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OFFICE OF ENFORCEMENT

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Characterization and Evaluation of Wastewater Sources United States Steel Corporation Irvin Plant Pittsburgh, Pennsylvania

NATIONAL ENFORCEMENT INVESTIGATIONS CENTER

DENVER, COLORADO

AND

REGION III, PHILADELPHIA, PENNSYLVANIA

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Environmental Protection Agency
Office of Enforcement

CHARACTERIZATION AND EVALUATION OF WASTEWATER SOURCES
UNITED STATES STEEL CORPORATION
IRVIN PLANT, PITTSBURGH, PENNSYLVANIA
August 18-28, 1975

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National Enforcement Investigations Center
Denver, Colorado

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I. INTRODUCTION

The Irvin Plant, which commenced operation in 1938, is primarily a steel finishing operation. Steel slabs, up to 8-inches thick and 235-inches long, are received from other plants, primarily the Edgar Thomson Plant and converted into finished steel for the automotive industry and tin products for container manufacturers. The Irvin Plant has an 80-inch hot strip mill; 36-inch, 56-inch, 80-inch and 84-inch pickling lines; 5-stand cold-rolling mill; annealing lines; sheet steel finishing lines (i.e., temper-rolled, side-trimmed, and/or split and recoiled); electrolytic tin lines; and galvanizing, aluminum and terne* coating lines.

Process water, estimated at a maximum of 265,000 m^3/day (70 mgd), is obtained from the Monongahela River. A portion receives treatment, consisting of coagulation and sand filtration in the old and new (No. 1 and No. 3) water treatment facilities. Daily water use rates of treated and untreated water were unavailable from company officials.

Wastewater is discharged from two outfalls (005 and 006)** to the Monongahela River [Figure 1]. An acid neutralization treatment facility, a waste oil treatment facility and a domestic wastewater treatment facility are located at the Irvin Plant. Waste oil treatment effluent is discharged through outfall 005 and domestic effluent through outfall 006. Wastes from the acid neutralization treatment facility are hauled by railroad tank car to an approved dump for disposal.

The Environmental Protection Agency, Region III, requested the National Enforcement Investigations Center (NEIC) to conduct an intensive survey of the U. S. Steel Works in the Pittsburgh area to characterize and evaluate existing wastewater discharges. NEIC conducted a wastewater survey at the Irvin Plant from August 18-28, 1975. Outfalls 005 and 006, intermediate sampling points, and raw and treated water supplies were monitored for six days between August 21 and 28. Effluent from the domestic wastewater treatment plant was monitored August 21 and 22.

*Terne metal plating is a mixture of approximately 85 percent lead and 15 percent tin.
**These numbers refer to permit discharge points.

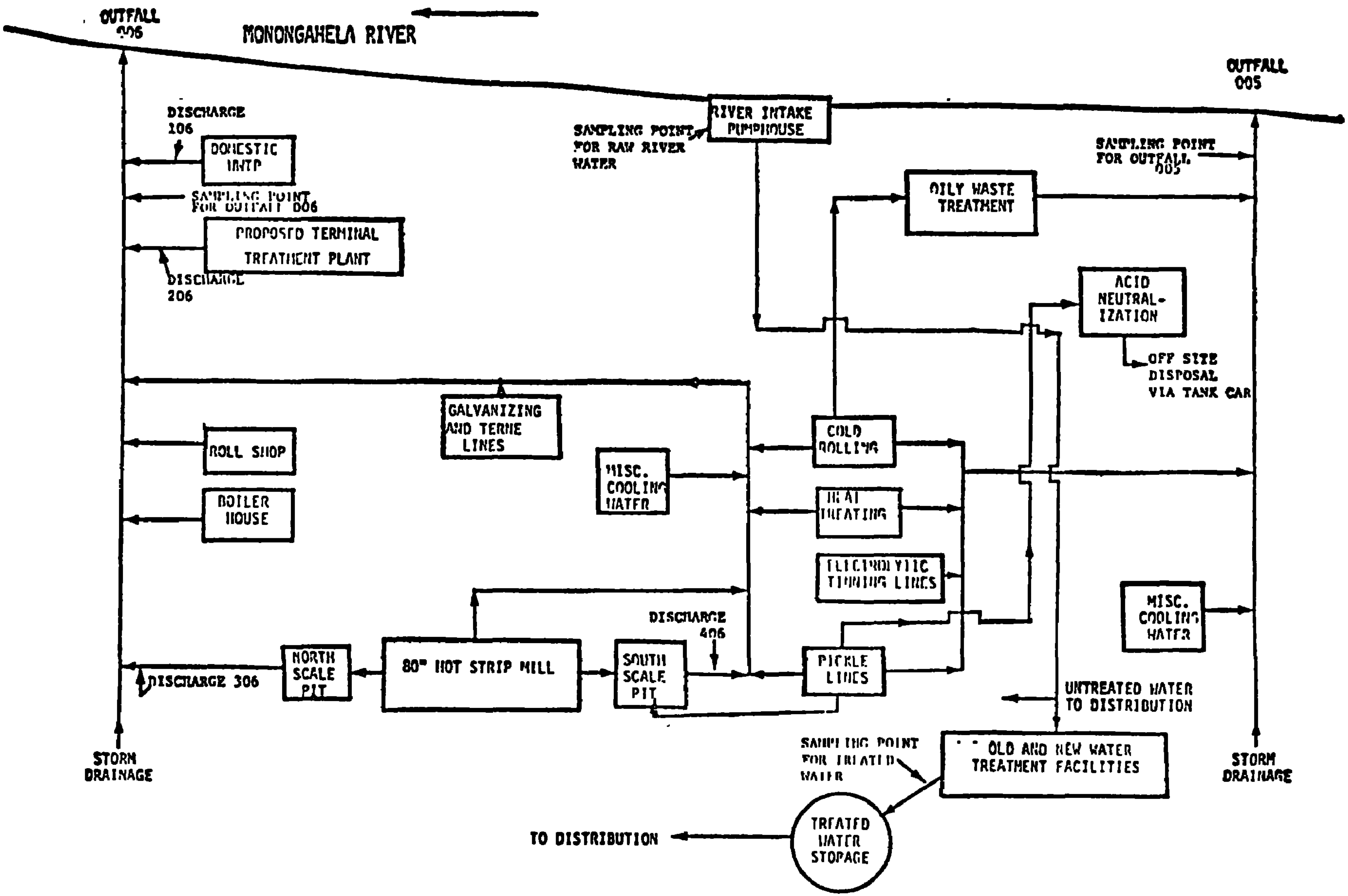

FIGURE 1. Wastewater Schematic Flow Diagram - USSC Irvin
(Information courtesy USSC)

II. SUMMARY

1. From August 18-28, 1975, wastewater discharges from outfalls 005, 006, 106, 306 and 406 were monitored. Raw and treated water from the Monongahela River was sampled to determine net pollutant concentrations discharged. In addition, influent and effluent from the oily waste treatment system was sampled for three consecutive days from August 25-27. Flow was measured and pollutant loads were calculated for each outfall with the exception of the oily waste treatment system.

2. Outfall 005 contains oily waste treatment facility effluent, pickling rinse waters, heat treating waters, non-contact cooling water, process and cooling wastes from electrolytic tinning, miscellaneous cooling waters and area storm drainage. Company officials have reported on self-monitoring data, flows ranging from 25,000 to 47,300 m^3/day (6.6-12.5 mgd). During NEIC monitoring, flows ranged from 51,200 to 71,400 m^3/day (13.5-18.9 mgd). USSC has proposed effluent limitations for total suspended solids, oil and grease and dissolved iron. The proposed limitations and the NEIC monitoring data are as follows:

	USSC Proposed Limitations		Survey Data	
	Daily Average kg/day (lb/day)	Daily Maximum kg/day(lb/day)	Daily Average kg/day(lb/day)	Daily Maximum kg/day(lb/day)
TSS	221,223 (487,276	664,467 (1,461,828)	1770 (3890)	3570 (7880)
Oil & Grease		21,015 (46,236)		5650 (12,400)
Dissolved Iron		2640 (5808)		3600 (7900)

The proposed limitation on TSS is a net limitation while oil and grease and dissolved iron are gross limitations. Survey data is tabulated accordingly. Suspended solids and oil and grease loads were less than 1 and 33% respectively of proposed limitations. Dissolved iron exceeded the proposed limitation on two of six days sampled. The pH of wastewaters discharged from outfall 005 ranged from 2.6 to 9.6. USSC has proposed that outfall 005 not be limited to a minimum pH in order to more accurately describe the quality of the current discharge.

Grab samples for organic analysis collected August 25 and 27, indicated the presence of petroleum hydrocarbons, primarily normal paraffins. These hydrocarbons ranged from C_9 to c_{20} and appeared in a uniform pattern suggesting light refined oils. Triphenyl phosphate was also identified. Quantitative results are as follows:

Compound	8/25/75 µg/l	8/27/75 µg/l
C_9 - Nonane	Trace	4
C_{10} - Decane	10	23
C_{11} - Undecane	23	55
C_{12} - Dodecane	20	42
C_{13} - Tridecane	17	26
C_{14} - Tetradecane	14	19
C_{15} - Pentadecane	8	9
C_{16} - Hexadecane	5	5
C_{17} - Heptadecane	3	5
C_{18} - Octadecane	3	5
C_{19} - Nonadecane	3	5
C_{20} - Eicosane	Trace	4
Triphenyl Phosphate	220	240

3. The oily waste treatment system consists of an old and a new section with a combined treatment capacity of 27,200 m^3/day (7.2 mgd). The company has not installed equipment to measure flow, however, oil and grease and TSS concentrations were determined for influent to the oil and new sections and for the combined effluent. Results are summarized below:

	Influent to Old Section	Influent to New Section	Combined Effluent
Oil & Grease			
Range (mg/l)	71-420	150-4800	< 1-34
Average (mg/l)	188	1727	9
TSS			
Range (mg/l)	96-1600	120-5600	< 10-12
Average	428	1226	< 10

Based on average values of grab samples, treatment efficiency was ≥ 95 and ≥ 97 percent for oil and grease and TSS removal respectively. Actual treatment efficiency could be determined only by knowing the influent flow to each section of the system.

4. Outfall 006 contains wastewater from the north (306) and south (406) scale pits, the domestic WWTP (106), miscellaneous cooling water, heat treating water, cooling tower blowdown, boiler house effluents and water treatment sludges. The company estimated the flow between 99,500 m^3/day (26.3 mgd) and 193,000 m^3/day (51 mgd). During the NEIC survey, outfall 006 was sampled downsewer of all inputs except the domestic WWTP effluent. Daily flows ranged from 146,000 m^3/day (38.6 mgd) to 258,000 m^3/day (68.2 mgd). USSC has proposed effluent limitations

for TSS, oil and grease, phenols, dissolved iron and dissolved zinc. The proposed limitations, compared below with NEIC results, are all gross except TSS which is net.

	USSC Proposed Limitations		Survey Data	
	Daily Average kg/day(lb/day)	Daily Maximum kg/day(lb/day)	Daily Average kg/day(lb/day)	Daily Maximum kg/day(lb/day)
TSS	621,525 (1,368,998)	1,864,575 (4,106,994)	7500 (16,500)	11,700 (25,600)
Oil & Grease		38,249 (84,147)		8800 (19,400)
Phenols	36 (80)	109 (240)	3.3 (7.3)	7.6 (16.7)
Dissolved Iron	33 (73)	99 (217)	53 (116)	190 (420)
Dissolved Zinc	38 (83)	114 (249)	12 (27)	67 (151)

Daily average and daily maximum values for TSS were less than 1.5%, phenols less than 10%, oil and grease less than 30% and dissolved zinc less than 70% of the proposed limitations. Dissolved iron exceeded the proposed daily maximum limitation on one of the six days sampled.

5. USSC has submitted plans to the State of Pennsylvania for a new wastewater treatment facility which will discharge to outfall 006. Company officials indicate the facility will treat a normal flow of 60,000 m^3/day (11,000 gpm) composed of pickling rinse waters, oily wastewater effluent, basement sump drainage and miscellaneous waste streams, and caustic and acid rinse waters from normalizing, terne and galvanizing operations. All of these flows are now discharged to outfall 005. The facility has not received State approval, but company officials indicate that it should be operational approximately 30 months after it is approved. Additionally, USSC plans to construct new wastewater treatment facilities to treat discharges from the 80-inch hot strip mill. These facilities will include additional sedimentation, partial filtration, cooling and 90% recycle. No completion dates were provided by USSC.

6. Outfall 106, the domestic WWTP was sampled for two consecutive days for BOD and TSS. USSC proposed limitations for BOD and TSS are compared below with NEIC monitoring results.

	USSC Proposed Limitations		Survey Data	
	Daily Average	Daily Maximum	8/21	8/22
BOD	30 mg/l	90 mg/l	15 mg/l	33 mg/l
TSS	43 mg/l	129 mg/l	45 mg/l	48 mg/l

During sampling, daily average flows as determined using an existing Parshall flume were 821 m^3/day (0.22 mgd) and 950 m^3/day (0.25 mgd). The company has reported this flow to range from 570 m^3/day (0.15 mgd) to 760 m^3/day (0.2 mgd).

7. Outfalls 306 (the north scale pit) and 406 (the south scale pit) were found to contribute 61 to 92% of the daily flow discharged through outfall 006. USSC proposed that limitations not be established and monitoring not be conducted at the scale pits. During NEIC monitoring, the north scale pit discharged from 54,800 to 70,400 m^3/day (14.5 to 18.6 mgd) of wastewater containing from 12 to 46 mg/l oil and grease. The south scale pit flow was 66,900 to 138,000 m^3/day (17.7 to 36.5 mgd) and contained oil and grease concentrations ranging from 15 to 61 mg/l. The net TSS concentrations discharged were 0-6 mg/l from the north scale pit and 1-66 mg/l from the south scale pit.

8. Flows should be continuously measured and recorded at each outfall at the following frequencies: 005-3 days/week, 006-daily, 106-1 day/week, 306-3 days/week, 406-3 days/week. Wastewater discharges should also be sampled at these frequencies with the exception of outfall 106 which need be sampled only 1 day/month. All composite sampling except the raw and treated water supplies should be on a flow-weighted basis. The outfall 105 sampling point is not representative because wastewater inputs are not completely mixed. A sampling point downsewer of the present location should be selected.

Monitoring at outfalls 005, 006, 106, 306 and 406 should be increased to include all critical parameters. This will result in the addition of six parameters (total iron, total and hexavalent chromium, free and total cyanide and tin) for outfall 005; five parameters (total iron, total and hexavalent chromium, lead and tin) for outfall 006; two parameters (chlorine residual and settleable solids) for outfall 106; one parameter (pH) for outfall 306; and two parameters (pH and dissolved iron) for outfall 406. The oily waste treatment plant effluent currently not monitored should be monitored once per week for flow, oil and grease, suspended solids, total iron and pH.

III. MONITORING PROCEDURES

During June 23-25, 1975, a reconnaissance inspection was conducted at the Irvin Plant in order to evaluate waste treatment systems, sampling locations and processing operations. A report describing this visit is located in Appendix D. Sampling was conducted during the period August 18-28, 1975, at selected stations. The parameters monitored, sample type and number of days sampled at each station are summarized in Table 1. Chain of custody procedures were followed for the collection of all samples and field data and for laboratory analyses [Appendix A]. Production figures[1] for the monitoring period were provided by USSC [Table 2].

The amount of intake water and wastewater discharged is not measured but estimated by the company based on individual intake pump capacities and operating times. During the survey, effluent flows, except station 106, were obtained using the dye dilution technique [Appendix B]. Flow from the domestic wastewater treatment plant (WWTP) (106) is measured by a 3-inch Parshall flume. The flume was checked for proper installation[2] and the throat width was found to be only 8.82 cm (2.69 inch) rather than 9.8 cm (3 inch). The strip chart recorder is based on a 9.8 cm (3 inch) throat, thereby inducing an error in the flow recorded. A rating curve was developed by NEIC for the actual throat width and flows were calculated using this curve.

Samples were collected every three hours and composited based on instantaneous flows measured at approximately the same time at stations 005, 006, 306 and 406. Hourly samples were collected for a period of 24-hours at the domestic WWTP (106) using SERCO automatic samplers and then manually composited on a flow-weighted basis. Untreated and treated river water was manually sampled every three hours and then time composited on an equal volume basis for each 24-hour period. Grab samples for organic analysis were collected August 25 and 27, 1975, from outfalls 005 and 006, the river intake and the water treatment plant clearwell. Specific procedures used in organic sample collection and analysis are presented in Appendix C. Samples for oil and grease, suspended solids and BOD were analyzed at the NEIC mobile laboratory located at the McKeesport Wastewater Treatment Plant. Other samples were air freighted to Denver for analysis at the NEIC laboratories. All samples were preserved and analyzed in accordance with EPA approved analytical quality control procedures [Appendix C].

EPA regulations require that net loadings be calculated based on constituents present in intake water after treatment. That is, the intake water concentration must be subtracted from the effluent concentration and the result used to calculate pollutant loads. Because the company could not supply figures indicating the amount of raw intake water used or the percentage of intake water treated, net calculations were made based on raw water concentrations and, therefore, are biased in favor of USSC. (i.e., The net discharged waste load calculated will be less than that using the treated water concentration.)

TABLE 1
SAMPLING SCHEDULE FOR USSC IRVIN PLANT

Station Description	Number Days Sampled	Type of Sample	Parameter[1]
Discharge from waste oil treatment & cooling water (South Sewer 005)	6	24 Hr. Comp. Grab	TSS; ammonia; total & dissolved iron; total & hexavalent chromium; aluminum; lead; tin. O&G[2]; organics[3].
Discharge from scale pits, pickling lines, cooling water (North Sewer 006)	6	24 Hr. Comp. Grab	TSS; total & dissolved iron & zinc; total & hexavalent chromium; aluminum; lead; tin. O&G[2]; phenols[2]; organics[3].
Discharge from domestic WWTP (106)	2	24 Hr. Comp.	BOD; TSS.
Discharge from N. scale pit (306)	6	24 Hr. Comp. Grab	TSS. O&G[2].
Discharge from S. Scale pit (406)	6	24 Hr. Comp. Grab	TSS. O&G[2].
Water Intake	6	24 Hr. Comp. Grab	TSS; total & dissolved iron & zinc; total & hexavalent chromium; aluminum; lead; tin. O&G[2]; phenol[2]; organics[3].
Water Intake after treatment (old plant)	6	24 Hr. Comp. Grab	TSS; total & dissolved iron & zinc; total & hexavalent chromium; aluminum; lead; tin. O&G[2]; phenol[2]; organics[4].
Water Intake after treatment (new plant)	6	24 Hr. Comp. Grab	TSS; total & dissolved iron & zinc; total & hexavalent chromium; aluminum; lead; tin. O&G[2]; phenol[2]; organics[4].

TABLE 1 (cont.)
SAMPLING SCHEDULE FOR USSC IRVIN PLANT

Station Description	Number Days Sampled	Type of Sample	Parameter1/
Influent to the old API separators	3	Grab	TSS5/; O&G2/.
Influent to the new API separators	3	Grab	TSS5/; O&G2/.
Effluent from oil treatment system	3	Grab	TSS5/; O&G2/.

1/ pH and temperature were measured periodically at all stations.
2/ O&G and phenol samples were collected 3 times each day.
3/ Organics were sampled twice during the survey.
4/ Organics were sampled once during the survey.
5/ TSS samples were collected 3 times each day.

TABLE 2
PRODUCTION DURING EPA SAMPLING PERIOD--METRIC TONS (TONS)
USSC - IRVIN

1975 Date	Turn	80" Hot Strip Mill	56" Pickle Line	80" Pickle Line	84" Pickle Line	No. 3 Elec. Cleaner	No. 4 Elec. Cleaner	No. 1 5 Stand	No. 2 5 Stand	No. 3 5 Stand	3 Stand	No. 1 ETL	No. 2 ETL	No. 3 ETL	No. 1 Galv. Line	No. 2 Galv. Line	Terne Line	Continuous Normaliz. Line
8/20	2	1614	670		393		334		458	1566		153		121				
		(1776)	(737)		(432)[c]		(367)		(504)	(1723)		(168)		(133)				
8/21	1	2605	404		563				608	1223		196		154				
		(2856)	(444)		(619)				(669)	(1345)		(216)		(169)				
	2	2534	678		1042		358		479	554		148		112				
		(2788)	(746)		(1146)[d]		(394)		(527)	(610)		(163)		(123)				
	3	2133	455	644	1496				504	1265		156						
		(2347)	(501)	(708)	(1645)				(554)	(1392)		(172)						
8/22	1	2659	475		1102				511	1054		186						
		(2925)	(523)		(1212)				(562)	(1160)		(205)						
	2	2674	710		1063		424	179		1004		201		145				
		(2942)	(781)		(1169)		(466)	(197)		(1104)		(221)		(160)				
	3	2410	534	656	851			405		1328		237		183				
		(2651)	(587)[a]	(722)	(936)[e]			(445)		(1461)		(261)		(201)				
8/23	1	2653	330		1114			330		1114				200				
		(3150)	(363)		(1226)			(363)		(1226)				(220)				
8/25	1				1054					1491								
					(1159)					(1640)								
	2			635	1004					1683								
				(699)	(1104)					(1852)								
	3	2535	673	724	1068		321		514	1285		32	43			79	171	
		(2789)	(740)	(797)	(1175)		(353)		(565)	(1414)		(35)	(47)			(87)	(188)	
8/26	1	1957	726		1149				562	1656		113	169			100	164	
		(2164)	(799)		(1264)				(618)	(1822)		(124)	(186)			(110)	(180)	
	2	3228	599	680	1058	254	369		484	1678		177	97			84	153	95
		(3551)	(659)	(748)	(1164)	(279)	(406)		(532)	(1846)		(195)	(107)			(92)	(168)	(104)
	3	2562	463	611	896		325		483	1688		172	123			76	128	118
		(2818)	(509)	(672)	(986)		(358)		(531)	(1857)		(189)	(135)			(84)	(140)	(130)
8/27	1	1703	682		716				496	1424		200		93		89	171	103
		(1873)	(750)		(788)				(546)	(1567)		(220)		(102)		(98)	(188)	(113)
	2	2519	686	504	948	235	387		469	1430		144		159		98	172	96
		(2771)	(755)	(554)	(1043)	(259)	(426)		(516)	(1573)		(158)		(175)		(108)	(189)	(105)
	3	2686	305	599	510		429		508	989		196		105		94	164	97
		(2955)	(336)[b]	(659)	(561)		(472)		(559)	(1088)		(216)		(115)		(103)	(180)	(106)
8/28	1	2530	544	638	898				460	1142		218		125		104	172	96
		(2783)	(598)	(702)	(988)				(506)	(1256)		(240)		(138)		(114)	(189)	(105)
	2	2043	636	594	1337	295	400		469	1166		188		116		104	170	100
		(2247)	(700)	(654)	(1471)	(324)	(440)		(516)	(1283)		(207)		(128)		(114)	(187)	(110)
	3	2540	637		1451		252		464	1356		170		81		142	177	105
		(2794)	(701)		(1596)		(277)		(510)	(1492)		(187)		(89)		(156)	(195)	(115)
8/29	1	2549	646		783				544	1693		200		85		116	173	91
		(2804)	(711)		(861)				(598)	(1862)		(220)		(93)		(128)	(190)	(100)

a - 6 Hours
b - 4 Hours
c - 5 Hours
d - 7 Hours
e - 7 Hours

IV. MONITORING RESULTS

Monitoring results are tabulated by individual sampling locations [Tables 3, 4 and 5] and discussed by individual outfall. Organic compounds were found only in wastewater from outfall 005 and are discussed only in that section.

OUTFALL 005

This discharge contains oily waste treatment facility effluent, pickling rinse (bath) waters, "heat treating" water, non-contact cooling water (NCCW), process and cooling wastes from electrolytic tinning, miscellaneous cooling waters and area storm drainage [Figure 1], self-monitoring data* report a measured flow of from 25,000 m^3/day (6.6 mgd) to 47,300 m^3/day (12.5 mgd). During the survey, flows ranged from 51,200 m^3/day (13.5 mgd) to 71,400 m^3/day (18.9 mgd).

USSC proposed effluent limitations for outfall 005 were compared with survey data [Table 6]. The dissolved iron concentration exceeded the USSC proposed daily maximum limitation of 2640 kg/day (5808 lb/day) on two of the six days sampled. Suspended solids and oil and grease loads were less than one percent and 33 percent respectively of proposed limitations. The odor of ammonia was detected coming from this discharge. The data [Table 3] show that from 1.0 to 2.1 kg/day (2.2 to 4.5 lb/day) of ammonia was discharged. Company officials were not aware that any source of ammonia existed on outfall 005 and have not proposed ammonia limitations.

Total iron, total zinc, dissolved zinc, total chromium, total tin, total aluminum and lead were also monitored. Results [Table 5] indicate that during the survey, outfall 005 discharged from 13.7-39.4 kg/day (30.0-86.6 lb/day) total chromium, from 37-186 kg/day (82-410 lb/day) total tin and from 19-61 kg/day (41-134 lb/day) total aluminum. Total iron concentrations averaged 4.7 mg/l greater than dissolved iron concentrations. Total zinc averaged 0.07 mg/l and dissolved zinc averaged 0.07 mg/l. USSC has not proposed limitations on any metals other than dissolved iron.

A grab sample collected on August 25, 1975, and another on August 27, 1975, were analyzed for organic compounds. Results indicated the presence of petroleum hydrocarbons, primarily normal paraffins. These hydrocarbons ranged from C_9 to C_{20} and appeared in a uniform pattern suggesting light refined oils. Triphenyl phosphate was also identified. Quantitative results are as follows:

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*Refers to USSC self-monitoring reports for the period January 1 - March 31, 1975.

Compound	8/25/75 µg/l	8/27/75 µg/l
C_9 - Nonane	Trace	4
C_{10}- Decane	10	23
C_{11}- Undecane	23	55
C_{12}- Dodecane	20	42
C_{13}- Tridecane	17	26
C_{14}- Tetradecane	14	19
C_{15}- Pentadecane	8	9
C_{16}- Hexadecane	5	5
C_{17}- Heptadecane	3	5
C_{18}- Octadecane	3	5
C_{19}- Nonadecane	3	5
C_{20}- Eicosane	Trace	4
Triphenyl Phosphate	220	240

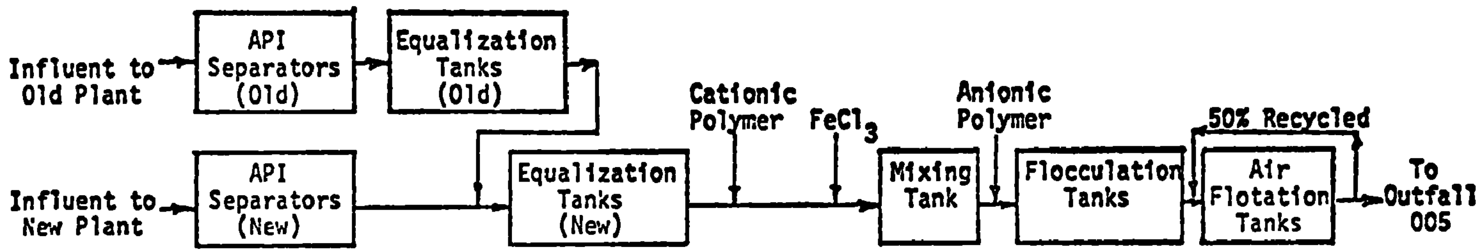
USSC has proposed that outfall 005 not be limited to a minimum pH in order to more accurately describe the quality of the current discharge. The pH showed a wide variation ranging from 2.6-9.6 during monitoring. Low pH values are probably caused by the discharge of pickling rinse waters. The source of the high pH values is not known. The pH of the intake water, which is downstream from this discharge, was 6.0 or greater except on the second day of sampling when a pH of 5.6 was observed.

The self-monitoring data [Table 7] show that total suspended solids, oil and grease concentrations, and pH values are similar to those obtained during NEIC monitoring. Dissolved iron concentrations, however, were more than 28 times higher during the survey (net values of 14.3 to 53.3 mg/l) than the values reported by USSC (0.02 to 0.51 mg/l). The cause for the wide variation is not known.

The oily waste treatment system consists of an old and new section with a combined treatment capacity of 27,200 m^3/day (7.2 mgd). Oily wastewater enters the system through API separators operating in parallel. Wastewater then flows to equalization tanks to which 10-25 mg/l of a cationic polymer (emulsion breaker) is added. The flow passes to a mixing tank where 30 mg/l of $FeCl_3$ is added and then to a flocculation tank where 1 mg/l of anionic polymer is added. The flocculation tank effluent flows by gravity to two air flotation tanks where additional oil is removed. Effluent from the flotation units is split with approximately 50 percent recycled to the air flotation tanks and the remainder discharged through outfall 005. The company has not installed equipment to measure flow through the oily waste treatment system. A schematic flow diagram and physical description[1] of individual treatment units is presented in Figure 2.

Influent and effluent grab samples were collected from the oily waste treatment system and analyzed for total suspended solids and oil and grease to evaluate the treatment efficiency of the system. Results

SCHEMATIC FLOW DIAGRAM:



PHYSICAL DESCRIPTION OF TREATMENT UNITS:

UNIT	DIMENSIONS	CAPACITY	FLOW	DETENTION TIME
Old Plant: API Separators	2 @ 3.6x14x1.8m SWD (12x46x6 ft. SWD)	95,400 liters ea. (24,800 gal. ea.)	1900 lpm ea. (500 gpm ea.)	50 min.
Equalization Tanks	2 @ 1.8x6.7x2.7m SWD (6x22x9 ft. SWD)	34,180 liters ea. (8,890 gal. ea.)	1900 lpm ea. (500 gpm ea.)	18 min.
New Plant: API Separators	4 @ 6.1x30.3x2.1m SWD (20x100x7 ft. SWD)	404,000 liters ea. (105,000 gal. ea.)	4600 lpm ea. (1200 gpm ea.)	84 min.
Equalization Tanks	2 @ 8.6x9.1x2.4m SWD (28.3x30x8 ft. SWD)	195,600 liters ea. (50,860 gal.ea.)	9600 lpm ea. (2500 gpm ea.)	20 min.
Mixing Tank	1 @ 3.8x3.8x3.0m SWD (12.5x12.5x10 ft. SWD)	45,000 liters (11,690 gal.)	19,000 lpm (5000 gpm)	2 min.
Flocculation Tanks	2 @ 3.9x7.9x3.0m SWD (13x26x10 ft. SWD)	97,230 liters ea. (25,280 gal. ea.)	9600 lpm ea. (2500 gpm ea.)	10 min.
Dissolve Air Flotation Tanks	2 @ 18m dia.x3.3m SWD (60 ft. dia.x11 ft. SWD)	804,000 liters ea. (209,000 gal. ea.)	9600 lpm ea. (2500 gpm ea.)	56 min. with 50% recycle

FIGURE 2. SCHEMATIC FLOW DIAGRAM AND PHYSICAL DESCRIPTION OF TREATMENT UNITS
OILY WASTE TREATMENT SYSTEM - USSC IRVIN

[Tables 3 and 4] are summarized below:

	Influent to Old Section	Influent to New Section	Combined Effluent
Oil & Grease			
Range (mg/l)	71-420	150-4800	< 1-34
Average (mg/l)	188	1727	9
TSS			
Range (mg/l)	96-1600	120-5600	<10-12
Average (mg/l)	428	1226	< 10

Based on average values of grab samples, treatment efficiency was $\geq$ 95 and $\geq$ 97 percent for oil and grease and TSS removal respectively. Actual treatment efficiency could be determined only by knowing the influent flow to each section of the system.

OUTFALL 006

Outfall 006 contains wastewaters originating from the north (306) and south (406) scale pits; domestic wastewater treatment facility (106); miscellaneous cooling water (estimated at 8250 m^3/day--2.18 mgd); heat treating waters; cooling tower blowdown; boiler house effluents; and water treatment sludges.

USSC has submitted plans and specifications to the State of Pennsylvania for a new Terminal Treatment facility which will discharge to outfall 006[3]. According to company officials, the facility will treat a normal flow of 60,000 m^3/day (11,000 gpm) consisting of four principal waste streams now discharged through outfall 005. These waste streams include:

a) Approximately 16,000 m^3/day (2935 gpm) of acid rinse waters resulting from nine pickling operations.

b) Approximately 16,360 m^3/day (3000 gpm) of oily wastewater effluent from two existing dissolved air flotation units.

c) Approximately 16,720 m^3/day (3065) gpm) of combined cooling and miscellaneous water and drainage from basement sumps.

d) Approximately 10,910 m^3/day (2000 gpm) of typical acid and caustic rinse waters from normalizing, terne and galvanizing operations.

Based on information provided by USSC[3] none of the wastewater now discharged to outfall 006 will be treated in the proposed Terminal Treatment Facilities. Instead, the waste load discharged through outfall 006 will be increased due to the addition of effluent from the proposed facility. The treatment system will include equalization, neutralization, aeration, clarification, thickening and vacuum filtration. Waste pickle liquor will be added to the raw wastewater at the equalization facilities. Following equalization, lime will be added for neutralization. After aeration, polymer will be added to assist in clarification. Waste oil and solids will be hauled away by railroad car or truck. USSC officials indicated that the facility should be operational approximately 30 months following State approval.

USSC also plans to construct new wastewater treatment facilities to treat discharges from the 80-inch hot strip mill. These facilities will include additional sedimentation, partial filtration, cooling and 90% recycle. No completion dates were provided by USSC[4].

The company previously has estimated* the flow through outfall 006 to range between 99,500 m^3/day (26.3 mgd) and 193,000 m^3/day (51 mgd). During the survey, the flow ranged from about 146,000 m^3/day (38.6 mgd) to 258,000 m^3/day (68.2 mgd). The USSC proposed effluent limitations for suspended solids, oil and grease, phenols, dissolved iron and dissolved zinc are compared with the survey data [Table 8] indicating that only the dissolved iron limitation was exceeded. Both daily average and daily maximum values for suspended solids were less than 1.5%, phenols less than 10%, oil and grease less than 30% and dissolved zinc less than 70% of the proposed limitations. Dissolved iron exceeded the proposed daily maximum limitation on one of the six days sampled. Self-monitoring data [Table 7] were similar to values obtained during the survey (i.e., total suspended solids, pH, phenol, oil and grease and dissolved iron).

OUTFALL 106

The domestic WWTP consists of two Imhoff tanks in parallel, a trickling filter with no recirculation and chlorine contact chamber/final clarifier. Physical descriptions[1] of the treatment units are as follows:

	Size	Capacity	Flow	Detention Time
Imhoff Tanks	2 @ 10.6x7.6x5.2 m swd (35x25x17 ft swd)	423,000 l ea. (110,000 gal ea.)	385,000 lpd ea. (100,000 gpd ea.)	24 hrs.
Trickling Filter	22.7 m dia.x1.8 m depth (75 ft dia.x6 ft depth)	N/A	769,000 lpd (200,000 gpd)	
Chlorine Contact Chamber/Final Clarifier	3.3x3.3x1.4 m + a 1.5 m inverted pyramid bottom (11x11x4.5 ft + a 5 ft inverted pyramid bottom)	21,200 l (5,500 gal)	769,000 lpd (200,000 gpd)	40 min.

*Refers to USSC self monitoring reports for the period January 1-March 31, 1975.

Chlorine gas was being fed at the rate of about 2.9 mg/l, 2.7 kg/day (6 lb/day). Sludge from the Imhoff tanks is buried on company property. During the two days of NEIC sampling, daily average flows as determined using an existing Parshall flume were 821 m^3/day (0.22 mgd) and 950 m^3/day (0.25 mgd). The company has reported* this flow to range from 530 m^3/day (0.14 mgd) to 760 m^3/day (0.2 mgd).

USSC has proposed effluent limitations for coliform organisms, BOD and total suspended solids. During the survey, effluent was monitored two consecutive days for BOD and total suspended solids. USSC proposed limitations are as follows:

BOD daily average - 30 mg/l; daily maximum - 90 mg/l
TSS daily average - 43 mg/l; daily maximum - 129 mg/l

Sampling August 21 and 22, 1975, gave the following results:

	BOD	TSS
8/21/75	15 mg/l 12 kg/day (27 lb/day)	45 mg/l 38 kg/day (83 lb/day)
8/22/75	33 mg/l 31 kg/day (69 lb/day)	48 mg/l 45 kg/day (100 lb/day)

The self-monitoring data [Table 6] show that the BOD and total suspended solids concentrations both ranged from <5 to 55 mg/l, which is similar to values obtained during the survey.

OUTFALLS 306 AND 406

Coarse scale settled in the north and south scale pits is removed by clamshell and hauled to the Edgar Thomson Plant for recycling to the blast furnaces. The company presently does not monitor the wastewater discharges from the north (306) or south (406) scale pits. These pits consist of four and three chamber settling basins respectively. The north scale pit measures 11.5 x 26.2 m (38 x 86.5 ft) with a 3 m (10 ft) swd and a capacity of 781,000 l (203,000 gal). The south scale pit measures 10.6 x 12.4 m (35 x 41 ft) with a 2.1 m (7 ft) swd and a capacity of 260,000 l (67,500 gal)[1]. USSC does not measure flow through the scale pits.

The combined average daily flow from the north and south scale pits constituted from 61 to 92% of the total flow discharged through outfall 006. Flow measurements at points 306, 406 and outfall 006 were normally taken within 30 minutes of each other. On several occasions, combined instantaneous

*Refers to USSC self-monitoring reports for the period January 1-March 31, 1975.

flows at 306 and 406 exceeded the flow at outfall 006. In these cases, flow through one or both of the scale pits apparently decreased between the time fluorimetry samples were collected at the scale pits and outfall 006. Travel time from both scale pits to 006 was measured at less than six minutes.

NEIC monitoring results [Tables 3 and 5] show that at the times sampled, the north scale pit discharged from 54,800 to 70,400 m^3/day (14.5 to 18.6 mgd) of wastewater containing from 12 to 46 mg/l oil and grease. When the south scale pit was sampled, it was discharging from 66,900 to 138,000 m^3/day (17.7 to 36.5 mgd) containing oil and grease concentrations ranging from 15 to 61 mg/l. The net total suspended solids concentrations discharged were 0 to 6 mg/l from the north scale pit and 1 to 66 mg/l from the south scale pit.

V. MONITORING REQUIREMENTS

Monitoring requirements include both sampling and flow measurement considerations. This section presents requirements concerning parameters to be monitored, sampling frequency, sampling location and sample type. Flow measurement aspects including the need for and duration of flow measurement are addressed. Proposed treatment is not discussed in this section, however, flow measurement and recording equipment must be included in all future wastewater treatment facilities.

OUTFALL 005

The major inputs to outfall 005 include pickling, cold rolling and tin plating wastes. The critical parameters for these operations are flow, suspended solids, oil and grease, dissolved iron, total iron, hexavalent chromium, total chromium, tin, free and total cyanide and pH [Table 9][5]. This is an increase of six parameters (total iron, total and hexavalent chromium, free and total cyanide and tin) in addition to those now monitored. Monitoring frequency for the above parameters shall be three times per week rather than the current practice of twice per month[6]. Sampling shall be conducted on a 24-hour composite basis for all parameters except oil and grease and pH. Representative oil and grease sampling requires the collection of several individual grab samples during each 24-hour period. Field measurements are taken for pH. Due to variability in flow rate, samples collected at outfall 005 are representative only when composited on a flow-weighted basis. Moreover, oil and grease loads can be determined only when instantaneous flows at the time of sample collection are known. At the present time, flow is not measured but estimated and samples are composited on an equal volume basis.

The sampling location must be selected to insure that samples are representative of wastewater discharged. During the survey, NEIC determined through dye studies that the sampling location used for outfall 005 is not acceptable because wastewater from the oily waste treatment system is not thoroughly mixed with other wastewaters in 005. An acceptable sampling location downsewer of the existing sampling point must be used. The new sampling location must be above high water in the river to preclude surcharged conditions.

Continuous flow measurement and recording capability must be provided. The dye dilution flow measurement technique, used by NEIC during the survey, is technically feasible for application by USSC. On a long-term basis, however, this method may prove prohibitive economically. Dye costs* are approximately \$2.00/day per 3785 m^3/day (1 mgd) of flow. Equipment costs including a metering pump, sample pump, fluorometer and strip recorder are estimated at \$2700-\$3000. In lieu of the dye dilution technique, USSC may install any of several conventional flow measurement devices (i.e., flumes, weirs, etc.) equipped with a continuous flow recorder. Should USSC choose

*Costs are for Rhodamine WT dye.

the latter option, modifications will be necessary. Although the sewer is an estimated 30 feet underground, sufficient elevation head is available to allow gravity flow measurement between the plant site and the Monongahela River.

OILY WASTE TREATMENT FACILITY

The oily waste treatment facility is not monitored by USSC. During the NEIC survey, monitoring showed that influent process wastes ranged in concentration from 71-4800 mg/l oil and grease and 96-5600 mg/l suspended solids. Effluent monitoring indicated treatment efficiency of > 95% and oil and grease and suspended solids concentrations averaging 10 mg/l or less. Control of pollutants from this facility can most effectively be maintained by placing limitations on effluent from the treatment system.

It is recommended that the oily waste treatment system effluent be monitored for flow, oil and grease, suspended solids, total iron and pH [Table 9][5]. The recommended monitoring frequency for these parameters is once per week[6]. Flow must be measured on a continuous basis during self-monitoring. With modifications a standard flow measurement device can be installed on the treatment facility effluent.

OUTFALL 006

Outfall 006 receives process wastes from hot forming, pickling, cold rolling, galvanizing and terne coating operations. Wastes from these processes shall be monitored for flow, oil and grease, suspended solids, total and dissolved iron, total and hexavalent chromium, zinc, lead, tin and pH [Table 9][5]. This is an increase of five parameters (total iron, total and hexavalent chromium, lead and tin) in addition to those now monitored. Monitoring frequency shall be daily, instead of the current practice of twice per month[6] and all parameters except oil and grease shall be sampled on a 24-hour flow-weighted composite basis. Oil and grease will be grab sampled at least three times per 24-hour sampling period and loads calculated based on instantaneous flows at the time of sampling. Presently samples are composited on an equal volume basis because flows are estimated rather than measured.

The sampling location for outfall 006 was found to be adequate for representative sampling. NEIC used dye to verify that all wastewater inputs to this outfall were well mixed at the 006 sampling point. Continuous flow measurement and recording must be provided for self-monitoring. USSC has the same flow measurement options for 006 as were previously presented for 005. The sewer depth below grade is estimated at 3.6-4.5 meters (12-15 feet) at the 006 sampling point.

OUTFALL 106

Effluent from the domestic WWTP is discharged to outfall 006 downsewer of the 006 sampling point. The WWTP serves USSC-Irvin personnel and discharges about 760 m^3/day (0.2 mgd). Parameters for which self-monitoring is required are flow, BOD, suspended solids, chlorine residual, total or fecal coliform, settleable solids and pH. Presently these parameters are all monitored with the exception of chlorine residual and settleable solids. Flow must be measured and recorded at least one day per week and all other parameters a minimum of once per month[6]. USSC presently monitors all parameters (flow, total coliform, BOD and suspended solids) weekly.

Twenty-four hour composite samples shall be collected for BOD and suspended solids. All other parameters shall be grab samples. At the present time, USSC collects grab samples for BOD and 24-hour composite samples for suspended solids. The existing sampling location and flow measurement equipment are acceptable provided the flow recorder is re-calibrated for the actual throat width of the Parshall flume (Re: Monitoring Procedures).

OUTFALLS 306 AND 406

Wastewater from the roughing end of the 80-inch hot strip mill is discharged to the north scale pit and then to outfall 006. Wastewater from the finishing end of the 80-inch hot strip mill and from pickling is discharged to the south scale pit and then to outfall 006. The combined average daily flow from the north and south scale pits constituted from 61 to 92% of the total flow discharged through outfall 006. Outfalls 306 and 406 discharging from the north and south scale pits respectively will be monitored three days per week beginning January 1977 for flow, suspended solids and oil and grease. Based upon the list of critical parameters for hot forming and pickling operations[5], 306 must also be monitored for pH and 406 for pH and dissolved iron. Sampling for suspended solids and dissolved iron shall be on a 24-hour flow-weighted composite basis. In addition, continuous flow measurement and recording capability must be installed and operational at 306 and 406 by January 1977. Flow may be measured using the dye dilution technique or conventional flow measurement devices. The dye dilution technique, as mentioned previously, is costly. NEIC used dye and found the flow through both scale pits to be highly variable. Instantaneous flows ranged from 24,000-143,000 m^3/day (6.4-37.9 mgd) at the north scale pit and 28,000-301,000 m^3/day (7.5-79.4 mgd) at the south scale pit. Should USSC elect to install conventional flow measurement equipment instead of using the dye dilution technique, some modifications will be necessary. Each scale pit outlet is a suitable location for sampling and for the installation of a standard flow measurement device such as a rectangular weir.

RIVER WATER INTAKE AND TREATMENT PLANT

Raw and treated water must be monitored on the same days outfalls are sampled to determine net pollutant loads inasmuch as raw and treated water is used at various points within the plant. USSC estimates for the period January-June 1975 indicate that 13% of the total intake water is treated[1].

EPA regulations require that whenever water is treated prior to use, treated water quality be used in determining net pollutants discharged[7]. This cannot be accomplished until the quantity of treated water discharged through each outfall is known. USSC does not meter treated water to the mill on a daily basis and therefore is unable to accurately compute net pollutants discharged. To correct this situation the flow of treated water from storage to the mill areas served by each outfall must be measured.

Daily grab samples of raw water are analyzed and used in computing net pollutants discharged. Because river water quality can change markedly in 24 hours, raw water must be sampled on a composite basis. Treated water quality can also change as raw water quality changed. Composite sampling of both raw and treated water is required. Composite sampling may be on an equal volume basis.

The raw water sampling site, located at the river pumphouse adjacent to the intake screens, is acceptable for the collection of representative samples. During the NEIC survey, treated water was sampled at the water treatment plant clearwell upstream of storage facilities. For self-monitoring, it is recommended that treated water be sampled after storage.

TABLE 3
SUMMARY OF FIELD MEASUREMENTS AND ANALYTICAL DATA
USSC IRVIN PLANT
AUGUST 21-29, 1975

		Flow					TSS			Ammonia N		
Station Description	Date	m^3/day X 10 ^{3}	MGD	pH Range	Temp. Range °C	Gross / Net	mg/l	kg/day	(lb/day)	mg/l	kg/day	(lb/day)
Discharge from waste oil treatment; cooling water; pickling rinse water (005)	8/22	67.5	(17.8)	2.6-8.6	29-34	G	73	4920	(10,900)	0.03	2.1	(4.5)
	8/23	61.6	(16.3)	3.6-7.5	30-36	G	42	2590	(5710)	0.02	1.2	(2.7)
	8/26	58.7	(15.5)	2.8-6.5	30-33	G	18	1050	(2330)	0.02	1.2	(2.6)
	8/27	71.4	(18.9)	4.5-9.6	33-39	G	14	1000	(2200)	0.02	1.5	(3.2)
	8/28	51.3	(13.5)	3.6-6.8	32-39	G	66	3380	(7500)	0.02	1.0	(2.2)
	8/29	59.3	(15.7)	3.8-7.2	30-35	G	45	2670	(5890)	0.02	1.2	(2.7)
	8/22					N	53	3570	(7880)			
	8/23					N	29	1780	(3900)			
	8/26					N	0	0	(0)			
	8/27					N	4	280	(630)			
	8/28					N	56	2870	(6330)			
	8/29					N	35	2070	(4580)			
Discharge from scale pits, pickling rinse waters and cooling water (006)	8/22	242.0	(63.9)	3.3-7.7	31-35	G	68	16,500	(37,100)			
	8/23	233.5	(61.7)	6.7-7.6	32-40	G	28	6500	(14,400)			
	8/26	146.0	(38.6)	5.9-8.1	26-34	G	36	5200	(11,600)			
	8/27	258.2	(68.2)	6.7-9.4	28-36	G	49	12,700	(27,900)			
	8/28	188.8	(49.9)	6.4-7.4	32-35	G	62	11,700	(25,800)			
	8/29	254.0	(67.1)	6.2-7.3	34-40	G	39	9940	(21,900)			
	8/22					N	48	11,700	(25,600)			
	8/23					N	15	3510	(7720)			
	8/26					N	17	2480	(5470)			
	8/27					N	39	10,000	(22,200)			
	8/28					N	52	9770	(21,600)			
	8/29					N	29	7400	(16,200)			

TABLE 3 (cont.)
SUMMARY OF FIELD MEASUREMENTS AND ANALYTICAL DATA
USSC IRVIN PLANT
AUGUST 21-29, 1975

Station Description	Date	Flow m^3/day X 10^{-3}	Flow MGD	pH Range	Temp. Range °C	Gross Net	TSS mg/l	TSS kg/day	TSS (lb/day)	Ammonia-N mg/l	Ammonia-N kg/day	Ammonia-N (lb/day)
Discharge from N. scale pit (306)	8/22	70.4	(18.6)	6.1-8.6	28-38	G	26	1830	(4040)			
	8/23	62.3	(16.5)	6.9-8.3	30-31	G	11	700	(1510)			
	8/26	68.5	(18.0)	5.9-8.3	26-32	G	< 10	< 700	(1530)			
	8/27	54.8	(14.5)	6.9-8.3	31-32	G	< 10	< 550	(1210)			
	8/28	55.1	(14.6)	7.1-8.3	31-32	G	15	820	(1830)			
	8/29	57.4	(15.2)	6.8-8.1	29-32	G	11	630	(1390)			
	8/22					N	6	420	(934)			
	8/23					N	0	0	(0)			
	8/26					N	0	0	(0)			
	8/27					N	0	0	(0)			
	8/28					N	5	270	(608)			
	8/29					N	1	57	(127)			
Discharge from S. scale pit (406)	8/22	138.2	(36.5)	6.3-6.9	36-41	G	86	11,900	(26,200)			
	8/23	125.6	(33.2)	6.7-7.5	32-40	G	27	3390	(7470)			
	8/26	66.9	(17.7)	3.2-8.2	26-39	G	20	1340	(2950)			
	8/27	112.9	(29.8)	7.6-8.1	38-39	G	17	1920	(4230)			
	8/28	86.9	(23.0)	7.0-7.6	37-39	G	38	3300	(7280)			
	8/29	97.6	(25.8)	6.6-7.4	36-40	G	20	1950	(4300)			
	8/22					N	66	9080	(20,100)			
	8/23					N	14	1760	(3870)			
	8/26					N	1	67	(147)			
	8/27					N	7	790	(1740)			
	8/28					N	28	2430	(5370)			
	8/29					N	10	998	(2150)			
Water Intake	8/22			6.0-6.8	24-26	G	20					
	8/23			5.6-7.5	24-26	G	13					
	8/26			6.1-8.0	25-27	G	19					
	8/27			6.6-7.9	25-27	G	< 10					
	8/28			6.4-7.5	25-28	G	< 10					
	8/29			6.5-7.3	26-28	G	< 10					

TABLE 3 (cont.)
SUMMARY OF FIELD MEASUREMENTS AND ANALYTICAL DATA
USSC IRVIN PLANT
AUGUST 21-29, 1975

Station Description	Date	Flow m^3/day X 10^3	Flow MGD	pH Range	Temp. Range °C	Gross/Net	TSS mg/l	TSS kg/day	TSS (lb/day)	Ammonia N mg/l	Ammonia N kg/day	Ammonia N (lb/day)
Water Intake After Treatment (old plant)	8/22	19.7	(5.2[1])	8.2-9.1	24-26	G	< 10		(434)			
	8/23	19.7	(5.2[1])	8.9-9.6	25-26	G	< 10		(434)			
	8/26	17.8	(4.7)	7.5-9.0	25-28	G	< 10		(392)			
	8/27	21.2	(5.6)	8.1-8.7	26-28	G	< 10		(467)			
	8/28	20.8	(5.5)	7.6-9.2	26-28	G	< 10		(459)			
	8/29	18.5	(4.9)	8.8-9.0	26-28	G	< 10		(409)			
Water Intake After Treatment (new plant)	8/22	19.7	(5.2)	7.6-9.1	24-26	G	13	260	(560)			
	8/23	19.7	(5.2)	6.0-9.2	25-26	G	13	260	(560)			
	8/26	17.8	(4.7)	7.3-8.6	25-27	G	< 10					
	8/27	21.2	(5.6)	7.0-8.2	25-28	G	< 10					
	8/28	20.8	(5.5)	6.8-8.2	25-28	G	< 10					
	8/29	18.5	(4.9)	7.7-8.2	25-28	G	< 10					
Influent to the Old API Separator	8/25 1			7.6-10.4	28-29	G	96					
	2						110					
	3						400					
	8/26 1			9.0-10.1	50-60	G	240					
	2						250					
	3						610					
	8/27 1			6.3-10.4	49-50	G	340					
	2						210					
	3						1600					
Influent to the New API Separator	8/25 1			6.8-7.9	32-34	G	120					
	2						490					
	3						650					
	8/26 1			7.6-9.5	30-34	G	2000					
	2						780					
	3						180					
	8/27 1			6.6-8.1	31-34	G	1030					
	2						180					
	3						5600					

[1]Average of last 4 days of sampling as data for this date was not recorded.

TABLE 3 (cont.)
SUMMARY OF FIELD MEASUREMENTS AND ANALYTICAL DATA
USSC IRVIN PLANT
AUGUST 21-29, 1975

Station Description	Date	Flow m^3/day X 10^3	Flow MGD	pH Range	Temp. Range °C	Gross/Net	TSS mg/l	TSS kg/day	TSS (lb/day)	Ammonia N mg/l	Ammonia N kg/day	Ammonia N (lb/day)
Effluent from Oil Treatment System	8/25 1			7.8-9.0	32-23	G	< 10					
	2						10					
	3						< 10					
	8/26 1			8.5-9.9	33-37	G	12					
	2						< 10					
	3						12					
	8/27 1			10.0-10.4	33-36	G	< 10					
	2						10					
	3						< 10					

TABLE 4
SUMMARY OF OIL AND GREASE AND PHENOL DATA[1]
USSC IRVIN PLANT
AUGUST 22-29, 1975

Station Description	Date	Time	Instantaneous Flow[2] m³/day X 10³	(MGD)	Oil & Grease (Gross)[3] mg/l	kg/day	lb/day	Phenol (Gross) µg/l	kg/day	lb/day	Phenol (Net)[4] µg/l	kg/day	lb/day
Discharge from waste oil treatment plant cooling water pickling rinse water (005)[5]	8/21 1	1505	59.6	(15.8)	31	1850	(4080)						
	2	2230	83.0	(21.9)	23	1910	(4210)						
	3	-	-	-	-	-	-						
	8/22 1	0405	44.4	(11.7)	60	2660	(5880)						
	2	1515	67.4	(17.8)	52	3500	(7730)						
	3	2125	60.0	(15.8)	47	2820	(6210)						
	8/25 1	1520	59.0	(15.6)	24	1410	(3120)						
	2	1805	63.2	(16.7)	21	1330	(2930)						
	3	-	-	-	-	-	-						
	8/26 1	0005	68.1	(18.0)	26	1770	(3900)						
	2	1500	146.0	(38.6)	66	9600	(21,300)						
	3	1815	69.4	(18.3)	79	5480	(12,100)						
	8/27 1	0005	59.6	(15.8)	31	1850	(4110)						
	2	1500	41.8	(11.0)	86	3600	(7930)						
	3	1825	53.6	(14.1)	46	2460	(5420)						
	8/28 1	0015	65.1	(17.2)	58	3780	(8330)						
	2	1510	59.4	(15.7)	75	4450	(9770)						
	3	1830	61.0	(16.1)	22	1340	(2960)						
	8/29 1	0005	63.6	(16.8)	44	2790	(6160)						
Discharge from scale pits, pickling rinse water and cooling water (006)	8/21 1	1545	227	(60.1)	15	3410	(7520)	5	1.1	(2.5)	0	0	(0)
	2	2010	425	(112.0)	10	4250	(9340)	5	2.1	(4.7)	1	0.43	(0.9)
	3	2330	47.4	(12.5)	23	1090	(2400)	11	0.52	(1.1)	4	0.19	(0.4)
	8/22 1	0440	266	(70.1)	30	7950	(17,600)	10	2.7	(5.8)	8	2.1	(4.7)
	2	1540	242	(64.1)	34	8240	(18,200)	2	0.4	(1.0)	0	0	(0)
	3	2215	236	(62.4)	27	6370	(14,100)	83	19.6	(43.2)	79	18.7	(41.1)
	8/25 1	1615	166	(43.9)	31	5140	(11,300)	9	1.5	(3.3)	8	1.3	(2.9)
	2	1950	231	(61.2)	18	4160	(9170)	9	2.1	(4.6)	5	1.2	(2.6)
	3	-	-	-	-	-	-	-	-	-	-	-	-
	8/26 1	0045	251	(66.2)	15	3760	(8290)	7	1.7	(3.9)	2	0.5	(1.1)
	2	1615	408	(108.0)	39	15,900	(35,100)	7	2.8	(6.3)	5	2.1	(4.5)
	3	1920	249	(66.0)	27	6740	(14,800)	5	1.3	(2.7)	4	1.0	(2.2)
	8/27 1	0045	224	(59.5)	20	4500	(9940)	6	1.4	(3.0)	2	0.4	(1.4)
	2	1605	154	(40.7)	19	2920	(6450)	5	0.8	(1.7)	3	0.4	(1.0)
	3	1925	241	(63.8)	29	7030	(15,400)	7	1.7	(3.7)	4	0.9	(2.1)

TABLE 4 (cont.)
SUMMARY OF OIL AND GREASE AND PHENOL DATA[1]
USSC IRVIN PLANT
AUGUST 22-29, 1975

Station Description	Date	Time	Instantaneous Flow[2] m^3/day X 10^3	(MGD)	Oil & Grease (Gross)[3] mg/l	kg/day	lb/day	Phenol (Gross) µg/l	kg/day	lb/day	Phenol (Net)[4] µg/l	kg/day	lb/day
Discharge from scale pits, pickling rinse water and cooling water (036) (cont'd)	8/28 1	0040	212	(55.9)	24	5070	(11,230)	5	1.4	(3.0)	0	0	(0)
	2	1535	390	(103.0)	23	8910	(19,700)	7	3.7	(8.1)	4	2.1	(4.6)
	3	1855	204	(54.0)	20	4090	(9000)	.6	1.6	(3.5)	4	1.0	(2.3)
	8/29 1	0040	206	(54.6)	17	3510	(7740)	43	12.7	(27.9)	39	11.5	(25.3)
Discharge from N. scale pit (306)	8/21 1	1530	59.6	(15.8)	18	1070	(2360)						
	2	1935	144	(37.9)	21	3020	(6650)						
	3	2300	49.9	(13.2)	12	600	(1320)						
	8/22 1	0415	55.1	(14.6)	46	2540	(5590)						
	2	1530	60.0	(15.8)	38	2280	(5020)						
	3	2155	45.4	(12.0)	27	1230	(2700)						
	8/25 1	1605	95	(25.1)	24	2280	(5020)						
	2	1910	47.6	(12.6)	17	810	(1780)						
	3	-	-	-	-	-	-						
	8/26 1	0020	52.5	(13.9)	22	1160	(2540)						
	2	1540	40.9	(10.8)	30	1230	(2700)						
	3	1900	46.4	(12.3)	24	1110	(2450)						
	8/27 1	0020	47.6	(12.6)	38	1810	(3990)						
	2	1545	56.5	(14.9)	[6]	-	-						
	3	1900	53.6	(14.1)	35	1870	(4130)						
	8/28 1	0020	49.0	(12.9)	32	1570	(3450)						
	2	1525	86.6	(22.8)	20	1720	(3800)						
	3	1840	55.1	(14.6)	26	1430	(3160)						
	8/29 1	0020	43.1	(11.4)	34	1460	(3230)						
Discharge from S. scale pit (406)	8/21 1	1515	34.4	(9.1)	32	1097	(2420)						
	2	1950	300	(79.4)	19	5710	(12,600)						
	3	2310	160	(42.3)	18	2880	(6360)						
	8/22 1	0430	143	(38.2)	44	6360	(14,100)						
	2	1520	112	(29.6)	45	5030	(11,100)						
	3	2200	132	(35.0)	43	5690	(12,500)						
	8/25 2	1950	83	(21.9)	31	2570	(5670)						

TABLE 4 (cont.)
SUMMARY OF OIL AND GREASE AND PHENOL DATA[1]
USSC IRVIN PLANT
AUGUST 22-29, 1975

			Instantaneous Flow[2]		Oil & Grease (Gross)[3]			Phenol (Gross)			Phenol (Net)[4]		
Station Description	Date	Time	m^3/day X 10^{-3}	(MGD)	mg/l	kg/day	lb/day	µg/l	kg/day	lb/day	µg/l	kg/day	lb/day
Discharge from	8/26 1	0030	132	(35.0)	15	1990	(4370)						
S. scale pit (406)	2	1530	133	(35.0)	28	3710	(8180)						
(cont'd)	3	1910	126	(33.3)	61	7700	(17,000)						
	8/27 1	0035	107	(28.4)	39	4180	(9260)						
	2	1555	61.9	(16.4)	31	1920	(4230)						
	3	1910	105	(27.8)	44	4620	(10,200)						
	8/28 1	0030	92	(24.3)	28	2580	(5680)						
	2	1520	104	(27.4)	37	3840	(8460)						
	3	1845	110	(28.9)	22	2400	(5300)						
	8/29 1	0030	94	(24.9)	27	2540	(5600)						
Water Intake	8/21 1	1600			< 1			5					
	2	2020			3			4					
	3	2345			8			7					
	8/22 1	0450			6			2					
	2	1555			< 1			21					
	3	2235			2			4					
	8/25 1	1625			< 1			1					
	2	2005			< 1			4					
	3	-			-			-					
	8/26 1	0100			2			5					
	2	1635			1			2					
	3	1935			< 1			1					
	8/27 1	0100			6			4					
	2	1615			2			2					
	3	1945			2			3					
	8/28 1	0055			3			5					
	2	1545			1			3					
	3	1905			< 1			2					
	8/29 1	0055			< 1			5					

TABLE 4 (cont.)
SUMMARY OF OIL AND GREASE AND PHENOL DATA[1]
USSC IRVIN PLANT
AUGUST 22-29, 1975

Station Description	Date	Time	Instantaneous Flow[4] m³/day X 10⁻³	Instantaneous Flow[4] (MGD)	Oil & Grease (Gross)[3] mg/l	Oil & Grease (Gross)[3] kg/day	Oil & Grease (Gross)[3] lb/day	Phenol (Gross) µg/l	Phenol (Gross) kg/day	Phenol (Gross) lb/day	Phenol (Net)[6] µg/l	Phenol (Net)[6] kg/day	Phenol (Net)[6] lb/day
Water Intake after Treatment	8/21 1	1625			< 1			< 1					
	2	2055			< 1			< 1					
	3	2355			2			< 1					
	Avg		18.2	(4.81[7])	1.3	23.7	(52.1)	1	0.018	(0.040)			
	8/22 1	0505			2			< 1					
	2	1610			2			7					
	3	2250			4			1					
	Avg		18.2	(4.81[7])	2.7	49.2	(108)	3	0.055	(0.120)			
	8/25 1	1645			13			3					
	2	2020			< 1			5					
	3	-			-			-					
	Avg		17.7	(4.68)	7	124	(273)	4	0.071	(0.156)			
	8/26 1	0120			1			4					
	2	1655			7			1					
	3	1950			< 1			3					
	Avg		20.9	(5.52)	3	63	(140)	2.7	0.056	(0.124)			
	8/27 1	0120			< 1			1					
	2	1630			< 1			1					
	3	1955			1			1					
	Avg		21.0	(5.56)	1	20	(45)	1	0.021	(0.046)			
	8/28 1	0115			< 1			4					
	2	1600			< 1			3					
	3	1920			< 1			3					
	Avg		18.4	(4.87)	1.8[8]	33	(73)	3.3[8]	0.061	(0.134)			
	8/29 1	0115			4			3					
Water Intake after Treatment	8/21 1	1630			< 1			< 1					
	2	2055			< 1			< 1					
	3	2355			< 1			< 1					
	Avg		18.2[7]	(4.81)	1	18	(40)	1	0.018	(0.04)			
	8/22 1	0505			9			< 1					
	2	1620			2			1					
	3	2250			3			< 1					
	Avg		18.2[7]	(4.81)	4.7	85	(190)	1	0.018	(0.04)			

TABLE 4 (cont.)
SUMMARY OF OIL AND GREASE AND PHENOL DATA[1]
USSC IRVIN PLANT
AUGUST 22-29, 1975

Station Description	Date	Time	Instantaneous Flow[2] $m^3/day \times 10^3$	(MGD)	Oil & Grease (Gross)[3] mg/l	kg/day	lb/day	Phenol (Gross) µg/l	kg/day	lb/day	Phenol (Net)[4] µg/l	kg/day	lb/day
Water Intake after Treatment (cont'd)	8/25 1	1650			10			3					
	2	2020			< 1			4					
	3	-			-			-					
	Avg		17.7	(4.68)	5.5	100	(215)	3.5	0.062	(0.136)			
	8/26 1	0120			< 1			2					
	2	1700			7			< 1					
	3	1920			< 1			4					
	Avg		20.9	(5.52)	3	63	(140)	2.3	0.048	(0.106)			
	8/27 1	0120			< 1			3					
	2	1640			1			2					
	3	1955			5			1					
	Avg		21.0	(5.56)	2.3	48	(105)	2	0.042	(0.092)			
	8/28 1	0115			2			1					
	2	1610			< 1			3					
	3	1910			< 1			1					
	Avg		18.4	(4.87)	1.3[8]	24	(53)	2[8]	0.039	(0.081)			
	8/29 1	0115			< 1			3					
Influent to the Old API Separators	8/25 1	1210			71								
	2	1535			92								
	3	1840			320								
	8/26 1	0910			130								
	2	1505			170								
	3	1845			250								
	8/27 1	0910			102								
	2	1520			133								
	3	1840			420								

TABLE 4 (cont.)
SUMMARY OF OIL AND GREASE AND PHENOL DATA[1]
USSC IRVIN PLANT
AUGUST 22-29, 1975

Station Description	Date	Time	Instantaneous Flow[2] m³/day X 10⁻³	(MGD)	Oil & Grease (Gross)[3] mg/l	kg/day	lb/day	Phenol (Gross) µg/l	kg/day	lb/day	Phenol (Net)[4] µg/l	kg/day	lb/day
Influent to the New API Separators	8/25 1	1220			150								
	2	1545			4800								
	3	1825			1760								
	8/26 1	0920			790								
	2	1515			1900								
	3	1840			3500								
	8/27 1	0915			220								
	2	1525			1700								
	3	1845			720								
Effluent from Oil Treatment System	8/25 1	1225			34								
	2	1555			1								
	3	1820			33								
	8/26 1	0925			< 1								
	2	1525			3								
	3	1830			< 1								
	8/27 1	0920			6								
	2	1530			5								
	3	1830			3								

[1]All data based on grab samples.
[2]Loads are calculated using instantaneous flows.
[3]Freon extractable material.
[4]Credit is given for intake concentration where specified in permit or adjudicatory hearing request.
[5]Numbers in parenthesis are permit designations.
[6]Rejected value.
[7]Average daily flows for 8/21 and 8/22 obtained by averaging the average daily flows of 8/23-8/29.
[8]Average includes 8/29-Sequence #1 concentrations.

Table 5
SUMMARY OF METALS DATA
USSC IRVIN PLANT
August 21-29, 1975

Station Description	Date	Flow $m^3/day \times 10^3$	Flow (mgd)	Gross Net	Total Iron mg/l	Total Iron kg/day	Total Iron (lb/day)	Dissolved Iron mg/l	Dissolved Iron kg/day	Dissolved Iron (lb/day)	Total Zinc mg/l	Total Zinc kg/day	Total Zinc (lb/day)	Dissolved Zinc mg/l	Dissolved Zinc kg/day	Dissolved Zinc (lb/day)
Discharge	8/22	67.4	(17.8)	G	22	1500	(3300)	17	1100	(2500)	0.04	2.7	(5.9)	0.06	4.0	(8.9)
from waste	8/23	61.6	(16.3)	G	21	1300	(2900)	14	860	(1900)	0.03	1.9	(4.0)	0.02	1.2	(2.7)
oil treat-	8/26	58.7	(15.5)	G	32	1900	(4100)	28	1600	(3600)	0.04	2.3	(5.1)	<0.01	-	-
ment plant,	8/27	71.4	(18.9)	G	50	3600	(7900)	50	3600	(7900)	0.20	15	(32)	0.22	15	(34.3)
cooling	8/28	51.2	(13.5)	G	50	2600	(5600)	42	2100	(4700)	0.08	4.1	(9.0)	0.09	4.6	(10.3)
water &	8/29	59.4	(15.7)	G	60	3600	(7900)	50	3000	(6500)	0.04	2.4	(5.2)	0.05	3.0	(6.5)
pickling																
rinse	8/22			N	21	1400	(3100)	17	1100	(2500)						
water (005)	8/23			N	20	1200	(2700)	14	860	(1900)						
	8/25			N	31	1800	(4000)	28	1600	(3600)						
	8/27			N	49	3500	(7700)	50	3600	(7900)						
	8/28			N	49	2500	(5500)	42	2100	(4700)						
	8/29			N	59	3500	(7700)	50	3000	(6500)						
Discharge	8/22	242.0	(63.9)	G	5.2	1260	(2780)	0.78	190	(420)	0.01	-	-	<0.01	-	-
from scale	8/23	233.5	(61.7)	G	3.5	810	(1800)	0.14	33	(72)	0.01	-	-	<0.01	-	-
pits pick-	8/26	145.9	(38.8)	G	4.6	670	(1480)	0.07	10.3	(22)	0.70	102	(225)	0.47	67	(151)
ling rinse	8/27	258.2	(68.2)	G	3.3	850	(1880)	<0.01	-	(-)	0.11	28.3	(63)	<0.01	-	-
water &	8/23	188.7	(49.9)	G	3.8	717	(1580)	0.08	15.4	(33)	0.06	11.1	(24)	<0.01	-	-
cooling	8/29	254.0	(67.1)	G	7.3	1850	(4090)	0.26	66	(146)	0.06	15.4	(33)	0.02	5	(11.1)
water (006)																
	8/22			N	4.2	1020	(2240)	0.70	171	(377)						
	8/23			N	2.5	580	(1300)	0.06	14	(31)						
	8/25			N	3.6	520	(1160)	<0.01	-	(-)						
	8/27			N	2.1	545	(1200)	<0.01	-	(-)						
	8/28			N	2.7	506	(1120)	<0.01	-	(-)						
	8/29			N	6.2	1580	(3470)	<0.01	-	(-)						
Water	8/22			G	1.0			0.08			<0.01			<0.01		
intake	8/23			G	1.0			0.08			<0.01			<0.01		
	8/25			G	1.0			0.10			<0.01			<0.01		
	8/27			G	1.2			0.19			<0.01			<0.01		
	8/28			G	1.1			0.21			<0.01			<0.01		
	8/29			G	1.1			0.52			<0.01			<0.01		
Water	8/22	16.9	(4.5)[1]	G	0.12	2.1	(4.5)	0.07	1.2	(2.6)	<0.01			<0.01		
intake	8/23	16.9	(4.5)	G	0.13	2.2	(4.8)	0.06	1.0	(2.2)	<0.01			<0.01		
after	8/26	15.3	(4.0)	G	0.14	2.1	(4.7)	0.04	0.6	(1.4)	<0.01			<0.01		
treatment	8/27	18.2	(4.8)	G	0.21	3.9	(8.4)	0.08	1.5	(3.2)	<0.01			<0.01		
(Old Plant)	8/28	17.8	(4.7)	G	0.17	3.0	(6.7)	0.15	2.7	(5.7)	<0.01			<0.01		
	8/29	15.9	(4.2)	G	-	-	-	0.06	0.94	(2.1)	-			<0.01		
Water	8/22	16.9	(4.5)	G	0.10	1.7	(3.7)	0.03	0.5	(1.1)	<0.01			<0.01		
intake	8/23	16.9	(4.5)	G	0.11	1.9	(4.1)	0.02	0.3	(0.8)	<0.01			<0.01		
after	8/25	15.3	(4.0)	G	0.13	2.0	(4.4)	0.04	0.6	(1.4)	<0.01			<0.01		
treatment	8/27	18.2	(4.8)	G	0.05	0.94	(2.0)	0.01	0.2	(0.4)	<0.01			<0.01		
(New Plant)	8/28	17.8	(4.7)	G	0.04	0.7	(1.5)	0.03	0.5	(1.2)	<0.01			<0.01		
	8/29	15.9	(4.2)	G	0.02	0.3	(0.5)	0.03	0.5	(1.0)	<0.01			<0.01		

[1]Average of last four days data as readings were not recorded on this date.

TABLE 5 (cont.)
SUMMARY OF METALS DATA
USSC IRVIN PLANT
AUGUST 21-29, 1975

Station Description	Date	Flow m³/day X 10³	Flow (mgd)	Gross Net	Total Chromium mg/l	Total Chromium kg/day	Total Chromium (lb/day)	Total Tin mg/l	Total Tin kg/day	Total Tin (lb/day)	Total Aluminum mg/l	Total Aluminum kg/day	Total Aluminum (lb/day)
Discharge	8/22	67.4	(17.8)	G	0.50	33.4	(74.6)	<0.4	-	-	1.1	74	(163)
from waste	8/23	61.6	(16.3)	G	0.30	18.8	(41.1)	0.6	37	(82)	0.6	37	(82)
oil treat-	8/26	58.7	(15.5)	G	0.23	13.7	(30.0)	0.7	41	(90)	1.1	65	(142)
ment plant,	8/27	71.4	(18.9)	G	0.54	38.6	(84.8)	2.6	186	(410)	0.4	29	(63)
cooling	8/28	51.2	(13.5)	G	0.40	39.4	(86.6)	1.4	72	(158)	1.1	56	(124)
water and	8/29	59.4	(15.7)	G	0.39	23.1	(51.4)	1.0	60	(131)	0.9	54	(118)
pickling													
rinse	8/22			N							0.9	61	(134)
water (005)	8/23			N							0.3	19	(41)
	8/26			N							1.0	59	(129)
	8/27			N							0.3	22	(47)
	8/28			N							1.1	56	(124)
	8/29			N							0.8	48	(105)
Discharge	8/22	242.0	(63.9)	G	0.03	6.9	(16.3)	<0.4	-	-	<0.1	-	-
from scale	8/23	233.5	(61.7)	G	0.03	6.9	(15.4)	<0.4	-	-	<0.1	-	-
pits pick-	8/26	145.9	(38.8)	G	0.10	14.6	(32.6)	<0.4	-	-	0.2	29	(65)
ling rinse	8/27	258.2	(68.2)	G	0.04	10.3	(23.1)	<0.4	-	-	0.5	129	(284)
water and	8/28	188.7	(49.9)	G	0.03	6.0	(12.9)	<0.4	-	-	0.5	95	(208)
cooling	8/29	254.0	(67.1)	G	-	-	-	<0.4	-	-	<0.1	-	-
water (006)													
	8/22			N							-		
	8/23			N							-		
	8/26			N							0.1	15	(32)
	8/27			N							0.4	103	(228)
	8/28			N							0.5	95	(208)
	8/29			N							-		
Water	8/22			G	<0.01			<0.4			0.2		
intake	8/23			G	0.01			<0.4			0.3		
	8/26			G	<0.01			<0.4			0.1		
	8/27			G	0.03			<0.4			0.1		
	8/28			G	0.02			<0.4			<0.1		
	8/29			G	0.02			<0.4			0.1		
Water	8/22	16.9	(4.5)[1]	G	0.02	0.4	(0.9)	<0.4			<0.1		
intake	8/23	16.9	(4.5)	G	<0.01			<0.4			<0.1		
after	8/26	15.3	(4.0)	G	<0.01			<0.4			<0.1		
treatment	8/27	18.2	(4.8)	G	<0.01			<0.4			<0.1		
(Old Plant)	8/28	17.8	(4.7)	G	<0.01			<0.4			<0.1		
	8/29	15.9	(4.2)	G	-			<0.4			<0.1		
Water	8/22	16.9	(4.5)	G	<0.01			<0.4			0.2		
intake	8/23	16.9	(4.5)	G	<0.01			<0.4			0.2		
after	8/26	15.3	(4.0)	G	0.01	0.2	(0.3)	<0.4			0.2		
treatment	8/27	18.2	(4.8)	G	0.01	0.2	(0.4)	<0.4			0.2		
(New Plant)	8/28	17.8	(4.7)	G	<0.01			<0.4			0.2		
	8/29	15.9	(4.2)	G	<0.01			<0.4			0.1		

[1]Daily lead analysis indicated less than detectable limits at each station.

TABLE 6
COMPARISON OF USSC PROPOSED EFFLUENT LIMITATIONS AND SURVEY DATA - DISCHARGE 005 USSC IRVIN PLANT

Parameter	USSC Proposed Limitations				Survey Data				No. of Days Limitations Exceeded
	Daily Average		Daily Maximum		Daily Average		Daily Maximum		
	kg/day	(lb/day)	kg/day	(lb/day)	kg/day	(lb/day)	kg/day	(lb/day)	
Total Suspended Solids	221,223[1]	(487,276)	664,467[1]	(1,461,828)	1770	(3890)	3570	(7880)	0/6
Oil and Grease			21,015[2]	(46,236)			5650	(12,400)	0/6
Dissolved Iron			2640[2]	(5808)			3850	(8490)	2/6
[3]/									

[1]This is a net limitation.
[2]This is a gross limitation.
[3]USSC has proposed that flow be estimated rather than measured.

TABLE 7
SUMMARY OF SELF MONITORING DATA[1]
USSC IRVIN PLANT

Station Description	Date[2]		Temp °C	pH	TSS mg/l	CN-T mg/l	CN-A mg/l	Phenol mg/l	O&G mg/l	TOC mg/l	Fe mg/l
Discharge from waste oil treatment plant pickling rinse water, cooling water (005)	1/15-6/19	Range	16-26	2.3-12.6	37-1392	0.003-0.050	0-0.010	0.21-1.70	0.2-212.1	7.0-103.4	0.02-0.51
		Avg			499	0.020	0.002	0.623	28	54	0.13
		No. of Samples	12	25	13	10	10	10	44	8	14
Discharge from scale pits, pickling rinse water, cooling water (006)	1/10-6/19	Range	13-27	6.2-11.9	22-610	0.004-0.021	0-0.002	0-0.120	3.6-69.4	0-16.5	0.01-11.8
		Avg			174	0.012	0.0005	0.049	20	4.7	1.17
		No. of Samples	11	23	12	10	10	15	40	8	13
Discharge from domestic WWTF (106)[3]	1/17-4/25	Range			< 5-50					1.0-16.0	
		Avg			25					9	
		No. of Samples			16					16	
Water Intake[4]	1/17-6/19	Range	4-24	2.3-8.0	3-583	0-0.043	0-0.020	0.009-0.106	0.09-15	0-80.3	0.01-0.44
		Avg			115	0.013	0.002	0.040	4.3	15	0.14
		No. of Samples	9	19	11	9	9	13	38	7	12

[1]Data provided by USSC in August 29, 1975 transmittal to Enforcement Director, EPA, Region III from James L. Hamilton, III.
[2]Dates samples collected were not provided for all data. Therefore dates are those that were reported.
[3]In addition to these parameters, company monitors for fecal coliform and BOD. Based on 16 samples, fecal coliform ranged from < 30 to 24,000/100 ml and the BOD ranged from < 5 to 55 mg/l (< 10 mg/l average).
[4]The company monitors the intake water for zinc. Based on 15 samples the zinc concentrations averaged 0.10 mg/l (range of 0-0.80 mg/l).

TABLE 8
COMPARISON OF USSC PROPOSED EFFLUENT LIMITATIONS
AND SURVEY DATA - DISCHARGE 006
USSC IRVIN PLANT

Parameter	USSC PROPOSED LIMITATIONS[1]				SURVEY DATA				No. of Days Limitations Exceeded
	Daily Average		Daily Maximum		Daily Average		Daily Maximum		
	kg/day	(lb/day)	kg/day	(lb/day)	kg/day	(lb/day)	kg/day	(lb/day)	
Total Suspended Solids	621,525	(1,368,998)	1,864,575	(4,106,994)	7500	(16,500)	11,700	(25,600)	0/6
Oil and Grease			38,249	(84,147)			8800	(19,400)	0/6
Phenols	36	(80)	109	(240)	3.3	(7.3)	7.6	(16.7)	0/6
Dissolved Iron	33	(73)	99	(217)	53	(116)	190	(420)	1/6
Dissolved Zinc	38	(83)	114	(249)	12	(27)	67	(151)	0/6
2/									

[1]All limitations are gross except suspended solids which are net.

[2]USSC has proposed that flow be estimated rather than measured.

TABLE 9

CRITICAL PARAMETERS AND REQUIRED MONITORING FREQUENCY
USSC IRVIN[1]

Outfall	Parameters																	Frequency
	Flow	O&G	TSS	pH	Fe-D	Fe-T	Cr^{+6}	Cr-T	Zn	Pb	SN	CN-F	CN-T	BOD	Cl_2-r	Fec.C.	Sds.	
005	X	X	X	X	X	X	X	X			X	X	X					3 days/week
105[2]	X	X	X	X		X												1 day/week
006	X	X	X	X	X	X	X	X	X	X	X							Daily
106	X		X	X										X	X	X	X	1 day/month[3]
306	X	X	X	X														3 days/week
406	X	X	X	X														3 days/week
Intake	X	X	X	X	X	X	X	X	X	X	X	X	X					Daily

[1]Permit Program Guidance for Self-Monitoring and Reporting Requirements, April 30, 1973, Office of Permit Programs, EPA.
[2]This outfall is effluent from the oily waste treatment system which is currently not monitored by USSC.
[3]Except flow which shall be monitored one day per week.

REFERENCES

1. Letter dated September 30, 1975, 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, Philadelphia, Pennsylvania.

2. Water Measurement Manual, United States Department of the Interior, Bureau of Reclamation, Second Edition 1967, p. 48-52.

3. Letter dated September 21, 1973, with plans and specifications from Mr. H. J. Dunsmore, Director-Environmental Control, United States Steel Corporation to Mr. Howard Luley, Regional Sanitary Engineer, Department of Environmental Resources, Pittsburgh, Pennsylvania.

4. Letter dated August 1, 1975, 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, Philadelphia, Pennsylvania.

5. Development Document for the Hot Forming and Cold Finishing Segment of the Iron and Steel Manufacturing Point Source Category, USEPA, Effluent Guidelines Division, p. 174-179.

6. Permit Program Guidance for Self-Monitoring and Reporting Requirements, April 30, 1975, USEPA, Office of Permit Programs, p. 12.

7. 40 CFR Part 125.28(c).

APPENDICES

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

Back

EXHIBIT II

OR ______________________________ SURVEY, PHASE ______, DATE ______________

YPE OF SAMPLE ______________________

ANALYSES REQUIRED

STATION NUMBER	STATION DESCRIPTION	TOTAL VOLUME	TYPE CONTAINER	PRESERVATIVE	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

BI I

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

APPENDIX B

DYE DILUTION TECHNIQUE FOR FLOW MEASUREMENT - IRVIN WORKS

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 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 was used due to its low sorptive tendency and stability under varying pH conditions.

Background investigation 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.

APPENDIX C
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.1/ The analytical procedures for characterizing trace organic chemical pollutants are described below. The remaining procedures are listed in the following table.

Parameter	Method	Reference
Al, Cr, Fe, Pb, Sn, Zn, Cu	Atomic Absorption	EPA Methods for Chemical Analyses of Water and Wastewater, 1971, page 83
TSS	Gravimetric	ibid., page 278
Cyanide	Distillation, Colorimetric	ibid., page 41
Phenol	Automated Colorimetric	EPA Methods for Chemical Analyses of Water & Wastes, 1974, page 243
Ammonia	Automated Phenate	ibid., page 168
Oil & Grease	Freon Extraction	Standard Methods 13th Ed., page 254
BOD	Serial Dilution (Winkler-Azide)	ibid., page 489
Hexavalent Chromium	Colorimetric	ibid., page 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 anhyd. sodium sulfate, concentrated, exchanged 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 Quadrapole 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 listings 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.

1/ Federal Register, Vol. 40, No. 111, June 9, 1975.

APPENDIX D

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

T. P. Gallagher, Director
NEIC-Denver

DATE: July 2, 1975

E. J. Struzeski, Jr.
Industrial Waste Consultant, NEIC-Denver

Visit to Irvin Works of United States Steel Corporation, Pittsburgh, Pennsylvania Area, June 24-25, 1975.

In Attendence

Fred Thomas, E. T. Irvin
Bob Dunham, Corporate, Pittsburgh
George Pitcairn, E. T. Irvin
B. A. Procyk, Monroeville
S. A. (Jeff) Davis, Corporate, Pittsburgh

EPA:

Jim Vincent, NEIC-D
Jim Hatheway, NEIC-D
E. J. Struzeski, NEIC-D
M. G. Miller, Region III

Background

The Edgar Thomson Plant and the Irvin Plant comprise two separate iron and steel-making plants situated about 8 miles apart but are, however, included under a single management and described by U. S. Steel Corporation as the Edgar Thompson-Irvin Works. Both plants are included in a single NPDES permit. The ET and Irvin plants are located on the Monongahela River respectively 11 miles and 18 miles upstream from the confluence of the Allegheny and Monongahela Rivers which join to form the Ohio River at Pittsburgh. The Irvin Plant is on the left side of the River facing downstream. The ET Plant is on the right side. This trip report focuses upon the Irvin Steel Plant visited by the EPA on Tuesday, July 24, 1975. The Irvin Plant commenced production in 1938. The Irvin plant is primarily a finishing steel operation receiving slab steel from other plants, particularly Edgar Thomson. Maximum production capacity for the Irvin Plant has been specified in the NPDES permit as 7900 tons/day of hot-formed steel products, 7800/tons cold-formed products, 1650 tons/day of galvanized (zinc) terne-coated (85% lead - 15% tin) steel; and 1600 tons of electrolytically - tin coated steel/day. Additionally, it is reported that 8100 tons steel are acid-pickled daily. Matt Miller of Region III, the permit writer, indicates that the permit production figures were taken as the highest single month production over the past five years experienced by U. S. Steel at each mill and for each major process sector.

Both during the general meeting between EPA and Steel on Friday, July 20 and the Irvin plant visit of July 24th, the Company was extremely cautious and pleaded ignorance on many of the questions presented before them by EPA personnel. Jim Hamilton, the Team Leader for USSC at the meeting of June 20th pledged a spirit of cooperation with the EPA. This cooperation demonstrated by U. S. Steel during our field visits of June 23-25 to the Edgar Thomson and Irvin Plants, was however, severely constrained by Steel personnel, especially as to their completely inadequate responses to many of our questions. Likewise, attitudes were extremely subdued. Dunham and Thomas implied certain data could only be obtained via an official 308 request, and perhaps even then, legal complications could preclude any sort of speedy response.

Process Description

The Irvin Plant primarily produces much of its finished steel for the automotive industry. Partly because of a currently-depressed demand for steel by the auto industry, the Irvin Plant is slated to be completely shut down the week of June 30th and stay closed for an indefinite period thereafter.

Processing at the Irvin steel-finishing mill is described below. Primary production takes place in the 80-inch hot strip mill. Steel slabs are received into the Irvin mill varying in approximate width from 36 to 80 inches. Although Irvin receives much of its primary (slab) steel from the neighboring Edgar Thomson mill, the largest slab coming from the latter mill runs only about 44 inches in width. The large slabs at 80-84 inches are shipped from from the Homestead Plant into Irvin.

In the 80 inch Hot Stripmill, the red hot slabs are hot rolled into steel coils of varying dimensions. Slabs up to eight inches thick and 19.5 feet long (or less) are inserted into slab reheating furnaces (five in number) and subsequently passed through a scalebreaker, and then four roughing stands followed by six finishing stands. The steel slab is rolled down to thickness of .047 to .375 inches. Traveling at speeds up to 2,000 feet per minute, the strip steel is rolled into large coils. The original slab of 235 inches in length may be rolled out to a total length of nearly 3,000 feet. A single coil or roll of steel may weigh up to 47 tons (generally no more than 30 tons.) This mill utilizes no steel scarfing but the sheet steel is sheared before being rolled to the desired gage on the six finishing stands. The six finishing stands have a total of 26,500 HP under remote control. As the hot strip leaves the finishing stands, it is water cooled, coiled, inspected, banded and forwarded by conveyor to a storage area to await final shipment or further processing.

Products at this stage of processing are directed into pipeline, i.e. Alaskan pipe, auto bumpers, etc. Three coilers are deployed at the end of the 80 inch hot strip mill to enable continuous operation. Steel must be adequately coded via water sprays to permit coiling of the strip metal. The hot strip mill also has facilities for cutting the strips down into narrower widths.

Pickling

After hot rolling, the steel coils slated for cold reduction and subsequent finishing are delivered according to width to one of four continuous pickling lines, i.e. an 84 inch pickle line, and/or 36", 56" and 80" pickle lines. At the pickling lines, the rolls are uncoiled and immersed into a sulfuric acid (or other unspecified acid) baths to remove surface oxides. The pickling lines comprise uncoilers, a butt welder (in order to maintain a continuous strip down the pickle line), pickle tanks, rinsing tanks, dryers and recoilers. Overall length of the 84 inch pickle line is about 1,000 feet. After pickling, the strip steel is delivered to the cold reduction and temper mills sectors of the overall works. Pickled steel is generally conveyed to one of two major product areas: A - Tin or Black Plate Products; or B - The Cold Rolled/Coated/Terne Products Sectors. Fumes coming off the pickle lines are collected and conveyed into packed tower air scrubbers. There are a total of 5 such scrubbers on the 80 inch line, and one each on the 84, 36 and 56 inch pickle lines. These fumes are wet scrubbed and disposed of into the pickle rinse lines.

Cold Rolling Mills

For Tin or Black Plate Product, pickled steel is sent through a 5-stand cold rolling mill, through cleaning followed by annealing, then a 2-stand temper mill; the line then splits into two possible products. The tempered steel may be sheared and converted into black plate (backyard sheds, etc.) or otherwise is subjected to electrolytic tinning yielding tin (can) plate products.

Other pickled products after passing a 5-stand cold-rolling mill (similar to above) may proceed in one of three general directions:

1. The cold rolled product is subjected to annealing, a four-high temper mill, then sheared, recoiled and shipped;

2. Cold-rolled strip is passed through continuous galvanizing and aluminum coating lines giving galvanized or aluminum-coated sheet steel;

3. Cold-rolled strip is exposed to annealing and lead coating giving terne plate product.

There are actually four cold reduction mills at the Irvin site. Steel to be converted into tin or blackplate mill products are passed through one of two 43-inch wide five stand cold reduction mills. This steel can be rolled at speeds up to 3900 fpm yielding final product thickness of .006 to .040 inches. An 84-inch five stand cold reduction mill produces final product having thickness of .012 to .165 inches with steel width up to 76 inches. The 84-inch cold reduction mill is served by a total of 39,000 HP and can achieve maximum rolling speeds up to 5,000 fpm. The 84-inch mill generates coils 75 inches in diameter weighing up to 42 tons. Lastly, a three-stand tandem cold reduction mill is employed to produce sheet product. The tandem mill has a line speed of approximately 900 fpm and handles coils up to 72 inches in width and up to 30 tons.

Annealing

Annealing is a process whereby cold-reduced strip steel is specially heat-treated to provide ductibility and softness in the steel product necessary to meet drawing and forming requirements of the customer. The strip steel may be handled either in box annealing furnaces or by continuous annealing techniques. In box annealing, the coils are heated to between 1,200 and 1,300°F in separate furnaces for many hours. The coils once removed from the furnaces are cooled to approximately 225°F in unique containers or covers. During both heating and cooling, a deoxidizing atmosphere is maintained to protect the steel surfaces. Open coil annealing is a variation of the above in which coils are loosely wound on the recoiler with a wire inserted between concentric wraps, thereby giving greater exposure to heat and accelerating the annealing cycle. An alternate to box annealing is continuous annealing whereby the strip steel is moved through a furnace in a series of vertical passes and the steel is heated to a prescribed temperature and held at that level. The metal is subsequently cooled at a controlled rate. At Irwin, on the continuous annealing line, cold reduced rolls are welded into a continuous strip, cleaned in an alkaline detergent solution, heat-treated by passing through a furnace and cooled in rapidly cooling chambers. The total length of sheet steel on the continuous annealing line at Irvin is about one mile. A controlled deoxidizing atmosphere is also maintained in this heating operation. The continuous annealing line at the Irvin Works is deployed for Tin or Black Plate Product. All other annealing is conducted via the box annealing process.

Sheet Steel Finishing

Finishing operations at Irvin are divided into hot-rolled steel operations and cold-rolled steel operations. Off the 80-inch hot strip mill, the products are temper-rolled, side-trimmed and/or slit, or sheared and recoiled. Sheets or coils hot-rolled and finished out on the Nos. 10 and 11 lines at Irvin include railroad cars, automobile and truck frames, agricultural equipment and building components.

In the Cold Strip Finishing Department, products that have been hot-rolled, pickled, cold reduced and annealed receive final treatments. Final products include the steel parts in automotive bodies, refrigerators, wall partitions, etc. Cold-rolled products are rolled in one of four temper mills which include an 84-inch temper mill. Temper rolling imparts desired flatness, hardness and specific surface finish or textures to the final finished products. Following temper rolling, coils may be sheared, side-trimmed, slit and recoiled. The 84-inch cold steel line is further equipped with a welder that enables joining two coils together to form a very large single coil weighing as much as 50 tons.

The Coated Product lines at Irvin include application of zinc (galvanized), aluminum, and lead (terne) coatings onto cold-rolled steel. Three different process lines are involved. On lines Nos. 1 and 2, coils are cleaned, annealed, coated with molten zinc, cooled, chemically treated, leveled, and sheared or recoiled. This galvanizing process imparts corrosion resistance to the steel. This galvanized product is used in roofing, siding, road culverts, heating ducts, rocker panels on cars, and air conditioner parts. Line No. 2 may be used to produce galvanized steel or to produce aluminum coated steel. The aluminum coated material is deployed in parts where protection from higher temperatures is necessary, such as in auto mufflers and exhaust systems. Line No. 3 at Irvin is the terne-coat line. Terne metal is a mixture of approximately 85% lead and 15% tin. In this production sector, the cold reduced steel is annealed, tempered, cleaned, pickled, fluxed, coated with lead and tin, cooled, leveled, and sheared or recoiled. Terne-coated product provides good corrosion resistance and is specially used in forming auto gas tanks, TV and radio chassis, etc.

Tin Finishing

In the tin-coated sheet steel production sector, the strip steel is first annealed, then passed through a temper mill. Sheet steel in the non-coated form after tempering is side trimmed or sheared in producing the black plate product used in the manufacture of pie pans, trays, and other uses wherein a light but durable metal is required. Irvin has three continuous tinning lines employing electrolytic plating for making "tin" cans, which are actually 99% steel. The thin, temper rolled black plate is pickled or cleaned and then passed through on electrolyte solution in which are immersed pure tin anodes. An electric current superimposed on the solution deposits a thin layer of tin on both sides of the steel. The coated sheet is heated to fuse the tin coating, cooled, chemically treated and either sheared into desired lengths or coiled. Four different temper mills are used in the tin finishing department. The tin recoil line can accept steel speeds up to 4,000 feet per minute.

The Irvin mill has only two permitted outfalls to the Monongahela River, i.e. outfalls 005 and 006. However, these sewer systems serve to collect many factory wastewater sources. Both outfalls are large.

General Mill Operations

The Irvin mill is aligned in a general north-south direction with outfall 006 serving the northern or downstream sector of the plant and outfall 005 serving the southern half of the plant. USSC has recently submitted plans to the State of Pennsylvania for proposed wastewater treatment facilities at the Irvin plant intended to treat "some" of the present wastes on the 006 outfall line. These wastes, however, exclude scale pit effluents from the 80 inch hot strip mill, up to 1.3 MGD "process" waste flow from heat treating operations customarily going to outfall 006, and boiler house effluents. Maximum water intake to the Irvin Plant was reported by USSC people as around 70 MGD. At current decreased steel production, Irvin should be below the 70 MGD intake figure. Previous data accompanying the NPDES permit application from USSC to EPA, Region III gives 70 MGD as a total for both outfalls 005 and 006. All these figures appear significantly biased on the high side.

We were told the 80-inch hot strip mill in June was only operating 5 days a week, 3 shifts per day. However, upon walking through the 80-inch strip mill, the production board indicated this particular mill was only operating 12 shifts or "turns" per week equalling 57% capacity. Fred Thomas also cited normal operations on the galvanizing lines may be one week up and perhaps 1 to 2 weeks down. The Terne-Coating line may typically operate 1 week and be down the subsequent 3-4 weeks.

In the various cold steel reduction operations, lubricating oils are extensively used throughout processing. Irvin personnel consider their oil treatment facilities to be more than adequate for USEPA needs. Air compressors generate (uncontaminated) coolant waters. Oil cooling is involved in hot rolling and/or cold rolling steel processing. Pump gland leakages, etc. are "supposedly" directed into pits underlying critical operations and collected into the oil treatment sewer. Fred Thomas initially described the Irvin waste treatment sub-system as consisting of API separators followed by $FeCl_2$ addition followed by air flotation, with sludges being removed from the system. None of the pickling lines incorporate "drag-out" recovery procedures. Spent or discard pickle baths go in the direction of the acid neutralization WW treatment sub-system. Sprays off the 84 inch pickle line, immediately following the pickling solution baths plus pickling rinse (bath) waters are discharged untreated to both the 005 and 006 outfalls. Irvin does not utilize pickling rinse waters as makeup although they supposedly will do so in the future.

Plating metals utilized at Irvin are tin, zinc, aluminum and lead. Other waste constituents include chromium, detergents, wetting agents, etc. Of the plating metals, only zinc is required to be measured in the NPDES permit. The Company could provide us with no data on the other constituents. Plating is generally conducted via the hot dip and rinse technique. For lead plating, the steel is dipped in the metallic solution, then cooled; lead presents absolutely no problems in the effluents according to Steel. Chromium could present difficulties. Steel personnel had no idea what acid solutions were utilized in the pickling baths. Furthermore, they could not give us any data on composition of chemicals used in steel finishing.

Questions on storm sewers contributing to outfalls 005 and 006 indicated there would be little or no upstream contribution during dry weather. During wet weather, practically all storm flow would originate from Company grounds rather than from external areas. Some spring water was thought to be possible in outfall 005 and/or outfall 006. Possible sampling points were selected on the open storm culverts immediately above plant production areas in the event that NET determinations are necessary. One such point is close to the main gate at Irvin (on the head end of outfall 005), and the other is close to the north (truck) gate (on the head end of outfall 006) near the blue shack.

Two sets of scale pits exist on the wastes off the 80-inch hot strip mill. The first of these is a (south side) 3-compartment scale basin, the compartments thought to be arranged in series. Two larger cells are followed by a smaller third cell. The second of these consists of four compartments arrayed in series located adjacent to and just north of the boiler house. Both scale pits are on the east side of the 80-inch hot strip mill. Scale pit effluents find their way into outfall 006. The south side scale pit complex also receives up to 0.84 MGD spent concentrated pickling liquors off the 84-inch continuous pickling line. Effluents from the respective scale pits are represented by sampling points "306" and "406" as specified in the NPDES Permit. However, no sampling is required at these two latter points until after 1/1/77 and the Company has not yet selected these stations. The stations if sampled today, will need to be taken off the last compartment of each scale pit just as the effluent leaves the tank and flows underground to sewer 006. The presence and function of aluminum sulphate phenolate in marked barrels around the scale pits was not determined. Scale originating from the 80-inch hot strip mill is collected and customarily shipped to the E. Thomson sinter plant. However, this sinter plant has been shut down since January 1975 due to air pollution problems. Current disposition and disposal of the Irvin hot strip mill scale solids is not known. The boiler house contributes primarily boiler blowdown to the 006 sewer. Close to the boiler house was located a set of cooling towers (double fan type) primarily for treatment and reuse of waters from the annealing operations generally located in the cold reduction-temper rolling process sectors of the plant. USSC characterizes the hot annealing waters as "plain cooling waters." This cooling tower is situated on the north side of the Irvin Works. As shown in the available materials given EPA by Steel, "Miscellaneous Cooling Water" amounting to 2.18 MGD is directed to the 006 sewer whereas "Heat Treating" waters are split with approximately one-half going to the 006 sewer and the remaining to the 005 sewer.

On the fuel sides, the boilers are powered by coal and coke oven gas. The annealing furnaces are served by natural gas. The No. 7 boiler has collection of fly ash and subsequent reuse of fly ash. The "shot" plant is equipped with small sized baghouses.

In the coating section, we viewed the two galvanizing lines and the terne-coated line. The coating lines are equipped with large furnaces for drying the sheet steel after dipping or coating. Before terne-coating, the metal steel receives caustic-detergent cleaning. Pure metal bars of zinc, aluminum and lead seem to be largely bought from St. Joe Metals. The galvanized and aluminum coat lines can handle a maximum width of steel of 54-inches. Steel plate prior to terne coating is subjected to annealing and acid cleaning and rinsing.

The metal for tin coating employs caustic-detergent cleaning, looping of the metal, heat treating or annealing of the metal, followed by rapid cooling. The annealed metal may then be temper rolled prior to coating. Tin sheet is largely used for tin cans. In the electrolytical tinning sector, the operations generally comprise uncoiling, acid cleaning, rinsing, immersion in the electrolytic bath, rinsing, probable drying, and coiling. The tinning operations were completely shut down during our visit of June 24 which, according to Pitcairn, was the first time he had witnessed this occurrence. The tinning operations which consist of 3 separate lines, handle steel plate of approximately 150 fpm requiring less than 60 seconds for complete coating and drying. The anodes are made of pure tin and the steel introduced into solution becomes the cathode. Thomas reported that practically all tin coating in the industry today is accomplished by electrolytic means and there is practically no more tin "dipping."

Waste Oil Treatment and Acid Neutralization Systems at Irvin Plant

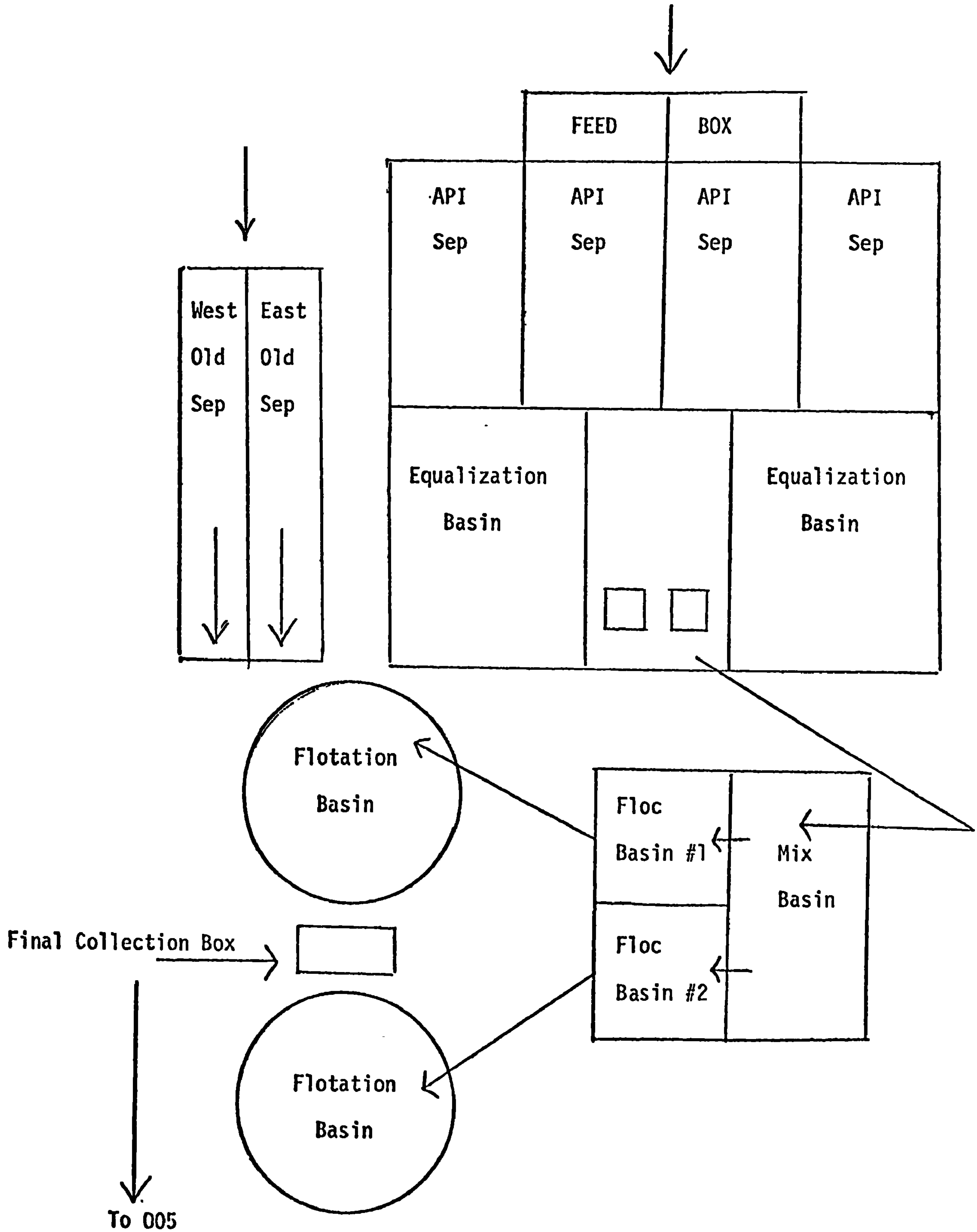
Waste streams into the waste oil treatment system originate almost entirely from various cold rolling steel operations. Waste oils enter either into the "old" plant consisting of a dual chamber API separator or into a four-compartment (in parallel) API separator, the latter part of the new plant. The wastes next enter one of two equalization basins and are pumped across into a rectangular mixing basin. Chemicals, principally $FeCl_2$ plus polyelectrolytes, are added to this tank. The waste next enters two flocculation basins in parallel followed by two circular air flotation tanks in parallel. The effluents from the waste oil treatment system enter into outfall 005. Oils skimmed off the various sets of API separators are separately stored and taken to Clairton where the oils are added to the coal in the coking works. Thomas reports this system has been down to less than 5 mg/l oils. Irvin samples the waste oil treatment plant effluent on what is believed to be a daily basis and reports analytical results to PENDER on a monthly basis. Analyses include Fe, TSS, and oils. The plant operator indicated to us that the influent oil level of around 300 mg/l is consistently lowered to less than 10 mg/l. They had been previously dosing the system with about 58 mg/l $FeCl_2$ but have since entered into an experimental testing phase. Current dosage is down to 22 mg/l $FeCl_2$ or less. Sludges are removed to the acid neutralization plant. The effluent pH of the waste oil treatment system is around 10.0, compared to highly acidic condition of the other wastes entering the 005 discharge line. The composite 005 waste stream continues to be highly acidic.

The acid neutralization treatment system essentially receives concentrated spent pickling solutions. This system includes two waste pickling liquor storage tanks, three reaction tanks wherein lime is added to the pickling liquors and the end-point pH is brought up to about 5.0, followed by three detention tanks. Chemical sludges from the waste oil treatment system are mixed with sludge contents of the final detention tanks and piped into adjoining railroad cars. These sludges are taken to landfill. Waste oils from the waste oil treatment plant are piped into a tank truck at the rear of the neutralization plant and as reported previously, are transported to the USSC Clairton site. There is no reported discharge from the neutralization system to either outfall 005 or 006 or any other Irvin outfall, although Thomas admits there is still access of a sludge line to the 005 sewer. Irvin reports this discharge to be "zero" in the NPDES permit information. Neutralized sludges amount to between 10,000 to 20,000 gallons per shift per day; this material is disposed of to Brown's Dump. Irvin personnel cite the 005 outfall as carrying 15 to 20 MGD wastewater to the Monongahela River. Besides waste sources previously described, the 005 sewer receives NCCW, process and cooling wastes from electrolytic tinning, considerable pickling rinse waters, miscellaneous non-process waters from cold rolling and heat-treating operations, miscellaneous cooling waters, and area storm drainage. A large sub-flow of 10.34 MGD was shown by previous Company transmittals as a separate discharge into the 005 sewer but according to Pitcairn, this is not true; the 10.34 MGD actually enters the 005 line at many diverse points. Plant personnel characterize the composite 005 discharge as generally acidic with a pH between 2.3 and 11.0 and typified as a generally white foaming scum on the surface of the Monongahela River.

Effluent from the waste oil treatment system is accessible via a central collection box before disappearing into the 005 sewer. Measurement of this flow will be exceedingly difficult. The 005 sewer is sampled by the Company immediately below the waste oil treatment and acid neutralization systems just before the sewer starts its radical vertical descent down the hillside into the Monongahela River. Access to the 005 sampling point is through an impossibly small 6-inch diameter "hole" on plant property. Flow measurement is impossible at this location.

The 005 outfall at the River is difficult to reach because of a steep incline from the road down the river bank and no parking on the roadway within a quarter mile or more of the outfall. On June 24th, the 005 discharge into the river was observed as being very murky and oily. Down at the river bottoms, the circular cross section of outfall 005 was measured as approximately 66-inches across. The discharge was observed moving down a 40 foot apron before intercepting the River with an approximate velocity around 18 fps. The discharge was noted as being very hot and extremely oily. There was a preponderance of sludge banks in proximity to the outfall although these deposits were heavy black in contrast to the milky-white emulsion contained in the direct discharge. A sketch of the waste oil treatment plant is shown on the following page. (Exhibit A)

EXHIBIT A



FEED BOX
API Sep
API Sep
API Sep
API Sep
West Old Sep
East Old Sep
Equalization Basin
Equalization Basin
Flotation Basin
Floc Basin #1
Mix Basin
Floc Basin #2
Final Collection Box
Flotation Basin
To 005

Domestic Sewage Treatment

Returning to the 006 sewer line, we proceeded down to the domestic sewage treatment facility of the Irvin works located on the last series of bluffs overlooking the River. We viewed the plant from outside a chained fence since nobody had a key to enter inside. The treatment plant consisted of two small imhoff tanks in series followed by a non-recirculating trickling filter and chlorination, with chlorine contact presumably obtained in the discharge line down to the 006 sewer. During our visit, the trickling filter was non-operational. Fred Thomas stated the filter had been down only a couple of days but judging by the condition of the filter rocks, the down time was more like many weeks or months. We were told chlorination was followed by a parshall flume but we could neither see nor get access to this side of the plant. As usual, Steel personnel could provide no technical detail on treatment. Even chlorine dosage was unknown.

A double set of manholes is available a few feet upstream of the domestic sewage treatment plant. One manhole provides access to the domestic sewage flow down to the separate treatment facility. The other manhole provides access to the 006 sewer upstream of the domestic sewage treatment plant. Both manholes are deep and the 006 pipeline in particular, has extremely high velocity as it drops down the hillside to the Monongahela River. The 006 outfall at its terminus with the Monongahela River cascades in almost a waterfall effect down a concrete apron and then into the River. Maximum reported flow for "006" has been given in the NPDES permit as 54 MGD. This very large flow was hot and estimated to have a velocity in the range of 25 fps. From the River, this outfall is extremely well-hidden, being situated behind a long series of empty-standing barges. On the North side of the Irvin plant boundaries are located Westinghouse, Continental Can, and General Motors, indicating a highly industrialized area.

River Water Intake and Water Treatment

Lastly, we visited the Irvin water intake pumping station on the Monongahela River and the water treatment facilities situated on a hill overlooking both the production plant and the River approximately 300 feet higher in elevation than the River. We received conflicting data on volumes of water withdrawn. Initially, plant personnel were guessing about 18,000 gpm per pump x 5 available pumps = 130 MGD, but with only 2 or 3 pumps generally being used, the estimated intake was then 51.9 to 77.8 MGD. Thomas and Pitcairn indicated the pump station has a maximum intake of 80 MGD but they were currently utilizing only about 40-45 MGD, or roughly 50% of capacity. After talking with the plant operator and inspecting the nameplates and gages on the pumps, we found there are 5 large pumps and one small pump. The capacity on each of the 5 large pumps was 12,000 gpm but they were currently running at only 8,800 gpm. During our visit, volume being pumped was close to 8,800 gpm x 5 pumps = 63.4 MGD.

The Company for purposes of NET loads in the NPDES permit, is sampling water intake from the pumps at the intake station on the pump discharge side. Sampling is conducted at the lower level in the pump station. A pipe discharge extends from the intake station on the north side running down the hill to the water. This intermittent discharge was described as screen or strainer backwash from pumps on the intake station. A second unreported discharge was observed boiling up in the River (backed with high pressure) apparently coming from the direction of the intake station and finally described by USSC as sump discharge from the intake station. This is a relatively sizeable discharge flowing almost constantly. This discharge will be most difficult to sample and nearly impossible to gage. A third unreported discharge was found coming down the hillside, crossing the road, and intercepting the Monongahela River a short distance downstream of the Irvin water intake station. Flow was appreciable and whereas the discharge appeared clear, large deposits of oil were present where this stream intercepted the River. The Company thought this to be acid mine drainage from abandoned operations.

The water treatment plant consists of an old and a new section. The old facility seems to comprise a circular settling basin and sand filters, the latter no longer in use. The new plant more or less includes a new settler and a new sand filtration station. They also have available, a large storage tank or reservoir for finished water together with an emergency elevated water tank. Steel could not provide us with any figures on sizes and dimensions of the various water treatment units nor with volumes of raw or finished water. Steel divides Irvin water use into three categories: Filtered water (thru water treatment plant); Plant water (thru water treatment plant); and plant water used in production but not treated. Large quantities of Calgon BC-4 Industrial Cleaner were stored in the main filter plant building but Steel did not know its use. Aluminum sulfate also stored on the premises is undoubtedly used as a coagulant. The new water treatment facility was equipped with three high-rate sand filters. Water treatment sludges were reported as primarily discharged to the 006 sewer. Irvin obtains its drinking water from Allegheny Company, not from its own treatment system.

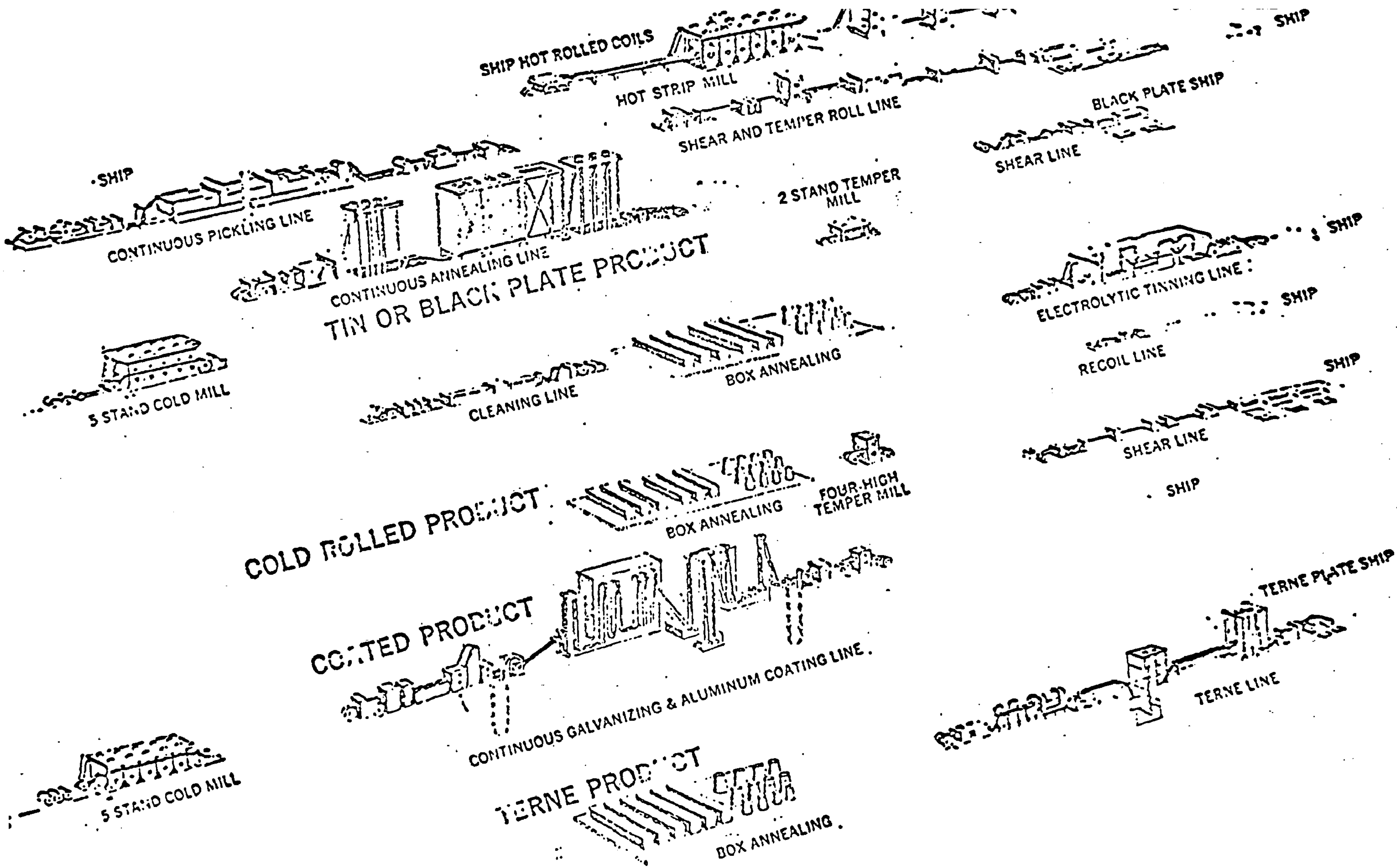
Proposed sampling and gaging points for the Irvin works are tabbed as follows:

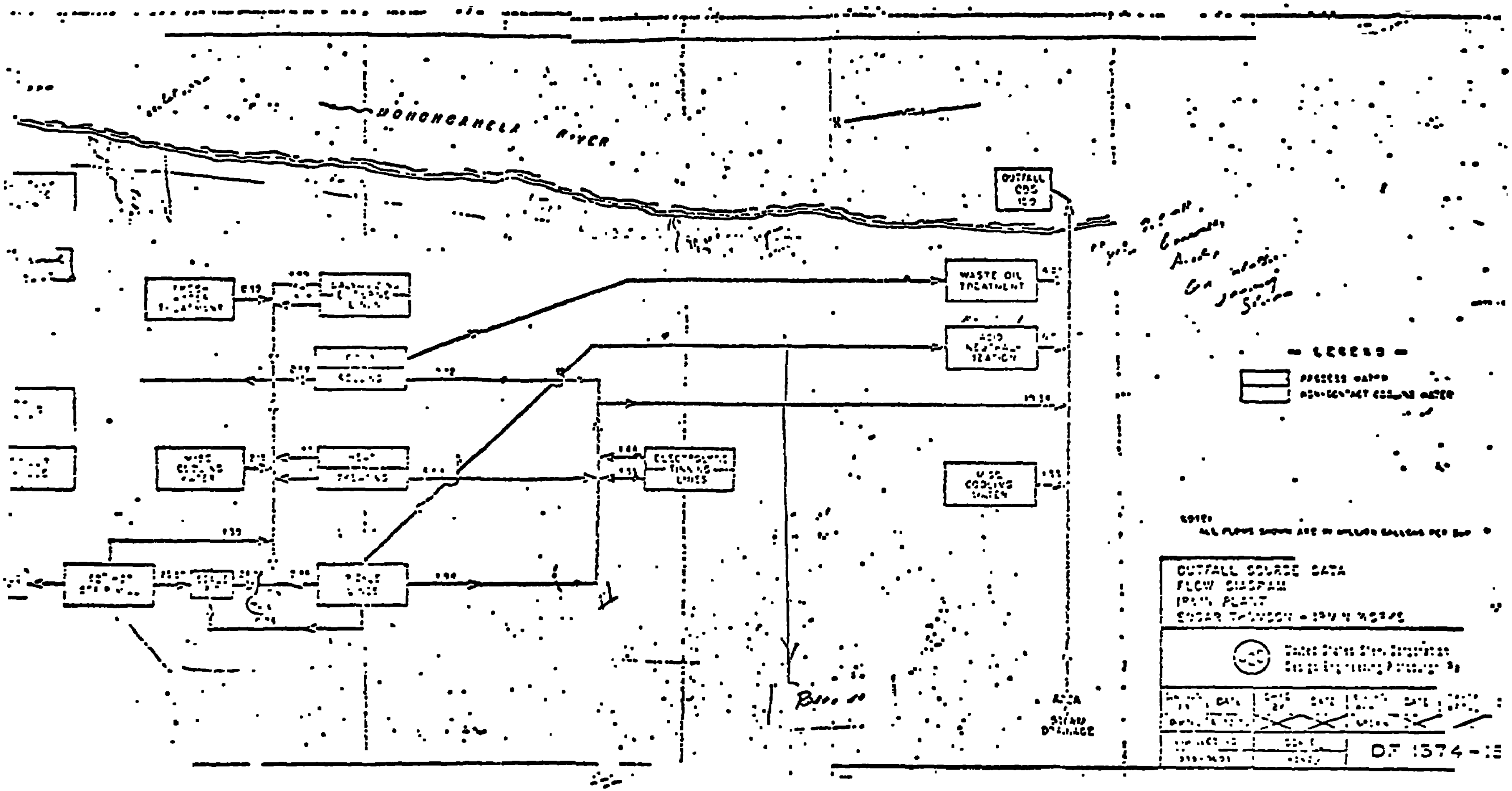
	Total
005, at terminus	-
006, at terminus	-
Water intake at River	3
306, 80-inch hot strip scale pit effluent	-
406, " " " " " " "	-
106, sanitary treatment plant effluent	6
Waste oil treatment plant influent	-
Waste oil treatment plant effluent	8
Storm drainage (1 or 2 locations) but only if found necessary	10

Additional Items

During a closing meeting of June 25 with USSC, we asked as to the availability of water metering records since we had been previously told Irvin routinely meters the raw water into its tin works. We thereby suspected records were available for the water usage on all three electrolytic tinning lines. We were told whatever records are available are maintained by the Accounting Department and in order to satisfy our data needs, the whole accounting department would need to become involved. They would also have to tell us where the meters may be located if any others existed. We asked for the same information on the water treatment plant and were told "nobody knows", the meters, if they exist, probably need calibration, they will try to find out, etc. Water not treated at the water plant is that which primarily is utilized within the 80-inch hot strip mill.

cc: Hathaway
Vincent
Blackman
Pennington
Benson


SHIP HOT ROLLED COILS
HOT STRIP MILL
SHIP
SHEAR AND TEMPER ROLL LINE
BLACK PLATE SHIP
SHEAR LINE
SHIP
CONTINUOUS PICKLING LINE
CONTINUOUS ANNEALING LINE
2 STAND TEMPER MILL
SHIP
TIN OR BLACK PLATE PRODUCT
ELECTROLYTIC TINNING LINE
SHIP
5 STAND COLD MILL
CLEANING LINE
BOX ANNEALING
RECOIL LINE
SHIP
SHEAR LINE
BOX ANNEALING
FOUR-HIGH TEMPER MILL
SHIP
COLD ROLLED PRODUCT
COATED PRODUCT
TERNE PLATE SHIP
CONTINUOUS GALVANIZING & ALUMINUM COATING LINE
TERNE LINE
5 STAND COLD MILL
TERNE PRODUCT
BOX ANNEALING


MONONGAHELA RIVER
OUTFALL
WASTE OIL TREATMENT
LEGEND
OUTFALL SOURCE DATA
FLOW DIAGRAM