Publication No. 74-e63

WA-15-0040

May 29, 1974

Memo to: John Glynn

From: Pat Lee

Subject: Survey at the City of Bremerton's Charlestown Plant.

A routine efficiency study was conducted at the Charlestown STP in Bremerton on February 27, 1974. Influent and effluent were composited for eight hours and a series of grab samples for coliform analysis was taken. Visual inspection of the facilities show it to be well kept and the plant's personnel were well trained and had a high morale. They were very aware of the operating deficiencies of the plant. To pump sludge from the clarifiers, the clarifier first has to be emptied. The plant was bypassing (due to a hydraulic overload) during the morning of the survey. The plant is extremely overloaded both hydraulically and organically, as it was only designed for a 30,000 population and it is currently serving 50,000. The reasons for the hydraulic overload is a combined storm-sanitary system. Also a lot of salt water is coming through the system as can be seen by the field conductivity data. The lab data proves the above assertions as there is little or no reduction in BOD and solids. Surprisingly, disinfection was good, although with a 5 ppm residual, they must be using a lot of chlorine to get the bugs combined with minimal primary treatment.

PL:jmh

STP Survey Report Form

Efficiency Study

City Bremerton Charlestown Plant Type Primary Pop. Served 50,000 Design Capacity 30,000

Receiving Water Sinclair Inlet Perennial X Intermittent

Date 2-27-74 Survey Period 0830-1630 Survey Personnel Pat Lee

Comp. Sampling Frequency half hour Sampling Alequot (Flow-MGD) (2)

Weather Conditions (24 hr) Rain Are facilities provided for complete by-pass of raw sewage? X Yes No/Frequency of bypass During rainy season

Reason for bypass hydraulic overload Is bypass chlorinated? X Yes No

Was DOE Notified? Yes Discharge - Intermittent Continuous X

Plant Operation

Total flow 1,437,000 in 8 hours How measured Totalizer

Maximum flow 7.0 MGD Time of Max. 1030

Minimum flow 5.4 MGD Time of Min. 1430

Pre Cl_2 100 #/day Post Cl_2 300 #/day

Field Results

8 Determinations	Influent Max.	Influent Min.	Influent Mean	Influent Median	Effluent Max.	Effluent Min.	Effluent Mean	Effluent Median
Temp °C	10.8	10.1		10.5	11.0	9.6		10.4
pH (Units)	7.4	6.7		7.3	7.2	6.9		7.1
Conductivity (µmhos/cm²)	13,200	1,400		9,000	12,500	7,000		8,500
Settleable Solids (mls/l)	8.0	4.0	5.5	4.0	2.5	Trace	1.2	.4

Laboratory Results on Composites

	Influent	Effluent	% Reduction
Laboratory No.	74-576	74-577	
5-Day BOD ppm	80	80	0
COD ppm	210	200	5
T.S. ppm	4621	5424	--
T.N.V.S. ppm	3946	4670	--
T.S.S. ppm	107	76	29
N.V.S.S. ppm	20	14	30
pH (Units)	7.2	7.3	
Conductivity (µmhos/cm²)	8400	9600	
Turbidity (JTU's)	50	45	

Laboratory Bacteriological Results

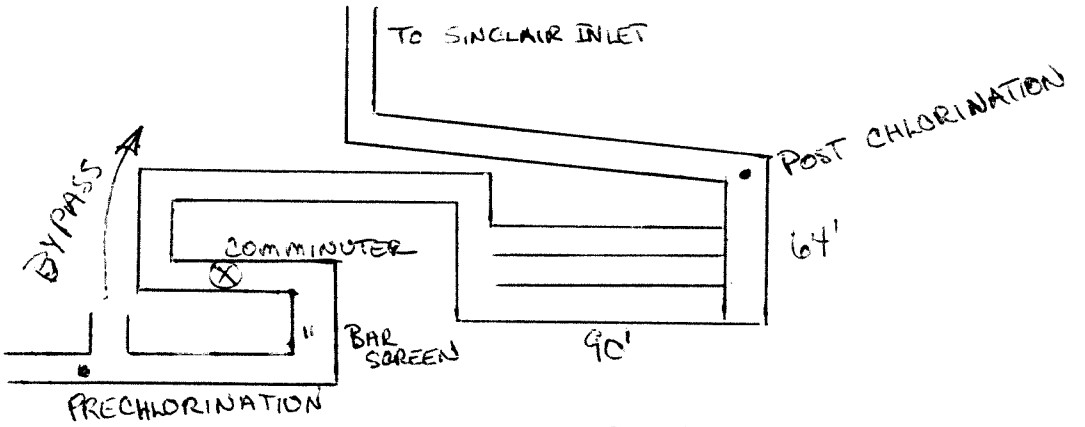
Lab No.	Sampling Time	Colonies/100 ml (MF) Total Coliform	Fecal Coliform	Fecal Strep	Cl_2 Residual
74-578	0930	20	<10		5.0 in 3 min
579	1030	40	<10		5.0 " "
580	1130	80	<10		5.0 " "
581	1330	<20	<10		5.0 " "
582	1430	<20	<10		5.0 " "
583	1530	200	20		2.5 " "

Additional Laboratory Results

NO_3-N ppm -	.65
NO_2-N ppm -	.15
NH_3-N ppm -	10.4
T. Kjeldahl-N ppm -	14.1
O-PO_4-P ppm -	2.2
T-PO_4-P ppm -	4.5

Operator's Name Albert O. Herrmann Phone No. 478-5351

Furnish a flow diagram with sequence and relative size and points of chlorination.



Type of Collection System

__ Combined __ Separate X Both

Estimate flow contributed by surface or ground water (infiltration)

2 to 3 MGD

Plant Loading Information

Annual average daily flow rate(mgd)		Peak flow rate(mgd)	
Dry	2.5	Dry	3.0
Wet	6.0	Wet	8.0

COMMENTS:

STATE OF WASHINGTON

DEPARTMENT OF ECOLOGY

WATER QUALITY LABORATORY

ORIGINAL TO: LFF

COPIES TO:

LAB FILES

DATA SUMMARY

Source ELMER CITY STP Collected By [illegible]

Date Collected 3/27/74 Goal, Pro./Obj.

Log Number:	74 576	577	578	579	580	581	582	583			STORET
Station:	INF	LFF	CL 0730	1030	CL 1130	1330	1430	1530			
pH	7.2	7.4									00403
Turbidity (JTU)	51	45									00070
Conductivity (umhos/cm)@25C	840	1600									00095
COD	210	212									00340
BOD (5 day)	78	—									00310
Total Coliform (Col./100ml)			20*	40*	80*	<20	<20	200*			31504
Fecal Coliform (Col./100ml)			<10	<10	<10	<10	<10	20*			31616
NO3-N (Filtered)		.65									00620
NO2-N (Filtered)		.15									00615
NH3-N (Unfiltered)		104									00610
T. Kjeldahl-N (Unfiltered)		141									00625
O-PO4-P (Filtered)		2.20									00671
Total Phos.-P (Unfiltered)		1.50									00665
Total Solids	4121	5464									00500
Total Non Vol. Solids	3946	4670									
Total Suspended Solids	107	76									00530
Total Sus. Non Vol. Solids	7	14									

Note: All results are in PPM unless otherwise specified. ND is "None Detected"
Convert those marked with a * to PPB (PPM X 10^3) prior to entry into STORET

Summary By [illegible] Date 3/26/74

U.S. DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADMINISTRATION

SEWAGE TREATMENT PLANT OPERATION AND MAINTENANCE PRACTICES QUESTIONNAIRE

FORM APPROVED
BUDGET BUREAU NO. 43-R1527

CHECK ONE: [X] 1ST AUDIT [ ] RE-AUDIT

DATE OF AUDIT: 2-27-74

PLANT DESCRIPTION CODE (For Official Use Only): Primary

A. GENERAL INFORMATION

1. PROJECT (State, Number): Washington

SCOPE OF PROJECT (new plant, additions, etc.): Routine

2. PLANT LOCATION (City, county): Bremerton, Kitsap — Plant #2 Charleston

IDENTIFICATION OF AREAS SERVED: Navy Yard, + ⅓ Bremerton

3. POPULATION

3A. FRACTION OF AREA POPULATION SERVED (%)	3B. PLANT DESIGN (population equivalent)	3C. SERVED BY PLANT (domestic)
100	30,000	50,000

4. TYPE OF COLLECTION SYSTEM

4A. [ ] COMBINED [ ] SEPARATE [X] BOTH

4B. ESTIMATED FLOW CONTRIBUTED BY SURFACE OR GROUND WATER (infiltration, m/d): 2-3

5. YEAR COMMUNITY BEGAN SEWAGE TREATMENT: 9-1950

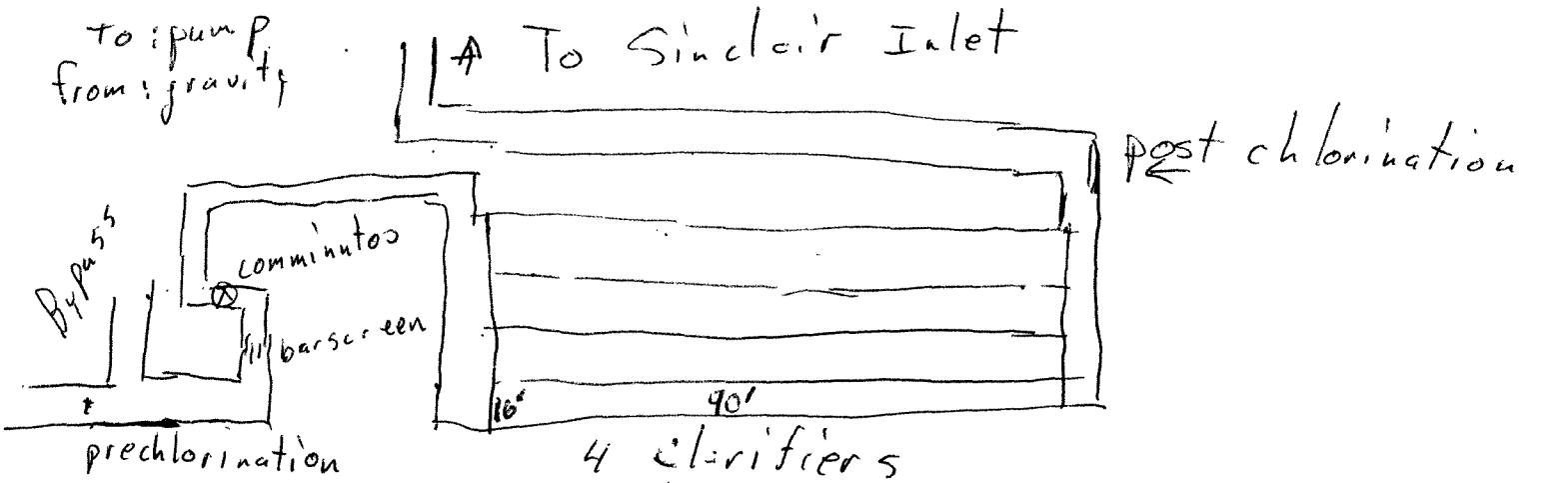
6. YEAR PRESENT SYSTEM PLACED IN OPERATION

6A. SEWER	6B. PLANT	6C. ANCILLARY WORKS
± 1900		

7A. SIZE OF PLANT SITE (acres): 2

7B. APPROXIMATE AREA LEFT FOR EXPANSION (acres):

8A. IN THE SPACE PROVIDED BELOW FURNISH A SIMPLIFIED FLOW DIAGRAM OR A WRITTEN DESCRIPTION OF THE PLANT UNITS IN FLOW SEQUENCE. INCLUDE THE METHOD OF ULTIMATE SLUDGE DISPOSAL. SHOW APPROXIMATE SURFACE AREA OF STABILIZATION PONDS AND NUMBER OF CELLS. INDICATE WHETHER FLOW TO AND FROM PLANT IS BY PUMPING OR GRAVITY.



8B. NOTE ANY SIGNIFICANT OR UNIQUE PROCESSING CONDITIONS.

9. RECEIVING STREAM

9A. NAME OF STREAM: Sinclair Inlet

9B. STREAM FLOW IS: [X] PERENNIAL [ ] INTERMITTENT [X] NATURAL [ ] REGULATED [ ] INTERSTATE [ ] INTRASTATE [X] COASTAL

B. CURRENT PERFORMANCE AND PLANT LOADING INFORMATION

1A. ANNUAL AVERAGE DAILY FLOW RATE (m&d)	1B. PEAK FLOW RATE (m.g.d) DRY WEATHER	1B. PEAK FLOW RATE (m.g.d) WET WEATHER	1C. MINIMUM FLOW RATE (m.g.d)
4	3	8	1/0

2. AVERAGE BOD OF RAW SEWAGE (5 DAY 20°C) (ppm):

3. AVERAGE SETTLEABLE SOLIDS OF RAW SEWAGE (ml/l):

4. AVERAGE SUSPENDED SOLIDS OF RAW SEWAGE (mg/l):

5. AVERAGE COLIFORM DENSITY OF RAW SEWAGE (MPN per 100 ml):

6. ANNUAL AVERAGE PLANT REDUCTION

6A. BOD (%)	6B. SETTLEABLE SOLIDS (%)	6C. SUSPENDED SOLIDS (%)	6D. COLIFORM DENSITY (%)
	90		

15. STABILIZATION PONDS

A. WEEDS CUT AND VEGETATIVE GROWTH IN PONDS ELIMINATED? ☐ YES ☐ NO

B. BANKS AND DIKES MAINTAINED (erosion etc.)? ☐ YES ☐ NO

C. FENCING AND "WARNING – POLLUTED WATER" SIGNS PRESENT AND IN GOOD REPAIR? ☐ YES ☐ NO

D. FREQUENCY OF INSPECTION BY OPERATOR

E. WATER DEPTH (feet)

_____ HIGH _____ LOW _____ MEDIUM

F. ADEQUATE CONTROL OF DEPTH? ☐ YES ☐ NO

G. SEEPAGE REPORTED? ☐ YES ☐ NO

H. ANY REPORTS OF GROUND WATER CONTAMINATION FROM POND (If yes, give details)? ☐ YES ☐ NO

I. MOSQUITO BREEDING PROBLEM? ☐ YES ☐ NO IF YES, NAME OF SPECIES IF KNOWN

J. CAN SURFACE RUN-OFF ENTER POND? ☐ YES ☐ NO

C. SUPERVISORY SERVICES

1. IS A CONSULTING ENGINEER RETAINED OR AVAILABLE FOR CONSULTATION ON OPERATING AND MAINTENANCE PROBLEMS?

☒ YES ☐ NO IF YES IS IT ON: ☒ CONTINUING BASIS OR ☐ UPON REQUEST BASIS

IF CONTINUING BASIS, WHAT IS THE FREQUENCY OF VISITS:

2. DO OPERATORS AND OTHER PERSONNEL ROUTINELY ATTEND SHORT COURSES, SCHOOLS OR OTHER TRAINING ACTIVITIES?

☒ YES ☐ NO

IF YES, CITE COURSE SPONSOR AND DATE OF LAST COURSE ATTENDED

IF NO, DO YOU KNOW OF ANY COURSES AVAILABLE TO SERVE THIS AREA?

3A. ARE ALL EQUIPMENT AND PARTS OF THE PRESENT PLANT STILL IN OPERATION? ☒ YES ☐ NO (If no, explain)

B. ARE PROCESSING UNITS OPERATING AT DESIGN EFFICIENCY? ☒ YES ☐ NO (If no, explain)

4. HAVE THERE BEEN ANY DIFFICULTIES WITH THE SEWAGE TREATMENT PLANT?

A. STRUCTURAL ☐ YES ☒ NO (If yes explain)

B. MECHANICAL ☐ YES ☒ NO (If yes, explain)

C. OPERATIONAL ☐ YES ☒ NO (If yes, explain)

D. BASED ON OPERATING EXPERIENCE TO DATE WHAT IF ANY CHANGES WOULD YOU RECOMMEND TO IMPROVE OPERATION OF THE PLANT?

E. LABORATORY CONTROL

Enter test codes opposite appropriate items. If any of the below tests are used to monitor industrial wastes place an "X" in addition to the test code.

CODES

1 – 7 or more per week
2 – 4, 5 or 6 per week
3 – 1, 2, or 3 per week
4 – as required
5 – 2 or 3 per month
6 – 1 per month
7 – Quarterly
8 – Semi-Annually
9 – Annually

ITEM	RAW	PRIMARY EFFLUENT	MIXED LIQUOR	FINAL	SLUDGE		DIGESTOR	RECEIVING STREAM
					RAW	SUPER-NATANT		
1. BOD								
2. SUSPENDED SOLIDS								
3. SETTLEABLE SOLIDS	1			1				
4. SUSPENDED VOLATILE								
5. DISSOLVED OXYGEN	1			1				
6. TOTAL SOLIDS								
7. VOLATILE SOLIDS								
8. pH	1			1			1	
9. TEMPERATURE	1						1	
10. COLIFORM DENSITY								
11. RESIDUAL CHLORINE				1				
12. VOLATILE ACIDS								
13. M. B. STABILITY								
14. ALKALINITY							1	
15.								
16.								
17.								
18.								
19.								

F. OPERATION AND MAINTENANCE COST FOR PLANT

YEAR OF OPERATION	SALARIES/WAGES	ELECTRICITY	CHEMICALS	MAINTENANCE	OTHER ITEMS	TOTAL
MOST CURRENT YEAR 19						
PRIOR YEAR 19						
PRIOR YEAR 19						
PRIOR YEAR 19						

EVALUATION PERFORMED BY	TITLE	ORGANIZATION
Pat Lee	E.T.	DOE

INFORMATION FURNISHED BY	TITLE	ORGANIZATION	DATE
A.O. Herrmann	Superintendent	City of Bremerton	2-21-74

STATE OF
WASHINGTON

Dixy Lee Ray
Governor

DEPARTMENT OF ECOLOGY

7272 Cleanwater Lane, Olympia, Washington 98504 206/753-2353

MEMORANDUM
January 18, 1979

To: Craig Baker

From: Greg Cloud

Subject: Charleston STP Class II Inspection

Introduction

The Charleston Wastewater Treatment Facility is a primary plant on the south side of Bremerton. It is composed of a headworks, parshall flume, four covered clarifiers, and an underground contact chamber. It receives both municipal and industrial waste, including a discharge from the metals plating division of the Bremerton Navy Yard. The plant also has an added load of sewage that is discharged into the headwork at the plant by septic tank pumping trucks. The final effluent is piped to Sinclair Inlet, with the discharge about 100 yards offshore. This surface water segment (07-15-03) is identified in the 5-year Strategy as meeting state water quality goals. The plant supervisor is Don Proctor. The plant is operated by Alan Rader. Laboratory analyses are done by Jack Hirsch.

Findings and Conclusions

On November 7 and 8, 1978, Eric Egbers and I visited the facility to conduct a Class II inspection for permit compliance and laboratory procedures. Automatic composite samplers were installed on the influent, unchlorinated effluent and chlorinated effluent. A Manning "dipper" flow recorder was installed in their parshall flume for an accuracy comparison of Charleston's flow recorder. Flow was measured over the same time period that composite samplers were operating. The plant's flow meter was found to be measuring 118.6 percent of the actual flow.

The septic tank pumpers still dump at the plant on an irregular schedule. This highly concentrated sewage is the probable cause of some of the high fecal coliform effluent values. The irregular coliform values are compounded by the use of a manual feed on the chlorination system (see laboratory procedures and techniques).

The fecal coliform value (<10) was very low for the sample taken on November 8, 1978. The chlorine residual at that time was 2.8 ppm. Since these low values were less than permit limitations (1,500/100 ml

weekly average, 700/100 ml monthly average) it is stressed that the chlorinator be repaired to allow greater control of the chlorine added. After the automatic feed is fixed, chlorine residuals should be maintained at as low a level as possible with fecal coliform kill adequate to meet permit limitations. The need to repair the chlorinator was addressed a year ago and has not yet been accomplished.

The plant has had some problems in the past with sludge disposal. Apparently they are now using it at the county airport as a soil conditioner.

Heavy metals were sampled in the influent, unchlorinated effluent, and in the sludge. The values were not abnormally high in the influent or in the unchlorinated effluent. Metal concentrations in the sludge, with the exception of Zinc, were relatively high when compared to other municipal plants (Table I). Table I shows Charleston's trace metal concentrations in comparison with the means of trace metal concentration data collected during Washington State Class II inspections. The results from three plants were utilized for the influent concentration mean. The results from 24 plants were utilized for the sludge concentration mean.[1/]

Table I Trace Metal Concentrations and Toxic Limits

	Influent Mg/l			Sludge (dry wgt. mg/kg)	
Parameter	Mean Concen.*	Charleston	Threshold Concen.[2/]	Mean Concen.*	Charleston (Anaerobic)
Cu	.08	.15	.005 to 0.5[3/]	545.0	950.0
Cd	<.01	.01		11.7	16.0
Cr	<.03	.13		150.0	540.0
Pb	<.05	.10	0.1[4/]	535.0	630.0
Zn	.30	.23	.08 to .5[3/]	1845.0	180.0

* See Text

1/ From Mt. Vernon STP, Morhous, 1978.

2/ WPCF and ASC2, 1977. Manual of Practice 8, Wastewater Treatment Division, Lancaster Press.

3/ Threshold concentration inhibitary to the activated sludge nitrification process.

4/ Threshold concentration inhibitary to activated sludge carbonaceous BOD removal.

These increased values might be related to the metals plating division at the Navy Yard. Jack Hirsch, at the treatment plant, mentioned that very high pH values were observed at the head works and were traced to the pump station at the Navy Yard. Jack Hirsch and Alan Rader were told that when high values are observed they should document the fact and visit the pump station and record the pH values found there. This wastewater flow should be fully characterized (pH, trace metal concentrations and flows) prior to design of a new secondary treatment facility.

Cyanide concentrations reported here are below those considered detrimental to biological wastewater treatment. The unchlorinated effluent value of 22.0 ppb is less than 25 percent of the low threshold for carbonaceous removal in sludge reported in MOP 8[1].

Review of Laboratory Procedures and Techniques

Jack Hirsch now performs analyses at Charleston. On the previous inspection (September 6, 1977) Mr. Fitzwater ran the analyses. As before, BOD_5 is still run on the unchlorinated effluent. It was again suggested that they gain confidence in their ability to run the BOD_5 test on the chlorinated effluent and change their procedure.

The effluent sample location for the BOD_5 test should be changed to include all four clarifiers instead of the three being presently sampled.

The Total Suspended Solids Test (TSS) should use a minimum of 50 ml of sample instead of a lesser volume. This sample should also be collected to include all four clarifiers.

[1] WPCF and ASC2, 1977. Manual of Practice 8, Wastewater Treatment Division, Lancaster Press.

24 Hour Composite Sampler Installations

Sampler	Date and Time Installed	Location
1. aliquot -	Influent 11/7/78 at 1005 hrs. 250 ml/30 minutes	Upstream from bar screen
2. aliquot -	Unchlorinated effluent 11/7/78 at 1035 hrs. 250 ml/30 minutes	Combined clarifer final effluent
3. aliquot -	Chlorinated effluent 11/7/78 at 1050 hrs. 250 mg/30 minutes	Manhole outside plant fence

Grab Samples

	Date and Time	Analysis	Sample Location
1.	11/7/78 @ 1400 hrs.	Chlorine residual	Manhole outside plant fence
2.	11/8/78 @ 1000 hrs.	Chlorine residual and fecal	Manhole outside plant fence
3.			
4.			
5.			
6.			

Flow Measuring Device

1. Type 12" parshall flume
2. Dimensions

a. Meets standard criteria [X] Yes

[ ] No Explain:

b. Accuracy check

	Actual Instan. Flow	Recorder Reading	Recorder Accuracy (% of inst. flow)
1.	See findings & conclusions	2.6 mgd	118.6%
2.			
3.			

[ ] is within accepted 15% error limitations

[ ] is in need of calibration

Field Data

Parameter	Date and Time	Sample Location	Result
Temperature	11/8/78 1100 hrs	Influent	15.5°
pH	11/8/78 1100 hrs	Influent	8.5
Conductivity	11/8/78 1100 hrs	Influent	1750
Temperature	11/8/78 1105 hrs	Unchlorinated effluent	15.5°
pH	11/8/78 1105 hrs	Unchlorinated effluent	7.6
Conductivity	11/8/78 1105 hrs	Unchlorinated effluent	1750
Temperature	11/8/78 1110 hrs	Chlorinated effluent	15.4°
pH	11/8/78 1110 hrs	Chlorinated effluent	7.0
Conductivity	11/8/78 1110 hrs	Chlorinated effluent	1900
Chlorine Residual	11/7/78 1400 hrs	Chlorinated effluent	3.5 ppm
Chlorine Residual	11/7/78 1110 hrs	Chlorinated effluent	2.9 ppm

The following table is a comparison of laboratory results from 24 hour composite(s) together with NPDES permit effluent limitations. Additional results pertinent to this inspection have also been included.

November 8, 1978	DOE Influent	DOE Unchlorinated Eff.	DOE Chlorinated Effluent	Charleston STP Influent	Charleston STP Unchlorinated Eff.	Charleston STP Chlorinated Effluent	NPDES (Monthly average
BOD_5 mg/l	205	134	116	220	150		165 mgl
lbs/day	4445	2906	2515	4770	3253		4800 lbs day
TSS mg/l	130	50	48	197	103		140 mgl
lbs/day	2819	1084	1041	4272	2233		4100 lbs day
Total Plant Flow MGD						2.6 mgd	3.5 mgd
Total Residual Chlorine			2.9*				
Fecal Coliform			<10				
COD mg/l	446	310	310				
pH (S.U.)	7.2*	7.2*	7.1*				
pH (S.U.)	7.8	8.0	7.6				
Specific Conductance (umhos/cm)	2015*	2030*	1900				
Specific Conductance (umhos/cm)	2060	1740	2500				
NH_3-N (mg/l)	26.0	22.0	21.0				
NO_2-N (mg/l)	<.5	<.5	<.5				
NO_3-N (mg/l)	<.5	<.5	<.5				
O-PO_4-P (mg/l)	4.5	4.4	4.6				
T-PO_4-P (mg/l)	6.7	6.8	6.1				
Total Solids (mg/l)	1254	1101	1054				
TNVS (mg/l)	959	899	840				
Total Sus. Solids (mg/l)	130	50	48				
TNVSS (mg/l)	30	10	12				
Turbidity (NTUs)	77	45	50				
Temp °C	15.5*	15.5*	15.4*				

* Field Analysis grab "<" is "less than" and ">" is "greater than"

Heavy Metals Results

November 8, 1978	Influent	DOE Unchlorinated Eff.	Sludge	NPDES (Monthly Average)
	mg/l	mg/l	mg/kg dry wt.	
Copper	0.15	0.19	950	
Chromium	0.13	0.07	540	
Lead	0.10	0.10	630	
Zinc	0.23	0.27	180	
Cadmium	0.01	<0.01	16	
Nickel	0.05	<0.05	95	
Cyanide	5.50*	22.00*		

*Parts per billion

"<" is "less than" and ">" is "greater than"