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State of Washington
Department of Ecology

Memo to: Bill Burwell

Re: A. I.W. Survey, Weyerhaeuser Company - White River Operations near Enumclaw

B. Water Quality of Boise Creek

From: Ron Devitt

References: A. Request for Survey, April 17, 1973 from Bill Burwell to Ron Pine

B. Survey Results, August 11, 1973 from Ron Devitt to Stew Messman

INTRODUCTION

On May 21, 1973, Jim Armstrong and I sampled selected stations on the Boise Creek. The next day we sampled the industrial treatment system at Weyerhaeuser, White River Operations.

Station Descriptions

Sta. #1 Boise Creek on Weyco property 80 yards upstream from culvert near office.

Sta. #2 Log pond effluent at discharge weir.

Sta. #3 Boise Creek 10 yards upstream from U.S. Highway 410.

Sta. #6 Boise Creek 5 yards upstream of 252nd Avenue SE.

Sta. #7 Enumclaw sewage treatment plant effluent at Boise Creek.

Sta. #8 Boise Creek at Mud Mountain Road Bridge.

Sta. A: Influent to Weyco treatment system from center of clarifier.

Sta. B: Primary effluent at end of discharge pipe to the areated cell.

Sta. C: Secondary effluent at end of discharge pipe from aerated cell.

Sta. D: Truck wash effluent at discharge to log pond.

WEYCO - WHITE RIVER

Chemical Lab Data

Station	pH	Turb	COD	BOD	NO_3-N	NO_2-N	NH_3-N	Total Kjeldahl	O-PO_4-P	Total Phos.P	TS	TNVS	TSS	TSNUS	Settleable Solids	PBI	Color Color
		JTU	ppm	ppm	filtered ppm	Filtered ppm	Unfilt. ppm	Unfilt. ppm	Filtered ppm	Unfilt. ppm	ppm	ppm	ppm	ppm	m/l		Unit
1	7.5	2	<5	<2	.59	.01	ND	ND	.02	.09	66	44	1	0	---	5	25
2	6.4	90	118	46	.03	.01	.04	.98	.01	.03	225	137	71	33	---	1030	1080
3	7.0	10	8	4	.21	.01	ND	ND	.01	.03	82	62	24	15	---	77	124
6	7.2	6	4	--	.22	ND	ND	.02	.03	.03	73	53	8	1	---	68	----
7	7.4	25	122	70	.83	.13	22.6	23.5	6.70	11.8	395	294	35	0	---	41	----
8	7.7	6	8	5	.44	.04	1.0	1.04	.16	.52	85	69	9	2	---	36	----
A**	7.0	50	180	*	.14	.02	.08	.26	.08	.46	250	95	191	45	2	520	----
B	6.9	40	192	*	.02	.02	.10	.32	.11	.36	227	85	86	30	.1	1630	----
C	7.0	30	125	6*	.02	.02	.06	.24	.10	.36	186	81	58	20	<.1	1320	----
D	7.3	20	12	2	.02	.02	.02	.04	.08	.58	440	226	242	209	.6	9	----

* Dilutions exhibit presence of toxic material

** Station "A" composited 1000ml/30 minutes from 1200 hours - 1430 hours.

Coliform data (colonies/100mls)

Station	Total Coliform	fecal coliform
1	280	<20
2	2000	<100
3	650	<40
6	6300	300
7	600	<200
8	4800	140

FIELD DATA

Station	Time	Temp (C)	DO ppm	DO %sat	pH	Cond. µmhos/cm	Settleable solids ml/l
1	1122	10.5	11.2	100	7.0	10	----
2	1205	18.5	<.4	<6	6.1	18	----
3	1230	11.0	10.0	90	6.9	--	----
6	1358	14.0	10.0	96	7.4	--	----
7	1430	16.0	----	--	7.1	--	----
8	1411	14.0	9.7	93	7.4	--	----
A	1300	15.0	----	--	7.2	--	3.5
B	1220	15.0	----	--	6.6	--	.2
C	1210	16.0	----	--	6.6	--	.05
D	1230	10.05	----	--	7.2	--	.8

Flows

Station #1 Depth was 4.75 inches at the 10-foot weir downstream of station #1. Flow was computed by formula cfs = $3.33\ (L-0.2H)H^{3/2}$ to be 8.2 cfs.

Station #2 The measured depth wwas 1 inch at one of three 57 inch weirs at effluent from log pond using the formula cfs = $3.33\ (L-0.2H)H^{3/2x3}$ (because there was 3 discharge weirs) the flow was >1.2 cfs.

Station #7 Flow at the treatment plant was .6 MGD (.93 cfs) from their recording flow meter.

Station A Flow to the clarifier was estimated by industrial personnel to be 600 gpm (1.3 cfs).

MACROORGANISM DATA

Station #1	
Ephemeroptera (mayflies)	
Baetidae	108
Heptageniidae	100
Trichoptera (Caddis flies)	10
Plecoptera (Stone flies)	2
Diptera (Flies)	
Chironomidae (Midge larvae)	2
Oligochaeta (segmented worms)	2
10 yards below Station #2	
Diptera	
Chironomidae	28
Oligochaeta	2
Gastropoda (Snail) -dead-	1
Station #3	
Ephemeroptera	
Baetidae	124
Heptageniidae	8
Trichoptera	12
Plecoptera	4
Oligochaeta	2

Discussion of Data and Observations

General

The data are presented and few anomalies exist. There is a discrepancy between pH values obtained in the field and in the laboratory. Although the samples were iced and lab analyses were conducted within 24 hours, the field data are considered more valid since no storage time was involved.

Weyco

The following BOD dilution factors were used and the following results obtained on Stations A & B:

		DILUTION FACTORS		
		200	100	40
A (influent to clarifier)	BOD (ppm)	106	60	19
B (primary effluent)	BOD (ppm)	30	69	38

The BOD value on the influent decreased with increased volume of sample used, indicating a toxic effect. However, this does not appear to be a straight-line toxicity according to the values obtained from B (the primary effluent).

Because of the relatively short retention time in the clarifier and considering that only physical settling occurs, it seems probable that the toxicant, if present, would not be removed. The ratio of COD to BOD of the secondary effluent is extremely low, and possibly a toxicant is still present.

The long detention time of the log pond itself, and the dilution and dispersion of the effluent could dissipate the toxic effect and premit a more plausible BOD:COD ratio. Comparing the COD, and solids data from C (the secondary effluent) to Station #2 (the log pond effluent) we would expect a higher BOD than 6 ppm from C.

The above postulation deserves examination by industry. Also, the relatively low concentration of nutrients entering the secondary system may explain its marginal efficiency.

After examining the possibility of a toxicant, and the effect of adding nutrients to the secondary system, Weyco should consider water conservation. The less water used, the less they would have to treat, the nutrient concentrations would be increased and also the effluent from the log pond would be reduced.

The vacuum filter was working well on the day of the survey. The clarifier has no catwalk around the perimeter for housekeeping. Considerable amounts of slime growth were present in the launders.

An oil-like sheen was present on the surface in the clarifier.

The truck wash was not used by industrial personnel while we were there. We initiated it ourselves without a vehicle. Log and bark chips, quantities of oil and sediment were flushed to the long pond. The data are reported on a series of samples taken in random order.

When the flow first started, the discharge had the worst appearance. The longer it ran, the clearer the water bacame. The point is that the flow is very variable in volume and chemical characteristics. Any projection of this data to the "typical" situation would be of little value.

The high dissolved oxygen and the low BOD, COD, turbidity, color, etc., indicate the typical "clean water" situation at Station #1. The insect data correlates well.

The characteristics differ drastically from Station #2. The insects are pollution tolerant organisms below the discharge from the log pond.

At Station #3 the effects of the discharge from Station #2 are very evident from the chemical data. The macroorganism diversity is also less. Coliform data exhibit an increase in total coliform.

Enumclaw STP

I contacted the head Operator, Jim Crossler, before taking the coliform sample from his outfall so he could record flow, chlorine dosage and residual for the determined result (600 colonies/100 mls). This value was reported to him and is presumably of some value in regulating the chlorine addition rate.

The most noteworthy data are the high nutrient values, and the significant increase in Boise Creek downstream. Solids also increase.

The coliform values at Station #6 indicate that there is a source of fecal contamination upstream.