NEIC

CHARACTERIZATION AND EVALUATION OF WASTEWATER SOURCES
UNITED STATES STEEL CORPORATION

CLAIRTON WORKS
PITTSBURGH, PENNSYLVANIA

January 28-31, 1976

National Enforcement Investigations Center, Denver

U.S. Environmental Protection Agency

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I. INTRODUCTION

The United States Steel Corporation (USSC) Clairton Works consists of a coke plant, chemical plant and steel plant [Fig. 1]. The facility is in the city of Clairton on the Monongahela River, about 29 km (18 mi) upstream of the confluence of the Ohio, Monongahela and Allegheny Rivers.

The major activity at Clairton is the coking of coal and subsequent recovery of chemicals. The coke and chemical plants, operating since 1918, produce 18,200 to 21,800 m. tons (20,000 to 24,000 tons)/day of coke* from 20 batteries containing a total of 1,375 ovens. Gases from the coking operation are processed to produce: coke oven gas (used for fuel at all the USSC Monongahela Valley Works); benzene; xylene; toluene; solvent naphtha; pyridene; alpha, beta and gamma picolene; phenols; ortho- and meta-para cresols; cresylic acid blends; naphthalene; creosote; pitch; ammonium sulfate; anhydrous ammonia; and sulfur.

The steel plant includes a blast furnace** for either basic iron or ferromanganese (FeMn) production and four steel finishing mills (14-, 18-, 21- and 22-inch***). The mills, built from 1905-1908, process steel slabs from the USSC Duquesne Works into angles, bulb angles, channels, beams, elevator tee bars, zee bars, other bars, plates, floor plates and special sections. Production is about 2,180 m. tons (2,400 tons)/day finished steel products, and 820 m. tons (900 tons)/day basic iron or 450 m. tons (500 tons)/day ferromanganese production.

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* *From 27,200 to 31,800 m. tons (30,000 to 35,000 tons)/day of coal is used to produce this coke.*

** *The blast furnace has not operated since January 1975.*

*** *Metric equivalents: 35.6-, 45.7-, 53.3-, 55.9-cm*

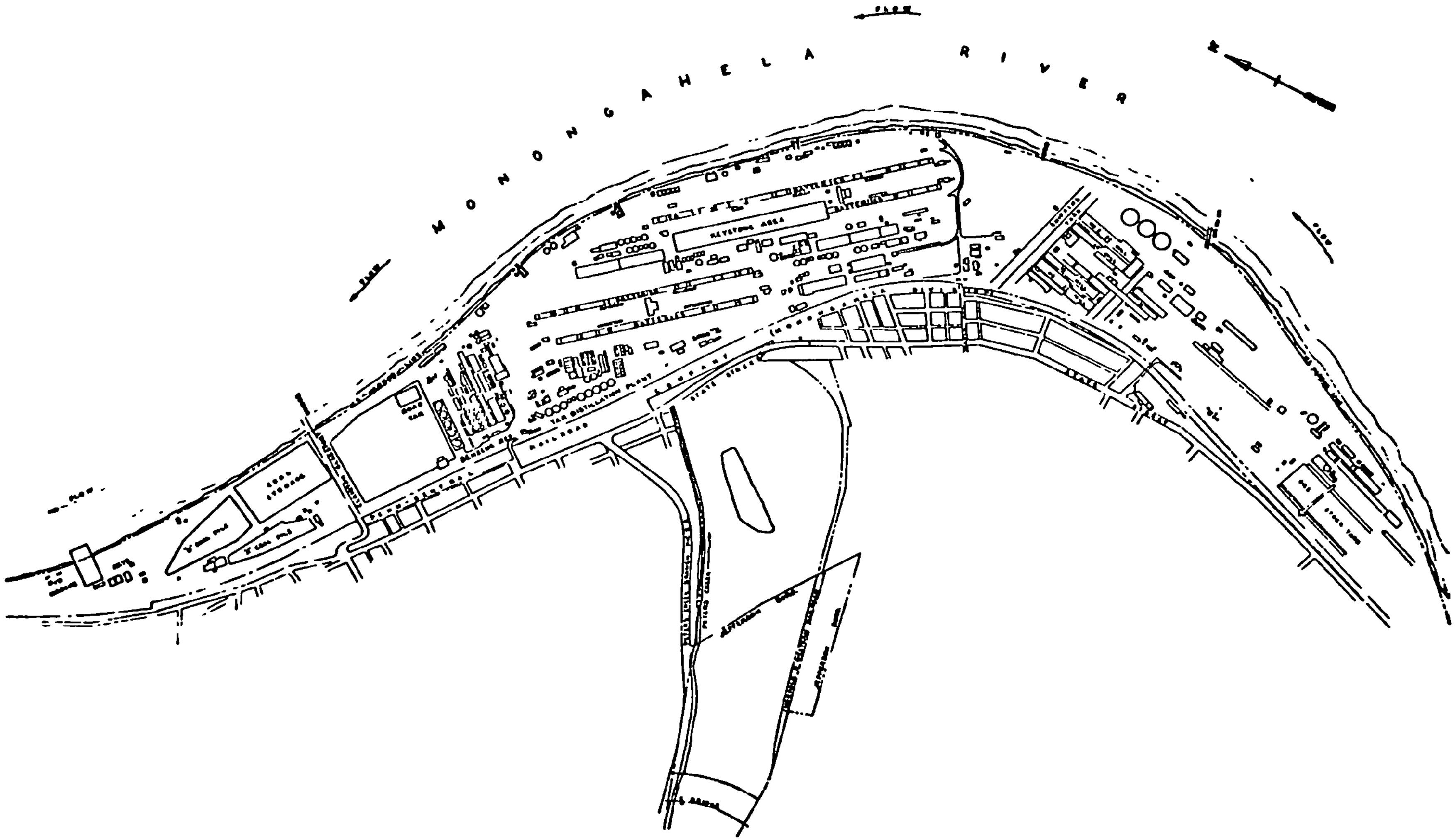

Figure 1. Location Map - USSC Clariton Works

The capacity[1] during 1976 for each operating area is listed below:

Process	Capacity†	
	m.tons/mo	tons/mo
FeMn	0	0
Iron	0	0
22-inch mill	5,347	5,889
18-inch mill	8,192	9,022
14-inch mill	4,585	5,050
21-inch mill	5,357	5,900
Coal charged to ovens	732,700	806,900
Furnace coke produced	509,600	561,200
Sulfur produced	2,106	2,319
Ammonia recovered from coke oven gas	1,046	1,152
Ammonia recovered from water	528	581
Syn ammonia produced	18,081	19,913
Slag	0	0
Light oil products	13,000 m^3/mo	3,442,000 gal/mo
Tar products	28,000 m^3/mo	7,384,000 gal/mo

† *Capacity given is base volume for 1976 which is predicted performance of the various producing sectors at Clairton Works.*

Two intake stations on the Monongahela River supply process and cooling water for this facility. The steel plant pumphouse* has five Wilson-Snyder pumps with a pumping capacity of 300,000 m^3/day (79.5 mgd). Pumps 1-4 are rated at 45 m^3/min (11,800 gpm) and pump 5 at 30 m^3/min (8,000 gpm). Some of the water is treated by lime softening and filtration for the blast furnace boiler makeup.

The coke plant pumphouse** has six Wilson-Snyder centrifugal pumps with capacities as follows:

* *This pumphouse supplies water for processes which discharge wastewaters through outfalls 001, 002 and 003.*

** *This pumphouse supplies water for processes which discharge wastewaters through outfalls 004, 005, 006, 007, 008, 010, 011, 012, 013, 014, 015, 115, 016, 017, 018 and 020.*

Pump	Capacity	
	m^3/day	mgd
1	132,000	35
2	121,000	32
3	87,000	23
4	159,000	42
5	159,000	42
6	159,000	42

A portion of this water is treated for use in the benzene boiler house, the No. 2 coke works boiler house and the "Keystone" complex cooling tower.

Wastewater is discharged daily into the Monongahela River through outfalls 001, 002, 003, 013, 014, 015, 115, 016, 017 and 018* [Figs. 2, 3]. The remaining outfalls (i.e., 004, 005, 006, 007, 008, 010, 011, 012 and 020) discharge into Peters Creek, a tributary of the Monongahela River.

A dye study was conducted on outfalls 003, 004, 008 and 020 by NEIC personnel December 15-18, 1975 to determine if the USSC sampling locations are representative. These stations reportedly contain about 75% of the total wastewater flow discharged from the Clairton Works. Results show that the sampling locations on outfalls 004, 008 and 020 were representative. Wastewaters from the steel rolling mills (outfall 003) combine at the manhole where USSC collects samples. Access to this wastewater is possible at the river during low stages; however, at the time of the dye study the outfall was surcharged. Therefore, the representativeness of 003 could not be determined.

In-plant monitoring was conducted during January 28-31, 1976. This report summarizes the survey results.

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* *Outfall numbers designated on the National Pollutant Discharge Elimination System (NPDES) permits.*

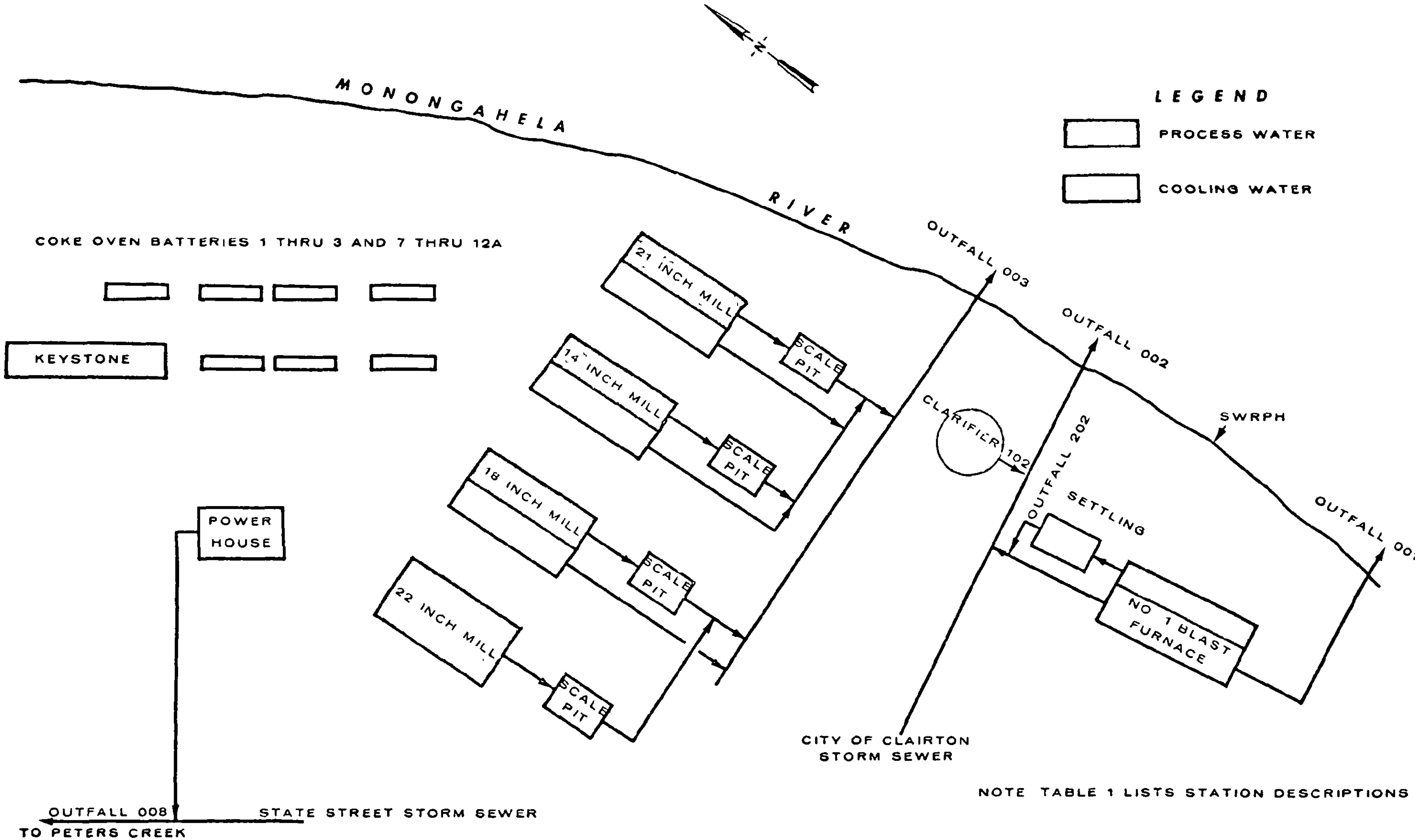
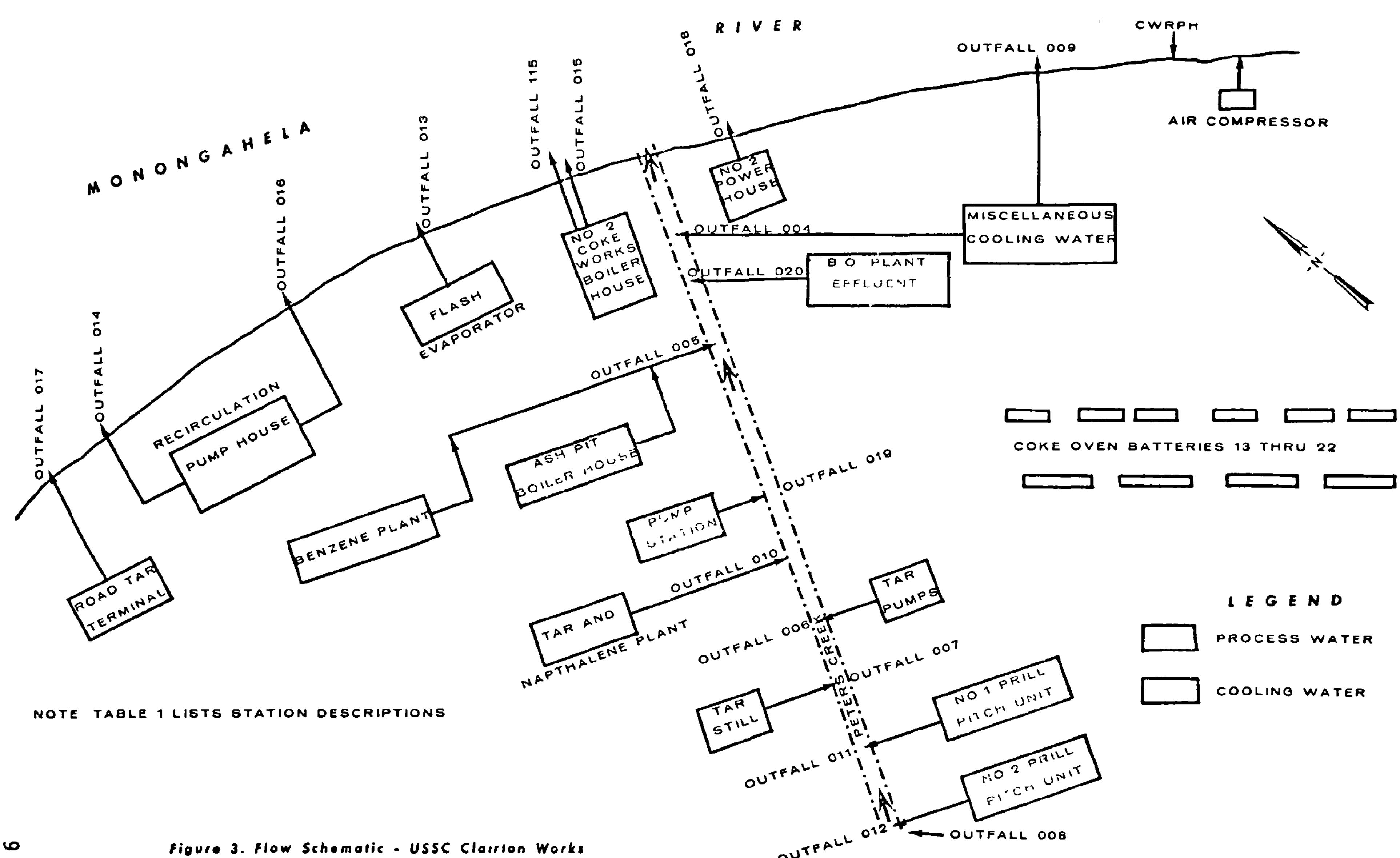


Figure 2. Flow Schematic - USSC Clairton Works



NOTE TABLE 1 LISTS STATION DESCRIPTIONS

Figure 3. Flow Schematic - USSC Clairton Works

II. SUMMARY

1. Wastewater discharges from all outfalls and water intakes were monitored January 28-31, 1976. Flows, measured at outfalls 003, 004 and 008 using the dilution techniques, were in accord with values reported in USSC self-monitoring data. Company-installed flow measurement devices were used to obtain the contaminated wastewater treatment facility and water intake flows. Twenty-four-hour flow-weighted composites were collected from outfalls 003, 004, 020 and the contaminated wastewater treatment plant. Grab samples were collected from outfalls 001, 002, 005, 006, 007, 008, 010, 011, 012, 013, 014, 015, 016, 017 and 018.

2. The blast furnace was banked.* The steel finishing mills which process steel slabs from the Duquesne works were operating at a combined production of 527 to 1,181 m. tons (581 to 1,301 tons)/day, 66 to 159% of the average production [795 m. tons (876 tons)/day] reported for the period January-October 1975. Coke production averaged 16,423 m. tons (18,087 tons)/day, similar to the average production reported for January-October 1975.

3. Outfall 001 primarily contains blast furnace cooling water, barometric condenser water, sand filter backwash and boiler blowdown. Daily maximum oil/grease concentrations were low, ranging from <1 to 3 mg/l, which are in accord with values reported in USSC self-monitoring data (1.8 to 5.7 mg/l). USSC has proposed a daily

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* *A banked furnace, although not in production, is maintained at lower than operating temperature so it can be efficiently brought back into production when necessary.*

maximum net oil/grease limitation for this outfall of 30 mg/l, which is ten times the maximum gross concentration observed during the survey.

4. Effluents from the blast furnace clarifier and slag settling basin and cooling water are discharged through outfall 002. The Company samples each effluent separately because a point does not exist where the combined discharge can be sampled. As discussed earlier, the blast furnace was banked; therefore, only cooling water was being discharged. Grab samples of cooling water contained net concentrations ranging from 0 to 8 mg/l total suspended solids (TSS); 0 to 0.03 mg/l total cyanide [CN(T)]; and 0.01 to 0.03 mg/l ammonia (NH_3-N). USSC self-monitoring data show that TSS, total cyanide and ammonia net concentrations ranged from 0 to 597; 0.01 to 1.54; and 0 to 1.3 mg/l, respectively.

   USSC has proposed the following daily maximum gross limitations for outfall 002:

Parameter	kg/day	lb/day
TSS	7,148	15,720
Ammonia	486	1,068
Cyanide	57	126
Phenol	14.7	32.4

   Based on the Company-estimated flow of 36,000 m^3/day (9.6 mgd) and self-monitoring data, the proposed TSS and cyanide limitations have been exceeded.

5. Outfall 003 discharges process and cooling waters from the four steel finishing mills. Flows through this outfall ranged from 79,800 to 98,000 m^3/day (21.1 to 25.9 mgd) compared to Company-

estimated flows of 16,700 to 117,000 m^3/day (4.4 to 30.8 mgd). The USSC has proposed limitations for TSS and oil/grease (O/G). These limitations are compared below with survey findings:

Parameter	USSC Proposed Limitations				NEIC Survey Data			
	Daily Average		Daily Maximum		Daily Average		Daily Maximum	
	kg/day	lb/day	kg/day	lb/day	kg/day	lb/day	kg/day	lb/day
TSS (Net)	18,681	41,099	56,200	123,297	0	0	0	0
O/G	2,185	4,810	6,560	14,430	570	1,250	670	1,470

Based on a flow of 130,500 m^3/day (34.5 mgd), the maximum flow observed during the survey, the net TSS concentration would have to exceed 430 mg/l before a violation of daily maximum criteria would occur.

6. Outfall 004, the main industrial sewer for the Clairton Works, contains cooling tower blowdown, boiler blowdown, steam condensate, barometric condenser water and primary cooler water. The discharge ranged from 226,900 to 232,800 m^3/day (60.0 to 61.5 mgd). The Company estimates that this flow ranges from 183,000 to 392,000 m^3/day (48.4 to 103.5 mgd).

   During the survey, large TSS, total cyanide, ammonia and total chromium loads were discharged into Peters Creek through outfall 004. The maximum loads (net) discharged were 12,500 kg (27,600 lb)/day TSS; 170 kg (375 lb)/day total cyanide; 1,500 kg (3,300 lb)/day ammonia; and 60 kg (132 lb)/day total chromium. USSC proposes only to measure the flow and temperature without any numerical limitations.

7. Outfall 005 contains benzene plant cooling water, ash pit effluent, boiler blowdown and treatment plant backwash water. The Company collects samples from a manhole where, in addition to the main

sewer, five drains/sewers terminate. Representative sampling and flow measurement at this location is impossible. The Company estimates that the flow varies from 8,700 to 12,100 m^3/day (2.3 to 3.2 mgd).

Grab samples collected from this discharge contained 390 mg/l of TSS.

USSC has proposed TSS limitations for outfall 005 as follows:

Parameter	(kg/day)	(lb/day)
Daily average	5,010	11,025
Daily maximum	15,030	33,075

Based on a flow of 12,100 m^3/day (3.2 mgd), the TSS concentration of a representative sample would have to exceed 1,240 mg/l (more than three times the concentration observed during the survey) before the daily maximum limitation would be exceeded.

8. The 006 discharge is cooling water from the pitch coolers. Outfall 007 contains cooling water from the tar stills, strainer building and electrode pitch factory. These outfalls terminate at common drop manholes which empty directly into Peters Creek. More than one discharge enters each manhole, precluding the collection of representative samples and flow measurements.

   USSC proposes that outfall 006 be monitored for temperature and pH with the flow to be estimated. Survey results showed that the samples collected contained from 1 to 8 mg/l of oil/grease, indicating the necessity for monitoring oil/grease.

   The Company has proposed a 30 mg/l daily maximum oil/grease limitation for outfall 007. During the survey, the maximum oil/grease concentration (2 mg/l) was one-fifteenth of the proposed limitation.

9. Outfall 008 contains cooling, seal and condenser waters from the No. 1 powerhouse. Flows through this outfall ranged from 35,600 to 43,100 m^3/day (9.4 to 11.4 mgd) lower than the Company-estimated flows of 45,000 to 90,500 m^3/day (11.9 to 23.9 mgd).

   During the survey, oil/grease and phenol concentrations were low (<1 to 3 mg/l and <0.005 mg/l, respectively), similar to values reported by the USSC. USSC proposes to measure flow, temperature and pH of outfall 008.

10. Outfall 010 contains cooling tower blowdown, cooling waters and condensate. USSC estimates that from 3,000 to 4,200 m^3/day (0.78 to 1.10 mgd) of wastewater is discharged into Peters Creek. The USSC has proposed a daily maximum oil/grease limitation of 30 mg/l for this discharge. During the survey, the maximum oil/grease concentration was 5 mg/l, considerably less than the proposed limitation.

11. Outfalls 011 and 012 both contain contact cooling water from prill pitch units. Estimated flow through each outfall is 2,100 m^3/day (0.568 mgd). USSC has proposed the following limitations for each outfall.

Parameter	Daily Average		Daily Maximum	
	kg/day	lb/day	kg/day	lb/day
TSS	1,330	2,925	3,990	8,775
O/G	910	2,000	2,730	6,000
Phenol	0.15	0.32	0.45	0.96

   Based on the Company-estimated flow, the TSS, O/G and phenol concentrations must exceed 1,850, 1,270 and 0.20 mg/l, respectively, before the daily maximum values are violated. The above concentrations are 3, 70 and 3 times greater than the maximum values observed during the survey.

12. Discharge 013 contains blowdown from the flash evaporator and cooling tower. USSC proposes to monitor this outfall for only flow, temperature and pH. Daily total cyanide concentrations ranged from 0.03 to 0.18 mg/l. The results indicate the necessity for monitoring total cyanide.

13. Outfall 014 contains cooling tower blowdown, cooling water and condensate. The Company currently samples this outfall at two locations (designated by them as 014 and 114) and has proposed to monitor only flow, temperature and pH.

    Survey results showed that phenol concentrations for the combined discharge ranged from 0.616 to 0.882 mg/l which greatly exceeds self-monitoring data (range of 0 to 0.158 mg/l).

14. Outfalls 015 and 115 each contain cooling water and blowdown from the No. 2 coke works boiler house. Each outfall is normally submerged during a portion of the year. Daily maximum oil/grease concentrations were negligible (1 to 3 mg/l).

    USSC has proposed no effluent limitations for outfalls 015 and 115. The Company plans only to estimate flow and measure the temperature and pH.

15. Outfall 016 contains backwash water from a continuous backwash strainer. TSS concentrations of the discharge were equal to or less than intake water concentrations. Again, USSC plans only to estimate flow and measure pH and temperature on this discharge.

16. Outfall 017 contains wastewaters originating in the Road Tar Terminal area. Daily oil/grease concentrations ranged from 1 to 24 mg/l. USSC proposes only to estimate flow and measure the pH and temperature. The survey results indicate the necessity for monitoring this outfall for oil/grease.

17. Discharge 018 contains cooling water, blowdown and condensates from the No. 2 powerhouse. USSC proposes to measure pH and temperature and estimate the flow. Oil/grease concentrations in this discharge were low (1 to 3 mg/l).

18. Air compressor cooling water is discharged into the Monongahela River through an outfall designated by USSC as 023. Oil/grease concentrations were high (maximum of 26 mg/l), indicating contamination from the air compressor. Since this was not an NPDES-designated outfall, USSC has not proposed any limitations.

19. Outfall 020 contains the effluent from the contaminated wastewater treatment plant and No. 2 primary cooler water. During the survey, the efficiency of the treatment plant was 95% or greater for total and amenable cyanide [CN(A)], ammonia, oil/grease and phenol. The TSS effluent concentrations were from 4 to 8 times greater than the influent concentrations. During the survey the flow through the sand filters was erratic, which could possibly have caused the high TSS effluent concentrations.

The USSC has proposed effluent limitations for outfall 020. The waste loads found during the survey and those proposed are compared below:

Parameter	USSC Proposed Limitations					NEIC Survey Data				
	Daily Average		Daily Maximum			Daily Average		Daily Maximum		
	kg/day	lb/day	kg/day	lb/day	mg/l	kg/day	lb/day	kg/day	lb/day	mg/l
TSS	730	1,606	2,190	4,818	NA†	1,540	3,390	1,830	4,040	63
NH_3-N	2,727	6,000	8,181	18,000	NA	225	500	465	1,030	16
CN(A)	2.7	6.0	8.1	18	0.5	33	70	49	110	1
Phenol	8.3	18.4	24.9	55	NA	1.9	4.0	2.5	5.4	0.116
O/G	218	480	654	1,440	30	37	80	70	150	3

† *Not Applicable*

On all three monitoring days, the USSC-proposed daily maximum waste load limitations for cyanide were exceeded. The daily average load limitations for cyanide and TSS exceeded the USSC-proposed daily limitations by 400 and 200%, respectively, during the three-day monitoring period.

20. Flows from outfalls 002, 003, 004 and 020 should be continuously measured and recorded. Flows from outfalls 001, 102, 202, 005, 006, 007, 008, 010, 011, 012, 013, 014 and 017 should be measured the same day samples are collected.

Representative samples were collected where possible. Representative sample collection and/or accurate flow measurements cannot be made at the present monitoring locations for outfalls 005, 006, 007, 011 and 012. Wastewaters from the 14- and 22-inch mills join with the 18- and 21-inch mills in the manhole where outfall 003 is sampled.

Since no other point existed to sample this outfall, the representativeness could not be determined. Outfalls 015, 115 and 018 are monitored at the river. Since sample containers scrape the river wall during sample collection, sample contamination is highly probable. Modification of present outfall configuration is necessary before accurate flow measurements and representative sampling can be conducted.

III. MONITORING PROCEDURES

During August 26-28, 1975 a reconnaissance visit was conducted at the Clairton Works to observe process operations, waste treatment systems and sampling locations [Appendix A].

The amount of intake water is measured at both the steel and coke pumphouses. According to Company officials, these meters are calibrated every six months. The amount of wastewater discharged is estimated monthly by Company personnel based on intake flows. The exact procedures used by USSC for estimating flows were not provided.

In conducting self-monitoring, Company personnel collect time-weighted 24-hour composite samples comprised of three aliquots taken once per shift. Grab samples are normally collected during the daylight shift (0800 to 1600 hours).

In-plant monitoring was conducted at selected stations [Table 1 and Figs. 2, 3] during January 28-31, 1976. The parameters monitored and the sample type for each station are shown in Table 2. Details on the sampling procedures and flow measurement techniques, analytical procedures and quality control, and chain of custody procedures are contained in Appendices B, C and D, respectively.

Effluent flows at outfalls 003, 004 and 008 were obtained using the dye dilution technique [Appendix B]. Influent and effluent flows for the contaminated wastewater treatment plant and the two water intake flows were obtained from Company-installed meters. According to Company representatives, these meters were checked in September 1975 and found to be accurate. Procedures used to check the meters were not provided.

Table 1

DESCRIPTION OF MONITORING STATIONS
USSC CLAIRTON WORKS

Station†	Description	Reported Flow $m^3/day \times 10^3$	Reported Flow mgd
001	Untreated cooling water (barometric condenser) from blast furnace	53	14
002	Treated effluent and cooling water from blast furnace	36	9.6
102	Treated effluent from the blast furnace clarifier	-	-
202	Treated effluent from the blast furnace slag pit	-	-
003	Process effluents and cooling waters from 14-, 18-, 21- and 22-inch rolling mills. Process wastewaters flow through their respective scale pits.	36	9.4
004 or 009	Untreated cooling waters primarily from coke oven gas coolers and recovery facilities are normally discharged into Peters Creek (004) but can be discharged into the Monongahela River (009)	269	71.1
005	Cooling waters from benzene plant, sludge from sediment tanks, and process wastewater from No. 2 boiler house ash pit	19	5
006	Cooling water from tar pitch coolers	0.8	0.1
007	Cooling water from tar still, downstream electrode pitch factory, tar stills, and strainer building	6.4	1.7
008	Barometric condenser water from No. 1 powerhouse	3.8	16
010	Cooling waters from tar and naphthalene plants	6.8	1.8
011	Untreated contact cooling water from No. 1 prill pitch unit	2.8	0.75
012	Untreated contact cooling water from No. 2 prill pitch unit	2.8	0.75
013	Blowdown from flash evaporator	5.3	1.4
014	Cooling tower blowdown, condensate and cooling water from BTX†† processing area	0.19	0.05
114	Condensate and cooling water from BTX processing area	-	-
015	Cooling water and blowdown from No. 2 coke works boiler house	3.94	1.04
115	Cooling water from No. 2 coke works boiler house	0.98	0.26
016	Strainer backwash	0.4	0.1
017	Miscellaneous flows from road tar terminal and loading facilities	0.4	0.1
018	Cooling water and blowdown from No. 2 powerhouse	1.9	0.5
020	Effluent from bioplant and primary cooling water from No. 2 unit	-	-
A.C.	Cooling water from air compressor	-	-
SWRPH	Steel works (water intake) river pumphouse	-	-
CWRPH	Coke works (water intake) river pumphouse	-	-

† *Figs. 2, 3 show outfall location; numbers are the NPDES permit outfall designation.*

†† *Benzene-toluene-xylene*

Table 2

SAMPLING SCHEDULE
USSC CLAIRTON WORKS

Station	Type of Sample	Parameter†
Outfall 001, 018, and air compressor cooling water discharge	Grab	O/G
Outfall 002	Grab	TSS; CN(A) and CN(T); NH_3-N
Outfall 003	24-hr composite	TSS
	Grab	O/G;†† organics*
Outfall 004	24-hr composite	TSS; CN(T) and CN(A); NH_3-N; total and hexavalent Cr
	Grab	O/G;†† phenol;†† organics*
Outfall 005	Grab	O/G; phenol; TSS; CN(T) and CN(A)
Outfalls 006, 007, 015 and 017	Grab	O/G; phenol
Outfall 008	Grab	O/G;†† phenol††
Outfall 010	Grab	O/G; phenol; CN(T) and CN(A); NH_3-N; total and hexavalent Cr
Outfalls 011, 012	Grab	O/G; phenol; TSS
Outfall 013	Grab	CN(T) and CN(A); total and hexavalent Cr
Outfall 014 (includes 114)	Grab	Phenol; total and hexavalent Cr
Outfall 016	Grab	TSS
Influent to bioplant and effluent from bioplant	24-hr composite	TSS; CN(T) and CN(A); NH_3-N
	Grab	O/G;†† phenol††
Outfall 020	24-hr composite	TSS; CN(T) and CN(A); NH_3-N
	Grab	O/G;†† phenol;†† organics*
SWRPH and CWRPH**	24-hr composite	TSS; CN(T) and CN(A); NH_3-N; total and hexavalent Cr
	Grab	O/G;†† phenol;†† organics*

† *Temperature and pH were measured periodically at all stations*
†† *Grab samples collected 3 times each day for this parameter*
* *Organics were sampled twice during the survey*
** *SWRPH: Steel Works River Pumphouse; CWRPH: Coke Works River Pumphouse*

IV. FINDINGS OF IN-PLANT MONITORING

During the survey, the blast furnace was banked;* therefore, there was no granulated slag or iron production. The rolling mills operated on the following schedule:

Mill	Turn†		
	12-8	8-4	4-12
14-inch			x
18-inch	x	x	
21-inch	x	x	
22-inch		x	x

† *Work shift*

Finished steel production during the survey was:

Mill	Product[2]					
	1/29		1/30		1/31	
	m.tons	tons	m.tons	tons	m.tons	tons
14-inch	53.38	58.79	91.01	100.23	61.33	67.54
18-inch	266.32	293.31	226.35	249.28	94.67	104.26
21-inch	294.62	324.47	334.46	368.35	131.68	145.02
22-inch	272.58	300.20	529.37	583.01	238.54	262.71

† *Production corresponds to sampling day (0600-0300 hours).*

The above production ranged from 66 to 159% of the average production [795 m. tons (876 tons)/day] reported for the period January-October 1975 data [Table 3].

Coke production during the survey ranged from 16,401 to 16,455 m. tons (18,063 to 18,122 tons) which was equal to the average weekly production reported for 1975 [Table 3].

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* *Cooling water is circulated to keep the heat level down.*

Table 3

PRODUCTION†
USSC CLAIRTON WORKS
January-October 1975

Process	Minimum week	Minimum month	Average week	Average month	Maximum week	Maximum month
		tons/day				
FeMn	0	0	0	0	0	0
Iron	0	0	142.6	146.5	988.3	784.8
22-inch mill	0	92.1	239.8	241.8	404.7	323.1
18-inch mill	0	66.4	253.4	255.0	572.2	461.1
14-inch mill	0	30.8	129.8	130.4	284.8	211.8
21-inch mill	0	58.5	252.5	254.7	478.9	389.7
Coal charged	20,950	26,969	26,970	27,262	29,265	27,930
Coke††	15,221	17,072	18,299	18,543	19,136	18,923
Sulfur	2.0	40.0	58.9	60.4	82.4	72.3
NH_3 Recov. COG	21.3	35.3	38.1	39.2	43.8	41.9
NH_3 Recov. H_2O	0	0	1.2	1.3	15.7	8.8
Syn NH_3	0	0	680.0	699.1	1,084.3	1,013.6
Slag	0	0	45.9	47.6	337.5	241.9
		gallons/day				
Light Oil Refining						
Benzene	0	75,322	93,279	95,766	138,857	126,733
Toluene	0	11,000	14,834	15,230	24,714	19,433
Xylene	0	1,100	2,477	2,543	7,285	3,225
Crude No. 2	0	734	2,280	2,341	6,641	3,734
Bz. Naph.	0	4,293	6,435	6,607	12,268	9,253
Raffinate	0	2,032	3,639	3,736	7,714	5,433
Sundries	0	1,751	3,659	3,757	16,914	6,032
Tar Refining						
Wax Oil	0	0	90	92	1,506	351
Creosote	29,874	78,024	89,986	92,385	150,637	106,453
Naph.	0	15,637	34,427	35,345	67,553	59,052
Naph. Sundries	0	4,750	11,631	11,941	25,574	21,029
Tar Acids	0	0	1,066	1,095	7,774	2,697
Pitch (bbl/day)	19,275	102,848	129,955	133,420	202,567	151,789
Prills††† (tons/day)	0	107	241	248	464	442

† *Information provided by USSC in letter dated January 19, 1976 with attachments from Mr. James L. Hamilton, III, Manager Environmental Control Water, United States Steel Corporation to Mr. Stephen R. Wassersug, Director, Enforcement Division, U. S. Environmental Protection Agency, Region III.*
†† *Quantities listed are furnace coke, not total coke.*
††† *Prills are produced from the pitch quantities listed.*

In addition to the steel and coke, USSC reported the following production figures for the survey:[2]

Product	Unit	1/29	1/30	1/31
Oxygen	mscf	3.596	3.340	3.808
Nitrogen	mscf	26.414	26.344	27.653
Phosam	m.ton	51	51	54
	ton	56	56	59
Synam	m.ton	915	917	916
	ton	1,008	1,010	1,009
Hydrogen	mscf	0.532	0.535	0.538
Sulfur	m.ton	40.86	38.29	63.25
	ton	45.00	42.17	69.66
Distillates	m^3	1,137	689	1,102
	gal	300,305	181,949	291,054
Desulfurized	m^3	252	281	258
Naphthalene	gal	66,691	74,300	68,152
Pitch Prills	m.ton	418	372	418
	ton	460	410	460

Monitoring results are tabulated by sampling location [Tables 4, 5, 6 and Figs. 2, 3] and discussed by individual outfalls. Waste loads discharged per unit of production have also been calculated.

OUTFALL 001

Company officials stated that outfall 001 contains cooling waters from the blast furnace and air compressor, barometric condenser water from turbine-driven pumps, exhaust steam from feedwater treatment, sand filter backwash from the treatment plant and boiler blowdown. The Company has reported this flow to be 53,000 m^3/day (14 mgd). According to self-monitoring data [Table 7] the flow is considerably lower, ranging from 4,200 to 14,000 m^3/day (1.1 to 3.7 mgd). This is partly due to the blast furnace not being in operation since January 1975.

Table 4

SUMMARY OF FIELD MEASUREMENTS AND ANALYTICAL DATA
USSC CLAIRTON WORKS
January 28-31, 1976

Station Description	Date	Flow m^3/day x 10^3	Flow mgd	pH Range	Temp. Range (°C)	TSS mg/l	TSS kg/day	TSS lb/day	CN(T) mg/l	CN(T) kg/day	CN(T) lb/day	CN(A) mg/l	CN(A) kg/day	CN(A) lb/day	NH_3-N mg/l	NH_3-N kg/day	NH_3-N lb/day
Outfall 002[a]	1/28			7.2	2	44			0.03			<0.01			0.20		
	1/29			6.9	4	33			0.05			0.03			0.17		
	1/30			7.3	3	28			0.01			<0.01			0.17		
	3-day average					35			0.03			0.01			0.18		
Outfall 003	1/29	98.0	25.9	6.4-6.9	9-24	25	2,450	5,400									
	1/30	83.2	22.0	5.8-8.1	9-20	18	1,500	3,300									
	1/31	79.8	21.1	6.3-7.3	10-45	15	1,200	2,600									
	3-day average	87.0	23.0			19	1,700	3,800									
Steel works water intake	1/29	129.8	34.3	6.5-6.9	4-5	36	4,700	10,300	0.01	1.3	2.9	<0.01			0.19	25	54
	1/30	126.4	33.4	6.0-7.4	3-7	33	4,200	9,200	0.02	2.5	5.6	<0.01			0.15	19	42
	1/31	105.6	27.9	6.5-7.3	4-5	24	2,500	5,600	0.01	1.1	2.3	<0.01			0.14	15	33
	3-day average	120.6	31.9			31	3,800	8,400	0.01	1.6	3.6	<0.01			0.16	20	43
Outfall 004	1/29	226.9	60.0[c]	6.3-8.6	17-23	100	22,700	50,000	0.04	9	20	<0.01			1.9	430	950
	1/31[b]	229.6	60.7	6.5-7.5	16-22	16	3,700	8,100	0.75	170	380	0.25	55	125	7.0	1,600	3,500
	1/31[d]	232.8	61.5	7.3-8.1	18-19	68	15,900	34,900	0.20	45	100	<0.01			1.9	440	970
	3-day average	229.6	60.7			61	14,100	31,000	0.33	75	165	0.08	18	40	3.6	820	1,800
Outfall 005[a]	1/30			8.5	37	390			0.01			<0.01					
Outfall 010[a]	1/28			7.5	9				<0.01			<0.01			0.23		
	1/29			6.9	11				0.02			<0.01			0.21		
	1/30			7.1	9				1.0			0.98			0.18		
	3-day average								0.34			0.33			0.21		
Outfall 011[a]	1/28			7.0	12	120											
	1/29			7.2	11	190											
	1/30			7.2	9	320											
	3-day average					210											
Outfall 012[a]	1/28			6.9	12	560											
	1/29			7.0	10	260											
	1/30			7.2	9	480											
	3-day average					430											
Outfall 013[a]	1/28			9.0	42				0.03			0.02					
	1/29			9.5	41				0.18			0.16					
	1/30			9.1	41				0.10			0.08					
	3-day average								0.10			0.09					

Table 4 (Continued)

SUMMARY OF FIELD MEASUREMENTS AND ANALYTICAL DATA

Station Description	Date	Flow m^3/day x 10^3	Flow mgd	pH Range	Temp. Range (°C)	TSS mg/l	TSS kg/day	TSS lb/day	CN(T) mg/l	CN(T) kg/day	CN(T) lb/day	CN(A) mg/l	CN(A) kg/day	CN(A) lb/day	NH_3-N mg/l	NH_3-N kg/day	NH_3-N lb/day
Outfall 016[a]	1/28			7.3	3	31											
	1/29			7.0	3	41											
	1/30			7.3	3	20											
	3-day average					31											
Influent to bioplant	1/29	7.2	1.9	8.3-8.7	53-62	12	85	190	e			e			1,700	12,200	26,900
	1/30	9.5	2.5	8.2-8.8	47-58	21	200	440	500	4,700	10,400	460	4,400	9,600	2,000	19,000	41,700
	1/31	9.5	2.5	8.4-9.0	50-61	13	125	270	550	5,200	11,500	520	4,900	10,800	2,000	19,000	41,700
	3-day average	8.7	2.3			15	135	300	525	5,000	11,000	490	4,600	10,200	1,900	16,700	36,800
Effluent from bioplant	1/29	16.3	4.3	6.8-8.9	26-30	87	1,420	3,120	10	165	360	3	49	110	6.7	110	240
	1/30	15.9	4.2	6.6-8.0	25-36	86	1,370	3,010	9	145	315	2	32	70	6.7	105	235
	1/31	16.7	4.4	6.5-7.8	27-31	110	1,830	4,040	8	135	295	1	17	37	28	465	1,030
	3-day average	16.3	4.3			94	1,540	3,390	9	150	325	2	33	70	13.8	225	500
Outfall 020[f]	1/29			6.9-7.4	29-44	57			5.5			0.10			1.0		
	1/30			6.6-7.9	31-47	63			4			1			6.7		
	1/31			6.7-7.8	31-41	54			4			<0.01			16		
	3-day average					58			4.5			0.37			7.9		
Coke works water intake	1/29	344	91	6.5-6.9	3-4	45	15,500	34,200	0.01	3.4	7.5	<0.01			0.23	80	175
	1/30	340	90	6.3-7.3	3-5	40	13,600	30,000	0.02	6.8	15	<0.01			0.18	60	135
	1/31	340	90	6.4-7.2	3-5	33	11,300	24,800	0.01	3.4	7.5	<0.01			0.48	165	360
	3-day average	340	90			39	13,500	29,700	0.01	4.5	10	<0.01			0.30	100	225

a One grab sample was collected daily from this discharge. Flow was not measured.
b Composite sample collected from 0600, 1/30 to 0300, 1/31.
c Dye pump did not operate continuously on this date. Therefore the average flow for 0600 1/29 to 0300 1/31 is used.
d Composite sample collected from 1200, 1/30 to 0900, 1/31
e Sample contained gross interferences.
f Loads discharged through outfall 020 are equal to or greater than those discharged from the treatment plant.

Table 5

SUMMARY OF OIL AND GREASE AND PHENOL ANALYSES[a]
USSC CLAIRTON WORKS
January 28-30, 1976

Station	Date (Jan.)	Time of Collection	Instantaneous Flow[b] m^3/day x 10^3	Instantaneous Flow[b] mgd	Oil/Grease[c] mg/l	Oil/Grease[c] kg/day	Oil/Grease[c] lb/day	Phenol mg/l	Phenol kg/day	Phenol lb/day
SWRPH	28	1705	112.0	29.6	<1			<0.005		
		2035	110.5	29.2	<1			<0.005		
		2330	129.8	34.3	1	130	285	<0.005		
	29	0510	126.8	33.5	<1			<0.005		
		1625	130.6	34.5	<1			<0.005		
		2235	107.1	28.3	<1			<0.005		
	30	0125	132.4	35.0	1	130	290	<0.005		
		1610	106.0	28.0	1	105	235	<0.005		
		2210	60.6	16.0	3	181	400	<0.005		
Outfall 001	28	1230			<1					
	29	1220			<1					
	30	1220			3					
Outfall 003	28	1545	98.8	26.1	9	890	1,960			
		1825	84.0	22.2	9	760	1,670			
		2115	103.9	27.4	3	310	690			
	Daily average[d]		98.0	25.9	7	650	1,440			
	29	0307	94.1	24.9	10	940	2,070			
		1505	76.0	20.1	7	530	1,170			
		2110	75.5	20.0	7	530	1,170			
	Daily average[d]		130.5	34.5	5	670	1,470			
	30	0001	97.8	25.8	4	390	860			
		1455	84.0	22.2	6	500	1,110			
		2105	86.4	22.8	3	260	570			
	Daily average[d]		79.8	21.1	5	380	845			
CWRPH	28	1730	340	90	<1					
		1947	348	92	<1			<0.005		
		2243	337	89	2	670	1,480	<0.005		
	29	0540	340	90	<1			<0.005		
		1635	340	90	<1			<0.005		
		2200	340	90	<1			<0.005		
	30	0055	340	90	1	340	750	<0.005		
		1630	340	90	<1			<0.005		
		2200	340	90	3	1,020	2,250	<0.005		
Outfall 004	28	1545	237.5	62.8[e]	1	240	520	0.026	6	14
		1840	237.5	62.8[e]	6	1,430	3,140	0.036	9	19
		2132	237.5	62.8[e]	2	480	1,050	0.085	20	45
	Daily average[d]		237.5	62.8	3	720	1,570	0.049	12	26
	29	0322	171.7	45.4	2	340	760	0.033	6	12
		1536	213.4	56.4	4	860	1,880	0.068	15	32
		2120	233.9	61.8	1	235	520	0.041	10	21
	Daily average[d]		229.6	60.7	2	480	1,050	0.043	10	22
	30	0012	230.2	60.8	2	460	1,010	0.040	9	20
		1510	224.1	59.2	3	670	1,480	0.047	11	23
		2133	224.1	59.2	4	900	1,980	0.033	7	16
	Daily average[d]		232.8	61.5	3	680	1,490	0.039	9	20

Table 5 (Continued)

SUMMARY OF OIL AND GREASE AND PHENOL ANALYSES[a]

Station	Date (Jan.)	Time of Collection	Instantaneous Flow[b]		Oil/Grease[c]			Phenol		
			m^3/day x 10^3	mgd	mg/l	kg/day	lb/day	mg/l	kg/day	lb/day
Outfall 005	30	1515			4			<0.005		
Outfall 006	28	1435			1			<0.005		
	29	1410			6			<0.005		
	30	1425			8			<0.005		
Outfall 007	28	1505			2			0.007		
	29	1415			2			0.024		
	30	1420			<1			0.011		
Outfall 008	28	1630	34.0	9.0	<1			<0.005		
		2005	36.0	9.5	<1			<0.005		
		2230	33.4	8.8	1	33	74	<0.005		
	Daily average[d]		35.6	9.4	0.3	11	25	<0.005		
	29	0445	33.0	8.7	<1			<0.005		
		1600	48.8	12.9	1	49	110	<0.005		
		2150	45.0	11.9	<1			<0.005		
	Daily average[d]		43.1	11.4	0.4	16	37	<0.005		
	30	0042	43.6	11.5	1	45	100	<0.005		
		1540	43.2	11.4	2	85	190	<0.005		
		2150	39.4	10.4	3	120	260	<0.005		
	Daily average[d]		41.3	10.9	2	85	185	<0.005		
Outfall 010	28	1450			<1			<0.005		
	29	1355			4			<0.005		
	30	1405			5			<0.005		
Outfall 011	28	1540			15			0.020		
	29	1425			7			0.025		
	30	1440			7			0.032		
Outfall 012	28	1550			14			0.051		
	29	1435			15			0.051		
	30	1445			18			0.054		
Outfall 014 (includes 114)	28	1350						0.882		
	29	1300						0.900		
	30	1335						0.616		
Outfall 015	29	1505			1			<0.005		
	30	1310			3			<0.005		
Outfall 017	28	1415			1			0.011		
	29	1340			21			<0.005		
	30	1345			4			<0.005		
Outfall 018	28	1615			2					
	29	1455			3					
	30	1305			1					
Influent to bioplant	28	1605	8.17	2.16	110	900	1,980	1,000	8,200	18,000
		1900	6.54	1.73	150	980	2,160	0.133	1	2
		2155	6.32	1.67	210	1,330	2,920	810	5,100	11,300
	Daily average[d]		7.2	1.9	149	1,070	2,350	616	4,430	9,770
	29	0325	6.28	1.66	190	1,200	2,630	880	5,500	12,200
		1535	9.31	2.46	220	2,050	4,510	1,100	10,200	22,600
		2135	9.38	2.48	180	1,700	3,720	1,100	10,300	22,800
	Daily average[d]		9.5	2.5	174	1,650	3,620	920	8,700	19,200

Table 5 (Continued)

SUMMARY OF OIL AND GREASE AND PHENOL ANALYSES[a]

Station	Date (Jan.)	Time of Collection	Instantaneous Flow[b] m³/day x 10³	mgd	Oil/Grease[c] mg/l	kg/day	lb/day	Phenol mg/l	kg/day	lb/day
Influent to bioplant (continued)	30	0025	9.38	2.48	200	1,880	4,140	1,200	11,300	24,800
		1520	9.42	2.49	180	1,700	3,740	650	6,100	13,500
		2124	9.50	2.51	55	520	1,150	810	7,700	17,000
	Daily average[d]		9.5	2.5	144	1,370	3,010	884	8,370	18,400
Effluent from bioplant	28	1610	16.01	4.23	2	32	70	0.106	1.7	3.7
		1915	19	5	<1			-		
		2145	16.19	4.28	2	32	70	0.127	2.1	4.5
	Daily average[d]		16.3	4.3	1	21	45	0.076	1.3	2.7
	29	0337	15.82	4.18	1	16	35	0.100	1.6	3.5
		1540	16.01	4.23	<1			0.130	2.1	4.6
		2130	15.82	4.18	3	48	105	0.101	1.6	3.5
	Daily average[d]		15.9	4.2	1	21	45	0.111	1.8	3.9
	30	0020	16.19	4.28	3	49	105	0.138	2.3	5.0
		1525	14.87	3.93	3	45	100	0.149	2.2	4.9
		2119	18.13	4.79	6	110	240	0.156	2.9	6.4
	Daily average[d]		16.3	4.3	4	70	150	0.151	2.5	5.4
Discharge 020[f]	28	1545			<1			0.072		
		1929			1			0.049		
		2215			<1			0.078		
	Daily average				0.4			0.067		
	29	0352			<1			0.079		
		1530			<1			0.104		
		2140			2			0.067		
	Daily average				0.7			0.083		
	30	0035			1			0.084		
		1510			3			0.116		
		2137			1			0.095		
	Daily average				2			0.098		
Air Compressor Discharge	28	1315			1					
	29	1325			26					
	30	1255			<1					

a *All data based on grab samples.*
b *Loads were calculated using instantaneous flows.*
c *Freon extractable material*
d *Daily average flow is calculated from total of all flow measurement for day (i.e., 0600, Jan. 28, to 0300, Jan. 29). The daily average load is the arithmetic average of instantaneous loads. The daily average concentration, mg/l, was calculated from daily average load and daily average flow.*
e *Mean of daily flows as instantaneous flows not available.*
f *The loads discharged from outfall 020 are equal to or greater than those discharged from the treatment plant.*

Table 6

SUMMARY OF TOTAL AND HEXAVALENT CHROMIUM DATA
USSC CLAIRTON PLANT
January 28-31, 1976

Station Description	Date	Flow		Total Cr			Hexavalent Cr		
		m³/day x 10³	mgd	mg/l	kg/day	lb/day	mg/l	kg/day	lb/day
Outfall 004	1/29	226.9	60.0	0.26	60	130	0.04	9	20
	1/31†	229.6	60.7	0.10	23	50	0.03	7	15
	1/31††	232.8	61.5	0.19	45	100	0.06	14	32
Outfall 010†††	1/28			0.01			<0.01		
	1/29			<0.01			<0.01		
	1/30			<0.01			<0.01		
Outfall 013†††	1/28			<0.01			<0.01		
	1/29			<0.01			<0.01		
	1/30			0.03			<0.01		
Outfall 014††† (includes 114)	1/28			0.02			<0.01		
	1/29			0.02			<0.01		
	1/30			<0.01			<0.01		
Coke works water intake	1/29			<0.01			<0.01		
	1/30			<0.01			<0.01		
	1/31			<0.01			<0.01		

† *Composite sample collected from 0600 1/30 to 0300 1/31*
†† *Composite sample collected from 1200 1/30 to 0900 1/31*
††† *One grab sample was collected daily from this discharge. Flow was not measured.*

Table 7

SUMMARY OF SELF-MONITORING DATA
USSC CLAIRTON WORKS[§]
January-September[†]

Station	Flow[††] mgd	Temperature °F	pH[††]	TSS (mg/l)	O/G (mg/l)	NH_3-N (mg/l)	CN(T) (mg/l)	Phenol (mg/l)
Outfall 001								
Range (gross)	1.1-3.7	79-92	7.6-9.6		1.8-5.7			
Measurements	6	6	5		5			
Outfall 002								
Range (net)	0.9-3.7	49-92	7.3-8.6	0-597	0.2-51.1[††]	0-1.3	0.01-1.54	0-0.066
Measurements	5	5	5	5	5	5	5	5
Outfall 003								
Range (net)	4.4-30.8	47-88	6.6-8.1	0-2,647	0.96-268.7[††]			
Measurements	18	16	16	16				
Outfall 004								
Range (net)	48.4-103.5	52-100	4.3-9.4					0-0.218
Measurements	32	31	32					9
Outfall 005								
Range (net)	2.3-3.2	93-150	9.2-11.2	0-404	0.6-20.5[††]		0-0.06	0-0.074
Measurements	8	8	8	8	8		8	8
Outfall 006								
Range	0.3-1.0	83-102	7.2-7.9					
Measurements	2	2	2					
Outfall 007								
Range (gross)	2.07-2.95	60-110	2.6-7.7		0-4.2			
Measurements	8	8	8		8			
Outfall 008								
Range (gross)	11.9-23.9	51-112	5.1-8.2		0-2.9		0.008-0.125	0-0.409
Measurements	32	32	26		8		8	8
Outfall 010								
Range	0.78-1.10	42-94	7.0-7.7		0.1-7.6		0.005-0.016	0.005-0.409
Measurements	10	9	7		8		8	8
Outfall 011								
Range (net)	0.568[†††]	48-66	6.8-7.6	11-511	0-21.5			0-0.064
Measurements	10	8	6	6	6			6
Outfall 012								
Range (net)	0.568[†††]	42-97	6.7-8.0	16-839	0-11.5			0-0.105
Measurements	12	10	12	11	9			11
Outfall 013								
Range	0.97-1.50	108-120	7.0-9.4					
Measurements	8	8	8					

Table 7

SUMMARY OF SELF-MONITORING DATA
USSC CLAIRTON WORKS
January-September†

Station	Flow††	Temperature	pH††	TSS	O/G	NH_3-N	CN(T)	Phenol
	mgd	°F		mg/l				
Outfall 014								
Range (net)	0.20-0.27	82-94	7.1-8.1					0-0.158
Measurements	6	7	6					7
Outfall 015								
Range	0.87-1.14	52-112	7.2-10.3					
Measurements	8	8	8					
Outfall 016								
Range	0.075†††	49-84	7.2-7.7					
Measurements	2	2	2					
Outfall 017								
Range	0.060†††	58-88	8.6-8.9					
Measurements	2	2	2					
Outfall 018								
Range	0.49-0.59	64-92	7.6-8.6					
Measurements	3	3	3					
Outfall 020								
Range (net)	3.5-4.6	118-146	5.6-8.0	0-123	0-5	0-47.8	0.007-0.357	0-1.73
Measurements	12	13	10	12	12	11	10	12
Steelworks Pumphouse								
Range (gross)	6.1-38.8	42-93	6.2-8.6	0-128	0-10	0-2.2	0.006-0.02	0-0.014
Measurements	Continuous	22	21	23	24	8	9	9
Coke Works Pumphouse								
Range (gross)	78.4-125.6	40-97	6.5-8.0	1-563	0-50.7	0.009-0.86	0.002-0.061	0-0.124
Measurements	Continuous	34	30	22	25	10	19	27

† *Data for June 1975 was not available. All negative values reported by the Company are considered to be 0.*
†† *These are gross values.*
††† *All values were the same.*

During NEIC monitoring, grab samples were collected daily for oil/grease analyses and field measurements. The analytical results [Table 5] show gross oil/grease concentrations of <1 to 3 mg/l which are the same as those concentrations observed in the intake water. The temperature ranged from 4 to 18 °C (39.2 to 64.4 °F), and pH ranged from 9.6 to 9.8 °C (49.3 to 49.6 °F). Self-monitoring data for 1975 show that the oil/grease concentrations ranged from 1.8 to 5.7 mg/l. USSC has proposed a daily maximum net oil/grease concentration of 30 mg/l for this discharge [Table 8] or ten times the maximum gross concentration observed during the survey.

The present monitoring location for outfall 001 is satisfactory. Flows are currently estimated by USSC, but they can be measured either by tracer techniques or conventional devices, such as a flume or weir.

OUTFALL 002

The 002 discharge contains wastewater originating from blast furnace operations. Slag from the blast furnace is sprayed with water in the granulating pit; the overflow from the pit is pumped into a settling basin, about 25 m long x 10 m wide (80 x 33 ft), and then it is discharged through outfall 202. Water, 4.5 m^3/min (1,200 gpm), is used to scrub blast furnace gas in a venturi. The wastewater is treated in a Dorr thickener, 34 m (110 ft) in diameter, and recycled, discharging 0.2 m^3/min (50 gpm) through outfall 102. Water used to cool the blast furnace is also discharged (002). All three of the above wastewater discharges (102, 202, 002) enter a City storm sewer in which evidence of domestic sewage was observed. The combined flow enters the Monongahela River. The Company samples all three discharges, estimates flow, and sums the loading to obtain pollutant load. Since Janaury 1975 the blast furnace has been banked; therefore, only cooling water is discharged through 002.

Table 8

USSC PROPOSED EFFLUENT LIMITATIONS
USSC CLAIRTON WORKS

Outfall	Parameter†	Gross/Net	USSC Proposed Limitations				
			Daily Average††		Daily Maximum		
			kg/day	lb/day	kg/day	lb/day	mg/l
001 Duration of permit	O/G	N	NA†††	NA	NA	NA	30
002* Effective date to 6/30/77	TSS	G	2,376	5,240	7,148	15,720	NA
	O/G	G	NA	NA	NA	NA	NA
	NH_3-N	G	162	356	486	1,068	NA
	CN(T)	G	19	42	57	126	NA
	Phenol	G	4.9	10.8	14.7	32.4	NA
003 Effective date to 6/30/77	TSS	N	18,681	41,099	56,200	123,297	NA
	O/G	G	2,185	4,810	6,560	14,430	NA
004 or 009 Duration of permit	Phenol	N	NA		NA		NA
005 Duration of permit	TSS	G	5,010	11,025	15,030	33,075	NA
	O/G	G	NA	NA	NA	NA	NA
	CN(T)	G	NA	NA	NA	NA	NA
	Phenol	G	NA	NA	NA	NA	NA
007 Duration of permit	O/G	G	NA	NA	NA	NA	30
008 Duration of permit	O/G	NS**	NA	NA	NA	NA	NA
	CN(T)	NS	NA	NA	NA	NA	NA
	Phenol	NS	NA	NA	NA	NA	NA
010 Duration of permit	CN(T)	NS	NA	NA	NA	NA	NA
	Phenol	NS	NA	NA	NA	NA	NA
	O/G	G	NA	NA	NA	NA	30
011 Effective date to 6/30/77	TSS	G	1,330	2,925	3,990	8,775	NA
	O/G	G	910	2,000	2,730	6,000	NA
	Phenol	G	0.15	0.32	0.45	0.96	NA
012 Effective date to 6/30/77	TSS	G	1,330	2,925	3,990	8,775	NA
	O/G	G	910	2,000	2,730	6,000	NA
	Phenol	G	0.15	0.32	0.45	0.96	NA
014 Duration of permit	Phenol	N	NA	NA	NA	NA	NA
020 Startup of bioplant*** to expiration	TSS	G	730	1,606	2,190	4,818	NA
	NH_3-N	G	2,727	6,000	8,181	18,000	NA
	CN(A)	G	2.7	6.0	8.1	18	0.5
	Phenol	G	8.3	18.4	24.9	55	NA
	O/G	G	218	480	654	1,440	30

† *Flow and temperature parameters were listed as NA for all limitations. The proposed pH limitation for all outfalls is 6.0 minimum and NA maximum. The Company thought outfalls 006, 013, 015, 115, 016, 017 and 018 should only be monitored for pH.*

†† *Daily average in mg/l not applicable.*

††† *Not applicable*

* *Limitations also proposed for 102 and 202. However, during the survey there were no flows from these two intermediate locations.*

** *Not specified*

*** *Prior to startup of bioplant USSC proposes no limitations for outfall 020.*

Grab samples were collected for three days from the blast furnace cooling water (002) for TSS, total and amenable cyanide and ammonia. Results [Table 4] show that the discharge contained net concentrations ranging from 0 to 8 mg/l TSS; 0 to 0.03 mg/l total cyanide; and 0.01 to 0.03 mg/l ammonia.

Self-monitoring data [Table 7] for January-October 1975 show that the net TSS, total cyanide, and ammonia concentrations ranged from 0 to 597; 0.01 to 1.54; and 0 to 1.3 mg/l, respectively, similar to the values observed during the survey. USSC has proposed the following daily maximum limitations for this discharge [Table 8].

Parameter	kg/day	lb/day
TSS	7,148	15,720
CN(T)	57	126
Phenol	14.7	32.4
NH_3-N	486	1,068

Based on Company-estimated flows of 36,000 m^3/day (9.6 mgd) [Table 1], the daily TSS, ammonia and cyanide concentrations would have to exceed 196, 13 and 0.4 mg/l, respectively, before violations of USSC-proposed maximum criteria would occur. The self-monitoring data show that USSC-proposed TSS and cyanide criteria have been exceeded.

Representative samples of all waste sources (102, 202 and 002) can be collected at the sampling points. Flows presently estimated by USSC can be measured by installing flow measuring devices and/or using tracer techniques.

OUTFALL 003

This outfall contains scale pit effluents and cooling waters from the four hot form rolling mills. An average 1,111 m. tons (1,225 tons)/mo of scale is removed from the scale pits and trucked either to Carrie

Blast Furnace or Saxonburg. Scale and/or other solids were also observed where outfall 003 enters the Monongahela River [Appendix A].

The rolling mills are a major user of oils and greases. According to Company data, monthly usage figures are:

Area	O/G Type	Monthly Usage	
		metric	English
All mills	Van Talgar 10 block grease	455 kg	1,000 lb
18-inch mill vertical rolls	Atlantic Premium 1,000 oil	0.8 m^3	4 bbl
Steam engines at 14-, 18-, 21-inch mills	NLS 1000	10,200 liters	2,700 gal
	Penoil #6	10,200 liters	2,700 gal

† *It is assumed that these barrels are 55-gal drums*

Company officials do not know the amount of oil/grease discharged into the Monongahela River.[1]

Composite samples were collected for three days and analyzed for TSS. Grab samples for oil/grease analyses were collected three times each day [Table 2]. During the survey, 79,800 to 98,000 m^3/day (21.1 to 25.9 mgd) of wastewater was discharged through outfall 003. Results [Table 4] show that the effluent contained TSS loads ranging from 1,200 to 2,450 kg (2,600 to 5,400 lb)/day. Net loads for all three days were zero (the intake TSS concentrations were greater than the effluent concentrations on all three days of the survey). The oil/grease concentrations [Table 5] ranged from 3 to 10 mg/l, resulting in daily loads of 380 to 670 kg (845 to 1,470 lb)/day.

Self-monitoring data [Table 7] for January-October 1975 show that the net TSS concentrations ranged from 0 to 2,647 mg/l and oil/grease concentrations ranged from 0.96 to 268.7 mg/l. Survey data is within the ranges reported by the Company. The Company-estimated flows ranged from 16,700 to 117,000 m^3/day (4.4 to 30.8 mgd). The maximum flow recorded during the survey (130,500 m^3/day to 34.5 mgd) is within 15% of the maximum value reported in the self-monitoring data.

USSC has proposed effluent limitations for TSS and oil/grease [Table 8]. The daily maximum load limitations are 56,200 kg (123,297 lb) for TSS (net) and 6,560 kg (14,430 lb) for oil/grease. Based on the maximum flow observed during the survey (130,500 m^3/day), the net TSS concentrations would have to exceed 430 mg/l before a daily maximum violation would exist. The oil/grease loads were 10% of the proposed daily maximum limitations.

Samples are collected using a pump permanently installed in the manhole. Wastewater from the 14- and 22-inch mills join with the wastewaters from the 18- and 21-inch mills in this manhole. A dye study was conducted December 15-18, 1975 to determine if samples collected from the pump were representative of the total discharge. However, the surcharged condition of the outfall due to the high river stage precluded this determination. USSC personnel should conduct a study of this sampling point to insure representativeness or provide an alternate sampling location. Flow can be measured using tracer techniques.

OUTFALL 004

Outfall 004, the main industrial sewer at the Clairton Works, extends from south to north through the major portion of the coke works and terminates at Peters Creek. The Company has the option of discharging this wastewater directly into the Monongahela River (outfall 009) by opening a control gate. According to USSC, outfall 004 contains the following wastewater sources:[1]

Source	Flow m^3/day	Flow gpm
#2 Unit Tar Storage tank heater steam condensate	545	100
Keystone Cooling Tower blowdown from tower	4,360	800
Phosam Plant barometric condenser	8,175	1,500
Ammonia Plant barometric condenser	109,000	20,000
#1 Unit Tar Storage tank heater steam condensate	1,640	300
#1 Unit Primary Coolers indirect cooling water	54,500	10,000
#1 Unit Exhauster House barometric condenser	38,150	7,000
Sulfur Recovery Plant indirect heat exchangers	10,900	2,000
Keystone waste heat boilers blowdown	380	70

Company self-monitoring data for January-September 1975 indicate that from 183,000 to 392,000 m^3/day (48.4 to 103.5 mgd) of wastewater is discharged to Peters Creek through outfall 004. Survey flows varied from 226,900 to 232,800 m^3/day (60.0 to 61.5 mgd). USSC proposes only flow and temperature measurements without any numerical limitations.

Composite samples for TSS, total and amenable cyanide, and total and hexavalent chromium analyses were collected for three days. Grab samples for oil/grease and phenol analyses were collected three times daily [Table 2]. Results [Tables 4, 6] show that the discharge contained large amounts of TSS, total cyanide, ammonia and total chromium (maximum net loads of 12,500, 170, 1,500 and 60 kg/day, respectively).

Self-monitoring data [Table 7] show that the net phenol concentrations ranged from 0 to 0.218 mg/l, similar to the survey data (0.026 to 0.085 mg/l).

The Company samples outfall 004 using a submersible pump permanently installed in a manhole. A dye study conducted December 15-18, 1975 showed that this sampling location is representative of the wastewater discharged into Peters Creek. Flow can be measured using tracer techniques.

OUTFALL 005

This outfall reportedly contains: benzene plant cooling water; No. 2 boiler house ash pit effluent; backwash from the benzene boiler feedwater treatment plant; and blowdown from the benzene boiler house. The total flow is estimated at 18,900 m^3/day (5 mgd). The Company samples this outfall using a pump permanently installed in a manhole. According to Company officials, no other point exists to sample this outfall before it is discharged into the enclosed section of Peters Creek. Representative sample collection from this manhole is impossible because in addition to the main 36-inch sewer, five smaller drains/sewers discharge at different elevations. Flow measurement is not possible.

During the first two days of the survey, samples could not be collected from this discharge because USSC personnel were unable to operate the pump. Grab samples were collected the third day and analyzed for TSS, total and amenable cyanide, oil/grease and phenol [Table 2]. Results* [Tables 4, 5] show that the sample collected contained 390 mg/l TSS and 4 mg/l of oil/grease. Self-monitoring data [Table 7] show that the concentrations of parameters measured by USSC are similar in magnitude to those obtained during the survey. Flow was reported to

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* *Temperature and pH were 37°C (98.6°F) and 8.5, respectively.*

vary from 8,700 to 12,100 m^3/day (2.3 to 3.2 mgd) which is less than previously reported (18,900 m^3/day; 5 mgd).

USSC has proposed the following TSS limitations for the duration of the permit [Table 8].

Parameter	kg/day	lb/day
Daily average	5,010	11,025
Daily maximum	15,030	33,075

The flow is to be measured. However, as indicated earlier, flow measurement is not possible with the present configuration of multiple discharges into one manhole. Moreover, representative collection is impossible.

OUTFALL 006

Outfall 006 contains cooling water from the pitch coolers. Two separate lines discharge into a vertical manhole directly over Peters Creek. Samples are collected through a pipe which extends from the manhole cover to the ground surface, which precludes sampling each discharge separately. Therefore, the samples collected are not representative unless the concentration of pollutants is the same in each. Flow measurement is not possible.

Grab samples* were collected for three days and analyzed for oil/grease and phenol to determine if the cooling water was being contaminated by the process. Results [Table 5] show that the oil/grease concentration of wastewater ranged from 1 to 8 mg/l, more than twice the maximum concentration of the intake water (3 mg/l), indicating contamination of the cooling water.

* *These samples were collected the same way that USSC personnel collect samples and are not considered representative of the discharge.*

USSC currently monitors this discharge for temperature and pH [Table 7]. Accordingly, the Company has proposed that for the duration of the permit only the above parameters be monitored, with only pH being limited.

OUTFALL 007

This outfall contains cooling waters originating from the tar stills, strainer building and electrode pitch factory. Three lines enter a manhole also located over Peters Creek. Samples are collected through a pipe which extends from the manhole cover to the ground surface without knowing the source (wastewater from one or all three lines is collected in a sampling container lowered into the manhole). Samples collected in this manner are not representative.

According to Company self-monitoring data, 7,800 to 11,200 m^3/day (2.07 to 2.95 mgd) of wastewater was discharged from this outfall during January-September 1975 [Table 7]. Under the present configuration flow measurement is not possible. Therefore, the Company flow figures are questionable.

Grab samples* for oil/grease and phenol analyses were collected for three days [Table 2], to determine if the cooling water was being contaminated by the process. Monitoring results** [Table 5] show that the samples contained oil/grease and phenol concentrations ranging from <1 to 2 and 0.007 to 0.024 mg/l, respectively. The phenol concentrations are higher than the intake values, indicating contamination of the cooling water.

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* *Grab samples were collected the same way that USSC personnel collect samples and are not considered to be representative.*

** *The temperature ranged from 21 to 26°C (69.8 to 78.8 °F) and pH ranged from 7.0 to 7.4.*

Self-monitoring data [Table 7] were similar for oil/grease, ranging from 0 to 4.2 mg/l. The Company does not monitor for phenol. USSC has proposed a daily maximum oil/grease limitation for the duration of the NPDES permit of 30 mg/l [Table 8]. This limitation is 15 times greater than the maximum concentration (2 mg/l) observed during the survey.

OUTFALL 008

Powerhouse No. 1 cooling, seal and condenser waters are discharged into Peters Creek through outfall 008. Company officials estimate that from 45,000 to 90,500 m^3/day (11.9 to 23.9 mgd) of wastewater is discharged through this outfall [Table 7]. Actual flows varied from 35,600 to 43,100 m^3/day (9.4 to 11.4 mgd), lower than the reported flow.

Grab samples for oil/grease and phenol analyses were collected three times per day for three days [Table 2]. During the survey, oil/grease concentrations ranged from <1 to 3 mg/l. Phenol concentrations were <0.005 mg/l. These values are similar to those reported in USSC's self-monitoring data [Table 7].

A dye study conducted December 15-18, 1975 showed that the Company sampling location is representative of the wastewater discharged. Flow can be measured using tracer techniques. USSC proposes to measure the flow, temperature and pH of outfall 008, with pH being limited [Table 8].

OUTFALL 010

Outfall 010 originates in the tar and naphthalene plant. Wastewater contributions include naphthalene cooling tower blowdown, cooling water from tar acid distillation (includes compressor and pump cooling waters) and condensate from tank heating. The wastewater is discharged through a manhole into Peters Creek. Company officials reported that from 3,000 to 4,200 m^3/day (0.78 to 1.10 mgd) was discharged through outfall 010 during January-September 1975 [Table 7].

Grab samples were collected three days for oil/grease, phenol, total and amenable cyanide, ammonia and total and hexavalent chromium analyses [Table 2]. Results [Tables 4, 5, 6] show that the effluent concentrations were similar to water intake concentrations for all samples except total and amenable cyanide on the third day. The total and amenable cyanide concentrations of 1.0 and 0.98 mg/l, respectively, were considerably higher than intake values (0.01 and <0.01 mg/l). The cause for the cyanide concentration increase is not known.

Self-monitoring data [Table 7] were similar for oil/grease and phenol, but considerably less for total cyanide. Company data show a maximum total cyanide concentration of 0.016 mg/l, while the maximum survey concentration was 1.0 mg/l.

USSC has proposed a daily maximum oil/grease limitation of 30 mg/l [Table 8] with the flow to be estimated. Results [Table 5] show that the oil/grease concentration ranged from <1 to 5 mg/l, considerably less than the proposed limitation. The monitoring location for outfall 010 is satisfactory. Flow measurement can be accomplished using tracer techniques.

OUTFALLS 011 and 012

Outfalls 011 and 012 both contain contact cooling water from prill pitch units.* Company officials reported that 2,100 m^3/day (0.568 mgd) of wastewater is discharged into Peters Creek through each outfall [Table 7].

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* *No. 1 prill pitch unit discharges through outfall 011 and No. 2 unit through 012.*

Outfall 011 is sampled from a manhole adjacent to the No. 1 prill pitch building. In addition to the contact cooling water, condensate and wastewater from an unknown source are also discharged into this manhole. The shallow flow makes the collection of representative samples doubtful. Flow measurement could possibly be accomplished by a weir or similar device.

Outfall 012 is sampled from the recycle holding tank in the No. 2 prill pitch building. While representative wastewater samples can be collected, flow measurements are not possible with the existing configuration.

Grab samples were collected from each outfall for three days and analyzed for TSS, phenol and oil/grease analyses [Table 2]. Samples collected from each outfall contained black solids (prills). Results [Table 4] show that the TSS concentrations ranged from 120 to 320 mg/l and 260 to 560 mg/l, respectively, for outfalls 011 and 012. The lower TSS concentrations in outfall 011 are probably due to the unsatisfactory sampling location (the shallow flow precluded collection of a representative sample). Similarly, oil/grease and phenol concentrations were lower in otufall 011 [Table 5].

USSC has proposed the following effluent limitations (effective until June 30, 1977) for each of the outfalls [Table 8] with the flow to be estimated.

Parameter	Daily Average		Daily Maximum	
	kg/day	lb/day	kg/day	lb/day
TSS	1,330	2,925	3,990	8,775
O/G	910	2,000	2,730	6,000
Phenol	0.15	0.32	0.45	0.96

Based on the Company flow of 2,100 m^3/day, the daily maximum TSS, oil/grease and phenol concentrations would have to exceed 1,850, 1,270 and 0.20 mg/l, respectively, before a violation occurs. These concentrations are about 3, 70 and 3 times greater than the maximum TSS, oil/grease and phenol concentrations observed during the survey.

The Company self-monitoring data [Table 7] for January-September 1975 are similar to NEIC results.

OUTFALL 013

This discharge contains blowdown from the flash evaporator and cooling tower. The ratio of blowdown to recycle is 1:1. The Company measures the total flow with an orifice plate, and from this outfall the discharge is calculated. Reported flows ranged from 3,700 to 5,700 m^3/day (0.97 to 1.5 mgd) [Table 7]. The Company sampling point is adequate to obtain representative samples.

USSC has proposed measuring the flow, temperature and pH with only pH being limited. Grab samples were collected for three days and analyzed for total and amenable cyanide and total and hexavalent chromium [Table 2]. During the survey, total and amenable cyanide concentrations ranged from 0.03 to 0.18 mg/l and 0.02 to 0.16 mg/l, respectively. These concentrations are higher than those observed in the intake water (0.01 to 0.02 mg/l total cyanide and <0.01 mg/l amenable cyanide) [Table 4]. Total chromium concentrations were insignificant, ranging from <0.01 to 0.03 mg/l [Table 6].

OUTFALL 014

Outfall 014 contains benzene plant cooling tower blowdown and condensate and cooling water from the benzene-toluene-xylene (BTX) processing area. The Company samples the benzene plant cooling tower blowdown and the wastewater from the BTX area separately, designating the two points as 014 and 114 respectively. Representative samples can be collected from the combined discharge, and flow is possible by installing a conventional flow structure (weir, flume, etc.). USSC has reported that the flow varies from 760 to 1,000 m^3/day (0.20 to 0.27 mgd)* [Table 7].

Grab samples** were collected three days from the total discharge (014 plus 114) for phenol and total and hexavalent chromium analyses [Table 2]. During the survey, the phenol concentrations were high, ranging from 0.616 to 0.882 mg/l [Table 5]. These concentrations exceed those reported in the Company self-monitoring data (0 to 0.158 mg/l).

Company officials indicated that chromium is used in the cooling towers. The grab samples collected from outfall 014 indicate that excessive amounts of chromium are not being used in the towers. The total chromium concentration ranged from <0.01 to 0.02 mg/l.

The Company proposes to measure flow, temperature and pH with only pH being limited (minimum of 6.0). As ntoed earlier, flow can be measured by installing a conventional flow device.

OUTFALLS 015 and 115

These outfalls each contain cooling water and blowdown from the No. 2 coke works boiler house. Outfalls 015 and 115 reportedly discharge 3,900 m^3/day (1.04 mgd) and 1,000 m^3/day (0.26 mgd) of wastewater,

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* *Self-monitoring reports the flow for outfall 014 and does not indicate whether this includes the flow from outfall 114.*

** *The temperature of the wastewater was 27°C (80.6°F). The pH ranged from 7.1 to 7.5.*

respectively. At high river stages, generally in the springtime, each outfall is submerged.

Grab samples were collected for two days from outfall 015 and analyzed for oil/grease and phenols [Table 2]. Survey results showed the effluent contained no phenol (<0.005 mg/l) and only 1 to 3 mg/l oil/grease.

USSC proposes to estimate flow and measure temperature and pH for outfalls 015 and 115. Only the pH has numerical limitations (minimum of 6.0). The self-monitoring data contains only flow (estimated), temperature and pH values.

Outfalls 015 and 115 are monitored at the river. A sample container lowered over the river wall scrapes the wall during sample collection, thus sample contamination is highly probable. As noted earlier, these stations are also submerged during high river stages. An alternate sampling location should be established so flow can be measured and representative samples can be collected at all times.

OUTFALL 016

Outfall 016 contains backwash water from a continuous basket strainer. Product water is used for BTX cooling tower makeup. Company officials estimate that 280 m^3/day (0.075 mgd) of wastewater enters the Monongahela River through this outfall [Table 7].

Grab samples for TSS analyses were collected three days [Table 2]. Results [Table 4] show that the TSS concentrations in outfall 016 were equal to or less than intake concentrations (net discharge of TSS was zero).

USSC proposes to estimate flow and measure temperature and pH of outfall 016 for the duration of the permit, with only pH being limited (6.0 minimum) [Table 8]. Self-monitoring data includes flow (estimated), temperature, and pH [Table 7].

The present monitoring location for outfall 016 is satisfactory except for obtaining accurate flow measurements. Modifications are necessary to provide accurate measurement.

OUTFALL 017

This outfall contains miscellaneous wastewater, primarily tank heating condensate, originating from the Road Tar Terminal area. Company officials estimate that 230 m^3/day (0.06 mgd) of wastewater is discharged to the Monongahela River through outfall 017 [Table 7].

USSC proposes flow estimation, pH and temperature measurements, limiting only pH (6.0 minimum) [Table 8]. Self-monitoring data [Table 7] includes flow, pH and temperature values.

Grab samples were collected three days for oil/grease and phenol analyses [Table 2]. During the survey,* oil/grease and phenol concentrations ranged from 1 to 24 mg/l and from <0.005 to 0.011 mg/l, respectively [Table 5].

The monitoring location for outfall 017 is satisfactory. Flow can be measured using conventional flow techniques (weir, flume, etc.).

* *The temperature ranged from 11 to 13°C (51.8 to 55.4 °F) and pH ranged from 7.1 to 8.5.*

OUTFALL 018

Outfall 018 contains cooling water, blowdown and condensate originating from the No. 2 powerhouse. USSC currently estimates flow and measures temperature and pH [Table 7]. Accordingly, the Company has proposed that for the duration of the permit only the above parameters be monitored, with only pH limited [Table 8].

Grab samples were collected for three days for oil/grease analyses* [Table 2]. During the survey, oil/grease concentrations ranged from 1 to 3 mg/l. These concentrations are similar to oil/grease concentrations of the intake water (<1 to 3 mg/l) [Table 5].

Samples are collected by lowering a sample container over the river wall. A steel plate has been positioned over the outfall to prevent the wastewater from being discharged into barges; the plate interferes with sample collection. In addition, the sample container scrapes the river wall, causing contamination of the sample. An alternate sampling location must be provided for this discharge. Flow can be measured using tracer techniques.

AIR COMPRESSOR DISCHARGE

Air compressor cooling water is discharged to the Monongahela River through outfall 023.** This discharge apparently was not identified in the NPDES permit application; therefore, no monitoring requirements were established and the Company has not provided the results of their monitoring.

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* *The temperature and pH ranged from 22 to 30°C (71.6 to 86.0°F) and from 7.1 to 7.4, respectively.*

** *The NPDES permit designates outfall 023 as a 1-1/2-inch condensate drain from the No. 1 transfer tower.*

Grab samples were collected for three days and analyzed for oil/grease* [Table 2]. The oil/grease concentrations ranged from <1 to 26 mg/l [Table 5]. The high oil/grease concentrations (26 mg/l) indicate a possible oil leak from the compressor into the cooling water system.

The monitoring location for this discharge is satisfactory. Flow can be measured using tracer techniques.

OUTFALL 020

Outfall 020 contains the effluent from the contaminated wastewater treatment plant and No. 2 primary cooler water. Company officials reported the flow at 13,200 to 17,400 m^3/day (3.5 to 4.6 mgd) [Table 7]. The Company samples this outfall using a submersible pump permanently installed in a manhole. A dye study conducted December 15-18, 1975 showed that this sampling location is representative of the wastewater discharged into Peters Creek.

During the survey, dye was injected in outfall 020 upstream of the contaminated wastewater treatment plant effluent to determine the total flow in outfall 020. However, clouds of water vapor rising from the manhole (dye injection point) made it impossible to see into the manhole. Flow measurement by dye dilution proved impractical because NEIC survey results show that the dye was not directly entering the wastewater as required to obtain continuous flow results. The dye results are not reported, and it is assumed that the loads discharged in outfall 020 were the same as discharged from the treatment plant. The loads reported are lower than actual; that is, actual loads would be greater due to any load contributions from the No. 2 primary cooler.

* *The temperature and pH ranged from 9 to 11°C (48.2 to 51.8°F) and from 7.3 to 8.4, respectively.*

Composite samples for TSS, total and amenable cyanide and ammonia analyses were collected for three days from outfall 020. Grab samples were collected three times each day for oil/grease and phenol analyses [Table 2]. During the survey, net TSS, total cyanide and ammonia concentrations ranged from 54 to 63 mg/l, 4 to 5.5 mg/l, and 1.0 to 16 mg/l, respectively [Table 4]. The phenol concentrations [Table 5] ranged from 0.049 to 0.116 mg/l (daily average: 0.067 to 0.098 mg/l).

Self-monitoring data [Table 7] for January-September 1975 were similar for TSS, ammonia, oil/grease and phenol, but considerably less for total cyanide. Company data show that the total cyanide concentrations ranged from 0.007 to 0.357 mg/l [Table 7], while the survey concentrations ranged from 4.0 to 5.5 mg/l.

USSC has proposed the following limitations from treatment plant startup until the permit expiration:

Parameter	Daily Average		Daily Maximum		
	kg/day	lb/day	kg/day	lb/day	mg/l
TSS	730	1,606	2,190	4,818	NA
NH_3-N	2,727	6,000	8,181	18,000	NA
CN(A)	2.7	6.0	8.1	18	0.5
Phenol	8.3	18.4	24.9	55	NA
O/G	218	480	654	1,440	30
Flow	Measured				

A comparison of survey data [Tables 4, 5] to these proposed limitations show that the daily average TSS and the daily average and daily maximum amenable cyanide limitations were exceeded by more than 2, 11 and 6 times, respectively. In addition, the daily maximum amenable cyanide concentration limitation (0.5 mg/l) was exceeded on the second day of the survey.

The contaminated wastewater treatment plant [Fig. 4] treats ammonia and phenolic-laden wastes from the primary coolers, final coolers, phosam distillation, light oil refinery and tar distillation plant. These wastewaters were previously used in the quench towers. Major treatment units consist of four 380 m^3 (100,000 gal) separator tanks (tar and oil removal), free and fixed stills (ammonia removal), aeration basins, clarifiers and sand filtration. Because the wastewater is toxic to biological treatment, approximately 30 m^3/min (1,350 gpm) dilution water* is added to the wastewater as it enters the aeration basins. According to Company personnel, treatment plant water is diverted to the quench water system when operational problems develop.[1]

The plant is equipped with flow measurement devices which permit flow monitoring at the influent, effluent and intermediate points. Information on the type of devices used and calibration procedures was not provided. During the survey, the effluent flow meter was inoperative. Therefore, the meter which measures the amount of wastewater applied to the filtration unit (sand filters), an intermediate point, was used to obtain flow.

Company officials collect influent samples upstream of the stills (after tar and oil removal). Effluent samples are collected following the sand filters. Composite samples were collected from these two points for three days for TSS, total and amenable cyanide, and ammonia analyses. Grab samples were collected three times daily for oil/grease and phenol analyses. Results [Table 4] show that TSS concentrations were greater in the effluent than the influent. As a result, 1,370 to 1,830 kg/day (3,010 to 4,040 lb/day) of TSS were discharged to outfall 020. During the survey, the flow through the sand filters was erratic, varying from 15,800 m^3/day (2,900 gpm) to more than 19,100 m^3/day (3,500 gpm) within a few seconds. This is a possible cause for the TSS

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* *This dilution water is obtained from the Monongahela River.*

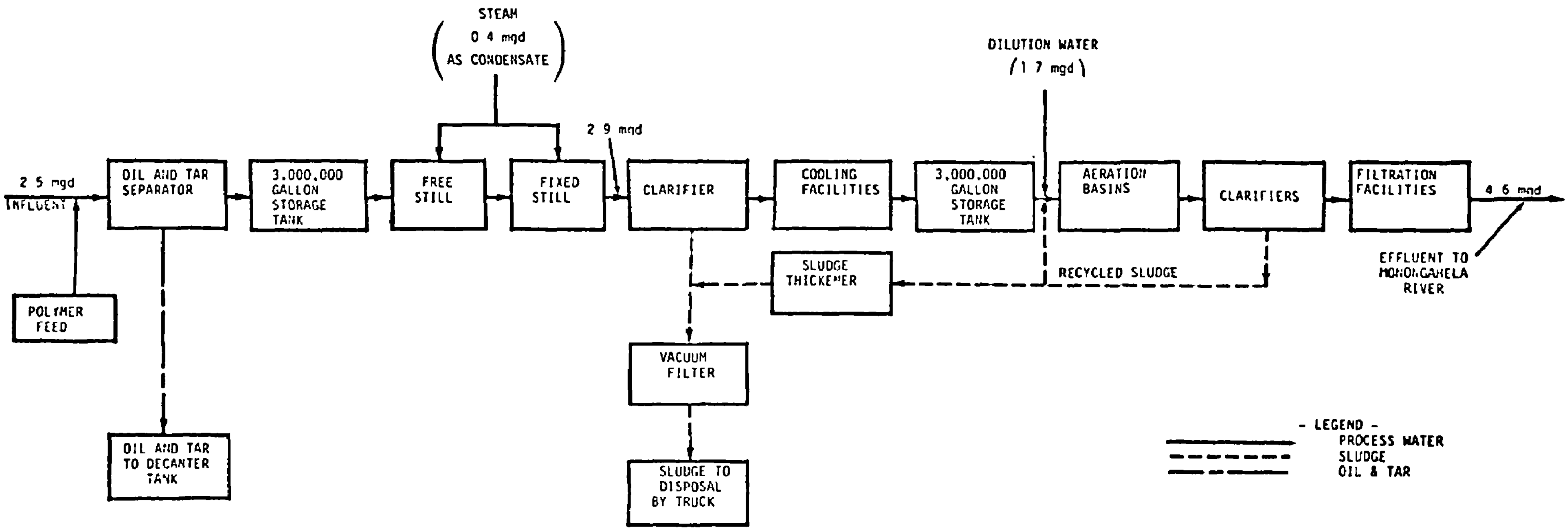

Figure 4. Flow Diagram for Contaminated Wastewater Treatment Plant[1]

effluent loads exceeding the influent loads. On February 3, 1976, NEIC personnel observed that the sand filters were being bypassed and clarifier effluent was being discharged directly to outfall 020. Company officials indicated that the bypass was necessary for pump repair.

The removal efficiency* of the wastewater treatment plant for total and amenable cyanide, ammonia, oil/grease and phenol was 95% or more on all three days of the survey.

The sampling stations for the treatment plant (influent and effluent) and outfall 020 are satisfactory. Flow measurement in the treatment plant is satisfactory, provided that the devices are calibrated periodically and the continuous flow recorders are operational. Flow in outfall 020 can be measured using tracer techniques, provided the upstream injection point can be located to insure that dye enters the waste stream.

OUTFALLS 21 to 44

Outfalls 21 to 44 reportedly contain only steam condensate. A description of each follows:

Outfall	Description
021	Two 3/4-in. condensate drains from temporary change house
022	Two 2-in. and one 1-1/2-in. condensate drains from waste oil storage area and fuel oil tank
023	One 1-1/2-in. condensate drain from No. 1 transfer tower
024	Two 3/4-in. condensate drains from No. 1 sample building
025	One 1/2-in., one 4-in. and one 2-in. condensate drains from surge bin area
026	One 2-in. condensate from sanitary station
027	One 1-1/2-in. condensate from machinery house
028	One 4-in. and one 1-1/2-in. condensate drains

* *These efficiencies do not include any materials removed in the tar and oil treatment units.*

Outfall	Description
029	One 1-1/2-in. condensate from transformer station
030	Two 2-in. and one 3-in. condensate and area drains from coal hoppers
031	Two 1/2-in. condensate drains from coke works river pumphouse
032	Two 3/4-in., one 1-in. and one 2-in. condensate drains from clarifier and pumphouse
033	One 2-in. condensate drain from surge bin area
034	One 2-in. condensate drain from No. 2 sample building
035	One 3/4-in. condensate from No. 3 transfer tower
036	One 1-in. and one 3/4-in. condensate from No. 3 coal hoist
037	One 3/4-in. and two 1-in. condensate from oil house and sanitary station
038	Two 3/4-in. and one 2-in. condensate drains from No. 4 coal hoist
039	One 1-in. condensate from No. 2 boiler house
040	Condensate from water treating plant
041	One 1-in. condensate at evaporator
042	Two 1-1/2-in. condensate drains from recirculating pumphouse
043	Four 1-in. and two 3/4-in. condensate drains from creosote and naphthalene line tracers
044	One 3/4-in. condensate drain from lime slurry storage tank and one 8-in. compressor cooling water

Monitoring these outfalls is not required either in the NPDES permit or USSC-amended adjudicatory hearing request. These stations were not monitored during the survey.

STEEL WORKS PLANT WATER INTAKE

The steel plant water intake structure contains a wide-spaced bar screen followed by a traveling screen. The pumphouse has five pumps with a 300 m^3/day (79.5 mgd) pumping capacity. Intake volumes are measured using Bailey continuous flow meters. These meters were calibrated in September 1975 and found to be within $\pm 2\%$ at full-scale range.

Maximum intake water volumes for January-October 1975 ranged from 40,500 to 147,000 m^3/day (10.7 to 38.8 mgd).[1] During the NEIC survey, the intake volume ranged from 105,600 to 129,800 m^3/day (27.9 to 34.3 mgd) [Table 4]. The steel plant intake supplies water for processes from which wastewater discharges to outfalls 001, 002 and 003.

Total and amenable cyanide, ammonia, oil/grease and phenol concentrations were low and remained constant during the survey [Tables 4, 5]. TSS concentrations varied daily ranging from 24 to 36 mg/l [Table 4]. Self-monitoring data [Table 7] are similar to those obtained during the survey.

Intake water samples are collected from the pump seal water supply line ahead of the filter. This monitoring location is adequate to collect representative samples.

Flow measurement is adequate, providing that USSC continues to calibrate the existing flow devices on a regular schedule (every 4 to 6 months).

COKE WORKS PLANT WATER INTAKE

The coke plant water intake structure is downstream from the steel works outfalls 001, 002 and 003. The pumphouse has six centrifugal pumps with a total pumping capacity of 817,000 m^3/day (216 mgd). Intake volumes are measured with two Foxboro DP #12-A Venturi meter tubes. These meters are calibrated at least every six months. USSC last calibrated the meters in September 1975 with a meter error of $\pm$2% at full-scale range.

Maximum intake volumes for January-October 1975 ranged from 379,000 to 473,000 m^3/day (100 to 125 mgd).[1] During the survey, daily intake volumes were lower, ranging from 340,000 to 344,000 m^3/day (90 to 91 mgd) [Table 4]. This intake supplies process and cooling waters which discharge to outfalls 004 through 020.

During the survey, total and amenable cyanide, oil/grease, phenol and total and hexavalent chromium concentrations were low and remained constant [Tables 4, 5, 6]. Ammonia and TSS concentrations ranged from 0.18 to 0.48 mg/l and 33 to 45 mg/l, respectively [Table 4]. These concentrations are similar to those reported in the USSC self-monitoring data [Table 7].

Intake samples are collected from screen backflush water ahead of the strainer; it is the same water that is pumped into the coke works. The monitoring location and flow measurement procedures are adequate.

RESULTS OF ORGANIC ANALYSIS

Outfalls 003, 004, 020, steel works water intake, and coke works water intake were grab-sampled for organic analyses twice during the survey (January 30 and February 3, 1976). Results [Table 9] show that organic chemical pollutants were present in detectable levels in outfalls 003 and 004. Pollutants were present in both samples from outfall 004 and in a sample from outfall 001.

WASTE LOADS DISCHARGED PER UNIT OF PRODUCTION

Finished steel and coke production for the survey period are listed below:

Product	Quantity of Product[2]					
	1/29		1/30		1/31	
	m.tons	tons	m.tons	tons	m.tons	tons
Finished steel	887	977	1,181	1,301	527	580
Coke	16,412	18,075	16,401	18,063	16,455	18,122

Table 9

ORGANIC CHEMICAL POLLUTANTS
USSC CLAIRTON WORKS
January 30 and February 3, 1976

Compound	Location and Date		
	Outfall 003 2/3/76 μg/l	Outfall 004 1/30/76 μg/l	Outfall 004 2/3/76 μg/l
Ethylbenzene	32	ND†	375
Cumene	5	ND	ND
Ethylmethylbenzene	14	5	ND
Trimethylbenzene	6	4	ND
p-Cymene	6	ND	ND
m or p-Diethylbenzene	18	2	ND
m or o-Cymene	41	18	ND
m or p-Diethylbenzene	6	8	ND
Naphthalene	14	ND	ND
1,2,3,4-Tetrahydronaphthalene	ND	ND	12
1,2,4,5-Tetramethylbenzene	∿30	∿35	ND
Dimethyl-Iso-Propylbenzene	∿10	∿10	ND
Subs, Alkane	∿10	ND	ND

† *Not detected*

Using the above production rates, the waste loads discharged per unit of production were computed [Table 10]. Results show that for the steel mills, the TSS and oil/grease loads ranged from 1.999 to 2.764 and 0.565 to 0.737 kg/kkg. If credit is given for intake TSS concentrations, waste loads per unit of production are zero.

Loads per unit of production for the coke works were calculated by summing the waste loads contained in the effluent from the contaminated wastewater treatment plant and the net load discharged through outfall 004. The January 30, 1976 data is based only on treatment plant waste loads because the composite from outfall 004 was spilled during compositing. During the survey, the TSS unit loads ranged from 0.083 to 0.847 kg/kkg of coke produced [Table 10]. Ammonia, total cyanide, oil/grease and phenol loads per unit of production were low.

Table 10

LOADS DISCHARGED PER UNIT OF PRODUCTION
USSC CLAIRTON WORKS
January 29-31, 1976

Process	Parameter	Load Discharged/Unit of Production		
		January 29 kg/kkg	January 30 kg/kkg	January 31 kg/kkg
Rolling mills	TSS†	2.764	1.999	
	O/G	0.737	0.565	
Coke works††	TSS	0.847	0.083†††	0.112
	NH_3-N	0.030	0.007†††	0.120
	CN(T)	0.010	0.009†††	0.019
	O/G	0.045	0.001†††	0.045
	Phenol	0.001	0.0001†††	0.001

† *Actual load discharged based on gross values.*
†† *Actual load discharged based on pollutants contained in the discharge from contaminated wastewater treatment plant (gross) and in outfall 004 (net except for oil/grease which is gross).*
††† *Number includes only loadings from treatment plant. Sample from outfall 004 for this date was lost.*

V. MONITORING REQUIREMENTS

USSC personnel collect time-weighted composite samples comprised of three aliquots, one collected each 8-hour shift. Grab samples are collected during the daylight shift. Flows are estimated* except for water intakes, the contaminated wastewater treatment plant and outfall 013.

During the survey, the dye dilution technique was used to measure wastewater flows from outfalls 003, 004 and 008 because these points are not amenable to flow measurement using conventional techniques (flumes, flow meters, weirs, etc.). The installation of the latter flow measurement devices will require modification of the existing outfalls. Company-installed measurement devices were used to obtain intake and wastewater treatment plant flows.

The dye tracer technique could be used to measure and record flow on a continuous basis. The method requires an upstream dye injection point, and a sampling point downstream at which all wastewater sources are adequately mixed. The majority of the outfalls from the USSC Clairton Works are suited for the tracer technique. This method of continuous flow measurement, however, is costly and time consuming. The wastewater must be pumped through a fluorometer with the results continuously recorded. Each outfall would require a metering pump for controlled dye injection, sampling pump, fluorometer and recorder. These items would cost from $2,700 to $3,000.** In addition, a suitable tracer such as Rhodamine WT dye would cost about $2 per day per 3,785 m^3/day (1 mgd)

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* *The exact procedures used by USSC for estimating flows were not provided.*

** *These costs do not include maintenance, extra parts, manpower, protective structures or power to operate the pumps, fluorometer and recorder.*

of flow measured. Conventional flow measurement devices may be preferable due to the lower cost, reduced maintenance requirement and ease of operation.

The flows from outfalls 002, 003, 004 and 020 should be continuously measured and recorded. This can be accomplished by either modifying existing outfall lines to allow installation of flow structures or installing in-line meters. Flows through outfalls 001, 102, 202, 005, 006, 007, 008, 010, 011, 012, 013, 014 and 017 should be measured the same day samples are collected. Outfalls for which net limitations apply should be sampled the same day the intake water is sampled.

Recommended monitoring requirements are listed in Table 11. Significant parameters for process wastes are from the EPA *Guidelines for Iron and Steel Manufacturing*.[3,4] Measurement frequency was established on the basis of EPA Permit Program Guidance.[5]

As discussed previously, outfall 002 only contains cooling water from the blast furnace. A new outfall line should be constructed such that this cooling water, the settling basin effluent (102), and the clarifier effluent (202) can be sampled at a common point (designated in the NPDES permit as 002).

Representative samples cannot be collected from outfalls 005, 006, 007 and 011. In addition, the representativeness of samples from outfalls 003, 015, 115 and 018 is questionable. The present discharge configurations of outfalls 005, 006, 007 and 012 preclude representative flow measurements. Modifications will be required at these locations to allow accurate flow measurement and the collection of representative samples.

USSC presently samples both 014 and 114 instead of the combined discharge as required. Representative samples and accurate flow measurement can be accomplished after the two discharges combine.

Table 11

RECOMMENDED MONITORING REQUIREMENTS
USSC CLARITON WORKS

Outfall Number	Effluent Parameter	Measurement Frequency	Sample Type
001	Oil/grease	1/month	3 grabs/24 hr
	pH	1/month	3 grabs/24 hr
	Temperature	1/month	3 grabs/24 hr
	Flow	1/month	Minimum of 8 instantaneous measurements over 24 hr
002†	TSS	1/week	24-hr flow-weighted composite††
	Ammonia	1/week	24-hr flow-weighted composite
	Total Cyanide	1/week	24-hr flow-weighted composite
	Amenable Cyanide	1/week	24-hr flow-weighted composite
	Total Zinc	1/week	24-hr flow-weighted composite
	Total Iron	1/week	24-hr flow-weighted composite
	Manganese	1/week	24-hr flow-weighted composite
	Oil/grease	1/week	3 grabs/24 hr
	Phenol	1/week	3 grabs/24 hr
	pH	1/week	3 grabs/24 hr
	Temperature	1/week	3 grabs/24 hr
	Flow	Continuous	Measured†††
102*	TSS	1/week	24-hr flow-weighted composite
	Ammonia	1/week	24-hr flow-weighted composite
	Amenable Cyanide	1/week	24-hr flow-weighted composite
	Total Iron	1/week	24-hr flow-weighted composite
	Total Zinc	1/week	24-hr flow-weighted composite
	Manganese	1/week	24-hr flow-weighted composite
	Phenol	1/week	3 grabs/24 hr
	pH	1/week	3 grabs/24 hr
	Temperature	1/week	3 grabs/24 hr
	Flow	1/week	Minimum of 8 instantaneous measurements over 24 hr
202*	TSS	1/week	24-hr flow-weighted composite
	Ammonia	1/week	24-hr flow-weighted composite
	Total Iron	1/week	24-hr flow-weighted composite
	Total Zinc	1/week	24-hr flow-weighted composite
	Manganese	1/week	24-hr flow-weighted composite
	Phenol	1/week	24-hr flow-weighted composite
	pH	1/week	3 grabs/24 hr
	Temperature	1/week	3 grabs/24 hr
	Flow	1/week	Minimum of 8 instantaneous measurements over 24 hr

Table 11 (Continued)

RECOMMENDED MONITORING REQUIREMENTS

Outfall Number	Effluent Parameter	Measurement Frequency	Sample Type
003	TSS	2/week	24-hr flow-weighted composite
	Oil/grease	2/week	3 grabs/24 hr
	pH	2/week	3 grabs/24 hr
	Temperature	2/week	3 grabs/24 hr
	Flow	Continuous	Measured†††
004 or 009	TSS	2/week	24-hr flow-weighted composite
	Ammonia	2/week	24-hr flow-weighted composite
	Total Cyanide	2/week	24-hr flow-weighted composite
	Phenol	2/week	3 grabs/24 hr
	pH	2/week	3 grabs/24 hr
	Temperature	2/week	3 grabs/24 hr
	Flow	Continuous	Measured†††
005	TSS	1/month	24-hr flow-weighted composite
	Oil/grease	1/month	3 grabs/24 hr
	pH	1/month	3 grabs/24 hr
	Temperature	1/month	3 grabs/24 hr
	Flow	1/month	Minimum of 8 instantaneous measurements over 24 hr
006	Oil/grease	1/month	3 grabs/24 hr
	pH	1/month	3 grabs/24 hr
	Temperature	1/month	3 grabs/24 hr
	Flow	1/month	Instantaneous measurements at the time samples are collected
007	Oil/grease	1/month	3 grabs/24 hr
	pH	1/month	3 grabs/24 hr
	Temperature	1/month	3 grabs/24 hr
	Flow	1/month	Instantaneous measurements at the time samples are collected
008	Oil/grease	1/week	3 grabs/24 hr
	pH	1/week	3 grabs/24 hr
	Temperature	1/week	3 grabs/24 hr
	Flow	1/week	Minimum of 8 instantaneous measurements over 24 hr
010	Total Cyanide	1/month	24-hr flow-weighted composite
	Amenable Cyanide	1/month	24-hr flow-weighted composite
	Oil/grease	1/month	3 grabs/24 hr
	Phenol	1/month	3 grabs/24 hr
	pH	1/month	3 grabs/24 hr
	Temperature	1/month	3 grabs/24 hr
	Flow	1/month	Minimum of 8 instantaneous measurements over 24 hr

Table 11 (Continued)

RECOMMENDED MONITORING REQUIREMENTS

Outfall Number	Effluent Parameter	Measurement Frequency	Sample Type
011	TSS	2/month	24-hr flow-weighted composite
	Oil/grease	2/month	3 grabs/24 hr
	Phenol	2/month	3 grabs/24 hr
	pH	2/month	3 grabs/24 hr
	Temperature	2/month	3 grabs/24 hr
	Flow	2/month	Minimum of 8 instantaneous measurements over 24 hr
012	TSS	2/month	24-hr flow-weighted composite
	Oil/grease	2/month	3 grabs/24 hr
	Phenol	2/month	3 grabs/24 hr
	pH	2/month	3 grabs/24 hr
	Temperature	2/month	3 grabs/24 hr
	Flow	2/month	Minimum of 8 instantaneous measurements over 24 hr
013	Total Cyanide	1/month	Grab
	pH	1/month	Grab
	Temperature	1/month	Grab
	Flow	1/month	Instantaneous
014	Phenol	1/month	3 grabs/24 hr
	pH	1/month	3 grabs/24 hr
	Temperature	1/month	3 grabs/24 hr
	Flow	1/month	Instantaneous measurements at the time samples are collected
015	pH	1/month	Grab
	Temperature	1/month	Grab
	Flow	1/month	Estimated
115	pH	1/month	Grab
	Temperature	1/month	Grab
	Flow	1/month	Estimated
016	pH	1/quarter	Grab
	Temperature	1/quarter	Grab
	Flow	1/quarter	Estimated
017	Oil/grease	1/month	3 grabs/24 hr
	pH	1/month	3 grabs/24 hr
	Temperature	1/month	3 grabs/24 hr
	Flow	1/month	Instantaneous measurement at the time samples are collected

Table 11 (Continued)

RECOMMENDED MONITORING REQUIREMENTS

Outfall Number	Effluent Parameter	Measurement Frequency	Sample Type
018	pH	1/quarter	Grab
	Temperature	1/quarter	Grab
	Flow	1/quarter	Estimated
A.C.**	Oil/grease	1/month	3 grabs/day
	pH	1/month	3 grabs/day
	Temperature	1/month	3 grabs/day
	Flow	1/month	Estimated
020	TSS	2/week	24-hr flow-weighted composite
	Ammonia	2/week	24-hr flow-weighted composite
	Total Cyanide	2/week	24-hr flow-weighted composite
	Amenable Cyanide	2/week	24-hr flow-weighted composite
	Oil/grease	2/week	3 grabs/24 hr
	Phenol	2/week	3 grabs/24 hr
	pH	2/week	3 grabs/24 hr
	Temperature	2/week	3 grabs/24 hr
	Flow	Continuous	Measured†††
021-044	None	NA	NA

† *Outfall 002 should be sampled at a location which includes all wastewater from the blast furnace operation (i.e., 102, 202 and cooling water).*

†† *24-hr flow-weighted composite samples shall consist of a minimum of 8 sample portions collected at equally spaced intervals.*

††† *Flow measurement to consist of a minimum of 8 readings equally spaced over each day.*

* *Outfalls 102 and 202 are to be sampled the same day that outfall 002 is sampled.*

** *The air compressor discharge has not been assigned an NPDES designation.*

REFERENCES

1. Letter - January 19, 1976 with attachments from Mr. James L. Hamilton III, Manager, Environmental Control - Water, USSC, to Mr. Stephen R. Wassersug, Director, Enforcement Division, USEPA, Region III.

2. Letter - March 11, 1976 with attachments from Mr. James L. Hamilton III, Manager, Environmental Control - Water, USSC, to Mr. Stephen R. Wassersug, Director, Enforcement Division, USEPA, Region III.

3. Development Document for the Steel Making Segment of the Iron and Steel Manufacturing Point Source Category, Feb. 1974, USEPA Effluent Guidelines Division, Washington, D.C. and Guidelines published in Federal Register, Phase I, June 28, 1974.

4. Development Document for the Hot Forming and Cold Finishing Segment of the Iron and Steel Manufacturing Point Source Category, Aug. 1975, USEPA Effluent Guidelines Division, Washington, D.C. and Guidelines published in Federal Register, Phase II, Mar. 29, 1976.

5. Permit Program Guidance for Self-Monitoring and Reporting Requirements, Apr. 30, 1975, USEPA, Office of Permit Programs, Washington, D.C.

APPENDICES

A Reconnaissance Report

B Study Methods

C Analytical Procedures, Quality Control

D Chain of Custody Procedures

APPENDIX A

Reconnaissance Report

SUMMARY - RECONNAISSANCE REPORT FOR USSC, CLAIRTON WORKS MADE AUGUST 1975 BY EPA, NEIC AND REGION III

An EPA field reconnaissance was made to the Clairton, Pennsylvania, Coke and By Products Chemical Works of U. S. Steel on August 26-28, 1975, in order to prepare for an intensive NEIC field sampling survey tentatively scheduled for Clairton December 1975. Clairton is a complex facility including 20 coke batteries having up to 1,375 ovens, a Blast Furnace producing basic iron and/or ferromanganese, four steel finishing mills, two power plants, three boiler houses, and cryogenic processing (i.e., ultra low temperature) and conventional distillation -fractionation of the coke oven gases in turn consisting of tar product distillation, tar acid refining, benzene toluene-xylene processing, light oil refining and the Claus-carbonate process for desulfurization of fuel gas and production of sulfur. More than two dozen products are made at Clairton, the two most important being metallurgical coke and coke oven or fuel gas piped as fuel supply to the other USSC iron/steel mills in the Monongahela Valley. Tar and pitch constitute additional chief products.

The Clairton complex occupies about 2.5 miles of waterfront and is about 1/3 mile wide. The draft NPDES permit for Clairton contains 25 primary outfalls or sampling locations plus 24 specified secondary discharges, plus a number of condensate drains and two more discharges which the Company has asked be permitted. Most operations, excluding steel finishing, are conducted 24 hours per day, 7 days per week utilizing approximately 4,500 employees. Production is in the range of 20,000 to 24,000 TPD coke manufactured from some 30,000 to 35,000 TPD coal, around 2,400 TPD finished steel, and 900 TPD basic iron or 500 TPD ferromanganese. Total water intake via two main pumping stations is in the range of 120-145 MGD. The Clairton permit is essentially written on a net load basis. Presently waste discharges to the Monongahela River total around 36 MGD and aggregate flows into Peters Creek amount to approximately 101 MGD. The largest and/or most important waste volumes are contained in Outfall 003 from the Steel Works; 008 - the State Street storm sewer containing No. 1 Power Plant effluents with 16.0 MGD or more into Peters Creek; 004 - the Industrial Waste Sewer conveying 71 MGD of miscellaneous spent liquors into Peters Creek; and Outfall 020 - containing the effluent from the physical/biological treatment plant receiving high ammonia-phenolics contaminated waste waters, plus undesignated effluent into 020.

It was noted during the reconnaissance that current USSC sampling points are in some instances in different locations than specified by the NPDES document. Practically all waste flow values supplied by the Company have been developed as estimated values. Certain of the monitoring locations being used by USSC cannot provide representative sampling.

In the quenching of coke, USSC reports about 160 gallons of water used per ton coke. "Stage charging" of the coke batteries is extensively employed at Clairton. At this plant, the 20 batteries and support equipment and processing are basically divided into two operational Units physically separated by the Keystone (gas processing) operations. USSC recovers ammonia uniquely by the Phosam process, employing phosphoric acid. This process aids in recovering additional light oils in conjunction with cryogenic gas separation and processing. Both synthetic ammonia and ammonia from coke oven gas are produced. Hydrogen, nitrogen and oxygen constitute additional products. A physical-biological waste treatment plant receiving heavily-laden ammonia-phenolics contaminated wastewater is nearly ready for operation as of September 1975.

Storm sewers can impact upon Clairton Outfalls 002, 003 and 008 and possibly others including municipal storm lines on the northerly and southerly USSC plant boundaries and miscellaneous runoff that can enter Peters Creek.

The Blast Furnace and slag handling operations are served by Outfalls 001 and 002. A Dorr Thickener with appreciable recycling is available on the venturi scrub effluent from the Blast Furnace. The steel finishing mills all drain into Outfall 003. Outfall 004 has been cited above. It serves a very extensive portion of the Clairton property. Discharge 005 emanates from the BTX and Water Treatment Sector entering into Peters Creek; Outfalls 006, 007, 010, 011, 012 and 019 are all considered minor contributions to Peters Creek. The State Street storm sewer, i.e., 008 must be sampled in detail to determine USSC loads, other possible industrial loads, municipal loads and storm loads. Outfalls 018, 015-115, 013, and 014-114-116 respectively serve the No. 2 Power House, Boiler Houses Nos. 1 and 2, Flash Evaporator Building, and BTX Recirculating Cooling Pump House, all located along the Monongahela River. The Clairton plant has a high River Wall making sampling of outfalls issuing forth via this Wall extremely difficult. Sampling within the completely-enclosed section of the lower quarter-mile of Peters Creek 35-40 feet underground will be as difficult, if not more so, than the Monongahela River waterfront. Outfall 017 is a small waste flow from a road tar terminal. Outfall 009 has been discontinued.

The NEIC reconnaissance report additionally provides a series of seven figures on overall layout of the Clairton Works together with location of buildings, outfalls, etc. Also included is a Table giving tentative sampling locations for the NEIC future field study.

REPORT ON EPA RECONNAISSANCE/INSPECTION OF AUGUST 26-28, 1975 AND PRELIMINARY EVALUATION OF AVAILABLE DATA RELATIVE TO NEIC PROPOSED FIELD SAMPLING SURVEY, USSC, CLAIRTON, PA. COKE WORKS

Attendees during the EPA Reconnaissance of August 26-28, 1975:

Paul Morrison, USSC, Chief Environmental Officer, Clairton Works
Robert Dunham, USSC, Environmental Control, Corporate, Pittsburgh
William E. Snee, USSC, Clairton Works
Eric Hrivnak, USSC, Clairton Works
James Hatheway, EPA, NEIC
David L. Brooman, EPA, NEIC
Edmund Struzeski, Jr., EPA, NEIC
Peter Schaul, EPA, Region III
Matthew Miller, EPA, Region III

This document contains results of an EPA field reconnaissance and inspection made to U. S. Steel's Clairton, Pa. Coke and Chemical Works during August 26-28, 1975 together with a preliminary evaluation of accompanying technical information on this plant obtained from various sources.

The Report is essentially divided into history of the Clairton Works; sampling locations specified in the 1974 NPDES draft permit; process description and information; iron and steel making and Outfalls 001, 002 and 003; the steel Works and coke Works water Intakes; Outfalls 009, 013 through 016 and 018; BTX processing and Outfall 005; minor discharges to Peters Creek; and Outfalls 008, 020 and 004. The latter three outfalls were the largest and perhaps the most important from Clairton - contributing almost 100 mgd to Peters Creek. These outfalls are respectively described as the State Street sewer; effluent from the physical/biological treatment works; and the Industrial Waste Sewer capturing up to 71 mgd miscellaneous flows.

I. HISTORY AND BACKGROUND

The Clairton Coke Works of United States Steel is located at Clairton, Pa. about 18 miles upstream of Pittsburgh on the Monongahela River. This facility is reported as the Nation's largest coke plant and producer of chemicals from coal. By far and away, the major activities at Clairton comprise the coking of coal and recovery of chemicals. However, the Works also has a convertible basic iron and ferromanganese blast furnace together with four old-type steel finishing/rolling mills. Coke was first produced at Clairton in 1918. In the early days, byproduct chemicals were limited to tar, ammonium sulfate, and benzene products. Coke is used at the blast furnaces of other USSC mills principally in the Monongahela River Valley. Coke oven gas is relied upon as a primary fuel for Clairton and for the other USSC mills in the Valley. The list of products and byproducts reported as produced today at Clairton include the following:

Steel. Bulb angles, angles - special/equal/unequal/other, channels, beams, H-beams, I-beam Lok, cold drawn flats, elevator tee, plates, round edge flat bars and other bars, floor plates, and special sections.

Coal Products and Chemicals. Coke oven gas, matallurgical coke, domestic coke, coke breeze, benzene, xylene, toluene, solvent naphtha, pyridine, alpha picoline, beta picoline, gamma picoline, phenols, ortho and meta-para cresols, cresylic acid blends, naphthalene, creosote, pitch, ammonium sulfate, anhydrous ammonia, sulfur, ferro-manganese, and slag.

Other. Nitrogen, hydrogen, oxygen, roof tar, various forms of pitch including pitch prill, fibre pitch, electrode pitch, roofing pitch, enamel pitch, cathode pitch.

The first steel rolling mills at Clairton were originally built by the St. Clair Steel Co., a subsidiary of Crucible Steel Co. around 1901-1902. The facilities were transferred to the Clairton Steel Co. in July 1902 and the first steel was rolled later the same year. Additional works included 3-400 TPD blast furnaces and 12 open hearths. The original rolling mills consisted of a 40-inch bloom mill and a 28-inch billet mill. The overall facilities were purchased by USSC in 1904. Thereafter the steel finishing mills were constructed. The first of these was the 22-inch (No. 1) structural shape rolling mill comprising 3-stands, 3-high reversing rolling facilities. This mill on the westernmost side of Clairton steelmaking sector was changed in the 1940's from steam-driven to becoming fully electrified. The 18-inch mill, a 5-stand cross-country mill, was built in 1905 principally for rolling merchant bars, flats and tees. In 1907, the 14-inch mill, a 7-stand cross-country mill was opened to roll small structurals and bar shapes. In 1909, the 22 or 21-inch (No. 2) structural shape rolling mill was completed. These rolling mills continue to operate largely with "old" original equipment and are steam-driven except for the 22-inch, No. 1 mill.

Operation of byproduct coke and chemical processing facilities started in 1918. The first phase consisted of 12 batteries each having 64 ovens (768 total ovens). The second phase comprised 6 batteries having 61 ovens each (366 total ovens). The third phase included 4 batteries of 87 ovens each (348 total ovens). In 1948, an additional battery of 87 ovens was installed and later in 1964, 3 batteries totalling 192 ovens were removed to make way for the Keystone gas processing facilities. Net facilities now consist of 20 batteries with a total of 1,375 ovens.

In 1921, the Marine Ways were built at Clairton to maintain and repair USSC's navy. Coal pulverization was instituted around 1960 aimed to yield coke with more uniform characteristics. Light oil purification, naphthalene recovery and new tar distillation plants were all constructed in the early 1960's. Steel making was discontinued and blooms and billets thereafter obtained from the Duquesne Plant of USSC by rail.

In the mid-1960's, construction started on the new coke oven gas processing faciliites and the anhydrous ammonia plant which became known as the Keystone Project. In 1964, Clairton's remaining blast furnace was converted over to the production of ferromanganese. The Clairton Fe Mn process casts the molten metal into beds; this procedure continues today.

In 1965, a new 60-cycle power generation station and high-pressure boiler were added. Facilities were also completed for making pitch prills, and the road tar terminal was placed under construction. In 1968, molten sulfur and anhydrous ammonia were recovered. In 1969, synthetic anhydrous ammonia was produced and the new naphthalene desulfurization plant was put into operation. A simplified sketch of the processing steps "From Coal to Chemicals at the Clairton Works" as of around the early-1970's is given by the figure contained in Attachment I. It is noted that cryogenic (intense cooling) is heavily relied upon at Clairton in lieu of the more conventional distillation-fractionation means of separating the various chemicals and gases.

The U. S. Steel Clairton Works extends over about 2.5 miles of waterfront and varies from 1/4-1/2 mile wide plus a narrow strip of land up Peters Creek to the Ravensburg Bridge or beyond. Clairton has 25 primary NPDES outfall or sampling NPDES points; plus 24 secondary, small condensate discharges; plus two discharges which the Company has asked be permitted but upon which no action has been yet taken by the EPA.

The Clairton Coke and Chemical Works operates 7 days a week, 24 hours a day for most processing. The main exceptions are the hot rolling steel finishing mills which generally operate 4-5 days per week, 2 turns per day. Total employment is approximately 4,500 persons.

Coking operations are roughtly divided about 30% on first turn (12:00 Midnight-8:00 A.M.), 35% on second turn (8:00 A.M.-4:00 P.M.) and 35% on the third turn (4:00 P.M.-12:00 Midnight). Coking is reported heaviest on the second turn. The rolling mills operate primarily during the second and third turns. The maintenance force is relatively light during the first turn. During the week of our reconnaissance, all four steel finishing mills were operating 2 turns over 4 days. The single (No. 1) blast furnace at Clairton has not operated since January 1975. Rather than shut down however this furnace has been banked with cooling water continuously running through it. During most of 1974 the blast furnace was producing only basic iron and no ferromanganese. The NPDES permit was written on basic iron production, not Fe Mn. We would hope the No. 1 blast furnace would be started up prior to the NEIC contemplated field sampling survey. However, Steel personnel stated of all Company blast furnaces in the Valley, the Clairton unit may be the last one up because of its small size. All sanitary sewage from the Clairton Works is said to be pumped to the City of Clairton.

The draft NPDES permit and Fact Sheet of 1974 on the Clairton Works gives production as follows: coke - 22,000 TPD; finished steel production as a total for the four mills - 2,400 TPD; and blast furnace basic iron production - 900 TPD <u>or</u> ferromanganese - 500 TPD. Basic iron when made at Clairton is shipped in molten form generally to the National or E. Thompson Works of USSC. The permit reports 108 mgd spent waters discharged to the Monongahela River and some 25 mgd to Peter's Creek (total = 133 mgd). USSC personnel on August 26-28, 1975 indicated they could not synthesize the figure of 2,400 TPD finished steel. Calculations leading to this figure could not only be obtained from top management by very careful scrutiny of past records. On the A.M. of August 26th (our first day), plant officials stated production at Clairton was only running 30-50% of capacity, probably 30-40%. Production of coke was estimated in the range of 18,000 TPD during late August 1975. Bob Dunham stated most companies including USSC had developed their permits on the basis of maximum month capacity over the most recent five years of record preceding the NPDES permit preparation. This very probably was also the case for the USSC Clairton permit.

II. SAMPLING/MONITORING LOCATIONS PROVIDED BY THE 1974 DRAFT NPDES CLAIRTON PERMIT

The Fact Sheet and the Draft NPDES Permit describe the primary outfalls at Clairton as follows. We note that current USSC sampling points in a few instances are in different locations than specified by the NPDES document.

001- Cooling water (barometric condenser) effluent from blast furnace, untreated, 14.0 mgd to Monongahela River to be sampled in 001 line "downstream of last addition point."

002- Treated effluent from blast furnace as "combined flow before city of Clairton storm sewer discharging into Outfall 002." Includes 9.2 mgd cooling water plus 0.4 mgd process waters, treated.

102- Treated effluent from blast furnace at the discharge of the blast furnace clarifier, to Outfall 002 (this point effective after 7/1/77).

202- Treated effluent "at the discharge of the slag pit to Outfall 002"(this point effective after 7/1/77).

003- Combined treated process effluents plus untreated cooling waters from hot form rolling mills, 9.4 mgd to Monongahela River. Outfall 003 sampling apparently includes Shaw Av. storm sewer addition.

103- Combined effluents from 21-inch (old No. 2) and 14-inch steel finishing mills (the two mills closest to the River). This sampling point in actual practice is inside and on the south side of the 18-inch mill. Besides scale type wastes, it includes barometric condenser waters from the combined 21- and 18-inch (steam driven) mills, but excludes cooling waters from the reheat furnaces on the 21-inch mill (this point effective only after 7/1/77). The permit defines this point as containing the entire 21- and 14-inch mill flows prior to entering the storm sewer.

203- Combined effluents from the 18-inch and 22-inch steel finishing mills. This point is actually located between the 18-inch and 22-inch mills and on the south side of the mills. The Company likely has not yet established precise sampling locations for 103 or 203 because the need for sampling these points does not occur until mid-1977. USSC personnel believe the 203 point although including scale pit effluent from the 18- and 22-inch mills does not pick up barometric condenser water from the 18 inch (steam-driven) mill. The presence of reheat furnace cooling water could not be ascertained (this point effective only after 7/1/77). The permit defines this point as containing the entire 18- and 22-inch mill flows prior to entering the storm sewer.

004 or 009- "Miscellaneous" cooling waters before entering Peters Creek (004) or the Monongahela River (009) - whichever is discharging. Cooling waters, untreated, 71.1 mgd, reported to be originating from miscellaneous coke oven gas coolers and recovery facilities. Outfall 009 was reportedly used previously only during the relining of sewer 004, this project now completed. 009 discharge should presently be zero. Other data indicate spent waters mostly derive from barometric condensers and primary coolers being released to 004 then to the enclosed section of Peters Creek.

005- Reported to consist of 4.7 mgd cooling waters from benzene plant and 0.3 mgd process flows from the No. 2 boiler house ash pit. Total flow of 5.0 mgd enters into the enclosed section of Peters Creek. Waste line runs between water treatment plant and benzene boiler house via a 36-inch line which converts to a 42-inch sewer line. Waste sources are said to include benzene refining, the benzene boiler house and feed water treatment.

006- Approximately 0.1 mgd cooling waters, from compressors and/or tar pumps entering into the completely enclosed section of Peters Creek. Tar distillation facilities, tar stills and tank yards are situated directly over Peters Creek in the vicinity of this outfall to Peters Creek. Connection is via 48-inch diameter vertical drop MH into the concrete arch sewer representing Peters Creek underground.

007- Approximately 1.7 mgd cooling waters nominally originating from tar still into enclosed portion of Peters Creek. Connections include drain from electrode pitch factory, drains from tar stills, and drain from strainer building all entering 48-inch diameter vertical drop MH into the concrete arch sewer of Peters Creek.

008- State Street storm sewer entering open section of Peters Creek receiving Power House No. 1 effluents, barometric condenser waters plus undefined miscellaneous. Power house effluents reported as 16.0 mgd. Draft permit specifies that 008 shall be monitored both at State Street storm sewer upstream of power house discharge, and also at storm sewer discharge into Peters Creek.

009- Given as "zero" discharge previously used as temporary discharge while 004 sewer was under repair. If used, may contain spent flows from "miscellaneous cooling water zone" or from barometric condensers and primary coolers. Outfall is directed to Monongahela River via submerged release immediately north of water treatment clarifier tank.

010- Approximately 1.8 mgd of cooling waters from tar and naphthalene plant(s) (intermittent flow) discharged into completely enclosed section of Peters Creek. Sub-drains originating from tar plant, phenolate storage area and naphthalene desulfurization reported entering into 24-inch sewer in turn entering concrete arch sewer representing Peters Creek.

011- Cooling waters from No. 1 Prill Pitch Unit, process and/or cooling waters untreated, 0.75 mgd to enclosed portion of Peters Creek. Drains originate from strainer building, prill pitch building into 48-inch vertical drop MH entering concrete arch sewer representing Peters Creek. Prill pitch, electrode pitch facilities, strainer building, and tar storage tanks all are more or less situated directly overhead of Peters Creek.

012- Cooling waters from No. 2 Prill Pitch Unit, untreated, 0.75 mgd process and/or cooling waters to enclosed portion of Peters Creek. Drains originate from tar storage tanks and old and new prill pitch buildings which more or less directly overlay Peters Creek.

013- Reported principally as blowdown from flash evaporator and cooling tower. Spent waters originate from area of pumphouse, flash evaporator system and cooling tower, untreated, 1.4 mgd to Monongahela River.

014- Approximately 0.05 mgd from water recirculation pump house adjacent to cooling tower both serving benzene, toluene, i.e. BTX processing area. Discharge is untreated to Monongahela River. Company actually samples two separate flows from water recirculation pump house which make up sewer 014.

016- Approximately 0.10 mgd from south side of water recirculation pump house. Discharge is untreated to Monongahela River. Flow also reported to contain strainer backwash and cooling tower sump drain water.

015- Spent cooling water plus blowdown from No. 2 Coke Works boiler house; flow of 1.04 mgd untreated. Discharge to Monongahela River, may be submerged a portion of the year.

115- Spent cooling water plus blowdown from No. 2 Coke Works boiler house. Flow of 0.26 mgd untreated. Discharge to Monongahela River may be submerged during a portion of the year.

017- Miscellaneous flows reported as 0.1 mgd intermittent to Monongahela River from road tar terminal and loading facilities. Discharge originates from area of road tar piles and loading, storage tanks and BTX plant.

018- Some 0.5 mgd cooling waters, blowdowns, condensates, etc. principally from No. 2 power house. Discharge to Monongahela River.

019- Emergency overflow from sanitary pump station on Peters Creek. Zero discharge reported. Company has withdrawn discharge permit application. This point is in area of naphthalene desulfurization facilities surmounting Peters Creek.

020- Described as final effluent from "Contaminated Waste Water Physical/Biological Waste Treatment Works" entering into completely enclosed sector of Peters Creek. Permit specifies that outfall shall be measured at discharge point of the wastewater treatment plant.

River mileage locations of the above permitted outfalls and/or monitoring locations are tabulated in the following listing.

USSC, CLAIRTON, PA. NPDES "PRIMARY" PERMITTED LOCATIONS

Outfall	Discharging to	River Mile
001	Monongahela River	21.66
002	Monongahela River	21.56
003	Monongahela River	21.13
004	Peters Creek	19.62/0.02
005	Peters Creek	19.62/0.08
006	Peters Creek	19.62/0.23
007	Peters Creek	19.62/0.25
008	Peters Creek	19.62/0.42
009	Monongahela River	20.16
010	Peters Creek	19.62/0.17
011	Peters Creek	19.62/0.27
012	Peters Creek	19.62/0.28
013	Monongahela River	19.58
014	Monongahela River	19.52
015	Monongahela River	19.59
115	Monongahela River	19.59
016	Monongahela River	19.54
017	Monongahela River	19.40
018	Monongahela River	19.65
019	Peters Creek	19.62/0.17
020	Peters Creek	19.62/0.06

Other outfalls, described as 021 through 044 are given in the Clairton Draft NPDES Permit and reported as containing "steam condensate only," and for which no monitoring was to have been required for the duration of the permit. These "minor" outfalls most of which are highly sporadic, are tabulated below for informational purposes. We note that "old" Outfall Nos. 1-17 as condensate drains in USSC's permit application, are now known as Outfalls 021 through 037, respectively. Old condensate drain outfalls 18 through 23 have been changed to New Outfall Nos. 038-043, respectively, and old Outfall No. 24 to new Outfall No. 044.

CLAIRTON WORKS
CONDENSATE DRAINS

Outfall No.	Description
021	Two 3/4" condensate drains from temporary change house
022	Two 2" and one 1-1/2" condensate drains from waste oil storage area and fuel oil tank
023	One 1-1/2" condensate drain from No. 1 transfer tower
024	Two 3/4" condensate drains from No. 1 sample building
025	One 1/2", one 4" and one 2" condensate drains from surge bin area
026	One 2" condensate from sanitary station
027	One 1-1/2" condensate from machinery house
028	One 4" and one 1-1/2" condensate drains
029	One 1-1/2" condensate from transformer station
030	Two 2" and one 3" condensate and area drains from coal hoppers
031	Two 1/2" condensate drains from coke works river pumphouse
032	Two 3/4", one 1", and one 2" condensate drains from clarifier and pumphouse
033	One 2" condensate drain from surge bin area
034	One 2" condensate drain from No. 2 sample building
035	3/4" condensate from No. 3 transfer tower
036	One 1" and One 3/4" condensate from No. 3 coal hoist
037	One 3/4" and two 1" condensate from oil house and sanitary station
038	Two 3/4" and one 2" condensate drains from No. 4 coal hoist
039	1" condensate from No. 2 boiler hosue
040	Condensate from water treating plant
041	1" condensate at evaporator
042	Two 1-1/2" condensate drains from recirculating pumphouse
043	Four 1" and two 3/4" condensate drains from creosote and naphthalene line tracers
044	One 3/4" condensate drain from lime slurry storage tank and one 8" compressor cooling water

For purposes of NET load calculations, the SW (Steel Works) pump house intake is to be sampled for coverage of Outfalls 001 through 003. The CW (Coke Works) pump house intake will be sampled for coverage of the remaining Outfalls, 004 through 020.

III. GENERAL AND SPECIFIC PROCESSING

Coal is received from barges or the Clairton storage piles and off-loaded into the Clairton Works at three points. The coal which has been previously washed elsewhere is blended and mixed with other coals, pulverized, and conveyed into tall storage bunkers east of the coking batteries near the River. Clairton is reported to have 1,375 coke ovens where coal is heated in the absence of air for about 18 hours at 2,000-2,100 °F, yielding metallurgical coke, coke oven gases, and various coke chemicals. Some 40-50% of the coke oven gas (fuel gas) from the Clairton coking facilities is employed for underfiring the flues in the refractory brick-lined ovens in the Clairton coke batteries. The remainder is shipped to other USSC iron and steel Works in the Monongahela Valley. Once the coking process is complete, the contents of a single oven are pushed into a railroad quenching car. The car is moved to one of 8 quench towers where the coke is cooled with water and then discharged to coke wharfs. Once completely cooled, the coke is screened and either loaded into railroad cars for use at other USSC mills, or stockpiled.

At Clairton, the 20 coke batteries are divided into two operating units, i.e. in one unit is contained batteries 1, 2, 3, 7, 8, 9, 10, 11, 12 and 12A (10 batteries); and in the other unit is contained batteries 13, 14, 15, 16, 17, 18, 19, 20, 21 and 22 (also 10 batteries). The two units are more or less physically divided by Keystone operations and by oil and tar removal facilities.

In the coking process, coal volatiles are collected via overhead mains running the length of each coke oven. These hot gases being withdrawn under suction are initially cooled by spraying with ammonia or flushing liquors. A large portion of the tar in the raw gas drops out with this initial cooling. Condensed tar and the flushing liquor mixture travel down the suction main and into a decanter tank. The partially cooled gas is then passed through primary coolers where the gas temperature is further lowered. Condensate from primary cooling is also sent to the above cited decanters.

In the decanters, separation is made into tars and flushing liquors, the latter being recycled back to the coke ovens. Excess flushing liquors are sent to storage. Gases after the primary coolers are forwarded to exhausters and tar extractors both of which contribute additional tar product. The excess flushing liquor is generally the major single source of contaminated water from the coke plant.

Following the primary coolers of which there are two separate banks at Clairton, the cooled gas is compressed to about 50 psi by compressors each driven by a 3,000 hp motor. The gases pass to final coolers. In the final coolers, water sprays dissolve soluble constituents and flush out and condense insoluble naphthalene from the coke oven gases. Separation is thusly made into tar, naphthalene, and ammonia. The final cooler waters after separation of chemicals, are usually recycled utilizing a cooling tower. If an efficient recycle system is not used at this point, final cooler waters can constitute the largest wastewater volume from the plant.

In most coke plants, ammonia is recovered or absorbed between the tar extractor and final coolers, but in the case of USSC, Clairton, ammonia is recovered via the Phosam (phosphoric acid) Process, following final coolers. In the Phosam process, ammonia is recovered through absorption in a recycled solution of ammonium phosphate. In a typical absorption cycle, "lean" i.e. 40% phosphate solution is employed to absorb the ammonia. The enriched phosphate solution is subsequently reboiled in a distillation tower from which the ammonia vapor is recovered and the phosphate-type solution separated for reuse. The Phosam process is said to substantially contribute to the overall Keystone operations by producing additional light oils from the gases.

Regenerators at Clairton are employed for supercooling and the cryogenic separation of gas into various components such as methane, hydrogen, oxygen, nitrogen and light oils. The regenerators utilize indirect cooling via extremely large quantities of coil exchangers. USSC considers cryogenic separation of chemicals significantly more efficient than conventional fractionation and distillation. Nevertheless the latter operations are used in part. Oxygen is produced at the air box. In the hydrogen plant, methane is separated out cryogenically but importantly, ammonia is produced synthetically in the SYN loop. Temperatures of -300 °F or lower are achieved at Clairton. The synthetic ammonia is commercially sold together with the ammonia produced from the Phosam process.

The important tar products after recovery are refined and reworked generally via tar distillation, tar acid distillation and naphthalene refining to give desirable cuts of products including various pitches and tars, carbolic oils, methyl naphthalene, creosotes, naphthalene, phenols, ortho cresol, meta para cresol, and xylenols. In most coking operations the tars are refined using continuous type distillation with multiple columns and reboilers. After naphthalene removal the phenols and other tar acids are extracted from the middle oil fraction with caustic, neutralized and fractionally distilled.

The usual process after final coding is to remove the crude light oils from the gases by absorbing onto wash oils and subsequently regenerating and refining the light oils and wash oils. We note, however, Clairton employs cyrogenic separation in lieu of wash oil absorbing. In this process line, the coke oven gases conveyed with the light oils are additionally desulfurized via cryogenic facilities, the carbonate plants and an old and new Claus plants. Elemental sulfur is produced concurrently. The Claus process is currently undergoing considerable expansion at Clairton.

Light oils are distilled and/or fractionated into benzene, toluene, xylene and solvent naphthas in the extensive Clairton BTX process sectors. Light oil recovery has recently become very profitable for USSC. Steel even purchases outside light oil stocks to supplement internal supply due to substantial process capacity. Hydrogen from the hydrogen plant is employed for hydrogenation of light oils and their components in the BTX plant. The No. 3 Still building is another important facility in the BTX complex. The purification of pyridine and its derivatives from light oils appears to have been discontinued at Clairton.

According to EPA Effluent Guidelines on the Iron and Steel Industry, the more significant liquid wastes from overall coking and chemical recovery are the excess ammonia liquor, final cooling water overflow, light oil recovery wastes and indirect cooling waters. Additionally, smaller volumes of wastewater may originate from coke wharf drainage, quench water overflow and coal pile runoff. The Clairton Works [illegible]erts all sanitary sewage to the city via four sanitary pump stations situated at each of four main sectors of the plant. All drinking water for the Coke Works is obtained from the city. We also learned that currently there are three (rather than one as previously thought) municipal water supplies on the lower stretches of the Monongahela River including North Versailles, Braddock and South Pittsburgh (West Penn).

U. S. Steel with regard to NPDES monitoring for its Clairton plant has requested that sampling requirements generally be changed from grab to composites. We have also been told on storm sewers feeding plant sewers that Paul Morrison has additional data and perhaps maps that will be furnished upon request.

IV. IRON AND STEEL MAKING: BLAST FURNACE AND STEEL FINISHING MILLS; OUTFALLS 001, 002 and 003

The reconnaissance inspection was started in the iron making and steel making areas located on the southernmost side of the Clairton Works and covered by Outfalls 001, 002 and 003. Layout of this overall sector is shown in enclosed sketches. During our visit the No. 1 Blast Furnace and granulated slag processing were completely down. However, the furnace was banked with continuous recirculating water through the unit including the three accompanying stoves.

A. 002 Sewer System

Slag from the blast furnace (when occurring) is immersed into water (i.e. slag enters under the water surface) in a small, three compartment quench basin (for slag), and the overflow is pumped to a concrete-lined slag settling basin, the latter approximately 80 ft long by 33 ft wide. Sludges in the settling basin are removed via clamshell. Unrecoverable or unusable slag is transported to a Peters Creek dump area for final disposal (i.e. across the Creek from the Clairton STP and/or upstream. Overflow from the settling basin leaves from the SE corner of the chamber, crosses over or under the 001 sewer, and drains into the 002 Sewer. The slag settling basin effluent is sampled at point 202 close to the settling basin, but we did not determine its precise location. Also feeding the 002 sewer are: 1) a major city of Clairton storm sewer intersecting 002 at the west end of Steel's property in the vicinity of the railroad car tipple; 2) Blast Furnace No. 1 cooling waters; and 3) effluent from a 110 ft diameter Dorr thickener serving the venturi scrubber off the Blast Furnace. Blast Furnace No. 1 is equipped with a dry dust catcher and a venturi scrubber on the exhaust air discharges. The venturi scrub effluent flows to the Dorr thickener.

The Company does not sample at the end of the 002 sewer but rather at three intermediate points: 202, 102 and 002. This is because the end of the 002 sewer below the river bank is difficult to access and because sanitary sewage from the city of Clairton is entering the top end of the 002 line. Our observations of the end of the 002 sewer near the river verified probable presence of organic matter, likely domestic sewage, and hot temperatures. The 202 point, or the effluent from the slag settling basin, has already been described. There is currently no flow reported in the 202 sewer line.

The Dorr Thickener was dry during our visit. Under normal operation, thickener effluent is largely recirculated back to the venturi scrubber. The effluent flows into a box at the south side of the thickener. There are two overflows from the box passing through the recirculation water pump house. One is the recycle to the venturi scrubbing unit and the other is the thickener bleedoff or blowdown to the 002 sewer through sampling point 102. During Fe Mn blast furnace operation, USSC reports no discharge through 102. With basic iron blast furnace operation, the Company reports an overflow of only about 50 gpm via sampling point 102. The vacuum filter building serving thickener underflow was locked during our inspection but regardless, the blast furnace and thickener were both down. Filter cake is reported to be disposed of to Peters Creek dumping grounds with the filtrate returning back to the thickener. Curiously we noted oily water in a cistern below ground just east of the thickener and filter house. We later learned this was previous exhaust from vacuum pumps on the vacuum filters. Some of this oil was escaping onto adjacent land surfaces. Immediately north of the 002 sewer is located the Fe Mn screening and casting operations; neither was in use during our reconnaissance.

We inspected the upstream portion of the 002 sewer line for sampling control on the city storm sewer feeding into the 002 line. This municipal sewer seems to continuously convey sanitary sewage to the river and we located a possible sampling location at the manhole next to the railroad car tipple station just east and above the railraod tracks. Upon raising the manhole cover, we observed reasonable flow in the sewer. Subsequent inspection was made of the ore trench, the blast furnace materials stockpile area, and the 30 and 54-inch storm sewers at the southwest side of Steel property.

The ore trench was mostly filled with water during our reconnaissance. It appears to receive drainage from the materials stockpile area. We noted at least two culverts leading off the stockpile sector to the ore trench. Stockpiled materials running from north to south included iron ore, ferromanganese ore, limestone and coke. Morrison indicated the ore trench receives venturi scrub water bypassing the Dorr thickener when the thickener is down for repair or for other reasons, and this bypass is brought down into the south end of the ore trench. Flow is returned to the thickener via a pump at the north end of the ore trench. USSC personnel insisted there is no drainage from the materials stockpiles into the trench nor from the trench to the 002 sewer. Nevertheless with heavy and sustained rainfall the ore trench will overflow and it is possible this excess runoff may find its way to the 002 sewer. There may be a possible connection at the manhole next to the car tipple. All three manholes on the upper end of the 30 and 54-inch storm sewers in the railroad track area at the west side of Steel's property were inspected and found to be almost completely dry. Morrison believes the 30-inch sewer may be clogged and presently is carrying no flow during both wet and dry weather. USSC promised there was absolutely no process water in either of these two storm sewers (possible unknown connections?).

Back on the 002 sewer, we visited USSC's 002 sampling point which was directly east of Blast Furnace No. 1 and situated between the blast furnace and the boiler house. The flow we observed at the raised manhole representing the Company 002 location was reported to be entirely cooling water coming from the banked blast furnace. Flow was estimated by Morrison to be around 1.0 mgd. Sampling is conducted via a pump with a solenoid valve. When the blast furnace is in normal operation, this sampling point also receives slag settling basin overflow, i.e. discharge from the 202 location. At this 002 location, it was reported that little or no blowdown occurs with Fe Mn blast furnace operations. However, considerable blowdown results with basic iron.

Within the "Pitch Bay" building (close to the slag settling basin) pitch is poured in thin layers over the floor and allowed to harden as a black, amorphous , highly-brittle product. The pitch is broken into more easily-handled pieces and loaded into outgoing railraod cars. There appears to be no waste discharge from the Pitch Bay building. We were told that the solid pitch is admixed with tar and creosote and used in blast furnace operations at other USSC mills.

B. Upstream Storm Sewers

We viewed the site where the 30- and 54-inch storm sewers come through the river bank and empty into the Monongahela River. From atop the bluff we could see a reasonable discharge from one of the two lines but could not tell which. The second outfall apparently was not flowing. Our point of observation was approximately 130 ft upstream or south of the "Pitch Bay" building.

C. 001 Sewer System

The 001 sewer is sampled by the Company at a manhole immediately to the west of the railroad tracks next to the water purifying plant handling boiler feed water. Immediately to the north side of the 001 Company sampling point, is located the Steel Works Water Pump House and a tall emergency standpipe. The Blowing Engine House (for the Blast Furnace) is situated directly west of the water purifying plant. The power house and turbogenerator house are directly west of the pump house. The boiler house is also within this complex. Boiler water is treated by the hot soda ash process (plus lime sometimes), followed by sand filtration. The 001 sewer is reported as receiving cooling waters from the blast furnace, barometric condenser waters from turbine-driven water pump(s) in the water pump house, cooling waters and barometric condenser waters from seven blowing engines in the blowing engine house, exhaust steam from boiler feedwater treatment, air compressor cooling waters, plus boiler blowdowns and sand filter backwashes. Boiler water treatment chemical sludges are likely discharged separately or with the sand filter backwashes to the 001 sewer. The boilers are rated about 190,000 lb steam per hour with blowdown around 15%. We were told the boilers in the Steel Works sector were not currently running. There was a relatively small flow at the Company 001 sampling point because the blast furnace and iron making complex were essentially down awaiting increased production across the industry.

D. SW Water Intake

The Steel Works (SW) Water Intake Structure contains a wide-spaced bar screen followed by a traveling screen. On the north side of the pump house, two pumps are functional and were running, with a third pump in need of repair and non-functional. USSC indicates a single pump could conceivably meet full demands of the steel-making portion of the plant. One pump appeared to be steam-driven and the other electric-driven. On the south side of the pump station are three more steam-driven pumps not believed in use. Practically all readout gages are located at the lowermost level of the pump station. The Company samples for calculation of NET NPDES loads off the discharge side of the active pump(s) at a convenient location on the main floor. This sampling station is located at the southwest side of the pump house. Samples are withdrawn from a spigot just downstream of a cartridge filter. Water pressure was reading 43 lb during our visit. This water intake sampling point on the main floor is directly next to the three steam-driven standby pumps. We were told that the Steel Works Water intake is measured via an orifice meter with continuous flow chart which in turn is planimetered. However, we did not see this instrumentation. Further checking is in order prior to the NEIC field survey. The Steel Works water intake was said to be in the range of 20 to 30 mgd. However, it was later stated that weekend intake is as low as 7 mgd running up to about 24 mgd.

E. 003 Sewer System and the Steel Finishing Mills

The four steel finishing mills run in order from west to east: the 22-inch mill, 18-inch mill, the 14-inch mill and the 21-inch mill. All four mills drain to the 003 sewer. Because of difficulty of access to the end of the 003 sewer near the river, the company samples the combined structural mill effluents at a point in the yards just east of the Guide and Welding Shop and west of the southernmost ammonia storage tank. The 003 sampling point is an appreciable distance from the river - almost 500 ft. The 003 sample station is completely enclosed and has been equipped with a pump and solenoid. The line must be sufficiently bled before a proper sample can be taken. Because this manhole is completely hidden from inspection and due to its proximity to the mills and reheat furnaces, one must question if adequate mixing and a representative sample is possible at this station. Each of the ammonia storage tanks cited above is rated at 7.1 mg capacity. Liquid ammonia is stored in the tanks at approximately -28°F and under minimum pressure. This ammonia may originate from coke oven gas or represent ammonia specially synthesized at Clairton.

We viewed what were described as sampling points 103 and 203. The 103 point is located inside the 21-inch mill on the south side, the 203 point is between but outside the 22- and 18-inch mills and south of the mills. The latter two points were previously described in our listing of NPDES sampling points for Clairton. Station 103 is intended to pick up all effluents from the 21- and 14-inch finishing mills whereas Station 203 is intended to pick up all effluent combined from the 18- and 22-inch finishing mills. Neither station picks up all effluent intended to be present at the respective points.

The four finishing mills are each equipped with one or more scale breakers. There are scale pits at each of the four mills. There is no skimming nor specific removal of oils. Besides descaling and other waters from underneath the rolling lines, other effluents originate as furnace cooling waters, cooling waters on the saws and barometric condenser waters. Two barometric condensers are available. One serves the combined needs of the 21-inch (No. 2) and 14-inch steam-driven mills, and a second barometric serves the 18-inch mill separately. Metal and sludge from the scale pits are said to be recycled back for processing but Steel was extremely unclear in this explanation. The scale pits are said to remove the larger chunks. Smaller particles probably pass through.

The 21-inch mill has a box-type scale pit approximately 6 ft x 16 ft. On the A.M. of August 27th in our tour of the 21-inch mill there was 3-5 inches of water over much of the floor on the south side of the mill. The 14-inch mill appears to have the scale pit directly under the mill stands, a few feet wide x many feet long. The 22-inch mill scale pit is approximately 4 ft x 58 ft long. The 18-inch mill is shown to have both north and south scale pits respectively 4 ft x 12 ft and 11 ft x 4 ft joined by a common channel (undergrating) 4 ft x about 70 ft which also contains the effluent pipe serving both scale pits.

A storm sewer is reported as contributing to the upstream end of the 003 sewer. We were taken to a manhole just west of the 22-inch mill which can serve as a possible wet weather sampling control on the 003 sewer. During our visit of the A.M. of August 27th, the sewer at this location was running virtually dry.

The bottom end of the 003 sewer was free-flowing into the river as was also the case for 002 (i.e. neither was submerged). The best way to sample both outfalls is believed to be by boat. Flow at the 003 outfall was relatively large (20 to 25 mgd est.) and thought to be in excess of NPDES figures. Velocity of the 003 flow is extremely fast issuing forth from a 4 ft arch brick-lined sewer. A ladder was observed as available down the side of the river bank in the vicinity of the Belle Bridge and it may be possible although difficult, to get to the end of the 003 sewer by foot. Scale or other solids buildup was noted at the end of the 003 outfall. This outfall is located directly to the rear of the southernmost NH_3 storage tank. It is also about 130 ft downstream of the Belle Bridge. We noted a manhole on the bank just west of the end of the 003 outfall. The Company reported this manhole is most probably connected to a sanitary sewer line.

It is tentatively suggested on NEIC sampling of the Steel Works outfalls that the 001, 002, 003 and the 54/30-inch (storm) sewers each be sampled at their very end by boat, even though this will not be easy. None of the outfalls should be submerged unless the river rises higher than expected.

V. MISCELLANEOUS DISCUSSION ON CLAIRTON OPERATIONS, MORNING OF AUGUST 27, 1975

On the morning of August 27th, Paul Morrison was repeatedly called out of our meeting because of a significant oil spill that had occurred on the river adjacent and upstream of Peters Creek the night before. The Oil spill was found by the USCG. Steel disclaimed any responsibility for the incident. General discussion was held with USSC personnel concerning the overall Works. We covered the Coke Works Water Intake, number and function of various cooling towers throughout the chemical operations, and use of contaminated waters in quenching coke. The practice of using contaminated water in quenching was scheduled to be terminated on July 1, 1975. Thereafter a physical/biological treatment works would receive the contaminated waste stream.

Coal is washed and sized before coming to Clairton. It is pulverized after off-loading. A single barge bringing coal into Clairton runs from 900 to 1,200 tons in capacity and Clairton can handle 30-35 barges daily through its coke ovens. USSC personnel insisted there are no wastewaters originating from coking until the site of the primary coolers. Further checking is necessary on this point. Clairton divides its 20 coke batteries into two groups of ten batteries each. A list of cooling towers was given us as follows: Cooling tower available at flash evaporator, at the naphthalene refinery, at BTX (Benzene-Toluene) refinery, and at the Keystone Process Center. Air conditioning at various locations through the plant is additionally served by various small cooling towers.

VI. COKE WORKS WATER INTAKE AND OUTFALLS 022 and 023

The Coke Works Water Intake is located immediately east of Battery No. 12 and upstream of the 009 discharge to the Monongahela River. Two venturi meters are available on the intake which are calibrated regularly. According to the NPDES Draft Permit, Coke Works Water Intake is in the range of 90-120 mgd. Flows are recorded and the Company planimeters the flow charts to obtain total volume. The pump station has six pumps, all electric. During our visit of August 28, the two meters at the pump house were reading 44 and 59 mgd respectively. USSC samples off the pump discharge for calculation of NET NPDES permit loads. The sample is actually collected at the southwest side of pump house. River water is used throughout the Coke Works primarily for cooling. Needs were reported to include coke oven gas cooling, primary coolers, various shell and tube heat exchangers, makeup for cooling towers, boiler feedwater (employing settling(?) - see below, hot process softening and flash evaporation), supply for barometric condensers, etc. Besides boiler water supply receiving special treatment, makeup for the large 5-cell Keystone cooling tower (approximate recycle rate of 72,000 gpm) is also treated. The latter receives clarification, addition of special flocculating agents and pH adjustment when necessary. The clarifier for the Keystone cooling tower is located immediately north of the Coke Works Pump House and adjacent to the 009 Outfall. Hexavalent chromium is added to the recycle waters of the cooling tower. Cooling tower makeup is estimated around 1200 gpm. Sludges from the clarifier are taken to dumping grounds. Blowdowns from the large 72,000 gpm cooling tower likely enter into the 004 sewer.

Outfall Nos. 022 and 023 are associated with the Coke Works water intake pump station but we carefully note the numbers on these two particular outfalls have been designated by Steel and not by the EPA. USSC has applied for permits on these two outfalls but so far has not received any approval, according to the Company. The above numbers are confusing in the sense that there are a series of miscellaneous condensate discharges in the Clairton draft NPDES draft permit which are numbered 021 through 044 and which have received prior approval by the EPA. The EPA approved condensate discharges 022 and 023 are different than the Steel-designated outfalls 022 and 023 at the pump station. Morrison reported that the 022 line is strainer backwash off the pumps, and 023 is essentially cooling water off an air compressor. These discharges to the Monongahela River are thought to flow only intermittently. The recommendation is made that NEIC sample these two discharges only for one or two days; flow determinations are judged unnecessary.

VII. WASTE SEWER 009

This sewer and its discharge is reported no longer in use. It was deployed in the last couple of years as a temporary measure while the 004 industrial waste sewer was undergoing relining and repair. This sewer can conceivably be used - but only under emergency conditions. The 009 sewer potentially can drain a rather expansive sector of the

Clairton grounds including the coke ovens. The outfall is said to be submerged intersecting the Monongahela River immediately north of the Keystone cooling tower water treatment clarifier and Coke Works water intake pump station. The upcoming NEIC survey should conclusively verify the absence of flow in this sewer which was not done during the August 1975 reconnaissance.

VIII. 018 OUTFALL FROM NO. 2 POWER HOUSE AT COKE WORKS

The Draft NPDES permit reports the 018 outfall as discharging about 0.5 mgd of condensates and blowdowns from the No. 2 power station to the Monongahela River. USSC personnel indicated this outfall could additionally contain some oil bearing cooling waters from pumps, etc. The 018 flow emanates at the River wall from the base and approximate center of the power house. Coal barges were lined up along the wall on the river side making access from that side most difficult. The Company samples the 018 flow by drop bucket and this is likely our only means of sampling the power house effluent. The 018 water system is under pressure probably negating use of the dye dispersion technique for flow measurement.

IX. OUTFALL 015 FROM COKE WORKS BOILER HOUSE NO. 1 AND OUTFALL 115 FROM BOILER HOUSE NO. 2 (EAST SIDE OF COKE WORKS)

Both outfalls 015 and 115 discharge to the Monongahela River and may be submerged part of the year although they were not during our reconnaissance. Both outfalls emanate from the River Wall which also forms the side of the Boiler House building. Outfall 015 is the upstream discharge located at the southeast corner of the building (immediately downstream of Peters Creek) whereas 115 is about 1/3 from the northeast corner of the building. Both discharges are a considerable vertical distance down from the main level at the top of the River Wall and must be sampled by drop bucket.

The Boiler House discharge comprises spent cooling waters and condensates, cooling waters from a hydraulic system compressor, some air conditioning waters, and boiler blowdowns. Blowdowns, principally from the No. 2 Boiler House are carried over for use in the Flash Evaporator House. This blowdown could be as high as 20%.

We were told the 015 outfall may receive storm drainage from certain areas adjacent to the boiler house. Both the 015 and 115 water drainage systems are reported under pressure, likely negating possible use of the dye dispersion technique for determination of flow. The 015 discharge was observed as significantly churning up the river bottom at the point of release. Flow may be appreciably higher than the 1.04 mgd given in the draft permit.

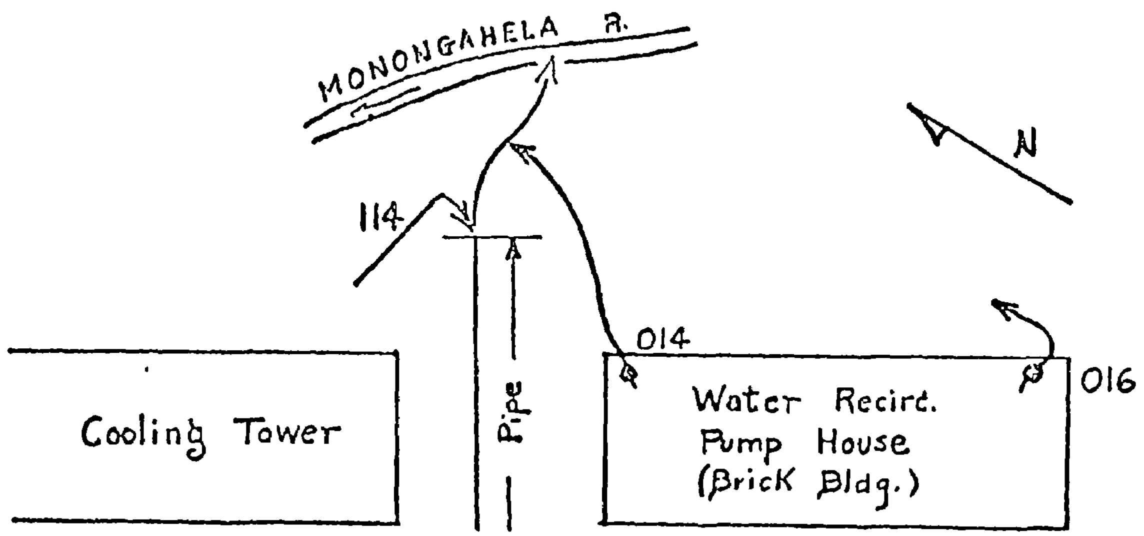
X. FLASH EVAPORATOR BUILDING AND OUTFALL 013

The Flash Evaporator building is located between the main Coke Works Boiler House (East Side) and the Water Recirculating BTX Pump House. Outfall 013 discharges directly to the Monongahela River and is reported to consist mainly of blowdowns from the flash evaporator and accompanying cooling tower. We understand the flash evaporator system serves to supply feed water to waste heat boilers in the Keystone complex. The other boiler water treatment system is located across the road and southeast of the flash evaporator building and consists of the hot soda ash-lime process, filtering and zeolite softening. The latter water treatment plant provides boiler supply for the main Coke Works boilers and the Benzene Boiler House. The hot soda ash process situated on the 005 waste line and the BTX area will be described later.

The Flash Evaporator is thought to provide makeup for the adjacent cooling tower. The 013 Outfall is said to contain recycle blowdown from the flash evaporators for the Keystone complex together with cooling tower blowdown. A 14-inch line originates from the northeast side of the building and discharges to the Monongahela River as 013. USSC records product flow; measurement is reported via an orifice plate, calibrated periodically. This waste line is actually sampled inside the evaporator building on the west side. Five sampling spigots are available on a manifold. These five lines include boiler blowdown, recycle brine, distillate, primary cooler and cooling tower water lines. Samples for 013 are taken from the first of these.

XI. THE 014, 114 AND 016 OUTFALLS FROM BTX (BENZENE-TOLUENE-XYLENE) RECIRCULATING COOLING PUMP HOUSE AND ADJACENT BTX COOLING TOWER

The above three outfalls all discharge to the Monongahela River in the area of the BTX cooling water recirculating pump house and accompanying cooling tower. The BTX process area is located across the road generally west of the subject facilities. The BTX processing covers considerable area in the Clairton plant. The current sampling points of 014 and 114 presently used by the Company for monitoring, if added together, would be equivalent to the older 014 sampling location described by the draft NPDES permit. Physical layout of these points is depicted below.



The 114 waste stream is carried in a pipe and sampled by USSC at the end of the pipe. The 114 outfall cascades over the hill in an open section. The Company samples both lines separately. The 114 flow is relatively small (est. <0.10 mgd) but unmeasured by USSC. Besides miscellaneous condensates, USSC indicates that the 114 drain may capture storm waters from at least part of the BTX area. This was not mentioned in the NPDES permit application nor the ensuing draft permit. Blowdowns from the BTX cooling tower would appear to enter 114 although they are reported going to 014.

The 014 line is sampled by USSC inside and at the northwest corner of the water recirculating pump building on the main or upper floor of the building. The point represents a takeoff from the cooling tower hot well inside the building. Cooling tower blowdown is said to find its way to the 014 waste line. USSC meters the makeup to the cooling tower. It is tentatively recommended that NEIC in their upcoming survey sample and gage the combined 014-114 effluent below their joining and just before the river. However safety in sampling must be carefully evaluated for this point particularly for nighttime work. An alternative is to come into this point via boat.

The 016 waste stream originates from the other side, i.e. the south side of the recirculating cooling water pump house. This stream is described in the draft permit as comprising cooling tower sump drain water plus strainer backwash. These sources were verified during the reconnaissance. The actual sampling point used by the Company is located inside, i.e. at the southeast corner and the lower level or bottom floor of the recirculating pump house (adjacent to the strainer). The 016 stream seems to be mostly basket strainer backwash discharge. The screened water is used for BTX cooling tower makeup. A flow estimate may suffice for this secondary discharge.

XII. BENZENE PROCESSING WATER TREATMENT AND OUTFALL 005

Outfall 005 serves the benzene or BTX process area situated on the north side of Peters Creek. Within this complex is also located the hot soda ash and lime water treatment works supplying feed water to the majority of boilers within the Coke Works at Clairton. Besides cooling waters, approximately 0.3 mgd continuous overflow from an ash settling basin enters the 005 sewer. Ashes from stoker-fired boilers (east side boiler house) are transformed in a slurry to ash bins then decanted to the ash settling basin. The plant did not seem to be pumping ash-carrying waters at the time of our observations. The 005 sewer also captures sludge blowdowns off the hot process water treatment chemical mix and/or settling tanks, blowdowns off the Benzene Boiler House, primary cooler operations (2nd Unit) excess water (to be taken out in future), blowdowns from a small cooling tower together with evaporator, excess cooling waters or blowdowns from a large BTX cooling tower, and possibly some yard storm runoff. Outfall 005 is a reasonably-sized flow described in the draft permit around 5.0 mgd.

Flow into the 005 manhole is judged quite warm. The 005 Company sampling manhole is about 500 ft from Peters Creek which is the receiving stream. This manhole is sandwiched inbetween the Feed Water Pump House and the Benzene Boiler House and just south of the No. 3 Still Building. The 005 manhole is completely enclosed and equipped with a pump to obtain Company samples. There was a question whether this pump was operable. This point is available for sampling by NEIC but the subject of representative sampling prevails once again.

In the water treatment area, electrostatic precipitators are available believed installed on the ash collection and storage tanks directly west of the Flash Evaporator Building. We observed fine ash being off-loaded into a truck from one of the ash tanks. Unfortunately the ultra-fine dust was dispersing in all directions much of it not being captured into the truck.

XIII. ADDITIONAL DATA ON COKE OVEN OPERATIONS

Clairton has 1,375 coke ovens contained in 20 batteries. The batteries are supported by 8 quench towers and 8 coke wharfs. There are two coke screening stations. One of these is equipped with three wet scrubbers and the second has a single wet scrubber (on one of 4 available lines). Liquid scrubber effluents are sent to quenching or are diverted to the contaminated water sewer. Coke underdrainage off the screening stations is either reused internally at Clairton or shipped to sinter plant(s) at other USSC locations. Clairton has been testing an experimental coke shed device (with venturi scrubber) on Battery 17. In the quenching of coke, USSC reports using about 160 gal water per ton coke quenched. This compares to 350 gallons per ton coke cited in previous EPA Effluent Guidelines. Morrison stated that more water can be evaporated in quenching than they now use. They dilute flushing liquor with "good" water in order to keep down the chloride content. Excess runoff from quench towers is collected into a sump below each tower and either recycled for additional quenching or pumped to the contaminated water system. Morrison stated there is absolutely no extraneous wastewater from the coke batteries and directly-associated operations. Coke wharf drainage if accumulating, is collected into trenches and flows to the coke quench stations.

Plant personnel still visualize the 1 mg contaminated water mix tank as being a central distribution point for supplying quench water to the towers, putting out fires in the ovens, etc. It was indicated whenever there may be trouble in the biological system that contaminated waters will be returned to the contaminated water mix tank and/or to the quench water system. Bypass capabilities back to the quench water system probably will be maintained even after full connection is made to biological treatment.

Large coke storage piles are maintained by USSC on the Peters Creek watershed upstream of State Street and Outfall 008 all the way up to the Ravensburg Bridge and even beyond. Granulated slag, ash, clinkers, stone and other discards are interdispersed among the coke piles in this same area. Many small trickles representing subsoil or overland drainage from this area were observed flowing into the lower stretch of Peters Creek from USSC property.

XIV. SMALL WASTE SEWERS INTO PETERS CREEK - 006, 007, 010, 011, 012 AND 019 OUTFALLS

We have previously described each of these six outfalls in general terms. The draft NPDES permit describes the six discharges as totalling a maximum of 5.1 mgd, mostly cooling waters from a number of sources.

The 006 manhole is reported as situated directly over Peters Creek. Discharge comprises spent cooling waters from tar pitch coolers, cooling water off tar still(s), and possible barometric condenser waters. A number of spent streams enter directly into the 006 vertical manhole. It will be near impossible to directly measure the 006 flow volume and also very difficult to obtain representative samples at this location.

The 007 manhole also located more or less directly over Peters Creek principally consists of cooler condenser waters on the overheads from tar refining stills. Other cooling waters may also be present. At least three streams are known to enter directly into the 007 vertical manhole at various elevations. We see no possible way to accurately determine flow into 007. Furthermore, from indications given us, we see no way either the Company or ourselves can obtain any kind of representative sampling at this particular location.

The 010 sewer mainly carries cooling waters from the tar and naphthalene process plants into Peters Creek. The 010 manhole is above Peters Creek immediately west of Coke Battery No. 22. During our visit, various subflows to the 010 sewer were reported by USSC as including cooling waters from tar acid distillation, naphthalene cooling tower blowdowns, and considerable condensates from tank heating and storage and process tanks. It was also reported that strainer backwash off an industrial cooling water line finds its way to the 010 sewer but we do not know where this is located. Condensate sump drainage and other strong waste waters off carbolic acid processing are said to be diverted from this general plant sector over and into the contaminated water collection system. This sewer manhole hopefully can be adequately sampled and flow rated.

The two Prill Pitch process waste streams 011 and 012 are reported by the Company to be nearly similar in waste flow and characteristics. USSC samples 012 inside the Prill Pitch Bldg. No. 2 at the overflow end of a small receiver box in an open section. This stream represents cooling water in direct contact with the pitch prill. The contact cooling waters are said to be partly recycled and partly bled off. The No. 1 Pitch Prill building effluent is sampled at a box manhole directly outside on the west side of the process building. It is recommended that NEIC sample only 012 since it is relatively accessible and since the two discharges are thought similar. Both flows appear to be extremely warm. One or two samples could be taken of 011 and waste concentration compared with 012.

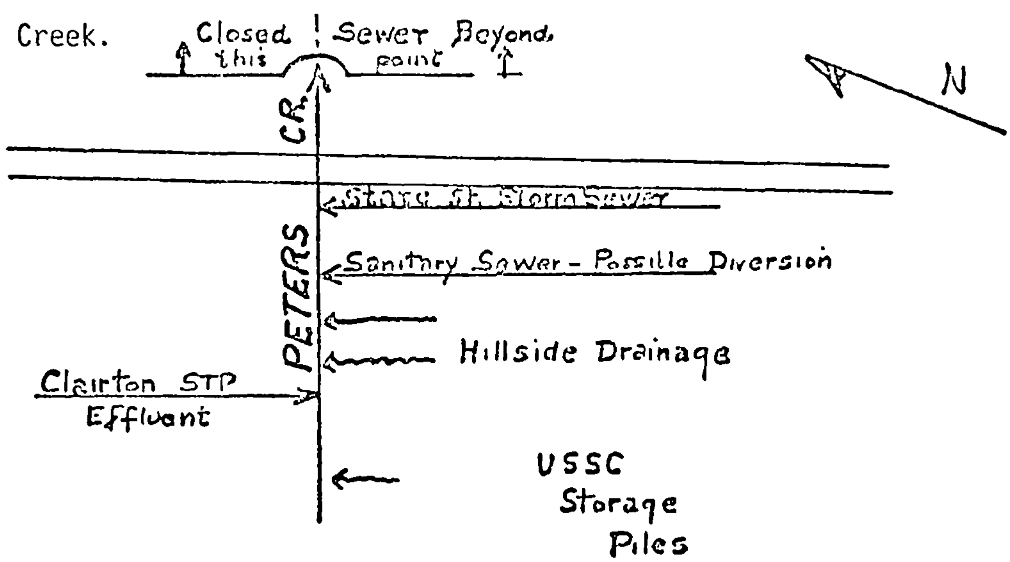
Outfall 019 represents a potential emergency overflow, if and when occurring, from a sanitary sewage pump station to Peters Creek. It is not known if past discharge has occurred at 019. USSC, however, reports they have never collected samples at this point. There are four main sanitary pump stations serving the Clairton Works. These are in the Marine Ways sector; the 019 pump station serving the benzene-tar-boiler feedwater-coke sectors; the Maple Avenue sector, and the Steel Works sector. The 019 pump station is the largest of the four. Previous information supplied to the EPA had described this station as containing only one pump and hence the need for a permitted discharge. Upon inspecting the pump station we found two pumps with one reported as capable of handling the entire sanitary flow together with dual power supply.

XV. OUTFALL 008 - STATE STREET STORM SEWER, CITY OF CLAIRTON, POWER HOUSE NO. 1 DISCHARGES, CLAIRTON STP, AND PETERS CREEK ABOVE AND BELOW USSC PROPERTY

The State Street storm sewer drains the west side of the Clairton Works and discharges into Peters Creek just below the city of Clairton STP and immediately above the point where the Creek goes underground through USSC property. Steel claims that only Power House No. 1 effluent is released to the State Street sewer and accordingly the Company samples internally within the plant on a sewer line reportedly joining the storm sewer southwest of Battery No. 19. EPA, Region III because of phenolics found in the State St. storm sewer from unknown sources, has recommended in the permit that the Company sample at two locations, i.e. the very end of the State Street storm sewer, and the storm sewer above the point where the Power House No. 1 effluent enters this municipal sewer. Apparently the State or others have conducted previous sampling upstream on the storm system. The Company is presently sampling its internal sewer southwest of Coke Battery No. 19 approximately 300 ft from State Street and calling this point 008. The Company sampling access to its manhole on 008 is only 4 inches in diameter. The flow inside was judged very hot. There was some indication that dye had been previously dumped at this manhole.

We located another manhole on the internal plant drain line but farther downstream and only about 30 ft from State Street. This latter point is recommended for one of the NEIC sampling points. We more or less walked upstream on the internal sewer up to the Power Plant and observed two barometric condensers on the west side of the Power Station reported to be connected to the top end of the sewer. Other spent flows were said to include effluents from a pair of turbine generators and cooling waters from an air compressor. Power Plant No. 1 pulls steam from about 150-180 psi down to vacuum utilizing a barometric for condensing steam. The other barometric is connected to a topping turbine. Additional information indicates the Clairton power plants are equipped with both mechanical dust collectors and electrostatic precipitators; however, no specific data was obtained.

On State Street in the city of Clairton we noted that both Hercules, Inc. and Pico Chemicals (reported to be a subsidiary of Hercules) maintain relatively small but complex processing/manufacturing operations. These two companies may (or may not) be connected to the city storm sewer; they are located upstream of USSC's power plant No. 1 discharge. Sanitary and storm sewer lines run more or less parallel down the center of State Street heading north. John Mitchell, Superintendent at the Clairton STP indicated Pico and Hercules could possibly have extraneous discharges to the storm sewer. He also thought that USSC could have a series of discharges into the storm sewer. On Peters Creek immediately upstream of the State Street storm sewer and also on the south side of the Creek, we found a diversion structure with flap gate believed to be a sanitary bypass off State Street. A short distance further upstream but from the north side, the Clairton STP effluent also enters into Peters Creek.



We were unable to make contact with either Mr. Margard, City Engineer or Mr. Pastor, Asst. City Engineer for Clairton, but Mitchell promised to send us copies of maps of the storm sewers in the subject area by mail as soon as possible. The Clairton STP is a primary treatment works with preaeration. Flow averages 1.7 mgd and plant capacity is 3.4 mgd. They will be picking up 6 municipalities in the future and total sewage flow is expected to increase to 9.0 mgd with provisions for a secondary treatment works. Suggested NEIC sampling for the upcoming survey covering 008, State Street and Peters Creek includes as follows:

1. State Street storm sewer immediately upstream of the USSC sewer; the latter contains No. 1 power plant effluent.

2. USSC effluent at manhole approximately 40 ft from State St. sewer

3. State Street storm sewer at point where it empties into Creek

4. Peters Creek at Ravensburg Bridge or possibly downstream, but still above influence of USSC coke and slag piles and above Clairton STP effluent

5. Clairton STP effluent.

6. Peters Creek at the mouth sampled from Monongahela River side assuming there is no surcharge from the Monongahela River back up into the underground sewer. We will attempt a mass balance by means of the stipulated sampling on Peters Creek and waste flows into it. Flow gaging and sampling at the lowermost end of Peters Creek will be challenging. Velocity during the reconnaissance was estimated around 6-9 fps. A double oil boom was anchored in place at the mouth of the Creek. The float and skirt on the boom were roughly estimated as 8 inches and 15 inches respectively. Because of fast flows, the skirt was almost horizontal a good part of the time. The flows appeared surging back and forth. Appreciable oil was seen at the mouth of the Creek and down and inbetween coal barges moored on the upstream side of Peters Creek on the Monongahela River. The oil boom was largely ineffective in holding back oils and no collection provisions were evident.

XVI. PHYSICAL TREATMENT AND ACTIVATED SLUDGE TREATMENT SYSTEM FOR HIGH NITROGEN AND PHENOLICS WASTES PREVIOUSLY USED AS COKE QUENCH WATER: 020 SEWER

The activated sludge treatment works has been recently started up at Clairton for handling ammonia and phenolics-laden wastewaters. These wastes consisting mainly of excess flushing liquors were previously disposed of in coke quenching. During our visit the activated sludge basins were in operation with 9 or 12 turbine aerators functioning but the secondary settlers had not yet received any wastes. Contaminated wastes are collected into a mix-equalization tank just north of the Claus process, then pass through a series of Tar Separation Tanks (5 tanks at 100,000 gallons each), to a 3 mg feed tank just east of the activated sludge basins, through free and fixed stills for removal of ammonia, through another 3 mg equalization tank, the aeration basins (in parallel) followed by 80 ft diameter secondary clarifiers in parallel, then discharged. The final settlers are equipped with skimmers. Cooling may or may not be available before feeding the activated sludge tanks. Acid and/or antifoam may be present in an insulated tank next to the final settlers. Upon walking over the top of the basins, wastewater temperature at the head end of the activated sludge tanks was perceived to be extremely warm. We were told that the ammonia stills will be starting up around the first of September. Following the stills, flotation cells are said to be present for handling lime sludges particularly emanating from the fixed still. The sludge material is taken to a thickener and solids sent to vacuum filters. Secondary sludges are also destined to be forwarded to the vacuum filters. Ammonia off the stills is scrubbed by the Phosam stripper and absorber sub-system.

USSC indicated they can achieve relatively low NH_3N via the ammonia stills but upon passing through the activated sludge aeration basins due to thiocyanate breakdown, ammonia rises again to very high levels. This treatment system was almost entirely designed and built by U.S. Steel without outside consultation. A superstill is available somewhere close to this circuit and we received two versions on role of the superstill. The superstill is intended to recover ammonia from recirculating waters and eventually from the streams leaving the free and fixed stills or its purpose is to control corrosion in the process waste lines. Secondary settler effluent from the treatment works may (also) in the future receive final polishing via sand filtration.

Besides flushing liquors, the contaminated waste stream is thought to contain spent process waters from the benzene refining plant, the tar refining plant, spent streams from gas processing in turn consisting of direct and primary cooling heat exchange waters and blowdowns (which today are still going to the 004 sewer), tailwater off the Phosam process, and various barometric condenser waters. Final cooler spent flows consisting of contact cooler effluent, blowdown from recirculating systems, and possibly some product water are thought to be routed to the treatment works. Fractionater blowdown from the Phosam Process is reported to be sent to the contaminated water collection system together with undefined waters from tail gas operations on the Scot Unit and other streams from the Claus process. A number of these streams probably have not yet been converted over from the 004 sewer into the treatment works. Trench and contaminated yard waters from the coke battery sectors, BTX and No. 3 Still areas are said by USSC to be picked up and either sent to the quench water service tanks or to the contaminated water treatment works. Flow into treatment approximates 1.5 mgd and with added dilution water to the aeration basins will run about 2.5 to 3.0 mgd. Final effluent from this biological/ physical treatment system is discharged to the 020 sewer. The Company intends to monitor close to the final clarifiers on the west side. This point is a considerable distance from Peters Creek, the receiving stream. The 020 sewer should be sampled close to Peters Creek to check with the Company's upstream sampling point and determine how much if any yard drainage could be entering the 020 drain line from nearby coke batteries and other possible sources. It is recommended NEIC in their upcoming survey sample 020 at the downstream manhole 50-100 ft from Peters Creek. (Effluent characterization data if available from the Company would be from the downstream manhole but limited.) We note that the 004 sewer line passes almost directly under the activated sludge treatment plant on its way to Peters Creek.

Inadvertently or otherwise, we did not have the opportunity to inspect the building reportedly containing the free and fixed ammonia stills, coolers, chemical feeders, etc. Further data on design and operational criteria/results are imperative from USSC on this treatment works. We were told part of this data can only be obtained via a secrecy agreement and is found only in Harrisburg. The Chemical Division is responsible for maintenance and operation of the treatment plant. USSC personnel indicated they had no idea of MLVSS in the aeration basins. There was no specific knowledge whether flow instrumentation existed at the treatment works-influent or effluent although USSC personnel had the feeling there may be flow metering somewhere on the influent. Pilot data is available in Harrisburg. On costs of the treatment system, we were told this would necessarily have to be obtained in a 308 letter. It is recommended that NEIC on its upcoming survey, sample both 020 locations and additionally the influent(s) to the treatment works.

XVII. THE 004 MAIN INDUSTRIAL SEWER AT CLAIRTON

The 004 waste drain extends through an extensive portion of the Clairton Coke Works over three-quarters mile or longer as far south as Coke Battery No. 1. It also serves the Keystone complex including primary and final coolers on Unit 1, the main gas regenerators, tar extractors and exhausters, both Claus plants and sulfur recovery, the tar storage area, two areas of flushing liquor decanters, primary and final coolers on Unit 2, compressor buildings. It passes under or near the biological/physical waste treatment plant and finally terminates in Peters Creek near Coke Battery No. 18. This drainage system termed by the Clairton Works as the "Main Industrial Sewer," is described in the draft NPDES permit as conveying 71 mgd of spent waters, and intercepts Peters Creek very close to its mouth at R.M. 0.02. Previous descriptive materials on sewer 004 categorize this flow as miscellaneous cooling water. From the EPA reconnaissance of August 26-28, 1975, the following list of known, reported, or inferred waste sources was prepared.

Keystone Complex "large" cooling tower blowdowns. Blowdowns from other undesignated cooling towers within the Keystone complex.

"Ammonia recovery" barometric condensers. Two barometrics are believed present, one on the synthetic ammonia (SYN) loop and a second in the ammonia production building.

Effluents from HCN plant and from vacuum carbonate desulfurization process (old and new Claus plants).

Cooling waters from sulfur recovery. We note sulfur is shipped out from Clairton both in molten and solid (cast) form.

Condenser waters from barometric on No. 2 Final Coolers. It is noted that significant process water is recycled from sump collection to the final coolers.

Condenser waters from barometric in Phosam sector (close to 009 waste line)

Undefined boiler blowdowns

Cooling waters from No. 1 Primary Cooler operations, and likely also from No. 2 Primary Cooler facilities. On our reconnaissance we observed heavy oil layers on the ground in the vicinity of certain primary cooler units and in and around certain flushing liquor decanter units. Some of this could find its way into the 004 sewer.

Air box cooling waters

Large barometric condenser, one of which was seen in the area of the Primary Coolers

Various unknown drainages.

The Company sampling point on the 004 sewer is located about 1,100 ft from Peters Creek just north of the primary coolers and about 200 ft south of the final clarifiers at the new biological treatment works. This is a pumped station on a completely enclosed manhole. This manhole is thought to be an exorbitant distance from Peters Creek. The next downstream manhole is located immediately north of the aeration basin at the waste treatment works. This manhole is situated about 350 ft from Peters Creek and is the preferred point for NEIC sampling. Peering down this manhole we could not see the flowing stream but could perceive a rather distinct odor off the manhole. Dye insertion hopefully can be made at the upstream manhole and measured at the lower manhole. A further downstream manhole is doubtful but should be searched for. It is tentatively suggested both manholes be sampled by NEIC depending upon where and how the dye may be added.

XVIII. ROAD TAR TERMINAL/LOADING AREA AND OUTFALL 017

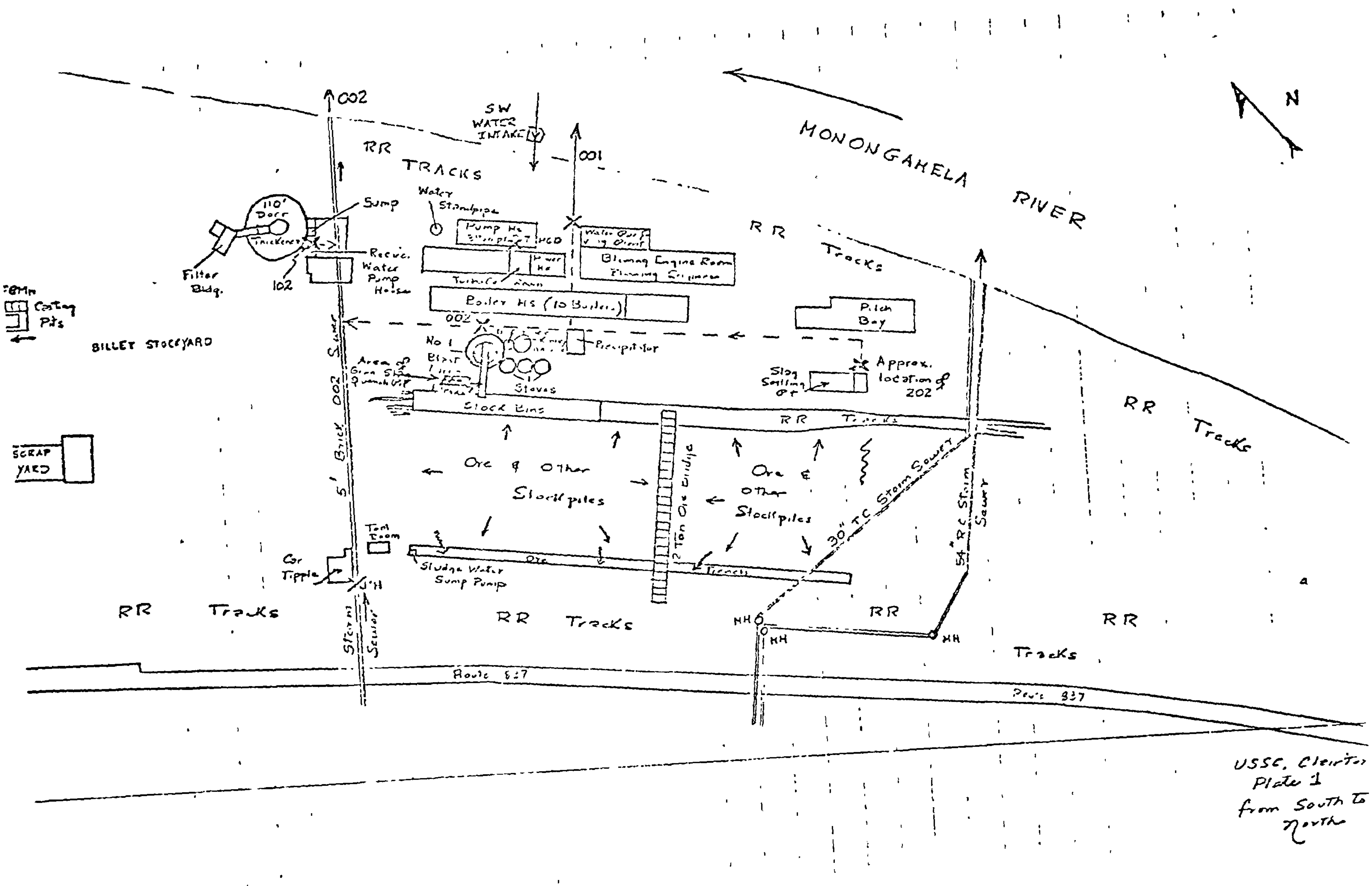
This is a relatively small flow representing yard drainage and probably condensates from out-of-doors tar and coal storage sectors. Tank heating and yard tracing flows may also be integrated into this sewer system. The Company sampling point for 017 is at a grated manhole at the base of the railroad car load facilities just east of the tar storage tanks and north of the BTX water recirculating cooling tower. This stream can also be sampled just below the crest of the River bank as an 11-inch ID pipe which terminates in an open section. The stream then cascades down the hillside to the Monongahela River. Personal preference is for sampling and gaging at the open section rather than the manhole. During our visit, waste flow was estimated at 10 gpm, or perhaps slightly more. Flow may be determinable by the bucket and stopwatch method. The outfall may be subject to occasional spills by the nature of adjacent facilities. The effluent was noted as fairly clear but possessing a slight yellowish tinge.

XIX. COAL STORAGE AREAS

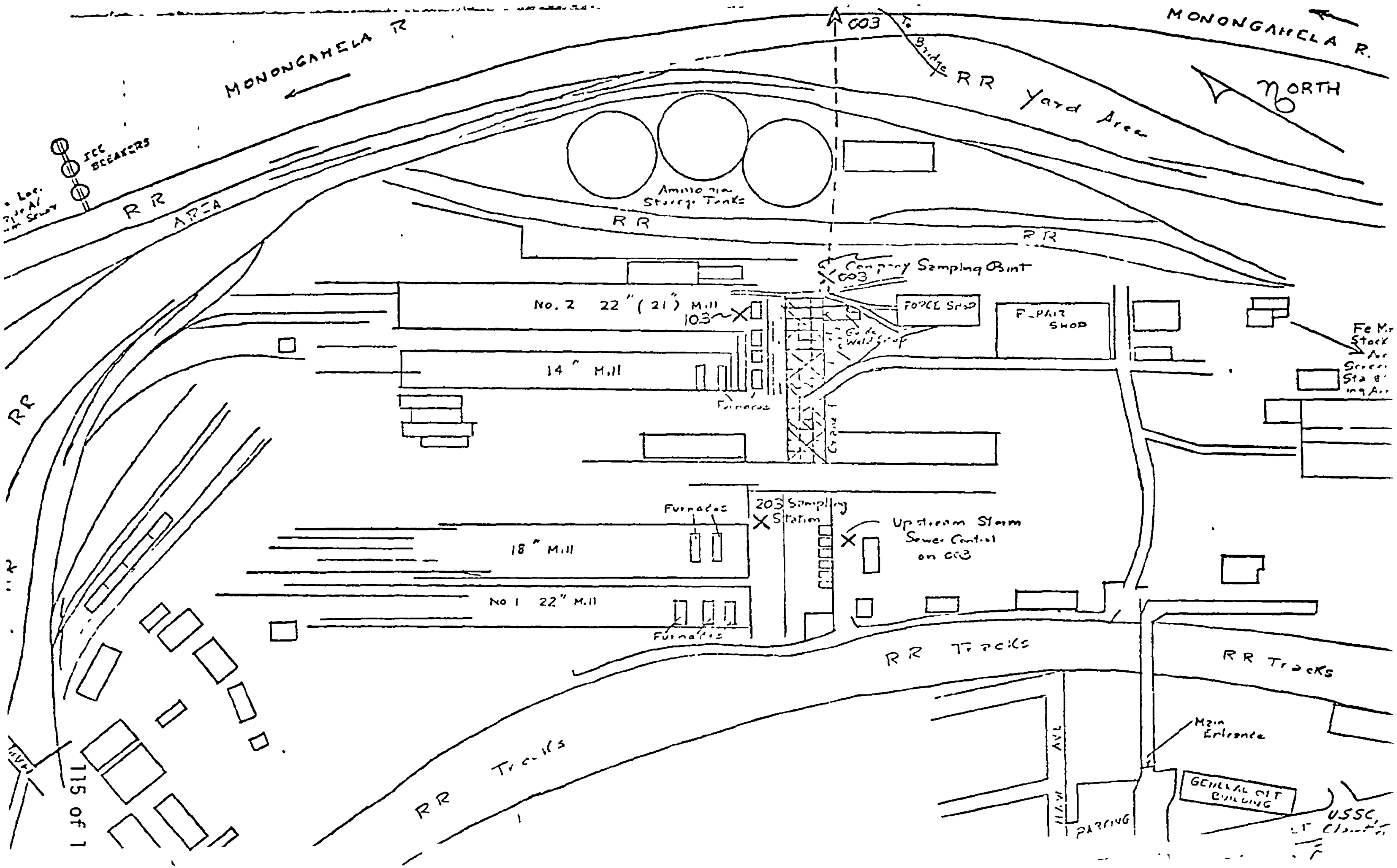
The Clairton coal storage piles are located directly north of the road tar terminal station i.e. Outfall 017, extending about one half mile downriver to the Marine Ways area. Coal reserves appeared low probably due to the coal miners' strike which had started around mid-August, 1975. Due to press of time we did not closely inspect this area. Two main storm sewers cross under this area, one just north of the Glassport Bridge and the other about 1,000 ft further downstream. We will attempt to obtain further technical data on these sewers from both the city of Clairton and USSC. Although sampling of sewers in the coal yards is not planned, if new data indicates the need, revisions will be made in the NEIC study plan. USSC personnel stated there is no discharge from within this sector except possibly for storm runoff. No drains are reported directly in the coal storage yards. Manholes are present on the city sewers traversing this sector of which there are at least three (sewers) according to Morrison although the maps only show two such systems. We also need to obtain additional data on other storm sewers as promised by Morrison, e. g. The Maple Street storm sewer discharging to the Monongahela River almost directly east of the Keystone Plant Office. In this same (Maple Street outfall) area along the River we noted two waste oil storage tanks. Morrison stated each tank holds roughly 87,000 gallons of waste oil. This oil is added to the pulverized coal to impart better properties to the coal before entering the coke batteries.

TENTATIVE SELECTION OF NEIC SAMPLING LOCATIONS FOR
USSC, CLAIRTON COKE WORKS FACILITY, CLAIRTON, PA

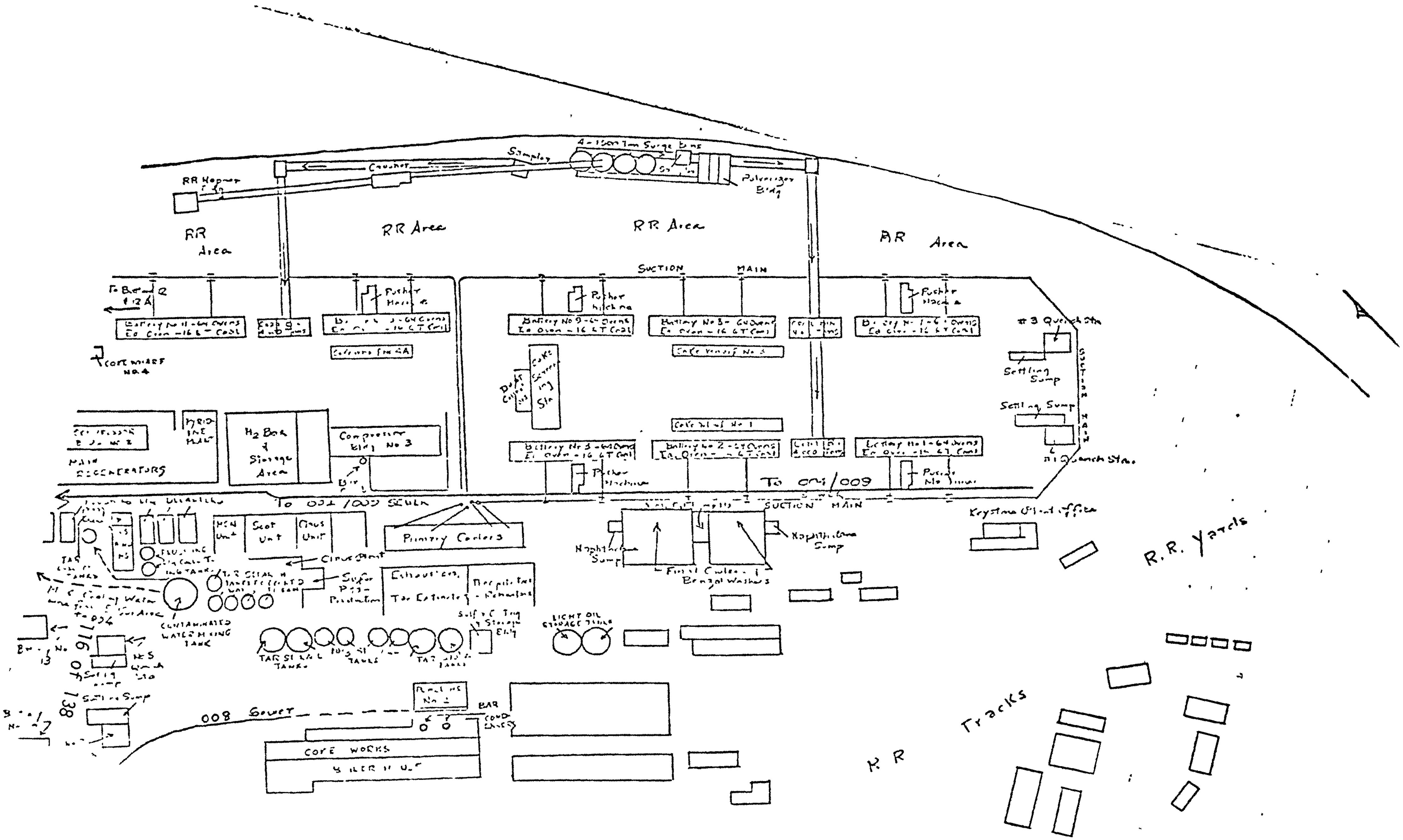
Station No or Description	Primary		Secondary	Comments
30/54-inch storm sewers at river			x	Only one sewer flowing
SW Water Intake	x			
001	x			
002 Upstream	x			On storm sewer at car tipple
002 (at river)	x			(Chk 102 just prior to survey)
003 (upstream, storm sewer)	-		-	To be sampled only if necessary
003 (at river)	x			-
CW Water Intake	x			-
022 (USSC designated)			x	1-2 sampling days only, no flow determination necessary
023 (USSC designated)			x	1-2 sampling days only, no flow determination necessary
009			x	To be sampled only if flowing
018			x	Flow measurement unlikely
015			x	Flow estimate only
115			x	Flow estimate only
013	x			
014/114	x			Attempt to sample and gage the combined 014/114 dischg.
016			x	1-2 days sampling, flow estimate may suffice
005	x			To be sampled @ USSC manhole 005. Major disadvantage is rel long distance from Peters Creek
006			x	Recommendation against smplg.
007			x	" " "
010	x			
011			x	1-2 days sampling only. No flow meas. necessary
012	x			
019			x	Recommendation against smplg
State St Storm Sewer (Upstream of USSC Power Plant No. 1 Discharge)	x			
State St Storm Sewer at Peters Creek	x			
008	x			Approx. 40 ft from State St.
Peters Creek (upstream)	x			Near Ravensburg Br.
Peters Creek at mouth	x			
020 (downstream)	x			Approx. 100 ft from Peters Cr.
020 (USSC designated monitoring point)	x			Approx. 350 ft from Peters Cr.
Influent to Treatment Plant on 020	x			
004 (downstream)	x			Approx. 350 ft from Peters Cr.
004 (USSC designated monitoring/ sampling pt)	x			Approx. 1,100 ft from Peters Cr.
017	x	or	x	Preference is for location just below crest of hill



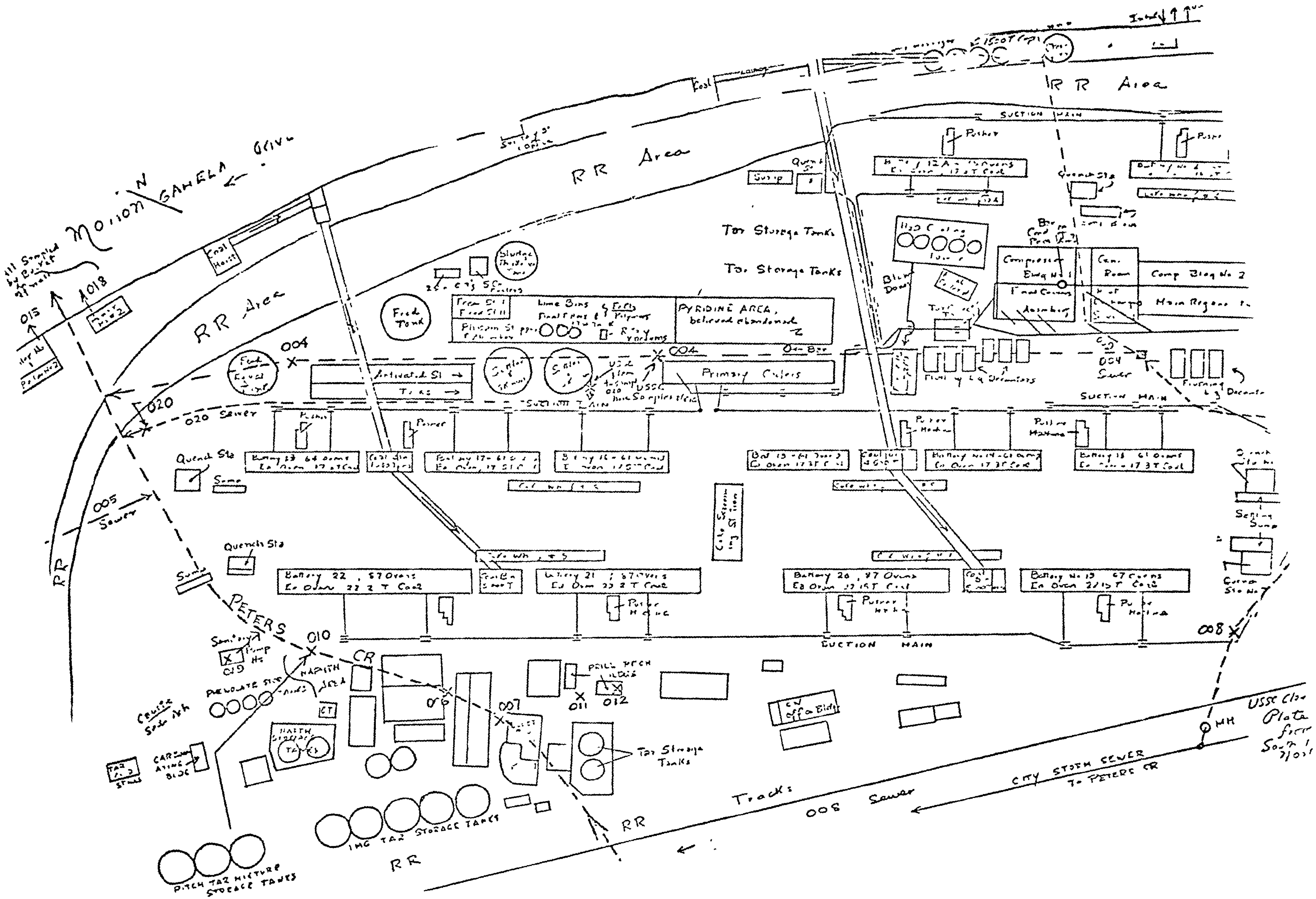
USSC, Clairton
Plate 1
from South to North

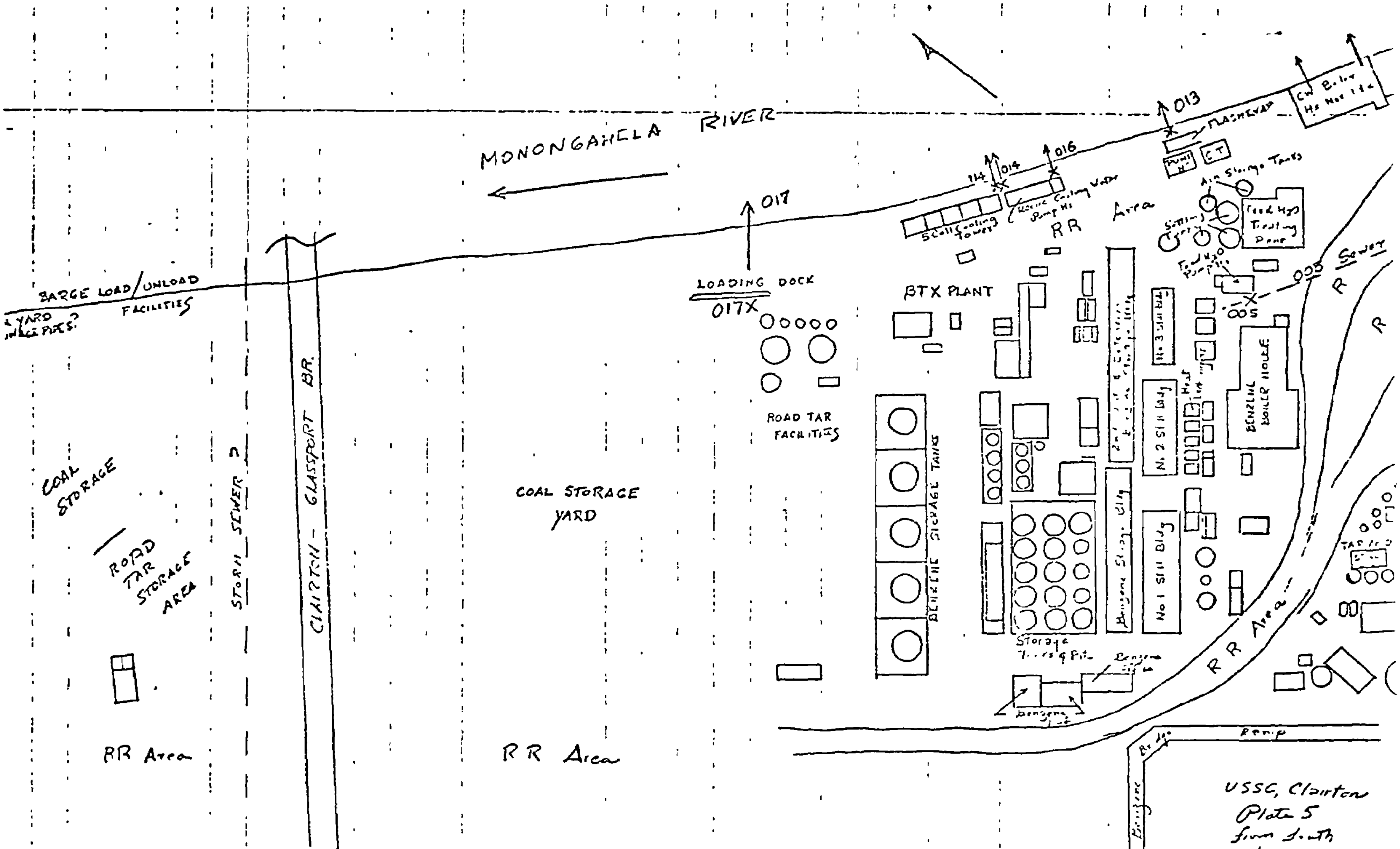


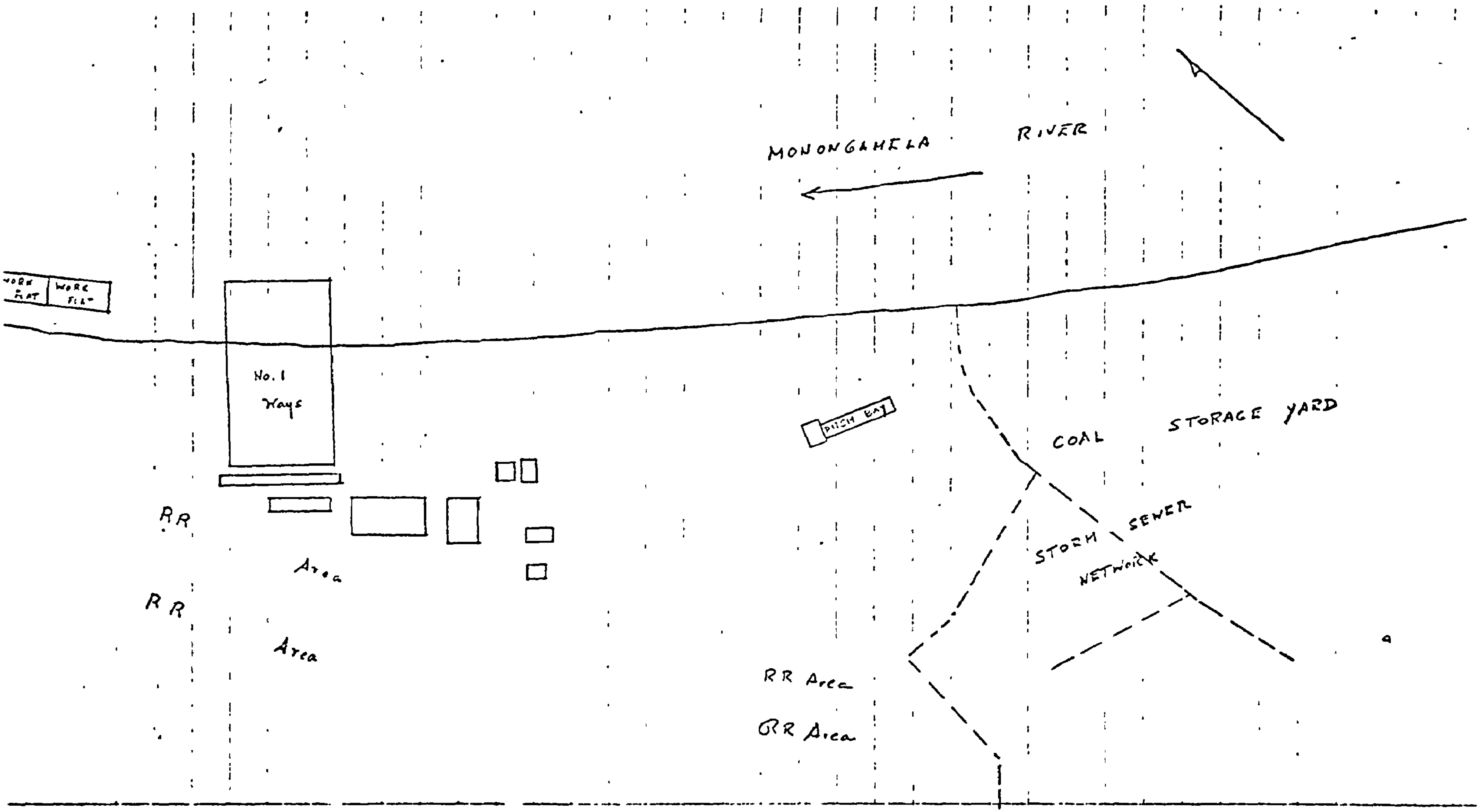
MONONGAHELA R
MONONGAHELA R.
NORTH
003
To Bridge
RR Yard Area
ICE BREAKERS
RR AREA
Ammonia Storage Tanks
RR
RR
Company Sampling Point
003
No. 2 22"(21") Mill
103
FORGE Shop
REPAIR SHOP
14" Mill
Furnaces
RR
203 Sampling Station
Furnaces
18" Mill
Upstream Storm Sewer Control on 003
No 1 22" Mill
Furnaces
RR Tracks
RR Tracks
RR Tracks
Main Entrance
PARKING
GENERAL OFFICE BUILDING
USSC



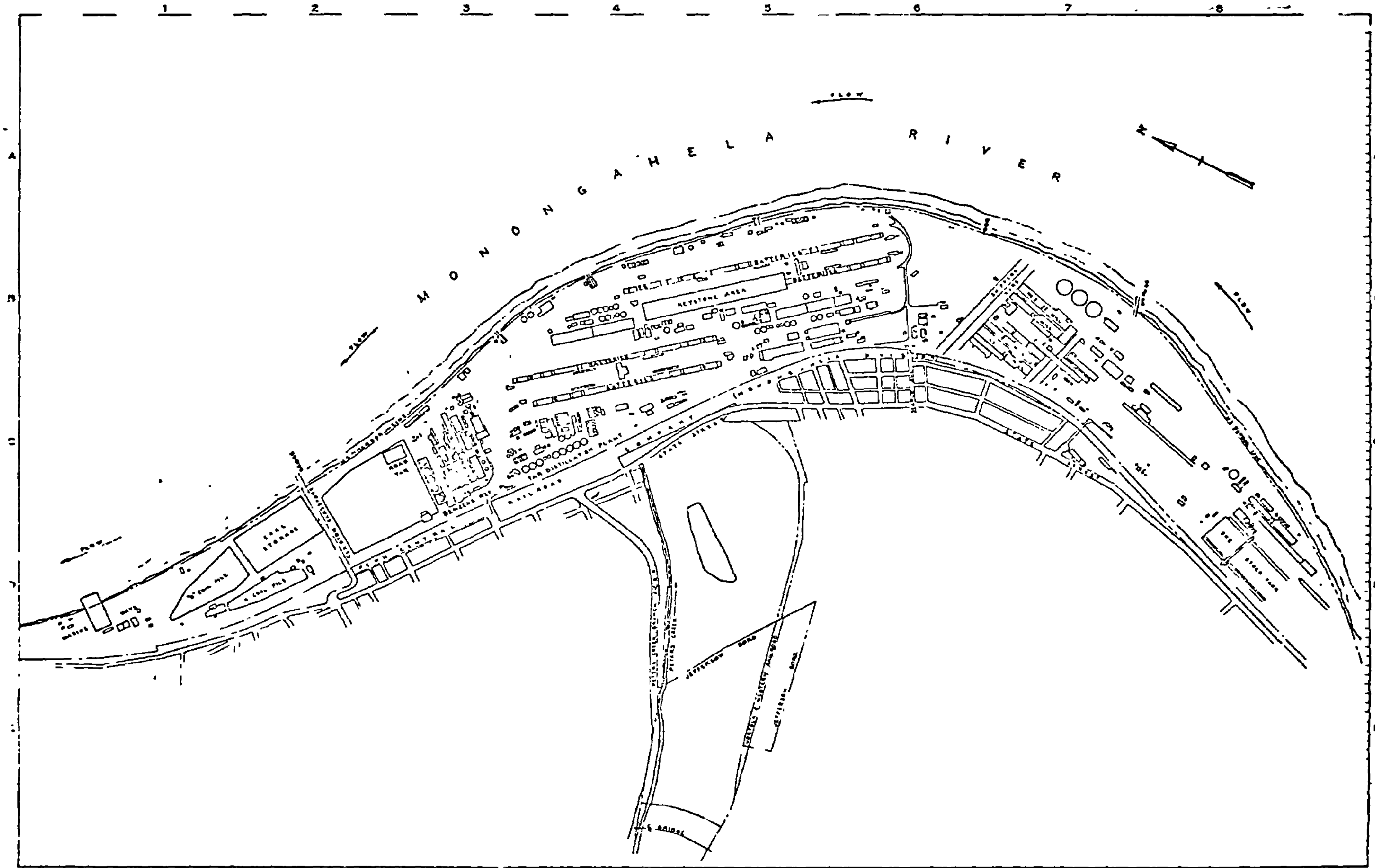
USSC, Clairt.
Plate 3
from South


Monongahela River
RR Area
RR Area
RR Area
RR Area
Coal Hoist
015
018
020
020 Sewer
005
Sewer
Feed Tank
Sludge
Tar Storage Tanks
Tar Storage Tanks
PYRIDINE AREA, believed abandoned
Lime Bins
004
004
004 Sewer
Activated Sl
Primary Coolers
USSC
Suction Main
Suction Main
Suction Main
Pusher
Pusher
Quench Sta
Quench Sta
Quench Sta
Sump
Sump
Compressor Bldg No 1
Comp Bldg No 2
Main Regen
Blow Down
Final Coolers
Absorbers
Battery 22 57 Ovens
Battery 21 57 Ovens
Battery 20 57 Ovens
Battery No 19 57 Ovens
Pusher
PETERS CR
010
019
Sanitary Pump Hs
NAPHTH
Phenolate Sto
Crude Sto Tnk
007
011
012
008
MH
Tar Storage Tanks
Pitch Tar Mixture Storage Tanks
Tracks
RR
RR
RR
008 Sewer
City Storm Sewer To Peters Cr
USSC


MONONGAHELA RIVER
BARGE LOAD/UNLOAD FACILITIES
LOADING DOCK
017
017X
014
016
013
005
BTX PLANT
ROAD TAR FACILITIES
COAL STORAGE
ROAD TAR STORAGE AREA
STORM SEWER
CLAIRTON - GLASSPORT BR.
COAL STORAGE YARD
RR Area
R R Area
BENZENE BOILER HOUSE
No 1 Still Bldg
No 2 Still Bldg
Storage Tanks & Pits
Sewer
C T
USSC, Clairton
Plate 5
from South
to North.



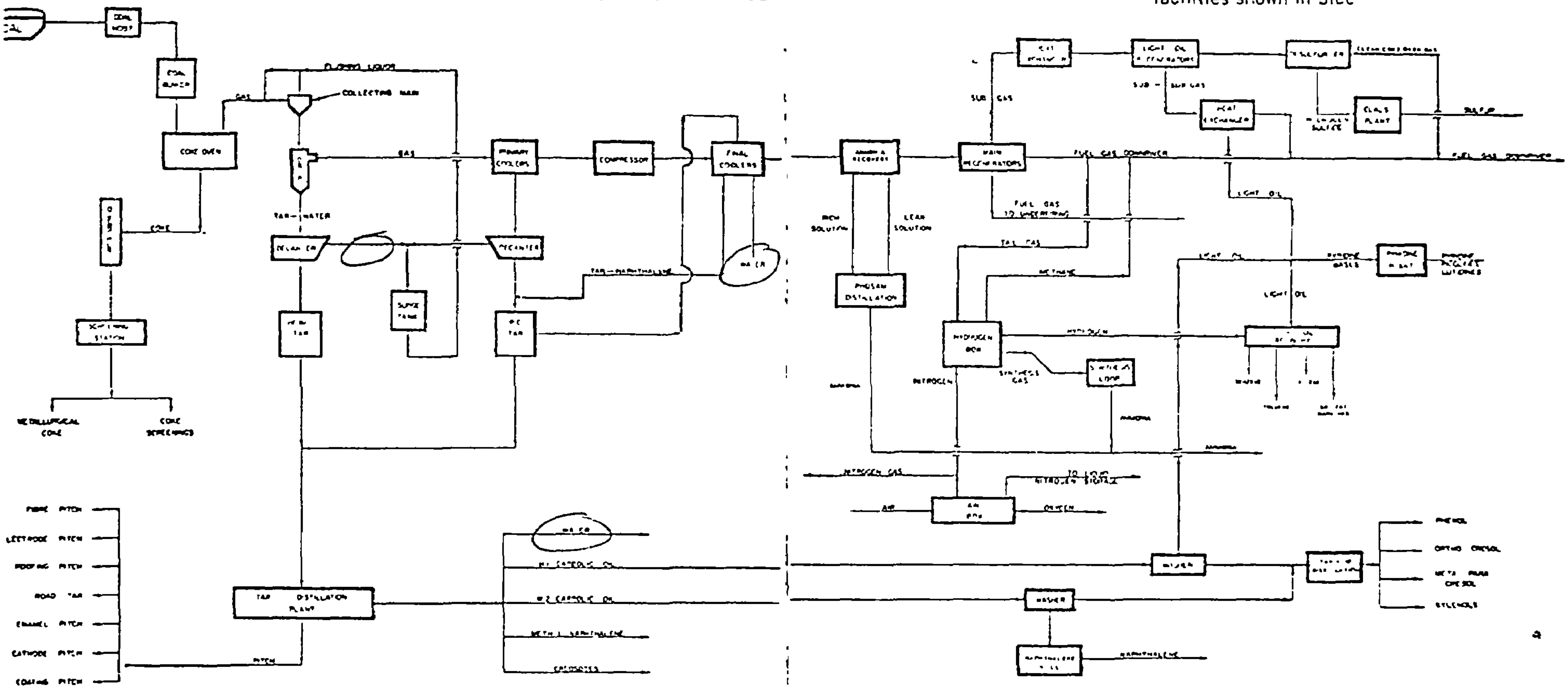
USSC, Clairton
Plate 6
from South to North

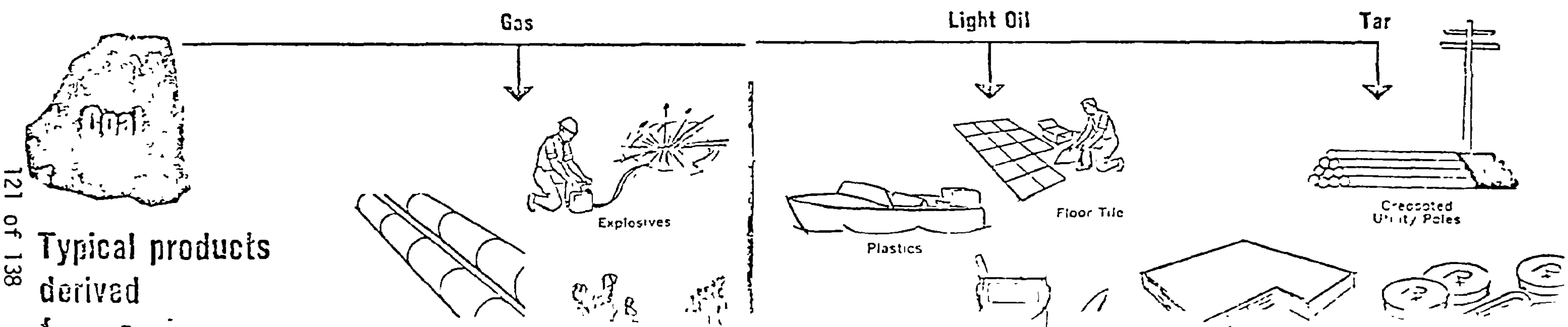


1
2
3
4
5
6
7
8
A
B
C
D
E
FLOW
MONONGAHELA RIVER
N
KEYSTONE AREA
BATTERIES
TAR DISTILLATION PLANT
COMPANY
STATE STREET
RAILROAD
COAL STORAGE

From Coal to Chemicals at USS Clairton Works

cryogenic gas processing and anhydrous ammonia facilities shown in blue





APPENDIX B

Study Methods

STUDY METHODS

SAMPLING AND COMPOSITING TECHNIQUES

Information was obtained through interviews with plant officials on water pollution control practices and in-plant surveys.

Influent water samples from the Monongahela River, collected from the two pumphouses, were time-composited (i.e., equal portions from each grab sample). Samples from outfall 003, 004, 020, influent to bioplant and effluent from bioplant, were flow-composited according to instantaneous flow readings obtained at the point of collection. Aliquots for the composites were collected manually every three hours. Grab samples were collected daily from all other discharges.

Samples for chemical analyses were collected in clean containers. Each time a sample was collected field measurements of pH, temperature and conductivity were made. Samples were delivered to the NEIC mobile laboratory (McKeesport, Pennsylvania) and analyzed for selected parameters (e.g., oil/grease and total suspended solids). Appropriate preserved aliquots were shipped to the NEIC laboratory (Denver, Colorado) and analyzed for total and amenable cyanide, heavy metals, ammonia, phenolic materials and organics. All samples collected were split with USSC.

FLOW MEASUREMENT TECHNIQUES

Flow monitoring of discharges is specified in the NPDES permit proposed by Region III, EPA. Flow measurements of selected discharge points by NEIC personnel commenced January 28, 1976.

Flow determinations were made using dye dilution with fluorometric detection technique. In this procedure, a dye of known concentration is injected at constant rate upstream of the sample site, an adequate distance to insure mixing. Samples are collected and the dye concentration is determined by a fluorometer. Knowing the dye injection rate, initial dye concentration and concentration after the dye has mixed with the wastewater flow, the flow can be calculated.

The G. K. Turner Model III fluorometer was used. Calibration of the fluorometer was accomplished daily using dye standards prepared in the NEIC laboratory. Rhodamine WT dye produced exclusively by duPont DeNemours, E. I. and Company, was selected as the tracer because of its low sorptive tendency and high stability to varying pH conditions.

Background investigations of all stations were conducted to determine if any substances in the waste stream would fluoresce in the range that could induce errors in flow determinations. Background samples were taken each time samples for flow determination were collected. The fluorescence measured on background samples was subtracted from the fluorescence measured on the flow samples.

Special precautions taken to insure against interference in flow measurements consisted of: 1) cuvettes triple-rinsed with distilled water between each sample; 2) cuvettes cleaned daily with solvent; 3) cuvettes filled with distilled water and fluorescence measured twice daily to insure against contamination from operator handling; 4) fluorometer checked for "0" reference between each reading and after use, using "0" reference blank; 5) all readings were taken on upward movement of indicator to eliminate any error due to gear "slop;" and 6) rubber gloves were worn when handling raw dye to avoid contamination during fluorometer operation.

Company-installed meters were used to obtain intake flows and bioplant influent and effluent flows. USSC personnel calibrate these flow meters every six months. The last calibration was reported to have been completed in September 1975.

APPENDIX C

Analytical Procedures and Quality Control

ANALYTICAL PROCEDURES AND QUALITY CONTROL

Samples collected during this survey were analyzed, where appropriate, according to procedures approved by EPA for the monitoring of industrial effluents.* The analytical procedures for characterizing trace organic chemical pollutants are described below. The remaining procedures are listed in the following table.

Parameter	Method	Reference
Cr	Atomic absorption	EPA Methods for Chemical Analyses of Water and Wastewater, 1971, p 83
TSS	Gravimetric	ibid., p 278
Cyanide	Distillation, colorimetric	ibid., p 41
Phenol	Automated colorimetric	EPA Methods for Chemical Analyses of Water and Wastes, 1974, p 243
Ammonia	Automated phenate	ibid., p 168
Oil/grease	Freon extractable material	Standard Methods, 13th Ed., p 254
Hexavalent chromium	Colorimetric	ibid., p 429

Samples for organic chemical pollutant analysis were collected in clean, solvent-rinsed one-gallon glass containers. These samples were air-freighted to Denver and extracted with methylene chloride. The extract was dried with anhydrous sodium sulfate, concentrated, exchanged

* *Federal Register, Vol. 40, No. 111, June 9, 1975*

into acetone and analyzed by hydrogen flame ionization gas chromatography. Those samples that showed adequate response were set aside for characterization by combined gas chromatography-mass spectrometry (GC/MS). The GC/MS analyses were carried out with a Finnigan Model 1015 Quadropole Mass Spectrometer and a Systems Industries Model 150 computerized data system. Mass spectra were compared to data files in the NIH Computer System and also to listing in the *Eight Peak Index of Mass Spectra*, Second Edition, 1974, compiled by the Mass Spectrometry Data Center. All identifications are considered preliminary until authentic standards of the suspected chemical compounds can be obtained and analyzed under similar conditions to match the mass spectrum and gas chromatographic retention time. This procedure does not detect highly volatile organic chemical pollutants since their presence is masked by the extraction solvent.

Reliability of the analytical results was documented through an active Analytical Quality Control Program. As part of this program, replicate analyses were normally performed with every tenth sample to ascertain the reproducibility of the results. In addition, where appropriate, every tenth sample was spiked with a known amount of the constituents to be measured and reanalyzed to determine the percent recovery. These results were evaluated in regard to past AQC data on the precision, accuracy and detection limits of each test. On the basis of these findings, all analytical results reported for the survey were found to be acceptable with respect to the precision and accuracy control of this laboratory.

APPENDIX D

Chain of Custody Procedures

ENVIRONMENTAL PROTECTION AGENCY
Office Of Enforcement
NATIONAL ENFORCEMENT INVESTIGATIONS CENTER
Building 53, Box 25227, Denver Federal Center
Denver, Colorado 80225

July 24, 1974

CHAIN OF CUSTODY PROCEDURES

General:

The evidence gathering portion of a survey should be characterized by the minimum number of samples required to give a fair representation of the effluent or water body from which taken. To the extent possible, the quantity of samples and sample locations will be determined prior to the survey.

Chain of Custody procedures must be followed to maintain the documentation necessary to trace sample possession from the time taken until the evidence is introduced into court. A sample is in your "custody" if:

1. It is in your actual physical possession, or
2. It is in your view, after being in your physical possession, or
3. It was in your physical possession and then you locked it up in a manner so that no one could tamper with it.

All survey participants will receive a copy of the survey study plan and will be knowledgeable of its contents prior to the survey. A pre-survey briefing will be held to re-appraise all participants of the survey objectives, sample locations and Chain of Custody procedures. After all Chain of Custody samples are collected, a de-briefing will be held in the field to determine adherence to Chain of Custody procedures and whether additional evidence type samples are required.

Sample Collection:

1. To the maximum extent achievable, as few people as possible should handle the sample.
2. Stream and effluent samples shall be obtained, using standard field sampling techniques.
3. Sample tags (Exhibit I) shall be securely attached to the sample container at the time the complete sample is collected and shall contain, at a minimum, the following information: station number, station location, date taken, time taken, type of sample, sequence number (first sample of the day - sequence No. 1, second sample - sequence No. 2, etc.), analyses required and samplers. The tags must be legibly filled out in ballpoint (waterproof ink).

Sample Collection (Continued)

4. Blank samples shall also be taken with preservatives which will be analyzed by the laboratory to exclude the possibility of container or preservative contamination.

5. A pre-printed, bound Field Data Record logbook shall be maintained to record field measurements and other pertinent information necessary to refresh the sampler's memory in the event he later takes the stand to testify regarding his action's during the evidence gathering activity. A separate set of field notebooks shall be maintained for each survey and stored in a safe place where they could be protected and accounted for at all times. Standard formats (Exhibits II and III) have been established to minimize field entries and include the date, time, survey, type of samples taken, volume of each sample, type of analysis, sample numbers, preservatives, sample location and field measurements such as temperature, conductivity, DO, pH, flow and any other pertinent information or observations. The entries shall be signed by the field sampler. The preparation and conservation of the field logbooks during the survey will be the responsibility of the survey coordinator. Once the survey is complete, field logs will be retained by the survey coordinator, or his designated representative, as a part of the permanent record.

6. The field sampler is responsible for the care and custody of the samples collected until properly dispatched to the receiving laboratory or turned over to an assigned custodian. He must assure that each container is in his physical possession or in his view at all times, or locked in such a place and manner that no one can tamper with it.

7. Colored slides or photographs should be taken which would visually show the outfall sample location and any water pollution to substantiate any conclusions of the investigation. Written documentation on the back of the photo should include the signature of the photographer, time, date and site location. Photographs of this nature, which may be used as evidence, shall also be handled recognizing Chain of Custody procedures to prevent alteration.

Transfer of Custody and Shipment:

1. Samples will be accompanied by a Chain of Custody Record which includes the name of the survey, samplers signatures, station number, station location, date, time, type of sample, sequence number, number of containers and analyses required (Fig. IV). When turning over the possession of samples, the transferor and transferee will sign, date and time the sheet. This record sheet

allows transfer of custody of a group of samples in the field, to the mobile laboratory or when samples are dispatched to the NFIC - Denver laboratory. When transferring a portion of the samples identified on the sheet to the field mobile laboratory, the individual samples must be noted in the column with the signature of the person relinquishing the samples. The field laboratory person receiving the samples will acknowledge receipt by signing in the appropriate column.

2. The field custodian or field sampler, if a custodian has not been assigned, will have the responsibility of properly packaging and dispatching samples to the proper laboratory for analysis. The "Dispatch" portion of the Chain of Custody Record shall be properly filled out, dated, and signed.

3. Samples will be properly packed in shipment containers such as ice chests, to avoid breakage. The shipping containers will be padlocked for shipment to the receiving laboratory.

4. All packages will be accompanied by the Chain of Custody Record showing identification of the contents. The original will accompany the shipment, and a copy will be retained by the survey coordinator.

5. If sent by mail, register the package with return receipt requested. If sent by common carrier, a Government Bill of Lading should be obtained. Receipts from post offices and bills of lading will be retained as part of the permanent Chain of Custody documentation.

6. If samples are delivered to the laboratory when appropriate personnel are not there to receive them, the samples must be locked in a designated area within the laboratory in a manner so that no one can tamper with them. The same person must then return to the laboratory and unlock the samples and deliver custody to the appropriate custodian.

Laboratory Custody Procedures:

1. The laboratory shall designate a "sample custodian." An alternate will be designated in his absence. In addition, the laboratory shall set aside a "sample storage security area." This should be a clean, dry, isolated room which can be securely locked from the outside.

2. All samples should be handled by the minimum possible number of persons.

3. All incoming samples shall be received only by the custodian, who will indicate receipt by signing the Chain of Custody Record Sheet

accompanying the samples and retaining the sheet as permanent records. Couriers picking up samples at the airport, post office, etc. shall sign jointly with the laboratory custodian.

4. Immediately upon receipt, the custodian will place the sample in the sample room, which will be locked at all times except when samples are removed or replaced by the custodian. To the maximum extent possible, only the custodian should be permitted in the sample room.

5. The custodian shall ensure that heat-sensitive or light-sensitive samples, or other sample materials having unusual physical characteristics, or requiring special handling, are properly stored and maintained.

6. Only the custodian will distribute samples to personnel who are to perform tests.

7. The analyst will record in his laboratory notebook or analytical worksheet, identifying information describing the sample, the procedures performed and the results of the testing. The notes shall be dated and indicate who performed the tests. The notes shall be retained as a permanent record in the laboratory and should note any abnormalities which occurred during the testing procedure. In the event that the person who performed the tests is not available as a witness at time of trial, the government may be able to introduce the notes in evidence under the Federal Business Records Act.

8. Standard methods of laboratory analyses shall be used as described in the "Guidelines Establishing Test Procedures for Analysis of Pollutants," 38 F.R. 28758, October 16, 1973. If laboratory personnel deviate from standard procedures, they should be prepared to justify their decision during cross-examination.

9. Laboratory personnel are responsible for the care and custody of the sample once it is handed over to them and should be prepared to testify that the sample was in their possession and view or secured in the laboratory at all times from the moment it was received from the custodian until the tests were run.

10. Once the sample testing is completed, the unused portion of the sample together with all identifying tags and laboratory records, should be returned to the custodian. The returned tagged sample will be retained in the sample room until it is required for trial. Strip charts and other documentation of work will also be turned over to the custodian.

11. Samples, tags and laboratory records of tests may be destroyed only upon the order of the laboratory director, who will first confer with the Chief, Enforcement Specialist Office, to make certain that the information is no longer required or the samples have deteriorated.

EXHIBIT I

★ GPO IMPRINT

EPA, NATIONAL ENFORCEMENT INVESTIGATIONS CENTER

Station No.	Date	Time	Sequence No.

Station Location

________Grab
________Comp.

________BOD
________Solids
________COD
________Nutrients
________Metals
________Oil and Grease
________D O.
________Bact.
________Other

Remarks/Preservative:

Samplers:

Front

ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF ENFORCEMENT
NATIONAL ENFORCEMENT INVESTIGATIONS CENTER
BUILDING 53, BOX 25227, DENVER FEDERAL CENTER
DENVER, COLORADO 80225

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Back

EXHIBIT II

FOR ______________________________ SURVEY, PHASE ______, DATE ______________

TYPE OF SAMPLE ______________________________

STATION NUMBER	STATION DESCRIPTION	TOTAL VOLUME	TYPE CONTAINER	PRESERVATIVE	ANALYSES REQUIRED																					
					NUTRIENTS	BOD	COD	TOC	TOTAL SOLIDS	SUSPENDED SOLIDS	ALKALINITY	DO	pH*	CONDUCTIVITY*	TEMPERATURE*	TOTAL COLIFORM	FECAL COLIFORM	TURBIDITY	OIL AND GREASE	METALS	BACTI	PESTICIDES	HERB	TRACE ORGANICS	PHENOL	CYANIDE

REMARKS

E....BIT ...

Samplers: ______________________

FIELD DATA RECORD

STATION	NUMBER	DATE	TIME	TEMPERATURE °C	CONDUCTIVITY μmhos/cm	pH S.U.	D O. mg/l	Gage Ht. or Flow Ft or CFS

EXHIBIT IV

ENVIRONMENTAL PROTECTION AGENCY
Office Of Enforcement
NATIONAL ENFORCEMENT INVESTIGATIONS CENTER
Building 53, Box 25227, Denver Federal Center
Denver, Colorado 80225

CHAIN OF CUSTODY RECORD

SURVEY	SAMPLERS: (Signature)

STATION NUMBER	STATION LOCATION	DATE	TIME	SAMPLE TYPE Water Comp	SAMPLE TYPE Water Grab	SAMPLE TYPE Air	SEQ NO	NO OF CONTAINERS	ANALYSIS REQUIRED

Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Relinquished by: (Signature)	Received by Mobile Laboratory for field analysis: (Signature)	Date/Time

Dispatched by: (Signature)	Date/Time	Received for Laboratory by:	Date/Time
Method of Shipment:			

Distribution: Orig.—Accompany Shipment
1 Copy—Survey Coordinator Field Files

GPO 834-8