

October 30, 1972

Department  
of Ecology



Memo to: Nelson Graham

From: Ron Devitt *RD*

Subject: Water Quality of Chehalis River in the Chehalis-Centralia Area

### Introduction

In 1969, two surveys were conducted on the Chehalis River to characterize the existing water quality. The subject stretch of river between Scammon Creek and the Newaukum River proved to be substandard for coliform, dissolved oxygen and aesthetics. The cities of Chehalis and Centralia, through inadequate sewage treatment, were degrading the river.

Facilities at the municipalities were expanded to improve treatment. By November, 1969, both plants were in operation. Since then three additional river surveys have been conducted to evaluate resulting changes in the receiving water.

### Water Quality Standards

The coliform standard for this water is a median value of 240 total coliform colonies per 100 milliliters, with no more than 20% of the samples exceeding 1000 colonies per 100 milliliters.

The dissolved oxygen of water should exceed 5.0 mg/l or 50% of the saturation value whichever is greater.

### Discussion of Data

#### Total coliform:

Before sewage treatment plant improvements the entire stretch of river was in violation of coliform standards. The median values exceeded the standard by a factor of about 100. Station 1, above the influence of the treatment plants, was high (1900 colonies/100 mls) but the values increased downstream. There was a significant increase caused by Chehalis sewage treatment discharge. Values remained high the entire length of river surveyed.

TABLE I

COLIFORM<sup>1</sup>

Date	Before Municipal Improvements		After Municipal Improvements		
	8-5-69	8-14-69	8-20-70	9-21-70	9-18-72
Median	>10,000	30,500	170	440	500
% over 1,000	100%	100%	0%	0%	50%

1. Standard for coliform is median values of 240, with less than 20% exceeding 1000 colonies/100 mls.

TABLE II

DISSOLVED OXYGEN<sup>2</sup>

Sta.	Date:	Before Municipal Improvements		After Municipal Improvements		
		8-5-69	8-14-69	8-20-70	9-21-70	9-18-72
1		+	+	+	+	+
2		+	+	+	+	+
3		+	+	+	+	+
4		0	0	0	+	+
5		0	0	0	+	+
6		0	0	+	+	+
7		0	0	0	+	+
8		0	0	+	+	+
9		-	0	+	+	+
10		-	-	+	+	+
11		-	-	+	+	+
12		-	-	+	+	+
% violations		62%	75%	25%	0%	0%

- = not sampled

0 = violation of standard

+ = acceptable

2. Standard for dissolved oxygen is greater than 5.0 mg/l or 50% of saturation.

After improved disinfection by the municipalities, the coliform levels were much lower.

August, 1970 - All stations were acceptable for coliform.

September, 1970 - The median values slightly exceeded 240 colonies/100 mls but no sample exceeded 1000 colonies/100 mls. The values that were high did not seem to be associated with the sewage treatment plants.

September, 1972 - Although half of the stations were over 1,000 colonies/100 mls and the median value was 500 colonies/100 ml, the high values do not seem to be associated with the treatment plants. The control (station 1) was high (800) but stations 2 and 3 below the Chehalis treatment plant were low (40 & 50). Downstream, somewhere between 3 and 4, there is a fecal source of contamination. This source was not identified. The cattle along the river and the waterfowl might contribute to, but seem to be incapable of being the sole cause of these high values at stations 4 and 5 (>4,000 colonies/100 mls). Stations 10, 11, and 12 are all >1,000 and this seems due to the influence of the Skookumchuck River which enters between stations 9 and 10. Coliform values for this tributary are 1,800 colonies/100 mls.

### Dissolved Oxygen

Before improved sewage treatment, the data indicated an oxygen sag below the Chehalis treatment plant. Stations were not sampled far enough downstream to evaluate the effect of the Centralia plant.

After improvements the data showed violation of oxygen requirements on August 20, 1970 downstream of Chehalis, but on subsequent surveys violations were not recorded.

The oxygen values are complicated by the following factors:

1. Slow current in stretches of the river results in stratification, retarded air transfer, and incomplete vertical mixing.
2. Algal activity leads to supersaturation of upper layers of water and oxygen depletion near bottom. Climatic and diurnal activities would tend to change oxygen concentrations greatly.
3. The influence of Skookumchuck River tends to mask any BOD from the Centralia treatment plant.

### Aesthetics

Automobiles which have been used to rip rap the river banks to retard erosion are unsightly, but they are obvious mostly to the limited numbers of boaters who use this section of river. Garbage has been dumped at some areas. Cows still have free access to the river.

The improved water quality, of course, improved the general aesthetics of the river but the general area is still somewhat of an eyesore.

### Conclusion

Data indicates that expansion of the sewage treatment facilities by the cities of Centralia and Chehalis have improved the water quality of the Chehalis River in the parameters for which it was substandard, namely coliform, dissolved oxygen and aesthetics. Deficiencies still exist, but these (coliform and aesthetics) do not appear to be associated with sewage treatment plant effluents.

## CHEHALIS RIVER

August 5, 1969

## Sampling Run

Sta.#	Time	Sampling Depth Feet	Total Coliform /100 mls	Temp. °C	DO PPM	DO % Sat.
1	1115	S	1,900	18.8	8.5	90%
2	1200	S	>50,000	19.1	7.75	86%
3	1220	S		19.8	6.6	74%
		14'		19.8	6.4	72%
4	1235	S		20.2	2.25	26%
		12'		19.6	1.9	21%
5	1350	S	>10,000	20.7	3.8	44%
		14'		20.1	2.9	33%
6	1305	S		21.0	3.8	44%
		6'		20.2	3.1	35%
		14'		20.2	1.9	22%
7	1335	S	>10,000	22.2	4.45	52%
		4		20.9	4.4	51%
		6		20.6	3.0	34%
		7		20.3	2.7	31%
		8		20.2	1.6	18%
		16		20.0	1.45	16%
8	1355	S	>10,000	21.8	10.4	121%
		3		21.1	10.0	115%
		5		21.0	6.7	77%
		7		21.0	4.9	56%
		14		20.8	3.7	42%

Please notice that the bacteriological data is very high.

CHEHALIS RIVER

August 14, 1969

Sampling Run

Station	Time	Depth	Total Coliform /100 mls	Temp °C	DO PPM	DO % Sat.
1	9:35	Surf.	3,400	18.5	8.5	93%
2	9:50	Surf.	21,000	18.1	6.9	75%
		10'		18.1	7.5	81%
3	10:05	Surf.		18.5	6.9	75%
		5'		18.5	6.5	71%
		14'		18.4	6.0	66%
4	10:15	Surf.		17.6	3.6	38%
		5'		17.7	3.4	36%
		14'		17.7	3.2	34%
5	10:45	Surf.	1,200,000	18.0	2.4	26%
		5'		17.8	2.1	22%
		14'		17.9	2.0	21%
6	11:00	Surf.		18.2	2.2	24%
		5'		18.2	1.9	20%
		14'		18.0	1.7	18%
7	11:10	Surf.	40,000	18.5	4.8	52%
		5'		18.3	4.0	43%
		14'		18.0	3.2	34%
8	11:20	Surf.	110,000	18.8	4.5	49%
		5'		18.0	2.6	28%
		10'		18.0	2.4	26%
9	11:30	Surf.	12,000	18.4	3.2	35%
		5'		18.2	3.1	33%

CHEHALIS RIVER

August 20, 1970

Sampling Run

Station #	Time	Sampling Depth Feet	Total Coliform /100 mls.	Temp. °C	DO PPM	DO % Sat.
1	1100	2	240	18.9	7.8	87
2	1115	1	10	19.3	7.4	82
3	1125	1	260	19.5	7.7	86
		5		19.5	7.5	84
		13		19.4	6.9	78
4	1140	1	360	19.5	6.8	76
		5		19.7	6.8	76
		15		19.8	5.3	60
		18		19.0	Nil	0
5	1155	1	170	19.7	6.5	73
		5		19.8	6.5	73
		10		19.7	6.4	72
	1160	15		19.5	2.4	27
		18		19.0	2.1	23
6	1220	1	150	20.5	12.5	142
		5		20.3	7.8	89
		7		20.3	7.2	82
	1225	9		20.3	6.5	74
		12		18.7	Nil	0
7	1235	1	40	20.5	11.3	129
		5		20.8	11.1	128
		10		20.2	6.7	76
8	1245	1	50	20.4	11.1	126
		7		20.0	7.0	80
		10		19.4	1.0	11
		14		18.4	Nil	0
9	1254	1	190	19.5	8.9	100
		5		19.4	8.7	98
10	1330	1	70	20.2	7.0	80
		5		20.4	8.6	98
11	1355	1	230	20.2	8.6	88
		4		19.6	8.7	98

CHEHALIS RIVER

September 21, 1970

Sampling Run

Station #	Time	Sampling Depth Feet	Total Coliform /100 mi.	Temp. °C	DO PPM	DO % Sat.
1	1030	2	700	13.5	10.4	103
2	1040	3	230	13.6	9.5	94
3	1045	1	210	13.8	9.4	94
		7		13.8	9.8	98
4	1055	9	500	13.8	9.5	95
				13.8	9.4	94
				13.8	9.0	90
5	1105	1	940	13.8	9.2	92
				13.8	9.2	92
				13.8	9.3	93
				13.7	9.2	92
				13.8	9.3	93
6	1125	1	760	14.1	8.9	69
		5		14.0	9.1	91
		10		14.0	9.0	90
		13		14.0	9.3	93
7	1135	1	440	14.7	8.9	91
		4		14.6	8.8	90
		7		14.1	8.8	88
8	1140	1	280	14.8	8.4	86
		5		14.7	8.8	90
		11		14.7	8.4	86
9	1150	1	350	14.9	8.5	87
		4		14.9	8.6	88
10	1300	1	350	15.3	8.6	89
11	1320	1	600	15.4	8.7	90
		4		15.4	8.6	89

CHEHALIS RIVER

September 9, 1972

Sampling Run

Sta.#	Time	Sampling Depth Feet	Total Coliform /100 ml	Fecal Coliform /100 ml	Conductivity $\mu$ MHOS /cm	T°C	DO PPM	DO % Saturation
#1	1045	1'	800	<40	100	14.0	6.9	69%
		2'			130	14.0	7.5	75%
#2	1100	1'	<40	<40	100	14.0	6.5	65%
		3'			110	14.0	6.5	65%
		5'			110	14.0	6.5	65%
2a	1110	1'			100	14.5	6.3	63%
		4'			100	14.5	6.4	64%
		6'			100	14.4	6.4	65%
		10'			120	14.5	6.5	66%
		14'			120	14.3	6.8	68%
3	1115	1'	54	<40	100	15.0	6.55	67%
		4'			100	15.0	6.55	67%
		6'			100	15.0	6.6	68%
		8'			100	15.0	6.6	68%
		10'			100	15.0	6.7	69%
		12'			95	14.7	6.9	70%
3a	1140	1'			105	15.05	5.7	58%
		4'			105	15.0	5.8	59%
		8'			110	15.0	5.85	60%
		14'			110	15.0	5.85	60%
		18'			100	15.0	5.9	60%
		22'			100	15.0	6.0	61%
#4	1155	1'	>4000	330	100	16.0	5.6	59%
		4'			105	16.0	5.6	59%
		6'			100	15.5	5.6	58%
		8'			100	15.5	5.7	59%
		10'			100	15.0	5.8	59%
4a	1205	1'			110	16.0	5.4	56%
		6'			110	15.9	5.4	56%
		10'			110	15.8	5.4	56%
		16'			110	15.7	5.3	55%
		20'			110	15.7	5.3	55%
		24'			105	15.5	5.4	56%
		26'			105	15.5	5.6	58%

Sta.#	Time	Sampling Depth Feet	Total Coliform /100 ml	Total Coliform /100 ml	Conductivity $\mu$ MHOS /cm	T°C	DO PPM	DO % Saturation
5	1220	1'	>4000	80	100	16.0	5.7	60%
		4'			100	16.0	5.65	59%
		8'			100	15.5	5.7	59%
6	1240	1'	1500	<40	110	16.7	5.4	57%
		4'			110	16.2	5.45	57%
		8'			110	16.0	5.35	56%
		12'			110	16.0	5.25	55%
		16'			105	16.0	5.3	55%
7	1255	1'	300	<40	105	16.8	5.3	56%
		6'			105	16.0	5.2	54%
		12'			105	16.0	5.1	53%
		20'			108	16.0	5.1	53%
		26'			100	15.8	5.1	53%
8	1310	1'	500	<40	100	16.0	5.2	54%
		4'			100	16.0	5.2	54%
		6'			100	16.0	5.2	54%
		8'			100	15.8	5.2	54%
9	1320	1'	500	<40	100	16.0	5.3	55%
		4'			100	16.0	5.35	56%
		6'			99	16.0	5.45	57%
9a	1325		1800	<40				
10	1330	1'	1600	<40	70	14.0	6.9	69%
		3'			75	14.0	7.05	70%
11	1350	1'	1200	<40	70	14.0	7.15	72%
		4'			70	14.0	7.25	73%
		6'			70	14.0	7.35	74%
12	1415	1'	1000	<40	75	13.6	7.35	73%
		4'			70	13.8	7.20	72%

