Memo To: John Stetson

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From: Pat Lee

WA-22-0030

Subject: Weyerhaeuser at Cosmopolis

Date: December 12, 1974

A comprehensive survey was conducted on Weyerhaeuser at Cosmopolis on July 30, 1974. The influents and effluents of the two clarifiers were composited to determine respective efficiencies and the outfall known as 002 was sampled for six hours to determine chemical changes in the discharge (if any) between the tide gate and the automatic compositer that is located at the mouth of the ditch. A visual inspection of the premises was also conducted.

The results of the clarifier observations and tests are as follows:

Both clarifiers are being improperly operated and maintained. Although the westernmost clarifier was allowing less settleable solids to escape over the v-notch weirs than the eastern one, both were exhibiting all the classic characteristics of a poor clarifier operation. For purposes of identification the 60 foot clarifier (easternmost) will be referred to as #1 and the western clarifier which is smaller by 10 feet in diameter as #2 clarifier. Although #2 clarifier is only 5 feet smaller in radius it has only 2/3 of the surface area of #1. Both clarifiers showed strong evidence of short circuiting. Flow patterns were pretty obvious in both clarifiers. The flow patterns in both were from the center well to western half of the clarifiers. Aiding in the short circuiting was the inequity of flow distribution across the v-notch weirs. The obvious reason for this unequal distribution of flow was the lack of balancing of the v-notch weirs. It was also obvious the condition had been this way for some time as algae had built up below the weirs where the flow was least. The skimming operation on both clarifiers was not effective either as the paddle on #1 was missing and thus was not accomplishing anything and, the skimmer on #2 was not adjusted right and thus skipped and stuttered on its way around the clarifier. This stuttering caused more flow patterns to appear in the clarifier, causing much less efficient operation. The field data on the clarifier operation follows:

Field Results

	Influent				Effluent #1			
15 Determinations	Max.	Min.	Mean	Median	Max.	Min.	Mean	Median
Temp °C	33.0	29.8		32.5	33.0	29.7		32.5
pH (Units)	8.2	7.4		8.0	8.0	7.4		8.0
Conductivity (umhos/cm2)	6000	5500		5700	6250	5000		5750
Settleable Solids	600	480	525.	510.	175	90	132.	137.

Effluent #2

15 Determinations	Max.	Min.	Mean	Median
Temp °C	33.0	30.0		32.5
pH (Units)	8.0	7.6		8.0
Conductivity (umhos/cm2)	6000	5400		5600
Settleable Solids (mls/l)	50.	15.	30.	25.

The lab data on the clarifier composites follow. The total coliform counts are unreliable because of the large overgrowth of non-coliforms on all the plates. Fecal counts were not taken. The high color readings interfere with the turbidity values.

Log Number: 74 - 3145	46	47
Station	Inf. 0900-1600	Eff.#1 0900-1600	Eff.#2 0900-1600
pH	8.2	8.3	8.3
Turbidity (JTU)	32	5	4
Conductivity (umhos/cm) @25°C	5000	4900	4900
COD	8980	3700	3750
BOD (5 day)	<800	<800	<800
Total Coliform (Col./100ml)		6400	5500
Fecal Coliform (Col./100ml)			
Total Suspended Solids	4210	480	680
Total Sus.Non.Vol. Solids	290	20	220
Color	10,200	11,150	10,000

Flow through the clarifiers during the seven hour sampling period was 800,000 gallons. The lab results show a surprisingly high COD to BOD ratio. This accounts for the fact that they underestimated the dilution ranges for BOD values and thus reported "less than values". The high ratio could be accounted for by toxic materials that is killing off the bacteria needed for the BOD test, thus giving an artificially low number. There are some questions as to the validity of the solids data, so if these results do not help you, then we will be more than willing to resample the clarifiers. Also the data shows that #2 clarifier is sloughing off more suspended solids than #1 while at the same time sloughing off less settleable solids than #1. COD reduction across the clarifiers is 59% and 58% respectively.

For the biopond area, we conducted a visual inspection and the lab analyzed a 24 hour composite of the influent to the biopond. The lab results of the composite are as follows:

pH	5.1	
Turbidity	5	JTU
Conductivity	6300	umho/cm
COD	14,500	ppm
BOD	4,900	ppm
T.S.S.	420	ppm
T.S.N.V.S.	140	ppm
Color	13,100	ppm

The visual inspection of the biopond area was very interesting. I walked the outer perimeter of the bioponds and discovered that sludge and foam had both escaped over the outer wall of the bioponds in a number of places. Part of the south wall and most of the eastern wall were the places where sludge and foam had overflowed most apparently. The mixture drained off to the east and then down through a swampy area and finally out the slough that the sweet sewer (002) joins with right before the slough enters the Chehalis River. Scott Jeane mentioned a historical toxicity problem in this immediate area. This swampy area also included a sludge drying bed. On the day of the survey it was mainly foam that was escaping the bioponds but there was also some sludge or mixed liquor going over in spots on the far eastern pond.

As part of our survey we also monitored the final spot where the sweet sewer enters the Chehalis River slough after traveling the length of the ditch on Weyerhaeuser Company property. Discharge 002 is a high but unknown volume discharge of grayish water. The effluent runs through an open ditch having the appearance of a black colored creek. No odors were apparent, and only infrequently were oil films noticed on the surface. The amount of oil was judged so insufficient that no samples were taken.

As the tide ebbs and stream (effluent) velocity increases, white foam was formed at the discharge. On the survey date, the tidal gate did not seem to be operating correctly and was discharging on an incoming tide. The effluent went out the tide gate, under the road and on up the slough, adjoining Weyerhaeuser Company's property. Later when the tide changed the slough then flowed the other way out into the Chehalis. This is the same slough that the overflow from the bioponds flows into. The field data on the ditch follows:

Field Results

16 Determinations	Max.	Min.	Mean	Median
Temp °C	31.2	28.0		30.4
pH (Units	6.8	6.1		6.3
Conductivity (umhos/cm2)	500	360		440
Settleable Solids (mls/l)	0.5	0.2	.37	.4

Grab samples for PBI's were 18 ppm, 23 ppm, and 45 ppm. We also ran total sulfides in the field but all analyses came up with no trace of sulfides. Two total coliform samples were collected at 1300 and 1600 and were analyzed and proved to have 4300 and 800 colonies per 100 ml respectively. These samples like the other coliform samples were also overgrown with non-coliforms. The lab also ran its normal industrial tests on two other samples associated with the 002 outfall. One was a 24 hour composite on the influent to the ditch and the other was a seven hour composite on the effluent from the ditch. Also included is Weyerhaeuser Company's analysis of the 24 hour composite.

These lab results are as follows:

	DOE (7 hour) Effluent from 002 Ditch	DOE (24 hour) Sweet Sewer Discharge	Weyco (24 hour) Sweet Sewer Discharge
pH	6.9	7.2	6.2(average)
Turbidity (JTU)	20.	45.	
Conductivity (umho/cm)	560.	200.	
COD (ppm)	116.	293.	
BOD (ppm)	<100	82.	26.
T.S.S. (ppm)	92.	210.	
TSNVS (ppm)	28.	30.	
SCS (ppm)	64.	180.	37.
Color (units)	225.	256.	

The above lab results are consistent with the proposition that the sweet sewer discharge is diluted as it flows through the ditch. The concentrations of all the pollutants are less at the effluent of the ditch than at the sweet sewer discharge to the ditch (or lagoon as Weyerhaeuser Company calls it). The one parameter than does increase is conductivity which would be accounted for by leaching of salts through the soil or by simple backing up of the saltwater at the high tide mark. I have no explanation for the discrepancy, between the DOE and Weyerhaeuser Company sample split other than the one I stated earlier which was that I've had stronger confidence in our lab results than I had in this specific case.

The lab ran one additional sample, a grab from the 001 discharge on the south channel. This was supposed to have been a 24 hour composite but Weyerhaeuser Company's sampler failed and we ended up splitting a grab instead. This isn't as invalid as it may seem due to the long holding time in Weyerhaeuser Company's lagoon system.

The DOE results and Weyerhaeuser Company's results are as follows:

	DOE Results	Weyco Results
pH	6.1	6.2 (average)
Turbidity (JTU)	8	
Conductivity (umhos/cm	2300.	
COD ppm	1260.	
BOD ppm	205.	161.
T.S.S. ppm	100.	
T.S.N.V.S. ppm	30.	
S.C.S. ppm	70.	0.
Color units	2130.	

I don't have too much to say about these results other than the BOD's match up a lot better. I also notice that our results are generally higher than Weyerhaeuser Company's results, a relatively common occurrence in industrial sample effluent splitting.

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