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STATE OF WASHINGTON

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DEPARTMENT OF ECOLOGY

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M E M O R A N D U M
January 29, 1979

To: Doug Houck

From: Bill Yake

Subject: Chehalis STP Class II Inspection

Introduction:

A Class II inspection was performed at the Chehalis STP on November 21 and 22, 1978. Jim Armstrong and other facility personnel were present. DOE representatives were Doug Houck and Gerry Caulkins (S.W. Region) and Mike Morhous and Bill Yake (Water and Wastewater Monitoring). The Chehalis plant is a secondary plant of unusual design. Influent comes from a pump station, is comminuted, passed through a grit chamber with flotation, and then routed to two Parshall flumes, which normally would split the flow to two primary settling basins. One of these basins was down due to a non-level sludge arm which was shearing pins. The flow can then pass to two trickling filters and/or two aeration basins. The trickling filters had just been started up, had little fixed growth and substantial leakage at the base of the distributor arms. One aeration basin was down because the floating aerators were inoperable. The flow then passes to a secondary clarifier, a Venturi flow meter, a chlorinator, and finally, to a well-designed contact chamber. Primary sludge is digested in anaerobic digesters, the secondary sludge in an aerobic digestor. A flotation thickener, which is designed to thicken this sludge, was also down during the inspection. Unthickened, digested sludge is being hauled to the airport for land distribution.

The plant effluent is discharged to the Chehalis River (10-23-13), which the Five-Year Strategy defines as a surface water segment where available data is insufficient to determine if the water quality goal is being achieved.

Findings and Conclusions:

Compliance with NPDES permit limitations was marginal. Unchlorinated effluent was not meeting BOD permit limitations for concentration (30 mg/l) or loading (350 lbs/day). Chlorinated effluent was meeting BOD limitations. The concentration (30 mg/l) and percent removal (85 percent) limitations on suspended solids were not being met. The recorded flow (2.05 MGD) was well above the monthly permitted average of 1.4 MGD. Weak influent strength indicates substantial infiltration/inflow.

There appear to be three major reasons why the facility performance was inadequate:

1. The facility is not well maintained. This is evidenced by the fact that the following unit processes were inoperable:

   a. One of two primary settling basins was down due to an off-level sludge scraper.

   b. One of two aeration basins was down due to aerator failure.

   c. The flotation sludge thickener (Komline unit) was down.

   In addition, leakage at the base of the trickling filter distributor arms was causing inadequate wastewater distribution over the filter.

2. There is no control method being used to operate the plant. This appears to be due to both physical deficiencies in the plant (e.g., no means of measuring or monitoring return sludge flow) and lack of operator familiarity with control methodology.

3. A combination of excessive flow rates (probably due to infiltration/inflow) and undersized unit processes. This situation is probably most critical with the secondary clarifier which has difficulty handling flows in excess of 2.0 to 2.5 MGD.

To provide adequate treatment until completion of the facility upgrade (2 to 3 years), we make the following recommendations:

1. Inoperable equipment should be repaired or replaced at the earliest possible date and maintenance improved to assure operation of all unit processes in the plant.

2. A rational control method should be developed and instituted by the town or their consultant. Necessary physical modifications (primarily in-plant flow measuring devices at necessary points) should be made concurrently with method development. These would probably include measuring flow to each of the aeration basins and perhaps each of the trickling filters. In addition, capability to measure and accurately control return sludge and waste sludge rates should be incorporated.

In addition to the above-mentioned deficiencies, the facility's dissolved oxygen meter has been inoperable for approximately 9 months. Thus dissolved oxygen levels in the aeration basin and aerobic digesters can not be monitored. This meter should be repaired immediately.

Trace metal concentrations in influent, effluent, and sludges were generally lower than concentrations found in other municipal plants in Washington State.

Review of Laboratory Procedures and Techniques:

Split sample results showed excellent agreement for the BOD and suspended solids tests. In general, laboratory procedures were very good. There were, however, several recommendations made to bring STP laboratory procedures in line with those recommended by the Department.

BOD_5:

1. Dilution water temperatures should be checked before setup and brought to 20°C.

2. Blank drops are not accounted for if the five-day blank depletion is less than 0.4 mg/l. Blank depletions should be accounted for by using the following formula for calculating results:

$$BOD_5 = f\ (D.O._0 - D.O._5 - Dep.)$$

where f = dilution factor

$D.O._0$ = sample dilution d.o. at beginning of test (mg/l)
$D.O._5$ = sample dilution d.o. after 5 days (mg/l)
Dep. = Depletion in d.o. in blank after 5 days (mg/l)

3. Zero day d.o. should be determined from sample dilution, not dilution water.

4. A thermometer in a water bath placed on same shelf as test bottles should be used to check and calibrate incubator temperatures.

Suspended Solids:

1. The filter being presently used (A.P. Millipor prefilter) is not approved for suspended solids testing and should be replaced with an approved filter (Reeves Angel 940 AH or Gelman A/E) as soon as possible.

2. Filters should be cooled in dessicator before tare weight is determined.

3. Filters should be cooled in dessicator after sample is filtered and dried before they are weighed.

Fecal Coliform:

1. Samples are taken at 6 a.m. This is probably not indicative of normal conditions and should be changed to sometime between 10 a.m. and 5 p.m.

2. Water bath temperatures should be regulated carefully. A temperature of 45.8°C was noted during the inspection. Temperatures should be maintained at 44.5 ± 0.2°C.

3. High effluent suspended solids concentrations are interfering with the fecal coliform test. The plant is having trouble filtering more than 30 mls per test and this is resulting in counts of zero to 13 colonies per filter. Duplicate samples should be run to achieve better accuracy at this low sample volume. Increased volumes might well result in solids interference on the filter.

Class II Field Review and Sample Collection
24 Hour Composite Sampler Installations

Sampler	Date and Time Installed	Location
1. Influent aliquot - 250 ml/30 min	11/21/78 - 1010	Downstream end of Parshall Flume
2. Unchlorinated effluent aliquot - 250 ml/30 min	11/21/78 - 1000	Secondary clarifier launder outfall
3. Chlorinated effluent aliquot - 250 ml/30 min	11/21/78 - 1015	Effluent end of chlorine contact chamber

Grab Samples

	Date and Time	Analysis	Sample Location
1.	11/21/78 - 1015	Fecal Coliform, Chlorine Res.	Chlorinated Effluent as above
2.	11/21/78 - 1330	Fecal Coliform, Chlorine Res.	Chlorinated Effluent as above
3.	11/21/78	Trace Metals	Anaerobic sludge
4.			
5.			
6.			

Flow Measuring Device

1. Type - In-line Venturi
2. Dimensions -

a. Meets standard criteria /__/ Yes

/__/ No Explain: In-line meter, could not be checked for accuracy.

b. Accuracy check

	Actual Instan. Flow	Recorder Reading	Recorder Accuracy (% of inst. flow)
1.			
2.			
3.			

/__/ is within accepted 15% error limitations

/__/ is in need of calibration

Field Data

Parameter	Date and Time	Sample Location	Result
pH, Cond, Temp.	11/21/78 - 1010	Influent	See Results.
pH, Cond, Temp.	11/21/78 - 1000	Unchlorinated effluent	See Results.
pH, Cond, Temp.	11/21/78 - 1015	Chlorinated effluent	See Results.
Total Res. Chlorine	11/21/78 - 1015	Chlorinated effluent	1.25 mg/l
Total Res. Chlorine	11/21/78 - 1330	Chlorinated effluent	1.00 mg/l

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 Laboratory Results			STP Results		NPDES (Month avera
	Influent	Unchlori-nated Eff.	Chlori-nated Eff.	Influent	Unchlori-nated Eff.	
BOD_5 mg/l	172	37	19	188	41	30
lbs/day	2940	633	325	3210	701	350
TSS mg/l	100	35	28	122	38	30
lbs/day	1710	598	479	2090	650	350
Total Plant Flow MGD					2.05	1.4
Fecal Coliform (#/100ml)			14 Est.[1] 14 Est.[2]			
Chlorine Res. (mg/l)			1.25 mg/l[1] 1.0 mg/l[2]			
COD (mg/l)	341	67	(e)			
pH						6.0-9.
Sp. Cond. (umhos/cm)	388	328	332			
NH_3-N (mg/l)	4.8	3.2	3.4			
NO_2-N (mg/l)	<0.1	0.2	<0.1			
NO_3-N (mg/l)	2.2	3.4	3.6			
O-PO_4-P (mg/l)	4.3	3.8	4.1			
T-PO_4-P (mg/l)	7.0	3.8	4.5			
Total Solids (mg/l)	335	227	230			
TNVS (mg/l)	190	167	165			
TSS (mg/l)	100	35	28			
TSNVS (mg/l)	32	18	17			

* Field Analysis "<" is "less than" and ">" is "greater than"
(e) Apparent laboratory error
(1) 11/21/78 - 1015
(2) 11/21/78 - 1330

	DOE				NPDES (Monthly Average
	Influent (ug/l)	Effluent (ug/l)	Anaerobic Sludge mg/kg dry wt.	Aerobic Sludge mg/kg dry wt.	
Copper	30	10	360	310	
Chromium	<10	<10	45	15	
Lead	100	<50	420	150	
Zinc	140	56	2100	800	
Cadmium	<10	<10	6	5	
Nickel	<50	<50	35	30	
Percent Solids			10.2%	6.3%	

* Field Analysis

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