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Segment No. 05-10-05

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MEMORANDUM
February 24, 1987

To: Gary Brugger

From: Marc Heffner

Subject: Enumclaw Sewage Treatment Plant/Farman Brothers Pickle Company Class II Inspection, August 19-20, 1986

ABSTRACT

A Class II inspection was conducted on August 19-20, 1986, at the Enumclaw Sewage Treatment (STP) and at the Farman Brothers Pickle Company Plant (Farmans). The Enumclaw STP, an RBC-type secondary facility, was operating well during the inspection. Discharge was within weekly and monthly NPDES permit discharge limits although the influent BOD_5 load was greater than 85 percent of the plant design capacity included in the NPDES permit. The Farmans flow to the Enumclaw STP represented 49 percent of the STP BOD_5 design load. The aeration basin providing pretreatment for the Farmans waste appeared ineffective during the inspection. Inadequate support from the Ecology laboratory prevented all survey objectives from being attained (see Appendix A).

INTRODUCTION

At Kyle Cook's request, a Class II inspection was conducted on August 19-20, 1986 at the Enumclaw Sewage Treatment Plant (STP). Included in the inspection was sampling at the Farman Brothers Pickle Company Plant (Farmans), which is the largest industrial contributor to the STP. The inspection was scheduled to correspond with peak activity at the pickle plant and thus peak organic loading at the STP.

The study was conducted by Brad Hopkins and Marc Heffner of the Ecology Water Quality Investigations Section (WQIS) and Kyle Cook of the Ecology Northwest Regional Office. Jim Crossler, operator at the STP, and Don Grover, vice-president at Farmans, provided assistance at the respective sampling stations.

Objectives of the survey included:

1. Estimate STP loading and treatment efficiency during the peak pickling season. Compare results to NPDES permit limits.

2. Review laboratory procedures (including sample splits with the operator) to estimate accuracy of results and conformance with approved analytical techniques.

3. Quantify the load to the STP from the pickle plant.

4. Estimate the efficiency of the pickle plant pretreatment system.

SETTING

Enumclaw STP

The Enumclaw STP is an RBC type secondary plant that was completed in 1980. Treatment units include two primary clarifiers, two RBC basins, two secondary clarifiers, and chlorination facilities (Figure 1). The two RBC basins are each set up in four stages; the first stage consisting of three shafts and the next three stages consisting of one shaft each. Effluent is discharged into the White River as permitted by NPDES permit # WA-002507-5(M). Sludge is anaerobically digested then spread along with the digester supernatant on farmland.

During periods of low hydraulic loading the operator has tried several flow scheme modifications. These include:

1. One or parts of one of the two parallel treatment trains can be shut down. The operator noted that this works for the primary clarifiers, but does not work well for the RBC units or the secondary clarifiers. Start-up time for the RBC units is excessive to take one out of service for a short period. The operator reported that ground water seeps into the secondary clarifiers when they are drained, creating an odor problem.

2. A portion of the flow can be recycled through the plant to increase the hydraulic load. To do this the operator drains part of the flow from between the third and forth stages of one of the RBC basins into the influent pump station. This system increases the hydraulic load to the primary clarifiers and RBC units.

During the inspection all units were being used with no recycle. Sludge depths were shallow in the primary clarifiers (1-2 feet), the secondary clarifiers (0-1.25 feet), and the chlorine contact basins (approximately 2 inches) (measurements made 1230-1245 hours on August 20).

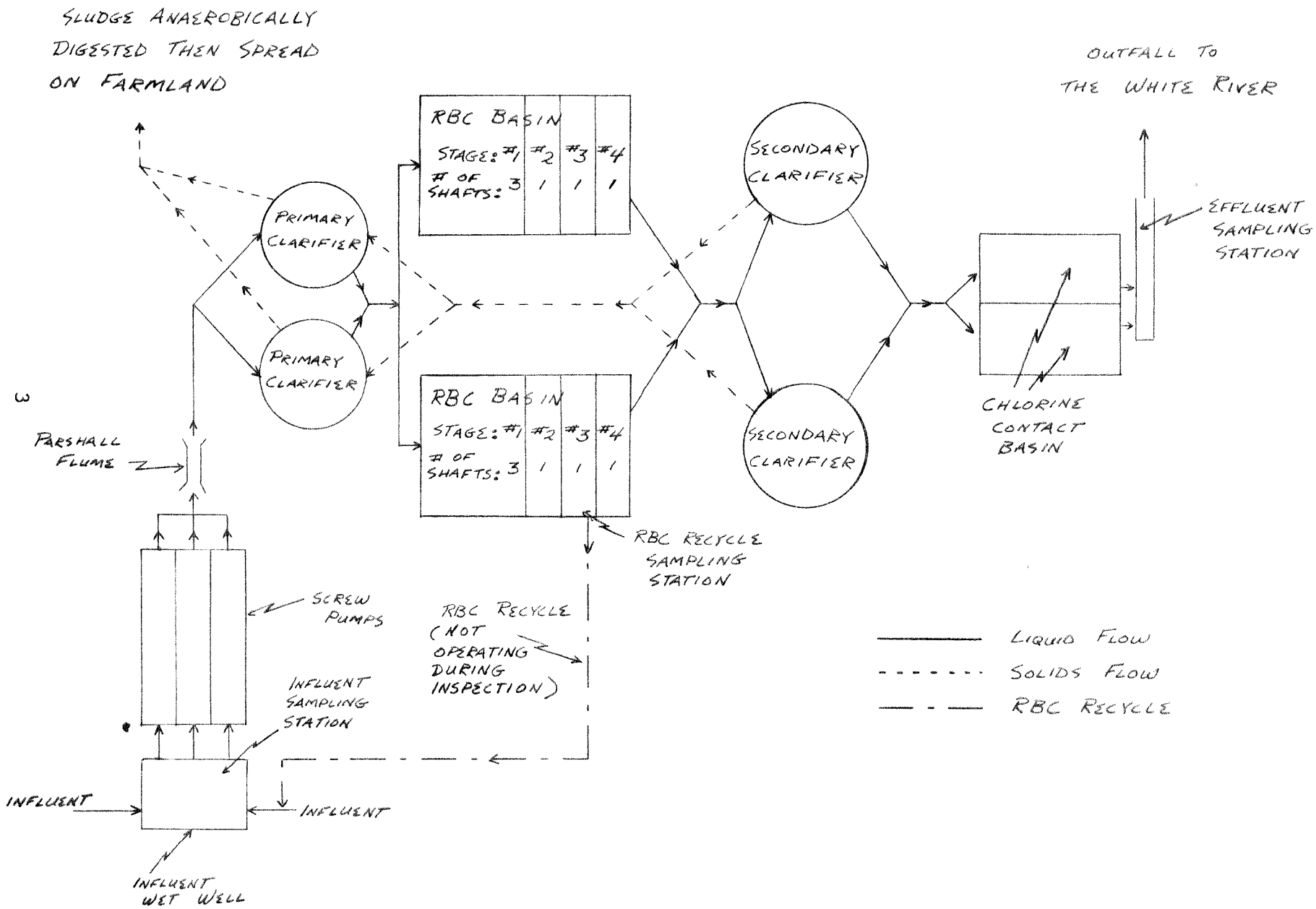

FIGURE 1 - ENUMCLAW STP FLOW SCHEME - ENUMCLAW / FARMANS, 8/86.

Farmans

Process wastes at Farmans are pretreated then discharged into the Enumclaw STP sanitary sewer system. The pretreatment flow scheme is diagrammed in Figure 2. Varying degrees of pretreatment are provided for different flow streams. During the inspection there were three basic streams at the factory.

The first stream was the brining solution used to soak the cucumbers prior to fresh packing. The used brine has historically been dumped into an old dry well. Don Grover estimated daily flow to the dry well during the peak pickling season to be 140 tubs of 80 gallons each, with a maximum of 200 tubs of 80 gallons each (11,200-16,000 gpd).

The second stream was flow from the processing building. Screens on the floor drains of the processing building provide some pretreatment. The flow then goes directly to a wet well from which it is pumped into a surge tank and drained into an aeration basin (Figure 2). The pH of the wet well is checked one or two times a day and the pH raised to greater than 6.5 by lime addition when necessary. The aeration basin is 29 feet by 45 feet by 7 feet deep (68,500 gallons) with a centrally mounted surface aerator. Effluent from the aeration system is routed through a Parshall flume and into the sanitary sewer system.

The third stream was flow from the outside work areas. This flow can follow three routes (Figure 2):

1. The flow can be sent to the wet well and receive pretreatment in the aeration basin. This option is usually used when production is taking place.

2. The flow can be sent to a screening basin for solids removal only. This option is used when yard clean-up is taking place and the flow is fairly clean water carrying large solids chunks. Flow from this option joins the aeration basin flow just upstream of the effluent flume.

3. The flow can be routed directly to the effluent flume with the screening basin effluent. When blockage in the system prevents conveyance of the waste to either option 1 or 2, option 3 is utilized.

The flow routing at the Farmans pretreatment system was different during each of the three stops made to observe the system.

The August 19 morning stop was during a processing period. The splitter box gates were in place to route the yard flow through the aeration basin (Figure 2). Unfortunately the wet well pump station was partially

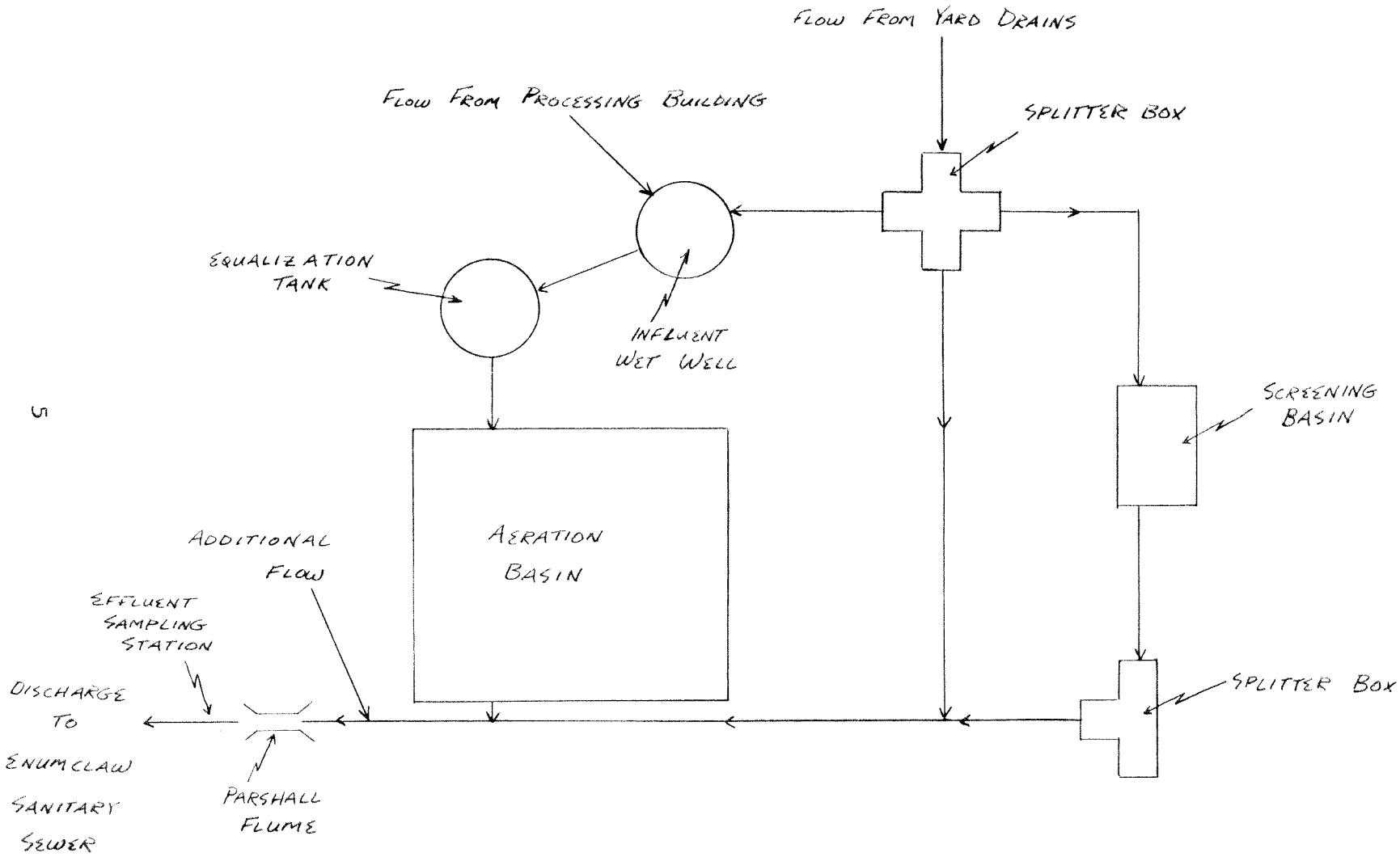

FIGURE 2 - FARMANS PICKLES FLOW SCHEME - ENUMCLAW/FARMANS, 8/86.

plugged, and only a small portion of the wet well contents was sent to the aeration basin. The remainder was flowing by gravity from the wet well to the splitter box and routed to the effluent flume with no pretreatment. Don Grover was informed of the problem and had the situation corrected within 45 minutes. The Enumclaw STP operator suspected that the problem occurred sometime during the night. He noted that the primary clarifiers were a green color in the morning compared to the typical gray color when he left work the afternoon before.

The afternoon stop on August 19 appeared to be during a clean-up period. The gates were in place to route the yard flows to the screening basin. Very little flow was going to the screening basin.

The morning stop on August 20 appeared to be during a processing period. The gates were in place to route the yard flow to the screening basin rather than to the aeration system.

PROCEDURE

Ecology composite and grab samples were collected at the STP. Ecology composite samplers were set up to collect influent, RBC recycle station, and effluent samples (Figure 1). Samplers collected approximately 220 mLs of sample every 30 minutes for 24 hours. The STP operator also collected composite samples at the influent and effluent stations. His compositors were set to collect approximately 150 mLs of sample every hour for 24 hours. Both sets of influent and effluent samples were split for analysis by the Ecology and Enumclaw STP laboratories. Grab and composite sampling times and parameters analyzed are summarized in Table 1.

At Farmans, Ecology composite samplers were set up to collect aeration basin influent and final effluent samples. Both samplers were set to collect 220 mLs of sample every 30 minutes. The aeration basin influent sampler was started at approximately 1230 hours on August 19, collecting sample from the equalization tank. When checked at 1700 hours on August 19, the tank was dry down to the sediment layer above which the compositor intake line had been suspended. The sampler was turned off for the night and at 0900 hours on August 20 was restationed in the wet well and restarted. Sampling was stopped at approximately 1200 hours on August 20. The final effluent sampler was run continuously for a 24-hour period. Sampling times and parameters analyzed are summarized on Table 2. Grab sample collection at Farmans was based on the flow scheme at the time of sampling and is also summarized on Table 2.

Flows at both the STP and Farmans were measured using Parshall flumes. Ecology instantaneous measurements were made for comparison with in place flow meters.

Table 1 - Sample collection at Enumclaw STP - Enumclaw/Farmans, 8/86.

Station		Time	Sampler	Laboratory	Field Analyses: Temperature	pH	Cond.	Laboratory Analyses: BOD_5	Sol. BOD_5	Inh. BOD_5	COD	Solids: TS	TNVS	TSS	TNVSS	Turbidity	Nutrients: NH_3-N	NO_2-N	NO_3-N	O-PO_4-P	Total P	Cond.	Alkalinity	Chloride	Salinity	Color
COMPOSITE SAMPLES																										
Influent	8/19-20	1000-1000	Ecology	Ecology	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
				Enumclaw				X						X												
		0930-0930	Enumclaw	Ecology				X			X			X		X						X	X	X	X	X
				Enumclaw				X						X												
RBC Recycle	8/19-20	1030-1030	Ecology	Ecology	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Effluent	8/19-20	1015-1015	Ecology	Ecology	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
				Enumclaw				X						X												
		0930-0930	Enumclaw	Ecology				X			X			X		X						X	X	X	X	X
				Enumclaw				X						X												

Station	Date	Time	Field Analyses: Temperature	pH	Cond.	Chlor. Resid.: Free	Total	Laboratory Analyses: F.C.	Oil & Grease	COD	TSS	Turbidity	Cond.	Alkalinity	Chloride	Color	Metals	% Solids
GRAB SAMPLES																		
Influent	8/19	0950	X	X	X				X	X	X	X	X	X		X		
		1520	X	X	X				X	X	X		X	X		X		
	8/20	1020	X	X	X													
RBC Recycle	8/19	1035	X	X	X					X	X							
		1550	X	X	X					X	X							
	8/20	1025	X	X	X													
Effluent	8/19	1010	X	X	X	X	X	X	X	X	X	X	X	X		X		
		1535	X	X	X	X	X	X	X	X	X	X	X	X	X	X		
	8/20	1035	X	X	X	X	X	X*		X	X	X	X	X	X	X		
Digester Sludge	8/20	1215															X	X

*Sample split for Enumclaw STP laboratory analysis also

Table 2 - Sample collection at Farmans - Enumclaw/Farmans, 8/86.

					Field Analyses			Laboratory Analyses																		
											Solids					Nutrients										
Station	Date	Time	Sampler	Laboratory	Temperature	pH	Cond.	BOD_5	Sol. BOD_5	COD	TS	TNVS	TSS	TNVSS	Turbidity	NH_3-N	NO_2-N	NO_3-N	NO_2+NO_3-N	O-PO_4-P	Total P	Cond.	Alkalinity	Chloride	Salinity	Color
COMPOSITE SAMPLES																										
Influent	8/19-20	*	Ecology	Ecology				X	X	X	X	X	X	X	X	X			X		X	X	X	X	X	X
Effluent	8/19-20	1130- 1130	Ecology	Ecology Enumclaw	X	X	X	X X	X	X	X	X	X X	X	X	X	X	X		X	X	X	X	X	X	X

			Field Analyses				Laboratory Analyses								
Station	Date	Time	Temperature	pH	Cond.	D.O.	Oil & Grease	COD	TSS	Cond.	Alkalinity	Acidity	Chloride	Salinity	Color
GRAB SAMPLES															
Influent Wet Well	8/20	0925	X	X	X										
Equali-zation Basin	8/19	1230	X	X	X		X	X	X	X				X	X
		1635	X	X	X			X	X	X				X	X
	8/20	0930	X	X	X			X	X	X			X	X	
Aeration Basin	8/20	0940				X									
Aeration Basin	8/19	1210	X	X	X			X	X	X	X			X	X
		1615	X	X	X			X	X	X				X	X
Effluent	8/20	0915	X	X	X			X	X	X			X	X	
Pre-screening	8/20	0925	X	X	X			X	X	X			X	X	
Post-screening	8/20	0920	X	X	X			X	X	X			X	X	
Effluent	8/19	1155	X	X	X		X	X	X	X		X		X	X
		1625	X	X	X		X	X	X	X				X	X
	8/20	0935	X	X	X			X	X	X			X	X	
Pickling Brine	8/19	1240	X	X	X			X	X	X	X		X	X	

*influent composite collected in equalization basin on 8/19 from 1230 til 1700; and in the influent wet well on 8/20 from 0900 til 1200. Flow rates and routings necessitated the off-period and sampler move.

RESULTS AND DISCUSSION

Results of sample analysis by the Ecology laboratory are included in Tables 3 and 4. The quality of the analytical results was inadequate to successfully meet the objectives of the inspection. Data points that look unusual or for which the detection limit provided prevents the intended use are identified with an asterisk. A summary of the data shortcomings is presented in the memos included in Appendix A (Heffner, 1986a and b). General comments about the Enumclaw STP/ Farmans system that can be made with the available data follow.

Enumclaw STP

The data indicate that the Enumclaw STP was operating well during the inspection (Table 3). Good BOD_5, TSS, and color removal was observed. An instantaneous Ecology flow measurement at the influent flume corresponded closely with the plant flow meter (Table 5). The plant flow meter appeared to be operating accurately.

Table 5 - Enumclaw STP flow measurements - Enumclaw/Farmans, 8/86.

Date			Instantaneous	Totalizer	Flow for time
Month	Day	Time	Flow (MGD)	Reading	Increment (MGD)
8	19	0920	1.05	5646900	
					1.17
8	19	1510	--	5649742	
					0.86
8	20	1130	1.0	5657049	
8	20	1240	1.1*		
			Average flow during inspection = 0.93		

*Instantaneous Ecology measurement was 1.0 MGD

Table 6 compares inspection data to NPDES limits. Inspection data were all within the weekly and monthly effluent limits. Table 7 compares inspection data to plant loading limits in the NPDES permit. The minimum BOD_5 plant load calculated using the inspection data was slightly greater than the average summer monthly design load. Plant TSS loading was approximately 85 percent of the monthly design load while the flow was less than half of the monthly design rate. The high loadings suggest that Enumclaw should consider the portion of the

Table 3 - Ecology analytical results of samples collected at the Enumclaw STP - Enumclaw/Farmans, 8/86.

Station	Sampler	Field Analyses: Temp. (°C)	pH (S.U.)	Cond. (umhos/cm)	Laboratory Analyses: BOD_5 (mg/L)	Sol. BOD_5 (mg/L)	Inhib. BOD_5 (mg/L)	COD (mg/L)	Solids (mg/L): TS	TNVS	TSS	TNVSS	Turb. (NTU)	Nutrients (mg/L): NH_3-N	NO_2-N	NO_3-N	O-PO_4-P	Total P	Cond. (umhos/cm)	Alk. (mg/L as $CaCO_3$)	Chloride (mg/L as Cl^-)	Sal. (ppt)	Color (units)
Composite Samples																							
Influent	Ecology	5.6	7.0	1750	>300*	280		710	1200	830	250	47	48	18*	0.02	0.04*	3.8	8.0	1740	140	420	<1	580
	Enumclaw				>300*			860			190		54						1740	160	390	<1	650
RBC Recycle	Ecology	7.0	7.2	1220	<500*	<500*		220	810	670	81	13	3	0.62*	0.11	1.7*	4.6	7.3	1310	140	290	1	46
Effluent	Ecology	6.2	7.2	1020	7	<10	<10	51	620	500	7	3	3	2.6*	0.06	0.10*	4.4	4.6	1120	120	230	<1	13
	Enumclaw				11			68			14		5						1140	110	240	1	34

Station	Date	Time	Field Analyses: Temp. (°C)	pH (S.U.)	Cond. (umhos/cm)	Chlorine Residual (mg/L): Free	Total	Laboratory Analyses: Fecal Coli. (#/100 mL)	Oil & Grease (mg/L)	COD (mg/L)	TSS (mg/L)	Turbidity (NTU)	Conductivity (umhos/cm)	Alk. (mg/L as $CaCO_3$)	Chloride (mg/L as Cl^-)	Color (units)
Grab Samples																
Influent	8/19	0950	18.6	6.6	1200				12	650	210	44	1140	150		440
		1520	19.2	7.1	1450				34	690	120		1260	200		500
	8/20	1020	19.0	7.0	1910											
RBC Recycle	8/19	1035	19.7	7.0	1050					220	68					
		1550	20.1	7.2	1080					230	50					
	8/20	1025	19.7	7.0	1300											
Effluent	8/19	1010	18.6	7.0	925	<0.1	0.7	2	1	46	4	3	965	100		<4
		1535	20.1	7.1	1380	0.2	1.3	10	10	54	4	2	101	100	220	<4
	8/20	1035	19.7	7.1	1100	0.3	0.7	27		55	7	3	1190	120	320	4

*Data point unusual or detection limit provided prevents intended use.

Table 4 - Ecology analytical results of samples collected at Farmans - Enumclaw/Farmans, 8/86.

		Field Analyses			Laboratory Analyses																		
								Solids (mg/L)					Nutrients (mg/L)										
Station	Sampler	Temp. (°C)	pH (S.U.)	Cond. (umhos/cm)	BOD_5 (mg/L)	Sol. BOD_5 (mg/L)	COD (mg/L)	TS	TNVS	TSS	TNVSS	Turb. (NTU)	NH_3-N	NO_2-N	NO_3-N	NO_2+NO_3-N	O-PO_4-P	Total P	Cond. (umhos/cm)	Alk. (mg/L as $CaCO_3$)	Chloride (mg/L as Cl^-)	Salinity (ppt)	Color (units)
COMPOSITE SAMPLES																							
Influent	Ecology				1400	1300	1200*+	5400	4200	400	90	66	2.0			1.4		4.7	6100	44	2600	2	440
Effluent	Ecology	6.3	6.7	8000	1400	1200	2400*+	640*	28*	5*	<1*	3*	0.23	0.02	3.9		1.1	4.4	1100*	110	2800	<1	17*

			Field Analyses				Laboratory Analyses									
Station	Date	Time	Temp. (°C)	pH (S.U.)	Cond. (umhos/cm)	D.O. (mg/L)	Oil & Grease (mg/L)	COD (mg/L)	TSS (mg/L)	Cond. (umhos/cm)	Alk. (mg/L as $CaCO_3$)	Acidity (mg/L as $CaCO_3$)	Chloride (mg/L as Cl^-)	Salinity (ppt)	Color (units)
GRAB SAMPLES															
Influent wet well	8/20	0925	20.4	4.3	2580										
Equalization basin	8/19	1230	21.2	9.0	9600		34	1200*+	420	9480				3	400
		1635	17.3	5.1	1700			610*+	420	56	1650			<1	130
	8/20	0930	22.4	4.8	3280			940*+	130	2800			830	1	
Aeration basin	8/20	0940				0.4-0.6									
Aeration basin effluent	8/19	1210	18.0	6.6	5500			2100*+	760	5760	87			2	1000
		1615	19.5	7.0	6750			1900*+	420	6440				2	730
	8/20	0915	18.5	6.8	5000			4000*+	390	5300			1600	2	
Pre-screening	8/20	0925	18.5	6.6	>10000			620+	300	12000			3800	5	
Post-screening	8/20	0920	18.8	6.4	>10000			510+	58	16000			5900	7	
Effluent	8/19	1155	21.0	4.7	9200		10	1500+	470	10000		62		4	440
		1625	19.6	6.7	7250		3	1900+	430	6910				3	1200
	8/20	0935	19.5	6.3	9250			2500+	350	9800			3100	5	
Pickling brine	8/19	1240	16.5	6.3	>10000			1300+	140	56100	95		25000	38	

*data point unusual or detection limit provided prevents intended use
+possible chloride interference

permit addressing evaluation of plant capacity when monthly loadings reach 85 percent of the design capacity (page 6 of the permit). Because the peak pickling season lasts four to six weeks, monthly average loadings in that time period may be large enough to require plant capacity to be addressed. The inspection was conducted near the beginning of the heavy pickling season, so prolonged impacts of heavy loadings were not measured.

Table 6 - Comparison of Enumclaw STP inspection data to NPDES Permit Limits - Enumclaw/Farmans, 8/86.

	NPDES Permit Limits		Inspection Data*		
Parameter	Monthly Average	Weekly Average	Ecology Composite	STP Composite	Grab Samples
BOD_5					
(mg/L)	30	45	7	11	
(lbs/D)	336	504	54	85	
(% removal)	85		>98	>96	
TSS					
(mg/L)	30	45	7	14	
(lbs/D)	344	515	54	109	
(% removal)	85		97	93	
Fecal coliform					
(#/100 mL)	200	400			2, 10, 27
pH (S.U.)	$6.0 \leq pH \leq 9.0$				7.0, 7.1, 7.1
Flow (MGD)			0.93	0.93	

*Results of Ecology analyses

Table 7 - Comparison of Enumclaw STP data to NPDES permit design loads - Enumclaw/Farmans, 8/86.

	BOD_5 (lbs/D)	TSS (lbs/D)	Flow (MGD)
Design loads*	2240	2290	2.0
Inspection loads**	>2326	1939	0.93
% of limit	>104%	85%	47%

*design loads from page 6 of the Enumclaw STP NPDES permit
**loads calculated from Ecology laboratory analysis of Ecology composite samples

Although in-plant recycling was not being used during the inspection, samples were collected at the recycle station to provide a rough estimate of recycle strength when recycle is used. COD and TSS reductions in the plant prior to the recycle station were approximately 66 percent, suggesting that 33 percent of influent strength might be a good rough estimate of recycle strength. The operator should quantify the recycle if it is re-instituted.

Metals analysis results from the digester sludge sample are presented in Table 8. The results indicate that the Enumclaw STP sludge metals concentrations fell within the range of concentrations found at trickling filter or RBC plants during previous Class II inspections.

Table 8 - Enumclaw STP Sludge metals data - Enumclaw/Farmans, 8/86.

		Data From Previous Inspections*		
Metal	STP Sample** (mg/kg dry wt)	Range (mg/kg dry wt)	Geometric Mean (mg/kg dry wt)	Number of Samples
Cadmium	4.4	0.01 - 16	5.6	16
Chromium	56	0.4 - 313	40	16
Copper	1410	28 - 3100	500	16
Lead	135	100 - 1140	300	16
Nickel	31	12 - 46	28	14
Zinc	1860	680 - 2500	1600	16

*Data collected during previous Class II inspections at trickling filter or RBC plants
**Percent solids = 8 percent

Farmans

Ecology analytical results of samples from Farmans are presented in Table 4. Table 9 presents flow data collected at the Farmans Parshall flume.

Table 9 - Farmans flow measurements - Enumclaw/Farmans, 8/86.

Date			Instantaneous	Totalizer	Flow for Time
Month	Day	Time	Flow (MGD)*	Reading	Increment (MGD)
8	19	1145	0.132	273935	
					0.113
8	19	1615	0.075	276052	
					0.092
8	20	930	0.110	282697	
					0.072
8	20	1145	--	283374	
			Average flow during inspection =		0.094

*Ecology measurements

The load from Farmans to the Enumclaw STP is summarized in Table 10. The Farmans BOD_5 load represented 49 percent of the STP design load during the inspection. The inspection loading appears similar to Farmans loads measured by the Enumclaw STP laboratory during August 1985. Thus, inspection data appear representative of loading during the peak pickling season.

Table 10 - Comparison of Farmans Data with Enumclaw STP NPDES permit design loads - Enumclaw/Farmans, 8/86.

	BOD_5 (lbs/D)	TSS (lbs/D)	Flow (MGD)
Design loads*	2240	2290	2.0
Inspection loads**	1100	330	0.094
% of limit	49%	14%	5%
8/85 load***	1350	370	0.103

*design loads from page 6 of the Enumclaw STP NPDES permit
**BOD_5 load estimated from Ecology laboratory results of Ecology composite sample. TSS load estimated from average of Ecology grab samples (420 mg/L)
***8/85 data from records maintained by Enumclaw STP operator

Waste treatment available at Farmans, after initial screening at the floor drains, includes either additional screening or aeration. Additional screening is used primarily during clean up periods when large solids enter the collection lines. The grab samples collected before and after screening suggest that approximately 4/5ths of the suspended solids (300 mg/L reduced to 58 mg/L) were removed by screening, but only about 1/6th of the COD (620 mg/L reduced to 510 mg/L) was removed (Table 4). Long-term efficiency was not measured.

Aeration basin efficiency appeared minimal during the inspection. Grab samples from the equalization basin and the influent composite sample represent the aeration basin influent while the aeration basin effluent grab samples represent the aeration basin effluent (Table 4). The aeration basin effluent samples had higher COD and TSS concentrations than the influent. The nominal aeration basin detention time would have been 17.5 hours if the entire Farmans flow had been routed through the aeration basin during the inspection. With this detention time, changes in the load to the aeration system occurring before or during the inspection could explain these differences.

Discharge from Farmans is permitted by NPDES permit #WA-003741-9. Flow is the only parameter limited. The process water flow during the inspection of 0.094 MGD was well below the permitted limit of 0.776 MGD.

Another discharge from Farmans is the waste pickling brine which is presently dumped into a dry-well. The pickling brine sample had a fairly high COD concentration and a very high salinity (Table 4). The quality and quantity of the brine suggest potential impacts on the ground water, and that some treatment prior to disposal is desirable. The high salinity might impact the Farmans pre-treatment system if the brine was dumped directly into the system. Alternative treatment systems assuring prevention of ground water impacts should be explored by Farmans. Potential impacts of the brine at the STP should also be considered in the effort.

Routine monitoring of the Farmans pretreatment system is minimal. More attention is needed. Presently Farmans checks the pH of the aeration basin influent once or twice a day and the city checks the BOD_5 and TSS load to the sewer twice a month for billing purposes. At a minimum, a monitoring system to determine the loading and efficiency of the aeration basin should be instituted. Loads bypassing the aeration basin should also be quantified. This information is particularly important in light of the high BOD_5 load at the Enumclaw STP and the high percentage of the design load coming from Farmans.

Laboratory Review

Laboratory procedures appeared good at the Enumclaw STP. The comparison of split sample results is acceptable (Table 11). Several suggestions were made so procedures conform with approved techniques. These included:

Table 11 - Comparison of laboratory results - Enumclaw/Farmans, 8/86.

Station	Date	Time	Sampler	Laboratory	Fecal Coliform (#/100 mL)	BOD_5 (mg/L)	TSS (mg/L)
STP							
Influent	8/19-20	Comp.	Ecology	Ecology		>300	250
				Enumclaw		360*	234
			Enumclaw	Ecology		>300	190
				Enumclaw		352*	164
Effluent	8/20	1035		Ecology	27		
				Enumclaw	88		
	8/19-20	Comp.	Ecology	Ecology		7	7
				Enumclaw		11	8
			Enumclaw	Ecology		11	14
				Enumclaw		14	5
Farmans							
Effluent	8/19-20	Comp.	Ecology	Ecology		1400	5**
				Enumclaw		1183	220

*less than 1.0 mg/L D.O. remaining after 5 days
**lab error suspected

Sampling

1. Composite sampling lines should be monitored closely and cleaned as necessary. The present practice involves cleaning the lines with a strong chlorine solution every three to four months. This is a good cleaning technique, but cleaning frequency may need to be increased.

BOD_5

1. All chlorinated samples should be seeded to run the BOD_5 test (APHA, 1985; p. 28, #5d, p. 529, #5e2). This is applicable to the plant effluent samples collected during the inspection. Also, pH adjustment and seeding of low pH (<6.5) samples is recommended (APHA, 1985; p. 529, #5e1).

2. Placing the thermometer used to monitor BOD_5 incubator temperature in a water bath in the incubator provides more accurate incubator temperature monitoring.

3. Calibration of the D.O. meter prior to use is recommended in preference to the present bi-weekly frequency.

TSS

1. Use of a Standard Methods approved filter paper is recommended for the TSS test (APHA, 1985; p 95).

2. A maximum drying time of overnight is recommended for the TSS test. Extended drying times can drive off some organics, resulting in underestimating solids concentrations.

3. Redrying and reweighing the solids filter after the test is complete is suggested to help assure that adequate drying is taking place. Quarterly checks are recommended.

RECOMMENDATIONS AND CONCLUSIONS

The Enumclaw STP was operating well during the inspection and producing a good effluent. Inspection data were within weekly and monthly NPDES permit discharge limits. BOD_5 load to the plant during the inspection exceeded 85 percent of design criteria suggesting Enumclaw should begin investigating the adequacy of plant capacity, as required by the NPDES permit.

Memo to Gary Brugger
Enumclaw Sewage Treatment Plant/Farman Brothers Pickle Company Class II Inspection, August 19-20, 1986

Inspection monitoring at the Farmans pretreatment system suggested a need for additional operator attention and a routine monitoring system to provide efficiency data. The limited inspection data showed no COD or TSS removals in Farmans aeration basin. Routine monitoring could better describe system efficiency and perhaps provide information that could lead to improved system performance. Effluent from Farmans represented 49 percent of the Enumclaw STP design BOD_5 load, suggesting improved pretreatment at Farmans could significantly decrease plant loading.

The Farmans dry well disposal method for used brine solution could potentially impact ground water in the area. Alternative systems that assure ground water protection should be explored by Farmans.

Sample analyses by the Enumclaw STP laboratory appeared good. Suggestions to keep procedures in conformance with approved techniques are included in the laboratory review portion of the discussion.

Goals of the survey could have been more completely achieved with better analytical support from the Ecology laboratory.

MH:cp

Attachments

REFERENCES

APHA-AWWA-WPCF, 1985. Standard Methods for the Examination of Water and Wastewater, 16th ed.

Heffner, M., 1986a. "BOD_5 Laboratory Support for the August 19-20, 1986, Enumclaw/Farman Brothers Pickles Class II Inspection," Memo to Norm Glenn through John Bernhardt, October 22, 1986.

Heffner, M., 1986b. "Laboratory Support for the August 19-20, 1986, Enumclaw STP/Farman Brothers Pickles Class II Inspection," Memo to Norm Glenn through John Bernhardt, November 19, 1986.

APPENDIX A

ANDREA BEATTY RINKER
Director

STATE OF WASHINGTON

DEPARTMENT OF ECOLOGY

[illegible] • Olympia, Washington [illegible] • [illegible]

MEMORANDUM
October 22, 1986

To: Norm Glenn

Through: John Bernhardt

From: Marc Heffner

Subject: BOD_5 Laboratory Support for the August 19-20, 1986, Enumclaw/Farman Brothers Pickles Class II Inspection

BOD_5 analysis for the Enumclaw/Farman Class II inspection was unsatisfactory. Table 1 summarizes the problem. Data for the majority of the samples collected at the STP are reported as either less than or greater than concentrations. Accomplishing one of the inspection goals, measuring STP loading for a day during the pickling season, will be difficult. Table 1 notes that only one dilution was run on most of the samples for which a < or > result was reported. I do not consider one dilution adequate for samples of unknown concentration from a sample source that has not been studied routinely. In this case one dilution was not enough.

Prior arrangements were made with the lab to handle the rather large number of samples collected during the inspection. A solution to assure satisfactory BOD_5 laboratory support for our field inspections is requested.

MH:cp

Attachment

cc: Merley McCall

Table 1 - Summary of the Ecology laboratory bench sheet for the August 19-20, 1986, Class II inspection at Enumclaw STP/Farman Brothers Pickles

Sample	Sampler	Number of Dilutions	Bench Sheet BOD_5 (mg/L)
QA Samples			
Water		1	NA
Water+Nutrients		1	NA
Seed		2	NA
Seed Blank		1	NA
Sugar Control		2	215
Enumclaw STP Samples			
Influent	Ecology	1	>298
	Ecology*	1	277
	STP	1	>304
Recycle	Ecology+	2	<500
	Ecology+*	2	<500
Effluent	Ecology	1	7
	Ecology*	1	<10
	Ecology**	1	<10
	STP	1	11
Farmans Pickles			
Influent	Ecology	2	1,414
	Ecology*	2	1,333
Effluent	Ecology	2	1,430
	Ecology*	2	1,246

*sample tested for soluble BOD_5
+listed as Farmans sample on bench sheet
**sample tested for inhibited BOD_5

ANDREA BEATTY RINIKER
Director

STATE OF WASHINGTON

DEPARTMENT OF ECOLOGY

[illegible] • Olympia, Washington [illegible] • [illegible]

MEMORANDUM
November 19, 1986

To: Norm Glenn

Through: John Bernhardt

From: Marc Heffner

Subject: Laboratory Support for the August 19-20, 1986, Enumclaw STP/ Farman Brothers Pickles Class II Inspection

This memo is a follow-up to my 10/22/86 memo to you concerning unsatisfactory BOD_5 lab support for the Enumclaw STP/Farman Brothers Pickles (E/F) Class II inspection. Since then, the remainder of the data were reviewed as part of the report writing effort. Meeting the objectives of the E/F inspection were even more dependent on good laboratory analysis than most inspections because of the number and variety of samples taken. Meeting those objectives with the analytical results provided will not be possible. A summary of the inspection objectives included in the 8/12/86 inspection proposal and circumstances that prevent meeting those objectives follows:

OBJECTIVE 1: "Estimate the efficiency of the pickle 'pre-treatment' system." Meeting this objective was difficult from the onset of the inspection when a pump malfunction at the pickle plant resulted in the pre-treatment system being bypassed for an unknown time period prior to the inspection. Higher reported COD and TSS concentrations in the pre-treatment effluent than in the influent for the three grab samples collected during the inspection suggest that the pre-treatment system was a hindrance rather than an asset.

A brief comparison of the influent and effluent composite data makes use of the COD comparison questionable. Because of the system of selective pre-treatment, the influent and effluent sample data do not represent the actual percent removal of the pre-treatment system. Nevertheless an influent BOD_5 of 1400 mg/L and COD of 1200 mg/L compared to an effluent BOD_5 of 1400 mg/L and COD of 2400 mg/L suggests a problem with the BOD_5 or COD data. A re-analysis to check the correctness of the COD data was not done. The holding time for COD

analysis (28 days) had been reached when the 9/17 partial report was filled out by the lab, in part discouraging a re-test.

OBJECTIVE 2: "Quantify the load to the Enumclaw STP from the pickle factory." The effluent composite sample at Farman's was collected to satisfy this objective. Ecology laboratory analytical results of this sample do not appear correct. Three effluent grab samples were collected; the TSS concentrations varying from 350 to 470 mg/L. Analysis of the composite sample by the Enumclaw STP laboratory found a TSS concentration of 220 mg/L. The Ecology laboratory result was 5 mg/L. The Ecology laboratory solids results closely resembled concentrations in the Enumclaw STP effluent sample for three of the four parameters, suggesting possible analysis of the wrong sample.

Again, re-analysis of the sample was not practical. The allowable holding time for solids analysis (7 days) had long since been exceeded when the analytical results arrived as part of the 10/13 final report. Note: solids data were not included in the 9/17 partial report.

The COD concern included as part of the Objective 1 discussion is also of some concern when trying to meet Objective 2.

OBJECTIVE 3: "Estimate Enumclaw STP loading and efficiency during the peak pickling season. Quantify recycle if necessary. Compare data to NPDES permit limits." The Ecology BOD_5 laboratory results (>300 mg/L) prevent calculation of the BOD_5 load at the STP. Calculations can only say that the plant loading was at least this much, but cannot answer the how much question. Similarly, analytical results of samples taken from the flow stream at the point from which recyling is done were reported as <500 mg/L (although no recycling was taking place during the inspection the site was sampled to give some estimate of the recycle strength).

OBJECTIVE 4: "Review laboratory procedures (including sample splits with the operator) to estimate accuracy of results and conformance with approved analytical techniques." Samples split for analysis by both the Ecology and Enumclaw STP labs included the STP influent and effluent samples and the Farman's effluent sample. Parameters analyzed by both labs were BOD_5 and TSS. Because the Ecology analyses of the STP influent BOD_5 and the Farman's effluent TSS were of poor quality, 1/3 of the comparisons could not be made. This is a particular source of embarrassment in that the Ecology results are to be considered accurate, thus using them as the standard for comparison should be

possible. It is difficult to make comments or suggestions critical of the STP laboratory when Ecology itself cannot properly analyze a set of samples split with the STP laboratory.

ADDITIONAL COMMENTS:

In addition to the BOD_5, TSS, and COD inconsistencies noted, several other questionable areas have caused concern. While these do not have as great an impact on attaining the objectives of the survey, they make overall assessment of the E/F facility operation difficult. These include:

1. The nitrogen data for the inspection are difficult to understand. The Total Inorganic Nitrogen (TIN) concentration for the STP influent (18.06 mg/L) is much greater than at the STP RBC recycle station (2.43 mg/L) or the STP effluent station (2.76 mg/L). The loss through the system is unusual and confirmation of the concentrations is thought appropriate. Unfortunately, nutrient data were not reported until 10/13, far after the 28-day holding time for the parameters of interest.

2. A sample of the pickling brine solution was collected for selected analysis including chlorides. A concentration of 2500 mg/L as Cl^- was reported. This concentration was similar to chloride concentrations for other samples with salinity concentrations ranging from 2 to 7 ppt. The salinity of the brine solution was 38 ppt, leading one to expect a much higher chloride concentration. Laboratory review of the chloride data found a transcription error; the actual result was 25,000 mg/L.

While I do not expect the lab to be perfect, I do expect the lab to provide adequate analytical support to allow successful inspections to be conducted. A primary problem preventing adequate support is receiving laboratory data reports after the allowable sample holding times have passed. A program allowing collector review of lab data prior to holding time exceedence provides an opportunity for review and possible analytical confirmation of unusual data. Collector review is thought preferable to laboratory review because the collector will have some idea of the expected results, increasing the odds of unusual data being spotted quickly.

An alternative method of quality assurance that can be conducted by the field collector is submission of duplicate samples labeled as different samples. This method is likely not the most efficient use of the laboratory, but may be necessary to assure usable analytical

support. A net gain in field time productivity may be realized. Although more time would be necessary for sample collection, additional visits (when possible) would not be required (the E/F study was scheduled to coincide with the 4- to 6-week peak pickling season, so resampling is not possible until August 1987).

The laboratory support problem is not new. During the summer of 1985, holding times were exceeded for many parameters. For inspections I conducted personally, the Richmond Beach STP Class II inspection laboratory data was the worst, necessitating discarding the laboratory analytical results. Other Class II inspection reports--Friday Harbor STP, Goldendale STP (the dry-weather portion), and the Waitsburg STP--contained footnotes identifying analyses completed after holding times and deletion of some data. A system of rapid return of laboratory results or a field collector duplicate sample quality assurance plan should be in place before 1987 inspections are conducted.

MH:cp

cc: Merley McCall
Dick Cunningham