDC
700	11/05/91	11/12	GW	CLEAR	NE	6-12	NORTH	CLEAR	WHARF
701	11/05/91	11/12	GW	CLEAR	NE	6-12	NORTH	CLEAR	WHARF
702	11/05/91	11/12	GW	CLEAR	NE	6-12	NORTH	CLEAR	WHARF
703	11/05/91	11/12	GW	CLEAR	NE	6-12	NORTH	CLEAR	WHARF
704	11/06/91	11/12	GW	CLEAR	SE	6-12	NORTH	CLEAR	WHARF

OBS	OBSERVATION START TIME	OBSERVATION END TIME	KRESS BOX NUMBER	CUMULATIVE EMISSION TIME SECONDS	MAXIMUM OPACITY %	KIDC COOLING TIME HR.MIN	HOT SPOTS Y/N	COMMENTS
683	1510	1513	2	174	35	.		
684	1514	1514	.	.	0	.		
685	1521	1522	.	10	5	.		
686	1523	1524	8	43	15	.		
687	1536	1536	.	.	0	.		
688	1546	1547	.	5	5	.		
689	1555	1556	.		0			
690	1152	1153	2	57	15			
691	1220	1223	3	113	15			
692	1241	1243	5	60	15			
693	1432	1456	2	138	30			1380 SECONDS
694	1456	1510	3	840	30			
695	1205	1206			0			
696	1410	1414	8	132	35	2:41		
697	1414	1415	.		0			
698	1448	1449	3	113	25	2:53		
699	1454	1456	6	46	15	2:25		
700	1523	1523			0			
701	1529	1529		0	0			
702	1535	1536		0	0			
703	1544	1545		0	0	.		
704	1130	1131	.	0	0	.		

OBS	DATE	BATTERY	OBSERVERS INITIALS	WEATHER	WIND DIRECTION	WIND SPEED MPH	OBSERVER LOCATION	BACKGROUND	COKE DISCHARGE LOCATION
705	11/06/91	11/12	GW	CLEAR	SE	6-12	NORTH	CLEAR	KIDC
706	11/06/91	11/12	GW	CLEAR	SE	6-12	NORTH	CLEAR	KIDC
707	11/06/91	11/12	GW	CLEAR	SE	6-12	NORTH	CLEAR	KIDC
708	11/06/91	11/12	GW	CLEAR	SE	6-12	NORTH	CLEAR	KIDC
709	11/06/91	11/12	GW	CLEAR	SE	6-12	NORTH	CLEAR	WHARF
710	11/06/91	11/12	GW	CLEAR	SE	6-12	NORTH	CLEAR	WHARF
711	11/07/91	11/12	GW	OVERCAST	SE	4-8	NORTH	CLOUDY	KIDC
712	11/07/91	11/12	GW	OVERCAST	SE	4-8	NORTH	CLOUDY	KIDC
713	11/07/91	11/12	GW	OVERCAST	SE	4-8	NORTH	CLOUDY	KIDC
714	11/07/91	11/12	GW	OVERCAST	SE	4-8	NORTH	CLOUDY	KIDC
715	11/07/91	11/12	GW	OVERCAST	SE	4-8	NORTH	CLOUDY	WHARF
716	11/07/91	11/12	GW	OVERCAST	SE	4-8	NORTH	CLOUDY	WHARF
717	11/07/91	11/12	GW	OVERCAST	SE	4-8	NORTH	CLOUDY	KIDC
718	11/07/91	11/12	GW	OVERCAST	SE	4-8	NORTH	CLOUDY	KIDC
719	11/12/91	11/12	REA	OVERCAST	NE	5-10	WEST		KIDC
720	11/12/91	11/12	REA	OVERCAST	NE	5-10	WEST		KIDC
721	11/12/91	11/12	REA	OVERCAST	NE	5-10	WEST		KIDC
722	11/14/91	11/12	REA	CLEAR	WEST	5-10	NORTH	QUENCH T	KIDC
723	11/14/91	11/12	REA	CLEAR	WEST	5-10	NORTH	QUENCH T	KIDC
724	11/14/91	11/12	REA	CLEAR	WEST	5-10	NORTH	QUENCH T	KIDC
725	11/20/91	11/12	REA	CLEAR	SW	10-15	NORTH	CLEAR	KIDC
726	11/20/91	11/12	REA	CLEAR	SW	10-15	NORTH	CLEAR	KIDC

OBS	OBSERVATION START TIME	OBSERVATION END TIME	KRESS BOX NUMBER	CUMULATIVE EMISSION TIME SECONDS	MAXIMUM OPACITY %	KIDC COOLING TIME HR:MIN	HOT SPOTS Y/N	COMMENTS
705	1146	1147	6	26	15			CABLE BROKE
706	1218	1219	3	17	5			
707	1428	1433	5	264	45	3:00		
708	1449	1452	3	213	45	2:28		
709	1530	1531	.	0	0	.		
710	1538	1538	.	0	0	.		
711	1135	1136	2	0	0	.		
712	1203	1204	5	49	10	.		
713	1225	1226	3	18	5	.		
714	1225	1226	3	18	5			
715	1255	1256		0	0			1216
716	1303	1303		0	0			1226
717	1440	1441	2	54	10	2:53		1148
718	1459	1501	5	70	15	2:48		1151 F BALL
719	1434	1435	4	45	10	3:05		1148
720	1456	1457	8	28	15	2:50		1151
721	1512	1513	3	40	20	2:30		1153
722	1430	1432	2	9	5	3:00		1148
723	1525	1526	6	33	10	3:10		1151
724	1547	1548	5	7	5	3:35		1153
725	1334	1335	6	5	5			
726	1403	1404	4	3	5			

OBS	DATE	BATTERY	OBSERVERS INITIALS	WEATHER	WIND DIRECTION	WIND SPEED MPH	OBSERVER LOCATION	BACKGROUND	COKE DISCHARGE LOCATION
727	11/20/91	11/12	REA	CLEAR	SW	10-15	NORTH	CLEAR	KIDC
728	11/20/91	11/12	REA	CLEAR	SW	10-15	NORTH	CLEAR	KIDC
729	11/20/91	11/12	RFA	CLEAR	SW	10-15	NORTH	CLEAR	KIDC
730	11/20/91	11/12	RFA	CLEAR	SW	10-15	NORTH	CLEAR	KIDC
731	11/21/91	11/12	GW	CLR/OC	SE	4 8	NORTH	OVCAST	WHARF
732	11/21/91	11/12	GW	CLR/OC	SE	4 8	NORTH	OVCAST	WHARF
733	11/21/91	11/12	GW	CLR/OC	SE	4-8	NORTH	OVCAST	KIDC
734	11/21/91	11/12	GW	CLR/OC	SE	4 8	NORTH	OVERCAST	KIDC
735	11/21/91	11/12	GW	CLR/OC	SE	4 8	NORTH	OVERCAST	KIDC
736	11/21/91	11/12	GW	CLR/OC	SE	4 8	NORTH	OVERCAST	KIDC
737	11/21/91	11/12	GW	CLR/OC	SE	4-8	NORTH	OVERCAST	WHARF
738	11/21/91	11/12	GW	CLR/OC	SE	4-8	NORTH	OVERCAST	WHARF
739	11/21/91	11/12	GW	CLR/OC	SE	4-8	NORTH	OVERCAST	WHARF
740	11/21/91	11/12	GW	CLR/OC	SE	4-8	NORTH	OVERCAST	KIDC
741	11/21/91	11/12	GW	CLR/OC	SE	4-8	NORTH	OVERCAST	KIDC
742	11/22/91	11/12	GW	OVERCAST	SE	10-15	NORTH	CLOUDY	WHARF
743	11/22/91	11/12	GW	OVERCAST	SE	10 15	NORTH	CLOUDY	WHARF
744	11/22/91	11/12	GW	OVERCAST	SE	10-15	NORTH	CLOUDY	WHARF
745	11/22/91	11/12	GW	OVERCAST	SE	10 15	NORTH	CLOUDY	WHARF
746	11/22/91	11/12	GW	OVERCAST	SE	10 15	NORTH	CLOUDY	WHARF
747	11/22/91	11/12	GW	OVERCAST	SE	10-15	NORTH	CLOUDY	WHARF
748	11/22/91	11/12	GW	OVERCAST	SE	10 15	NORTH	CLOUDY	KIDC

OBS	OBSERVATION START TIME	OBSERVATION END TIME	KRESS BOX NUMBER	CUMULATIVE EMISSION TIME SECONDS	MAXIMUM OPACITY %	KIDC COOLING TIME HR:MIN	HOT SPOTS Y/N	COMMENTS
727	1420	1421	8	8	5			
728	1441	1447	7	12	5			DUMP 2X
729	1517	1531	1	17	10			DUMP 3X
730	1553	1554	2	5	5			
731	1240	1241		0	0			1236
732	1252	1252		0	0			1246
733	1345	1345	6	13	5			1149
734	1407	1407	4	9	5			1172
735	1422	1422	8	11	5			1152
736	1444	1550	7	8	5			1135 STICKER
737	1500	1501		0	0			1238
738	1508	1508		0	0			1246
739	1517	1517		0	0			1258
740	1528	1618	1	0	0			1154 STICKER
741	1638	1638	2	10	5			1171
742	1156	1156		0	0			1224
743	1208	1208		0	0			1234 STICKER
744	1241	1241		0	0			1234 #2 DUMP
745	1250	1250		0	0			1244
746	1300	1300		0	0			1226
747	1332	1332		0	0			1236
748	1344		6	15	5			1149

QUENCHED COKE DISCHARGE/HANDLING EMISSIONS DATA
KRESS DEMONSTRATION PROJECT BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

OBS	DATE	BATTERY	OBSERVERS INITIALS	WEATHER	WIND DIRECTION	WIND SPEED MPH	OBSERVER LOCATION	BACKGROUND	COKE DISCHARGE LOCATION
749	11/22/91	11/12	GW	OVERCAST	SE	10-15	NORTH	CLOUDY	KIDC
750	11/22/91	11/12	GW	OVERCAST	SE	10-15	NORTH	CLOUDY	KIDC
751	11/22/91	11/12	GW	OVERCAST	SE	10-15	NORTH	CLOUDY	KIDC
752	11/22/91	11/12	GW	OVERCAST	SE	10 15	NORTH	CLOUDY	KIDC
753	11/22/91	11/12	GW	OVERCAST	SE	10-15	NORTH	CLOUDY	KIDC
754	11/24/91	11/12	GW	OVERCAST	NW	10-15	NORTH	CLOUDY	KIDC
755	11/24/91	11/12	GW	OVERCAST	NW	10-15	NORTH	CLOUDY	KIDC
756	11/24/91	11/12	GW	OVERCAST	NW	10 15	NORTH	CLOUDY	KIDC
757	11/24/91	11/12	GW	OVERCAST	NW	10-15	NORTH	CLOUDY	KIDC
758	11/24/91	11/12	GW	OVERCAST	NW	10-15	NORTH	CLOUDY	KIDC
759	11/24/91	11/12	GW	OVERCAST	NW	10-15	NORTH	CLOUDY	KIDC
760	11/25/91	11/12	GW	CLEAR	NW	10-15	NORTH	CLEAR	KIDC
761	11/25/91	11/12	SBP	CLEAR	NW	10 15	NORTH	CLEAR	KIDC
762	11/25/91	11/12	RJA	CLEAR	NW	10-20	NORTH	CLEAR	KIDC
763	11/25/91	11/12	GW	CLEAR	NW	10 15	NORTH	CLEAR	KIDC
764	11/25/91	11/12	SBP	CLEAR	NW	10 15	NORTH	CLEAR	KIDC
765	11/25/91	11/12	RJA	CLEAR	NW	10 20	NORTH	CLEAR	KIDC
766	11/25/91	11/12	GW	CLEAR	NW	10-15	NORTH	CLEAR	KIDC
767	11/25/91	11/12	SBP	CLEAR	NW	10 15	NORTH	CLEAR	KIDC
768	11/25/91	11/12	RJA	CLEAR	NW	10-20	NORTH	CLEAR	KIDC
769	11/25/91	11/12	GW	CLEAR	NW	10-15	NORTH	CLEAR	KIDC

OBS	OBSERVATION START TIME	OBSERVATION END TIME	KRESS BOX NUMBER	CUMULATIVE EMISSION TIME SECONDS	MAXIMUM OPACITY %	KIDC COOLING TIME HR:MIN	HOT SPOTS Y/N	COMMENTS
749	1409	.	4	9	5	.		1172
750	1431	.	8	13	10	.		1152
751	1454	.	7	18	20	.		1135 STICKER
752	1558	.	2	5	5	.		1154
753	1635	.	3	35	20	.		1171
754	1244	1244	7	6	5	.		1135
755	1345	1345	5	0	0	.		1149
756	1405	1405	6	12	5	.		1172
757	1422	1422	4	0	0	.		1152
758	1503	1503	2	0	0	.		1154
759	1558	1558	7	84	25	2:57		1148FIREBALL
760	1255	1255	7	23	5	.		1171
761	1255	1256	7	20	5	.		1171
762	1256	1256	7	25	5	.		1171LOOKGOOD
763	1351	1351	5	11	5	.		1149
764	1351	1351	5	15	5	.		1149
765	1351	1351	5	15	5	.		1149LOOKGOOD
766	1413	1413	6	5	5	.		1172
767	1413	1413	6	0	0	.		1172
768	1413	1413	6	0	0	.		1172LOOKGOOD
769	1429	1429	4	0	0	.		1152

QUENCHED COKE DISCHARGE/HANDLING EMISSIONS DATA
KRESS DEMONSTRATION PROJECT - BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

OBS	DATE	BATTERY	OBSERVERS INITIALS	WEATHER	WIND DIRECTION	WIND SPEED MPH	OBSERVER LOCATION	BACKGROUND	COKE DISCHARGE LOCATION
770	11/25/91	11/12	GW	CLEAR	NW	10-15	NORTH	CLEAR	KIDC
771	11/25/91	11/12	GW	CLEAR	NW	10-15	NORTH	CLEAR	KIDC

OBS	OBSERVATION START TIME	OBSERVATION END TIME	KRESS BOX NUMBER	CUMULATIVE EMISSION TIME SECONDS	MAXIMUM OPACITY %	KIDC COOLING TIME HR:MIN	HOT SPOTS Y/N	COMMENTS
770	1452	1502	8	17	5	.		1135 DISCOKE
771	1532	1532	2	0	0	.		1154

Section 7

Emission Statistics T-test Results

AVERAGE MAXIMUM OPACITY - KIDC VS. CONVENTIONAL COKE OVEN TOPSIDE OBSERVATIONS — 14:43 Friday, July 10, 1992 1

TTEST PROCEDURE

Variable: MAXOP

PECS	N	Mean	Std Dev	Std Error	Minimum	Maximum	Variances	T	DF	Prob>|T|
CONV	312	47.14743590	33.47558586	1.89518185	0.00000E+00	100.00000000	Unequal	-10.4117	208.9	0.0001
KIDC	97	80.46391753	25.39359411	2.57832884	2.00000E+01	100.00000000	Equal	-9.0250	407.0	0.0000

For HO: Variances are equal, F' = 1.74 DF = (311,96) Prob>F' = 0.0017

AVERAGE MAXIMUM OPACITY - 11 BATT. VS. 12 BATT. COKE OVEN TOPSIDE OBSERVATIONS - CONVENTIONAL PUSHES ONLY — 14:43 Friday, July 10, 1992 2

TTEST PROCEDURE

Variable: MAXOP

OVNO	N	Mean	Std Dev	Std Error	Minimum	Maximum	Variances	T	DF	Prob>|T|
1100	68	51.02941176	35.25555766	4.27536436	0	100.00000000	Unequal	1.0412	101.9	0.3003
1200	244	46.06557377	32.95607195	2.10979631	0	100.00000000	Equal	1.0816	310.0	0.2803

For HO: Variances are equal, F' = 1.14 DF = (67,243) Prob>F' = 0.4620

PUSHER SIDE OVEN EMISSIONS AND TIME OF EMISSIONS T TEST KIDC VS. ALL CONVENTIONAL PUSHES MAXIMUM OPACITY (MAXOP) CUMULATIVE TIME OF EMISSIONS (CTOE) — 15:06 Friday, July 10, 1992 1

TTEST PROCEDURE

Variable: MAXOP

ECON	N	Mean	Std Dev	Std Error	Minimum	Maximum	Variances	T	DF	Prob>|T|
CONV	283	51.39575972	32.72351806	1.94521124	5.00000000	100.00000000	Unequal	-2.8055	221.0	0.0055
KIDC	126	61.90476190	35.93247636	3.20111942	10.00000000	100.00000000	Equal	2.9081	407.0	0.0038

For HO: Variances are equal, F' = 1.21 DF = (125,282) Prob>F' = 0.2069

Variable: CTOE

ECON	N	Mean	Std Dev	Std Error	Minimum	Maximum	Variances	T	DF	Prob>|T|
CONV	283	57.35335689	29.55081357	1.75661353	5.00000000	165.00000000	Unequal	-0.6203	322.4	0.5355
KIDC	125	58.96000000	21.27788493	1.90315188	5.00000000	109.00000000	Equal	-0.5482	406.0	0.5839

For HO: Variances are equal, F' = 1.93 DF = (282,124) Prob>F' = 0.0000

PUSHER SIDE OVEN EMISSIONS AND TIME OF EMISSIONS T TEST 15:06 Friday, July 10, 1992 2
KIDC VS. CHEMICO PUSHES
MAXIMUM OPACITY (MAXOP)
CUMULATIVE TIME OF EMISSIONS (CTOE)

TTEST PROCEDURE

Variable: MAXOP

ECON	N	Mean	Std Dev	Std Error	Minimum	Maximum	Variances	T	DF	Prob>|T|
CHEMICO	58	45.08620690	33.43613157	4.39037916	5.00000000	100.00000000	Unequal	-3.0954	118.4	0.0025
KIDC	126	61.90476190	35.93247636	3.20111942	10.00000000	100.00000000	Equal	-3.0138	182.0	0.0029

For HO: Variances are equal, F' = 1.15 DF = (125,57) Prob>F' = 0.5477

Variable: CTOE

ECON	N	Mean	Std Dev	Std Error	Minimum	Maximum	Variances	T	DF	Prob>|T|
CHEMICO	58	57.68965517	26.12668656	3.43060202	5.00000000	95.00000000	Unequal	0.3238	93.4	0.7468
KIDC	125	58.96000000	21.27788493	1.90315188	5.00000000	109.00000000	Equal	-0.3489	181.0	0.7276

For HO: Variances are equal, F' = 1.51 DF = (57,124) Prob>F' = 0.0604

PUSHER SIDE OVEN EMISSIONS AND TIME OF EMISSIONS T TEST 15:06 Friday, July 10, 1992 3
KIDC VS. SHENANGO PUSHES
MAXIMUM OPACITY (MAXOP)
CUMULATIVE TIME OF EMISSIONS (CTOE)

TTEST PROCEDURE

Variable: MAXOP

ECON	N	Mean	Std Dev	Std Error	Minimum	Maximum	Variances	T	DF	Prob>|T|
KIDC	126	61.90476190	35.93247636	3.20111942	10.00000000	100.00000000	Unequal	2.2999	237.4	0.0223
SHENANGO	225	53.02222222	32.41368269	2.16091218	5.00000000	100.00000000	Equal	2.3677	349.0	0.0184

For HO: Variances are equal, F' = 1.23 DF = (125,224) Prob>F' = 0.1834

Variable: CTOE

ECON	N	Mean	Std Dev	Std Error	Minimum	Maximum	Variances	T	DF	Prob>|T|
KIDC	125	58.96000000	21.27788493	1.90315188	5.00000000	109.00000000	Unequal	0.6088	330.0	0.5431
SHENANGO	225	57.26666667	30.42408585	2.02827239	5.00000000	165.00000000	Equal	0.5517	348.0	0.5815

For HO: Variances are equal, F' = 2.04 DF = (224,124) Prob>F' = 0.0000

PUSHER SIDE OVEN EMISSIONS AND TIME OF EMISSIONS T TEST 15:06 Friday, July 10, 1992 4
11 BATTERY VS. 12 BATTERY
MAXIMUM OPACITY (MAXOP)
CUMULATIVE TIME OF EMISSIONS (CTOE)

TTEST PROCEDURE

Variable: MAXOP

OVEN	N	Mean	Std Dev	Std Error	Minimum	Maximum	Variances	T	DF	Prob>|T|
1100	90	52.83333333	33.91206408	3.57464542	5.00000000	100.00000000	Unequal	0.4947	166.1	0.6215
1200	193	50.72538860	32.22224626	2.31940804	5.00000000	100.00000000	Equal	0.5040	281.0	0.6147

For HO: Variances are equal, F' = 1.11 DF = (89,192) Prob>F' = 0.5564

Variable: CTOE

OVEN	N	Mean	Std Dev	Std Error	Minimum	Maximum	Variances	T	DF	Prob>|T|
1100	90	58.22222222	25.98304450	2.73885337	10.00000000	126.00000000	Unequal	0.3600	205.4	0.7192
1200	193	56.94818653	31.13072921	2.24083892	5.00000000	165.00000000	Equal	0.3372	281.0	0.7362

For HO: Variances are equal, F' = 1.44 DF = (192,89) Prob>F' = 0.0548

QUENCHED COKE DISCHARGE/HANDLING EMISSIONS T TEST 15:12 Friday, July 10, 1992 1
KIDC VS. WHARF DISCHARGE

TTEST PROCEDURE

Variable: MAXOP

LOC	N	Mean	Std Dev	Std Error	Minimum	Maximum	Variances	T	DF	Prob>|T|
KIDC	167	13.47305389	12.84420753	0.99391462	0	60.00000000	Unequal	11.7328	175.4	0.0001
WHARF	584	1.64897260	4.02629423	0.16660924	0	20.00000000	Equal	19.2138	749.0	0.0000

For HO: Variances are equal, F' = 10.18 DF = (166,583) Prob>F' = 0.0000

Appendix C
Keystone Environmental Resources Report on
KIDC Box Gas Sampling

BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MD
DETERMINATION OF CONCENTRATIONS OF VOLATILE AND SEMI-VOLATILE ORGANIC COMPOUNDS IN THE HEADSPACE OF KRESS BOX #3

Prepared for:

BETHLEHEM STEEL CORPORATION
BETHLEHEM, PA

Prepared by:

KEYSTONE ENVIRONMENTAL RESOURCES, INC.
3000 TECH CENTER DRIVE
MONROEVILLE, PA 15146

PROJECT NUMBER: 395110-01

MARCH 1992

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DRAFT

1.0 INTRODUCTION

On October 30, 1991, a diagnostic test program was conducted on Kress Box #3 at the Bethlehem Steel Corporation (BSC) Sparrows Point, Maryland plant. The Kress Box is designed to virtually eliminate quenching emissions by cooling the coke using a process called indirect dry cooling. After the hot coke is loaded into the Kress Box, the box is sealed and taken to the quenching area where a large volume of water is poured over it, whereby indirectly cooling the coke contained inside. The purpose of the testing was to determine concentrations of volatile organic compounds (VOC's) and semi-volatile organic compounds (SVOC's) in the head space of the Kress Box during the indirect cooling process. Semi-volatile organic compound groups include polynuclear aromatic hydrocarbons (PAH's), phenols and cresols, and phthalates. Table 1-1 presents a detailed listing of the VOC's and SVOC's that were targeted in this test program. Three tests were conducted for each of the two constituent groups. The sampling took place at approximately five minutes and at two hours following the loading of the freshly pushed coke into the Kress Box #3.

Sample collection was performed by the Air Quality Engineering Division of Keystone Environmental Resources, Inc., Monroeville, Pennsylvania. The test crew was comprised of Mark Grunebach, Manager of Monitoring Services, Patrick Stockton, and Thomas Morgan. Testing was coordinated by George Ossman of Bethlehem Steel Corporation.

DRAFT

TABLE 1-1

BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MD

KRESS BOX #3
TEST PROGRAM TARGET COMPOUNDS

Volatile Organic Compounds

acrylonitrile
benzene
chloroform
2,4-dinitrotoluene
2,6-dinitrotoluene
ethyl benzene
isophorone
styrene
toluene
m/p xylene
o-xylene

Semi-Volatile Organic Compounds (Polynuclear Aromatic Hydrocarbons)

acenaphthene
acenaphthylene
anthracene
benzo(a)anthracene
benzo(a)pyrene
benzo(b)fluoranthene
benzo(k)fluoranthene
benzo(g,h,i)perylene
carbazole
chrysene
dibenzo(a,h)anthracene
fluoranthene
fluorene
indeno(1,2,3-c,d)pyrene
naphthalene
phenanthrene
pyrene

Semi-Volatile Organic Compounds (Phenols and Cresols)

2,4-dimethylphenol
4,6-dinitro-o-cresol
parachlorometacresol
pentachlorophenol
phenol
2,4,6-trichlorophenol

Semi-Volatile Organic Compounds (Phthalates)

bis(2-ethylhexyl)phthalate
butyl benzyl phthalate
di-n-butyl phthalate
di-n-octyl phthalate
diethyl phthalate
dimethyl phthalate

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2.0 METHODOLOGIES

The following EPA test methodologies were used in the test program: modified EPA Method TO-1 for VOC, modified EPA Method 5 for PAH, modified EPA Method TO-8 for phenols and cresols, and modified EPA Method 5 for phthalates. The specifics for each test and analytical methodology are discussed in the following sections.

2.1 Volatile Organic Compounds

Volatile organic compounds were determined with a modified EPA Method TO-1 set up. The standard Method TO-1 configuration requires a 1 to 2 gram portion of Tenax adsorbent resin. The apparatus was modified such that the stainless steel sorbent cartridge contained approximately 2 grams of charcoal followed by 2 grams of Tenax resin; the charcoal and Tenax were separated by a plug of glass wool. Three test runs were conducted for the determination of VOC's. The first test run utilized only one sorbent cartridge, while the second and third test runs employed two sorbent cartridges arranged in series; the cartridges are identified as the primary cartridge and the secondary cartridge. The dual cartridge arrangement used for the second and third test runs was employed to determine any breakthrough from the primary to the secondary cartridge.

Analysis was performed by thermally desorbing the collected constituents into a cryofocusing trap. The sorbent cartridge contents were then analyzed by gas chromatography (GC) with ion trap detection (ITD). For the first test run, the constituent VOC's were not quantified. Rather, a scan of the collected constituents was performed to identify the most prominent VOC's collected. For the second and third test runs, both primary and secondary cartridges were analyzed and quantified separately for the constituents listed in Table 1-1. An identification scan was also performed on the adsorbent cartridges from the second and third tests.

2.2 Polynuclear Aromatic Hydrocarbons

Polynuclear aromatic hydrocarbons were determined utilizing a modified EPA Method 5 sample train. Modifications pertained to the back half of the sample train such that two XAD-2 adsorption canisters, arranged in series, replaced the first three Method 5

impingers. The adsorption canisters are identified as the primary canister and the secondary canister. An impinger containing silica gel followed the two XAD-2 canisters to collect any remaining moisture. The dual XAD-2 canister arrangement was used to determine any breakthrough from the primary to the secondary canister. For the first test run, only the resin of the primary XAD-2 canister was prepared for analysis. The resin was extracted in a Soxhlet extractor using methylene chloride and submitted for analysis by gas chromatography/mass spectrometry (GC/MS) in accordance with EPA Method 8270. This sample was scanned for the twenty most prominent compounds and was also quantified to identify the specific PAH compounds listed in Table 1-1. For the second and third test runs, the primary and secondary canisters resins were extracted separately with methylene chloride in a Soxhlet extraction apparatus and concentrated to known volumes. These extracts were submitted for high performance liquid chromatography (HPLC) analysis in accordance with EPA Method 610.

2.3 Phenols and Cresols

Phenols and cresols were determined using a modified EPA Method TO-8 sampling apparatus. Modifications to the sampling train set up included the addition of a filter prior to the impingers and the use of three Greenburg-Smith impingers in place of two midget impingers required by the method. The purpose of the filter was to screen out particulate matter that may have normally been entrained in the impingers. The filter was not analyzed for phenols and cresols. All three impingers contained 100 mL each of 0.1 N NaOH. The third impinger was added to determine if any breakthrough occurred from the first two impingers to the third impinger. The first two impinger solutions of the first test run were combined and extracted. The extract was scanned for the twenty most prominent compounds using GC/MS. The third impinger solution from the first test run was not analyzed. From the second and third test runs, the first two impinger solutions were combined and extracted while the third impinger solution from each test was extracted separately. All extractions were performed with methylene chloride. The extracts from the second and third test runs were then analyzed using GC/MS in accordance with EPA Method 8270.

2.4 Phthalates

Phthalates were determined using a modified Method 5 sampling apparatus. Modifications pertained to the impinger contents and clean up of the sampling train. The first three impingers contained 100 mL each of deionized distilled water. The third impinger was added to determine if any carryover had occurred from the first two impingers to the third impinger. Methylene chloride was used to rinse all sample train components during field clean up. All sample extractions including sample train filter digestion were performed with methylene chloride. The first two impinger solutions and the sample train filter of the first test run were combined and extracted. The extract was scanned, but not quantified, for the twenty most prominent compounds using GC/MS. The third impinger solution from the first test run was not analyzed. For the second and third test runs, the first two impinger solutions and sample train filter were combined and extracted while the third impinger solution from each test was extracted separately. The extracts for the second and third test runs were submitted for GC/MS analysis in accordance with EPA Method 8270.

2.5 Gas Characteristics

During the test runs for PAH's and Phenols and Cresols, measurements were taken for percent O_2, percent combustible gases, and static pressure of the Kress box. Percent O_2 and percent combustible gases were measured using a Teledyne Analytical Instruments Model 980 Portable O_2 / Combustible Gas Analyzer.

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3.0 RESULTS

Tables 3-1, 3-3, 3-5, and 3-7 present concentrations of the different chemical compounds for the VOC's and SVOC's group. The concentrations of the various compounds are in units of parts per billion by volume (ppb) and grains per dry cubic feet (gr/dcf) or grains per dry standard cubic feet (gr/dscf). The concentration for the various compounds are presented for each sample train portion (primary and secondary charcoal/tenax sorbent cartridges, primary and secondary XAD-2 cartridges, and impingers 1 and 2, and impinger 3). Collection efficiencies for the different adsorption/absorption systems are shown in these tables. Many of the concentrations were found to be below detectable limits, thus, no collection efficiency information is provided in these cases. With regard to the detectable quantities of VOC's, the sorbent system exhibited a collection efficiency of 100 percent. The collection efficiency of the PAH sorbent system was generally greater than 90 percent. There were six instances where the collection efficiency fell below 90 percent. The impinger absorption system for the detectable phenols and cresols showed a collection efficiency of 95 percent or greater. All phthalate concentrations were below detectable limits, thus no collection efficiency determinations could be made. Other related testing parameters are also presented in these tables such as sampling port temperature (°F), start and finish times, sampling time duration, and gas sample volume in the units of dry cubic feet (dcf) or dry standard cubic feet (dscf).

Tables 3-2, 3-4, and 3-6 summarize the results of the test sample scans for the different compound groups. The objective of the scans was to determine the twenty most prominent compounds collected by each media. Table 3-2 lists the VOC's detected during the s of the three test run samples. Table 3-4 lists the PAH's and other compounds dete sample submitted for GC/MS analysis. The Table 3-6 lists the phenols, cresols, and compounds that were identified in the sample scan. In Tables 3-4 and nknown hydrocarbons were detected in the scans. The analytical equipment, due to the absence of gas standards and retention time information, was unable to discern the specific ty of hydrocarbon. The compounds were assigned to the hydrocarbon group that most closely resembled that particular compound. The compound was designated as an aliphatic hydrocarbon, an aromatic hydrocarbon, or simply a hydrocarbon. Table 3-6 shows two compounds, $C_{14}H_{10}$ Substituent Methyl and C_3 Substituent Phenol. The analytical equipment, once again, was unable to determine the exact type of compound. The $C_{14}H_{10}$

Substituent Methyl compound has a methyl base with an attached $C_{14}H_{10}$ molecule. Similarly, the C_3 Substituent Phenol compound is comprised of a Phenol base with three carbon atoms attached. Each of these two substituent-type compounds can be constructed in several different ways, consequently the specific name of the compound is unknown. With regard to the phthalate compounds, a GC/MS scan was performed on solutions of impingers 1 and 2 for the first test run, however, there were no phthalate compounds or other compounds detected in the sample. The results of this scan is consistent with the quantification analysis performed on test runs 2 and 3, as shown in Table 3-7. Test runs 2 and 3 concentrations were all below detectable limits.

Table 3-8, summarizes measurements for percent O_2, percent combustible gases, and static pressure taken during four test runs. Percent O_2 ranged from 0.5 percent to 1.4 percent. Combustible gases were measured at greater than 5 percent for all test runs. All measurements are shown to be greater than 5 percent because the combustible gas analyzer can only indicate concentrations up to 5 percent. Thus, concentrations that surpassed this upper limit of 5 percent on the meter were simply designated as greater than 5 percent. The static pressure of the Kress box ranged from -0.1 to -0.3 inches of water.

TABLE 3-1

BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MD

KRESS BOX #3
VOLATILE ORGANIC COMPOUND DATA

		Run 2 BS-VOC-2 10/30/91						Run 3 BS-VOC-3 10/30/91					
		Primary Sorbent Cartridge	Secondary Sorbent Cartridge	Total	Percent Collection Efficiency (%)	Primary Sorbent Cartridge	Secondary Sorbent Cartridge	Total	Percent Collection Efficiency (%)
CONCENTRATIONS									
Acrylonitrile	(ppb)	< 1.52	< 1.52	< 3.04		< 1.4	< 1.4	< 2.8	
	(gr/DCF)	< 1.43E-06	< 1.43E-06	< 2.87E-06	CNBD	< 1.35E-06	< 1.35E-06	< 2.71E-06	CNBD
Benzene	(ppb)	< 1.03	< 1.03	< 2.06		< 1.0	≤ 118.9	119.9	
	(gr/DCF)	< 1.43E-06	< 1.43E-06	< 2.87E-06	CNBD	< 1.35E-06	≤ 1.66E-04	≤ 1.67E-04	CNBD
Chloroform	(ppb)	< 0.67	< 0.67	< 1.34		< 0.6	< 0.6	< 1.2	
	(gr/DCF)	< 1.43E-06	< 1.43E-06	< 2.87E-06	CNBD	< 1.35E-06	< 1.35E-06	< 2.71E-06	CNBD
2,4 Dinitrotoluene	(ppb)	< 0.44	< 0.44	< 0.88		60.9	< 0.4	≤ 61.3	
	(gr/DCF)	< 1.43E-06	< 1.43E-06	< 2.87E-06	CNBD	1.98E-04	< 1.35E-06	≤ 1.99E-04	100
2,6-Dinitrotoluene	(ppb)	< 0.44	< 0.44	< 0.88		< 0.4	< 0.4	< 0.8	
	(gr/DCF)	< 1.43E-06	< 1.43E-06	< 2.87E-06	CNBD	< 1.35E-06	< 1.35E-06	< 2.71E-06	CNBD
Ethyl Benzene	(ppb)	0.92	2.53	3.45		1.6	< 0.7	< 2.3	
	(gr/DCF)	1.74E-06	4.79E-06	6.53E-06	CNBD	2.93E-06	< 1.35E-06	≤ 4.29E-06	100
Isophorone	(ppb)	< 0.58	< 0.58	< 1.16		< 0.5	< 0.5	< 1	
	(gr/DCF)	< 1.43E-06	< 1.43E-06	< 2.87E-06	CNBD	< 1.35E-06	< 1.35E-06	< 2.71E-06	CNBD
Styrene	(ppb)	< 0.77	< 0.77	< 1.54		< 0.7	< 0.7	< 1.4	
	(gr/DCF)	< 1.43E-06	< 1.43E-06	< 2.87E-06	CNBD	< 1.35E-06	< 1.35E-06	< 2.71E-06	CNBD
Toluene	(ppb)	< 0.87	< 0.87	< 1.74		< 0.8	< 0.8	< 1.6	
	(gr/DCF)	< 1.43E-06	< 1.43E-06	< 2.87E-06	CNBD	< 1.35E-06	< 1.35E-06	< 2.71E-06	CNBD
M/P-Xylene	(ppb)	< 0.76	0.83 ≤	1.59		1.3	< 0.7	≤ 2	
	(gr/DCF)	< 1.43E-06	1.57E-06 ≤	3.00E-06	CNBD	2.48E-06	< 1.35E-06	≤ 3.83E-06	100
O-Xylene	(ppb)	< 0.76	< 0.76	< 1.52		< 0.7	< 0.7	< 1.4	
	(gr/DCF)	< 1.43E-06	< 1.43E-06	< 2.87E-06	CNBD	< 1.35E-06	< 1.35E-06	< 2.71E-06	CNBD
SAMPLING PORT CONDITIONS									
Temperature	(°F)	82				80			
SAMPLING CONDITIONS									
Test times	Start	15:04				16:46			
	Finish	15:19				17:01			
Sampling Time	(minutes)	15				15			
Sample Volume	(DCF)	0.1075				0.1139			

Notes:
CNBD = Can Not Be Determined
Percent Collection Efficency = (1-Secondary/Primary)*100
ppb = parts per billion by volume
Concentrations expressed in gr/DCF can not be converted to standard conditions because of lack of necessary data.

TABLE 3-2

BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MD

KRESS BOX #3
GC/ITD SCAN FOR VOLATILE ORGANIC COMPOUNDS

Test Number	Sorbent Cartridge	Volatile Organic Compounds
BS-VOC-1	Single	1,1-Dibromo-2-Chloro-2-Fluro-Cyclopropane Carbon Monoxide
BS-VOC-2	Primary	Ethyl Benzene
	Secondary	Ethyl Benzene M/P-Xylene
BS-VOC-3	Primary	2,4-Dinitrotoluene 2-[2-(Ethenyloxy)Ethonxy]-Ethanol Ethyl Benzene M/P-Xylene
	Secondary	2,4-Imidazolidinedione n-Methyl-1-Octanamine Carbon Monoxide Benzene 1,3-Dioxolane-2-Methanol 1,1-Oxybis[2-Ethoxy]-Ethane Thieno[3,2-C]Pyridine

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Notes:
Test Run #1 used only one charcoal/tenax sorbent cartridge in its sampling train.

TABLE 3 3

BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MD

KRESS BOX #3
POLYNUCLEAR AROMATIC HYDROCARBON DATA

		BS-PAH-1 10/30/91 Primary XAD-2 Cartridge		BS-PAH-2 10/30/91 Primary XAD-2 Cartridge		Secondary XAD-2 Cartridge		Total	Percent Collection Efficiency		BS-PAH-3 10/30/91 Primary XAD-2 Cartridge		Secondary XAD-2 Cartridge		Total	Percent Collection Efficiency
CONCENTRATIONS																
Acenaphthene	(ppb)	4.7	<	7.8		0.33	≤	8.13			9.3		0.012		9.31	
	(gr/DSCF)	1.33E-05	<	2.20E-05		9.31E-07	≤	2.29E-05	CNBD		2.93E-05		3.83E-08		2.93E-05	99.9
Acenaphthylene	(ppb)	177.2		14.3		0.56		14.85		<	8.0	<	0.008	<	8.01	
	(gr/DSCF)	4.89E-04		3.95E-05		1.52E-06		4.10E-05	96.2	<	2.47E-05	<	2.47E-08	<	2.47E-05	CNBD
Anthracene	(ppb)	36.5	<	1.7		0.66	≤	2.36		<	1.7	<	0.17	<	1.87	
	(gr/DSCF)	1.18E-04	<	5.49E-06		2.12E-06	≤	7.60E-06	CNBD	<	6.18E-06	<	6.18E-07	<	6.79E-06	CNBD
Benzo(a)anthracene	(ppb)	10.8		1.0		0.15		1.15			0.2		0.01		0.21	
	(gr/DSCF)	4.46E-05		4.16E-06		6.32E-07		4.79E-06	84.8		8.40E-07		4.45E-08		8.85E-07	94.7
Benzo(b)fluoranthene	(ppb)	6.9		0.6		0.01		0.61		<	0.05		0.001	≤	0.05	
	(gr/DSCF)	3.16E-05		2.75E-06		4.83E-08		2.80E-06	98.2	<	2.47E-07		4.94E-09	≤	2.52E-07	CNBD
Benzo(k)fluoranthene	(ppb)	6.5		0.2		0.003		0.20		<	0.05		0.0005	≤	0.05	
	(gr/DSCF)	2.99E-05		7.90E-07		1.32E-08		8.03E-07	98.3	<	2.47E-07		2.47E-09	≤	2.50E-07	CNBD
Benzo(g,h,i)perylene	(ppb)	3.1		0.4	<	0.002	≤	0.40		<	0.4	<	0.0001	<	0.40	
	(gr/DSCF)	1.56E-05		2.00E-06	<	8.78E-09	≤	2.01E-06	100.0	<	6.18E-07	<	6.18E-10	<	6.18E-07	CNBD
Benzo(a)pyrene	(ppb)	6.8		0.8		0.006		0.81			0.1		0.0005		0.10	
	(gr/DSCF)	3.10E-05		3.58E-06		2.63E-08		3.60E-06	99.3		5.93E-07		2.47E-09		5.95E-07	99.6
Carbazole	(ppb)	10	<	7.2	<	0.116	<	7.32		<	7.2	<	0.007	<	7.21	
	(gr/DSCF)	3.03E-05	<	2.20E-05	<	3.51E-07	<	2.24E-05	CNBD	<	2.47E-05	<	2.47E-08	<	2.47E-05	CNBD
Chrysene	(ppb)	9.5		0.9		0.69		1.59			1.3		0.076		1.38	
	(gr/DSCF)	3.95E-05		3.61E-06		2.87E-06		6.48E-06	20.5		6.00E-06		3.52E-07		6.36E-06	94.1
Dibenzo(a,h)anthracene	(ppb)	3.0	<	0.1		0.008	≤	0.11		<	0.1	<	0.0001	≤	0.10	
	(gr/DSCF)	1.53E-05	<	3.29E-07		3.95E-08	≤	3.69E-07	CNBD		8.40E-07	<	3.71E-10	≤	8.40E-07	100.0
Fluoranthene	(ppb)	49.5		6.1		0.66		6.76		<	0.5		0.021	≤	0.62	
	(gr/DSCF)	1.82E-04		2.24E-05		2.41E-06		2.48E-05	89.2	<	2.47E-06		8.65E-08	≤	2.56E-06	CNBD
Fluorene	(ppb)	64.9		2.5		1.25		3.75			1.0		0.035		1.04	
	(gr/DSCF)	1.96E-04		7.57E-06		3.78E-06		1.14E-05	50.1		3.37E-06		1.20E-07		3.49E-06	96.4
Indeno(1,2,3-cd)pyrene	(ppb)	5.2		0.3	<	0.002	≤	0.30		<	0.1	<	0.0001	<	0.10	
	(gr/DSCF)	2.58E-05		1.37E-06	<	8.78E-09	≤	1.38E-06	100.0	<	6.18E-07	<	6.18E-10	<	6.18E-07	CNBD
Naphthalene	(ppb)	1938.5	<	9.4	<	0.15	<	9.55		<	19.8	<	0.009	≤	19.81	
	(gr/DSCF)	4.51E-03	<	2.20E-05	<	3.51E-07	<	2.23E-05	CNBD		5.19E-05	<	2.47E-08	≤	5.19E-05	100.0
Phenanthrene	(ppb)	134.3		3.9		2.66		6.56		<	1.7		0.102	≤	1.80	
	(gr/DSCF)	4.36E-04		1.27E-05		8.60E-06		2.13E-05	32.4	<	6.18E-06		3.72E-07	≤	6.55E-06	CNBD
Pyrene	(ppb)	30.9		3.6		1.25		4.85			1.3	<	0.001	≤	1.80	
	(gr/DSCF)	1.13E-04		1.33E-05		4.57E-06		1.78E-05	65.6		7.38E-06	<	2.47E-09	≤	7.38E-06	100.0
SAMPLING PORT CONDITIONS																
Temperature	(°F)	68		105							80					
SAMPLING CONDITIONS																
Test times	Start	12:02		14:36							16:40					
	Finish	13:02		15:06							17:10					
Sampling Time	(minutes)	60		30							30					
Sample Volume	(DSCF)	28.882		14.048							12.481					

CNBD = Can Not Be Determined Percent Collection Efficiency = (1-Secondary/Primary)*100 ppb = parts per billion by volume

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TABLE 3-4

BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MD

KRESS BOX #3
GC/MS SCAN FOR POLYNUCLEAR AROMATIC HYDROCARBONS
AND OTHER COMPOUNDS

Test Number	XAD-2 Cartridge	Polynuclear Aromatic Hydrocarbon Compounds and Other Compounds	Chemical Compound Category
BS-PAH-1	Primary	Acenaphthene	PAH
		Acenaphthylene	PAH
		Anthracene	PAH
		Benzo(a)anthracene	PAH
		Benzo(b)fluoranthene	APH
		Benzo(k)fluoranthene	PAH
		Benzo(g,h,i)perylene	PAH
		Benzo(a)pyrene	PAH
		Benzothiophene	PAH
		Carbazole	PAH
		Chrysene	PAH
		Dibenzo(a,h)anthracene	PAH
		Dibenzofuran	AH
		Dimethylnaphthalene	PAH
		Dimethylphenol	PC
		Fluoranthene	PAH
		Fluorene	PAH
		1H-Indene	PAH
		Indenol(1,2,3-cd)pyrene	PAH
		Methylnaphthalene	PAH
		Methylphenol	PC
		Naphthalene	PAH
		Phenanthrene	PAH
		Phenol	PC
		Pyrene	PAH
		Styrene	VOC
		Thiophene	AH
		Unknown Aliphatic Hydrocarbon	
		Unknown Aromatic Hydrocarbon	
		Unknown Hydrocarbons	

Notes:
For Test Run #1, only the primary XAD-2 cartridge was submitted for GC/MS scan.
PAH = Polynuclear Aromatic Hydrocarbon
AH = Aromatic Hydrocarbon
PC = Phenol/Cresol
VOC = Volatile Organic Compound

TABLE 3-5

BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MD

KRESS BOX #3
PHENOLS AND CRESOLS DATA

		BS PHCR-2 10/30/91				BS-PHCR-3 10/30/91			
		Impingers 1 & 2	Impinger 3	Total	Percent Collection Efficiency (%)	Impingers 1 & 2	Impinger 3	Total	Percent Collection Efficiency (%)
CONCENTRATIONS									
2,4-Dimethylphenol	(gr/DSCF)	< 7.44E-05	< 8.39E-06	< 8.27E-05	CNBD	1.83E-04	8.49E-06	1.92E-04	95.4
4,6-Dinitro-o-cresol	(gr/DSCF)	< 3.72E-04	< 4.19E-05	< 4.14E-04	CNBD	< 1.14E-04	< 2.00E-05	< 1.34E-04	CNBD
Parachlorometacresol	(gr/DSCF)	< 7.44E-05	< 8.39E-06	< 8.27E-05	CNBD	< 2.28E-05	< 4.00E-06	< 2.68E-05	CNBD
Pentachlorophenol	(gr/DSCF)	< 3.72E-04	< 4.19E-05	< 4.14E-04	CNBD	< 1.14E-04	< 2.00E-05	< 1.34E-04	CNBD
Phenol	(gr/DSCF)	< 7.44E-05	< 8.39E-06	< 8.27E-05	CNBD	1.01E-04	< 4.00E-06	≤ 1.05E-04	100.0
2,4,6-Trichlorophenol	(gr/DSCF)	< 7.44E-05	< 8.39E-06	< 8.27E-05	CNBD	< 2.28E-05	< 4.00E-06	< 2.68E-05	CNBD
SAMPLING PORT CONDITIONS									
Temperature	(°F)	105				80			
SAMPLING CONDITIONS									
Test times	Start	14:38				16:42			
	Finish	15:08				17:12			
Sampling Time	(minutes)	30				30			
Sample Volume	(DSCF)	15.668				11.945			

Notes:
CNBD = Can Not Be Determined
Percent Collection Efficiency = (1-Impinger 3 / Impingers 1 & 2)*100

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TABLE 3-6

BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MD

KRESS BOX #3
GC/MS SCAN FOR PHENOLS, CRESOLS, AND OTHER COMPOUNDS

Test Number	Impingers	Phenols, Cresols and Other Compounds
BS-PHCR-1	1 & 2	Benzonitrile Benzothiophene Dibenzothiophene Dimethylnaphthalene Ethylphenol 1H-Indene Isoquinoline Methyldibenzofuran Methylnaphthalene C14H10 Substituant Methyl C3 Substituant Phenol Trimethylphenol Unknown Aliphatic Hydrocarbon

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Notes:
For Test Run #1, only solutions for impingers 1 and 2 were submitted for GC/MS.

TABLE 3-7

BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MD

KRESS BOX #3
PHTHALATES DATA

		BS-PHT-2 10/30/91				BS-PHT-3 10/30/91			
		Impingers 1 & 2	Impingers 3	Total	Percent Collection Efficiency (%)	Impingers 1 & 2	Impingers 3	Total	Percent Collection Efficiency (%)
CONCENTRATIONS									
Bis (2-ethylhexyl) Phthalate	(gr/DSCF)	< 7.13E-06	< 8.91E-09	< 7.14E-06	CNBD	< 8.46E-06	< 5.29E-09	< 8.46E-06	CNBD
Butyl Benzyl Phthalate	(gr/DSCF)	< 7.13E-06	< 8.91E-09	< 7.14E-06	CNBD	< 8.46E-06	< 5.29E-09	< 8.46E-06	CNBD
Di n- Butyl Phthalate	(gr/DSCF)	< 7.13E-06	< 8.91E-09	< 7.14E-06	CNBD	< 8.46E-06	< 5.29E-09	< 8.46E-06	CNBD
Di-n Octyl Phthalate	(gr/DSCF)	< 7.13E-06	< 8.91E-09	< 7.14E-06	CNBD	< 8.46E-06	< 5.29E-09	< 8.46E-06	CNBD
Diethyl Phthalate	(gr/DSCF)	< 7.13E-06	< 8.91E-09	< 7.14E-06	CNBD	< 8.46E-06	< 5.29E-09	< 8.46E-06	CNBD
Dimethyl Phthalate	(gr/DSCF)	< 7.13E-06	< 8.91E-09	< 7.14E-06	CNBD	< 8.46E-06	< 5.29E-09	< 8.46E-06	CNBD
SAMPLING PORT CONDITIONS									
Temperature	(°F)	107				80			
SAMPLING CONDITIONS									
Test times	Start	14:38				16:41			
	Finish	15:08				17:11			
Sampling Time	(minutes)	30				30			
Sample Volume	(DSCF)	17.298				14.587			

Notes:
CNBD -- Can Not Be Determined
Percent Collection Efficiency = (1 - Impinger 3 / Impingers 1 & 2)*100

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TABLE 3-8

BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MD

KRESS BOX #3
GAS CHARACTERISTICS

		BS-PAH-1 10/30/91			BS-PHCR-1 10/30/91	BS-PHCR-2 10/30/91	BS-PHCR-3 10/30/91		
		Run 1	Run 2	Run 3			Run 1	Run 2	Run 3
Gas Characteristics									
Oxygen	(%)	0.5	0.5	0.5	NMT	1.0	1.3	1.3	1.4
Combustible Gases	(%)	> 5	> 5	> 5	NMT	> 5	> 5	> 5	> 5
Static Pressure	(in. H2O)	NMT	NMT	NMT	-0.20	-0.10	-0.30	NMT	NMT
Time of Measurement		12:12	12:32	12:50	12:25	14:43	16:49	16:59	17:07

Notes:
NMT = No Measurement Taken
All combustible gases were measured at greater than 5 percent. The upper limit of the combustible gas meter is 5 percent.

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0 RECOMMENDATIONS

Many of the test program target compounds were below the detectable limits of the analytical equipment. In order to get above the analytical detection limits it is recommended that, in the event of any future testing, a larger gas volume be sampled. By collecting a larger sample volume it is hoped that the sorbent systems will collect higher amounts of the target compounds. A larger sample volume can be obtained simply by the extending the sampling time. It is not recommended to sample at a higher sampling rate to obtain a larger sample volume. Sampling at a higher sampling rate may cause the process gas to pass through the sorbent media too quickly and thus prevent the target compounds in the gas from being collected efficiently by the sorbent media.

Appendix D
Area Monitoring Data Sheets & Analytical Results

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Section 1

Summary Tables of Area Monitoring Statistic-
Door Machine vs. KIDC Carrier for Total Particulate and Benzene
Soluble Organics.

AREA MONITORING STATISTICS

OVERALL STATISTICS

TOTAL PARTICULATE CONCENTRATION

	NUMBER OF OBSERVATIONS	AVERAGE VALUE	STANDARD DEVIATION	MAXIMUM VALUE	MINIMUM VALUE
DOOR MACHINE	62	10.88	8.55	40.70	0.52
KIDC CARRIER	16	5.75	6.73	22.64	0.00

BENZENE SOLUBLE PARTICULATE CONCENTRATION

	NUMBER OF OBSERVATIONS	AVERAGE VALUE	STANDARD DEVIATION	MAXIMUM VALUE	MINIMUM VALUE
DOOR MACHINE	61	2.14	2.39	12.41	0.04
KIDC CARRIER	16	0.41	0.24	0.92	0.00

AREA MONITORING STATISTICS

MONTHLY STATISTICS

TOTAL PARTICULATE CONCENTRATION

	NUMBER OF OBSERVATIONS	AVERAGE VALUE	STANDARD DEVIATION	MAXIMUM VALUE	MINIMUM VALUE
DOOR MACHINE					
APR91	4	16.85	13.85	31.90	3.00
MAY91	10	15.37	9.77	33.50	4.75
JUN91	8	9.44	6.55	24.00	3.09
JUL91	10	13.37	7.32	28.50	6.89
AUG91	10	9.25	11.34	40.70	2.16
SEP91	8	8.32	5.63	21.82	4.88
OCT91	11	6.63	4.03	14.50	0.52
NOV91	1	12.16	.	12.16	12.16
KIDC CARRIER					
OCT91	2	2.86	3.78	5.53	0.19
NOV91	13	6.64	7.10	22.64	0.00
DEC91	1	0.08	.	0.08	0.08

AREA MONITORING STATISTICS

MONTHLY STATISTICS

BENZENE SOLUBLE PARTICULATE CONCENTRATION

	NUMBER OF OBSERVATIONS	AVERAGE VALUE	STANDARD DEVIATION	MAXIMUM VALUE	MINIMUM VALUE
DOOR MACHINE					
APR91	5	3.06	1.60	4.21	0.29
MAY91	10	3.05	1.89	6.00	0.57
JUN91	8	1.96	1.85	6.34	0.80
JUL91	10	3.59	4.55	12.41	0.63
AUG91	10	0.83	0.54	1.67	0.04
SEP91	8	0.68	0.56	1.54	0.04
OCT91	9	1.87	1.43	4.06	0.28
NOV91	1	2.67	.	2.67	2.67
KIDC CARRIER					
OCT91	6	0.47	0.25	0.68	0.00
NOV91	9	0.42	0.21	0.92	0.25
DEC91	1	0.00	.	0.00	0.00

Section 2

Table of Total Particulate Sample Database

AREA MONITORING PROGRAM TEST RESULTS 11/12 BATTERY
TOTAL PARTICULATE CONCENTRATION
KIDC DEMONSTRATION PROJECT - BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

OBS	DATE	AML NUMBER	AMI NUMBER	SAMPLE ID NUMBER	SAMPLE LOCATION	SAMPLE WGT, MG	AIR VOL, M3	CONCENTRATION MG/M3	DETECTION LIMIT, MG
1	04/16/91	8226930	7180-7437	PVC 7437	DOOR MACH	.	0.960	.	.
2	04/18/91	8226931	7180-7537	PVC 7537	DOOR MACH	30.70	0.960	31.90	0.010
3	04/25/91	8226914	7180-2331	PVC 7505	DOOR MACH	2.67	0.888	3.00	0.010
4	04/26/91	8226915	7180-2333	PVC 7515	DOOR MACH	21.90	0.870	25.10	0.010
5	04/30/91	8227416	7180-2141	PVC 7520	DOOR MACH	6.96	0.940	7.40	0.010
6	05/01/91	8227417	7180-2143	PVC 7523	DOOR MACH	16.40	0.930	17.60	0.010
7	05/06/91	8228020	7180-2151	PVC 7522	DOOR MACH	12.70	1.027	12.30	0.010
8	05/07/91	8228021	7180-2153	PVC 7525	DOOR MACH	3.98	0.840	4.75	0.010
9	05/13/91	8228995	7180-2162	PVC 7507	DOOR MACH	12.20	0.874	13.90	0.010
10	05/13/91	8228996	7180-2163	PVC 7503	DOOR MACH	7.53	0.916	8.22	0.010
11	05/14/91	8228998	7180-2167	PVC 7517	DOOR MACH	10.00	0.912	10.90	0.010
12	05/21/91	8230115	7180-2231	PVC 7510	DOOR MACH	9.85	0.930	10.50	0.010
13	05/22/91	8230117	7180-2235	PVC 7541	DOOR MACH	8.88	0.886	10.00	0.010
14	05/28/91	8230977	7180-2171	PVC 7516	DOOR MACH	28.90	0.902	32.00	0.010
15	05/30/91	8230979	7180-2175	PVC 7502	DOOR MACH	28.70	0.855	33.50	0.010
16	06/06/91	8232140	7180-2183	PVC 7536	DOOR MACH	3.32	0.902	3.68	0.010
17	06/07/91	8232141	7180-2185	PVC 6472	DOOR MACH	10.40	0.900	11.50	0.010
18	06/10/91	8232781	7180 2193	PVC 6425	DOOR MACH	7.51	0.846	8.87	0.010
19	06/14/91	8232780	7180 2191	PVC 6424	DOOR MACH	6.50	0.790	8.22	0.010
20	06/19/91	8233051	7180 2201	PVC 6443	DOOR MACH	2.62	0.846	3.09	0.010
21	06/20/91	8233052	7181 2203	PVC 6444	DOOR MACH	21.60	0.900	24.00	0.010
22	06/25/91	8234483	7180 2221	PVC 6433	DOOR MACH	8.41	0.869	9.67	0.010
23	06/26/91	8234485	7180-2225	PVC 6469	DOOR MACH	5.65	0.872	6.47	0.010
24	07/01/91	8234714		PVC 6428	DOOR MACH	13.90	0.921	15.00	0.010
25	07/02/91	8234715		PVC 6452	DOOR MACH	9.34	0.955	9.78	0.010
26	07/09/91	8236030	7180-2253	PVC6457	DOOR MACH	11.90	1.010	11.80	0.010
27	07/11/91	8236031	7180-2255	PVC6458	DOOR MACH	7.55	0.916	8.24	0.010
28	07/16/91	8236507	7180-2263	PVC8292	DOOR MACH	7.15	0.986	7.25	0.010
29	07/17/91	8236508	7180-2265	PVC8323	DOOR MACH	7.61	1.060	7.18	0.010
30	07/22/91	8237971	7180-2271	PVC 8286	DOOR MACH	5.74	0.833	6.89	0.010
31	07/23/91	8237972	7180-2273	PVC 8285	DOOR MACH	28.40	0.995	28.50	0.010
32	07/31/91	8238508	7180-2303	PVC 8328	DOOR MACH	19.31	0.864	22.35	0.010
33	07/31/91	8238509	7180-2305	PVC 8331	DOOR MACH	15.83	0.950	16.66	0.010
34	08/01/91	8238510	7180-2307	PVC 8283	DOOR MACH	6.97	0.912	7.64	0.010
35	08/01/91	8238511	7180-2309	PVC 8332	DOOR MACH	3.32	0.883	3.76	0.010
36	08/05/91	8239736	7180-2343	PVC 8327	DOOR MACH	5.67	0.727	7.80	0.010
37	08/06/91	8239737	7180-2345	PVC 8321	DOOR MACH	6.70	0.882	7.59	0.010
38	08/12/91	8241886	7180 2321	PVC 8282	DOOR MACH	1.90	0.878	2.16	0.010
39	08/13/91	8241887	7180-2324	PVC 8289	DOOR MACH	43.57	1.070	40.70	0.010
40	08/19/91	8242126	7180 2313	PVC 7435	DOOR MACH	8.06	0.802	10.10	0.010
41	08/22/91	8242127	7180 2315	PVC 8288	DOOR MACH	4.46	0.828	5.42	0.010
42	08/27/91	8244057	7180 2351	PVC 7436	DOOR MACH	3.58	0.785	4.56	0.010
43	08/30/91	8244058	7180 2353	PVC 9291	DOOR MACH	2.22	0.813	2.73	0.010
44	09/04/91	8247842	7180-2371	PVC 8111	DOOR MACH	5.34	0.859	6.21	0.010
45	09/05/91	8247843	7180 2373	PVC 8097	DOOR MACH	4.75	0.849	5.59	0.010
46	09/10/91	8245625	7180 2401	PVC 8102	DOOR MACH	4.46	0.843	5.29	0.010
47	09/13/91	8245626	7180-2403	PVC 8109	DOOR MACH	4.62	0.813	5.68	0.010
48	09/13/91	8245627	7180-2405	PVC 8106	Q/A	6.77	0.822	8.23	0.010
49	09/18/91	8246593	7180-2381	PVC 8095	DOOR MACH	6.64	0.780	8.51	0.010
50	09/19/91	8246594	7180-2383	PVC 8108	DOOR MACH	17.13	0.785	21.82	0.010
51	09/25/91	8247989	7180-2391	PVC 8101	DOOR MACH	4.67	0.958	4.88	0.010
52	09/26/91	8247990	7180-2393	PVC 8117	DOOR MACH	7.42	0.869	8.54	0.010

TOTAL PARTICULATE CONCENTRATION

KIDC DEMONSTRATION PROJECT - BETHLEHEM STEEL CORPORATION

SPARROWS POINT, MARYLAND

OBS	DATE	AML NUMBER	AML NUMBER	SAMPLE ID NUMBER	SAMPLE LOCATION	SAMPLE WGT, MG	AIR VOL, M3	CONCENTRATION MG/M3	DETECTION LIMIT, MG
53	10/01/91	8249363	7180 2411	PVC 8114	DOOR MACH	3.87	0.773	5.01	0.010
54	10/02/91	8249364	7180-2413	PVC 8093	DOOR MACH	4.54	0.769	5.90	0.010
55	10/08/91	8249849	7181 2421	PVC 8115	DOOR MACH	9.63	0.802	12.00	0.010
56	10/09/91	8249850	7181 2423	PVC 8094	DOOR MACH	4.64	0.855	5.42	0.010
57	10/15/91	8253501	7180-2891	PVC 8099	DOOR MACH	7.65	0.802	9.54	0.010
58	10/16/91	8253502	7180-2893	PVC 8103	DOOR MACH	11.76	0.811	14.50	0.010
59	10/23/91	8253491	7180 2881	PVC 8105	DOOR MACH	0.58	0.191	3.04	0.010
60	10/24/91	8253492	7180-2883	PVC 8112	DOOR MACH	1.28	0.299	4.27	0.010
61	10/25/91	8253496	7180-2871	PVC 8116	DOOR MACH	0.39	0.752	0.52	0.010
62	10/28/91	8253486	7180-2851	PVC 8042	DOOR MACH	2.16	0.406	5.31	0.010
63	10/29/91	8253506	7180-2861	PVC 6460	DOOR MACH	7.14	0.960	7.44	0.010
64	10/30/91	8254637	7180-2843	PVC 8043	KRESS CAR	1.69	0.305	5.53	0.010
65	10/31/91	8254638	7180 2845	PVC 6454	KRESS CAR	0.48	0.242	0.19	0.010
66	11/04/91	8254634	7180-2831	PVC 6455	DOOR MACH	10.12	0.832	12.16	0.010
67	11/05/91	8254639	7180-2847	PVC 8049	KRESS CAR	0.00	0.309	0.00	0.010
68	11/05/91	8254635	7180-2833	PVC 8053	DR MCH, NP	0.38	0.076	5.03	0.010
69	11/06/91	8255348	7180-2823	PVC 6430	KRESS CAR	0.46	0.246	1.88	0.010
70	11/07/91	8255347	7180-2821	PVC 6465	KRESS CAR	0.90	0.357	2.52	0.010
71	11/12/91	8256491	7180-2811	PVC 8045	KRESS CAR	0.85	0.312	2.71	0.010
72	11/13/91	8256492	7180-2813	PVC 8038	KRESS CAR	0.31	0.144	2.18	0.010
73	11/14/91	8256493	7180-2815	PVC 6447	KRESS CAR	1.90	0.285	6.67	0.010
74	11/20/91	8260729	7183 6061	PVC 9236	KRESS CAR		0.409	.	.
75	11/21/91	8260730	7183-6062	PVC 9236	KRESS CAR		0.447	.	.
76	11/21/91	8260731	7183-6063	PVC 9219	KRESS CAR	3.48	0.445	7.81	0.010
77	11/22/91	8260732	7183-6064	PVC 9225	KRESS CAR	9.42	0.447	21.08	0.010
78	11/22/91	8260733	7183-6065	PVC 9231	KRESS CAR	10.08	0.445	22.64	0.010
79	11/23/91	8260734	7183-6066	PVC 9241	KRESS CAR	2.37	0.431	5.51	0.010
80	11/23/91	8260735	7183 6067	PVC 9235	KRESS CAR	.	0.434	.	.
81	11/24/91	8260736	7183-6068	PVC 9220	KRESS CAR	.	0.436	.	.
82	11/24/91	8260737	7183 6069	PVC 9218	KRESS CAR	.	0.436	.	.
83	11/25/91	8260738	7183 6070	PVC 9223	KRESS CAR	1.52	0.303	5.03	0.010
84	11/25/91	8260739	7183-6071	PVC 9228	KRESS CAR	1.65	0.300	5.49	0.010
85	11/26/91	8260740	7183-6072	PVC 9204	KRESS CAR	0.63	0.228	2.75	0.010
86	12/12/91	8260741	7183-6075	PVC 8754	KRESS CAR	0.08	0.994	0.08	0.010

Section 3

Table of Benzene Soluble Organics Database.

BENZENE SOLUBLE ORGANICS CONCENTRATION

KIDC DEMONSTRATION PROJECT - BETHLEHEM STEEL CORPORATION

SPARROWS POINT, MARYLAND

OBS	DATE	AML NUMBER	AML NUMBER	SAMPLE ID NUMBER	SAMPLE LOCATION	SAMPLE WGT, MG	AIR VOL, M3	CONCENTRATION MG/M3	DETECTION LIMIT, MG
1	04/16/91	8226927	7180-2296	CO 2296	DOOR MACH	3.80	0.902	4.21	0.020
2	04/18/91	8226928	7180 1817	CO 1817	DOOR MACH	3.54	0.902	3.92	0.020
3	04/25/91	8226911	7180 2330	CO 1820	DOOR MACH	0.26	0.907	0.29	0.020
4	04/26/91	8226912	7180-2332	CO 1798	DOOR MACH	2.76	0.874	3.15	0.020
5	04/30/91	8227414	7180-2142	CO 1816	DOOR MACH	3.74	0.995	3.75	0.020
6	05/01/91	8227413	7180-2140	CO 1808	DOOR MACH	1.23	0.945	1.30	0.020
7	05/06/91	8228017	7180 2150	CO 1799	DOOR MACH	0.55	0.960	0.57	0.020
8	05/07/91	8228018	7180-2152	CO 1812	DOOR MACH	2.76	0.846	3.26	0.020
9	05/13/91	8228991	7180-2160	CO 1811	DOOR MACH	4.76	0.874	5.44	0.020
10	05/13/91	8228992	7180-2161	CO 1809	DOOR MACH	4.58	0.916	5.00	0.020
11	05/14/91	8228994	7180 2166	CO 1797	DOOR MACH	2.90	0.902	3.21	0.020
12	05/21/91	8230112	7180 2230	CO 1796	DOOR MACH	2.00	0.874	2.28	0.020
13	05/22/91	8230114	7180 2234	CO 1805	DOOR MACH	1.06	0.846	1.25	0.020
14	05/28/91	8230974	7180 2170	CO 2436	DOOR MACH	5.42	0.902	6.00	0.020
15	05/30/91	8230976	7180 2174	CO 2461	DOOR MACH	2.02	0.900	2.24	0.020
16	06/06/91	8232137	7180 2182	CO 2464	DOOR MACH	5.72	0.902	6.34	0.020
17	06/07/91	8232138	7180-2184	CO 2467	DOOR MACH	1.39	0.846	1.64	0.020
18	06/10/91	8232778	7180-2192	CO 2435	DOOR MACH	0.82	0.846	0.96	0.020
19	06/14/91	8232777	7180 2190	CO 2299	DOOR MACH	0.67	0.840	0.80	0.020
20	06/19/91	8233648	7181-2200	CO 2305	DOOR MACH	0.90	0.887	1.01	0.020
21	06/20/91	8233649	7181-2202	CO 2453	DOOR MACH	1.20	0.846	1.41	0.020
22	06/25/91	8234480	7180-2220	CO 2290	DOOR MACH	2.26	0.932	2.42	0.020
23	06/26/91	8234482	7180-2224	CO 2328	DOOR MACH	1.05	0.990	1.06	0.020
24	07/01/91	8234711		CO 2329	DOOR MACH	3.04	0.948	3.20	0.020
25	07/02/91	8234712		CO 2323	DOOR MACH	1.30	0.937	1.38	0.020
26	07/09/91	8236027	7180-2252	CO 2331	DOOR MACH	1.21	0.102	11.84	0.020
27	07/11/91	8236028	7180 2254	CO 2317	DOOR MACH	1.42	0.924	1.54	0.020
28	07/16/91	8236504	7180 2262	CO 2320	DOOR MACH	1.65	0.990	1.67	0.020
29	07/17/91	8236505	7180-2264	CO 2311	DOOR MACH	1.30	0.105	12.41	0.020
30	07/22/91	8237968	7180-2270	CO 2294	DOOR MACH	0.56	0.887	0.63	0.020
31	07/23/91	8237969	7180-2272	CO 2661	DOOR MACH	1.31	1.020	1.28	0.020
32	07/31/91	8238503	7180-2302	CO 2293	DOOR MACH	1.02	0.926	1.10	0.020
33	07/31/91	8238504	7180-2304	CO 2691	DOOR MACH	0.75	0.902	0.84	0.020
34	08/01/91	8238505	7180 2306	CO 2675	DOOR MACH	1.10	0.864	1.28	0.020
35	08/01/91	8238506	7180-2308	CO 2688	DOOR MACH	1.54	0.922	1.67	0.020
36	08/05/91	8239733	7180-2342	CO 27	DOOR MACH	0.91	0.774	1.18	0.020
37	08/06/91	8239734	7180 2344	CO 26	DOOR MACH	1.09	0.882	1.24	0.020
38	08/12/91	8241883	7180 2320	CO 10	DOOR MACH	0.38	0.869	0.45	0.020
39	08/13/91	8241884	7180-2322	CO 54	DOOR MACH	0.04	1.030	0.04	0.020
40	08/19/91	8242122	7180-2312	CO 43	DOOR MACH	0.94	0.764	1.23	0.020
41	08/22/91	8242123	7180-2314	CO 41	DOOR MACH	0.41	0.896	0.46	0.020
42	08/27/91	8244054	7180 2350	CO 2	DOOR MACH	0.30	0.785	0.38	0.020
43	08/30/91	8244055	7180-2352	CO 37	DOOR MACH	0.33	0.848	0.39	0.020
44	09/04/91	8247839	7180-2370	CO 78	DOOR MACH	0.16	0.828	0.20	0.020
45	09/05/91	8247840	7180 2372	CO 61	DOOR MACH	0.43	0.871	0.49	0.020
46	09/10/91	8245622	7180-2400	CO 66	DOOR MACH	0.73	0.851	0.86	0.020
47	09/11/91	8245623	7180-2402	CO 35	DOOR MACH	0.77	0.855	0.90	0.020
48	09/13/91	8245624	7180 2404	CO 40	QA/QC	0.92	0.831	1.11	0.020
49	09/18/91	8246590	7180 2380	CO 53	DOOR MACH	1.21	0.785	1.54	0.020
50	09/19/91	8246591	7180-2382	CO 24	DOOR MACH	0.03	0.844	0.04	0.020
51	09/25/91	8247986	7180 2390	CO 2313	DOOR MACH	0.09	0.752	0.12	0.020
52	09/26/91	8247987	7180 2392	CO 2325	DOOR MACH	1.13	0.860	1.31	0.020

BENZENE SOLUBLE ORGANICS CONCENTRATION
KIDC DEMONSTRATION PROJECT - BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

OBS	DATE	AMI NUMBER	AMI NUMBER	SAMPLE ID NUMBER	SAMPLE LOCATION	SAMPLE WGT. MG	AIR VOL. M3	CONCENTRATION MG/M3	DETECTION LIMIT, MG
53	10/01/91	8249360	7180-2410	CO 67	DOOR MACH	0.54	0.769	0.71	0.020
54	10/02/91	8249361	7180-2412	CO 31	DOOR MACH	0.21	0.764	0.28	0.020
55	10/08/91	8249846	7180-2420	CO 2674	DOOR MACH	1.53	0.802	1.91	0.020
56	10/09/91	8249847	7180-2422	CO 2678	DOOR MACH	0.58	0.860	0.68	0.020
57	10/15/91	8253498	7180-4890	CO 2369	DOOR MACH	2.40	0.785	3.06	0.020
58	10/16/91	8253499	7180-4892	CO 2370	DOOR MACH	2.83	0.794	3.56	0.020
59	10/20/91	8253488	7180-2880	CO 2359	KRESS CAR	0.00	0.184	0.00	0.020
60	10/24/91	8253489	7180-2882	CO 2372	KRESS CAR	0.19	0.282	0.68	0.020
61	10/25/91	8253494	7180-2870	CO 2377	DOOR MACH	1.65	0.781	2.12	0.020
62	10/28/91	8253484	7180-2850	CO 2358	DOOR MACH	0.22	0.456	0.49	0.020
63	10/29/91	8254636	7180-2841	CO 2348	KRESS CAR	0.10	0.215	0.45	0.020
64	10/29/91	8254630	7180-2840	CO 2349	KRESS CAR	0.11	0.232	0.47	0.020
65	10/29/91	8253504	7180-2860	CO 2363	DOOR MACH	3.66	0.902	4.06	0.020
66	10/30/91	8254631	7180-2842	CO 2347	KRESS CAR	0.19	0.299	0.64	0.020
67	10/31/91	8254632	7180-2844	CO 2355	KRESS CAR	0.15	0.261	0.57	0.020
68	11/04/91	8254628	7180-2830	CO 2351	DOOR MACH	2.19	0.819	2.67	0.020
69	11/05/91	8254629	7180-2832	CO 2356	DR MCH,NP	0.00	74.50	0.00	0.020
70	11/05/91	8254633	7180-2846	CO 2353	KRESS CAR	0.10	0.353	0.28	0.020
71	11/06/91	8255344	7180-2822	CO 2346	KRESS CAR	0.11	0.243	0.45	0.020
72	11/06/91	8255344	7180-2822	CO 2346	KRESS CAR	0.11	0.243	0.45	0.020
73	11/07/91	8255343	7180-2820	CO 106	KRESS CAR	0.10	0.403	0.25	0.020
74	11/12/91	8256487	7180-2810	CO 132	KRESS CAR	0.12	0.306	0.40	0.020
75	11/13/91	8256488	7180-2812	CO 127	KRESS CAR	0.04	0.145	0.26	0.020
76	11/14/91	8256489	7180-2814	CO 115	KRESS CAR	0.26	0.285	0.92	0.020
77	11/20/91	8260726	7183-6060	CO 134	KRESS CAR	0.11	0.411	0.27	0.020
78	11/26/91	8260727	7183-6073	CO 113	KRESS CAR	0.12	0.230	0.53	0.020
79	12/12/91	8260728	7183-6074	CO 90	KRESS CAR	0.00	0.994	0.00	0.020

Section 4

Table of Ambient Air Sample Database.

AREA MONITORING PROGRAM TEST RESULTS 11/12 BATTERY 15:41 Tuesday, March 31, 1992 1
AMBIENT AIR DATA BASE
KIDC DEMONSTRATION PROJECT - BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

OBS	DATE	AML NUMBER	AML NUMBER	SAMPLE ID NUMBER	SAMPLE LOCATION	SAMPLE WGT, MG	AIR VOL, M3	CONCENTRATION MG/M3	DETECTION LIMIT, MG
1	06/05/91	8232136	7180-2181	PVC 7533	BET CF&SY	0.09	0.930	0.09	0.010
2	07/23/91	8237975	7180-2277	PVC 8326	BET CP&SY	0.01	0.916	0.01	0.010
3	08/19/91	8242128	7180-2317	PVC 8324	AMBNT AIR	0.00	0.955	0.00	0.010
4	06/05/91	8232135	7180 2180	CO 2470	BET CF&SY	0.00	0.902	0 00	0.020
5	07/23/91	8237974	7180 2276	CO 2307	BET CF&SY	0.00	0.941	0.00	0.020
6	08/19/91	8242124	7180-2316	CO 36	AMB AIR	0.00	0.907	0.00	0.030

Section 5

Report of GC/MS Scan for Organics in Area of Conventional Pushing Operation from American Medical Laboratories, Inc.

AMERICAN MEDICAL LABORATORIES, INC.
P.O. Box 188 • 11091 Main Street
Fairfax, Virginia 22030-0188
Telephone: (703) 691-9120

INDUSTRIAL HYGIENE DEPARTMENT

 XXXXXXXXXX

RECEIVED : 11/01/91
RELEASED : 02/22/92
REPORTED : 02/23/92
WORK ORDER: 50368

7180 BETHLEHEM STEEL CORPORATION
CORPORATE HEALTH & SAFETY SERV
701 E. THIRD ST.,RM 163A SGO
BETHLEHEM , PA
18016

PROJECT NAME/JOB ID: 400-8691-652

AML NUMBER		VALUE	UNITS
8253481	5 MINUTE FILTER	MISCELLANEOUS	
3280	TDU MASS SPEC SCREEN		
	TUBE TYPE:	Carbotrap 300	
	DATE COLLECTED:	10/9/92	
	TIME COLLECTED:	Data not provided.	
	QUALITATIVE SCREEN:		
	COMPOUNDS IDENTIFIED	Probability of Match	
	NOTES:		
	Peak #1	Hexane	91 %
	Peak #2	Benzene	94 %
	Peak #3	2,2,3,3-Tetramethyl Butane	74 %
	Peak #4	Toluene	83 %
	ANALYST:	Jeffrey Martin	
8253482	10 MINUTE FILTER	MISCELLANEOUS	
3280	TDU MASS SPEC SCREEN		
	TUBE TYPE:	Carbotrap 300	
	DATE COLLECTED:	10/9/91	
	TIME COLLECTED:	Data not provided.	
	QUALITATIVE SCREEN:		
	COMPOUNDS IDENTIFIED	Probability of Match	
	NOTES:		
	Peak #1	Benzene	95 %
	Peak #2	Toluene	90 %
	Peak #3	Xylene	95 %
	Peak #4	Ethyl Benzene	76 %
	ANALYST:	Jeffrey Martin	
8253483	15 MINUTE FILTER	MISCELLANEOUS	
3280	TDU MASS SPEC SCREEN		
	TUBE TYPE:	Carbotrap 300	
	DATE COLLECTED:	10/9/91	
	TIME COLLECTED:	Data not provided.	
	QUALITATIVE SCREEN:		
	COMPOUNDS IDENTIFIED	Probability of Match	
	NOTES:		
	Peak #1	Methylene Chloride	90 %
	Peak #2	Hexane	78 %
	Peak #3	Benzene	94 %

CONTINUED ON NEXT PAGE

IRA D. GODWIN, M.D.
DIRECTOR OF LABORATORIES

AMERICAN MEDICAL LABORATORIES, INC.®
P.O. Box 188 • 11091 Main Street
Fairfax, Virginia 22030-0188
Telephone: (703) 691-9120

INDUSTRIAL HYGIENE DEPARTMENT

 XXXXXXXXXX

RECEIVED : 11/01/91
RELEASED : 02/22/92
REPORTED : 02/23/92
WORK ORDER: 50368

7180 BETHLEHEM STEEL CORPORATION
CORPORATE HEALTH & SAFETY SERV
701 E. THIRD ST.,RM 163A SGO
BETHLEHEM , PA
18016

PROJECT NAME/JOB ID: 400-8691-652

AML NUMBER----------VALUE-----UNITS----------

CONTINUED FROM PRIOR PAGE

ANALYST: Jeffrey Martin

NOTATIONS

Analysis includes a library search of the 5 largest peaks, (based on area counts), performed by a Probability Based Matching (PBM) system, which is a reverse search of the peak of interest against the NBS49K library.

Probability is a numerical degree of "match" between the unknown peak of interest and the reference spectra. Single peaks may have more than one match and are reported in % reliability of the match against the reference spectra. Further information on percent reliability may be found in "Interpetation of Mass Spectra", 3rd edition, F. W. McLafferty, ISBN0-935702-04-0.

Conformation of peaks are based on matching retention times and mass spectras of the peaks of interest and of reference standards.

*** FINAL REPORT ***

FRED I. GRUNDER
TECHNICAL DIRECTOR, IND. HYGIENE

FOR INDUSTRIAL HYGIENE RELATED QUESTIONS,
INCLUDING REQUESTS FOR SUPPLIES, CALL
1-800-348-1590

IRA D. GODWIN, M.D.
DIRECTOR OF LABORATORIES

Appendix E
Alliance Corporation Report on Quench Tower Emissions & Water Analysis

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1	Alliance Corporation Report on Quench Tower Emissions	E-2
2	Quench & Make-up Water Constituent Analysis Database	E-6
3	Quench & Make-up Water TCLP Reports	E-9

Section 1

Alliance Corporation Report on Quench Tower Emissions

ALLIANCE
Technologies Corporation

Date: 25 September 1991

To: C. Vogel, EPA-RTP

From: J. Jeffery, Alliance Technologies Corporation

Subject: Transmittal of Final Inspection Report-Sparrows Point

Attached please find the inspection report containing the emission estimate for Wet Coke Quench Tower No. 6 at the Bethlehem Steel Facility in Sparrows Point, Maryland.

As no long term total dissolved solids (TDS) data exists at this time, both an equation and a chart showing anticipated emission rates for various quench water TDS levels have been presented.

Should you have any questions please call me at (508) 970-5600.

Once again, thank you for the opportunity to be a part of this interesting tasks.

cc: G. Ossman, Bethlehem Steel
R. Fatzinger, Bethlehem Steel

kas0050jj

ALLIANCE
Technologies Corporation

To: C. Vogel-EPA/RTP

From: J. Jeffery-Alliance

Subject: Inspection Visit - Bethlehem Steel/Sparrows Point,
Wet Coke Quench Tower No. 6

Background

On Thursday, 29 August 1991, an inspection of the No. 6 Wet Coke Quench Tower was conducted to determine an estimate of particulate emissions.

Personnel

Bethlehem Steel

George Ossman - (215) 694-2060
Robert Fatzinger (215) 694-7658

Alliance

John Jeffery - (508) 970-5600

Process Description

The number six (6) or 11 & 12 Battary Quench Tower is a 100 ft. circular brick tower with an approximate inside diameter of 16.5 ft. The tower was constructed in 1953.

Quench water is supplied from a 20,000 gallon holding tank to a series of nozzles made up from the original set and those installed for use with the Chemico car system. Return water and make-up water enter via the return water trough. The sump has a breeze filter located at the spillway wall. The main portion of the sump is clammed on a daily basis. Water is pumped from this basin to the holding tank.

Approximately 8450 gallons is sprayed on each one-spot car load for about 47 seconds with the entire quenching process taking 2-3 minutes from the time the car enters the tower until it exits the tower.

In 1981, a baffle array was installed at the top of the tower. The design is of a "doghouse" or "tent" nature, with a pitched roof effect and is estimated to be 50-60% effective. The baffles cover 85-90% of the tower's exit and are made of reinforced fiberglass. Spacing

looks to between 4 and 6 inches and the baffles were constructed at a forty-five degree angle. This meets equipment standards as set fourth in several states now controlling quench tower emission (i.e., baffle design, location and TDS water quality).

Emission Estimation

Of the five (5) quench towers that have been tested in the last 15 years in Canada and the United States, the USX/Lorain Tower best matches the physical and draft characteristics of Tower No. 6. Both are tall (100 ft) circular brick constructions with exhaust velocities in the 25 to 35 fps range.

A series of tests were conducted in 1976 and 1977 using both "clean" (1000 mg/l of Total Dissolved Solids) and "contaminated" (10,000 mg/l TDS) water. From these tests, a relationship was discovered between TDS levels and particulate emissions.

The formula* presented below uses only the results from the USX Lorain Tower tests. It does not include those from USX/Gary (No. 3 & 5) and DOFASCO (North and No. 1) which do not match the No. 6 Tower in terms of physical and draft characteristics.

The formula is expressed as $E = 1.31 + 0.000144y$; were

E = Particulate emissions in lbs per ton of coal

Y = TDS (mg/l)

(It should be noted that TDS determinations need to be done at 103-105° and not at 180°C).

Without actual TDS data available a range of emission values have been calculated for 500, 800, 1,000, 1,200, and 1,5000 mg/l TDS levels and are presented as follows:

TDS (mg/l)	Emissions (lb/ton coal charged)
500	1.38
800	1.42
1000	1.45
1200	1.48
1500	1.53
2000	1.60

*Final Report, "Coke Quench Tower Paper" U.S. EPA Contract no. 68-01-6316, Task Assignment No. 43, Table 4, Case D, Pg 19.

kas0076jj

Section 2

Quench & Make-up Water Constituent Analysis Database

Bethlehem Steel Corporation
Sparrows Point Plant
Coke Oven Division
No. 11 & 12 Batteries

Quench Water Analyses

Date	CNt ppm	As ppm	Pb ppm	Hg ppm	Ca ppm	Hard ppm	TSS ppm	TDS ppm	SO4 ppm	Cl ppm	O&G ppm	NH3 ppm	Phenol ppm	Na ppm	Sulfide ppm	pH	Temp F
03 19 91	0.14	0.07	0.02	< .005	48	565	366	2560	249	1121	81	4	0.12	.	.	7.8	150
03 26 91	0.24	0.08	0.02	< .005	47	396	816	1330	176	463	11	2	0.21	.	.	8.5	183
04 09 91	0.12	0.05	<.20	< .005	101	318	420	1200	179	345	5	3	0.31	188	.	8.0	175
04 23 91	0.05	0.06	<.20	.	76	383	575	1644	180	470	33	1	0.18	293	12.0	8.2	180
04 29 91	0.03	0.03	<.20	<.005	42	129	393	687	85	99	10	2	0.15	80	20.0	7.9	162
05 15 91	0.08	0.07	<.20	< .005	80	387	426	1101	188	72	<5	1	0.09	167	14.0	8.0	197
05 21 91	0.08	0.05	<.20	< .005	69	323	381	1129	185	82	<5	1	0.19	194	12.0	7.1	198
05 28 91	0.07	0.06	<.20	<.005	62	280	975	762	184	212	5	2	0.24	92	10.4	8.1	186
07 25 91	0.12	0.07	<.20	< .005	62	269	560	793	172	189	20	1	0.66	124	1.6	8.1	198
08 01 91	0.08	0.08	<.20	<.005	59	280	393	758	337	182	6	1	0.28	130	0.8	8.2	193
08 13 91	0.04	0.06	<.20	< .005	64	220	698	644	137	139	10	<1	0.63	106	<2.0	8.1	190
08 29 91*	0.12	0.03	<.20	<.005	47	212	168	721	149	152	<5	1	0.25	106	5.6	7.7	142
09 10 91*	0.06	0.07	<.20	<.005	60	242	303	711	122	186	<5	2	0.39	127	3.9	8.3	146
09 26 91*	0.12	0.03	<.20	<.005	72	321	92	1104	167	196	7	2	0.29	260	<2.0	6.2	138
09 26 91	0.07	0.07	<.20	<.005	75	323	1403	1138	172	203	19	3	1.40	252	<4.0	.	
10 04 91*	0.12	0.03	<.20	<.005	61	343	161	1626	172	205	<5	1	0.36	364	<2.0	7.9	142
10 08 91*	0.05	0.03	<.20	<.005	60	301	254	1237	144	207	<5	4	0.32	261	<2.0	7.9	140
10 22 91*	<0.02	0.03	<.20	<.005	46	192	540	613	91	156	<5	3	0.75	114	<2.0	7.8	138
10 31 91*	0.27	0.05	<.20	< .005	70	250	190	904	149	196	<5	1	0.32	164	<2.0	8.1	191
11 26 91*	0.16	0.03	<.02	<.005	85	540	133	2676	263	1024	<5	<1	0.21	700	<2.0	8.3	126
11 26 91	0.07	0.04	<.02	<.005	87	554	1077	2826	273	1028	16	<1	1.20	730	3.4	8.4	176

* Added sampling point at quench water spray outlet on tower.

Bethlehem Steel Corporation
Sparrows Point Plant
Coke Oven Division
No. 11 & 12 Batteries

Quench Water Make-up Analyses

Date	CNt ppm	As ppm	Pb ppm	Hg ppm	Ca ppm	Hard ppm	TSS ppm	TDS ppm	SO4 ppm	Cl ppm	O&G ppm	NH3 ppm	Phenol ppm	Na ppm	Sulfide ppm	pH	Temp f
03 19 91	<0.10	< 02	0.03	<.005	24	387	28	1971	171	863	104	5	<.05		.	7 5	59
03 26 91	<0 10	<.02	0.02	< 005	25	256	28	1010	106	366	5	4	<.05		.	6.9	60
04 09 91	<0.02	<.02	<.20	<.005	52	218	12	980	93	339	124	4	<.02	184	.	6.7	70
04 23 91	<0.02	<.02	<.20		33	252	6	1192	97	324	<5	2	<.05	207	15.0	6.5	66
04 29 91	<0.20	< 02	<.20	<.005	31	200	6	571	65	88	16	2	<.05	69	1 6	6 3	70
05 15 91	<0.20	<.02	<.20	<.005	32	194	5	583	90	89	19	3	<.05	90	1.2	6 5	85
05 21 91	0.02	<.02	<.20	<.005	34	206	74	763	106	102	48	1	0.23	146	1.2	7.1	80
05 28 91	0.02	<.02	<.20	< 005	26	138	11	324	77	99	<5	2	<.05	62	2.6	7 0	86
07 25 91	<0.02	< 02	<.20	< 005	25	134	7	454	81	94	14	<1	<.05	72	0.8	6.2	84
08 01 91	<0 02	< 02	<.20	<.005	25	140	6	428	144	97	<5	2	<.05	83	11.2	6.8	87
08 13 91	<0 02	< 02	< 20	< 005	37	135	14	434	83	88	<5	<1	<.05	72	<2 0	6 4	86
08 29 91	0 09	< 02	<.20	<.005	24	129	8	434	76	92	<5	1	<.05	77	2.2	6.8	86
09 10 91	<0 02	< 02	< 20	<.005	20	121	12	404	67	88	<5	<1	< 05	66	3.7	6 1	83
09 26 91	<0 02	< 02	< 20	<.005	20	117	3	368	71	82	<5	1	<.05	66	<4.0	6 4	80
10 04 91	<0 02	< 02	< 20	<.005	39	313	<4	1720	153	203	<5	<1	<.05	430	<2.0	6.1	84
10 08 91	<0 02	< 02	<.20	<.005	35	255	<4	1121	100	206	<5	2	<.05	265	<2 0	6.6	76
10 22 91	0.03	< 02	<.20	<.005	34	224	<4	1047	116	206	<5	3	<.05	261	<2.0	6.3	76
10 22 91*	0.02	< 02	<.20	<.005	34	192	6	980	102	193	<5	2	< 05	182	<2.0	6 3	72
10 31 91	0.06	< 02	<.20	<.005	37	130	6	482	70	114	<5	2	<.05	85	24.6	6.7	72
10 31 91*	0.02	<.02	<.20	<.005	35	190	11	851	96	206	<5	1	< 05	191	3.0	6 8	71
11 26 91	0.11	<.02	<.20	<.005	28	210	8	925	107	306	<5	<1	<.05	212	<2.0	6.8	64
11 26 91*	0.13	<.02	<.20	<.005	29	245	10	1097	111	485	<5	<1	<.05	260	15.4	7.0	61

* - Sample taken at Kress Quench Station make-up line.

Section 3

Quench & Make-up Water TCLP Reports

BETHLEHEM STEEL CORPORATION

HOMER RESEARCH LABORATORIES

Analytical Chemistry Group

Bethlehem, PA 18016

Test Report

Client Dick Sewald
Environmental Contact

Address Homer Research Labs

Serial No. 1029

Material Sparrows Point Coke Oven Quench + Make-Up Waters

Receipt Date 9/27/91

Report Date 10/14/91

Reported By Linda Pollock

Title Research Analyst

Page 1 Of 8

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5. Mercury Analysis.....5

6. QC Requirements / Holding Times.....6

ess/dmf/tcreq/11 02 90

FIGURE 2 TCLP ANALYSIS REQUEST FORM- ANALYTICAL CHEMISTRY GROUP, RESEARCH

EPA PROTOCOL

Project Number: TPH-SD-91008 Date Submitted: 9/27/91 Date Reported: 10/14/91 MP

Requestor: RT Sewald Facility: SPARROWS POINT Phone No : 6519

Source and Description of Waste: SP PT Coke Ovens 11+12 Battery Quench + Makeup waters

Date Sampled: 9/26/91 Serial No.: 1029

Initial Request Reference:

Work Required (Circle determinations needed):

Metals: Ag As Ba Cd Cr Pb Ni Se Hg (all metals)

Semi-volatiles: 2,4-dinitrotoluene, hexachlorobenzene hexachlorobutadiene hexachlorothane
nitrobenzene pyridine 1,4-dichlorobenzene o-cresol
m-cresol p-cresol pentachlorophenol 2,4,5--trichlorophenol
2,4,6-trichlorophenol (all semi-volatiles)

Volatiles: benzene carbon tetrachloride chlorobenzene chloroform
1,2-dichloroethane 1,1-dichloroethane 1,1-dichloroethylene methyl ethyl ketone
tetrachloroethylene trichloroethylene vinyl chloride (all volatiles)

QC Samples(Required):

Lab. No.	Description
1029 TB	Trip Blank
1029 EB	Equipment Blank

Unknown Materials:

Lab. No.	Description(15 characters max.)
59264K	Quench Water
59274K	Make-up Water #1
59284K	Make-up Water #2

Lab use only:

Item	Units
Prep	39
TCLP	0
ZHS	0
ICP	78
Hg	42
SVol	66
Vol	66
Tot	291

Submitters supply information indicated by '____'.
Other spaces reserved for Laboratory Use.
This form must be submitted with samples.

Original file all studies file #1029 in Bldg C-182

E-12

m111v164

Analytical Chemistry Group
Homer Research Labs

TCLP METALS ANALYSIS REPORT
(EPA Protocol)

Date Leachate Submitted: 9/27/91 Date Analyzed: 10/7/91

Batch Serial Number: 1029 Analyst(s): S. Li

Requester/Facility: Sewald/Sparrows Pt Reported by: J. Y. Liu JYL

Sample Description: Coke Oven No.11&12 Batteries Quench water

Method: Determination of Heavy Metals in TCLP Leachates
By Inductively Coupled Plasma Spectrometry

SAMPLE No.	Ag (mg/l)	As (mg/l)	Ba (mg/l)	Cd (mg/l)	Cr (mg/l)	Ni (mg/l)	Pb (mg/l)	Se (mg/l)
5926	<.05	<.2	<.5	<.02	<.1	<.1	<.2	<.3
5927	<.05	<.2	<.5	<.02	<.1	<.1	<.2	<.3
5928	<.05	<.2	<.5	<.02	<.1	<.1	<.2	<.3

(2)

VOL1029

ANALYTICAL CHEMISTRY GROUP
HRL

TCLP VOLATILE ORGANICS ANALYSIS REPORT
(EPA PROTOCOL)

BATCH SERIAL NUMBER: 1029
REQUESTOR/FACILITY: Dick Sewald / Sparrows Point
SAMPLE DESCRIPTION: Coke Oven Nos 11 & 12 Batteries - Quench Quench Water And Quench Water Makeup

DATE SAMPLES SUBMITTED : 9/27/91
DATE OF ANALYSIS: 9/30/91
DATE REPORTED: 10-14-91
ANALYST(S): LMPollock

COMPOUND (CONC. IN PPB)	RCRA LIMIT (PPB)	SAMPLE NO. #5926 LK	#5927 LK	#5928 LK
BENZENE	500	<5.00	<5.00	<5.00
CARBON TETRACHLORIDE	500	<5.00	<5.00	<5.00
CHLOROFORM	6,000	<5.00	18.8	20.4
CHLOROBENZENE	100,000	<5.00	<5.00	<5.00
1,2-DICHLOROETHANE	500	<5.00	<5.00	<5.00
1,1-DICHLOROETHYLENE	700	<5.00	<5.00	<5.00
2 BUTANONE	200,000	<100.0	<100.0	<100.0
VINYL CHLORIDE	200	<10.00	<10.00	<10.00
TETRACHLOROETHYLENE	700	<5.00	<5.00	<5.00
TRICHLOROETHYLENE	500	<5.00	<5.00	<5.00

SV1029

ANALYTICAL CHEMISTRY GROUP
HRL

TCLP SEMIVOLATILE ORGANICS ANALYSIS REPORT
(EPA PROTOCOL)

BATCH SERIAL NUMBER: 1029
REQUESTOR/FACILITY: Dick Sawald / Sparrows Point
SAMPLE DESCRIPTION: Coke Oven Nos 11 and 12 Batteries - Quench Water and Quench Water Makeup

DATE SAMPLES SUBMITTED : 9/27/91
DATE(S) LIQUID-LIQUID EXTRACTION: 10/1,2
DATE(S) OF ANALYSIS: 10/08/91
DATE REPORTED: 10-14-91
ANALYST(S): LMP

COMPOUND (CONC. IN PPB)	RCRA LIMIT (PPB)	SAMPLE NO. #5926 LK	#5927 LK	#5928 LK
1,4-DICHLOROBENZENE	7,500	<10.00	<10.00	<10.00
2-METHYLPHENOL (O CRESOL)	200,000	45.9	<10.00	<10.00
3&4-METHYLPHENOL (M&P-CRESOL)	200,000	58.9	<10.00	<10.00
HEXACHLOROETHANE	3,000	<10.00	<10.00	<10.00
NITROBENZENE	2,000	<10.00	<10.00	<10.00
HEXACHLOROBUTADIENE	500	<10.00	<10.00	<10.00
2,4,6 TRICHLOROPHENOL	2,000	<10.00	<10.00	<10.00
2,4,5-TRICHLOROPHENOL	400,000	<10.00	<10.00	<10.00
2,4-DINITROTOLUENE	130	<10.00	<10.00	<10.00
HEXACHLOROBENZENE	130	<10.00	<10.00	<10.00
PENTACHLOROPHENOL	100,000	<50.00	<50.00	<50.00
PYRIDINE	5,000	<10.00	<10.00	<10.00

jyl/tclphg
10/07/91
163v102

Analytical Chemistry Group
Homer Research Labs

TCLP MERCURY ANALYSIS REPORT
(EPA Protocol)

Date Leachate Submitted: 9/27/91 Date Analyzed: 10/4/91

Batch Serial Number: 1029 Analyst: S. Li

Requester/Plant: Sewald/Sparrows Pt Reported by: J. Y. Liu

Sample Description: Coke Oven No 11&12 Batteries Quench Water

Method: Determination of Mercury in TCLP Leachates by Cold-Vapor Atomic Absorption Spectroscopy

Sample No.	Hg (ug/l)
59261k	< 5
59271k	< 5
59281k	< 5

E-16

EPA1029

QC REQUIREMENTS / HOLDING TIMES

BATCH SERIAL NO.: 1029

SAMPLE NOS.: 5926 - 5928 Lk

SAMPLE DESCRIPTION: Coke Oven Nos. 11 & 12 Quench Water and Quench Water Makeup

SAMPLING DATE: 9/26/91

ANALYSES REQUESTED: Complete TCLP: Metals, Semivolatiles, Volatiles

ORIGINAL FILES STORED IN C-182 UNDER FILE NO: 1029

SAMPLES ANALYZED IN ACCORDANCE WITH ALL EPA PROTOCOLS AS OUTLINED IN SW-846 AND INTERPRETED BY THE ANALYTICAL CHEMISTRY GROUP. ALL EPA MANDATED QA/QC REQUIREMENTS WERE MET WITH THE EXCEPTION OF THOSE LISTED BELOW. KEY DATES ARE LISTED BELOW TO VERIFY HOLDING TIMES. ALL ADDITIONAL QC DATA IS AVAILABLE UPON REQUEST.

	METALS	SEMIVOLATILES	VOLATILES	Hg
DATE OF SAMPLE RECEIPT	9-27-91	9-27-91	9-27-91	9-27-91
DATE OF TCLP EXTRACTION	NA	NA	NA	NA
DATE OF ZHE EXTRACTION	NA	NA	NA	NA
DATE OF LIQUID/LIQUID EXTRACTION	NA	10/1,2	NA	NA
DATE OF ANALYSIS	10-07-91	10-08-91	9-30-91	10-04-91
ANALYST	SL	LMP	LMP	SL

COMMENTS/EXCEPTIONS: _____

BETHLEHEM STEEL CORPORATION

HOMER RESEARCH LABORATORIES



Analytical Chemistry Group

Bethlehem, PA 18016

Test Report

Client Dick Sewald/SPARROWS POINT

Address HRL

Serial No. 1023

Material Quench Water + Make-Up Water
#11 + #12 Batteries

Receipt Date 9/11/91

Report Date 9/24/91

Reported By Linda Allick

Title Research Analyst

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6. QC Requirements / Holding Times.....6

ess/dmf/tcreq/11-02-90

FIGURE 2. TCLP ANALYSIS REQUEST FORM--ANALYTICAL CHEMISTRY GROUP, RESEARCH EPA PROTOCOL

Project Number: TPH-80-91008 Date Submitted: 9/11/91 Date Reported: 9/24/91

Requestor Dick Seawell Facility: Gunnison Point #11+12 Batteries Phone No.: 6519

Source and Description of Waste: Quench Water and Make-up Water #11+12 Batteries

Date Sampled: 9/10/91 Serial No.: 1023

Initial Request Reference: .....

Work Required (Circle determinations needed):

Metals:	Ag	As	Ba	Cd	Cr	Pb	Ni	Se	Hg	(all metals)

Semi-volatiles:	2,4-dinitrotoluene,	hexachlorobenzene	hexachlorobutadiene	hexachloroethane
	nitrobenzene	pyridine	1,4-dichlorobenzene	o-cresol
	m-cresol	p-cresol	pentachlorophenol	2,4,5--trichlorophenol
	2,4,6-trichlorophenol	(all semi-volatiles)		
Volatiles:	benzene	carbon tetrachloride	chlorobenzene	chloroform
	1,2-dichloroethane	1,1-dichloroethane	1,1-dichloroethylene	methyl ethyl ketone
	tetrachloroethylene	trichloroethylene	vinyl chloride	(all volatiles)

QC Samples(Required):

Lab. No.	Description
1023TB	Trip Blank
1023EB	Equipment Blank

Unknown Materials:

Lab. No.	Description(15 characters max.)
5887LK	Quench Water - 11+12 Batteries
5888LK	Make-up Water #1
5889LK	Make-up Water #2

Lab use only:

Item	Units
Prep	39
TCLP	0
ZHS	0
ICP	78
Hg	Y2
SVol	66
Vol	66
Tot	9
	(291)

Submitters supply information indicated by '___'.
Other spaces reserved for Laboratory Use.
This form must be submitted with samples.

Results filed in Bldg C-3 Room 182
file NO. 1023

E-20

mlllv164

Analytical Chemistry Group
Homer Research Labs

TCLP METALS ANALYSIS REPORT
(EPA Protocol)

Date Leachate Submitted: 9/11/91 Date Analyzed: 9/19/91

Batch Serial Number: 1023 Analyst(s): S. Li

Requester/Facility: D Sewald/Sparrows Pt Reported by: J. Y. Liu

Sample Description: Coke Oven No.11&12 Batteries Quench water

Method: Determination of Heavy Metals in TCLP Leachates
By Inductively Coupled Plasma Spectrometry

SAMPLE No.	Ag (mg/l)	As (mg/l)	Ba (mg/l)	Cd (mg/l)	Cr (mg/l)	Ni (mg/l)	Pb (mg/l)	Se (mg/l)
5887	<.05	<.2	<.5	<.02	<.1	<.1	<.2	<.3
5888	<.05	<.2	<.5	<.02	<.1	<.1	<.2	<.3
5889	<.05	<.2	<.5	<.02	<.1	<.1	<.2	<.3

VOI 1023

ANALYTICAL CHEMISTRY GROUP
HRL

TCLP VOLATILE ORGANICS ANALYSIS REPORT
(EPA PROTOCOL)

BATCH SERIAL NUMBER: 1023
REQUESTOR/FACILITY: Dick Sewald / Sparrows Point
SAMPLE DESCRIPTION: Coke Oven Nos 11 & 12 Batteries - Quench Quench Water And Quench Water Makeup

DATE SAMPLES SUBMITTED : 9/11/91
DATE OF ANALYSIS: 9/18/91
DATE REPORTED: 9/24/91
ANALYST(S): LMPollock

COMPOUND (CONC. IN PPB)	RCRA LIMIT (PPB)	SAMPLE NO. #5887 LK	#5888 LK	#5889 LK
BENZENE	500	<5.00	<5.00	<5.00
CARBON TETRACHLORIDE	500	<5.00	<5.00	<5.00
CHLOROFORM	6,000	<5.00	27.5	30.5
CHLOROBENZENE	100,000	<5.00	<5.00	<5.00
1,2-DICHLOROETHANE	500	<5.00	<5.00	<5.00
1,1-DICHLOROETHYLENE	700	<5.00	<5.00	<5.00
2-BUTANONE	200,000	<100.0	<100.0	<100.0
VINYL CHLORIDE	200	<10.00	<10.00	<10.00
TETRACHLOROETHYLENE	700	<5.00	<5.00	<5.00
TRICHLOROETHYLENE	500	<5.00	<5.00	<5.00

(3)

SV1023

ANALYTICAL CHEMISTRY GROUP
HRL

TCLP SEMIVOLATILE ORGANICS ANALYSIS REPORT
(EPA PROTOCOL)

BATCH SERIAL NUMBER: 1023
REQUESTOR/FACILITY: Dick Sewald / Sparrows Point
SAMPLE DESCRIPTION: Coke Oven Nos 11 and 12 Batteries - Quench Water and Quench Water Makeup

DATE SAMPLES SUBMITTED : 9/11/91
DATE(S) LIQUID-LIQUID EXTRACTION: 9/11,12
DATE(S) OF ANALYSIS: 9/16/91
DATE REPORTED: 9/24/91
ANALYST(S): LMP

COMPOUND (CONC. IN PPB)	RCRA LIMIT (PPB)	SAMPLE NO. #5887 LK	#5888 LK	#5889 LK
1,4 DICHLOROBENZENE	7,500	<10.00	<10.00	<10.00
2-METHYLPHENOL (O-CRESOL)	200,000	88.3	<10.00	<10.00
3&4 METHYLPHENOL (M&P-CRESOL)	200,000	170	<10.00	<10.00
HEXACHLOROETHANE	3,000	<10.00	<10.00	<10.00
NITROBENZENE	2,000	<10.00	<10.00	<10.00
HEXACHLOROBUTADIENE	500	<10.00	<10.00	<10.00
2,4,6-TRICHLOROPHENOL	2,000	<10.00	<10.00	<10.00
2,4,5 TRICHLOROPHENOL	400,000	<10.00	<10.00	<10.00
2,4-DINITROTOLUENE	130	<10.00	<10.00	<10.00
HEXACHLOROBENZENE	130	<10.00	<10.00	<10.00
PENTACHLOROPHENOL	100,000	<50.00	<50.00	<50.00
PYRIDINE	5,000	<10.00	<10.00	<10.00

jyl/tclphg
09/23/91
163v102

Analytical Chemistry Group
Homer Research Labs

TCLP MERCURY ANALYSIS REPORT
(EPA Protocol)

Date Leachate Submitted: 9/11/91 Date Analyzed: 9/19/91

Batch Serial Number: 1023 Analyst: S. Li

Requester/Plant: D Sewald/Sparrows Pt Reported by: J. Y. Liu

Sample Description: Coke Oven No 11&12 Batteries Quench Water

Method: Determination of Mercury in TCLP Leachates by Cold-Vapor Atomic Absorption Spectroscopy

Sample No.	Hg (ug/l)
58871k	< 5
58881k	< 5
58891k	< 5

EPAREP997
09/24/91

QC REQUIREMENTS / HOLDING TIMES

BATCH SERIAL NO.: 1023

SAMPLE NOS.: 5887 - 5889 Lk

SAMPLE DESCRIPTION: Coke Oven Nos. 11 & 12 Quench Water and Quench Water Makeup

SAMPLING DATE: 9/10/91

ANALYSES REQUESTED: Complete TCLP: Metals, Semivolatiles, Volatiles

ORIGINAL FILES STORED IN C-182 UNDER FILE NO: 1023

SAMPLES ANALYZED IN ACCORDANCE WITH ALL EPA PROTOCOLS AS OUTLINED IN SW-846 AND INTERPRETED BY THE ANALYTICAL CHEMISTRY GROUP. ALL EPA MANDATED QA/QC REQUIREMENTS WERE MET WITH THE EXCEPTION OF THOSE LISTED BELOW. KEY DATES ARE LISTED BELOW TO VERIFY HOLDING TIMES. ALL ADDITIONAL QC DATA IS AVAILABLE UPON REQUEST.

	METALS	SEMIVOLATILES	VOLATILES	Hg
DATE OF SAMPLE RECEIPT	9-11-91	9-11-91	9-11-91	9-11-91
DATE OF TCLP EXTRACTION	NA	NA	NA	NA
DATE OF ZHE EXTRACTION	NA	NA	NA	NA
DATE OF LIQUID/LIQUID EXTRACTION	NA	9-11,12	NA	NA
DATE OF ANALYSIS	9-19-91	9-16-91	9-18-91	9-19-91
ANALYST	SL	LMP	LMP	SL

COMMENTS/EXCEPTIONS: _____

BETHLEHEM STEEL CORPORATION

HOMER RESEARCH LABORATORIES



Analytical Chemistry Group

Bethlehem, PA 18016

Test Report

Client George Ossman HRL

Address Environmental Control

Serial No. 997 Coke Oven Nos. 11+12

Material Batteries - Quench Water and Quench Water Makeup

Receipt Date 7/11/91, 8/14/91

Report Date 8/16/91

Reported By Linda Pelock

Title Research Analyst

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ess/dmf/tcreq/11-02-90

FIGURE 2. TCLP ANALYSIS REQUEST FORM ANALYTICAL CHEMISTRY GROUP, RESEARCH EPA PROTOCOL

Project Number: TPH-SD-91008 Date Submitted: 7/11/91 Date Reported: 8/16/91

Requestor: George Ossman Facility: Sparrows Pt. Phone No.: x2060

Source and Description of Waste: Coke Oven Nos 11 & 12 Batteries Quench Water & Quench Water makeup

Date Sampled: 7/10/91 Serial No.: 997

Initial Request Reference:

Work Required (Circle determinations needed):

Metals: Ag As Ba Cd Cr Pb Ni Se Hg (all metals)

Semi-volatiles: 2,4-dinitrotoluene, hexachlorobenzene hexachlorobutadiene hexachloroethane
nitrobenzene pyridine 1,4-dichlorobenzene o-cresol
m-cresol p-cresol pentachlorophenol 2,4,5--trichlorophenol
2,4,6-trichlorophenol (all semi-volatiles)

Volatiles: benzene carbon tetrachloride chlorobenzene chloroform
1,2-dichloroethane 1,1-dichloroethane 1,1-dichloroethylene methyl ethyl ketone
tetrachloroethylene trichlorethylene vinyl chloride (all volatiles)

QC Samples(Required):

Lab. No	Description
997 TB	Trip Blank
997 EB	Equipment Blank

Unknown Materials:

Lab. No.	Description(15 characters max.)
57234K	SP PT Coke Ovens #11 + #12 Quench WATER MAKEUP-1
57235K	SP PT Coke Oven #11 + #12 Quench Water
57236K	SP PT Coke Oven #11 - #12 Quench Water Make-UP - 2

Lab use only:

Item	Units
Prep	39
TCLP	0
ZHS	0
ICP	78
Hg	52
SVol	26
Vol	68
Tot	291

Submitters supply information indicated by '___'.
Other spaces reserved for Laboratory Use.
This form must be submitted with samples.

Results in Laboratory File 997
and Laboratory Notebook #129

E-28

m111v164

Analytical Chemistry Group
Homer Research Labs

TCLP METALS ANALYSIS REPORT
(EPA Protocol)

Date Leachate Submitted: 7/11/91 Date Analyzed: 8/12/91

Batch Serial Number: 897 Analyst(s): S. Li

Requester/Facility: Ossman/Sparrows Pt Reported by: J. Y. Liu

Sample Description: Coke Oven No.11&12 Batteries Quench water

Method: Determination of Heavy Metals in TCLP Leachates
By Inductively Coupled Plasma Spectrometry

SAMPLE No.	Ag (mg/l)	As (mg/l)	Ba (mg/l)	Cd (mg/l)	Cr (mg/l)	Ni (mg/l)	Pb (mg/l)	Se (mg/l)
5724	<.05	<.2	<.5	<.02	<.1	<.1	<.2	<.3
5725	<.05	<.2	<.5	<.02	<.1	<.1	<.2	<.3
5726	<.05	<.2	<.5	<.02	<.1	<.1	<.2	<.3

VOL997

ANALYTICAL CHEMISTRY GROUP
HRL

TCLP VOLATILE ORGANICS ANALYSIS REPORT
(EPA PROTOCOL)

BATCH SERIAL NUMBER: 997
REQUESTOR/FACILITY: George Ossman / Sparrows Point
SAMPLE DESCRIPTION: Coke Oven Nos 11 & 12 Batteries - Quench Quench Water And Quench Water Makeup

DATE SAMPLES SUBMITTED : 8/14/91
DATE OF ANALYSIS: 8/15/91
DATE REPORTED: 8/16/91
ANALYST(S): LMPollock

COMPOUND (CONC. IN PPB)	RCRA LIMIT (PPB)	SAMPLE NO. #5724 LK	#5725 LK	#5726 LK
BENZENE	500	<5.00	<5.00	<5.00
CARBON TETRACHLORIDE	500	<5.00	<5.00	<5.00
CHLOROFORM	6,000	19.2	<5.00	23.9
CHLOROBENZENE	100,000	<5.00	<5.00	<5.00
1,2-DICHLOROETHANE	500	<5.00	<5.00	<5.00
1,1-DICHLOROETHYLENE	700	<5.00	<5.00	<5.00
2-BUTANONE	200,000	<100.0	<100.0	<100.0
VINYL CHLORIDE	200	<5.00	<5.00	<5.00
TETRACHLOROETHYLENE	700	<5.00	<5.00	<5.00
TRICHLOROETHYLENE	500	<5.00	<5.00	<5.00

SV997

ANALYTICAL CHEMISTRY GROUP
HRL

TCLP SEMIVOLATILE ORGANICS ANALYSIS REPORT
(EPA PROTOCOL)

BATCH SERIAL NUMBER: 997
REQUESTOR/FACILITY: George Ossman / Sparrows Point
SAMPLE DESCRIPTION: Coke Oven Nos 11 and 12 Batteries - Quench Water and Quench Water Makeup

DATE SAMPLES SUBMITTED : 7/11/91
DATE(S) LIQUID-LIQUID EXTRACTION: 7/15,16,17
DATE(S) OF ANALYSIS: 8/05/91
DATE REPORTED: 8/16/91
ANALYST(S): LMP

COMPOUND (CONC. IN PPB)	RCRA LIMIT (PPB)	SAMPLE NO. #5724 LK	#5725 LK	#5726 LK
1,4-DICHLOROBENZENE	7,500	<10.00	<10.00	<10.00
2-METHYLPHENOL (O-CRESOL)	200,000	<10.00	24.8	<10.00
3&4-METHYLPHENOL (M&P-CRESOL)	200,000	<10.00	50.2	<10.00
HEXACHLOROETHANE	3,000	<10.00	<10.00	<10.00
NITROBENZENE	2,000	<10.00	<10.00	<10.00
HEXACHLOROBUTADIENE	500	<10.00	<10.00	<10.00
2,4,6-TRICHLOROPHENOL	2,000	<10.00	<10.00	<10.00
2,4,5-TRICHLOROPHENOL	400,000	<10.00	<10.00	<10.00
2,4 DINITROTOLUENE	130	<10.00	<10.00	<10.00
HEXACHLOROBENZENE	130	<10.00	<10.00	<10.00
PENTACHLOROPHENOL	100,000	<50.00	<50.00	<50.00
PYRIDINE	5,000	<10.00	<10.00	<10.00

jyl/tclphg
08/14/91
163v102

Analytical Chemistry Group
Homer Research Labs

TCLP MERCURY ANALYSIS REPORT
(EPA Protocol)

Date Leachate Submitted: 7/11/91 Date Analyzed: 7/30/91

Batch Serial Number: 997 Analyst: S. Li

Requester/Plant: Oseman/Sparrows Pt Reported by: J. Y. Liu

Sample Description: Coke Oven No 11&12 Batteries Quench Water

Method: Determination of Mercury in TCLP leachates by Cold-Vapor Atomic Absorption Spectroscopy

Sample No.	Hg (ug/l)
57241k	< 5
57251k	< 5
57261k	< 5

EPAREP997
08/16/91

QC REQUIREMENTS / HOLDING TIMES

BATCH SERIAL NO.: 997

SAMPLE NOS.: 5724 - 5726 Lk

SAMPLE DESCRIPTION: Coke Oven Nos. 11 & 12 Quench Water and Quench Water Makeup

SAMPLING DATE: 7/10/91, 8/13/91

ANALYSES REQUESTED: Complete TCLP: Metals, Semivolatiles, Volatiles

ORIGINAL FILES STORED IN C-182 UNDER FILE NO: 997 AND NOTEBOOK 129

SAMPLES ANALYZED IN ACCORDANCE WITH ALL EPA PROTOCOLS AS OUTLINED IN SW-846 AND INTERPRETED BY THE ANALYTICAL CHEMISTRY GROUP. ALL EPA MANDATED QA/QC REQUIREMENTS WERE MET WITH THE EXCEPTION OF THOSE LISTED BELOW. KEY DATES ARE LISTED BELOW TO VERIFY HOLDING TIMES. ALL ADDITIONAL QC DATA IS AVAILABLE UPON REQUEST.

	METALS	SEMIVOLATILES	VOLATILES	Hg
DATE OF SAMPLE RECEIPT	7-11-91	7-11-91	8-14-91	7-11-91
DATE OF TCLP EXTRACTION	NA	NA	NA	NA
DATE OF ZHE EXTRACTION	NA	NA	NA	NA
DATE OF LIQUID/LIQUID EXTRACTION	NA	7-15, 16, 17	NA	NA
DATE OF ANALYSIS	8-12-91	8-05-91	8-15-91	7-30-91
ANALYST	SL	LMP	LMP	SL

COMMENTS/EXCEPTIONS: Resampling on 8/13/91 due to exceeded holding time for volatile organic analysis. Poor spike recovery for Pb + Barium due to precipitation of these metals in the sample matrix.

APPENDIX F

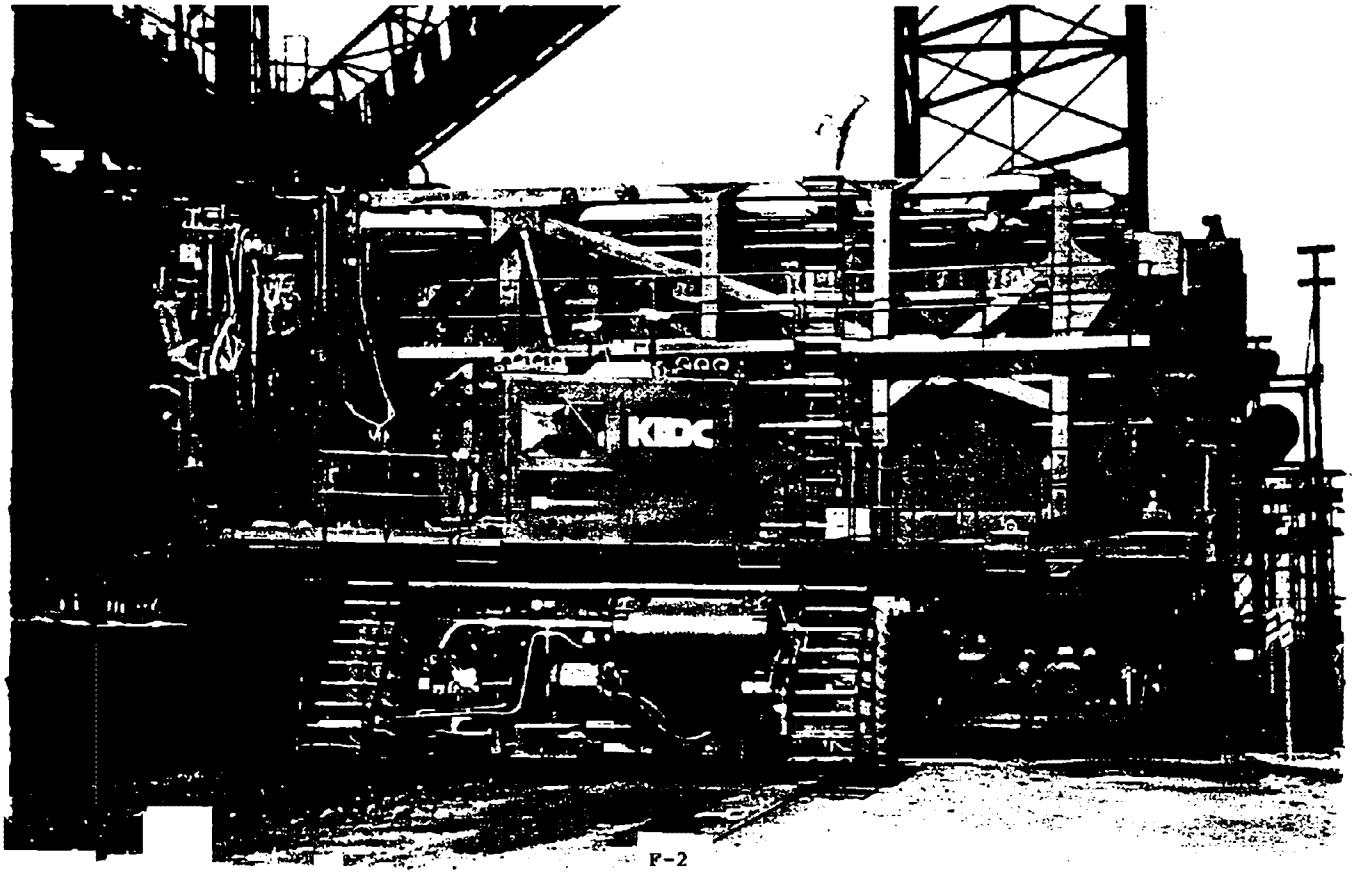
Kress Bulletin* and Photographs of the KIDC Operation

*Reproduced with permission of Kress Corporation, P. O. Box 368, Brimfield, IL 61517.

KIDC® system in testing at Bethlehem Steel

Kress Corporation's innovative KIDC (Kress Indirect Dry Cooling) coke handling system is now in testing at one of America's leading steel plants, the Bethlehem Steel Corp. location at Sparrows Point, MD. The KIDC system controls pushing and quenching emissions, and is expected to improve coke quality and yield. The system plans include door extracting and cleaning as well as jamb cleaning. This then eliminates the need for traditional coke side operations, including conventional door machines, coke guides, quench cars, quench towers, breeze ponds and wharfs. Also replaced will be hoods, sheds and conventional dry quench systems, plus conventional door and jamb cleaning systems.

(continued)



Other KIDC Advantages

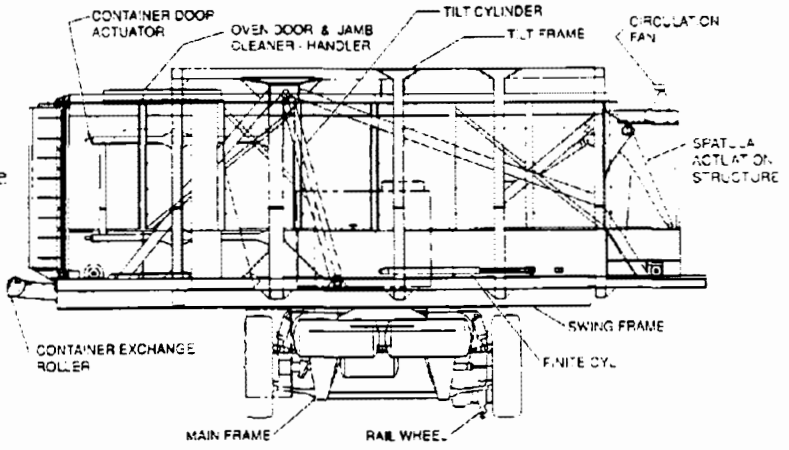
In addition to all the advantages gained through elimination of pushing emissions and conventional coke side operations, it is anticipated that the KIDC will improve coke yield for a variety of reasons: the coke cake maintains its in-oven form as it enters the box, so it stays intact as it cools. The coke is cooled slowly, does not burn, and is not shocked by the common water quenching. Laboratory tests have shown that KIDC-cooling improves coke quality.

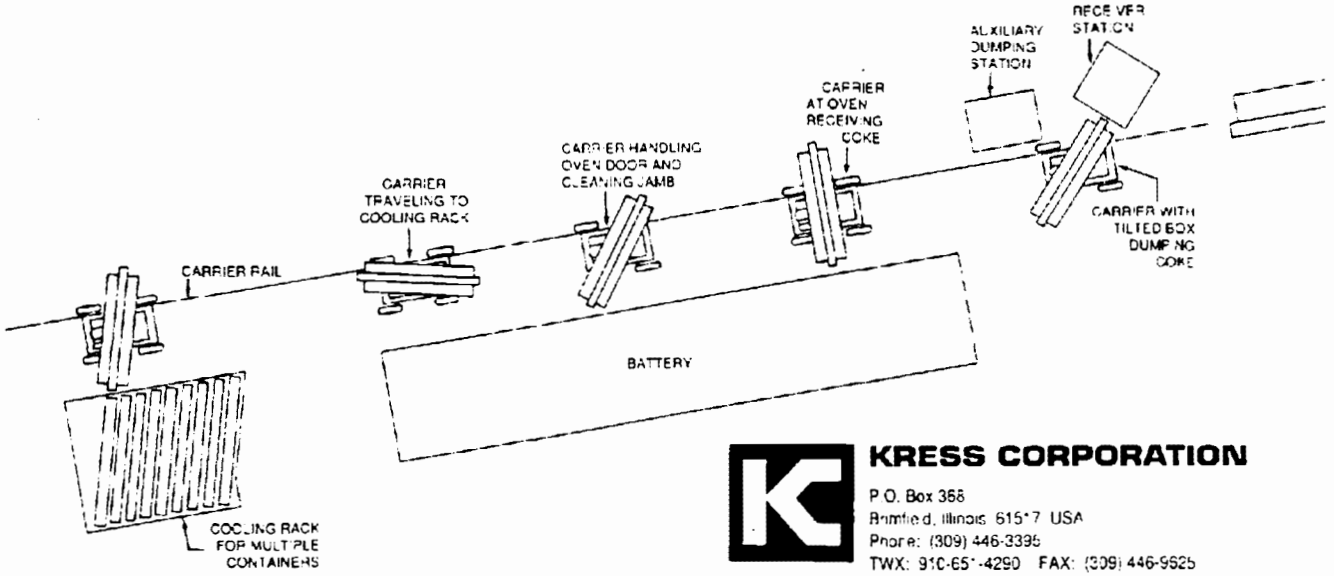
KIDC components and operation

The KIDC system includes a vehicle, a series of boxes (a single box will serve approximately six ovens), a cooling rack with space for each box, and a receiving station. During the push, the box is sealed at the jamb, and when the push is completed, a guillotine door closes and the box is automatically sealed. Water flows over the box at all times except when at the receiver station. Oven door leakage is expected to be reduced, since the door and jamb will be cleaned with the latest technology during each push. Door replacement is accomplished with an alignment system designed for accuracy and reliability. Following the push, the KIDC vehicle transports the box to a cooling rack. An adjacent cooled box is then loaded onto the carrier and transferred to the receiving station, where the cooled coke is deposited into a hopper that is designed for environmental soundness, and onto the conveyor system. The coke is then transported to the blast furnace. KIDC cycle time is designed to be approximately 8 1/2 minutes and the entire cycle is planned with no operator involvement required, eliminating human error.

For more information

Find out how the KIDC system can work for your operation. For more information and details on current operations, contact us today.





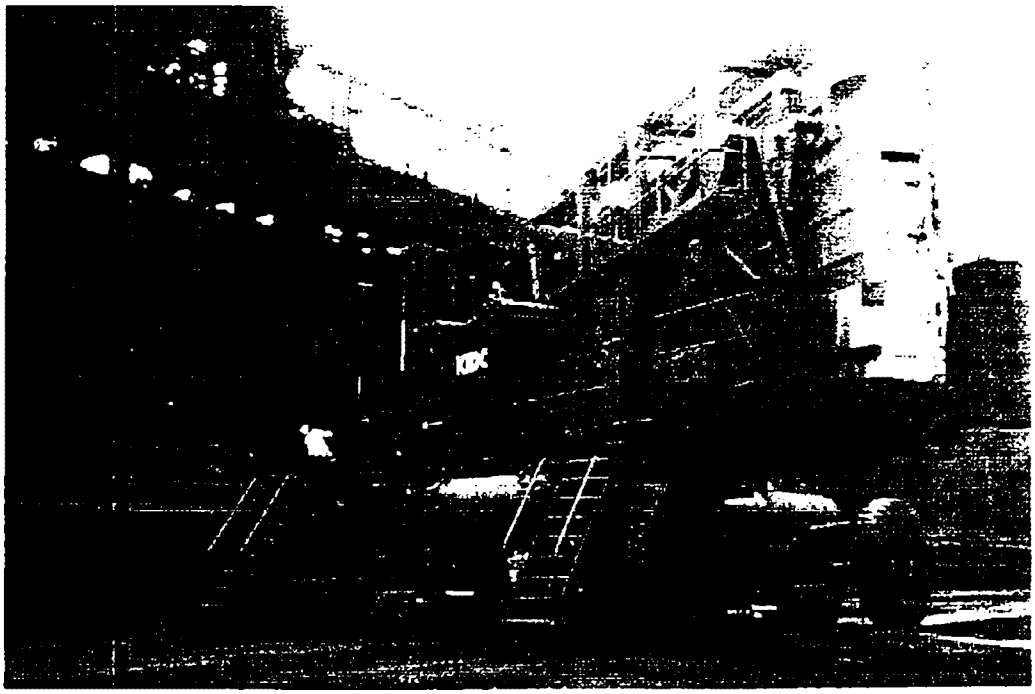
KRESS CORPORATION

P.O. Box 368
Bramfield, Illinois 61517 USA
Phone: (309) 446-3395
TWX: 910-651-4290 FAX: (309) 446-9625

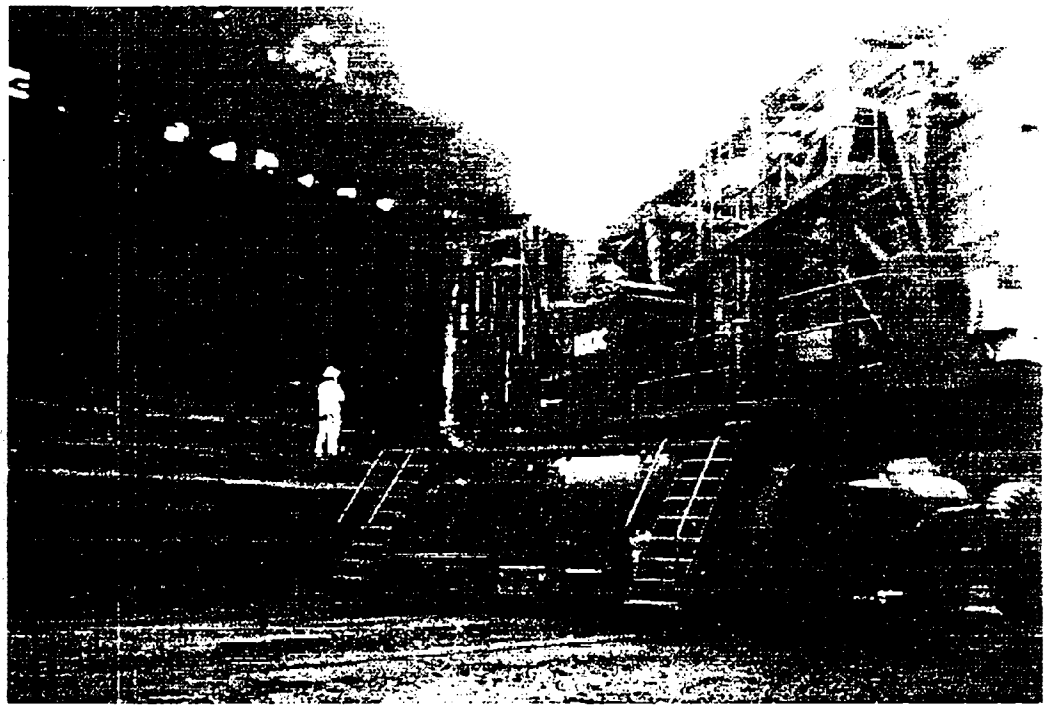
Avenue de la Tancre 2
1160 Brussels, Belgium
Phone: (02) 674-5213 FAX: (02) 674-5207

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KRESS CORPORATION
1988
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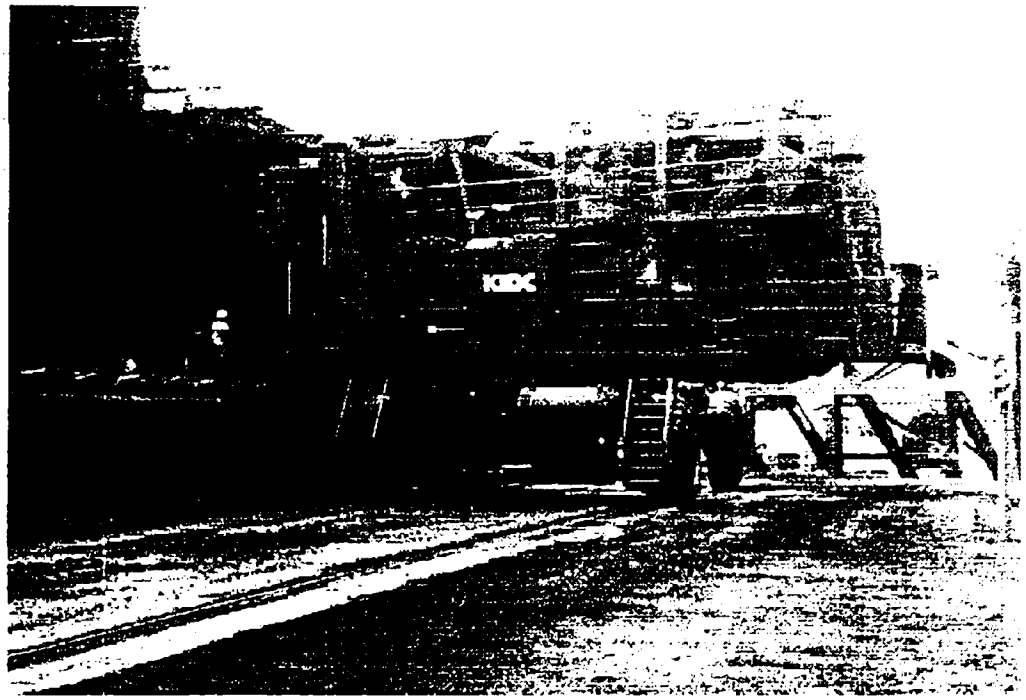
KRESS and [K] are Trademarks of Kress



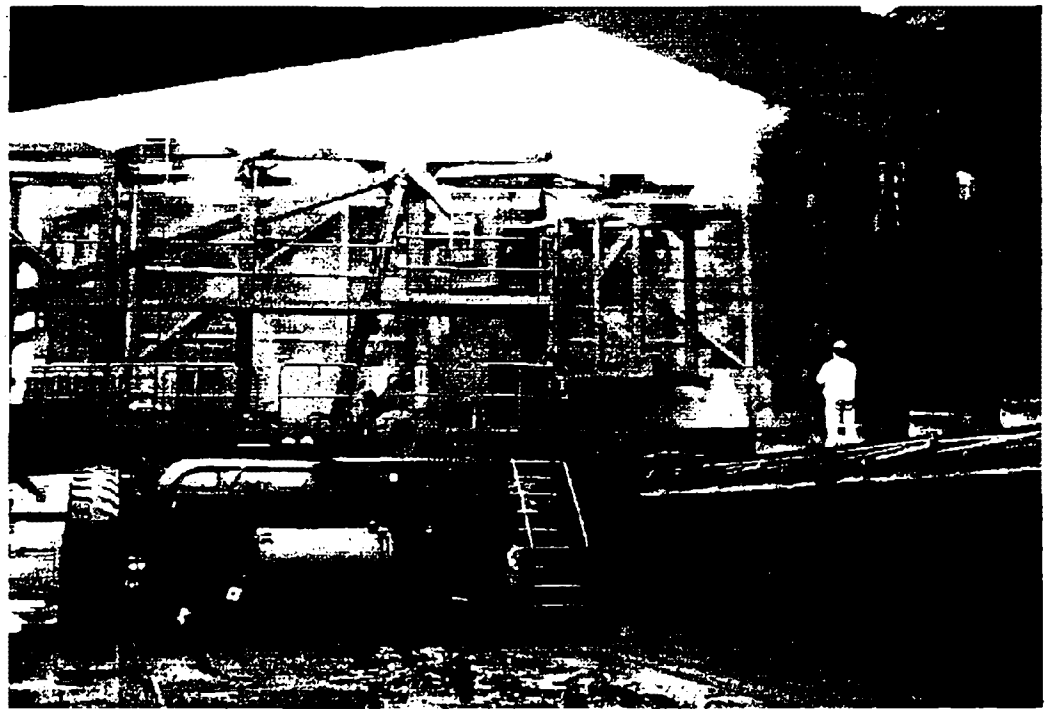
KIDC carrier lining up on an overhead to accept a pallet



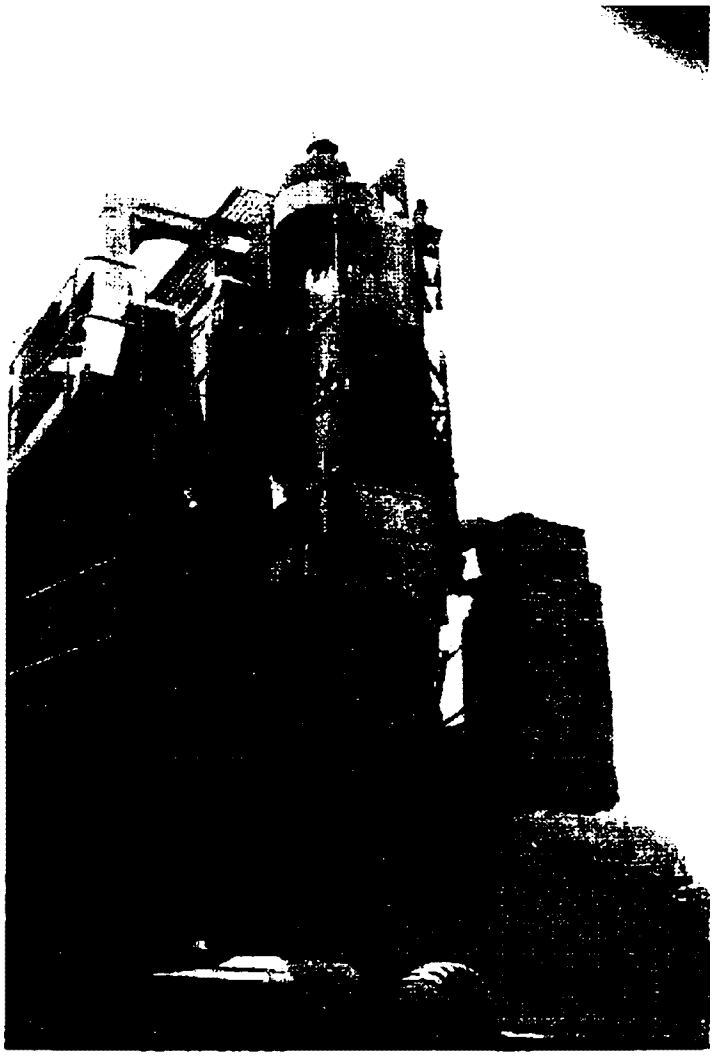
KIDC carrier removing coke oven door



KIDC carrier in position to accept a push



KIDC carrier accepting a fish



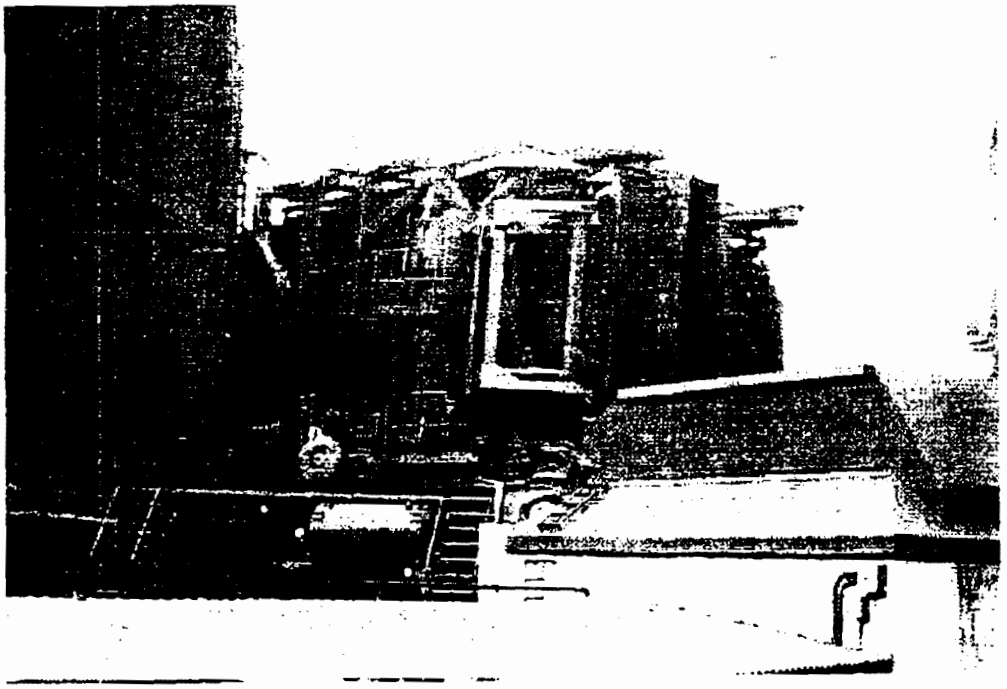
Back of a RIDC box after accepting a push with flame stack ignited



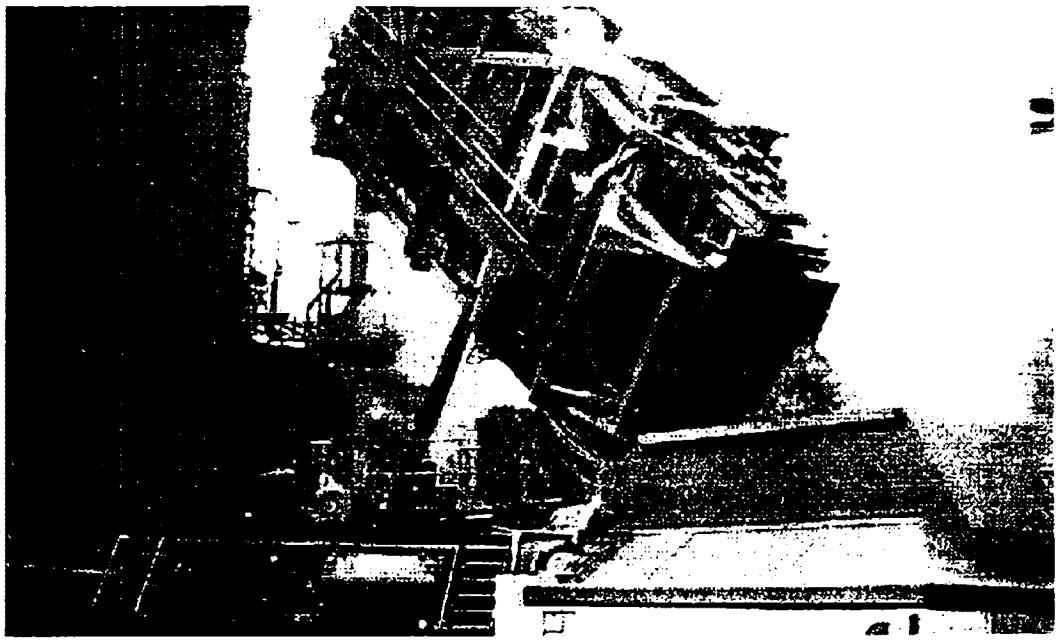
KIDC box in travel mode to cooling rack after accepting a push with flare stack ignited



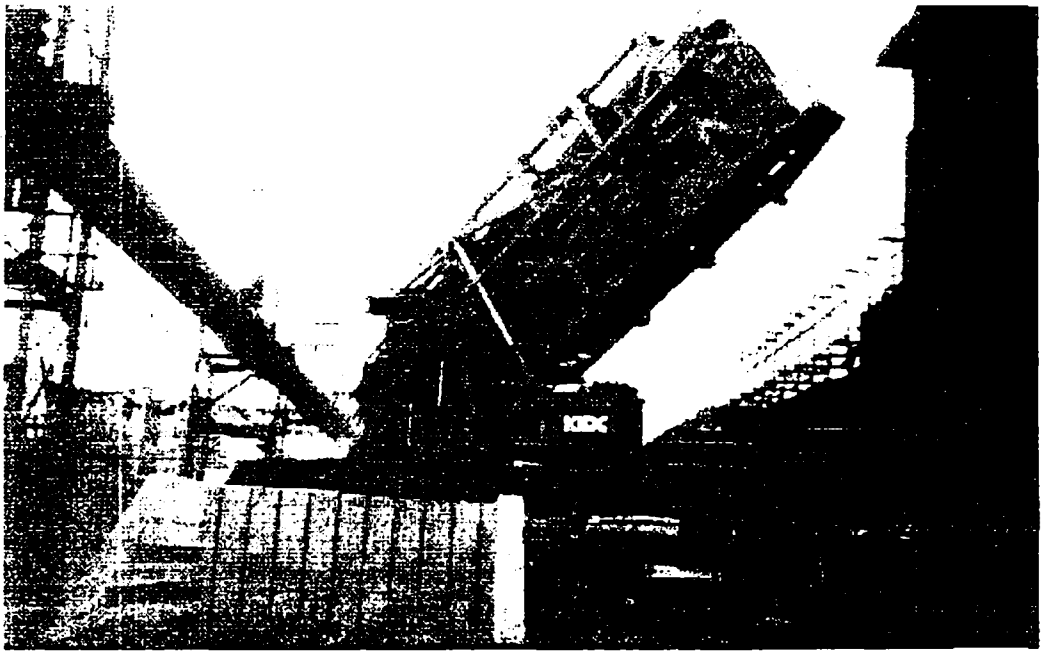
KIDC cooling station



KIDC box and carrier preparing for discharge after dunking



KIDC carrier discharging coke into the receiver station.



KIDC carrier discharging coke into the receiver station with auxiliary receiver station shown in the foreground