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Agency

EPA-600/R-93-080b

May 1993

EPA

Research and Development

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

Volume 2. Appendices G-N

Prepared for

Office of Environmental Engineering
and Technology Demonstration

Prepared by

Air and Energy Engineering Research
Laboratory
Research Triangle Park NC 27711

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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.

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

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May 1993

KRESS INDIRECT DRY COOLING SYSTEM, BETHLEHEM STEEL'S COKE PLANT DEMONSTRATION

AT

SPARROWS POINT, MARYLAND

Volume 2. Appendices G-N

By:

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Bethlehem Steel Corporation
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EPA Contract No. 68-DO-0128

Project Officer: Chester A. Vogel
U.S. Environmental Protection Agency
Air and Energy Engineering Research Laboratory
Research Triangle Park, NC 27711

Prepared For:

U.S. Environmental Protection Agency
Office of Research and Development
Washington, DC 20460

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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*In Volume 1

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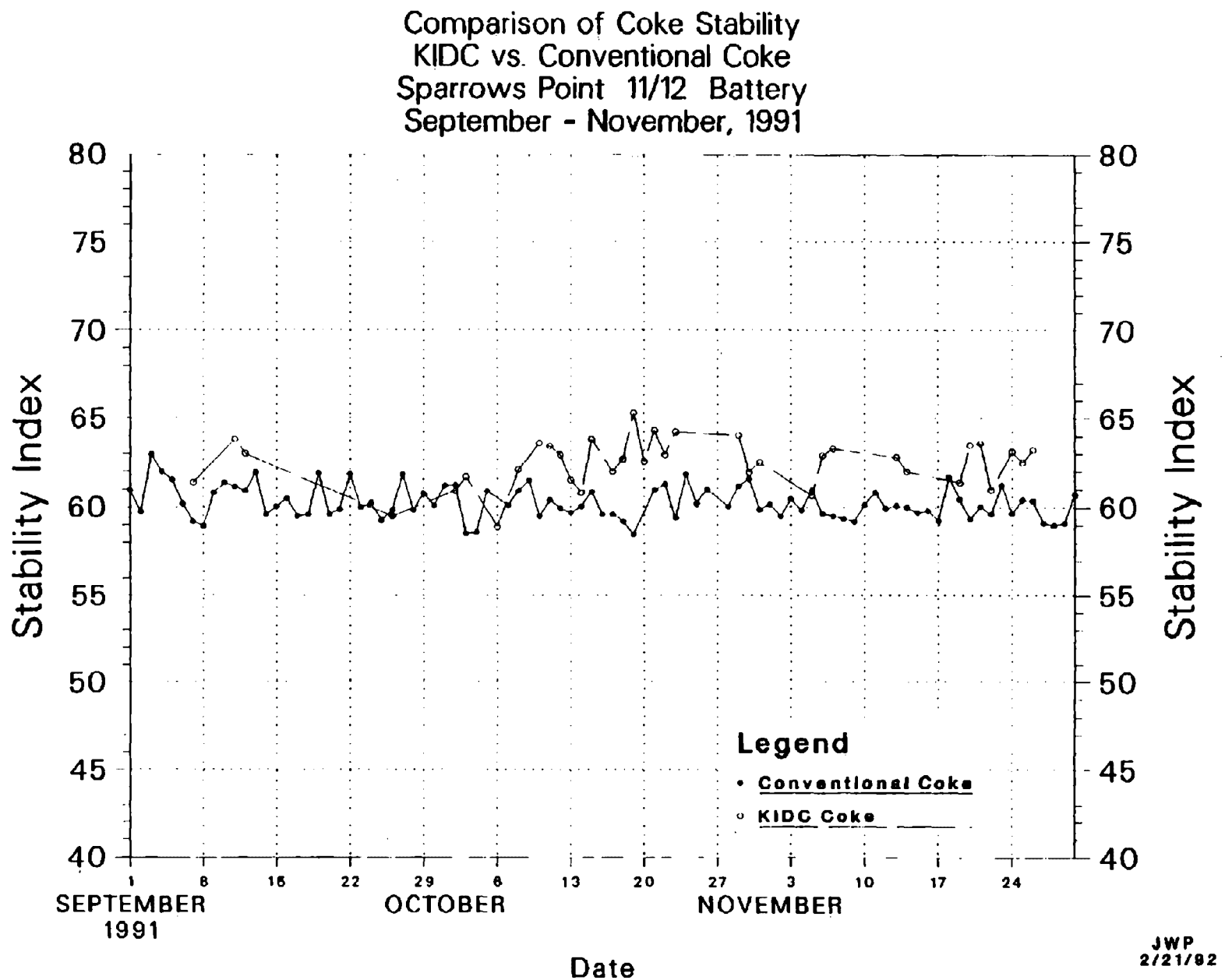
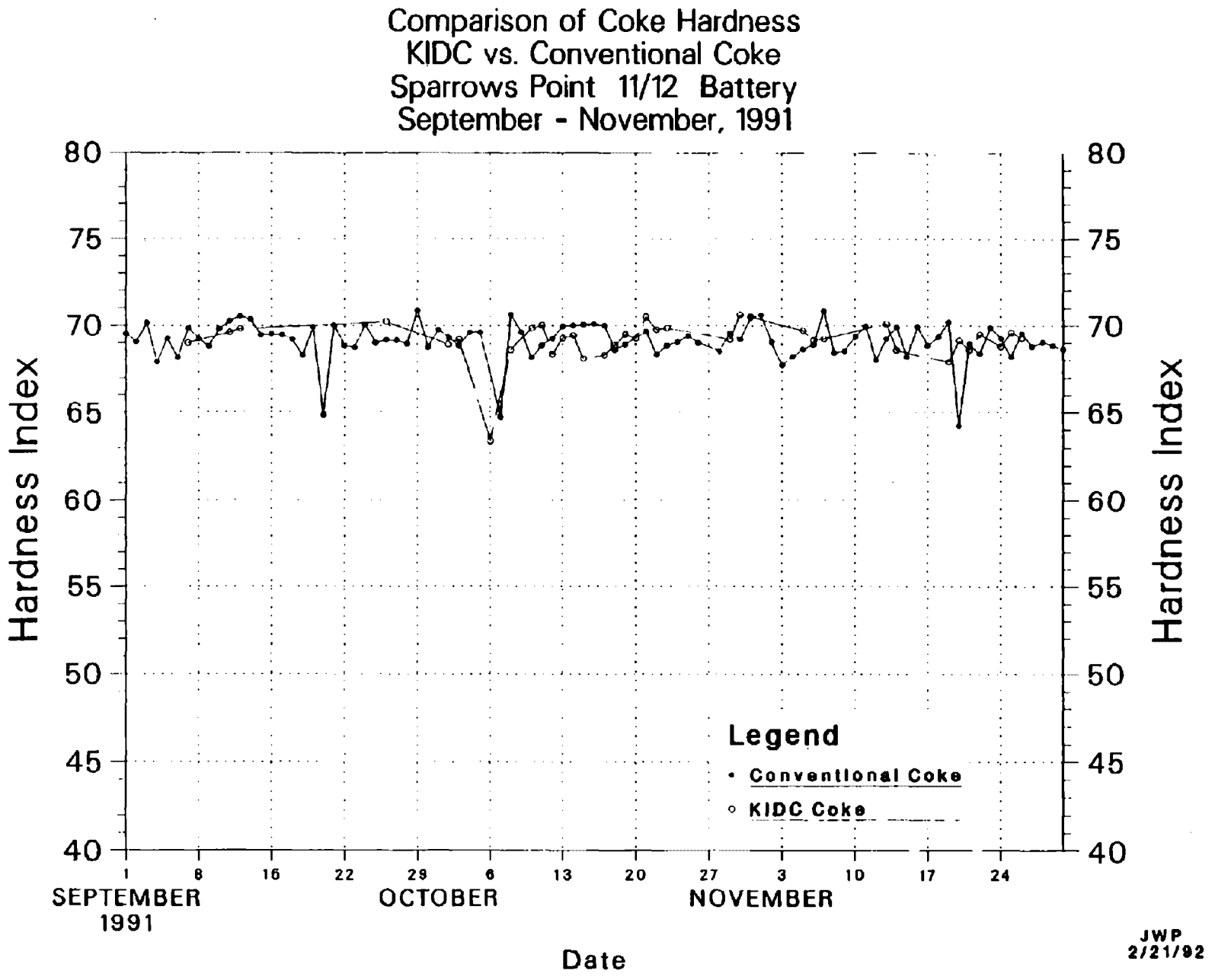
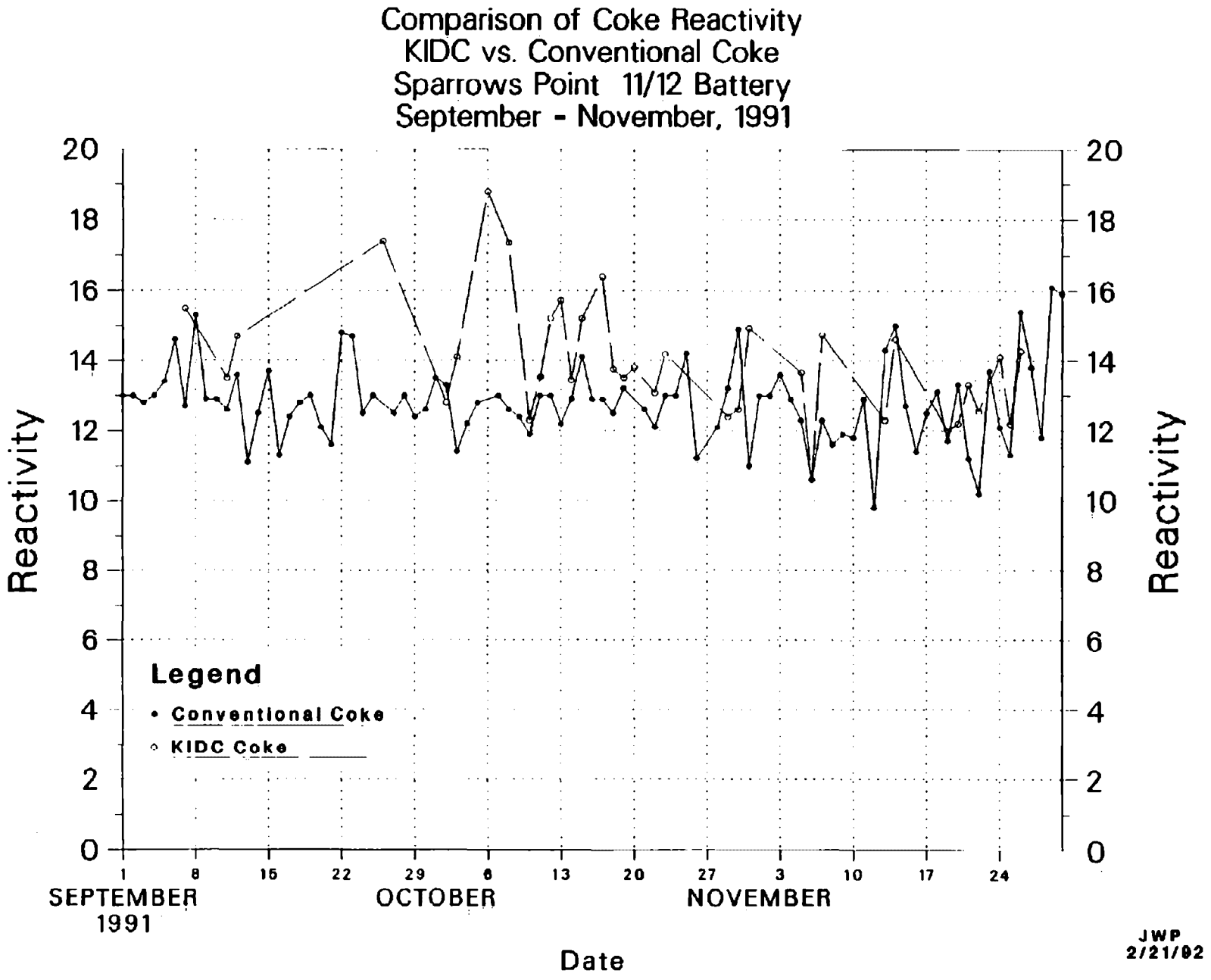
Section 1

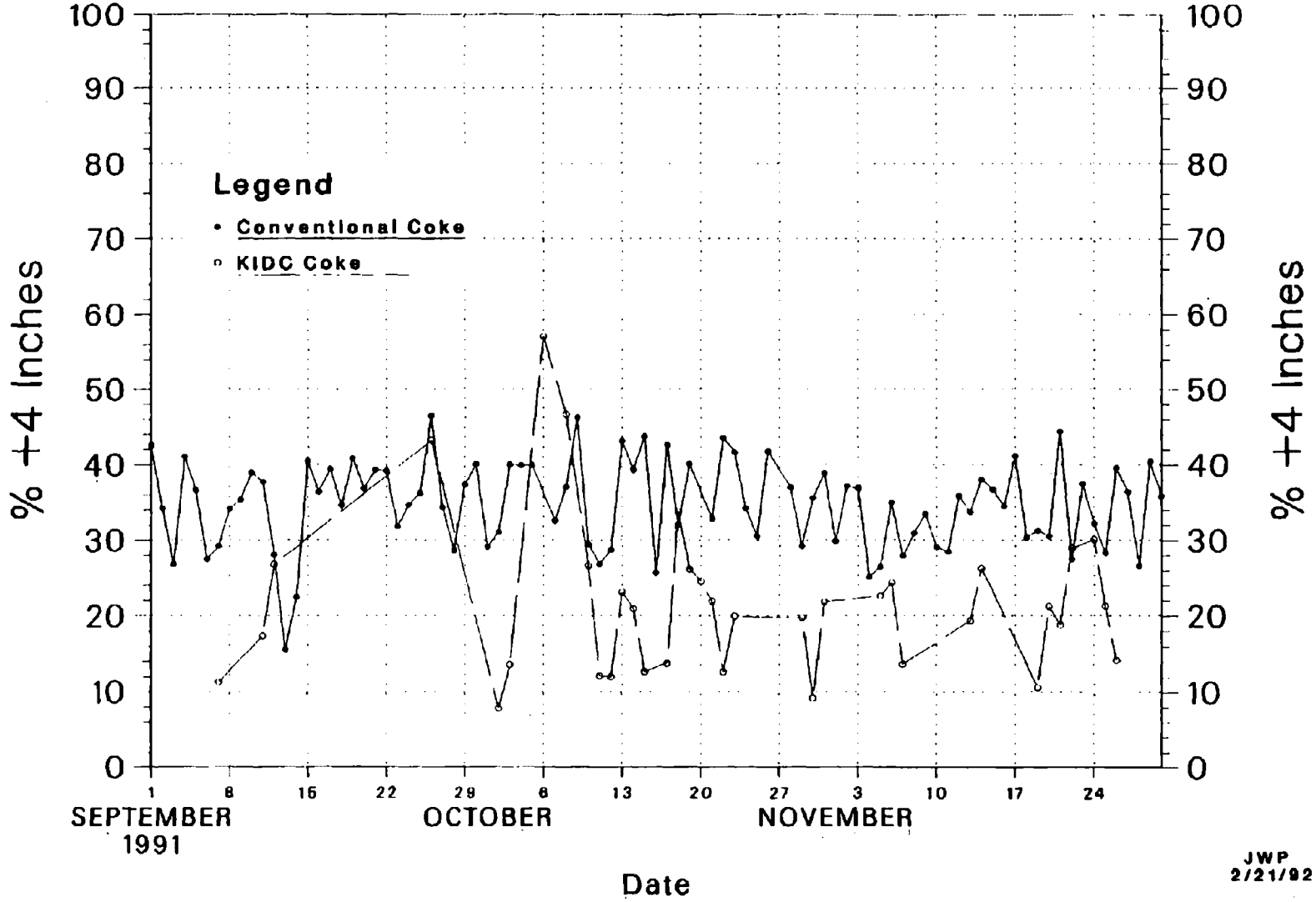
Comparison Graphs of Coke Properties -
KIDC vs. Conventional Coke.


Comparison of Coke Stability
KIDC vs. Conventional Coke
Sparrows Point 11/12 Battery
September - November, 1991
Stability Index
80
75
70
65
60
55
50
45
40
1
8
15
22
29
6
13
20
27
3
10
17
24
SEPTEMBER
1991
OCTOBER
NOVEMBER
Date
Legend
Conventional Coke
KIDC Coke
JWP
2/21/92


Comparison of Coke Hardness
KIDC vs. Conventional Coke
Sparrows Point 11/12 Battery
September - November, 1991
Hardness Index
80
75
70
65
60
55
50
45
40
1
8
16
22
29
6
13
20
27
3
10
17
24
SEPTEMBER
1991
OCTOBER
NOVEMBER
Date
Legend
Conventional Coke
KIDC Coke
JWP
2/21/92


Comparison of Coke Reactivity
KIDC vs. Conventional Coke
Sparrows Point 11/12 Battery
September - November, 1991
Reactivity
20
18
16
14
12
10
8
6
4
2
0
Legend
Conventional Coke
KIDC Coke
1
8
15
22
29
6
13
20
27
3
10
17
24
SEPTEMBER
1991
OCTOBER
NOVEMBER
Date
JWP
2/21/92

Comparison of Coke Size, % +4 Inches
KIDC vs. Conventional Coke
Sparrows Point 11/12 Battery
September - November, 1991



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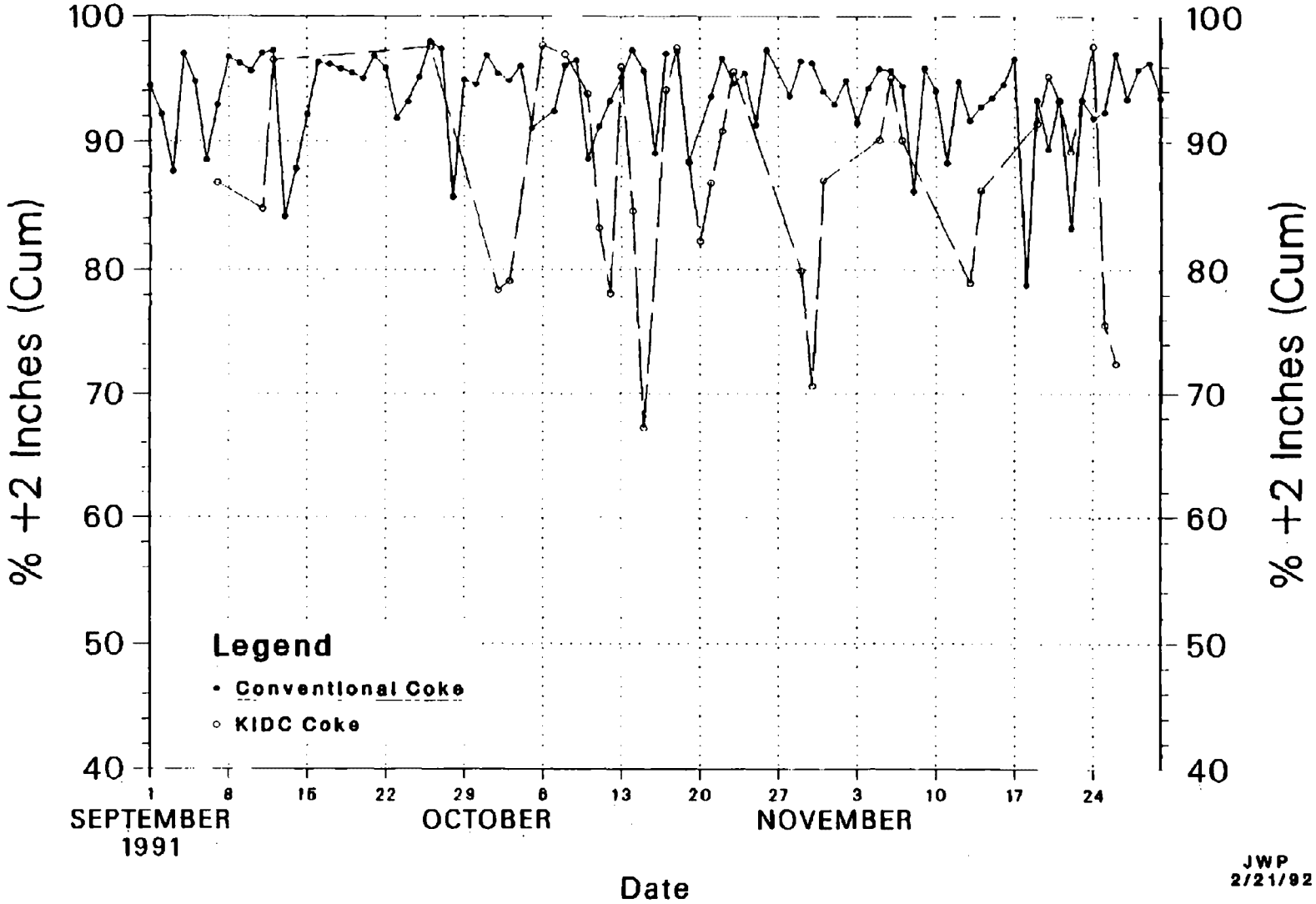
Comparison of Coke Size, % +2 Inches
KIDC vs. Conventional Coke
Sparrows Point 11/12 Battery
September - November, 1991



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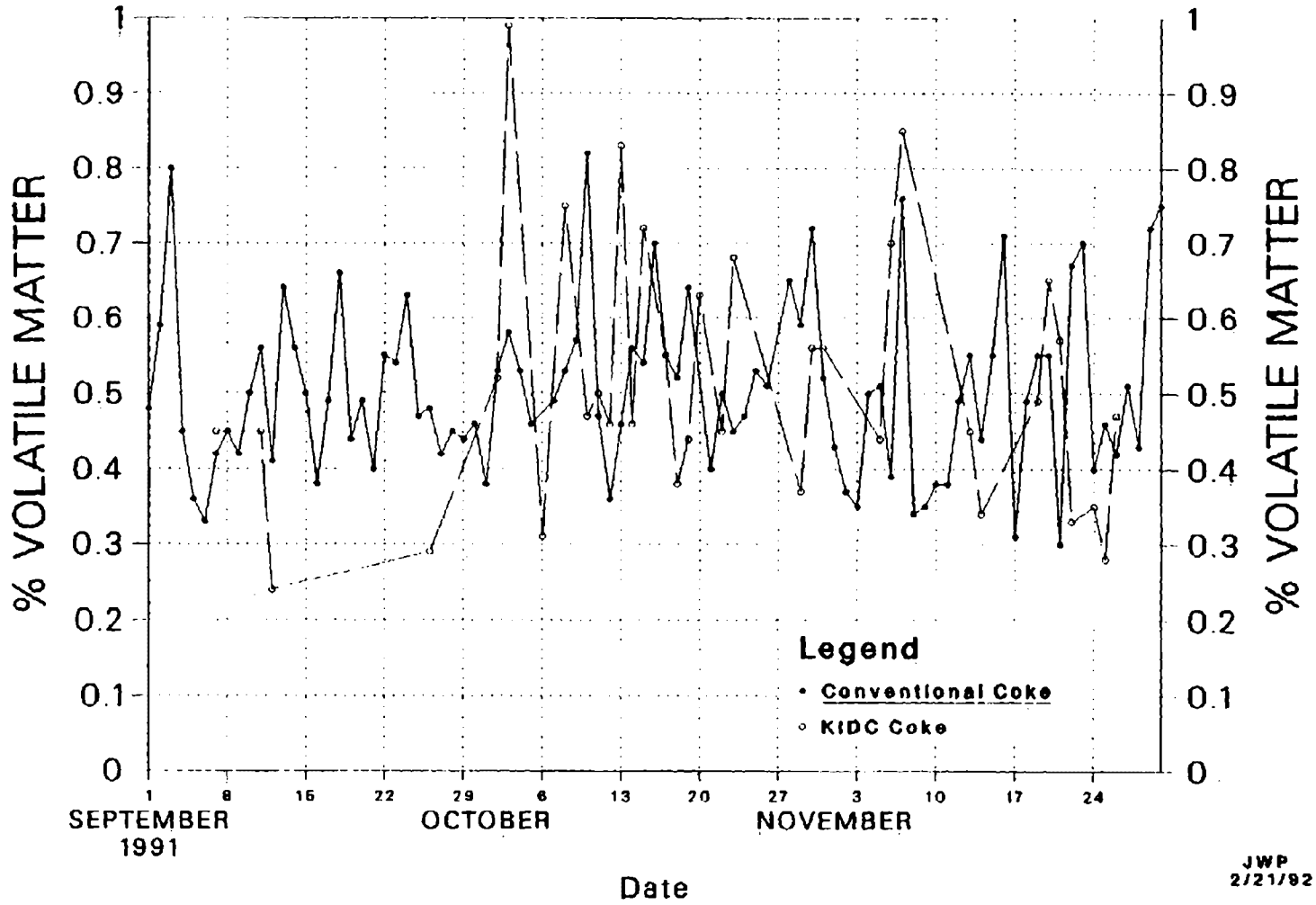
Comparison of Coke Volatile Matter
KIDC vs. Conventional Coke
Sparrows Point 11/12 Battery
September - November, 1991



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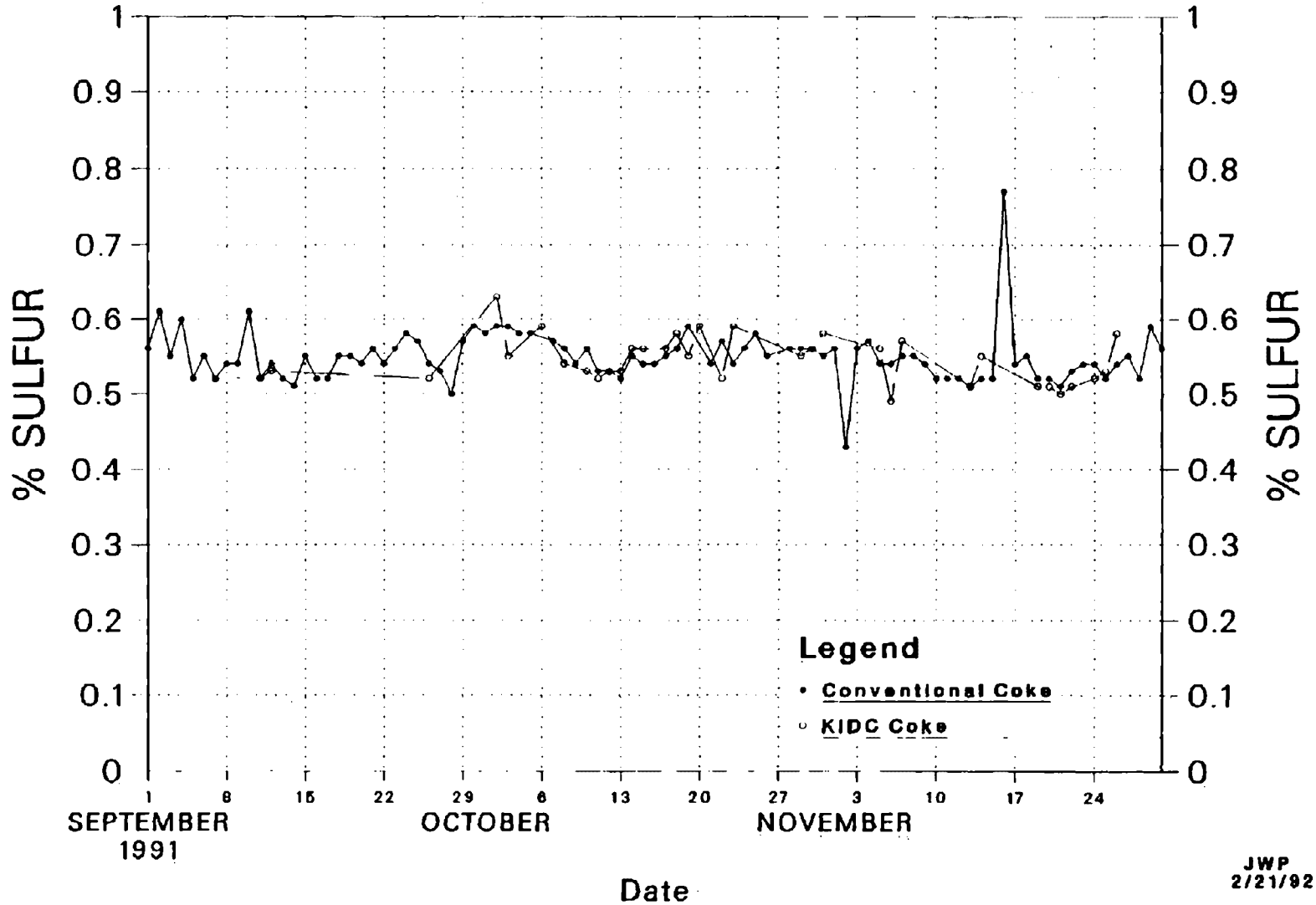
Comparison of Coke % Sulfur
KIDC vs. Conventional Coke
Sparrows Point 11/12 Battery
September - November, 1991



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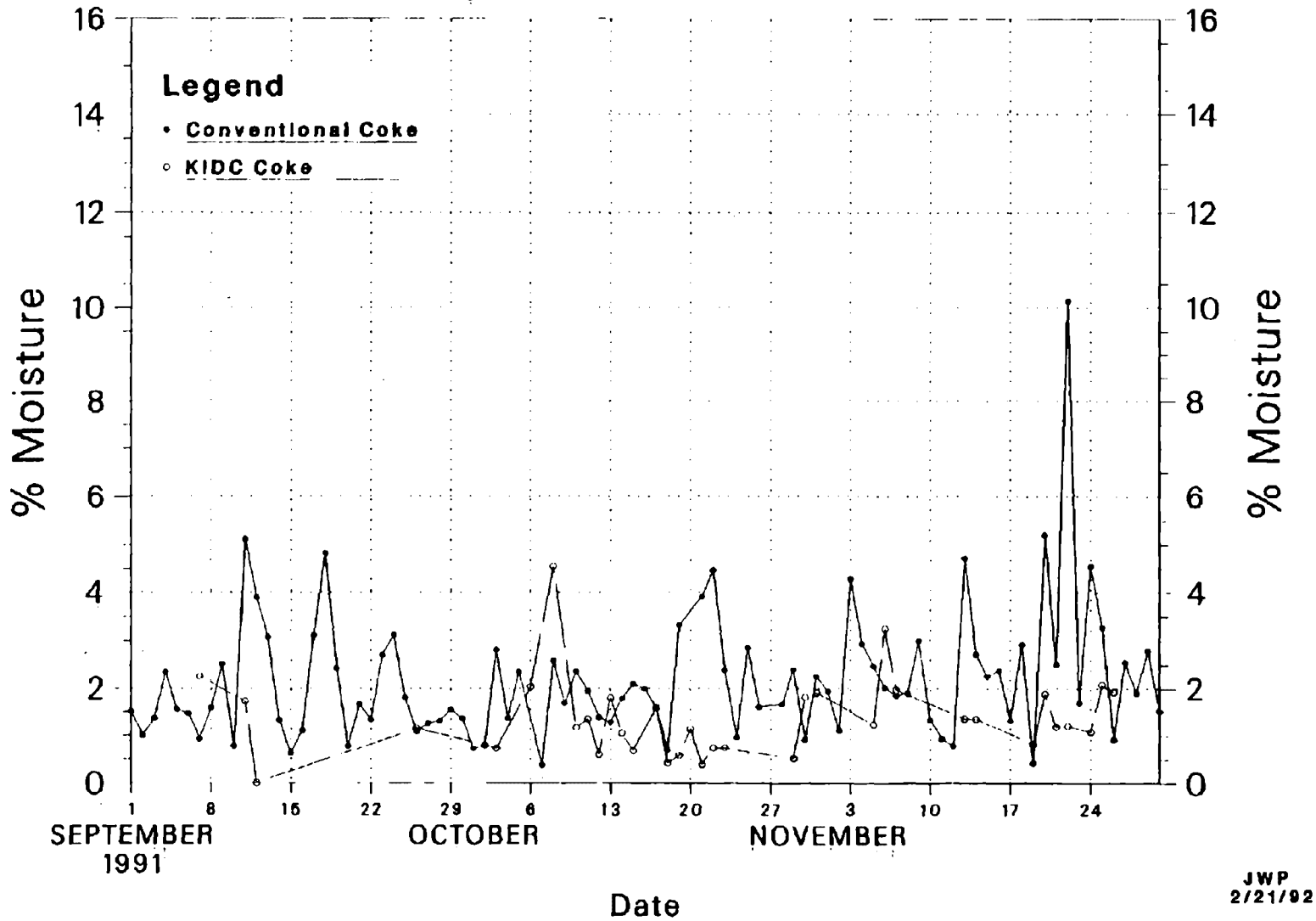
Comparison of Coke % Moisture
KIDC vs. Conventional Coke
Sparrows Point 11/12 Battery
September - November, 1991



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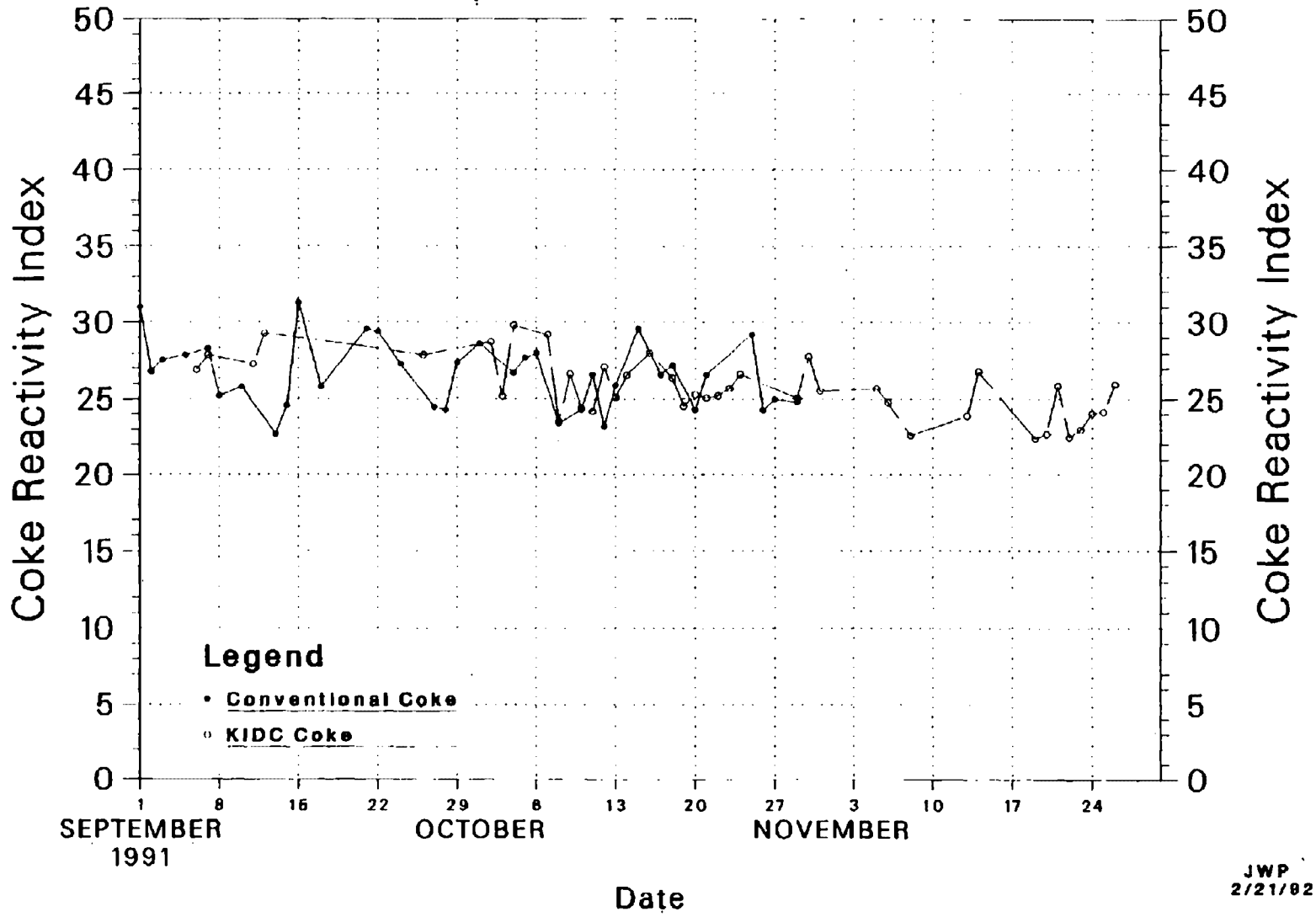
Comparison of Coke CRI (Hampton Roads)
KIDC vs. Conventional Coke
Sparrows Point 11/12 Battery
September - November, 1991



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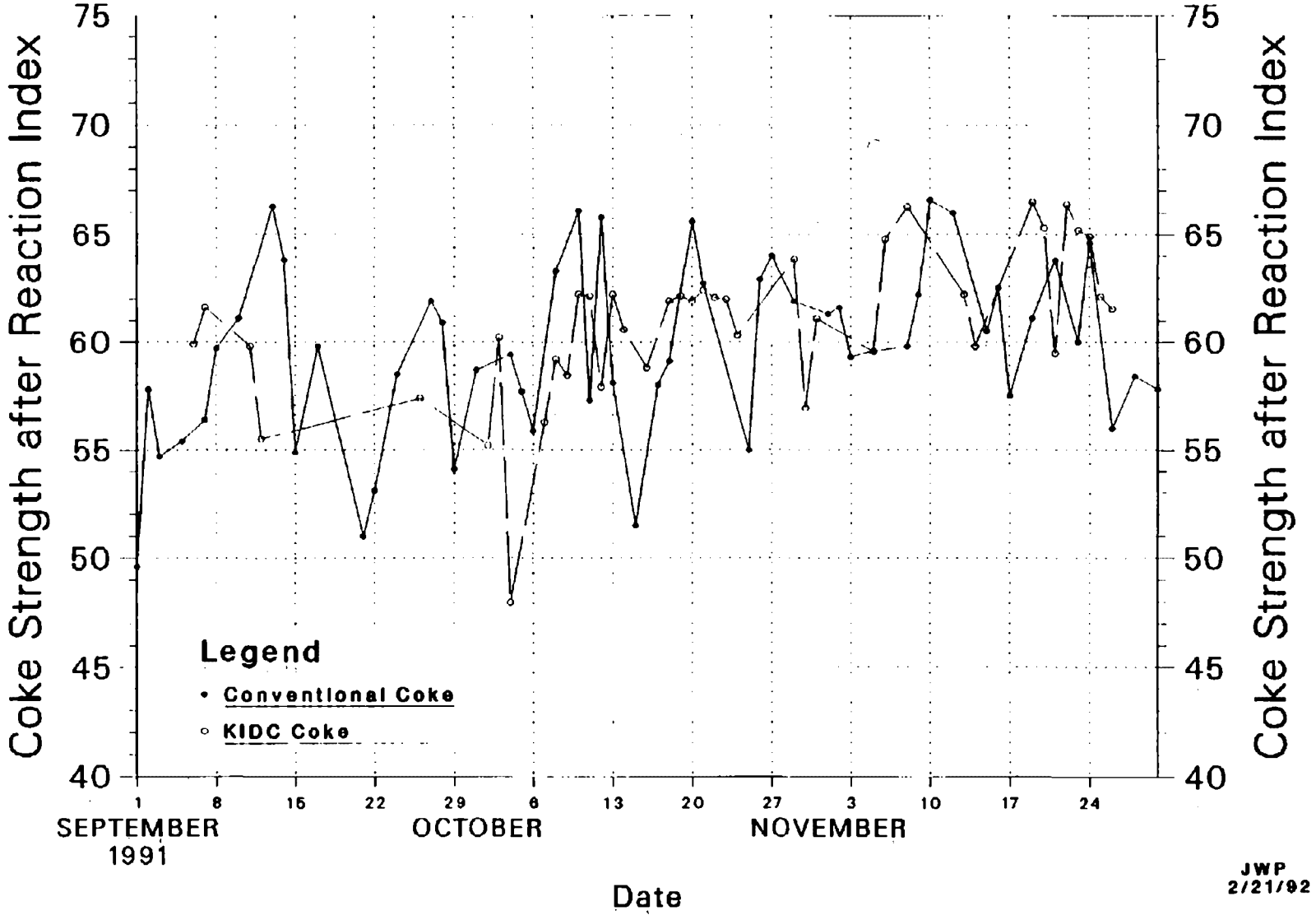
Comparison of Coke CSR (Hampton Roads)
KIDC vs. Conventional Coke
Sparrows Point 11/12 Battery
September - November, 1991



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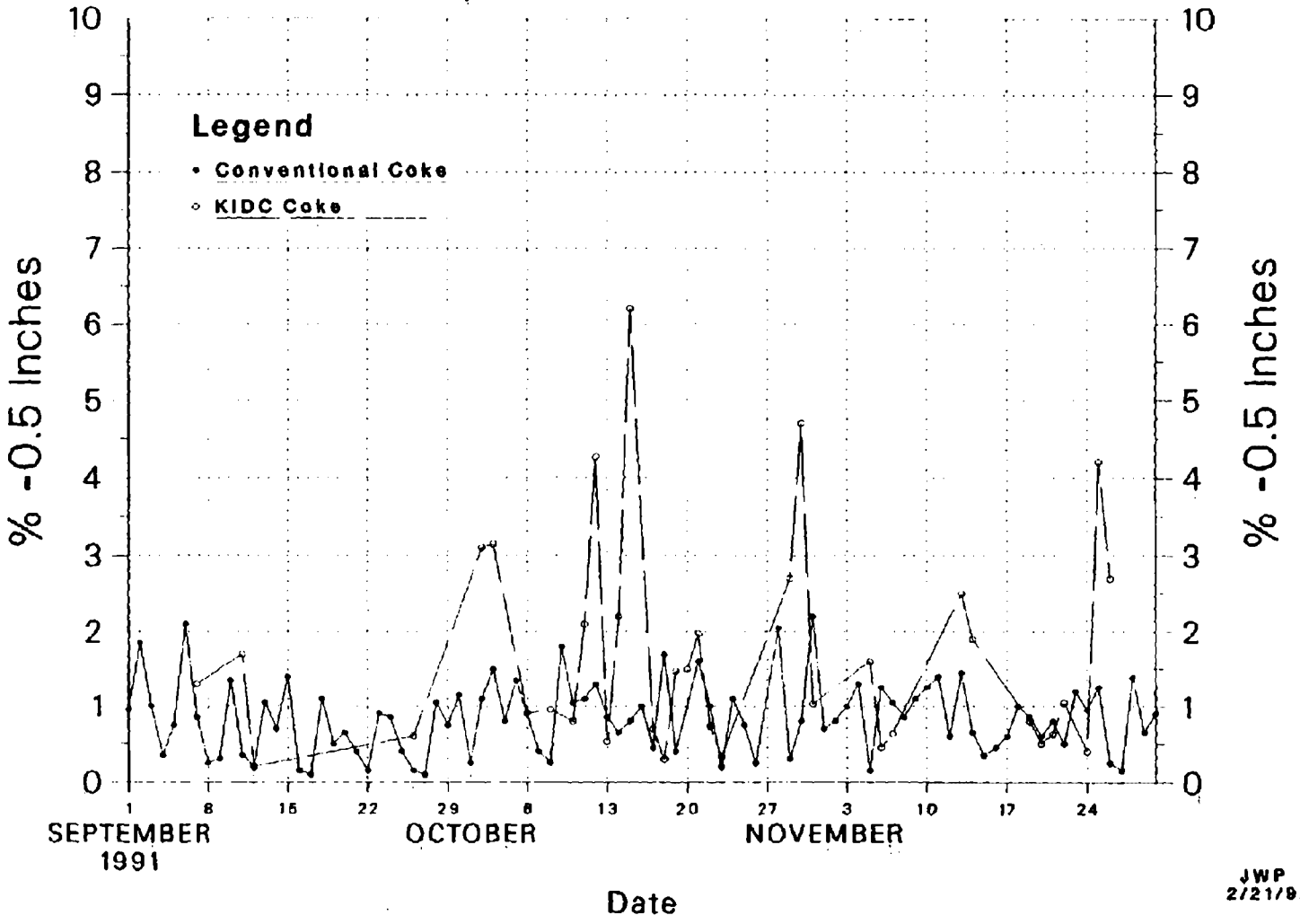
Comparison of Coke Size, % -0.5 Inches
KIDC vs. Conventional Coke
Sparrows Point 11/12 Battery
September - November, 1991



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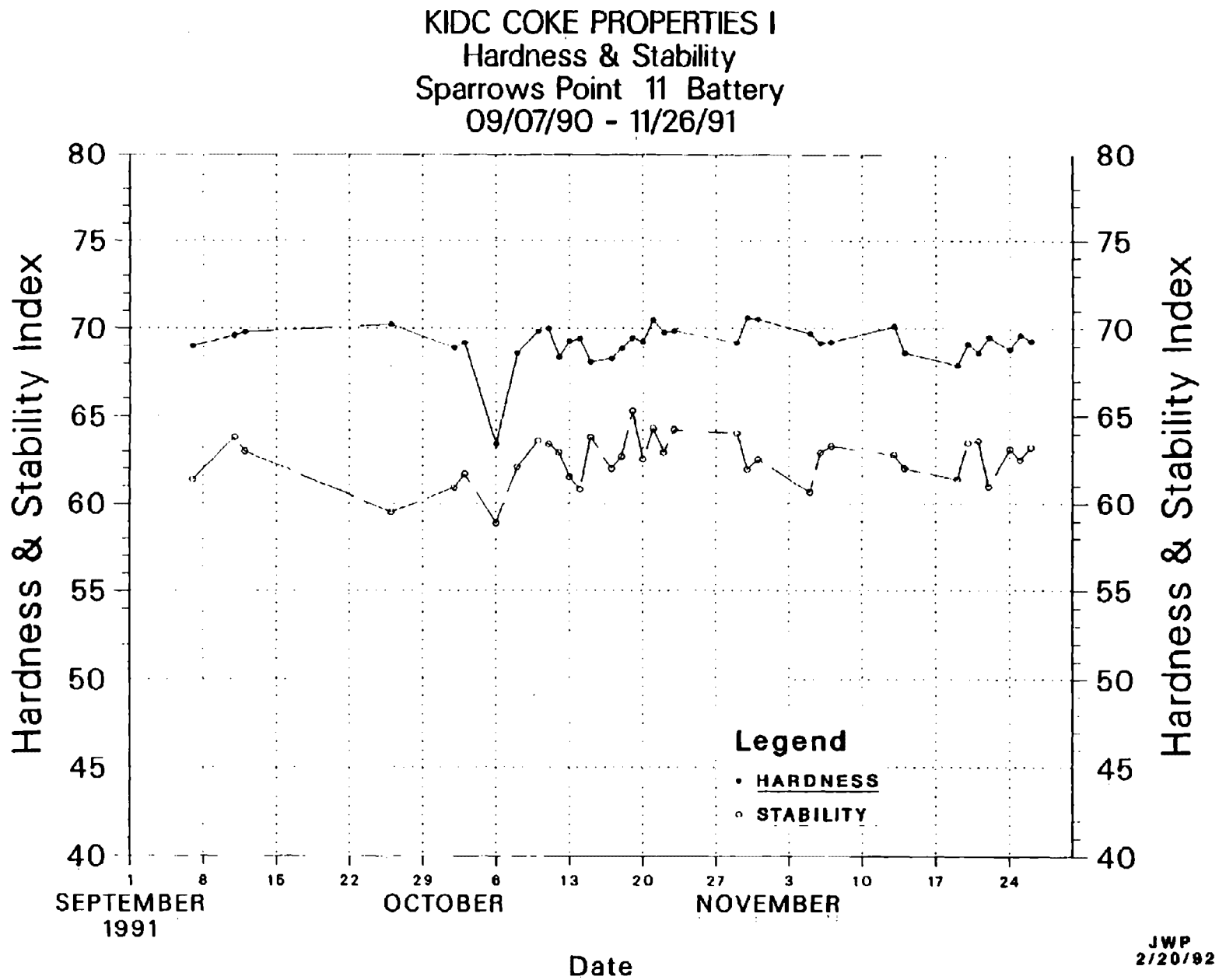
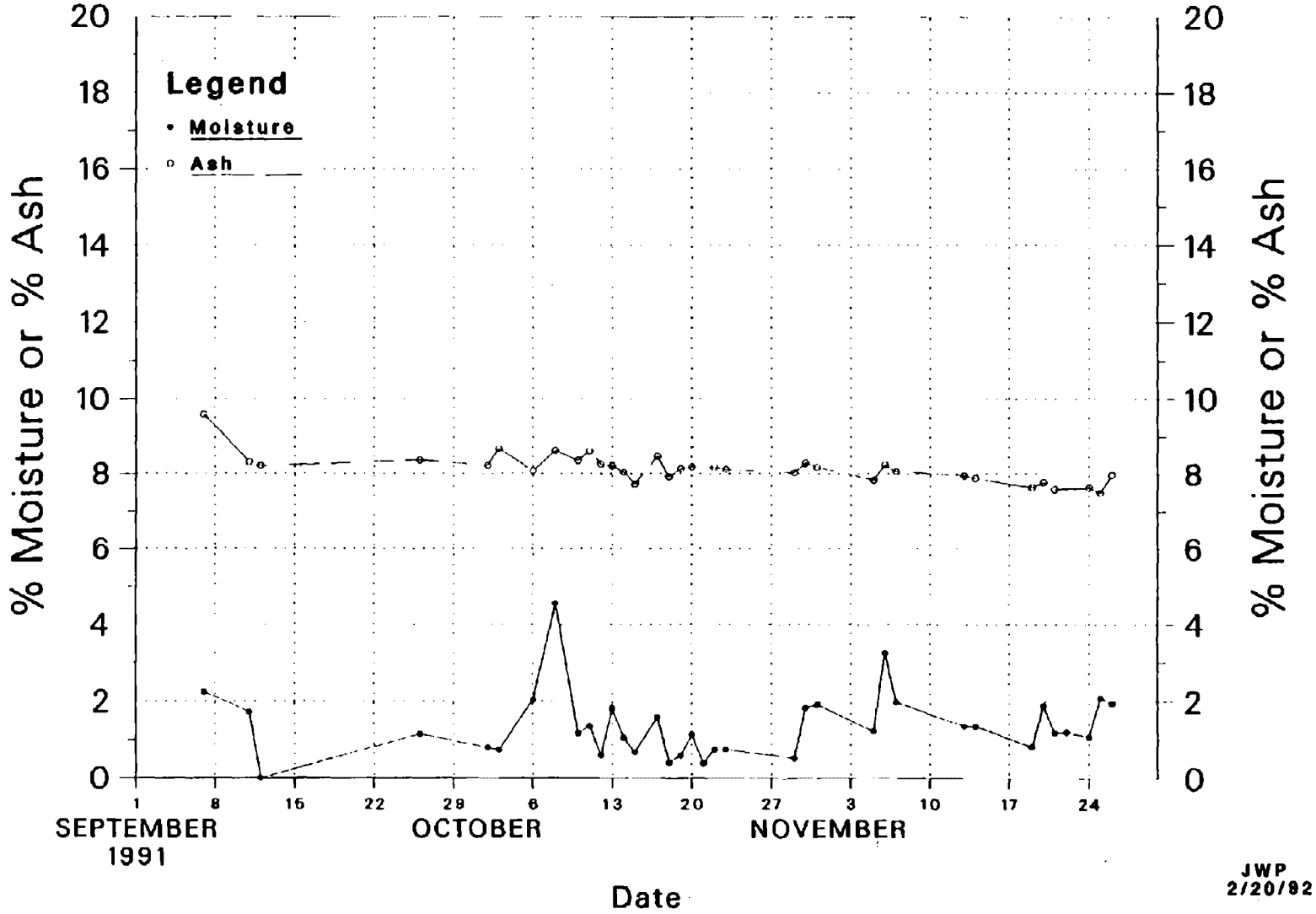
Section 2

Graphs of KIDC Coke Properties


KIDC COKE PROPERTIES I
Hardness & Stability
Sparrows Point 11 Battery
09/07/90 - 11/26/91
Hardness & Stability Index
80
75
70
65
60
55
50
45
40
Legend
• HARDNESS
○ STABILITY
1
8
15
22
29
6
13
20
27
3
10
17
24
SEPTEMBER
1991
OCTOBER
NOVEMBER
Date
JWP
2/20/92

KIDC COKE PROPERTIES II
Moisture & Ash
Sparrows Point 11 Battery
09/07/91 - 11/26/91



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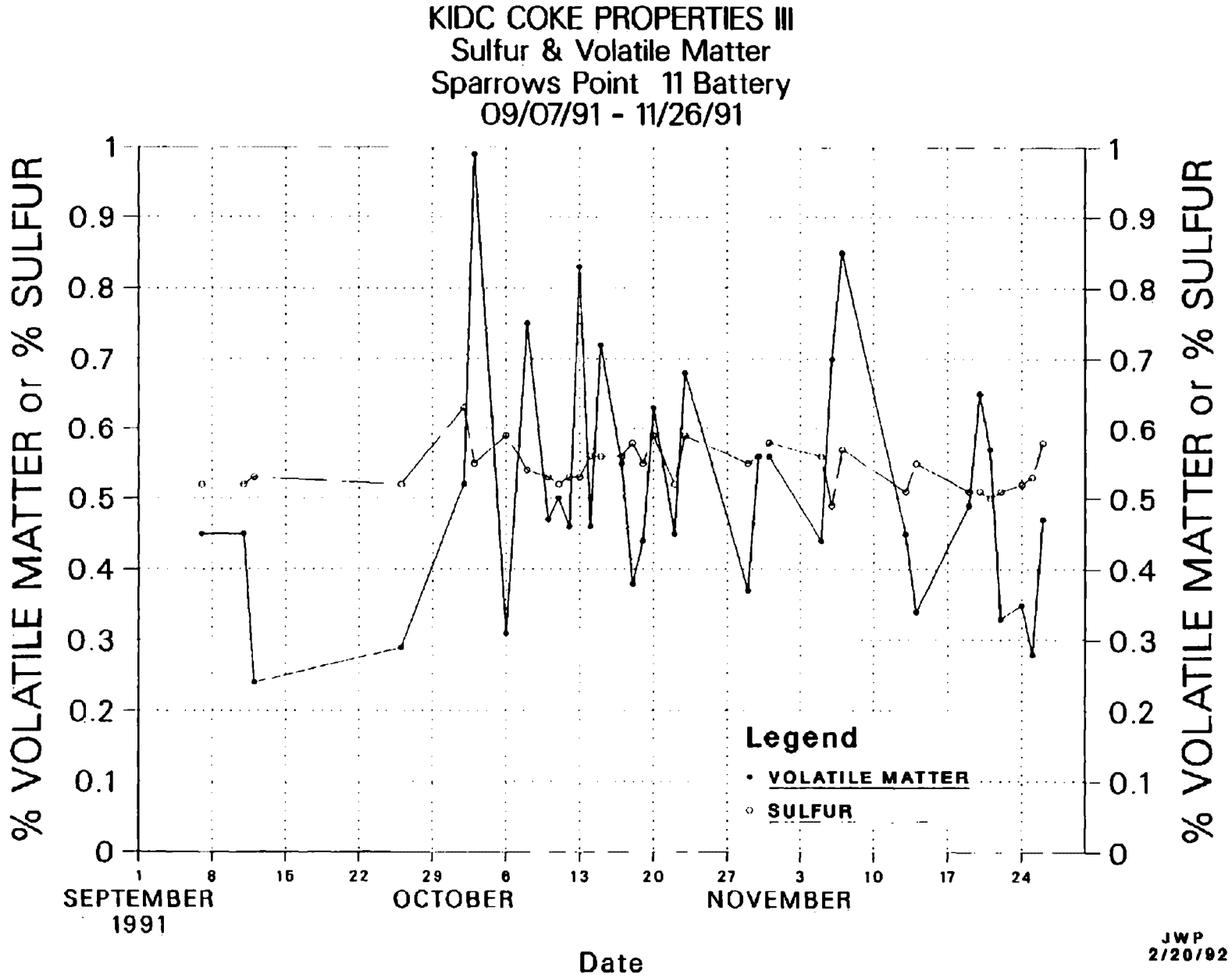
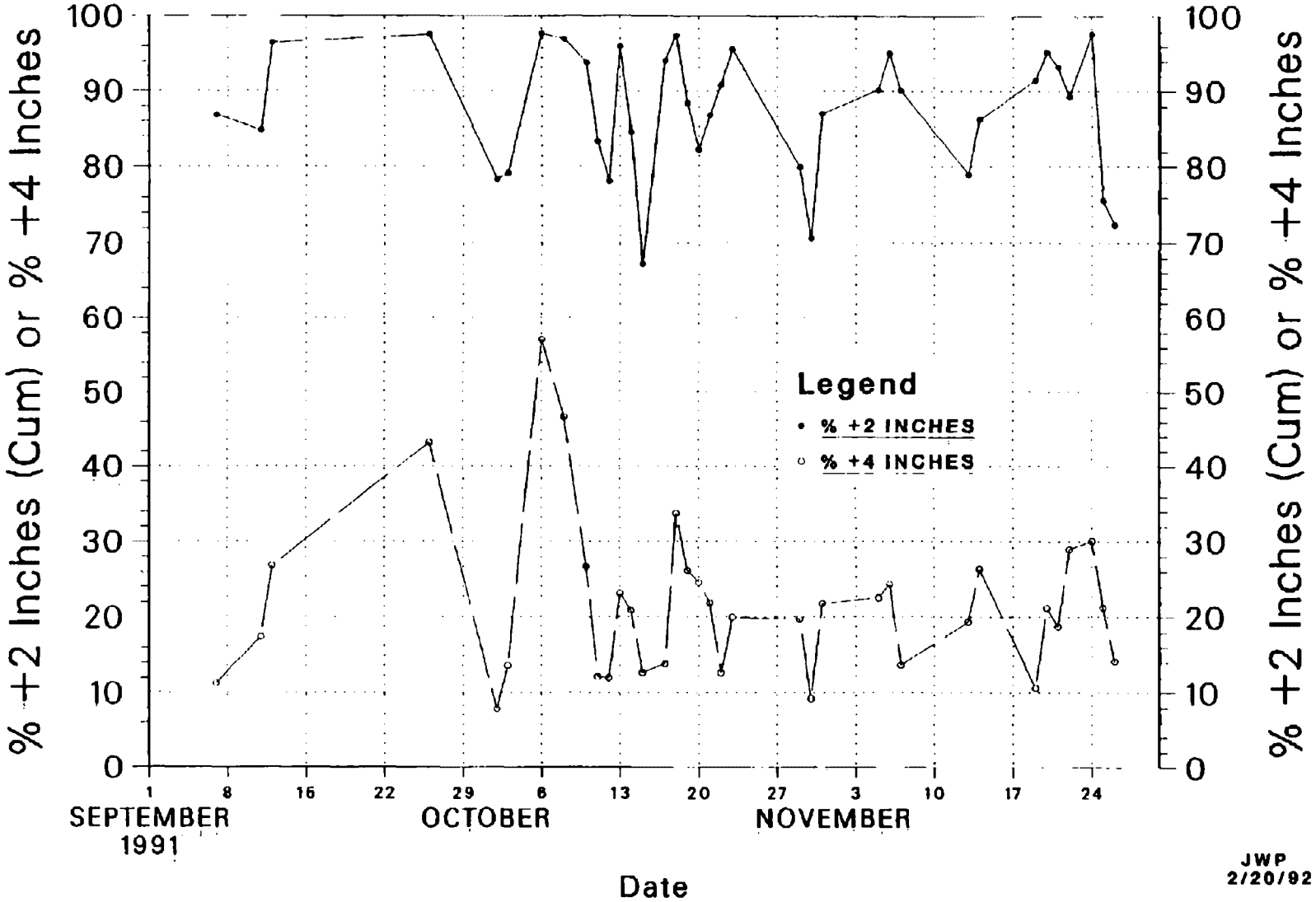
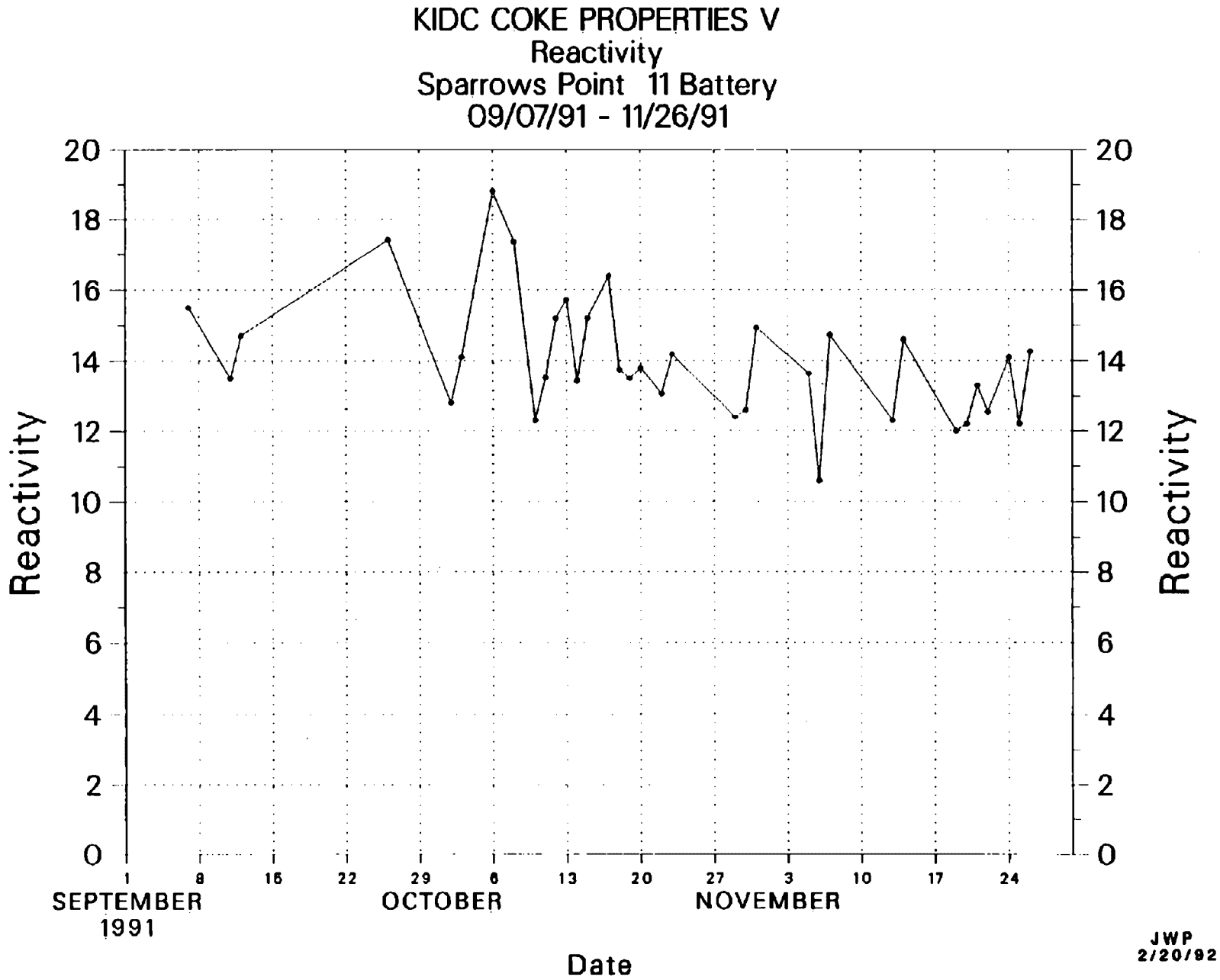
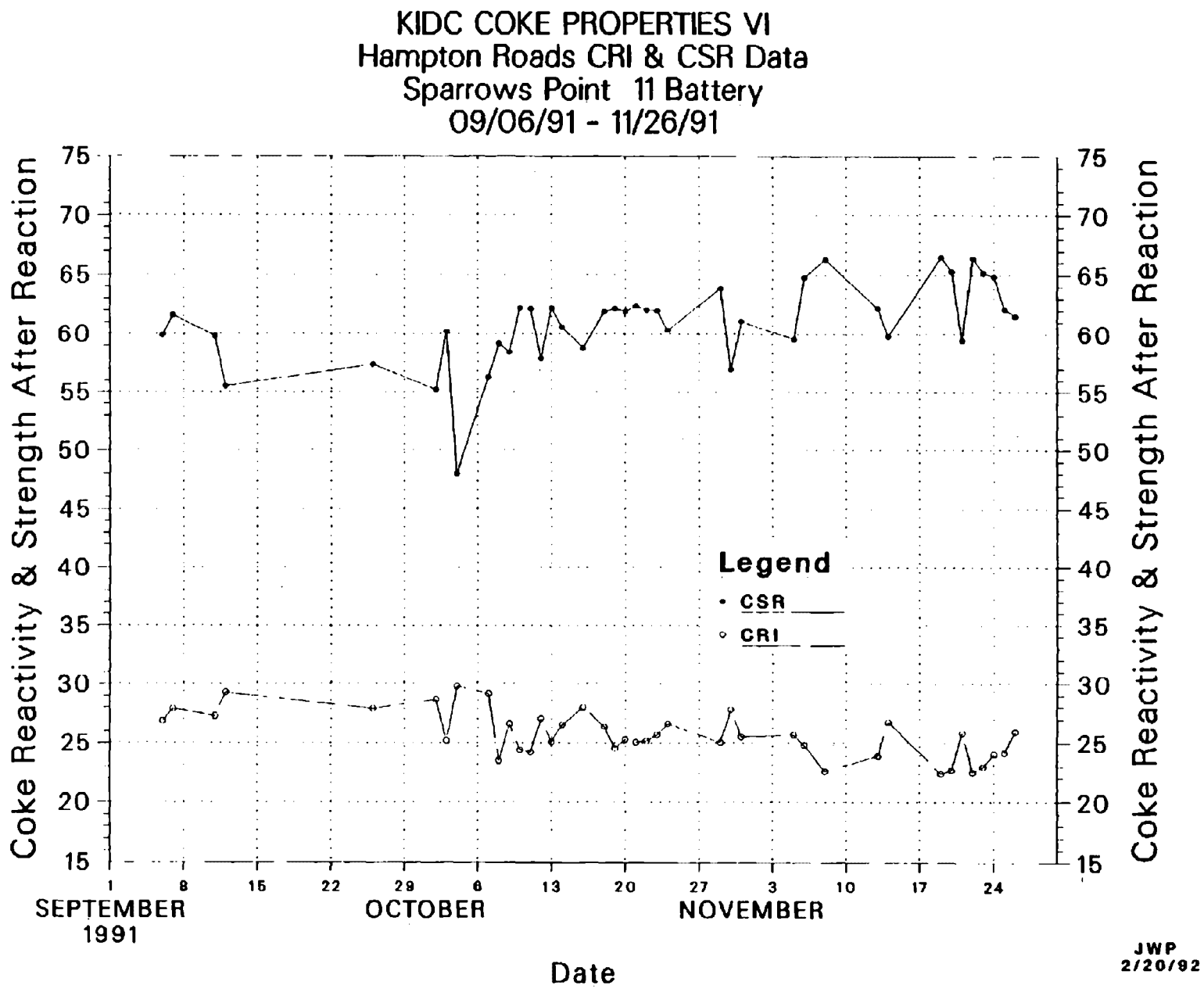
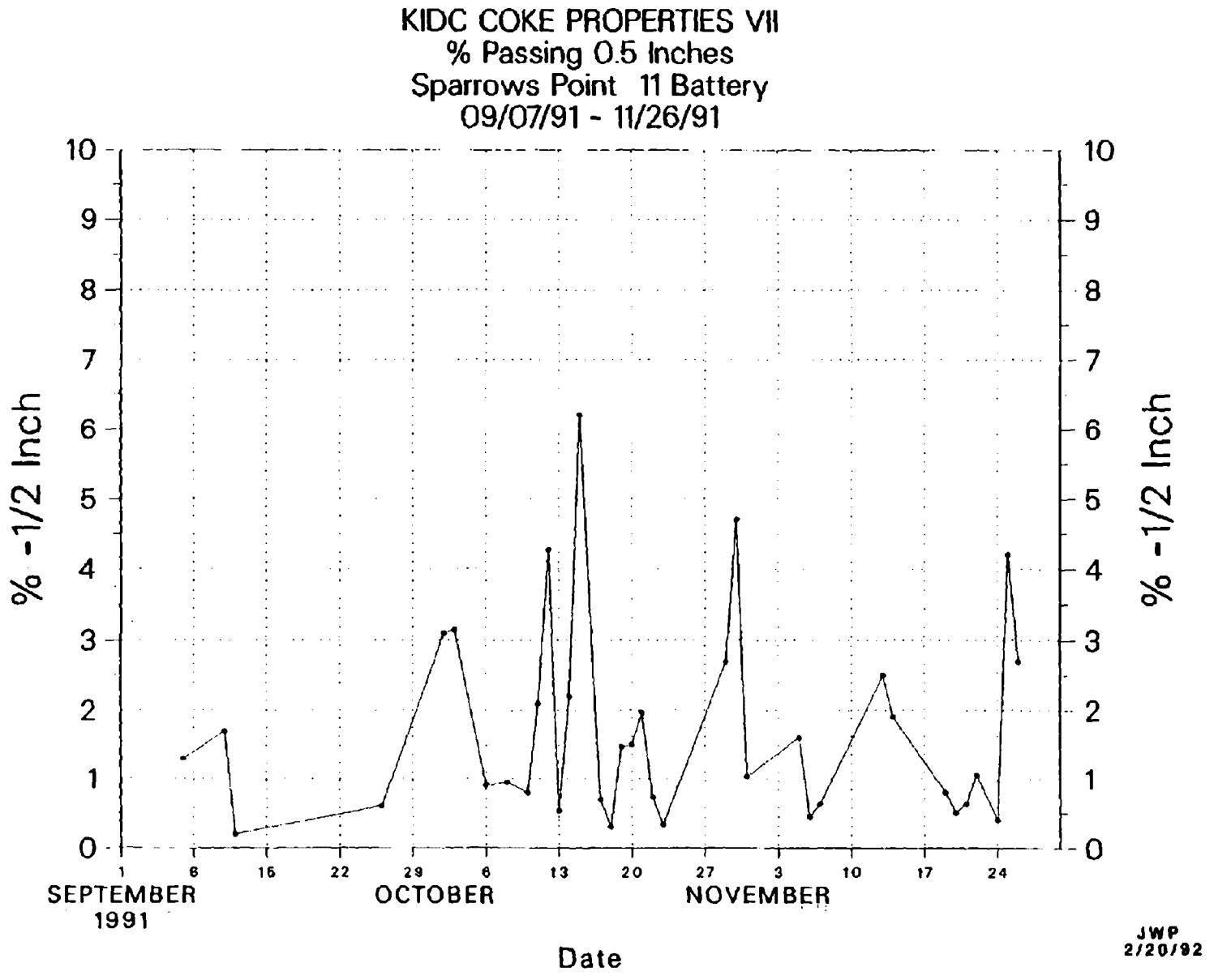

KIDC COKE PROPERTIES III
Sulfur & Volatile Matter
Sparrows Point 11 Battery
09/07/91 - 11/26/91
% VOLATILE MATTER or % SULFUR
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
1
8
15
22
29
6
13
20
27
3
10
17
24
SEPTEMBER
1991
OCTOBER
NOVEMBER
Date
Legend
VOLATILE MATTER
SULFUR
JWP
2/20/92


KIDC COKE PROPERTIES IV
% +2 Inches (Cum) & % +4 Inches
Sparrows Point 11/12 Battery
09/07/91 - 11/26/91
% +2 Inches (Cum) or % +4 Inches
100
90
80
70
60
50
40
30
20
10
0
Legend
% +2 INCHES
% +4 INCHES
1
8
16
22
29
6
13
20
27
3
10
17
24
SEPTEMBER
1991
OCTOBER
NOVEMBER
Date

JWP
2/20/92

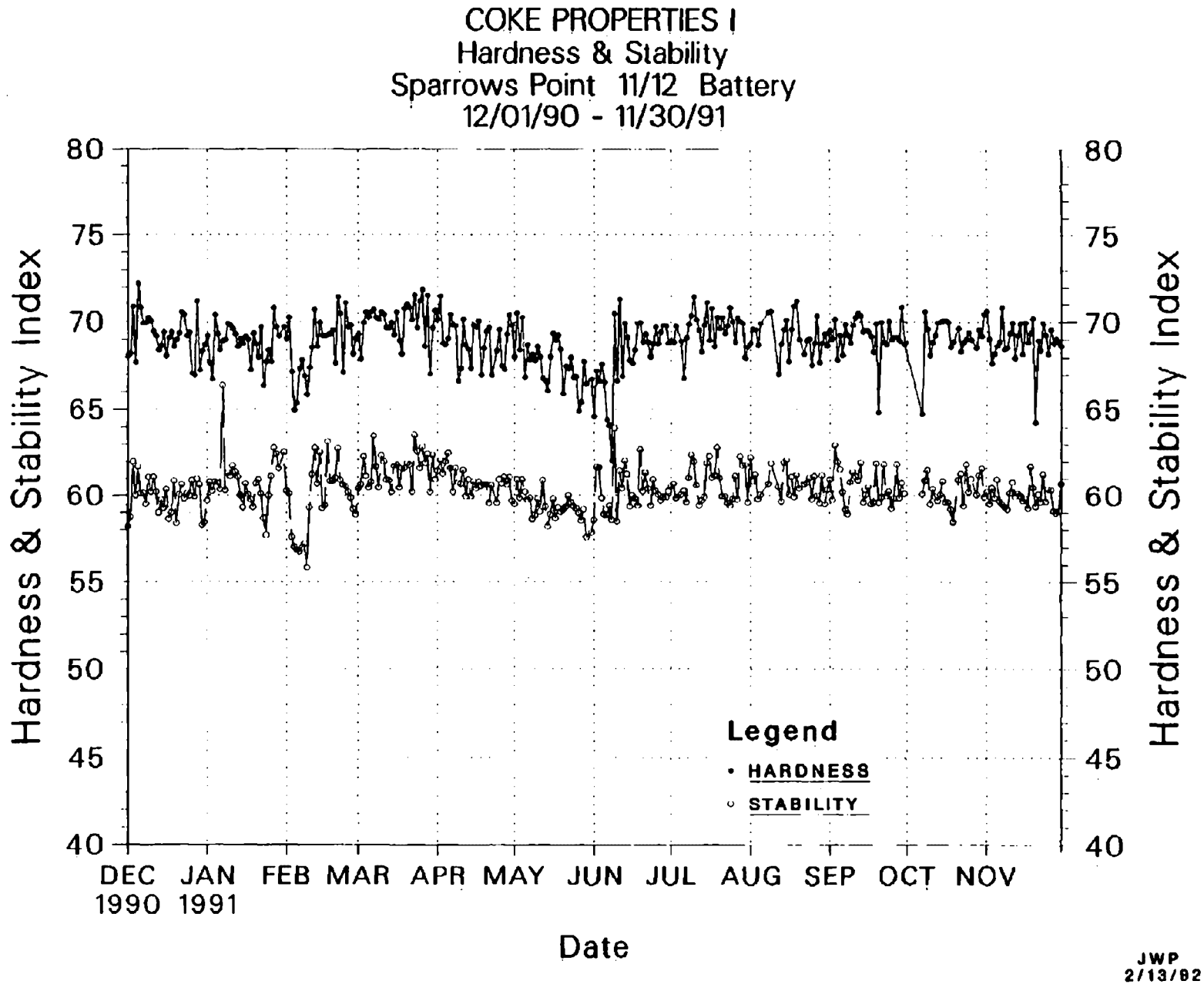

KIDC COKE PROPERTIES V
Reactivity
Sparrows Point 11 Battery
09/07/91 - 11/26/91
Reactivity
20
18
16
14
12
10
8
6
4
2
0
1
8
15
22
29
6
13
20
27
3
10
17
24
SEPTEMBER
1991
OCTOBER
NOVEMBER
Date
JWP
2/20/92

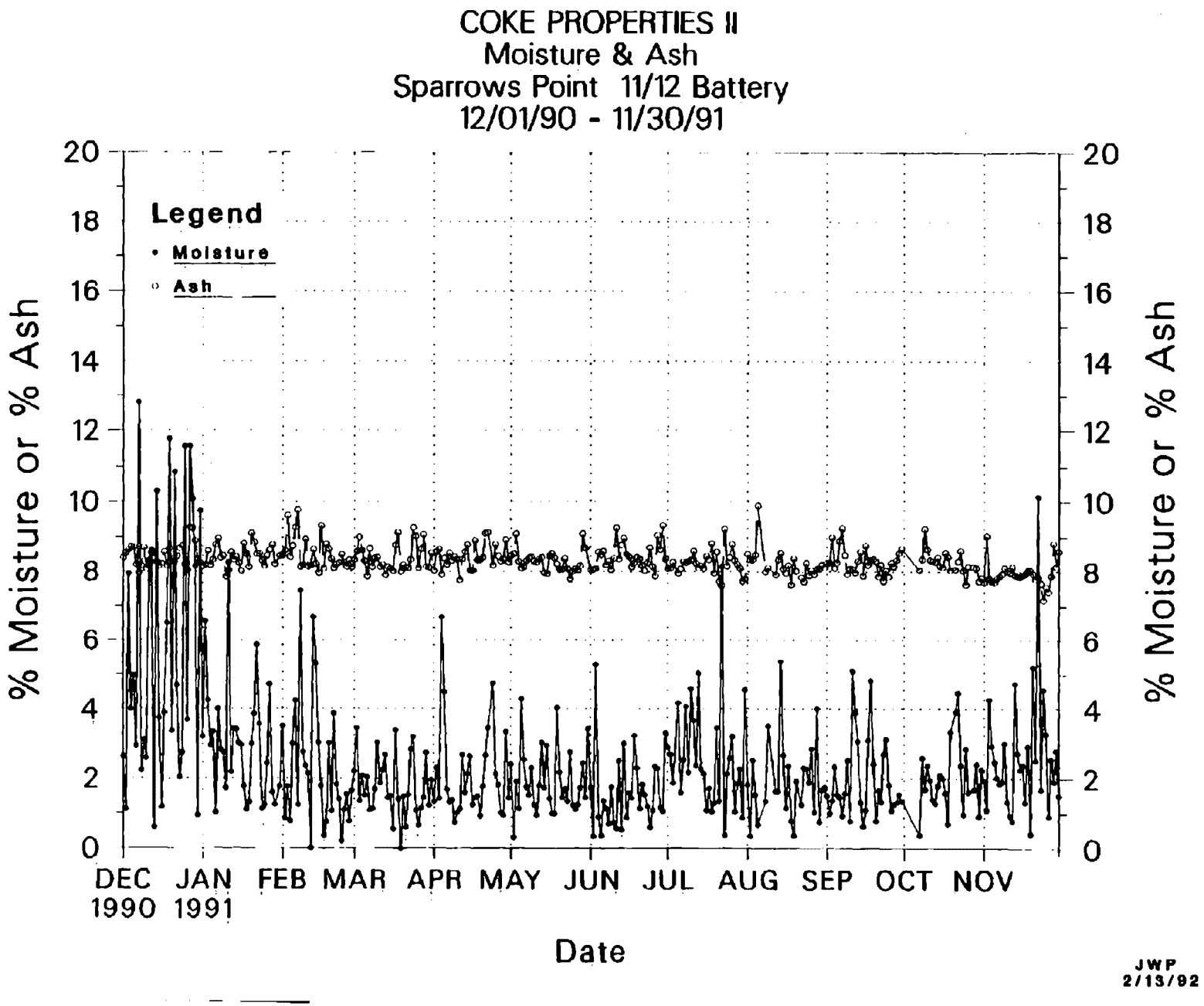

KIDC COKE PROPERTIES VI
Hampton Roads CRI & CSR Data
Sparrows Point 11 Battery
09/06/91 - 11/26/91
Coke Reactivity & Strength After Reaction
75
70
65
60
55
50
45
40
35
30
25
20
15
Legend
CSR
CRI
1
8
15
22
29
6
13
20
27
3
10
17
24
SEPTEMBER
1991
OCTOBER
NOVEMBER
Date
JWP
2/20/92

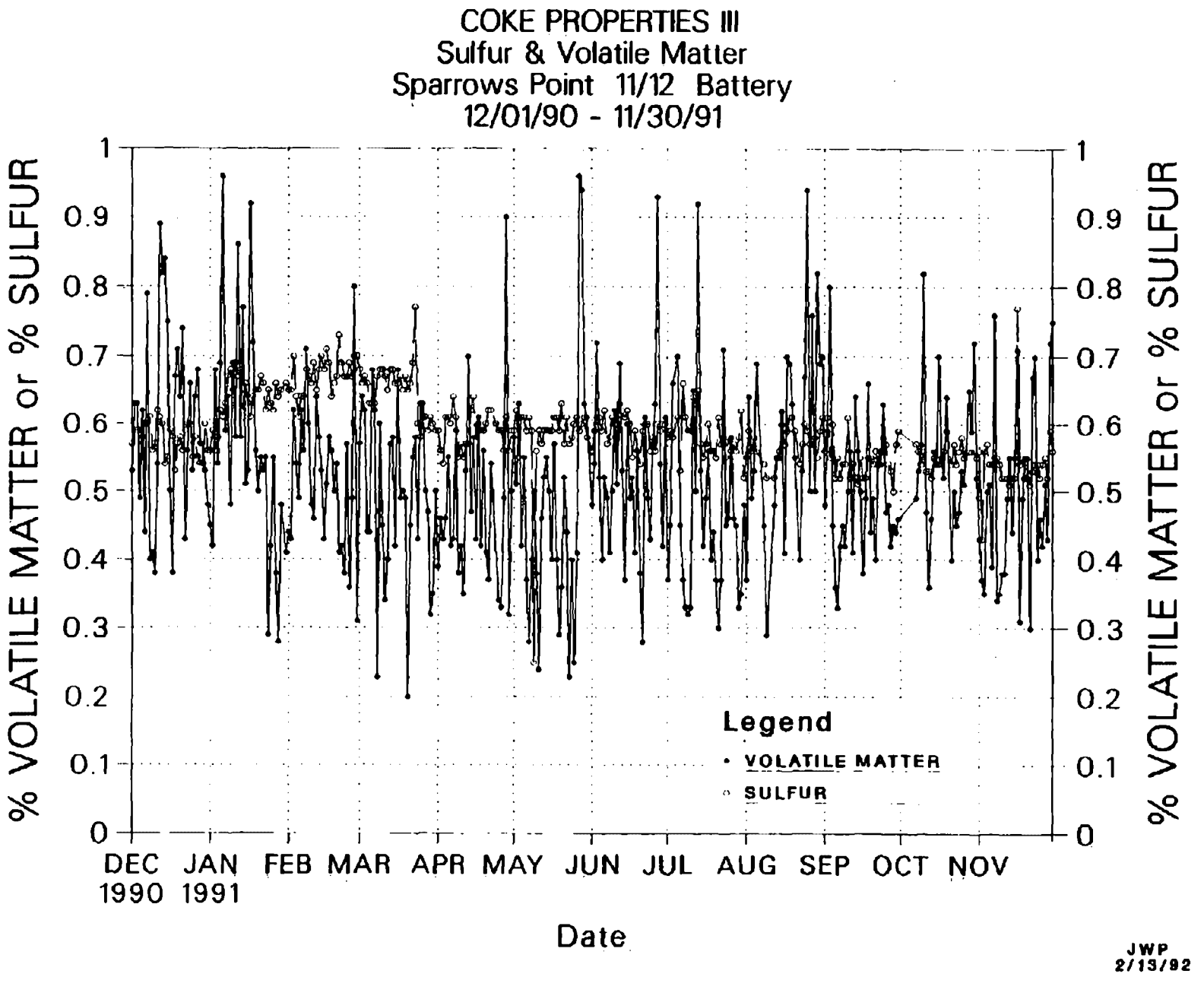

KIDC COKE PROPERTIES VII
% Passing 0.5 Inches
Sparrows Point 11 Battery
09/07/91 - 11/26/91
% -1/2 Inch
10
9
8
7
6
5
4
3
2
1
0
1
8
15
22
29
6
13
20
27
3
10
17
24
SEPTEMBER
1991
OCTOBER
NOVEMBER
Date
JWP
2/20/92

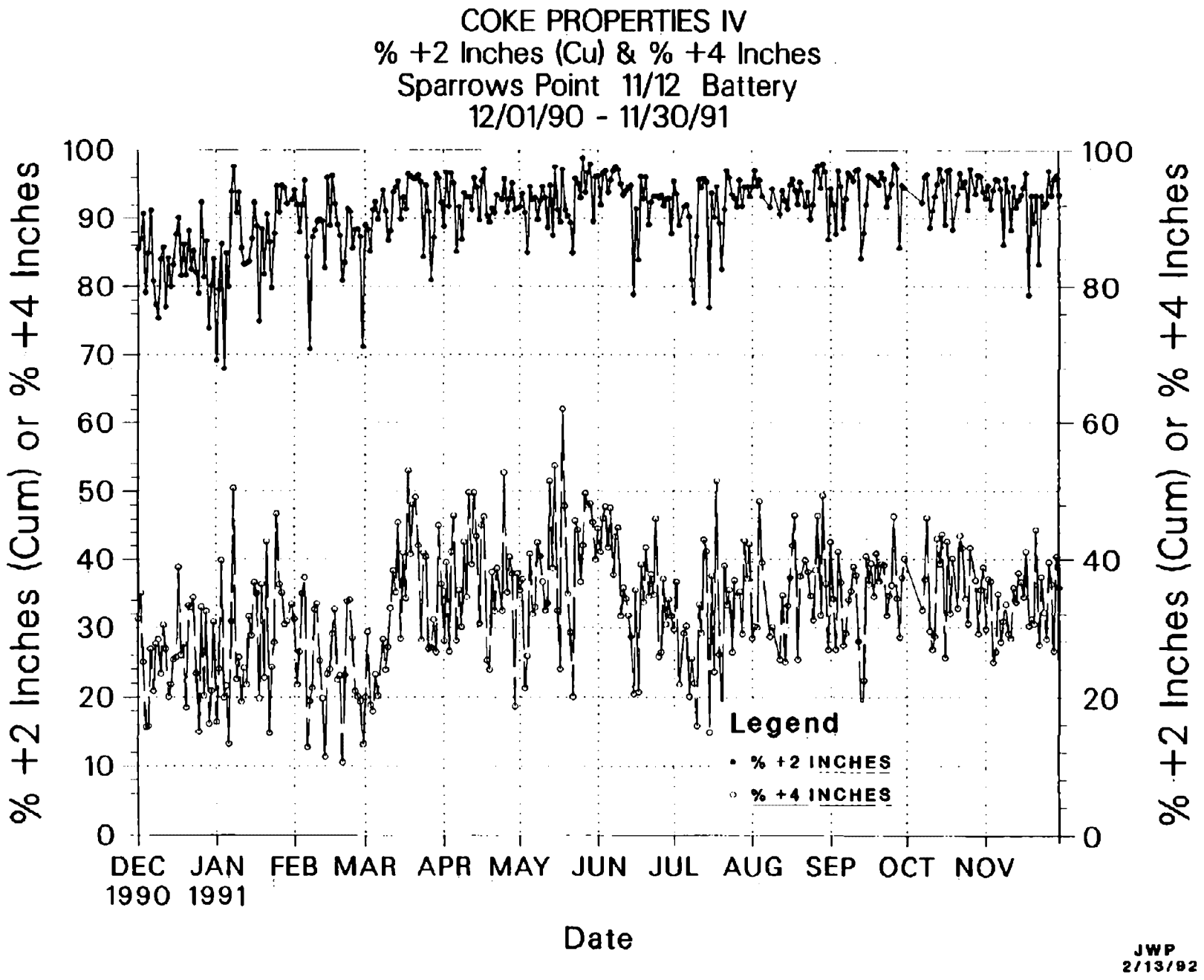
Section 3

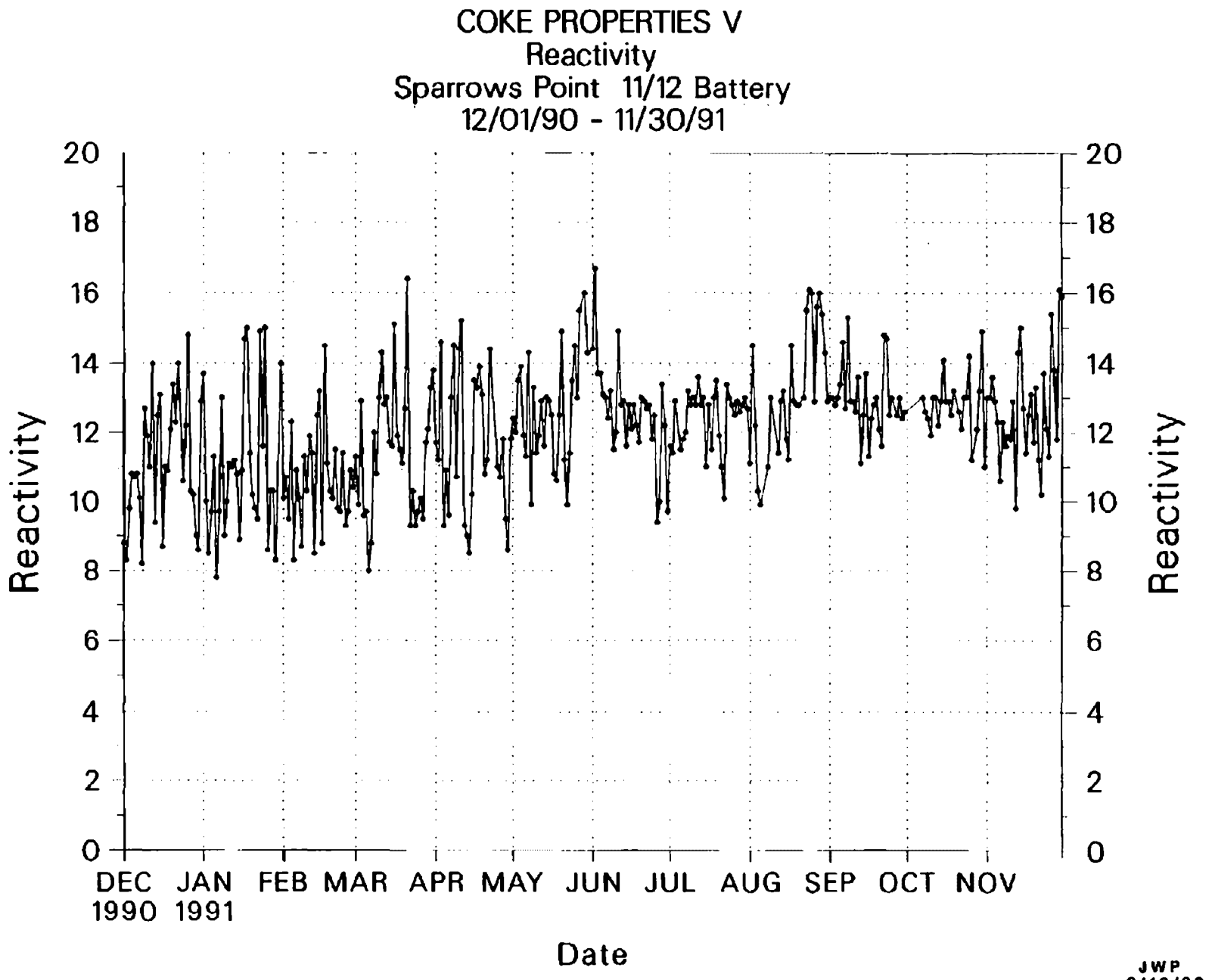
Graphs of Conventionally Quenched Coke Properties


COKE PROPERTIES I
Hardness & Stability
Sparrows Point 11/12 Battery
12/01/90 - 11/30/91
Hardness & Stability Index
80
75
70
65
60
55
50
45
40
DEC 1990
JAN 1991
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
Date
Legend
HARDNESS
STABILITY
JWP
2/13/92


COKE PROPERTIES II
Moisture & Ash
Sparrows Point 11/12 Battery
12/01/90 - 11/30/91
Legend
Moisture
Ash
% Moisture or % Ash
20
18
16
14
12
10
8
6
4
2
0
DEC 1990
JAN 1991
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
Date
JWP
2/13/92


COKE PROPERTIES III
Sulfur & Volatile Matter
Sparrows Point 11/12 Battery
12/01/90 - 11/30/91
% VOLATILE MATTER or % SULFUR
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
DEC 1990
JAN 1991
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
Date
Legend
VOLATILE MATTER
SULFUR
JWP
2/13/92


COKE PROPERTIES IV
% +2 Inches (Cu) & % +4 Inches
Sparrows Point 11/12 Battery
12/01/90 - 11/30/91
% +2 Inches (Cum) or % +4 Inches
100
90
80
70
60
50
40
30
20
10
0
DEC 1990
JAN 1991
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
Date
Legend
% +2 INCHES
% +4 INCHES
JWP
2/13/92


COKE PROPERTIES V
Reactivity
Sparrows Point 11/12 Battery
12/01/90 - 11/30/91
Reactivity
20
18
16
14
12
10
8
6
4
2
0
DEC 1990
JAN 1991
FEB
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APR
MAY
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JUL
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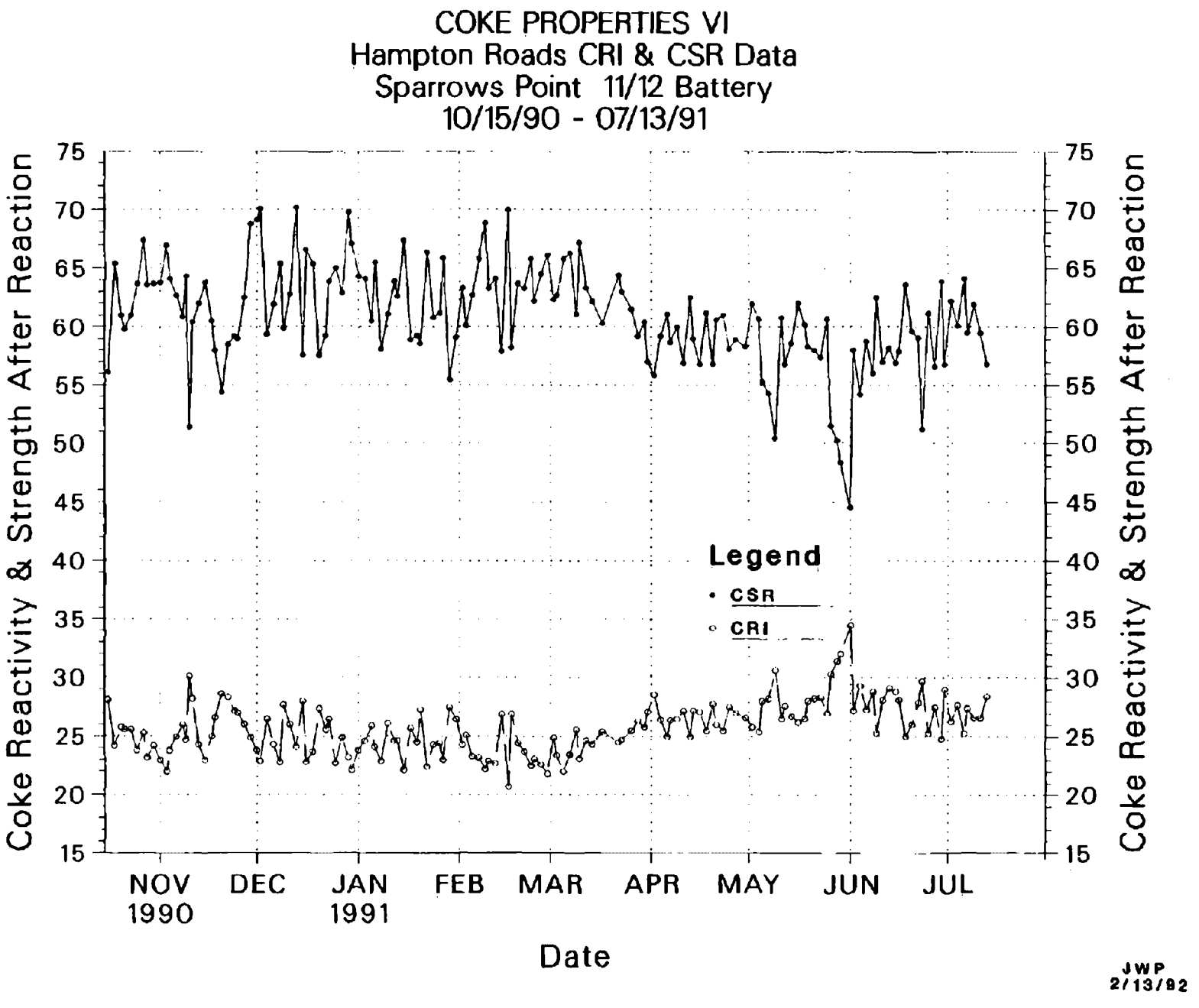
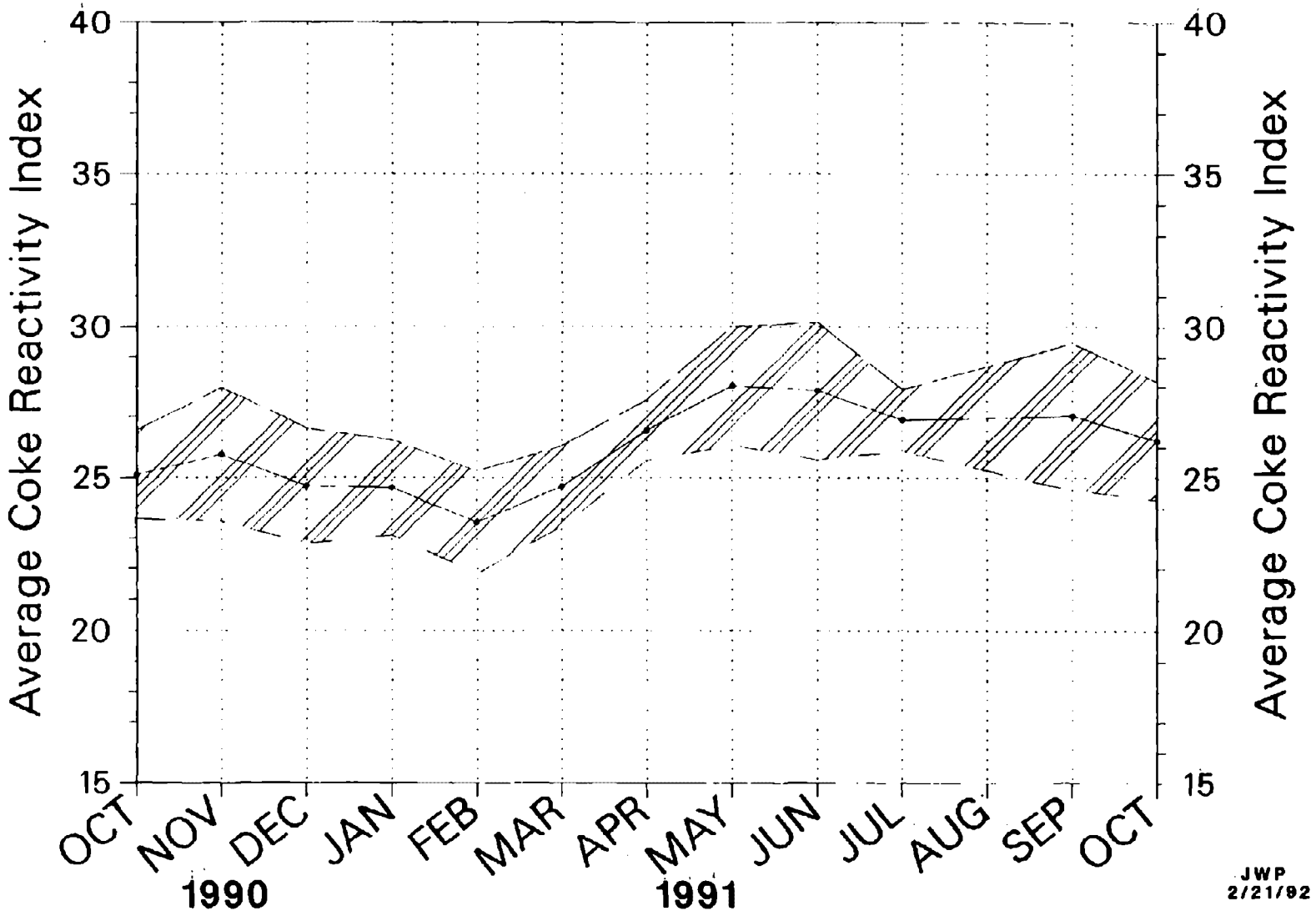
JWP
2/13/92


COKE PROPERTIES VI
Hampton Roads CRI & CSR Data
Sparrows Point 11/12 Battery
10/15/90 - 07/13/91
Coke Reactivity & Strength After Reaction
75
70
65
60
55
50
45
40
35
30
25
20
15
NOV 1990
DEC
JAN 1991
FEB
MAR
APR
MAY
JUN
JUL
Date
Legend
CSR
CRI
JWP
2/13/92

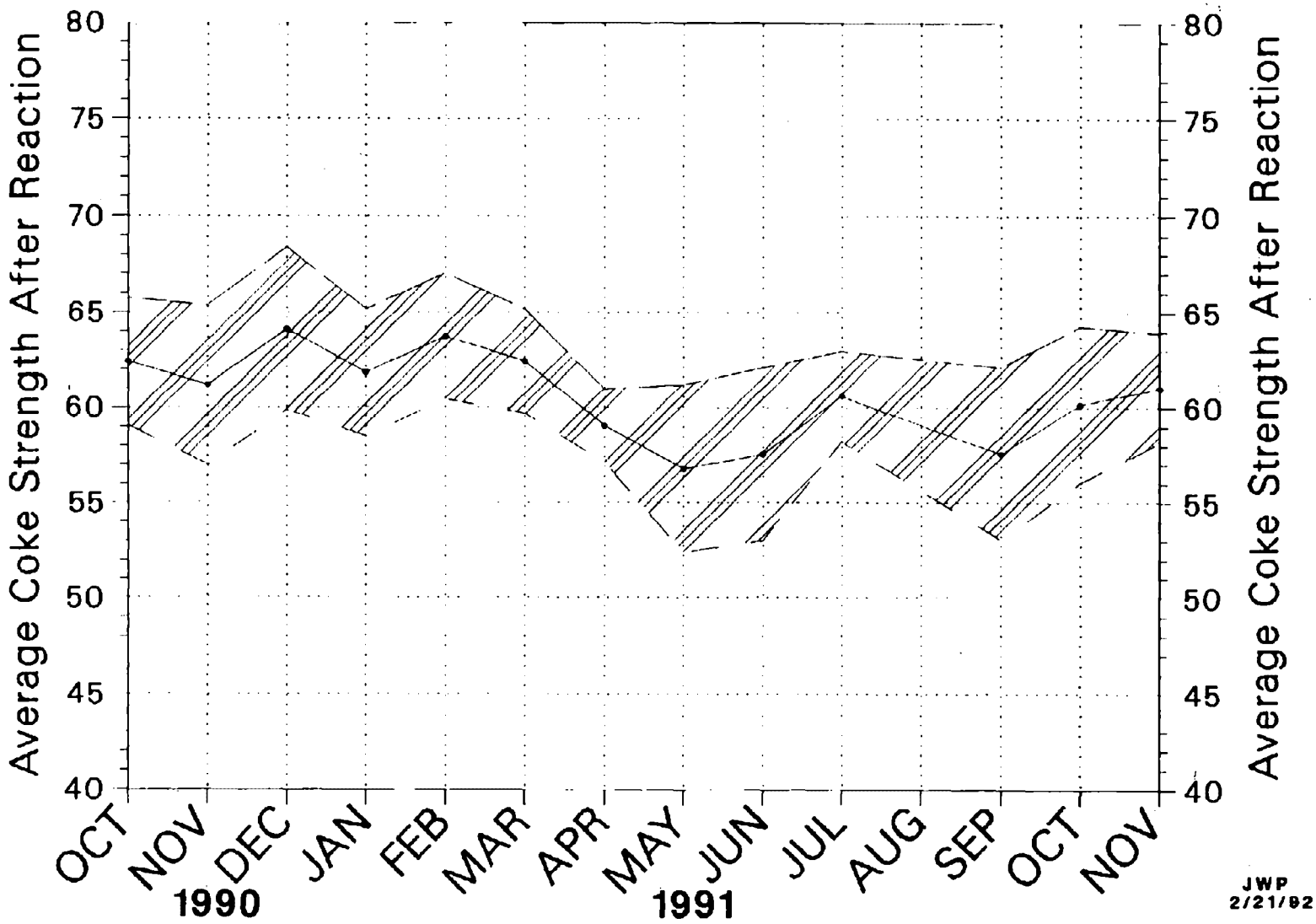
Section 4

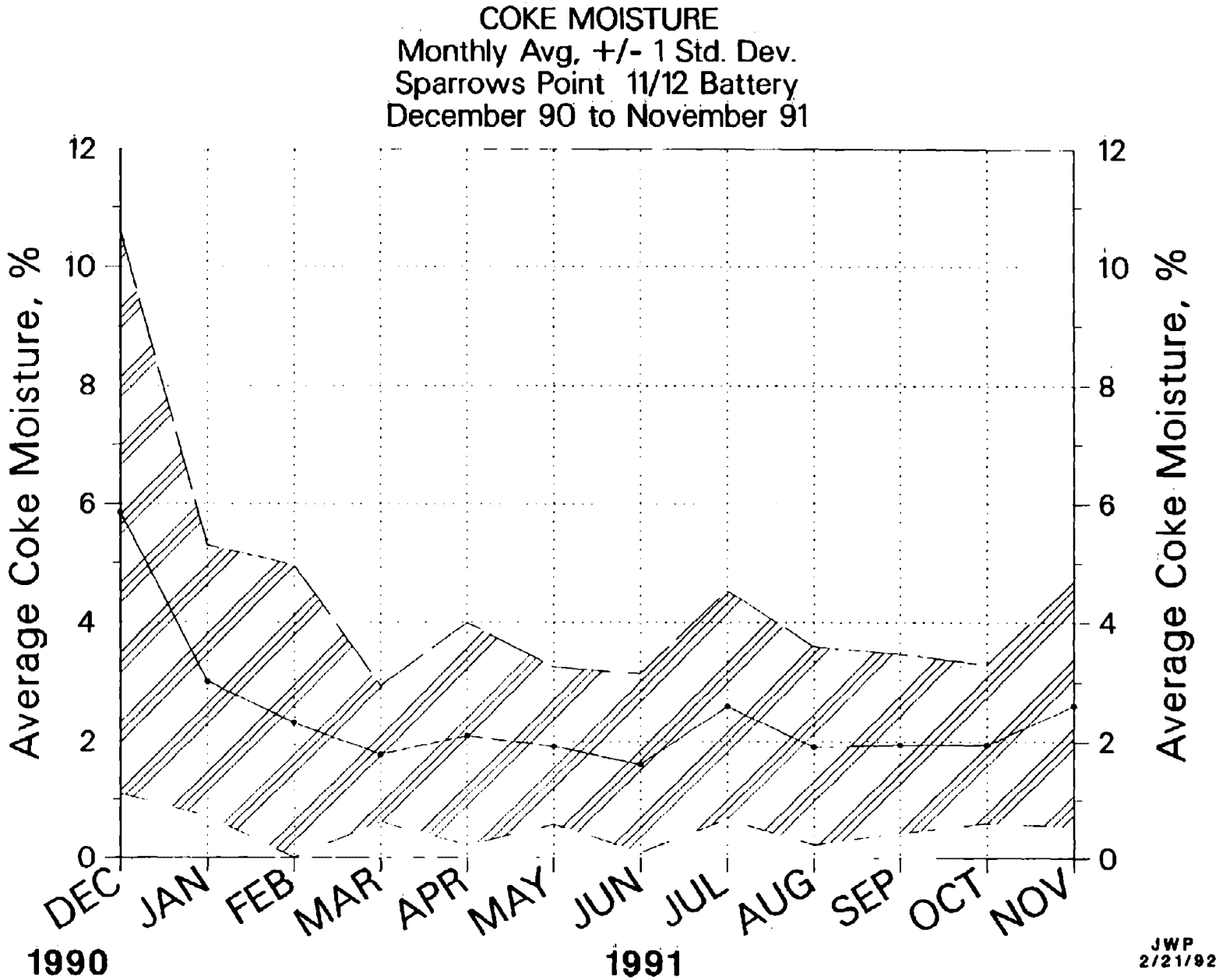
Monthly Average & Standard Deviation Graphs for
Conventionally Quenched Coke Properties

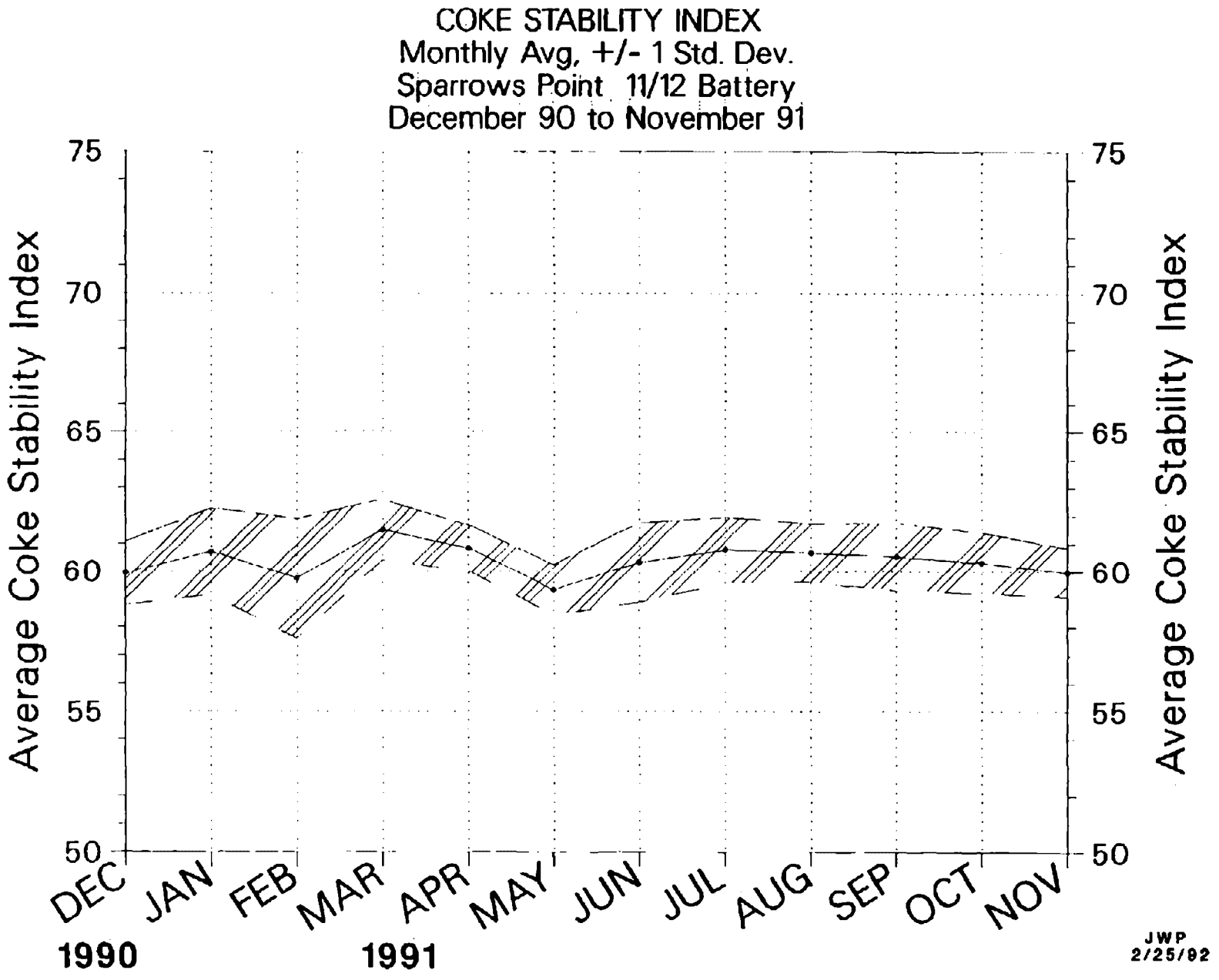
COKE REACTIVITY INDEX
Monthly Avg, +/- 1 Std. Dev. (Hampton Roads Data)
Sparrows Point 11/12 Battery
October 90 to October 91

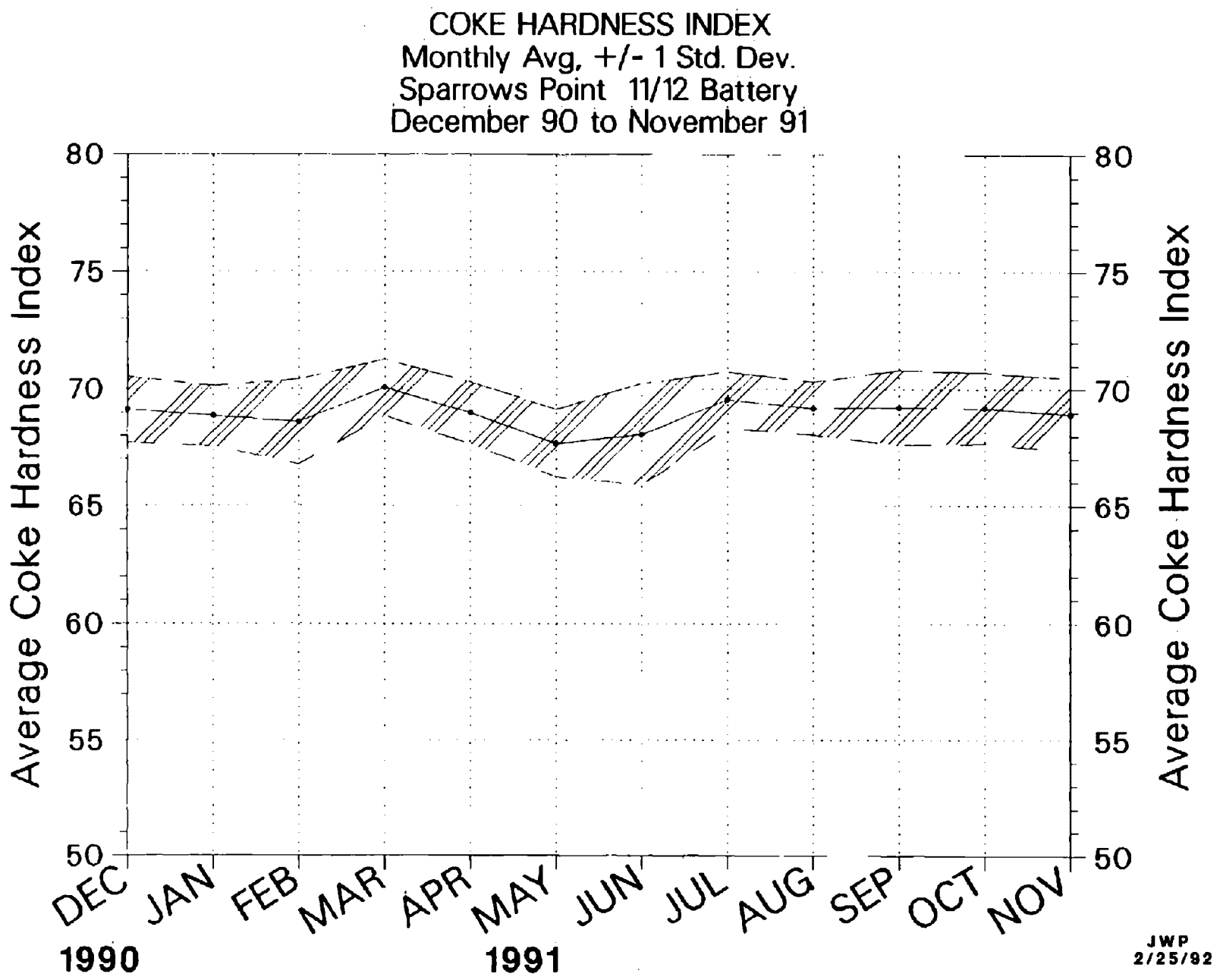


COKE STRENGTH AFTER REACTION
Monthly Avg, +/- 1 Std. Dev. (Hampton Roads Data)
Sparrows Point 11/12 Battery
October 90 to November 91

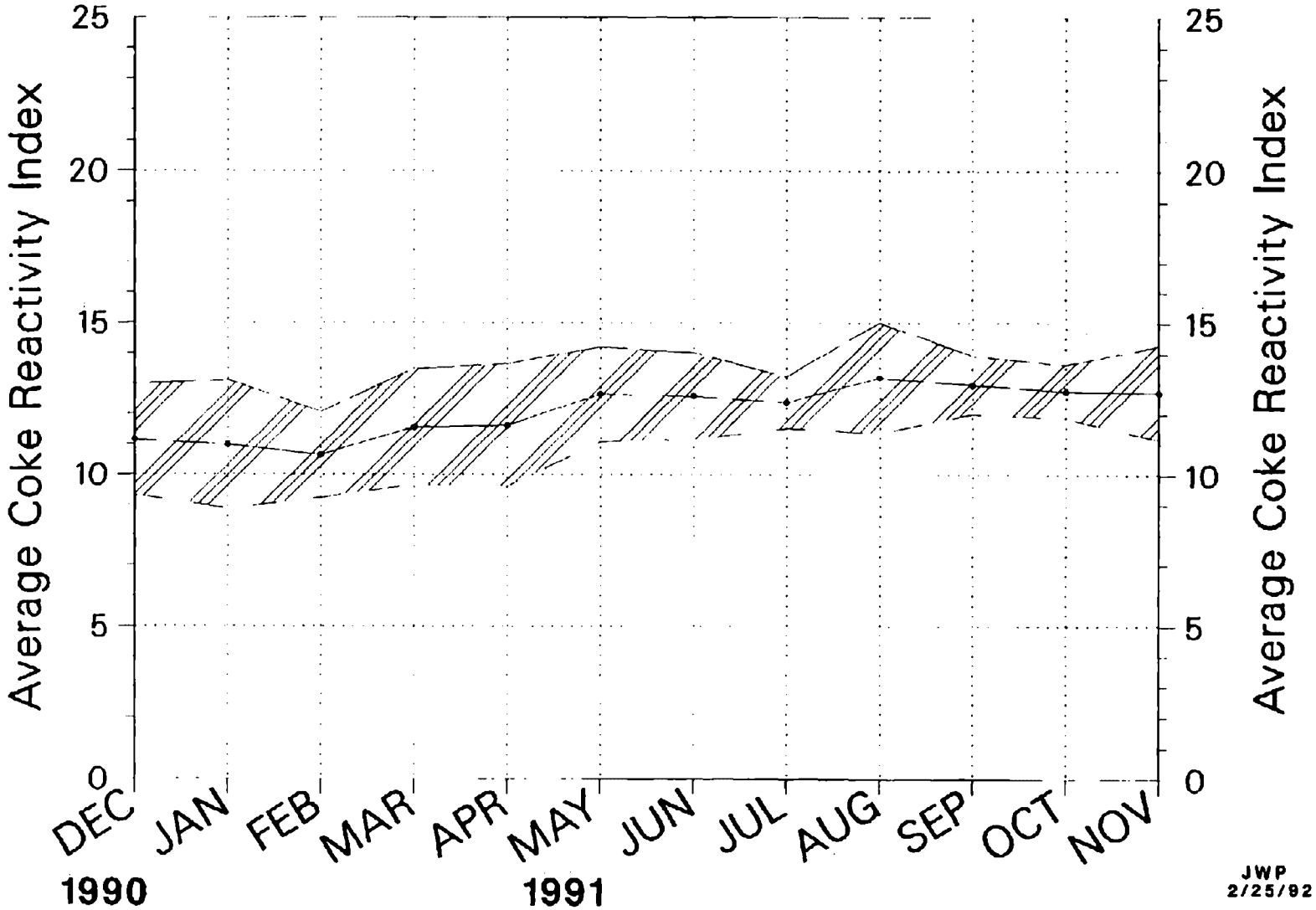



COKE MOISTURE
Monthly Avg, +/- 1 Std. Dev.
Sparrows Point 11/12 Battery
December 90 to November 91
Average Coke Moisture, %
12
10
8
6
4
2
0
DEC
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
1990
1991
JWP
2/21/92


COKE STABILITY INDEX
Monthly Avg, +/- 1 Std. Dev.
Sparrows Point 11/12 Battery
December 90 to November 91
Average Coke Stability Index
75
70
65
60
55
50
DEC
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
1990
1991
JWP
2/25/92

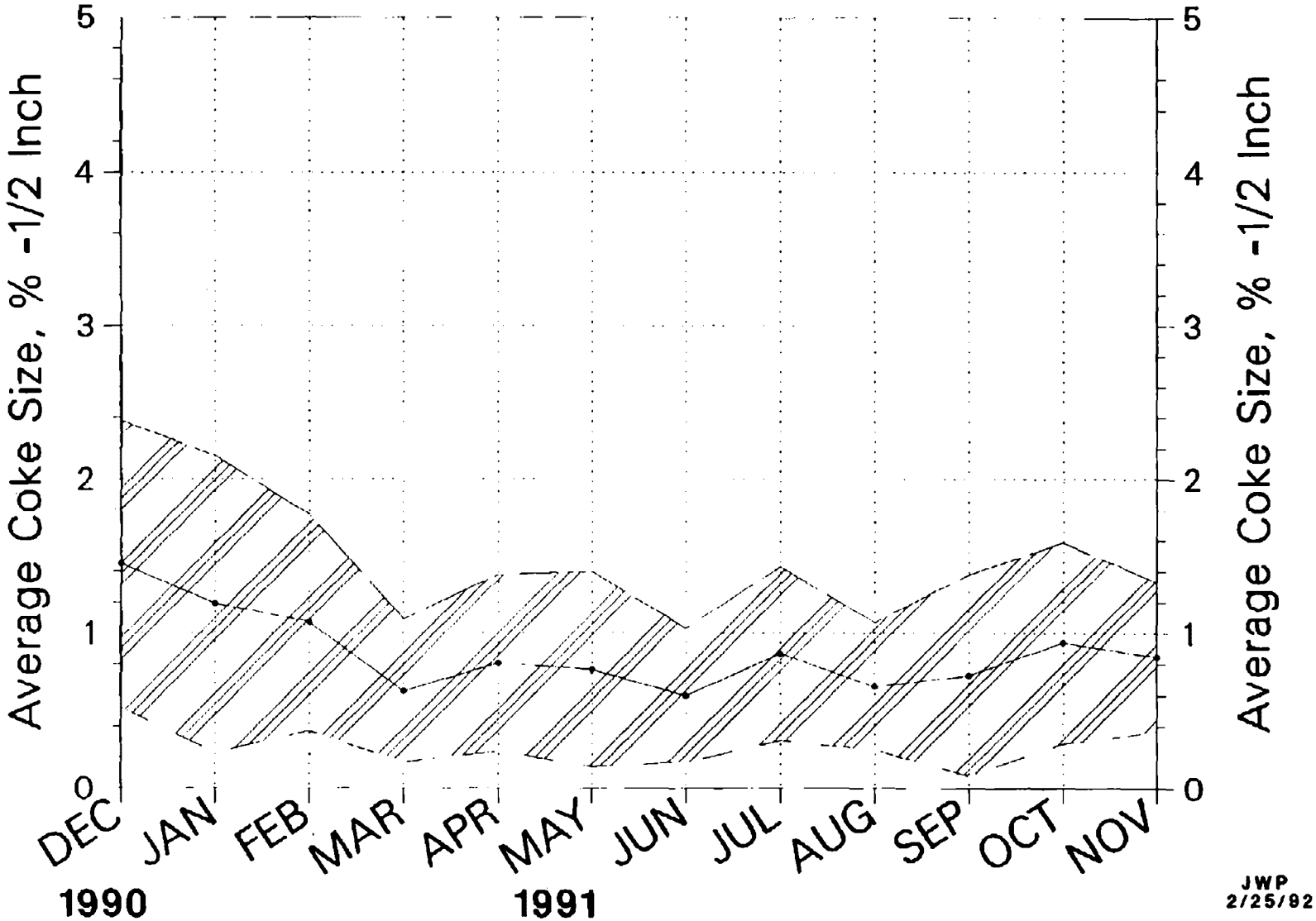

COKE HARDNESS INDEX
Monthly Avg, +/- 1 Std. Dev.
Sparrows Point 11/12 Battery
December 90 to November 91
Average Coke Hardness Index
80
75
70
65
60
55
50
DEC
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
1990
1991
JWP
2/25/92

COKE REACTIVITY INDEX (Bethlehem)
Monthly Avg. +/- 1 Std. Dev.
Sparrows Point 11/12 Battery
December 90 to November 91

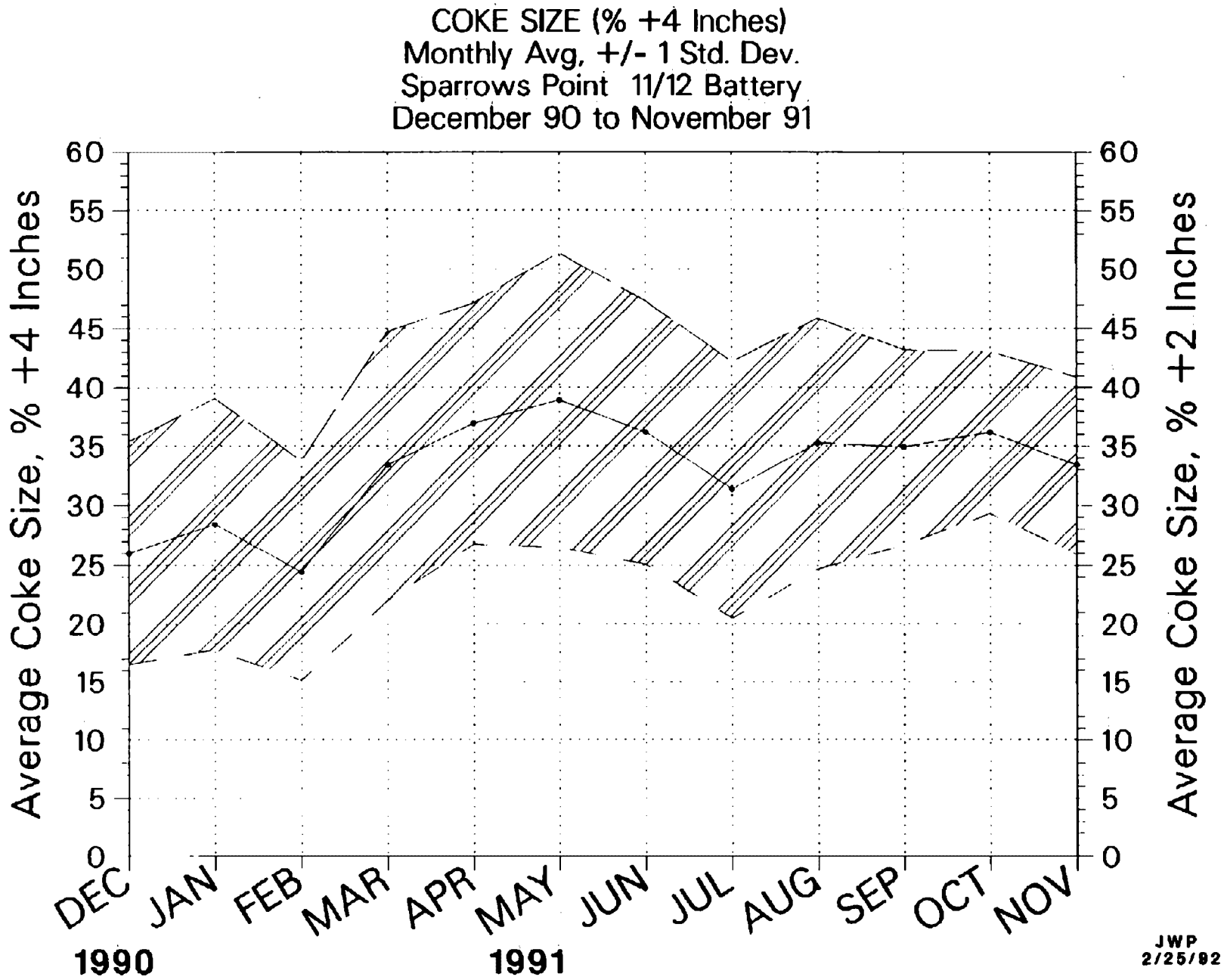


JWP
2/25/92

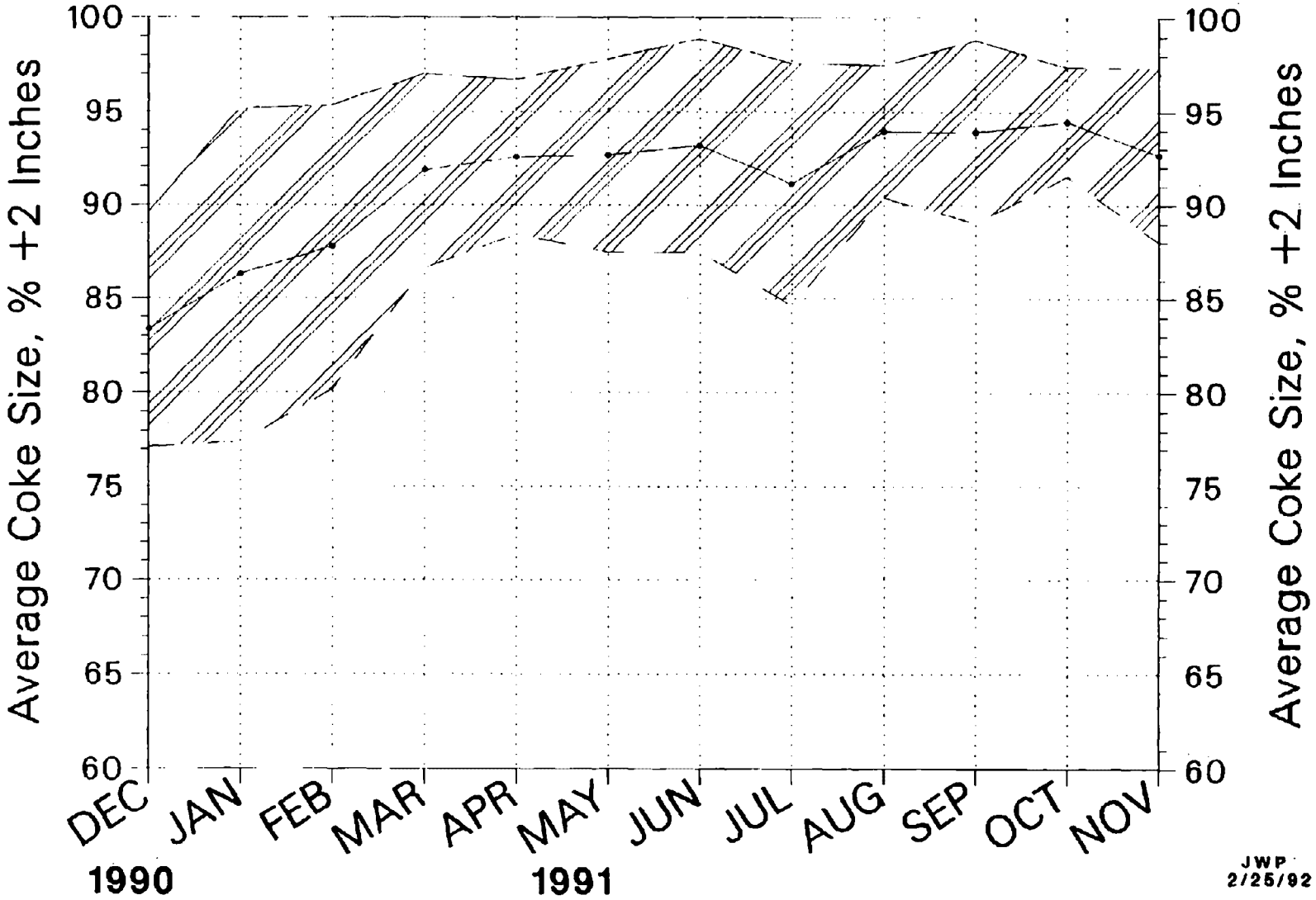
COKE SIZE (% -1/2 Inch)
Monthly Avg, +/- 1 Std. Dev.
Sparrows Point 11/12 Battery
December 90 to November 91



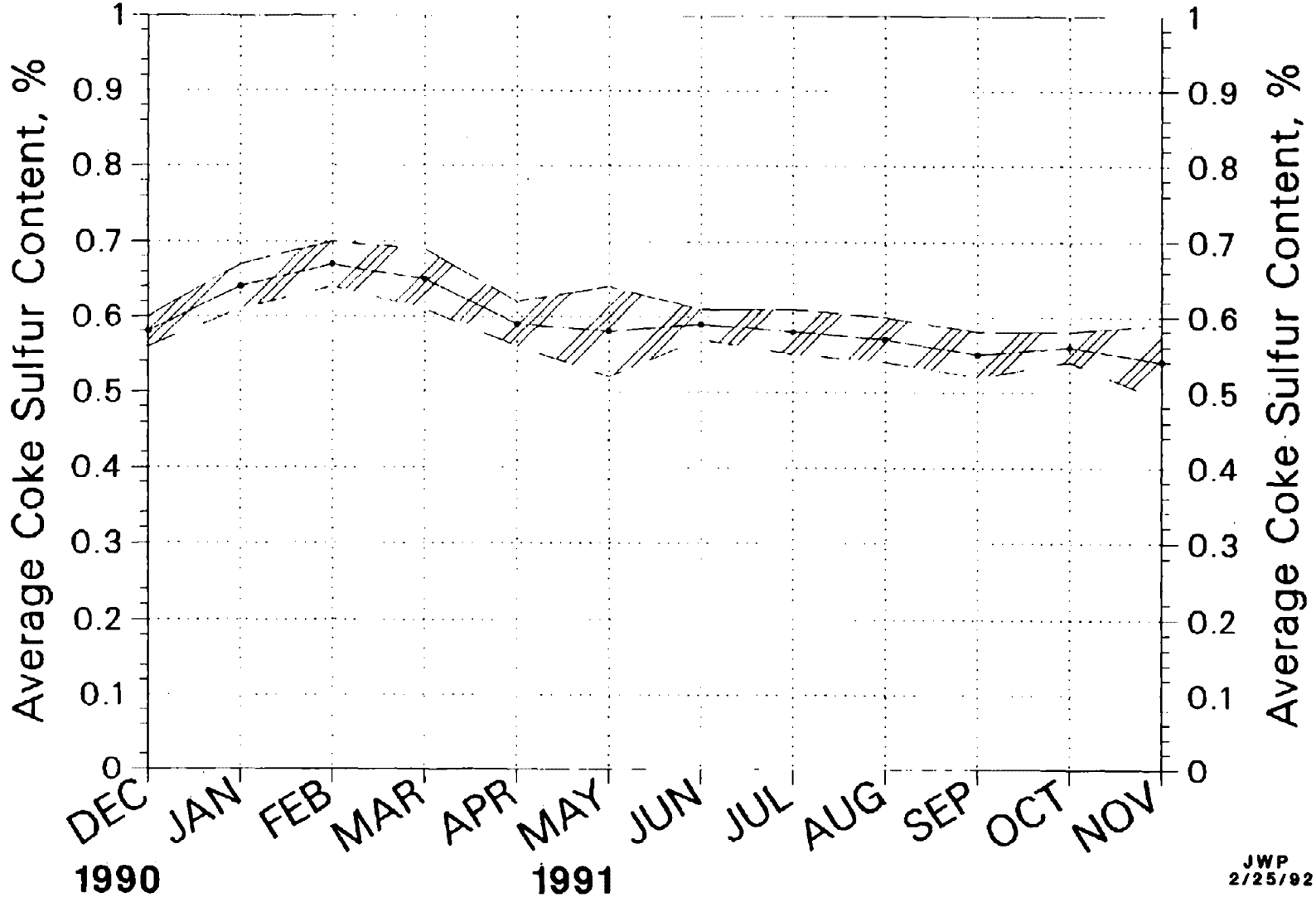
JWP
2/25/92


COKE SIZE (% +4 Inches)
Monthly Avg, +/- 1 Std. Dev.
Sparrows Point 11/12 Battery
December 90 to November 91
Average Coke Size, % +4 Inches
Average Coke Size, % +2 Inches
0
5
10
15
20
25
30
35
40
45
50
55
60
DEC
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
1990
1991
JWP
2/25/92

COKE SIZE (Cum. % +2 Inches)
Monthly Avg, +/- 1 Std. Dev.
Sparrows Point 11/12 Battery
December 90 to November 91



COKE SULFUR CONTENT, %
Monthly Avg, +/- 1 Std. Dev.
Sparrows Point 11/12 Battery
December 90 to November 91



Section 5

Conventionally Quenched Coke Properties Database

COKE PROPERTIES FROM DAILY COKE REPORTS, 11/12 BATTERIES 11:30 Wednesday, April 1, 1992 1
KIDC DEMONSTRATION PROJECT - BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

OBS	DATE	BELT	TURN	ON4"	ON3"	COKE ON2"	ON1 5"	SIZE ON1"	ON.75"	ON.5"	THRU.5	% H2O	STABIL ITY	HARD NESS	REACT IVITY	SULFUR	VM	ASH
1	12/01/90	K-6	3-11	31.3	30.1	24.1	8.2	3.2	1.1	0.5	1.5	2.63	58.2	68.1	8.8	0.57	0.53	8.40
2	12/02/90	K-6	7-3	34.4	28.2	25.9	6.6	2.4	0.6	0.6	1.3	1.16	58.4	68.0	8.3	0.59	0.63	8.54
3	12/02/90	K-6	3-11	35.9	19.2	30.3	8.7	3.1	0.6	0.6	1.6	1.11	59.1	68.4	8.3	0.59	0.63	8.54
4	12/03/90	K-6	7-3	22.3	30.9	34.5	8.2	2.0	0.5	0.2	1.4	12.21	61.5	71.2	9.8	0.59	0.63	8.63
5	12/03/90	K-6	3-11	27.8	33.9	32.0	4.0	1.1	0.1	0.1	1.0	3.68	62.5	70.5	9.8	0.59	0.63	8.63
6	12/04/90	K-6	7-3	20.4	36.1	30.9	8.9	2.4	0.6	0.3	0.4	1.04	59.6	68.1	10.8	0.59	0.49	8.72
7	12/04/90	K-6	3-11	11.0	20.5	39.4	15.5	7.4	1.6	1.2	3.4	6.95	60.4	67.4	10.8	0.59	0.49	8.72
8	12/05/90	K-6	3-11	15.8	28.2	40.9	11.7	2.3	0.4	0.3	0.4	4.98	61.7	72.2	10.7	0.58	0.62	8.71
9	12/06/90	K-6	3-11	26.9	33.9	30.4	4.4	2.5	0.5	0.3	1.1	2.93	60.1	70.8	10.8	0.60	0.44	8.20
10	12/07/90	K-6	7-3	11.1	28.4	40.6	12.5	5.1	0.9	0.4	1.0	14.19	59.8	69.6	10.1	0.60	0.79	7.96
11	12/07/90	K-6	3-11	30.7	20.7	30.1	10.4	4.8	1.7	0.3	1.3	11.43	60.5	70.2	10.1	0.60	0.79	7.96
12	12/08/90	K-6	7-3	20.1	22.9	25.6	20.2	9.1	0.6	0.5	1.0	2.44	60.1	70.5	8.2	0.61	0.40	8.17
13	12/08/90	K-6	3-11	35.2	21.1	29.8	7.0	5.0	0.8	0.3	0.8	2.03	58.9	69.4	8.2	0.61	0.40	8.17
14	12/09/90	K-6	7-3	25.4	23.0	22.5	16.1	11.4	0.4	0.3	0.9	0.34	61.3	70.8	12.7	0.56	0.41	8.69
15	12/09/90	K-6	3-11	31.2	22.7	26.0	12.5	5.6	0.2	0.3	1.5	5.88	60.9	69.7	12.7	0.56	0.41	8.69
16	12/10/90	K-6	7-3	21.4	32.1	28.3	8.1	4.9	1.1	1.7	2.4	2.34	60.1	70.4	11.9	0.57	0.38	8.07
17	12/10/90	K-6	3-11	25.3	26.1	34.8	8.9	3.1	0.6	0.6	0.6	2.82	60.3	69.7	11.9	0.57	0.38	8.07
18	12/11/90	K-6	7-3	20.9	28.4	32.3	10.4	3.7	1.2	0.9	2.2	4.63	60.9	68.7	11.0	0.62	0.54	8.31
19	12/11/90	K-6	3-11	39.9	25.2	24.8	5.8	1.7	0.7	0.2	1.7	11.97	61.3	70.2	11.0	0.62	0.54	8.31
20	12/12/90	K-6	3-11	26.9	20.6	29.5	11.9	5.6	1.5	1.2	2.8	8.63	60.2	69.2	14.0	0.61	0.89	8.54
21	12/13/90	K-6	3-11	20.1	26.5	37.6	7.2	4.4	1.9	0.8	1.5	0.61	59.0	68.4	9.4	0.60	0.82	8.54
22	12/14/90	K-6	7-3	23.7	25.2	33.3	9.3	4.6	1.1	0.7	2.1	8.44	61.7	69.2	12.5	0.54	0.84	8.28
23	12/14/90	K-6	3-11	20.0	29.9	27.9	7.3	5.5	1.7	1.7	6.0	12.16	57.8	68.1	12.5	0.54	0.84	8.28
24	12/15/90	K-6	7-3	28.4	26.4	29.9	8.1	3.5	1.1	0.7	1.9	3.75	59.7	68.8	13.1	0.55	0.75	8.17
25	12/15/90	K-6	3-11	22.4	28.4	30.9	8.2	4.4	1.2	1.2	3.3	3.74	58.8	70.0	13.1	0.55	0.75	8.17
26	12/16/90	K-6	7-3	19.7	29.5	35.6	9.1	3.3	1.2	0.5	1.1	2.37	61.0	68.8	8.7	0.59	0.50	8.23
27	12/16/90	K-6	3-11	31.7	31.4	27.4	5.4	2.3	0.4	0.3	1.1	0.00	59.7	67.4	8.7	0.59	0.50	8.23
28	12/17/90	K-6	7-3	36.5	34.3	20.3	5.3	1.8	0.2	0.5	1.1	5.14	58.9	69.6	11.0	0.58	0.38	8.57
29	12/17/90	K-6	3-11	41.2	23.8	24.0	6.1	2.1	0.2	0.6	2.0	2.64	58.4	68.6	11.0	0.58	0.38	8.57
30	12/18/90	K-6	7-3	10.9	25.4	33.8	17.5	8.8	2.1	0.8	0.7	11.52	58.0	68.5	10.9	0.53	0.67	8.17
31	12/18/90	K-6	3-11	41.2	30.9	21.1	3.7	1.5	0.4	0.4	0.8	1.47	60.0	70.3	10.9	0.53	0.67	8.17
32	12/19/90	K-6	7-3	20.8	28.4	37.2	6.9	4.2	0.8	0.6	1.1	8.91	60.5	69.9	12.1	0.57	0.71	8.67
33	12/19/90	K-6	3-11	34.4	28.4	23.1	4.4	3.8	3.5	0.5	1.9	14.65	61.2	67.3	12.1	0.57	0.71	8.67
34	12/20/90	K-6	7-3	14.1	22.7	38.7	12.4	7.8	1.8	1.1	1.4	4.23	57.6	68.0	13.4	0.58	0.64	8.36
35	12/20/90	K-6	3-11	22.9	20.2	44.8	6.7	2.7	0.2	0.7	1.8	2.49	59.2	70.0	13.4	0.58	0.64	8.36
36	12/21/90	K-6	7-3	53.6	24.1	17.5	3.0	1.0	0.4	0.2	0.2	13.51	59.7	68.9	12.3	0.56	0.74	8.29
37	12/21/90	K-6	3-11	12.8	31.7	36.7	10.5	4.1	1.2	1.0	2.0	8.21	60.4	69.8	12.3	0.56	0.74	8.29
38	12/22/90	K-6	7-3	44.6	22.1	18.8	10.5	3.3	0.3	0.2	0.2	8.99	60.2	70.2	14.0	0.59	0.43	8.45
39	12/22/90	K-6	3-11	21.4	25.6	32.6	13.8	3.0	1.8	1.0	0.8	0.37	61.1	70.9	14.0	0.59	0.43	8.45
40	12/23/90	K-6	7-3	32.5	25.8	25.0	9.4	5.1	0.8	0.3	1.1	1.46	60.0	70.0	.	0.60	0.56	8.67
41	12/23/90	K-6	3-11	36.4	23.9	26.8	8.2	2.3	0.2	0.2	2.0	2.61	59.6	70.8	.	0.60	0.56	8.67
42	12/24/90	K-6	7-3	17.3	14.4	47.9	14.1	3.2	0.7	0.9	1.5	2.92	60.4	69.7	10.6	0.60	0.66	8.74
43	12/24/90	K-6	3-11	29.4	17.8	37.4	10.1	3.4	0.6	0.4	0.9	2.56	59.8	68.7	10.6	0.60	0.66	8.74
44	12/25/90	K-6	7-3	18.8	22.0	41.9	10.0	4.2	1.0	0.3	1.8	7.58	59.6	68.9	12.2	0.55	0.53	8.20
45	12/25/90	K-6	3-11	11.1	23.6	40.6	13.6	7.6	1.2	0.4	1.9	15.56	60.4	69.9	12.2	0.55	0.53	8.20
46	12/26/90	K-6	7-3	28.2	45.6	20.4	2.8	0.8	0.2	0.9	1.1	5.84	60.2	64.7	14.8	0.58	0.64	8.04
47	12/26/90	K-6	3-11	37.8	27.4	25.4	4.3	2.0	0.7	0.3	2.1	1.54	61.6	69.5	14.8	0.58	0.64	8.04
48	12/27/90	K-6	7-3	24.0	25.0	34.3	8.7	6.5	0.6	0.1	0.8	15.79	59.3	67.6	10.3	0.55	0.68	9.28
49	12/27/90	K-6	3-11	16.4	23.5	39.6	13.2	5.6	0.6	0.3	0.8	7.36	60.6	66.4	10.3	0.55	0.68	9.28
50	12/28/90	K-6	3-11	32.4	27.4	26.8	8.7	2.5	0.8	0.6	0.8	10.09	61.0	71.2	10.2	0.54	0.57	9.25
51	12/29/90	K-6	7-3	18.3	23.3	34.8	13.4	8.0	0.5	0.3	1.4	10.71	60.1	65.5	9.0	0.54	0.57	8.90
52	12/29/90	K-6	3-11	14.0	25.9	31.5	16.3	9.0	1.2	0.3	1.8	5.62	61.2	69.1	9.0	0.54	0.57	8.90
53	12/30/90	K-6	7-3	17.4	25.2	34.5	13.1	7.6	1.3	0.4	0.5	0.78	58.5	68.3	8.6	0.60	0.53	8.37

KIDC DEMONSTRATION PROJECT - BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

OBS	DATE	BELT	TURN	ON4"	ON3"	COKE ON2"	ON1.5"	SIZE ON1"	ON.75"	ON.5"	THRU.5	% H2O	STABIL ITY	HARD NESS	REACT IVITY	SULFUR	VM	ASH
54	12/30/90	K-6	3-11	24.4	25.5	33.2	10.9	4.5	0.7	0.5	0.3	1.12	58.1	68.4	8.6	0.60	0.53	8.37
55	12/31/90	K-6	7-3	33.7	29.0	23.6	6.8	4.8	0.4	0.1	1.6	2.77	58.1	68.1	12.9	0.56	0.48	8.26
56	12/31/90	K-6	3-11	28.0	30.2	23.5	9.8	5.3	1.8	0.1	1.3	16.72	58.8	68.3	12.9	0.56	0.48	8.26
57	01/01/91	K-6	7-3	12.7	16.9	37.6	21.5	8.1	1.4	0.5	1.3	2.06	59.2	68.8	13.7	0.56	0.45	8.16
58	01/01/91	K-6	3-11	20.1	21.6	29.5	13.2	5.8	3.6	3.4	2.8	4.34	60.2	69.6	13.7	0.56	0.45	8.16
59	01/02/91	K-6	7-3	17.5	15.4	30.9	19.2	7.7	2.0	1.5	5.8	11.37	60.1	68.0	10.0	0.59	0.42	8.20
60	01/02/91	K-6	3-11	30.5	36.5	28.3	2.2	1.1	0.3	0.2	0.9	1.72	61.5	67.4	10.0	0.59	0.42	8.20
61	01/03/91	K-6	7-3	29.6	27.3	24.6	10.1	5.8	0.8	0.3	1.5	5.26	60.1	66.9	8.5	0.56	0.68	8.60
62	01/03/91	K-6	3-11	50.0	21.5	19.4	4.8	2.3	0.1	0.3	1.6	3.26	60.4	66.6	8.5	0.56	0.68	8.60
63	01/04/91	K-6	7-3	18.6	12.0	31.5	26.3	8.2	1.9	0.6	0.9	3.29	59.6	70.1	9.7	0.58	0.54	8.18
64	01/04/91	K-6	3-11	21.3	11.1	41.4	16.4	6.8	2.2	0.4	0.4	2.61	62.0	70.7	9.7	0.58	0.54	8.18
65	01/05/91	K-6	7-3	17.5	29.3	31.4	14.8	5.4	0.3	0.2	1.1	3.18	61.1	68.5	11.3	0.62	0.69	8.35
66	01/05/91	K-6	3-11	25.7	30.7	35.2	5.4	1.2	0.3	0.3	1.2	3.50	60.4	70.1	11.3	0.62	0.69	8.35
67	01/06/91	K-6	7-3	7.3	22.9	46.7	12.8	4.9	1.6	1.1	2.7	0.62	60.8	68.6	7.8	0.61	0.96	8.78
68	01/06/91	K-6	3-11	19.2	26.8	37.0	8.6	3.6	2.1	1.2	1.5	1.44	59.9	68.2	7.8	0.61	0.96	8.78
69	01/07/91	K-6	3-11	30.9	37.9	25.1	3.5	1.4	0.5	0.4	0.3	4.00	66.4	68.9	9.7	0.63	0.59	8.96
70	01/08/91	K-6	3-11	50.4	24.6	22.6	1.3	0.3	0.3	0.2	0.3	2.82	60.3	69.0	13.0	0.67	0.64	8.40
71	01/09/91	K-6	7-3	27.0	38.6	28.3	4.5	0.8	0.3	0.2	0.3	2.74	61.7	70.5	9.0	0.68	0.48	8.46
72	01/09/91	K-6	3-11	18.3	37.1	32.3	7.8	2.7	0.6	0.3	0.9	2.76	61.0	69.3	9.0	0.68	0.48	8.46
73	01/10/91	K-6	7-3	41.7	32.4	21.8	3.0	0.7	0.1	0.1	0.2	1.12	62.2	69.1	10.0	0.65	0.69	7.86
74	01/10/91	K-6	3-11	9.8	41.2	40.9	5.2	1.5	0.2	0.2	1.0	2.34	60.1	70.5	10.0	0.65	0.69	7.86
75	01/11/91	K-6	7-3	19.4	41.0	29.7	7.4	1.0	0.4	0.3	0.8	7.33	62.3	69.1	11.1	0.69	0.58	8.04
76	01/11/91	K-6	3-11	19.5	29.0	32.8	10.7	4.3	1.0	0.7	2.0	9.21	61.2	70.1	11.1	0.69	0.58	8.04
77	01/12/91	K-6	7-3	18.8	23.4	33.5	13.2	5.2	1.6	0.9	3.4	3.57	62.8	70.3	11.0	0.67	0.86	8.56
78	01/12/91	K-6	3-11	29.6	34.5	26.8	5.2	2.2	0.5	0.3	0.9	0.82	60.0	68.3	11.0	0.67	0.86	8.56
79	01/13/91	K-6	7-3	19.1	33.2	31.4	10.2	2.9	1.1	0.6	1.5	4.61	62.5	69.9	11.2	0.68	0.58	8.35
80	01/13/91	K-6	3-11	24.6	28.7	29.8	9.7	3.9	0.9	0.7	1.7	2.26	59.7	67.3	11.2	0.68	0.58	8.35
81	01/14/91	K-6	7-3	34.2	28.5	27.7	4.8	3.2	0.4	0.3	0.9	6.06	59.4	69.6	10.8	0.62	0.77	8.42
82	01/14/91	K-6	3-11	29.2	22.8	25.0	11.7	8.1	2.1	0.1	1.0	0.76	60.6	68.5	10.8	0.62	0.77	8.42
83	01/15/91	K-6	7-3	27.2	34.6	20.8	10.0	6.2	0.4	0.1	0.7	3.87	58.6	68.4	8.9	0.66	0.51	8.25
84	01/15/91	K-6	3-11	30.6	35.3	25.5	5.4	2.2	0.2	0.2	0.6	2.19	60.0	69.1	8.9	0.66	0.51	8.25
85	01/16/91	K-6	7-3	37.4	30.2	26.2	3.7	1.2	0.3	0.2	0.8	0.34	60.4	68.9	10.9	0.63	0.53	8.02
86	01/16/91	K-6	3-11	35.9	33.0	22.1	4.8	2.6	0.1	0.1	1.4	5.59	61.0	69.4	10.9	0.63	0.53	8.02
87	01/17/91	K-6	7-3	35.6	32.4	23.5	5.2	2.1	0.3	0.1	0.8	1.32	60.2	70.0	14.7	0.61	0.92	8.82
88	01/17/91	K-6	3-11	34.6	29.7	22.0	7.9	4.7	0.3	0.1	0.7	2.25	59.9	68.0	14.7	0.61	0.92	8.82
89	01/18/91	K-6	7-3	18.6	22.4	29.9	15.7	8.6	3.8	0.4	0.6	1.22	59.6	66.2	15.0	0.64	0.72	8.51
90	01/18/91	K-6	3-11	21.1	25.6	32.3	9.9	4.9	5.0	0.4	0.8	1.05	59.9	68.4	15.0	0.64	0.72	8.51
91	01/19/91	K-6	7-3	38.0	32.9	22.1	3.9	1.4	0.3	0.1	1.3	0.35	59.5	70.1	11.4	0.65	0.56	8.14
92	01/19/91	K-6	3-11	34.8	20.8	28.3	13.0	1.8	0.1	0.1	1.1	2.31	59.1	68.6	11.4	0.65	0.56	8.14
93	01/20/91	K-6	7-3	20.6	25.6	31.2	19.2	2.0	0.3	0.3	0.8	2.84	60.9	67.3	10.2	0.65	0.50	9.11
94	01/20/91	K-6	3-11	25.0	29.1	32.2	10.1	1.4	1.2	0.4	0.6	3.15	60.5	70.2	10.2	0.65	0.50	9.11
95	01/21/91	K-6	7-3	53.6	28.8	13.8	1.7	0.4	0.8	0.5	0.4	3.30	60.3	68.7	9.8	0.67	0.55	8.85
96	01/21/91	K-6	3-11	31.7	31.2	22.2	6.6	2.9	1.3	0.9	3.2	4.41	61.6	67.4	9.8	0.67	0.55	8.85
97	01/22/91	K-6	7-3	13.8	43.0	37.9	2.6	1.4	0.6	0.4	0.3	2.44	59.8	69.2	9.5	0.66	0.53	8.51
98	01/22/91	K-6	3-11	15.8	21.6	40.9	10.7	5.5	1.2	1.8	2.5	9.29	60.4	70.2	9.5	0.66	0.53	8.51
99	01/23/91	K-6	7-3	21.4	22.8	31.5	11.3	8.0	3.5	0.6	0.9	5.94	60.1	67.8	14.9	0.62	0.55	8.51
100	01/23/91	K-6	3-11	27.2	25.6	31.1	7.0	6.2	1.9	0.4	0.6	1.18	57.3	65.0	14.9	0.62	0.55	8.51
101	01/24/91	K-6	7-3	32.2	36.3	26.2	2.1	1.5	0.8	0.5	0.4	0.00	58.9	68.2	11.6	0.65	0.29	8.32
102	01/24/91	K-6	3-11	23.5	25.9	31.5	8.7	5.3	1.2	1.3	2.6	2.28	56.5	67.4	11.6	0.65	0.29	8.32
103	01/25/91	K-6	7-3	37.3	28.4	27.6	3.5	1.7	0.4	0.4	0.7	0.96	59.8	68.2	15.0	0.63	0.42	8.16
104	01/25/91	K-6	3-11	56.3	27.5	12.5	1.7	0.5	0.2	0.3	1.0	1.52	60.2	68.6	15.0	0.63	0.42	8.16
105	01/26/91	K-6	7-3	33.7	35.7	25.3	2.5	1.2	0.4	0.3	0.9	2.32	60.9	68.1	8.6	0.62	0.55	8.46
106	01/26/91	K-6	3-11	39.0	26.5	21.7	5.1	2.7	0.7	2.2	2.1	2.56	61.4	67.5	8.6	0.62	0.55	8.46

OBS	DATE	BELT	TURN	ON4"	ON3"	COKE ON2"	ON1.5"	SIZE ON1"	ON.75"	ON.5"	THRU 5	% H2O	STABILITY	HARDNESS	REACTIVITY	SULFUR	VM	ASH
107	01/27/91	K-6	7-3	30.8	41.5	22.4	2.7	0.6	0.3	0.5	1.2	5.70	64.6	72.1	10.3	0.66	0.38	8.62
108	01/27/91	K-6	3-11	39.5	29.4	26.2	2.8	0.6	0.1	0.3	1.1	3.70	61.0	69.5	10.3	0.66	0.38	8.62
109	01/28/91	K-6	7-3	33.2	34.4	26.4	3.6	1.1	0.8	0.2	0.3	1.42	62.9	70.3	10.3	0.64	0.28	8.77
110	01/28/91	K-6	3-11	27.8	42.1	25.2	2.9	0.9	0.3	0.3	0.5	1.78	62.0	69.1	10.3	0.64	0.28	8.77
111	01/29/91	K-6	7-3	20.0	31.8	39.2	5.7	1.6	0.4	0.4	0.9	1.87	61.4	70.4	8.3	0.65	0.48	8.21
112	01/29/91	K-6	3-11	41.9	23.6	27.9	4.0	1.1	0.4	0.4	0.7	0.62	61.8	68.0	8.3	0.65	0.48	8.21
113	01/31/91	K-6	7-3	26.2	35.1	33.5	3.0	1.0	0.3	0.2	0.7	2.31	61.4	68.9	14.0	0.66	0.41	8.46
114	01/31/91	K-6	3-11	40.7	31.6	18.4	2.5	4.6	0.5	0.6	1.1	1.25	63.7	70.5	14.0	0.66	0.41	8.46
115	02/01/91	K-6	7-3	25.9	37.7	32.7	2.6	0.6	0.1	0.1	0.3	2.91	59.8	68.8	10.1	0.65	0.44	8.47
116	02/01/91	K-6	3-11	36.6	31.2	24.3	3.5	2.1	1.4	0.2	0.7	4.11	60.7	69.3	10.1	0.65	0.44	8.47
117	02/02/91	K-6	7-3	20.1	35.4	38.3	3.7	1.4	0.2	0.2	0.7	0.44	59.8	70.2	10.7	0.65	0.43	8.61
118	02/02/91	K-6	3-11	23.5	30.8	36.1	6.8	1.4	0.9	0.2	0.3	1.26	60.4	70.3	10.7	0.65	0.43	8.61
119	02/03/91	K-6	7-3	25.4	35.7	32.3	4.5	0.9	0.3	0.1	0.8	1.28	55.8	67.2	9.5	0.70	0.62	9.61
120	02/03/91	K-6	3-11	27.6	29.6	25.3	12.4	2.4	1.2	0.4	1.1	2.25	59.4	67.2	9.5	0.70	0.62	9.61
121	02/04/91	K-6	7-3	34.7	39.2	21.2	2.1	0.8	0.2	0.6	1.2	1.55	56.9	65.9	12.3	0.64	0.54	8.43
122	02/04/91	K-6	3-11	35.4	31.7	21.8	5.0	2.5	1.0	0.7	1.9	0.00	57.2	64.0	12.3	0.64	0.54	8.43
123	02/05/91	K-6	7-3	35.0	31.4	27.8	3.9	0.6	0.3	0.3	0.7	4.48	57.1	65.8	8.3	0.61	0.49	8.75
124	02/05/91	K-6	3-11	39.7	37.1	20.2	1.5	0.6	0.2	0.2	0.5	1.54	56.6	64.9	8.3	0.61	0.49	8.75
125	02/06/91	K-6	7-3	19.7	38.8	35.1	4.1	1.1	0.3	0.2	0.7	2.46	56.2	67.0	10.9	0.64	0.62	9.27
126	02/06/91	K-6	3-11	5.9	29.2	40.0	15.9	5.3	1.8	0.4	1.5	6.04	57.3	67.8	10.9	0.64	0.62	9.27
127	02/07/91	K-6	7-3	26.6	19.8	28.0	14.7	7.6	1.4	0.9	1.0	0.00	57.4	68.0	10.1	0.64	0.56	9.77
128	02/07/91	K-6	3-11	12.3	17.4	37.5	19.1	9.0	1.7	1.0	2.0	2.49	56.6	67.8	10.1	0.64	0.56	9.77
129	02/08/91	K-6	7-3	13.7	42.0	28.3	11.4	3.8	0.3	0.2	0.3	1.04	55.5	67.0	8.7	0.68	0.71	8.15
130	02/08/91	K-6	3-11	28.9	41.0	20.5	5.2	2.2	0.9	0.6	0.7	13.87	59.0	66.9	8.7	0.68	0.71	8.15
131	02/09/91	K-6	7-3	38.3	27.9	21.1	9.3	1.7	0.4	0.1	1.2	3.38	55.6	65.7	11.3	0.67	0.60	8.20
132	02/09/91	K-6	3-11	27.0	37.2	25.0	7.7	1.5	0.3	0.2	1.1	2.14	56.1	66.0	11.3	0.67	0.60	8.20
133	02/10/91	K-6	7-3	36.9	26.8	24.5	8.1	2.6	0.3	0.2	0.6	2.29	58.8	66.6	10.3	0.66	0.48	8.94
134	02/10/91	K-6	3-11	30.1	35.4	25.4	5.8	2.0	0.3	0.3	0.7	2.45	59.8	68.3	10.3	0.66	0.48	8.94
135	02/11/91	K-6	7-3	14.8	29.7	39.7	10.0	3.2	0.3	0.6	1.7	1.22	60.8	67.2	11.9	0.69	0.46	8.15
136	02/11/91	K-6	3-11	35.7	35.4	24.3	3.0	0.4	0.2	0.2	0.8	3.07	61.7	69.9	11.9	0.69	0.46	8.15
137	02/12/91	K-6	7-3	17.2	30.7	39.8	7.5	3.2	0.3	0.1	1.2	0.00	62.9	71.0	11.4	0.65	0.64	8.17
138	02/12/91	K-6	3-11	22.5	39.6	29.4	5.1	2.4	0.3	0.3	0.4	0.00	62.7	70.4	11.4	0.65	0.64	8.17
139	02/13/91	K-6	7-3	15.3	26.1	32.8	13.9	4.8	1.6	1.4	4.1	5.13	60.9	68.2	8.5	0.68	0.58	8.64
140	02/13/91	K-6	3-11	7.4	44.2	39.7	4.8	2.3	0.6	0.3	0.7	8.21	60.5	69.0	8.5	0.68	0.58	8.64
141	02/14/91	K-6	7-3	19.1	39.2	37.6	2.6	0.6	0.1	0.1	0.7	0.55	64.0	70.3	12.5	0.70	0.53	8.23
142	02/14/91	K-6	3-11	27.5	36.5	32.1	2.9	0.2	0.1	0.2	0.5	10.08	61.1	69.6	12.5	0.70	0.53	8.23
143	02/15/91	K-6	7-3	20.9	27.3	35.3	10.1	3.4	1.0	0.5	1.5	2.10	57.9	68.8	13.2	0.68	0.43	7.96
144	02/15/91	K-6	3-11	27.0	39.7	27.7	4.2	0.6	0.1	0.1	0.6	3.95	60.6	69.6	13.2	0.68	0.43	7.96
145	02/16/91	K-6	3-11	29.1	41.4	25.8	2.0	0.4	0.3	0.4	0.6	1.79	59.4	69.2	8.8	0.71	0.51	9.32
146	02/17/91	K-6	7-3	39.0	20.1	33.6	4.3	1.6	0.5	0.3	0.6	0.40	62.6	68.7	14.5	0.69	0.58	8.09
147	02/17/91	K-6	3-11	26.4	38.1	27.1	6.3	1.1	0.2	0.2	0.6	0.34	63.7	69.8	14.5	0.69	0.58	8.09
148	02/18/91	K-6	7-3	18.3	45.1	25.6	5.8	2.5	0.7	0.4	1.6	0.86	59.5	66.5	11.1	0.64	0.56	8.80
149	02/18/91	K-6	3-11	26.7	37.2	25.2	6.6	2.8	0.3	0.3	0.9	0.65	62.2	72.1	11.1	0.64	0.56	8.80
150	02/19/91	K-6	7-3	19.6	34.8	30.7	9.1	3.2	0.7	0.5	1.4	0.00	60.6	68.9	10.3	0.66	0.50	8.65
151	02/19/91	K-6	3-11	26.6	37.3	25.9	6.7	1.9	0.6	0.4	0.6	6.06	61.1	70.1	10.3	0.66	0.50	8.65
152	02/20/91	K-6	7-3	7.5	30.0	42.4	14.0	5.1	0.2	0.3	0.5	1.49	61.2	67.3	10.1	0.67	0.54	8.37
153	02/20/91	K-6	3-11	13.6	20.1	48.1	9.7	3.9	1.0	1.6	2.0	0.65	60.9	68.1	10.1	0.67	0.54	8.37
154	02/21/91	K-6	7-3	16.1	22.6	37.4	16.3	4.4	0.6	1.0	1.6	1.41	63.5	72.2	11.5	0.73	0.41	8.10
155	02/21/91	K-6	3-11	30.1	32.3	28.4	7.1	1.4	0.2	0.1	0.4	6.34	62.0	70.7	11.5	0.73	0.41	8.10
156	02/22/91	K-6	7-3	35.8	24.5	30.4	5.1	2.0	0.5	0.2	1.5	1.65	60.6	70.1	9.8	0.69	0.42	8.22
157	02/22/91	K-6	3-11	31.9	27.9	32.4	4.8	1.6	0.3	0.3	0.8	2.01	61.2	70.8	9.8	0.69	0.42	8.22
158	02/23/91	K-6	7-3	37.0	23.9	31.4	5.0	1.3	0.3	0.2	0.9	2.04	61.0	67.2	9.7	0.67	0.38	8.25
159	02/23/91	K-6	3-11	31.1	30.2	28.4	6.4	2.5	0.2	0.2	1.0	0.78	60.2	67.1	9.7	0.67	0.38	8.25

OBS	DATE	BELT	TURN	ON4"	ON3"	COKE ON2"	ON1.5"	SIZE ON1"	ON.75"	ON.5"	THRU.5	% H2O	STABIL ITY	HARD NESS	REACT IVITY	SULFUR	VM	ASH
160	02/24/91	K-6	7-3	25.4	33.6	30.0	6.3	3.6	0.2	0.1	0.8	0.41	60.0	70.6	11.4	0.67	0.57	8.49
161	02/24/91	K-6	3-11	31.5	26.1	24.6	12.0	4.8	0.3	0.1	0.6	0.00	61.1	71.6	11.4	0.67	0.57	8.49
162	02/25/91	K-6	7-3	10.0	30.5	43.0	8.9	4.5	0.9	0.4	1.8	0.18	60.8	70.3	9.3	0.69	0.36	8.26
163	02/25/91	K-6	3-11	31.8	36.6	24.8	4.2	0.7	0.4	0.3	1.2	2.04	59.6	69.1	9.3	0.69	0.36	8.26
164	02/26/91	K-6	7-3	14.1	19.8	46.2	12.4	3.5	1.4	0.3	2.3	2.82	58.9	69.2	9.7	0.67	0.49	8.14
165	02/26/91	K-6	3-11	26.2	43.3	27.2	2.6	0.3	0.1	0.1	0.2	0.29	60.8	70.4	9.7	0.67	0.49	8.14
166	02/27/91	K-6	7-3	12.2	33.3	36.7	10.0	3.2	1.6	0.9	2.1	1.24	59.6	68.0	10.0	0.70	0.80	8.34
167	02/27/91	K-6	3-11	26.7	35.1	30.6	4.3	1.3	0.4	0.2	1.4	0.31	58.8	68.4	10.9	0.70	0.80	8.34
168	02/28/91	K-6	7-3	4.8	17.3	39.5	18.2	12.3	3.5	1.7	2.7	1.66	58.6	69.4	10.4	0.70	0.31	8.13
169	02/28/91	K-6	3-11	21.6	27.7	31.5	11.5	5.5	1.3	0.2	0.7	1.66	59.2	68.7	10.4	0.70	0.31	8.13
170	03/01/91	K-6	7-3	12.4	34.1	43.4	6.2	1.5	0.4	0.4	1.6	1.69	60.3	69.4	11.3	0.68	0.57	8.34
171	03/01/91	K-6	3-11	27.7	26.4	34.1	6.6	2.7	0.6	0.3	1.6	2.74	60.5	69.2	11.3	0.68	0.57	8.34
172	03/02/91	K-6	7-3	28.3	29.8	31.9	6.0	2.3	0.5	0.2	1.0	2.99	60.3	67.7	9.9	0.66	0.64	8.58
173	03/02/91	K-6	3-11	30.6	26.7	29.6	9.4	2.2	0.5	0.2	0.8	3.88	61.0	68.2	9.9	0.66	0.64	8.58
174	03/03/91	K-6	7-3	13.8	35.6	42.2	5.2	1.0	0.3	0.3	1.6	1.07	62.0	70.2	12.9	0.67	0.62	9.00
175	03/03/91	K-6	3-11	24.1	25.6	29.1	9.2	9.1	1.9	0.4	0.6	1.66	62.6	69.7	12.9	0.67	0.62	9.00
176	03/04/91	K-6	7-3	13.6	29.2	48.2	5.9	1.9	0.2	0.3	0.7	0.71	62.0	70.0	9.6	0.66	0.44	8.61
177	03/04/91	K-6	3-11	22.4	37.1	32.1	4.4	2.5	0.4	0.3	0.8	3.46	60.3	71.1	9.6	0.66	0.44	8.61
178	03/05/91	K-6	7-3	33.8	39.0	22.5	2.3	0.9	0.5	0.3	0.7	1.48	60.6	70.1	9.7	0.63	0.44	8.31
179	03/05/91	K-6	3-11	12.8	34.5	42.4	7.0	1.3	0.7	0.3	1.0	1.56	60.3	70.4	9.7	0.63	0.44	8.31
180	03/06/91	K-6	7-3	22.6	32.5	33.6	8.5	1.3	0.5	0.3	0.7	2.68	60.4	70.2	8.0	0.63	0.68	7.86
181	03/06/91	K-6	3-11	17.8	36.0	37.3	5.6	1.9	0.4	0.2	0.8	1.39	61.2	70.9	8.0	0.63	0.68	7.86
182	03/07/91	K-6	3-11	.	.	.	.	.	.	.	.	1.09	63.5	70.7	8.8	0.63	0.62	8.66
183	03/08/91	K-6	7-3	23.6	42.1	30.5	2.6	0.4	0.2	0.2	0.4	0.38	61.1	70.6	12.0	0.67	0.23	8.13
184	03/08/91	K-6	3-11	33.1	30.7	28.4	5.6	0.9	0.1	0.2	1.0	1.90	62.3	69.9	12.0	0.67	0.23	8.13
185	03/09/91	K-6	7-3	23.1	36.9	31.5	5.6	0.9	0.7	0.7	0.6	1.44	60.7	70.5	10.8	0.68	0.60	8.38
186	03/09/91	K-6	3-11	24.8	33.2	32.8	5.9	1.3	0.6	0.3	1.1	1.96	60.2	69.8	10.8	0.68	0.60	8.38
187	03/10/91	K-6	7-3	25.7	28.6	30.0	9.3	3.3	1.9	0.2	1.0	1.67	63.6	71.9	13.0	0.68	0.45	8.42
188	03/10/91	K-6	3-11	28.7	26.3	34.2	7.5	2.4	0.2	0.2	0.5	4.41	61.1	69.2	13.0	0.68	0.45	8.42
189	03/11/91	K-6	7-3	30.3	16.7	32.4	11.1	4.1	1.8	0.9	2.7	2.67	62.3	71.2	14.3	0.67	0.34	8.14
190	03/11/91	K-6	3-11	35.5	35.9	25.6	1.4	0.5	0.2	0.4	0.5	1.08	61.7	69.6	14.3	0.67	0.34	8.14
191	03/12/91	K-6	7-3	22.5	43.1	28.1	3.3	1.6	0.2	0.2	1.0	2.91	61.5	70.8	12.8	0.65	0.40	8.20
192	03/12/91	K-6	3-11	54.3	21.1	18.7	2.6	1.9	0.2	0.2	1.0	1.58	60.3	68.5	12.8	0.65	0.40	8.20
193	03/13/91	K-6	7-3	34.0	24.8	32.7	4.9	2.5	0.2	0.2	0.7	1.99	60.8	70.1	13.0	0.68	0.57	7.90
194	03/13/91	K-6	3-11	36.5	31.7	29.6	0.4	0.4	0.4	0.4	0.6	3.36	61.0	69.2	13.0	0.68	0.57	7.90
195	03/14/91	K-6	7-3	42.0	25.5	28.1	3.0	0.5	0.2	0.3	0.4	1.25	60.1	70.1	11.7	0.68	0.58	8.14
196	03/14/91	K-6	11-7	49.1	24.3	22.0	2.1	1.0	0.3	0.5	0.7	1.66	60.3	69.8	11.7	0.68	0.58	8.14
197	03/15/91	K-6	7-3	21.6	24.4	38.9	7.0	4.0	3.1	0.4	0.6	2.01	60.6	68.7	11.6	0.66	0.42	8.08
198	03/15/91	K-6	3-11	35.2	31.2	28.5	2.1	1.4	0.8	0.4	0.4	1.02	62.9	69.8	11.6	0.66	0.42	8.08
199	03/16/91	K-6	7-3	31.3	33.9	27.5	3.1	2.1	0.4	0.8	0.9	0.73	62.4	71.7	15.1	0.66	0.68	8.02
200	03/16/91	K-6	3-11	50.7	22.2	20.6	3.1	1.4	0.3	0.9	0.8	0.39	61.2	69.4	15.1	0.66	0.68	8.02
201	03/17/91	K-6	7-3	26.4	29.9	30.3	7.2	2.9	1.0	1.9	0.4	6.03	60.7	69.2	11.9	0.67	0.49	8.77
202	03/17/91	K-6	3-11	42.3	30.1	23.8	1.8	0.7	0.4	0.6	0.3	0.75	60.2	68.7	11.9	0.67	0.49	8.77
203	03/18/91	K-6	7-3	54.4	32.0	9.4	2.6	0.7	0.2	0.2	0.5	1.61	61.6	68.2	11.5	0.65	0.50	9.13
204	03/18/91	K-6	3-11	51.6	31.9	13.8	1.8	0.2	0.2	0.2	0.3	1.19	.	.	11.5	0.65	0.50	9.13
205	03/19/91	K-6	7-3	40.6	33.6	23.0	0.9	0.9	0.5	0.2	0.3	0.00	61.9	71.0	11.1	0.67	0.49	8.00
206	03/19/91	K-6	3-11	41.0	32.6	21.6	3.1	0.9	0.2	0.2	0.4	0.00	61.3	70.5	11.1	0.67	0.49	8.00
207	03/20/91	K-6	7-3	50.5	30.3	15.0	2.3	0.7	0.4	0.3	0.5	1.57	61.3	70.7	12.7	0.65	0.20	8.20
208	03/20/91	K-6	3-11	45.8	32.6	17.7	2.4	0.5	0.3	0.3	0.4	1.41	62.5	71.3	12.7	0.65	0.20	8.20
209	03/21/91	K-6	7-3	37.1	40.0	19.3	1.9	1.0	0.2	0.2	0.3	0.41	61.3	70.6	16.4	0.66	0.45	8.13
210	03/21/91	K-6	3-11	61.2	20.2	14.1	1.9	1.4	0.5	0.2	0.5	0.79	62.3	71.0	16.4	0.66	0.45	8.13
211	03/22/91	K-6	7-3	39.5	36.5	19.5	3.4	0.5	0.2	0.2	0.2	1.13	59.9	70.7	9.3	0.69	0.55	8.10
212	03/22/91	K-6	3-11	44.6	32.7	20.0	1.6	0.2	0.2	0.4	0.3	1.95	60.5	69.5	9.3	0.69	0.55	8.10

COKE PROPERTIES FROM DAILY COKE REPORTS, 11/12 BATTERIES 11:30 Wednesday, April 1, 1992 5
KIDC DEMONSTRATION PROJECT - BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

OBS	DATE	BELT	TURN	ON4"	ON3"	COKE ON2"	ON1.5"	SIZE ON1"	ON.75"	ON.5"	THRU.5	% H2O	STABIL ITY	HARD NESS	REACT IVITY	SULFUR	VM	ASH
213	03/23/91	K-6	7-3	22.8	37.9	32.6	5.3	0.7	0.3	0.2	0.2	4.20	63.2	71.3	10.3	0.77	0.58	8.35
214	03/23/91	K-6	3-11	33.7	43.5	20.3	0.9	0.7	0.2	0.5	0.2	1.47	63.9	71.8	10.3	0.77	0.58	8.35
215	03/24/91	K-6	7-3	39.8	26.4	17.4	9.7	5.6	0.9	0.1	0.1	3.88	62.0	69.6	9.3	0.60	0.43	9.26
216	03/24/91	K-6	3-11	42.1	23.5	19.5	11.1	2.6	0.2	0.2	0.8	2.50	63.2	69.7	9.3	0.60	0.43	9.26
217	03/25/91	K-6	7-3	43.4	40.2	11.5	3.4	0.9	0.2	0.2	0.2	1.78	60.9	70.5	9.7	0.58	0.63	9.02
218	03/25/91	K-6	3-11	37.4	34.6	22.7	3.3	1.2	0.2	0.2	0.4	0.39	62.3	71.9	9.7	0.58	0.63	9.02
219	03/26/91	K-6	7-3	17.2	40.9	26.9	7.7	5.2	1.0	0.5	0.6	1.01	62.5	71.7	10.1	0.61	0.63	8.10
220	03/26/91	K-6	3-11	36.7	41.8	18.6	1.4	0.7	0.1	0.5	0.2	0.30	63.2	72.0	10.1	0.61	0.63	8.10
221	03/27/91	K-6	7-3	34.3	23.2	30.4	6.9	4.7	0.1	0.1	0.3	1.75	62.1	68.8	9.5	0.61	0.50	8.65
222	03/27/91	K-6	3-11	19.8	17.8	36.4	17.2	6.1	1.1	0.2	1.4	0.56	61.7	68.4	9.5	0.61	0.50	8.65
223	03/28/91	K-6	7-3	33.8	26.5	25.3	9.0	3.3	1.0	0.4	0.7	1.37	62.6	71.9	11.7	0.59	0.47	9.07
224	03/28/91	K-6	3-11	28.6	31.1	29.0	6.3	4.2	0.2	0.2	0.4	1.56	62.3	71.2	11.7	0.59	0.47	9.07
225	03/29/91	K-6	7-3	27.3	41.9	28.4	1.8	0.3	0.1	0.1	0.1	2.71	59.2	66.4	12.1	0.61	0.32	8.14
226	03/29/91	K-6	3-11	25.7	35.5	34.3	2.8	0.8	0.5	0.2	0.2	2.76	61.2	67.7	12.1	0.61	0.32	8.14
227	03/30/91	K-6	7-3	45.0	33.4	17.2	2.5	0.7	0.4	0.5	0.3	1.08	61.7	70.2	13.3	0.60	0.35	8.13
228	03/30/91	K-6	3-11	45.2	32.6	18.5	2.0	0.6	0.5	0.4	0.2	1.39	63.1	69.1	13.3	0.60	0.35	8.13
229	03/31/91	K-6	7-3	38.5	30.1	22.4	4.5	2.9	0.7	0.6	0.3	1.92	59.8	69.6	13.8	0.59	0.50	8.54
230	03/31/91	K-6	3-11	34.3	32.3	27.1	2.3	1.9	1.7	0.3	0.1	2.01	62.1	71.7	13.8	0.59	0.50	8.54
231	04/01/91	K-6	7-3	26.0	22.7	40.9	7.8	0.9	0.2	0.2	1.3	0.82	60.9	69.7	11.7	0.59	0.39	8.03
232	04/01/91	K-6	3-11	30.1	21.9	36.1	8.2	2.4	0.4	0.2	0.7	1.87	62.0	70.6	11.7	0.59	0.39	8.03
233	04/02/91	K-6	7-3	46.3	32.6	19.5	0.2	0.2	0.2	0.2	0.8	2.34	61.6	71.0	11.2	0.56	0.46	8.58
234	04/02/91	K-6	3-11	32.8	25.3	37.0	2.2	1.1	0.5	0.2	0.9	2.29	62.6	72.0	11.2	0.56	0.46	8.58
235	04/03/91	K-6	7-3	22.5	41.7	29.5	3.7	0.9	0.7	0.2	0.8	1.37	61.1	68.0	14.6	0.54	0.43	8.65
236	04/03/91	K-6	3-11	30.6	34.5	24.8	7.2	1.1	0.5	0.5	0.8	1.50	61.5	69.6	14.6	0.54	0.43	8.65
237	04/04/91	K-6	7-3	28.8	43.7	23.7	3.1	0.2	0.1	0.1	0.3	12.59	61.9	68.8	9.3	0.61	0.46	7.91
238	04/04/91	K-6	3-11	53.4	27.9	15.8	1.8	0.7	0.1	0.1	0.2	0.74	62.1	68.6	9.3	0.61	0.46	7.91
239	04/05/91	K-6	7-3	45.2	33.7	15.3	2.9	0.7	0.4	0.7	1.1	7.00	62.3	67.7	10.9	0.61	0.55	8.39
240	04/05/91	K-6	3-11	47.8	29.4	19.0	2.0	0.4	0.4	0.2	0.8	1.97	62.7	70.4	10.9	0.61	0.55	8.39
241	04/06/91	K-6	7-3	25.7	19.8	35.7	10.5	5.5	1.1	0.2	1.5	2.24	61.9	70.2	9.6	0.60	0.42	8.20
242	04/06/91	K-6	3-11	30.5	18.9	39.6	7.0	2.9	0.2	0.2	0.7	1.14	61.3	70.6	9.6	0.60	0.42	8.20
243	04/07/91	K-6	7-3	33.5	26.4	30.3	6.3	2.3	0.4	0.2	0.6	1.01	59.7	69.4	13.0	0.64	0.43	8.54
244	04/07/91	K-6	3-11	37.6	22.1	33.6	4.2	1.1	0.2	0.4	0.8	1.65	60.7	70.2	13.0	0.64	0.43	8.54
245	04/08/91	K-6	7-3	17.9	25.9	35.0	9.6	3.7	2.7	1.6	3.6	0.87	61.3	69.7	14.5	0.61	0.59	8.32
246	04/08/91	K-6	3-11	42.3	35.7	16.9	1.4	0.4	1.4	0.7	1.7	1.92	61.9	69.8	14.5	0.61	0.59	8.32
247	04/09/91	K-6	7-3	43.4	32.5	21.1	1.9	0.5	0.2	0.2	0.2	0.76	60.2	66.7	10.7	0.55	0.38	8.43
248	04/09/91	K-6	3-11	41.7	27.0	21.8	4.7	2.4	0.5	0.5	1.4	0.71	61.3	66.6	10.7	0.55	0.38	8.43
249	04/10/91	K-6	7-3	33.1	28.7	31.0	5.2	1.0	0.4	0.2	0.4	0.81	60.5	68.2	14.4	0.57	0.42	8.35
250	04/10/91	K-6	3-11	35.9	25.2	32.3	3.9	1.1	0.7	0.2	0.7	1.22	60.9	66.6	14.4	0.57	0.42	8.35
251	04/11/91	K-6	7-3	48.3	34.3	11.3	2.9	1.5	0.5	0.5	0.7	0.70	61.1	70.4	15.2	0.55	0.35	7.75
252	04/11/91	K-6	3-11	51.3	23.0	18.1	4.8	1.7	0.2	0.2	0.7	1.57	61.9	69.9	15.2	0.55	0.35	7.75
253	04/12/91	K-6	7-3	45.0	35.0	16.3	2.3	0.5	0.3	0.3	0.3	3.27	59.4	68.4	9.3	0.57	0.53	8.37
254	04/12/91	K-6	3-11	33.6	21.4	31.3	6.7	3.4	1.3	0.9	1.4	2.09	60.5	69.0	9.3	0.57	0.53	8.37
255	04/13/91	K-6	7-3	49.8	32.9	12.4	2.7	0.7	0.3	0.4	0.8	0.85	60.5	68.9	9.0	0.57	0.70	8.57
256	04/13/91	K-6	3-11	49.7	30.7	16.4	1.9	0.3	0.3	0.3	0.4	2.36	61.4	68.0	9.0	0.57	0.70	8.57
257	04/14/91	K-6	7-3	46.2	28.5	21.9	1.8	0.7	0.3	0.2	0.4	3.22	60.3	67.8	8.5	0.62	0.47	8.78
258	04/14/91	K-6	3-11	40.5	31.9	20.2	4.2	1.5	0.7	0.5	0.5	1.04	59.6	67.0	8.5	0.62	0.47	8.78
259	04/15/91	K-6	7-3	44.0	32.5	18.8	3.1	0.8	0.2	0.2	0.4	1.47	61.1	69.7	10.2	0.64	0.58	8.04
260	04/15/91	K-6	3-11	17.2	37.2	29.8	9.1	4.5	0.9	0.7	0.6	3.80	60.6	69.9	10.2	0.64	0.58	8.04
261	04/16/91	K-6	7-3	50.0	35.9	10.5	1.8	0.5	0.5	0.2	0.6	1.48	60.0	69.2	13.5	0.58	0.43	8.04
262	04/16/91	K-6	3-11	40.4	30.1	24.2	3.4	0.7	0.2	0.2	0.8	1.01	60.8	70.2	13.5	0.58	0.43	8.04
263	04/17/91	K-6	7-3	55.6	29.8	12.3	1.2	0.5	0.2	0.2	0.2	1.10	60.6	69.7	13.3	0.60	0.61	8.90
264	04/17/91	K-6	3-11	37.2	30.7	29.0	1.7	0.6	0.2	0.2	0.4	1.83	61.0	70.4	13.3	0.60	0.61	8.90
265	04/18/91	K-6	7-3	21.1	36.4	34.6	4.6	1.6	0.4	0.3	1.0	1.33	61.5	67.5	13.9	0.59	0.42	8.34

KIDC DEMONSTRATION PROJECT - BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

OBS	DATE	BELT	TURN	ON4"	ON3"	COKE ON2"	ON1.5"	SIZE ON1"	ON.75"	ON.5"	THRU.5	% H2O	STABILITY	HARDNESS	REACTIVITY	SULFUR	VM	ASH
266	04/18/91	K-6	3-11	29.6	31.9	27.4	6.6	2.4	0.9	0.4	0.8	1.67	59.6	66.5	13.9	0.59	0.42	8.34
267	04/19/91	K-6	7-3	20.1	29.8	41.4	5.7	1.4	0.9	0.5	0.2	1.13	60.3	68.3	13.1	0.59	0.56	8.34
268	04/19/91	K-6	3-11	27.9	21.8	37.9	6.5	2.6	1.1	0.9	1.3	0.73	61.0	68.7	13.1	0.59	0.56	8.34
269	04/20/91	K-6	7-3	38.0	23.1	27.2	7.9	2.5	0.4	0.2	0.7	1.65	60.9	69.9	10.8	0.60	0.41	8.41
270	04/20/91	K-6	3-11	38.4	26.9	29.5	3.0	0.7	0.2	0.2	1.1	1.88	60.4	69.0	10.8	0.60	0.41	8.41
271	04/21/91	K-6	7-31	30.9	17.4	39.2	5.2	2.8	0.9	0.9	2.7	3.11	59.8	69.3	11.2	0.62	0.37	9.11
272	04/21/91	K-6	3-11	34.0	28.4	31.8	3.6	0.7	0.4	0.2	0.9	2.21	59.3	70.0	11.2	0.62	0.37	9.11
273	04/22/91	K-6	7-3	50.4	30.8	15.5	2.0	0.5	0.2	0.2	0.4	4.61	59.9	67.2	14.4	0.62	0.54	9.13
274	04/22/91	K-6	3-11	27.1	33.6	29.7	5.3	2.5	0.4	0.4	1.0	2.29	61.3	66.8	14.4	0.62	0.54	9.13
275	04/23/91	K-6	7-3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
276	04/23/91	K-6	3-11	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
277	04/24/91	K-6	7-3	28.8	35.0	26.0	7.0	1.4	0.5	0.5	0.8	6.36	59.8	67.9	.	0.60	.	8.18
278	04/24/91	K-6	3-11	36.2	38.1	21.6	2.3	0.7	0.2	0.2	0.7	3.09	59.3	68.8	.	0.60	.	8.18
279	04/25/91	K-6	7-3	52.8	27.6	15.4	2.9	0.4	0.2	0.2	0.5	2.89	60.8	69.3	11.0	0.59	0.34	8.79
280	04/25/91	K-6	3-11	52.7	29.2	14.0	2.8	0.4	0.2	0.2	0.5	1.36	61.1	69.8	11.0	0.59	0.34	8.79
281	04/26/91	K-6	7-3	34.8	31.2	28.5	2.2	1.4	0.7	0.7	0.5	2.38	60.3	68.3	10.7	0.59	0.33	8.45
282	04/26/91	K-6	3-11	35.7	27.2	24.4	6.8	4.0	0.8	0.3	0.8	1.24	61.1	66.8	10.7	0.59	0.33	8.45
283	04/27/91	K-6	7-3	44.9	35.3	16.9	1.5	0.5	0.2	0.2	0.5	1.18	60.9	67.3	11.8	0.56	0.49	8.30
284	04/27/91	K-6	3-11	35.8	28.6	24.3	5.1	2.3	1.8	1.5	0.6	0.83	61.3	67.4	11.8	0.56	0.49	8.30
285	04/28/91	K-6	7-3	36.3	30.8	26.9	1.9	1.7	0.7	0.7	1.0	1.01	60.5	69.6	9.5	0.61	0.90	8.37
286	04/28/91	K-6	3-11	39.6	33.4	23.5	1.6	0.7	0.3	0.3	0.6	0.89	60.8	69.0	9.5	0.61	0.90	8.37
287	04/29/91	K-6	7-3	13.6	38.6	41.4	3.6	1.3	0.6	0.2	0.7	4.04	60.9	71.2	8.6	0.56	0.32	8.93
288	04/29/91	K-6	3-11	23.9	33.5	31.7	5.9	2.7	1.0	0.2	1.1	2.63	61.3	69.6	8.6	0.56	0.32	8.93
289	04/30/91	K-6	7-3	43.7	31.8	16.3	5.7	1.2	0.4	0.4	0.5	1.49	59.6	69.7	11.8	0.59	0.50	8.28
290	04/30/91	K-6	3-11	32.2	31.5	27.6	5.0	1.6	1.0	0.7	0.4	1.40	59.8	69.9	11.8	0.59	0.50	8.28
291	05/01/91	K-6	7-3	20.0	28.6	38.9	6.6	3.0	0.9	0.2	1.8	4.09	59.1	67.4	12.4	0.59	0.58	8.46
292	05/01/91	K-6	3-11	51.1	33.3	11.6	3.4	0.2	0.2	0.1	0.1	0.75	59.9	68.7	12.4	0.59	0.58	8.46
293	05/02/91	K-6	7-3	36.5	41.1	20.1	1.1	0.5	0.0	0.0	0.7	0.00	60.6	70.4	12.0	0.62	0.51	8.51
294	05/02/91	K-6	3-11	37.7	31.2	20.8	3.9	2.6	1.7	0.9	1.2	0.62	61.3	70.6	12.0	0.62	0.51	8.51
295	05/03/91	K-6	7-3	23.5	37.2	33.0	4.0	0.9	0.6	0.2	0.6	1.44	59.8	68.6	13.5	0.55	0.63	9.09
296	05/03/91	K-6	3-11	19.2	29.1	39.7	7.7	2.6	0.4	0.4	0.9	2.38	59.9	68.2	13.5	0.55	0.63	9.09
297	05/04/91	K-6	7-3	16.1	25.6	33.3	13.0	6.6	2.0	1.4	2.0	1.22	60.4	70.0	13.9	0.61	0.42	8.30
298	05/04/91	K-6	3-11	35.8	34.8	24.4	3.4	0.7	0.2	0.2	0.5	1.06	61.5	70.5	13.9	0.61	0.42	8.30
299	05/05/91	K-6	7-3	47.8	34.3	14.3	1.7	0.4	0.4	0.4	0.7	2.82	59.8	66.8	11.9	0.61	0.55	8.10
300	05/05/91	K-6	3-11	33.8	30.6	28.7	4.8	0.7	0.5	0.2	0.7	5.76	60.6	66.9	11.9	0.61	0.55	8.10
301	05/06/91	K-6	7-3	29.2	31.4	29.6	5.3	2.6	0.7	0.5	0.7	3.45	59.3	68.3	11.3	0.59	0.37	8.15
302	05/06/91	K-6	3-11	34.9	36.7	23.9	2.5	0.9	0.3	0.3	0.5	1.64	60.2	69.1	11.3	0.59	0.37	8.15
303	05/07/91	K-6	7-3	29.6	28.7	35.7	5.2	0.4	0.1	0.1	0.2	1.36	59.8	68.0	14.3	0.61	0.28	8.32
304	05/07/91	K-6	3-11	36.4	24.8	31.0	4.4	1.8	0.4	0.4	0.8	2.16	59.9	67.8	14.3	0.61	0.28	8.32
305	05/08/91	K-6	7-3	50.6	22.4	17.9	4.4	1.4	0.4	0.3	2.6	1.39	59.6	68.7	9.9	0.59	0.40	8.41
306	05/08/91	K-6	3-11	34.4	27.8	26.5	7.6	1.3	0.6	0.5	1.3	1.66	57.7	67.6	9.9	0.59	0.40	8.41
307	05/09/91	K-6	7-3	39.1	27.5	25.3	4.5	1.8	0.5	0.4	0.9	3.87	59.3	67.9	13.3	0.25	0.50	8.43
308	05/09/91	K-6	3-11	41.8	32.2	19.3	3.2	0.9	0.7	0.2	1.7	0.77	58.4	67.8	13.3	0.25	0.50	8.43
309	05/10/91	K-6	7-3	33.5	39.1	24.0	2.5	0.3	0.2	0.2	0.2	1.02	59.4	68.3	11.4	0.56	0.38	8.31
310	05/10/91	K-6	3-11	40.0	30.8	22.1	4.2	1.9	0.5	0.3	0.2	1.47	60.2	68.9	11.4	0.56	0.38	8.31
311	05/11/91	K-6	7-3	29.4	30.5	32.6	3.6	2.1	0.7	0.5	0.6	0.80	59.0	66.9	11.9	0.59	0.24	8.27
312	05/11/91	K-6	3-11	35.7	30.5	27.4	3.4	1.3	1.1	0.2	0.4	1.09	59.1	69.2	11.9	0.59	0.24	8.27
313	05/12/91	K-6	7-3	31.5	27.1	28.9	6.7	2.5	1.8	0.6	0.9	0.78	60.4	66.6	12.9	0.57	0.46	8.37
314	05/12/91	K-6	3-11	35.7	30.2	24.0	4.8	1.8	0.8	0.6	2.1	2.83	61.4	67.0	12.9	0.57	0.46	8.37
315	05/13/91	K-6	7-3	52.0	17.6	24.1	4.3	0.9	0.4	0.4	0.3	4.31	59.1	66.9	11.6	0.59	0.52	8.41
316	05/13/91	K-6	3-11	51.0	25.0	20.1	1.3	0.9	0.4	0.2	1.1	1.77	59.6	66.4	11.6	0.59	0.52	8.41
317	05/14/91	K-6	7-3	56.1	22.0	17.8	2.2	0.5	0.5	0.4	0.5	1.49	57.7	65.6	13.0	0.59	0.55	7.96
318	05/14/91	K-6	3-11	21.4	20.5	37.2	12.8	5.6	0.6	0.3	1.6	1.97	58.7	66.5	13.0	0.59	0.55	7.96

KIDC DEMONSTRATION PROJECT - BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

OBS	DATE	BELT	TURN	ON4"	ON3"	COKE ON2"	ON1.5"	SIZE ON1"	ON.75"	ON.5"	THRU.5	% H2O	STABILITY	HARDNESS	REACTIVITY	SULFUR	VM	ASH
319	05/15/91	K-6	7-3	71.3	19.4	7.5	0.9	0.2	0.1	0.2	0.4	4.47	58.6	68.2	12.9	0.59	0.50	7.93
320	05/15/91	K-6	3-11	36.1	38.2	22.7	1.9	0.2	0.2	0.2	0.5	1.40	59.2	67.9	12.9	0.59	0.50	7.93
321	05/16/91	K-6	7-3	49.8	34.9	13.4	1.4	0.2	0.1	0.1	0.1	1.78	60.1	68.8	12.5	0.59	0.40	8.45
322	05/16/91	K-6	3-11	15.2	35.9	33.5	8.9	3.0	0.9	0.9	1.7	1.09	59.5	69.9	12.5	0.59	0.40	8.45
323	05/17/91	K-6	7-3	13.5	28.6	41.2	11.0	3.3	0.8	0.4	1.2	0.75	58.2	68.5	10.8	0.61	0.57	8.52
324	05/17/91	K-6	3-11	34.6	33.4	27.6	2.3	0.9	0.2	0.2	0.8	1.25	59.2	69.4	10.8	0.61	0.57	8.52
325	05/18/91	K-6	7-3	67.4	22.3	9.0	0.5	0.5	0.1	0.1	0.1	0.85	59.0	69.8	10.6	0.61	0.40	8.40
326	05/18/91	K-6	3-11	56.7	26.0	13.0	2.3	1.6	0.2	0.1	0.1	1.15	59.6	68.7	10.6	0.61	0.40	8.40
327	05/19/91	K-6	7-3	49.7	28.8	14.8	3.4	2.6	0.4	0.2	0.1	5.00	58.8	68.9	12.5	0.59	0.29	8.23
328	05/19/91	K-6	3-11	46.1	30.0	13.1	6.0	3.6	0.8	0.2	0.2	3.07	59.3	68.0	12.5	0.59	0.29	8.23
329	05/20/91	K-6	7-3	26.4	36.1	25.3	6.5	3.3	0.8	0.8	0.8	3.57	59.5	65.7	14.9	0.63	0.36	8.06
330	05/20/91	K-6	3-11	43.6	28.8	20.6	2.8	0.9	0.9	0.5	1.9	0.80	58.8	66.1	14.9	0.63	0.36	8.06
331	05/21/91	K-6	7-3	21.8	36.2	28.4	5.7	3.2	2.8	0.6	1.3	2.58	59.1	68.0	11.2	0.57	0.52	8.07
332	05/21/91	K-6	3-11	36.9	29.4	26.0	4.8	1.4	0.9	0.2	0.4	0.34	59.6	67.1	11.2	0.57	0.52	8.07
333	05/22/91	K-6	7-3	18.0	28.6	32.4	8.8	7.1	2.0	1.1	2.0	3.41	60.1	67.5	9.9	0.61	0.44	8.38
334	05/22/91	K-6	3-11	22.2	35.4	33.3	7.2	0.8	0.6	0.2	0.3	0.00	59.9	67.3	9.9	0.61	0.44	8.38
335	05/23/91	K-6	7-3	40.1	32.8	22.0	3.4	0.9	0.4	0.0	0.4	1.99	59.7	68.9	11.4	0.57	0.23	8.09
336	05/23/91	K-6	3-11	51.5	33.2	12.2	1.3	0.9	0.4	0.3	0.2	0.77	59.5	67.7	11.4	0.57	0.23	8.09
337	05/24/91	K-6	7-3	46.7	36.1	16.2	0.5	0.2	0.0	0.0	0.3	0.80	59.0	66.5	13.5	0.58	0.40	7.79
338	05/24/91	K-6	3-11	42.1	26.1	23.2	5.4	1.1	0.8	0.6	0.7	4.72	59.7	67.2	13.5	0.58	0.40	7.79
339	05/25/91	K-6	7-3	26.0	35.9	29.7	3.9	1.8	1.4	0.4	0.9	2.46	59.7	67.1	14.5	0.60	0.25	8.00
340	05/25/91	K-6	3-11	47.4	26.8	20.3	2.0	0.9	0.6	0.4	1.6	0.00	58.8	66.7	14.5	0.60	0.25	8.00
341	05/26/91	K-6	7-3	45.0	35.4	17.8	0.9	0.6	0.1	0.1	0.1	1.48	59.5	65.1	13.0	0.61	0.41	8.08
342	05/26/91	K-6	3-11	39.1	39.1	21.3	0.4	0.0	0.0	0.0	0.1	0.75	58.5	64.7	13.0	0.61	0.41	8.08
343	05/27/91	K-6	7-3	54.8	27.9	15.7	0.9	0.3	0.2	0.1	0.1	2.16	58.7	64.9	15.5	0.59	0.96	8.04
344	05/27/91	K-6	3-11	44.6	17.2	27.5	7.3	1.9	0.4	0.4	0.7	0.36	58.4	65.9	15.5	0.59	0.96	8.04
345	05/28/91	K-6	7-3	46.6	31.0	19.8	1.7	0.6	0.1	0.1	0.1	1.43	58.4	66.1	.	0.60	0.94	8.18
346	05/28/91	K-6	3-11	49.4	32.5	14.2	1.6	1.1	0.2	0.2	0.8	2.05	60.0	69.5	.	0.60	0.94	8.18
347	05/29/91	K-6	7-3	43.4	39.6	15.3	0.4	0.6	0.2	0.2	0.3	2.11	57.3	65.2	16.0	0.61	0.63	9.10
348	05/29/91	K-6	3-11	53.1	28.7	15.8	1.4	0.5	0.3	0.1	0.1	2.79	57.9	67.8	16.0	0.61	0.63	9.10
349	05/30/91	K-6	7-3	49.0	25.2	19.6	3.3	1.6	0.2	0.2	0.9	1.48	.	.	14.3	0.58	0.61	8.68
350	05/30/91	K-6	3-11	42.1	19.5	23.7	5.3	5.7	1.0	0.8	1.9	1.45			14.3	0.58	0.61	8.68
351	05/31/91	K-6	7-3	36.5	29.8	29.1	3.2	0.4	0.2	0.3	0.5	2.44	57.6	68.2				
352	05/31/91	K-6	3-11	43.4	32.0	21.4	2.0	0.6	0.2	0.2	0.2	4.41	58.1	65.3				
353	06/01/91	K-6	7-3	38.6	23.1	34.3	1.8	1.2	0.5	0.2	0.3	2.08	56.9	63.6	14.4	0.56	0.48	8.06
354	06/01/91	K-6	3-11	50.6	17.4	28.4	1.8	0.6	0.2	0.2	0.8	1.41	60.3	65.6	14.4	0.56	0.48	8.06
355	06/02/91	K-6	7-3	44.1	36.5	12.6	4.8	0.7	0.5	0.5	0.3	0.70	62.5	67.2	16.7	0.59	0.54	8.06
356	06/02/91	K-6	3-11	38.1	33.7	19.1	6.1	1.5	0.5	0.5	0.5	0.00	60.9	67.3	16.7	0.59	0.54	8.06
357	06/03/91	K-6	7-3	46.0	29.0	22.2	1.3	0.7	0.3	0.2	0.3	0.77	62.0	67.5	13.7	0.61	0.72	8.09
358	06/03/91	K-6	3-11	46.3	34.6	15.3	2.3	0.6	0.3	0.3	0.3	9.80	61.3	65.8	13.7	0.61	0.72	8.09
359	06/04/91	K-6	7-3	47.6	34.1	14.2	2.5	0.9	0.3	0.2	0.2	0.70	60.8	66.2	13.7	0.61	0.52	8.56
360	06/04/91	K-6	3-11	48.1	35.6	14.5	0.9	0.5	0.2	0.1	0.1	1.09	58.9	69.1	13.7	0.61	0.52	8.56
361	06/05/91	K-6	7-3	41.8	28.9	23.2	4.3	0.9	0.2	0.2	0.5	0.37	58.9	66.6	13.1	0.59	0.40	8.50
362	06/06/91	K-6	7-3	66.2	22.4	10.0	0.5	0.3	0.2	0.2	0.2	2.38	58.6	64.6	13.0	0.62	0.52	8.60
363	06/06/91	K-6	3-11	29.1	37.6	26.1	3.4	1.8	0.2	0.8	1.0	0.37	59.2	64.2	13.0	0.62	0.52	8.60
364	06/07/91	K-6	7-3	44.8	39.3	12.3	2.6	0.7	0.1	0.1	0.1	0.76	59.2	64.0	12.4	0.57	0.49	8.20
365	06/07/91	K-6	3-11	30.8	37.3	29.6	1.4	0.3	0.2	0.2	0.2	1.53	59.6	64.2	12.4	0.57	0.49	8.20
366	06/08/91	K-6	7-3	55.4	31.1	11.2	1.6	0.3	0.2	0.1	0.1	0.71	58.2	61.2	13.2	0.58	0.41	8.32
367	06/08/91	K-6	3-11	31.3	40.8	25.5	1.9	0.2	0.1	0.1	0.1	0.70	59.0	62.9	13.2	0.58	0.41	8.32
368	06/09/91	K-6	7-3	38.8	37.7	20.4	1.1	0.8	0.4	0.4	0.4	1.82	64.6	70.4	11.5	0.61	0.50	8.05
369	06/09/91	K-6	3-11	50.7	30.1	16.7	1.4	0.5	0.2	0.2	0.2	1.69	63.3	70.5	11.5	0.61	0.50	8.05
370	06/10/91	K-6	7-3	38.5	38.5	20.3	2.2	0.2	0.1	0.1	0.1	0.77	58.1	66.6	12.0	0.60	0.62	8.39
371	06/10/91	K-6	3-11	25.0	38.9	29.1	4.5	1.8	0.1	0.4	0.2	0.68	58.9	66.7	12.0	0.60	0.62	8.39

KIDC DEMONSTRATION PROJECT - BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

OBS	DATE	BELT	TURN	ON4"	ON3"	COKE ON2"	ON1.5"	SIZE ON1"	ON.75"	ON.5"	THRU.5	% H2O	STABILITY	HARDNESS	REACTIVITY	SULFUR	VM	ASH
372	06/11/91	K-6	7-3	42.2	37.2	17.8	0.9	0.3	0.3	0.3	1.0	0.76	62.2	71.4	14.9	0.62	0.51	9.26
373	06/11/91	K-6	3-11	29.6	36.9	23.3	6.8	1.9	0.6	0.3	0.6	0.37	60.7	71.2	14.9	0.62	0.51	9.26
374	06/12/91	K-6	7-3	38.3	38.1	20.6	1.4	0.5	0.3	0.2	0.6	4.26	59.9	66.3	12.8	0.63	0.69	8.37
375	06/12/91	K-6	3-11	30.3	35.3	25.6	6.9	1.0	0.2	0.2	0.5	0.76	60.9	67.5	12.8	0.63	0.69	8.37
376	06/13/91	K-6	7-3	33.7	27.3	31.7	4.1	1.3	0.5	0.3	1.1	0.35	61.9	70.2	12.9	0.62	0.53	8.77
377	06/13/91	K-6	3-11	30.0	32.9	33.9	2.3	0.5	0.1	0.1	0.2	0.71	62.2	69.6	12.9	0.62	0.53	8.77
378	06/14/91	K-6	7-3	27.6	31.6	34.6	3.3	0.7	0.4	0.7	1.1	4.90	60.8	68.9	11.6	0.61	0.37	8.97
379	06/14/91	K-6	3-11	29.9	41.7	24.5	1.6	0.8	0.4	0.2	0.9	1.11	61.7	69.3	11.6	0.61	0.37	8.97
380	06/15/91	K-6	7-3	8.8	16.2	38.9	25.6	7.0	2.0	0.5	1.0	0.65	59.8	68.1	12.8	0.62	0.60	8.50
381	06/15/91	K-6	3-11	32.2	38.2	23.5	3.0	0.5	0.5	0.8	1.3	1.10	58.9	67.6	12.8	0.62	0.60	8.50
382	06/16/91	K-6	7-3	40.5	32.7	15.6	6.5	0.0	0.0	3.7	1.0	0.94	60.3	67.4	12.1	0.60	0.49	8.44
383	06/16/91	K-6	3-11	30.6	38.7	24.9	3.3	1.2	0.5	0.2	0.6	2.27	59.7	68.0	12.1	0.60	0.49	8.44
384	06/17/91	K-6	7-3	37.5	33.5	21.2	4.2	1.5	1.0	0.3	0.8	2.12	59.8	68.9	12.8	0.55	0.52	8.15
385	06/17/91	K-6	3-11	4.0	32.0	39.6	13.3	7.1	1.3	0.9	1.8	0.77	59.9	67.9	12.8	0.55	0.52	8.15
386	06/18/91	K-6	7-3	48.4	28.9	19.9	1.9	0.2	0.3	0.2	0.2	3.33	59.5	70.2	12.2	0.59	0.41	8.26
387	06/18/91	K-6	3-11	30.2	40.2	24.7	2.5	1.2	0.5	0.3	0.4	3.12	59.3	69.6	12.2	0.59	0.41	8.26
388	06/19/91	K-6	7-3	21.4	42.2	26.1	6.8	1.7	0.8	0.3	0.7	3.78	64.0	70.2	11.7	0.56	0.56	8.42
389	06/19/91	K-6	3-11	46.1	33.6	16.5	1.5	0.7	0.5	0.4	0.7	0.83	61.4	69.7	11.7	0.56	0.56	8.42
390	06/20/91	K-6	7-3	29.9	38.1	28.1	2.3	0.9	0.2	0.0	0.5	0.81	60.9	70.0	13.0	0.54	0.38	8.37
391	06/20/91	K-6	3-11	53.6	20.2	22.3	1.1	1.4	0.2	0.2	1.0	1.47	59.6	67.7	13.0	0.54	0.38	8.37
392	06/21/91	K-6	7-3	35.6	44.3	17.5	1.4	0.5	0.2	0.2	0.3	2.04	62.4	70.0	12.9	0.59	0.28	8.18
393	06/21/91	K-6	3-11	33.7	25.8	21.3	12.1	3.8	1.1	1.2	1.0	1.62	60.3	68.6	12.9	0.59	0.28	8.18
394	06/22/91	K-6	7-3	32.7	41.2	22.7	1.7	0.8	0.3	0.4	0.2	1.73	60.9	69.6	12.7	0.60	0.61	8.03
395	06/22/91	K-6	3-11	43.0	23.5	21.8	6.8	2.5	0.7	0.8	0.9	1.35	59.9	68.1	12.7	0.60	0.61	8.03
396	06/23/91	K-6	7-3	38.5	31.6	24.4	2.5	0.7	0.7	0.5	1.1	1.64	59.3	68.3	12.8	0.60	0.49	8.26
397	06/23/91	K-6	3-11	31.3	33.4	27.3	4.9	1.1	0.7	0.5	0.8	0.76	59.5	67.8	12.8	0.60	0.49	8.26
398	06/24/91	K-6	7-3	64.4	19.8	12.5	1.7	0.5	0.2	0.2	0.7	0.81	59.7	67.8	11.8	0.56	0.43	8.70
399	06/24/91	K-6	3-11	27.8	37.4	24.6	5.1	1.7	0.8	1.3	1.3	0.38	62.2	69.7	11.8	0.56	0.43	8.70
400	06/25/91	K-6	7-3	18.8	40.9	33.2	5.1	0.7	0.2	0.2	0.9	0.34	60.7	69.8	12.5	0.58	0.57	8.16
401	06/25/91	K-6	3-11	32.9	30.2	30.2	4.5	0.9	0.2	0.2	0.9	1.84	59.8	69.6	12.5	0.58	0.57	8.16
402	06/26/91	K-6	7-3	22.5	39.1	32.0	3.4	1.4	0.7	0.5	0.4	3.51	60.4	69.4	9.4	0.56	0.63	7.88
403	06/26/91	K-6	3-11	30.4	38.0	24.8	4.1	0.9	0.7	0.5	0.6	1.20	59.7	68.1	9.4	0.56	0.63	7.88
404	06/27/91	K-6	7-3	37.4	41.7	16.7	2.5	0.8	0.3	0.3	0.3	1.49	59.9	69.7	10.0	0.60	0.93	9.06
405	06/27/91	K-6	3-11	36.9	26.8	24.3	5.0	3.3	0.8	0.8	2.1	3.10	59.5	69.1	10.0	0.60	0.93	9.06
406	06/28/91	K-6	7-3	29.6	39.4	23.9	3.4	2.2	0.5	0.5	0.5	0.83	59.6	69.1	13.4	0.59	0.54	8.64
407	06/28/91	K-6	3-11	31.4	39.8	27.6	4.7	0.9	0.4	0.4	0.8	1.52	60.2	70.4	13.4	0.59	0.54	8.64
408	06/29/91	K-6	7-3	36.8	44.0	12.5	4.4	1.8	0.2	0.2	0.1	1.10	59.6	68.9	12.2	0.60	0.42	9.33
409	06/29/91	K-6	3-11	31.5	34.5	26.7	4.3	2.1	0.5	0.2	0.2	1.03	60.2	70.6	12.2	0.60	0.42	9.33
410	06/30/91	K-6	7-3	33.3	36.3	21.0	7.8	1.0	0.3	0.1	0.2	2.72	59.2	68.3	9.7	0.60	0.61	8.37
411	06/30/91	K-6	3-11	30.1	32.6	22.2	12.2	1.9	0.5	0.2	0.3	3.88	61.3	69.3	9.7	0.60	0.61	8.37
412	07/01/91	K-6	7-3	17.8	48.1	28.4	2.5	1.1	0.5	0.2	1.4	5.39	60.2	69.1	11.6	0.58	0.37	8.09
413	07/01/91	K-6	3-11	41.8	38.0	16.9	1.6	0.9	0.2	0.2	0.4	0.40	60.9	68.8	11.6	0.58	0.37	8.09
414	07/02/91	K-6	7-3	37.2	44.5	13.0	2.4	1.2	0.4	0.4	0.9	2.38	61.2	69.2	11.4	0.59	0.45	8.10
415	07/02/91	K-6	3-11	36.2	26.1	30.3	4.2	1.7	0.2	0.2	1.1	2.99	60.2	68.5	11.4	0.59	0.45	8.10
416	07/03/91	K-6	7-3	31.7	41.7	22.3	2.7	1.0	0.2	0.2	0.2	2.27	60.1	70.6	12.9	0.58	0.66	8.28
417	07/03/91	K-6	3-11	12.0	37.3	32.9	9.6	4.6	1.1	0.9	1.6	1.48	59.6	68.9	12.9	0.58	0.66	8.28
418	07/05/91	K-6	7-3	33.0	41.5	19.7	3.2	0.6	0.3	0.3	0.4	3.79	60.3	69.7	11.5	0.61	0.70	7.95
419	07/05/91	K-6	3-11	25.4	34.0	29.9	6.1	2.5	0.6	0.4	1.1	4.54	59.8	68.1	11.5	0.61	0.70	7.95
420	07/06/91	K-6	7-3	33.0	35.5	27.4	2.7	0.4	0.3	0.2	0.5	1.58	60.8	67.3	11.8	0.53	0.45	8.09
421	07/06/91	K-6	3-11	27.5	30.3	30.3	6.3	2.8	0.9	0.7	1.2	1.63	59.7	66.3	11.8	0.53	0.45	8.09
422	07/07/91	K-6	7-3	20.6	45.8	27.0	5.0	0.9	0.3	0.2	0.2	1.35	60.0	68.5	12.0	0.66	0.37	8.30
423	07/07/91	K-6	3-11	19.6	30.1	37.4	6.0	4.7	0.4	0.4	1.4	3.70	59.2	69.7	12.0	0.66	0.37	8.30
424	07/08/91	K-6	7-3	15.3	24.6	33.5	14.9	6.9	0.8	1.2	2.8	3.90	60.5	69.3	13.2	0.61	0.33	8.26

OBS	DATE	BELT	TURN	ON4"	ON3"	COKE ON2"	ON1.5"	SIZE ON1"	ON.75"	ON.5"	THRU.5	% H2O	STABILITY	HARDNESS	REACTIVITY	SULFUR	VM	ASH
425	07/08/91	K-6	3-11	35.8	25.4	27.5	7.1	2.5	0.8	0.2	0.7	4.24	61.6	70.4	13.2	0.61	0.33	8.26
426	07/09/91	K-6	7-3	19.4	22.7	38.5	10.7	5.1	1.0	0.6	2.0	2.97	62.1	69.9	12.8	0.59	0.32	8.32
427	07/09/91	K-6	3-11	24.6	20.0	29.9	13.5	8.2	2.6	0.4	0.8	1.38	62.7	70.8	12.8	0.59	0.32	8.32
428	07/10/91	K-6	7-3	13.3	25.7	42.0	13.3	3.8	0.5	0.5	0.9	7.01	62.4	72.4	13.0	0.59	0.33	8.35
429	07/10/91	K-6	3-11	18.4	34.9	40.4	2.5	1.5	0.7	0.5	1.1	2.14	61.6	70.5	13.0	0.59	0.33	8.35
430	07/11/91	K-6	3-11	33.4	35.6	26.7	1.9	1.5	0.2	0.2	0.5	3.67	60.6	70.1	12.8	0.64	0.65	8.60
431	07/12/91	K-6	3-11	29.2	31.6	33.8	3.0	1.4	0.4	0.4	0.2	2.38	59.4	69.5	13.6	0.63	0.50	8.25
432	07/13/91	K-6	7-3	41.9	28.0	25.5	2.4	1.3	0.8	0.2	0.9	8.78	59.5	68.3	12.8	0.65	0.92	8.10
433	07/13/91	K-6	3-11	43.9	35.8	16.7	1.5	0.8	0.5	0.4	1.6	1.30	59.9	.	12.8	0.65	0.92	8.10
434	07/14/91	K-6	7-3	44.7	31.5	18.7	3.4	0.9	0.2	0.3	0.3	2.38	60.5	69.7	13.0	0.57	0.53	8.18
435	07/14/91	K-6	3-11	37.6	30.3	28.0	2.1	1.0	0.3	0.3	0.4	2.17	59.3	69.9	13.0	0.57	0.53	8.18
436	07/15/91	K-6	7-3	17.2	32.0	32.8	12.1	3.9	0.7	0.5	0.8	1.44	61.5	70.7	11.0	0.55	0.42	8.11
437	07/15/91	K-6	3-11	12.5	10.0	49.3	17.5	8.3	0.8	0.4	1.2	2.86	62.3	71.5	11.0	0.55	0.42	8.11
438	07/16/91	K-6	7-3	34.5	42.0	19.5	1.6	0.8	0.4	0.4	0.8	1.42	61.3	68.4	12.8	0.57	0.49	8.45
439	07/16/91	K-6	3-11	40.7	30.5	20.3	4.4	1.3	0.6	0.4	1.8	0.76	63.3	69.5	12.8	0.57	0.49	8.45
440	07/17/91	K-6	7-3	25.1	42.9	25.1	2.9	0.7	0.7	0.7	1.9	1.17	62.6	71.7	11.5	0.60	0.56	8.35
441	07/17/91	K-6	3-11	22.2	20.4	44.5	9.2	1.3	0.6	0.4	1.4	2.27	59.5	69.8	11.5	0.60	0.56	8.35
442	07/18/91	K-6	7-3	32.6	32.5	30.8	2.7	0.5	0.0	0.0	0.9	0.73	60.7	67.0	13.0	0.56	0.40	8.82
443	07/18/91	K-6	3-11	70.4	7.2	16.0	2.4	1.6	0.4	0.4	1.6	1.36	61.7	70.2	13.0	0.56	0.40	8.82
444	07/19/91	K-6	7-3	27.9	45.8	17.1	5.6	0.9	0.6	0.6	1.5	0.76	62.9	69.9	13.5	0.56	0.44	7.96
445	07/19/91	K-6	3-11	24.4	21.4	42.0	7.3	2.6	0.5	0.7	1.1	1.84	62.7	70.6	13.5	0.56	0.44	7.96
446	07/20/91	K-6	7-3	11.0	30.4	38.0	13.9	4.2	0.6	0.6	1.3	2.70	60.9	69.2	11.9	0.55	0.37	8.58
447	07/20/91	K-6	3-11	25.7	31.2	28.8	10.9	1.1	0.5	0.6	1.2	4.20	61.2	70.0	11.9	0.55	0.37	8.58
448	07/21/91	K-6	7-3	40.0	41.0	17.0	0.5	0.3	0.3	0.0	1.0	1.25	60.4	70.1	11.0	0.61	0.30	7.72
449	07/21/91	K-6	3-11	38.2	23.7	22.9	10.0	2.8	0.3	1.2	0.9	1.45	59.5	70.4	11.0	0.61	0.30	7.72
450	07/22/91	K-6	7-3	30.6	32.4	35.2	0.5	0.2	0.2	0.3	0.6	7.91	60.1	68.8	10.1	0.57	0.37	7.60
451	07/22/91	K-6	3-11	36.1	30.2	29.6	3.1	0.2	0.1	0.1	0.6	8.40	59.8	69.9	10.1	0.57	0.37	7.60
452	07/23/91	K-6	7-3	36.7	39.5	20.4	1.8	0.4	0.8	0.2	0.2	0.76	59.3	69.1	13.4	0.57	0.71	9.23
453	07/23/91	K-6	3-11	34.6	30.9	30.0	2.3	1.6	0.2	0.2	0.2	0.00	59.8	70.4	13.4	0.57	0.71	9.23
454	07/24/91	K-6	3-11	26.5	35.6	31.5	4.5	0.6	0.4	0.4	0.5	2.13	59.4	70.8	13.0	0.55	0.45	8.16
455	07/25/91	K-6	7-3	41.8	33.4	22.3	1.4	0.2	0.2	0.2	0.5	3.01	60.2	70.4	12.8	0.58	0.46	8.41
456	07/25/91	K-6	3-11	32.2	26.7	29.7	6.9	2.8	0.9	0.2	0.6	2.15	59.4	69.6	12.8	0.58	0.46	8.41
457	07/26/91	K-6	7-3	36.1	31.6	28.9	2.1	0.6	0.2	0.2	0.3	3.47	60.7	67.3	12.5	0.56	0.58	8.80
458	07/26/91	K-6	3-11	33.3	25.6	28.1	8.1	2.9	1.1	0.3	0.6	2.94	61.6	70.4	12.5	0.56	0.58	8.80
459	07/27/91	K-6	7-3	32.3	29.1	32.8	3.0	1.9	0.4	0.2	0.3	1.02	60.2	71.3	12.9	0.57	0.46	8.34
460	07/27/91	K-6	3-11	38.5	39.1	19.6	1.6	0.5	0.3	0.2	0.2	1.09	59.3	69.1	12.9	0.57	0.46	8.34
461	07/28/91	K-6	7-3	18.2	36.9	33.9	7.7	2.2	0.3	0.2	0.6	1.10	61.3	70.1	12.6	0.56	0.45	8.23
462	07/28/91	K-6	3-11	40.1	39.6	15.1	3.8	0.5	0.3	0.2	0.4	2.61	63.3	69.9	12.6	0.56	0.45	8.23
463	07/29/91	K-6	7-3	42.5	34.4	20.9	1.1	0.2	0.3	0.3	0.3	2.71	60.5	69.9	12.8	0.58	0.33	8.11
464	07/29/91	K-6	3-11	43.1	27.0	21.5	6.7	0.8	0.3	0.3	0.3	1.84	63.0	69.9	12.8	0.58	0.33	8.11
465	07/30/91	K-6	7-3	31.1	39.9	24.0	2.7	0.3	0.3	0.3	1.4	1.40	61.6	68.6	13.0	0.62	0.35	7.73
466	07/30/91	K-6	3-11	43.4	28.6	22.6	3.6	0.4	0.2	0.2	1.0	0.35	62.0	67.4	13.0	0.62	0.35	7.73
467	07/31/91	K-6	3-11	42.3	27.0	24.0	3.3	2.0	0.5	0.5	0.4	4.55	59.6	68.6	12.7	0.52	0.48	7.80
468	08/01/91	K-6	7-3	33.7	37.7	24.3	2.8	0.8	0.2	0.2	0.3	1.26	62.0	69.3	11.1	0.55	0.37	8.51
469	08/01/91	K-6	3-11	23.3	42.9	27.7	4.0	0.7	0.4	0.2	0.8	2.38	62.5	68.3	11.1	0.55	0.37	8.51
470	08/02/91	K-6	7-3	29.9	36.2	30.1	2.9	0.5	0.1	0.1	0.2	0.71	61.4	69.7	14.5	0.59	0.64	8.35
471	08/02/91	K-6	3-11	30.6	39.2	28.2	1.1	0.3	0.2	0.2	0.2	0.00	60.3	69.5	14.5	0.59	0.64	8.35
472	08/03/91	K-6	7-3	26.8	43.2	25.6	2.8	0.5	0.5	0.3	0.3	1.69	62.9	70.1	12.2	0.56	0.49	8.35
473	08/03/91	K-6	3-11	33.4	34.1	26.6	3.6	0.9	0.2	0.2	1.0	3.37	59.6	69.0	12.2	0.56	0.49	8.35
474	08/04/91	K-6	7-3	52.5	26.7	18.2	0.9	0.5	0.4	0.4	0.4	1.70	59.4	69.1	10.3	0.58	0.53	8.49
475	08/04/91	K-6	3-11	44.7	27.9	21.4	2.7	1.2	0.9	0.6	0.6	1.37	60.2	68.3	10.3	0.58	0.53	8.49
476	08/05/91	K-6	7-3	60.2	23.7	13.6	0.4	0.4	0.4	0.2	1.1	0.00	59.6	69.2	9.9	0.56	0.69	9.89
477	08/05/91	K-6	3-11	18.9	36.5	33.7	5.5	3.2	0.5	0.2	1.5	1.34	60.5	70.6	9.9	0.56	0.69	9.89

COKE PROPERTIES FROM DAILY COKE REPORTS, 11/12 BATTERIES 11:30 Wednesday, April 1, 1992 10
KIDC DEMONSTRATION PROJECT - BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

OBS	DATE	BELT	TURN	ON4"	ON3"	COKE ON2"	ON1.5"	SIZE ON1"	ON.75"	ON.5"	THRU.5	% H2O	STABIL ITY	HARD NESS	REACT IVITY	SULFUR	VM	ASH
478	08/08/91	K-6	7-3	32.2	36.3	26.0	2.2	1.3	0.4	0.4	1.2	1.14	60.4	70.3	11.0	0.54	0.45	8.00
479	08/08/91	K-6	3-11	25.3	38.9	24.8	5.9	3.3	0.9	0.5	0.4	1.56	61.0	70.8	11.0	0.54	0.45	8.00
480	08/09/91	K-6	7-3	37.6	40.6	19.7	0.9	0.5	0.3	0.2	0.2	5.28	63.2	71.2	13.0	0.52	0.29	8.12
481	08/09/91	K-6	3-11	22.6	39.7	28.7	4.6	2.2	1.5	0.5	0.2	1.74	60.6	70.0	13.0	0.52	0.29	8.12
482	08/12/91	K-6	7-3	20.9	36.0	32.0	4.9	2.2	1.0	2.4	0.6	2.92	60.3	66.8	11.4	0.52	0.48	7.92
483	08/12/91	K-6	3-11	30.0	34.2	28.2	4.1	1.6	0.5	0.5	0.9	0.37	60.7	67.3	11.4	0.52	0.48	7.92
484	08/13/91	K-6	7-3	39.5	35.7	20.3	2.7	1.0	0.2	0.3	0.3	1.32	59.4	69.1	12.9	0.55	0.55	8.36
485	08/13/91	K-6	3-11	30.1	36.3	26.4	3.2	2.3	0.9	0.6	0.2	1.97	59.9	68.4	12.9	0.55	0.55	8.36
486	08/14/91	K-6	7-3	22.9	40.2	30.7	3.7	1.5	0.4	0.2	0.4	10.07	61.5	68.9	13.2	0.56	0.55	8.55
487	08/14/91	K-6	3-11	27.3	37.2	27.1	4.8	2.1	0.6	0.4	0.5	0.70	62.4	70.2	13.2	0.56	0.55	8.55
488	08/15/91	K-6	7-3	28.4	26.5	31.7	8.1	3.3	1.0	0.5	0.5	1.62	62.5	69.9	11.8	0.60	0.62	8.09
489	08/15/91	K-6	3-11	38.1	35.2	23.1	2.0	0.7	0.2	0.2	0.5	3.72	61.7	70.3	11.8	0.60	0.62	8.09
490	08/16/91	K-6	7-3	53.5	31.2	13.3	1.1	0.3	0.3	0.2	0.1	0.78	59.4	68.4	11.2	0.57	0.41	7.96
491	08/16/91	K-6	3-11	21.2	43.0	27.8	6.0	0.8	0.2	0.3	0.7	1.54	60.7	67.2	11.2	0.57	0.41	7.96
492	08/17/91	K-6	7-3	44.7	29.0	23.1	2.3	0.3	0.1	0.2	0.3	1.99	61.6	69.3	14.5	0.59	0.70	8.19
493	08/17/91	K-6	3-11	39.4	37.2	18.2	3.9	0.4	0.2	0.2	0.5	2.74	60.6	69.8	14.5	0.59	0.70	8.19
494	08/18/91	K-6	7-3	53.4	20.7	17.0	3.2	3.0	0.6	0.6	1.5	0.68	60.6	70.8	12.9	0.61	0.69	7.63
495	08/18/91	K-6	3-11	39.7	37.5	19.7	2.3	0.4	0.2	0.2	0.6	0.89	59.2	71.0	12.9	0.61	0.69	7.63
496	08/19/91	K-6	7-3	20.0	31.3	37.3	6.2	2.2	1.3	0.2	1.5	0.00	61.6	71.4	12.8	0.61	0.63	8.39
497	08/19/91	K-6	3-11	30.9	32.6	32.2	1.7	0.8	0.6	0.2	1.0	0.74	60.8	71.0	12.8	0.61	0.63	8.39
498	08/20/91	K-6	7-3	45.5	33.1	17.2	2.5	0.7	0.2	0.2	0.6	0.76	60.0	68.8	12.8	0.59	0.55	8.02
499	08/20/91	K-6	3-11	29.6	36.7	28.6	3.5	0.4	0.2	0.2	0.8	3.08	60.8	69.2	12.8	0.59	0.55	8.02
500	08/22/91	K-6	7-3	44.8	32.1	17.8	3.4	1.0	0.2	0.2	0.5	0.00	61.5	68.8	13.0	0.54	0.40	7.84
501	08/22/91	K-6	3-11	34.9	26.2	27.9	7.0	1.7	0.7	0.7	0.9	2.50	59.9	67.6	13.0	0.54	0.40	7.84
502	08/23/91	K-6	7-3	41.3	27.9	26.1	3.1	0.7	0.2	0.2	0.5	1.97	61.0	68.8	15.5	0.57	0.53	7.72
503	08/23/91	K-6	3-11	35.1	37.8	19.8	4.3	0.9	0.7	0.7	0.7	2.67	60.5	69.1	15.5	0.57	0.53	7.72
504	08/24/91	K-6	7-3	41.2	33.2	21.0	3.2	0.2	0.2	0.2	0.8	2.20	62.0	69.3	16.1	0.60	0.67	8.26
505	08/24/91	K-6	3-11	28.2	27.0	29.2	10.5	3.2	0.7	0.5	0.7	2.38	60.1	68.8	16.1	0.60	0.67	8.26
506	08/25/91	K-6	7-3	31.1	31.5	29.5	4.0	1.5	0.8	0.6	1.0	0.58	59.8	68.7	16.0	0.59	0.94	7.90
507	08/25/91	K-6	3-11	31.2	37.5	23.4	5.5	0.9	0.4	0.4	0.7	3.21	59.8	66.5	16.0	0.59	0.94	7.90
508	08/26/91	K-6	7-3	35.9	33.7	26.5	2.2	0.5	0.3	0.4	0.5	4.34	60.7	68.9	12.9	0.57	0.50	8.05
509	08/26/91	K-6	3-11	41.0	38.4	18.5	1.1	0.4	0.3	0.2	0.1	1.37	61.6	68.7	12.9	0.57	0.50	8.05
510	08/27/91	K-6	7-3	34.8	35.0	27.4	1.6	0.4	0.2	0.2	0.4	1.45	59.4	70.1	15.6	0.57	0.76	7.93
511	08/27/91	K-6	3-11	58.2	28.6	11.6	0.4	0.2	0.0	0.2	0.8	0.63	60.6	70.6	15.6	0.57	0.76	7.93
512	08/28/91	K-6	7-3	37.2	25.6	30.4	4.0	0.9	0.3	0.3	1.3	2.34	59.8	68.5	16.0	0.58	0.50	8.09
513	08/28/91	K-6	3-11	26.5	38.0	31.4	2.0	0.5	0.5	0.5	0.6	5.67	59.3	67.0	16.0	0.58	0.50	8.09
514	08/29/91	K-6	7-3	36.6	42.3	18.2	1.1	0.5	0.5	0.2	0.6	1.13	62.5	69.7	15.4	0.55	0.82	8.09
515	08/29/91	K-6	3-11	62.2	30.4	6.4	0.2	0.2	0.2	0.2	0.2	0.38	59.9	67.9	15.4	0.55	0.82	8.09
516	08/30/91	K-6	7-3	46.4	35.4	16.4	1.0	0.4	0.4	0.0	0.0	1.78	58.9	69.4	14.3	0.59	0.69	8.20
517	08/30/91	K-6	3-11	26.6	43.6	25.4	2.3	0.7	0.2	0.2	1.0	1.58	60.1	69.2	14.3	0.59	0.69	8.20
518	08/31/91	K-6	7-3	26.9	27.6	32.0	7.6	3.2	0.7	0.4	1.6	2.32	60.2	68.5	12.9	0.61	0.70	8.12
519	08/31/91	K-6	3-11	26.7	23.2	37.3	7.6	3.4	0.2	0.2	1.4	1.18	60.5	68.8	12.9	0.61	0.70	8.12
520	09/01/91	K-6	7-3	42.7	30.6	19.0	3.3	2.6	0.3	0.3	1.2	1.67	61.6	69.2	13.0	0.56	0.48	8.26
521	09/01/91	K-6	3-11	42.4	37.2	17.0	1.9	0.4	0.2	0.2	0.7	1.35	60.3	69.8	13.0	0.56	0.48	8.26
522	09/02/91	K-6	7-3	36.8	28.6	23.4	4.5	3.0	0.6	0.4	2.7	0.00	59.9	68.6	13.0	0.61	0.59	8.26
523	09/02/91	K-6	3-11	31.7	39.2	24.6	2.0	0.5	0.5	0.5	1.0	2.00	59.6	69.5	13.0	0.61	0.59	8.26
524	09/03/91	K-6	7-3	26.4	25.7	35.6	7.5	2.6	0.7	0.5	1.0	1.35	62.5	69.6	12.8	0.55	0.80	9.00
525	09/03/91	K-6	3-11	27.3	23.0	37.4	7.1	3.5	0.5	0.2	1.0	1.40	63.4	70.7	12.8	0.55	0.80	9.00
526	09/04/91	K-6	7-3	37.4	40.4	20.1	1.1	0.2	0.2	0.2	0.4	2.45	61.6	66.6	13.0	0.60	0.45	8.11
527	09/04/91	K-6	3-11	44.8	32.3	19.1	2.9	0.4	0.3	0.3	0.3	2.25	62.4	69.2	13.0	0.60	0.45	8.11
528	09/05/91	K-6	7-3	36.4	35.0	21.8	3.1	2.1	0.6	0.2	0.8	1.33	61.1	68.5	13.4	0.52	0.36	8.27
529	09/05/91	K-6	3-11	36.9	36.2	23.3	2.3	0.2	0.2	0.2	0.7	1.78	62.0	70.0	13.4	0.52	0.36	8.27
530	09/06/91	K-6	7-3	26.3	46.3	21.0	4.0	0.8	0.4	0.2	1.0	2.14	60.7	67.6	14.6	0.55	0.33	8.90

OBS	DATE	BELT	TURN	ON4"	ON3"	COKE ON2"	ON1.5"	SIZE ON1"	ON.75"	ON.5"	THRU.5	% H2O	STABIL ITY	HARD NESS	REACT IVITY	SULFUR	VM	ASH
531	09/06/91	K 6	3 11	28.7	31.0	23.8	6.4	3.7	1.4	1.8	3.2	0.80	59.7	68.7	14.6	0.55	0.33	8.90
532	09/07/91	K-6	7-3	28.6	43.3	23.1	2.9	0.7	0.4	0.2	0.8	0.59	58.5	69.6	12.7	0.52	0.42	9.25
533	09/07/91	K 6	3-11	29.9	35.8	25.2	4.8	2.0	0.7	0.7	0.9	1.26	59.9	70.1	12.7	0.52	0.42	9.25
534	09/08/91	K-6	7-3	33.3	39.6	22.9	2.1	1.0	0.4	0.3	0.4	1.01	57.7	68.0	15.3	0.54	0.45	8.48
535	09/08/91	K-6	3-11	35.0	41.6	21.1	1.1	0.6	0.3	0.2	0.1	2.15	60.2	70.5	15.3	0.54	0.45	8.48
536	09/09/91	K-6	7-3	32.4	37.4	25.8	2.5	0.6	0.4	0.6	0.3	2.33	59.9	67.1	12.9	0.54	0.42	7.93
537	09/09/91	K-6	3-11	38.5	37.2	21.2	1.3	0.4	0.7	0.4	0.3	2.70	61.7	70.5	12.9	0.54	0.42	7.93
538	09/10/91	K-6	7-3	46.9	30.0	16.8	1.7	1.4	0.9	0.4	1.9	0.38	60.3	68.9	12.9	0.61	0.50	8.09
539	09/10/91	K-6	3-11	31.1	41.5	25.0	1.0	0.2	0.2	0.2	0.8	1.17	62.5	70.7	12.9	0.61	0.50	8.09
540	09/11/91	K 6	7-3	43.0	38.0	16.2	1.0	0.7	0.5	0.0	0.5	7.43	61.9	69.9	12.6	0.52	0.56	8.09
541	09/11/91	K 6	3 11	32.5	36.3	28.2	2.1	0.2	0.3	0.2	0.2	2.78	60.4	70.6	12.6	0.52	0.56	8.09
542	09/12/91	K-6	7-3	25.2	43.2	28.0	2.0	0.8	0.4	0.2	0.2	0.00	60.6	70.6	13.6	0.54	0.41	7.98
543	09/12/91	K-6	3-11	31.0	43.0	24.2	0.8	0.4	0.2	0.2	0.2	7.80	61.2	70.4	13.6	0.54	0.41	7.98
544	09/13/91	K-6	7-3	10.0	27.5	38.5	17.3	8.2	1.5	1.3	1.7	2.08	60.4	70.6	11.1	0.52	0.64	8.32
545	09/13/91	K-6	3-11	21.2	37.6	33.5	4.1	1.6	0.8	0.8	0.4	4.08	63.5	70.1	11.1	0.52	0.64	8.32
546	09/14/91	K-6	7-3	17.3	34.5	32.1	9.1	4.3	0.9	0.7	1.1	1.16	60.0	69.8	12.5	0.51	0.56	8.58
547	09/14/91	K-6	3-11	27.6	38.5	25.8	4.6	2.3	0.7	0.2	0.3	1.48	59.2	69.1	12.5	0.51	0.56	8.58
548	09/15/91	K-6	7-3	42.7	27.5	24.3	3.2	1.0	0.2	0.3	0.8	0.31	59.9	68.6	13.7	0.55	0.50	7.88
549	09/15/91	K-6	3-11	38.2	35.8	15.8	4.7	1.6	0.9	1.0	2.0	0.95	60.2	70.4	13.7	0.55	0.50	7.88
550	09/16/91	K-6	7-3	41.5	34.8	21.6	1.5	0.2	0.2	0.1	0.1	1.44	60.3	69.5	11.3	0.52	0.38	8.76
551	09/16/91	K 6	3-11	31.3	36.4	27.1	4.2	0.4	0.2	0.2	0.2	0.75	60.7	69.4	11.3	0.52	0.38	8.76
552	09/17/91	K-6	7-3	34.8	34.0	27.1	2.0	1.2	0.6	0.2	0.1	3.57	59.6	69.2	12.4	0.52	0.49	8.20
553	09/17/91	K-6	3-11	44.1	34.4	17.9	1.6	0.7	0.7	0.5	0.1	2.65	59.4	69.2	12.4	0.52	0.49	8.20
554	09/18/91	K-6	7-3	34.4	37.9	22.4	2.4	0.4	0.2	0.4	1.9	6.00	59.5	69.3	12.8	0.55	0.66	8.35
555	09/18/91	K-6	3-11	34.9	39.0	23.1	2.3	0.2	0.1	0.1	0.3	3.64	59.7	67.3	12.8	0.55	0.66	8.35
556	09/19/91	K-6	7-3	42.6	36.9	16.6	2.1	0.9	0.2	0.2	0.5	2.09	63.0	70.8	13.0	0.55	0.44	8.37
557	09/19/91	K 6	3 11	39.1	34.7	21.1	2.4	1.7	0.0	0.5	0.5	2.77	60.8	69.0	13.0	0.55	0.44	8.37
558	09/20/91	K-6	7-3	39.9	34.0	21.2	2.9	0.7	0.3	0.3	0.7	0.79	58.8	59.6	12.1	0.54	0.49	8.31
559	09/20/91	K-6	3-11	33.8	39.5	21.7	2.4	0.8	0.8	0.4	0.6	0.76	60.4	70.1	12.1	0.54	0.49	8.31
560	09/21/91	K-6	7-3	40.6	37.6	19.4	1.3	0.4	0.2	0.2	0.3	1.35	59.6	69.6	11.6	0.56	0.40	7.86
561	09/21/91	K-6	3-11	38.1	29.4	28.6	3.0	0.2	0.1	0.1	0.5	1.98	60.2	70.4	11.6	0.56	0.40	7.86
562	09/22/91	K-6	7-3	39.5	35.9	21.2	2.3	0.5	0.3	0.2	0.1	1.35	61.7	69.0	14.8	0.54	0.55	8.21
563	09/22/91	K-6	3-11	38.9	37.3	19.0	2.9	1.0	0.5	0.2	0.2	1.34	62.0	68.7	14.8	0.54	0.55	8.21
564	09/23/91	K-6	7-3	43.2	39.4	13.9	1.6	0.8	0.3	0.3	0.5	3.85	60.5	69.0	14.7	0.56	0.54	7.74
565	09/23/91	K-6	3-11	20.5	50.0	16.7	8.5	2.4	0.4	0.2	1.3	1.55	59.5	68.5	14.7	0.56	0.54	7.74
566	09/24/91	K-6	7-3	43.2	37.4	14.6	2.2	0.8	0.8	0.4	0.6	4.20	60.0	70.6	12.5	0.58	0.63	8.05
567	09/24/91	K-6	3-11	26.3	39.1	25.8	4.9	1.8	0.5	0.5	1.1	2.05	60.5	69.5	12.5	0.58	0.63	8.05
568	09/25/91	K-6	7-3	37.5	33.8	25.2	2.0	0.5	0.3	0.3	0.4	2.16	59.6	68.8	13.0	0.57	0.47	7.86
569	09/25/91	K-6	3-11	35.0	38.7	20.1	3.9	1.0	0.5	0.4	0.4	1.45	58.9	69.2	13.0	0.57	0.47	7.86
570	09/26/91	K 6	7 3	36.6	40.2	21.9	0.7	0.3	0.1	0.1	0.1	1.45	59.7	68.5	.	0.54	0.48	8.26
571	09/26/91	K-6	3-11	56.3	30.9	10.1	1.4	0.9	0.1	0.1	0.2	0.70	60.0	69.8		0.54	0.48	8.26
572	09/27/91	K-6	7-3	43.4	36.6	18.3	1.0	0.4	0.1	0.1	0.1	0.76	61.4	68.7	12.5	0.53	0.42	8.16
573	09/27/91	K-6	3-11	25.3	41.8	29.5	3.0	0.1	0.1	0.1	0.1	1.70	62.3	69.6	12.5	0.53	0.42	8.16
574	09/28/91	K-6	7-3	40.1	38.4	18.6	1.4	0.4	0.3	0.3	0.5	1.41	59.1	69.0	13.0	0.50	0.45	8.34
575	09/28/91	K-6	3-11	17.2	23.6	33.5	16.3	5.6	1.4	0.8	1.6	1.21	60.6	68.9	13.0	0.50	0.45	8.34
576	09/29/91	K-6	7-3	43.0	32.5	21.3	2.1	0.2	0.2	0.2	0.5	2.31	60.6	71.4	12.4	0.57	0.44	8.54
577	09/29/91	K-6	3-11	31.7	38.8	22.6	3.8	0.7	0.7	0.7	1.0	0.79	60.9	70.3	12.4	0.57	0.44	8.54
578	09/30/91	K-6	7-3	36.5	28.1	27.3	6.2	0.5	0.3	0.2	0.9	1.24	59.2	68.5	12.6	0.59	0.46	8.66
579	09/30/91	K-6	3-11	43.7	32.5	21.0	0.7	0.2	0.2	0.3	1.4	1.48	61.0	69.0	12.6	0.59	0.46	8.66
580	10/01/91	K-6	7-3	32.5	45.3	19.9	1.5	0.4	0.1	0.1	0.2	0.40	60.7	69.9	13.5	0.58	0.38	8.65
581	10/01/91	K-6	3-11	25.8	40.1	30.3	2.3	0.8	0.2	0.2	0.3	1.06	61.7	69.6	13.5	0.58	0.38	8.65
582	10/02/91	K-6	7-3	37.0	40.6	18.8	1.5	0.4	0.2	0.2	1.3	0.81	61.0	68.9	13.3	0.59	0.53	8.54
583	10/02/91	K-6	3-11	25.0	40.1	29.4	2.7	1.0	0.4	0.5	0.9	0.76	61.5	69.7	13.3	0.59	0.53	8.54

KIDC DEMONSTRATION PROJECT - BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

OBS	DATE	BELT	TURN	ON4"	ON3"	COKE ON2"	ON1.5"	SIZE ON1"	ON.75"	ON.5"	THRU.5	% H2O	STABIL ITY	HARD NESS	REACT IVITY	SULFUR	VM	ASH
584	10/03/91	K-6	7-3	43.2	36.1	16.5	2.4	0.3	0.2	0.1	1.2	3.66	57.5	68.1	11.4	0.59	0.58	9.05
585	10/03/91	K-6	3-11	36.8	31.2	26.0	3.2	0.4	0.4	0.2	1.8	1.97	59.6	69.6	11.4	0.59	0.58	9.05
586	10/04/91	K-6	7-3	46.1	37.3	15.2	0.4	0.2	0.2	0.0	0.6	0.00	60.0	70.1	12.2	0.58	0.53	8.55
587	10/04/91	K-6	3-11	33.7	28.6	31.2	4.1	0.6	0.4	0.4	1.0	2.74	57.2	69.1	12.2	0.58	0.53	8.55
588	10/05/91	K-6	7-3	34.0	32.7	23.9	4.3	2.6	0.6	0.4	1.5	2.91	60.7	69.5	12.8	0.58	0.46	8.38
589	10/05/91	K-6	3-11	45.8	27.7	18.1	4.5	1.9	0.4	0.4	1.2	1.80	61.1	69.7	12.8	0.58	0.46	8.38
590	10/07/91	K-6	7-3	33.2	26.0	30.9	5.2	3.4	0.5	0.4	0.4	0.76	60.9	69.3	13.0	0.57	0.49	8.05
591	10/07/91	K-6	3-11	32.0	36.3	26.4	2.6	1.1	0.6	0.6	0.4	0.00	59.3	60.2	13.0	0.57	0.49	8.05
592	10/08/91	K-6	7-3	34.0	35.5	25.4	2.6	0.9	0.7	0.7	0.2	1.48	60.6	70.2	12.6	0.56	0.53	8.37
593	10/08/91	K-6	3-11	40.1	37.7	19.5	1.3	0.7	0.2	0.2	0.3	3.69	61.2	71.0	12.6	0.56	0.53	8.37
594	10/09/91	K-6	3-11	46.2	31.0	19.3	0.5	0.5	0.5	0.2	1.8	1.69	61.5	69.6	12.4	0.54	0.57	9.23
595	10/10/91	K-6	7-3	34.0	35.5	20.2	5.2	3.3	0.5	0.5	0.8	0.76	59.2	69.1	11.9	0.56	0.82	8.65
596	10/10/91	K-6	3-11	25.0	37.7	24.9	8.6	1.9	0.3	0.3	1.3	3.97	59.8	67.2	11.9	0.56	0.82	8.65
597	10/11/91	K-6	7-3	30.3	38.0	26.4	3.0	0.9	0.4	0.4	0.6	2.85	60.6	69.0	13.0	0.53	0.47	8.34
598	10/11/91	K-6	3-11	23.4	31.8	32.5	6.2	3.1	0.9	0.5	1.6	1.06	60.2	68.7	13.0	0.53	0.47	8.34
599	10/12/91	K-6	7-3	33.3	39.2	23.0	1.6	0.7	0.5	0.5	1.2	1.44	59.8	68.6	13.0	0.53	0.36	8.31
600	10/12/91	K-6	3-11	24.2	35.8	31.0	4.5	2.1	0.6	0.4	1.4	1.34	60.1	69.9	13.0	0.53	0.36	8.31
601	10/13/91	K-6	7-3	38.4	34.8	20.2	2.8	1.8	0.4	0.5	1.1	0.77	60.0	70.2	12.2	0.52	0.46	8.30
602	10/13/91	K-6	3-11	47.7	31.2	17.9	1.9	0.3	0.2	0.2	0.6	1.81	59.4	69.7	12.2	0.52	0.46	8.30
603	10/14/91	K-6	7-3	42.3	31.3	22.7	1.7	0.7	0.2	0.1	1.0	1.42	60.6	70.2	12.9	0.55	0.56	8.43
604	10/14/91	K-6	3-11	36.4	35.8	26.1	0.8	0.2	0.2	0.2	0.3	2.16	59.5	69.8	12.9	0.55	0.56	8.43
605	10/15/91	K-6	7-3	38.2	31.1	27.6	1.2	0.5	0.2	0.0	1.2	2.15	61.0	70.8	14.1	0.54	0.54	8.18
606	10/15/91	K-6	3-11	49.2	26.3	18.9	3.6	1.2	0.2	0.2	0.4	2.04	60.7	69.3	14.1	0.54	0.54	8.18
607	10/16/91	K-6	3-11	25.7	41.3	22.1	6.3	2.6	0.6	0.4	1.0	2.00	59.6	70.1	12.9	0.54	0.70	8.14
608	10/17/91	K-6	7-3	45.1	28.4	23.2	1.9	0.6	0.1	0.2	0.5	1.16	60.6	70.9	12.9	0.55	0.55	8.55
609	10/17/91	K-6	3-11	40.1	36.2	21.1	1.1	0.6	0.2	0.3	0.4	2.03	58.6	69.1	12.9	0.55	0.55	8.55
610	10/18/91	K-6	7-3	32.1	36.2	28.9	0.6	0.2	0.2	0.1	1.7	0.70	59.2	68.6	12.5	0.56	0.52	8.44
611	10/19/91	K-6	3-11	40.1	26.1	22.2	8.6	1.9	0.4	0.3	0.4	3.33	58.5	68.9	13.2	0.59	0.64	8.05
612	10/21/91	K-6	7-3	40.9	34.4	20.4	1.8	0.7	0.2	0.1	1.5	5.34	62.0	69.3	12.6	0.54	0.40	8.08
613	10/21/91	K-6	3-11	24.8	45.3	21.4	3.0	2.0	1.4	0.4	1.7	2.47	59.9	70.0	12.6	0.54	0.40	8.08
614	10/22/91	K-6	7-3	44.0	31.2	22.0	0.8	0.6	0.2	0.2	1.0	7.33	61.1	68.1	12.1	0.57	0.50	8.31
615	10/22/91	K-6	3-11	43.0	35.6	17.5	2.0	0.5	0.3	0.1	1.0	1.61	61.5	68.6	12.1	0.57	0.50	8.31
616	10/23/91	K-6	7-3	43.4	31.1	21.9	1.6	0.6	0.2	0.1	0.1	1.53	58.6	68.1	13.0	0.54	0.45	8.61
617	10/23/91	K-6	3-11	39.9	35.9	17.1	4.4	1.5	0.7	0.2	0.3	3.25	60.2	69.6	13.0	0.54	0.45	8.61
618	10/24/91	K-6	7-3	28.9	32.1	33.2	2.4	0.8	0.2	0.3	2.1	1.20	61.7	68.5	13.0	0.56	0.47	8.04
619	10/24/91	K-6	3-11	39.6	32.9	24.2	2.9	0.1	0.1	0.1	0.1	0.73	62.0	69.6	13.0	0.56	0.47	8.04
620	10/25/91	K-6	7-3	32.0	36.3	23.2	4.8	1.8	0.4	0.4	1.1	3.70	59.4	69.0	14.2	0.58	0.53	7.64
621	10/25/91	K-6	3-11	29.1	28.7	33.4	5.4	1.8	1.0	0.2	0.4	2.02	61.0	69.8	14.2	0.58	0.53	7.64
622	10/26/91	K-6	7-3	45.3	30.1	22.6	1.0	0.5	0.2	0.1	0.2	1.56	61.3	69.6	11.2	0.55	0.51	8.16
623	10/26/91	K-6	3-11	38.2	37.5	21.0	1.9	0.7	0.2	0.2	0.3	1.66	60.7	68.4	11.2	0.55	0.51	8.16
624	10/28/91	K-6	7-3	40.1	33.2	22.1	0.5	0.5	0.3	0.3	3.0	2.27	60.3	69.1	12.1	0.56	0.65	8.14
625	10/28/91	K-6	3-11	33.8	31.2	26.9	5.3	1.2	0.3	0.2	1.1	1.07	59.8	68.0	12.1	0.56	0.65	8.14
626	10/29/91	K-6	7-3	31.1	37.0	27.6	2.7	0.8	0.3	0.1	0.4	3.75	61.9	70.5	13.2	0.56	0.59	8.12
627	10/29/91	K-6	3-11	27.3	40.1	29.8	2.1	0.3	0.1	0.1	0.2	1.07	60.5	68.6	13.2	0.56	0.59	8.12
628	10/30/91	K-6	7-3	34.4	38.8	22.7	1.9	0.5	0.4	0.4	0.9	1.49	61.9	69.6	14.9	0.56	0.72	7.73
629	10/30/91	K-6	3-11	36.9	37.5	22.2	1.5	0.7	0.3	0.2	0.7	0.35	61.3	68.8	14.9	0.56	0.72	7.73
630	10/31/91	K-6	7-3	41.5	33.6	21.0	1.2	0.3	0.3	0.2	1.9	2.44	59.6	69.8	11.0	0.55	0.52	7.82
631	10/31/91	K-6	3-11	36.3	31.8	23.8	4.2	0.7	0.4	0.3	2.5	2.08	60.2	71.1	11.0	0.55	0.52	7.82
632	11/01/91	K-6	7-3	27.3	43.4	23.6	3.4	0.7	0.3	0.3	1.0	2.12	59.4	69.6	13.0	0.56	0.43	7.70
633	11/01/91	K-6	3-11	32.4	31.0	28.3	4.9	1.6	0.8	0.6	0.4	1.76	61.0	71.6	13.0	0.56	0.43	7.70
634	11/02/91	K-6	7-3	40.8	33.4	22.5	1.4	0.5	0.5	0.2	0.7	1.06	58.8	68.5	13.0	0.43	0.37	9.04
635	11/02/91	K-6	3-11	33.5	38.7	20.9	3.4	1.9	0.4	0.3	0.9	1.15	60.2	69.6	13.0	0.43	0.37	9.04
636	11/03/91	K-6	7-3	36.1	29.5	25.6	5.4	1.1	0.9	0.5	0.9	5.37	60.6	67.1	13.6	0.56	0.35	7.82

COKE PROPERTIES FROM DAILY COKE REPORTS, 11/12 BATTERIES 11:30 Wednesday, April 1, 1992 13
KIDC DEMONSTRATION PROJECT - BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

OBS	DATE	BELT	TURN	ON4"	ON3"	COKE ON2"	ON1.5"	SIZE ON1"	ON.75"	ON.5"	THRU.5	% H2O	STABIL ITY	HARD NESS	REACT IVITY	SULFUR	VM	ASH
637	11/03/91	K 6	3-11	37.6	33.4	20.8	3.8	1.6	1.0	0.7	1.1	3.17	60.3	68.3	13.6	0.56	0.35	7.82
638	11/04/91	K-6	7-3	22.9	41.1	30.2	2.8	1.6	0.2	0.2	1.0	2.63	59.7	69.3	12.9	0.57	0.50	7.73
639	11/04/91	K-6	3-11	27.3	46.0	21.0	2.8	0.7	0.4	0.2	1.6	3.24	60.0	67.1	12.9	0.57	0.50	7.73
640	11/05/91	K-6	7-3	21.7	37.4	38.3	1.9	0.5	0.1	0.0	0.1	2.47	60.3	68.1	12.3	0.54	0.51	7.70
641	11/05/91	K 6	3 11	31.4	30.7	32.2	4.3	0.8	0.2	0.2	0.2	2.48	61.6	69.2	12.3	0.54	0.51	7.70
642	11/06/91	K-6	7-3	38.0	36.0	22.0	1.8	0.4	0.3	0.3	1.2	2.19	59.2	68.6	10.6	0.54	0.39	7.82
643	11/06/91	K-6	3-11	32.0	41.8	21.6	2.1	0.7	0.3	0.2	1.3	1.85	60.1	69.2	10.6	0.54	0.39	7.82
644	11/07/91	K-6	7-3	29.2	46.0	19.5	3.2	0.4	0.4	0.5	0.8	1.68	58.4	70.6	12.3	0.55	0.76	7.87
645	11/07/91	K-6	3-11	26.7	44.3	23.2	3.0	0.6	0.5	0.4	1.3	2.02	60.6	71.1	12.3	0.55	0.76	7.87
646	11/08/91	K 6	7 3	33.2	35.1	19.6	8.1	2.5	0.5	0.4	0.6	1.73	58.6	68.2	11.6	0.55	0.34	7.94
647	11/08/91	K-6	3-11	28.7	32.0	23.7	10.1	3.0	0.6	0.8	1.1	2.08	60.1	68.7	11.6	0.55	0.34	7.94
648	11/09/91	K-6	7-3	33.7	35.7	25.8	1.7	1.0	0.3	0.3	1.5	3.18	59.6	68.1	11.9	0.54	0.35	8.12
649	11/09/91	K-6	3-11	33.2	38.7	24.7	1.7	0.5	0.3	0.2	0.7	2.84	58.8	69.0	11.9	0.54	0.35	8.12
650	11/10/91	K 6	7 3	32.6	38.5	24.4	2.2	0.7	0.4	0.3	0.9	1.26	60.7	69.5	11.8	0.52	0.38	8.00
651	11/10/91	K-6	3-11	25.7	40.8	26.1	3.6	1.4	0.5	0.3	1.6	1.40	59.6	69.2	11.8	0.52	0.38	8.00
652	11/11/91	K-6	7-3	24.6	38.7	24.1	8.8	1.9	1.0	0.1	0.8	1.50	60.1	69.7	12.9	0.52	0.38	7.97
653	11/11/91	K-6	3-11	32.4	36.4	20.5	4.1	2.5	1.1	1.0	2.0	0.37	61.5	70.2	12.9	0.52	0.38	7.97
654	11/12/91	K-6	7-3	42.1	31.6	22.0	2.7	0.8	0.2	0.3	0.3	0.83	60.1	68.9	9.8	0.52	0.49	8.15
655	11/12/91	K-6	3-11	29.7	42.1	22.2	3.0	1.0	0.6	0.5	0.9	0.74	59.8	67.1	9.8	0.52	0.49	8.15
656	11/13/91	K-6	7-3	31.2	38.3	25.6	3.1	0.2	0.2	0.0	1.4	7.14	61.0	69.6	14.3	0.51	0.55	7.91
657	11/13/91	K-6	3-11	36.3	31.9	20.1	5.1	2.5	1.8	0.8	1.5	2.29	59.2	68.9	14.3	0.51	0.55	7.91
658	11/14/91	K-6	7-3	43.4	37.0	16.9	2.1	0.3	0.1	0.1	0.1	2.38	59.6	68.7	15.0	0.52	0.44	7.87
659	11/14/91	K-6	3 11	32.7	30.0	25.6	5.8	3.4	0.8	0.5	1.2	3.05	60.4	71.1	15.0	0.52	0.44	7.87
660	11/15/91	K 6	7 3	40.5	34.5	19.6	3.5	0.8	0.4	0.2	0.5	3.16	59.4	67.6	12.7	0.52	0.55	7.85
661	11/15/91	K-6	3-11	32.9	35.6	23.9	5.5	1.4	0.3	0.2	0.2	1.35	60.0	68.8	12.7	0.52	0.55	7.85
662	11/16/91	K 6	7 3	38.2	36.0	20.3	3.2	1.0	0.4	0.3	0.6	2.45	60.4	71.1	11.4	0.77	0.71	7.90
663	11/16/91	K 6	3-11	30.9	37.8	26.0	3.6	0.8	0.3	0.3	0.3	2.31	59.2	68.8	11.4	0.77	0.71	7.90
664	11/17/91	K-6	7-3	42.7	32.4	20.8	2.5	0.7	0.3	0.2	0.4	1.28	59.6	69.8	12.5	0.54	0.31	7.94
665	11/17/91	K-6	3-11	39.6	31.1	26.7	1.2	0.3	0.1	0.2	0.8	1.36	58.9	67.9	12.5	0.54	0.31	7.94
666	11/18/91	K-6	7-3	28.6	30.2	22.6	9.9	5.1	2.4	0.6	0.6	3.90	62.5	69.8	13.1	0.55	0.49	8.04
667	11/18/91	K-6	3-11	32.0	31.6	12.6	10.8	6.9	3.5	1.2	1.4	1.93	60.9	68.9	13.1	0.55	0.49	8.04
668	11/19/91	K-6	7-3	36.3	40.6	18.2	2.3	1.2	0.4	0.2	0.8	0.37	61.1	70.7	11.7	0.52	0.55	8.04
669	11/19/91	K 6	3-11	26.3	36.9	28.4	7.1	0.2	0.1	0.1	0.9	0.46	59.8	69.7	11.7	0.52	0.55	8.04
670	11/20/91	K-6	7-3	51.2	29.2	15.0	2.5	1.1	0.3	0.3	0.4	5.09	58.6	68.9	13.3	0.52	0.55	7.94
671	11/20/91	K 6	3-11	9.9	27.3	46.3	11.6	3.6	0.4	0.1	0.8	5.30	60.1	59.6	13.3	0.52	0.55	7.94
672	11/21/91	K 6	7 3	48.9	29.5	14.0	5.1	1.6	0.2	0.2	0.5	4.20	59.7	68.5	11.2	0.51	0.30	7.78
673	11/21/91	K-6	3-11	39.9	31.4	23.1	3.1	1.0	0.3	0.1	1.1	0.81	60.4	69.4	11.2	0.51	0.30	7.78
674	11/22/91	K-6	7-3	21.7	22.8	30.1	17.5	6.9	0.3	0.3	0.4	7.50	58.7	68.0	10.2	0.53	0.67	7.84
675	11/22/91	K-6	3-11	33.3	35.2	23.5	2.5	3.1	1.5	0.3	0.6	12.77	60.5	68.8	10.2	0.53	0.67	7.84
676	11/23/91	K-6	7-3	42.5	34.1	19.2	2.4	0.6	0.2	0.2	0.8	1.63	60.8	69.3	13.7	0.54	0.70	7.67
677	11/23/91	K-6	3 11	32.4	35.0	23.5	5.4	1.3	0.4	0.4	1.6	1.76	61.7	70.5	13.7	0.54	0.70	7.67
678	11/24/91	K-6	7 3	33.5	36.4	21.6	5.6	1.3	0.6	0.3	0.7	2.21	59.3	69.4	12.1	0.54	0.40	7.18
679	11/24/91	K-6	3-11	31.0	38.5	22.8	4.2	1.2	0.5	0.6	1.2	6.89	60.0	69.1	12.1	0.54	0.40	7.18
680	11/25/91	K-6	7-3	38.3	36.5	19.4	0.5	1.3	0.8	1.3	1.9	3.22	59.9	68.4	11.3	0.52	0.46	7.57
681	11/25/91	K-6	3-11	18.4	37.8	34.3	6.4	1.8	0.4	0.3	0.6	3.33	60.9	68.0	11.3	0.52	0.46	7.57
682	11/26/91	K-6	7-3	49.5	25.7	23.2	0.4	0.6	0.2	0.2	0.2	0.76	60.5	69.9	15.4	0.54	0.42	7.42
683	11/26/91	K-6	3-11	29.7	42.8	23.2	2.1	1.0	0.7	0.2	0.3	1.08	60.2	69.2	15.4	0.54	0.42	7.42
684	11/27/91	K 6	7-3	36.6	34.0	21.3	5.3	1.8	0.2	0.6	0.2	3.76	59.7	68.6	13.8	0.55	0.51	7.88
685	11/27/91	K 6	3-11	36.2	38.6	20.1	3.6	0.9	0.3	0.2	0.1	1.33	58.5	69.0	13.8	0.55	0.51	7.88
686	11/28/91	K-6	7-3	30.3	39.7	26.4	2.3	0.1	0.1	0.1	1.0	2.14	59.2	68.7	11.8	0.52	0.43	8.82
687	11/28/91	K-6	3-11	23.0	33.6	38.6	1.7	0.9	0.3	0.1	1.8	1.69	58.8	69.4	11.8	0.52	0.43	8.82
688	11/29/91	K-6	7-3	42.6	34.2	19.2	2.4	0.5	0.2	0.2	0.7	3.87	59.6	68.7	16.1	0.59	0.72	8.15
689	11/29/91	K-6	3-11	38.2	35.4	23.0	1.8	0.5	0.3	0.2	0.6	1.71	58.6	69.0	16.1	0.59	0.72	8.15

COKE PROPERTIES FROM DAILY COKE REPORTS, 11/12 BATTERIES 11:30 Wednesday, April 1, 1992 14
KIDC DEMONSTRATION PROJECT BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

OBS	DATE	BELT	TURN	ON4"	ON3"	COKE ON2"	ON1 5"	SIZE ON1"	ON.75"	ON 5"	THRU.5	% H2O	STABIL ITY	HARD NESS	REACT IVITY	SULFUR	VM	ASH
690	11/30/91	K-6	7-3	39.0	32.5	21.4	3.9	1.3	0.4	0.7	0.8	1.68	60.8	68.8	15.9	0.56	0.75	8.59
691	11/30/91	K-6	3-11	32.8	40.2	21.1	3.3	0.9	0.4	0.3	1.0	1.36	60.6	68.5	15.9	0.56	0.75	8.59

KIDC DEMONSTRATION PROJECT - BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

OBS	DATE	COKE BATTERY	COKE REACTIVITY INDEX	COKE STRENGTH AFTER REACTION
1	10/15/90	A	27.0	56.2
2	10/16/90	A	28.8	54.9
3	10/16/90	11/12	28.1	56.1
4	10/17/90	A	28.2	59.2
5	10/18/90	A	28.6	56.7
6	10/18/90	11/12	24.2	65.4
7	10/19/90	A	25.3	62.0
8	10/20/90	A	24.5	61.9
9	10/20/90	11/12	25.8	61.0
10	10/21/90	A	26.1	62.2
11	10/21/90	11/12	25.6	59.8
12	10/22/90	A	24.7	63.6
13	10/23/90	A	23.5	64.9
14	10/23/90	11/12	25.6	61.0
15	10/24/90	A	21.6	69.1
16	10/25/90	11/12	23.8	63.7
17	10/26/90	A	23.0	65.0
18	10/27/90	A	23.0	65.4
19	10/27/90	11/12	25.3	67.4
20	10/28/90	A	22.8	68.0
21	10/28/90	11/12	23.2	63.6
22	10/29/90	A	22.4	68.8
23	10/30/90	A	23.0	64.9
24	10/30/90	11/12	24.2	63.7
25	10/31/90	A	24.1	63.5
26	11/01/90	A	24.9	63.2
27	11/01/90	11/12	23.0	63.8
28	11/02/90	A	22.0	66.1
29	11/03/90	A	25.3	61.5
30	11/03/90	11/12	22.0	67.0
31	11/04/90	A	25.3	60.7
32	11/04/90	11/12	23.8	64.1
33	11/05/90	A	26.6	58.5
34	11/06/90	A	21.4	69.1
35	11/06/90	11/12	25.0	62.7
36	11/07/90	A	28.7	55.0
37	11/08/90	A	25.1	63.1
38	11/08/90	11/12	26.0	60.9
39	11/09/90	A	26.9	61.3
40	11/09/90	11/12	24.7	64.3
41	11/10/90	A	26.2	59.4
42	11/10/90	11/12	30.1	51.4
43	11/11/90	11/12	28.2	60.4
44	11/12/90	A	23.0	65.0
45	11/13/90	A	26.2	59.9
46	11/13/90	11/12	24.3	62.0
47	11/14/90	A	20.5	69.2
48	11/15/90	A	23.6	65.3
49	11/15/90	11/12	23.0	63.8
50	11/16/90	A	24.3	61.8
51	11/17/90	A	23.7	62.4
52	11/17/90	11/12	25.0	60.5
53	11/18/90	A	21.3	69.9

KIDC DEMONSTRATION PROJECT - BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

OBS	DATE	COKE BATTERY	COKE REACTIVITY INDEX	COKE STRENGTH AFTER REACTION
54	11/18/90	11/12	26.6	58.0
55	11/19/90	A	24.3	65.6
56	11/20/90	A	26.2	60.2
57	11/20/90	11/12	28.6	54.4
58	11/21/90	A	27.0	59.9
59	11/22/90	A	26.0	61.2
60	11/22/90	11/12	28.3	58.5
61	11/23/90	A	26.5	62.1
62	11/24/90	A	26.9	58.4
63	11/24/90	11/12	27.2	59.2
64	11/25/90	A	24.7	66.0
65	11/25/90	11/12	27.0	59.0
66	11/26/90	A	28.4	63.5
67	11/27/90	A	24.1	64.9
68	11/27/90	11/12	26.0	62.5
69	11/28/90	A	20.8	79.1
70	11/29/90	A	24.7	64.4
71	11/29/90	11/12	24.9	68.8
72	11/30/90	A	26.2	61.5
73	12/01/90	A	24.8	64.3
74	12/01/90	11/12	23.8	69.2
75	12/02/90	A	29.4	58.0
76	12/02/90	11/12	22.9	70.1
77	12/03/90	A	22.9	65.2
78	12/04/90	A	26.8	60.7
79	12/04/90	11/12	26.5	59.4
80	12/05/90	A	24.6	64.3
81	12/06/90	A	24.2	63.3
82	12/06/90	11/12	24.3	61.9
83	12/07/90	A	30.8	51.3
84	12/08/90	A	27.1	58.0
85	12/08/90	11/12	22.8	65.4
86	12/09/90	A	25.7	60.7
87	12/09/90	11/12	27.7	59.9
88	12/10/90	A	26.0	61.9
89	12/11/90	A	24.4	64.8
90	12/11/90	11/12	26.0	62.8
91	12/12/90	A	26.5	63.3
92	12/13/90	A	23.8	65.5
93	12/13/90	11/12	24.1	70.2
94	12/14/90	A	20.3	69.1
95	12/15/90	A	22.5	68.0
96	12/15/90	11/12	28.0	57.6
97	12/16/90	A	23.7	63.1
98	12/16/90	11/12	22.8	66.6
99	12/17/90	A	22.9	65.0
100	12/18/90	A	21.9	66.6
101	12/18/90	11/12	23.7	65.4
102	12/19/90	A	27.1	59.2
103	12/20/90	A	23.9	64.0
104	12/20/90	11/12	27.4	57.6
105	12/21/90	A	23.6	63.4
106	12/22/90	A	23.3	66.8

KIDC DEMONSTRATION PROJECT - BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

OBS	DATE	COKE BATTERY	COKE REACTIVITY INDEX	COKE STRENGTH AFTER REACTION
107	12/22/90	11/12	25.6	59.3
108	12/23/90	A	22.7	67.2
109	12/23/90	11/12	26.5	63.9
110	12/24/90	A	24.3	62.6
111	12/25/90	A	24.3	64.2
112	12/25/90	11/12	22.7	65.0
113	12/26/90	A	24.1	66.4
114	12/27/90	A	20.9	69.8
115	12/27/90	11/12	24.9	62.9
116	12/28/90	A	22.8	68.1
117	12/29/90	A	21.7	67.4
118	12/29/90	11/12	23.2	69.8
119	12/30/90	11/12	22.1	67.1
120	12/31/90	A	24.6	66.7
121	01/01/91	A	23.2	66.4
122	01/01/91	11/12	23.8	64.3
123	01/02/91	A	25.2	66.0
124	01/03/91	A	23.8	64.5
125	01/03/91	11/12	24.6	64.1
126	01/04/91	A	23.3	63.9
127	01/05/91	A	26.0	61.3
128	01/05/91	11/12	25.9	60.5
129	01/06/91	A	25.0	63.4
130	01/06/91	11/12	24.1	65.5
131	01/07/91	A	23.4	66.0
132	01/08/91	A	22.7	66.2
133	01/08/91	11/12	22.9	58.1
134	01/09/91	A	24.3	64.2
135	01/10/91	A	22.1	69.1
136	01/10/91	11/12	26.1	61.1
137	01/11/91	A	26.2	61.9
138	01/12/91	A	23.8	65.1
139	01/12/91	11/12	24.6	63.9
140	01/13/91	A	22.6	66.8
141	01/13/91	11/12	24.6	62.6
142	01/14/91	A	22.6	65.3
143	01/15/91	A	20.9	70.8
144	01/15/91	11/12	22.1	67.4
145	01/16/91	A	18.8	70.7
146	01/17/91	A	20.5	69.8
147	01/17/91	11/12	25.7	58.9
148	01/18/91	A	22.2	66.2
149	01/19/91	A	19.4	68.1
150	01/19/91	11/12	24.5	59.3
151	01/20/91	A	22.8	65.1
152	01/20/91	11/12	27.3	58.6
153	01/21/91	A	20.3	69.9
154	01/22/91	A	24.5	61.2
155	01/22/91	11/12	22.4	66.4
156	01/23/91	A	23.1	63.6
157	01/24/91	A	22.4	68.5
158	01/24/91	11/12	24.3	60.8
159	01/25/91	A	25.3	60.8

KIDC DEMONSTRATION PROJECT - BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

OBS	DATE	COKE BATTERY	COKE REACTIVITY INDEX	COKE STRENGTH AFTER REACTION
160	01/26/91	A	21.2	69.1
161	01/26/91	11/12	24.4	61.2
162	01/27/91	A	24.3	63.9
163	01/27/91	11/12	23.0	65.9
164	01/28/91	A	23.6	67.0
165	01/29/91	A	21.8	66.3
166	01/29/91	11/12	27.5	55.5
167	01/30/91	A	21.7	66.9
168	01/31/91	A	24.6	61.0
169	01/31/91	11/12	26.5	59.1
170	02/01/91	A	21.2	65.6
171	02/02/91	A	21.4	65.1
172	02/02/91	11/12	24.3	63.3
173	02/03/91	A	20.2	68.1
174	02/03/91	11/12	25.1	60.1
175	02/04/91	A	21.1	68.0
176	02/05/91	A	21.6	68.2
177	02/05/91	11/12	23.3	62.7
178	02/06/91	A	22.7	65.9
179	02/07/91	A	22.3	65.8
180	02/07/91	11/12	23.2	65.8
181	02/08/91	A	20.6	66.4
182	02/09/91	A	21.5	68.8
183	02/09/91	11/12	22.2	68.9
184	02/10/91	A	22.4	67.9
185	02/10/91	11/12	22.9	63.3
186	02/11/91	A	21.4	66.1
187	02/12/91	A	21.4	67.9
188	02/12/91	11/12	22.7	64.1
189	02/13/91	A	23.9	63.0
190	02/14/91	A	26.1	62.9
191	02/14/91	11/12	26.9	57.9
192	02/15/91	A	25.8	62.2
193	02/16/91	A	23.4	63.8
194	02/16/91	11/12	20.7	70.0
195	02/17/91	A	26.7	57.9
196	02/17/91	11/12	26.9	58.2
197	02/18/91	A	23.1	65.9
198	02/19/91	A	20.1	68.3
199	02/19/91	11/12	24.4	63.7
200	02/20/91	A	22.9	65.9
201	02/21/91	A	23.3	65.1
202	02/21/91	11/12	23.7	63.3
203	02/22/91	A	23.5	65.5
204	02/23/91	A	23.4	63.6
205	02/23/91	11/12	22.5	65.8
206	02/24/91	A	23.1	65.5
207	02/24/91	11/12	23.1	62.2
208	02/25/91	A	22.6	65.9
209	02/26/91	A	22.6	65.3
210	02/26/91	11/12	22.6	64.5
211	02/27/91	A	22.7	67.1
212	02/28/91	A	22.8	64.3

KIDC DEMONSTRATION PROJECT - BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

OBS	DATE	COKE BATTERY	COKE REACTIVITY INDEX	COKE STRENGTH AFTER REACTION
213	02/28/91	11/12	21.8	66.1
214	03/01/91	A	23.0	63.3
215	03/02/91	A	22.3	66.7
216	03/02/91	11/12	24.9	62.3
217	03/03/91	A	26.7	62.9
218	03/03/91	11/12	23.4	62.7
219	03/04/91	A	17.9	72.9
220	03/05/91	A	21.2	68.3
221	03/05/91	11/12	22.0	65.8
222	03/06/91	A	26.4	59.0
223	03/07/91	A	21.8	66.0
224	03/07/91	11/12	23.5	66.3
225	03/08/91	A	20.0	67.0
226	03/09/91	A	21.3	67.3
227	03/09/91	11/12	25.6	61.1
228	03/10/91	A	20.9	68.5
229	03/10/91	11/12	23.1	67.2
230	03/11/91	A	20.9	68.2
231	03/12/91	A	21.2	67.9
232	03/12/91	11/12	24.6	63.3
233	03/13/91	A	22.0	65.2
234	03/14/91	A	22.0	66.4
235	03/14/91	11/12	24.3	62.1
236	03/15/91	A	24.4	64.1
237	03/16/91	A	21.1	68.1
238	03/17/91	11/12	25.4	60.3
239	03/22/91	11/12	24.5	64.4
240	03/23/91	11/12	24.7	63.0
241	03/26/91	11/12	25.5	61.5
242	03/28/91	11/12	26.3	59.2
243	03/30/91	11/12	25.8	60.4
244	03/31/91	11/12	27.1	57.0
245	04/02/91	11/12	28.5	55.8
246	04/04/91	11/12	26.4	59.2
247	04/06/91	11/12	25.0	61.1
248	04/07/91	11/12	26.4	58.7
249	04/09/91	11/12	26.5	60.0
250	04/11/91	11/12	27.2	56.9
251	04/13/91	11/12	25.0	62.5
252	04/14/91	11/12	27.2	59.0
253	04/16/91	11/12	27.1	56.8
254	04/18/91	11/12	25.5	61.2
255	04/20/91	11/12	27.8	56.8
256	04/21/91	11/12	26.0	60.6
257	04/23/91	11/12	25.5	61.0
258	04/25/91	11/12	27.5	58.1
259	04/27/91	11/12	27.0	58.9
260	04/30/91	11/12	26.6	58.3
261	05/02/91	11/12	25.8	61.9
262	05/04/91	11/12	25.4	60.7
263	05/05/91	11/12	28.0	55.3
264	05/07/91	11/12	28.2	54.3
265	05/09/91	11/12	30.6	50.4

KIDC DEMONSTRATION PROJECT - BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

OBS	DATE	COKE BATTERY	COKE REACTIVITY INDEX	COKE STRENGTH AFTER REACTION
266	05/11/91	11/12	26.5	60.8
267	05/12/91	11/12	27.6	56.8
268	05/14/91	11/12	26.7	58.6
269	05/16/91	11/12	26.2	62.0
270	05/18/91	11/12	26.5	60.2
271	05/19/91	11/12	28.0	58.3
272	05/21/91	11/12	28.2	58.0
273	05/23/91	11/12	28.3	57.4
274	05/25/91	11/12	27.0	60.7
275	05/26/91	11/12	30.3	51.5
276	05/28/91	11/12	31.4	50.2
277	05/29/91	11/12	32.0	48.3
278	06/01/91	11/12	34.4	44.5
279	06/02/91	11/12	27.2	58.0
280	06/04/91	11/12	29.3	54.2
281	06/04/91	BETH	21.7	64.3
282	06/05/91	BETH	21.9	63.8
283	06/06/91	11/12	27.3	58.8
284	06/08/91	11/12	28.8	56.0
285	06/09/91	11/12	25.3	62.5
286	06/11/91	11/12	28.1	57.0
287	06/11/91	KRESS	26.1	61.4
288	06/13/91	11/12	29.1	58.2
289	06/15/91	11/12	28.8	56.9
290	06/16/91	11/12	28.1	57.9
291	06/18/91	11/12	25.0	63.6
292	06/20/91	11/12	26.0	59.6
293	06/22/91	11/12	27.9	59.1
294	06/23/91	11/12	29.7	51.2
295	06/25/91	11/12	25.3	61.2
296	06/27/91	11/12	27.5	56.6
297	06/29/91	11/12	24.8	63.9
298	06/30/91	11/12	29.0	56.8
299	07/02/91	11/12	26.3	62.2
300	07/04/91	11/12	27.7	60.1
301	07/06/91	11/12	25.3	64.1
302	07/07/91	11/12	27.4	59.5
303	07/09/91	11/12	26.6	61.9
304	07/11/91	11/12	26.6	59.5
305	07/13/91	11/12	28.4	56.8
306	08/14/91	KRESS	27.3	57.1
307	08/15/91	KRESS	27.2	59.0
308	08/23/91	KRESS	26.9	59.7
309	08/29/91	KRESS	28.6	55.7
310	09/01/91	11/12	31.0	49.6
311	09/02/91	11/12	26.8	57.8
312	09/03/91	11/12	27.6	54.7
313	09/05/91	11/12	27.9	55.4
314	09/06/91	KRESS	26.9	59.9
315	09/07/91	KRESS	27.9	61.6
316	09/07/91	11/12	28.3	56.4
317	09/08/91	11/12	25.2	59.7
318	09/10/91	11/12	25.8	61.1

KIDC DEMONSTRATION PROJECT - BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

OBS	DATE	COKE BATTERY	COKE REACTIVITY INDEX	COKE STRENGTH AFTER REACTION
319	09/11/91	KRESS	27.3	59.8
320	09/12/91	KRESS	29.3	55.5
321	09/13/91	11/12	22.7	66.3
322	09/14/91	11/12	24.6	63.8
323	09/15/91	11/12	31.3	54.9
324	09/17/91	11/12	25.8	59.8
325	09/21/91	11/12	29.6	51.0
326	09/22/91	11/12	29.4	53.1
327	09/24/91	11/12	27.3	58.5
328	09/26/91	KRESS	27.9	57.4
329	09/27/91	11/12	24.5	61.9
330	09/28/91	11/12	24.3	60.9
331	09/29/91	11/12	27.4	54.1
332	10/01/91	11/12	28.6	58.7
333	10/02/91	KRESS	28.7	55.2
334	10/03/91	KRESS	25.2	60.2
335	10/04/91	11/12	26.7	59.4
336	10/05/91	11/12	27.7	57.7
337	10/06/91	11/12	28.0	55.9
338	10/07/91	KRESS	29.2	56.3
339	10/08/91	11/12	23.4	63.3
340	10/10/91	11/12	24.3	66.1
341	10/11/91	11/12	26.6	57.3
342	10/12/91	11/12	23.2	65.8
343	10/13/91	11/12	25.9	58.1
344	10/15/91	11/12	29.6	51.5
345	10/17/91	11/12	26.6	58.0
346	10/18/91	11/12	27.2	59.1
347	10/20/91	11/12	24.3	65.6
348	10/21/91	11/12	26.6	62.7
349	10/25/91	11/12	29.2	55.0
350	10/26/91	11/12	24.3	62.9
351	10/27/91	11/12	25.0	64.0
352	10/29/91	11/12	24.8	61.9
353	11/01/91	11/12	.	61.3
354	11/02/91	11/12	.	61.6
355	11/03/91	11/12	.	59.3
356	11/05/91	11/12	.	59.6
357	11/08/91	11/12	.	59.8
358	11/09/91	11/12	.	62.2
359	11/10/91	11/12	.	66.6
360	11/12/91	11/12	.	66.0
361	11/15/91	11/12	.	60.5
362	11/16/91	11/12	.	62.5
363	11/17/91	11/12	.	57.5
364	11/19/91	11/12	.	61.1
365	11/21/91	11/12	.	63.8
366	11/23/91	11/12	.	60.0
367	11/24/91	11/12	.	64.6
368	11/26/91	11/12	.	56.0
369	11/28/91	11/12	.	58.4
370	11/30/91	11/12	.	57.8

Section 6

KIDC Coke Properties Database

KIDC DEMONSTRATION PROJECT - BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

OBS	DATE	OVEN #1	OVEN #2	OVEN #3	COKE ON4"	ON3"	ON2"	SIZE ON1.5"	ON1"	ON.75"	ON.5"	THRU.5	% H2O	STABILITY	HARD NESS	REACTIVITY	SULFUR	VM	ASH
1	08/08/91	.	.	.	.	.	.	.	.	.	.	.	3.37					.	.
2	08/08/91	.		.	.	.	.	.	.	.	.		4.86					.	.
3	08/09/91	.	.	.	.	.	.	.	.	.	.	.	9.58	.	.	.	.	.	.
4	08/09/91	.	.	.	.	.	.	.	.	.	.	.	0.83	.	.	.	.	.	.
5	08/14/91	.	.	.	38.8	48.2	11.2	0.7	0.2	0.2	0.2	0.5	0.93	62.0	66.3	15.0	0.55	0.43	7.80
6	08/15/91	.	.	.	8.9	21.1	46.7	14.2	6.5	1.0	0.9	0.7	2.53	62.2	67.5	12.2	0.58	0.60	8.22
7	08/23/91		.		20.9	18.2	38.7	10.1	6.0	1.9	1.2	3.0	0.33	62.1	69.9	11.5	0.55	0.36	7.88
8	08/23/91				41.5	35.9	19.2	1.4	0.5	0.2	0.2	1.1	0.77	62.2	70.1	14.1	0.60	0.63	8.48
9	08/29/91			.	33.4	44.4	20.0	0.9	0.2	0.2	0.2	0.7	1.12	62.3	66.0	13.2	0.59	0.69	8.51
10	09/07/91	.		.	11.3	31.9	43.6	7.4	2.9	1.1	0.5	1.3	2.25	61.4	69.0	15.5	0.52	0.45	9.59
11	09/11/91	.	.	.	17.4	36.5	30.9	8.5	3.6	0.9	0.5	1.7	1.72	63.8	69.6	13.5	0.52	0.45	8.32
12	09/12/91	.	.	.	26.8	43.9	25.8	2.5	0.6	0.1	0.1	0.2	0.00	63.0	69.8	14.7	0.53	0.24	8.22
13	09/26/91	.	.	.	43.2	40.7	13.7	1.1	0.5	0.1	0.1	0.6	1.15	59.5	70.2	17.4	0.52	0.29	8.37
14	10/02/91	.	.	.	7.8	34.2	36.4	9.2	6.3	1.5	1.5	3.1	0.81	60.9	68.9	12.8	0.63	0.52	8.23
15	10/03/91	1	.	.	12.7	32.2	32.2	9.4	5.8	2.1	1.5	4.1	0.74	61.6	68.9	14.1	0.55	0.99	8.67
16	10/03/91	2		.	14.5	34.5	32.2	9.4	5.1	1.2	0.9	2.2	.	61.8	69.5	.		.	.
17	10/06/91	.	.	.	57.1	31.9	8.7	0.5	0.3	0.3	0.3	0.9	2.04	58.9	63.4	18.8	0.59	0.31	8.08
18	10/08/91	1	.	.	35.0	44.1	18.4	1.7	0.4	0.0	0.0	0.4	1.46	61.8	68.3	16.2	0.54	0.36	8.74
19	10/08/91	2	.	.	58.2	27.1	11.2	1.5	0.3	0.2	0.0	1.5	7.63	62.4	68.9	18.5	0.54	1.13	8.51
20	10/10/91	1148	1151	1153	33.8	39.3	21.4	2.3	0.9	0.4	0.3	1.6	1.67	63.9	69.1	12.2	0.53	0.47	8.32
21	10/10/91	1149	1152	1154	32.3	28.4	33.2	3.4	1.1	0.2	0.3	1.1	1.23	64.7	71.3	14.4	0.53	0.76	8.37
22	10/10/91	1101	1135	1171	14.5	36.3	38.2	8.4	1.8	0.4	0.1	0.3	0.66	62.6	70.0	11.3	0.54	0.32	8.38
23	10/10/91	1148	1151	1153	26.0	35.0	36.8	1.2	0.6	0.1	0.1	0.2	1.11	63.1	68.9	11.3	0.54	0.32	8.38
24	10/11/91	1153		.	9.3	23.5	40.6	11.3	7.6	1.9	1.6	4.2	1.53	64.2	70.1	14.5	0.52	0.48	8.65
25	10/11/91	1171	1149	1135	20.3	39.4	37.2	2.3	0.2	0.1	0.1	0.4	1.13	63.8	70.0	13.5	0.48	0.67	8.68
26	10/11/91	1148	1151	.	6.9	35.8	36.8	10.2	6.3	1.3	1.0	1.7	1.39	62.2	69.9	12.6	0.56	0.36	8.47
27	10/12/91	1171	1148	.	15.2	23.4	33.4	14.2	4.6	1.9	1.7	5.6	0.75	62.0	67.6	14.2	0.53	0.50	8.18
28	10/12/91	1152	1154	1135	9.6	40.1	44.7	3.0	1.2	0.7	0.2	0.5	0.69	63.1	68.6	14.9	0.56	0.57	8.51
29	10/12/91	1153	1151	1149	11.3	25.0	31.7	13.3	7.5	2.1	2.4	6.7	0.35	63.7	68.0	16.5	0.50	0.31	8.08
30	10/13/91	1152	1154	1135	19.5	50.5	26.5	1.8	0.5	0.5	0.2	0.5	1.92	61.7	69.5	17.8	0.49	0.96	8.20
31	10/13/91	1152	1154	1147	25.6	46.4	24.3	1.7	1.0	0.2	0.2	0.6	3.13	61.0	68.5	14.3	0.56	0.65	8.24
32	10/13/91	1135	1171	1148	24.2	41.8	29.1	2.6	1.2	0.3	0.3	0.5	0.37	61.9	69.8	15.1	0.53	0.87	8.23
33	10/14/91	1135	1171	.	10.9	17.8	35.3	17.5	10.9	2.0	1.7	3.9	0.74	60.9	69.0	12.9	0.57	0.45	7.80
34	10/14/91	1152	1134	1148	29.8	36.2	29.7	2.1	0.7	0.1	0.1	1.3	0.81	61.7	70.1	14.3	0.58	0.46	7.94
35	10/14/91	1149	1151	1153	22.0	36.4	35.6	2.8	1.3	0.4	0.1	1.4	1.61	59.8	69.2	13.1	0.54	0.47	8.39
36	10/15/91	1135	1171	.	12.7	19.7	34.8	13.8	8.7	2.2	1.9	6.2	0.69	63.8	68.1	15.2	0.56	0.72	7.73
37	10/17/91	1151	1153	1149	13.8	40.3	40.0	3.4	1.2	0.3	0.3	0.7	1.59	62.0	68.3	16.4	0.56	0.55	8.47
38	10/18/91	1148	1151	1153	31.2	45.6	20.5	1.9	0.4	0.1	0.0	0.3	0.41	62.4	68.6	13.0	0.58	0.30	7.77
39	10/18/91	1149	1152	1154	36.3	37.4	24.0	1.5	0.3	0.1	0.1	0.3	0.42	63.0	69.1	14.5	0.58	0.46	8.06
40	10/19/91	1148	1151	1153	41.8	37.9	17.9	1.6	0.5	0.1	0.1	0.1	0.42	64.9	68.9	13.4	0.57	0.25	8.17
41	10/19/91	1149	1152		26.1	41.4	30.1	1.9	0.2	0.0	0.1	0.2	0.81	65.1	69.3	12.7	0.55	0.30	8.14
42	10/19/91	1135	1147	1171	10.6	22.5	36.9	15.7	6.6	2.0	1.6	4.1	0.53	65.9	70.2	14.4	0.54	0.76	8.10
43	10/20/91	1149	1151		39.0	40.8	17.0	0.9	0.5	0.1	0.1	0.7	0.41	63.2	69.3	14.6	0.56	0.77	8.09
44	10/20/91	1154	1135	1171	10.1	23.2	33.5	16.3	8.9	4.8	0.9	2.3	1.87	61.9	69.2	13.0	0.62	0.48	8.28
45	10/21/91	1135	1154	1171	6.7	20.7	42.2	18.2	4.5	2.5	1.7	3.5	0.37	63.1	69.6	.	.	.	.
46	10/21/91	1148	1151	1153	21.0	47.0	26.8	2.6	0.9	0.6	0.1	1.0	0.40	65.9	72.1	.	.	.	.
47	10/21/91	1149	1152	1172	38.0	38.0	19.9	1.7	0.6	0.3	0.1	1.4	0.40	63.9	69.7	.			
48	10/22/91	1149	1172	.	11.6	51.5	32.7	3.2	0.4	0.2	0.1	0.3	0.56	63.4	69.6	12.8	0.50	0.60	8.08
49	10/22/91	1148	1151	1153	5.4	42.1	48.9	3.2	0.2	0.0	0.0	0.2	0.68	62.6	69.8	14.4	0.53	0.52	8.27
50	10/22/91	1135	1154	1171	20.9	23.7	35.7	10.3	5.9	1.2	0.6	1.7	1.01	62.8	69.9	12.0	0.54	0.22	8.20
51	10/23/91	1152	1159	1135	32.8	40.1	24.0	1.7	0.6	0.3	0.3	0.2	0.65	64.9	69.8	14.9	0.57	0.91	7.80
52	10/23/91	1148	1151	1171	14.1	38.1	44.7	1.2	0.8	0.4	0.4	0.3	0.53	63.2	69.9	14.8	0.61	0.66	8.32
53	10/23/91	1153	1149	1172	14.7	41.9	39.5	2.5	0.6	0.3	0.3	0.2	0.80	65.7	71.5	12.5	0.57	0.50	8.03

OBS	DATE	OVEN #1	OVEN #2	OVEN #3	COKE ON4"	COKE ON3"	COKE ON2"	COKE ON1.5"	SIZE ON1"	SIZE ON.75"	SIZE ON.5"	THRU.5	H2O	% STABILITY	HARDNESS	REACTIVITY	SULFUR	VM	ASH
54	10/23/91	1152	.	.	18.2	32.6	41.7	3.8	1.5	0.8	0.8	0.6	1.01	63.1	68.2	14.5	0.61	0.66	8.32
55	10/29/91	1148	1151	1153	18.0	21.9	31.5	16.5	6.8	1.2	1.0	3.1	0.36	64.8	70.0	12.7	0.55	0.40	8.00
56	10/29/91	1149	1152	.	21.5	36.1	30.8	6.6	1.6	0.8	0.3	2.3	0.68	63.3	68.4	12.1	0.55	0.34	8.06
57	10/30/91	1148	1151	1153	7.0	28.7	38.9	13.8	5.4	1.5	1.3	3.4	3.33	61.6	70.1	12.1	0.55	0.34	8.06
58	10/30/91	1149	1172	1152	11.4	23.4	31.8	16.7	6.7	2.3	1.7	6.0	0.32	62.3	71.1	13.1	0.57	0.78	8.51
59	10/31/91	1171	.	.	33.9	28.7	26.3	6.6	2.4	0.5	0.5	1.1	1.10	61.6	70.1	14.7	0.58	0.58	8.13
60	10/31/91	1154	1135	.	19.1	19.8	40.8	10.9	5.9	1.2	0.7	1.6	2.10	63.3	71.4	14.5	0.60	0.50	7.65
61	10/31/91	1148	1151	1153	12.5	32.6	47.3	5.3	1.4	0.3	0.2	0.4	2.56	62.7	70.0	15.6	0.57	0.60	8.80
62	11/05/91	1148	1151	1153	24.3	36.0	28.8	5.6	2.5	0.6	0.6	1.6	1.28	60.1	70.3	14.2	0.56	0.52	7.82
63	11/05/91	1149	1152	1172	20.9	40.0	30.3	4.6	1.8	0.4	0.4	1.6	1.18	61.2	69.1	13.1	0.55	0.36	7.83
64	11/06/91	1135	1154	.	12.3	30.3	51.5	4.1	0.6	0.4	0.4	0.4	3.93	.	.	9.7	0.56	0.66	8.51
65	11/06/91	1149	1172	1152	29.9	40.8	25.9	2.4	0.4	0.2	0.2	0.2	4.47	.	.	9.0	0.53	0.80	8.20
66	11/06/91	1171	1151	.	25.4	51.4	21.7	0.7	0.4	0.1	0.1	0.2	2.75	63.1	69.0	11.0	0.33	0.64	8.22
67	11/06/91	1148	1153	.	29.8	31.5	30.0	5.1	2.0	0.4	0.2	1.0	1.86	62.7	69.3	12.7	0.55	0.69	8.04
68	11/07/91	1135	1154	1171	4.0	47.4	39.6	4.0	1.5	1.5	1.0	1.0	1.60	63.2	69.1	16.7	0.57	0.88	8.02
69	11/07/91	1148	1151	1153	14.9	39.9	32.9	11.2	0.5	0.4	0.1	0.1	1.67	64.7	70.5	12.4	0.56	0.37	8.12
70	11/07/91	1149	1152	1172	22.1	29.2	40.3	6.1	0.9	0.4	0.2	0.8	2.67	61.9	68.1	15.1	0.57	1.29	.
71	11/13/91	1148	1151	1153	19.4	27.0	32.6	12.2	4.6	1.0	0.7	2.5	1.36	62.8	70.1	12.3	0.51	0.45	7.95
72	11/14/91	1148	1151	1153	26.3	34.5	25.4	8.0	2.6	0.6	0.7	1.9	1.35	62.0	68.6	14.6	0.55	0.34	7.88
73	11/19/91	1148	1151	1153	10.6	36.0	44.9	6.5	0.9	0.2	0.1	0.8	0.82	61.4	67.9	12.0	0.51	0.49	7.64
74	11/20/91	1135	1154	1171	14.2	37.0	42.3	4.2	1.0	0.2	0.2	0.9	2.40	63.7	70.3	12.0	0.51	0.65	7.76
75	11/20/91	1149	1172	1152	38.0	47.7	12.9	0.8	0.2	0.1	0.1	0.2	2.30	62.9	68.1	12.8	0.50	0.70	7.87
76	11/20/91	1148	1151	1153	11.5	33.2	49.0	5.1	0.6	0.1	0.1	0.4	0.96	63.8	69.0	11.8	0.52	0.60	7.72
77	11/21/91	1148	1151	1153	11.3	36.4	46.6	4.4	0.6	0.1	0.2	0.4	0.86	63.9	68.6	13.4	0.50	0.56	7.52
78	11/21/91	1149	1172	1152	41.4	33.9	22.4	1.3	0.6	0.2	0.1	0.1	1.85	63.6	69.5	12.2	0.50	0.43	7.47
79	11/21/91	1135	1154	1171	3.8	37.2	46.8	8.7	1.8	0.2	0.1	1.4	0.83	63.2	67.7	14.3	0.51	0.73	7.77
80	11/22/91	1148	1151	1153	18.2	28.2	37.8	8.3	4.1	1.1	0.8	1.5	0.85	60.8	69.4	11.5	0.51	0.31	.
81	11/22/91	1149	1152	1172	39.8	30.4	24.1	3.2	1.0	0.4	0.5	0.6	1.56	61.1	69.6	13.6	0.51	0.35	.
82	11/24/91	1171	1149	.	29.4	40.0	28.3	1.4	0.4	0.1	0.1	0.3	1.31	63.3	68.5	13.8	0.53	0.38	7.67
83	11/24/91	1172	1152	1154	30.8	47.4	19.4	1.0	0.4	0.2	0.3	0.5	0.84	62.9	69.1	14.4	0.51	0.32	7.61
84	11/25/91	1149	1172	1152	15.1	18.2	32.6	14.8	9.8	2.0	1.7	5.8	2.08	62.1	70.4	10.3	0.53	0.28	7.42
85	11/25/91	1171	.	.	27.4	42.3	15.6	7.3	3.2	0.8	0.8	2.6	2.08	62.9	68.8	14.1	0.53	0.28	7.57
86	11/26/91	1148	1151	1153	15.6	19.0	31.4	17.9	10.5	1.9	1.1	2.6	1.67	63.4	69.1	15.9	0.59	0.42	7.98
87	11/26/91	1154	.	.	3.1	26.9	38.9	14.9	9.1	2.1	1.5	3.5	3.33	62.8	69.6	13.9	0.57	0.52	7.77
88	11/26/91	1149	1152	1172	23.8	43.6	15.0	10.1	2.8	1.5	1.2	2.0	0.79	63.4	69.1	13.0	0.59	0.48	8.12

HAMPTON ROADS LABS COKE DATA, KIDC QUENCHED COKE
KIDC DEMONSTRATION PROJECT - BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

OBS	DATE	OVEN 1	OVEN 2	OVEN 3	COKE REACTIVITY INDEX	COKE STRENGTH AFTER REACTION	COMMENTS
1	08/14/91				27.3	57.1	OVENS NOT LABELED
2	08/15/91				27.2	59.0	OVENS NOT LABELED
3	08/23/91				26.9	59.7	OVENS NOT LABELED
4	08/23/91				27.5	58.8	NO OVENS LISTED
5	08/29/91				28.6	55.7	NO OVENS LISTED
6	09/06/91				26.9	59.9	OVENS NOT LABELED
7	09/07/91				27.9	61.6	OVENS NOT LABELED
8	09/11/91				27.3	59.8	OVENS NOT LABELED
9	09/12/91				29.3	55.5	OVENS NOT LABELED
10	09/26/91				27.9	57.4	OVENS NOT LABELED
11	10/02/91				28.7	55.2	OVENS NOT LABELED
12	10/03/91				25.2	60.2	OVENS NOT LABELED
13	10/04/91				29.8	48.0	OVENS NOT LABELED
14	10/07/91				29.2	56.3	OVENS NOT LABELED
15	10/08/91				24.6	60.7	KRESS I
16	10/08/91				22.4	57.7	KRESS II
17	10/09/91				26.9	58.0	NOS
18	10/09/91				26.4	58.9	3-4
19	10/10/91				25.2	60.3	NOS
20	10/10/91	1148	1151	1153	23.6	64.1	
21	10/11/91	1148	1151		24.7	62.0	
22	10/11/91	1135	1149	1171	24.5	61.2	
23	10/11/91	1153			23.4	63.2	
24	10/12/91	1135	1151	1154	26.0	57.5	
25	10/12/91	1149	1151	1153	29.5	54.8	
26	10/12/91	1148	1171		25.8	61.4	
27	10/13/91	1135	1148	1171	25.1	62.2	
28	10/14/91	1149	1151	1153	26.9	60.0	
29	10/14/91	1135	1171		26.0	60.3	
30	10/14/91	1134	1148	1152	26.8	61.4	
31	10/16/91	1135	1171		28.0	58.8	
32	10/18/91	1148	1151	1153	27.2	62.8	
33	10/18/91	1149	1152	1154	25.6	61.0	
34	10/19/91	1135	1147	1171	24.3	62.9	
35	10/19/91	1148	1151	1153	24.0	61.3	
36	10/19/91	1149	1152		25.3	62.2	
37	10/20/91	1134	1154	1171	25.4	62.1	
38	10/20/91	1149	1152		25.2	61.7	
39	10/21/91	1135	1154	1171	23.4	64.4	
40	10/21/91	1148	1151	1153	27.5	58.5	
41	10/21/91	1149	1152	1172	24.3	64.2	
42	10/22/91	1135	1154	1171	24.8	62.5	
43	10/22/91	1149	1172		25.6	61.6	
44	10/23/91	1149	1153	1172	24.3	62.1	
45	10/23/91	1135	1152	1159	23.3	67.7	
46	10/23/91	1148	1151	1153	23.2	66.1	
47	10/23/91				29.2	57.4	NO OTHER IDENTITY
48	10/23/91	1148	1151	1171	28.5	56.6	
49	10/24/91	1135	1154	1171	25.4	62.2	
50	10/24/91	1149	1152	1172	27.0	59.2	
51	10/24/91	1148	1151	1153	27.5	59.5	
52	10/29/91	1149	1152		24.6	66.9	
53	10/29/91	1148	1151	1153	25.5	60.8	

HAMPTON ROADS LABS COKE DATA, KIDC QUENCHED COKE
KIDC DEMONSTRATION PROJECT - BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

OBS	DATE	OVEN 1	OVEN 2	OVEN 3	COKE REACTIVITY INDEX	COKE STRENGTH AFTER REACTION	COMMENTS
54	10/30/91	1148	1152	1153	31.0	51.3	
55	10/30/91	1149	1152	1172	24.6	62.6	
56	10/31/91	1148	1151	1153	26.7	60.5	
57	10/31/91	1135	1154		25.6	61.0	
58	10/31/91	1171			24.3	61.8	
59	11/05/91	1148	1151	1153	26.3	58.5	
60	11/05/91	1149	1152	1172	25.1	60.6	
61	11/06/91	1135	1154		25.4	66.0	
62	11/06/91	1141	1152	1172	23.2	65.6	
63	11/06/91	1151	1171		26.9	60.2	
64	11/06/91	1148	1153		23.7	67.3	
65	11/08/91	1135	1154	1171	22.6	66.3	
66	11/13/91	1148	1151	1153	23.9	62.2	
67	11/14/91				26.8	59.8	NO OVENS LISTED
68	11/19/91	1148	1151	1153	22.4	66.5	
69	11/20/91	1131	1135	1154	22.6	65.0	
70	11/20/91	1148	1151	1153	22.8	65.6	
71	11/21/91	1149	1152	1172	26.2	58.8	
72	11/21/91	1134	1135	1171	24.0	62.1	
73	11/21/91	1148	1151	1153	27.4	57.5	
74	11/22/91	1149	1152	1172	22.5	66.4	
75	11/23/91	1148	1152	1153	23.0	65.2	
76	11/24/91	1152	1154	1172	24.5	63.5	
77	11/24/91	1149	1171		23.6	66.3	
78	11/25/91	1171			24.3	62.1	
79	11/25/91	1149	1152	1172	24.0	62.1	
80	11/26/91	1149	1152	1172	27.6	59.6	
81	11/26/91	1148	1151	1153	25.7	61.7	
82	11/26/91	1154			24.6	63.3	

Section 7

Consolidation Coal Company Report of Coke Analysis

Consolidation Coal Company
Research & Development
Library, PA 15129

Coke Laboratory Report

January 20, 1992

TO: Alan D. Strauss - Bethlehem Steel

FROM: D. E. Lowenhaupt - Consol R&D

SUBJECT: **Physical, Chemical, and Reactive Properties of Cokes Subjected to the Kress Process - Coke Lab Report No. 4762**

The tests you requested for the coke samples representing plant coke subjected to the Kress process are complete. The data are in the attached table, and an invoice has been issued to cover these costs. Also in the invoice are costs for sample preparation and dumping.

D. E. Lowenhaupt

D. E. Lowenhaupt
cs

TABLE I

PHYSICAL AND CHEMICAL PROPERTIES OF THE KRESS COKE SAMPLES

COKE	REGULAR	KRESS	KRESS	KRESS	KRESS	KRESS
DATE	10/28/91	10/28	10/28	10/29	10/29	10/29
TIME	--	3:20pm	3:40pm	11:30am	12:15pm	12:15pm
CHEMISTRY						
M	7.2	1.4	1.1	0.0	0.0	0.0
VM(dry)	1.06	0.94	1.13	0.94	1.21	1.28
FC(dry)	90.20	90.18	90.03	90.10	89.79	89.88
ASH(dry)	8.74	8.88	8.84	8.96	9.00	8.84
S(dry)	0.57	0.58	0.57	0.58	0.58	0.59
COKE SCREEN ANALYSIS(cum %)						
+4"	15.9	6.0	12.6	11.0	7.0	4.4
4 X 3	44.4	25.3	38.1	34.0	38.0	25.0
3 X 2	79.1	61.5	74.0	70.7	73.0	67.8
2 X 1.5	91.2	80.6	88.0	89.8	86.8	84.4
1.5 X 1	85.7	93.0	95.2	97.4	95.0	92.2
1 X .5	97.5	96.9	97.3	98.6	98.0	95.1
-.5	100.0	100.0	100.0	100.0	100.0	100.0
AVERAGE COKE SIZE	2.90	2.40	2.75	2.72	2.56	2.41
COKE STABILITY	60.0	64.0	63.9	62.2	62.7	62.9
COKE HARDNESS	67.2	70.6	69.8	68.7	66.5	67.4
CRI	29.3	24.2	26.3	25.6	26.8	26.8
CSR	52.4	66.8	62.4	60.8	60.8	59.2

Appendix H
Blast Furnace Balwax Model Report

Table of Contents

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1	Description of the Primary Facilities (BALWAX) Model.	H-2
2	Report of KIDC Coke Impact on Blast Furnace Performance.	H-5

Section 1

Description of the Primary Facilities (BALWAX) Model.

Bethlehem's Computer Models

Primary Facilities (BALWAX) Model

The Primary Facilities Models (BALWAX) is a heat and material balance model for the blast furnace and associated processes: coke plant, sinter plant and hot blast stoves.

For a given case the key inputs to the BALWAX model are:

- The costs, chemical composition, energy content, moisture level of all ores, fluxes, coals and other fuels.
- The overall hot metal production requirement, the coke oven capacity an utilization of purchased coke.
- The availability of all coals, ores, revert materials, fluxes except for the "swing" material required to achieve specified product demand for each process. Typically these swing materials could be: one coal type for the coke ovens, one sintering ore fines type for the sinter plant, one pellet type and purchased coke for the blast furnace.
- For each blast furnace, the production, the blast conditions, slag B/A, hot metal silicon, sulfur and temperature, burden composition and coke rate. The coke rate assumption is checked in the model via empirical coke rate coefficients. Either the production rate or the wind rate may be specified and the other calculated.

For each case the key outputs from the BALWAX model are:

- For each blast furnace, a two stage mass and energy balance is produced which indicates the quantities, chemical composition and temperature of the furnace outputs (hot metal, slag and top gas) and completes the specification of required inputs not already specified: ferrous materials, purchased coke, fluxes, wind rate.

- Also, for the blast furnace, detailed heat balances and elemental material balances and an analysis of coke rate changes based on coke rate coefficients.

- For the sinter plant, an overall material balance presents the required ore fines and additional flux needed to satisfy sinter production and chemistry (B/A) requirements.

- The coke plant balances indicate coal, coke, and byproduct streams.

- The quantities, unit costs, and total costs and energy requirements for each process and for the overall process are presented on a summary sheet.

Section 2

Report of KIDC Coke Impact on Blast Furnace Performance.

BETHLEHEM STEEL
Bethlehem, PA

INTEROFFICE CORRESPONDENCE
Research Department
Primary Processes Research

==========

February 3, 1992

Ref: 1004-18
563-691

From: J. J. Poveromo

To: P. D. Stelts

Subject: PROJECTED BLAST FURNACE BENEFITS FROM COKE PRODUCED IN THE KRESS INDIRECT COOLING (KIDC) SYSTEM AT SPARROWS POINT.

The KIDC Process offers potential benefits in the areas of environmental control, reduction of coke breeze and improved coke properties due to dry quenching. The improved coke properties have been projected as reduced moisture content and increased stability. These improved coke properties would then project an improvement in blast furnace performance as outlined in earlier letters on this topic.

The test program of the Kress System has just been completed at Sparrows Point. A summary of key coke properties, on a daily average basis, comparing coke quenched by standard methods with coke quenched by the Kress System for the same coke battery, is attached. This summary was compiled by T. J. Strayer based on sampling and testing conducted by Sparrows Point, Research and Corporate Environmental personnel.

The key differences between the Kress coke and coke quenched by the standard process, designated as K6 coke, are that with Kress coke:

- Coke sizing is adversely affected, with a decrease in +2" coke of almost 5% and an increase in coke breeze of 0.7%. This is contrary to expectations; however, Kress personnel attribute this to the method used in discharging coke from the KIDC cooling boxes following the coke cooling cycle. Originally the discharged coke was expected to fall approximately five feet into a specially built receiving hopper that would remain full of coke. During the trial period, Kress coke was not produced in sufficient quantity to keep the receiving hopper full. Therefore, the coke discharged from the cooling box had a total vertical drop of about 20 feet into an empty hopper which may have caused excessive breakage compared to coke discharged onto the wharf.

- Coke moisture is reduced by 1%. A reduction in coke moisture was expected with the Kress dry quenching method

- Coke stability is increased by 2.4%. This exceeds expectations but it is likely that a portion of this increase may be attributed to the stabilization effect of the excessive drop height which caused the adverse change in coke size.

- Coke reactivity increased by 0.8%; however, the CRI (Coke Reactivity Index) decreased by 0.9% while the CSR (Coke Strength After Reaction) increased by 1.3%. The changes in reactivity and CRI are normally expected to be in the same direction since both are measures of coke reactivity. This contradiction along with the observation that the standard deviations for all of these measurements exceeds the differences, lead us to suspect that, as projected, there would be no change in these coke metallurgical properties.

In addition to the large standard deviation for the coke metallurgical properties we observe the same for coke sizing and moisture. Given the variability of the attached data and with the presumption that coke sizing would be unaffected after design changes we estimate that the Kress system would have negligible influence on coke sizing, reactivity and CSR. We conclude that the Kress system would positively influence coke moisture and coke stability; to be conservative we will project a 1% increase in coke stability and a moisture reduction of at least 1%.

The blast furnace process benefit of reduced coke moisture is strongly dependent on overall blast furnace top temperature level. If the top temperature is already at or near the lower threshold value, then further increases in coke moisture will further suppress top temperature and cause insufficiently pre-heated and pre-reduced burden materials to descend in the furnace. This will lower the furnace heat level and disturb hot metal quality. These conditions will require an increase in furnace coke rate to restore stable operation. Based on past analyses of blast furnace operating data we estimate this effect to be an increase of 7 lbs coke/NTHM for every 1% increase in coke moisture.

Within Bethlehem Steel, the following coefficients are used for estimating the benefit of improved coke stability (ASTM Tumbler Strength):

Change (%)	Decrease in Coke Rate, (lbs/NTHM)	Increase in Wind Volume, (%)
Coke Stability, + 1%	5	1

The total increase in productivity would include the impact of operation at a higher wind volume and also of operation at a lower coke rate. This increase would be calculated with the Primary Facilities (BALWAX) Computer Model but could be estimated as follows:

Production
Gain, NTHM/d = Old Production x (% Increase in Wind Volume)/100

+ Old Production x (% Decrease in Coke Rate)/100

In order to illustrate the impact of improvements in coke stability and coke moisture on blast furnace energy requirements and productivity we have used Bethlehem's Primary Facility (BALWAX) Computer Model. In the following table we show calculated results for a 1% improvement coke stability and then for an additional improvement with 1% reduction in coke moisture. The calculations are based on Sparrows Point L furnace with a base production level of 9000 NTHM/day.

Case	Base	With KIDC Coke Improved Stability, + 1%		Process Impact of Reduced Moisture, -1%	
Production, NTHM/d	9000	9000	9146*	9000	9219*
Coke Rate, lbs/NTHM	860	855		848	
Natural Gas Rate, "	70	70		70	
Total Fuel Rate, "	930	925		918	
Blast,					
Volume, Inc.O2, CFM	221161	219935		218218	
Natural Gas, CFM	9187	9237		9162	
Oxygen Enr., %	1.0	1.0		1.0	
Flame Temperature, F	4000	4000		4000	
Top Gas					
Temperature, F	282	278		280	
BTU/CF	84.00	83.14		81.88	
MCF/NTHM	52.80	52.46		52.00	
MMBTU/NTHM	4.44	4.36		4.26	
Blast Quantities, Annual					
Steam, NT	16620	16528		16399	
Wind, MMCF	116338	115693		114790	
Gas, MMCF	4886	4859		4821	
Oxygen, NT	49062	48790		48409	
Net BF Gas, available to plant after stoves, MMBTU/NTHM	2.704	2.640		2.550	
Coke Consumed, MNT/yr	1414	1406		1394	

The above results are presented for a constant level of hot metal demand so that we could calculate, (using the annual quantities) the reduction in hot metal cost due to coke rate reductions with KIDC coke. We have also shown with an * the potential increase in hot metal production due to these coke rate reductions and also due to the increased wind volume with increased coke stability.

We emphasize that the coke rate reduction for reduced coke moisture is dependent upon base case top temperature. Indeed in the example above the base case top temperature of 272 F, in actual practice, would be high enough to drive off any small (e.g. 1-2%) additional coke moisture and thereby minimize or eliminate the coke rate effect of this increase in coke moisture. The above results in the final column are presented for illustrative purposes only.

The table above summarizes the key results; the complete of BALWAX output for the constant level of hot metal demand are attached.

J. J. Poveromo
Research Fellow

JJP:mts

Attachment

cc:	RWBouman	(w/o Balwax attachments)	TJStrayer	(w Balwax attach.)
	DKwasnoski	"	LMStuart	"
	ADStrauss	"	AGOssman	"
	RRGreenbaum	"		
	APBreen	"		

KRE. 3 COKE DATA THROUGH NOVEMBER 26, 1991

	% ON 4"	% ON 2"	% THRU 1/2"	MOISTURE	STABILITY	HARDNESS	REACTIVITY	CRI	CSR	SHATTER TEST COEFF
KRESS COKE										
MEAN	21.5	88.5	1.5	1.4	62.8	69.1	13.7	25.7	60.9	2.7
SD	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
K 6 COKE										
MEAN	34.6	93.2	0.8	2.5	60.4	69.2	12.9	26.6**	59.6**	2.2
SD	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

**DATA FROM SEPT, OCTOBER, NOVEMBER - BLAST FURNACE DATA

SP PT I KIDC - IMPR STABILITY,MOISTURE

OPERATING SUMMARY AND HEAT & MATERIAL BALANCE FOR FCE I 01/31/92

	LB/NTHM	TON/DAY	TON/YEAR 365 DAYS	NATURAL ANALYSES, % FE	SIO2	AL2O3	CAO	MGO	H2O
HOT METAL PRODUCTION	2000	9000	3287823	94.13					
RUNNER LOSS 1.15%	23	105	38250	94.13					
COKE-DRY 89.6%C	848	3816	1394150	0.00	3.94	2.19	0.20	0.00	0.00
STEAM	10	45	16399						
OXYGEN ENRICHMENT	29	133	48409						
SLAG	492	2215	809161						
DRY FLUE DUST 30.0%C	1	2	822	32.00	6.60	2.80	3.50	1.20	0.00
DRY FILT CAKE 35.0%C	0	0	0	33.00	6.60	1.70	6.20	2.20	0.00
BURDEN - METALLICS									
CAROLPEL (31.2%)	999	4494	1641773	63.83	4.61	0.31	0.44	0.15	3.00
SINTER (68.8%)	2200	9900	3616605	57.59	5.43	1.05	7.46	3.40	0.00
GRAVEL	11	50	18083	2.40	94.70	0.70	0.60	0.30	0.00
BURDEN - FLUX									
SINFLUX (100.0%)	1	7	2427	0.45	1.70	0.33	42.00	13.00	0.00

INJECTED FUEL

GAS	CF/NTHM	MCF/DAY	MMCF/YR	CO	CO2	H2	H2O	N2	CH4	C2H6
NAT GAS	1466	13198	4821	0.00	0.00	0.00	0.00	0.00	97.00	3.00

HOT BLAST		HOT METAL		SLAG		TOP GAS		TWO-STAGE DATA	
DRY ENR WIND, CFM	21821B	FE	94.13	SIO2	37.2	CO %	21.29	ETACO	94.72
CF/NTHM	34914	SI	0.60	AL2O3	9.1	CO2 %	22.15	ETAH2	107.72
OXYGEN, %	22.0	P	0.056	TIO2	0.18	H2 %	4.19	HEAT LOSS	
MOISTURE, GR/CF	8.0	MN	0.57	CAO	34.7	N2 %	52.38	MMBTU/MIN	1.20
TEMPERATURE,DEG F	2250	S	0.025	MGO	15.5	CO/CO2	0.96		
PRESSURE PSIG	36.0	TI	0.03	MNO	0.75	BTU/CF	81.88	HEAT REQUIRED	
COLD BLAST, DEG F	400	C	4.60	SULFUR	1.01	MCF/NTHM	52.00	(MMBTU/NTHM)	
PERCENT OPERATION	95.0	TEMP	2770	OTHER	1.50	MMBTU/NTHM	4.26	ABOVE 77	13.85
				B/S	1.349	TEMP DEG F	280	ABOVE 1800	1.95
FLAME TEMP, DEG F	4000	SI	0.84	B/A	1.080	DEWPOINT F	101		
		THEORETICAL		TEMP	2870				
				LIQUUS	2492				

HOT BLAST STOVE OPERATION (2747 DEG DOME TEMP AT 5.0% EXCESS AIR)

HEAT CONTENT OF BLAST	1626 MBTU/NTHM		
HEAT CONTENT OF COLD BLAST	260 MBTU/NTHM		
REQUIRED INPUT HEATING VALUE *	1708 MBTU/NTHM		
GASSING RATE TO STOVES (0 CFM MAX)	12817 NAT CF/NTHM	80109 NAT CFM	
STOVE FUEL ENRICHMENT	12.00 PCT		
COKE GAS ENRICHMENT TO STOVES (540.0 BTU/CF)	1538 CF/NTHM	9613 CFM	

DRY BLAST FURNACE GAS

GENERATED	51995 CF/NTHM	324982 CFM
USED IN STOVES (11279 WET CF/NTHM)	10715 CF/NTHM	66971 CFM
AVAILABLE TO OTHER DEPARTMENTS	41280 CF/NTHM	258010 CFM

CARBON (MOL/NTHM)	
AT TUYERES	42.70
METALLOIDS	1.44
HOT METAL	7.75
FLUE DUST	0.01
SOLN LOSS	15.37
TOTAL	67.27

(%S SLAG)/(%S HM)	
BY MASS BAL	40.46
THEORETICAL	58.27
A K BISWAS	68.91

* AT STOVE EFFICIENCY OF 80.0 %

SP PT L KIDC - IMPR STABILITY,MOISTURE 01/31/92

SINTER PLANT OPERATIONS

NAME	NATURAL MNT/YR	NATURAL LB/T SINT	DRY %	% H2O	TOT	FE	P	% DRY BASIS SIO2	MN	AL2O3	CAO	MGO	S	TIO2
CAROLPEL	142.8	78.9	4.1	3.00	1.00	65.80	0.010	4.75	0.13	0.32	0.45	0.15	0.007	0.06
CAROL C	455.0	251.6	13.4	0.00	1.00	66.10	0.008	4.32	0.11	0.12	0.44	0.27	0.003	0.03
MBR	900.0	497.7	26.6	0.00	0.45	68.18	0.027	0.81	0.27	0.73	0.01	0.01	0.003	0.03
TAZIOIT	420.0	232.3	12.4	0.00	0.70	63.91	0.032	5.88	0.03	0.97	0.21	0.11	0.007	0.04
HAM PAD	650.0	359.5	19.2	0.00	3.40	63.50	0.055	4.45	0.15	1.82	0.03	0.05	0.015	0.01
SAND	15.0	8.3	0.4	0.00	0.00	2.40	0.000	94.70	0.00	0.70	0.60	0.30	0.000	0.00
MILL SCL	450.0	248.9	13.3	0.00	-5.00	71.95	0.011	1.40	0.66	0.88	0.56	0.08	0.010	0.05
BNT LIME	0.0	0.0	0.0	0.00	0.00	0.00	0.000	0.00	0.00	0.00	100.00	0.00	0.000	0.00
OLIVINE	110.0	60.8	3.2	0.00	0.95	3.99	0.011	42.20	0.08	0.88	0.88	47.40	0.030	0.01
STLMKG S	164.4	90.9	4.9	0.00	0.00	21.86	0.450	11.50	3.50	1.20	42.00	6.50	0.120	0.50
PLTREV	85.5	47.3	2.5	0.00	0.00	47.80	0.145	11.80	10.00	2.65	14.80	2.00	0.150	0.15
FL DUST	0.7	0.4	0.0	0.00	30.00	32.00	0.000	6.60	0.00	2.80	3.50	1.20	0.000	0.00
SINFLUX	432.9	239.4		0.00	43.00	0.45	0.000	1.70	0.00	0.33	42.00	13.00	0.003	0.00
COKE BRZ	189.2	104.6		7.00	91.75	0.0	.0	3.94	0.0	2.19	0.20	0.0	0.613	0.0
TOT FEED	4015.5	2220.6		0.44	9.04	52.38	0.043	4.94	0.54	0.95	6.79	3.09	0.042	0.05
DRY FEED	3998.0	2210.9												
IGNITION	-361.4	-199.8												
YIELD LOSS	-20.0	-11.1												
SINTER	3616.6	2000.0		0.00	0.00	57.59	0.047	5.43	0.59	1.05	7.46	3.40	0.010	0.05

SINTER FED, % = 7.50
FE2O3, % = 74.10
BASICITY, (CAO+MGO)/SIO2 = 2.000
STONE EQUIVALENT(1), LB/100 LB = 8.73

DESULFURIZATION = 78.09% = 1305.0 TONS

(1) STONE EQUIVALENT = 100 * ASE OF SINTER / ASE OF BF FLUX
WHERE, ASE = CAO+MGO-BS*(SIO2-2.14*FE*SIHM/FEHM)
BS = (CAO+MGO)/SIO2 FOR BF SLAG, 1.5
SIHM = SI IN HOT METAL, 0.95%
FEHM = FE IN HOT METAL, 94.0%
(2) BEFORE DUST LOSS

SP PT L KIDC IMPR STABILITY,MOISTURE
RESULTS OF TWO-STAGE MASS AND HEAT BALANCE FOR FCE L

RESULTS BASED ON

PRODUCTION	9000 NTHM/DAY	DRY WIND	218218 CFM	TOTAL FLUX	1 LB/NTHM
RUNNER LOSS	1 1 %		34914 CF/NTHM	SLAG VOLUME	492 LB/NTHM
COKE RATE	848 LB/NTHM	OPERATION	95 0 %	SLAG B/A	1.080
NAT GAS	1466 CF/NTHM	BLAST TEMP	2250 DEG F	B/S	1.349
		BLAST H2O	8 0 GR/CF	FRACTION CACO3 CALCINED ABOVE	
		BLAST O2	22.0 %	EQUILIBRIUM TEMP 0.00 %	

HEAT BALANCES

TUYERE ZONE (BTU / 100 MOLS TUYERE GAS)			HEAT ABOVE 1800 DEG F (BTU / NTHM)		HEAT ABOVE 77 DEG F (BTU / NTHM)	
DRY AIR	(2250)	1235269	SENSIBLE HEAT*	1917798	SENSIBLE HEAT	1626194
BLAST H2O	(2250)	70453	REACTION HEAT	1633282	CHEM ENERGY OF COKE	10714703
COKE CARBON	(3000)	448984	TUYERE GASES AT 1800	1604726	CHEM ENERGY OF AUX FUEL	1513821
INJECTANT(S)		0	TOTAL	1946354	TOTAL	13854718
REACTIONS AT 77						
C + 1/2 O2 = CO		1571425				
H2O - H2 + 1/2 O2		-218680	FE OXIDES REDUCTION	895417	FE OXIDES REDUCTION	5880971
INJECTANT(NET CV)		51665	METALLOID REDUCTION	143040	METALLOID REDUCTION	220422
TOTAL		3159114	HOT METAL	632455	CO3 DECOMPOSITION	1073
TUYERE GASES			SLAG	131444	SENS & LAT HT OF HM	1244673
CO	(42 7 MOLS/NTHM)	1094454	CACO3 + C = CAO + 2CO	0	SENS & LAT HT OF SLAG	332078
H2	(10 1 MOLS/NTHM)	241469	HEAT LOSS	143995	CHEM ENERGY OF C IN HM	1311817
N2	(71 8 MOLS/NTHM)	1823179			CHEM ENERGY OF C IN FD	2114
TOTAL		3159102			CHEM ENERGY OF DRY TG	4257610
					SENS & LAT HT OF DRY TG	215531
					SENS & LAT HT OF TG H2O	196439
					HEAT LOSS	191993
FLAME TEMP = 4000 DEG F			TOTAL	1946350	TOTAL	13854717

* INCLUDES COKE CARBON AT 1800. DEG F

SP PT L KIDC - IMPR STABILITY,MOISTURE
RESULTS OF TWO STAGE MASS AND HEAT BALANCE FOR FCE L

ELEMENTAL MATERIAL BALANCE (1)

	NATURAL TONS/YR	NATURAL LB/NTHM	% H2O	TONS / YEAR FE	SIO2	AL2O3	CAO	MGO	MN	S	P	TIO2
METALLICS												
CAROLPEL	1641773	999	3.0	1047878	75645	5096	7166	2389	2070	111	159	956
SINTER	3616605	2200	0.0	2082650	196328	37822	269799	122859	21452	364	1701	1918
GRAVEL	18083	11	0.0	434	17125	127	108	54	0	0	0	0
FLUXES												
SINFLUX	2427	1	0.0	11	41	8	1018	316	0	0	0	0
COKE (DRY)	1394150	848		0	54980	30490	2765	0	0	8539		
TOTAL				3130971	344119	73543	280858	125617	23522	9015	1860	2873
HOT METAL	3287823	2000		3094694	42200(2)				18601	822	1839	1420(2)
RUNNER LOSS	38250	23		36003	491(2)				216	10	21	17(2)
SLAG	809161	492			301374	73520	280829	125607	4704	8184	0	1437
FLUE DUST	822	1		263	54	23	29	10	0	0	0	0
FILTER CAKE	0	0		0	0	0	0	0	0	0	0	0
TOTAL				3130960	344119	73543	280858	125617	23522	9015	1860	2873

(1) ANNUAL TONNAGES BASED ON 365 DAYS/YR AT 95.0 % OPERATION
(2) ELEMENTAL, REPORTED AS OXIDE

CARBON BALANCE (MOL/NTHM)

CHARGED		CONSUMED	
COKE	63.296	BURNED AT TUYERES	42.705
NAT GAS	3.807	REDUCTION OF METALLOIDS	1.436
		HOT METAL CARBON	7.749
		FLUE DUST	0.012
		FILTER CAKE	0.000
		SOLUTION LOSS	15.370
TOTAL	67.103	TOTAL	67.272

SP PT L KIDC IMPR STABILITY,MOISTURE 01/31/92

COKE PLANT OPERATIONS

COAL NAME	NATURAL PERCENT	NATURAL MNT/YR	DRY ANALYSIS VOL MATTER	DRY ANALYSIS SULFUR	ASH ANALYSIS ASH	ASH ANALYSIS SIO2	ASH ANALYSIS AL2O3+TIO2	ASH ANALYSIS CAO+MGO	ASH ANALYSIS H2O
ELLSBLND	0.00	0.0	37.10	1.330	6.60	46.80	25.40	3.90	6.50
LOMING	30.40	686.4	34.75	0.700	5.50	46.80	25.40	3.90	6.00
PURCH HV	45.60	1029.6	31.00	0.800	6.25	49.00	29.30	1.43	5.00
CAMBRIA	16.00	361.3	18.50	0.900	6.80	46.20	26.60	2.50	6.25
PURCH LV	8.00	180.6	21.00	0.710	7.20	47.70	15.70	2.75	5.00
HIGH VOL COAL	30.40								
LOW VOL COAL	69.60								
TOTAL COAL MIX		2258.0	29.35	0.778	6.19	47.80	26.51	2.40	5.50

COKE PRODUCED

TOTAL DRY COAL USED	2133.7 MNT/YR
TOTAL OVEN COKE (DRY BASIS) (1)	1600.0 MNT/YR
COKE PURCHASED	50.9 MNT/YR
FURNACE COKE	1394.1 MNT/YR
COKE BREEZE	154.9 MNT/YR
COKE BREEZE USED IN SINTERING	189.2 MNT/YR
NET COKE BREEZE FOR SALE	-34.2 MNT/YR

ANALYSIS,%	HOME	PURCH	AVERAGE
C	89.64	0.00	89.64
SIO2	3.94	0.00	3.94
AL2O3+TIO2	2.19	0.00	2.19
CAO+MGO	0.20	0.00	0.20
S (2)	0.613	0.000	0.613
H2	0.00	0.00	0.00
N2	0.00	0.00	0.00
ASH	8.25	0.00	8.25
MOISTURE	7.00	0.00	7.00

COKE OVEN BY-PRODUCTS

COKE OVEN GAS:	
TOTAL GENERATED (3)	24461 MMCF/YR
AIR-DILUTED BASIS (4)	23164 MMCF/YR
UNDERFIRING (5)	7998 MMCF/YR
STOVE FUEL ENRICHMENT	5057 MMCF/YR
AVAILABLE FOR OTHER DEPARTMENTS	10109 MMCF/YR
GROSS HEATING VALUE	540 BTU/CF
TAR:	
TOTAL GENERATED	100733 TONS/YR
USED IN BLAST FURNACE	0 TONS/YR
AVAILABLE FOR SALE	100733 TONS/YR
LIGHT OIL PRODUCED	5310 MGAL/YR
PRIMARY OIL PRODUCED	853 MGAL/YR
NAPHTHALENE RECOVERED	0 MGAL/YR
AMMONIUM SULFATE RECOVERED	23136 TONS/YR
ELEMENTAL SULFUR RECOVERED	1334 TONS/YR

COKE OVEN GAS, DRY %	
CO	7.10
CO2	2.10
H2	52.80
N2	8.60
CH4	26.10
C2H6	3.16
GHV	540.00 BTU/CF

(1) PLANT CAPACITY 1600 MNT RUN OF OVEN COKE PER YR.
(2) DESULFURIZATION = 40.99% = 6808.1 TONS
(3) 11464 STD CU FT PER TON DRY COAL CHARGED
(4) BASED ON MEASURED CALORIFIC VALUE OF 540.0 BTU/SCF
(5) IN ADDITION TO 8492 MMCF/YR BLAST FURNACE GAS
AT 81.88 BTU/SCF TO PROVIDE 2.350 MMBTU/TON DRY COAL

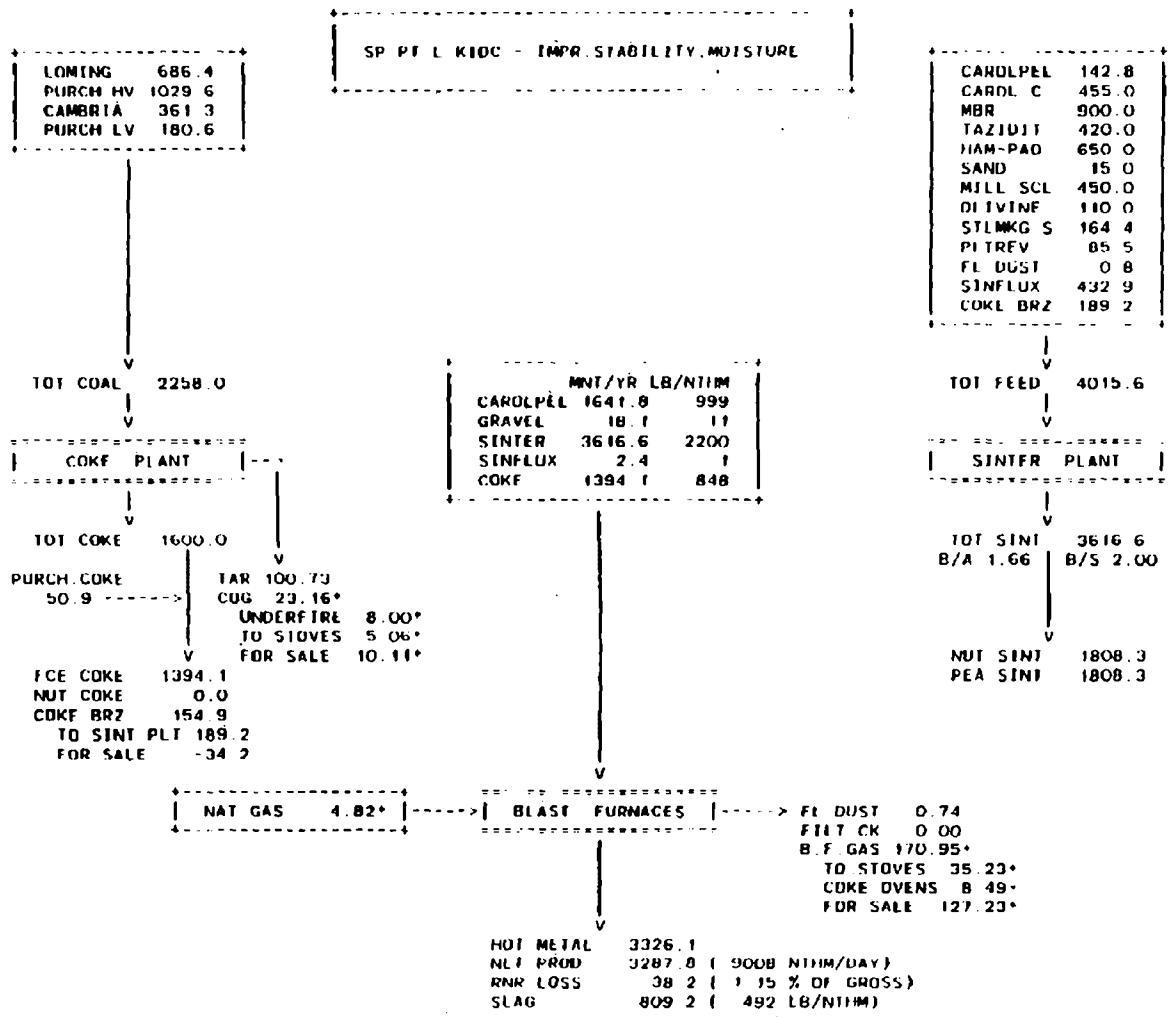
THEORETICAL UNDERFIRING REQUIRED
BASED ON HEAT BALANCE
2.765 MMBTU/TON DRY COAL
9409. MMCF/YR COKE OVEN GAS
9991. MMCF/YR BLAST FURNACE GAS

SP PT L KIDC IMPR STABILITY,MOISTURE SUMMARY OF BLAST FURNACE OPERATIONS 01/31/92

FURNACE	L	SINTER PLANT	TOTAL
ORE USED, MNT/YR			
CAROLPEL	1641.8 (31.2%)	142.8	1784.5
CAROL C	0.0 (0.0%)	455.0	455.0
MBR	0.0 (0.0%)	900.0	900.0
TAZIDIT	0.0 (0.0%)	420.0	420.0
HAM PAU	0.0 (0.0%)	650.0	650.0
SAND	0.0 (0.0%)	15.0	15.0
MILL SCI	0.0 (0.0%)	450.0	450.0
OLIVINE	0.0 (0.0%)	110.0	110.0
TOTAL ORE	1641.8	3142.8	4784.6
PLANT SINTER	3616.6 (68.8%)		3616.6
PLANT REVERTS		85.5	85.5
STEELMAKING SLAG	0.0 (0.0%)	164.4	164.4
GRAVEL	18.1, 11.0#/T	0.0	18.1
SINFLUX	2.4	432.9	435.4
DRY COKE (7.0% H2O)	1394.2	189.2	1583.3
DRY FLUE DUST	0.8, 0.5#/T	0.7	0.8
HOT METAL PRD, MNT/YR	3288		3287.8
NT/DAY	9000		9000
SILICON, %	0.600		0.600
PHOSPHORUS, %	0.056		0.056
MANGANESE, %	0.57		0.566
SULFUR, %	0.025		0.025
RUNNER LOSS, MNT/YR	38.2		38.2
COKE RATE, LB/NTHM	848		848
NAT GAS CF/NTHM	1466		1466
FLUX RATE, LB/NTHM	1		1
SLAG VOLUME, LB/NTHM	492	ANALYSIS	492
SIO2, %	37.25	5.43	
AL2O3, %	9.09	1.05	
CAO, %	34.71	7.46	
MGO, %	15.52	3.40	
S, %	1.011	0.010	1.011
B/S	1.349	2.000	
B/A	1.080	1.663	
DRY ENR WIND, CFM	229703		229703
CF/NTHM	34914		34914
TEMPERATURE, DEG F	2250		
MOISTURE, GR/CF	8.0		
OXYGEN, %	22.0		
OXYGEN ADDED, CFM	2182		
FLAME TEMP, DEG F	4000		
TOP GAS TEMPERATURE, DEG F	280		
CARBON UTIL ETACO, %	94.72		
HYDROGEN UTIL ETAH2,	107.72		
OPERATING DAYS	365		365
PCT OPERATION	95.0		

ADJUSTMENES RELATIVE TO A THEORETICAL BASE

COKE RATE, LB/TON	86.0
WIND RATE, PCT	0.00



* IN BILLION SCF/YR, ALL OTHERS IN MNT/YR

SP PT I KIOC STUDY - IMPROVE STABILITY

OPERATING SUMMARY AND HEAT & MATERIAL BALANCE FOR FCE L 01/30/92

	LB/NTHM	TON/DAY	TON/YEAR 365 DAYS	FE	SIO2	AL2O3	CAO	MGO	H2O
				NATURAL ANALYSES, %					
HOT METAL PRODUCTION	2000	9000	3287833	94.13					
RUNNER LOSS 1.15%	23	105	38250	94.13					
COKE-DRY 89.6%C	855	3848	1405700	0.00	3.94	2.19	0.20	0.00	0.00
STEAM	10	45	16528						
OXYGEN ENRICHMENT	30	134	48790						
SLAG	491	2210	807356						
DRY FLUE DUST 30.0%C	1	2	822	32.00	6.60	2.80	3.50	1.20	0.00
DRY FILT CAKE 35.0%C	0	0	0	33.00	6.60	1.70	6.20	2.20	0.00
BURDEN - METALLICS									
CAROLPEL (31.2%)	999	4495	1641856	63.83	4.61	0.31	0.44	0.15	3.00
SINTER (68.8%)	2200	9900	3616615	57.59	5.43	1.05	7.46	3.40	0.00
GRAVEL	10	45	16439	2.40	94.70	0.70	0.60	0.30	0.00
BURDEN - FLUX									
SINFLUX (100.0%)	0	2	655	0.45	1.70	0.33	42.00	13.00	0.00

INJECTED FUEL GAS	CF/NTHM	MCF/DAY	MMCF/YR	CO	CO2	H2	H2O	N2	CH4	C2H6
NAT GAS	1478	13302	4859	0.00	0.00	0.00	0.00	0.00	97.00	3.00

HOT BLAST		HOT METAL		SLAG		TOP GAS		TWO-STAGE DATA	
DRY ENR WIND, CFM	219935	FE	94.13	SIO2	37.2	CO %	21.63	ETACO	92.83
CF/NTHM	35188	SI	0.60	AL2O3	9.1	CO2 %	21.82	ETAH2	105.83
OXYGEN, %	22.0	P	0.056	TIO2	0.18	H2 %	4.24	HEAT LOSS	
MOISTURE, GR/CF	8.0	MN	0.57	CAO	34.7	N2 %	52.32	MMBTU/MIN	1.20
TEMPERATURE, DEG F	2250	S	0.025	MGO	15.5	CO/CO2	0.99		
PRESSURE PSIG	36.0	TI	0.03	MNO	0.75	BTU/CF	83.14	HEAT REQUIRED	
COLD BLAST, DEG F	400	C	4.60	SULFUR	1.02	MCF/NTHM	52.46	(MMBTU/NTHM)	
PERCENT OPERATION	95.0	TEMP	2770	OTHER	1.50	MMBTU/NTHM	4.36	ABOVE 77	13.97
				B/S	1.350	TEMP DEG F	278	ABOVE 1800	1.96
FLAME TEMP, DEG F	4000	SI	0.84	B/A	1.080	DEWPOINT F	101		
		THEORETICAL		TEMP	2870				
				LIQDUS	2493				

HOT BLAST STOVE OPERATION (2759 DEG DOME TEMP AT 5.0% EXCESS AIR)

HEAT CONTENT OF BLAST	1639 MBTU/NTHM		
HEAT CONTENT OF COLD BLAST	262 MBTU/NTHM		
REQUIRED INPUT HEATING VALUE *	1721 MBTU/NTHM		
GASSING RATE TO STOVES (0 CFM MAX)	12817 NAT CF/NTHM	80109 NAT CFM	
STOVE FUEL ENRICHMENT	12.00 PCT		
COKE GAS ENRICHMENT TO STOVES (540.0 BTU/CF)	1538 CF/NTHM	9613 CFM	

CARBON (MOL/NTHM)	
AT TUYERES	43.04
METALLOIDS	1.44
HOT METAL	7.75
FLUE DUST	0.01
SOLN LOSS	15.59
TOTAL	67.83

DRY BLAST FURNACE GAS

GENERATED	52462 CF/NTHM	327900 CFM	
USED IN STOVES (11279 WET CF/NTHM)	10715 CF/NTHM	66971 CFM	
AVAILABLE TO OTHER DEPARTMENTS	41747 CF/NTHM	260929 CFM	

(%S SLAG)/(%S HM)	
BY MASS BAL	40.90
THEORETICAL	58.30
A K BISWAS	69.17

* AT STOVE EFFICIENCY OF 80.0 %

SP PT L KIDC STUDY - IMPROVE STABILITY 01/30/92

SINTER PLANT OPERATIONS

NAME	NATURAL MNT/YR	NATURAL LB/T SINT	DRY %	% H2O	% DRY BASIS LOI	FE	P	SIO2	MN	AL2O3	CAO	MGO	S	TIO2
CAROLPEL	142.8	79.0	4.1	3.00	1.00	65.80	0.010	4.75	0.13	0.32	0.45	0.15	0.007	0.06
CAROL C	455.0	251.6	13.4	0.00	1.00	66.10	0.008	4.32	0.11	0.12	0.44	0.27	0.003	0.03
MBR	900.0	497.7	26.6	0.00	0.45	68.18	0.027	0.81	0.27	0.73	0.01	0.01	0.003	0.03
TAZIDIT	420.0	232.3	12.4	0.00	0.70	63.91	0.032	5.88	0.03	0.97	0.21	0.11	0.007	0.04
HAM-PAO	650.0	359.5	19.2	0.00	3.40	63.50	0.055	4.45	0.15	1.82	0.03	0.05	0.015	0.01
SAND	15.0	8.3	0.4	0.00	0.00	2.40	0.000	94.70	0.00	0.70	0.60	0.30	0.000	0.00
MILL SCL	450.0	248.9	13.3	0.00	-5.00	71.95	0.011	1.40	0.66	0.88	0.59	0.08	0.010	0.05
BNT LIME	0.0	0.0	0.0	0.00	0.00	0.00	0.000	0.00	0.00	0.00	100.00	0.00	0.000	0.00
DOLIVINE	110.0	60.8	3.2	0.00	0.95	3.99	0.011	42.20	0.08	0.88	0.88	47.40	0.030	0.01
SILMKG S	164.4	90.9	4.9	0.00	0.00	21.86	0.450	11.50	3.50	1.20	42.00	6.50	0.120	0.50
PETREV	85.5	47.3	2.5	0.00	0.00	47.80	0.145	11.80	10.00	2.65	14.80	2.00	0.150	0.15
FL DUST	0.7	0.4	0.0	0.00	30.00	32.00	0.000	6.60	0.00	2.80	3.50	1.20	0.000	0.00
SINFLUX	432.9	239.4		0.00	43.00	0.45	0.000	1.70	0.00	0.33	42.00	13.00	0.003	0.00
COKE BRZ	191.2	105.7		8.00	91.75	0.0	0	3.94	0.0	2.19	0.20	0.0	0.613	0.0
TOT FEED	4017.5	2221.7		0.49	9.04	52.38	0.043	4.94	0.54	0.95	6.79	3.09	0.042	0.05
DRY FEED	3998.0	2210.9												
IGNITION	-361.4	-199.8												
YIELD LOSS	20.0	11.1												
SINTER	3616.6	2000.0		0.00	0.00	57.59	0.047	5.43	0.59	1.05	7.46	3.40	0.010	0.05

SINTER FEO, % = 7.50
FE2O3, % = 74.10
BASICITY, (CAO+MGO)/SIO2 = 2.000
STONE EQUIVALENT(1), LB/100 LB = 8.73

DESULFURIZATION = 78.09% = 1305.0 TONS

(1) STONE EQUIVALENT = 100 * ASE OF SINTER / ASE OF BF FLUX
WHERE, ASE = CAO+MGO-BS*(SIO2-2.14*FE*SIHM/FEHM)
BS = (CAO+MGO)/SIO2 FOR BF SLAG, 1.5
SIHM = SI IN HOT METAL, 0.95%
FEHM = FE IN HOT METAL, 94.0%
(2) BEFORE DUST LOSS

SP PI L KIDC STUDY - IMPROVE STABILITY
RESULTS OF TWO-STAGE MASS AND HEAT BALANCE FOR FCE L

RESULTS BASED ON

PRODUCTION	9000 NTHM/DAY	DRY WIND	219935 CFM	TOTAL FLUX	0 LB/NTHM
RUNNER LOSS	1 1 %		35188 CF/NTHM	SLAG VOLUME	491 LB/NTHM
COKE RATE	855 LB/NTHM	OPERATION	95 0 %	SLAG B/A	1.080
NAT GAS	1478 CF/NTHM	BLAST TEMP	2250 DEG F	B/S	1.350
		BLAST H2O	8.0 GR/CF	FRACTION CACO3 CALCINED ABOVE	
		BLAST O2	22 0 %	EQUILIBRIUM TEMP	0.00 %

HEAT BALANCES

TUYERE ZONE (BTU / 100 MOLS TUYERE GAS)		HEAT ABOVE 1800 DEG F (BTU / NTHM)		HEAT ABOVE 77 DEG F (BTU / NTHM)	
DRY AIR (2250)	1235269	SENSIBLE HEAT*	1932879	SENSIBLE HEAT	1638983
BLAST H2O (2250)	70453	REACTION HEAT	1646126	CHEM ENERGY OF COKE	10803440
COKE CARBON(3000)	448984	TUYERE GASES AT 1800	1617345	CHEM ENERGY OF AUX FUEL	1525726
INJECTANT(S)	0				
REACTIONS AT 77		TOTAL	1961660	TOTAL	13968149
C + 1/2 O2 - CO	1571425				
H2O - H2 + 1/2 O2	-218680	FE OXIDES REDUCTION	910742	FE OXIDES REDUCTION	5881055
INJECTANT(NET CV)	51665	METALLOID REDUCTION	143039	METALLOID REDUCTION	220420
TOTAL	3159114	HOT METAL	632456	CO3 DECOMPOSITION	290
TUYERE GASES		SLAG	131430	SENS & LAT HT OF HM	1244674
CO (43.0 MOLS/NTHM)	1094454	CACO3 + C - CAO + 2CO	0	SENS & LAT HT OF SLAG	331616
H2 (10 1 MOLS/NTHM)	241469	HEAT LOSS	143994	CHEM ENERGY OF C IN HM	1311817
N2 (72.3 MOLS/NTHM)	1823179			CHEM ENERGY OF C IN FD	2114
TOTAL	3159102			CHEM ENERGY OF DRY TG	4361677
				SENS & LAT HT OF DRY TG	215055
				SENS & LAT HT OF TG H2O	207440
				HEAT LOSS	191992
FLAME TEMP = 4000 DEG F		TOTAL	1961660	TOTAL	13968148

* INCLUDES COKE CARBON AT 1800. DEG F

SP PT I KIDC STUDY - IMPROVE STABILITY
RESULTS OF TWO-STAGE MASS AND HEAT BALANCE FOR FCE L

ELEMENTAL MATERIAL BALANCE (1)

	NATURAL TONS/YR	NATURAL LB/NTHM	% H2O	TONS / YEAR FE	SIO2	AL2O3	CAO	MGO	MN	S	P	TIO2
METALLICS												
CAROLPEL	1641856	999	3.0	1047931	75649	5096	7167	2389	2070	111	159	956
SINTER	3616615	2200	0.0	2082651	196331	37822	269807	122857	21451	364	1701	1918
GRAVEL	16439	10	0.0	395	15568	115	99	49	0	0	0	0
FLUXES												
SINFLUX	655	0	0.0	3	11	2	275	85	0	0	0	0
COKE (DRY)	1405700	855		0	55436	30743	2788	0	0	8610		
TOTAL				3130978	342994	73778	280135	125380	23521	9086	1860	2873
HOT METAL	3287833	2000		3094707	42200(2)				18601	822	1839	1420(2)
RUNNER LOSS	38250	23		36003	491(2)				216	10	21	17(2)
SLAG	807356	491			300249	73755	280106	125370	4704	8254	0	1437
FLUE DUST	822	1		263	54	23	29	10	0	0	0	0
FILTER CAKE	0	0		0	0	0	0	0	0	0	0	0
TOTAL				3130973	342994	73778	280135	125380	23521	9086	1860	2873

(1) ANNUAL TONNAGES BASED ON 365 DAYS/YR AT 95.0 % OPERATION
(2) ELEMENTAL, REPORTED AS OXIDE

CARBON BALANCE (MOL/NTHM)

CHARGED		CONSUMED	
COKE	63.820	BURNED AT TUYERES	43.041
NAT GAS	3.837	REDUCTION OF METALLOIDS	1.436
		HOT METAL CARBON	7.749
		FLUE DUST	0.012
		FILTER CAKE	0.000
		SOLUTION LOSS	15.589
TOTAL	67.657	TOTAL	67.827

SP PT 1 KIDC STUDY IMPROVE STABILITY 01/30/92

COKE PLANT OPERATIONS

COAL NAME	NATURAL PERCENT	NATURAL MNT/YR	DRY ANALYSIS VOL MATTER	DRY ANALYSIS SULFUR	DRY ANALYSIS ASH	ASH ANALYSIS SIO2	ASH ANALYSIS AL2O3+TIO2	ASH ANALYSIS CAO+MGO	ASH ANALYSIS H2O
ELLSBLND	0.00	0.0	37.10	1.330	6.60	46.80	25.40	3.90	6.50
LOMING	30.40	686.4	34.75	0.700	5.50	46.80	25.40	3.90	6.00
PURCH HV	45.60	1029.6	31.00	0.800	6.25	49.00	29.30	1.43	5.00
CAMBRIA	16.00	361.3	18.50	0.900	6.80	46.20	26.60	2.50	6.25
PURCH LV	8.00	180.6	21.00	0.710	7.20	47.70	15.70	2.75	5.00
HIGH VOL COAL	30.40								
LOW VOL COAL	69.60								
TOTAL COAL MIX		2258.0	29.35	0.778	6.19	47.80	26.51	2.40	5.50

COKE PRODUCED

TOTAL DRY COAL USED	2133.7 MNT/YR
TOTAL OVEN COKE (DRY BASIS) (1)	1600.0 MNT/YR
COKE PURCHASED	-38.1 MNT/YR
FURNACE COKE	1405.7 MNT/YR
COKE BREEZE	156.2 MNT/YR
COKE BREEZE USED IN SINTERING	191.2 MNT/YR
NET COKE BREEZE FOR SALE	-35.0 MNT/YR

ANALYSIS,%	HOME	PURCH	AVERAGE
C	89.64	0.00	89.64
SIO2	3.94	0.00	3.94
AL2O3+TIO2	2.19	0.00	2.19
CAO+MGO	0.20	0.00	0.20
S (2)	0.613	0.000	0.613
H2	0.00	0.00	0.00
N2	0.00	0.00	0.00
ASH	8.25	0.00	8.25
MOISTURE	8.00	0.00	8.00

COKE OVEN BY-PRODUCTS

COKE OVEN GAS.		
TOTAL GENERATED (3)	24461	MMCF/YR
AIR-DILUTED BASIS (4)	23164	MMCF/YR
UNDERFIRING (5)	7981	MMCF/YR
STOVE FUEL ENRICHMENT	5057	MMCF/YR
AVAILABLE FOR OTHER DEPARTMENTS	10126	MMCF/YR
GROSS HEATING VALUE	540	BTU/CF
TAR.		
TOTAL GENERATED	100733	TONS/YR
USED IN BLAST FURNACE	0	TONS/YR
AVAILABLE FOR SALE	100733	TONS/YR
LIGHT OIL PRODUCED	5310	MGAL/YR
PRIMARY OIL PRODUCED	853	MGAL/YR
NAPHTHALENE RECOVERED	0	MGAL/YR
AMMONIUM SULFATE RECOVERED	23136	TONS/YR
ELEMENTAL SULFUR RECOVERED	1334	TONS/YR

COKE OVEN GAS, DRY %	
CO	7.10
CO2	2.10
H2	52.80
N2	8.60
CH4	26.10
C2H6	3.16
GHV	540.00 BTU/CF

(1) PLANT CAPACITY - 1600 MNT RUN OF OVEN COKE PER YR.
(2) DESULFURIZATION - 40.99% = 6808.1 TONS
(3) 11464. STD CU FT PER TON DRY COAL CHARGED
(4) BASED ON MEASURED CALORIFIC VALUE OF 540.0 BTU/SCF
(5) IN ADDITION TO 8474. MMCF/YR BLAST FURNACE GAS
AT 83.14 BTU/SCF TO PROVIDE 2.350 MMBTU/TON DRY COAL

THEORETICAL UNDERFIRING REQUIRED
BASED ON HEAT BALANCE
2.764 MMBTU/TON DRY COAL
9387 MMCF/YR COKE OVEN GAS
9968 MMCF/YR BLAST FURNACE GAS

SP PT I KIDC STUDY - IMPROVE STABILITY SUMMARY OF BLAST FURNACE OPERATIONS 01/30/92

FURNACE	I	SINTER PLANT	TOTAL
ORE USED, MNT/YR			
CAROLPEL	1641.9 (31.2%)	142.8	1784.6
CAROL C	0.0 (0.0%)	455.0	455.0
MBR	0.0 (0.0%)	900.0	900.0
TAZEDIT	0.0 (0.0%)	420.0	420.0
HAM-PAD	0.0 (0.0%)	650.0	650.0
SAND	0.0 (0.0%)	15.0	15.0
MILL SCI	0.0 (0.0%)	450.0	450.0
OLIVINE	0.0 (0.0%)	110.0	110.0
TOTAL ORE	1641.9	3142.8	4784.6
PLANT SINTER	3616.6 (68.8%)		3616.6
PLANT REVERTS		85.5	85.5
STEELMAKING SLAG	0.0 (0.0%)	164.4	164.4
GRAVEL	16.4, 10.0#/T	0.0	16.4
SINFLUX	0.7	432.9	433.6
DRY COKE (8.0% H2O)	1405.7	191.2	1596.9
DRY FLUE DUST	0.8, 0.5#/T	0.7	0.8
HOT METAL PRD. MNT/YR	3288		3287.8
NT/DAY	9000		9000
SILICON, %	0.600		0.600
PHOSPHORUS, %	0.056		0.056
MANGANESE, %	0.57		0.566
SULFUR, %	0.025		0.025
RUNNER LOSS, MNT/YR	38.2		38.2
COKE RATE, LB/NTHM	855		855
NAT GAS CF/NTHM	1478		1477
FLUX RATE, LB/NTHM	0		0
SLAG VOLUME, LB/NTHM	491	ANALYSIS	491
SIO2, %	37.19	5.43	
AL2O3, %	9.14	1.05	
CAO, %	34.69	7.46	
MGO, %	15.53	3.40	
S, %	1.022	0.010	1.022
B/S	1.350	2.000	
B/A	1.080	1.663	
DRY ENR WIND, CFM	231511		231511
CF/NTHM	35188		35188
TEMPERATURE, DEG F	2250		
MOISTURE, GR/CF	8.0		
OXYGEN, %	22.0		
OXYGEN ADDED, CFM	2199		
FLAME TEMP, DEG F	4000		
TOP GAS TEMPERATURE, DEG F	278		
CARBON UTIL ETACO, %	92.83		
HYDROGEN UTIL ETAH2,	105.83		
OPERATING DAYS	365		365
PCT OPERATION	95.0		

ADJUSTMENTS RELATIVE TO A THEORETICAL BASE

COKE RATE, LB/TON	-86.8
WIND RATE, PCT	0.00

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+-----------------------------------------------------------+
|  SP PT L KIDC STUDY - IMPROVE STABILITY                   |
+-----------------------------------------------------------+

+-----------------+                                  +-------------------+
| LOMING    686.4 |                                  | CAROLPEL  142.8   |
| PURCH HV 1029.6 |                                  | CAROL C   455.0   |
| CAMBRIA   361.3 |                                  | MBR       900.0   |
| PURCH LV  180.6 |                                  | TAZIDIT   420.0   |
+-----------------+                                  | HAM PAO   650.0   |
        |                                            | SAND       15.0   |
        |                                            | MILL SCL  450.0   |
        |                                            | OLIVINE   110.0   |
        |                                            | STLMKG S  164.4   |
        |                                            | PLTREV     85.5   |
        |                                            | FL DUST     0.8   |
        |                                            | SINFLUX   432.9   |
        |                                            | COKE BRZ  191.2   |
        |                                            +-------------------+
        v                                                   |
  TOT COAL    2258.0                                        v
        |                                             TOT FEED    4017.6
        v                                                   |
=================                                           v
|  COKE  PLANT  |-->                                  ====================
*****************                                     |  SINTER  PLANT   |
        |                                             ********************
        |                                                   |
        v                                                   v
  TOT COKE    1600.0                                  TOT SINT    3616.6
        |                                             B/A 1.66 | B/S 2.00
PURCH COKE      |     TAR 100.73                            |
  -38.1 ------->|     COG  23.16*                           |
                |       UNDERFIRE   7.98*                   |
                |       TO STOVES   5.06*                   v
                v       FOR SALE   10.13*                 NUT SINT    1808.3
  FCE COKE    1405.7                                      PEA SINT    1808.3
  NUT COKE       0.0
  COKE BRZ     156.2
    TO SINT PLT 191.2
    FOR SALE     35.0

                                  +-------------------+
                                  |          MNT/YR LB/NTHM |
                                  | CAROLPEL 1641.9    999  |
                                  | GRAVEL     16.4     10  |
                                  | SINTER   3616.6   2200  |
                                  | SINFLUX     0.7      0  |
                                  | COKE     1405.7    855  |
                                  +-------------------+
                                            |
                                            v
+-------------------+                 ====================
|  NAT GAS    4.86* |  -->|  BLAST  FURNACES  |------> FL DUST    0.74
+-------------------+                 ====================      FILT CK    0.00
                                            |                   B.F.GAS 172.49*
                                            |                     TO STOVES   35.23*
                                            |                     COKE OVENS   8.47*
                                            v                     FOR SALE   128.78*
                                   HOT METAL    3326.1
                                   NET PROD     3287.8 ( 9008 NTHM/DAY)
                                   RNR LOSS       38.2 ( 1.15 % OF GROSS)
                                   SLAG          807.4 (  491 LB/NTHM)
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* IN BILLION SCF/YR, ALL OTHERS IN MNT/YR

SP PT L KIDC STUDY - BASE CASE

OPERATING SUMMARY AND HEAT & MATERIAL BALANCE FOR FCF 1 01/30/92

	LB/NTHM	TON/DAY	TON/YEAR 365 DAYS	NATURAL ANALYSES, % FE	SIO2	AL2O3	CAO	MGO	H2O
HOT METAL PRODUCTION	2000	9000	3287820	94 13					
RUNNER LOSS 1 15%	23	105	38250	94 13					
COKE-DRY 89 6%C	860	3870	1413862	0.00	3 94	2.19	0 20	0.00	0.00
STEAM	10	45	16620						
OXYGEN ENRICHMENT	30	134	49062						
SLAG	492	2213	808496						
DRY FLUE DUST 30.0%C	1	2	822	32 00	6 60	2 80	3 50	1.20	0 00
DRY FILT CAKE 35 0%C	0	0	0	33 00	6.60	1.70	6 20	2.20	0.00
BURDEN - METALLICS									
CAROLPET (31 2%)	999	4494	1641838	63.83	4 61	0 31	0 44	0 15	3 00
SINTER (68.8%)	2200	9900	3616601	57 59	5 43	1 05	7 46	3 40	0 00
GRAVEL	10	45	16439	2 40	94 70	0 70	0.60	0.30	0.00
BURDEN - FLUX									
SINFLUX (100 0%)	1	5	1651	0 45	1 70	0.33	42 00	13.00	0 00

INJECTED FUEL

GAS	CF/NTHM	MCF/DAY	MMCF/YR	CO	CO2	H2	H2O	N2	CH4	C2H6
NAT GAS	1486	13376	4886	0 00	0 00	0 00	0 00	0 00	97 00	3 00

HOT BLAST		HOT METAL		SLAG		TOP GAS		TWO-STAGE DATA	
DRY ENR WIND, CFM	221161	FE	94.13	SIO2	37.2	CO %	21.86	ETACO	91.51
CF/NTHM	35384	SI	0 60	AL2O3	9.1	CO2 %	21.59	ETAH2	104.51
OXYGEN, %	22.0	P	0.056	TIO2	0.18	H2 %	4.27	HEAT LOSS	
MOISTURE, GR/CF	8.0	MN	0.57	CAO	34.7	N2 %	52.27	MMBTU/MIN	1.20
TEMPERATURE, DEG F	2250	S	0.025	MGO	15.5	CO/CO2	1.01		
PRESSURE PSIG	36 0	TI	0 03	MNO	0.75	BTU/CF	84.00	HEAT REQUIRED	
COLD BLAST, DEG F	400	C	4 60	SULFUR	1.03	MCF/NTHM	52.80	(MMBTU/NTHM)	
PERCENT OPERATION	95.0	TEMP	2770	OTHER	1 50	MMBTU/NTHM	4 44	ABOVE 77	14 05
				B/S	1 351	TEMP DEG F	282	ABOVE 1800	1 97
FLAME TEMP, DEG F	4000	SI	0 83	B/A	1.080	DEWPOINT F	101		
		THEORETICAL		TEMP	2870				
				LIQDUS	2493				

HOT BLAST STOVE OPERATION (2768 DEG DOME TEMP AT 5 0% EXCESS AIR)

HEAT CONTENT OF BLAST	1648 MBTU/NTHM		
HEAT CONTENT OF COLD BLAST	263 MBTU/NTHM		
REQUIRED INPUT HEATING VALUE *	1731 MBTU/NTHM		
GASSING RATE TO STOVES (0 CFM MAX)	12820 NAT CF/NTHM	80126 NAT CFM	
STOVE FUEL ENRICHMENT	12.00 PCT		
COKE GAS ENRICHMENT TO STOVES (540.0 BTU/CF)	1538 CF/NTHM	9615 CFM	

DRY BLAST FURNACE GAS

GENERATED	52799 CF/NTHM	330007 CFM
USED IN STOVES (11281 WET CF/NTHM)	10717 CF/NTHM	66985 CFM
AVAILABLE TO OTHER DEPARTMENTS	42082 CF/NTHM	263022 CFM

CARBON (MOL/NTHM)	
AT TUYERES	43 28
METALLOIDS	1 44
HOT METAL	7 75
FLUE DUST	0 01
SOLN LOSS	15 74
TOTAL	68 22

(%S SLAG)/(%S HM)	
BY MASS BAL	41.09
THEORETICAL	58.35
A K BISWAS	69.23

* AT STOVE EFFICIENCY OF 80 0 %

SP PT L KEDC STUDY - BASE CASE 01/30/92

SINTER PLANT OPERATIONS

NAME	NATURAL MNT/YR	NATURAL LB/T SINT	DRY %	% H2O	LOI	FE	P	% DRY BASIS SIO2	MN	AL2O3	CAO	MGO	S	TIO2
CAROLPEL	142.8	79.0	4.1	3.00	1.00	65.80	0.010	4.75	0.13	0.32	0.45	0.15	0.007	0.06
CAROL C	455.0	251.6	13.4	0.00	1.00	66.10	0.008	4.32	0.11	0.12	0.44	0.27	0.003	0.03
MBR	900.0	497.7	26.6	0.00	0.45	68.18	0.027	0.81	0.27	0.73	0.01	0.01	0.003	0.03
TAZIDIT	420.0	232.3	12.4	0.00	0.70	63.91	0.032	5.88	0.03	0.97	0.21	0.11	0.007	0.04
HAM-PAO	650.0	359.5	19.2	0.00	3.40	63.50	0.055	4.45	0.15	1.82	0.03	0.05	0.015	0.01
SAND	15.0	8.3	0.4	0.00	0.00	2.40	0.000	94.70	0.00	0.70	0.60	0.30	0.000	0.00
MILL SCL	450.0	248.9	13.3	0.00	-5.00	71.95	0.011	1.40	0.66	0.88	0.56	0.08	0.010	0.05
BNT LIME	0.0	0.0	0.0	0.00	0.00	0.00	0.000	0.00	0.00	0.00	100.00	0.00	0.000	0.00
OLIVINE	110.0	60.8	3.2	0.00	0.95	3.99	0.011	42.20	0.08	0.88	0.88	47.40	0.030	0.01
STLMKG S	164.4	90.9	4.9	0.00	0.00	21.86	0.450	11.50	3.50	1.20	42.00	6.50	0.120	0.50
PLTREV	85.5	47.3	2.5	0.00	0.00	47.80	0.145	11.80	10.00	2.65	14.80	2.00	0.150	0.15
FL DUST	0.7	0.4	0.0	0.00	30.00	32.00	0.000	6.60	0.00	2.80	3.50	1.20	0.000	0.00
SINFLUX	432.9	239.4		0.00	43.00	0.45	0.000	1.70	0.00	0.33	42.00	13.00	0.003	0.00
COKE BRZ	191.2	105.7		8.00	91.75	0.0	.0	3.94	0.0	2.19	0.20	0.0	0.613	0.0
TOT FEED	4017.5	2221.7		0.49	9.04	52.38	0.043	4.94	0.54	0.95	6.79	3.09	0.042	0.05
DRY FEED	3998.0	2210.9												
IGNITION	-361.3	199.8												
YIELD LOSS	-20.0	11.1												
SINTER	3616.6	2000.0		0.00	0.00	57.59	0.047	5.43	0.59	1.05	7.46	3.40	0.010	0.05

SINTER FEO, % = 7.50
FE2O3, % = 74.10
BASICITY, (CAO+MGO)/SIO2 = 2.000
STONE EQUIVALENT(1), LB/100 LB = 8.73

DESULFURIZATION = 78.09% - 1305.0 TONS

(1) STONE EQUIVALENT = 100 * ASE OF SINTER / ASE OF BF FLUX
WHERE, ASE = CAO+MGO-BS*(SIO2-2.14*FE*SIHM/FEHM)
BS = (CAO+MGO)/SIO2 FOR BF SLAG, 1.5
SIHM = SI IN HOT METAL, 0.95%
FEHM = FE IN HOT METAL, 94.0%
(2) BEFORE DUST LOSS

SP PT I KIDC STUDY - BASE CASE
RESULTS OF TWO-STAGE MASS AND HEAT BALANCE FOR FCF I

RESULTS BASED ON

PRODUCTION	9000 NTHM/DAY	DRY WIND	221161 CFM	TOTAL FLUX	1 LB/NTHM
RUNNER LOSS	1.1 %		35384 CF/NTHM	SLAG VOLUME	492 LB/NTHM
COKE RATE	860 LB/NTHM	OPERATION	95.0 %	SLAG B/A	1.080
NAT GAS	1486 CF/NTHM	BLAST TEMP	2250 DEG F	B/S	1.351
		BLAST H2O	8.0 GR/CF	FRACTION CACO3 CALCINED ABOVE	
		BLAST O2	22.0 %	EQUILIBRIUM TEMP	0.00 %

HEAT BALANCES

TUYERE ZONE (BTU / 100 MOLS TUYERE GAS)		HEAT ABOVE 1800 DEG F (BTU / NTHM)		HEAT ABOVE 77 DEG F (BTU / NTHM)	
DRY AIR (2250)	1235269	SENSIBLE HEAT*	1943662	SENSIBLE HEAT	1648126
BLAST H2O (2250)	70453	REACTION HEAT	1655310	CHEM ENERGY OF COKE	10866205
COKE CARBON(3000)	448984	TUYERE GASES AT 1800	1626368	CHEM ENERGY OF AUX FUEL	1534238
INJECTANT(S)	0				
REACTIONS AT 77		TOTAL	1972604	TOTAL	14048569
C + 1/2 O2 = CO	1571425				
H2O = H2 + 1/2 O2	-218680	FE OXIDES REDUCTION	921415	FE OXIDES REDUCTION	5881053
INJECTANT(NET CV)	51665	METALLOID REDUCTION	143040	METALLOID REDUCTION	220422
TOTAL	3159114	HOT METAL	632456	CO3 DECOMPOSITION	730
TUYERE GASES		SLAG	131698	SENS & LAT HT OF HM	1244674
CO (43.3 MOLS/NTHM)	1094454	CACO3 + C = CAO + 2CO	0	SENS & LAT HT OF SLAG	332168
H2 (10.2 MOLS/NTHM)	241469	HEAT LOSS	143995	CHEM ENERGY OF C IN HM	1311817
N2 (72.7 MOLS/NTHM)	1823179			CHEM ENERGY OF C IN TD	2114
TOTAL	3159102			CHEM ENERGY OF DRY TG	4435146
				SENS & LAT HT OF DRY TG	220776
				SENS & LAT HT OF TG H2O	207679
				HEAT LOSS	191993
FLAME TEMP = 4000 DEG F		TOTAL	1972603	TOTAL	14048568

* INCLUDES COKE CARBON AT 1800. DEG F

SP PT L KIDC STUDY - BASE CASE
RESULTS OF TWO-STAGE MASS AND HEAT BALANCE FOR FCE L

ELEMENTAL MATERIAL BALANCE (1)

	NATURAL TONS/YR	NATURAL LB/NTHM	% H2O	TONS / YEAR FE	SIO2	AL2O3	CAO	MGO	MN	S	P	TIO2
METALLICS												
CAROLPEL	1641838	999	3.0	1047920	75648	5096	7167	2389	2070	111	159	956
SINTER	3616601	2200	0.0	2082649	196328	37822	269798	122859	21452	364	1701	1918
GRAVEL	16439	10	0.0	395	15568	115	99	49	0	0	0	0
FLUXES												
SINFLUX	1651	1	0.0	7	28	5	693	215	0	0	0	0
COKE (DRY)	1413862	860		0	55758	30922	2805	0	0	8660		
TOTAL				3130970	343329	73960	280561	125512	23522	9136	1860	2873
HOT METAL	3287820	2000		3094696	42200(2)				18601	822	1839	1420(2)
RUNNER LOSS	38250	23		36003	491(2)				216	10	21	17(2)
SLAG	808496	492			300584	73937	280532	125502	4704	8304	0	1437
FLUE DUST	822	1		263	54	23	29	10	0	0	0	0
FILTER CAKE	0	0		0	0	0	0	0	0	0	0	0
TOTAL				3130962	343329	73960	280561	125511	23522	9136	1860	2873

(1) ANNUAL TONNAGES BASED ON 365 DAYS/YR AT 95.0 % OPERATION
(2) ELEMENTAL, REPORTED AS OXIDE

CARBON BALANCE (MOL/NTHM)

CHARGED		CONSUMED	
COKE	64.191	BURNED AT TUYERES	43.281
NAT GAS	3.858	REDUCTION OF METALLOIDS	1.436
		HOT METAL CARBON	7.749
		FLUE DUST	0.012
		FILTER CAKE	0.000
		SOLUTION LOSS	15.742
TOTAL	68.049	TOTAL	68.220

SP PT L KIDC STUDY - BASE CASE 01/30/92

COKE PLANT OPERATIONS

COAL NAME	NATURAL PERCENT	NATURAL MNT/YR	DRY ANALYSIS VOL MATTER	DRY ANALYSIS SULFUR	ASH ANALYSIS ASH	ASH ANALYSIS SIO2	ASH ANALYSIS AL2O3+TIO2	ASH ANALYSIS CAO+MGO	ASH ANALYSIS H2O
ELLSBLND	0.00	0.0	37.10	1.330	6.60	46.80	25.40	3.90	6.50
LUMING	30.40	686.4	34.75	0.700	5.50	46.80	25.40	3.90	6.00
PURCH HV	45.60	1029.6	31.00	0.800	6.25	49.00	29.30	1.43	5.00
CAMBRIA	16.00	361.3	18.50	0.900	6.80	46.20	26.60	2.50	6.25
PURCH LV	8.00	180.6	21.00	0.710	7.20	47.70	15.70	2.75	5.00
HIGH VOL COAL	30.40								
LOW VOL COAL	69.60								
TOTAL COAL MIX		2258.0	29.35	0.778	6.19	47.80	26.51	2.40	5.50

COKE PRODUCED

TOTAL DRY COAL USED	2133.7 MNT/YR
TOTAL OVEN COKE (DRY BASIS) (1)	1600.0 MNT/YR
COKE PURCHASED	-29.0 MNT/YR
FURNACE COKE	1413.9 MNT/YR
COKE BREEZE	157.1 MNT/YR
COKE BREEZE USED IN SINTERING	191.2 MNT/YR
NET COKE BREEZE FOR SALE	-34.1 MNT/YR

ANALYSIS,%	HOME	PURCH	AVERAGE
C	89.64	0.00	89.64
SIO2	3.94	0.00	3.94
AL2O3+TIO2	2.19	0.00	2.19
CAO+MGO	0.20	0.00	0.20
S (2)	0.613	0.000	0.613
H2	0.00	0.00	0.00
N2	0.00	0.00	0.00
ASH	8.25	0.00	8.25
MOISTURE	8.00	0.00	8.00

COKE OVEN BY-PRODUCTS

COKE OVEN GAS:	
TOTAL GENERATED (3)	24461 MMCF/YR
AIR-DILUTED BASIS (4)	23164 MMCF/YR
UNDERFIRING (5)	7969 MMCF/YR
STOVE FUEL ENRICHMENT	5058 MMCF/YR
AVAILABLE FOR OTHER DEPARTMENTS	10137 MMCF/YR
GROSS HEATING VALUE	540 BTU/CF
TAR:	
TOTAL GENERATED	100733 TONS/YR
USED IN BLAST FURNACE	0 TONS/YR
AVAILABLE FOR SALE	100733 TONS/YR
LIGHT OIL PRODUCED	5310 MGAL/YR
PRIMARY OIL PRODUCED	853 MGAL/YR
NAPHTHALENE RECOVERED	0 MGAL/YR
AMMONIUM SULFATE RECOVERED	23136 TONS/YR
ELEMENTAL SULFUR RECOVERED	1334 TONS/YR

COKE OVEN GAS, DRY %	
CO	7.10
CO2	2.10
H2	52.80
N2	8.60
CH4	26.10
C2H6	3.16
GHV	540.00 BTU/CF

(1) PLANT CAPACITY = 1600 MNT RUN OF OVEN COKE PER YR.
(2) DESULFURIZATION - 40.99% = 6808.1 TONS
(3) 11464 STD CU FT PER TON DRY COAL CHARGED
(4) BASED ON MEASURED CALORIFIC VALUE OF 540.0 BTU/SCF
(5) IN ADDITION TO 8462 MMCF/YR BLAST FURNACE GAS
AT 84.00 BTU/SCF TO PROVIDE 2.350 MMBTU/TON DRY COAL

THEORETICAL UNDERFIRING REQUIRED
BASED ON HEAT BALANCE
2.764 MMBTU/TON DRY COAL
9372 MMCF/YR COKE OVEN GAS
9952 MMCF/YR BLAST FURNACE GAS

SP PT L KIDC STUDY - BASE CASE SUMMARY OF BLAST FURNACE OPERATIONS 01/30/92

FURNACE	L	SINTER PLANT	TOTAL
ORE USED, MNT/YR			
CAROLPEL	1641.8 (31.2%)	142.8	1784.6
CAROL C	0.0 (0.0%)	455.0	455.0
MBR	0.0 (0.0%)	900.0	900.0
TAZIDIT	0.0 (0.0%)	420.0	420.0
HAM-PAO	0.0 (0.0%)	650.0	650.0
SAND	0.0 (0.0%)	15.0	15.0
MILL SCL	0.0 (0.0%)	450.0	450.0
OLIVINE	0.0 (0.0%)	110.0	110.0
TOTAL ORE	1641.8	3142.8	4784.6
PLANT SINTER	3616.6 (68.8%)		3616.6
PLANT REVERTS		85.5	85.5
STEELMAKING SLAG	0.0 (0.0%)	164.4	164.4
GRAVEL	16.4, 10.0#/T	0.0	16.4
SINFLUX	1.7	432.9	434.6
DRY COKE (8.0% H2O)	1413.9	191.2	1605.1
DRY FLUE DUST	0.8, 0.5#/T	0.7	0.8
HOT METAL PRD, MNT/YR	3288		3287.8
NT/DAY	9000		9000
SILICON, %	0.600		0.600
PHOSPHORUS, %	0.056		0.056
MANGANESE, %	0.57		0.566
SULFUR, %	0.025		0.025
RUNNER LOSS, MNT/YR	38.2		38.2
COKE RATE, LB/NTHM	860		860
NAT GAS CF/NTHM	1486		1486
FLUX RATE, LB/NTHM	1		1
SLAG VOLUME, LB/NTHM	492	ANALYSIS	492
SIO2, %	37.18	5.43	
AL2O3, %	9.14	1.05	
CAO, %	34.70	7.46	
MGO, %	15.52	3.40	
S, %	1.027	0.010	1.028
B/S	1.351	2.000	
B/A	1.080	1.663	
DRY ENR. WIND, CFM	232801		232801
CF/NTHM	35384		35384
TEMPERATURE, DEG F	2250		
MOISTURE, GR/CF	8.0		
OXYGEN, %	22.0		
OXYGEN ADDED, CFM	2212		
FLAME TEMP, DEG F	4000		
TOP GAS TEMPERATURE, DEG F	282		
CARBON UTIL ETACO, %	91.51		
HYDROGEN UTIL ETAH2,	104.51		
OPERATING DAYS	365		365
PCT OPERATION	95.0		

ADJUSTMENTS RELATIVE TO A THEORETICAL BASE

COKE RATE, LB/TON	87.1
WIND RATE, PCT	0.00

```
+-------------------------------------------------------------+
|                SP PT L KIDC STUDY - BASE CASE                |
+-------------------------------------------------------------+

+-------------------+                                  +-------------------+
| LOMING     686.4  |                                  | CAROLPEL   142.8  |
| PURCH HV  1029.6  |                                  | CAROL C    455.0  |
| CAMBRIA    361.3  |                                  | MBR        900.0  |
| PURCH LV   180.6  |                                  | TAZIDIT    420.0  |
+-------------------+                                  | HAM PAO    650.0  |
          |                                            | SAND        15.0  |
          |                                            | MILL SCL   450.0  |
          |                                            | OLIVINE    110.0  |
          |                                            | STIMKG S   164.4  |
          |                                            | PLTREV      85.5  |
          |                                            | FL DUST      0.8  |
          |                                            | SINFLUX    432.9  |
          |                                            | COKE BRZ   191.2  |
          |                                            +-------------------+
          v                                                     |
  TOT COAL    2258.0                                            v
          |                                             TOT FEED    4017.6
          v                                                     |
  ******************                                            v
  |   COKE  PLANT  |                                    ******************
  ******************                                    |  SINTER  PLANT |
          |                                             ******************
          |                                                     |
          v                                                     v
  TOT COKE    1600.0                                     TOT SINT    3616.6
          |                                             B/A 1.66  | B/S 2.00
          |                                                     |
PURCH COKE        |  TAR 100.73                                 |
  29.0 ------>    |  COG  23.16*                                |
                  |    UNDERFIRE   7.97*                        v
                  |    TO STOVES   5.06*                  NOT SINT    1808.3
                  v    FOR SALE     10.14*                 PFA SINT    1808.3
  FCF COKE    1413.9
  NUT COKE       0.0
  COKE BRZ     157.1
    TO SINT PLT 191.2
    FOR SALE   -34.1

+-------------------------+
|          MNT/YR LB/NTHM |
| CAROLPEL 1641.8    999  |
| GRAVEL     16.4     10  |
| SINTER   3616.6   2200  |
| SINFLUX     1.7      1  |
| COKE     1413.9    860  |
+-------------------------+
          |
          v
+-------------------+      ******************      ***********
| NAT GAS    4.89*  |----->|  BLAST  FURNACES |----> FL DUST    0.74
+-------------------+      ******************       FILT CK    0.00
                                   |                B F GAS  173.59*
                                   |                  TO STOVES   35.24*
                                   |                  COKE OVENS   8.46*
                                   v                  FOR SALE    129.90*
                          HOT METAL    3326.1
                          NET PROD     3287.8 ( 9008 NTHM/DAY)
                          RNR LOSS       38.2 ( 1.15 % OF GROSS)
                          SLAG          808.5 (  492 LB/NTHM)
```

* IN BILLION SCF/YR. ALL OTHERS IN MNT/YR

Appendix I

Report of KIDC Operating Costs and Maintenance Requirements
from the Kress Corporation.

pg. 01 MAINTENANCE COST FOR MILE CARRIER
DS

CHG EVERY		PN.	QTY.	PRICE
250	ENGINE OIL FILTERS	088024	2	29.60
		088025	1	14.80
250	ENGINE OIL	15-40	12.5 GAL.	58.88
250	ENGINE FUEL FILTERS	088027	2	16.60
500	ENGINE COOLANT FILTERS	088033	1	7.90
100	HIGH PSI HYD FILTERS	027602	2	128.42
100	LOW PSI HYD FILTERS	085521	9	60.48
500	SWING DRIVE	SAE-40	11.7 GAL.	54.29
500	FRONT LEFT PLANETARY	SAE-40	16 GAL.	74.24
500	FRONT RIGHT PLANETARY	SAE-40	14 GAL.	64.96
500	REAR LEFT PLANETARY	SAE-40	16 GAL.	74.24
500	REAR RIGHT PLANETARY	SAE-40	14 GAL.	64.24
100	HYDROSTATIC DRIVE FILTERS	085176	4	132.00
AS REQ	HYDROSTATIC OIL	039217	105 GAL.	1066.80
AS REQ	HYDRAULIC OIL	105539	450 GAL.	3429.00
100	CAB AIR FILTERS	088031	2	13.96
250	ENGINE AIR FILTERS	111707	1	61.26
100	GEN. FILTERS	084262	1	5.24
1000	TWIN DISK DRIVE	SAE-30	1 GAL.	4.64
AS REQ	COOLING SYSTEM	H2O & ANTIFREEZE	38 GAL.	66.12
AS REQ	FUEL 13 gal per hr (est)	DIESEL	546 GAL.	397.90
AS REQ	GREASE	067987	40 LBS.	151.60

COST PER 100 HRS.....$ 340.10

COST PER 250 HRS.....$ 521.24

COST PER 500 HRS.....$ 2017.39

COST PER 1000 HRS.....$ 4039.42

THE COST LISTED ABOVE DOESN'T INCLUDE THE COST OF HYDRAULIC OIL OR HYDROSTATIC OIL LOST DURING FILTER CHANGES OR GREASE ESTIMATED COST FOR THIS WILL BE.

HYDROSTATIC OIL LOST 2 GAL. AT 10.16 PER GAL.= .....$ 20.32
HYDRAULIC OIL LOST 6 GAL. AT 7.62 PER GAL.= .....$ 45.72
GREASE EVERY 100 HOURS 10 LBS.....$ 37.90
EVERY 100 HOUR FILTER CHANGE.....TOTAL $ 103.94

DIESEL FUEL CONSUMPTION OF 13 GAL. PER HOUR AT $ 1.15 PER GAL. = $ 14.95 PER HOUR.
100 HOURS X $ 14.95 =..... $ 1495.00

MAINTENANCE COST FOR KIDC CARRIER

MAN HOURS TO CHANGE ENGINE OIL & FILTERS, ENGINE FUEL FILTERS ENGINE COOLANT FILTERS, HIGH PSI HYD. FILTERS, LOW PSI HYD. FILTERS, HYDROSTATIC DRIVE FILTERS, CAB AIR FILTERS, ENGINE AIR FILTERS, GEN. FILTERS WOULD TAKE 8 MAN HOURS. TO GREASE AND INSPECT THE CARRIER IT WOULD TAKE 4 MAN HOURS.

THE LABOR RATE USED IS $ 25.00 PER MAN HOUR.

OIL AND FILTER CHANGE 8 X $ 25.00 = ...$ 200.00
GREASE AND INSPECT 4 X $ 25.00 = ...$ 100.00

THE COST FOR ROUTINE MAINTENANCE AND FUEL PER 100 HOURS ON THE KIDC CARRIER IS AS FOLLOWS.

$ 4039.42 / 1000 HRS = $ 4.04 x 100 HRS =.....$ 404.00
OIL LOST AND GREASE PER 100 HRS.....$ 103.94
FUEL PER 100 HRS.....$ 1495.00
LABOR FOR OIL CHANGES AND GREASE.....$ 300.00
TOTAL $ 2302.94

THE COST PER 100 HOURS OF SERVICE IS.....$ 2302.94

THE COST PER 1 HOUR OF SERVICE IS.....$ 23.03

DS

MAINTENANCE COST FOR KIDC CARRIER

THE FOLLOWING ITEMS WERE MAINTAINED FROM OCTOBER 1, 1991 TO NOVEMBER 26, 1991 ON THE KIDC CARRIER. THESE ITEMS WERE NON SCHEDULE MAINTENANCE ITEMS.

LABOR RATE USED IS $ 25.00 PER MAN HOUR.

(01)

WATER SHORTS OUT DIODE UNDER LOWER CAB IT ALSO TOOK OUT A D/C OUTPUT CARD.

PARTS	$ 305.64
LABOR 2 HOURS	$ 50.00
TOTAL	$ 355.64

(02)

HYDAULIC RETURN LINE ABOVE ROTARY JOINT BROKE AND LOST 150 GAL. OF HYDAULIC OIL.

HOSE	$ 75.00
OIL	$ 1143.00
LABOR 3 HOURS	$ 75.00
TOTAL	$ 1293.00

(03)

CLEAN MOOG VALVE

LABOR 1 HOUR	$ 25.00
TOTAL	$ 25.00

(04)

REPLACE SEAL IN ROTARY JOINT HYDRAULIC MOTOR.

PARTS	$ 35.40
LABOR 4 HOURS	$ 100.00
CHANGED OIL AT THAT TIME IN SWING DRIVE	$ 54.29
TOTAL	$ 189.69

(05)

REPLACE STEERING SELECTOR SWITCH ON DRIVE BOX.

PARTS	$ 50.00
LABOR 1/2 HOUR	$ 12.50
TOTAL	$ 62.50

(06)

CLEAN AIR CONDITIONER COILS AND CONDENSERS.

LABOR 1 HOUR X 3 TIMES	$ 75.00
TOTAL	$ 75.00

(07)

CLEAN CABS

LABOR 1 HOUR X 4 TIMES	$ 100.00
TOTAL	$ 100.00

(08)

READJUST PROXIMITY SWITCH FOR FINITES, FINE ALIGNMENT AND AIR INTERLOCK.

LABOR 1 1/2 HOUR	$ 37.50
TOTAL	$ 37.50

(09)

CLEAN OUT WATER TUBES ON TOP OF CARRIER.

LABOR 1/2 HOUR X 10 TIMES	$ 125.00
TOTAL	$ 125.00

MAINTENANCE COST FOR KIDC CARRIER

DS

(10)

REPAIR STACK IGNITER.

LABOR 2 HOURS.....$ 50.00

TOTAL $ 50.00

THE COST FOR UNSCHEDULE MAINTENANCE ON THE KIDC CARRIER FROM OCTOBER 1 1991 TO NOVEMBER 26 1991 IS AS FOLLOWS.

(01).....$ 355.64
(02).....$ 1293.00
(03).....$ 25.00
(04).....$ 189.69
(05).....$ 62.50
(06).....$ 75.00
(07).....$ 100.00
(08).....$ 37.50
(09).....$ 125.00
(10).....$ 50.00

TOTAL $ 2313.33

AS OF OCTOBER 1, 1991 THERE WAS 962 HOURS ON THE KIDC CARRIER. NOVEMBER 26, 1991 WAS THE END OF TESTING AND PUSHING WITH 1265 HOUR ON THE CARRIER. THIS IS A TOTAL OF 303 HOURS BETWEEN OCTOBER 1, 1991 AND NOVEMBER 26, 1991.

UNSCHEDULE MAINTENANCE FOR 303 HOURS.....$ 2313.33
SCHEDULE MAINTENANCE AND FUEL FOR 303 HOURS.....$ 6978.09
303 HOURS X 23.03 PER HOUR = 6978.09

TOTAL $ 9291.42

TOTAL COST FOR 303 HOURS IS $ 9291.42 WITHOUT OPERATOR.
$ 9291.42 / 303 = $ 30.66 PER HOUR.

THE ACTUAL MAINTENANCE AND FUEL COST PER HOUR FOR THE KIDC CARRIER FROM OCTOBER 1, 1991 TO NOVEMBER 26, 1991 IS $ 30.66 PER HOUR.

12-18-91
REPORT BY DAVE SHIPLEY

MAINTENANCE ITEMS ON CARRIER

* = REGULAR MAINTENANCE ITEMS

* 1. POWER SUPPLIES FAILED IN LOWER CAB AND UPPER CAB.

* 2. WATER SHORTS OUT DIODE ON BRAKE SWITCHES UNDER LOWER CAB.

* 3. HYDRAULIC RETURN LINE ABOVE ROTARY JOINT LOST 150 GAL. OIL.

* 4. HYDRAULIC LOW PSI FILTER LINE FAILED--LOST 100 GAL. OIL.

5. REPLACE WATER VALVE ON CATCH PAN.

* 6. REPLACE TIRES ON LEFT SIDE.

7. REPLACE DRIVE AXLES ON LEFT SIDE.

* 8. REPAIR JAMB CLEANER.

* 9. REPAIR WIRES THAT BURNED DURING PUSHES.

10. RESET NEW LIMITS FOR GEOTRONICS.

11. REPLACE GEOTRONICS BOX.

*12. REPLACE RIGHT REAR STEERING MOOG VALVE.

13. ADD ACCUMULATOR TO TILT FRAME.

14. REPLACE HYDRAULIC TEMPERATURE GAUGE.

*15. REPLACE STEERING SWITCH ON DRIVE BOX.

*16. REPLACE WINDOW IN UPPER CAB.

*17. REPLACE WINDOW IN LOWER CAB.

18. RELOCATE DOOR CLEANER.

*19. REPLACE FRONT RIGHT HEADLIGHT.

*20. REPLACE SEAL IN FINE ALIGNMENT CYCLE END.

*21. CLEAN MOOG VALVE.

*22. REPLACE SEAL IN ROTARY JOINT HYDRAULIC MOTOR.

23. ADD AIR TANK TO SWING FRAME.

MAINTENANCE ITEMS ON CARRIER (Continued)

*24. REPLACE HYDRAULIC SUCTION LINES ON MAIN PUMP.

25. ADD STACK IGNITER.

26. REPLACE E STOP.

*27. CLEAN AIR CONDITIONERS.

*28. CLEAN CABS.

*29. REPLACE D/C OUTPUT CARD.

30. ADD GAUGES TO MAIN HYDRAULIC PUMP.

31. ADD FLOW METERS IN HYDRAULIC SYSTEM.

32. RELOCATE AIR CANNON.

*33. CHANGE OIL, FILTERS, AND GREASE.

34. REWORK RIGHT REAR COUNTER WEIGHT.

*35. READJUST PROXIMITY SWITCH FOR FINITES.

*36. READJUST PROXIMITY SWITCH FOR FINE ALIGNMENT.

*37. READJUST PROXIMITY SWITCH FOR AIR INTERLOCK.

38. REPAIR SPATULAR RETURN ROLLER.

39. ADD SHIM PLATES UNDER TILT FRAME.

40. ADD SHADES TO CAB.

41. ADD STOP TO DRAGON TONGUE.

42. ADD DOOR OPEN DETECTION STUCTURE.

43. RELOCATE HOSES ON TILT FRAME SO THAT BOX SPATULA ARMS WILL NOT HIT THEM.

*44. CLEAN OUT WATER TUBE VALVES.

*45. REPLACE TEMPOSONIC IN STRUT.

46. REPLACE FINE ALIGNMENT CYLINDER ENDS.

*47. REPLACE PROXIMITY SWITCH FOR FINE ALIGNMENT AIR CYLINDER ON TILT FRAME.

pg.01
DS

MAINTENANCE COST FOR KIDC BOXES

THIS REPORT IS ON THE ACTUAL MAINTENANCE PREFORMED ON THE 9 KIDC BOXES FROM OCTOBER 1, 1991 THRU NOVEMBER 26, 1991. LABOR RATE USED IS $ 25.00 PER HOUR.

BOX # 1

(1) INSTALL PINCH POINT ADJUSTMENT BARS.

PARTS (3 SETS)	$	189.75
LABOR 6 HOURS	$	150.00
TOTAL	$	339.75

(2) INSTALL DRIP EDGE MATERIAL.

PARTS	$	105.00
LABOR 3 HOURS	$	75.00
TOTAL	$	180.00

(3) INSPECT AND GREASE BOX.

PARTS	$	3.79
LABOR 1 1/2 HOURS	$	37.50
TOTAL	$	41.29

TOTAL COST FOR BOX # 1 ..... $ 561.04 *

BOX # 2

(1) REPAIR JAMB SEALS BOTTOM LEFT & RIGHT.

PARTS 1 SEAL	$	77.00
LABOR 1 HOUR	$	25.00
TOTAL	$	102.00

(2) REPLACE TOP JAMB SEAL.

PARTS	$	96.00
LABOR 1 HOUR	$	25.00
TOTAL	$	121.00

(3) BLOW LOOSE PAINT OFF SIDE BOX.

LABOR 1 HOUR	$	25.00
TOTAL	$	25.00

(4) REPAIR BLAST DOOR SAFETY CHAIN.

LABOR 1 HOUR	$	25.00
TOTAL	$	25.00

(5) REPLACE AIR DUCTS

PARTS (2 DUCTS)	$	134.00
LABOR 1 1/2 HOURS	$	37.50
TOTAL	$	171.50

(6) STRAIGHTEN BOTTOM LEFT & RIGHT JAMB SEALS.

LABOR 2 HOURS	$	50.00
TOTAL	$	50.00

MAINTENANCE COST FOR KIDL BOXES

(7) INSPECT AND GREASE.
PARTS.....$ 3.79
LABOR 1 1/2 HOURS.....$ 37.50
TOTAL $ 41.29

TOTAL COST FOR BOX # 2.....$ 535.79 *

BOX # 3
(1) INSPECT AND GREASE.
PARTS.....$ 3.79
LABOR 1 1/2 HOURS.....$ 37.50
TOTAL $ 41.29

TOTAL COST FOR BOX # 3.....$ 41.29 *

BOX # 4
(1) BLOW LOOSE PAINT OFF SIDE OF BOX.
LABOR 1 HOUR.....$ 25.00
TOTAL $ 25.00

(2) CLEAN OUT CATCH BASIN.
LABOR 1 1/2 HOURS.....$ 37.50
TOTAL $ 37.50

(3) TOP LEFT SEAL NEED ADJUSTED.
LABOR 1 HOUR.....$ 25.00
TOTAL $ 25.00

(4) INSPECT AND GREASE.
PARTS.....$ 3.79
LABOR 1 1/2 HOURS.....$ 37.50
TOTAL $ 41.29

TOTAL COST FOR BOX # 4.....$ 128.79 *

BOX # 5
(1) REPLACE WATER CURTAIN.
PARTS.....$ 105.00
LABOR 3 HOURS.....$ 75.00
TOTAL $ 180.00

(2) INSPECT AND GREASE.
PARTS.....$ 3.79
LABOR 1 1/2 HOURS.....$ 37.50
TOTAL $ 41.29

TOTAL COST FOR BOX # 5.....$ 221.29 *

MAINTENANCE COST FOR WIDE BOXES

BOX # 6

(1) REPAIR BROKEN WELD ON CABLE BRACKET ON EXHAUST STACK DOOR.

LABOR 1 HOUR	$	25.00
TOTAL	$	25.00

(2) REPLACE WATER CURTAIN.

PARTS	$	105.00
LABOR 3 HOURS	$	75.00
TOTAL	$	180.00

(3) INSPECT AND GREASE.

PARTS	$	3.79
LABOR 1 1/2 HOURS	$	37.50
TOTAL	$	41.29

(4) REPLACE AIR DUCTS.

PARTS (3 DUCTS)	$	201.00
LABOR 3 1/4 HOURS	$	81.25
TOTAL	$	282.25

TOTAL COST FOR BOX # 6 ..... $ 528.54 *

BOX # 7

(1) ADJUST TOP JAMB SEAL.

LABOR 1 HOUR	$	25.00
TOTAL	$	25.00

(2) REMOVE LOOSE PAINT.

LABOR 1 HOUR	$	25.00
TOTAL	$	25.00

(3) INSPECT AND GREASE.

PARTS	$	3.79
LABOR 1 1/2 HOURS	$	37.50
TOTAL	$	41.29

TOTAL COST FOR BOX # 7 ..... $ 91.29 *

BOX # 8

(1) REPLACE AIR DUCTS

PARTS (3 DUCTS)	$	201.00
LABOR 3 1/4 HOURS	$	81.25
TOTAL	$	282.25

(2) INSPECT AND GREASE.
PARTS.....$ 3.79
LABOR 1 1/2 HOURS.....$ 37.50
TOTAL $ 41.29

(3) REPAIR WELD SEAMS ON FLOOR INSIDE BOX.
LABOR 3 HOURS.....$ 75.00
TOTAL $ 75.00

(4) REWORK EXPLOSION DOOR HINGES.
LABOR 2 HOURS.....$ 50.00
TOTAL $ 50.00

TOTAL COST FOR BOX # 8.....$ 448.54 *

BOX # 9
(1) INSPECT AND GREASE.
PARTS.....$ 3.79
LABOR 1 1/2 HOURS.....$ 37.50
TOTAL $ 41.29

TOTAL COST FOR BOX # 9.....$ 41.29 *

pg. 05 MAINTENANCE COST FOR KIDC BOXES

TOTAL COST PER BOX.

BOX # 1.....$ 561.04

BOX # 2.....$ 535.79

BOX # 3.....$ 41.29

BOX # 4.....$ 128.79

BOX # 5.....$ 221.29

BOX # 6.....$ 528.54

BOX # 7.....$ 91.29

BOX # 8.....$ 448.54

BOX # 9.....$ 41.29

TOTAL...$ 2597.86

THE TOTAL COST FOR MAINTENANCE ON ALL 9 BOXES IS $ 2597.86. THE ADVERAGE COST PER BOX IS $ 288.65. ($ 2597.86 / 9 = $ 288.65)

FROM OCTOBER 1,1991 TO NOVEMBER 26, 1991 THERE WERE 269 PUSHES TAKEN WITH THE 9 BOXES. THE ADVERAGE AMOUNT OF PUSHES PER BOX IS 29.88.(269 / 9 = 29.88)

THE COST PER PUSH IS $ 9.66. ($ 288.65 / 29.88 = $ 9.66)

THE ACTUAL MAINTENANCE COST ON THE BOXES PER PUSH IS $ 9.66.

12/19/91
REPORT BY DAVE SHIPLEY

MAINTENANCE ITEMS ON BOXES

* = REGULAR MAINTENANCE ITEMS

* 1. REPLACE JAMB SEALS.

* 2. REPAIR JAMB SEALS.

* 3. REPLACE DOOR SEALS.

* 4. REPLACE WATER CURTAIN.

* 5. RE-WELD FLOOR OF BOX.

* 6. REPAIR EXPLOSION DOOR HINGES.

* 7. REPAIR EXPLOSION DOOR SEALS.

* 8. REPLACE AIR DUCTS IN BOX.

9. REPAIR SPATULA RETURN ARM.

* 10. PUT SUPPORTS ON SIDE OF BOX.

* 11. CLEAN LOOSE PAINT OFF BOX.

* 12. CLEAN CATCH PAN OUT.

* 13. REPLACE CABLE ON EXHAUST STACK DOOR.

14. RESEAL PAN ON BOX.

15. ADD WATER GUIDES TO REAR OF BOX.

16. REMOVE CORNER OF CATCH PAN FOR CLEARNACE ON RAILS.

17. REWORK SPATULA TRUNIONS.

18. REPAIR SPATULA TUBE.

19. RELOCATE LIFT EYES.

20. REPAIR CHAIN ON EXPLOSION DOOR.

21. GREASE WHEELS AND ROLLER BEARINGS ON BOX DOOR AND EXHAUST STACK DOOR, REACTION ARM.

Appendix J

KIDC Box Thickness Readings

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2	Graph of KIDC Box Wear vs. Pushes Accepted	J-4
3	Data Sheets of KIDC Box Thickness Readings	J-6
4	Report of Water Analysis and Estimated Treatment Costs from Betz MetChem	J-17

Section 1

Summary Table of KIDC Box Erosion/Corrosion

APPENDIX J-1

PUSHES ACCEPTED BY EACH KIDC BOX AND RESULTS OF THICKNESS MEASUREMENTS

Box No.	1	2	3	4	5	6	7	8	9	Total
No. of pushes	3	55	90	22	48	52	12	36	9	327
Erosion/ Corrosion	NA	0.008	0.0009	NA	0.01[illegible]	0.011	0.159	NA	0.002	
								0.004*	0.010*	

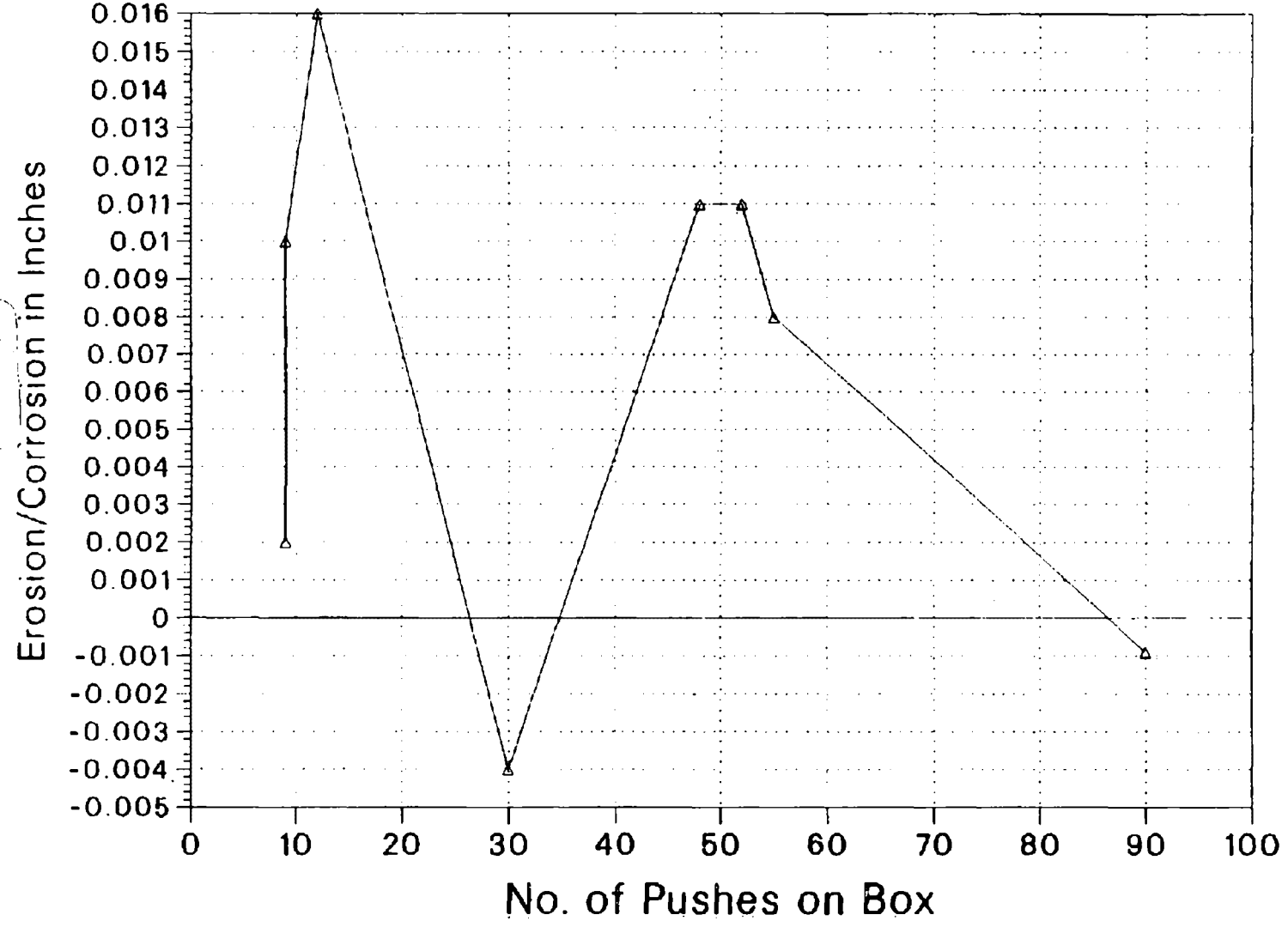
NA - Not Available

* These readings are based on the original box thickness readings minus readings after the demonstration

Section 2

Graph of KIDC Box Wear vs. Pushes Accepted

Appendix J
BOX EROSION/CORROSION VS. KIDC PUSHES
Sparrows Point 11 Battery



Section 3

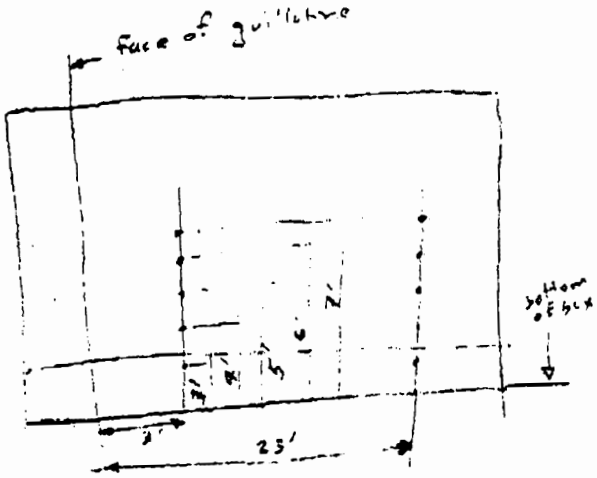
Data Sheets of KIDC Box Thickness Readings

10/15/91

CKNESS OF COICE BOXES

No	e
3'	23'
0.251	0.245
0.249	0.246
0.245	0.262
0.244	0.240
0.246	0.241
.2[illegible]	.2[illegible]

funnell



East Side

	3'	23'
3'	0.257	0.260
4'	0.259	0.264
5'	0.260	0.262
6'	0.257	0.265
7'	0.258	0.262
	0.258	0.263

0.260

Box #8 0.250" nominal thickness

9348-001-4100
Bob Wilson BSC Shipyd.
x5082 10/15/91

x7213 Roland Fuhrer

Box 9

West Side	3	23
3	.264	.264
4	.265	.267
5	.260	.265
6	[illegible]	.263
7	[illegible]	.265
	.2622	.2651

.264

East Side	3	23
3	.269	.267
4	[illegible]	.263
5	.256	.260
6	.261	.260
7	.260	.26[illegible]
Avg	.2616	[illegible]

.253

	.2528	.2544
Δ	.0094	.0106

BF w/T mate/ASTM
Dave King 604
Joe King 505

	.2518	.2536
Δ	.0098	.0088

Ave. Δ = .0097

BOX #2	Height from bottom	A 3' from door	B 23' from door	C 1' from spoilers	WEAR C-B	WEAR C-A
EAST SIDE	3'	261	259	274		
	4'	262	263	272		
	5'	264	261	262		
	6'	264	258	263		
	7'	258	254	266		
	AVG.	.262	.259	.2674	.0084	.0056
	STD DEV	.002	.003	.0048		
WEST SIDE	3'	269	261	270		
	4'	257	255	265		
	5'	260	257	264		
	6'	255	255	263		
	7'	254	244	261		
	AVG.	259	.2544	.2646	.0102	.005
	STD. DEV.	.0057	.0056	.003		

.01" for 40 pushes

.59" for 2350 push

BOX # 5	height from bottom	A 3' from door	B 23' from door	C 1' from spoilers	WEAR C-B	WEAR C-A
EAST SIDE	3'	.247	[illegible]	.261	[illegible]	
	4'	.257	[illegible]	.257		
	5'	.245	.242	.241		
	6'	.246	.241	.256		
	7'	244	.242	.258		
	AVG.	.2476	.2426	.2546	.012	.007[illegible]
	STD DEV.	.0048	.0014	.0070		
WEST SIDE	3'	247	246	260		
	4'	242	244	244		
	5'	238	243	243		
	6'	239	243	256		
	7'	246	242	258		
	AVG	.2424	244[illegible]	2522	0074	.0098
	STD. DEV.	.0076	.0019	.0072		

Data 11/27/91

J. Grodziowsk

C. Keltel

Brauthram Branson

BOX #3	height from bottom	A 3' from door	B 23' from door	C 1' from spoil	WEAR C-B	WEAR C-A
EAST SIDE	3	249	256	257		
	4'	252	254	253		
	5'	249	255	244		
	6'	248	263	251		
	7'	240	266	245		
	AVG.	.2476	.2588	250	-.0088	.0024
	STD DEV.	.0043	.0048	.0049		
WEST SIDE	3'	.258	.236	.243		
	4	.245	.252	.250		
	5'	.252	.255	.259		
	6'	.258	.247	.258		
	7	.251	.246	.252		
	AVG	.2528	.2472	2514	.0042	-.0014
	STD. DEV.	.0049	.0066	0052		

-.0009

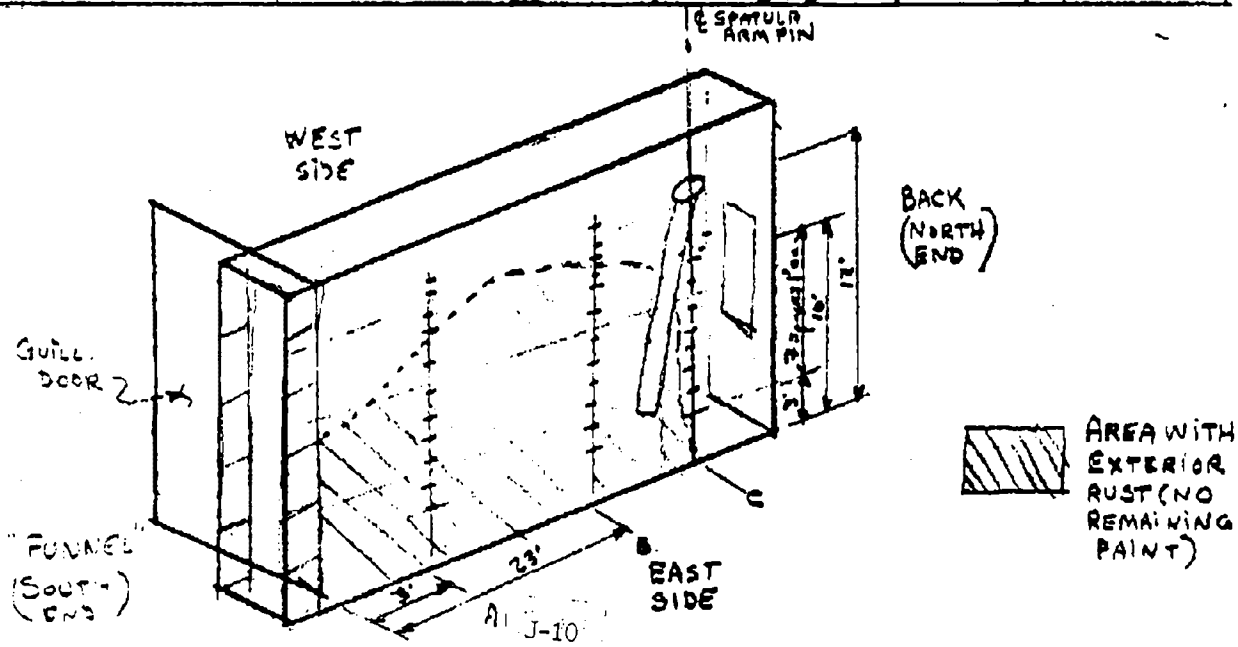
BOX #9	height from bottom	A 3' from door	B 23' from door	C 1' from spoil	WEAR C-B	WEAR C-A
EAST SIDE	3	.257	.259	.258		
	4'	.252	.255	.253		
	5'	.250	.251	.250		
	6'	.250	.257	.254		
	7'	.253	.251	.258		
	AVG.	.2518	.2536	.2546	.004	.0[illegible]
	STD DEV.	0037				
WEST SIDE	3'	.254	.253	.257		
	4	.252	.254	.257		
	5'	.251	.252	.256		
	6'	.252	.255	.256		
	7	.255	.258	.253		
	AVG	.2528	.2544	.2558	.0014	.003
	STD. DEV.					

.002

[illegible] 27/9
T. G[illegible]
K. [illegible]

KRESS BOX THICKNESS READINGS

Box # 5	Height from Bottom	A 3' from guill. door	B 23' from guill. door	C under spatula pin		
EAST SIDE	3	264	255	271		
	4	269	269	274		
	5	252	259	273		
	6	254	254	264		
	7	252	253	267		
	8	263	257	275		
	9	260	267	286		
	10	262	262	292		
	10.5	271	278	282/283		
	11	262	262	288		
	11.5	257	252	—	$C_{AVG}-B_{AVG}$	$C_{AVG}-A_{AVG}$
	12	265	266	—		
	AVG.	261	261	278	0.017	0.017
WEST SIDE	3	254	254	268		
	4	252	256	261		
	5	253	251	251		
	6	250	251	270		
	7	254	268	271		
	8	268	255	263		
	9	269	253	262		
	10	258	250	263		
	10.5	271	258	265/275		
	11	257	258	266		
	11.5	267	254	—		
	12	252	259	—		
	AVG.	259	256	265	0.009	0.006



BETHLEHEM STEEL

CALCULATION SHEET

31124 (Rev.B 4-79)

Sheet No. _____ of _____

CHARGE

DATE 12-12-91

COMP. BY | APPROVED BY

$V_s = 2300$

Box 7 EAST SIDE 35

	3' back	6'	23'	26'	6' front	Spot	3' front
3'	240	244	244	263	247	255	260
	239	244	245	268	246	260	266
	239	243	243	260	244	257	262
6'	241	244	241	257	246	259	266
7'	241	245	243	254	246	265	270
Ave	.240	.245	.243	.260	.246	.2596	.2648
Δ	.0248	.0198	.0218	.0048	.0188	.0052	Base

Ave Δ = .019

	3' back	6'	23'	26'	6' front	Spot	3' front
3'	254	247	234	249	267	240	—
	241	266	248	264	255	256	—
	244	251	241	276	246	[illegible]	—
	255	249	241	263	248	[illegible]	—
	[illegible]	249	244	271	250	254	—
	258	252	255	271	254	—	
9'	[illegible]	[illegible]	254	266	251	—	253
	245	247	252	259	[illegible]	—	9
	251	251	245	265	254	253	Ave. W = .25[illegible]
Jt	8	6	7		7	7	

	3' back	6'	23'	26'	6' front	Spot	3' front
	[illegible]	250	265	246	249	262	
	[illegible]	[illegible]	269	242	252	256	
	[illegible]	[illegible]	252	241	257	244	
	[illegible]	262	264	242	250	253	
	[illegible]	—	260	[illegible]	247	246	
			253	[illegible]	[illegible]	—	
			255	[illegible]	[illegible]	—	
			252	[illegible]	[illegible]	—	
			[illegible]	[illegible]	[illegible]	252	
Jt				7	3	7	Ave E = .251

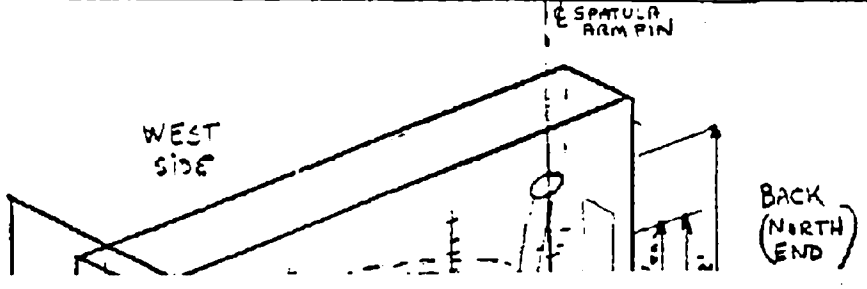
KRESS BOX THICKNESS READINGS

1/16/92

C.J. Kelber
G. Ossmer

used B.F. UK meter

Box # 8	Height from Bottom	A 3' from grill door	B 23' from grill door	C under spatula pin	$C_{AVG} - B_{AVG}$	$C_{AVG} - A_{AVG}$
EAST SIDE	3	272	262			
	4	262	271			
	5	255	265			
	6	256	263			
	7	262	261			
	8					
	9					
	10					
	10.5					
	11					
	11.5	263				
	12					
	AVG	262	264			
WEST SIDE	3	261	253			
	4	256	248			
	5	250	247			
	6	249	242			
	7	248	247			
	8					
	9					
	10					
	10.5					
	11					
	11.5	250				
	12					
	AVG	253	247			



BOX # 6	height from bottom	A 3' from door	B 23' from door	C 1' from spatula	WEAR C-B	WEAR C-A
EAST SIDE	3	.271	.274	.288		
	4'	.270	.273	.287		
	5	.276	.271	.281		
	6	.274	.272	.283		
	7'	.277	280	.281		
	8'	.282	.267	.282		
	9'	.272	281	.280		
WEST SIDE	3'	.267	.294	.289		
	4	.276	.285	.307		
	5'	.280	.272	.294		
	6'	.273	.281	.294		
	7	.273	.275	.285		
	AVG	.279	.283	.291	.008	.020
	STD. DEV	.0051	.0088	.0066		
	8'	.282	.273	.287		
	9'	.277	.282	.283		
	10	.282	.289	.259		
	10.5	.291	.269	.258		
	11'	.280	.272	[illegible]		

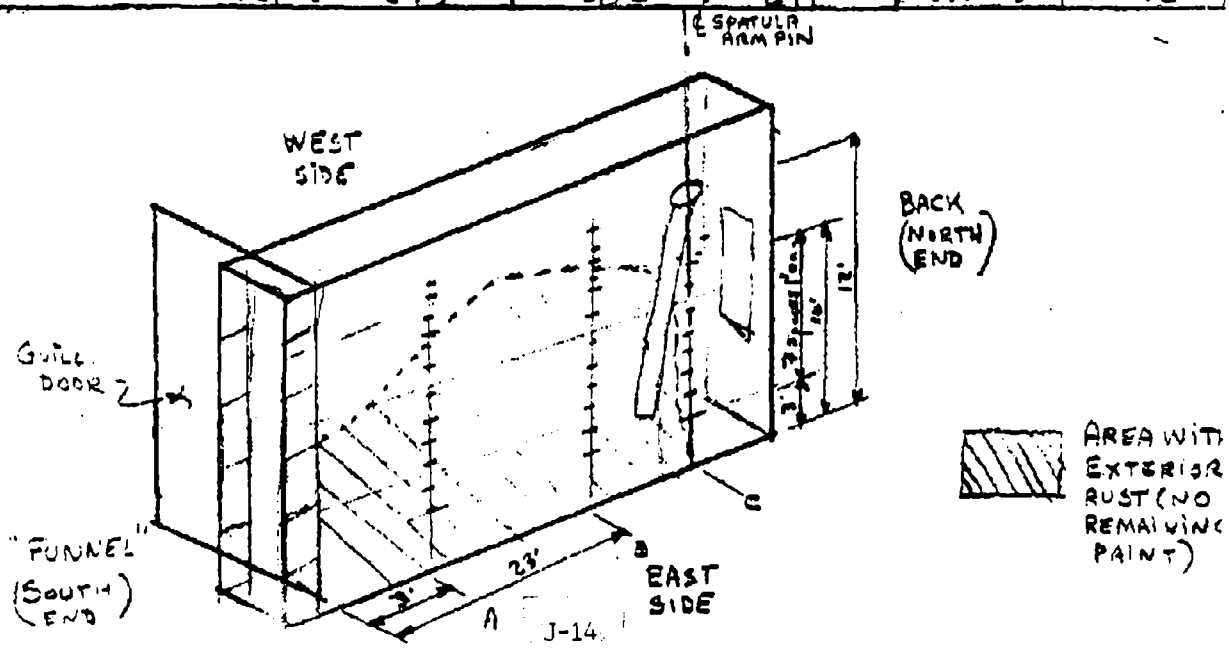
BOX #	height from bottom	A 3' from door	B 23' from door	C 1' from spatula	WEAR C-B	WEAR C-A
EAST SIDE	3'					
	4'					
	5					
	6					
	7'					
	AVG.	0.277	0.2755	0.2858	.0103	.0088
	STD DEV	0.0077	0.0044	0.005		
~~WEST SIDE~~	3'					
	4					
	5					
	6					
	7					
	AVG.					
	STD. DEV.					
West Side	11.5	.273	.288			
		.285	.285			
	13		.295 On Corrugation 10.5'	Measured thru paint		
East	10'	.273	281	.292		
	10.5'	.290	274	288/296		
	11	.291	.279	.296		
	11.5	.282	278			

Overall Ave. Δ
0.0118 ±0.012

KRESS BOX THICKNESS READINGS

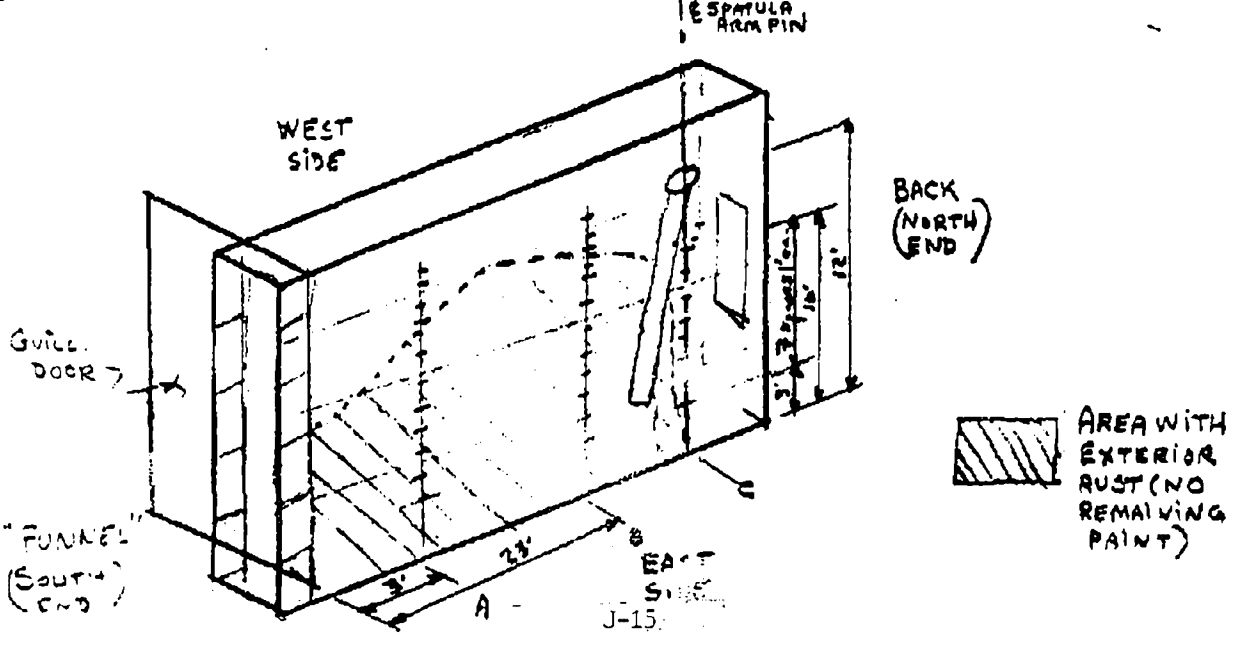
Box* 6	Height from Bottom	A 3' from gill door	B 23' from gill door	C under spatula pin		
EAST SIDE	3	271	274	288		
	4	270	273	287		
	5	276	271	281		
	6	274	272	283		
	7	277	280	281		
	8	282	267	282		
	9	272	281	280		
	10	273	281	292		
	10.5	290	274	288 / 296		
	11	291	279	286		
	11.5	282	278	—	$C_{AVG} - B_{AVG}$	$C_{AVG} - A_{AVG}$
	12	289	276	—		
	AVG.	279	276	286	0.010	0.007
WEST SIDE	3	269	294	289		
	4	276	285	307		
	5	280	272	294		
	6	273	281	294		
	7	273	275	285		
	8	285	293	287		
	9	277	282	283		
	10	282	289	289		
	10.5	281	269 *	285 / 291		
	11	280	272	294		
	11.5	283	288	—		
	12	285	285	—		
	AVG.	279	282	291	0.009	0.012

* on box corrugation



KRESS BOX THICKNESS READINGS

Box# 2	Height from Bottom	A 3' from gull. door	B 23' from gull door	C under spatula pin		
EAST SIDE	3	266	278	279		
	4	267	279	288		
	5	266	270	271		
	6	264	267	272		
	7	266	258	275		
	8	271	272	278		
	9	266	260	272		
	10	281	277	285		
	10.5	272	261	287/282		
	11	272	264	288		
	11.5	273	266	—	$C_{AVG}-B_{AVG}$	$C_{AVG}-A_{AVG}$
	12	273	273	—		
	AVG.	270	269	280	0.011	0.010
WEST SIDE	3	273	265	276		
	4	266	266	274		
	5	269	266	273		
	6	267	262	272		
	7	266	262	271		
	8	266	277	278		
	9	266	264	278		
	10	271	265	286		
	10.5	275	263	280/283		
	11	274	274	277		
	11.5	273	268	—		
	12	274	274	—		
	AVG.	270	267	277	0.010	0.007



Box #2		A 3' from Door	B 23' From Door	C 1' From Stairs	Dev C-B	Dev C-A
	3'	.266	.278	.279		
	4'	.267	.277	.288		
	5'	.266	.270	.271		
	6'	.267	.267	.272		
East Side	7'	.266	.258	.275		
	8'	.271	.272	278		
	9'	.266	.260	272		
	10'	.281	.277	285		
	10.5'	.272	.261	287/232		
	11'	.272	.264 Poor	288		
	11.5'	.273	.266 Poor	—		
	12'	.273	.273 Poor	—		
	3'	.273	.265	.276		
	4'	.266	.266	.274		
	5'	.269	.266	.273		
West Side	6'	.267	.262	.272		
	7'	.266	.262	271		
	8'	.266	.277	.278		
	9'	.266	.264	.278		
	10'	.271	.265	.286		
	10.5'	.275	.263	.280/283		
	11'	.274	.274	.277		
	11.5'	.273	.268	—		
	12'	.278	.274	—		
East Ave		.270	.269	.280	.011	.010
Std Dev.		0.0045	0.0072	.0067		
West Ave		.270	.267	.277	.010	.007
Std Dev		0.0042	0.0051	.0046		

Overall Ave. Dev
0.0095

Section 4

Report of Water Analysis and Estimated Treatment Costs from Betz Metchem

Rec. 11/5/91

Betz MetChem

The Metal Chemicals Division of Betz Laboratories Inc

October 29, 1991

Kress Corporation
227 Illinois Street
Brimfield, Illinois 61517

Attention: Mr. Bill Huffman

RE: Service Report

Dear Mr. Huffman:

The following water analysis was run on the indirect coke quench system.

System:

pH	=	7.8
Conductivity	=	2600 mmhos
Phosphonate	=	<0.1 ppm

Industrial Water:

pH	=	7.2
Conductivity	=	600

Atlantic Coast District Office
346 Bynum Road, Suite 2
Forest Hill, MD 21050
301-893-0555

Betz MetChem

This indicates that you are running 4.3 cycles of concentration which is the upper limit of control with treatment. At this point you have no treatment since the BETZ 83K tank is empty.

The conductivity control is not functional and needs to be repaired.

The timer for the feed of BETZ SLIMICIDE C74 is also faulty and in need of repair.

RECEIVING STATION We also ran suspended solids on the industrial water and the quench water which were 5.2 and 46.4 respectively.
NOZZLE URINAL SPRAY

Since this operation is going to be shut down sometime in the near future, we need to decide if we are going to treat the system and how it will be put into "storage".

Please let us know how Betz MetChem can help during this transition. If you have any questions, please not hesitate to contact me at our Bel Air, Maryland, District Office (301)893-0555.

Sincerely,
BETZ METCHEM

C. E. Delss
District Manager

CED/cb
report

Betz MetChem

The Metal Chemicals Division of Betz Laboratories, Inc.

February 19, 1992

Bethlehem Steel Corporation
Homer Research
Building C
Bethlehem, Pennsylvania 18016

Attention: Mr. George Osman

RE: KRESS INDIRECT COKE QUENCH PROJECT

Dear Mr. Osman:

The chemical treatment program which Betz recommended for the Kress Indirect Coke Quench System was a two part program.

Corrosion and scale inhibition was provided by Betz 83K. The annual cost for this program was estimated to be $23,000. This was assuming 3 cycles of concentration of Industrial Water and running a pH of 7 to 8.

Microbiological control would be achieved by a liquid non-oxidizing biocide, namely, Betz Slimicide C-74. We anticipate the annual cost of microbiological control to be $5,000.

In summary anticipated annual treatment cost would be $28,000.

If you need any more information on this subject, please do not hesitate to contact me at our Bel Air, Maryland, District office, (410) 893-0555.

Sincerely,

BETZ METCHEM

Charles E. Delss

Charles E. Delss
District Manager

CED/sah
kress-icqp

Atlantic Coast District Office
346 Bynum Road, Suite 2
Forest Hill, MD 21050
301-893-0556

Appendix K
KIDC Coke Discharge Temperature

Table of Contents

Section		Page
1	Calibration Report of the Ircon Temperature Sensors.	K-2
2	KIDC Coke Discharge Temperature Charts.	K-7
3	Three-Dimensional Heat Transfer Model	K-48

Section 1

Calibration Report of the Ircon Temperature Sensors

DEAN

SQUARE D COMPANY
INFRARED MEASUREMENT DIVISION
7301 N. CALDWELL AVE., NILES, IL 60648 708-967-5151 ADMIN. FAX 708-647-0070

MANUFACTURER OF IRCON PRODUCTS

October 11, 1991

Kress Corporation
C/O Bethlehem Steel
Truck Dock 321
Sparrows Point, MD 21219

Attn: Mr. Bill Hoffman

Dear Mr. Hoffman,

Enclosed is the Service Report which documents results obtained during the calibration visit I completed at your location on October 2nd.

If you have any questions, or if I may be of any assistance, please do not hesitate to contact me.

Sincerely,

SQUARE D IMD

Brian J. Burke

Brian J. Burke
Technical Services Engineer

encl.

cc: Commonwealth Controls Corp.

Michael Bailey
Eastern Regional Manager

Technical Service Report

CUSTOMER Kress Corporation	CUSTOMER CONTACTS Bill Hoffman	PHONE NO. 301/477-8394
ADDRESS C/O Bethlehem Steel		
CITY/STATE/ZIP Sparrows Point, MD	MODEL NO. 6-06F15	
CUSTOMER P.O. NO. 96051 / SERVICE OR W.O. NO. 15709	SERIAL NO.(S) See Report	
USER (IF OTHER THAN ABOVE)	CONTACTS	PHONE NO.
ADDRESS		
CITY/STATE/ZIP	DATE(S) SERVICE PROVIDED October 2, 1991	

A call was received from Bill Hoffman requesting a field service visit to check the calibration of their IRCON temperature sensors. Kress is using 2 Modline Plus 6-06F15 temperature sensors to measure the temperature of coke. A coke battery partially burns coal to remove impurities, the result being coke. The coke is used in making steel, both as a fuel and as an additive for making carbon steel.

After the coal has been partially burned, it is allowed to cool in its container before removal (this lowers pollution emissions). When the coke has cooled down, it is dumped into a large hopper, which empties onto a conveyor. The IRCON instruments measure the temperature of the coke as it is dumped on the conveyor.

The target temperature is approximately 400°F. If the temperature is too high, it can damage the conveyor belt. It takes a long time for the coke to cool down, so the customer would like to keep this wait to a minimum.

SERVICE ENGINEER Brian J. Burke REPORT DATE 10-11-91

IRCON, INC.
7301 North Caldwell Ave. • Niles, Illinois 60648
Phone (708) 967-5151 Fax (708) 647-0948
Toll Free (800) 323-7660 Telex 72-4412

SQUARE D COMPANY
INFRARED MEASUREMENT DIVISION
Dedicated to Growth • Committed to Quality

Technical Service Report

CUSTOMER	CITY/STATE	SERVICE ORDER NO. OR W.O.
Kress Corporation	Sparrows Point, MD	15709

The problem Kress was experiencing was that the IRCON instruments were pegging at their maximum temperature of 600°F. Also, one of the instruments seemed to be reading higher than the other. It was decided to have an IRCON representative check the calibration.

When I arrived, I checked the installations and did not see any initial problems. The sensing heads are about 2-3 feet apart, both looking straight down on the conveyor about 9 feet below. The target is relatively large, so focusing and alignment are not critical. Due to space restrictions, it was not possible to sight through the sensing heads. One of the heads was pointed at a small angle, and it looked as though some reinforcing on the hopper might interfere with the sight path of the instrument. This would tend to lower the temperature indication, but Kress personnel said that this instrument was reading higher than the other. The application looks very straightforward, and I did not see any possible cause for the instruments to read too high. If anything, dust and steam in the area would tend to make the instruments read low. I did not get a chance to view a run before calibrating the instruments.

Calibration consisted of checking the temperature indication at two separate temperatures, using a portable Blackbody Calibration System. The instrument was then adjusted to read correctly.

Results are as follows:

Location: Fire Switch #1 Model: 6-06F15

Initial:

Blackbody	Indication	Head V	100mV	Cal V
250	LOW	.010	-1.2	
601	582	5.43	94.3	

Final:

Blackbody	Indication	Head V	100mV	Cal V
250	250	.053	0.2	
600	600	8.00	98.7	1.443

IRCON, INC.
7301 North Caldwell Ave. • Niles, Illinois 60648
Phone (708) 967-5151 Fax (708) 647-0948
Toll Free (800) 323-7660 Telex 72-4412

SQUARE D COMPANY
INFRARED MEASUREMENT DIVISION
Dedicated to Growth • Committed to Quality

Technical Service Report

CUSTOMER	CITY/STATE	SERVICE ORDER NO. OR W.O.
Kress Corporation	Sparrows Point, MD	15709

Page 3

Location: Fire Switch #2 Model: 6-06F15

Initial:

Blackbody	Indication	Head V	100mV	Cal V
250	245	.040	-0.2	
600	595	6.84	99.1	1.380

Final:

Blackbody	Indication	Head V	100mV	Cal V
250	250	.054	0.8	
601	600	8.01	100.3	1.555

As shown in the above calibration results, both instruments were reading low. So after calibration, the instruments will read higher than they did before. After calibration, I viewed a production run, and both instruments pegged at 600°F, with the Emittance set to 0.999. There is no appreciable dust or steam, and I found no problems with the installations.

In conclusion, the instruments are pegging at 600°F because the temperature is actually above 600°F. There were no problems found with the instruments, or their applications. The coke is a very easy target to measure. I recommend either allowing the coke to cool further before running, or have the temperature range of the instruments changed to a higher range.

IRCON, INC.
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Section 2

KIDC Coke Discharge Temperature Charts

Gould TA550

Settings DC Volt. Unit/82

Range mV

Bias 0%

Cal. 100

Trigger Level

1%

Chart speed

14 mm/~~sec~~ min

Mode Funct

X-Y Store

BSC Research

Tag # 10229.00

Fac. No. 07011-01

Type 253-322111-1

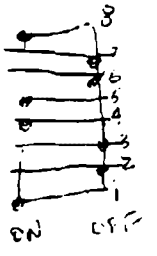
S/N 039-00675

Wt. 11 Kg.

Dip Switch Settings

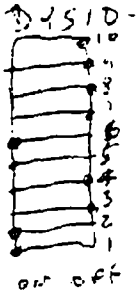
Function

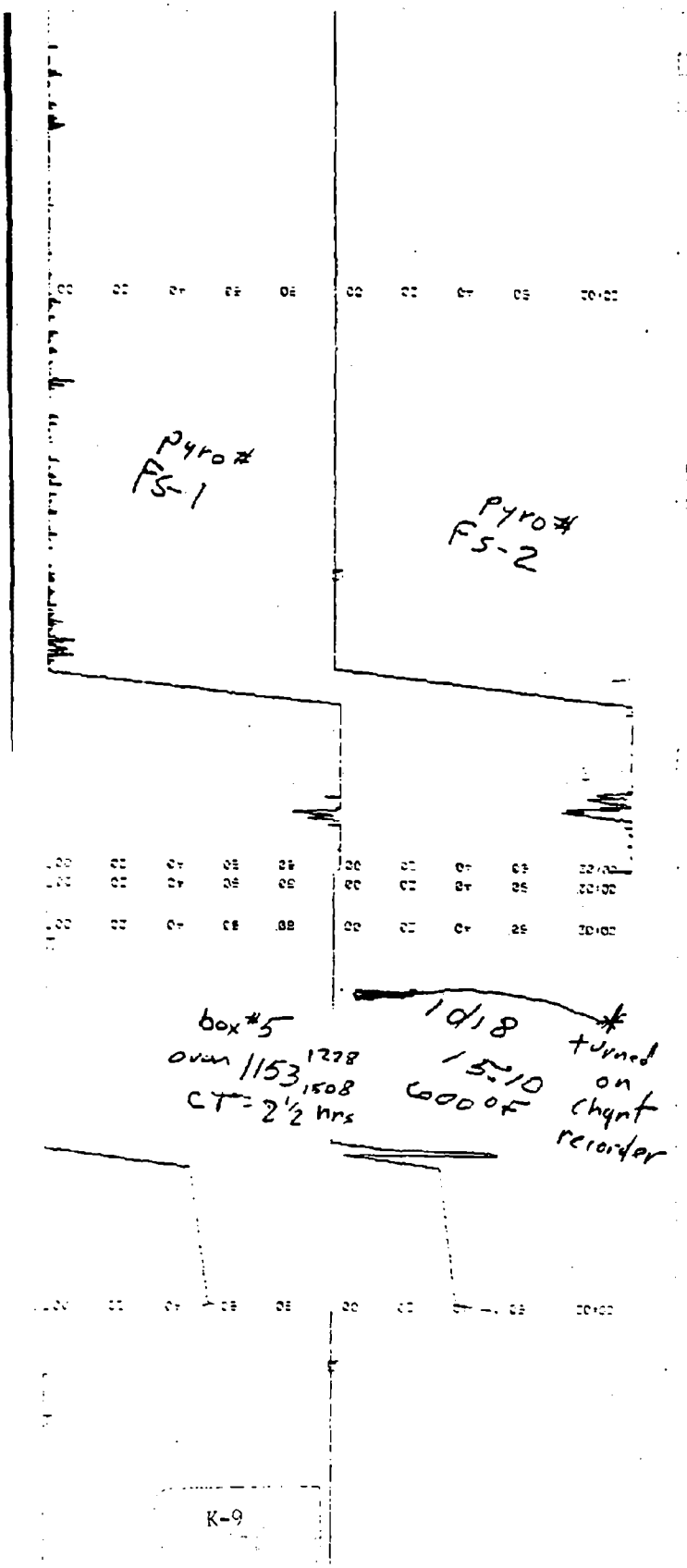
DYS 8N

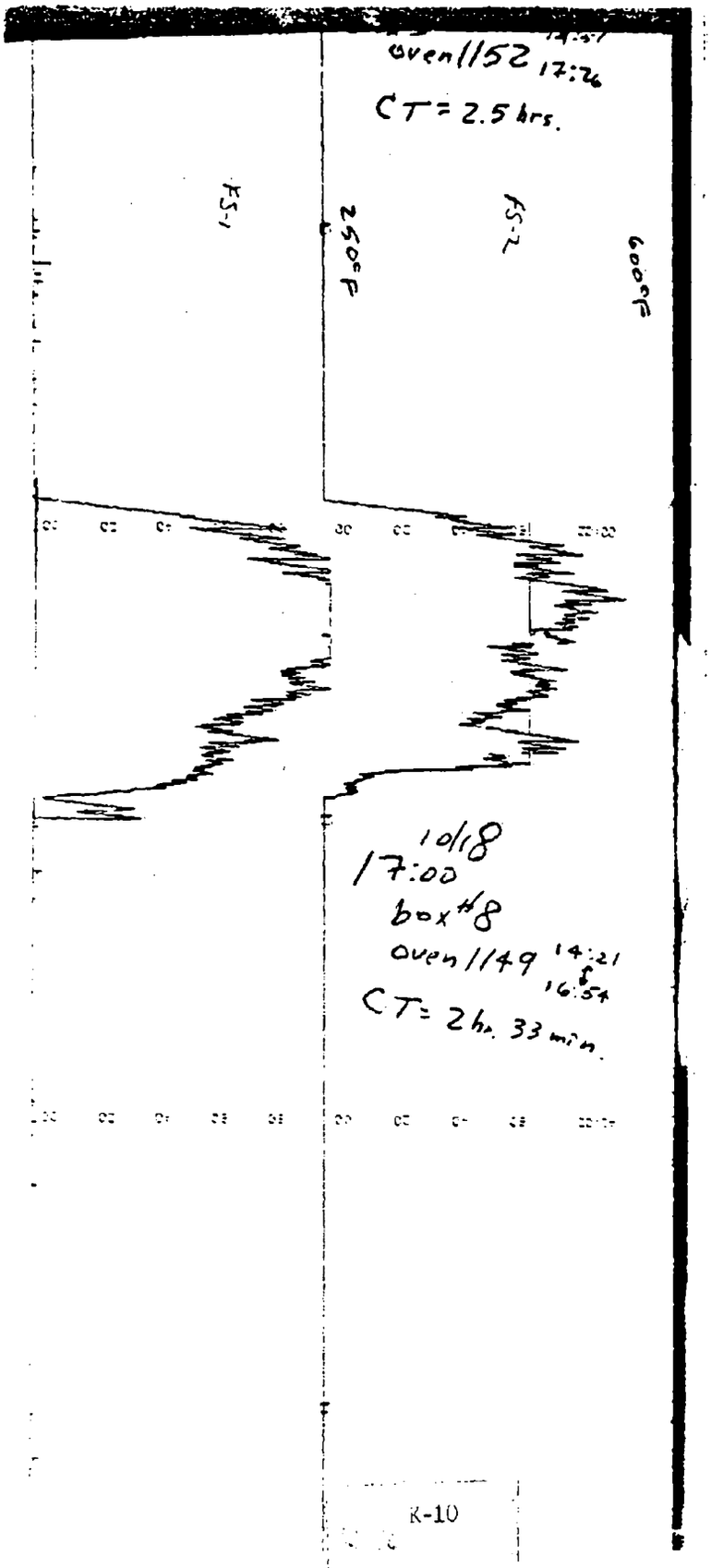


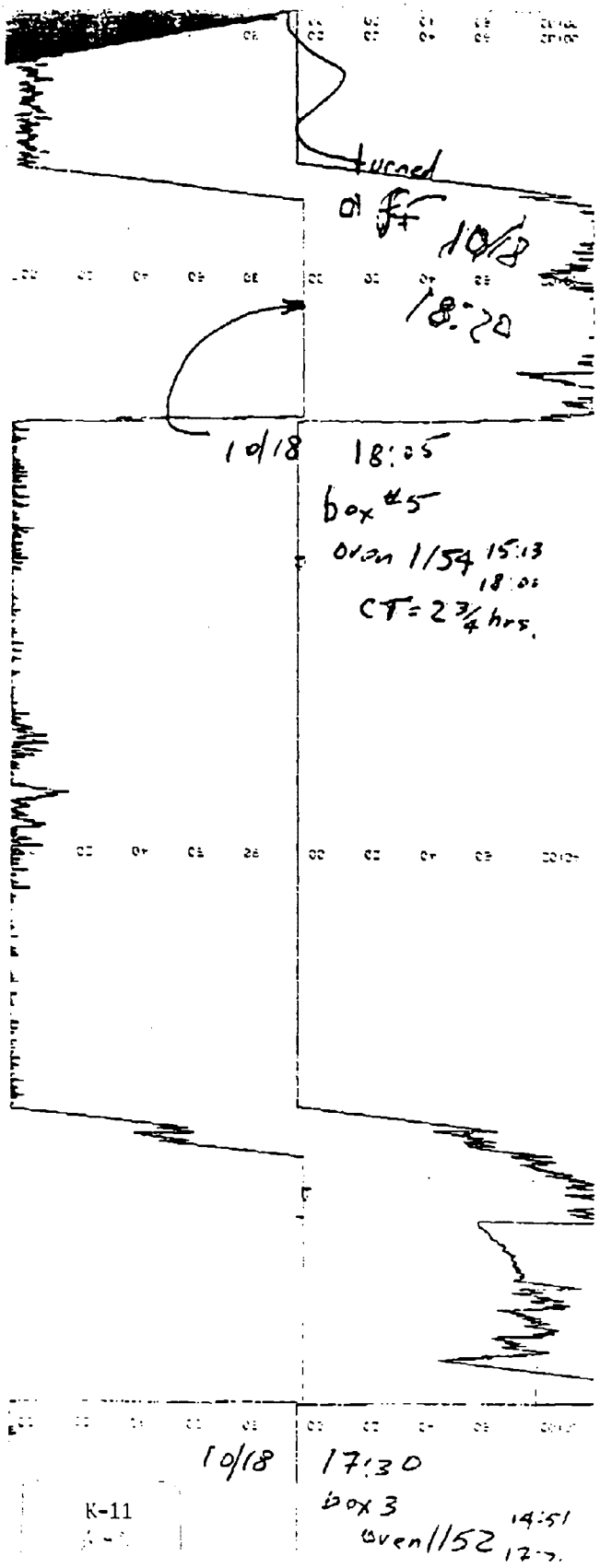
Baud Rate

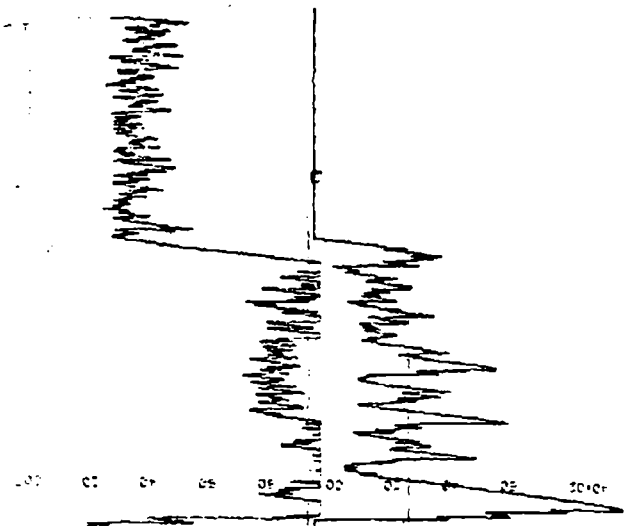
DYS 10-N

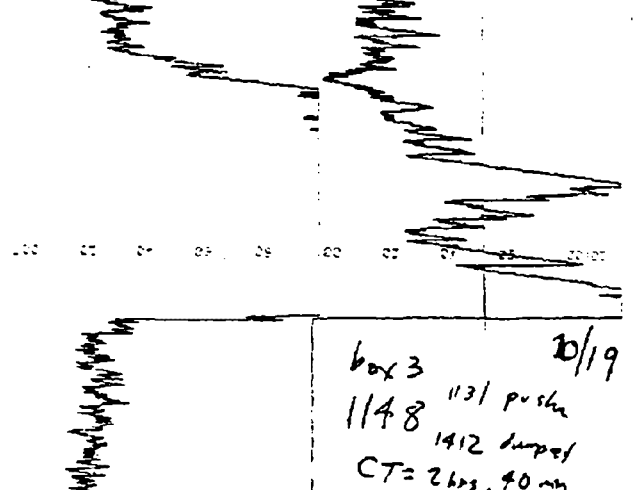


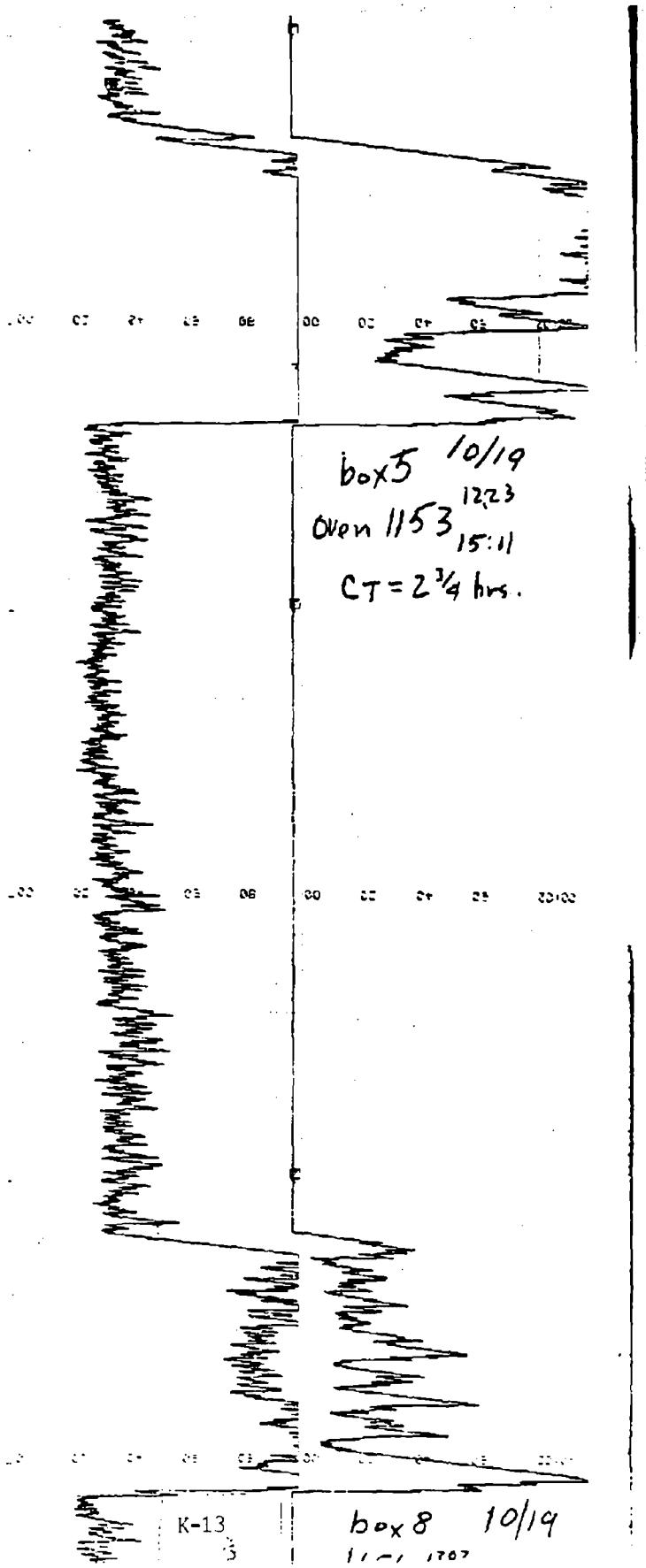

Pyro #
FS-1
Pyro #
FS-2
box #5
oven 1153 1278 1508
CT = 2 1/2 hrs
1018
1510
6000 °F
turned on chart recorder

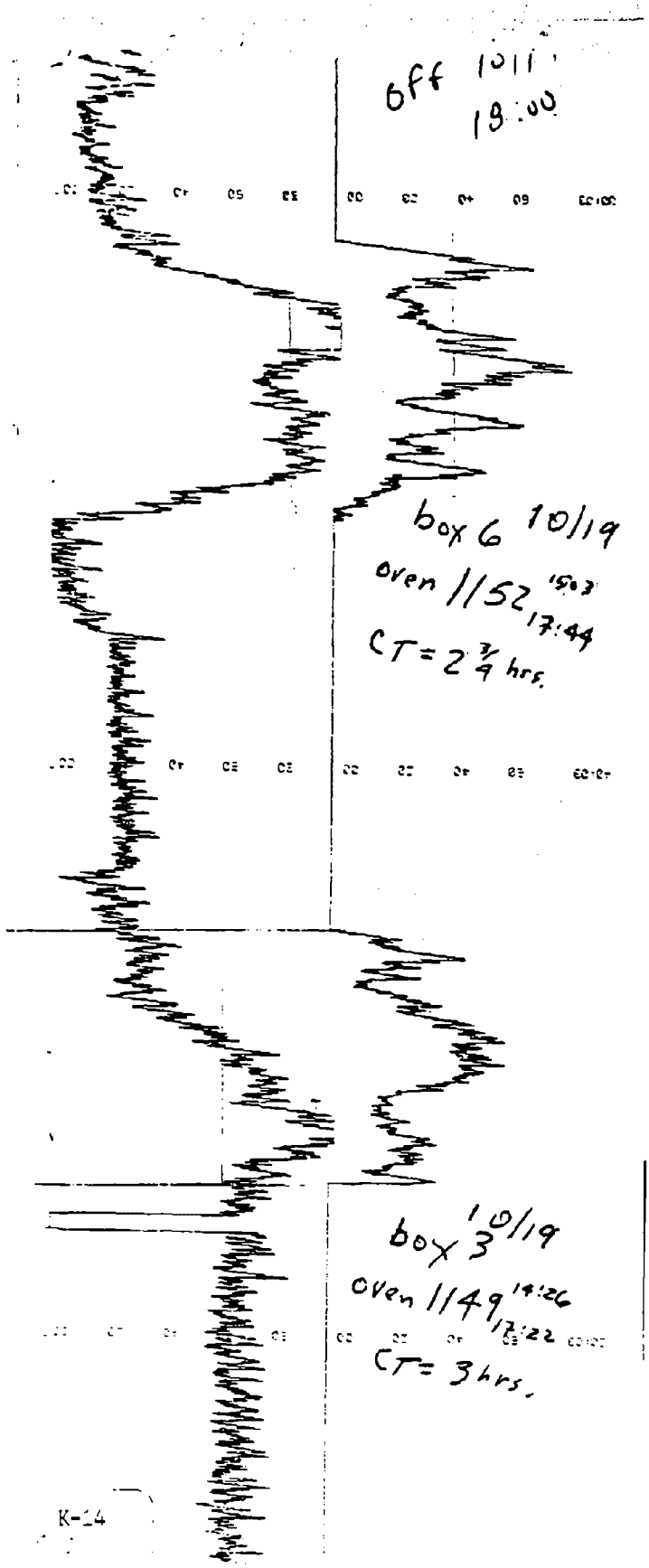

oven 1152 17:26
CT = 2.5 hrs.
600°F
FS-2
250°F
FS-1
10/18
17:00
box #8
oven 1149 14:21 & 16:54
CT = 2 hr. 33 min.

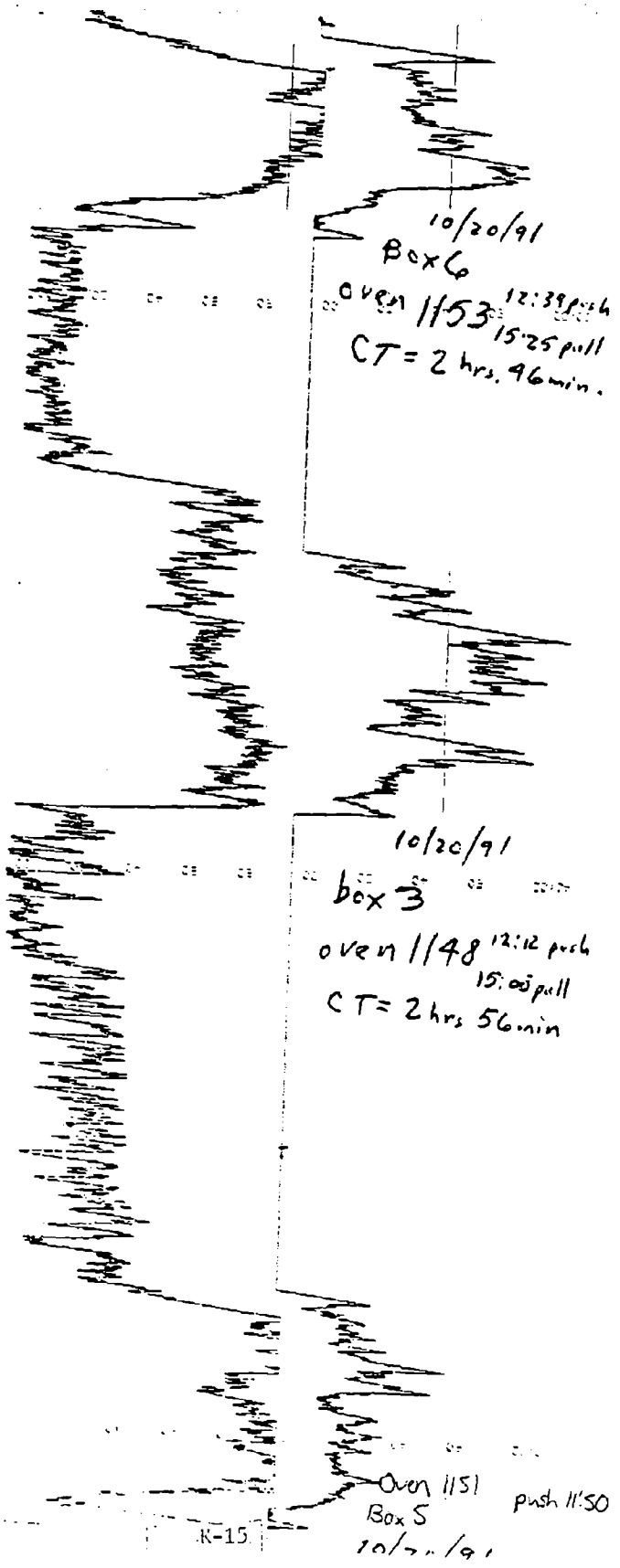

turned off 10/8 18:20
10/18 18:05
box #5
oven 1/54 15:13 18:05
CT = 2 3/4 hrs.
10/18 17:30
box 3
oven 1/52 14:51 17:2

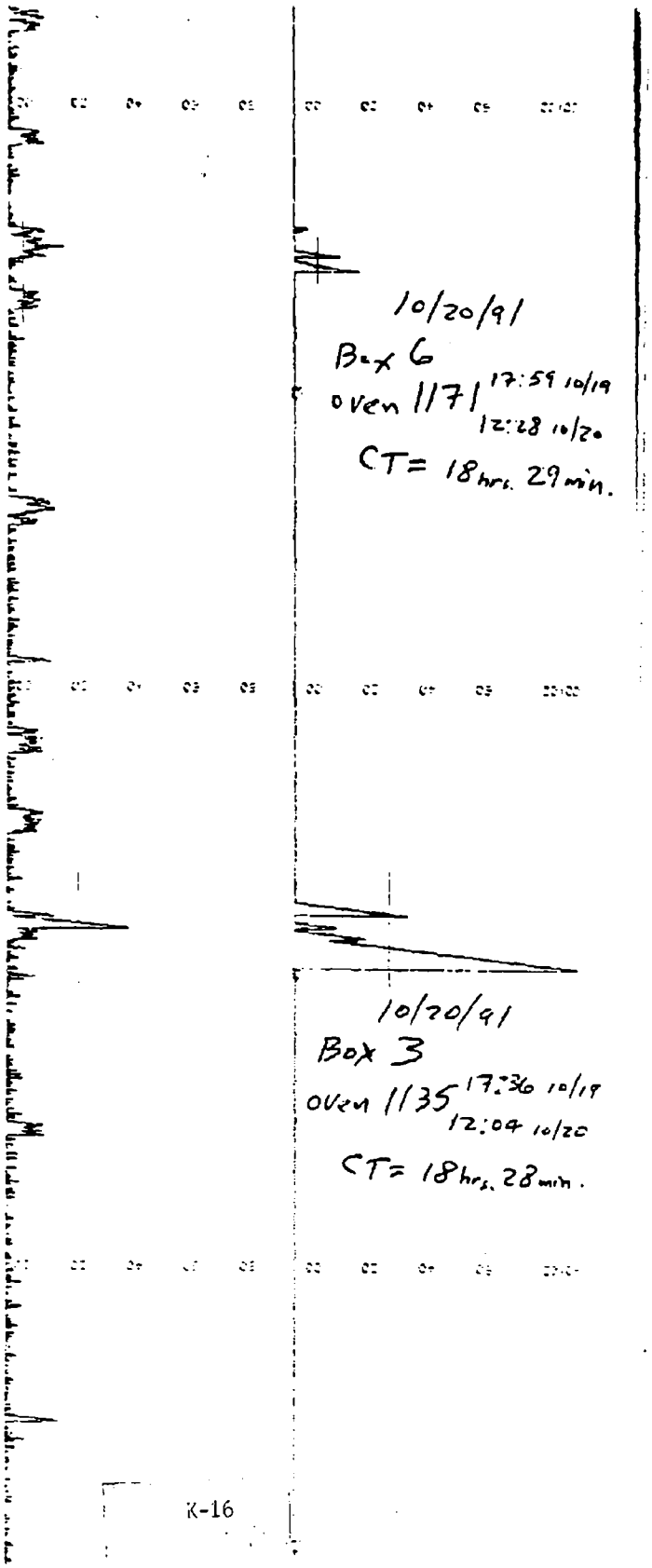

box 8 10/19
1151 1202
1434
CT = 2½ hrs.

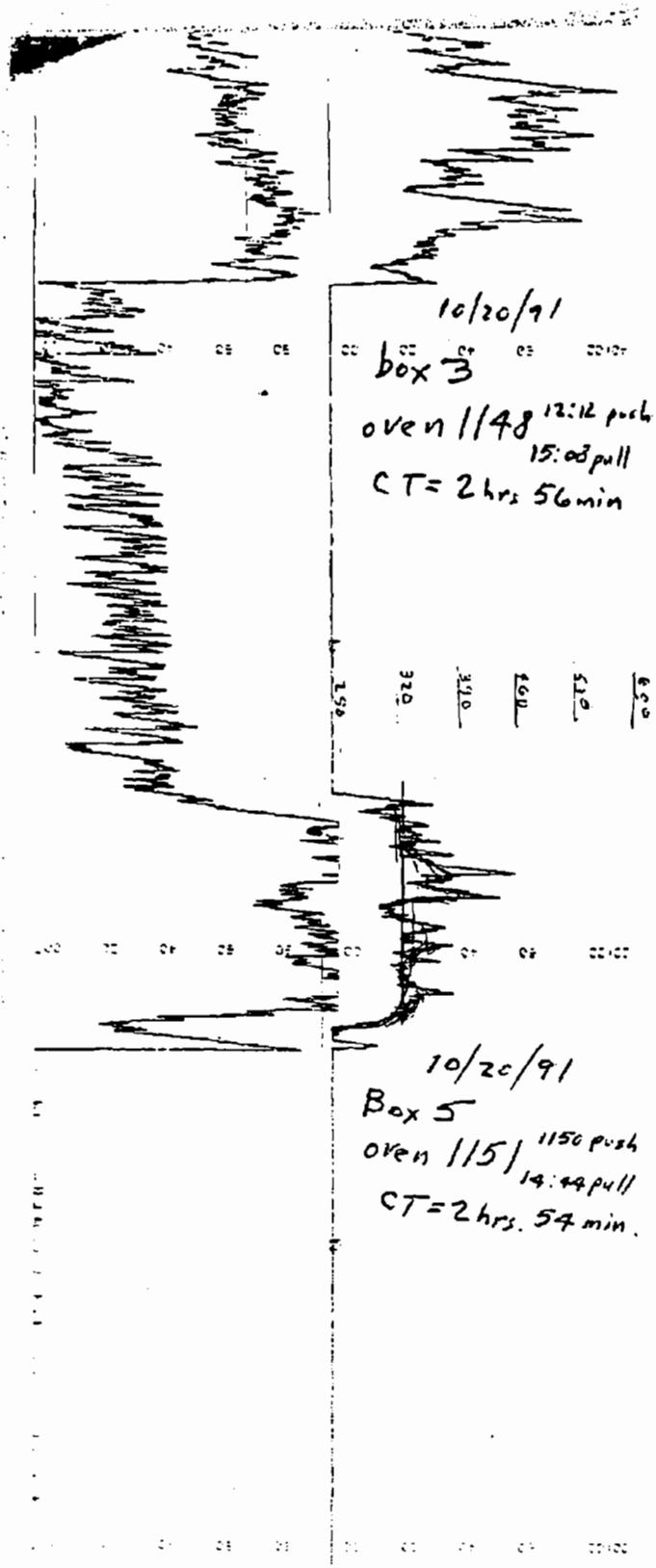

box 3 10/19
1148 1131 pushe
1412 dumped
CT = 2 hrs. 40 min

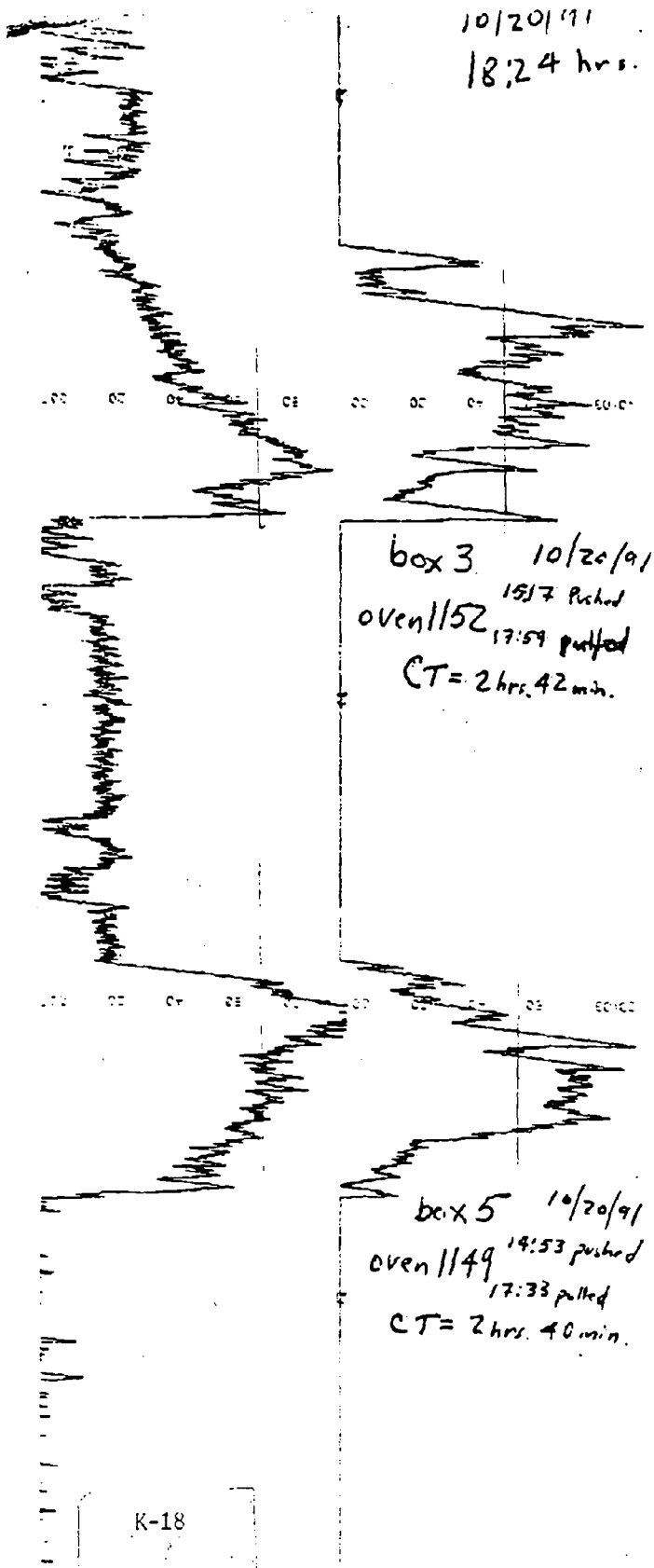

box5 10/19
12:23
Oven 1153
15:11
CT = 2 3/4 hrs.
box 8 10/19

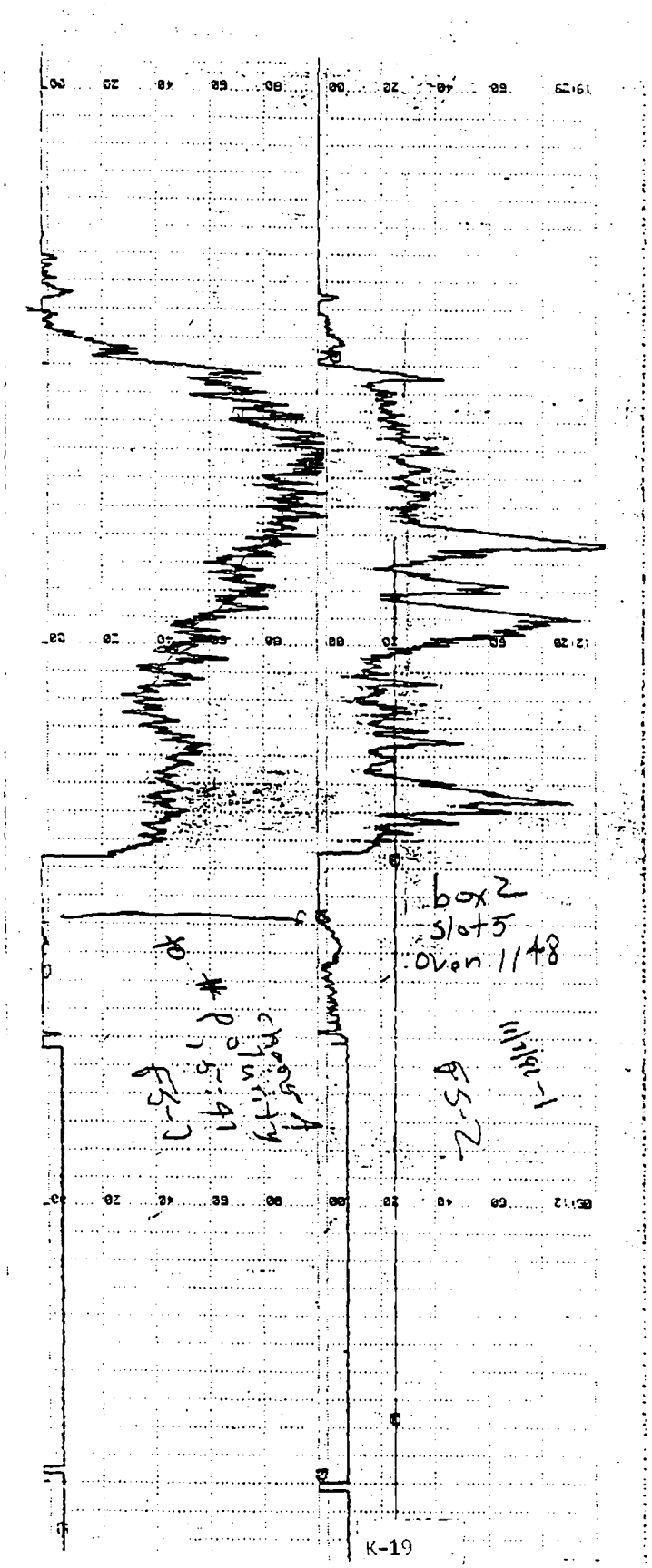

off 10/1
19:00
box 6 10/19
oven 1152 17:44
CT = 2 3/4 hrs.
box 3 10/19
oven 1149 17:22
CT = 3 hrs.

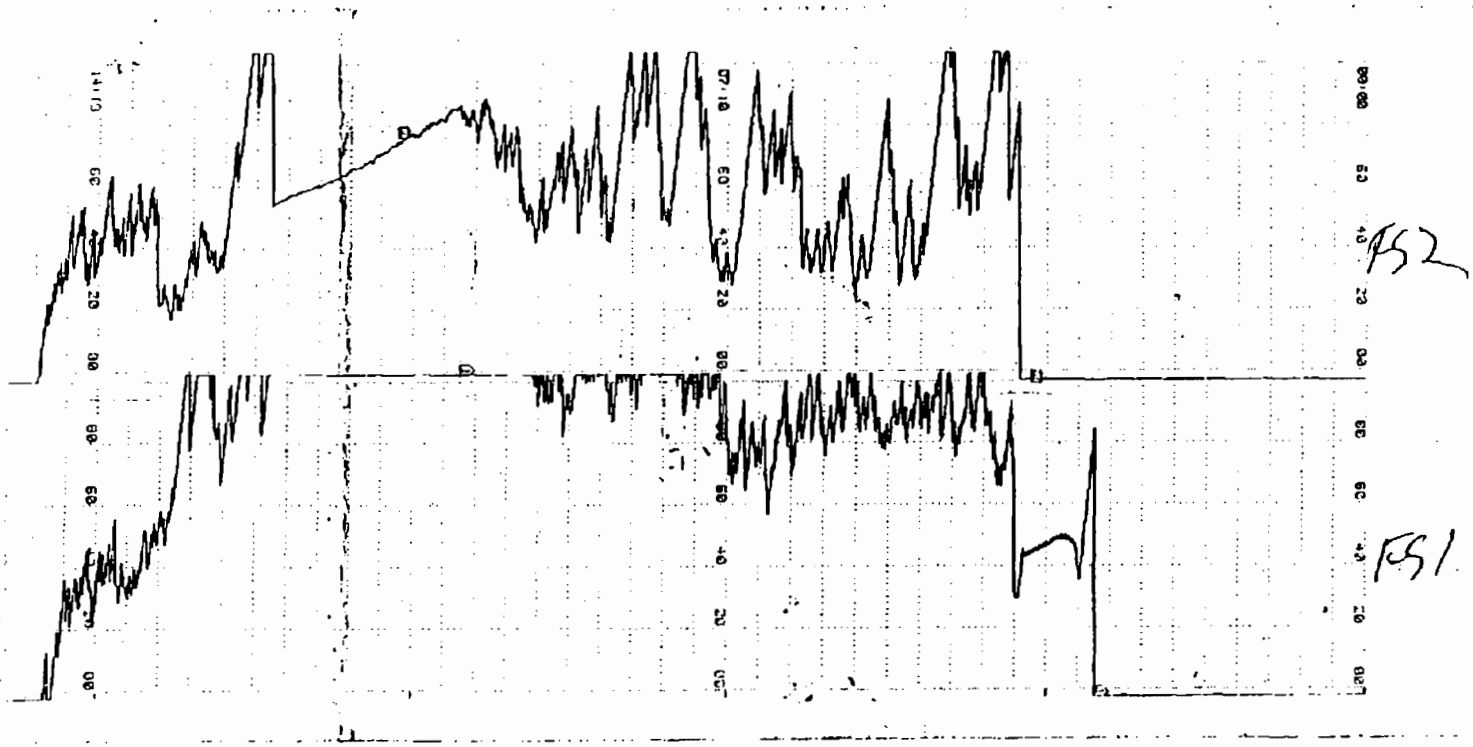

10/20/91
Box 6
oven 1153
12:39 push
15:25 pull
CT = 2 hrs. 46 min.
10/20/91
box 3
oven 1148
12:12 push
15:08 pull
CT = 2 hrs 56 min
Oven 1151
Box 5
push 11:50


10/20/91
Box 6
oven 1171
17:59 10/19
12:28 10/20
CT= 18 hrs. 29 min.
10/20/91
Box 3
oven 1135
17:36 10/19
12:04 10/20
CT= 18 hrs. 28 min.


10/20/91
box 3
oven 1148
12:12 push
15:08 pull
CT = 2 hrs 56 min
10/20/91
Box 5
oven 1151
1150 push
14:44 pull
CT = 2 hrs. 54 min.


10/20/91
18:24 hrs.
box 3 10/20/91
oven 1152
1517 Pushed
17:59 pulled
CT = 2 hrs. 42 min.
box 5 10/20/91
oven 1149
14:53 pushed
17:33 pulled
CT = 2 hrs. 40 min.

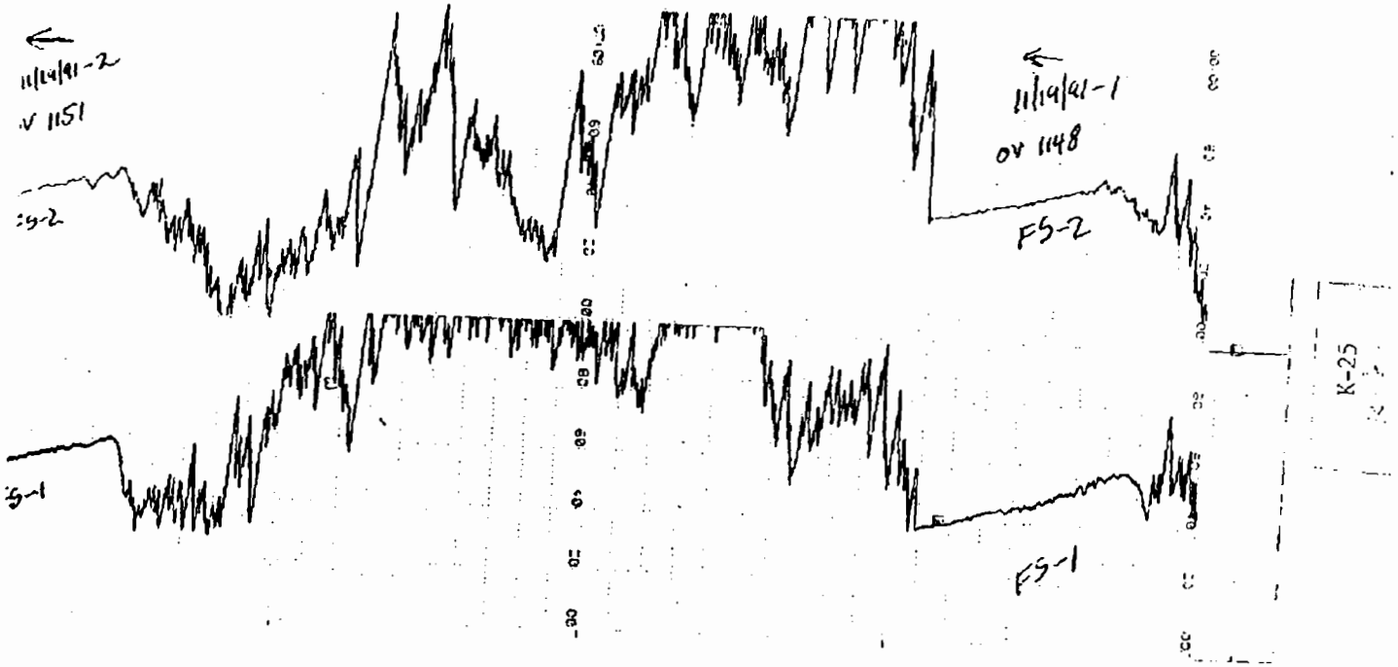

box 2
slot 5
oven 1148
FS-2
1-28-11
charge A
quality
0
FS-1


FS2 OV1149
Pot6
11/7/91
FS1

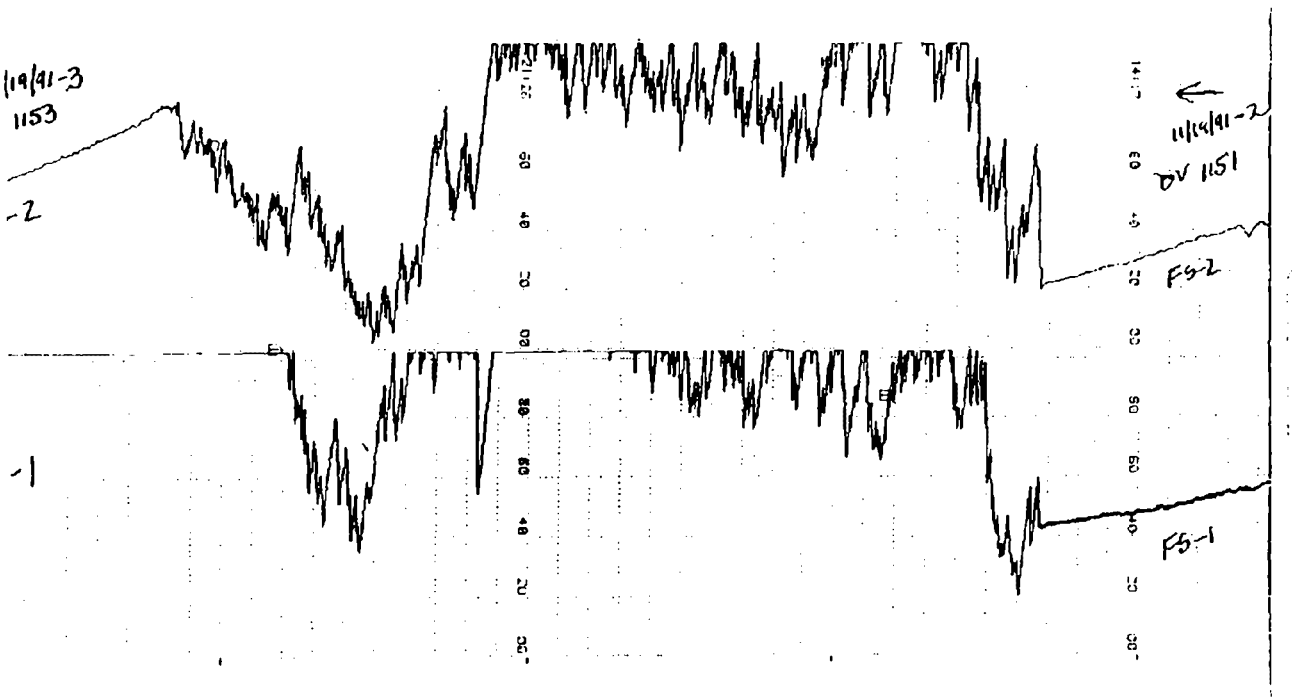
Run 117 &
Prod &
1/7/Long
Test Matrix

Drewes
Box 5
Pages 11
11/7/91

K-24

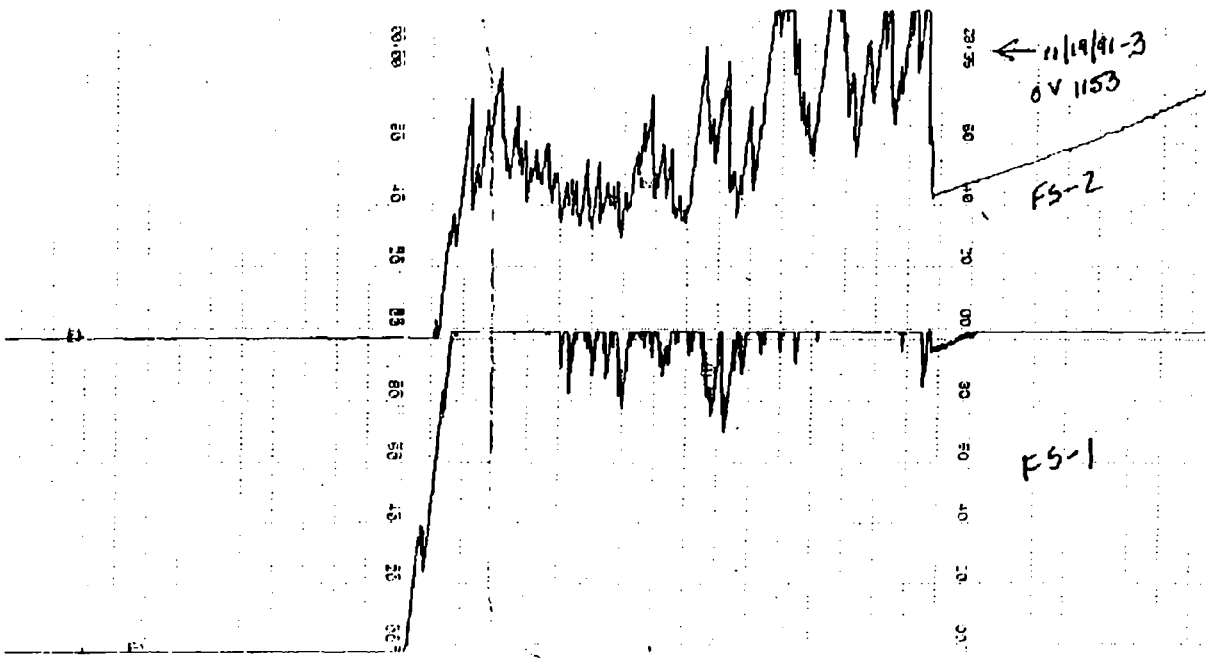


Push 249



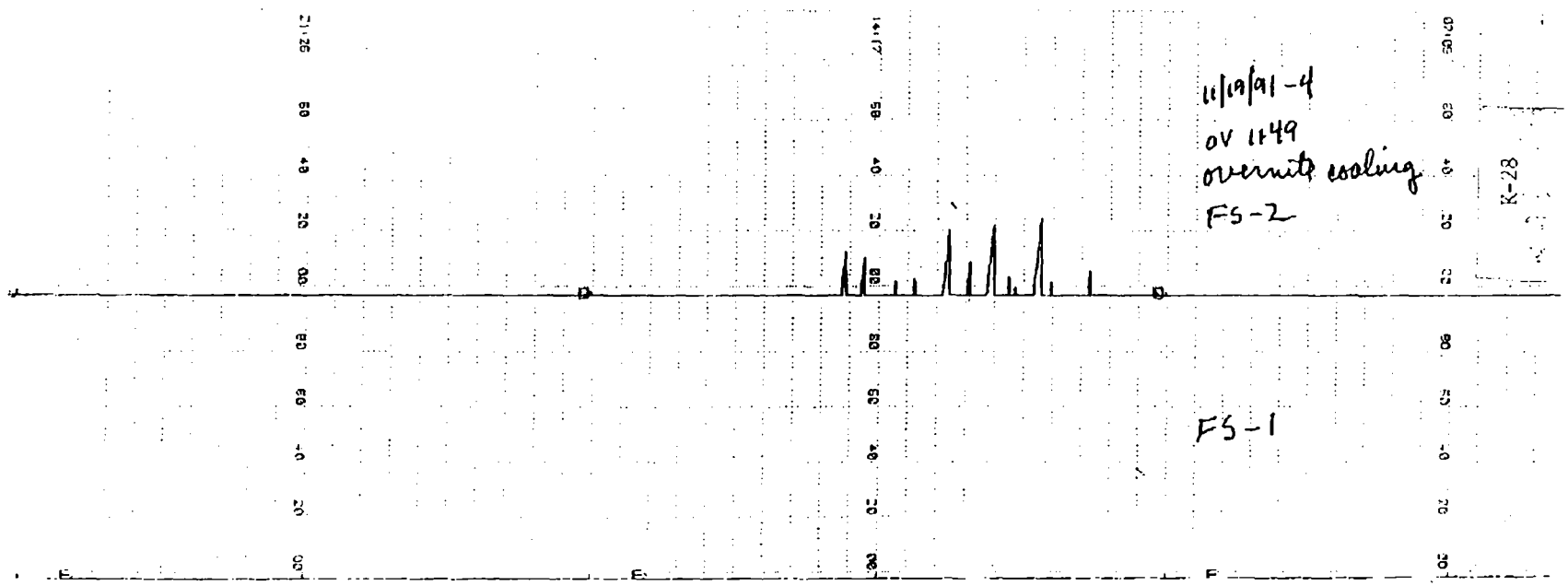
K-26

Rwk 250

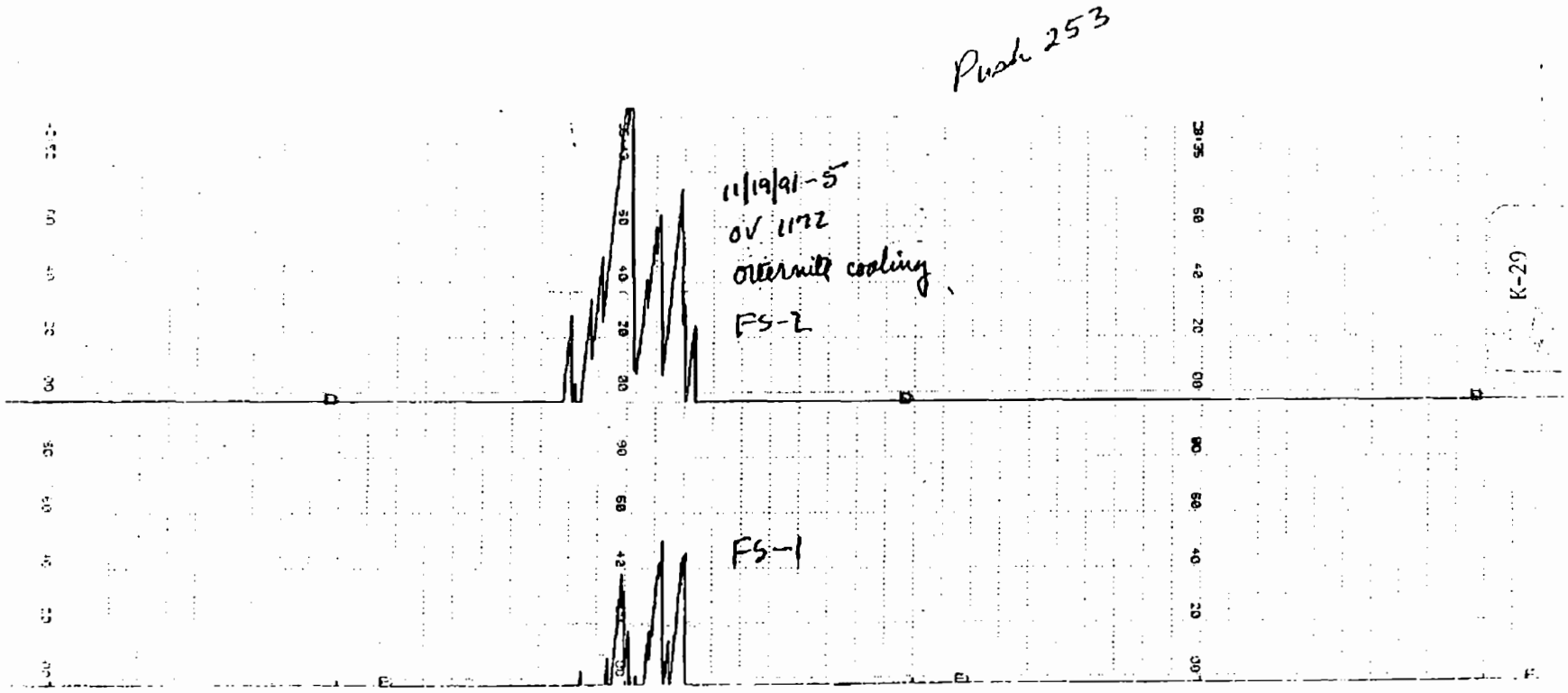


Punch 251

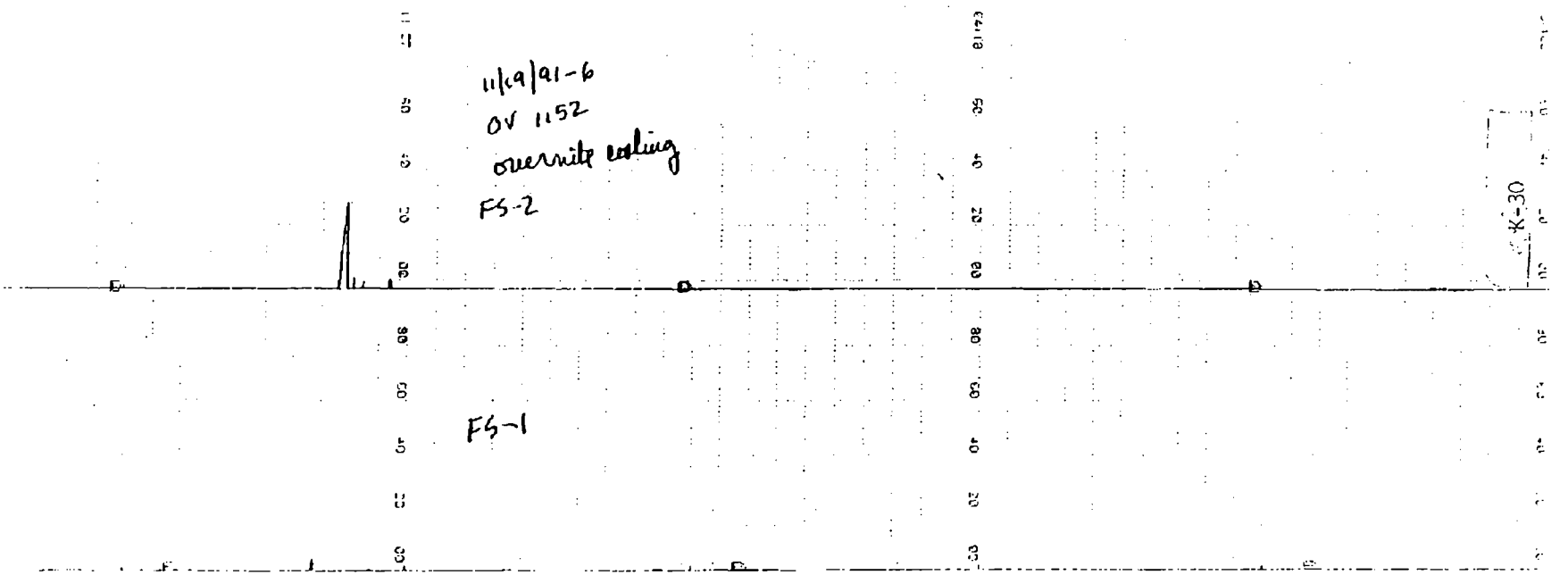
Push 252

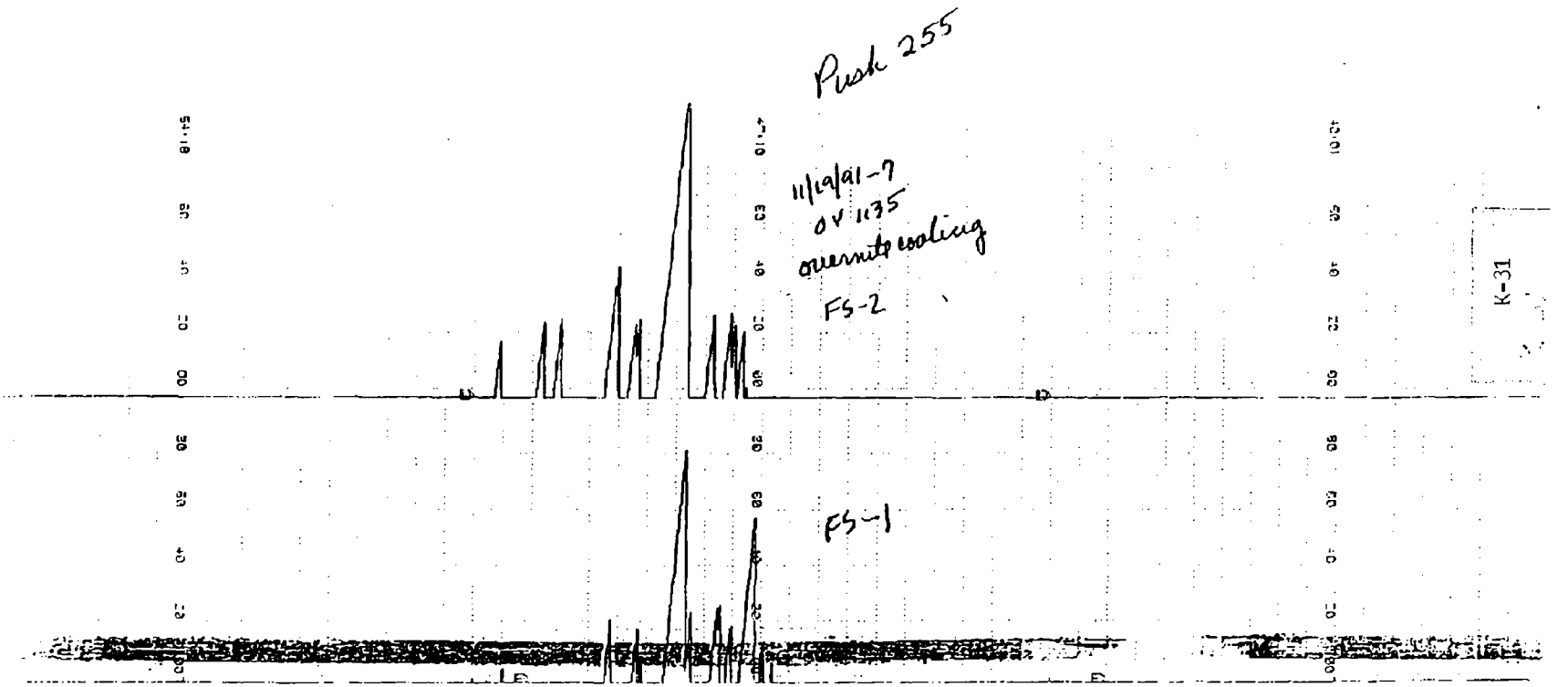


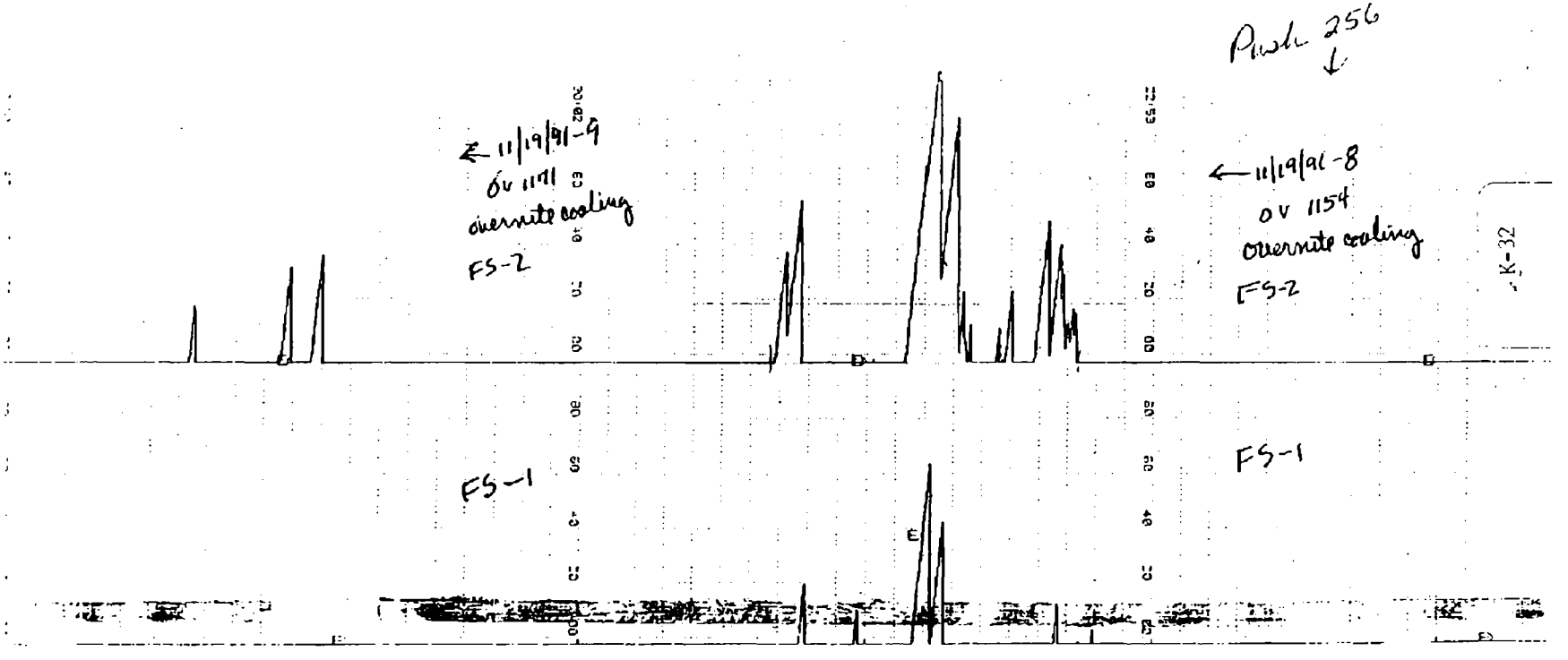
K-28

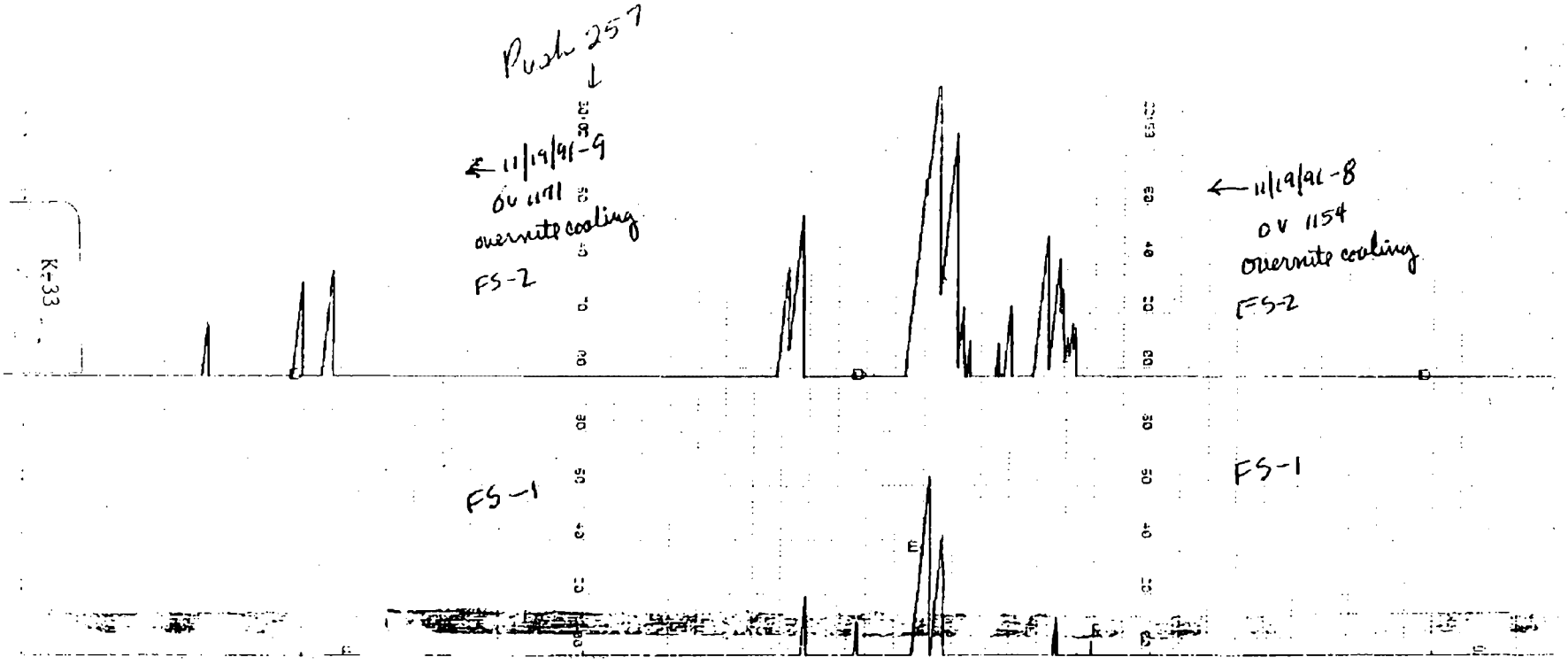

Push 253
11/19/91-5
OV 1172
overnite cooling
FS-2
FS-1

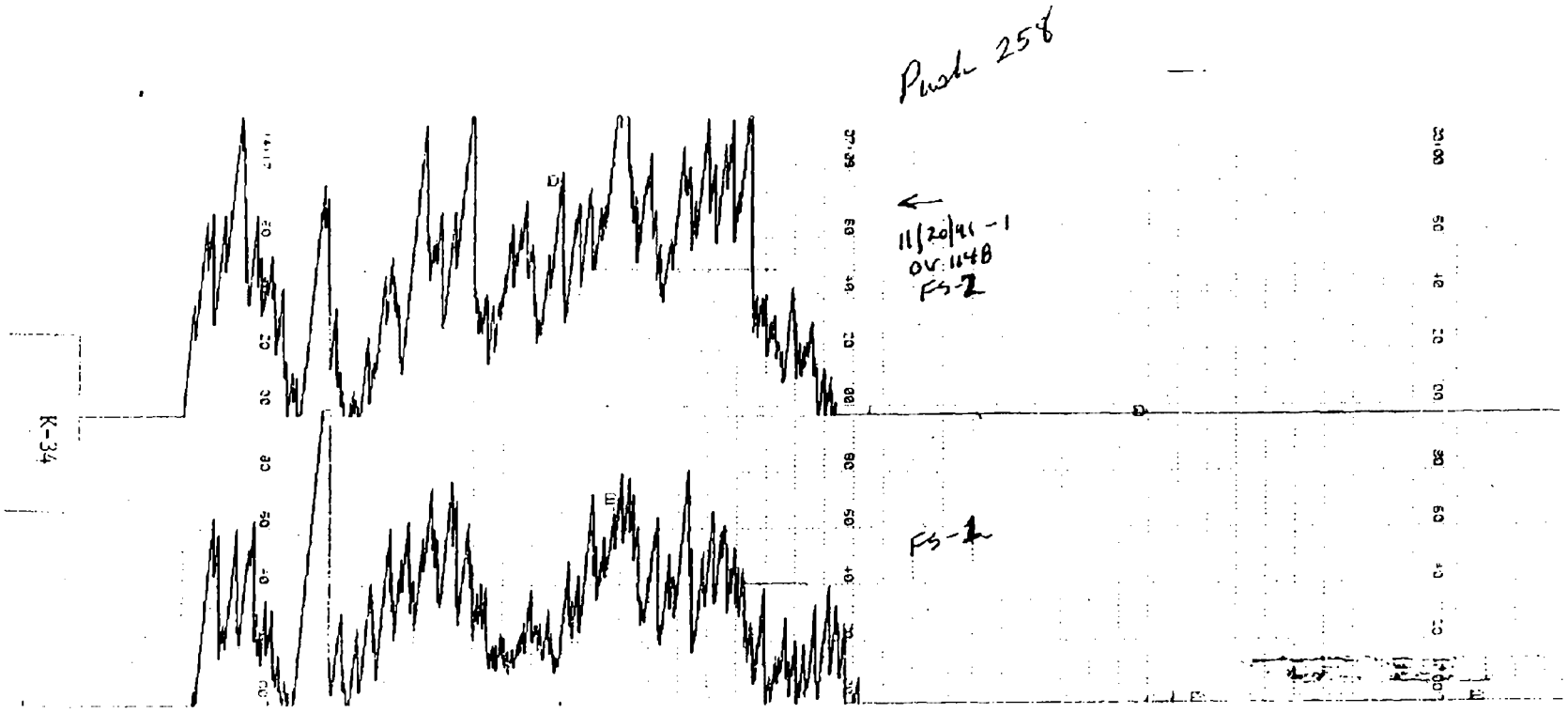
Peak 254

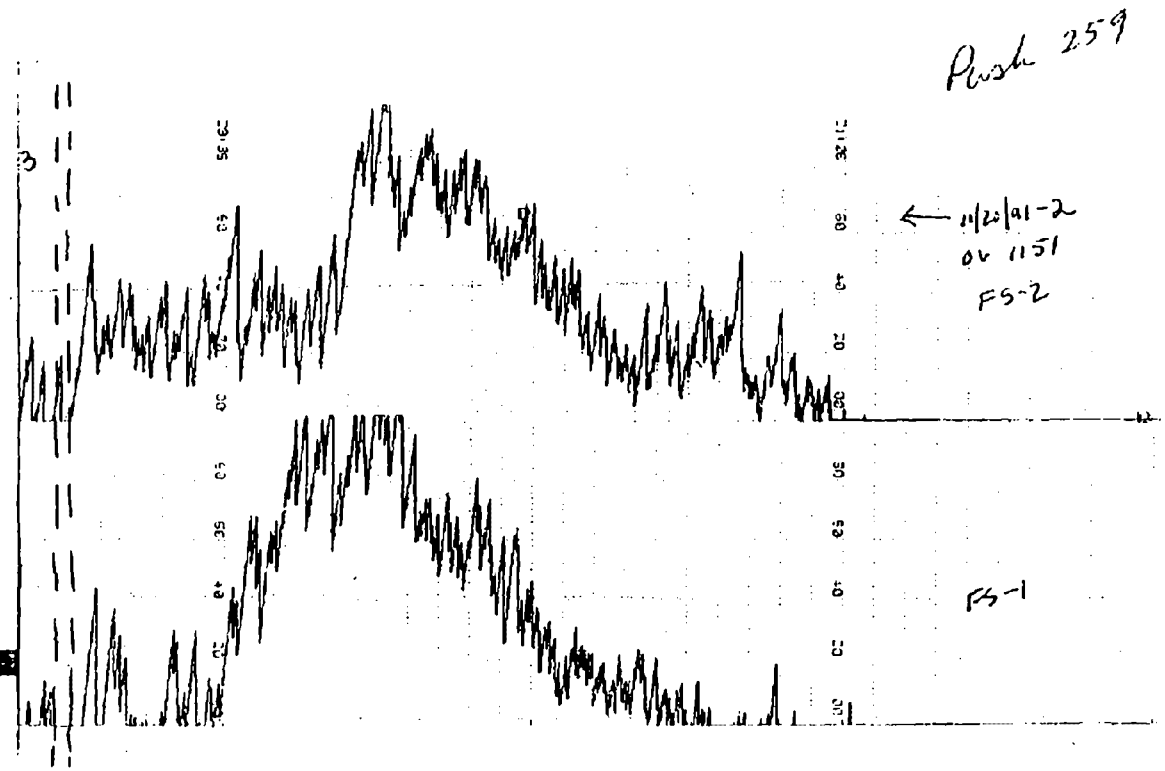


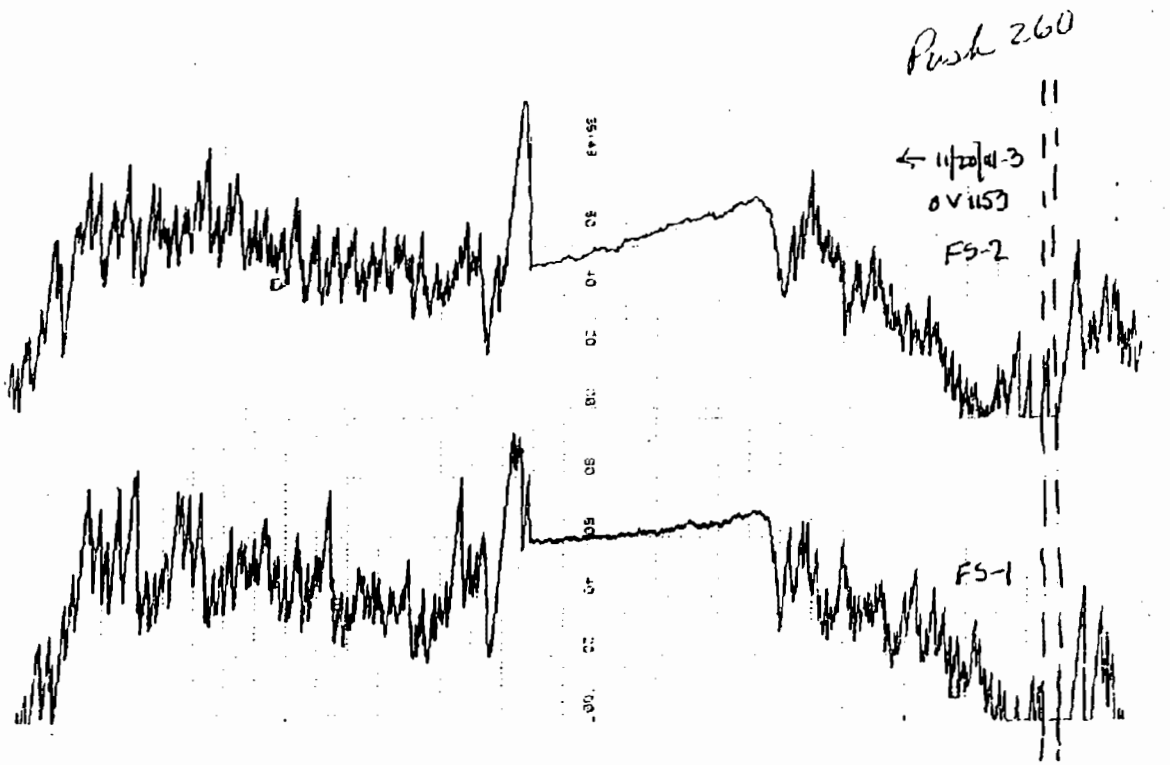

Push 255
11/19/91-7
OV 1135
overnite cooling
FS-2
FS-1


Pwdr 256
11/19/91-9
OV 1171
overnite cooling
FS-2
11/19/91-8
OV 1154
overnite cooling
FS-2
FS-1
FS-1

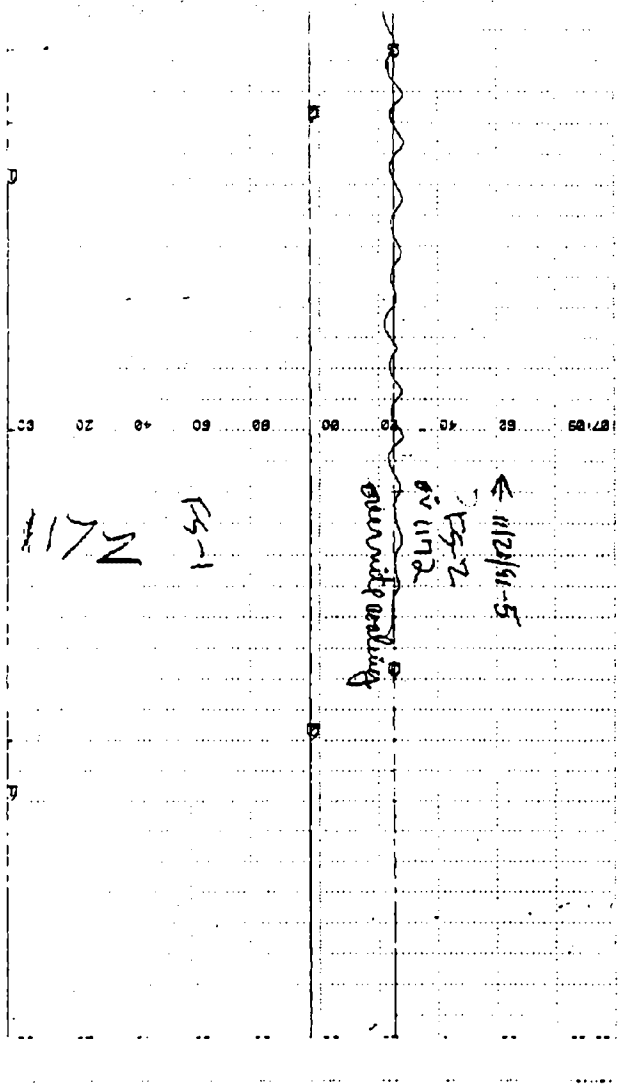

Push 257
11/19/91-9
OV 1171
overnite cooling
FS-2
11/19/91-8
OV 1154
overnite cooling
FS-2
FS-1
FS-1


Push 258
11/20/91 - 1
OV 1148
FS-2
FS-1

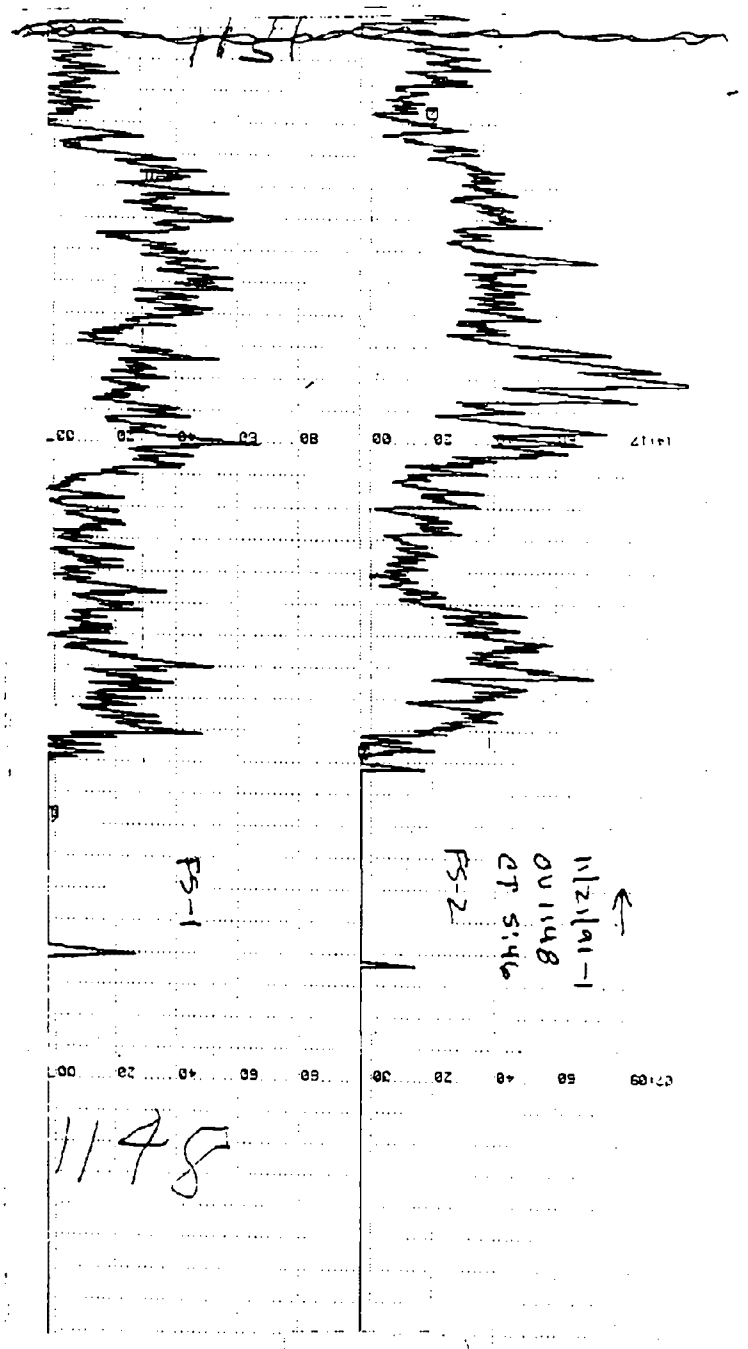

Push 259
← 11/20/91-2
OV 1151
FS-2
FS-1

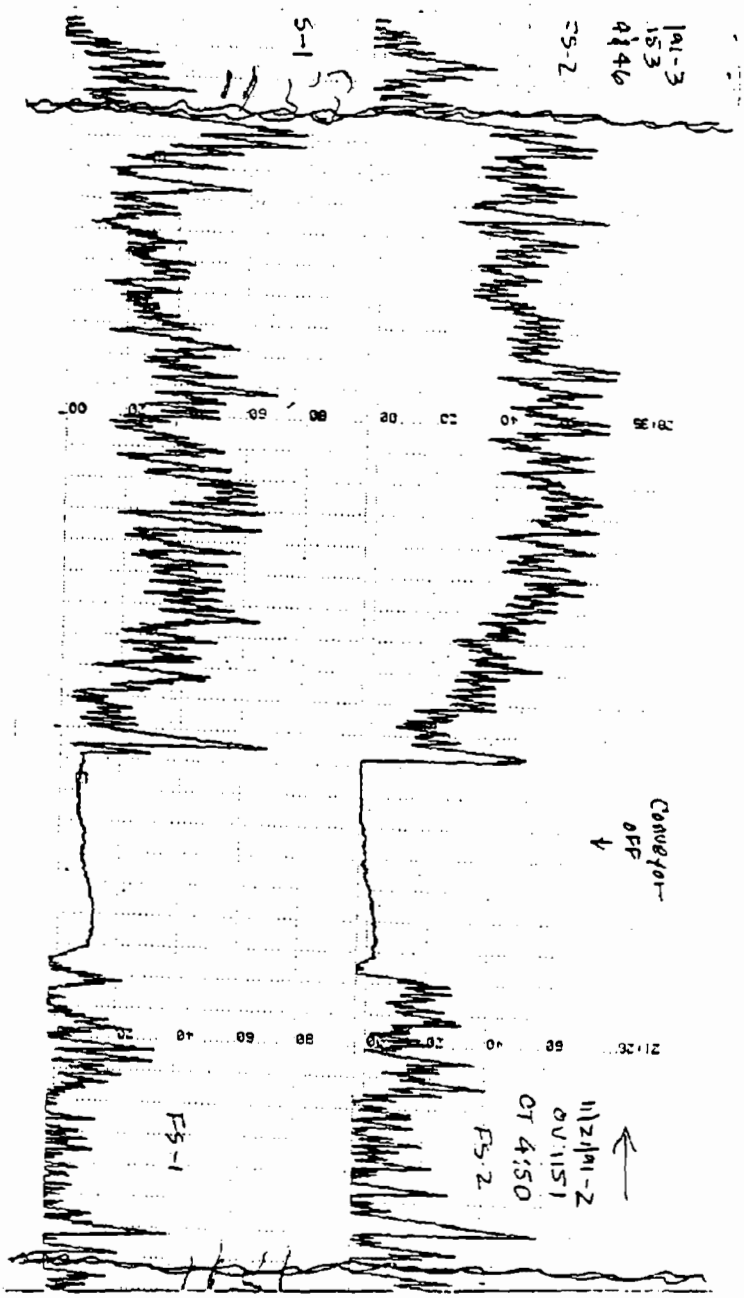

Push 260
← 11/20/91-3
0 V 1153
FS-2
FS-1

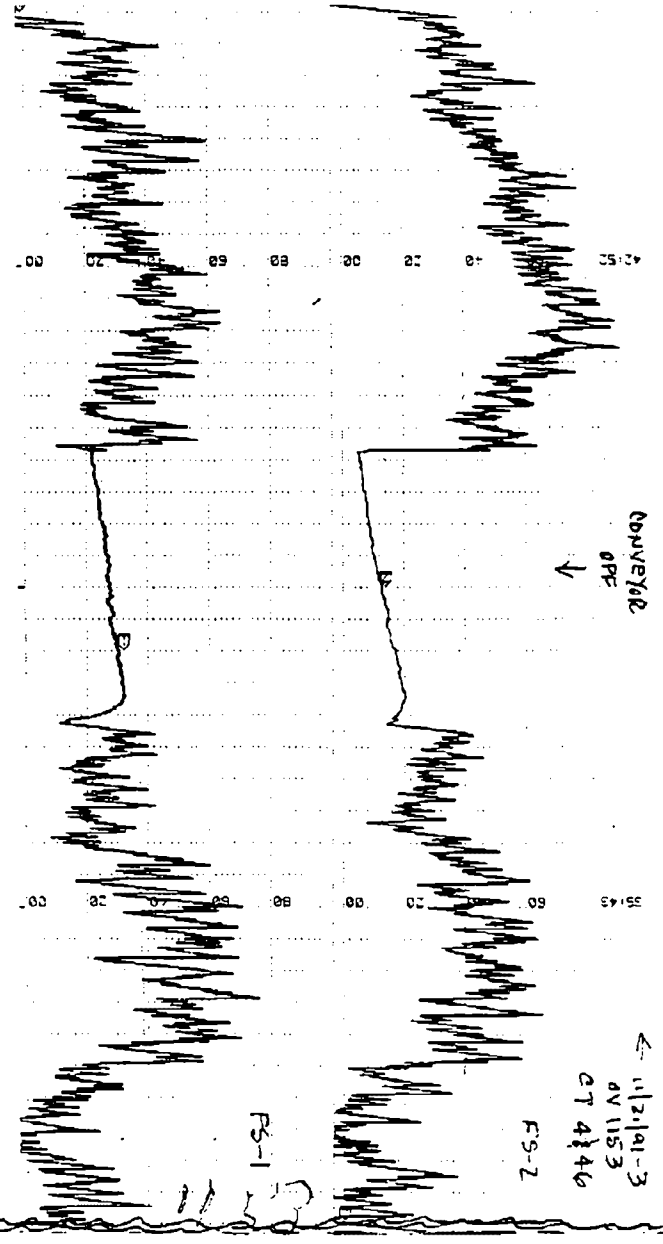
Push 262



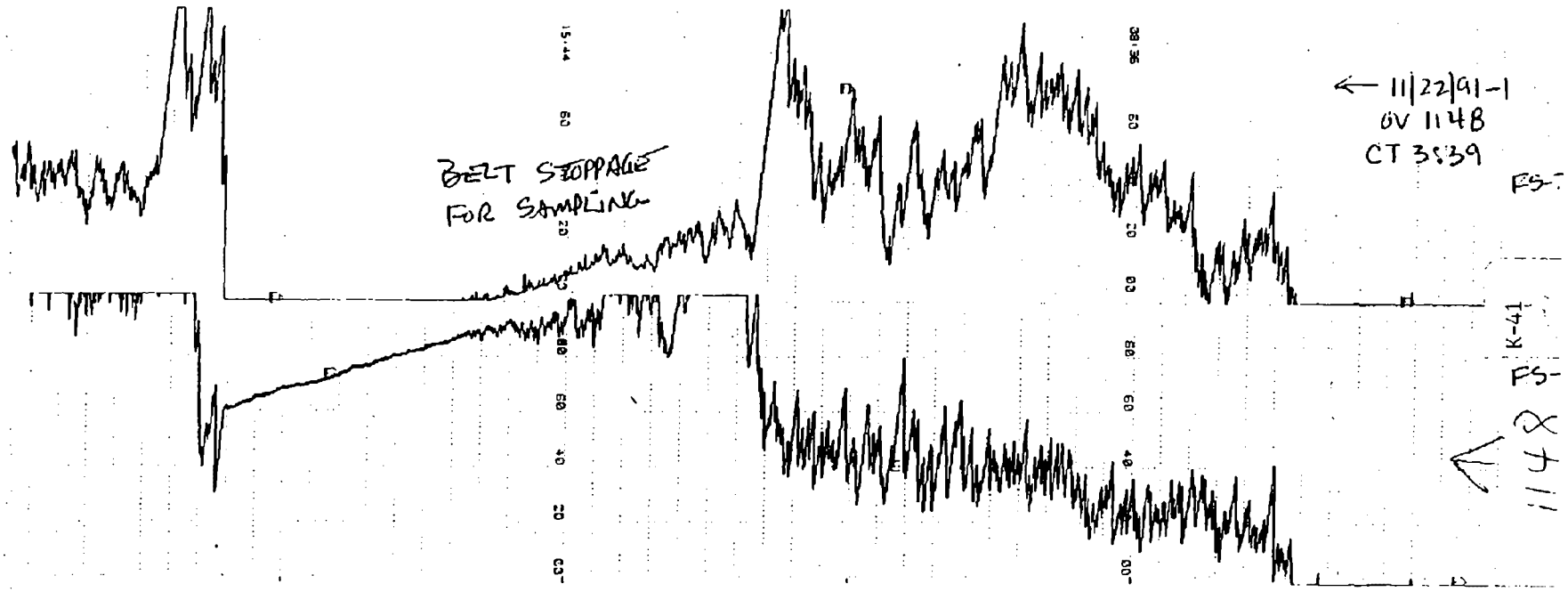
NO TEMP SPIKES SEEN
AT LAST ≃<250°F

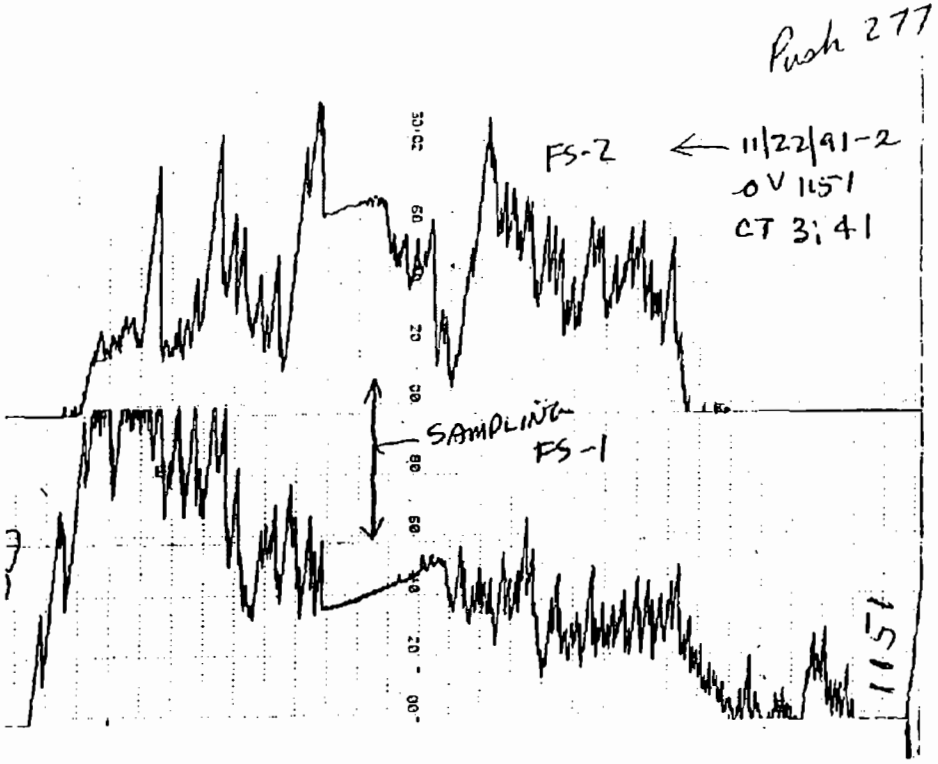

11/21/91-1
OU 1148
CT 5:46
PS-2
PS-1
1148

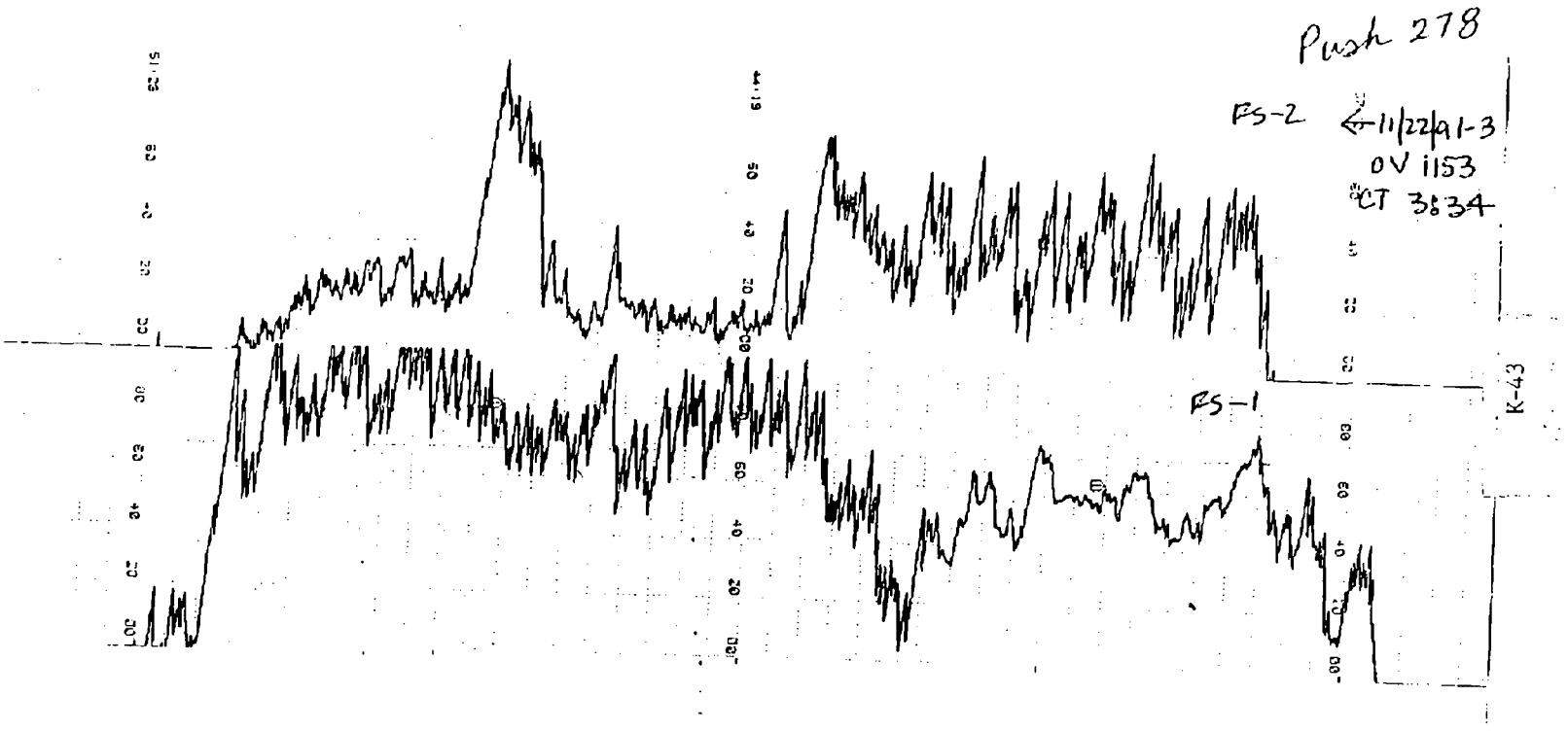

Conveyor OFF
11/2/91-2
OV.1151
OT 4:50
FS-2
FS-1
S-1
S-2

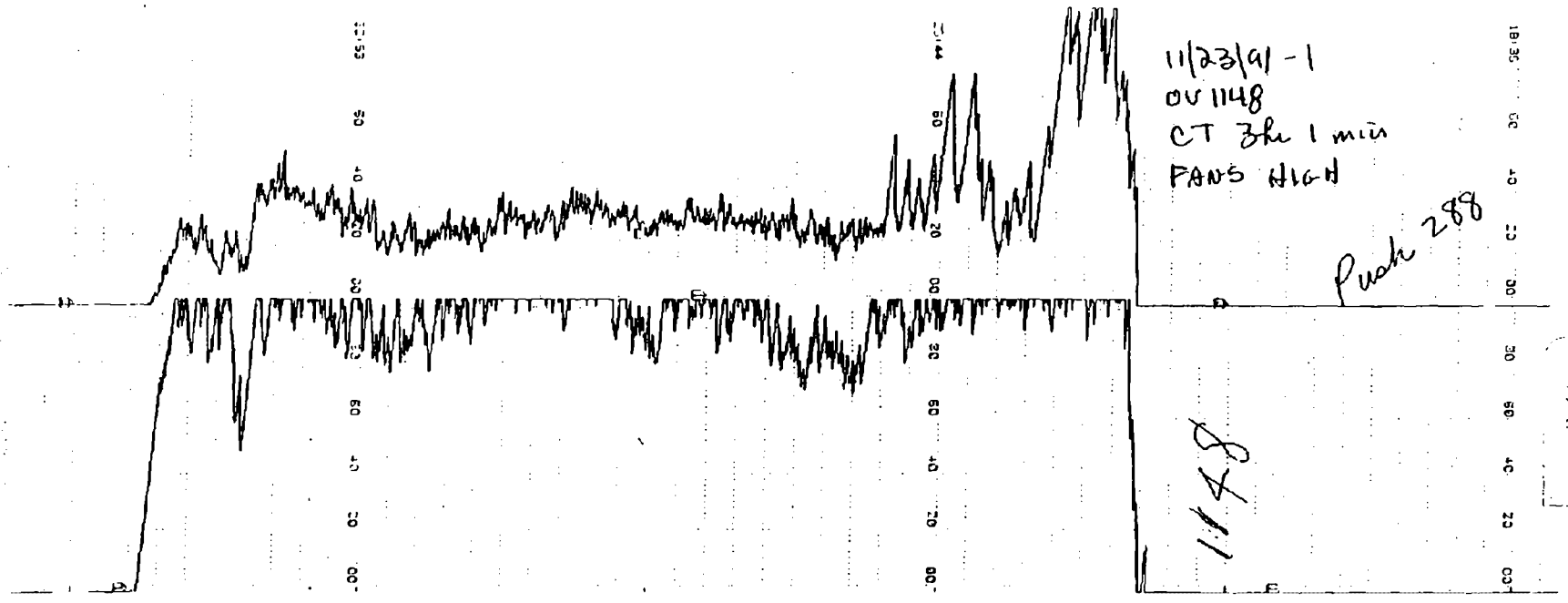

CT 4:46
AV 11:53
11/21/13
FS-1
FS-2
CONVEYOR
OFF
35:45
42:50

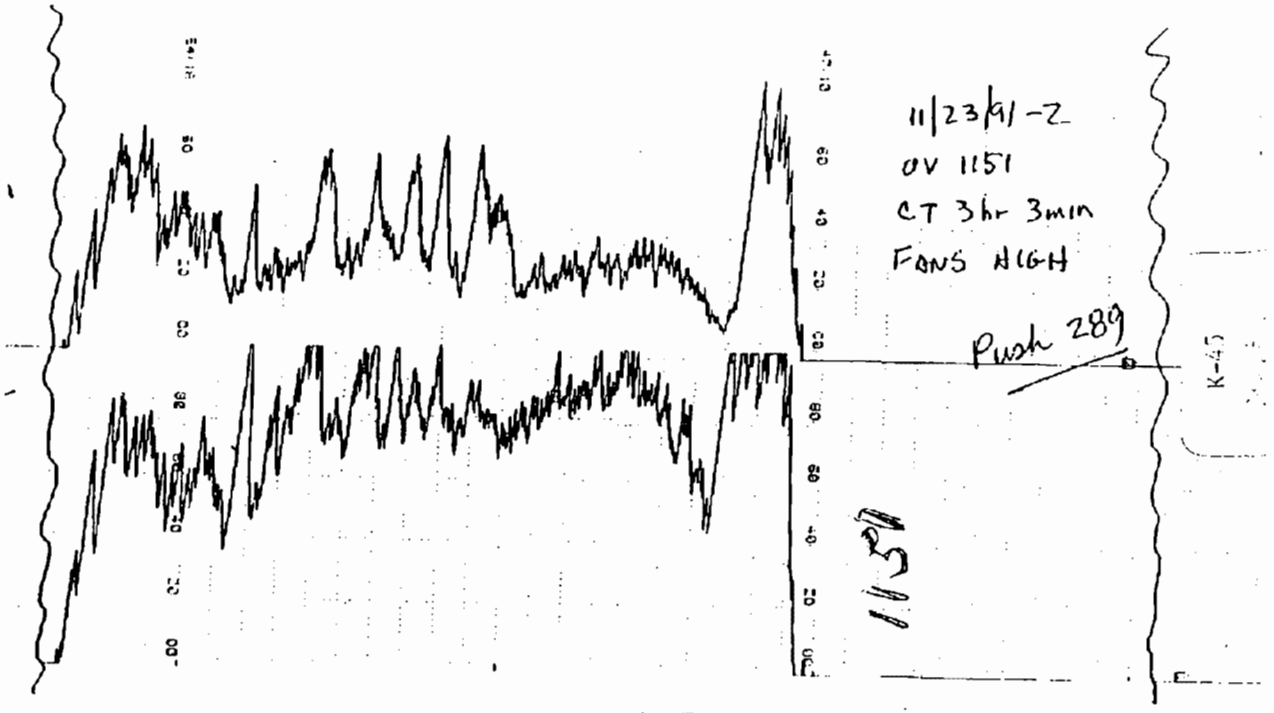
Push 276


← 11|22|91-1
OV 114B
CT 3:39
BELT STOPPAGE
FOR SAMPLING
FS-
K-41
FS-
114 &

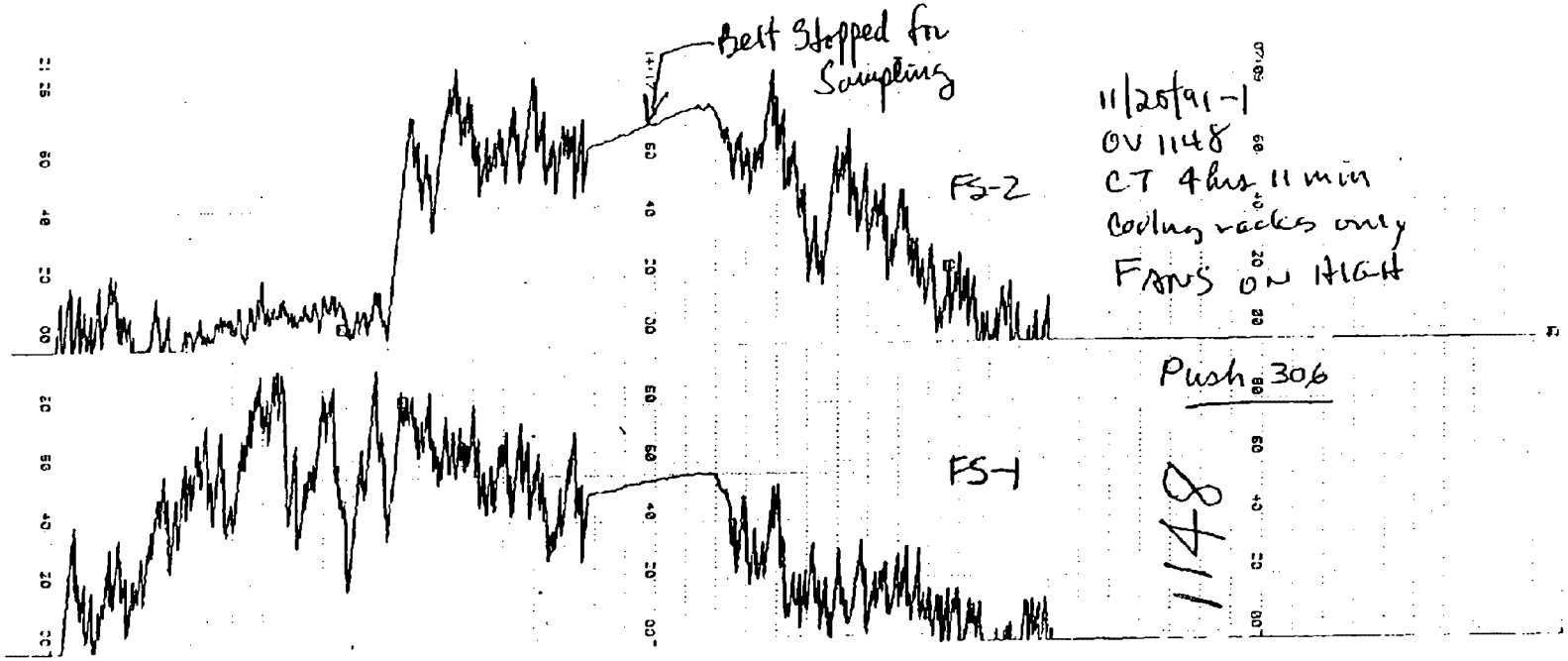

Push 277
FS-2
11/22/91-2
OV 1151
CT 3:41
SAMPLING
FS-1
1151
30.00
60
20
00
80
60
40
20
00


Push 278
FS-2
11/22/91-3
OV 1153
CT 3:34
FS-1
K-43


11/23/91 - 1
OV 1148
CT 3hr 1 min
FANS HIGH
Peak 288
1148


11/23/91-2
OV 1151
CT 3hr 3min
FANS HIGH
Push 289
K-45

11/23/91-3
OV 1153
CT 2hr 59 min
FANS NIGHT
Push 290
7 1 5 3


Belt Stopped for Sampling
FS-2
FS-1
11/20/91-1
OV 1148
CT 4hrs 11 min
Cooling racks only
FANS ON HIGH
Push 306
1148

K-47

Section 3

Three-Dimensional Heat Transfer Model

CALCULATION OF THE THREE-DIMENSIONAL TRANSIENT TEMPERATURE FIELD WITHIN THE COKE PILE COOLED IN THE KIDC BOX

Part of the cokemaking process involves the cooling of a pile of coke in a KIDC box because of environmental considerations. The KIDC box is a thin and almost rectangular prism so as to enhance heat removal. After the coke is pushed in and the box is closed water is sprayed over the top surface of the box and it cascades down the side walls. In the meantime, the air trapped in the box is circulated by means of a fan. The coke pile is assumed to form the shape shown in Figure 1. The walls of the KIDC box are made of 1/4" thick steel plate.

For the purpose of modeling, the change in thickness along the length of the box was neglected and a uniform thickness of 22.42" was assumed. In addition, the temperature field in the coke pile was assumed to be symmetric along the thickness and the length directions, hence one quarter of the coke pile was modeled. Figure 2 shows the geometry of the model. In Figures 1 and 2, X=0 and Z=0 define the two symmetry planes. Heat transfer coefficient boundary conditions were imposed on the remaining four planes. On the wide side, heat is transferred from the coke to the water film through the steel plate. On the top and inclined sides heat is removed by the recirculating air and transferred to the spraying water over the top of the box through the steel plate. This indirect nature of the process results in much less heat removal compared to the wide side. On the bottom surface, heat transfer from the steel plate to the ambient air is through natural convection.

The numerical values used in the model are as follows:

Initial Temperature of the Coke	= 1800 F
Specific Heat of Coke	= 0.38 BTU/lb-F
Density of Coke	= 30 lb/ft3
Thermal Conductivity of Coke	= 0.7 BTU/hr-ft-F
Heat Transfer Coefficients(BTU/hr-ft2-F)	
Wide Side	= 137
Bottom Surface	= 1.4
Top and Inclined Surfaces	= 0.2
Ambient Air Temperature	= 80 F
Cooling Water Temperature	= 80 F
Initial Time Step Size	= 0.001 sec
Maximum Time Step Size	= 60 sec
Period of Cooling Calculated	= 40,145 sec
Total Number of Time Steps	= 883
Finite Element Mesh	= 27 X 13X 9 Nodes (Nonuniform)

RESULTS

Results of the analysis are summarized in Figures 3 through 8. Figure 3 shows the variation of temperature along the line from point A to point B (indicated in Figure 2) as a function of time. Figures 4 through 6 show the isotherms at three different times on some portion of the plane containing points A and B. It can be observed from Figures 3 through 6 that the heat transfer occurs predominantly in the thickness direction as a result of the high convection coefficient on the outer face of the wide side. In Figure 7, the arithmetic average of the nodal temperatures is plotted as a function of the cooling time. The average temperature drops to 400 F after about 6 hours of cooling. Figure 8 shows the timewise variation of the fraction of nodes where the temperature is greater than 400 F. This curve is not smooth because of the fact that as the 400 F front moves inward along the thickness direction it reaches a nodal plane and crosses a large number of nodes at once.

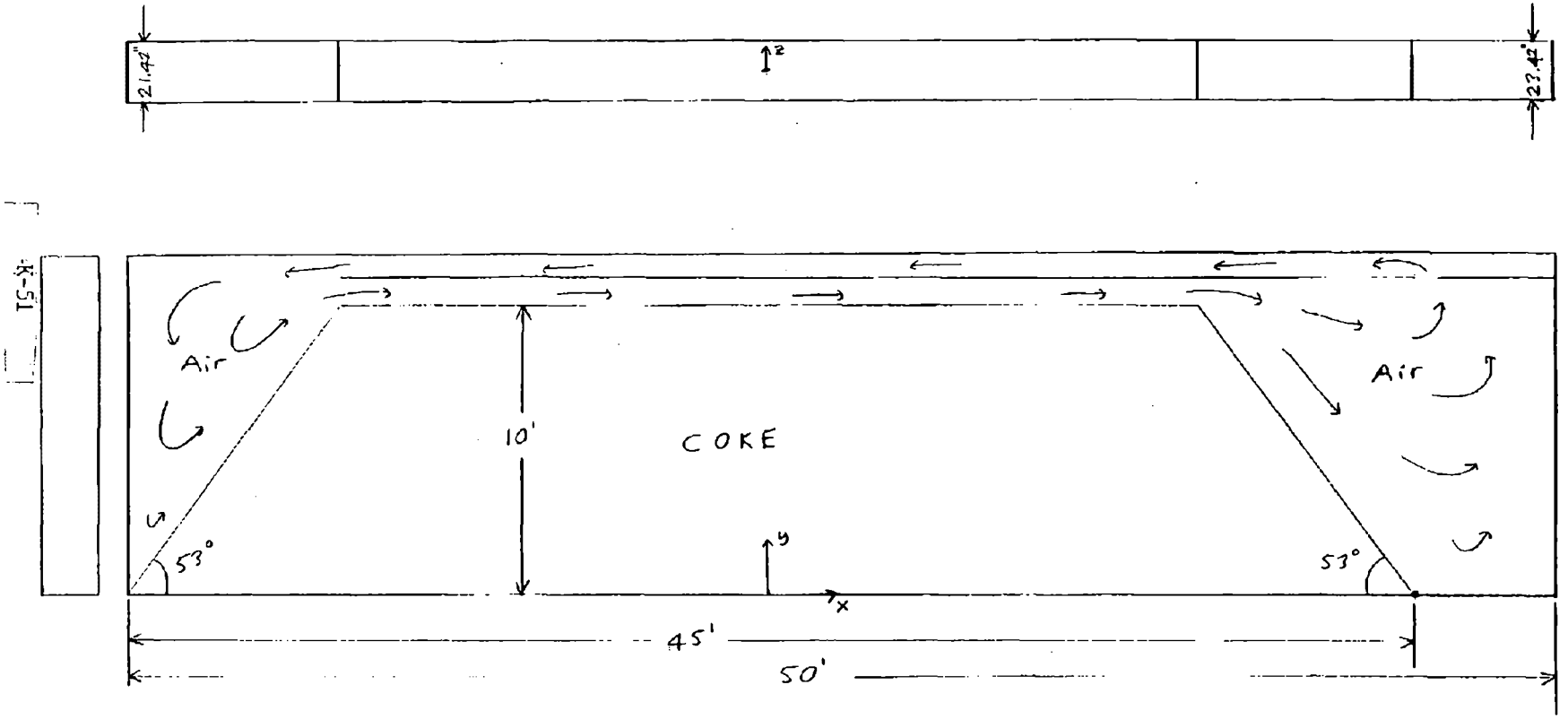


Figure 1.

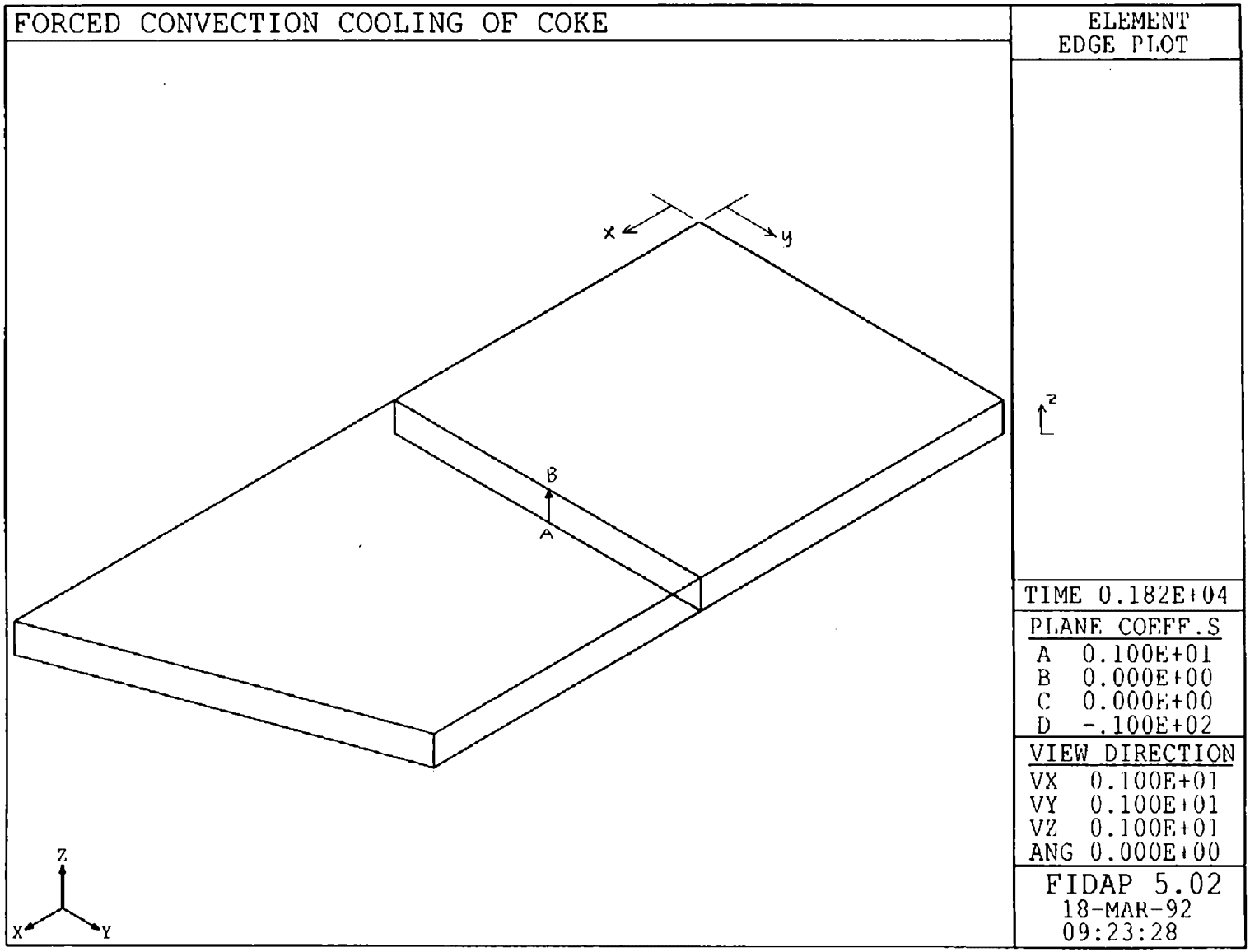

FORCED CONVECTION COOLING OF COKE
ELEMENT
EDGE PLOT
x
y
z
B
A
TIME 0.182E+04
PLANE COEFF.S
A 0.100E+01
B 0.000E+00
C 0.000E+00
D -.100E+02
VIEW DIRECTION
VX 0.100E+01
VY 0.100E+01
VZ 0.100E+01
ANG 0.000E+00
FIDAP 5.02
18-MAR-92
09:23:28
Z
X
Y

Figure 2.

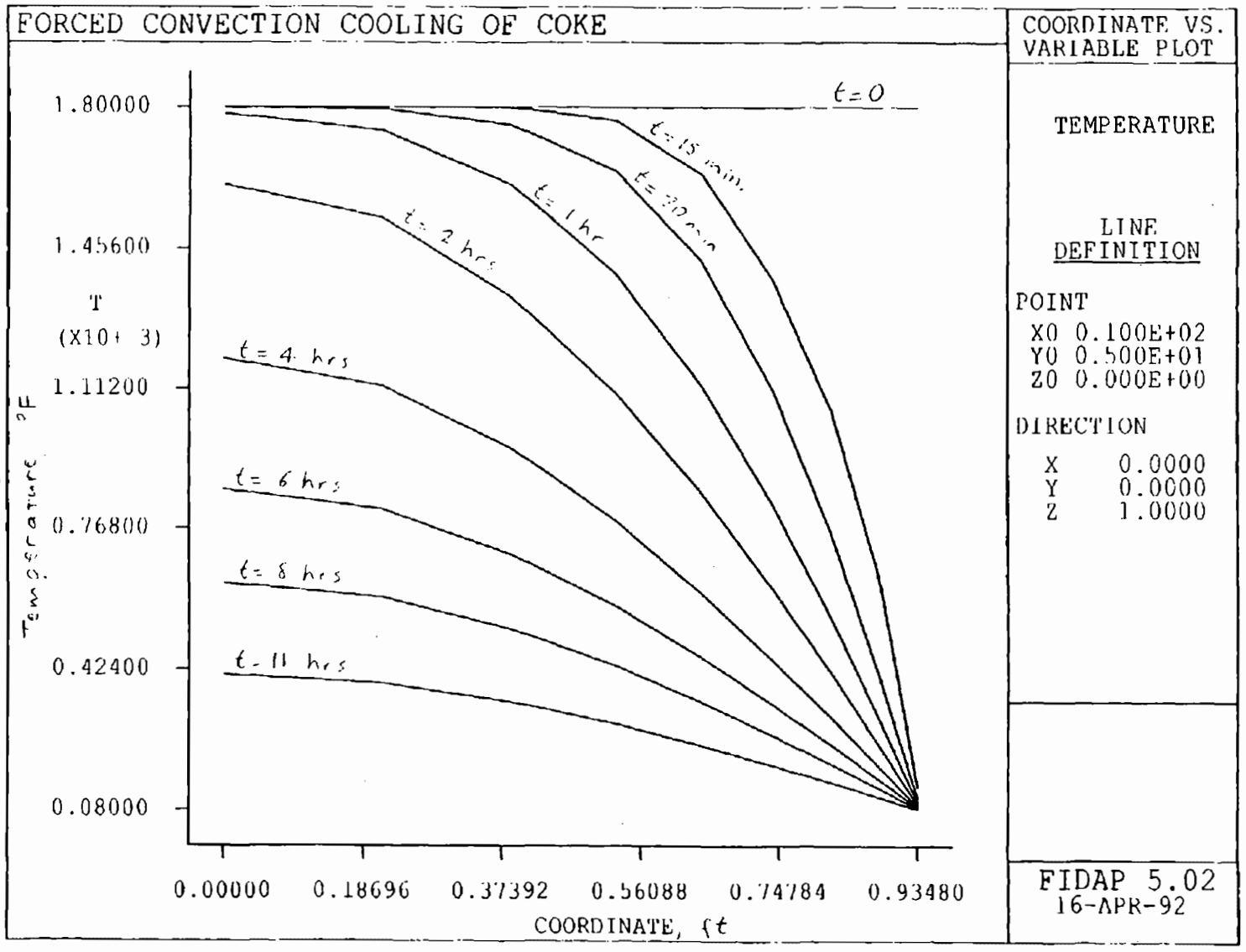

FORCED CONVECTION COOLING OF COKE
COORDINATE VS. VARIABLE PLOT
TEMPERATURE
LINE DEFINITION
POINT
X0 0.100E+02
Y0 0.500E+01
Z0 0.000E+00
DIRECTION
X 0.0000
Y 0.0000
Z 1.0000
FIDAP 5.02
16-APR-92
1.80000
1.45600
1.11200
0.76800
0.42400
0.08000
T
(X10+ 3)
Temperature °F
0.00000
0.18696
0.37392
0.56088
0.74784
0.93480
COORDINATE, ft
t=0
t=15 min.
t=30 min
t=1 hr
t=2 hrs
t=4 hrs
t=6 hrs
t=8 hrs
t=11 hrs

Figure 3

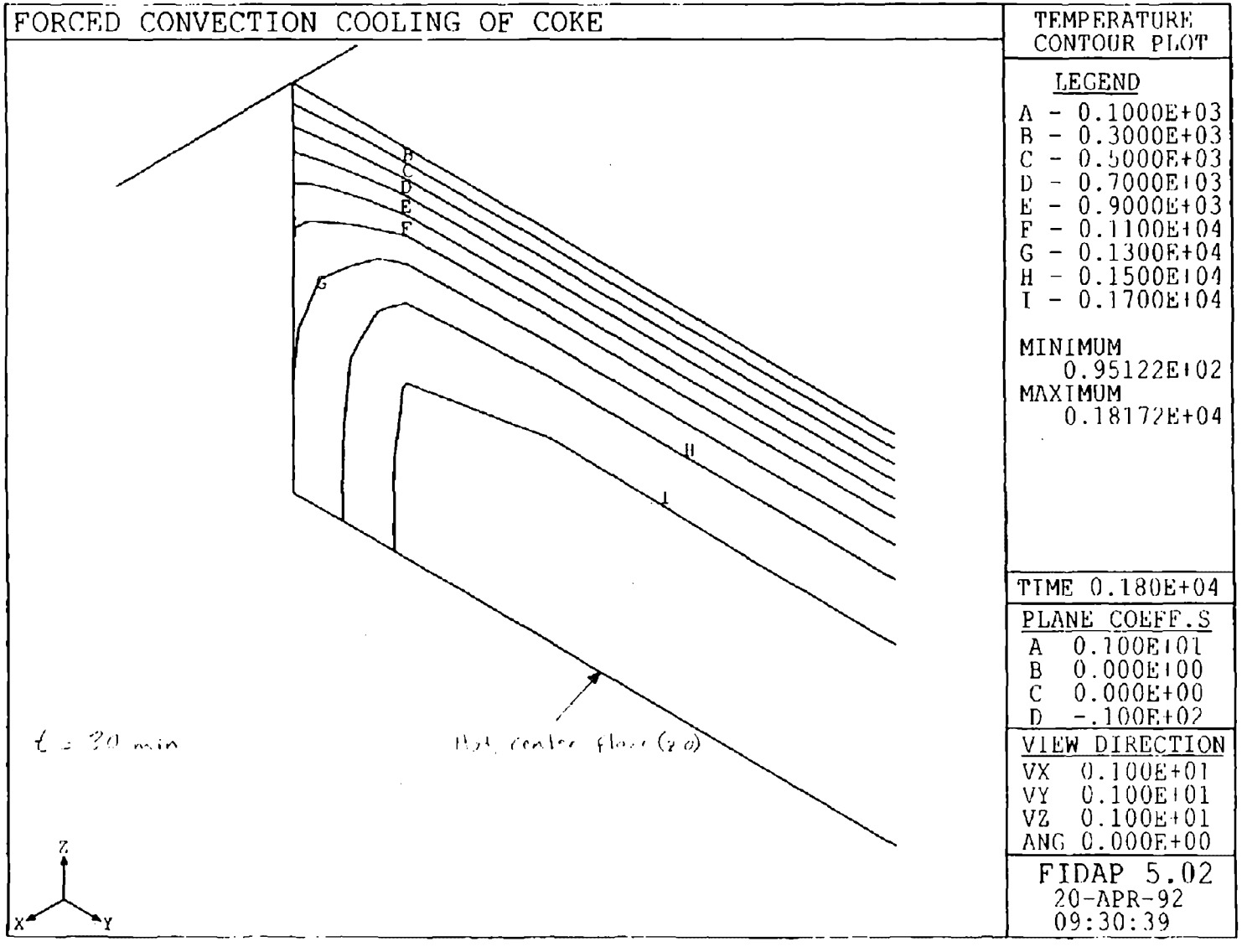

FORCED CONVECTION COOLING OF COKE
TEMPERATURE CONTOUR PLOT
LEGEND
A - 0.1000E+03
B - 0.3000E+03
C - 0.5000E+03
D - 0.7000E+03
E - 0.9000E+03
F - 0.1100E+04
G - 0.1300E+04
H - 0.1500E+04
I - 0.1700E+04
MINIMUM
0.95122E+02
MAXIMUM
0.18172E+04
TIME 0.180E+04
PLANE COEFF.S
A 0.100E+01
B 0.000E+00
C 0.000E+00
D -.100E+02
VIEW DIRECTION
VX 0.100E+01
VY 0.100E+01
VZ 0.100E+01
ANG 0.000E+00
FIDAP 5.02
20-APR-92
09:30:39
B
C
D
E
F
G
H
I
t = 20 min
Hot center floor (z=0)
Z
X
Y

Figure 4.

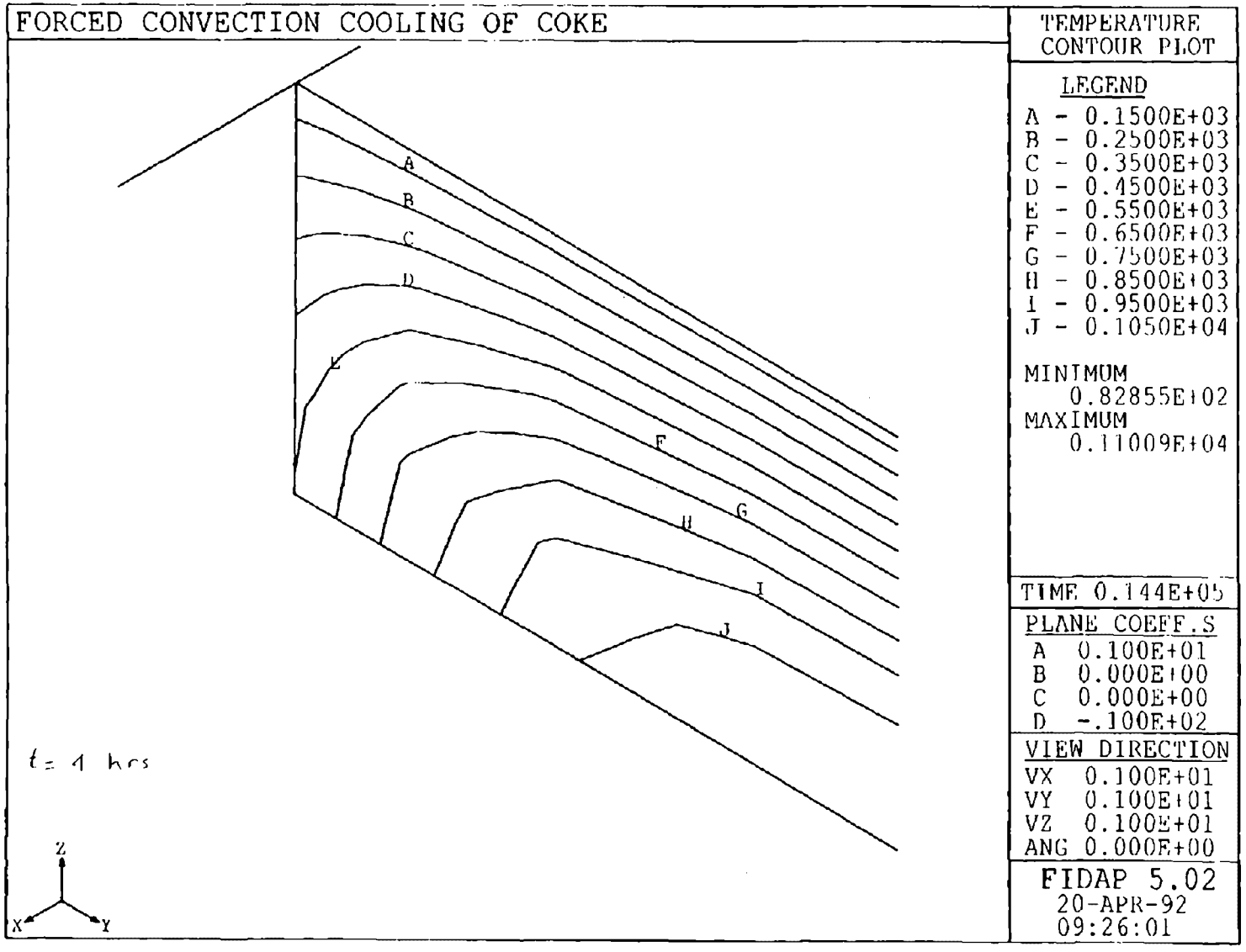

FORCED CONVECTION COOLING OF COKE
TEMPERATURE CONTOUR PLOT
LEGEND
A - 0.1500E+03
B - 0.2500E+03
C - 0.3500E+03
D - 0.4500E+03
E - 0.5500E+03
F - 0.6500E+03
G - 0.7500E+03
H - 0.8500E+03
I - 0.9500E+03
J - 0.1050E+04
MINIMUM
0.82855E+02
MAXIMUM
0.11009E+04
TIME 0.144E+05
PLANE COEFF.S
A 0.100E+01
B 0.000E+00
C 0.000E+00
D -.100E+02
VIEW DIRECTION
VX 0.100E+01
VY 0.100E+01
VZ 0.100E+01
ANG 0.000E+00
FIDAP 5.02
20-APR-92
09:26:01
A
B
C
D
E
F
G
H
I
J
t = 1 hrs
Z
X
Y

Figure 5.

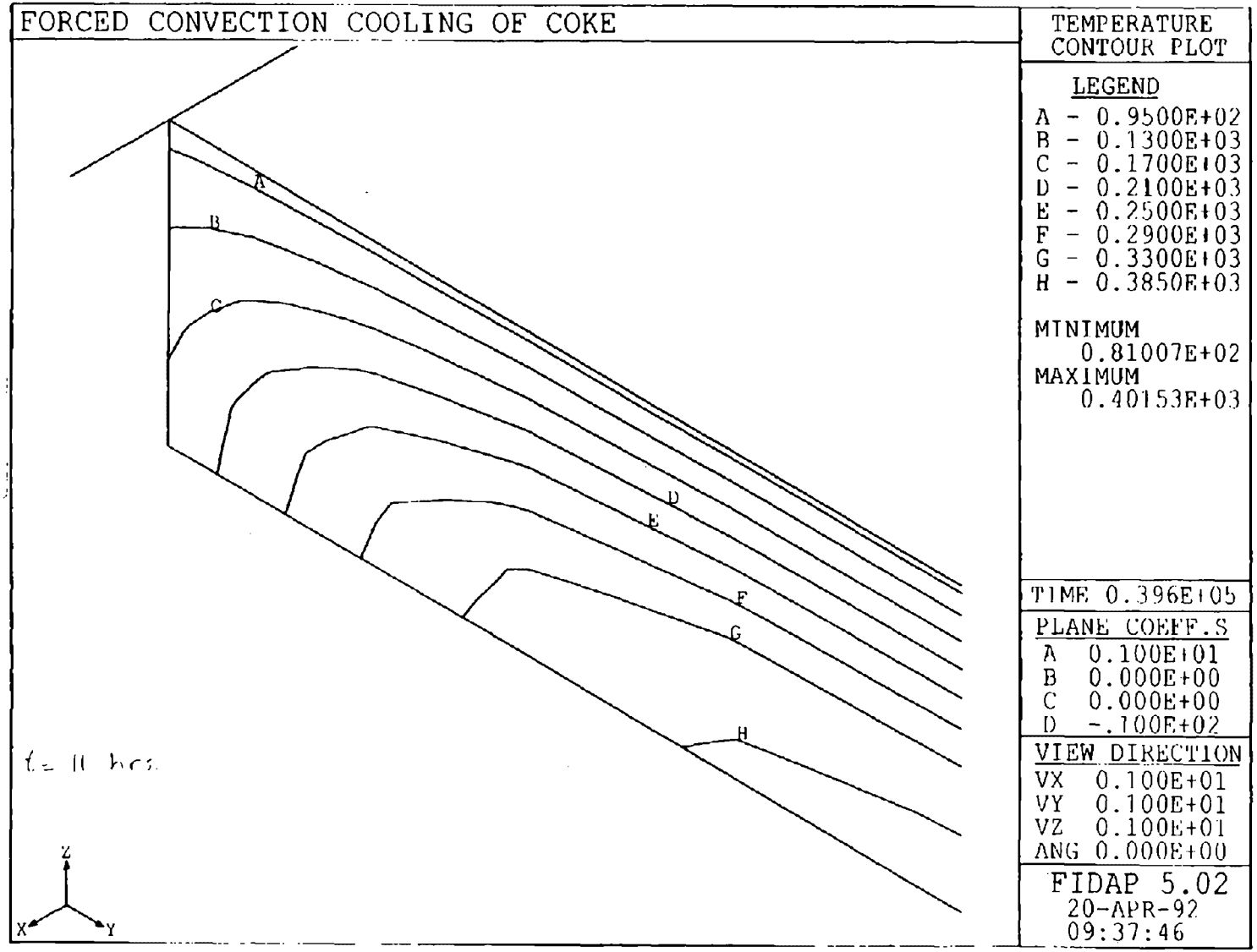

FORCED CONVECTION COOLING OF COKE
TEMPERATURE CONTOUR PLOT
LEGEND
A - 0.9500E+02
B - 0.1300E+03
C - 0.1700E+03
D - 0.2100E+03
E - 0.2500E+03
F - 0.2900E+03
G - 0.3300E+03
H - 0.3850E+03
MINIMUM
0.81007E+02
MAXIMUM
0.40153E+03
TIME 0.396E+05
PLANE COEFF.S
A 0.100E+01
B 0.000E+00
C 0.000E+00
D -.100E+02
VIEW DIRECTION
VX 0.100E+01
VY 0.100E+01
VZ 0.100E+01
ANG 0.000E+00
FIDAP 5.02
20-APR-92
09:37:46
A
B
C
D
E
F
G
H
t = 11 hrs.
Z
X
Y

Figure 6.

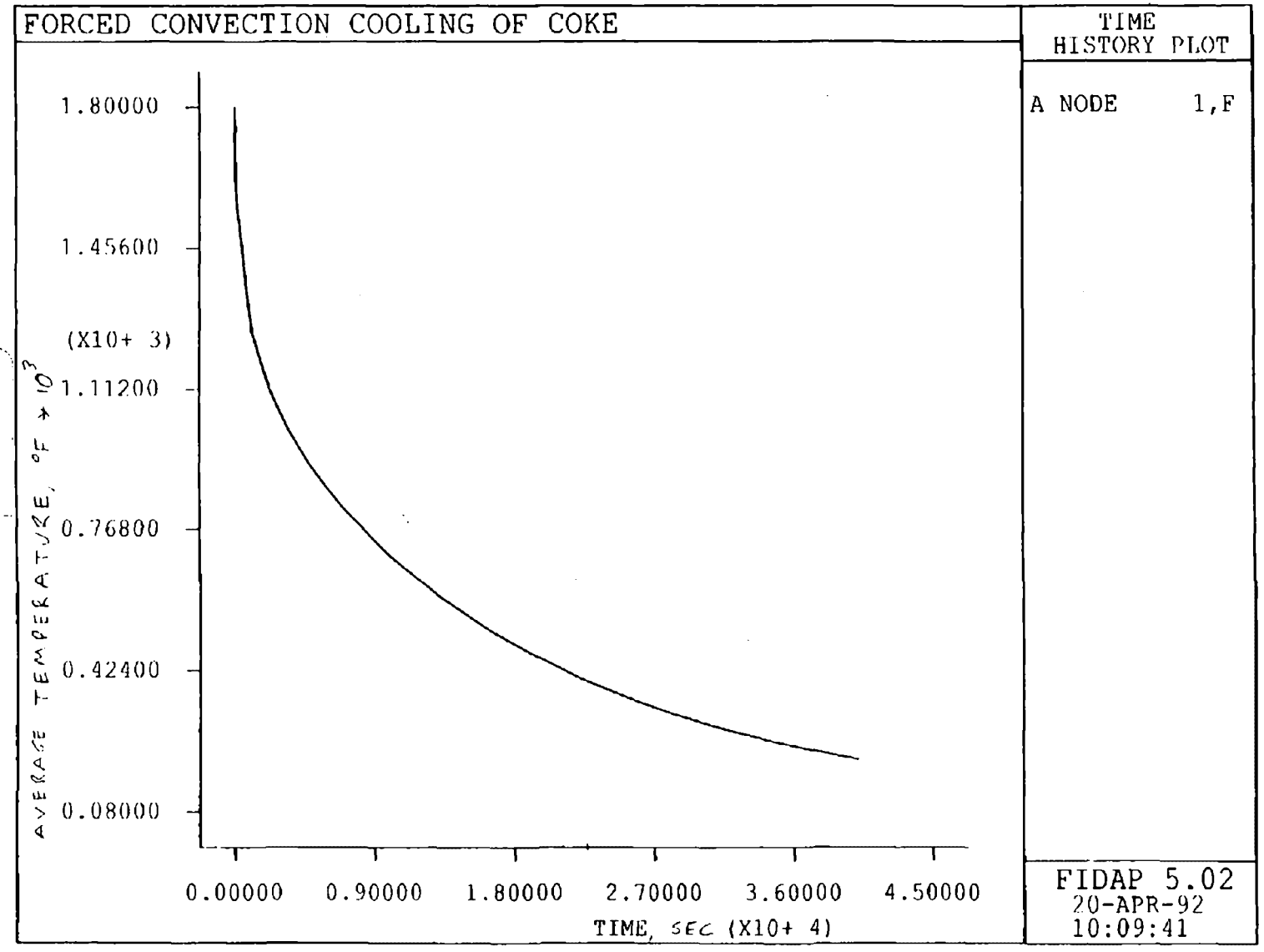

FORCED CONVECTION COOLING OF COKE
TIME HISTORY PLOT
A NODE 1,F
1.80000
1.45600
(X10+ 3)
1.11200
0.76800
0.42400
0.08000
AVERAGE TEMPERATURE, °F * 10^3
0.00000
0.90000
1.80000
2.70000
3.60000
4.50000
TIME, SEC (X10+ 4)
FIDAP 5.02
20-APR-92
10:09:41

Figure 7.

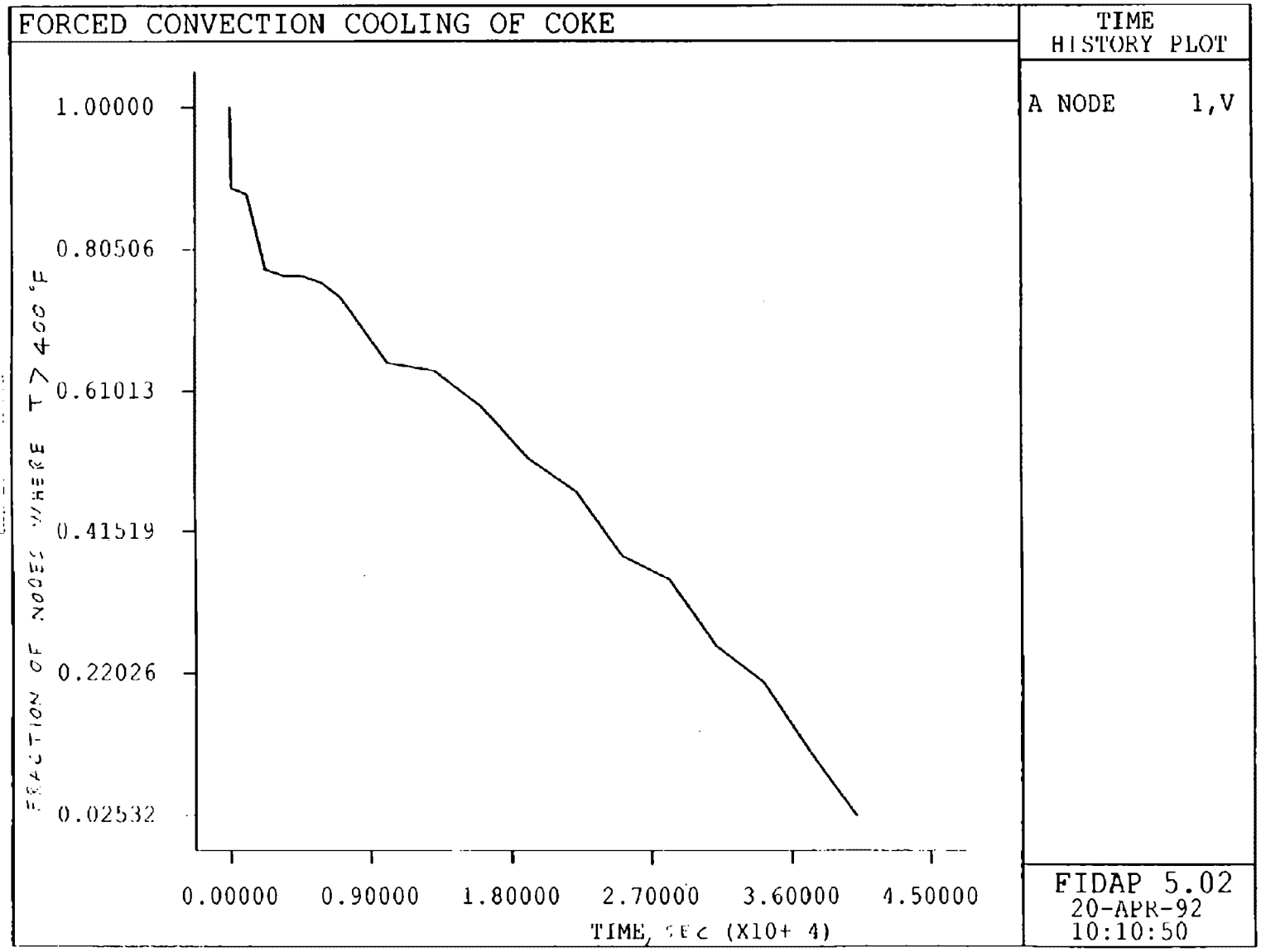

FORCED CONVECTION COOLING OF COKE
TIME HISTORY PLOT
A NODE 1,V
1.00000
0.80506
0.61013
0.41519
0.22026
0.02532
FRACTION OF NODES WHERE T > 400 °F
0.00000
0.90000
1.80000
2.70000
3.60000
4.50000
TIME, SEC (X10+ 4)
FIDAP 5.02
20-APR-92
10:10:50

Figure 8.

Appendix L
QA/QC Program

Table of Contents

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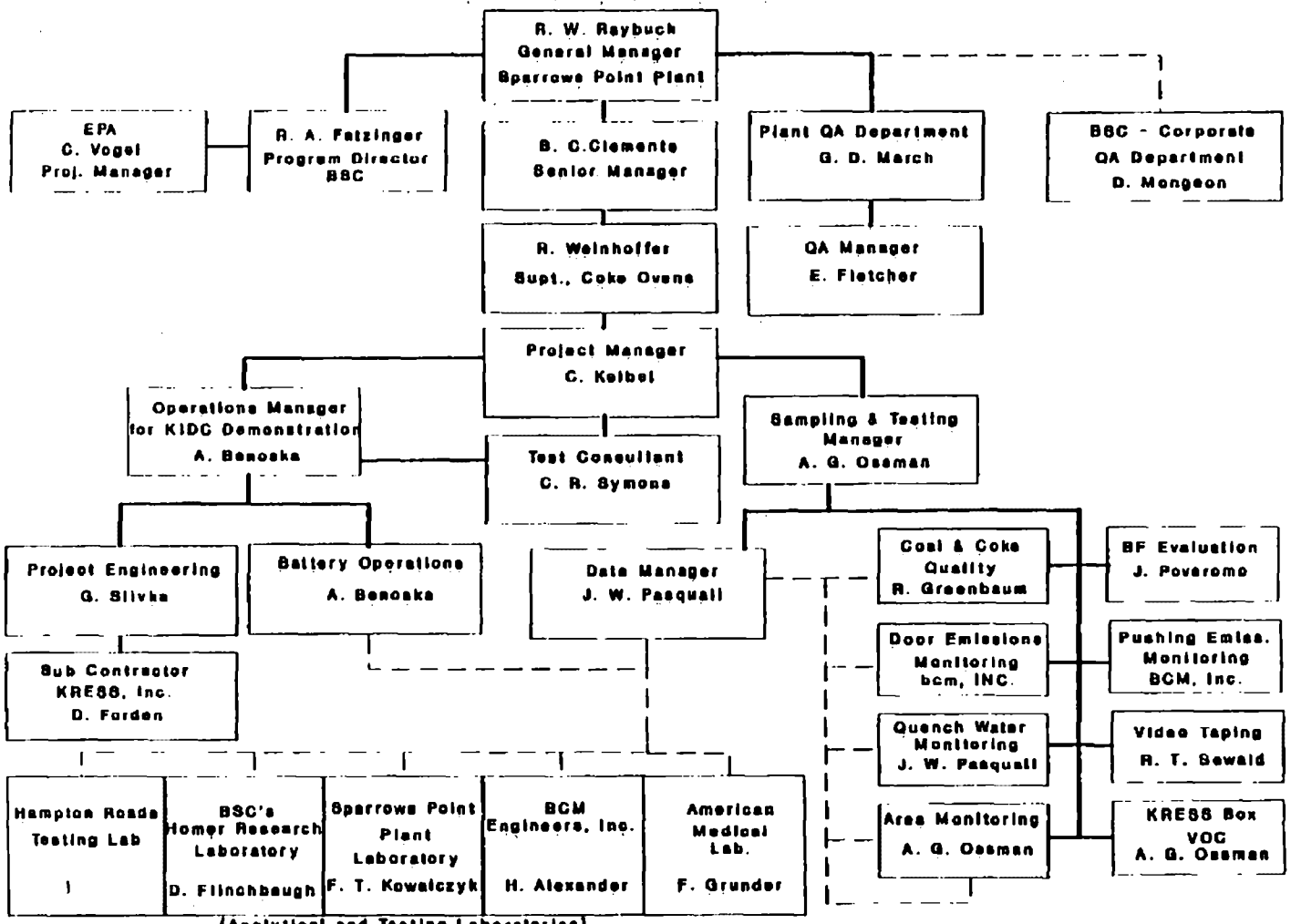
5	American Medical Laboratory Quality Assurance	L-92
6	Keystone Environmental Resources, Inc. Quality Assurance	L-106

Section 1

Demonstration Project Organization Chart

Attachment 4

DEMONSTRATION PROJECT ORGANIZATION CHART
OPERATION/TESTING PHASE



Section 2

Audit Reports

B E T H L E H E M S T E E L
SPARROWS POINT PLANT

Interoffice Correspondence
QUALITY ASSURANCE DEPARTMENT

==========

June 14, 1991
Ref:

From: G. D. Marsh, Superintendent, Quality Assurance

To: R. J. Weinhoffer, Superintendent, Coke Oven

Subject: 1991 INTERNAL QUALITY SYSTEM AUDIT

In compliance with the Corporate Quality Assurance Program, an Internal Quality Assurance Audit was conducted in the Coke Oven on May 2, 1991. The audit team members were:

E. A. Fletcher - Mgr. - QA Systems and SPC, Lead Auditor
R. A. Boehm - SPC Engineer
R. Charles - SPC Engineer

Specific audit results are attached, detailed as follows:

Category I

Audit Corrective Action Report (ACAR) - Audit findings which detail significant non-conformances and/or deficiencies in the Quality system.

Category II

Audit Comments/Suggestions - Audit findings which would improve the Quality System.

Category III

Audit Isolated Significant Observation (Fix-It) - Audit findings which appear to be isolated and generally reflect a deficiency in continued adherence to established procedures.

Significant improvements have been made since the last Internal Audit in both the documentation and implementation of the Quality System. Also, new control chart applications have been identified and implemented while the existing charts have undergone a complete review.

Primary areas of concern were identified as follows:

1. Identification of training requirements for individual positions and the establishment of a documentation method

2. Documentation of product standards

3. Calibration of scales

1991 INTERNAL QUALITY SYSTEM AUDIT

The KVSOP's for "B" coal chemical plant have been revised but are still under review, and the associated process audit cards have not been revised. At this point, a decision should be made to either expedite the finalization of the KVSOP's and audit cards or discontinue the effort and concentrate on the development of the process standards for the new coal chemical process.

It was also noted that several of the KVSOP's for the batteries are primarily related to environmental controls. In most cases, these process standards do not meet the strict criteria for the selection of key variables. Even though the KVSOP system is the most appropriate place to maintain the environmental standards and provides an audit process, a method to discretely distinguish the environmental standards from the process standards should be considered.

Other items of concern varied from area to area and are detailed in the attached report. An action plan to address each of the findings will be developed by the Audit Team in conjunction with Coke Oven Operating and Quality Assurance Personnel. Progress will be tracked by the Lead Auditor which will include, at a minimum, a formal quarterly review of progress.

G. D. Marsh

GD Marsh

Superintendent,
Quality Assurance

cc: R. W. Raybuck
B. R. Clements
C. W. Johnson
S. R. Kinghorn (C. Schramm) ACAR CO-G03-91
A. J. Williamson
I. R. Arnett
F. W. Kowalczyk
File

EAF/dee
'91iqsaco/EAF3

BETHLEHEM STEEL CORPORATION
AUDIT CORRECTIVE ACTION REPORT (ACAR)

FACILITY/DEPT.	ACAR NO.	DATE AUDITED:
Sparrows Point / Coke Ovens	CO-G01-91	05/02/91
AUDITOR:	AREA:	
Fletcher, Boehm, Charles	General	
ESCORT:	DISCUSSED WITH:	
A. Williamson	Various	
DOCUMENT/PROCEDURE NO.	VERIFIED WITH:	
QAM 6.3.1.2.1, 6.3.2.1.1, 6.3.2.1.3	Various	

STATEMENT OF REQUIREMENTS:

Personnel shall be evaluated and qualified on the basis of education, training and/or experience, as required. Records of training and qualification shall be maintained.

Employees performing inspection, testing and laboratory functions shall be trained to the extent necessary to permit them to acquire the necessary skills for the position.

Qualification evaluations shall be reviewed against established criteria and the results documented for an employee to be qualified.

OBSERVATION:

Training is handled differently throughout all areas of the Coke Oven. Even though some documentation is maintained, results are fragmented and incomplete. Due to lack of formal documentation, filling temporary vacancies would be very suspect and vulnerable to error. Training scope and requirements have not been clearly identified.

RECOMMENDATION:

Develop and implement a specific training program and documentation method. The training program should identify position requirements and qualifications.

CORRECTIVE ACTION RESPONSE: (INCLUDE TIMETABLE)

acar-form
F5359000(5-89)

BETHLEHEM STEEL CORPORATION
AUDIT CORRECTIVE ACTION REPORT (ACAR)

FACILITY/DEPT.	ACAR NO.	DATE AUDITED:
Sparrows Point / Coke Ovens	CO-G02-91	05/02/91
AUDITOR:	AREA:	
Fletcher, Boehm, Charles	General	
ESCORT:	DISCUSSED WITH:	
A. Williamson	Various	
DOCUMENT/PROCEDURE NO.	VERIFIED WITH:	
QAM 5.3.2	Various	

STATEMENT OF REQUIREMENTS:

A procedure for selection/verification of suppliers of critical materials and services shall be established and documented which includes one or more of the following: Supplier evaluation and approval system (Supplier Excellence), self-assessment, source evaluation, audits, quality performance measurements, receipt inspection and objective evidence of process control and/or product control.

OBSERVATION:

A selection/verification procedure has not been established for suppliers of critical services. For example, Console, Hampton Roads and Sampling Associates all supply a critical service to the Coke Oven.

RECOMMENDATION:

Establish and implement a selection/verification procedure for the suppliers of critical services.

CORRECTIVE ACTION RESPONSE: (INCLUDE TIMETABLE)

acar-form
F5359000(5-89)

BETHLEHEM STEEL CORPORATION
AUDIT CORRECTIVE ACTION REPORT (ACAR)

FACILITY/DEPT.	ACAR NO.	DATE AUDITED:
Coke Ovens	CO-G03-91	05/02/91
AUDITOR:	AREA:	
Fletcher, Boehm, Charles	Various	
ESCORT:	DISCUSSED WITH:	
Arnett	Various	
DOCUMENT/PROCEDURE NO.	VERIFIED WITH:	
QAM 8.3.1	Various	

STATEMENT OF REQUIREMENTS:

Calibration shall be performed on measuring and testing equipment used to evaluate key process variables and specified product attributes in accordance with MIL-STD-45662A.

OBSERVATION:

A significant amount of progress has been made in the calibration program for measuring and testing equipment used to evaluate key process variables and specified product attributes. However, scales continue to be a weak part of the program. Scales are maintained by both the Local Electronics Unit (within the Coke Oven) and the Plant Electronics Units (Ron Goetzke) dependent upon the age of the scale. Local Electronics' procedures are in compliance with plant calibration requirements and test weight traceability has been established to the plant scale. However, it was discovered that the procedures for initiating calibration of the plant scale is very informal and the calibration is not consistently performed. Awareness of the results of calibrations performed by Plant Electronics and the frequency of calibrations has not been communicated well to the Coke Oven and has not been incorporated into the overall Coke Oven calibration program. Test weight traceability has not been established by Plant Electronics. Also, an outside source is utilized to calibrate the scale at the Coal Moisture Test House.

RECOMMENDATION:

In order for Coke Oven Personnel to effectively manage the scale calibration program, better communication must be established between Plant Electronics and the Coke Oven Electronics Group. Also, the Plant Electronics Group must review calibration procedures and make any necessary changes to be in compliance with plant requirements.

A procedure must be developed and implemented to routinely initiate calibration of the plant scale.

CORRECTIVE ACTION RESPONSE: (INCLUDE TIMETABLE)

acar-form
F5359C00(5-89)

BETHLEHEM STEEL CORPORATION
AUDIT CORRECTIVE ACTION REPORT (ACAR)

FACILITY/DEPT.	ACAR NO.	DATE AUDITED:
Sparrows Point Plant	CO-GC4-91	05/02/91
AUDITOR:	AREA:	
Fletcher, Boehm, Charles	Various	
ESCORT:	DISCUSSED WITH:	
A. Williamson	A. Williamson	
DOCUMENT/PROCEDURE NO.	VERIFIED WITH:	
QAM 7.3.4	A. Williamson	

STATEMENT OF REQUIREMENTS:

Product standards shall be developed and documented to identify the critical product characteristics and acceptance criteria at each major stage of the process.

OBSERVATION:

Appropriate standard practice instructions (product standards) have not been developed for Coal, Coke, and appropriate by-products.

RECOMMENDATION:

Develop the appropriate product standards to identify the critical product characteristics and acceptance criteria.

CORRECTIVE ACTION RESPONSE: (INCLUDE TIMETABLE)

acar-form
F5359000(5-89)

BETHLEHEM STEEL CORPORATION
AUDIT - COMMENTS / SUGGESTIONS

FACILITY:	DATE AUDITED:
Sparrows Point Plant	05/02/91
DEPARTMENT:	AUDITOR:
Coke Ovens - General	Fletcher, Boehm, Charles

CO-G05-91

The unloading and segregation of coal is a very important aspect of the Coal Handling Process and several measures are taken to prevent mixing of coal types in the Coal Field. However, when a mix does occur, it is recommended that the investigation and corrective action for the mix be documented. Therefore, a procedure should be developed detailing the appropriate actions to be taken to investigate mixed coal.

comments
F5359200(5-89)

BETHLEHEM STEEL CORPORATION
AUDIT CORRECTIVE ACTION REPORT (ACAR)

FACILITY/DEPT.	ACAR NO.	DATE AUDITED:
Sparrows Point Plant	CO-BA01-91	05/02/91
AUDITOR:	AREA:	
Fletcher, Boehm, Charles	"A" Battery	
ESCORT:	DISCUSSED WITH:	
T. Baird	Various	
DOCUMENT/PROCEDURE NO.	VERIFIED WITH:	
QAM 7.3.6, 7.3.9	Various	

STATEMENT OF REQUIREMENTS:

Process standards, procedures or practices shall be developed, documented and implemented to establish the specific requirements necessary for process control to ensure consistency in product and service quality.

Standards, procedures and practices shall be periodically monitored to verify compliance with requirements.

OBSERVATION:

Several KVSOP's require review and revision as follows:

1. 03.01.01 Pushing Schedule - 24 Hour Coke is not addressed
2. 03.02.02 Changing - Corrective Action does not address what is to be done if the ovens are not charged in the proper sequence
3. 03.04.02 - Validity of current standard is questionable
4. Corrective Action - Many of the Corrective Actions appear to be very general in nature and their effectiveness may be questionable

RECOMMENDATION:

1. Develop a time table for the various pushing schedules to cover all operating scenarios.

2. Identify appropriate Corrective Action.

3. Statistically review validity of current standard and adjust as required.

4. Review all Corrective Actions to determine if more specific actions can be identified.

CORRECTIVE ACTION RESPONSE: (INCLUDE TIMETABLE)

acar-form
F5359000(5-89)

BETHLEHEM STEEL CORPORATION
AUDIT - ISOLATED SIGNIFICANT OBSERVATION
(FIX IT REPORT)

DATE: May 2, 1991

PLANT:	AUDITOR:
Sparrows Point Plant	Fletcher, Boehm, Charles
DEPARTMENT:	ACCOMPANIED BY:
Coke Ovens 11 & 12 Batteries	A. Benoska

LOCATION & REFERENCE NUMBER:	OBSERVATION:	COMMENTS:	CORRECT ACTION RESPONSE: (USE REVERSE IF NECESSARY)
CO-BA02-91	02.06.02 Gas Tending - Standard is addressed in degrees fahrenheit and and should be expressed in degrees centigrade	Revise KVSOP 02.06.02	
CO-BA03-91	02.05.01 KVSOP contains a large process table	Eliminate Process Table from KVSOP and develop a SPI to be referenced from the KVSOP	

isolated/DG

BETHLEHEM STEEL CORPORATION
AUDIT CORRECTIVE ACTION REPORT (ACAR)

FACILITY/DEPT.	ACAR NO.	DATE AUDITED:
Sparrows Point / Coal Chemical	CO-CC01-91	05/02/91
AUDITOR:	AREA:	
Fletcher, Boehm, Charles	Coal Chemical	
ESCORT:	DISCUSSED WITH:	
D. Saul	D. Saul	
DOCUMENT/PROCEDURE NO.	VERIFIED WITH:	
QAM 4.3.3	D. Saul	

STATEMENT OF REQUIREMENTS:

Documents shall be distributed to and maintained at required work locations.

OBSERVATION:

KVSOP's are not available to Operators at their work locations.
Example: Area of Primary Coolers/Tar Processing: Operating Engineer #2 does not have KVSOP's in their office. Distribution QCP lists only General Foreman, Supervisor, and Leader as only recipients of KVSOP copies.

RECOMMENDATION:

Broaden distribution to include other locations for Operators including above example.

CORRECTIVE ACTION RESPONSE: (INCLUDE TIMETABLE)

acar-form
F5359000(5-89)

BETHLEHEM STEEL CORPORATION
AUDIT CORRECTIVE ACTION REPORT (ACAR)

FACILITY/DEPT.	ACAR NO.	DATE AUDITED:
Sparrows Point / Coal Chemical	CO-CC02-91	05/02/91
AUDITOR:	AREA:	
Fletcher, Boehm, Charles	"B" Coal Chemical Plant	
ESCORT:	DISCUSSED WITH:	
D. Saul	D. Saul	
DOCUMENT/PROCEDURE NO.	VERIFIED WITH:	
QAM 4.3.4	D. Saul	

STATEMENT OF REQUIREMENTS:

4.3.4 Documents shall periodically be reviewed for accuracy and correctness and be revised as appropriate.

OBSERVATION:

Discrepancies exist between KVSOP Process Standards and Audit /Cards for B Coal Chemical Plant. Standards exist in following KVSOP's that are not included on audit cards: (KVSOP's

07.01.02	07.10.01
07.06.01	07.10.05
07.07.01	07.11.01
07.07.03	07.13.01
07.08.01	07.13.02

RECOMMENDATION:

Complete revisions to B Coal Chemical Plant KVSOP's and ensure all Process Standards are similarly included on Audit Cards. See suggestion CO-CC06-91

CORRECTIVE ACTION RESPONSE: (INCLUDE TIMETABLE)

acar-form
F5359000(5-89)

BETHLEHEM STEEL CORPORATION
AUDIT - ISOLATED SIGNIFICANT OBSERVATION
(FIX IT REPORT)

DATE: May 2, 1991

PLANT:	AUDITOR:
Sparrows Point Plant	R. Charles
DEPARTMENT:	ACCOMPANIED BY:
Coke Ovens/ Coal Chemical	D. Saul

LOCATION & REFERENCE NUMBER:	OBSERVATION:	COMMENTS:	CORRECT ACTION RESPONSE: (USE REVERSE IF NECESSARY)
CO-CC03-91	KVSOP 06.02.01 indicates use of an Individuals, Moving Range Chart	Chart is actually an X-Bar, R chart.	
CO-CC04-91	KVSOP 06.01.02 states, "Tar temp. in full dehydrator must be maintained between 80 and 90 degrees ...". Operator was reporting 90 degrees on his report though temperature gauge, after being wiped clean of grime, read 100°.	This incident underscores implementation of Process Standards that are valid and Operators are familiar with. See suggestions CO-CC06-91	
CO-CC05-91	Q.A. Calibration - Test Basin and Still PH: Located in B Plant; acct.# N009 in MICS. Identity of instrument used to perform calibration is not made on work order completed by technician.	Create a heading for instrument serial # or I.D. # on work order to be filled in by technician	

isolated/DG

BETHLEHEM STEEL CORPORATION
AUDIT - COMMENTS / SUGGESTIONS

FACILITY:	DATE AUDITED:
Sparrows Point Plant	05/02/91
DEPARTMENT:	AUDITOR:
Coke Ovens / Coal Chemical	R. Charles

CO-CC06-91

The key issue for the Coal Chemical Plant relative to the Quality System at the present, is the effective development and implementation of Process Standards in conjunction with the new plant scheduled to start up in September.

Recommendation:

While undergoing training on the new Foxboro process control system, Operators are monitoring hypothetical system pressures, temperatures, flow rates, etc. that are the same as those that will be identified in Process Standards. Ideally, alongside this training, Operator input can be used to develop Process Standards for the new operations. Expected benefits would be:

* Development and review of Process Standards with Operators throughout learning curve.

* Implementation of valid Process Standards as a result of Operator's familiarity, "buy-in", of well reviewed Process Standards and KVSOP's.

* Quality System will be in place for start-up of the facility.

comments
F5359200(5-89)

BETHLEHEM STEEL CORPORATION
AUDIT - COMMENTS / SUGGESTIONS

FACILITY:	DATE AUDITED:
Sparrows Point Plant	05/02/91
DEPARTMENT:	AUDITOR:
Coke Ovens / Coal Chemical	R. Charles

Recommendation:

CO-CC07-91

Training and documentation of training of employees in spill prevention, time spent in various positions, and or new Foxboro system is thorough and well maintained. Documentation of Operator's time spent in various positions will become cumbersome after some time and would lead itself well to routine input into a computerized system (HRIS, LOTUS, etc.)

Recommendation:

CO-CC08-91

Control Dept. has made much progress in development of a calibration system thru use of MICS System. Identification of quality and environmental related calibration requirements is a good idea. The only gap in the program is that instruments used to make calibration are not identified on MICS work orders that Technician completes and this limits traceability.

comments
F5359200(5-89)

BETHLEHEM STEEL CORPORATION
AUDIT - ISOLATED SIGNIFICANT OBSERVATION
(FIX IT REPORT)

DATE: May 2, 1991

PLANT:	AUDITOR:
Sparrows Point Plant	Fletcher, Boehm, Charles
DEPARTMENT:	ACCOMPANIED BY:
Coke Oven Lab.	M. Gould, M. Saddler

LOCATION & REFERENCE NUMBER:	OBSERVATION:	COMMENTS:	CORRECT ACTION RESPONSE: (USE REVERSE IF NECESSARY)
CO-LAB01-91	5Kg NIST Class P weight was due for calibration on 11/22/90. Calibration is significantly past due.	Calibrate as required per procedure.	
CO-LAB02-91	The Shelf Life of many of the chemicals used for analytical work was questionable.	Develop & implement a system to control the shelf life of ALL materials used by the lab.	

isolated/DG

SPARROWS POINT PLANT
CORRECTIVE ACTION REPLY

CHECK APPROPRIATE STEP:
ACAR (X) CO-G01-91 FIX IT ( ) SUGGESTION ( )
PRELIMINARY ( ) FINAL ( )

AREA:

General

OBSERVATION/RECOMMENDATION:

Training is handled differently throughout all areas of the Coke Oven. Even though some documentation is maintained, results are fragmented and incomplete. Due to lack of formal documentation, filling temporary vacancies would be very suspect and vulnerable to error. Training scope and requirements have not been clearly identified.

Develop and implement a specific training program and documentation method. The training program should identify position requirements and qualifications.

CORRECTIVE ACTION PLAN:

RECORDS OF QUALIFICATIONS WILL BE DEVELOPED BY 9/1/91
MINIMUM TRAINING REQUIREMENT CHECKLISTS WILL BE DEVELOPED FOR EACH POSITION BY 9/20/91.

PERSON RESPONSIBLE: A. WILLIAMSON, GENERAL FOREMAN

PROPOSED COMPLETION DATE: 9/20/91

corr/act/reply-EAF3

SPARROWS POINT PLANT
CORRECTIVE ACTION REPLY

CHECK APPROPRIATE STEP:
ACAR (X) CO-GO2-91 FIX IT ( ) SUGGESTION ( )
PRELIMINARY ( ) FINAL ( )

AREA:

General

OBSERVATION/RECOMMENDATION:

A selection/verification procedure has not been established for suppliers of critical services. For example, Console, Hampton Roads and Sampling Associates all supply a critical service to the Coke Oven.

Establish and implement a selection/verification precedure for the suppliers of critical services.

CORRECTIVE ACTION PLAN:

A SELECTION/VERIFICATION PROCEDURE FOR SUPPLIERS OF CRITICAL SERVICES WILL BE ESTABLISHED AND IMPLEMENTED. A LETTER HAS BEEN SUBMITTED TO CORP. QA TO ASSIST IN AUDITING SUPPLIERS OF CRITICAL SERVICES. (SEE LETTER ATTACHED). CORP. WILL ASSIST WITH THESE AUDITS. 4/15/91

PERSON RESPONSIBLE: E. FLETCHER, C. LANK

PROPOSED COMPLETION DATE: 11/30/91

corr/act/reply-EAF3

BETHLEHEM STEEL CORPORATION
AUDIT CORRECTIVE ACTION REPORT (ACAR)

FACILITY/DEPT.	ACAR NO.	DATE AUDITED:
Sparrows Point / Coke Ovens	CO-G01-91	05/02/91
AUDITOR:	AREA:	
Fletcher, Boehm, Charles	General	
ESCORT:	DISCUSSED WITH:	
A. Williamson	Various	
DOCUMENT/PROCEDURE NO.	VERIFIED WITH:	
QAM 6.3.1.2.1, 6.3.2.1.1, 6.3.2.1.3	Various	

STATEMENT OF REQUIREMENTS:

Personnel shall be evaluated and qualified on the basis of education, training and/or experience, as required. Records of training and qualification shall be maintained.

Employees performing inspection, testing and laboratory functions shall be trained to the extent necessary to permit them to acquire the necessary skills for the position.

Qualification evaluations shall be reviewed against established criteria and the results documented for an employee to be qualified.

OBSERVATION:

Training is handled differently throughout all areas of the Coke Oven. Even though some documentation is maintained, results are fragmented and incomplete. Due to lack of formal documentation, filling temporary vacancies would be very suspect and vulnerable to error. Training scope and requirements have not been clearly identified.

RECOMMENDATION:

Develop and implement a specific training program and documentation method. The training program should identify position requirements and qualifications.

CORRECTIVE ACTION RESPONSE: (INCLUDE TIMETABLE)

acar-form
F5359000(5-89)

BETHLEHEM STEEL CORPORATION
AUDIT CORRECTIVE ACTION REPORT (ACAR)

FACILITY/DEPT.	ACAR NO.	DATE AUDITED:
Sparrows Point / Coke Ovens	CO-G02-91	05/02/91
AUDITOR:	AREA:	
Fletcher, Boehm, Charles	General	
ESCORT:	DISCUSSED WITH:	
A. Williamson	Various	
DOCUMENT/PROCEDURE NO.	VERIFIED WITH:	
QAM 5.3.2	Various	

STATEMENT OF REQUIREMENTS:

A procedure for selection/verification of suppliers of critical materials and services shall be established and documented which includes one or more of the following: Supplier evaluation and approval system (Supplier Excellence), self-assessment, source evaluation, audits, quality performance measurements, receipt inspection and objective evidence of process control and/or product control.

OBSERVATION:

A selection/verification procedure has not been established for suppliers of critical services. For example, Console, Hampton Roads and Sampling Associates all supply a critical service to the Coke Oven.

RECOMMENDATION:

Establish and implement a selection/verification procedure for the suppliers of critical services.

CORRECTIVE ACTION RESPONSE: (INCLUDE TIMETABLE)

acar-form
F5359000(5-89)

BETHLEHEM STEEL CORPORATION
AUDIT CORRECTIVE ACTION REPORT (ACAR)

FACILITY/DEPT.	ACAR NO.	DATE AUDITED:
Coke Ovens	CO-G03-91	05/02/91
AUDITOR:	AREA:	
Fletcher, Boehm, Charles	Various	
ESCORT:	DISCUSSED WITH:	
Arnett	Various	
DOCUMENT/PROCEDURE NO.	VERIFIED WITH:	
QAM 8.3.1	Various	

STATEMENT OF REQUIREMENTS:

Calibration shall be performed on measuring and testing equipment used to evaluate key process variables and specified product attributes in accordance with MIL-STD-45662A.

OBSERVATION:

A significant amount of progress has been made in the calibration program for measuring and testing equipment used to evaluate key process variables and specified product attributes. However, scales continue to be a weak part of the program. Scales are maintained by both the Local Electronics Unit (within the Coke Oven) and the Plant Electronics Units (Ron Goetzke) dependent upon the age of the scale. Local Electronics' procedures are in compliance with plant calibration requirements and test weight traceability has been established to the plant scale. However, it was discovered that the procedures for initiating calibration of the plant scale is very informal and the calibration is not consistently performed. Awareness of the results of calibrations performed by Plant Electronics and the frequency of calibrations has not been communicated well to the Coke Oven and has not been incorporated into the overall Coke Oven calibration program. Test weight traceability has not been established by Plant Electronics. Also, an outside source is utilized to calibrate the scale at the Coal Moisture Test House.

RECOMMENDATION:

In order for Coke Oven Personnel to effectively manage the scale calibration program, better communication must be established between Plant Electronics and the Coke Oven Electronics Group. Also, the Plant Electronics Group must review calibration procedures and make any necessary changes to be in compliance with plant requirements.

A procedure must be developed and implemented to routinely initiate calibration of the plant scale.

CORRECTIVE ACTION RESPONSE: (INCLUDE TIMETABLE)

acar-form
F5359000(5-89)

BETHLEHEM STEEL CORPORATION
AUDIT CORRECTIVE ACTION REPORT (ACAR)

FACILITY/DEPT.	ACAR NO.	DATE AUDITED:
Sparrows Point Plant	CO-G04-91	05/02/91
AUDITOR:	AREA:	
Fletcher, Boehm, Charles	Various	
ESCORT:	DISCUSSED WITH:	
A. Williamson	A. Williamson	
DOCUMENT/PROCEDURE NO.	VERIFIED WITH:	
QAM 7.3.4	A. Williamson	

STATEMENT OF REQUIREMENTS:

Product standards shall be developed and documented to identify the critical product characteristics and acceptance criteria at each major stage of the process.

OBSERVATION:

Appropriate standard practice instructions (product standards) have not been developed for Coal, Coke, and appropriate by-products.

RECOMMENDATION:

Develop the appropriate product standards to identify the critical product characteristics and acceptance criteria.

CORRECTIVE ACTION RESPONSE: (INCLUDE TIMETABLE)

acar-form
F5359000(5-89)

BETHLEHEM STEEL CORPORATION
AUDIT - COMMENTS / SUGGESTIONS

FACILITY:	DATE AUDITED:
Sparrows Point Plant	05/02/91
DEPARTMENT:	AUDITOR:
Coke Ovens - General	Fletcher, Boehm, Charles

CO-G05-91

The unloading and segregation of coal is a very important aspect of the Coal Handling Process and several measures are taken to prevent mixing of coal types in the Coal Field. However, when a mix does occur, it is recommended that the investigation and corrective action for the mix be documented. Therefore, a procedure should be developed detailing the appropriate actions to be taken to investigate mixed coal.

BETHLEHEM STEEL CORPORATION
AUDIT CORRECTIVE ACTION REPORT (ACAR)

FACILITY/DEPT.	ACAR NO.	DATE AUDITED:
Sparrows Point Plant	CO-BA01-91	05/02/91
AUDITOR:	AREA:	
Fletcher, Boehm, Charles	"A" Battery	
ESCORT:	DISCUSSED WITH:	
T. Baird	Various	
DOCUMENT/PROCEDURE NO.	VERIFIED WITH:	
QAM 7.3.6, 7.3.9	Various	

STATEMENT OF REQUIREMENTS:

Process standards, procedures or practices shall be developed, documented and implemented to establish the specific requirements necessary for process control to ensure consistency in product and service quality.

Standards, procedures and practices shall be periodically monitored to verify compliance with requirements.

OBSERVATION:

Several KVSOP's require review and revision as follows:

1. 03.01.01 Pushing Schedule - 24 Hour Coke is not addressed
2. 03.02.02 Changing - Corrective Action does not address what is to be done if the ovens are not charged in the proper sequence
3. 03.04.02 - Validity of current standard is questionable
4. Corrective Action - Many of the Corrective Actions appear to be very general in nature and their effectiveness may be questionable

RECOMMENDATION:

1. Develop a time table for the various pushing schedules to cover all operating scenarios.

2. Identify appropriate Corrective Action.

3. Statistically review validity of current standard and adjust as required.

4. Review all Corrective Actions to determine if more specific actions can be identified.

CORRECTIVE ACTION RESPONSE: (INCLUDE TIMETABLE)

acar-form
F5359000(5-89)

BETHLEHEM STEEL CORPORATION
AUDIT - ISOLATED SIGNIFICANT OBSERVATION
(FIX IT REPORT)

DATE: May 2, 1991

PLANT:	AUDITOR:
Sparrows Point Plant	Fletcher, Boehm, Charles
DEPARTMENT:	ACCOMPANIED BY:
Coke Ovens 11 & 12 Batteries	A. Benoska

LOCATION & REFERENCE NUMBER:	OBSERVATION:	COMMENTS:	CORRECT ACTION RESPONSE: (USE REVERSE IF NECESSARY)
CO-BA02-91	02.06.02 Gas Tending - Standard is addressed in degrees fahrenheit and and should be expressed in degrees centigrade	Revise KVSOP 02.06.02	
CO-BA03-91	02.05.01 KVSOP contains a large process table	Eliminate Process Table from KVSOP and develop a SPI to be referenced from the KVSOP	

isolated/DG

BETHLEHEM STEEL CORPORATION
AUDIT CORRECTIVE ACTION REPORT (ACAR)

FACILITY/DEPT.	ACAR NO.	DATE AUDITED:
Sparrows Point / Coal Chemical	CO-CC01-91	05/02/91
AUDITOR:	AREA:	
Fletcher, Boehm, Charles	Coal Chemical	
ESCORT:	DISCUSSED WITH:	
D. Saul	D. Saul	
DOCUMENT/PROCEDURE NO.	VERIFIED WITH:	
QAM 4.3.3	D. Saul	

STATEMENT OF REQUIREMENTS:

Documents shall be distributed to and maintained at required work locations.

OBSERVATION:

KVSOP's are not available to Operators at their work locations.
Example: Area of Primary Coolers/Tar Processing: Operating Engineer #2 does not have KVSOP's in their office. Distribution QCP lists only General Foreman, Supervisor, and Leader as only recipients of KVSOP copies.

RECOMMENDATION:

Broaden distribution to include other locations for Operators including above example.

CORRECTIVE ACTION RESPONSE: (INCLUDE TIMETABLE)

acar-form
F5359000(5-89)

BETHLEHEM STEEL CORPORATION
AUDIT CORRECTIVE ACTION REPORT (ACAR)

FACILITY/DEPT.	ACAR NO.	DATE AUDITED:
Sparrows Point / Coal Chemical	CO-CC02-91	05/02/91
AUDITOR:	AREA:	
Fletcher, Boehm, Charles	"B" Coal Chemical Plant	
ESCORT:	DISCUSSED WITH:	
D. Saul	D. Saul	
DOCUMENT/PROCEDURE NO.	VERIFIED WITH:	
QAM 4.3.4	D. Saul	

STATEMENT OF REQUIREMENTS:

4.3.4 Documents shall periodically be reviewed for accuracy and correctness and be revised as appropriate.

OBSERVATION:

Discrepancies exist between KVSOP Process Standards and Audit /Cards for B Coal Chemical Plant. Standards exist in following KVSOP's that are not included on audit cards: (KVSOP's

07.01.02	07.10.01
07.06.01	07.10.05
07.07.01	07.11.01
07.07.03	07.13.01
07.08.01	07.13.02

RECOMMENDATION:

Complete revisions to B Coal Chemical Plant KVSOP's and ensure all Process Standards are similarly included on Audit Cards. See suggestion CO-CC06-91

CORRECTIVE ACTION RESPONSE: (INCLUDE TIMETABLE)

acar-form
F5359000(5-89)

BETHLEHEM STEEL CORPORATION
AUDIT - ISOLATED SIGNIFICANT OBSERVATION
(FIX IT REPORT)

DATE: May 2, 1991

PLANT:	AUDITOR:
Sparrows Point Plant	R. Charles
DEPARTMENT:	**ACCOMPANIED BY:**
Coke Ovens/ Coal Chemical	D. Saul

LOCATION & REFERENCE NUMBER:	OBSERVATION:	COMMENTS:	CORRECT ACTION RESPONSE: (USE REVERSE IF NECESSARY)
CO-CC03-91	KVSOP 06.02.01 indicates use of an Individuals, Moving Range Chart	Chart is actually an X-Bar, R chart.	
CO-CC04-91	KVSOP 06.01.02 states, "Tar temp. in full dehydrator must be maintained between 80 and 90 degrees ...". Operator was reporting 90 degrees on his report though temperature gauge, after being wiped clean of grime, read 100°.	This incident underscores implementation of Process Standards that are valid and Operators are familiar with. See suggestions CO-CC06-91	
CO-CC05-91	Q.A. Calibration - Test Basin and Still PH: Located in B Plant; acct.# N009 in MICS. Identity of instrument used to perform calibration is not made on work order completed by technician.	Create a heading for instrument serial # or I.D. # on work order to be filled in by technician	

isolated/DG

BETHLEHEM STEEL CORPORATION
AUDIT - COMMENTS / SUGGESTIONS

FACILITY:	DATE AUDITED:
Sparrows Point Plant	05/02/91
DEPARTMENT:	AUDITOR:
Coke Ovens / Coal Chemical	R. Charles

CO-CC06-91

The key issue for the Coal Chemical Plant relative to the Quality System at the present, is the effective development and implementation of Process Standards in conjunction with the new plant scheduled to start up in September.

Recommendation:

While undergoing training on the new Foxboro process control system, Operators are monitoring hypothetical system pressures, temperatures, flow rates, etc. that are the same as those that will be identified in Process Standards. Ideally, alongside this training, Operator input can be used to develop Process Standards for the new operations. Expected benefits would be:

* Development and review of Process Standards with Operators throughout learning curve.

* Implementation of valid Process Standards as a result of Operator's familiarity, "buy-in", of well reviewed Process Standards and KVSOP's.

* Quality System will be in place for start-up of the facility.

comments
F5359200(5-89)

BETHLEHEM STEEL CORPORATION
AUDIT - COMMENTS / SUGGESTIONS

FACILITY:	DATE AUDITED:
Sparrows Point Plant	05/02/91
DEPARTMENT:	AUDITOR:
Coke Ovens / Coal Chemical	R. Charles

Recommendation:

CO-CC07-91

Training and documentation of training of employees in spill prevention, time spent in various positions, and or new Foxboro system is thorough and well maintained. Documentation of Operator's time spent in various positions will become cumbersome after some time and would lead itself well to routine input into a computerized system (HRIS, LOTUS, etc.)

Recommendation:

CO-CC08-91

Control Dept. has made much progress in development of a calibration system thru use of MICS System. Identification of quality and environmental related calibration requirements is a good idea. The only gap in the program is that instruments used to make calibration are not identified on MICS work orders that Technician completes and this limits traceability.

comments
F5359200(5-89)

BETHLEHEM STEEL CORPORATION
AUDIT - ISOLATED SIGNIFICANT OBSERVATION
(FIX IT REPORT)

DATE: May 2, 1991

PLANT:	AUDITOR:
Sparrows Point Plant	Fletcher, Boehm, Charles
DEPARTMENT:	ACCOMPANIED BY:
Coke Oven Lab.	M. Gould, M. Saddler

LOCATION & REFERENCE NUMBER:	OBSERVATION:	COMMENTS:	CORRECT ACTION RESPONSE: (USE REVERSE IF NECESSARY)
CO-LAB01-91	5Kg NIST Class P weight was due for calibration on 11/22/90. Calibration is significantly past due.	Calibrate as required per procedure.	
CO-LAB02-91	The Shelf Life of many of the chemicals used for analytical work was questionable.	Develop & implement a system to control the shelf life of ALL materials used by the lab.	

isolated/DG

SPARROWS POINT PLANT
CORRECTIVE ACTION REPLY

CHECK APPROPRIATE STEP:
ACAR (X) CO-G01-91 FIX IT ( ) SUGGESTION ( )
PRELIMINARY ( ) FINAL ( )

AREA:

General

OBSERVATION/RECOMMENDATION:

Training is handled differently throughout all areas of the Coke Oven. Even though some documentation is maintained, results are fragmented and incomplete. Due to lack of formal documentation, filling temporary vacancies would be very suspect and vulnerable to error. Training scope and requirements have not been clearly identified.

Develop and implement a specific training program and documentation method. The training program should identify position requirements and qualifications.

CORRECTIVE ACTION PLAN:

RECORDS OF QUALIFICATIONS WILL BE DEVELOPED BY 9/1/91.
MINIMUM TRAINING REQUIREMENT CHECKLISTS WILL BE DEVELOPED FOR EACH POSITION BY 9/20/91.

PERSON RESPONSIBLE: A. WILLIAMSON, GENERAL FOREMAN

PROPOSED COMPLETION DATE: 9/20/91

corr/act/reply-EAF3

SPARROWS POINT PLANT
CORRECTIVE ACTION REPLY

CHECK APPROPRIATE STEP:
ACAR (X) CO-G02-91 FIX IT ( ) SUGGESTION ( )
PRELIMINARY ( ) FINAL ( )

AREA:

General

OBSERVATION/RECOMMENDATION:

A selection/verification procedure has not been established for suppliers of critical services. For example, Console, Hampton Roads and Sampling Associates all supply a critical service to the Coke Oven.

Establish and implement a selection/verification precedure for the suppliers of critical services.

CORRECTIVE ACTION PLAN:

A SELECTION/VERIFICATION PROCEDURE FOR SUPPLIERS OF CRITICAL SERVICES WILL BE ESTABLISHED AND IMPLEMENTED. A LETTER HAS BEEN SUBMITTED TO CORP. QA TO ASSIST IN AUDITING SUPPLIERS OF CRITICAL SERVICES. (SEE LETTER ATTACHED). CORP. WILL ASSIST WITH THESE AUDITS. 1/15/91

PERSON RESPONSIBLE: E. FLETCHER, C. LANK

PROPOSED COMPLETION DATE: 11/30/91

corr/act/reply-EAF3

SPARROWS POINT PLANT
CORRECTIVE ACTION REPLY

CHECK APPROPRIATE STEP:
ACAR (X) CO-G03-91 FIX IT ( ) SUGGESTION ( )
PRELIMINARY ( ) FINAL ( )

AREA:

Various

OBSERVATION/RECOMMENDATION:

A significant amount of progress has been made in the calibration program for measuring and testing equipment used to evaluate key process variables and specified product attributes. However, scales continue to be a weak part of the program. Scales are maintained by both the Local Electronics Unit (within the Coke Oven) and the Plant Electronics Units (Ron Goetzke), dependent upon the age of the scale. Local Electronics' procedures are in compliance with plant calibration requirements and test weight traceability has been established to the plant scale. However, it was discovered that the procedures for initiating calibration of the plant scale is very informal and the calibration is not consistently performed. Awareness of the results of calibrations performed by Plant Electronics and the frequency of calibrations has not been communicated well to the Coke Oven and has not been incorporated into the overall Coke Oven calibration program. Test weight traceability has not been established by Plant Electronics. Also, an outside source is utilized to calibrate the scale at the Coal Moisture Test House.

In order for Coke Oven Personnel to effectively manage the scale calibration program, better communication must be established between Plant Electronics and the Coke Oven Electronics Group. Also, the Plant Electronics Group must review calibration procedures and make any necessary changes to be in compliance with plant requirements.

A procedure must be developed and implemented to routinely initiate calibration of the plant scale.

CORRECTIVE ACTION PLAN:

PERSON RESPONSIBLE:

PROPOSED COMPLETION DATE: / /

corr/act/reply-DG3

ELECTRONIC SCALE REPAIR PROCEDURES REVIEWED IN COKE OVEN MAINTENANCE PJP MICS SYSTEM

SPARROWS POINT PLANT
CORRECTIVE ACTION REPLY

CHECK APPROPRIATE STEP:
ACAR (X) CO-G04-91 FIX IT ( ) SUGGESTION ( )
PRELIMINARY ( ) FINAL ( )

AREA:

Various

OBSERVATION/RECOMMENDATION:

Appropriate standard practice instructions (product standards) have not been developed for Coal, Coke, and appropriate by-products.

Develop the appropriate product standards to identify the critical product characteristics and acceptance criteria.

CORRECTIVE ACTION PLAN:

PRODUCT STANDARDS WILL RECEIVE PROPER DOCUMENTATION

PERSON RESPONSIBLE: I. R. [illegible]

PROPOSED COMPLETION DATE: 8/31/91 COMPLETED FOR COKE

corr/act/reply-OG3

SPARROWS POINT PLANT
CORRECTIVE ACTION REPLY

CHECK APPROPRIATE STEP:
ACAR ( ) FIX IT ( ) SUGGESTION (X) CO-GO5-91
PRELIMINARY ( ) FINAL ( )

AREA:

Coke Ovens - General

OBSERVATION/RECOMMENDATION:

The unloading and segregation of coal is a very important aspect of the Coal Handling Process and several measures are taken to prevent mixing of coal types in the Coal Field. However, when a mix does occure, it is recommended that the investigation and corrective actions for the mix be documented. Therefore, a procedure should be developed detailing the appropriate actions to be taken to investigate mixed coal.

CORRECTIVE ACTION PLAN:

THIS RECOMMENDATION WILL BE GIVEN CONSIDERATION.

PERSON RESPONSIBLE: A. WILLIAMSON

PROPOSED COMPLETION DATE: / /

corr/act/reply-OG3

SPARROWS POINT PLANT
CORRECTIVE ACTION REPLY

CHECK APPROPRIATE STEP:
ACAR (X) CO-8A01-91 FIX IT ( ) SUGGESTION ( )
PRELIMINARY ( ) FINAL ( )

AREA:

"A" Battery

OBSERVATION/RECOMMENDATION:

Seveal KVSOP's require review and revision as follows:

1. 03.01.01 Pushing Schedule - 24 Hour Coke is not addressed
2. 03.02.02 Charging - Corrective Action does not address what is to be done if the ovens are not charged in the proper sequence
3. 03.04.02 - Validity of current standard is questionable
4. Corrective Action - many of the Corrective Actions appear to be very general in nature and their effectiveness may be questionable

1. Develop a time table for the various pushing schedules to cover all operating scenarios.
2. Identify appropriate Corrective Action.
3. Statistically review validity of current standard and adjust as required.
4. Review all Corrective Actions to determine if more specific actions can be identified.

CORRECTIVE ACTION PLAN:
THE ABOVE KVSOPS WILL BE REVISED AND ALL KVSOPS WILL BE REVIED FOR CORRECTIVE ACTIONS.

PERSON RESPONSIBLE: C. CRABAN, B. ARNETT

PROPOSED COMPLETION DATE: 8/31/91

corr/act/reply-DG3

COMPLETED

SPARROWS POINT PLANT
CORRECTIVE ACTION REPLY

CHECK APPROPRIATE STEP:
ACAR ( ) FIX IT (X)CO-BA02-91 SUGGESTION ( )
PRELIMINARY ( ) FINAL ( )

AREA:

Coke Ovens 11 & 12 Batteries

OBSERVATION/RECOMMENDATION:

02.06.02 Gas Tending - Standard is addressed in degrees fahrenheit and should be expressed in degrees centigrade.

Revise KVSOP 02.06.02

CORRECTIVE ACTION PLAN:
KVSOP 02.06.02 WILL BE REVISED

PERSON RESPONSIBLE: A. BENOSKE, B. ARNETT

PROPOSED COMPLETION DATE: 8/15/91

corr/act/reply-DG3

COMPLETED

SPARROWS POINT PLANT
CORRECTIVE ACTION REPLY

CHECK APPROPRIATE STEP:
ACAR ( ) FIX IT (X) CO-8A03-91 SUGGESTION ( )
PRELIMINARY ( ) FINAL ( )

AREA:

Coke Ovens 11 & 12 Batteries

OBSERVATION/RECOMMENDATION:

02.05.01 KVSOP contains a large process table.

Eliminate Process Table from KVSOP and develop a SPI to be referenced from the KVSOP.

CORRECTIVE ACTION PLAN:

KVSOP WILL BE REVISED AND SPI DEVELOPED.

PERSON RESPONSIBLE: A. BENOSKE, B. ARNETT

PROPOSED COMPLETION DATE: 8/31/91

corr/act/reply-DG3

COMPLETED

SPARROWS POINT PLANT
CORRECTIVE ACTION REPLY

CHECK APPROPRIATE STEP:
ACAR (X) CO-CC01-91 FIX IT ( ) SUGGESTION ( )
PRELIMINARY ( ) FINAL ( )

AREA:

Coal Chemical

OBSERVATION/RECOMMENDATION:

KVSOP's are not available to Operators at their work locations.
Example: Area of Primary Coolers/Tar Processing: Operating Engineer #2 does not have KVSOP's in their office. Distribution QCP lists only General Foreman, Supervisor, ~~and Leader~~ as only recipients of KVSOP copies.

Broaden distribution to include other locations for Operators including above example.

CORRECTIVE ACTION PLAN:

KVSOPS WILL BE DISTRIBUTED TO KEY OPERATORS AT THEIR WORK LOCATIONS.

PERSON RESPONSIBLE: D. SAUL

PROPOSED COMPLETION DATE: ~~8/1/91~~

corr/act/reply-DG3

WILL BE DONE WHEN NEW KVSOPS ARE WRITTEN

SPARROWS POINT PLANT
CORRECTIVE ACTION REPLY

CHECK APPROPRIATE STEP:
ACAR (X) CO-CC02-91 FIX IT ( ) SUGGESTION ( )
PRELIMINARY ( ) FINAL ( )

AREA:

"8" Coal Chemical Plant

OBSERVATION/RECOMMENDATION:

Discrepancies exist between KVSOP Process Standards and Audit/Cards for B Coal Chemical Plant. Standards exist in following KVSOP's that are not included on audit cards: (KVSOP's

07.01.02 --	07.10.01
07.06.01	07.10.05
07.07.01	07.11.01
07.07.03	07.13.01
07.08.01	07.13.02

Complete revisions to B Coal Chemical Plant KVSOP's and ensure all Process Standards are similarly included on Audit Cards. See suggestion CO-CC06-91

CORRECTIVE ACTION PLAN:

COMPLETE REVISIONS OF B COAL CHEMICAL PLANT AND REVISE AUDIT CARDS.

PERSON RESPONSIBLE: D. SAUL, B. ARNETT

PROPOSED COMPLETION DATE: ~~8/31/91~~

corr/act/reply-DG3

WILL BE REVISED BY 9/20/91

SPARROWS POINT PLANT
CORRECTIVE ACTION REPLY

CHECK APPROPRIATE STEP:
ACAR ( ) FIX IT (X) CO-CC03-91 SUGGESTION ( )
PRELIMINARY ( ) FINAL ( )

AREA:

Coke Ovens - Coal Chemical

OBSERVATION/RECOMMENDATION:

KVSOP 06.02.01 indicates use of an Individuals, Moving Range Chart.

Chart is actually an X-Bar, R chart.

CORRECTIVE ACTION PLAN:

AN I, MR CHART WILL BE USED PER KVSOP 06.02.01.

PERSON RESPONSIBLE: D. SAUL, B. ARNETT

PROPOSED COMPLETION DATE: 8/1/91

corr/act/reply-EAF3

COMPLETED

SPARROWS POINT PLANT
CORRECTIVE ACTION REPLY

CHECK APPROPRIATE STEP:
ACAR ( ) FIX IT (X) CO-CC04-91 SUGGESTION ( )
PRELIMINARY ( ) FINAL ( )

AREA:

Coke Ovens / Coal Chemical

OBSERVATION/RECOMMENDATION:

KVSOP 06.01.02 states, "Tar temp. in full dehydrator must be maintained between 80 and 90 degrees ...". Operator was reporting 90 degrees on his report though temperature gauge, after being wiped clean of grime, read 100°.

This incident underscores implementation of Process Standards that are valid and Operators are familiar with. See suggestions CO-CC06-91.

CORRECTIVE ACTION PLAN:

SUPERVISION WILL MAKE CHECKS OF OPERATORS FOR PREVENTING POOR WORK PRACTICES. (FALSIFYING READINGS)

PERSON RESPONSIBLE: D. SAUL

PROPOSED COMPLETION DATE: 8/1/91

corr/act/reply-EAF3

COMPLETED

SPARROWS POINT PLANT
CORRECTIVE ACTION REPLY

CHECK APPROPRIATE STEP:
ACAR ( ) FIX IT ( ) SUGGESTION (X) CO-CCD6-91
PRELIMINARY ( ) FINAL ( )

AREA:

Coke Ovens / Coal Chemical

OBSERVATION/RECOMMENDATION:

The key issue for the Coal Chemical Plant relative to the Quality System at the present, is the effective development and implementation of Process Standards in conjunction with the new plant scheduled to start up in September.

While undergoing training on the new Foxboro process control system, Operators are monitoring hypothetical system pressures, temperatures, flow rates, etc. that are the same as those that will be identified in Process Standards. Ideally, alongside this training, Operator input can be used to develop Process Standards for the new operations. Expected benefits would be:

* Development and review of Process Standards with Operators throughout learning curve.

* Implementation of valid Process Standards as a result of Operator's familiarity, "buy-in", of well reviewed Process Standards and KVSOP's.

* Quality System will be in place for start-up of the facility.

CORRECTIVE ACTION PLAN:

DEVELOP KVSOPS FOR NEW BACK HALF OF COAL CHEMICAL PLANT PER SUGGESTIONS.

PERSON RESPONSIBLE: D. SAUL, B. ARNETT

PROPOSED COMPLETION DATE: 11/1/91

corr/act/reply-EAF3

SPARROWS POINT PLANT
CORRECTIVE ACTION REPLY

CHECK APPROPRIATE STEP:
ACAR ( ) FIX IT ( ) SUGGESTION (X) CO-CC07-91
PRELIMINARY ( ) FINAL ( )

AREA:

Coke Ovens / Coal Chemical

OBSERVATION/RECOMMENDATION:

Training and documentation of training of employees in spill prevention, time spent in various positions, and or new Foxboro system is thorough and well maintained. Documentation of Operator's time spent in various positions will become cumbersome after some time and would lend itself well to routine input into a computerized system (HRIS, LOTUS, etc.)

CORRECTIVE ACTION PLAN:

THIS IS ENTERED INTO THE COMPUTER AND THE INFORMATION IS AVAILABLE. (HRIS, PC AND DTR)

PERSON RESPONSIBLE:

PROPOSED COMPLETION DATE: / /

corr/act/reply-EAF3

COMPLETED

COKE OVENS – INTERNAL AUDIT
STATUS AS OF 09/11/91

1989 CORPORATE INTERNAL AUDIT

8 FINDINGS
8 COMPLETE

1991 PLANT INTERNAL AUDIT

18 FINDINGS
10 COMPLETE

OUTSTANDING FINDINGS

DESCRIPTION	CORRECTIVE ACTION PLAN	PERSON RESPONSIBLE	PROPOSED COMPLETION DATE
1. TRAINING PROGRAM	A. DEVELOP RECORDS OF QUALIFICATIONS B. ESTABLISH TRAINING REQUIREMENTS CHECKLIST	WILLIAMSON/ GEN FOREMAN	10/15/91
2. SERVICE VENDOR AUDITS	A. PERFORM AUDIT IF VENDOR SUPPLYING CRITICAL SERVICES (4 IDENTIFIED)	CORP QA/ FLETCHER	11/30/91
3. COAL CHEMICAL KVSOP'S	A. REVISE/COMBINE A & B B. DEVELOP NEW DISTRIBUTION	D. SAUL/ B. ARNETT	09/20/91
4. CALIBRATION	A. IDENTIFY STANDARD INSTRUMENT BY SERIAL NUMBER	S. DOWNEY	12/30/91
5. COAL MIX PROCEDURE	A. DOCUMENT PROCEDURE	WILLIAMSON	10/15/91
6. DEVELOP PRODUCT STANDARDS	A. COAL B. COKE	B. ARNETT	09/20/91 COMPLETE

COKE OVENS – INTERNAL AUDIT
STATUS AS OF 09/11/91

1989 CORPORATE INTERNAL AUDIT

8 FINDINGS
8 COMPLETE

1991 PLANT INTERNAL AUDIT

18 FINDINGS
10 COMPLETE

OUTSTANDING FINDINGS CON'T

DESCRIPTION	CORRECTIVE ACTION PLAN	PERSON RESPONSIBLE	PROPOSED COMPLETION DATE
7. PAST DUE CALIBRATION OF 5Kg NIST CLASS P WEIGHT	CALIBRATE	KOWALCZYK	10/01/91
8. SYSTEM TO CONTROL SHELF LIFE OF ALL CHEMICALS	DEVELOP AND IMPLEMENT SYSTEM	KOWALCZYK	10/01/91

(31) 8/4 S. Minnick

QUALITY SYSTEM AUDIT				DATE: 8/4/91
DEPARTMENT: (Oxygen) 103	AREA: 11/12 Batteries			
BY: S. T. MINNICK BADGE: 314-1916	CONTACT: Bob Arnett X4872 ACCOMPANIED: ANDY DENOSKA			
DISTRIBUTION	YES	NO	COMMENTS:	
1. IS THERE A DISTRIBUTION QCP?	✓			
2. ARE THE QCP'S, KVSOP'S AND SPI'S DISTRIBUTED PER THE DISTRIBUTION QCP?	✓			
UNCONTROLLED DOCUMENTS	YES	NO	N/A	COMMENTS:
1. IS AREA VOID OF UNSIGNED OR UNDATED OP. INST.?	✓		XXX	
2. ARE TEMPORARY SIGNED AND ORIGINAL DATE OF OP INST LESS THAN 3 MONTHS OLD?			✓	
CHANGE LOG	YES	N/A	COMMENTS:	
1. HAVE ANY CHANGES IN OPERATING PRACTICES, GRADES, SUPPLIERS AND EQUIPMENT OCCURRED IN THE CURRENT QTR?	✓			
	YES	NO	N/A	COMMENTS:
2. HAVE THE ABOVE CHANGES BEEN ENTERED INTO THE CHANGE LOG SYSTEM?	✓			
DOCUMENT CONTROL	YES	NO	N/A	COMMENTS:
1. DO THE KVSOP'S HAVE THE APPROPRIATE SIGNATURES?	✓			
2. DO THE REVISION #'S AND EFFECTIVE DATES AGREE WITH THE REVISION #'S AND EFFECTIVE DATES IN THE M.O. COPY?	✓			
3. DO THE KVSOP'S REFERENCE THE SPI AND QCP'S WHEN APPROPRIATE?			✓	
4. DO THE AUDIT CARDS AGREE WITH DOCUMENTS IN THE BOOK OR IS THERE EVIDENCE A REVISION IS BEING PROCESSED?	✓			

SELECT AT RANDOM

AREA 11/12 BATTERIES

BY S.T. MINNICK

DATE 8/21/91 NO. 314-1916

KVSOP'S	REV #	REV DATE	YES	NO
1. 02.01.01	1	1/31/90	✓	
2. 02.02.03	1	1/31/90	✓	
3. 02.04.04	1	1/31/90	✓	
4. 02.06.01	—	3/15/88	✓	
5. 02.08.01	1	10/15/90	✓	

SPI'S	REV #	REV DATE	YES	NO
1. NONE				
2.				
3.				
4.				
5.				

QCP'S	REV #	REV DATE	YES	NO
1. NONE				
2.				
3.				
4.				
5.				

* GENERAL FOREMAN'S OFFICE

* BATTERY FOREMAN'S OFFICE

* "11 + 12" BATTERY GAUGE ROOM

CLEAN AIR ROOM

* HEATER FOREMAN'S OFFICE

LABOR MAINTENANCE OFFICE

SPC CHARTS	YES	NO	N/A	AREA: 11/12 BATTERIES BY: J. T. MINNICK BADGE: 314-1916 DATE: 8/21/91
IS SPC REQUIRED FOR THE AREA? IF NO, DO NOT CONTINUE.	✓			
1. ARE THE SPC CHARTS IN THE AREA VALID APPLICATIONS? A. CHARTS OF SINGLE MEASUREMENT THAT ARE X, MR OR SPECS OR TOLERANCE CHARTS. B. X-BAR, R CHARTS C. ATTRIBUTE CHARTS (P CHART) D. OTHER:	✓			
2. ARE THE LIMITS APPLICABLE TO THE CONTROL CHART? X-BAR, R CHARTS MUST HAVE CONTROL LIMITS NOT SPECIFICATIONS.	✓			
3. ARE THE DATA POINTS PLOTTED CORRECTLY ON THE CHART (X-BAR, INDIVIDUALS, RANGES)?	✓			
4. ARE OUT OF CONTROL POINTS DOCUMENTED ON THE CHART?	✓			NOTE: UNTIL THIS MONTH, OUT OF CONTROL POINTS WERE DOCUMENTED ON FOREMAN'S REPORT, BUT NOT ON THE CHART. STARTING THIS MONTH, THEY ARE JUST BEGINNING TO DOCUMENT ON THE CHART.
5. IS THERE A REVISION # AND DATE ON THE CHART?	✓			
6. IS THE BASE PERIOD FOR CALCULATION OF THE CONTROL LIMITS IDENTIFIED?	✓			

KVSOP 02.05.01 HEATING - RECORD SPAN TEMPS. - X, MR CHART
(CHARTS IN "11 + 12" BATTERY GAUGE ROOMS)

02/04/91

	DOES THE UNIT/PROCESS EQUIPMENT REQUIRE CALIBRATION MAINTENANCE?	YES		N/A
		✓		
A	DOES THE SYSTEM HAVE POSITIVE IDENTIFICATION & CONTROL OF ALL MEASURING DEVICES? NO SERIAL NOS.	YES	NO ✓	N/A
B	IS THERE AN ESTABLISHED FREQUENCY OF CALIBRATION FOR ALL EQUIPMENT?	YES ✓	NO	N/A
C	ARE RECORDS OF CALIBRATION KEPT?	YES ✓	NO	N/A
D	DO CALIBRATION RECORDS INCLUDE AS FOUND/AS LEFT RESULTS?	YES ✓	NO	N/A
E	DO CALIBRATION RECORDS IDENTIFY THE PIECE OF EQUIPMENT USED TO MAKE THE CALIBRATION?	YES ✓	NO	N/A
F	ARE STANDARDS TRACEABLE TO N.I.S.T. OR OTHER ACCEPTABLE SOURCE?	YES ✓	NO	N/A
	IS THERE A SYSTEM (LABELS OR EQUIVALENT) TO INDICATE DATE OF CALIBRATION, BY WHOM AND NEXT DUE DATE?	YES ✓	NO	N/A
H	ARE THERE DOCUMENTED CALIBRATION PROCEDURES (DOD, US GOVT, MFG, BSCO)?	YES ✓	NO	N/A
I	DOES THE PROCEDURE INCLUDE AN ACCEPTABLE TOLERANCE (RANGE, PARAMETER) FOR THE ACCURACY OF THE INSTRUMENT CHARACTERISTIC BEING CALIBRATED?	YES ✓	NO	N/A
J	DOES THE PROCEDURE ADDRESS CORRECTIVE ACTION FOR THE PRODUCT PRODUCED DURING THE OUT OF CALIBRATION PERIOD?	YES	NO	N/A ✓

COMMENTS

1.A – SERIAL NOS. NEED TO BE ASSIGNED TO THE PYROMETERS FOR POSITIVE CONTROL, BOTH ON THE PYROMETERS AND IN THE SYSTEM

	1. ARE HAND TOOLS (TAPES/ MICROMETERS) USED FOR MEASURING AND TESTING OF PRODUCT?	YES		N/A
A	IS THERE A CALIBRATION SYSTEM?	YES	NO	N/A
B	DOES THE SYSTEM HAVE POSITIVE IDENTIFICATION & CONTROL OF ALL MEASURING DEVICES?	YES	NO	N/A
C	IS THERE AN ESTABLISHED FREQUENCY OF CALIBRATION FOR ALL EQUIPMENT?	YES	NO	N/A
D	ARE RECORDS OF CALIBRATION KEPT?	YES	NO	N/A
E	DO CALIBRATION RECORDS INCLUDE AS FOUND/AS LEFT RESULTS?	YES	NO	N/A
F	DO CALIBRATION RECORDS IDENTIFY THE PIECE OF EQUIPMENT USED TO MAKE THE CALIBRATION?	YES	NO	N/A
G	ARE STANDARDS TRACEABLE TO N.I.S.T. OR OTHER ACCEPTABLE SOURCE?	YES	NO	N/A
H	IS THERE A SYSTEM (LABELS OR EQUIVALENT) TO INDICATE DATE OF CALIBRATION, BY WHOM AND NEXT DUE DATE?	YES	NO	N/A
I	ARE THERE DOCUMENTED CALIBRATION PROCEDURES (DOD, US GOVT, MFG, BSCO)?	YES	NO	N/A
J	DOES THE PROCEDURE INCLUDE AN ACCEPTABLE TOLERANCE (RANGE, PARAMETER) FOR THE ACCURACY OF THE INSTRUMENT CHARACTERISTIC BEING CALIBRATED?	YES	NO	N/A
K	DOES THE PROCEDURE ADDRESS CORRECTIVE ACTION FOR THE PRODUCT PRODUCED DURING THE OUT OF CALIBRATION PERIOD?	YES	NO	N/A

COMMENTS

	1. ARE INSTRUMENTS (ROCKWELL, PROFILOMETER, TENSILE TESTER, LAB. EQUIPMENT ETC.) USED TO DETERMINE PRODUCT ACCEPTANCE?	YES		N/A
A	IS THERE A CALIBRATION SYSTEM?	YES	NO	N/A
B	DOES THE SYSTEM HAVE POSITIVE IDENTIFICATION & CONTROL OF ALL MEASURING DEVICES?	YES	NO	N/A
C	IS THERE AN ESTABLISHED FREQUENCY OF CALIBRATION FOR ALL EQUIPMENT?	YES	NO	N/A
D	ARE RECORDS OF CALIBRATION KEPT?	YES	NO	N/A
E	DO CALIBRATION RECORDS INCLUDE AS FOUND/AS LEFT RESULTS?	YES	NO	N/A
F	DO CALIBRATION RECORDS IDENTIFY THE PIECE OF EQUIPMENT USED TO MAKE THE CALIBRATION?	YES	NO	N/A
G	ARE STANDARDS TRACEABLE TO N.I.S.T. OR OTHER ACCEPTABLE SOURCE?	YES	NO	N/A
H	IS THERE A SYSTEM (LABELS OR EQUIVALENT) TO INDICATE DATE OF CALIBRATION, BY WHOM AND NEXT DUE DATE?	YES	NO	N/A
I	ARE THERE DOCUMENTED CALIBRATION PROCEDURES (DOD, US GOVT, MFG, BSCO)?	YES	NO	N/A
J	DOES THE PROCEDURE INCLUDE AN ACCEPTABLE TOLERANCE (RANGE, PARAMETER) FOR THE ACCURACY OF THE INSTRUMENT CHARACTERISTIC BEING CALIBRATED?	YES	NO	N/A
K	DOES THE PROCEDURE ADDRESS CORRECTIVE ACTION FOR THE PRODUCT PRODUCED DURING THE OUT OF CALIBRATION PERIOD?	YES	NO	N/A

COMMENTS

for this audit. ns.

(34) 2/2 R. Miller

QUALITY SYSTEM AUDIT				DATE: 7-8-91
DEPARTMENT: Coke Oven 101		AREA: Coal Handling		
BY: R. L. MILLER BADGE: 314-052		CONTACT: Bill Arnett 14872 ACCOMPANIED: F. Shirk		
DISTRIBUTION	YES	NO	COMMENTS:	
1. IS THERE A DISTRIBUTION QCP? CO-QAG-002	✓			
2. ARE THE QCP'S, KVSOP'S AND SPI'S DISTRIBUTED PER THE DISTRIBUTION QCP?	✓			
UNCONTROLLED DOCUMENTS	YES	NO	N/A	COMMENTS:
1. IS AREA VOID OF UNSIGNED OR UNDATED OP. INST.?	✓		XXX	
2. ARE TEMPORARY SIGNED AND ORIGINAL DATE OF OP INST LESS THAN 3 MONTHS OLD?			✓	
CHANGE LOG	YES	N/A	COMMENTS:	
1. HAVE ANY CHANGES IN OPERATING PRACTICES, GRADES, SUPPLIERS AND EQUIPMENT OCCURRED IN THE CURRENT QTR?	✓			
	YES	NO	N/A	COMMENTS:
2. HAVE THE ABOVE CHANGES BEEN ENTERED INTO THE CHANGE LOG SYSTEM?	✓			
DOCUMENT CONTROL	YES	NO	N/A	COMMENTS:
1. DO THE KVSOP'S HAVE THE APPROPRIATE SIGNATURES?	✓			
2. DO THE REVISION #'S AND EFFECTIVE DATES AGREE WITH THE REVISION #'S AND EFFECTIVE DATES IN THE M.O. COPY?	✓			
3. DO THE KVSOP'S REFERENCE THE SPI AND QCP'S WHEN APPROPRIATE?			✓	
4. DO THE AUDIT CARDS AGREE WITH DOCUMENTS IN THE BOOK OR IS THERE EVIDENCE A REVISION IS BEING PROCESSED?	✓			

NOTE: Previous Audit "NOs" were resolved for this audit. RJ.

L-40

SELECT AT RANDOM

AREA COAL HANDLING

BY R.L. MILLER

DATE 7-8-91 NO. 314-052

	KVSOP'S	REV #	REV DATE	YES	NO
1.	01.03.01	3	10/11/89	///	~
2.	01.04.01	3	10/11/89	///	~
3.	01.05.01	5	03/06/90	///	~
4.	01.06.01	5	03/06/90	///	~
5.	01.07.01	3	10/11/89	///	~

	SPI'S	REV #	REV DATE	YES	NO
1.					
2.					
3.					
4.					
5.					

	QCP'S	REV #	REV DATE	YES	NO
1.					
2.					
3.					
4.					
5.					

✓ Coal Handling Office

✓ Testhouse

✓ No 3 Station

SPC CHARTS	YES	NO	N/A	AREA: COAL HANDLING BY: R.L. MILLER BADGE: 314-052 DATE: 7-8-91
IS SPC REQUIRED FOR THE AREA? IF NO, DO NOT CONTINUE.	✓			
1. ARE THE SPC CHARTS IN THE AREA VALID APPLICATIONS? A. CHARTS OF SINGLE MEASUREMENT THAT ARE X, MR OR SPECS OR TOLERANCE CHARTS. B. X-BAR, R CHARTS C. ATTRIBUTE CHARTS (P CHART) D. OTHER:	✓			KVSOP 01.04.01 SIZE CONTROL $\bar{X}$, R % 1/8" or less KVSOP 01.05.01 RATIO CONTROL $\bar{X}$, R Hi to Lo Vol Ratio.
2. ARE THE LIMITS APPLICABLE TO THE CONTROL CHART? X-BAR, R CHARTS MUST HAVE CONTROL LIMITS NOT SPECIFICATIONS.	✓			
3. ARE THE DATA POINTS PLOTTED CORRECTLY ON THE CHART (X-BAR, INDIVIDUALS, RANGES)?	✓			
4. ARE OUT OF CONTROL POINTS DOCUMENTED ON THE CHART?			✓	OUT-OF-CONTROL POINTS WITHIN SPEC AND IN THIS INSTANCE BENEFICIAL TO QUAL. 01.04.01
5. IS THERE A REVISION # AND DATE ON THE CHART?	✓			
6. IS THE BASE PERIOD FOR CALCULATION OF THE CONTROL LIMITS IDENTIFIED?	✓			

02/04/91

CALIBRATION SYSTEM AUDIT

		YES	NO	N/A
1.	DOES THE UNIT/PROCESS EQUIPMENT REQUIRE CALIBRATION MAINTENANCE?	✓		
A	DOES THE SYSTEM HAVE POSITIVE IDENTIFICATION & CONTROL OF ALL MEASURING DEVICES?	✓		
B	IS THERE AN ESTABLISHED FREQUENCY OF CALIBRATION FOR ALL EQUIPMENT?	✓		
C	ARE RECORDS OF CALIBRATION KEPT?	✓		
D	DO CALIBRATION RECORDS INCLUDE AS FOUND/AS LEFT RESULTS?	✓		
E	DO CALIBRATION RECORDS IDENTIFY THE PIECE OF EQUIPMENT USED TO MAKE THE CALIBRATION?		✓	
F	ARE STANDARDS TRACEABLE TO N.I.S.T. OR OTHER ACCEPTABLE SOURCE?			✓
G	IS THERE A SYSTEM (LABELS OR EQUIVALENT) TO INDICATE DATE OF CALIBRATION, BY WHOM AND NEXT DUE DATE? NO	✓*		
H	ARE THERE DOCUMENTED CALIBRATION PROCEDURES (DOD, US GOVT, MFG, BSCO)?	✓		
I	DOES THE PROCEDURE INCLUDE AN ACCEPTABLE TOLERANCE (RANGE, PARAMETER) FOR THE ACCURACY OF THE INSTRUMENT CHARACTERISTIC BEING CALIBRATED?	✓		
J	DOES THE PROCEDURE ADDRESS CORRECTIVE ACTION FOR THE PRODUCT PRODUCED DURING THE OUT OF CALIBRATION PERIOD?			✓ ★

COMMENTS KVSOP 01.05.01 SCALES

* Frequency (weekly) is understood, but no next due date appears on form

★ KVSOP specifies corrective action.

WKLY

B CALIBRATION SYSTEM AUDIT

		YES	NO	N/A
1.	ARE HAND TOOLS (TAPES/MICROMETERS) USED FOR MEASURING AND TESTING OF PRODUCT?			✓
A	IS THERE A CALIBRATION SYSTEM?	YES	NO	N/A
B	DOES THE SYSTEM HAVE POSITIVE IDENTIFICATION & CONTROL OF ALL MEASURING DEVICES?	YES	NO	N/A
C	IS THERE AN ESTABLISHED FREQUENCY OF CALIBRATION FOR ALL EQUIPMENT?	YES	NO	N/A
D	ARE RECORDS OF CALIBRATION KEPT?	YES	NO	N/A
E	DO CALIBRATION RECORDS INCLUDE AS FOUND/AS LEFT RESULTS?	YES	NO	N/A
F	DO CALIBRATION RECORDS IDENTIFY THE PIECE OF EQUIPMENT USED TO MAKE THE CALIBRATION?	YES	NO	N/A
G	ARE STANDARDS TRACEABLE TO N.I.S.T. OR OTHER ACCEPTABLE SOURCE?	YES	NO	N/A
H	IS THERE A SYSTEM (LABELS OR EQUIVALENT) TO INDICATE DATE OF CALIBRATION, BY WHOM AND NEXT DUE DATE?	YES	NO	N/A
I	ARE THERE DOCUMENTED CALIBRATION PROCEDURES (DOD, US GOVT, MFG, BSCO)?	YES	NO	N/A
J	DOES THE PROCEDURE INCLUDE AN ACCEPTABLE TOLERANCE (RANGE, PARAMETER) FOR THE ACCURACY OF THE INSTRUMENT CHARACTERISTIC BEING CALIBRATED?	YES	NO	N/A
K	DOES THE PROCEDURE ADDRESS CORRECTIVE ACTION FOR THE PRODUCT PRODUCED DURING THE OUT OF CALIBRATION PERIOD?	YES	NO	N/A

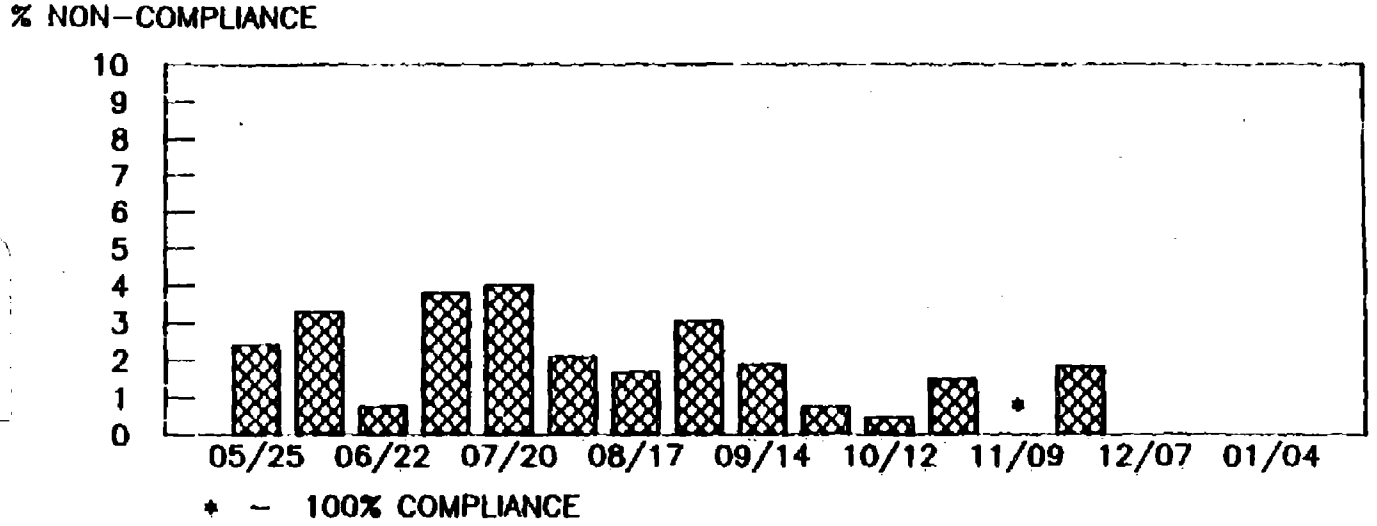
COMMENTS

C CALIBRATION SYSTEM AUDIT

		YES	NO	N/A
1.	ARE INSTRUMENTS (ROCKWELL, PROFILOMETER, TENSILE TESTER, LAB. EQUIPMENT ETC.) USED TO DETERMINE PRODUCT ACCEPTANCE?			✓
A	IS THERE A CALIBRATION SYSTEM?	YES	NO	N/A
B	DOES THE SYSTEM HAVE POSITIVE IDENTIFICATION & CONTROL OF ALL MEASURING DEVICES?	YES	NO	N/A
C	IS THERE AN ESTABLISHED FREQUENCY OF CALIBRATION FOR ALL EQUIPMENT?	YES	NO	N/A
D	ARE RECORDS OF CALIBRATION KEPT?	YES	NO	N/A
E	DO CALIBRATION RECORDS INCLUDE AS FOUND/AS LEFT RESULTS?	YES	NO	N/A
F	DO CALIBRATION RECORDS IDENTIFY THE PIECE OF EQUIPMENT USED TO MAKE THE CALIBRATION?	YES	NO	N/A
G	ARE STANDARDS TRACEABLE TO N.I.S.T. OR OTHER ACCEPTABLE SOURCE?	YES	NO	N/A
H	IS THERE A SYSTEM (LABELS OR EQUIVALENT) TO INDICATE DATE OF CALIBRATION, BY WHOM AND NEXT DUE DATE?	YES	NO	N/A
I	ARE THERE DOCUMENTED CALIBRATION PROCEDURES (DOD, US GOVT, MFG, BSCO)?	YES	NO	N/A
J	DOES THE PROCEDURE INCLUDE AN ACCEPTABLE TOLERANCE (RANGE, PARAMETER) FOR THE ACCURACY OF THE INSTRUMENT CHARACTERISTIC BEING CALIBRATED?	YES	NO	N/A
K	DOES THE PROCEDURE ADDRESS CORRECTIVE ACTION FOR THE PRODUCT PRODUCED DURING THE OUT OF CALIBRATION PERIOD?	YES	NO	N/A

COMMENTS

AUDITS OF COKE OVENS PROCESS STANDARDS
11/12 BATTERIES % NON-COMPLIANCE

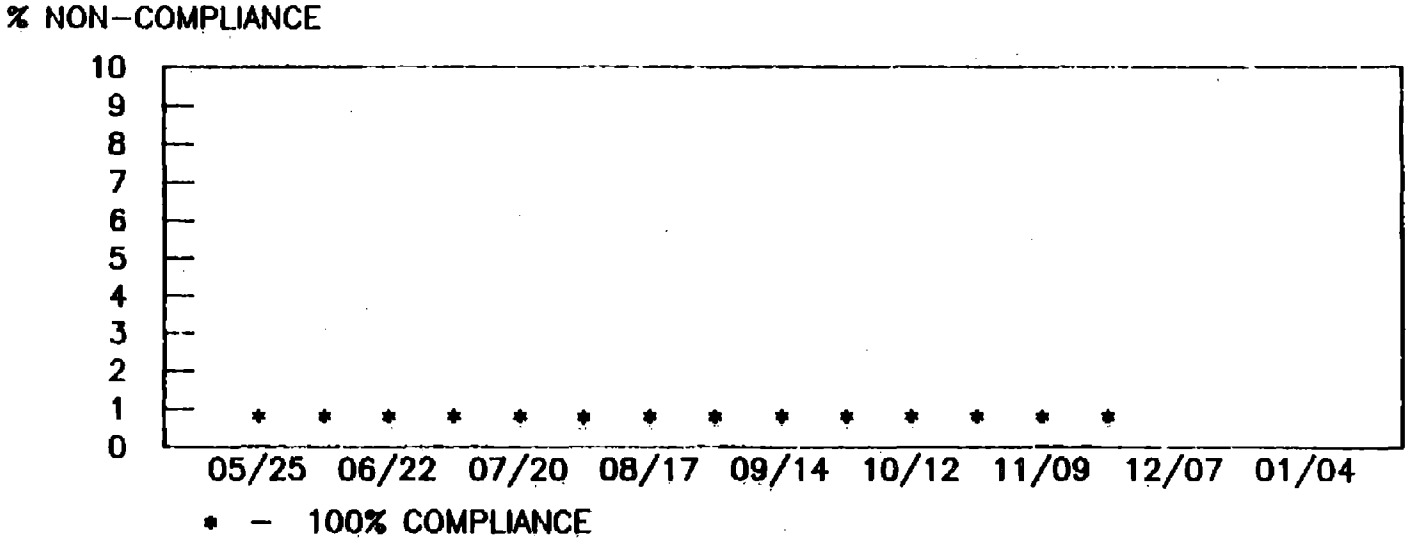


COKE OVENS - 11/12 BATTERIES

KVSOP CHECKLIST CARD ANALYSIS - BIWEEK/E 11/23/91

	TASK	
02.01.01A	DAMPER OUT: ARE DAMPERS DOWN SEALING OFF FOUL GAS FROM THE OVEN	3

AUDITS OF COKE OVENS PROCESS STANDARDS
COAL HANDLING % NON-COMPLIANCE



Section 3

Monthly Progress Reports

KIDC DEMONSTRATION PROJECT
BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

MONTHLY REPORT OF
SAMPLING AND TESTING PROGRAM ACTIVITIES

NOVEMBER, 1991

GENERAL OVERVIEW

The performance demonstration of the Kress system continued in November. Visible emission observations continued to be performed during the month and coke samples continued to be obtained. In addition, video recordings of both the conventional pushes and Kress pushes were made. Other activities related to the baseline sampling and analysis program continued during the month. Testing of the Kress system ended on November 26 as a result of the idling of the coke batteries in early December. Attachment 1 indicates the percent completion of the various aspects of the sampling and testing program through the end of November. Compilation and analysis of all data collected during the testing program will be performed during December and January.

Project Team Meetings

A meeting was held on December 5 with all personnel involved in the testing program to discuss the content and format of the final report. A follow up meeting will be scheduled for early January to evaluate progress on the data analysis currently being performed.

Demonstration Program

The Kress system accepted a total of 112 pushes during the performance testing in November. During October, a total of 158 pushes were accepted rather than the 159 pushes reported last month. This gives a total of 321 pushes accepted by the Kress system since start up in June. Visible emission observations continued in November and samples of the Kress coke were obtained. Video recordings of both the Kress and conventional pushes were made during this period as well.

QA/QC Activities

As a result of the audit performed by EPA's contractor in October, visible emission observations were performed of five Kress pushes by three certified observers at the same time. The results of this QA/QC activity are presented in attachment 2.

COAL AND COKE QUALITY

Coke Screening

One sample of Kress coke was obtained for every set of three pushes taken by Kress in November. These samples were in addition to the conventional quenched coke samples which continued to be collected. These samples are being screened to evaluate the size differential between this coke and conventional quenched coke. This information will be used to evaluate the impact on blast furnace performance.

Drop Shatter Test

Drop Shatter Testing of Kress coke continued in November.

Hampton Roads Testing Lab

Testing of Kress coke for coke reactivity index (CRI) and coke strength after reaction (CSR) continued to be conducted by Hampton Roads Testing Lab in November. These data will be compared to the CRI/CSR data for conventional quenched coke over the same period.

BLAST FURNACE PERFORMANCE EVALUATION

Bethlehem's research department has begun an evaluation of the Kress coke quality data so that inputs to the Balwax model can be developed. This model will be used to determine cost advantages or disadvantages of using Kress coke vs. conventional quenched coke.

DOOR EMISSIONS MONITORING

Collection of daily door emission data continued during the month.

PUSHING EMISSION MONITORING

Visible emission observations of Kress pushes continued to be performed by BCM, Inc. throughout November.

QUENCH WATER MONITORING

Sampling of quench and makeup waters continued in November.

VIDEO TAPING

Video taping of conventional and Kress pushes continued in November.

AREA MONITORING

Baseline samples for suspended particulate and benzene soluble matter in the area of the coke door machine continued in November. In addition, samples were obtained in November from the Kress carrier.

KRESS BOX VOC MEASUREMENTS.

Testing of the Kress boxes by Keystone Environmental Resources was conducted on October 30 & 31. This testing was performed to determine a number of volatile & semi-volatile organics including polynuclear aromatics, phenols, cresols, and phthalates held within the box during the cooling cycle. A report of the testing results from Keystone is expected by the middle of December.

KRESS BOX HEAT TRANSFER CALCULATIONS

Bethlehem's Research Group has agreed to assist in performing heat transfer calculations from the Kress box. These calculations were begun in November.

Prepared by: A. G. Ossman
December 10, 1991

December 10, 1991

ATTACHMENT 1

KRESS TESTING - PERCENT COMPLETION OF BASELINE TEST PLAN THROUGH NOVEMBER

	No. of Samples Completed	No. of Samples Needed	Percent Completion
Coal Analyses	262 days	180 days	>100%
Coke Analyses	277 days	180 days	>100%
Hampton Roads (CRI/CSR)	152 days	180 days	84%
Drop Shatter Test	35	40	88%
VEO Pushing/Travel	580 pushes	260	>100%
VEO Pushing (from TS/PS)	528 pushes	260	>100%
Video Pushing/ Travel/Discharge	23 days	13	>100%
Door Emissions	180	180	100%
Quench Water-TCLP	3	3	100%
Makeup Water-TCLP	3	3	100%
Quench Chem. Anal.	19	25	76%
Makeup Chem. Anal.	18	25	72%
Area Samples			
GC/MS	3	6	50%
GC/MS-QA	0	1	0
SP	53	50	>100%
BSO	46	50	92%
SP/BSO-QA	4	5	80%
Amb. Air	2	3	66%

KRESS TESTING - PERCENT COMPLETION FOR DEMONSTRATION TEST PLAN THROUGH NOVEMBER

	No. of Samples Completed	No. of Samples Needed	Percent Completion
Coke Analyses	90	150	60%
Hampton Roads (CRI/CSR)	90	150	60%
Drop Shatter Test	72	40	>100%
VEO Pushing/Travel	29	98 (days)	30%
VEO Pushing (from TS/PS)	29	98 (days)	30%
VEO Cooling Cycle	0	150 (days)	0
VEO Kress Burner	29	98 (days)	30%
Video Pushing/ Travel	39	46 (pushes)	85%
Video Cooling/Discharge	27	30	90%
Video Burner	34	30	>100%
Door Emissions	61	180	34%
Makeup Chem. Anal.	3	3	100%
Area Samples			
GC/MS	0	6	0
GC/MS-QA	0	1	0
SP	15	50	30%
BSO	15	50	30%
SP/BSO-QA	0	5	0
Kress Box Test	1	1	100%

ATTACHMENT 2

KRESS PUSHING EMISSION OBSERVATION QUALITY ASSURANCE DATA
NOVEMBER 25, 1991

OPACITY

OVEN NO.	OBSERVER 1 (Max. Stack Opacity Before Ignition / Max. Stack Opacity After Ignition / Max. Opacity Box/Jamb Interface)	OBSERVER 2	OBSERVER 3	AVERAGE
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 (Seconds During Push / Seconds During Travel)	OBSERVER 2	OBSERVER 3	AVERAGE
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.

KIDC DEMONSTRATION PROJECT
BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

MONTHLY REPORT OF
SAMPLING AND TESTING PROGRAM ACTIVITIES

OCTOBER, 1991

GENERAL OVERVIEW

The performance demonstration of the Kress system was conducted during October. This demonstration consisted of nine pushes per day between the hours of 11am and 7pm. These pushes were accepted by the Kress system in groups of three with a three hour cooling time between each group. During the demonstration, visible emission observations were made and three coke samples per day were obtained. In addition, video recordings of both the conventional pushes and kress pushes were made. Extended testing of the Kress system will continue through November. Other activities related to the baseline sampling and analysis program continued in October. Attachment 1 indicates the percent completion of the various aspects of the baseline sampling and testing program through the end of October.

Project Team Meetings

A visit by a number of personnel from EPA was made on October 17 to observe the Kress operation. On this day, one successful push was observed but because of power supply problems the remainder of pushes scheduled for Kress were cancelled. These problems were corrected and the Kress system resumed operation on October 18. An audit of the sampling and testing program was conducted on October 29 to 31 by EPA's contractor from Research Triangle Institute. In addition, the Kress box testing conducted by Keystone Environmental Resources during this period was observed.

Demonstration Program

The Kress system accepted a total of 158 pushes during the performance testing from October 1 to 31. During this period, visible emission observations were made and samples of the Kress coke were obtained. Video recordings of both the Kress and conventional pushes were made during this period as well. This testing will continue through November.

QA/QC Activities

An audit of the testing program was conducted by EPA's contractor from Research Triangle Institute on October 29 to 31. This audit consisted of an extensive review the data base collected to date and observation of the methods used by Bethlehem's contractor, BCM Inc., in making visible emission observations. Although not anticipated at this time, changes in the existing procedures will made as the findings of the audit require and as they are reported to us.

COAL AND COKE QUALITY

Coke Screening

One sample of Kress coke was obtained for every set of three pushes taken by Kress in October. These samples were in addition to the conventional quenched coke samples which continued to be collected. These samples are being screened to evaluate the size differential between this coke and conventional quenched coke. This information will be used to evaluate the impact on blast furnace performance.

Drop Shatter Test

Drop Shatter Testing of Kress coke was conducted in October and will continue through November.

Hampton Roads Testing Lab

Testing of Kress coke for coke reactivity index (CRI) and coke strength after reaction (CSR) were conducted by Hampton Roads Testing Lab in October. This test will continue through November. These data will be compared to the CRI/CSR data for conventional quenched coke over the same period.

BLAST FURNACE PERFORMANCE EVALUATION

No activities during the month.

DOOR EMISSIONS MONITORING

Collection of daily coke side and pusher side door emissions data are continuing.

PUSHING EMISSION MONITORING

Visible emission observations of Kress pushes were performed five days per week by BCM, Inc. throughout October. In addition, observations of ten conventional pushes per week continued in October. These observations will continue through November.

QUENCH WATER MONITORING

Sampling of quench and makeup waters continued in October. A modification to the TDS analytical procedure was initiated in October as recommended by Alliance Corp. This change involves making the TDS determination at 103-105 C instead of 180 C as directed by the EPA method. This change should provide a better estimate of particulate emissions when used with the emission formula developed by Alliance Corp. Plans for obtaining water samples from the Kress cooling system have been dropped from the program at EPA's request. This is being done so that efforts can be concentrated on other testing work which needs to be completed before the batteries are idled. A sample of the makeup water to the Kress cooling system was obtained, however, to ensure that this is essentially the same as the conventional quench water makeup.

VIDEO TAPING

Video taping of conventional and Kress pushes continued in October.

AREA MONITORING

Baseline samples for suspended particulate and benzene soluble matter in the area of the coke door machine continued in October. In addition, samples were obtained in October from the Kress carrier. This testing will continue through November.

KRESS BOX VOC MEASUREMENTS.

Testing of the Kress boxes by Keystone Environmental Resources was conducted on October 30 & 31. This testing was performed to determine a number of volatile & semi-volatile organics including polynuclear aromatics, phenols, cresols, and phthalates held within the box during the cooling cycle. A report of the testing results from Keystone is expected by the end of November or the beginning of December.

KRESS BOX HEAT TRANSFER CALCULATIONS

Bethlehem's Research Group has agreed to assist in performing heat transfer calculations from the Kress box. These calculations will be started in November.

Prepared by: A. G. Ossman
November 15, 1991

November 18, 1991

KRESS TESTING - PERCENT COMPLETION OF BASELINE TEST PLAN THROUGH OCTOBER

	No. of Samples Completed	No. of Samples Needed	Percent Completion
Coal Analyses	262 days	180 days	>100% (continuing)
Coke Analyses	277 days	180 days	>100% (continuing)
Hampton Roads (CRI/CSR)	152 days	180 days	84%
Drop Shatter Test	28	40	70%
VEO Pushing/Travel	542 pushes	260	>100% (continuing)
VEO Pushing (from TS/PS)	528 pushes	260	>100% (continuing)
Video Pushing/ Travel/Discharge	22 days	13	>100% (continuing)
Door Emissions	180	180	100% (continuing)
Quench Water-TCLP	3	3	100%
Makeup Water-TCLP	3	3	100%
Quench Chem. Anal.	17	25	68%
Makeup Chem. Anal.	16	25	64%
Area Samples			
GC/MS	1	6	17%
GC/MS-QA	0	1	0
SP	53	50	>100%(continuing)
BSO	46	50	92%
SP/BSO-QA	4	5	80%
Amb. Air	2	3	66%

KRESS TESTING - PERCENT COMPLETION FOR DEMONSTRATION TEST PLAN THROUGH OCTOBER

	No. of Samples Completed	No. of Samples Needed	Percent Completion
Coke Analyses	54	150	36%
Hampton Roads (CRI/CSR)	53	150	35%
Drop Shatter Test	40	40	100%(continuing)
VEO Pushing/Travel	16	98 (days)	16%
VEO Pushing (from TS/PS)	16	98 (days)	16%
VEO Cooling Cycle	0	150 (days)	0
VEO Kress Burner	16	98 (days)	16%
Video Pushing/ Travel	32	46 (pushes)	70%
Video Cooling/Discharge	27	30	90%
Video Burner	27	30	90%
Door Emissions	31	180	17%
Makeup Chem. Anal.	2	3	~~33%~~ 66
Area Samples			
GC/MS	0	6	0
GC/MS-QA	0	1	0
SP	5	50	10%
BSO	5	50	10%
SP/BSO-QA	0	5	0
Kress Box Test	1	1	100%

KIDC DEMONSTRATION PROJECT
BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

MONTHLY REPORT OF
SAMPLING AND TESTING PROGRAM ACTIVITIES

SEPTEMBER, 1991

GENERAL OVERVIEW

Activities related to the baseline sampling and analysis program for the Kress demonstration continued in September. We continued preliminary visible emission observations and video recordings of Kress pushes to monitor the progress of the Kress start-up operations. Kress coke samples were obtained to establish a baseline before the start of the performance demonstration. The performance demonstration is currently scheduled for the month of October. Attachment 1 indicates the percent completion of the various aspects of the baseline sampling and testing program through the end of September.

Project Team Meeting

A meeting to discuss the sampling and analysis program requirements during the Kress performance test was held on September 24. It was agreed that that the performance test would be seven days a week and would initially consist of nine pushes each day between 11am and 7pm. The nine pushes would be taken in groups of three with a three hour cooling time between each group. It was stated, however, that Kress should maximize efforts to achieve a 24 hour operation. It was also agreed that Kress should take pushes with or without the Kress door machine functioning.

Demonstration Program

The Kress system has accepted a total of 51 pushes through the end of September. The demonstration test program started on October 1. Preliminary Kress data continued to be obtained during September to monitor the start-up progress and to gain experience with visible emission observations and video taping of the Kress system prior to the October demonstration.

QA/QC Activities

An update of water sample QA/QC results are provided in Attachment 2. These data indicate good precision and accuracy by the Homer Research Laboratory. QA/QC samples for area monitoring data are provided in Attachment 3.

COAL AND COKE QUALITY

Coke Screening

The automatic coke screening equipment was installed in September. Starting in October one sample of Kress coke will be obtained for every set of three pushes taken by Kress in addition to the conventional quenched coke sample. The screening device will allow the laboratory personnel to conduct these additional sample screenings required.

Drop Shatter Test

Drop Shatter Testing of Kress coke will be initiated in October.

Hampton Roads Testing Lab

The representativeness of Kress coke samples continues to be problem e because of water spayed on the coke at the receiver station to reduce temperature. During October, some of the Kress coke will be cooled overnight to ensure that it is cool enough not to activate the receiver station water sprays.

BLAST FURNACE PERFORMANCE EVALUATION

No activities during the month.

DOOR EMISSIONS MONITORING

Collection of daily coke side and pusher side door emissions data are continuing.

PUSHING EMISSION MONITORING

Observation of baseline pushing emissions by BCM, Inc. continued in September. Observation of Kress pushes initiated in August continued in September as well.

QUENCH WATER MONITORING

Sampling of quench and makeup waters continued in September. A second TCLP test was performed on the quench and make-up waters in September. This test confirms the earlier test result which indicated that the waters are not characteristically hazardous. A modification to the TDS analytical procedure will be initiated in October as recommended by Alliance Corp. This change involves making the TDS determination at 103-105 C instead of 105 C as directed by the EPA method. This change should provide a better estimate of particulate emissions when used with the emission formula developed by Alliance Corp. Plans for obtaining water samples from the Kress cooling system have been dropped from the program at EPA's request. This is being done so that efforts can be concentrated on other testing work which needs to be completed before the batteries are idled.

VIDEO TAPING

Video taping of conventional and Kress pushes continued in September.

AREA MONITORING

Baseline samples for suspended particulate and benzene soluble matter in the area of the coke door machine continued in September. Samples will be obtained in October from the Kress carrier. Data from QA samples obtained are presented in Attachment 3.

KRESS BOX VOC MEASUREMENTS.

A draft test protocol from Keystone Engineers has been reviewed by Bethlehem and EPA. Keystone is currently revising the protocol to incorporate comments from EPA and Bethlehem. This test work is currently scheduled for the end of October or the first part of November.

Prepared by: A. G. Ossman
October 11, 1991

Attachment No. 1

October 14, 1991

KRESS TESTING - PERCENT COMPLETION OF BASELINE TEST PLAN THROUGH SEPTEMBER

	No. of Samples Completed	No. of Samples Needed	Percent Completion
Coal Analyses	261 days	180 days	>100% (continuing)
Coke Analyses	249 days	180 days	>100% (continuing)
Hampton Roads (CRI/CSR)	152 days	180 days	84%
Drop Shatter Test	10	40	25%
VEO Pushing/Travel	530 pushes	260	>100% (continuing)
VEO Pushing (from TS/PS)	421 pushes	260	>100% (continuing)
Video Pushing/ Travel/Discharge	18 days	13	>100% (continuing)
Door Emissions	180	180	100% (continuing)
Quench Water-TCLP	2	3	66%
Makeup Water-TCLP	2	3	66%
Quench Chem. Anal.	13	25	52%
Makeup Chem. Anal.	13	25	52%
Area Samples			
GC/MS	0	6	0
GC/MS-QA	0	1	0
SP	48	50	96%
BSO	29	50	58%
SP/BSO-QA	4	5	80%
Amb. Air	2	3	66%

KRESS TESTING - PERCENT COMPLETION FOR DEMONSTRATION TEST PLAN THROUGH SEPTEMBER

	No. of Samples Completed	No. of Samples Needed	Percent Completion
Coke Analyses	9	150	6%
Hampton Roads (CRI/CSR)	8	150	5%
Drop Shatter Test	0	40	0
VEO Pushing/Travel	1	98 (days)	1%
VEO Pushing (from TS/PS)	1	98 (days)	1%
VEO Cooling Cycle	0	150 (days)	0
VEO Kress Burner	1	98 (days)	1%
Video Pushing/ Travel	20	46 (pushes)	43%
Video Cooling/Discharge	15	30	50%
Video Burner	15	30	50%
Door Emissions	14	180	8%
Makeup Chem. Anal.	0	3	0
Area Samples			
GC/MS	0	6	0
GC/MS-QA	0	1	0
SP	0	50	0
BSO	0	50	0
SP/BSO-QA	0	5	0
Unflared Box (End of push)	0	2	0
Unflared Box (after cooling)	0	2	0

Attachment No. 2

BETHLEHEM STEEL
Bethlehem, PA

INTEROFFICE CORRESPONDENCE
Research Department
Planning, Administration and Technical Services

September 24, 1991

Ref: 1307

From: J. Y. Liu

To: A. G. Ossman

Subject: KRESS PROJECT WATER SAMPLES FROM SPARROWS POINT

Reference: Project Plan for Kress Indirect Dry Cooling System, Jan. 10, 1991

As requested, we have been analyzing the Kress Project water samples taken from the Sparrows Point Coke Batteries 11 and 12 since March 1991. We follow EPA methods for these analyses except for the Chloride determinations for which we use the Volhard titrimetric method. As part of our quality assurance program and the project plan (Ref), we periodically perform duplicate determinations and spike samples to check the precision and accuracy of our results. Our most recent data are shown on the following pages. The concentration of each determination, the agreement between the samples and the duplicates along with the spike values and the % recoveries are reported. As you can see, the agreement between the original samples and the duplicates are between 97% and 108% which are within the EPA expectation of 90% and 110%. The spike recoveries are above 86% which are much better than the EPA-accepted value of 75%. Some analytes such as TDS, TSS, and oil/grease are not appropriate to spike.

We have been discussing with you the possibility of having the EPA audit our laboratory. If possible, please make the necessary contacts and then advise us who to contact to discuss details of the audit. If you have any questions, contact me at x3118.

J. Y. Liu

J. Y. Liu

cc: WJRiley
LMStuart
PGCheplick
DAFLinchbaugh

SPARROWS POINT COKE BATTERIES 11 & 12 MAKE-UP WATER AND SPIKES

	Sampling Date	Make-up Water	Make-up Water Spiked	Spiked Value	Recovery
CN, ppm	8-29-91	0.03	0.23	0.20	100
Hg, ppb	7-25-91	<5	9.3	10	93
Na, ppm	8-29-91	77	113	40	90
As, ppm	7-25-91	<0.02	0.096	0.10	96
Pb, ppm	7-25-91	<0.2	1.0	1.0	100
Ca, ppm	7-25-91	25	43	20	90
Hardness, ppm	7-25-91	134	188	50	108
TSS, ppm	7-25-91	7	NA	NA	NA
TDS, ppm	7-25-91	454	NA	NA	NA
SO_4, ppm	8-29-91	76	167	100	91
Cl, ppm	8-29-91	92	135	50	86
Oil/Grease, ppm	7-25-91	14	NA	NA	NA
NH_3-N, ppm	7-25-91	<1	10	10.6	92
Phenol, ppm	7-25-91	<0.05	0.39	0.40	97

NA: Sample is not spiked.

SPARROWS POINT COKE BATTERIES 11 & 12 QUENCH WATER

	Sampling Date	Original	Duplicate	Agreement* %
CN, ppm	8-29-91	0.12	0.13	108
Hg, ppb	7-25-91	<5	<5	100
Na, ppm	7-25-91	124	123	99
As, ppm	7-25-91	0.07	0.07	100
Pb, ppm	7-25-91	<0.2	<0.2	100
Ca, ppm	7-25-91	62	60	97
Hardness, ppm	7-25-91	269	269	100
TSS, ppm	7-25-91	560	590	105
TDS, ppm	7-25-91	793	805	101
SO_4, ppm	7-25-91	172	176	102
Cl, ppm	7-25-91	189	186	98
Oil/Grease, ppm	9-10-91	<5	<5	100
NH_3-N, ppm	7-25-91	1	<1	98
Phenol, ppm	7-25-91	0.64 ?	0.68	106

* Agreement = (Duplicate / Original) x 100%

October 11, 1991

ATTACHMENT NO. 3

KRESS PROJECT 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
7/31/91	22.35	1.10
7/31/91	16.66	0.84
8/01/91	7.64	1.28
8/01/91	3.76	1.67
9/13/91	5.68	N.A.
9/13/91	8.23	N.A.

N.A.- Not available at the present time. Waiting on results from the lab.

KIDC DEMONSTRATION PROJECT
BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

MONTHLY REPORT OF
SAMPLING AND TESTING PROGRAM ACTIVITIES

AUGUST, 1991

GENERAL OVERVIEW

Activities related to the baseline sampling and analysis program for the Kress demonstration continued in August. We continued preliminary visible emission observations and video recordings of Kress pushes to monitor the progress of the Kress start-up operations. Kress coke samples were obtained to establish a baseline before the start of the performance demonstration. The performance demonstration is currently scheduled for the month of October. Attachment 1 indicates the percent completion of the various aspects of the baseline sampling and testing program through the end of August.

Project Team Meeting

A pre-audit survey by EPA and their contractor from Research Triangle Institute was held on August 12 - 14. During this visit, QA/QC procedures and sampling methods were reviewed. EPA recommended during the visit that their consultant from Alliance Corp visit Sparrows Point to observe the quench tower design and operation to develop an estimate of quench tower emissions. Bethlehem agreed and Alliance Corp's J. Jeffery visited Sparrows Point on August 29. As a result of this visit, the quench water sampling location was changed. J. Jeffery will issue a letter report of his observations with his suggested empirical correlations for estimating the quench tower particulate emissions. The correlation will be based on TDS concentration of the quench water used.

Demonstration Program

The Kress system has accepted a total of 38 pushes through the end of August. The demonstration test program is currently scheduled to start in October. Preliminary data will be obtained prior to the demonstration to monitor the start-up progress and to gain experience with visible emission observations and video tapping of the Kress system prior to the October demonstration.

QA/QC Activities

QA/QC results for water samples obtained during July are provided in Attachment 2. These data indicate good precision and accuracy by the Homer Research Laboratory. Other QA/QC samples for area monitoring and visible emission monitoring are planned for September. Bethlehem's corporate QA department has agreed to take a lead role in the performance of audits for contracted services related to this project. A meeting was held between the sampling and testing manager and the plant QA department to discuss the development of audit checklists. These checklists are currently being developed.

COAL AND COKE QUALITY

Coke Screening

The automatic coke screening equipment has been delivered. Installation by plant personnel will occur in September. It is hoped that this installation can be completed before the start of the performance test program in October. The screening device will allow the laboratory personnel to conduct the extra number of sample screenings required by the KIDC test plans. It will also provide more consistent screening procedures than the manual screening method now being used. Until this equipment is received and installed, the laboratory will use overtime to process the additional number of samples.

Drop Shatter Test

Drop Shatter Testing of Kress coke will be initiated in September. This testing is planned over a 20 week period.

Hampton Roads Testing Lab

Preliminary testing of Kress coke samples for CSR and CRI was initiated in August to monitor the start-up progress of the Kress process. The representativeness of these samples is questionable because of water spayed on the coke at the receiver station to reduce temperature. Methods will be used on future samples to obtain truly dry quenched coke samples.

BLAST FURNACE PERFORMANCE EVALUATION

No activities during the month.

DOOR EMISSIONS MONITORING

Collection of daily coke side and pusher side door emissions data are continuing. Multiple readings of doors for QA/QC were obtained in August to evaluate the accuracy and precision of the data being collected.

PUSHING EMISSION MONITORING

Observation of baseline pushing emissions by BCM, Inc. continued in August. Observations are currently scheduled for two days each week for 10 pushes each day. Observation of Kress pushes was also initiated in August in preparation for the performance demonstration.

QUENCH WATER MONITORING

Sampling of quench and makeup waters continued in August. The sampling location for quench water was changed at the end of the month as recommended by EPA's consultant from Alliance Corp. This new sampling location should provide a better estimate of TDS in the quench water which will be used in developing an estimate for particulate emissions. Results of TCLP analysis of quench and makeup waters obtained in July indicate that the water is not hazardous. A second TCLP test is planned for September.

VIDEO TAPING

Video taping of conventional pushes on 11 & 12 batteries continued in August. Videos are currently being taken once per week from two angles simultaneously. This program will continue for the next several months. Additional videos of pushes with the kress system have been initiated as well to monitor the start-up progress.

AREA MONITORING

Baseline samples for suspended particulate and benzene soluble matter in the area of the coke door machine continued in August. Additional samples will be obtained in the near future for volatiles and semi-volatiles as well as a number of quality assurance samples and background ambient air samples.

KRESS BOX VOC MEASUREMENTS.

A field survey with Keystone Environmental Resources, Inc. was conducted in August so that a testing protocol can be developed to perform this work. We have received a recommended test protocol from Keystone and will forward it to EPA for their comments and approval.

Prepared by: A. G. Ossman
September 13, 1991

September 9, 1991

ATTACHMENT 1

KRESS TESTING - PERCENT COMPLETION OF BASELINE TEST PLAN THROUGH AUGUST

	No. of Samples Completed	No. of Samples Needed	Percent Completion
Coal Analyses	241 days	180 days	>100% (continuing)
Coke Analyses	246 days	180 days	>100% (continuing)
Hampton Roads (CRI/CSR)	154 days	180 days	86%
Drop Shatter Test	6	40	15%
VEO Pushing/Travel	390 pushes	260	>100% (continuing)
VEO Pushing (from TS/PS)	380 pushes	260	>100% (continuing)
Video Pushing/ Travel/Discharge	16 days	13	>100% (continuing)
Door Emissions	180	180	100% (continuing)
Quench Water-TCLP	1	3	33%
Makeup Water-TCLP	1	3	33%
Quench Chem. Anal.	12	25	48%
Makeup Chem. Anal.	12	25	48%
Area Samples			
GC/MS	0	6	0
GC/MS-QA	0	1	0
SP	36	50	72%
BSO	29	50	58%
SP/BSO-QA	0	5	0
Amb. Air	2	3	66%

kress/_
09/13/91 12:01

Attachment 2

Sparrows Point Coke Batteries 11&12 Quench and Make-up Water

Submitted Date : 7/26/91 Reported Date : 8/16/91

Sample ID	CN ppm	Hg ppb	Na ppm	As ppm	Pb ppm	Ca ppm	Hardness ppm	TSS ppm	TDS ppm	SO4 ppm
quench water	0.12	<5	124	0.07	<.2	62	269	560	793	172
quench water duplicate	0.10	<5	123	0.07	<.2	60	269	590	805	176
make-up water	<.02	<5	72	<0.02	<.2	25	134	7	454	81
make-up water spiked	<.02	9.3	101	0.096	1.0	43	188	NA	NA	551
spike value	NA	10	40	0.10	1.0	20	50	NA	NA	500
recovery %	NA	93	73	96	100	90	108	NA	NA	102

**NA: sample is not spiked

kress/
09/13/9.

Sample ID	Cl ppm	O/G ppm	NH_3-N ppm	Phenol ppm
quench water	189	20	1	0.64
quench water duplicate	186	25	<1	0.68
make-up water	94	14	<1	<.05
make-up water spiked	138	NA	10	0.39
spike value	50	NA	10.6	0.4
recovery %	98	NA	92	95

**NA: sample is not spiked

L-72

KIDC DEMONSTRATION PROJECT
BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

MONTHLY REPORT OF
SAMPLING AND TESTING PROGRAM ACTIVITIES

JULY, 1991

GENERAL OVERVIEW

Activities related to the baseline sampling and analysis program for the Kress demonstration continued in July. In addition, we initiated preliminary visible emission observations and video recordings of Kress pushes to monitor the progress of the Kress start-up operations. Collection of Kress coke is planned for mid-August to establish a baseline before the start of the performance demonstration currently scheduled for September. Observation and video recording of baseline pushing emissions also continued. The quench water sampling program was restarted in July.

Project Team Meeting

A pre-audit survey by EPA and their contractor from Research Triangle Institute has been scheduled for August 12 - 14. The purpose of this visit is to review QA/QC procedures and sampling methods prior to the demonstration test program.

Demonstration Program

The Kress system has accepted a total of 17 pushes through the end of July. The demonstration test program is currently scheduled to start in September. Preliminary data will be obtained prior to the demonstration to monitor the start-up progress and to gain experience with visible emission observations and video tapping of the Kress system prior to the September demonstration.

QA/QC Activities

A meeting was held between the QA manager and the Sampling and Testing manager to identify actions needed to update the QA and QC aspects of the testing program. As a result of this meeting, a number of Quality Control Procedures and quality system audit checklists are being developed. In addition, arrangements are being made to audit outside laboratories involved in the testing program.

Additional quench water samples needed to perform spiked samples and multiple runs on the same sample were obtained during the month to evaluate the accuracy and precision of the analytical test methods being used by the Homer Research Lab Chemical Analysis laboratory. Other QA/QC samples for area monitoring and visible emission monitoring are planned for August.

COAL AND COKE QUALITY

Coke Screening

The automatic coke sample screening equipment should be delivered in August. It will require installation by plant personnel. It is hoped that this installation can be completed before the start of the performance test program in September. The screening device will allow the laboratory personnel to conduct the extra number of sample screenings required by the KIDC test plans. It will also provide more consistent screening procedures than the manual screening method now being used. Until this equipment is received and installed, the laboratory will use overtime to process the additional number of samples.

Drop Shatter Test

Drop Shatter Testing of baseline coke samples continued during the month. This testing will continue for a total of approximately 20 weeks. Additional testing of Kress coke will be initiated as soon as samples of the Kress coke are obtained. This testing is also planned over a 20 week period.

Hampton Roads Testing Lab

Testing of conventional coke for Coke Strength Reaction and Coke Reactivity Index by the Hampton Roads Testing Laboratory was temporarily stopped in early July because of delays in the start of steady operation of the Kress system. Testing of preliminary Kress coke samples for CSR and CRI will be initiated in August to monitor the start-up progress of the Kress process.

BLAST FURNACE PERFORMANCE EVALUATION

No activities during the month.

DOOR EMISSIONS MONITORING

Collection of daily coke side and pusher side door emissions data are continuing. BCM Inc., is collecting these data. We plan to begin entering all of these data into a computer data base. Multiple readings of doors for QA/QC are planned for August to evaluate the accuracy and precision of the data being collected.

PUSHING EMISSION MONITORING

Observation of baseline pushing emissions by BCM, Inc. continued in July. Observations are currently scheduled for two days each week for 10 pushes each day.

QUENCH WATER MONITORING

Sampling of quench and makeup waters was restarted in July. Additional samples were also obtained so that spiked samples and multiple runs on the same sample can be made for QA/QC. Samples were also obtained for TCLP analysis in July.

VIDEO TAPING

Video taping of conventional pushes on 11 & 12 batteries continued in July. Videos are currently being taken once per week from two angles simultaneously. This program will continue for the next several months. Additional videos of pushes with the kress system have been initiated as well to monitor the start-up progress.

AREA MONITORING

Baseline samples for suspended particulate and benzene soluble matter in the area of the coke door machine continued in July. Additional samples will be obtained in the near future for volatiles and semi-volatiles as well as a number of quality assurance samples and background ambient air samples. Additional personal sampling pumps and a calibrator to handle the increased number of samples during the demonstration test program was received in July.

KRESS BOX VOC MEASUREMENTS.

No activities during the month.

Prepared by: A. G. Ossman
August 9, 1991

KIDC DEMONSTRATION PROJECT
BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

MONTHLY REPORT OF
SAMPLING AND TESTING PROGRAM ACTIVITIES

JUNE, 1991

GENERAL OVERVIEW

Activities related to the baseline sampling and analysis program for the Kress demonstration continued in June. Collection of baseline data from 11 & 12 batteries relating to coal and coke properties continued. Observation and video recording of baseline pushing emissions also continued. The quench water sampling program was temporarily stopped in June because of a backlog at the Homer Research laboratory. It is anticipated that this sampling will start again in mid-July. The data base of the baseline data being collected continues to be updated.

Project Team Meeting

Members of the project team met with EPA on June 13 & 14 to review data collection procedures and to review the QA/QC plan for the program.

Demonstration Program

The Kress system accepted 6 pushes through the end of June. Collection of data for the demonstration test program will begin once the system becomes fully operational. Spot checks of coke quality and emission readings from the system may be obtained on a periodic basis to monitor the start-up progress.

QA/QC Activities

It is anticipated that audits of the analytical and testing laboratories by BSC and EPA will be scheduled at the start of the demonstration test program and again halfway through the program.

COAL AND COKE QUALITY

Coke Screening

The Sparrows Point Plant Laboratory has initiated the purchase of automatic coke sample screening equipment which will allow the laboratory personnel to conduct the extra number of sample screenings required by the KIDC test plans. It will also provide more consistent screening procedures than the manual screening method now being used. Until this equipment is received and installed, the laboratory will use overtime to process the additional number of samples. Delivery of this equipment is expected in early August.

Drop Shatter Test

Drop Shatter Testing of baseline coke samples continued during the month. This testing will continue for approximately 20 weeks. Additional testing of Kress coke will be initiated as soon as steady operation of the Kress system is attained. This testing is also planned over a 20 week period.

Hampton Roads Testing Lab

Testing of conventional coke for Coke Strength Reaction and Coke Reactivity Index by the Hampton Roads Testing Laboratory continued in June. This testing was temporarily stopped at the end of the month, however, because of delays in the start of steady operation of the Kress system. This testing will continue once steady operation of the Kress system is attained.

BLAST FURNACE PERFORMANCE EVALUATION

No activities during the month.

DOOR EMISSIONS MONITORING

Collection of daily coke side and pusher side door emissions data are continuing. BCM Inc., is collecting these data. We plan to begin entering all of these data into a computer data base.

PUSHING EMISSION MONITORING

Observation of baseline pushing emissions by BCM, Inc. continued in June. Observations are currently scheduled for two days each week for 10 pushes each day.

QUENCH WATER MONITORING

Sampling of quench and makeup waters was stopped in June because of a backlog at the Homer Research laboratory. Sampling is expected to start again in mid-July. Sampling and analysis for TCLP constituents is also planned for July.

VIDEO TAPING

Video taping of pushes on 11 & 12 batteries continued in June. Videos are currently being taken once per week from two angles simultaneously. This program will continue for the next several months.

AREA MONITORING

Baseline samples for suspended particulate and benzene soluble matter in the area of the coke door machine continued in June. Additional samples will be obtained in the near future for volatiles and semi-volatiles as well as a number of quality assurance samples and background ambient air samples. A purchase order has been issued for additional personal sampling pumps and a calibrator to handle the increased number of samples during the demonstration test program. Delivery of this equipment is expected in early July.

KRESS BOX VOC MEASUREMENTS.

No activities during the month.

Prepared by: A. G. Ossman
July 5, 1991

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KIDC DEMONSTRATION PROJECT
BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

MONTHLY REPORT OF
SAMPLING AND TESTING PROGRAM ACTIVITIES

MAY, 1991

GENERAL OVERVIEW

Activities related to the baseline sampling and analysis program for the Kress demonstration continued in May. Collection of baseline data from 11 & 12 batteries relating to coal and coke properties continued. Observation and video recording of baseline pushing emissions also continued along with the quench water sampling program during the month. All the baseline data collected is being entered into a data base for comparison with data to be collected during the Kress demonstration.

Project Team Meeting

A project team meeting was held on April 29 to review activities, data collection, and schedules related to the test program. Minutes of this meeting were issued. The next project team meeting will be scheduled as needed.

Demonstration Program

Delays in the start-up of the Kress system relating to the construction of the Kress carrier have delayed the start of the Demonstration Test Plan. Current schedules indicate that start-up of the Kress system should occur in mid-June. Initiation of the Demonstration Test Plan is planned to coincide with this start-up.

EPA Review of Test Program Reports

A response to EPA's comments on the Baseline, Demonstration and Quality Assurance Test reports has been completed and has been sent to EPA. A visit to Sparrows Point by EPA is scheduled for June 13 & 14 so that they can observe and discuss data collection procedures.

COAL AND COKE QUALITY

Coke Screening

The Sparrows Point Plant Laboratory has initiated the purchase of automatic coke sample screening equipment which will allow the laboratory personnel to conduct the extra number of sample screenings required by the KIDC test plans. It will also provide more consistent screening procedures than the manual screening method now being used. Until this equipment is received and installed, the laboratory will use overtime to process the additional number of samples. Delivery of this equipment is expected in early August.

Drop Shatter Test

Drop Shatter Testing of baseline coke samples was initiated during the month. This testing will continue for approximately 20 weeks. Additional testing of Kress coke will be initiated as soon as steady operation of Kress system is attained. This testing is also planned over a 20 week period.

Hampton Roads Testing Lab

Testing of conventional coke for Coke Strength Reaction and Coke Reactivity Index by the Hampton Roads Testing Laboratory continued in May.

BLAST FURNACE PERFORMANCE EVALUATION

No activities during the month.

DOOR EMISSIONS MONITORING

Collection of daily coke side and pusher side door emissions data are continuing. BCM Inc., is collecting these data. We plan to begin entering all of these data into a computer data base.

PUSHING EMISSION MONITORING

Observation of baseline pushing emissions by BCM, Inc. continued in May. Observations are currently scheduled for two days each week for 10 pushes each day.

QUENCH WATER MONITORING

Sampling of quench and makeup waters continued in May. Samples are currently being collected once per week. This program will continue for the next several months. We are currently investigating other labs to perform the required analyses because of a backlog at the Homer Research laboratory.

VIDEO TAPING

Video taping of pushes on 11 & 12 batteries continued in May. Videos are currently being taken once per week from two angles simultaneously. This program will continue for the next several months.

AREA MONITORING

Baseline samples for suspended particulate and benzene soluble matter in the area of the coke door machine continued in May. Additional samples will be obtained in the near future for volatiles and semi-volatiles as well as a number of quality assurance samples and background ambient air samples. We are currently investigating the purchase of additional personal sampling pumps and a calibrator to handle the increased number of samples which will need to be obtained when the Kress system starts up.

KRESS BOX VOC MEASUREMENTS.

No activities during the month.

Prepared by: A. G. Ossman
June 7, 1991

KIDC DEMONSTRATION PROJECT
BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

MONTHLY REPORT OF
SAMPLING AND TESTING PROGRAM ACTIVITIES

APRIL, 1991

GENERAL OVERVIEW

Activities related to the baseline sampling and analysis program for the Kress demonstration continued in April. Collection of baseline data from 11 & 12 batteries relating to coal and coke properties continued. Observation and video recording of baseline pushing emissions also continued along with the quench water sampling program during the month. All the baseline data collected is being entered into a data base for comparison with data to be collected during the Kress demonstration.

Project Team Meeting. A project team meeting was held on April 29 to review activities, data collection, and schedules related to the test program. Minutes of this meeting have been issued. The next project team meeting will be scheduled as needed.

Demonstration Program. Delays in the start-up of the Kress system relating to the construction of the Kress carrier have delayed the start of the Demonstration Test Plan. Current schedules indicate that start-up of the Kress system should occur in May. Initiation of the Demonstration Test Plan is planned to coincide with this start-up.

EPA Review of Test Program Reports. A response to EPA's comments on the Baseline, Demonstration and Quality Assurance Test reports has been completed and has been sent to EPA. A visit to Sparrows Point by EPA is scheduled for June 13 & 14 so that they can observe and discuss data collection procedures.

COAL AND COKE QUALITY

Coke Screening. The Sparrows Point Plant Laboratory has initiated the purchase of automatic coke sample screening equipment which will allow the laboratory personnel to conduct the extra number of sample screenings required by the KIDC test plans. It will also provide more consistent screening procedures than the manual screening method now being used. Until this equipment is received and installed, the laboratory will use overtime to process the additional number of samples.

Drop Shatter Test Equipment. Drop Shatter Test equipment which was constructed by BSC's Research Dept. has been tested and delivered to Sparrows Point. Training of Sparrows Point personnel will be performed in early May and initiation of baseline Drop Shatter Tests should begin soon after.

Hampton Roads Testing Lab. Testing of conventional coke for Coke Strength Reaction and Coke Reactivity Index by the Hampton Roads Testing Laboratory continued in April.

BLAST FURNACE PERFORMANCE EVALUATION.

No activities during the month.

DOOR EMISSIONS MONITORING

Collection of daily coke side and pusher side door emissions data are continuing. BCM Inc., is collecting these data. We plan to begin entering all of these data into a computer data base.

PUSHING EMISSION MONITORING

Observation of baseline pushing emissions by BCM, Inc. continued in April. Observations are currently scheduled for two days each week for 10 pushes each day.

QUENCH WATER MONITORING

Sampling of quench and makeup waters continued in April. Samples are currently being collected once per week. This program will continue for the next several months.

VIDEO TAPING

Video taping of pushes on 11 & 12 batteries continued in April. Videos are currently being taken once per week from two angles simultaneously. This program will continue for the next several months.

AREA MONITORING

Baseline samples for suspended particulate and benzene soluble matter in the area of the coke door machine was initiated in April. Additional samples will be obtained in the near future for volatiles and semi-volatiles as well as a number of quality assurance samples and background ambient air samples.

KRESS BOX VOC MEASUREMENTS.

No activities during the month.

Prepared by: A. G. Ossman
May 10, 1991

KIDC DEMONSTRATION PROJECT
BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

MONTHLY REPORT OF
SAMPLING AND TESTING PROGRAM ACTIVITIES

MARCH, 1991

GENERAL OVERVIEW

Activities related to the baseline sampling and analysis program for the Kress demonstration continued in March. Collection of baseline data from 11 & 12 batteries relating to coal and coke properties continued. Observation and video recording of baseline pushing emissions was initiated. The quench water sampling program was also initiated during the month. All the baseline data collected is being entered into a data base for comparison with data to be collected during the Kress demonstration.

Project Team Meeting. A project team meeting will be scheduled for the end of April to review activities, data collection, and schedules related to the test program.

Demonstration Program. Delays in the start-up of the Kress system relating to the construction of the Kress carrier have delayed the start of the Demonstration Test Plan. Current schedules indicate that start-up of the Kress system should occur in mid-May. Initiation of the Demonstration Test Plan is planned to coincide with this start-up.

EPA Review of Test Program Reports. A response to EPA's comments on the Baseline, Demonstration and Quality Assurance Test reports has been completed and will be sent to EPA.

COAL AND COKE QUALITY

Coke Screening. The Sparrows Point Plant Laboratory has initiated the purchase of automatic coke sample screening equipment which will allow the Laboratory personnel to conduct the extra number of sample screenings required by the KIDC test plans. It will also provide more consistent screening procedures than the manual screening method now being used.

Drop Shatter Test Equipment. Drop Shatter Test equipment which was constructed by BSC's Research Dept. has been tested and delivered to Sparrows Point. Initiation of baseline Drop Shatter Tests should begin in mid-April.

Hampton Roads Testing Lab. Testing of conventional coke for Coke Strength Reaction and Coke Reactivity Index by the Hampton Roads Testing Laboratory was initiated in March.

BLAST FURNACE PERFORMANCE EVALUATION.

No activities during the month.

DOOR EMISSIONS MONITORING

Collection of daily coke side and pusher side door emissions data are continuing. BCM Inc., is collecting these data. We plan to begin entering all of these data into a computer data base.

PUSHING EMISSION MONITORING

Observation of baseline pushing emissions by BCM, Inc. was initiated in March. Observations are currently scheduled for two days each week for 10 pushes each day.

QUENCH WATER MONITORING

Sampling of quench and makeup waters was initiated in March. Samples are currently being collected once per week. This program will continue for the next several months.

VIDEO TAPING

Video taping of pushes on 11 & 12 batteries was initiated in March. Videos are currently being taken once per week from two angles simultaneously. This program will continue for the next several months.

AREA MONITORING

We expect to begin collecting baseline samples for suspended particulate and benzene soluble matter in the area of the coke door machine in April.

KRESS BOX VOC MEASUREMENTS.

No activities during the month.

Prepared by: A. G. Ossman
April 11, 1991

KIDC DEMONSTRATION PROJECT
BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

MONTHLY REPORT OF
SAMPLING AND TESTING PROGRAM ACTIVITIES

FEBRUARY, 1991

GENERAL OVERVIEW

During the month of February a number of activities were initiated or completed to begin the collection of the information required by the Baseline and Demonstration Test Programs. These are discussed in the following paragraphs.

Project Team Meeting. On February 6, 1991 a meeting was held at Sparrows Point of the Sampling and Testing project team to review the overall test programs required, the test program schedules and personnel responsibilities. Several followup actions were initiated as a result of this meeting.

Demonstration Program Delay. There has been an extended delay in the startup of the KIDC demonstration project due to a number of factors relating to the construction of the KRESS Carrier. This delay has delayed the start of the Demonstration Test Plan. However, we have begun collecting information related to the Baseline Test Plan and have initiated training and practice programs for several activities which will be helpful during the conduct of the Test Plans. Revised test program schedules will be dveloped as soon as a new contruction/startup schedule has been established.

EPA Review of Test Program Reports. We have received EPA's comments on our Baseline, Demonstration and Quality Assurance Test reports and have begun preparing a response. In general, EPA's comments do not appear to be sufficient to delay the test program activities. We expect to have a response to EPA's comments completed by the end of March.

DATA MANAGER

We have retained the services of J. W. Pasquali for the Data Manager position and he has begun collecting and computer entry of several of the Baseline Data for coal and conventional coke quality, coke battery operating conditions.

COAL AND COKE QUALITY

Coke Screening. The Sparrows Point Plant Laboratory has initiated the purchase of a automatic coke sample screening equipment which will allow the Laboratory personnel to conduct the extra number of sample screenings required by the KIDC test plans. It will also provide more consistent screening procedures than the manual screening method now being used.

Drop Shatter Test Equipment. BSC's Research Dept. has completed the construction of the Drop Shatter Test Equipment. This equipment will be shipped to Sparrows Point for installation at the Sparrows Point Laboratory in March.

Hampton Roads Testing Lab. We have retained the Hampton Roads Testing Laboratory to conduct the Coke Strength Reaction tests required of both conventional and KIDC coke.

BLAST FURNACE PERFORMANCE EVALUATION.

No activities during the month.

DOOR EMISSIONS MONITORING

Collection of daily coke side and pusher side door emissions data are continuing. BCM Inc., is collecting these data. We plan to begin entering all of these data into a computer data base.

PUSHING EMISSION MONITORING

No activities during the month. We expect to begin collecting Baseline Pushing Emissions observations in March.

QUENCH WATER MONITORING

No activities during the month.

VIDEO TAPING

Two video cameras and tripods have been purchased and a few practice video taping trials have been conducted at Sparrows Point inorder to locate the best positions for filming.

AREA MONITORING

No activities during the month. We expect to begin collecting baseline samples for suspended particulate and benzene soluble matter in April.

KRESS BOX VOC MEASUREMENTS.

No activities during the month.

Prepared by: L. M. Stuart
March 13, 1991

Section 4

Observer Method 9 Certifications

Essex Community College

presents an award of completion

to

FRANK R. CAMPEGGI

For Completion of the Continuing Education Course

VISIBLE EMISSIONS EVALUATION TRAINING AND TESTING

Inclusive Dates of the Course May 20, 21, & 22, 1991

Continuing Education Units Awarded 2.5

Donald J. Slowinski, President

May 23, 1991

Date

Andrew J. Snope, Dean of Instruction

L-87

Essex Community College

presents an award of completion

to

RONALD J. ABRAMOWSKI

For Completion of the Continuing Education Course

VISIBLE EMISSIONS EVALUATION TRAINING AND TESTING

Inclusive Dates of the Course: May 20, 21, & 22, 1991

Continuing Education Units Awarded: 2.5

Donald J. Slowinski, President

May 23, 1991

Date

Andrew J. Snope, Dean of Instruction

L-88

Essex Community College

presents an award of completion

to

L-89

EUGENE P. WARD

For Completion of the Continuing Education Course

VISIBLE EMISSIONS EVALUATION TRAINING AND TESTING

Inclusive Dates of the Course May 20, 21, & 22, 1991

Continuing Education Units Awarded 2.5

Donald J. Slowinski, President

May 23, 1991

Date

Andrew J. Snope, Dean of Instruction

Essex Community College

presents an award of completion

to

SAMUEL B. POIST III

For Completion of the Continuing Education Course

VISIBLE EMISSIONS EVALUATION TRAINING AND TESTING

Inclusive Dates of the Course: May 20, 21, & 22, 1991

Continuing Education Units Awarded: 2.5

Donald J. Slowinski, President

Andrew J. Snope, Dean of Instruction

May 23, 1991

Date

L-90

Essex Community College

presents an award of completion

to

RICHARD E. ABRAMOWSKI

For Completion of the Continuing Education Course

VISIBLE EMISSIONS EVALUATION TRAINING AND TESTING

Inclusive Dates of the Course: May 20, 21, & 22, 1991

Continuing Education Units Awarded: 2.5

Donald J. Slowinski, President

Andrew J. Snope, Dean of Instruction

May 23, 1991

Date

L-91

Section 5

American Medical Laboratory Quality Assurance

AML®
INDUSTRIAL HYGIENE LABORATORY®
A DIVISION OF AMERICAN MEDICAL LABORATORIES, INC.
11091 Main Street . Fairfax, Virginia 22030 . (703)691-9100

March 25, 1991

Mr. George Ossman
Homer Research Labs, C-Building
Bethlehem Steel Corporation
Bethlehem, PA 18016

Dear Mr. Ossman:

In response to your request I have enclosed copies of several documents which demonstrate our commitment to quality including several of our certifications and accreditations and a general quality assurance statement. AML-Industrial Hygiene is accredited by the American Industrial Hygiene Association (AIHA), the National Voluntary Laboratory Accreditation program (NVLAP), and is certified by the Commonwealth of Virginia and the State of Florida to perform analysis of drinking water for inorganic parameters. The laboratory participates in several voluntary proficiency programs including a program for lead and arsenic in filters and one for the determination of PCB's in biological materials.

For the analyses which we discussed, BSFTPM and total particulate the following procedures are currently in place. Most of the samples that we currently analyze for BSFTPM are OSHA related so the final extract volume is too small for any type of repeat analysis. Filters are all prewashed with benzene and upon return to the laboratory, a blank sample is analyzed with every group of nine samples. This is in addition to the blanks that may be submitted by the client. We keep a record of these values and have established lower and upper control levels, which, if exceeded, require investigation. If duplicate samples could be obtained, we would be more than happy to compare extracted values and statistically monitor any significant changes. With regard to total particulate, filters are preweighed and every tenth filter is reweighed and compared with the original filter weight. A record of this information is also kept. Before any filter weights are taken, the electronic balance is calibrated with a class S standard weight on a daily basis and a record of these weights is monitored.

If you need any additonal information, please contact me.

Sincerely,

Fred I. Grunder

AMERICAN INDUSTRIAL HYGIENE ASSOCIATION

American Medical Laboratories
Industrial Hygiene Laboratory
Fairfax, Virginia

has fulfilled AIHA criteria for
Industrial Hygiene Laboratory Accreditation
since September 1, 1982
This accreditation shall be effective until
the 1st day of September, 1991
subject to continued compliance with
AIHA accreditation criteria.

Chairman
Laboratory Accreditation
Committee

President
American Industrial Hygiene
Association

#206
Accreditation Number

February 2, 1989
Date

United States Department of Commerce
National Institute of Standards and Technology

NVLAP

Certificate of Accreditation

AMERICAN MEDICAL LABORATORIES, INC.
FAIRFAX, VA

is recognized under the National Voluntary Laboratory Accreditation Program for satisfactory compliance with criteria established in Title 15, Part 7 Code of Federal Regulations. Accreditation is awarded for specific services, listed on the Scope of Accreditation, for:

ASBESTOS FIBER ANALYSIS

April 1, 1990
Effective until

DEPARTMENT OF COMMERCE · UNITED STATES OF AMERICA

For the National Institute of Standards and Technology

L-95

COMMONWEALTH of VIRGINIA

DEPARTMENT OF GENERAL SERVICES

DIVISION OF
CONSOLIDATED LABORATORY SERVICES

February 21, 1989

1 NORTH 14TH STREET
RICHMOND, VIRGINIA 23219

Mr. Fred I. Grunder
American Medical Laboratories
11091 Main Street
Fairfax, VA 22030

Enclosed is a copy of the on-site evaluation report for American Medical Laboratories conducted on February 9, 1989 in accordance with the provisions of the Regulations for the Certification of Laboratories Analyzing Drinking Water in the Commonwealth of Virginia.

This report addresses itself to the deviations found in the area of Microbiology and Inorganic Chemistry. All deviations are included under the broad headings: Laboratory Equipment and Supplies; Sample Collecting, Handling, and Preservation; General Laboratory Practices; and Methodology and Analytical Quality Control.

Comments on specific deviations are listed under broad headings. If no specific entries are made under such headings, this indicates that no deviations were observed at the time of the on-site visit.

LABORATORY CERTIFICATION (BY SECTIONS)

MICROBIOLOGY - CERTIFIED

Total Coliform - MF Procedure

INORGANIC - CERTIFIED

Arsenic, Barium, Cadmium, Chromium, Copper, Iron, Lead, Manganese, Selenium, Silver, Zinc, Fluoride, Nitrate, Chloride, Sulfate, pH

Your Laboratory I.D. Number is 00003.

Effective February 1989 through January 1992.

A letter to confirm and document the corrections of the listed deviations must be received by this office within sixty (60) days after receipt of this correspondence.

State of Florida
Department of Health and Rehabilitative Services

Office of Laboratory Services
Post Office Box 210
Jacksonville, Florida 32231

1990 - 1991

This is to certify that the laboratory named below has complied with section 10D-41 of the Florida Administrative Code pertaining to water testing in the following categories: Inorganic-Primary**********

EFFECTIVE: October 31, 1990 through June 30, 1991

№ 90253
HRS#87348
American Medical Laboratories
11091 Main Street
Fairfax, VA 22030

Eldert C. Hartwig, Jr., Sc.D., M.P.H.
Chief, Laboratory Services
Office of Laboratory Services
HRS Form 1629, Apr 90

NON-TRANSFERABLE

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF COMMERCE
3600 West Broad Street, Richmond, VA 23230
Telephone: 1 (804) 367-8500

VIRGINIA ASBESTOS LICENSE
ASBESTOS ANALYTICAL LABORATORY LICENSE

EXPIRES	NUMBER
08-31-91	000003

AMERICAN MEDICAL LABORATORIES, INC.
11091 MAIN STREET

FAIRFAX, VA 22030

Milton K. Brown, Jr.
Milton K. Brown, Jr., Director

(POCKET CARD) 3333000003 (DETACH HERE)

COMMONWEALTH OF VIRGINIA — DEPARTMENT OF COMMERCE — 3600 West Broad Street Richmond, Virginia 23230

VIRGINIA ASBESTOS LICENSE
ASBESTOS ANALYTICAL LABORATORY

NUMBER 000003
EXPIRES 08-31-91

(FOLD)

AMERICAN MEDICAL LABORATORIES, INC.
11091 MAIN STREET

FAIRFAX, VA 22030

L-98

Industrial Hygiene QC Plan

A. Introduction:

To maintain high standards of quality established by the management of American Medical Laboratories, Inc.® (AML®), is essential that each employee of AML have full knowledge of the Quality Assurance objectives, policies and programs as published. This policy is required to maintain the public confidence associated with the reliability of results reported on constituents analyzed at AML.

B. Purpose:

To establish Quality Assurance guidelines, procedures and control practices to assure the appropriate performance of all departments of the laboratory.

C. Policy:

The Quality Assurance Program at AML is designed to require the active involvement of all employees and to:

1. Assure satisfactory handling of specimens from collection through analysis which will ensure an acceptable level of integrity of the specimens.

2. Provide instrument maintenance schedules to include both functional checks and preventive maintenance.

3. Establish a protocol for the adequate evaluation of methodologies prior to selection and implementation.

4. Provide adequate space, equipment and stable control materials and reagents to accomplish the mission of the laboratory.

5. Ensure the competence of the personnel to perform the tasks required.

6. Enhance communication by providing a comprehensive program followed by instruction in quality philosophy.

7. Develop specific Quality Assurance objectives and a system for monitoring the program to achieve the performance required.

8. Provide support, supervision and communication between all levels of management and staff members.

D. Responsibility:

1. Director of Laboratories

It shall be the role of the Laboratory Director, or his delegate, the Vice-President of Clinical Operations, to

set the objectives of the laboratory Quality Assurance Program.

2. Quality Assurance Supervisor

   a. It shall be the primary responsibility of the Quality Assurance Department to design, execute, monitor and evaluate all Quality Assurance programs to ensure that the objectives set by the Laboratory Director are fulfilled.

   b. It shall be the responsibility of the Quality Assurance Supervisor or delegate to manage the required Proficiency Testing programs offered by:

      1) College of American Pathology (CAP)
      2) Centers for Disease Control (CDC)
      3) National Institute for Occupational Safety and Health (NIOSH)
      4) Commonwealth of Virginia
      5) Commonwealth of Pennsylvania
      6) Environmental Proection Agency Quality Control Program
      7) State of New York

      Other Quality Control Programs which are not mandatory are also managed by the Quality Assurance Office. These include:

      1) Wellcome Immunoassay Quality Control Programs (I and II)
      2) Wellcome Clinical Chemistry Quality Control Programs
      3) American Association of Clinical Chemistry - Therapeutic Drug Monitoring Program (AACC-TDM)
      4) American Association of Clinical Chemistry - Endocrinology Program (AACC-ENDO).

3. Technical Director or Technical Supervisor

   a. It shall be the responsibility of the Technical Director or Technical Supervisor of each department to assure that each technical member of the department staff has read and signed the Quality Assurance Statement written for the department. The statement will be initialed and dated again at the time of annual review.

   b. It shall be the responsibility of each Technical Director or Technical Supervisor to monitor all

Quality Assurance procedures in their respective departments and to assure that they are performed properly and in a timely manner.

c. It shall be the responsibility of each Technical Director or Technical Supervisor to: (1) respond appropriately when notified of control or instrument problems. (2) Institute corrective action as required. (3) Document action taken. The Technical Director or Technical Supervisor should inform the appropriate Vice-President of any unresolved methodology problems.

d. It shall be the responsibility of each Technical Director or Technical Supervisor to order and maintain a sufficient supply of control materials to assure availability of these controls at all times. (When possible, at least a 12 month supply should be ordered.)

e. It shall be the responsibility of each Technical Director or Technical Supervisor to assure the parallel analysis of each new lot number of control material introduced into the department. This will assure that acceptable parameters for the new control materials are established prior to its being placed in use. In areas where control material is not available, other parameters will be assessed.

4. Employees

a. It shall be the responsibility of each employee of AML to perform all Quality Assurance procedures as published.

b. It shall be the responsibility of each employee of AML to report all Quality Assurance problems to the appropriate supervisor immediately.

E. Analytical Procedures:

1. All analytical procedures shall be approved by the division Director/Supervisor.

2. The procedures in each department shall be read by the technical staff. Any unauthorized changes in any procedure are prohibited. Procedures are to be followed as written unless otherwise instructed by the Technical Director. Sample collection, storage, processing and analysis information is included in each method.

3. The following protocol will apply in all technical areas:

   a. Quality control specimens should be analyzed with each set of specimens when control material is available for that analyte.

   b. The results of all quality control specimens shall be evaluated and recorded prior to the release of results on any sample.

   c. When the results of quality control samples are not acceptable, the problem shall be defined and no results will be released until it is approved by the Technical Director of his designate.

   d. The Quality Assurance Department shall be notified by all departments of the following changes:

      1) Change in test methodology
      2) Change in manufacturer of reagents
      3) Change in control material, lot number or manufacturer
      4) Addition of a new test procedure

   e. Temperature of all water baths, refrigerators, freezers, and ovens shall be recorded and evaluated every day they are in use.

   f. The speed of all centrifuges and rotators shall be checked monthly. Repairs are to be accomplished as required.

   g. All new thermometers shall be calibrated against an NBS certified thermometer before being put into service and at least annually thereafter.

   h. All micropipettes shall be calibrated every month.

   i. Each deionized water outlet shall be examined for bacterial growth on a scheduled monthly basis.

   j. All instruments shall be calibrated and maintained as described by manufacturer.

      Maintenance records for all instruments will be reviewed on a weekly basis. A written report of this review will be submitted to the Quality Assurance Office.

BSFTPM - Blanks

Blank WEIGHT (mg)

START - 11/26/90
END - 1/13/91

Date	Value	Comment	TECH	-3S (-0.020)	-2S (-0.010)	-1S (0.000)	MEAN (+0.010)	+1S (+0.020)	+2S (+0.030)	+3S (+0.040)
11/26	0.013							X		
11/26	0.014							X		
11/27	0.021								X	
11/27	0.016							X		
11/28	0.015							X		
11/28	0.017							X		
11/29	0.038									X
11/29	0.045								X	
11/30	0.030								X	
11/30	0.017							X		
11/30	0.014							X		
12-3	0.013							X		
12-3	0.016							X		
12-4	0.023								X	
12-5	0.017							X		
12-5	0.031								X	
12-6	0.020							X		
12-6	0.018							X		
12-7	0.015							X		
12-7	0.017							X		
12-10	0.013							X		
12-10	0.019							X		
12-11	0.016							X		
12-11	0.023								X	
12-12	0.022								X	
12-13	0.019							X		
12-14	0.024								X	
12-17	0.019							X		
12-18	0.018							X		
12-19	0.019							X		
12-21	0.013							X		
12/26	0.019							X		
12/27	0.010						X			
12/27	0.0070					X				
12/28	0.012						X			
1/3	0.0075					X				
1/3	0.013						X			
1-8	0.0087					X				
1-8	0.0090					X				
1/9	0.0096					X				
1/9	0.0068					X				
1/10	0.0066					X				
1/10	0.0066					X				
1/13	0.0085					X				

LEVI-JENNINGS CHART

DATE: 10/01/90

GRAVIMETRIC
RE-WEIGHS OF FILTERS
START DATE: 10-2-90
END: 1/11/91

% RPD

$$\% RPD = 100 \times \frac{[\text{first weight (mg)} - \text{2nd weight (}}{\text{AVE (mg)}}$$

0% 5% 10% 15%

Date	Value	FILTER NUMBER	TECH	-3S	-2S	-1S	MEAN	+1S	+2S	+3S
10-2-90	0.00	6457	[illegible]							
10-3-90	0.00	6467	[illegible]							
10-8-90	0.02	6477	[illegible]							
10-9-90	0.01	6487	[illegible]							
10-9-90	0.00	6497	[illegible]							
10-11-90	0.04	6517	MM							
10-11-90	0.04	6527	MM							
10-12-90	0.01	6537	MM							
10-12-90	0.02	6547	MM							
10-13-90	0.02	6559	MM							
10-17-90	0.00	6569	[illegible]							
10-18-90	0.02	6579	[illegible]							
10-19-90	0.00	6589	[illegible]							
10-19-90	0.00	6599	[illegible]							
10-19-90	0.01	6608	[illegible]							
10-26-90	0.04	6619	[illegible]							
-26-90	0.01	6629	[illegible]							
[illegible]	0.02	6639	[illegible]							
11/[illegible]	0.00	6649	[illegible]							
11-3-90	0.02	6609	MM							
11-5-90	0.02	6687	MM							
11-5-90	0.00	6697	MM							
11-6-90	0.01	6707	MM							
11-6-90	0.01	6717	MM							
11-7-90	0.00	6727	MM							
11-7-90	0.00	6737	MM							
11-8-90	0.00	6747	MM							
11-8-90	0.00	6757	[illegible]							
11-9-90	0.00	6767	MM							
11-12-90	0.00	6777	[illegible]							
11-20-90	0.00	6787	[illegible]							
11-20-90	0.00	6797	MM							
11/26/90	0.00	6807	[illegible]							
11/26/90	0.00	6817	[illegible]							
12/6/90	0.01	6827	[illegible]							
12/6/90	0.00	6837	MM							
12/6/90	0.00	6847	MM							
12/7/90	0.00	6857	[illegible]							
12/11/90	0.00	6867	[illegible]							
12/14/90	0.00	6877	[illegible]							
1/4/91	0.00	6887	[illegible]							
1/4/91	0.00	6897	[illegible]							
1/5/91	0.00	6907	[illegible]							
1/10/91	0.00	6917	[illegible]							
1/11/91	0.00	6927	[illegible]							

MONTH MAR YEAR 91

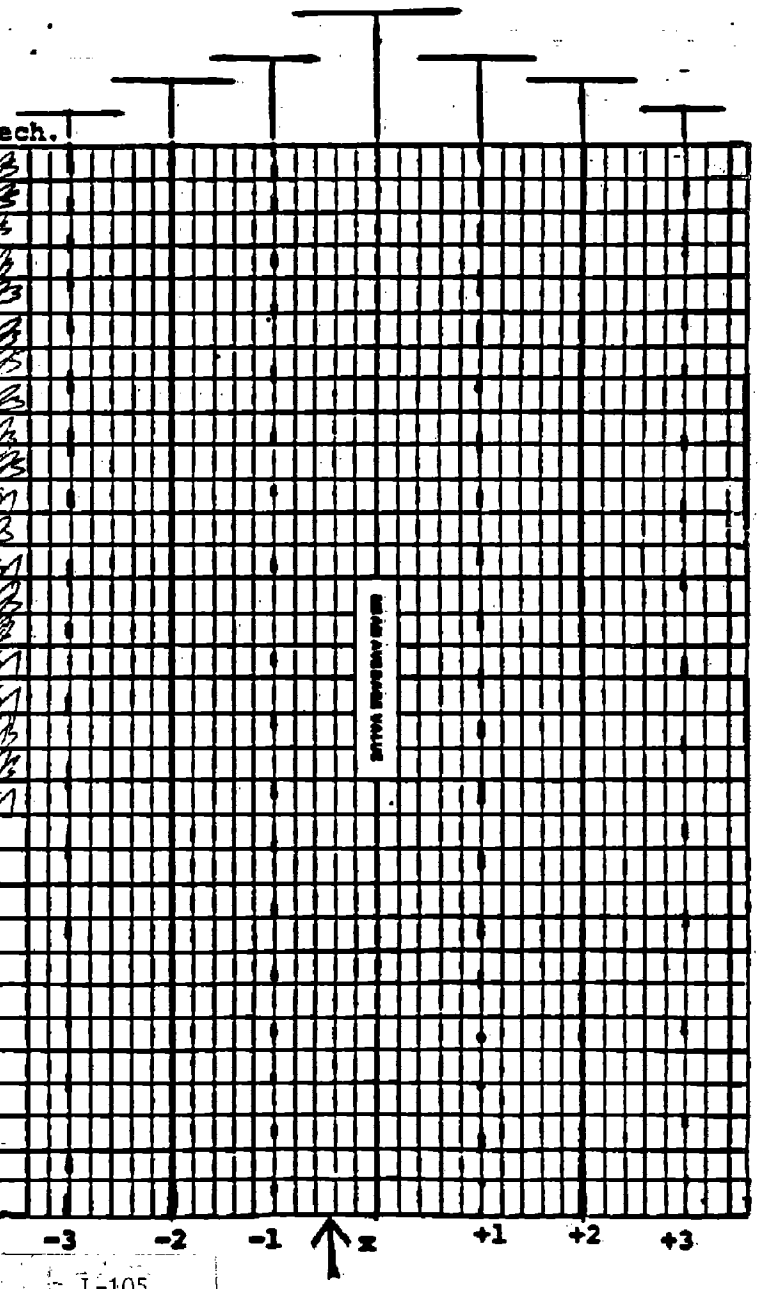
PROCEDURE: CALIBRATION INSTRUMENT: CAHN 29

CONTROL: 20 mg wt LOT # _____

MEAN _____ 2SD _____ C.V. _____

2 S.D. RANGE _____

Date	Value	Comment	Tech.
3/1	20.0178	50 mm	[illegible]
3/3	20.0187	"	[illegible]
3/5	20.0178	"	[illegible]
3/6	20.0188	"	[illegible]
3/7	20.0180	"	[illegible]
3/8	20.0187	"	[illegible]
3/10	20.0183	"	[illegible]
3/11	20.0182	"	[illegible]
3/12	20.0185	"	[illegible]
3/13	20.0177	"	[illegible]
3/14	20.0188	"	[illegible]
3/15	20.0176	"	[illegible]
3/17	20.0187	"	[illegible]
3/18	20.0184	"	[illegible]
3/19	20.0186	"	[illegible]
3/20	20.0193	"	[illegible]
3/21	20.0187	"	[illegible]
3/22	20.0181	"	[illegible]
3/23	20.0185	"	[illegible]
3/25	20.0179	"	[illegible]



Section 6

Keystone Environmental Resources, Inc. Quality Assurance

KEYSTONE
ENVIRONMENTAL RESOURCES, INC.
3000 Tech Center Drive
Monroeville, PA 15146
412 825-9600
FAX 412 825-9699

Ref. No. 395110-01

August 3, 1992

Mr. George Ossman
Bethlehem Steel Corporation
Homer Research Laboratories
Building C
Bethlehem, PA 18016

Dear Mr Ossman:

Re: Kress Box Report, Response to EPA Comments

In response to EPA's comments on the report summarizing the determination of concentrations of volatile and semi-volatile compounds in the headspace of Kress Box #3, the quality assurance/quality control procedures followed in the program are summarized in the attached table. Details of each procedure are listed below.

1 Sorbent Traps in Series
Two sorbent traps were connected in series in each sampling train to determine if all constituents were captured in the primary sorbent trap. Both the primary and back-up sorbent traps were analyzed separately to determine the capture efficiency.

2 Field Blank
A separate sampling train was transported to the site to serve as a field blank. No process gases were pumped through the field blanks. These samples were analyzed with the regular samples.

3 Surrogates Added to Extracts
Excluding the VOC sampling trains, constituents were extracted from the sorbent traps and concentrated in a liquid sample. Surrogate compounds were added to the extracts prior to analysis. The analyses of the surrogate compounds are expressed as percent recovery.

4 Frequency of Concurrent Calibration

An initial five point calibration curve was prepared and analyzed for each compound of interest. A continuing calibration standard was reanalyzed either every tenth sample or every twelfth hour. If the results between the initial and concurrent concentration differed by more than 15 percent, then a new five point calibration curve was prepared.

Tentatively identified compounds (TIC's) were determined by comparison of the retention time and mass spectral data of the TIC's to those in a NBS library resident in the data system.

If you have any questions regarding my response, please call me at (412) 825-9760.

Very truly yours,

John P. Shimshock

John P. Shimshock
Air Quality Scientist
Air Quality Engineering

JPS:mjt
Enclosures

KEYSTONE
ENVIRONMENTAL RESOURCES, INC.

BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

DETERMINATION OF CONCENTRATIONS OF
VOLATILE AND SEMI-VOLATILE ORGANIC COMPOUNDS
IN THE HEADSPACE OF KRESS BOX #3

SUMMARY OF QA/QC PROCEDURES

Constituent	# Sample Trains	Sorbent Traps in Series?	Field Blank?	Analytical EPA Method	Surrogates Added to Extracts?	Frequency of Concurrent Calibration
VOC's	2	yes	yes	TO-1 (GC/ITD)	no	None - Initial 3-point calibration only
VOC's - scan	1	no	yes	TO-1 (GC/ITD)	no	None - Initial 3-point calibration only
PAH's	2	yes	yes	610 (HPLC)	yes - benzo(e)pyrene & 2-fluorobiphenyl	every 10th sample
PAH's - scan	1	no	yes	625 (GC/MS)	yes - nitrobenzene-d5 & 2-fluorobiphenyl	every 12th hour
Phenols & Cresols	2	yes	yes	625 (GC/MS)	yes - nitrobenzene-d5	every 12th hour
Phenols & Cresols - scan	1	no	yes	625 (GC/MS)	no	every 12th hour
Phthalates	2	yes	yes	625 (GC/MS)	yes - nitrobenzene-d5 & 2-fluorobiphenyl	every 12th hour
Phthalates	1	no	yes	625 (GC/MS)	no	every 12th hour

KEYSTONE
ENVIRONMENTAL RESOURCES, INC.

Appendix M
Door Leak Data

NO. 11 & 12 BATTERY
DAILY PERCENT DOOR LEAKS FOR 1991

DATE	Inspector Initials	Percent Door Leaks
01JAN91		
02JAN91		
03JAN91	RA	6.5
04JAN91	RA	5.4
05JAN91	RA	7.1
06JAN91	RA	5.4
07JAN91		
08JAN91		
09JAN91		
10JAN91	RA	6.5
11JAN91	FC	7.2
12JAN91	FC	7.7
13JAN91	FC	7.7
14JAN91		
15JAN91		
16JAN91		
17JAN91	RA	7.5
18JAN91	RA	6.3
19JAN91	RA	7.2
20JAN91		
21JAN91		
22JAN91	CR	8.1
23JAN91	FC	8.6
24JAN91	RA	5.7
25JAN91	RA	6.3
26JAN91		
27JAN91		
28JAN91		
29JAN91	FC	7.4
30JAN91	FC	6.9
31JAN91	RA	5.1
01FEB91	RA	5.4
02FEB91		
03FEB91		
04FEB91		
05FEB91	FC	10.9
06FEB91	FC	6.1
07FEB91	RA	6.1
08FEB91	RA	5.3
11FEB91	FC	
12FEB91	FC	7.6
13FEB91	FC	7.5
14FEB91	RA	6.6
15FEB91	RA	3.9
16FEB91		
17FEB91		

NO. 11 & 12 BATTERY
DAILY PERCENT DOOR LEAKS FOR 1991

DATE	Inspector Initials	Percent Door Leaks
18FEB91	FC	7.8
19FEB91		
20FEB91	FC	4.7
21FEB91	RA	5.6
22FEB91	RA	4.6
23FEB91		
24FEB91		
25FEB91		
26FEB91	RA	6.4
27FEB91	FC	7.2
28FEB91	RA	6.6
01MAR91	RA	5.3
02MAR91		
03MAR91		
04MAR91		
05MAR91	RA	5.3
06MAR91	RA	5.8
07MAR91	RA	6.0
08MAR91	RA	7.4
09MAR91		
10MAR91		
11MAR91		
12MAR91	FC	7.7
13MAR91	FC	3.6
14MAR91	RA	3.0
15MAR91	RA	8.4
16MAR91		
17MAR91		
18MAR91		
19MAR91	FC	9.3
20MAR91	FC	11.0
21MAR91	RA	6.0
22MAR91	RA	5.5
23MAR91		
24MAR91		
25MAR91		
26MAR91	RA	7.9
27MAR91	RA	8.2
28MAR91	RA	9.6
29MAR91	RA	6.3
30MAR91		
31MAR91		
02APR91	FC	13.3
03APR91	FC	10.4
04APR91	RA	6.5
05APR91	RA	7.7
09APR91	FC	7.1
10APR91	FC	5.2

NO. 11 & 12 BATTERY
DAILY PERCENT DOOR LEAKS FOR 1991

DATE	Inspector Initials	Percent Door Leaks
11APR91	RA	5.5
12APR91	RA	6.0
16APR91	FC	9.1
17APR91	FC	8.8
18APR91	FC	8.0
19APR91	FC	9.9
23APR91	RA	9.1
24APR91	FC	9.4
25APR91	RA	5.1
26APR91	RA	6.8
30APR91	FC	7.7
01MAY91	FC	8.2
02MAY91	RA	8.5
03MAY91	FC	8.5
07MAY91	RA	4.1
08MAY91	FC	5.1
09MAY91	RA	3.0
10MAY91	RA	5.2
14MAY91	FC	9.7
15MAY91	FC	9.4
16MAY91	RA	5.4
17MAY91	RA	6.9
21MAY91	FC	10.8
22MAY91	FC	8.5
23MAY91	RA	6.8
24MAY91	RA	5.2
28MAY91	FC	10.5
29MAY91	FC	11.7
30MAY91	RA	8.3
31MAY91	FC	6.8
01JUN91		
02JUN91		
03JUN91		
04JUN91	RA	6.0
05JUN91	FC	10.2
06JUN91	RA	4.1
07JUN91	RA	8.5
08JUN91		
09JUN91		
10JUN91		
11JUN91	FC	8.5
12JUN91	RA	9.4
13JUN91	RA	8.0
14JUN91	RA	7.1
15JUN91		

NO. 11 & 12 BATTERY
DAILY PERCENT DOOR LEAKS FOR 1991

DATE	Inspector Initials	Percent Door Leaks
16JUN91		
17JUN91		
18JUN91	RA	4.4
19JUN91	FC	10.8
20JUN91	RA	8.2
21JUN91	RA	8.5
22JUN91		
23JUN91		
24JUN91		
25JUN91	FC	10.2
26JUN91	FC	6.3
27JUN91	RA	5.5
28JUN91	RA	8.8
29JUN91		
30JUN91		
AUG90		9.4
SEP90		14.2
OCT90		8.1
02JUL91	RA	5.8
03JUL91	FC	10.2
04JUL91	FC	7.2
05JUL91	RA	3.6
09JUL91	FC	8.0
10JUL91	FC	5.8
11JUL91	RA	6.6
12JUL91	RA	4.7
16JUL91	RA	5.8
17JUL91	FC	8.3
18JUL91	RA	5.0
19JUL91	RA	3.0
23JUL91	FC	7.7
24JUL91	RA	6.3
25JUL91	RA	4.1
26JUL91	RA	6.3
30JUL91	RA	5.5
31JUL91	FC	8.1
01AUG91	RA	11.9
02AUG91	RA	7.7
06AUG91	FC	7.1
07AUG91	FC	7.2
08AUG91	FC	5.0
09AUG91	RA	5.5
13AUG91	RA	8.0
14AUG91	FC	8.8
15AUG91	RA	6.3

NO. 11 & 12 BATTERY
DAILY PERCENT DOOR LEAKS FOR 1991

DATE	Inspector Initials	Percent Door Leaks
16AUG91	FC	4.9
20AUG91	FC	6.9
21AUG91	FC	6.3
22AUG91	RA	5.1
23AUG91	FC	6.0
27AUG91	RA	6.6
28AUG91	FC	8.2
29AUG91	RA	4.9
30AUG91	RA	5.2
03SEP91	FC	7.5
04SEP91	FC	8.9
05SEP91	RA	3.3
06SEP91	RA	1.1
10SEP91	RA	4.4
11SEP91	RA	7.1
12SEP91	RA	4.7
13SEP91	RA	4.7
17SEP91	FC	6.9
18SEP91	FC	6.0
19SEP91	RA	3.0
20SEP91	FC	8.5
24SEP91	RA	6.6
25SEP91	RA	3.8
26SEP91	RA	4.7
27SEP91	FC	8.0
01OCT91	FC	5.2
02OCT91	FC	8.5
03OCT91	FC	4.4
04OCT91	FC	6.1
08OCT91	FC	7.5
09OCT91	FC	6.1
10OCT91	FC	6.6
11OCT91	RA	2.7
15OCT91	FC	5.0

NO. 11 & 12 BATTERY
DAILY PERCENT DOOR LEAKS FOR 1991

DATE	Inspector Initials	Percent Door Leaks
16OCT91	FC	5.2
17OCT91	RA	3.3
18OCT91	RA	4.4
22OCT91	RA	6.[illegible]
23OCT91	FC	7.[illegible]
24OCT91	RA	4.1
25OCT91	FC	7.7
29OCT91	RA	3.8
30OCT91	FC	5.8
31OCT91	FC	6.3
01NOV91	FC	6.9
05NOV91	FC	9.1
06NOV91	FC	7.1
07NOV91	RA	4.[illegible]
08NOV91	RA	5.[illegible]
12NOV91	RA	4.4
13NOV91	RA	4.1
14NOV91	RA	6.6
15NOV91	FC	8.9
19NOV91	FC	8.3
20NOV91	FC	9.7
21NOV91	FC	8.6
22NOV91	FC	7.7
24NOV91	RA	7.5
25NOV91	RA	5.8
26NOV91	RA	6.3
27NOV91	RA	3.[illegible]

Appendix N
Coal Data - Summary Tables and Graphs

Table of Contents

Section		Page
1	Summary Table of Sparrows Point Coal Mix for 1991.	N-2
2	Summary Table of Sparrows Point Blended Coal Chemistry for 1991.	N-4
3	Graphs of Sparrows Point Coal Properties.	N-10
4	Sparrows Point Coal Properties - Database.	N-15

Section 1

Summary Table of Sparrows Point Coal Mix for 1991

SPARROWS POINT COAL MIX 1991

TABLE 1

	January	February	March	April	May	June	July	August	September	October	November
Individual Coal Mix % 1991											
Low Volatile:											
Cambria	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0
Jowel	6.6	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Va. Crews	3.4	–	–	–	–	–	–	–	–	–	–
Total Low Volatile	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0
High Volatile:											
Moss	30.0	30.0	30.0	10.0	–	–	–	–	–	–	–
Lo Ming	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	51.0
Knox Creek	–	–	–	20.0	30.0	30.0	30.0	30.0	30.0	30.0	24.0
Total High Volatile	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0

Section 2

Summary Table of Sparrows Point Blended Coal Chemistry for 1991.

N=4

SPARROWS POINT BLENDED COAL CHEMISTRY

TABLE 2

Coal Blend Properties 1991	January	February	March	April	May	June	July	August	September	October	November
% Moisture	7.9	7.0	7.8	7.8	7.6	7.1	7.0	7.2	7.1	7.7	7.6
% Volatiles	29.4	29.2	29.8	30.2	29.6	29.2	29.1	30.0	29.8	29.7	30.3
% Ash	6.2	6.2	6.2	6.2	6.3	6.2	6.2	6.2	6.3	6.3	6.2
% Sulfur	.79	.82	.80	.79	.79	.80	.80	.79	.78	.79	.77
% Minus 1/8"	78.8	78.9	78.8	78.7	78.8	78.8	79.0	78.9	78.9	78.8	78.9
Bulk Density	48.0	48.0	47.9	48.0	47.9	48.3	48.5	48.5	48.5	48.5	48.5

COAL PROPERTIES - 11/12 BATTERIES
OVERALL STATISTICS

VARIABLE	AVERAGE VALUE	STANDARD DEVIATION	MAXIMUM VALUE	MINIMUM VALUE	NUMBER OF OBSERVATIONS
% SULFUR	0.79	0.03	1.26	0.73	703
% VOLATILE MATTER	29.61	0.87	33.00	27.10	703
% ASH	6.21	0.28	9.30	5.50	703
% FIXED CARBON	64.17	0.90	66.90	60.20	703
% MINUS 100 MESH	15.63	1.61	22.00	9.70	698
% MINUS 1/8 INCH	78.84	0.24	79.80	78.09	364
% MOISTURE	7.42	0.67	9.81	5.55	364
BULK DENSITY, LB/CU FT	48.21	0.27	48.66	47.79	364

COAL PROPERTIES - 11/12 BATTERIES
MONTHLY STATISTICS

VARIABLE	AVERAGE VALUE	STANDARD DEVIATION	MAXIMUM VALUE	MINIMUM VALUE	NUMBER OF OBSERVATIONS
DEC90					
% SULFUR	0.80	0.02	0.85	0.77	59
% VOLATILE MATTER	29.16	0.67	32.30	28.30	59
% ASH	6.20	0.23	6.80	5.70	59
% FIXED CARBON	64.64	0.70	65.60	61.60	59
% MINUS 100 MESH	16.54	0.83	18.10	14.60	59
% MINUS 1/8 INCH	78.83	0.14	79.15	78.54	31
% MOISTURE	7.30	0.49	8.75	6.60	31
BULK DENSITY, LB/CU FT	48.00	0.05	48.10	47.90	31
JAN91					
% SULFUR	0.79	0.02	0.82	0.76	62
% VOLATILE MATTER	29.41	0.75	31.00	27.70	62
% ASH	6.24	0.23	6.80	5.70	62
% FIXED CARBON	64.36	0.80	66.20	62.50	62
% MINUS 100 MESH	16.49	1.31	19.90	12.40	62
% MINUS 1/8 INCH	78.82	0.27	79.80	78.54	31
% MOISTURE	7.92	0.59	9.29	6.93	31
BULK DENSITY, LB/CU FT	47.96	0.10	48.38	47.85	31
FEB91					
% SULFUR	0.82	0.03	0.88	0.75	55
% VOLATILE MATTER	29.19	0.82	31.80	27.10	55
% ASH	6.20	0.24	6.70	5.80	55
% FIXED CARBON	64.60	0.93	66.90	61.50	55
% MINUS 100 MESH	15.87	1.40	18.20	12.40	55
% MINUS 1/8 INCH	78.88	0.21	79.44	78.61	28
% MOISTURE	6.95	0.38	7.85	6.45	28
BULK DENSITY, LB/CU FT	47.97	0.08	48.22	47.86	28
MAR91					
% SULFUR	0.80	0.02	0.85	0.76	62
% VOLATILE MATTER	29.83	0.79	31.50	28.30	62
% ASH	6.17	0.17	6.60	5.90	62
% FIXED CARBON	63.98	0.83	65.60	62.20	62
% MINUS 100 MESH	17.02	1.18	21.70	14.80	62
% MINUS 1/8 INCH	78.81	0.21	79.22	78.56	31
% MOISTURE	7.80	0.92	9.81	6.65	31
BULK DENSITY, LB/CU FT	47.94	0.07	48.10	47.82	31
APR91					
% SULFUR	0.79	0.02	0.84	0.74	58
% VOLATILE MATTER	30.18	0.74	32.00	28.60	58
% ASH	6.20	0.21	7.20	5.90	58
% FIXED CARBON	63.62	0.83	65.40	61.60	58
% MINUS 100 MESH	15.81	1.29	18.80	12.70	57
% MINUS 1/8 INCH	78.70	0.26	79.70	78.57	27
% MOISTURE	7.75	0.38	8.90	6.95	27
BULK DENSITY, LB/CU FT	47.97	0.07	48.10	47.81	27

COAL PROPERTIES - 11/12 BATTERIES
MONTHLY STATISTICS

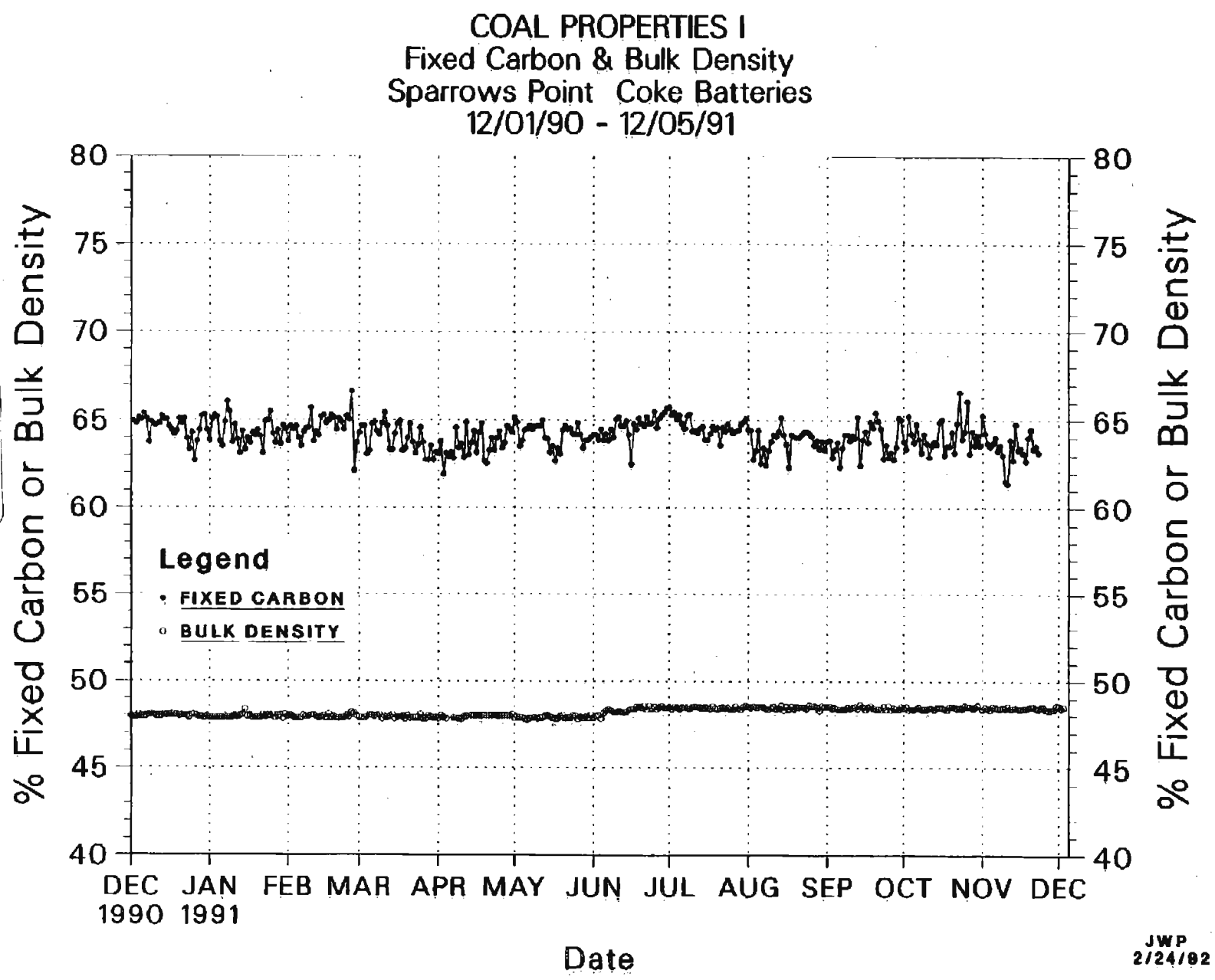
VARIABLE	AVERAGE VALUE	STANDARD DEVIATION	MAXIMUM VALUE	MINIMUM VALUE	NUMBER OF OBSERVATIONS
MAY91					
% SULFUR	0.79	0.02	0.87	0.75	58
% VOLATILE MATTER	29.57	0.68	31.20	28.20	58
% ASH	6.26	0.21	6.80	5.90	58
% FIXED CARBON	64.17	0.69	65.50	62.30	58
% MINUS 100 MESH	15.24	1.64	18.60	9.70	58
% MINUS 1/8 INCH	78.82	0.16	79.47	78.65	31
% MOISTURE	7.60	0.42	8.39	6.74	31
BULK DENSITY, LB/CU FT	47.91	0.06	48.04	47.79	31
JUN91					
% SULFUR	0.80	0.02	0.87	0.74	59
% VOLATILE MATTER	29.18	0.69	31.50	27.70	59
% ASH	6.20	0.30	7.40	5.60	59
% FIXED CARBON	64.62	0.71	66.20	62.20	59
% MINUS 100 MESH	15.54	1.87	22.00	10.60	59
% MINUS 1/8 INCH	78.84	0.26	79.41	78.52	30
% MOISTURE	7.07	0.45	8.28	5.95	30
BULK DENSITY, LB/CU FT	48.33	0.20	48.58	47.84	30
JUL91					
% SULFUR	0.80	0.06	1.26	0.75	61
% VOLATILE MATTER	29.13	0.52	30.20	27.70	61
% ASH	6.20	0.26	7.20	5.50	61
% FIXED CARBON	64.66	0.56	66.10	63.50	61
% MINUS 100 MESH	14.62	1.76	17.70	11.00	59
% MINUS 1/8 INCH	78.95	0.32	79.35	78.09	31
% MOISTURE	6.95	0.59	8.25	5.55	31
BULK DENSITY, LB/CU FT	48.48	0.06	48.62	48.38	31
AUG91					
% SULFUR	0.79	0.02	0.87	0.74	62
% VOLATILE MATTER	30.00	0.75	31.90	28.30	62
% ASH	6.15	0.31	6.80	5.60	62
% FIXED CARBON	63.83	0.81	65.60	62.00	62
% MINUS 100 MESH	15.27	1.52	18.30	10.60	62
% MINUS 1/8 INCH	78.91	0.28	79.44	78.51	31
% MOISTURE	7.17	0.55	8.14	6.22	31
BULK DENSITY, LB/CU FT	48.51	0.08	48.63	48.31	31
SEP91					
% SULFUR	0.78	0.03	0.85	0.73	60
% VOLATILE MATTER	29.83	0.92	31.60	28.00	60
% ASH	6.27	0.52	9.30	5.50	60
% FIXED CARBON	63.90	1.00	65.60	60.20	60
% MINUS 100 MESH	14.67	1.23	17.90	11.20	60
% MINUS 1/8 INCH	78.85	0.20	79.26	78.57	30
% MOISTURE	7.06	0.46	8.06	6.44	30
BULK DENSITY, LB/CU FT	48.48	0.07	48.66	48.36	30

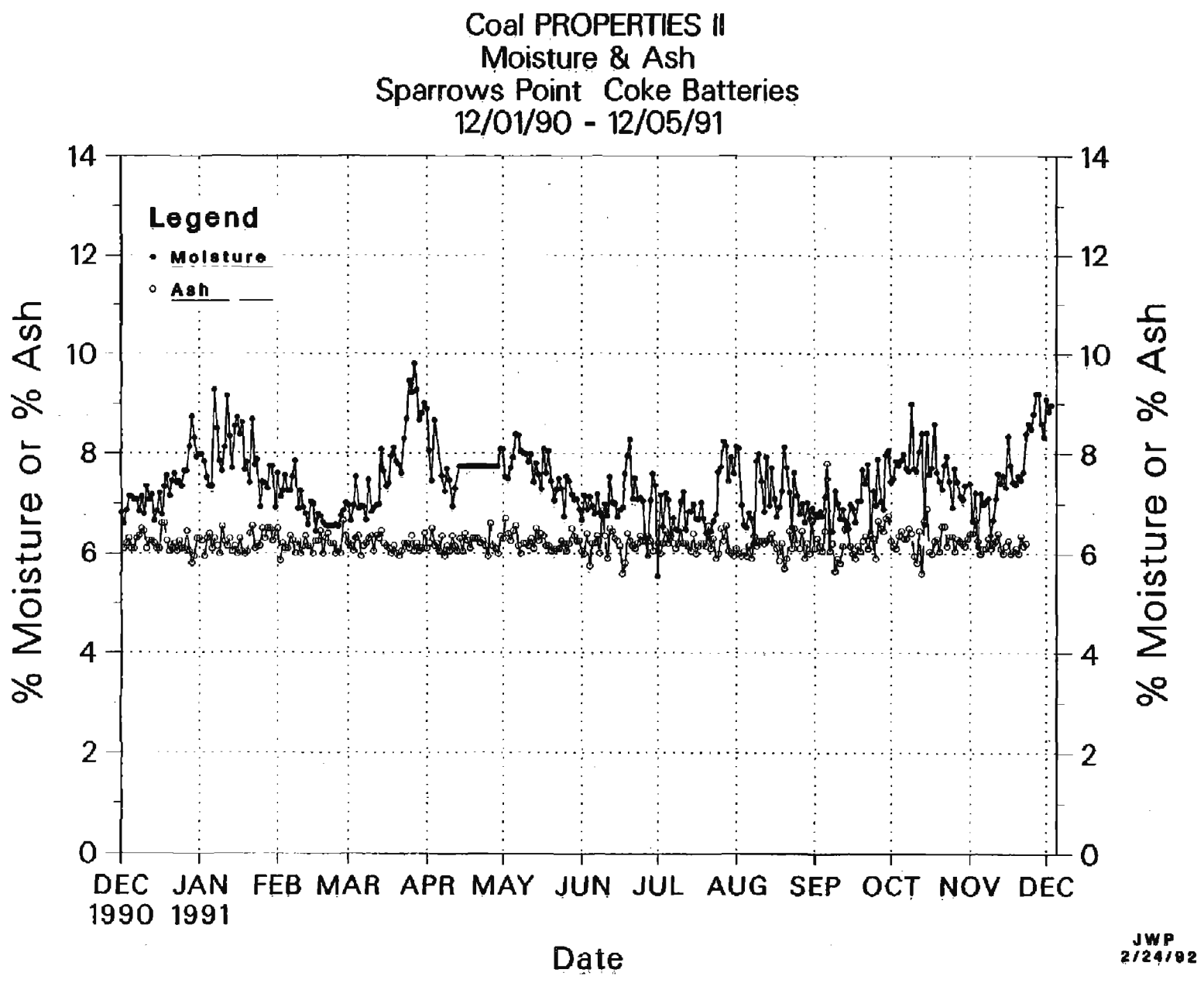
COAL PROPERTIES - 11/12 BATTERIES
MONTHLY STATISTICS

VARIABLE	AVERAGE VALUE	STANDARD DEVIATION	MAXIMUM VALUE	MINIMUM VALUE	NUMBER OF OBSERVATIONS
OCT91					
% SULFUR	0.79	0.03	0.84	0.73	61
% VOLATILE MATTER	29.67	0.96	31.60	27.10	61
% ASH	6.25	0.26	6.90	5.60	61
% FIXED CARBON	64.08	0.95	66.90	62.50	61
% MINUS 100 MESH	15.46	1.55	18.80	12.00	59
% MINUS 1/8 INCH	78.84	0.18	79.23	78.50	30
% MOISTURE	7.69	0.49	8.99	6.59	30
BULK DENSITY, LB/CU FT	48.49	0.07	48.64	48.35	30
NOV91					
% SULFUR	0.77	0.02	0.81	0.74	46
% VOLATILE MATTER	30.34	0.99	33.00	27.80	46
% ASH	6.20	0.19	6.70	6.00	46
% FIXED CARBON	63.49	0.99	65.80	61.00	46
% MINUS 100 MESH	14.78	1.36	17.60	12.10	46
% MINUS 1/8 INCH	78.86	0.23	79.33	78.50	30
% MOISTURE	7.63	0.80	9.21	6.14	30
BULK DENSITY, LB/CU FT	48.48	0.06	48.63	48.34	30

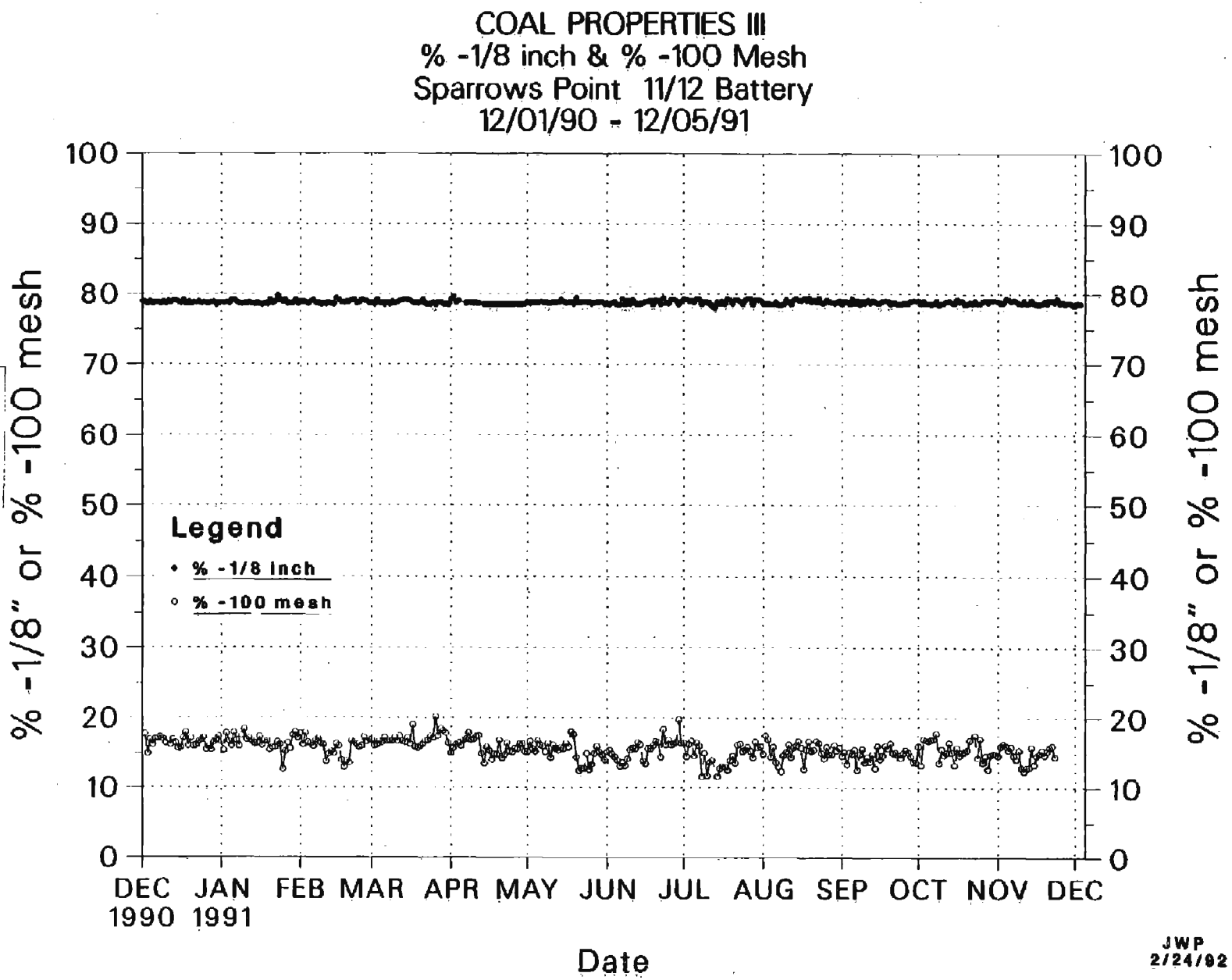
Section 3

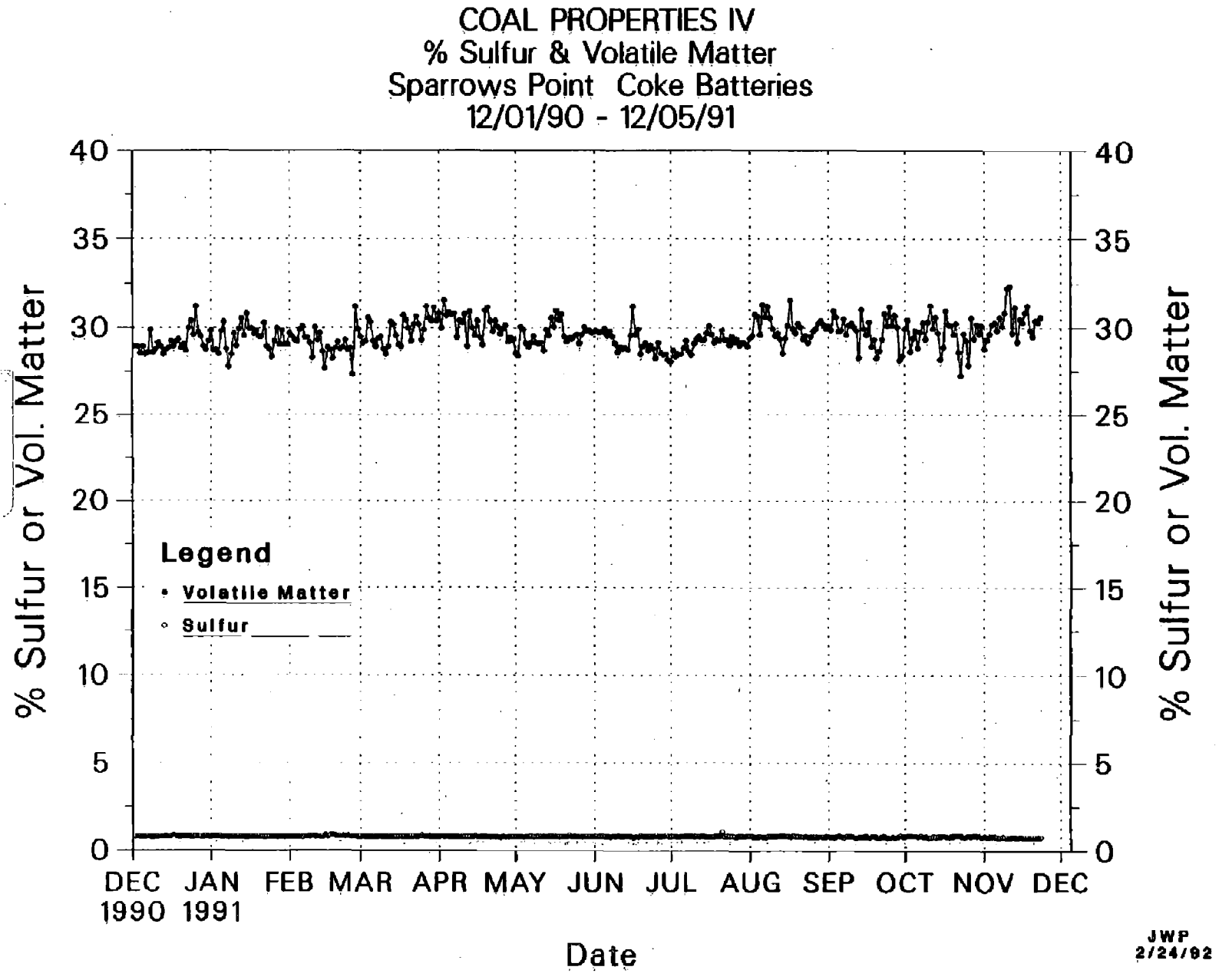
Graphs of Sparrows Point Coal Properties.


COAL PROPERTIES I
Fixed Carbon & Bulk Density
Sparrows Point Coke Batteries
12/01/90 - 12/05/91
% Fixed Carbon or Bulk Density
80
75
70
65
60
55
50
45
40
Legend
FIXED CARBON
BULK DENSITY
DEC 1990
JAN 1991
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
Date
JWP
2/24/92


Coal PROPERTIES II
Moisture & Ash
Sparrows Point Coke Batteries
12/01/90 - 12/05/91
Legend
Moisture
Ash
% Moisture or % Ash
14
12
10
8
6
4
2
0
DEC 1990
JAN 1991
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
Date
JWP
2/24/92

N-12


COAL PROPERTIES III
% -1/8 inch & % -100 Mesh
Sparrows Point 11/12 Battery
12/01/90 - 12/05/91
% -1/8" or % -100 mesh
100
90
80
70
60
50
40
30
20
10
0
Legend
% -1/8 inch
% -100 mesh
DEC 1990
JAN 1991
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
Date
JWP
2/24/92


COAL PROPERTIES IV
% Sulfur & Volatile Matter
Sparrows Point Coke Batteries
12/01/90 - 12/05/91
% Sulfur or Vol. Matter
40
35
30
25
20
15
10
5
0
Legend
Volatile Matter
Sulfur
DEC 1990
JAN 1991
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
Date
JWP
2/24/92

N-14

Section 4

Sparrows Point Coal Properties - Database.

COAL PROPERTIES FROM DAILY COAL MIX REPORTS
KIDC DEMONSTRATION PROJECT - BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

OBS	DATE	ROA	TURN	PLANT	VOLATILE MATTER	FIXED CARBON	ASH	SULFUR	FSI	PCT PASSING 100 MESH
1	12/02/90	1225	7-3	B	28.9	65.0	6.1	0.81	7.5	18.1
2	12/02/90	1225	3-11	B	29.0	64.9	6.1	0.79	7.5	17.4
3	12/03/90	1225	7-3	B	29.1	64.4	6.5	0.81	7.5	14.6
4	12/03/90	1225	3-11	B	28.8	65.3	5.9	0.80	8.0	15.2
5	12/04/90	1225	7-3	B	28.7	65.5	5.8	0.80	7.5	16.7
6	12/04/90	1225	3-11	B	28.4	64.8	6.8	0.80	7.5	17.2
7	12/05/90	1225	7-3	B	29.2	64.8	6.2	0.77	7.5	16.4
8	12/05/90	1225	3-11	B	28.7	65.3	6.0	0.79	8.0	15.9
9	12/06/90	1225	7-3	B	28.6	65.2	6.2	0.80	8.0	17.3
10	12/06/90	1225	3-11	B	28.4	65.6	6.0	0.79	7.5	16.7
11	12/07/90	1225	7-3	B	28.5	65.1	6.4	0.79	7.5	17.4
12	12/07/90	1225	3-11	B	28.7	65.1	6.2	0.83	7.5	16.8
13	12/08/90	1225	7-3	B	29.9	63.9	6.2	0.78	7.5	17.7
14	12/08/90	1225	3-11	B	29.9	63.6	6.5	0.78	7.5	16.9
15	12/09/90	1227	7-3	B	28.4	64.9	6.7	0.77	7.5	17.2
16	12/09/90	1227	3-11	B	28.8	64.9	6.3	0.77	7.5	16.8
17	12/10/90	1227	7-3	B	29.3	64.1	6.6	0.80	7.5	16.0
18	12/10/90	1227	3-11	B	28.3	65.4	6.3	0.80	7.5	16.8
19	12/11/90	1227	7-3	B	29.1	64.7	6.2	0.80	7.5	16.5
20	12/11/90	1227	3-11	B	29.2	64.8	6.0	0.79	8.0	17.2
21	12/12/90	1227	7-3	B	28.9	64.8	6.3	0.79	8.0	15.5
22	12/12/90	1227	3-11	B	29.0	64.8	6.2	0.82	7.5	16.8
23	12/13/90	1227	7-3	B	28.6	65.3	6.1	0.82	7.5	16.2
24	12/13/90	1227	3-11	B	28.4	65.2	6.4	0.79	7.5	17.6
25	12/14/90	1227	7-3	B	28.9	64.9	6.2	0.81	7.5	16.0
26	12/14/90	1227	3-11	B	28.6	65.2	6.2	0.82	7.5	16.8
27	12/15/90	1227	7-3	B	28.8	65.1	6.1	0.81	7.5	15.3
28	12/15/90	1227	3-11	B	28.9	65.0	6.1	0.81	7.5	16.0
29	12/16/90	1230	7-3	B	29.3	64.7	6.0	0.81	7.5	16.8
30	12/16/90	1230	3-11	B	29.2	64.6	6.2	0.81	7.0	14.8
31	12/17/90	1230	7-3	B	29.3	64.0	6.7	0.85	7.5	17.3
32	12/17/90	1230	3-11	B	28.6	64.9	6.5	0.84	7.5	17.0
33	12/18/90	1230	3-11	B	29.2	64.2	6.6	0.83	7.5	18.0
34	12/19/90	1230	7-3	B	29.2	64.5	6.3	0.80	7.5	15.5
35	12/19/90	1230	3-11	B	29.5	64.3	6.2	0.80	7.5	16.6
36	12/20/90	1230	7-3	B	29.1	64.8	6.1	0.80	7.0	17.2
37	12/20/90	1230	3-11	B	28.6	65.4	6.0	0.77	7.5	17.0
38	12/21/90	1230	7-3	B	29.2	64.7	6.1	0.80	7.5	15.8
39	12/21/90	1230	3-11	B	28.9	65.0	6.1	0.81	7.5	16.2
40	12/22/90	1230	7-3	B	28.6	65.1	6.3	0.81	7.5	16.0
41	12/22/90	1230	3-11	B	28.8	65.1	6.1	0.84	8.0	16.2
42	12/23/90	1232	7-3	B	29.5	64.4	6.1	0.82	7.0	16.1
43	12/23/90	1232	3-11	B	30.5	63.5	6.0	0.80	7.5	17.2
44	12/24/90	1232	7-3	B	30.5	63.0	6.5	0.81	7.5	17.4
45	12/24/90	1232	3-11	B	30.3	63.7	6.0	0.78	7.5	16.4
46	12/25/90	1232	7-3	B	29.7	64.3	6.0	0.78	7.5	16.8
47	12/25/90	1232	3-11	B	29.5	64.3	6.2	0.82	8.0	17.6
48	12/26/90	1232	7-3	B	32.3	61.6	6.1	0.82	7.5	14.9
49	12/26/90	1232	3-11	B	30.1	63.8	6.1	0.82	8.0	16.1
50	12/27/90	1232	7-3	B	29.9	63.8	6.3	0.82	8.0	15.5
51	12/27/90	1232	3-11	B	29.6	63.8	6.6	0.79	8.0	16.3
52	12/28/90	1232	7-3	B	30.0	64.1	5.9	0.78	7.5	15.8
53	12/28/90	1232	3-11	B	29.0	64.8	6.2	0.78	8.0	15.1

COAL PROPERTIES FROM DAILY COAL MIX REPORTS
KIDC DEMONSTRATION PROJECT - BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

OBS	DATE	ROA	TURN	PLANT	VOLATILE MATTER	FIXED CARBON	ASH	SULFUR	FSI	PCT PASSING 100 MESH
54	12/29/90	1232	7-3	B	29.1	65.2	5.7	0.81	8.0	16.2
55	12/29/90	1232	3-11	B	28.8	65.3	5.9	0.79	7.5	16.8
56	12/30/90	1234	7-3	B	28.8	65.1	6.1	0.81	7.5	17.4
57	12/30/90	1234	3-11	B	28.7	65.5	5.8	0.80	8.0	16.4
58	12/31/90	1234	7-3	B	29.2	64.4	6.4	0.80	7.5	18.1
59	12/31/90	1234	3-11	B	29.3	64.5	6.2	0.80	7.5	16.6
60	01/01/91	1234	7-3	B	29.7	63.9	6.4	0.79	7.5	17.1
61	01/01/91	1234	3-11	B	30.0	63.8	6.2	0.79	8.0	15.9
62	01/02/91	1234	7-3	B	28.5	65.4	6.1	0.82	8.0	16.3
63	01/02/91	1234	3-11	B	28.9	64.7	6.4	0.82	8.0	14.4
64	01/03/91	1234	7-3	B	28.9	65.1	6.0	0.82	7.5	17.5
65	01/03/91	1234	3-11	B	28.6	65.5	5.9	0.82	7.5	18.2
66	01/04/91	1234	7-3	B	28.8	64.9	6.3	0.81	8.0	16.3
67	01/04/91	1234	3-11	B	28.2	65.5	6.3	0.80	8.0	17.0
68	01/05/91	1234	7-3	B	30.0	63.4	6.6	0.76	7.0	15.8
69	01/05/91	1234	3-11	B	29.6	64.2	6.2	0.79	7.5	16.2
70	01/06/91	1236	7-3	B	31.0	62.5	6.5	0.78	8.0	17.5
71	01/06/91	1236	3-11	B	29.7	64.6	5.7	0.77	7.5	18.3
72	01/07/91	1236	7-3	B	28.5	65.2	6.3	0.82	7.5	17.1
73	01/07/91	1236	3-11	B	29.1	64.6	6.3	0.79	8.0	16.4
74	01/08/91	1236	7-3	B	27.7	66.2	6.1	0.79	8.0	15.8
75	01/08/91	1236	3-11	B	27.9	65.9	6.2	0.79	8.0	16.1
76	01/09/91	1236	7-3	B	28.3	65.8	5.9	0.81	8.0	17.6
77	01/09/91	1236	3-11	B	28.7	65.2	6.1	0.81	7.5	17.3
78	01/10/91	1236	7-3	B	29.4	63.8	6.8	0.79	7.5	18.8
79	01/10/91	1236	3-11	B	30.0	63.7	6.3	0.81	7.5	18.0
80	01/11/91	1236	7-3	B	28.5	65.5	6.0	0.82	7.5	17.2
81	01/11/91	1236	3-11	B	29.5	64.0	6.5	0.80	8.0	16.5
82	01/12/91	1236	7-3	B	30.3	63.5	6.2	0.79	8.0	17.4
83	01/12/91	1236	3-11	B	29.6	64.3	6.1	0.82	8.0	16.8
84	01/13/91	1238	7-3	B	30.7	63.1	6.2	0.79	8.0	17.0
85	01/13/91	1238	3-11	B	30.4	63.2	6.4	0.81	7.5	16.3
86	01/14/91	1238	7-3	B	29.5	64.4	6.1	0.78	7.5	15.8
87	01/14/91	1238	3-11	B	29.6	64.4	6.0	0.79	7.5	16.8
88	01/15/91	1238	7-3	B	30.8	63.3	5.9	0.79	7.5	16.7
89	01/15/91	1238	3-11	B	30.8	63.4	6.4	0.77	7.0	16.1
90	01/16/91	1238	7-3	B	29.6	64.2	6.2	0.82	7.5	19.9
91	01/16/91	1238	3-11	B	30.4	63.8	5.8	0.77	7.5	14.8
92	01/17/91	1238	7-3	B	30.0	63.7	6.3	0.79	8.0	16.4
93	01/17/91	1238	3-11	B	30.0	63.7	6.3	0.78	8.0	15.8
94	01/18/91	1238	7-3	B	30.1	63.9	6.0	0.80	7.5	16.4
95	01/18/91	1238	3-11	B	29.2	64.7	6.1	0.80	7.5	17.0
96	01/19/91	1238	7-3	B	29.6	64.2	6.2	0.82	7.0	16.9
97	01/19/91	1238	3-11	B	30.1	64.1	5.8	0.78	8.0	16.5
98	01/20/91	1240	7-3	B	29.4	64.5	6.1	0.80	7.5	15.0
99	01/20/91	1240	3-11	B	29.6	64.4	6.0	0.79	7.0	15.9
100	01/21/91	1240	7-3	B	29.3	64.2	6.5	0.81	7.5	14.7
101	01/21/91	1240	3-11	B	29.7	64.0	6.3	0.79	7.5	16.8
102	01/22/91	1240	7-3	B	30.6	62.9	6.5	0.76	8.0	15.6
103	01/22/91	1240	3-11	B	30.0	63.4	6.6	0.77	8.0	16.0
104	01/23/91	1240	7-3	B	29.3	64.5	6.2	0.78	7.5	15.2
105	01/23/91	1240	3-11	B	28.6	65.4	6.0	0.80	7.5	17.9
106	01/24/91	1240	7-3	B	28.6	65.2	6.2	0.81	8.0	15.9

COAL PROPERTIES FROM DAILY COAL MIX REPORTS
KIDC DEMONSTRATION PROJECT - BETHLEHEM STEEL CORPORATION
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OBS	DATE	ROA	TURN	PLANT	VOLATILE MATTER	FIXED CARBON	ASH	SULFUR	FSI	PCT PASSING 100 MESH
107	01/24/91	1240	3-11	B	29.0	64.8	6.2	0.79	7.5	16.4
108	01/25/91	1240	7-3	B	28.2	65.7	6.1	0.80	8.0	12.8
109	01/25/91	1240	3-11	B	28.5	65.3	6.2	0.78	7.5	12.4
110	01/26/91	1240	7-3	B	29.4	64.2	6.4	0.77	7.5	15.2
111	01/26/91	1240	3-11	B	29.1	64.3	6.6	0.80	8.0	15.2
112	01/27/91	1242	7-3	B	29.9	63.8	6.3	0.78	8.0	15.2
113	01/27/91	1242	3-11	B	30.1	63.6	6.3	0.79	7.5	17.6
114	01/28/91	1242	7-3	B	29.4	64.2	6.4	0.80	8.0	17.2
115	01/28/91	1242	3-11	B	28.7	64.7	6.6	0.80	7.5	14.0
116	01/29/91	1242	7-3	B	29.8	63.8	6.4	0.80	7.5	17.9
117	01/29/91	1242	3-11	B	29.9	63.5	6.6	0.77	7.5	17.2
118	01/30/91	1242	7-3	B	28.8	65.2	6.0	0.78	7.5	17.8
119	01/30/91	1242	3-11	B	29.3	64.2	6.5	0.79	7.0	18.2
120	01/31/91	1242	7-3	B	29.3	64.3	6.4	0.82	7.5	17.2
121	01/31/91	1242	3-11	B	28.9	64.7	6.4	0.79	8.0	17.0
122	02/01/91	1242	7-3	B	29.6	63.9	6.5	0.79	7.5	17.4
123	02/01/91	1242	3-11	B	29.8	63.7	6.5	0.78	7.5	18.1
124	02/02/91	1242	7-3	B	29.7	64.4	5.9	0.79	7.5	15.7
125	02/02/91	1242	3-11	B	29.3	64.9	5.8	0.78	7.5	16.6
126	02/03/91	1244	7-3	B	29.5	64.2	6.3	0.79	7.5	18.2
127	02/03/91	1244	3-11	B	29.1	64.8	6.1	0.79	7.5	17.6
128	02/04/91	1244	11-7	B	29.3	64.7	6.0	0.79	7.5	15.5
129	02/04/91	1244	7-3	B	29.2	64.6	6.2	0.78	7.5	17.6
130	02/05/91	1244	11-7	B	30.5	63.4	6.1	0.84	7.5	16.3
131	02/05/91	1244	7-3	B	29.3	64.6	6.1	0.77	7.5	16.4
132	02/06/91	1244	7-3	B	30.4	63.2	6.4	0.75	8.0	15.8
133	02/06/91	1244	11-7	B	29.8	63.9	6.3	0.77	7.5	16.1
134	02/07/91	1244	11-7	B	29.2	64.9	6.0	0.79	7.5	17.0
135	02/07/91	1244	7-3	B	29.7	63.8	6.5	0.82	7.5	16.6
136	02/08/91	1244	7-3	B	30.0	63.9	6.1	0.81	7.5	17.4
137	02/08/91	1244	3-11	B	28.9	65.2	5.9	0.82	8.0	16.8
138	02/09/91	1244	11-7	B	28.8	65.3	5.9	0.83	7.5	16.0
139	02/09/91	1244	7-3	B	29.5	63.9	6.6	0.80	7.5	16.8
140	02/10/91	1246	11-7	B	28.4	65.4	6.2	0.84	8.0	16.8
141	02/10/91	1246	7-3	B	28.2	66.0	5.8	0.82	8.0	15.6
142	02/11/91	1246	11-7	B	29.8	64.3	5.9	0.83	7.5	15.1
143	02/11/91	1246	7-3	B	30.3	63.3	6.4	0.80	7.0	12.4
144	02/12/91	1246	11-7	B	29.2	64.5	6.3	0.84	8.0	15.3
145	02/12/91	1246	7-3	B	29.4	64.2	6.4	0.81	7.5	14.4
146	02/13/91	1246	11-7	B	29.2	64.9	5.9	0.83	7.5	15.2
147	02/13/91	1246	7-3	B	30.2	63.4	6.4	0.79	7.5	15.2
148	02/14/91	1246	11-7	B	28.9	65.0	6.1	0.79	7.5	16.1
149	02/14/91	1246	7-3	B	28.4	65.4	6.2	0.80	8.0	13.8
150	02/15/91	1246	7-3	B	27.7	65.3	6.0	0.87	7.5	16.3
151	02/16/91	1246	11-7	B	28.4	65.8	5.8	0.81	8.0	16.0
152	02/16/91	1246	7-3	B	29.4	63.9	6.7	0.82	8.0	16.0
153	02/17/91	1252	7-3	B	28.6	65.4	6.0	0.86	7.5	14.0
154	02/17/91	1252	11-7	B	28.9	64.6	6.5	0.85	7.5	13.9
155	02/18/91	1252	11-7	B	27.7	65.9	6.4	0.88	7.5	13.1
156	02/18/91	1252	7-3	B	28.8	64.7	6.5	0.85	7.5	12.7
157	02/19/91	1252	11-7	B	28.7	65.1	6.2	0.84	8.0	14.1
158	02/19/91	1252	7-3	B	29.0	65.2	5.8	0.86	7.5	13.6
159	02/20/91	1252	11-7	B	29.5	64.2	6.3	0.84	7.5	13.2

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OBS	DATE	ROA	TURN	PLANT	VOLATILE MATTER	FIXED CARBON	ASH	SULFUR	FSI	PCT PASSING 100 MESH
160	02/20/91	1252	7-3	B	28.9	64.8	6.3	0.81	7.5	13.9
161	02/21/91	1252	11-7	B	28.9	65.4	6.3	0.83	7.5	16.8
162	02/21/91	1252	7-3	B	28.7	64.8	6.5	0.83	7.5	16.6
163	02/22/91	1252	11-7	B	29.0	64.9	6.1	0.84	7.5	15.3
164	02/22/91	1252	7-3	B	28.8	64.9	6.3	0.83	7.5	17.7
165	02/23/91	1252	11-7	B	29.5	64.3	6.2	0.82	8.0	16.8
166	02/23/91	1252	7-3	B	29.1	64.7	6.2	0.82	8.0	15.6
167	02/24/91	1254	11-7	B	28.3	65.6	6.1	0.84	8.0	15.3
168	02/24/91	1254	7-3	B	29.2	64.9	5.9	0.84	8.0	16.3
169	02/25/91	1254	11-7	B	28.4	65.4	6.2	0.82	8.0	16.0
170	02/25/91	1254	7-3	B	29.3	64.7	6.0	0.80	7.5	16.0
171	02/26/91	1254	11-7	B	27.1	66.9	6.0	0.83	7.5	17.7
172	02/26/91	1254	7-3	B	27.6	66.4	6.0	0.82	8.0	16.9
173	02/27/91	1254	11-7	B	30.6	62.8	6.6	0.83	7.5	16.5
174	02/27/91	1254	7-3	B	31.8	61.5	6.7	0.82	7.5	16.8
175	02/28/91	1254	11-7	B	30.5	63.2	6.3	0.79	8.0	17.1
176	02/28/91	1254	7-3	B	29.4	64.2	6.4	0.80	7.5	16.8
177	03/01/91	1254	11-7	B	29.7	64.1	6.2	0.78	7.0	17.0
178	03/01/91	1254	7-3	B	29.3	64.5	6.2	0.80	7.0	16.8
179	03/02/91	1254	11-7	B	29.0	64.9	6.1	0.81	7.5	15.6
180	03/02/91	1254	7-3	B	29.3	64.5	6.2	0.80	7.0	16.6
181	03/03/91	1256	11-7	B	29.8	64.2	6.0	0.80	7.5	16.0
182	03/03/91	1256	7-3	B	28.7	65.2	6.1	0.78	8.0	16.4
183	03/04/91	1256	11-7	B	30.9	62.9	6.2	0.79	8.0	17.1
184	03/04/91	1256	7-3	B	30.3	63.3	6.4	0.80	7.5	16.3
185	03/05/91	1256	11-7	B	30.7	62.7	6.6	0.76	7.5	16.8
186	03/05/91	1256	7-3	B	30.0	63.9	6.1	0.79	8.0	16.2
187	03/06/91	1256	11-7	B	28.9	65.2	5.9	0.83	7.5	17.5
188	03/06/91	1256	7-3	B	29.6	64.4	6.0	0.80	7.5	17.1
189	03/07/91	1256	11-7	B	29.0	64.9	6.1	0.78	7.5	17.0
190	03/07/91	1256	7-3	B	28.9	64.9	6.2	0.80	8.0	16.4
191	03/08/91	1256	11-7	B	29.0	64.7	6.3	0.80	8.0	16.4
192	03/08/91	1256	7-3	B	29.8	64.1	6.1	0.83	7.5	17.1
193	03/09/91	1256	11-7	B	29.5	64.1	6.4	0.80	8.0	16.5
194	03/09/91	1256	7-3	B	29.5	64.3	6.2	0.81	8.0	16.9
195	03/10/91	1258	11-7	B	28.9	64.8	6.3	0.79	7.5	17.3
196	03/10/91	1258	7-3	B	28.7	64.9	6.4	0.81	7.5	17.1
197	03/11/91	1258	11-7	B	28.3	65.6	6.1	0.81	8.0	16.8
198	03/11/91	1258	7-3	B	28.7	65.3	6.0	0.79	7.5	16.6
199	03/12/91	1258	11-7	B	29.2	64.5	6.3	0.80	7.5	17.5
200	03/12/91	1258	7-3	B	28.7	64.9	6.4	0.81	7.5	17.4
201	03/13/91	1258	11-7	B	30.4	63.4	6.2	0.80	7.5	17.3
202	03/13/91	1258	7-3	B	30.3	63.3	6.4	0.77	7.5	16.0
203	03/14/91	1258	11-7	B	30.4	63.3	6.3	0.78	7.5	16.8
204	03/14/91	1258	7-3	B	30.0	63.4	6.6	0.78	7.0	16.3
205	03/15/91	1258	11-7	B	29.5	64.4	6.1	0.80	7.5	18.3
206	03/15/91	1258	7-3	B	29.6	64.1	6.3	0.80	7.5	16.0
207	03/16/91	1258	11-7	B	28.3	65.4	6.3	0.83	8.0	15.9
208	03/16/91	1258	7-3	B	29.8	64.2	6.0	0.81	7.5	16.6
209	03/17/91	1260	11-7	B	28.9	65.0	6.1	0.81	8.0	18.8
210	03/17/91	1260	7-3	B	29.0	64.9	6.1	0.81	7.0	19.3
211	03/18/91	1260	11-7	B	30.8	63.1	6.1	0.80	7.5	14.8
212	03/18/91	1260	7-3	B	30.6	63.5	5.9	0.79	7.5	16.9

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OBS	DATE	ROA	TURN	PLANT	VOLATILE MATTER	FIXED CARBON	ASH	SULFUR	FSI	PCT PASSING 100 MESH
213	03/19/91	1260	11-7	B	30.3	63.5	6.2	0.77	7.5	15.5
214	03/19/91	1260	7-3	B	30.6	63.3	6.1	0.77	7.5	16.0
215	03/20/91	1260	11-7	B	30.3	63.7	6.0	0.80	8.0	16.7
216	03/20/91	1260	7-3	B	29.7	64.3	6.0	0.80	7.0	15.3
217	03/21/91	1260	11-7	B	29.0	65.1	5.9	0.80	7.5	16.0
218	03/21/91	1260	7-3	B	29.5	64.5	6.0	0.79	7.5	16.6
219	03/22/91	1260	11-7	B	29.9	64.0	6.1	0.81	7.5	16.5
220	03/22/91	1260	7-3	B	30.5	63.5	6.0	0.81	7.5	17.0
221	03/23/91	1260	11-7	B	30.8	63.0	6.2	0.79	7.5	16.5
222	03/23/91	1260	7-3	B	30.5	63.3	6.2	0.80	7.5	17.1
223	03/24/91	1262	11-7	B	30.1	63.8	6.1	0.79	7.0	18.6
224	03/24/91	1262	7-3	B	30.3	63.4	6.3	0.82	7.5	16.2
225	03/25/91	1262	11-7	B	29.2	64.8	6.0	0.82	7.5	17.5
226	03/25/91	1262	7-3	B	29.4	64.4	6.2	0.85	8.0	16.8
227	03/26/91	1262	11-7	B	29.0	64.4	6.6	0.80	7.5	21.7
228	03/26/91	1262	7-3	B	30.8	63.1	6.1	0.81	8.0	18.7
229	03/27/91	1262	11-7	B	31.3	62.6	6.1	0.82	7.5	16.8
230	03/27/91	1262	7-3	B	31.1	62.9	6.0	0.81	8.0	18.1
231	03/28/91	1262	11-7	B	30.6	63.3	6.1	0.81	7.5	20.5
232	03/28/91	1262	7-3	B	30.5	62.2	6.3	0.82	7.5	16.5
233	03/29/91	1262	11-7	B	30.3	63.7	6.0	0.79	8.0	19.0
234	03/29/91	1262	7-3	B	30.5	63.4	6.1	0.80	7.5	17.4
235	03/30/91	1262	11-7	B	31.5	62.4	6.1	0.76	7.5	18.5
236	03/30/91	1262	7-3	B	30.8	63.1	6.1	0.77	7.5	17.3
237	03/31/91	1264	11-7	B	30.3	63.3	6.4	0.77	7.5	17.2
238	03/31/91	1264	7-3	B	30.5	63.1	6.4	0.80	8.0	15.6
239	04/01/91	1264	11-7	B	30.8	63.2	6.0	0.78	7.5	15.2
240	04/01/91	1264	7-3	B	30.8	63.0	6.2	0.81	7.0	14.8
241	04/02/91	1264	11-7	B	30.4	63.3	6.3	0.81	7.5	16.3
242	04/02/91	1264	7-3	B	29.6	64.3	6.1	0.84	7.5	15.1
243	04/03/91	1264	11-7	B	31.5	62.1	6.4	0.81	8.0	17.1
244	04/03/91	1264	7-3	B	31.6	61.8	6.6	0.78	8.0	15.2
245	04/04/91	1264	11-7	B	31.0	62.8	6.2	0.83	7.0	16.1
246	04/04/91	1264	7-3	B	30.4	63.5	6.1	0.78	7.5	16.7
247	04/05/91	1264	11-7	B	30.1	63.6	6.3	0.77	7.5	15.0
248	04/05/91	1264	7-3	B	31.6	62.3	6.1	0.81	7.5	17.0
249	04/06/91	1264	11-7	B	30.7	63.3	6.0	0.81	7.5	16.5
250	04/06/91	1264	7-3	B	30.8	63.1	6.1	0.79	7.5	17.1
251	04/07/91	1266	11-7	B	30.4	63.3	6.3	0.80	8.0	17.4
252	04/07/91	1266	7-3	B	31.2	62.4	6.4	0.80	7.0	16.6
253	04/08/91	1266	11-7	B	29.4	64.6	6.0	0.77	7.5	18.2
254	04/08/91	1266	7-3	B	29.5	64.6	5.9	0.79	8.0	17.6
255	04/09/91	1266	11-7	B	30.2	63.7	6.1	0.76	7.5	16.5
256	04/09/91	1266	7-3	B	30.6	63.2	6.2	0.76	7.5	17.1
257	04/10/91	1266	11-7	B	30.4	63.5	6.1	0.80	7.5	17.0
258	04/10/91	1266	7-3	B	30.2	63.8	6.0	0.79	7.5	16.9
259	04/11/91	1266	11-7	B	30.5	63.3	6.2	0.77	7.5	17.7
260	04/11/91	1266	7-3	B	31.0	62.5	6.5	0.77	7.5	17.1
261	04/12/91	1266	11-7	B	29.2	64.6	6.2	0.77	8.0	16.4
262	04/12/91	1266	7-3	B	28.7	65.2	6.1	0.77	8.0	18.6
263	04/13/91	1266	11-7	B	31.1	62.8	6.1	0.78	7.5	15.1
264	04/13/91	1266	7-3	B	30.7	63.3	6.0	0.75	8.0	14.7
265	04/14/91	1268	11-7	B	29.8	64.0	6.2	0.77	7.5	14.2

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266	04/14/91	1268	7-37	B	30.2	63.4	6.4	0.79	7.5	12.7
267	04/15/91	1268	11-7	B	29.6	64.4	6.0	0.81	7.0	15.3
268	04/15/91	1268	7-3	B	29.5	64.4	6.1	0.84	7.5	16.3
269	04/16/91	1268	11-7	B	30.3	63.4	6.3	0.78	7.5	15.5
270	04/16/91	1268	7-3	B	30.5	63.0	6.5	0.79	7.5	15.2
271	04/17/91	1268	11-7	B	29.2	64.6	6.2	0.78	7.5	13.6
272	04/17/91	1268	7-3	B	29.7	64.0	6.3	0.79	7.5	14.4
273	04/18/91	1268	11-7	B	28.6	65.4	6.0	0.82	8.0	14.3
274	04/18/91	1268	7-3	B	29.5	64.3	6.2	0.82	7.5	15.4
275	04/19/91	1268	11-7	B	30.9	62.9	6.2	0.80	7.5	14.2
276	04/19/91	1268	7-3	B	31.1	62.5	6.4	0.83	8.0	15.4
277	04/20/91	1268	11-7	B	32.0	61.6	6.4	0.78	8.0	.
278	04/20/91	1268	7-3	B	30.3	63.5	6.2	0.81	8.0	16.8
279	04/21/91	1270	11-7	B	30.4	63.3	6.3	0.77	8.0	14.2
280	04/22/91	1270	11-7	B	29.6	64.4	6.0	0.77	7.5	14.4
281	04/22/91	1270	7-3	B	30.0	63.6	6.4	0.82	7.5	15.1
282	04/23/91	1270	11-7	B	30.4	63.5	6.1	0.76	7.5	18.8
283	04/23/91	1270	7-3	B	30.4	63.2	6.4	0.77	7.0	14.0
284	04/24/91	1270	11-7	B	29.7	64.5	6.0	0.76	7.0	14.7
285	04/24/91	1270	7-3	B	30.4	63.5	6.3	0.76	7.5	15.8
286	04/25/91	1270	11-7	B	29.5	64.6	5.9	0.75	7.0	15.5
287	04/25/91	1270	7-3	B	29.8	64.2	6.0	0.74	7.0	14.7
288	04/26/91	1270	11-7	B	29.8	64.2	6.0	0.77	7.5	16.0
289	04/26/91	1270	7-3	B	30.1	62.7	7.2	0.80	7.5	15.2
290	04/27/91	1270	11-7	B	30.1	63.7	6.2	0.76	8.0	16.4
291	04/27/91	1270	7-3	B	30.2	63.7	6.1	0.76	7.5	14.6
292	04/28/91	1272	11-7	B	.	.	.	.	.	.
293	04/28/91	1272	7-3	B	29.2	64.7	6.1	0.77	7.5	16.3
294	04/29/91	1272	11 7	B	29.5	64.4	6.1	0.77	7.5	17.0
295	04/29/91	1272	7-3	B	29.4	64.7	5.9	0.78	7.5	15.5
296	04/30/91	1272	11-7	B	29.4	64.2	6.4	0.78	7.0	14.4
297	04/30/91	1272	7-3	B	29.2	64.5	6.3	0.75	7.5	16.0
298	05/01/91	1272	11 7	B	28.2	65.5	6.3	0.79	7.5	14.8
299	05/01/91	1272	7-3	B	28.9	64.8	6.3	0.77	8.0	15.5
300	05/02/91	1272	11-7	B	28.3	65.1	6.6	0.78	7.5	17.1
301	05/02/91	1272	7-3	B	28.5	64.7	6.8	0.79	8.0	16.2
302	05/03/91	1272	11-7	B	30.1	63.6	6.3	0.77	7.5	15.0
303	05/03/91	1272	7-3	B	30.0	63.5	6.5	0.76	7.5	16.1
304	05/04/91	1272	11-7	B	29.9	64.0	6.1	0.76	7.0	14 8
305	05/04/91	1272	7-3	B	29.9	63.7	6.4	0.76	7.5	15.6
306	05/05/91	1282	11-7	B	29.3	64.0	6.7	0.78	7.5	16.9
307	05/05/91	1282	7-3	B	28.9	64.9	6.2	0.79	7.5	16.5
308	05/06/91	1282	11-7	B	29.1	64.1	6.8	0.80	8.0	16.3
309	05/06/91	1282	7-3	B	28.7	65.0	6.3	0.81	8.0	15.9
310	05/07/91	1282	11-7	B	29.4	64.5	6.1	0.79	7.5	15.8
311	05/07/91	1282	7-3	B	28.9	64.9	6.2	0.80	8.0	16.1
312	05/08/91	1282	11-7	B	29.4	64.5	6.1	0.77	8.0	14.2
313	05/08/91	1282	7-3	B	29.6	64.5	5.9	0.77	8.0	16.1
314	05/09/91	1282	11-7	B	29.6	64.1	6.3	0.76	8.0	16.4
315	05/09/91	1282	7-3	B	28.7	65.2	6.1	0.82	8.0	16.4
316	05/10/91	1282	11-7	B	28.7	65.2	6.1	0.83	7.5	13.2
317	05/10/91	1282	7-3	B	29.5	64.2	6.3	0.79	7.5	15.4
318	05/11/91	1282	11-7	B	29.4	64.5	6.1	0.78	8.0	17.1

COAL PROPERTIES FROM DAILY COAL MIX REPORTS
KIDC DEMONSTRATION PROJECT - BETHLEHEM STEEL CORPORATION
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OBS	DATE	ROA	TURN	PLANT	VOLATILE MATTER	FIXED CARBON	ASH	SULFUR	FSI	PCT PASSING 100 MESH
319	05/11/91	1282	7-3	B	28.9	64.9	6.2	0.80	7.5	15.2
320	05/12/91	1284	11-7	B	.	.	.	.	.	.
321	05/12/91	1284	7-3	B	28.7	65.0	6.3	0.79	8.0	15.6
322	05/13/91	1284	11-7	B	.	.	.	.	.	.
323	05/13/91	1284	7-3	B	29.9	64.0	6.1	0.78	8.0	15.4
324	05/14/91	1284	11-7	B	29.5	63.9	6.6	0.79	8.0	16.8
325	05/14/91	1284	7-3	B	29.6	64.0	6.4	0.81	7.5	14.7
326	05/15/91	1284	11-7	B	30.0	63.6	6.4	0.79	7.5	16.2
327	05/15/91	1284	7-3	B	31.1	62.8	6.1	0.78	8.0	15.0
328	05/16/91	1284	11-7	B	29.8	63.6	6.6	0.83	7.5	16.4
329	05/16/91	1284	7-3	B	30.3	63.5	6.2	0.80	8.0	16.4
330	05/17/91	1284	11-7	B	30.7	63.1	6.2	0.75	8.0	16.2
331	05/17/91	1284	7-3	B	31.2	62.3	6.5	0.80	7.5	15.5
332	05/18/91	1284	7-3	B	30.8	63.1	6.1	0.76	8.0	17.5
333	05/18/91	1284	3-11	B	30.1	63.7	6.2	0.78	8.0	18.6
334	05/19/91	1286	11-7	B	30.7	63.2	6.1	0.79	8.0	17.8
335	05/19/91	1286	7-3	B	30.8	63.0	6.2	0.77	7.5	17.6
336	05/20/91	1286	11-7	B	29.6	64.4	6.0	0.79	7.5	15.2
337	05/20/91	1286	7-3	B	29.4	64.5	6.1	0.79	7.5	13.5
338	05/21/91	1286	11-7	B	29.4	64.5	6.1	0.79	7.5	10.9
339	05/21/91	1286	7-3	B	29.0	64.9	6.1	0.79	8.0	13.9
340	05/22/91	1286	11-7	B	29.5	64.3	6.2	0.87	8.5	11.9
341	05/22/91	1286	7-3	B	29.3	64.7	6.0	0.80	8.0	13.5
342	05/23/91	1286	11-7	B	29.5	64.3	6.2	0.79	8.0	15.8
343	05/23/91	1286	7-3	B	29.2	64.8	6.0	0.81	8.0	9.7
344	05/24/91	1286	11-7	B	29.4	64.4	6.2	0.79	7.5	15.2
345	05/24/91	1286	7-3	B	29.6	64.1	6.3	0.79	8.0	14.6
346	05/25/91	1286	11-7	B	29.6	64.2	6.2	0.78	8.0	12.5
347	05/26/91	1290	11-7	B	28.5	65.5	6.0	0.80	7.5	12.6
348	05/26/91	1290	7-3	B	29.7	64.2	6.1	0.81	7.5	14.0
349	05/27/91	1290	7-3	B	29.6	64.2	6.2	0.77	7.5	14.9
350	05/28/91	1290	11-7	B	30.2	63.1	6.7	0.79	7.5	16.8
351	05/28/91	1290	7-3	B	29.9	63.8	6.3	0.80	8.0	15.0
352	05/29/91	1290	11-7	B	29.2	64.5	6.3	0.82	7.5	14.9
353	05/29/91	1290	7-3	B	30.4	63.2	6.4	0.79	8.0	15.3
354	05/30/91	1290	11-7	B	30.3	63.6	6.1	0.84	7.5	14.4
355	05/30/91	1290	7-3	B	29.4	64.2	6.4	0.77	7.5	15.0
356	05/31/91	1290	11-7	B	29.6	64.3	6.1	0.77	7.5	14.0
357	05/31/91	1290	7-3	B	29.8	63.8	6.4	0.79	7.5	14.0
358	06/01/91	1290	11-7	B	29.6	64.4	6.0	0.80	7.5	14.8
359	06/01/91	1290	7-3	B	29.9	64.0	6.1	0.80	7.0	15.5
360	06/02/91	1292	11-7	B	29.6	64.4	6.0	0.82	8.0	14.6
361	06/02/91	1292	7-3	B	30.0	64.0	6.0	0.80	7.5	16.2
362	06/03/91	1292	11-7	B	29.6	63.6	6.8	0.77	7.5	10.6
363	06/03/91	1292	7-3	B	29.8	64.2	6.0	0.81	7.5	19.1
364	06/04/91	1292	11-7	B	29.5	64.7	5.8	0.83	7.5	15.2
365	06/04/91	1292	7-3	B	30.0	64.3	5.7	0.80	7.5	13.7
366	06/05/91	1292	11-7	B	30.1	63.9	6.0	0.79	7.5	15.0
367	06/05/91	1292	7-3	B	29.8	63.8	6.4	0.79	7.0	12.9
368	06/06/91	1292	11-7	B	29.8	63.6	6.6	0.78	7.5	13.2
369	06/06/91	1292	7-3	B	29.3	64.9	5.8	0.81	7.5	12.9
370	06/07/91	1292	11-7	B	29.7	63.7	6.6	0.74	7.5	13.2
371	06/07/91	1292	7-3	B	29.9	64.0	6.1	0.78	8.0	14.0

COAL PROPERTIES FROM DAILY COAL MIX REPORTS
KIDC DEMONSTRATION PROJECT - BETHLEHEM STEEL CORPORATION
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OBS	DATE	ROA	TURN	PLANT	VOLATILE MATTER	FIXED CARBON	ASH	SULFUR	FSI	PCT PASSING 100 MESH
372	06/08/91	1292	11-7	B	29.6	64.3	6.1	0.83	7.5	13.3
373	06/08/91	1292	7-3	B	29.4	64.7	5.9	0.79	7.5	12.9
374	06/09/91	1296	11-7	B	29.5	63.1	7.4	0.79	7.5	13.7
375	06/09/91	1296	7-3	B	28.7	65.0	6.3	0.78	8.0	14.6
376	06/10/91	1296	11-7	B	28.5	65.1	6.4	0.83	8.0	15.9
377	06/10/91	1296	7-3	B	28.7	65.0	6.3	0.81	7.5	15.0
378	06/11/91	1296	11-7	B	28.7	65.4	5.9	0.82	7.5	14.8
379	06/11/91	1296	7-3	B	29.1	65.0	5.9	0.78	7.5	16.6
380	06/12/91	1296	11-7	B	28.7	64.7	6.6	0.79	7.5	15.1
381	06/12/91	1296	7-3	B	28.9	64.7	6.4	0.79	8.0	16.1
382	06/13/91	1296	11-7	B	29.0	64.7	6.3	0.80	7.5	16.0
383	06/13/91	1296	7-3	B	28.7	64.7	6.6	0.81	8.0	17.0
384	06/14/91	1296	11-7	B	28.9	64.9	6.2	0.78	8.0	16.3
385	06/14/91	1296	7-3	B	28.6	65.0	6.4	0.83	7.5	16.1
386	06/15/91	1296	11-7	B	29.4	64.3	6.3	0.79	7.5	13.6
387	06/15/91	1296	7-3	B	29.7	64.1	6.2	0.80	7.5	14.0
388	06/16/91	1298	11-7	B	30.9	62.8	6.0	0.76	7.5	12.4
389	06/16/91	1298	7-3	B	31.5	62.2	6.3	0.74	7.5	14.4
390	06/17/91	1298	11-7	B	29.5	64.9	5.6	0.76	8.0	14.8
391	06/17/91	1298	7-3	B	29.7	64.7	5.6	0.77	7.5	16.4
392	06/18/91	1298	11-7	B	30.1	64.1	6.0	0.77	7.5	14.8
393	06/18/91	1298	7-3	B	29.7	64.9	5.6	0.75	8.0	16.4
394	06/19/91	1298	11-7	B	28.3	65.3	6.4	0.80	7.5	14.4
395	06/19/91	1298	7-3	B	28.7	64.9	6.4	0.85	8.0	17.6
396	06/20/91	1298	11-7	B	29.3	64.4	6.3	0.79	7.5	16.1
397	06/20/91	1298	7-3	B	28.6	65.2	6.2	0.80	7.5	17.2
398	06/21/91	1298	11-7	B	28.8	65.1	6.1	0.80	8.0	16.2
399	06/21/91	1298	7-3	B	29.5	64.3	6.2	0.80	7.5	16.8
400	06/22/91	1298	11-7	B	28.7	65.2	6.1	0.80	7.5	14.4
401	06/23/91	1302	11-7	B	29.3	64.5	6.2	0.79	8.0	18.4
402	06/23/91	1302	7-3	B	28.7	65.1	6.2	0.81	8.0	18.4
403	06/24/91	1302	11-7	B	28.6	65.0	6.4	0.80	8.0	15.2
404	06/24/91	1302	7-3	B	29.0	64.7	6.3	0.78	7.5	17.1
405	06/25/91	1302	11-7	B	28.3	65.4	6.3	0.82	8.0	18.0
406	06/25/91	1302	7-3	B	28.2	65.6	6.2	0.85	7.0	15.6
407	06/26/91	1302	11-7	B	29.0	64.8	6.2	0.78	7.5	16.4
408	06/26/91	1302	7-3	B	29.3	64.4	6.3	0.79	8.0	16.0
409	06/27/91	1302	11-7	B	28.7	65.0	6.3	0.79	7.5	17.0
410	06/27/91	1302	7-3	B	28.4	65.2	6.4	0.79	8.0	15.6
411	06/28/91	1302	11-7	B	28.5	65.3	6.2	0.79	7.5	17.6
412	06/28/91	1302	7-3	B	28.4	65.3	6.3	0.79	7.5	15.6
413	06/29/91	1302	11-7	B	28.5	65.4	6.1	0.81	8.0	22.0
414	06/29/91	1302	7-3	B	28.5	65.5	6.0	0.87	8.0	17.6
415	06/30/91	1304	11-7	B	28.6	65.2	6.2	0.77	8.0	16.4
416	06/30/91	1304	7-3	B	27.7	66.2	6.1	0.80	7.5	16.4
417	07/01/91	1304	11-7	B	28.4	65.5	6.1	0.79	7.5	16.1
418	07/01/91	1304	7-3	B	27.7	66.0	6.3	0.81	7.5	16.8
419	07/02/91	1304	11-7	B	28.7	65.3	6.0	0.81	7.5	14.5
420	07/03/91	1304	11-7	B	27.9	66.1	6.0	0.77	7.5	17.0
421	07/03/91	1304	7-3	B	28.8	64.8	6.4	0.80	7.5	15.5
422	07/04/91	1304	11-7	B	28.3	65.3	6.4	0.79	7.5	17.0
423	07/04/91	1304	7-3	B	28.7	64.8	6.5	0.77	7.5	16.5
424	07/05/91	1304	11-7	B	28.2	65.7	6.1	0.80	7.5	14.2

COAL PROPERTIES FROM DAILY COAL MIX REPORTS
KIDC DEMONSTRATION PROJECT - BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

OBS	DATE	ROA	TURN	PLANT	VOLATILE MATTER	FIXED CARBON	ASH	SULFUR	FSI	PCT PASSING 100 MESH
425	07/05/91	1304	7-3	B	28.8	64.9	6.3	0.81	7.5	15.0
426	07/06/91	1304	11-7	B	28.8	64.9	6.3	0.79	8.0	17.7
427	07/06/91	1304	7-3	B	28.9	64.7	6.4	0.79	8.0	15.2
428	07/07/91	1307	11-7	B	29.5	64.2	6.3	0.81	7.5	17.0
429	07/07/91	1307	7-3	B	29.0	64.9	6.1	0.81	7.0	15.0
430	07/08/91	1307	11-7	B	28.7	65.3	6.0	0.84	7.5	11.0
431	07/08/91	1307	7-3	B	28.6	65.2	6.2	0.79	7.5	12.2
432	07/09/91	1307	11-7	B	28.5	65.3	6.2	0.82	7.5	16.6
433	07/09/91	1307	7-3	B	28.4	65.4	6.2	0.80	7.5	13.3
434	07/10/91	1307	11-7	B	28.7	64.7	6.6	0.79	8.0	11.5
435	07/10/91	1307	7-3	B	29.5	64.1	6.4	0.81	7.5	11.9
436	07/11/91	1307	11-7	B	29.2	64.5	6.3	0.80	7.5	13.0
437	07/11/91	1307	7-3	B	29.5	64.4	6.1	0.81	8.0	14.2
438	07/12/91	1307	11-7	B	29.6	64.3	6.1	0.81	8.0	15.2
439	07/12/91	1307	7-3	B	29.4	64.3	6.3	0.79	7.5	12.6
440	07/13/91	1307	11-7	B	29.2	64.9	5.9	0.85	7.5	.
441	07/13/91	1307	7-3	B	29.4	64.2	6.4	0.79	7.5	.
442	07/14/91	1309	11-7	B	29.2	64.7	6.1	0.79	7.5	11.4
443	07/14/91	1309	7-3	B	29.4	64.6	6.0	0.79	7.0	11.8
444	07/15/91	1309	11-7	B	29.9	63.8	6.3	0.78	8.0	12.6
445	07/15/91	1309	7-3	B	29.5	64.0	6.5	0.78	7.5	12.8
446	07/16/91	1309	11-7	B	30.0	64.3	5.7	0.77	7.5	13.9
447	07/16/91	1309	7-3	B	30.2	63.5	6.3	0.79	7.5	12.2
448	07/17/91	1309	11-7	B	29.6	64.2	6.2	0.77	7.5	13.8
449	07/17/91	1309	7-3	B	29.6	64.3	6.1	0.75	7.5	12.1
450	07/18/91	1309	11-7	B	29.2	64.4	6.4	0.79	7.5	12.2
451	07/18/91	1309	7-3	B	29.1	64.9	6.0	0.79	7.5	12.8
452	07/19/91	1309	11-7	B	29.8	64.2	6.0	0.80	8.0	13.6
453	07/19/91	1309	7-3	B	28.8	64.8	6.4	0.82	7.5	14.2
454	07/20/91	1309	11-7	B	29.2	64.5	6.3	0.81	8.0	14.1
455	07/20/91	1309	7-3	B	29.3	64.7	6.0	0.80	8.0	15.1
456	07/21/91	1311	11-7	B	29.5	63.7	6.8	1.26	7.5	13.2
457	07/21/91	1311	7-3	B	30.2	63.5	6.3	0.82	7.0	13.8
458	07/22/91	1311	11-7	B	29.8	64.0	6.2	0.75	7.0	16.2
459	07/22/91	1311	7-3	B	28.8	65.2	6.0	0.79	7.5	16.2
460	07/23/91	1311	11-7	B	29.6	64.0	6.4	0.82	7.5	16.8
461	07/23/91	1311	7-3	B	29.0	64.8	6.2	0.77	7.5	15.8
462	07/24/91	1311	11-7	B	28.8	65.1	5.5	0.81	7.5	15.9
463	07/24/91	1311	7-3	B	29.2	64.5	6.3	0.78	8.0	14.6
464	07/25/91	1311	11-7	B	29.5	64.6	5.9	0.79	7.5	15.6
465	07/25/91	1311	7-3	B	29.5	64.4	6.1	0.82	7.5	15.3
466	07/26/91	1311	11-7	B	29.3	64.3	6.4	0.78	7.5	16.2
467	07/26/91	1311	7-3	B	29.1	64.3	6.6	0.78	7.5	15.5
468	07/27/91	1311	11-7	B	29.3	64.2	6.5	0.78	7.0	16.0
469	07/27/91	1311	7-3	B	29.4	64.6	6.0	0.79	7.5	14.5
470	07/28/91	1313	11-7	B	28.9	63.9	7.2	0.77	7.5	12.7
471	07/28/91	1313	7-3	B	29.1	65.0	5.9	0.82	7.5	15.9
472	07/29/91	1313	11-7	B	29.8	64.2	6.0	0.79	7.5	15.9
473	07/29/91	1313	7-3	B	28.6	65.3	6.1	0.78	8.0	17.3
474	07/30/91	1313	11-7	B	29.4	64.7	5.9	0.79	8.0	15.2
475	07/30/91	1313	7-3	B	28.8	65.1	6.1	0.79	8.0	16.4
476	07/31/91	1313	11-7	B	29.0	65.0	6.0	0.80	7.0	15.7
477	07/31/91	1313	7-3	B	28.9	65.2	5.9	0.82	7.5	16.1

COAL PROPERTIES FROM DAILY COAL MIX REPORTS
KIDC DEMONSTRATION PROJECT - BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

OBS	DATE	ROA	TURN	PLANT	VOLATILE MATTER	FIXED CARBON	ASH	SULFUR	FSI	PCT PASSING 100 MESH
478	08/01/91	1313	11-7	B	29.5	64.2	6.3	0.80	8.0	14.5
479	08/01/91	1313	7-3	B	29.3	64.8	6.9	0.82	7.5	15.2
480	08/02/91	1313	11-7	B	29.7	64.4	5.9	0.78	7.5	17.7
481	08/02/91	1313	7-3	B	29.4	64.5	6.1	0.80	7.5	17.3
482	08/03/91	1313	11-7	B	30.8	63.3	5.9	0.78	7.5	16.3
483	08/03/91	1313	7-3	B	30.7	62.3	6.0	0.78	8.0	17.5
484	08/04/91	1317	11-7	B	30.7	63.3	6.0	0.77	7.0	13.1
485	08/04/91	1317	7-3	B	30.6	63.3	6.1	0.77	7.5	15.7
486	08/05/91	1317	11-7	B	29.7	64.3	6.0	0.76	7.5	15.5
487	08/05/91	1317	7-3	B	29.5	64.6	5.9	0.80	7.0	16.2
488	08/06/91	1317	11-7	B	31.1	62.9	6.0	0.77	8.0	14.9
489	08/06/91	1317	7-3	B	31.5	62.2	6.3	0.75	7.5	12.3
490	08/07/91	1317	11-7	B	31.6	62.4	6.0	0.74	7.5	12.8
491	08/07/91	1317	7-3	B	29.6	64.5	5.8	0.76	8.0	13.2
492	08/08/91	1317	11-7	B	31.2	62.2	6.6	0.80	7.5	13.6
493	08/08/91	1317	7-3	B	31.2	62.7	6.1	0.79	7.5	11.0
494	08/09/91	1317	11-7	B	31.0	62.4	6.6	0.82	7.5	14.2
495	08/09/91	1317	7-3	B	30.1	64.2	5.7	0.78	7.5	15.1
496	08/10/91	1317	11-7	B	29.7	63.8	6.5	0.79	7.5	14.5
497	08/10/91	1317	7-3	B	30.2	63.8	6.0	0.81	7.5	15.8
498	08/11/91	1320	11-7	B	29.1	65.2	5.7	0.81	7.5	15.7
499	08/11/91	1320	7-3	B	30.0	63.2	6.8	0.78	7.5	16.7
500	08/12/91	1320	11-7	B	29.5	63.8	6.7	0.82	7.5	14.8
501	08/12/91	1320	7-3	B	29.9	64.4	5.7	0.79	7.5	13.9
502	08/13/91	1320	11-7	B	29.3	64.6	6.1	0.87	7.5	16.5
503	08/13/91	1320	7-3	B	29.4	64.2	6.4	0.79	8.0	15.1
504	08/14/91	1320	11-7	B	28.3	65.6	6.1	0.86	8.0	15.8
505	08/14/91	1320	7-3	B	28.8	64.7	6.5	0.78	7.0	16.2
506	08/15/91	1320	11-7	B	28.9	64.9	6.2	0.82	8.0	15.1
507	08/15/91	1320	7-3	B	29.9	63.5	6.6	0.79	7.5	18.3
508	08/16/91	1320	11-7	B	30.5	63.2	6.3	0.78	7.5	14.2
509	08/16/91	1320	7-3	B	29.8	64.1	6.1	0.81	7.5	17.3
510	08/17/91	1320	11-7	B	31.9	62.0	6.1	0.78	8.0	10.6
511	08/17/91	1320	7-3	B	31.2	62.7	6.1	0.76	7.5	14.7
512	08/18/91	1323	11-7	B	29.6	64.7	5.7	0.81	7.5	16.2
513	08/18/91	1323	7-3	B	30.3	63.7	6.0	0.84	7.5	14.8
514	08/19/91	1323	11-7	B	29.1	64.5	6.4	0.79	7.5	17.4
515	08/19/91	1323	7-3	B	30.3	63.7	6.0	0.79	8.0	15.9
516	08/20/91	1323	11-7	B	30.9	63.3	5.8	0.78	8.0	15.6
517	08/20/91	1323	7-3	B	29.6	64.8	5.6	0.80	8.0	15.0
518	08/21/91	1323	11-7	B	30.1	64.1	5.8	0.78	8.0	13.9
519	08/21/91	1323	7-3	B	30.0	64.0	6.0	0.80	7.0	17.0
520	08/22/91	1323	11-7	B	29.5	63.8	6.7	0.77	7.5	17.0
521	08/22/91	1323	7-3	B	29.2	64.6	6.2	0.78	8.0	16.4
522	08/23/91	1323	11-7	B	29.8	64.0	6.2	0.79	8.0	16.0
523	08/23/91	1323	7-3	B	29.3	64.7	6.0	0.78	7.5	16.8
524	08/24/91	1323	11-7	B	29.5	64.3	6.2	0.75	7.5	15.2
525	08/24/91	1323	7-3	B	28.8	64.4	6.8	0.79	7.5	14.8
526	08/25/91	1326	11-7	B	29.7	63.8	6.5	0.77	7.0	15.6
527	08/25/91	1326	7-3	B	29.3	64.8	5.9	0.77	7.5	12.8
528	08/26/91	1326	11-7	B	29.9	63.8	6.3	0.77	7.5	16.1
529	08/26/91	1326	7-3	B	29.7	64.4	5.9	0.77	7.0	15.6
530	08/27/91	1326	11-7	B	30.2	63.1	6.7	0.75	7.5	14.8

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KIDC DEMONSTRATION PROJECT - BETHLEHEM STEEL CORPORATION
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OBS	DATE	ROA	TURN	PLANT	VOLATILE MATTER	FIXED CARBON	ASH	SULFUR	FSI	PCT PASSING 100 MESH
531	08/27/91	1326	7-3	B	29.7	64.1	6.2	0.78	7.5	14.8
532	08/28/91	1326	11-7	B	29.8	64.5	5.7	0.79	7.5	15.0
533	08/28/91	1326	7-3	B	30.7	63.2	6.1	0.76	7.5	14.6
534	08/29/91	1326	11-7	B	30.3	63.6	6.1	0.78	7.5	17.1
535	08/29/91	1326	7-3	B	30.5	63.2	6.3	0.77	7.5	15.1
536	08/30/91	1326	11-7	B	29.9	64.2	5.9	0.78	7.0	15.6
537	08/30/91	1326	7-3	B	30.5	63.4	6.1	0.77	7.5	15.1
538	08/31/91	1326	11-7	B	30.3	63.2	6.5	0.79	8.0	14.8
539	08/31/91	1326	7-3	B	29.7	63.5	6.8	0.79	7.5	16.6
540	09/01/91	1329	11-7	B	30.0	63.9	6.1	0.77	7.5	13.6
541	09/01/91	1329	7-3	B	30.2	63.7	6.1	0.78	7.5	15.5
542	09/02/91	1329	11-7	B	29.9	63.6	6.5	0.76	7.5	14.1
543	09/02/91	1329	7-3	B	29.8	64.1	6.1	0.77	7.5	16.1
544	09/03/91	1329	11-7	B	31.2	62.8	6.0	0.76	8.0	12.8
545	09/03/91	1329	7-3	B	30.7	63.0	6.3	0.73	7.5	13.9
546	09/04/91	1329	11-7	B	31.0	63.1	5.9	0.77	7.5	14.4
547	09/04/91	1329	7-3	B	30.2	63.6	6.2	0.80	7.5	15.8
548	09/05/91	1329	11-7	B	29.3	63.9	6.8	0.83	7.5	15.2
549	09/05/91	1329	7 3	B	30.3	63.6	6.1	0.80	7.5	14.6
550	09/06/91	1329	11-7	B	29.2	64.5	6.3	0.78	7.5	15.4
551	09/06/91	1329	7-3	B	30.5	60.2	8.3	0.78	7.5	15.6
552	09/07/91	1329	11-7	B	30.8	63.1	6.1	0.75	7.5	12.0
553	09/07/91	1329	7-3	B	30.2	63.8	6.0	0.73	7.5	13.1
554	09/08/91	1331	11-7	B	29.1	65.0	5.9	0.81	8.0	14.6
555	09/08/91	1331	7-3	B	30.1	63.4	6.5	0.78	7.5	15.0
556	09/09/91	1331	11-7	B	29.9	64.4	5.7	0.79	7.5	16.0
557	09/09/91	1331	7-3	B	30.4	64.0	5.6	0.78	7.5	15.2
558	09/10/91	1331	11-7	B	29.7	64.8	5.5	0.79	7.5	11.2
559	09/10/91	1331	7-3	B	30.8	62.9	6.3	0.79	7.5	16.0
560	09/11/91	1331	11-7	B	30.1	64.0	5.9	0.76	7.5	14.0
561	09/11/91	1331	7-3	B	30.0	64.9	5.7	0.77	7.5	14.9
562	09/12/91	1331	11-7	B	29.8	64.0	6.2	0.78	7.5	13.3
563	09/12/91	1331	7-3	B	29.9	64.0	6.1	0.74	7.0	14.2
564	09/13/91	1331	11-7	B	28.1	65.4	6.5	0.78	7.5	14.6
565	09/13/91	1331	7-3	B	28.5	65.0	6.5	0.77	7.5	15.1
566	09/14/91	1331	11-7	B	30.7	62.4	6.9	0.78	8.0	13.9
567	09/14/91	1331	7-3	B	31.4	62.5	6.1	0.77	7.5	11.6
568	09/15/91	1333	11-7	B	29.9	63.9	6.2	0.80	7.5	16.4
569	09/15/91	1333	7-3	B	30.0	63.9	6.1	0.80	7.5	15.6
570	09/16/91	1333	11-7	B	29.6	64.5	5.9	0.79	7.5	13.1
571	09/16/91	1333	7-3	B	29.6	64.3	6.1	0.79	7.5	15.1
572	09/17/91	1333	11-7	B	30.5	63.6	5.9	0.75	7.5	14.3
573	09/17/91	1333	7-3	B	30.2	63.9	5.9	0.76	7.5	15.1
574	09/18/91	1333	11-7	B	28.6	65.4	6.0	0.80	8.0	15.6
575	09/18/91	1333	7-3	B	29.3	64.4	6.3	0.81	7.5	16.4
576	09/19/91	1333	11-7	B	29.1	64.7	6.2	0.79	8.0	17.4
577	09/19/91	1333	7-3	B	29.6	64.5	5.9	0.80	7.5	13.9
578	09/20/91	1333	11-7	B	28.2	65.6	6.2	0.78	7.5	17.9
579	09/20/91	1333	7-3	B	28.4	65.3	6.3	0.76	8.0	14.8
580	09/21/91	1333	11-7	B	28.5	65.5	6.0	0.79	7.5	15.2
581	09/21/91	1333	7-3	B	28.9	64.4	6.7	0.75	7.5	14.8
582	09/22/91	1335	11-7	B	28.9	65.2	5.9	0.77	7.5	15.6
583	09/22/91	1335	7-3	B	29.8	63.9	6.3	0.80	8.0	14.6

COAL PROPERTIES FROM DAILY COAL MIX REPORTS
KIDC DEMONSTRATION PROJECT - BETHLEHEM STEEL CORPORATION
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OBS	DATE	ROA	TURN	PLANT	VOLATILE MATTER	FIXED CARBON	ASH	SULFUR	FSI	PCT PASSING 100 MESH
584	09/23/91	1335	11-7	B	30.3	63.3	6.4	0.81	7.5	14.6
585	09/23/91	1335	7-3	B	31.3	62.4	6.3	0.79	7.5	14.8
586	09/24/91	1335	11-7	B	29.6	63.8	6.6	0.75	7.5	14.6
587	09/24/91	1335	7-3	B	30.6	63.4	6.0	0.74	8.0	13.9
588	09/25/91	1335	11-7	B	31.6	62.5	5.9	0.74	8.0	14.6
589	09/25/91	1335	7-3	B	30.8	63.3	5.9	0.74	8.0	15.3
590	09/26/91	1335	11-7	B	29.3	64.0	6.7	0.79	7.0	15.6
591	09/26/91	1335	7-3	B	31.0	62.4	6.6	0.76	7.5	15.2
592	09/27/91	1335	11-7	B	30.3	62.8	6.9	0.74	7.5	15.2
593	09/27/91	1335	7-3	B	31.1	62.8	6.1	0.76	7.5	15.0
594	09/28/91	1335	11-7	B	30.8	62.9	6.3	0.76	7.5	14.0
595	09/28/91	1335	7-3	B	29.3	64.1	6.6	0.79	8.0	15.0
596	09/29/91	1337	11-7	B	28.0	65.1	6.9	0.83	8.0	13.4
597	09/29/91	1337	7-3	B	28.3	65.2	6.5	0.85	8.0	14.0
598	09/30/91	1337	11-7	B	28.6	64.9	6.9	0.77	7.5	12.6
599	09/30/91	1337	7-3	B	28.2	65.2	6.6	0.82	8.0	14.7
600	10/01/91	1337	11-7	B	30.0	63.8	6.2	0.78	7.5	16.8
601	10/01/91	1337	7-3	B	29.9	63.8	6.3	0.79	8.0	15.2
602	10/02/91	1337	11-7	B	30.0	63.9	6.1	0.83	8.0	14.3
603	10/02/91	1337	7-3	B	30.9	62.9	6.2	0.82	7.5	12.1
604	10/03/91	1337	11-7	B	28.3	65.6	6.1	0.82	8.0	17.6
605	10/03/91	1337	7-3	B	29.0	64.9	6.1	0.82	7.5	16.4
606	10/04/91	1337	11-7	B	29.1	64.5	6.4	0.79	7.5	16.5
607	10/04/91	1337	7-3	B	29.7	64.0	6.3	0.82	8.0	17.2
608	10/05/91	1337	11-7	B	29.4	64.2	6.4	0.81	8.0	16.4
609	10/05/91	1337	7-3	B	30.2	63.3	6.5	0.81	8.0	17.1
610	10/06/91	1339	11-7	B	29.5	64.1	6.4	0.80	7.5	15.1
611	10/06/91	1339	7-3	B	28.2	65.5	6.2	0.76	7.5	18.8
612	10/07/91	1339	11-7	B	30.1	63.5	6.4	0.81	7.5	17.2
613	10/07/91	1339	7-3	B	29.4	64.4	6.2	0.83	7.0	16.8
614	10/08/91	1339	11-7	B	29.8	63.5	6.7	0.79	8.0	17.6
615	10/08/91	1339	7-3	B	30.8	62.9	6.3	0.76	7.5	18.1
616	10/09/91	1339	11-7	B	29.2	64.4	6.4	0.79	7.5	13.8
617	10/09/91	1339	7-3	B	29.5	64.1	6.4	0.79	7.5	13.2
618	10/10/91	1339	11-7	B	30.4	63.6	6.0	0.74	8.0	13.5
619	10/10/91	1339	7-3	B	30.3	63.8	5.9	0.76	8.0	17.6
620	10/11/91	1339	11-7	B	30.9	63.4	5.7	0.74	7.5	14.6
621	10/11/91	1339	7-3	B	31.6	62.5	5.9	0.73	7.5	14.8
622	10/12/91	1339	11-7	B	30.2	63.5	6.3	0.79	7.5	15.3
623	10/12/91	1339	7-3	B	29.7	63.7	6.6	0.80	8.0	14.8
624	10/13/91	1344	11-7	B	30.4	64.0	5.6	0.78	7.5	17.3
625	10/13/91	1344	7-3	B	30.8	63.6	5.6	0.76	7.5	15.6
626	10/14/91	1344	11-7	B	29.8	63.6	6.6	0.78	7.5	15.8
627	10/14/91	1344	7-3	B	29.6	63.7	6.7	0.80	7.5	14.4
628	10/15/91	1344	7-3	B	28.2	64.9	6.9	0.80	8.0	13.2
629	10/16/91	1344	11-7	B	28.9	65.2	5.9	0.81	8.0	15.6
630	10/16/91	1344	7-3	B	28.9	64.9	6.2	0.81	8.0	15.9
631	10/17/91	1344	11-7	B	30.6	63.4	6.0	0.77	7.5	14.8
632	10/17/91	1344	7-3	B	31.3	62.7	6.0	0.78	8.0	14.5
633	10/18/91	1344	11-7	B	30.7	63.1	6.2	0.76	8.0	15.4
634	10/18/91	1344	7-3	B	29.7	64.0	6.3	0.75	8.0	14.8
635	10/19/91	1344	11-7	B	29.1	64.6	6.3	0.83	8.0	15.1
636	10/19/91	1344	7-3	B	31.2	62.5	6.3	0.77	7.5	15.4

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OBS	DATE	ROA	TURN	PLANT	VOLATILE MATTER	FIXED CARBON	ASH	SULFUR	FSI	PCT PASSING 100 MESH
637	10/20/91	1346	11-7	B	29.9	64.1	6.0	0.79	7.5	14.7
638	10/20/91	1346	7-3	B	29.3	64.6	6.1	0.79	7.5	16.3
639	10/21/91	1346	11-7	B	30.2	63.3	6.5	0.80	7.5	17.3
640	10/21/91	1346	7-3	B	30.3	63.1	6.6	0.83	7.5	16.5
641	10/22/91	1346	11-7	B	28.4	64.9	6.7	0.84	7.5	.
642	10/22/91	1346	7-3	B	28.8	64.8	6.4	0.79	7.0	.
643	10/23/91	1346	11-7	B	27.1	66.9	6.0	0.80	7.5	18.0
644	10/23/91	1346	7-3	B	27.4	66.3	6.3	0.79	7.5	17.2
645	10/24/91	1346	11-7	B	28.9	64.7	6.4	0.78	8.0	15.5
646	10/24/91	1346	7-3	B	30.4	63.2	6.3	0.74	7.5	13.2
647	10/25/91	1346	11-7	B	28.6	65.0	6.4	0.83	7.5	16.7
648	10/25/91	1346	7-3	B	29.9	63.8	6.3	0.75	7.5	17.4
649	10/26/91	1346	11-7	B	28.1	65.9	6.0	0.78	7.5	14.1
650	10/26/91	1346	7-3	B	27.6	66.3	6.1	0.80	8.0	13.1
651	10/27/91	1348	11-7	B	30.6	62.8	6.6	0.81	8.0	14.5
652	10/27/91	1348	7-3	B	30.5	63.5	6.0	0.79	7.5	14.7
653	10/28/91	1348	11-7	B	28.6	65.3	6.1	0.81	7.5	12.0
654	10/28/91	1348	7-3	B	30.1	63.5	6.4	0.78	7.5	13.3
655	10/29/91	1348	11-7	B	30.4	63.3	6.3	0.78	7.0	15.1
656	10/29/91	1348	7-3	B	30.0	63.9	6.1	0.80	7.5	14.4
657	10/30/91	1348	11-7	B	29.9	63.9	6.2	0.79	7.5	15.3
658	10/30/91	1348	7-3	B	29.4	64.5	6.1	0.78	8.0	14.6
659	10/31/91	1348	11-7	B	30.2	63.7	6.1	0.76	7.5	14.5
660	10/31/91	1348	7-3	B	30.0	63.5	6.5	0.79	7.5	15.2
661	11/01/91	1348	11-7	B	27.8	65.8	6.4	0.80	8.0	14.1
662	11/01/91	1348	7-3	B	29.8	64.8	6.4	0.81	8.0	15.2
663	11/02/91	1348	11-7	B	28.7	64.9	6.4	0.79	7.5	15.0
664	11/02/91	1348	7-3	B	29.9	63.7	6.4	0.76	8.0	16.9
665	11/03/91	1350	11-7	B	29.6	63.7	6.7	0.77	7.5	16.0
666	11/03/91	1350	7-3	B	29.7	63.7	6.6	0.80	7.5	16.6
667	11/04/91	1350	11-7	B	29.9	63.9	6.2	0.79	8.0	16.9
668	11/04/91	1350	7-3	B	30.5	63.2	6.3	0.78	7.5	15.2
669	11/05/91	1350	11-7	B	29.8	64.2	6.0	0.78	8.0	15.1
670	11/05/91	1350	7-3	B	30.8	63.2	6.0	0.79	7.5	15.8
671	11/06/91	1350	11-7	B	30.1	63.8	6.1	0.75	8.0	16.0
672	11/06/91	1350	7-3	B	29.6	64.3	6.1	0.78	8.0	15.7
673	11/07/91	1350	11-7	B	31.0	62.9	6.1	0.76	8.0	14.9
674	11/07/91	1350	7-3	B	30.2	63.7	6.1	0.76	8.0	14.4
675	11/08/91	1350	11-7	B	30.1	63.5	6.4	0.78	7.5	14.4
676	11/08/91	1350	7-3	B	30.1	63.7	6.2	0.78	8.0	13.8
677	11/09/91	1350	11-7	B	31.2	62.7	6.1	0.75	7.5	15.6
678	11/09/91	1350	7-3	B	30.5	63.4	6.1	0.77	7.5	15.1
679	11/10/91	1352	11-7	B	33.0	61.0	6.0	0.76	7.5	13.6
680	11/10/91	1352	7-3	B	31.5	62.1	6.4	0.76	7.5	12.1
681	11/11/91	1352	11-7	B	32.3	61.6	6.1	0.74	8.0	12.4
682	11/11/91	1352	7-3	B	32.4	61.2	6.4	0.76	8.0	12.3
683	11/12/91	1352	11-7	B	29.9	63.4	6.7	0.77	8.0	13.1
684	11/12/91	1352	7-3	B	29.5	64.4	6.1	0.78	8.0	12.6
685	11/13/91	1352	11-7	B	31.6	62.4	6.0	0.77	8.0	12.5
686	11/13/91	1352	7-3	B	30.7	63.1	6.2	0.77	7.5	13.4
687	11/14/91	1352	11-7	B	29.4	64.6	6.0	0.77	8.0	14.1
688	11/14/91	1352	7-3	B	29.0	65.0	6.0	0.75	8.0	17.6
689	11/15/91	1352	11-7	B	31.6	62.3	6.1	0.75	8.0	12.8

COAL PROPERTIES FROM DAILY COAL MIX REPORTS
KIDC DEMONSTRATION PROJECT - BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

OBS	DATE	ROA	TURN	PLANT	VOLATILE MATTER	FIXED CARBON	ASH	SULFUR	FSI	PCT PASSING 100 MESH
690	11/15/91	1352	7-3	B	29.4	64.4	6.2	0.80	8.0	13.9
691	11/16/91	1352	11-7	B	30.7	63.0	6.3	0.74	7.5	14.1
692	11/16/91	1352	7-3	B	29.9	63.9	6.2	0.78	7.5	15.2
693	11/17/91	1354	11-7	B	31.1	62.9	6.0	0.74	8.0	16.1
694	11/17/91	1354	7-3	B	30.6	63.4	6.0	0.75	8.0	13.8
695	11/18/91	1354	11-7	B	31.7	62.2	6.1	0.75	7.5	13.9
696	11/18/91	1354	7-3	B	30.8	63.2	6.0	0.75	7.0	16.9
697	11/19/91	1354	11-7	B	29.5	64.3	6.2	0.76	8.0	14.9
698	11/19/91	1354	7-3	B	30.2	63.8	6.0	0.75	7.5	14.6
699	11/20/91	1354	11-7	B	29.0	65.0	6.0	0.75	8.0	15.6
700	11/20/91	1354	7-3	B	30.0	64.0	6.0	0.75	8.0	15.0
701	11/21/91	1354	11-7	B	30.6	63.0	6.4	0.76	8.0	15.6
702	11/21/91	1354	7-3	B	30.2	63.8	6.3	0.74	8.0	16.0
703	11/22/91	1354	11-7	B	30.0	64.0	6.0	0.77	8.0	16.2
704	11/22/91	1354	7-3	B	30.6	63.1	6.3	0.77	7.5	15.9
705	11/23/91	1354	11-7	B	30.2	63.7	6.1	0.77	7.5	14.3
706	11/23/91	1354	7-3	B	31.0	62.7	6.3	0.75	7.5	14.7

COAL PROPERTIES FROM QUALITY COAL HANDLING REPORTS
KIDC DEMONSTRATION PROJECT - BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

OBS	DATE	BULK DENSITY	PULV. % -1/8"	% H2O
1	12/01/90	47.96	78.93	6.82
2	12/02/90	47.95	78.91	6.60
3	12/03/90	47.94	78.68	6.87
4	12/04/90	48.07	79.00	7.14
5	12/05/90	47.97	78.67	7.12
6	12/06/90	47.97	78.88	7.08
7	12/07/90	47.99	78.85	7.07
8	12/08/90	48.03	78.67	6.85
9	12/09/90	48.10	78.92	7.13
10	12/10/90	48.07	78.71	6.79
11	12/11/90	47.96	78.96	7.35
12	12/12/90	47.98	78.83	7.07
13	12/13/90	47.99	78.99	7.17
14	12/14/90	48.06	79.00	6.65
15	12/15/90	48.00	78.91	6.85
16	12/16/90	48.03	78.77	7.20
17	12/17/90	48.10	79.15	6.78
18	12/18/90	48.06	78.64	7.34
19	12/19/90	48.05	78.94	7.55
20	12/20/90	47.98	78.67	7.15
21	12/21/90	48.01	78.88	7.46
22	12/22/90	48.01	78.80	7.60
23	12/23/90	47.99	78.95	7.42
24	12/24/90	47.91	78.74	7.44
25	12/25/90	48.06	78.85	7.35
26	12/26/90	48.09	78.74	7.65
27	12/27/90	47.98	78.72	7.65
28	12/28/90	47.95	78.88	8.14
29	12/29/90	47.94	78.90	8.75
30	12/30/90	47.90	78.54	8.32
31	12/31/90	47.97	78.73	7.93
32	01/01/91	47.91	78.82	7.98
33	01/02/91	47.91	78.75	7.98
34	01/03/91	47.88	78.85	7.84
35	01/04/91	47.92	78.72	7.52
36	01/05/91	47.91	79.13	7.35
37	01/06/91	47.87	79.17	7.34
38	01/07/91	47.96	78.85	9.29
39	01/08/91	47.91	78.65	8.50
40	01/09/91	47.89	78.58	7.84
41	01/10/91	47.93	78.65	7.64
42	01/11/91	47.98	78.66	8.12
43	01/12/91	47.95	78.81	9.16
44	01/13/91	47.98	78.58	8.35
45	01/14/91	48.05	78.59	7.70
46	01/15/91	48.38	78.72	8.55
47	01/16/91	47.97	78.59	8.73
48	01/17/91	48.00	78.54	8.38
49	01/18/91	47.90	78.62	8.63
50	01/19/91	47.91	78.60	7.67
51	01/20/91	47.91	79.15	7.83
52	01/21/91	47.92	78.73	7.42
53	01/22/91	48.04	78.94	8.70

COAL PROPERTIES FROM QUALITY COAL HANDLING REPORTS
KIDC DEMONSTRATION PROJECT BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

OBS	DATE	BULK DENSITY	PULV. % -1/8"	% H2O
54	01/23/91	47.94	79.80	7.77
55	01/24/91	48.00	79.09	7.88
56	01/25/91	47.98	78.95	6.94
57	01/26/91	48.06	79.12	7.43
58	01/27/91	47.88	78.67	7.41
59	01/28/91	47.98	78.64	7.30
60	01/29/91	48.01	78.71	7.75
61	01/30/91	47.85	79.14	7.74
62	01/31/91	48.08	78.67	6.93
63	02/01/91	47.98	78.85	7.60
64	02/02/91	48.00	78.83	7.13
65	02/03/91	47.93	78.85	7.25
66	02/04/91	47.89	78.65	7.56
67	02/05/91	47.89	78.99	7.25
68	02/06/91	47.88	79.13	7.25
69	02/07/91	48.00	78.79	7.53
70	02/08/91	47.95	78.66	7.85
71	02/09/91	47.96	78.62	6.90
72	02/10/91	48.02	78.65	7.25
73	02/11/91	48.04	78.61	6.93
74	02/12/91	47.96	78.70	6.80
75	02/13/91	47.90	78.63	6.58
76	02/14/91	47.94	78.62	7.04
77	02/15/91	48.00	79.44	7.00
78	02/16/91	47.89	79.20	6.45
79	02/17/91	48.10	78.89	6.80
80	02/18/91	47.90	78.83	6.75
81	02/19/91	47.96	78.92	6.63
82	02/20/91	47.90	78.92	6.57
83	02/21/91	47.86	79.10	6.55
84	02/22/91	47.91	79.14	6.55
85	02/23/91	47.92	78.74	6.55
86	02/24/91	48.00	78.85	6.58
87	02/25/91	47.94	79.10	6.55
88	02/26/91	48.22	79.06	6.76
89	02/27/91	48.16	79.01	6.86
90	02/28/91	47.99	78.77	7.01
91	03/01/91	47.92	78.79	6.97
92	03/02/91	47.90	78.61	6.65
93	03/03/91	47.87	79.22	6.97
94	03/04/91	47.95	78.81	7.53
95	03/05/91	48.03	78.74	6.90
96	03/06/91	48.01	78.58	6.95
97	03/07/91	47.96	78.86	6.94
98	03/08/91	48.02	78.58	6.67
99	03/09/91	48.06	78.99	7.48
100	03/10/91	47.84	78.70	6.83
101	03/11/91	47.96	78.90	6.92
102	03/12/91	47.93	79.04	6.97
103	03/13/91	47.96	79.11	6.99
104	03/14/91	48.05	79.18	8.08
105	03/15/91	47.85	79.11	7.64
106	03/16/91	47.93	79.04	7.34

COAL PROPERTIES FROM QUALITY COAL HANDLING REPORTS
KIDC DEMONSTRATION PROJECT - BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

OBS	DATE	BULK DENSITY	PULV. % -1/8"	% H2O
107	03/17/91	47.95	78.81	7.40
108	03/18/91	47.97	78.70	7.95
109	03/19/91	47.83	78.72	8.12
110	03/20/91	47.99	78.89	7.84
111	03/21/91	47.86	79.18	7.77
112	03/22/91	47.90	78.66	7.60
113	03/23/91	47.91	78.59	8.30
114	03/24/91	47.92	78.62	8.70
115	03/25/91	48.10	78.71	9.46
116	03/26/91	47.82	78.56	9.23
117	03/27/91	47.84	78.85	9.81
118	03/28/91	47.99	78.83	9.28
119	03/29/91	47.94	78.58	8.68
120	03/30/91	47.89	78.58	8.81
121	03/31/91	47.91	78.57	9.01
122	04/01/91	47.85	79.28	8.90
123	04/02/91	48.01	79.70	8.05
124	04/03/91	47.93	78.85	7.45
125	04/04/91	47.84	79.03	8.67
126	04/07/91	47.89	78.68	7.55
127	04/08/91	47.88	78.76	7.24
128	04/09/91	47.83	78.79	7.69
129	04/10/91	47.81	78.68	7.47
130	04/11/91	47.96	78.72	6.95
131	04/12/91	47.97	78.69	7.30
132	04/13/91	.	.	.
133	04/14/91	48.00	78.57	7.74
134	04/15/91	48.00	78.57	7.74
135	04/16/91	48.00	78.57	7.74
136	04/17/91	48.00	78.57	7.74
137	04/18/91	48.00	78.57	7.74
138	04/19/91	48.00	78.57	7.74
139	04/20/91	48.00	78.57	7.74
140	04/21/91	48.00	78.57	7.74
141	04/22/91	48.00	78.57	7.74
142	04/23/91	48.00	78.57	7.74
143	04/24/91	48.00	78.57	7.74
144	04/25/91	48.00	78.57	7.74
145	04/26/91	48.00	78.57	7.74
146	04/27/91	48.00	78.57	7.74
147	04/28/91	48.00	78.57	7.74
148	04/29/91	48.00	78.57	7.74
149	04/30/91	48.10	78.65	8.09
150	05/01/91	47.87	78.85	8.08
151	05/02/91	47.94	78.66	7.53
152	05/03/91	47.92	78.73	7.50
153	05/04/91	47.90	78.75	7.71
154	05/05/91	47.82	78.70	7.92
155	05/06/91	47.79	78.88	8.39
156	05/07/91	47.85	78.84	8.37
157	05/08/91	47.88	78.79	8.05
158	05/09/91	47.91	78.73	8.01
159	05/10/91	47.84	78.71	7.99

COAL PROPERTIES FROM QUALITY COAL HANDLING REPORTS
KIDC DEMONSTRATION PROJECT - BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

OBS	DATE	BULK DENSITY	PULV. % -1/8"	% H2O
160	05/11/91	47.91	78.82	7.83
161	05/12/91	47.91	78.83	7.98
162	05/13/91	47.99	78.86	7.43
163	05/14/91	48.00	79.18	7.80
164	05/15/91	47.95	78.96	7.57
165	05/16/91	47.90	78.70	7.29
166	05/17/91	47.81	78.75	8.09
167	05/18/91	47.85	78.93	7.60
168	05/19/91	47.97	78.65	8.04
169	05/20/91	48.02	79.47	7.45
170	05/21/91	47.86	78.74	7.06
171	05/22/91	47.90	78.85	7.28
172	05/23/91	47.89	78.89	7.50
173	05/24/91	48.00	78.86	7.30
174	05/25/91	47.98	78.79	6.74
175	05/26/91	47.81	78.67	7.54
176	05/27/91	47.93	78.70	7.45
177	05/28/91	47.87	78.75	7.18
178	05/29/91	47.94	78.85	7.08
179	05/30/91	47.88	78.88	7.08
180	05/31/91	48.04	78.65	6.89
181	06/01/91	47.90	78.74	6.67
182	06/02/91	47.99	78.52	7.15
183	06/03/91	48.02	78.74	6.89
184	06/04/91	47.84	78.85	7.13
185	06/05/91	48.15	78.54	6.95
186	06/06/91	48.31	78.56	6.79
187	06/07/91	48.41	79.34	7.18
188	06/08/91	48.32	78.57	6.82
189	06/09/91	48.25	79.04	6.73
190	06/10/91	48.22	78.63	6.99
191	06/11/91	48.30	79.14	6.75
192	06/12/91	48.26	78.67	7.53
193	06/13/91	48.20	78.65	7.02
194	06/14/91	48.24	78.66	7.00
195	06/15/91	48.33	78.70	6.73
196	06/16/91	48.40	78.94	6.88
197	06/17/91	48.38	78.98	6.93
198	06/18/91	48.52	79.04	7.59
199	06/19/91	48.51	78.57	7.95
200	06/20/91	48.47	79.09	8.28
201	06/21/91	48.58	79.03	7.09
202	06/22/91	48.37	78.56	7.50
203	06/23/91	48.58	79.41	7.08
204	06/24/91	48.43	78.69	7.11
205	06/25/91	48.53	78.65	7.05
206	06/26/91	48.39	79.18	6.31
207	06/27/91	48.49	79.22	5.95
208	06/28/91	48.56	79.08	7.06
209	06/29/91	48.47	78.61	7.59
210	06/30/91	48.46	78.94	7.36
211	07/01/91	48.50	79.30	5.55
212	07/02/91	48.41	79.22	7.16

COAL PROPERTIES FROM QUALITY COAL HANDLING REPORTS
KIDC DEMONSTRATION PROJECT - BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

OBS	DATE	BULK DENSITY	PULV. % -1/8"	% H2O
213	07/03/91	48.53	79.06	6.54
214	07/04/91	48.49	79.06	7.20
215	07/05/91	48.43	78.88	7.07
216	07/06/91	48.49	79.33	6.39
217	07/07/91	48.53	79.25	6.70
218	07/08/91	48.46	78.58	6.48
219	07/09/91	48.45	78.81	6.46
220	07/10/91	48.52	78.77	7.04
221	07/11/91	48.56	78.74	7.23
222	07/12/91	48.53	78.32	6.48
223	07/13/91	48.50	78.09	6.85
224	07/14/91	48.48	78.81	6.84
225	07/15/91	48.52	78.64	6.99
226	07/16/91	48.47	79.01	6.70
227	07/17/91	48.43	78.68	6.69
228	07/18/91	48.58	79.35	7.02
229	07/19/91	48.46	79.16	6.70
230	07/20/91	48.43	78.72	6.42
231	07/21/91	48.48	79.15	6.30
232	07/22/91	48.50	79.22	6.45
233	07/23/91	48.46	78.99	6.65
234	07/24/91	48.49	78.65	6.79
235	07/25/91	48.39	79.14	7.63
236	07/26/91	48.38	79.34	7.72
237	07/27/91	48.57	79.27	8.25
238	07/28/91	48.46	78.60	8.15
239	07/29/91	48.39	79.14	7.45
240	07/30/91	48.52	79.14	7.92
241	07/31/91	48.62	79.11	7.60
242	08/01/91	48.55	78.71	8.14
243	08/02/91	48.50	78.69	8.11
244	08/03/91	48.56	78.68	6.98
245	08/04/91	48.51	78.59	6.58
246	08/05/91	48.51	78.58	6.53
247	08/06/91	48.53	78.84	6.82
248	08/07/91	48.52	78.52	6.70
249	08/08/91	48.45	78.51	6.22
250	08/09/91	48.41	78.58	7.85
251	08/10/91	48.49	79.20	7.99
252	08/11/91	48.56	78.83	7.45
253	08/12/91	48.42	78.59	6.84
254	08/13/91	48.47	79.16	7.93
255	08/14/91	48.63	79.40	6.97
256	08/15/91	48.35	79.15	7.71
257	08/16/91	48.55	79.10	7.09
258	08/17/91	48.43	79.35	6.74
259	08/18/91	48.56	79.12	6.94
260	08/19/91	48.43	79.44	7.25
261	08/20/91	48.51	78.92	8.13
262	08/21/91	48.51	79.14	7.72
263	08/22/91	48.53	78.90	7.22
264	08/23/91	48.50	79.38	6.53
265	08/24/91	48.45	78.76	7.61

COAL PROPERTIES FROM QUALITY COAL HANDLING REPORTS
KIDC DEMONSTRATION PROJECT - BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

OBS	DATE	BULK DENSITY	PULV. % -1/8"	% H2O
266	08/25/91	48.63	78.78	7.15
267	08/26/91	48.59	79.15	6.79
268	08/27/91	48.60	78.88	7.00
269	08/28/91	48.51	78.76	6.63
270	08/29/91	48.31	78.72	7.02
271	08/30/91	48.60	78.81	6.71
272	08/31/91	48.56	79.03	6.92
273	09/01/91	48.55	78.58	6.80
274	09/02/91	48.56	78.92	6.73
275	09/03/91	48.45	78.81	6.85
276	09/04/91	48.49	78.59	6.75
277	09/05/91	48.44	79.26	7.13
278	09/06/91	48.41	78.74	7.50
279	09/07/91	48.42	79.10	6.44
280	09/08/91	48.41	78.62	6.45
281	09/09/91	48.51	79.05	7.25
282	09/10/91	48.45	78.75	7.01
283	09/11/91	48.51	79.14	6.70
284	09/12/91	48.54	78.78	6.90
285	09/13/91	48.44	79.09	6.67
286	09/14/91	48.66	78.83	6.59
287	09/15/91	48.53	78.75	6.99
288	09/16/91	48.38	78.81	6.90
289	09/17/91	48.50	79.00	6.63
290	09/18/91	48.59	79.05	7.06
291	09/19/91	48.47	79.01	7.06
292	09/20/91	48.43	78.65	7.67
293	09/21/91	48.43	78.80	7.40
294	09/22/91	48.39	78.75	7.79
295	09/23/91	48.55	78.57	6.45
296	09/24/91	48.38	78.58	7.25
297	09/25/91	48.60	78.69	6.97
298	09/26/91	48.36	78.70	7.89
299	09/27/91	48.48	78.72	7.04
300	09/28/91	48.43	78.98	6.89
301	09/29/91	48.41	79.13	7.97
302	09/30/91	48.54	79.04	8.06
303	10/01/91	48.48	79.10	7.44
304	10/02/91	48.54	78.69	7.50
305	10/03/91	48.35	79.00	7.85
306	10/04/91	48.41	78.72	7.76
307	10/05/91	48.41	78.72	7.86
308	10/06/91	48.47	78.60	7.98
309	10/07/91	48.50	78.75	7.70
310	10/08/91	48.42	79.00	7.65
311	10/09/91	48.44	78.50	8.99
312	10/10/91	48.42	78.68	7.69
313	10/11/91	48.47	78.76	7.64
314	10/12/91	48.47	78.87	8.03
315	10/13/91	48.41	78.99	8.40
316	10/14/91	48.50	78.81	6.59
317	10/15/91	48.51	78.72	8.42
318	10/16/91	48.51	79.23	7.58

COAL PROPERTIES FROM QUALITY COAL HANDLING REPORTS
KIDC DEMONSTRATION PROJECT - BETHLEHEM STEEL CORPORATION
SPARROWS POINT, MARYLAND

OBS	DATE	BULK DENSITY	PULV. % -1/8"	% H2O
319	10/17/91	48.44	78.86	7.71
320	10/18/91	48.39	78.98	8.60
321	10/19/91	48.55	78.61	7.62
322	10/20/91	48.60	78.65	7.45
323	10/21/91	48.52	78.83	7.29
324	10/22/91	48.47	78.69	7.77
325	10/23/91	48.50	79.01	7.94
326	10/24/91	48.46	78.70	7.45
327	10/25/91	48.62	78.72	6.93
328	10/26/91	48.57	78.94	7.70
329	10/27/91	48.57	79.06	7.44
330	10/28/91	48.50	78.86	7.15
331	10/29/91	48.52	79.06	7.09
332	10/30/91	48.64	79.11	7.36
333	11/01/91	48.42	78.94	7.40
334	11/02/91	48.52	78.80	6.65
335	11/03/91	48.47	78.76	7.21
336	11/04/91	48.39	79.32	6.14
337	11/05/91	48.56	79.22	7.20
338	11/06/91	48.52	79.01	6.99
339	11/07/91	48.47	79.17	7.04
340	11/08/91	48.47	78.94	7.10
341	11/09/91	48.50	78.71	6.37
342	11/10/91	48.46	78.66	6.67
343	11/11/91	48.57	79.00	7.10
344	11/12/91	48.46	78.72	7.60
345	11/13/91	48.47	78.79	7.40
346	11/14/91	48.49	79.12	7.55
347	11/15/91	48.46	78.75	7.32
348	11/16/91	48.42	78.60	8.35
349	11/17/91	48.47	78.55	7.76
350	11/18/91	48.48	78.70	7.43
351	11/19/91	48.51	78.92	7.38
352	11/20/91	48.54	78.69	7.55
353	11/21/91	48.56	79.13	7.47
354	11/22/91	48.49	79.07	7.62
355	11/23/91	48.44	78.91	8.40
356	11/24/91	48.52	79.33	8.60
357	11/25/91	48.52	78.69	8.49
358	11/26/91	48.40	78.88	8.80
359	11/27/91	48.34	78.60	9.20
360	11/28/91	48.37	78.76	9.21
361	11/29/91	48.41	78.70	8.61
362	11/30/91	48.63	78.50	8.35
363	12/01/91	48.62	78.50	9.10
364	12/02/91	48.47	78.72	8.85
365	12/03/91	48.55	78.60	8.98
366	12/04/91	.	.	.