August 11, 1972

Publication No. 72-e11

MEMO TO: S. A. Messman

FROM: Ron Devitt

SUBJECT: Re: Boise Creek Survey

INTRODUCTION

On 6-21-72, I sampled various locations on Boise Creek near Enumclaw. Previous data was collected by Bob Bishop on 8-2-71.

As stated in his memo, Boise Creek passes under the log pond at Weyerhaeuser Company, White River Operations. The discharge from the log pond was to have been eliminated, except when the natural flow in Boise Creek as measured upstream exceeds 100 cfs.

On the day of the survey, flow upstream as measured with the pygmy Gurley meter was 17 cfs. Calculated flow from the log pond by measuring the head height of the discharge weirs at the dam was greater than .8 cfs. This volume is attributed to ground water and springs infiltrating the log pond according to Art Petersen, industrial representative.

STATION LOCATIONS

These stations as described below are essentially the same as those sampled by Mr. Bishop with the following exceptions:

A. Mr. Bishop's station #1 was further upstream
B. Stations #2A, #4A and #8 were added
C. The sewage treatment plant effluent was sampled
D. Mr. Bishop's station #7 was not sampled

Station #1. Boise Creek on Weyerhaeuser property 80 yards upstream of culvert near plant office --------

This was not the same location as sampled by Bob Bishop, because the substrate was large rocks. The width was 13.5 feet; maximum depth was 1.3 feet. Flow was 17 cfs. Insects were predominatly mayflies and stone flies commonly thought of as "clean water" indicators.

Station #2. Log pond effluent --------

Water samples were taken from the weirs on the dam. Insect samples were taken 15 yards downstream. Substrate was large rocks, silted with black sludge. The biomass and family diversity was lower than other stations. The majority of specimens

were chironomids which are characteristically pollution tolerant.

An unpleasant odor was present, but a test for sulfides was negative.

Station #2A. 20 yards downstream from confluence of log pond effluent and Boise Creek ---------

The insect population was very diverse; the biomass was much greater than other stations. This is probably due to the enriched condition created by the log pond effluent. The dark color typical of the pond effluent was obvious. Mixing of effluent and creek not complete at this point.

Station #3. Downstream of the intersection of Boise Creek and U. S. Highway 410 ---------

Complete mixing of the creek and effluent occurred at this point, both vertically and longitudinally. The numbers of insects were greater, but the diversity was less than at station #1.

Station #4. At 284th street bridge near Enumclaw ---------

Insect samples were not taken. Log pond color still noticeable

Station #4A. Small tributary to Boise Creek on 284th street ---

Observed salmonids, margaritifera and caddis flies

Station #5. Boise Creek at 268th Avenue bridge.

Station #6. Boise Creek at 252th Avenue S.E. --------

Occupant of house said that the creek changes color on weekends, presumably when Weyerhaeuser is not operating.

Station #7. Enumclaw STP effluent at Boise Creek --------

Determined 15 second chlorine residual to be .2; 3 minute to be 1.0. There was .15ppm MBAS.

Station #8. Boise Creek at Mud Mountain Road.

DISCUSSION OF DATA

Temperature: There is a gradual increase in the water temperature from station #1 to station #8.

Dissolved Oxygen: Insufficient data collected to indicate trend. Mr. Bishop's data demonstrate an oxygen sag caused by the log pond effluent.

pH: The pH of the log pond effluent is acidic in nature, this affects the pH of Boise Creek and is measurable for over ½ mile downstream. The pH of Boise Creek at Station #2 (5.9) violates Washington State Water quality criteria. The induced variation

exceeds that which is permissable (.25 units).

Turbidity: The turbidity of the log pond effluent was 25 JTU or 21 over natural condition. This is also a violation of water quality criteria.

Color: Although we have no established standards for color presently, the log pond adversely affects the aesthetics of the creek.

Conductivity: The log pond has little effect on the conductivity of Boise Creek. The sewage treatment plant however seems to contribute an increase.

COD: The COD of Boise Creek is increased significantly by log pond effluent. Surprisingly the sewage treatment plant was not shown to increase the COD.

BOD: The BOD values show very little.

Coliform: The entire length of Boise Creek is in violation of water quality standards. The high numbers at Station #1 were unexpected as there are no dwellings upstream. The log pond effluent although has high total coliform, has relatively low fecal indicating that the source is non-intestinal. The sewage treatment plant was adequately disinfecting the effluent.

Solids: Both the log pond and sewage treatment plant increase the amount of solids in the creek as shown by comparing the upstream and downstream data.

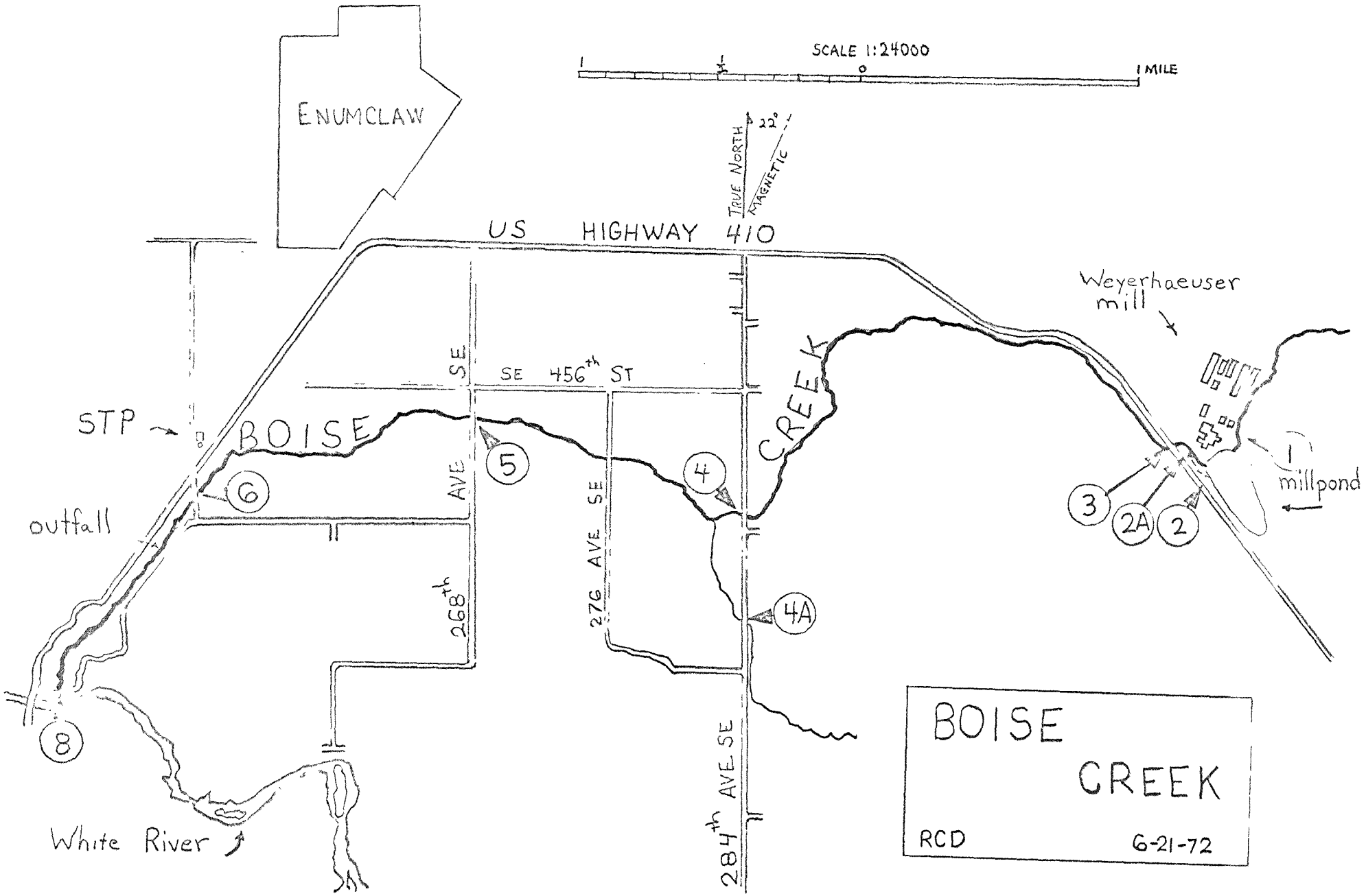
Nutrients: The primary source of nutrients is, as expected, the sewage treatment plant effluent. Concentrations of NO_3-N (7.3 ppm) and O-PO_4-P (7.01 ppm) capable of producing an algae bloom are present at Station #3 downstream, excepting Station #5.

SUMMARY

On 6-21-72, the log pond effluent of Weyerhaeuser, White River operations, caused an increase of the following parameters in Boise Creek: Temperature, turbidity, color, conductivity, COD, NO_3, NH_3, O-PO_4, Total-P, and solids. It caused a decrease in the pH. The characteristics of the log pond which violate state water quality criteria are pH, turbidity and total coliform. According to the industrial waste discharge permit, there should be been no discharge at all.

The Enumclaw sewage treatment plant effluent caused an increase in temperature, conductivity, color, COD, nutrients and all solids except suspended non-volatile solids. The effluent was being adequately disinfected.

RD/jsg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US HIGHWAY 410
Weyerhaeuser mill
SE 456th ST
BOISE CREEK
STP
outfall
268th AVE SE
276 AVE SE
284th AVE SE
1 millpond
White River
1
2
2A
3
4
4A
5
6
8
BOISE CREEK
RCD
6-21-72

BOISE CREEK

Station #	Time	Temp C.	D.O.	pH	Turb.	Color	Umhos/cm Cond.	COD	BOD	Colonies/100ml Total Colif.	Colonies/100ml Fecal Colif.
1	1000	9.3	----	7.3	3	61	42	1	4	1000	90
2	1025	17.8	----	5.9	25	790	70	141	25	9000	100
3	1115	9.8	----	6.9	4	86	49	15	2	1000	60
4	1130	10.4	12.0	7.4	3	68	52	15	2	2000	---
4A	1200	----	----	---	--	--	--	---	---	2000	---
5	1220	10.7	11.8	7.4	4	64	53	31	2	3500	---
6	1300	11.0	11.8	7.4	4	67	56	23	2	5000	60
STP Eff.	1320	16.3	----	---	--	--	--	---	---	200	40
@ Creek											
8	1400	11.4	11.4	7.4	4	70	88	20	3	2000	---

BOISE CREEK SOLIDS

Station #	Total Solids	Total Nonvolatile Solids	Total Suspended Solids	Total Suspended Nonvolatile Solids
1	36	15	3	0
2	115	47	23	5
3	55	39	5	0
4	42	10	14	4
5	56	41	11	16
6	56	51	14	9
8	73	65	15	10

Values in ppm.

BOISE CREEK

Station #	NO_3-N Filtered	NO_2-N Filtered	NH_3-N Unfiltered	Total Kjeldahl-N Unfiltered	O-PO4-P Filtered	Total Phosphorus P Unfiltered
1	.03	N.D.	.06	.28	.01	.01
2	.03	N.D.	.12	1.5	.24	.56
3	.32	N.D.	.12	.24	.02	.04
4	.31	N.D.	.10	.34	.01	.04
5	.28	N.D.	.14	.30	.01	.04
6	.37	N.D.	.10	.42	.01	.05
STP	.30	.07	20.0	20.3	5.32	5.8
8	.40	.02	.50	.88	.25	.31

Values in ppm.

STATE OF WASHINGTON

DEPARTMENT OF ECOLOGY

WATER QUALITY LABORATORY

ORIGINAL TO: [illegible]

COPIES TO:

LAB FILES

DATA SUMMARY

Source Rose Creek

Collected By R CD

Date Collected 6-21

Goal, Pro./Obj.

Log Number: 7221-	20	21	22	23	24	25	26	27	28	29	STORET
Station:	1	2	3	4	4A	5	6	9		STP Effluent	
pH	7.3	5.9	6.9	7.4	-	7.4	7.4	7.5	-	-	00403
Turbidity (JTU)	3	25	4	3	-	4	4	4	-	-	00070
Conductivity (µmhos/cm)@25°C	47	70	49	52	-	53	56	88	-	-	00095
COD	<1	141	15	15	-	31	23	20	-	-	00340
BOD (5 day)	4	25	7	2	-	2	2	3	-	-	00310
Total Coliform (Col./100ml)	1000	9000	1000	1000	1200	200	200	200	-	<200	31504
Fecal Coliform (Col./100ml)	90	<100	60	-	-	-	60	-	-	<40	31616
NO3-N (Filtered)	0.30	.03	.32	.31	-	.28	.27	.40	-	.80	00620
NO2-N (Filtered)	ND	ND	ND	ND	-	ND	ND	.02	-	.07	00615
NH3-N (Unfiltered)	.06	.12	.12	.10	-	.14	.10	.20	-	[illegible]	00610
T. Kjeldahl-N (Unfiltered)	.28	1.5	.24	.36	-	.30	.12	.88	-	[illegible].3	00625
O-PO4-P (Filtered)	<.01	.24	.02	.01	-	.01	.01	.25	-	5.32	00671
Total Phos.-P (Unfiltered)	<.01	.56	.04	.04	-	.04	.05	.31	-	[illegible]	00665
Total Solids	36	115	55	42	-	56	56	73	-	-	00500
Total Non Vol. Solids	15	47	[illegible]	10	-	41	51	65	-	-	
Total Suspended Solids	3	23	5	14	-	11	14	15	-	-	00530
Total Sus. Non Vol. Solids	0	5	0	4		16	9	10		-	
Color	61	270	86	68	-	64	67	70	-	-	

Note: All results are in PPM unless otherwise specified. ND is "None Detected"
Convert those marked with a * to PPB (PPM X 10^3) prior to entry into STORET

Summary By [illegible] Date [illegible]

Comments:

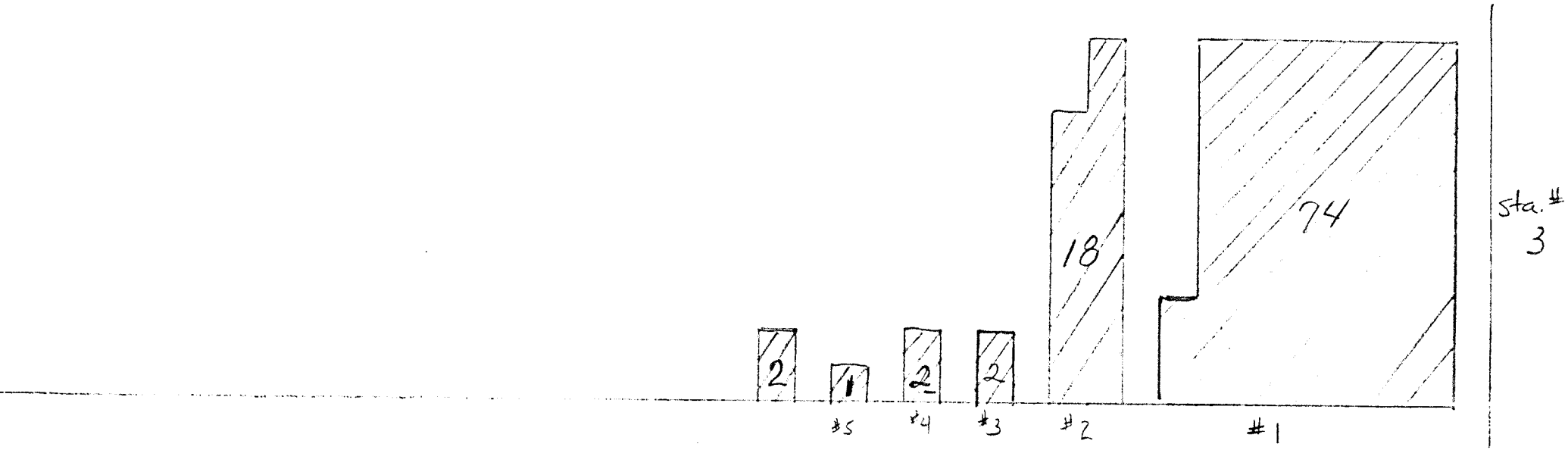
Groups found in sample 2 were not ~~found~~ represented in the other stations.

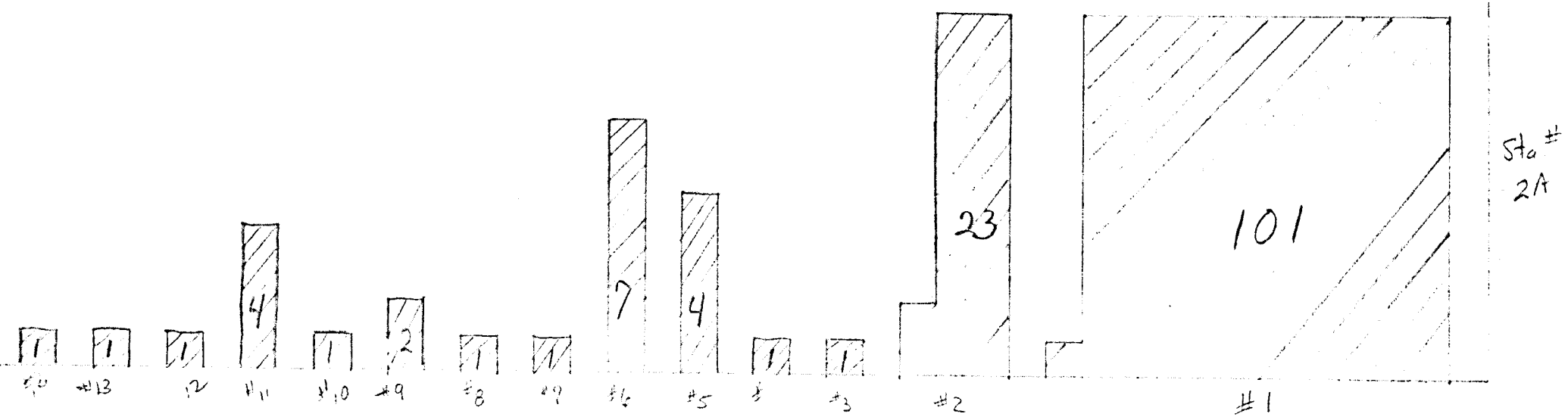
Groups # 1, # 2, are the same throughout the samples
" # 3 " " " " " "

Groups # 6 in Sta. # 1 is identical to Group # 1 in Sta. 2A.

Groups # 5, 6, 7 in Sta. # 2A are identical to Group # 4, 5, 8 in Sta. # 3.

The numbers in black represent the number of individuals in each group.


Sta. #
3
2
1
2
2
18
74
#5
#4
#3
#2
#1


Sta #
2A
1
1
1
4
1
2
1
1
7
4
1
1
23
101
#13
#12
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#9
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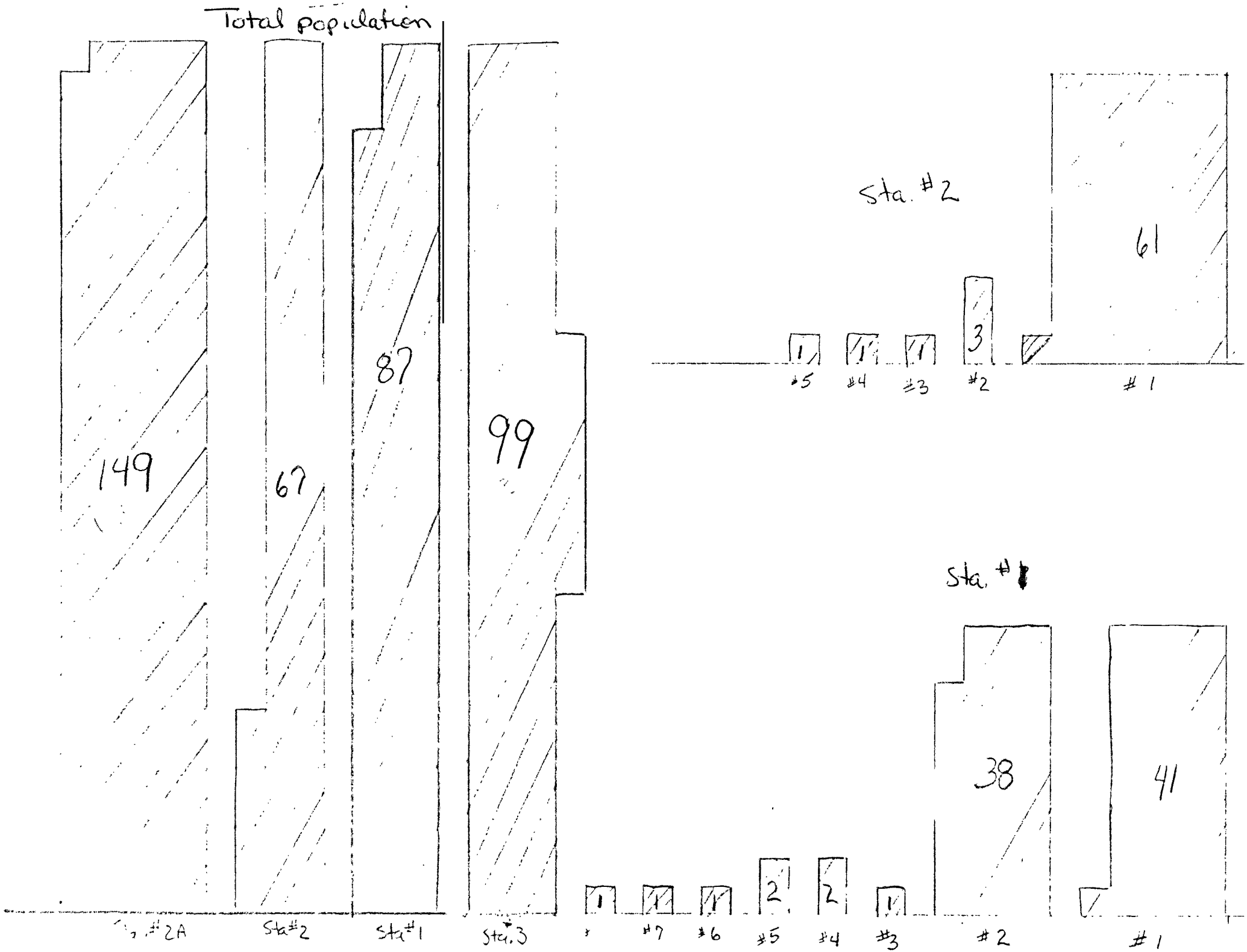
#6
#5
#3
#2
#1


Total population
149
67
87
99
Sta. #2A
Sta#2
Sta#1
Sta. 3
Sta. #2
61
1
1
1
3
#5
#4
#3
#2
#1
Sta. #1
38
41
1
1
1
2
2
1
#7
#6
#5
#4
#3
#2
#1

STATE OF WASHINGTON

DEPARTMENT OF ECOLOGY

DANIEL J. EVANS
GOVERNOR

JOHN A. BIGGS
DIRECTOR

MEMORANDUM

December 21, 1971

To: Steve Mossman & John Hodgson
From: Bob Bishop

Subject: Boise Creek survey

On 8-4-71, I conducted a survey on Boise Creek to study certain effects on stream water quality of effluent from the millpond of the Weyerhaeuser Company Wood Division White River mill near Enumclaw. Mr. Dennis Long, project engineer, pointed out what mill personnel had done to alter effluent waste from entering the creek. The creek has been diverted from upstream of the mill through a buried culvert which passes under the mill complex and flows from the culvert as Boise Creek upstream from confluence with millpond effluent. The company will next eliminate log pond outflow completely. At the time of the survey, the hydraulic barker used pond water in barking; the waste water was filtered, passed through a clarifier and aerated in an oxidation pond before flowing over the log pond dam to the creek. Most of the pond water is recycled to the barker operation.

Seven stations were surveyed from 0900 to 1500 hours, Figure 1. The weather was clear and sunny. Stream and log pond effluent samples were tested for: total coliform counts, DO, BOD, pH, temperature, turbidity, color, nutrients and solids, Tables 1 and 2.

The log pond effluent at station two, 30 feet below the pond dam, had a coliform count of 10,000. The pond effluent, when compared to the other stations had the following characteristics: the DO was lowest, 2.0 mg/l; the BOD was highest, 22 mg/l; the temperature was highest; the turbidity and color the highest; and the solids concentration the highest. There was a DO drop of 1.2 mg/l and a slight DO sag produced at station 3, compared to station 1, the control, after pond effluent entered the stream. At the confluence of the creek water flowing from the culvert and meeting pond water, there is strong mixing due to the culvert height; at station 3, 100 yards downstream of the confluence, BOD was 2.0 mg/l, and turbidity and color dropped greatly as compared with No. 2 sample. Coliform counts increased going downstream from station 3 to 30,000 counts downstream of the Enumclaw STP outfall. DO dropped slightly; BOD, temperature, turbidity and color increased at St. 7 compared to St. 6, above the STP outfall. Organic nitrogen concentration was highest in pond effluent sample. Phosphorous concentrations were highest at St. 7, following by St. 2.

Station observations follow, note photographs:

No. 1. (Control)
The water was clear. The bottom was gravel with little silt and low algal growth, not slippery. Aquatic insects were diverse in family composition and very plentiful. Area was shaded, excellent waters for game fish.

No. 2 Log pond effluent below dam was very black and had a foul odor. Much silt was present.

No. 3 Upstream from No. 3, there is very vigorous mixing of the stream water flowing out of the culvert and the log pond effluent. At St. 3, the water was black, note photograph. There were few insects; gravel was silted and was slimy. The flow was about 14 cfs.

No. 4 Area 2/3 riffles adn 1/3 sandy bottom alternating, water was dark. Noted crayfish and rainbow and cutthroat fingerlings.

No. 5 Through farm pasture area. The grey color was almost gone. Noted stringy green algae growing on some rocks. Typical benthic fauna for this type of stream stretch. Flow about 20 cfs.

No. 6 Grey color evident. Much silt on bottom; green and brown algae or stringy slime bacteria. Some insects were present.

No. 7 Downstream from Enumclaw STP:
Brown slime on rocks but not like slime bacteria Sphaerotilus. Chlorine odor was strong. Some sludge worms and few insects seen. Heavy silt loading between rocks. Still some grey color noted. Total coliform count of 30,000 noted at this station.

The water quality of Boise Creek will be greatly improved when log pond effluent flow ceases. The esthetic value and life form habitation will be greater.

Table 1. Total coliform counts, DO, BOD, pH, temperature, turbidity and color at survey stations

St.	Time	Total coli. per 100 ml.	DO	PPM BOD	pH	Temp. °C	Turb. JTU	Color
1	0930	1,000	9.6	1	7.2	14	*1	13
2	1015	10,000	7.0	22	6.0	23	35	1400
3	1045	2,000	8.4	2	7.0	13	3	170
4	1130	5,000	9.2	1	7.1	15	3	74
5	1315	+8,000	9.4	1	7.3	16	3	67
6	1430	+8,000	8.6	2	7.3	17	4	67
7	1530	30,000	8.3	5	7.4	19	10	104

+ means greater than
* means less than

Table 2. Nutrient nitrogen and phosphorous concentrations in mg/l at the survey stations.

St.	NH_3 - N	NO_2 - N filtered	NO_3 - N filtered	organic k,-eldhal-N	T-PO4-P	T-PO4-P filtered	O-PO4-P	O-PO4-P filter
1	0.0	0.0	.28	.06	.03	.01	*.01	0.0
2	0.0	0.01	0.0	2.80	.56	.43	.55	.42
3	0.0	0.0	.33	.34	.12	.05	.09	.04
4	0.0	0.0	.23	.18	.05	.04	.05	.03
5	0.0	0.0	.30	.18	.05	.03	.05	.03
6	0.0	*.01	.32	.52	.08	.05	.07	.04
7	2.44	.03	.32	.96	.76	.71	.75	.67

*means less than

Table 3. Solids concentraitons in mg/l for survey stations

St.	T.S.	T.N.V.S.	T.S.S.	T.S.N.U.S.
1	52	31	1	0.0
2	225	82	81	39
3	63	29	9	4
4	62	31	6	3
5	56	32	6	2
6	65	42	9	3
7	102	56	15	9

.0 .10 .20 .30 .40 .50 .60 .70

River at—

Angle coefficient	Dist. from initial point	Width	Depth	Observation depth	Revolutions	Time in seconds	VELOCITY At point	VELOCITY Mean in vertical	Adjusted for hor. angle or	Area

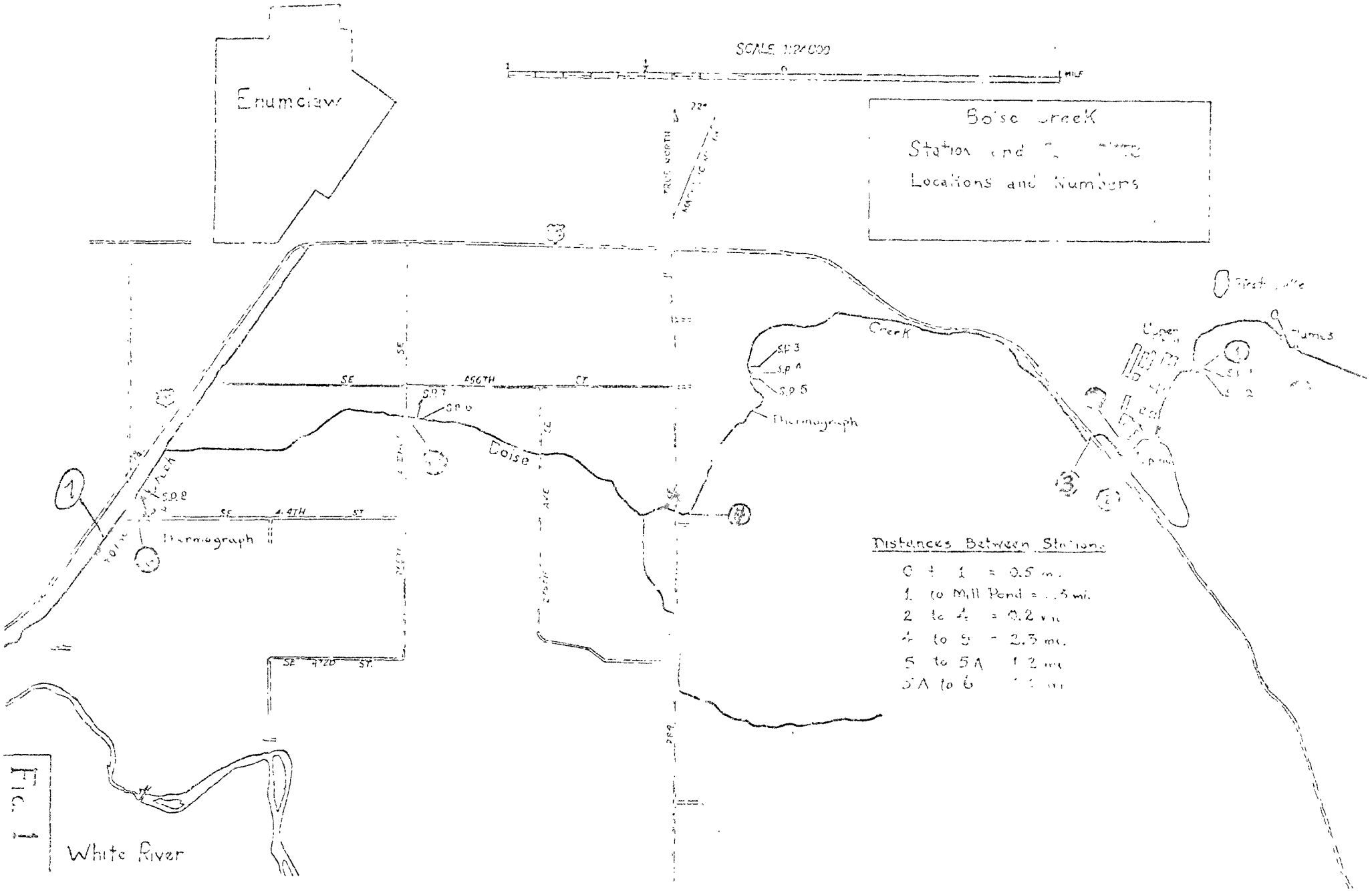

Enumclaw
SCALE 1:24000
MILE
Boise Creek
Station and
Locations and Numbers
TRUE NORTH
MAGNETIC NORTH
22°
SE 456TH ST
SE 448TH ST
SE 428TH ST
SE 436TH
SE 436TH AVE
SP 7
SP 6
SP 8
SP 3
SP 4
SP 5
Boise
Creek
Thermograph
Thermograph
White River
Upper
Lower
Distances Between Stations
0 to 1 = 0.5 mi.
1 to Mill Pond = .3 mi.
2 to 4 = 0.2 mi.
4 to 5 = 2.3 mi.
5 to 5A 1.2 mi.
5A to 6

Fig. 1

STATE OF WASHINGTON
WATER POLLUTION CONTROL COMMISSION
OLYMPIA, WASHINGTON

Permit No. T-3277

In accordance with Chapter 90.48 RCW, and Chapter 372-24 W.A.C.

Date of Issue October 6, 1969

Date of Expiration January 1, 1972

A WASTE DISCHARGE PERMIT is issued to:

Weyerhaeuser Company
Wood Products Group
White River Operations
Enumclaw, Washington

Waste from the permittee's industrial operation located ~~at~~ near Enumclaw

~~not exceeding~~ ~~gallons per day~~ may be discharged to Boise Creek from the permittee's log pond when the natural flow in Boise Creek as measured upstream of the pond exceeds 100 cfs (64.6 mgd). at the following point of discharge:

Section 28, Township 20-N, Range 7-E, W.M.

Said discharge is authorized subject to the following conditions:

1. The word "waste" in the above statement refers to the total volume of cooling and contaminated waters to be discharged.

2. Flows of 100 cfs. or less in Boise Creek, and discharge from the spring located upstream from the Weyerhaeuser plant, shall be diverted around the log pond. Such diversion shall be accomplished in accordance with the following time schedules:

   a. Final plans and specifications for the diversion project shall be submitted to this Commission for review and approval by November 21, 1969.

   b. Advertisement for bids for the diversion project shall occur by December 1, 1969.

   c. Facilities shall be completed and in operation by July 6, 1970.

3. Secondary treatment facilities shall be provided for treatment of hydraulic barker effluent. Such facilities shall be designed in accordance with the engineering study entitled "Domestic and Industrial Waste Study for Weyerhaeuser Company, White River Branch," which has been approved by this Commission. The following time schedules for the required project shall apply:

   a. Final plans and specifications shall be submitted to this Commission for review and approval by April 17, 1970.

   b. Award of contract for project construction shall be accomplished by May 15, 1970.

   c. Facilities shall be completed and in operation by October 30, 1970.

Permit No. T-3277

Weyerhaeuser Company

Date of Issue October 6, 1969

White River Operations

Date of Expiration January 1, 1972

Enumclaw, Washington

4. All condenser cooling water shall be discharged to the log pond at the point where the Boise Creek overflow enters the pond.

5. When dredging or cleaning the log pond, all mud, sawdust, bark, slabs, edgings and similar wastes are to be disposed of in a manner which will not permit their entry into a state waterway.

6. The log pond outlet shall be protected to prevent bark, sawdust, and other floating debris from being discharged to the waterway.

7. Sanitary wastes shall continue to be disposed of in accordance with the requirements of the County Health Department.

8. The following tests shall be conducted daily by the permittee during log pond overflow and results submitted to the Commission at the end of each month that overflow occurs.

   a. Date and duration of log pond overflow.

   b. Average and maximum pond overflow rates.

   c. Temperature of the pond overflow and Boise Creek upstream and downstream of the log pond.

   d. Dissolved oxygen of log pond overflow.

9. Weyerhaeuser Company shall submit to this Commission by November 1, 1970 a proposed testing program for the purpose of determining and evaluating the efficiency of waste treatment and control facilities. The approved testing program shall commence January 1, 1971, and continue until the expiration of this permit. Program results shall be submitted to this Commission for review upon request.

10. In the event the Company is temporarily unable to comply with any of the above conditions of this permit, due to breakdown of equipment or other cause, the Company shall notify the Commission. Such report is to include pertinent information as to the cause and what steps are being taken to correct the problem and prevent its recurrence.

This permit does not allow the discharge of wastes other than those mentioned herein. A new application shall be submitted whenever a change in the waste to be discharged is anticipated.

This permit is subject to termination if the Commission finds: (1) That it was procurred by misrepresentation of any material fact or by lack of full disclosure in the application; (2) That there has been a violation of the conditions thereof; (3) That a material change in quantity or type of waste disposal exists.

Permit No. T-3277

Weyerhaeuser Company

White River Operations

Enumclaw, Washington

Date of Issue October 6, 1969

Date of Expiration January 1, 1972

In the event that a material change in the conditions of the state waters utilized creates a dangerous degree of pollution, the Commission may specify additional conditions to this permit.

Signed _____
DIRECTOR
Water Pollution Control Commission