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STATE OF WASHINGTON
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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.

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 chec

	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.

		DOE		Charleston STP			
November 8, 1978	Influent	Unchlori-nated Eff.	Chlorinated Effluent	Influent	Unchlori-nated Eff.	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"