INNOVATIVE COKE OVEN GAS CLEANING SYSTEM

FOR

RETROFIT APPLICATIONS

QUARTERLY ENVIRONMENTAL MONITORING REPORT NO. 1

FOR THE PERIOD COVERING

JANUARY 1, 1991 THROUGH JUNE 30, 1991

PARTICIPANT

BETHLEHEM STEEL CORPORATION

BETHLEHEM, PA

PREPARED FOR THE UNITED STATES DEPARTMENT OF ENERGY

UNDER COOPERATIVE AGREEMENT NO. DE-FC22-90PC89658

AUGUST 24, 1992

Patents cleared by Chicago on September 14, 1992

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BETHLEHEM STEEL CORPORATION

SECTION 1.0 INTRODUCTION

Bethlehem Steel Corporation(BSC), in conjunction with the Department of Energy(DOE) is conducting a Clean Coal Technology project at its Sparrows Point, Maryland Coke Oven Plant. This project combines several existing technologies into an integrated system for removing impurities from Coke Oven Gas(COG) to make it an acceptable fuel. DOE is providing cost-sharing under a Cooperative Agreement with BSC.

This Cooperative Agreement requires BSC to develop and conduct an Environmental Monitoring Plan(EMP) for the Clean Coal Technology project and to report the status of the EMP on a quarterly basis. This report is the first quarterly status report of the EMP. It covers the Environmental Monitoring Plan activities for the period January 1, 1991 to June 30, 1991.

1.1 EMP Purpose

The EMP describes in detail the environmental monitoring activities to be performed during the project execution. The purpose of the EMP is to: (1) document the extent of compliance of monitoring activities activities, i.e. those monitoring required to meet permit requirements, (2) confirm the specific impacts predicted in the National Environmental Policy Act documentation, and (3) establish and information base for the assessment of the environmental performance of the technology demonstrated by the project.

1.2 EMP Scope

The EMP as approved by DOE, specifies the streams to be monitored (e.g. temperature, pressure, flow rate, pH), and the species to be analyzed (e.g. sulfur compounds, nitrogen compounds, trace elements, etc.). The operation and frequency of the monitoring activities is specified, as well as the timing for the monitoring activities related to project phase (e.g. construction, pre-operational, operational, post-operational). Within the five project phases, monitoring is be broken down into two types. COMPLIANCE monitoring is that which is or will be required under existing and/or anticipated regulatory requirements or permit conditions. SUPPLEMENTAL monitoring includes data gathering activities deemed important to measure operational or environmental performance, but not required to be measure by permits or regulations. A list of the Compliance and Supplemental sample streams is given in Table 1-1.

1.3 Project Description

The coke plant at the Sparrows Point Plant consist of three coke oven batteries (A, 11 and 12) and two coal chemical plants(A and B). The by-product coke oven gas(COG) consists primarily of hydrogen, methane, carbon monoxide, nitrogen and contaminants consisting of tars, light oils (benzene, toluene, and xylene) hydrogen sulfide, ammonia, water vapor and other hydrocarbons. This raw coke oven gas needs to be cleaned of most of its contaminants before it can be used as a fuel at other operations at the Sparrows Point Plant.

In response to environmental concerns, BSC decided to replace much of the existing coke oven gas treatment facilities in the two coal chemical plants(A and B) with a group of technologies consisting of;

- Secondary Cooling of the Coke Oven Gas
- Hydrogen Sulfide Removal
- Ammonia Removal
- Deacification of Acid Gases Removed
- Ammonia Distillation and Destruction
- Sulfur Recovery

The installation of this combination of technologies will replace the existing ammonia removal system, the final coolers, hydrogen sulfide removal system and the sulfur recovery system. The existing wastewater treatment, tar recovery and one of the three light oil recovery systems will continue to be used to support the new, innovative combination of COG treatment technologies. Figures 1-1 and 1-2 are simplified block diagrams of the new COG treatment process.

1.4 EMP Sampling Programs

The EMP consist of a Compliance Monitoring Sampling Program and a Supplemental Monitoring Sampling Program. The Compliance Monitoring Sampling Program will be conducted during a summer and a winter Baseline periods during the Pre-Construction/Construction phases of the Project and during a summer and a winter period following the successful startup and Operational phase of the completed Project.

Compliance monitoring consist of conducting all the sampling and observation programs associated with existing required Federal, State and Local Regulations, Permits and Orders. These include air, water and waste monitoring and OSHA and NESHAP monitoring.

The Supplemental Monitoring Program will also be conducted during a summer and a winter Baseline periods during the Pre-Construction/Construction phases of the Demonstration Facility and during a summer and a winter period following the successful startup and Operational phase of the completed Facility.

Supplemental Monitoring includes sampling of 27 additional streams that are important to measure operational or environmental performance and impacts of the installation of the new COG treatment facilities.

Collecting Compliance Monitoring data and Supplemental Monitoring data during the Baseline and Operational Phases of the Facility will provide a basis for comparing and estimating the impact of the Demonstration Facility on the compliance streams and important influent and effluent streams of treatment facilities.

Collecting Compliance monitoring data and Supplemental Monitoring data during summer and winter periods will provide a basis for demonstrating the impact of ambient temperature on the performance of the Demonstration Facility and hence, the impact on the compliance streams. This is important since the solubility of the hydrogen sulfide and ammonia contaminants in the COG are temperature dependant and the performance of the wet surface air cooler equipment at the initial part of the Demonstration Facility will be impacted by the ambient summer and winter temperatures and humidities.

1.5 Contents of EPM Reports

The quarterly and annual EPM reports will present information on the status of planned supplemental and compliance environmental monitoring activities. It will also contain a brief summary of the results of these monitoring activities. The sampling campaign reports will contain all of the data collected during the various sampling campaigns.

TABLE 1-1 ENVIRONMENTAL MONITORING PLAN SAMPLE STREAMS
List of Compliance and Supplemental Monitoring Streams

A. List of Compliance Streams (Sampled during all Phases of Project)

1. PERMITED STREAMS

STREAM	STREAM NAME
Gaseous	
G-1	Battery 'A' Stack Gas
G-2	Battery 11 Stack Gas
G-3	Battery 12 Stack Gas
Aqueous	
A-5	Monitoring Point 121-Effluent from Waste Water Treatment Plant
A-6	Outfall 021-Discharge to Patapsco River
Solids	
S-4	Sludge Blowdown to BRWWTP from Waste Water Treatment Plant

2. BENZENE NESHAP WASTEWATER STREAMS

A-7	Tar Sludge Decanter
A-8	'A' Flushing Liquor Strainer
A-9	'B' Secondary Decanter
A-10	Final Cooler Emulsified Oil
A-11	Final Cooler Condensate
A-12	Desulfurizer Blowdown
A-13	Coke Oven Drip Condensate
A-14	Gas Pump Tank Condensate
A-15	Light Oil Still Drainage
A-16	Vapor Oil Exchanger Condensate
A-17	Primary Light Oil Condensate
A-18	Secondary Light Oil Condensate
A-19	'B' Reflux Condensate
A-20	Centrifuge Water
A-21	Vapor Oil Exchanger and Centrifuge Condensate
A-22	Secondary Light Oil Tank Drainage

3. OSHA WORKER EXPOSURE DATA-Quarterly Monitoring of Coke Oven and Coal Chemical Worker Exposure

TABLE 1-1 ENVIRONMENTAL MONITORING PLAN SAMPLE STREAMS
List of Compliance and Supplemental Monitoring Streams - continued

B. List of Supplemental Streams

1. Sampled During Pre-Construction/Construction and Operational Phases

STREAM	STREAM NAME
Gaseous	
G-1,G-7	Battery 'A' Stack Gas
G-2	Battery 11 Stack Gas
G-3	Battery 12 Stack Gas
G-5	Blast Furnace Gas to Mixing Station
G-6	Mix Gas to Coke Oven Underfire Burners
G-23	Coke Oven Gas to Mixing Station
Aqueous	
A-24	Composite Feed from Equilization Tank
A-42	Fixed Ammonia Still Wastewater
Solids	
S-26	Coal Mix Feed to Coke Ovens
S-27	Coke Product

OSHA WORKER EXPOSURE DATA-Quarterly Monitoring of Coke Oven and Coal Chemical Worker Exposure

2. Sampled During Operational Phase of Project

STREAM	STREAM NAME
Gaseous	
G-25	Coke Oven Gas to Secondary Cooler
G-29	Coke Oven Gas to H2S Scrubber
G-41	Coke Oven Gas to Light Oil Scrubber
G-54	Air to Catalytic Oxidizer
G-55	Process Gas to Claus Plant
G-57	Tail Gas to Primary Cooler
Aqueous	
A-28	Flushing Liquor and Tar to Tar Decanter
A-31	Flushing Liquor to Secondary Cooler
A-39	Excess Flushing Liquor to Ammonia Scrubber
A-40	Stripped Liquor from Ammonia Still
A-42	Fixed Ammonia Still Wastewater
A-45	NaOH to Fixed Ammonia Still
Solids	
L-32	Tar to Sump of Secondary Cooler
L-56	Sulfur Product from Claus Plant
S-58	Catalytic Oxidizer Spent Catalyst
S-59	Claus Unit Spent Catalyst

Figure 1-1

Bethlehem Steel's Innovative Coke Oven Gas Cleaning System

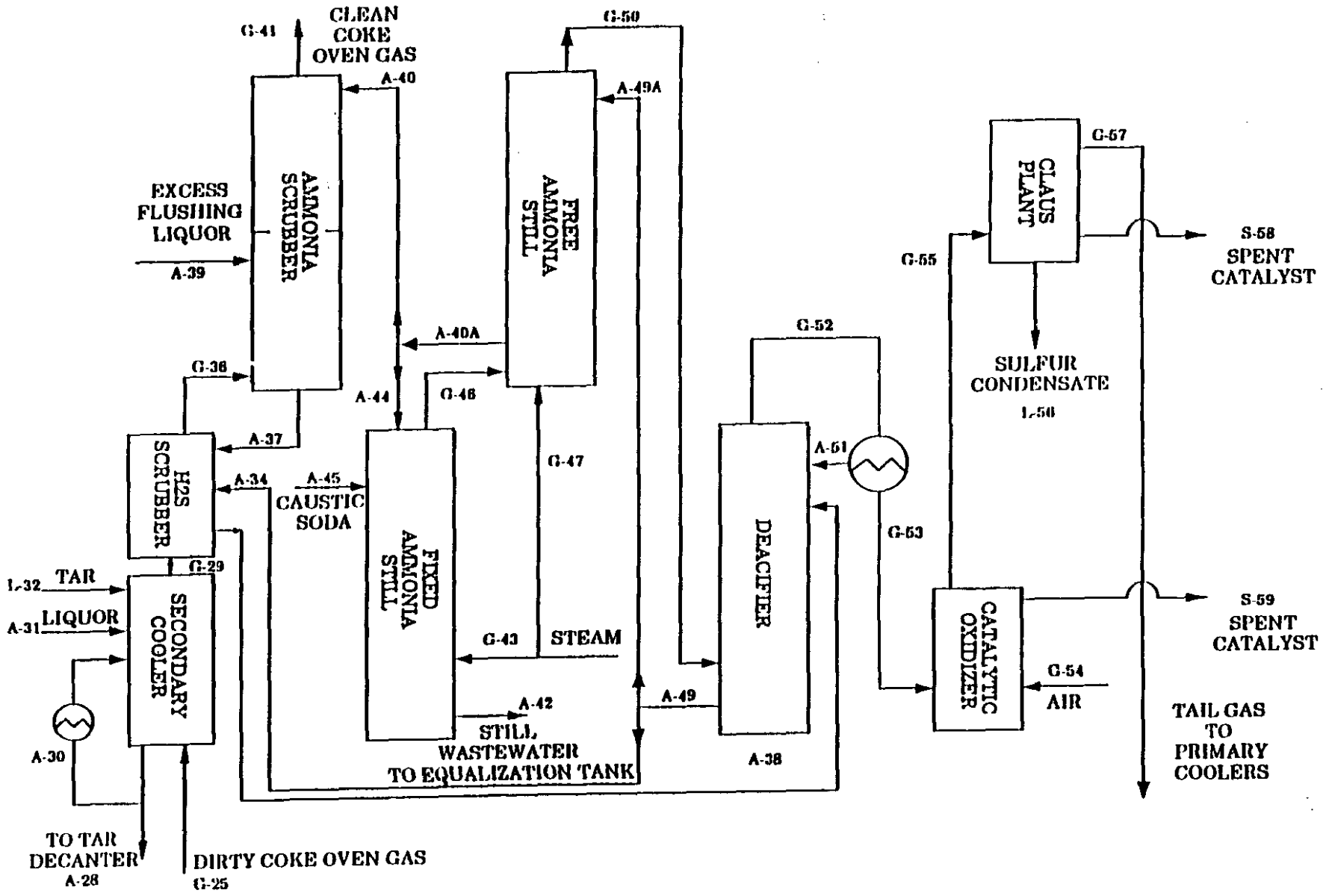
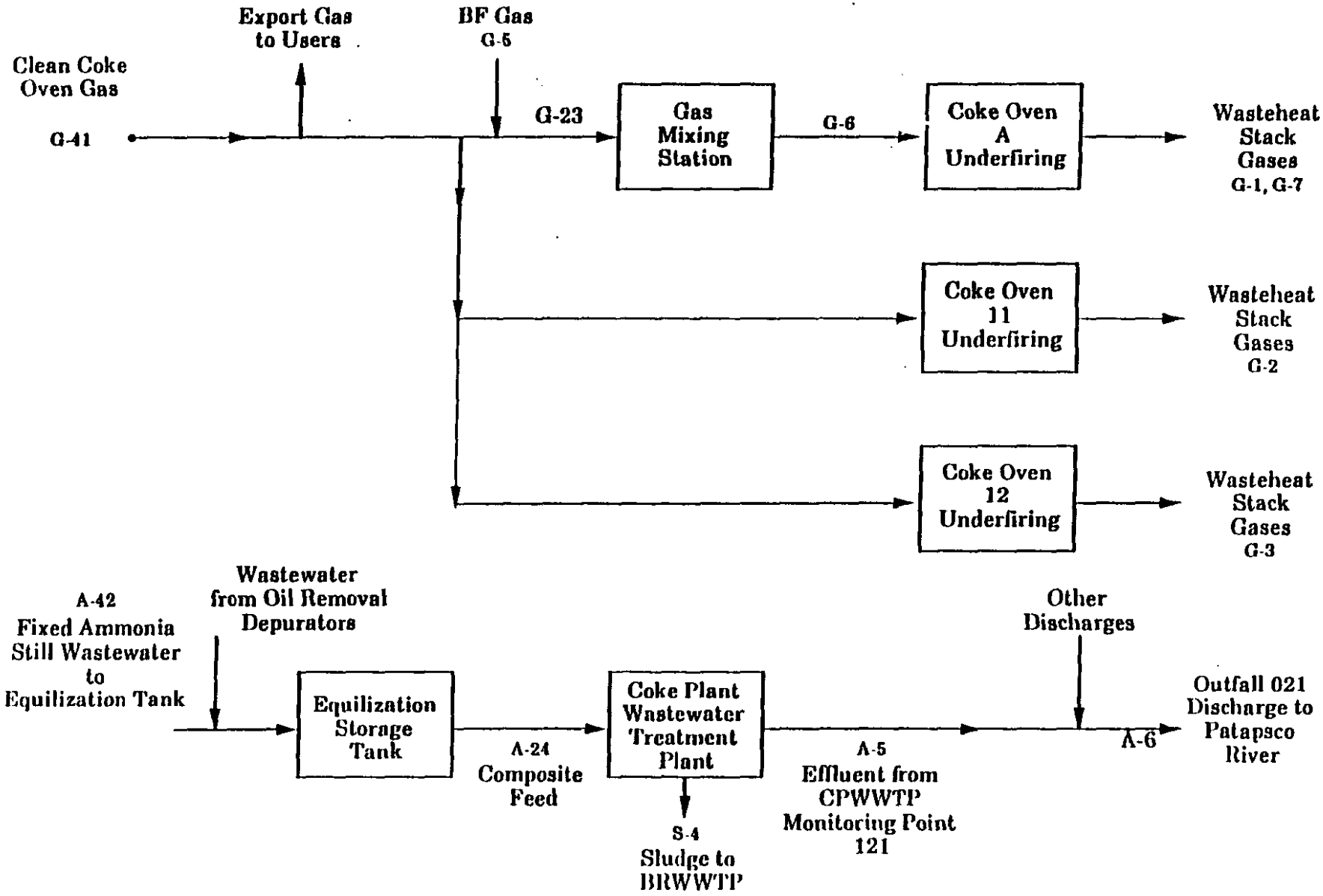


Figure 1-2

Bethlehem Steel's Innovative
Coke Oven Gas Cleaning System
Utilization, Treatment and Disposal of Principal Process Product Streams



SECTION 2.0 PROJECT STATUS

2.1 Installation and Commissioning of Facilities

As of the end of June, 1991 the Project Status as noted in the June, 1991 Monthly Report was as follows;

	Percent Complete
Engineering	90 %
Materials Ordered	99 %
Materials Delivered	95 %
Construction	58 %

It is expected that all construction will be completed by end of the first week of September, 1991 and that Cold Commissioning will be completed by the end of September. Hot Commissioning is scheduled to be completed by the end October, 1991.

2.2 Environmental Monitoring Plan

The final version of the Environmental Monitoring Plan was issued on July 5, 1991 and sent to the Department of Energy on July 25, 1991.

SECTION 3.0 ENVIRONMENTAL MONITORING STATUS

3.1 Overall Schedule

Figure 3-1 shows the overall schedule of the Innovative Coke Oven Gas Cleaning Project including the design and construction Phases (Phases I and II) and the Environmental and Operational Monitoring Phase (Phase III).

The Environmental Compliance Monitoring portion of the EMP is continuing throughout the duration of the project. The Environmental Supplemental Monitoring portion of the EMP has begun with the completion of the winter baseline sampling periods in March, 1991.

3.2 Planned Activities This Quarter

Gaseous, Aqueous and Solid Streams. The winter round of the Baseline Compliance Monitoring Sampling Program was in place as required by Federal, State, and local government regulations.

The winter round of the Baseline Supplemental Monitoring Program was planned for March 1991. The materials to be sampled were "A" battery combustion stack gases, coal charged and coke produced, blast furnace gas, coke oven gas, combined blast furnace and coke oven gas, ammonia still effluent, and the discharge of the one million gallon storage tank to the bio-oxidation basin.

OSHA Supplemental Personnel Monitoring. During the period personnel monitoring equipment was acquired to monitor personnel in the Coal Chemical Plant areas for exposure to hydrogen sulfide, ammonia, carbon monoxide, and fugitive hydrocarbons. Personnel monitoring for these exposures is scheduled for July and August 1991.

3.3 Completed Activities This Quarter

Gaseous, Aqueous and Solid Streams. The Baseline Compliance Monitoring Sampling Program was carried out as required by Federal, State, and Local regulations.

All planned Baseline Supplemental Monitoring Program activities described in 3.2 above were carried out. The "A" battery combustion stack analyses were carried out on-site. The liquid and gas samples were collected and submitted to an outside laboratory daily. The liquid and gas samples collected for laboratory submission are listed in Tables 3-1 and 3-2. The coal and coke samples are routinely collected and analyzed by on-site laboratories at the Sparrows Point Plant.

3.4 Problems With Sampling and Analytical Efforts

The only Baseline Supplemental Monitoring Sample not collected was the ammonia still effluent for the first day of the first week of the two week sampling period. The ammonia still was down for repairs during that day and no still effluent was produced. All other samples were collected and preserved according to agreed upon protocols. One "A" battery sulfur dioxide sample was discarded due to a leak in the gas sampling train discovered mid-way through the test.

The liquid and gas samples were submitted daily to Betz-Converse-Murdock (BCM) Laboratories in Norristown, Pennsylvania. We still have not received complete analytical results from BCM on the samples submitted in March. The long turn around time for the samples is unacceptable and we have changed laboratories for the summer round of Baseline Supplemental Monitoring Sampling Program.

3.5 Plans For the Next Reporting Period

The collection of the Baseline Compliance Monitoring Samples will continue as required by Federal, State, and Local regulations.

The summer round of Baseline Supplemental Monitoring Samples is scheduled for the weeks of August 18 and August 25. On-site analysis of No.11 and No.12 battery combustion stacks, as well as "A" battery stack, will be added in this round of sampling. These were not included in the winter round since they were added to the program in the final editing of the EMP.

Because of the unacceptable performance of BCM Labs during the winter round of samples, we have contracted with two other laboratories to perform the analyses of the gas and liquid samples. The gas samples (coke oven, blast furnace, and coke oven/blast furnace mixture) will be analyzed on-site by gas chromatography. This work will be performed by Keystone Environmental Resources, Inc. The liquid samples will be submitted daily to Laboratory Resources, Inc. of Bethlehem, PA.

FIGURE 3-1 OVERALL SCHEDULE OF INNOVATIVE COKE OVEN GAS CLEANING PROJECT

PHASES I & II:	START	COMP.
DESIGN & CONSTRUCTION ENGINEERING	01/30/89	05/31/90
PROCUREMENT OF MAJOR EQUIPMENT:		
- LONG DELIVERY ITEMS	03/01/89	12/15/90
- ALL OTHERS	03/01/89	04/30/90
DELIVERY OF MAJOR EQUIPMENT	05/15/90	08/30/90
CONSTRUCTION:		
- PILES	02/01/90	03/31/90
- FOUNDATIONS	04/01/90	08/30/90
- VESSELS, STRUCTURAL & MECHANICAL	05/15/90	01/31/91
- PIPING	09/04/90	04/30/90
- ELECTRICAL	09/04/90	04/30/90
- INSTRUMENTATION & CONTROL	05/15/90	04/30/90
COLD COMMISSION & DEBUGGING	05/01/90	08/30/91
HOT COMMISSION & PERFORMANCE TEST	07/02/90	08/02/91
PUNCH LIST & DEBUGGING	08/02/90	12/31/91
ACHIEVE COMPLIANCE	-	12/31/91

PHASE III: PLANT OPERATION MONITORING	START	COMP.
ENVIRONMENTAL COMPLIANCE		
- BEFORE START-UP	01/01/90	12/31/91
- AFTER START-UP	01/01/92	12/31/92
BASELINE MONITORING		
- ENV. SUPPLEMENTAL		
- WINTER PERIOD	01/01/91	03/31/91
- SUMMER PERIOD	07/01/90	09/31/90
OPERATIONAL MONITORING		
- ENV. SUPPLEMENTAL		
- WINTER PERIOD	01/01/92	03/31/92
- SUMMER PERIOD	07/01/92	09/31/92
- EQUIPMENT PERFORMANCE		
- WINTER PERIOD	01/01/92	03/31/92
- SUMMER PERIOD	07/01/92	09/31/92

Table 3-1 Sample Time Log for Aqueous Samples
Environmental Monitoring Plan - Supplemental Samples - Winter 1991
Sparrows Point Coke Oven - ICCT Demonstration Project

Sample	Date - 3/19/91				Date - 3/20/91				Date - 3/21/91			
	Time	Time	Time	Time	Time	Time	Time	Time	Time	Time	Time	Time
Ammonia Still Effluent	*	*	*	*	0910	1025	1110	1355	0920	1010	1120	1210
Million Gallon Tank Effluent	0840	1040	1140	1430	0930	1010	1145	1345	0910	1020	1110	1220

Sample	Date - 3/25/91				Date - 3/26/91				Date - 3/27/91			
	Time	Time	Time	Time	Time	Time	Time	Time	Time	Time	Time	Time
Ammonia Still Effluent	0920	1015	1120	1215	0925	1030	1130	1220	0820	1015	1100	1205
Million Gallon Tank Effluent	0910	1020	1115	1220	0920	1035	1125	1225	0830	1010	1105	1200

* - Ammonia Still was down for repairs. No samples were taken.

Table 3-2 Sample Time Log for Gaseous Samples
Environmental Monitoring Plan - Supplemental Samples - Winter 1991
Sparrows Point Coke Oven - ICCT Demonstration Project

Sample	Date - 3/25/91				Date - 3/26/91				Date - 3/27/91			
	Time	Time	Time	Time	Time	Time	Time	Time	Time	Time	Time	Time
Coke Oven/Blast Furnace Mix	0945	1045	1145	1345	0955	1100	1150	1245	1135	1225	1255	1345
Coke Oven Gas	0950	1050	1150	1355	1005	1105	1205	1250	1140	1230	1305	1350
Blast Furnace Gas	1000	1055	1155	1400	1010	1110	1200	1255	1145	1235	1310	1355

Sample	Date - 4/01/91				Date - 4/02/91				Date - 4/03/91			
	Time	Time	Time	Time	Time	Time	Time	Time	Time	Time	Time	Time
Coke Oven/Blast Furnace Mix	1040	1145	1305	1400	0910	1000	1100	1155	0925	1015	1115	1250
Coke Oven Gas	1035	1155	1315	1405	0920	1010	1105	1200	0935	1020	1120	1255
Blast Furnace Gas	1030	1140	1320	1415	0925	1015	1110	1205	0940	1025	1125	1300

SECTION 4.0 COMPLIANCE MONITORING RESULTS

The following compliance areas of the Sparrows Point Coke Plant will be impacted by the implementation of the new COG treatment system;

- o Coal Chemical Plants A and B
  - Benzene NESHAP emissions
  - OSHA worker exposure monitoring
  - NPDES outfalls 121 (discharge from the coke oven wastewater treatment plant)
  - NPDES outfalls 021 (combined discharges from the coke plant area) plant
  - spills
- o Coke Ovens Batteries No. 11, No. 12 and A
  - waste heat stack for each battery(continuous opacity monitoring)

4.1 Air Compliance Monitoring Results

Coke Oven Waste Heat Stack Monitoring. Continuous opacity monitoring was conducted throughout the period for the waste heat stack emissions for "A" Coke Battery, No. 11 Coke Battery and No. 12 Coke Battery. Quarterly reports of the results were reported to Maryland's Department of Environment on April 18, 1991 and July 22, 1991.

No other compliance monitoring for the waste heat stacks was required during the period.

A list of the air compliance reports submitted to the Maryland Department of the Environment during the period is provided in Appendix 5, Section 5.1

4.2 Water Compliance Monitoring Results - Coke Oven Outfalls All sampling programs required for compliance monitoring for Outfall 021 and Monitoring Point 121 were completed during the period January 1, 1991 through June 31, 1991, and the Daily Monitoring Reports were submitted to Maryland Department of Environment and the US EPA-Region III. See Section 5.2 for references to Water Compliance Monitoring Reports submitted during the period.

Outfall 021. This is the outfall for all non-contact cooling waters and treated wastewaters from the coke ovens area. During the period there were exceedances of the Low pH limit (Low pH Limit = 6.0) which occurred on March 4, 5, 15, and 16. These were reported to the Maryland Department of the Environment and to Region III of the EPA on April 26, 1991. A revised report was issued to both agencies on June 12, 1991. There were no other exceedances of any limited parameters at Outfall 021.

Monitoring Point 121. This monitoring point is the discharge from the coke oven wastewater biological treatment plant. It is a tributary to Outfall 021. During the period there were no exceedances of any limited parameters at this Monitoring Point.

4.3 Solid Waste Compliance Monitoring Results

Sludge Blowdown to Back River WasteWater Treatment Plant. The coke oven wastewater biological treatment plant sludge that is discharged to Baltimore's Back River Municipal Wastewater Treatment plant was sampled on April 2, 22, May 7, 8, 9, 21, 22 and 23. The analytical results of this sampling program were submitted to the Bureau of Utilities of Baltimore County on July 1, 1991. A list of the reports to the Bureau of Utilities of Baltimore County during the period is provided in Appendix 5, Section 5.3

Spills. During the period January 1, 1991 to July 1, 1991 there were 21 spill incidences that were reported by telephone to either the Maryland Department of the Environment, the U. S Coast Guard, or the National Response Center. The dates of the telephone calls and a brief description of the spills reported are listed in the Appendix, Section 5.3.

None of the spill incidences were above the equivalent Reportable Quantity for these materials.

4.4 Benzene NESHAP Monitoring Results

Equipment Monitoring. A large number of pumps, valves and other equipment in the Coal Chemical Plants at Sparrows Point are monitored for benzene leaks using a Foxboro Organic Vapor Analyzer on a monthly, quarterly, semi-annual and annual basis according to a prescribed protocol. This monitoring is done for the Sparrows Point Plant by an outside contractor. All required monitoring in the first six months of 1991 was completed, and the results of this monitoring were reported by the contractor to the Sparrows Point Plant. During the period there were no exceedances of the applicable standards. The results of these monitoring were also reported by Sparrows Point to the U. S. Environmental Protection Agency on January 21, 1991 and June 24, 1991.

Waste Water Streams. No sampling or analyses was conducted during the period on the 16 Benzene NESHAP wastewater streams listed in Table 1-1, Section A.2.

A list of the Benzene NESHAP monitoring reports submitted to Maryland during the period is provided in Appendix 5, Section 5.4.

4.5 OSHA Monitoring Results

Coal Chemical Plants. All required OSHA personnel exposure monitoring was conducted during the period and reported internally to Coke Plant Operations. There is no reporting requirement to either State or Federal Agencies.

In those areas where the exposure limit was greater than the than permissible exposure limit appropriate control measure are inplace.

SECTION 5.0 APPENDIX

List of Compliance Reports
Submitted January 1, 1991 through June 30, 1991

5.1 AIR COMPLIANCE REPORTS

1. Coke Oven Wasteheat Stack Opacity Measurements - Quarterly Reports

    1. Mr Ronald E. Lipinski, Administrator
    Enforcement Programs
    Air Management Administration
    Maryland Department of the Environment
    2500 Broeing Highway
    Baltimore, Maryland 21224

    April 18, 1991

    2. Mr Ronald E. Lipinski, Administrator
    Enforcement Programs
    Air Management Administration
    Maryland Department of the Environment
    2500 Broeing Highway
    Baltimore, Maryland 21224

    July 22, 1991

5.2 WATER COMPLIANCE REPORTS

1. Non-Compliance Reports for NPDES Monitoring Program - Outfall 021

    1. Mr. James Metz, Administrator
    Enforcement Programs
    Water Management Administration
    Maryland Department of the Environment
    2500 Broeing Highway
    Baltimore, Maryland 21224

    Reports issued on March 4, 5, 15 and 16, 1991

    Revised Report issued June 12, 1991.

2. Daily Monitoring Reports for NPDES Monitoring Program

    1. Mr. James Metz, Administrator
    Enforcement Programs
    Water Management Administration
    Maryland Department of the Environment
    2500 Broeing Highway
    Baltimore, Maryland 21224

    and

    United States Environmental Protection Agency
    Region III: Attention 3WM-55
    841 Chestnut Building
    Philadelphia, PA 19107

    Reports issued January, 1991
    February 29, 1991
    March 28; 1991
    April 26, 1991
    May 29, 1991
    June 28, 1991
    July 29, 1991

5.3 SOLID WASTE COMPLIANCE REPORTS

1. Analyses of Sludge Blowdown to Back River Wastewater Treatment Plant

   to

   County Bureau of Utilities
   Baltimore County
   111 W. Chesapeake Avenue
   Towson, MD 21204

   July 1, 1991

2. Telephone Reporting of Spills to

   (a) James Lizear, Acting Head
   Hazardous and Solid Waste Management
   Maryland Dept. of Environment
   2500 Broeing Highway
   Baltimore, Maryland 21224
   Telephone No. 301-631-3400

   (b) National Response Center
   800-424-8802
   (for oil to water and reportable quantity spills)

   (c) U. S. Coast Guard
   Marine Safety Office
   U. S. Customs House
   40 So. Gay St.
   Baltimore, MD 21202-4022
   Telephone No. 301-962-5100

Date	Spill Description
01/14/91	ammonia liquor at "A" Battery (approx. 5000 gallons).
02/10/91	Primary Light Oil at ball mill (approx. 100 gallons).
02/20/91	ammonia liquor at "A" Coal Chemical Plant (approx. 50 gal)
02/26/91	flushing liquor at No. 11 and No. 12 Battery Decanters - (approx. 150 gallons).
03/01/91	wash oil at the "A" Coal Chemcal Plant (approx. 500 gal)
03/02/91	ammonia sludge at the "B" Coal Chemical Plant (approx. 200 gals)
03/04/91	mother liquor at the "A" Coal Chemical Plant (approx. 700 gals)
03/20/91	saturator acid to Outfall 021 (approx. 100 gallons).
03/25/91	oil to Outfall 021 (approx. 20 gallons).
04/05/91	ammonia liquor and tar at "B" Coal Chemical Plant - (approx. 200 gallons)
04/14/91	sulfuric acid at the "B" Coal Chemical Plant (approx. 75 gals)
04/19/91	sulfuric acid at the "B" Coal Chemical Plant (amount unknown)
05/06/91	wash oil at the wastewater tank (approx. 350 gallons).
05/10/91	wash oil at the coke oven gas holder (approx. 600 gallons).
05/13/91	sulfuric acid at the "A" Coal Chemical Plant (approx. 500 gals).
05/30/91	Primary Light Oil at ball mill (approx. 25 gals).
06/03/91	acid to Outfall 021 (amount unknown).
06/04/91	acid to Outfall 021 (amount unknown).
06/20/91	wash oil at the "A" Coal Chemical Plant (approx. 50 gallons)
06/20/91	wash oil at No. 40 tank (approx. 50 gallons).
06/23/91	sulfuric acid at a railroad tank car. (approx. 2 gallons)

5.4 BENZENE NESHAP MONITORING AND SAMPLING PROGRAM

1. Equipment Monitoring Program - Semi-Annual Reports sent to

   Mr. Thomas Maslany
   Air Management Division
   United States Environmental Protection Agency
   841 Chestnut Building
   Philadelphia, PA 19107

   Reports issued on January 21, 1991 and June 24, 1991

2. Benzene NESHAP Wastewater Sampling Program

   No reports during the period.

5.4 OSHA - PERSONNEL MONITORING

No required reporting to State or Federal Agencies.

Internal Sparrows Point Plant reports are written to transmit exposure monitoring results to Coke Oven Operations.