October 28, 1974

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Memo to: Howard Steeley and Vern Meinz

From: Pat Lee

Subject: Survey Conducted on the Willapa River August 20 and 21, 1974.

On August 20 and 21, 1974, a survey of the water quality of the Willapa River was conducted by boat from approximately 3 miles downstream of South Bend to the upstream city limits of Raymond. The study was concentrated around East Point Seafoods, a shrimp processor, to determine the effect of their waste water on the dissolved oxygen and bacteria load of the river.

At the same time the effluents from East Point Seafoods, South Bend Lagoon, Raymond STP, Raymond Lagoon and Weyerhaeuser were sampled.

For the river survey, a Hydrolab of Hydrolab Corporation was used to determine salinities, temperatures, dissolved oxygens and pH's. Additional samples were taken for coliforms and sulfite waste liquor concentrations.

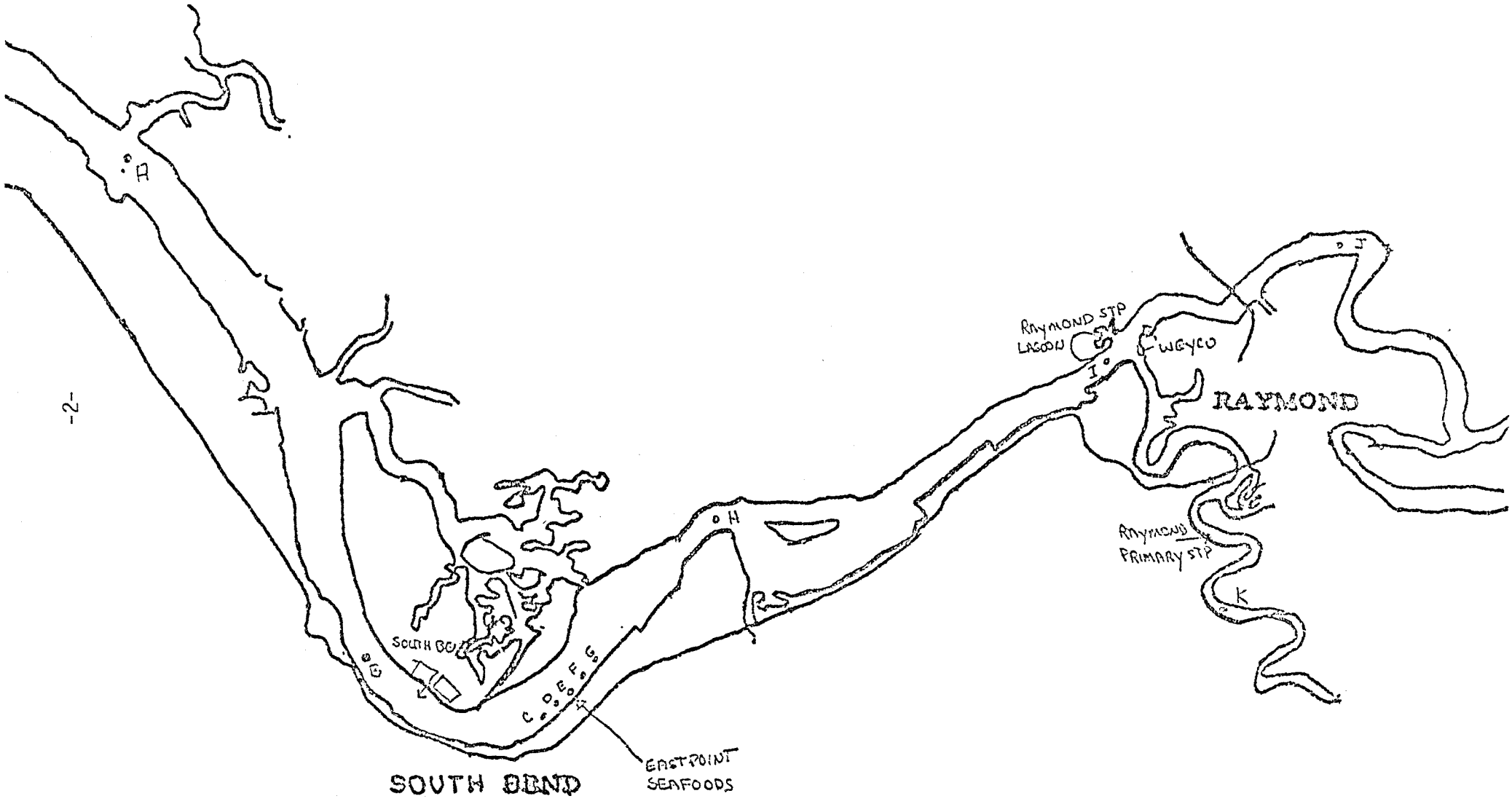
Sampling runs were designed to monitor the water quality at low tide, mid tide and high tide. Stations A and B were downstream of East Point Seafoods, C, D, E, F, and G were in the immediate vicinity and H, I, J, and K were further upstream. See Figure 1 for exact station locations.

On August 20, the dissolved oxygen concentrations at the mid tide run were unacceptable because of a tear in the semipermeable membrane of the dissolved oxygen probe.

On August 21, the survey was prematurely ended with 2 stations left to be sampled on the mid tide run because of a mechanical failure in the boat motor. The failure was due to the uptake of shrimp wastes from East Point into the motor. The shrimp waste was spilled into the waterway when a barge retaining wall collapsed. Because of the reproducibility of the samples already taken it was felt that there was no significant loss of accuracy by not conducting the planned higher tide run.

Simultaneously with the river sampling, the point sources along the river were also monitored. The domestic sources, the South Bend and Raymond Lagoons, and the Raymond primary were sampled only on August 20 due to the assumed homogeneity of their day to day operations. The two industrial sources, East Point in South Bend and Weyerhaeuser at Raymond, were monitored both on August 20 and August 21. Coast Oyster was not in production either day, so was not sampled. Efficiency studies were conducted on the East Point screening process and the Weyerhaeuser clarifier. All the normal field tests were also conducted. A specific breakdown of the field and lab tests is given in the results section.

WILLAPA RIVER - EASTPOINT SEAFOODS SURVEY



Results

The results of receiving water sampling show that there is a dissolved oxygen sag at stations C, D, E, F, and G, and high total and fecal coliform counts at the same stations and additionally at Station J. Stations C, D, E, F, and G are clustered right around East Point Seafoods while Station J is located on the North Fork of the Willapa River upstream of Weyerhaeuser and the Raymond Lagoon. As the tide was running upstream during the coliform sampling, it makes sense for any effects to show upstream. It is always difficult to pinpoint cause and effect in an estuary due to the interaction between river flow and the tides, and fresh and salt water. Even so, some specific assumptions can be made. The reason for the high coliform counts at stations C, D, E, F, and G is the impact from the waste from the shrimping process at East Point. Six coliform samples were collected during the survey from the main East Point effluent. All total coliform counts were on the order of 10^5 and all fecals were at least on the order of 10^3. Coliform samples collected at the South Bend lagoon showed excellent disinfection, with both fecal counts numbering less than 10 colonies per 100 ml. The high coliform count at Station J is probably due to discharges from Weyerhaeuser's operations. Total coliform counts coming out of Weyco's clarifier were on the order of 10^6 while fecals were in the order of 10^3. The other point source in the vicinity of Station J, the Raymond Lagoon, showed excellent disinfection with both low total and fecal counts. The BOD loading in pounds from East Point is two orders of magnitude greater than the only other point source in the area, the South Bend domestic lagoon, thus implying that East Point is the source of the D.O. sag at Stations C, D, E, F, and G. However, this is probably an oversimplification of the problem as some of the BOD loading to the river is in the form of complex sugars which takes a while to breakdown through bacterial action. Wood sugars from sawmill operations tend to be complex molecules and might not be having an immediate effect on the oxygen usage until arriving in the vicinity of East Point. A table of the BOD loading in lbs/day for August 21 is as follows:

East Point	4,250 lbs. (estimated)
Weyerhaeuser	250 lbs.
Raymond Primary	375 lbs.
South Bend Lagoon	25 lbs.
Raymond Lagoon	30 lbs.
Total	4,930 lbs.

From this standpoint East Point is by far the biggest contributor to the loading and is much more concentrated (3,000 ppm) and thus is probably the prime factor in causing the sag although each point source contributes its load. Specific laboratory and field data and a rundown of each point source including efficiency studies of the East Point screening process and the Weyerhaeuser clarifier are included in the tables.

WEYERHAEUSER AT RAYMOND

Weyerhaeuser at Raymond runs a sawmill with a hydraulic debarker. We conducted an efficiency study on the clarifier for seven hours on August 20th and six hours on the 21st. The study was augmented with a series of grabs on their cooling water operation that was an attempt to locate the source of the coliform in their effluent. Field data from the two day survey showed an average of 0.8 ppm of settleable solids escaping from the clarifier on the 20th and an average of 0.5 ppm on the 21st. The pH of the effluent ranged from 5.8 to 6.7 throughout the survey while the temperature ranged from 20.5°C to 25.0°C. Flows were .336 MGD on the 20th and .365 MGD on the 21st. The laboratory results were very interesting in a number of ways. The cooling water discharge to the south fork of the Willapa had a high (330 ppm) COD but minimal (2 ppm) BOD with a low T.S.S. This might be evidence of a toxic chemical killing off the bacteria. The clarifier effluent values remained similar from day to day while the influent BOD and T.S.S. values increased greatly from day to day. The non volatile suspended solids doubled in the same time period thus implying a drastic change in the chemical nature of the effluent. The source of the high total and fecal coliform counts in the clarifier effluent was traced back and discovered to be coming from the debarker facilities. A sample of Weyerhaeuser's incoming water supply was collected from their "frog pond", and although the counts were low, certainly were not free of contamination. The debarker as the source of coliform agrees with the work of R. N. Thut's Weyerhaeuser report of September 5, 1972.

SOUTH BEND LAGOON

The South Bend Lagoon was sampled on August 20. The field and lab data show it to be achieving effective treatment with excellent disinfection, low BOD (9 ppm) and suspended solids (40 ppm) in the effluent. No settleable solids escaped from either cell. The high conductivity, high chlorides, and high total solids to suspended solids ratio show that salt water is in the domestic system. Chlorine residual remained above 1 ppm throughout the seven hour survey. Flow was an estimated .35 MGD.

Log Number:	74-3450	74-3451	74-3452
Station	Effluent	Lagoon A	Lagoon B
pH	7.1		
Turbidity (JTU)	27		
Conductivity (umhos/cm) @25° C	5,000		
COD	76		
BOD (5 day)	9		
Total Coliform (Col./100 ml)	-	<10	>1,000
Fecal Coliform (Col./100 ml)	-	<10	<10
NO_3-N (Filtered)	.04		
NO_2-N (Filtered)	ND		
NH_3-N (Unfiltered)	1.5		
T. Kjeldahl-N (Unfiltered)	2.3		
O-PO_4-P (Filtered)	0.24		
Total Phos.-P (Unfiltered)	1.00		
Total Solids	2,685		
Total Non Vol. Solids	2,235		
Total Suspended Solids	40		
Total Sus. Non Vol. Solids	11		
Chlorides	920		

RAYMOND LAGOON

The Raymond lagoon serves the population of Raymond that is north of the Willapa River. The lagoon effluent was composited for seven hours on August 20. The field and lab data show that the lagoon provides good treatment of coliform and pretty good treatment of solids with a BOD of 23 ppm and a T.S.S. of 71 ppm in the effluent. As the T.S.N.V.S. is only 2 ppm, this indicates that most of the T.S.S. was only algae which agreed with the visual inspection. Chlorine residual remained above 1 ppm throughout the day and no settleable solids escaped out the effluent. The flow was .15 MGD and as the conductivity, chlorides, and high total solids show, there is a high influx of salt water into the sanitary system. Normal sea water is about 19,000 ppm chlorides.

Log Number:	74-3449
pH	9.1
Turbidity (JTU)	18
Conductivity (umhos/cm) @ 25° C	6,400
COD	129
BOD (5 day)	23
Total Coliform (Col./100 ml)	Est. 400
Fecal Coliform (Col./100 ml)	<10
NO_3-N (Filtered)	0.13
NO_2-N (Filtered)	ND
NH_3-N (Unfiltered)	1.5
T. Kjeldahl-N (Unfiltered)	3.5
O-PO_4-P (Filtered)	2.31
Total Phos.-P (Unfiltered)	7.40
Total Solids	3,708
Total Non Vol. Solids	2,765
Total Suspended Solids	71
Total Sus. Non Vol. Solids	2
Chlorides	1,180

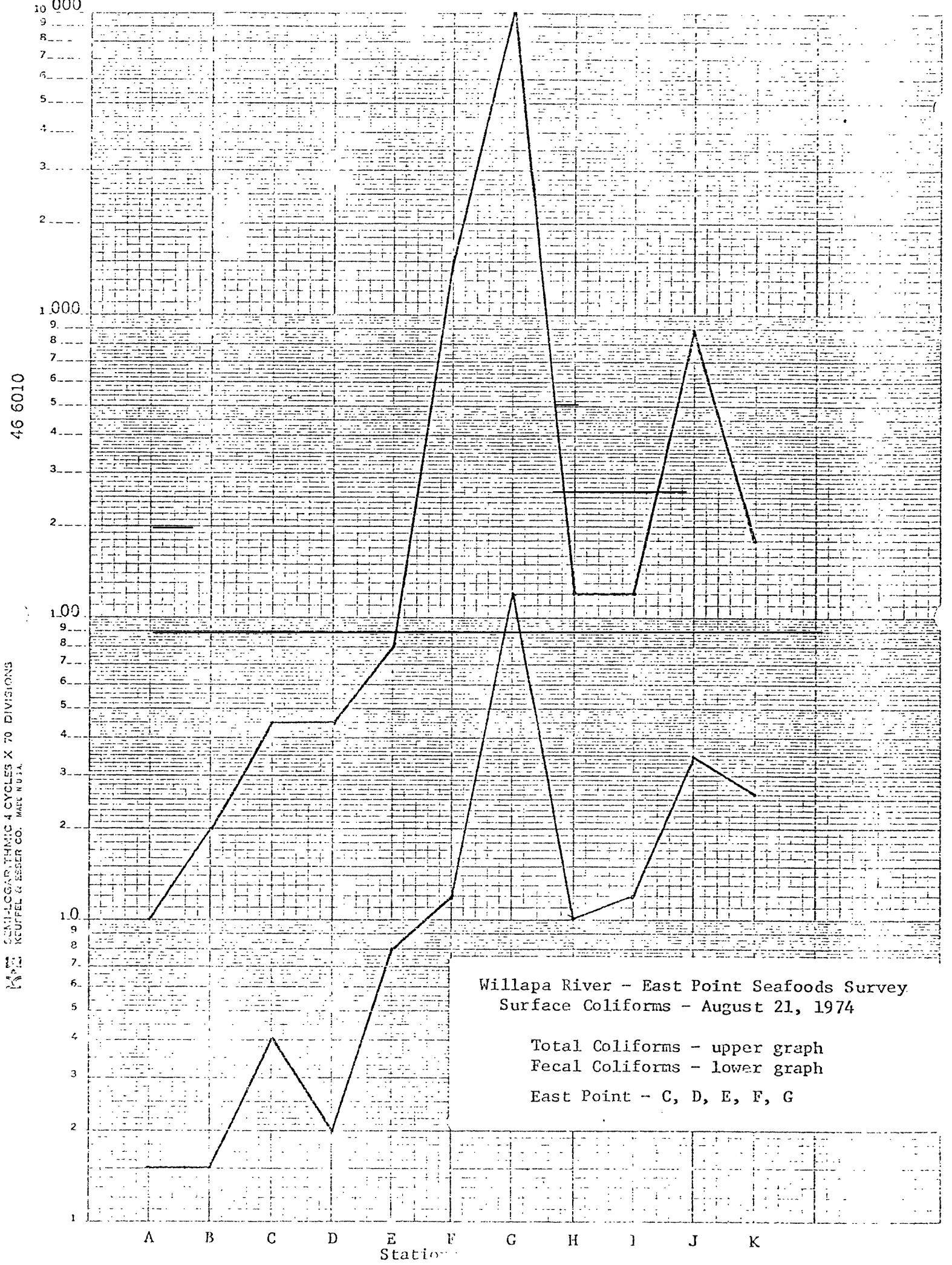
RAYMOND PRIMARY PLANT

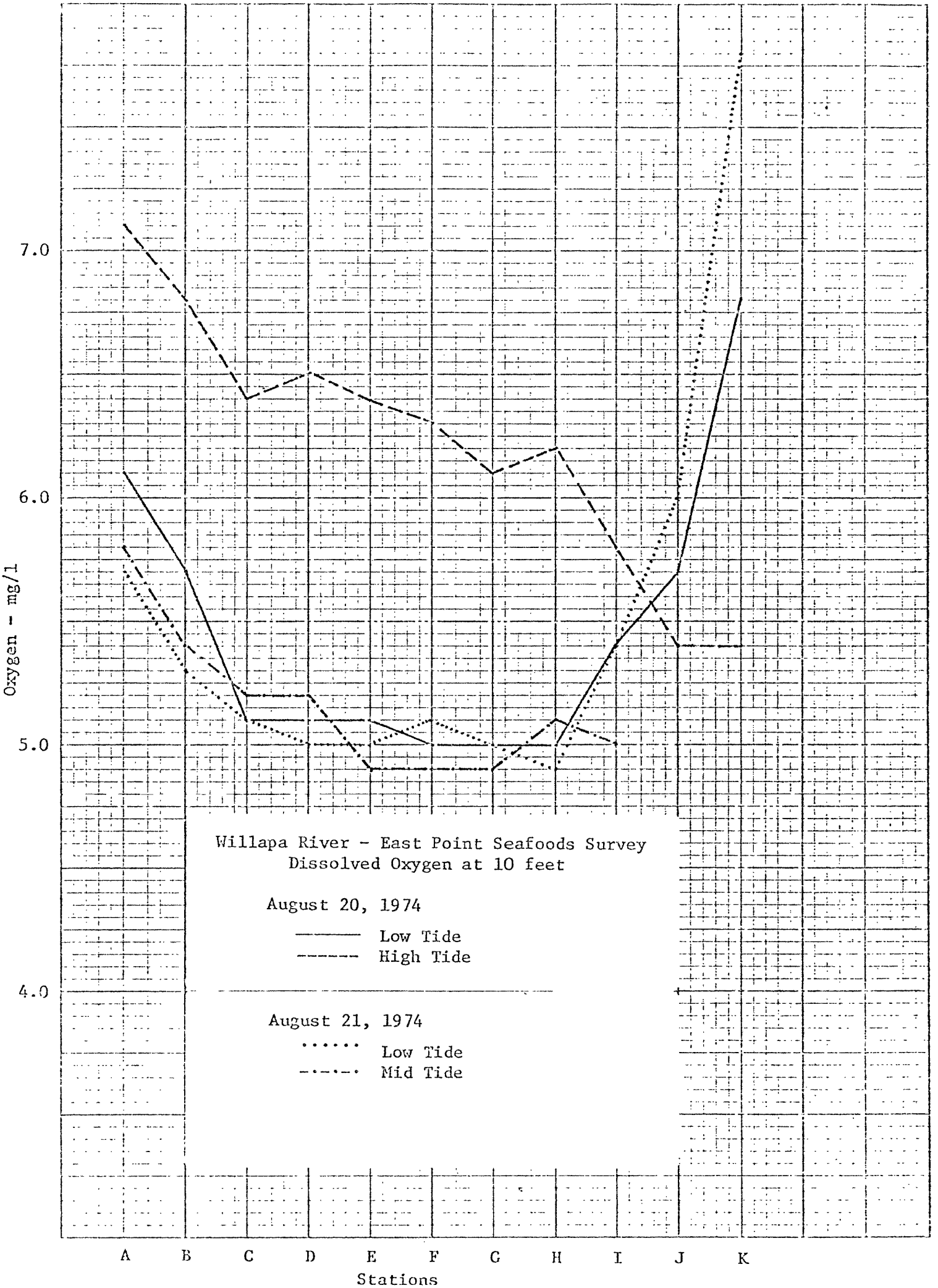
The Raymond primary plant serves the population of Raymond south of the Willapa River. The plant was not sampled by Investigations personnel so no field data, or an influent sample, were taken. Flow was .5 MGD. The high conductivity, chlorides, and total solids to total suspended solids ratio indicates almost a 10% inflow of salt water to the sanitary sewer.

Log Number:	74-3409	74-3410	74-3411
Station:	Effluent	1335 (Calkins)	(Meinz)
pH	7.1		
Turbidity (JTU)	56		
Conductivity (umhos/cm) @ 25° C	8,000		
COD	198		
BOD (5 day)	90		
Total Coliform (Col./100 ml)	-	940	2,200
Fecal Coliform (Col./100 ml)	-	Est. 30	Est. 20
Total Solids	4,195		
Total Non Vol. Solids	3,449		
Total Suspended Solids	124		
Total Sus. Non Vol. Solids	40		
Chlorides	1,450		

EAST POINT SEAFOODS

East Point Seafoods is located in South Bend and was processing shrimp during the survey periods of August 20th and 21st. On both days the influent and effluent to the screening process were sampled. The first day we sampled for eight hours and the second day for only four hours due to the problems with the boat. The screening process is a pretty sloppy operation with solids escaping into the effluent due to poor design of the transport belt part of the operation. Also there were a number of floor drains not connected to their sewer which were draining periodically into the river. None of these were sampled. Field data showed that the effluent was pretty consistent with time with the pH running right around 8.2 and temperature at 15°C. The actual point of the final discharge changed with the tide as the pressure from the incoming tide would force the effluent flow through breaks in the line progressively closer to shore as high tide approached. All through the survey, schools of anchovies hung around the effluent line, probably feeding on the shrimp waste. The lab data shows a 21% reduction of suspended solids on the 20th and a 16% reduction on the 21st. An exact definition of the BOD reduction across the screen is impossible due to the fact that the lab reported "greater than" values both days on the influent. The lab results on East Point are reported on the data summary sheet. The ones that stand out are the high concentrations of BOD, total suspended solids, ammonia and the high coliform counts. The source of the fecal coliform in their effluent escapes me.


10 000
1 000
100
10
1
46 6010
SEMI-LOGARITHMIC 4 CYCLES X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.
A
B
C
D
E
F
G
H
I
J
K
Station
Willapa River - East Point Seafoods Survey
Surface Coliforms - August 21, 1974
Total Coliforms - upper graph
Fecal Coliforms - lower graph
East Point - C, D, E, F, G



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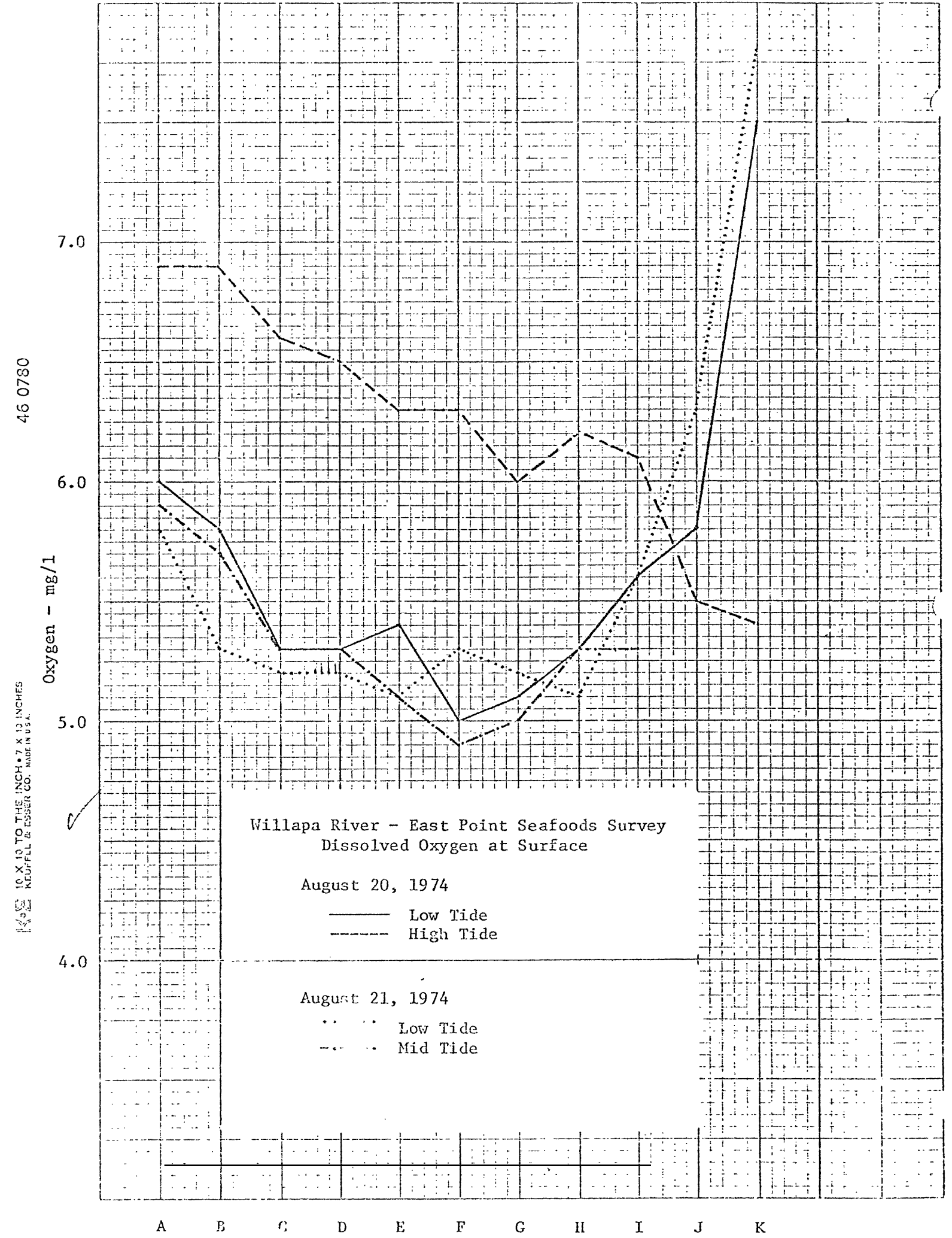
KEUFFEL & ESSER CO. MADE IN U.S.A.


7.0
6.0
5.0
4.0
Oxygen - mg/1
Willapa River - East Point Seafoods Survey
Dissolved Oxygen at Surface
August 20, 1974
Low Tide
High Tide
August 21, 1974
Low Tide
Mid Tide
A
B
C
D
E
F
G
H
I
J
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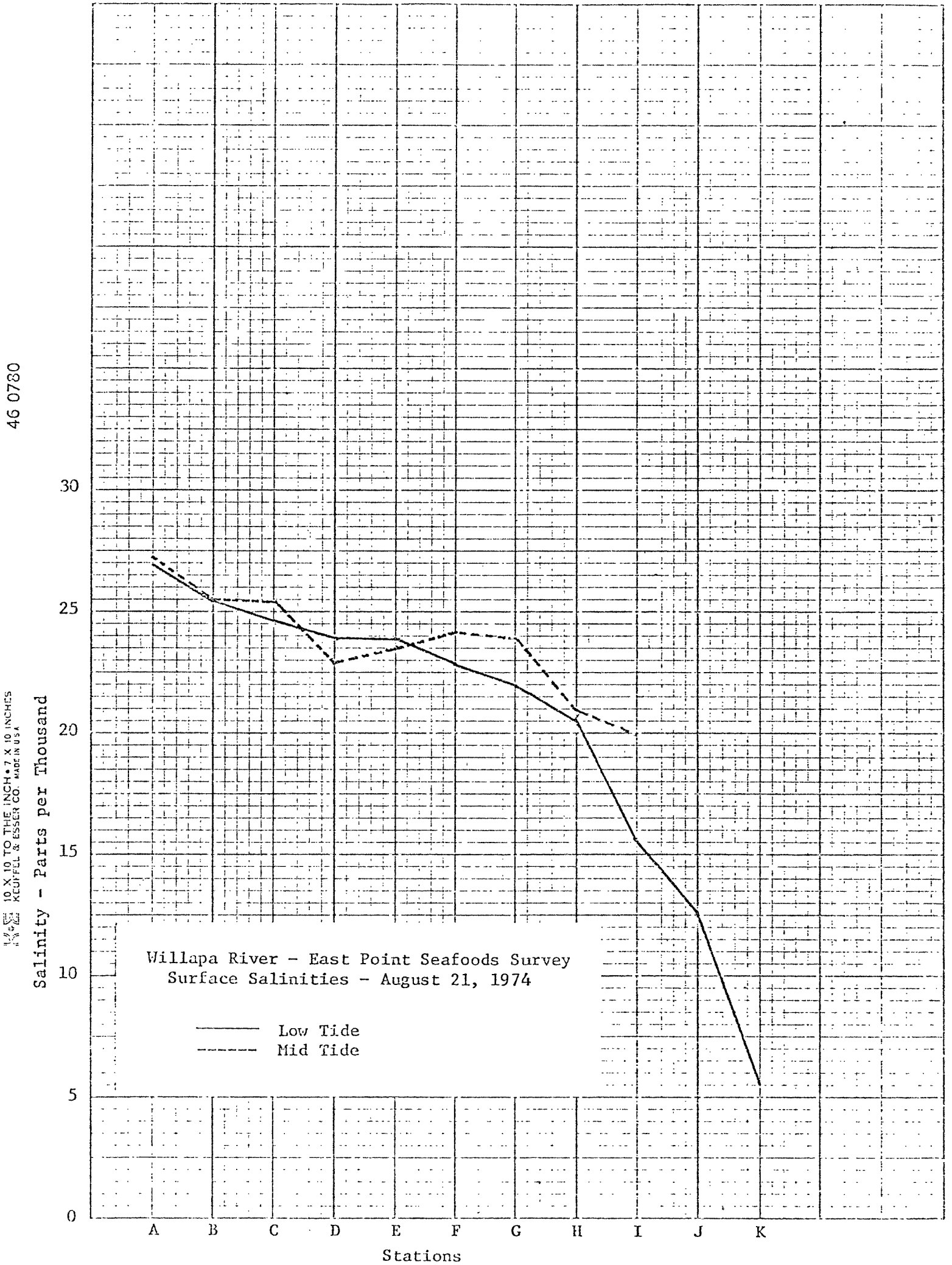
Willapa River - East Point Seafoods Survey
Surface Salinities - August 21, 1974
Low Tide
Mid Tide
Salinity - Parts per Thousand
0
5
10
15
20
25
30
A
B
C
D
E
F
G
H
I
J
K
Stations
46 0780
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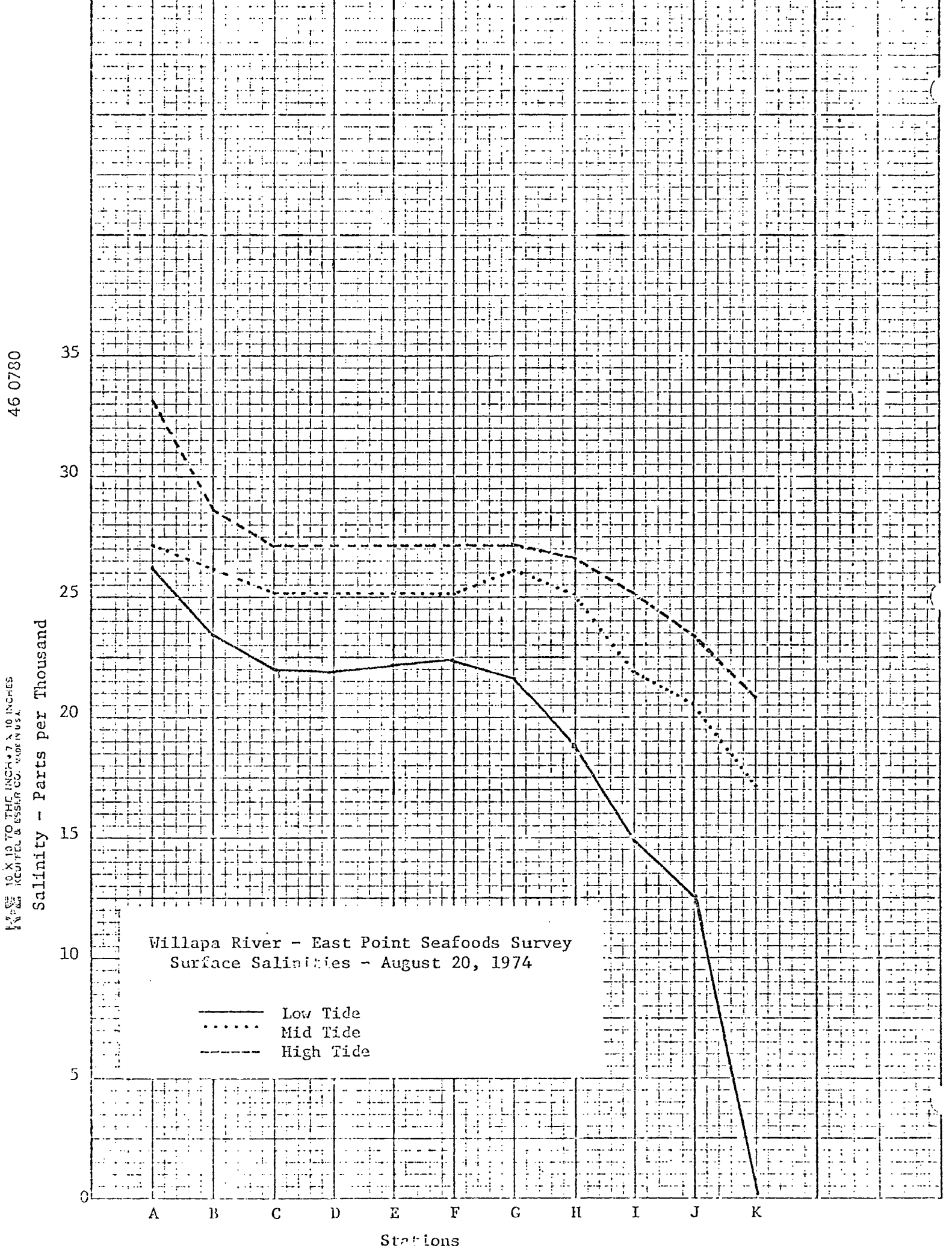
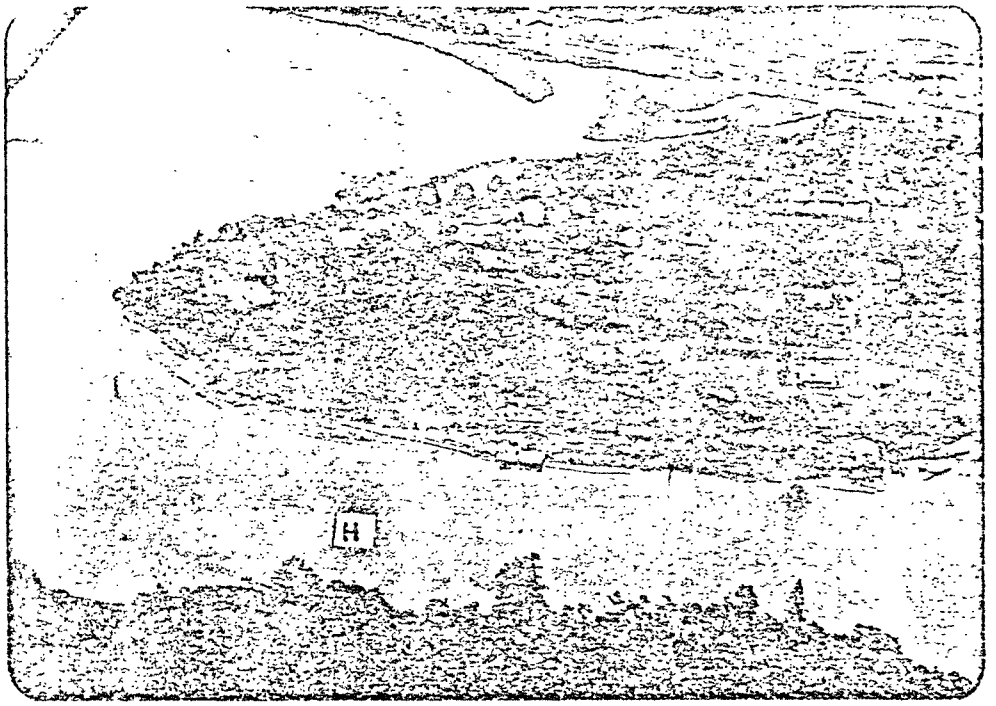
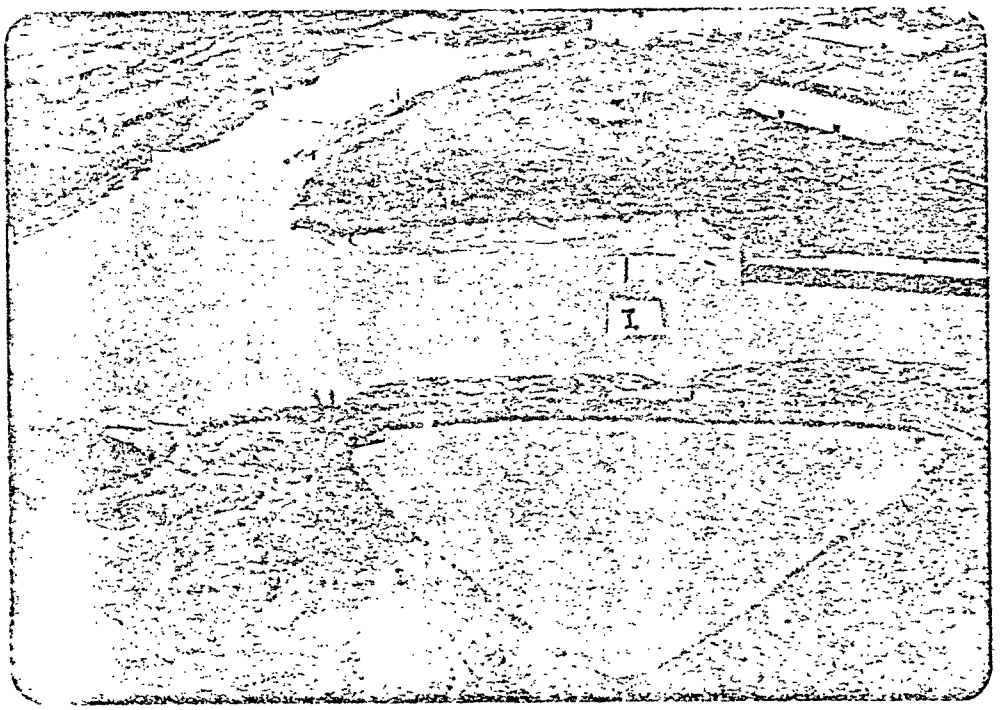

Willapa River - East Point Seafoods Survey
Surface Salinities - August 20, 1974
Low Tide
Mid Tide
High Tide
Salinity - Parts per Thousand
35
30
25
20
15
10
5
0
A
B
C
D
E
F
G
H
I
J
K
Stations
46 0780
10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

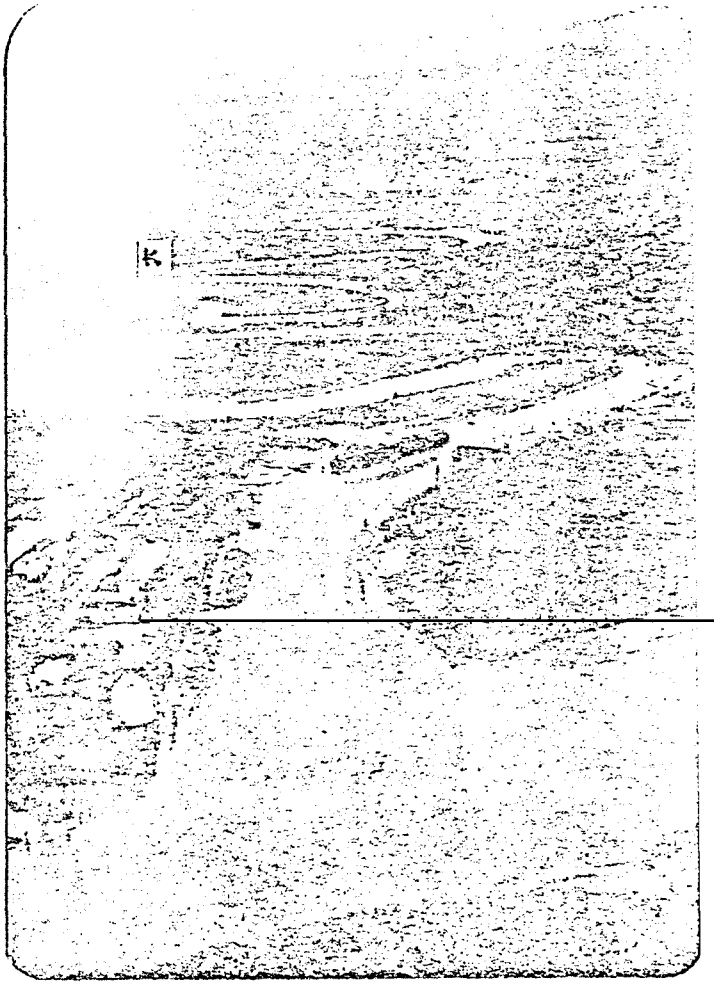

H


I

B
A

D
E
F
G

J


K

WILLAPA RIVER

Dissolved Oxygen

Surface

		A	B	C	D	E	F	G	H	I	J	K	
8/20	1st Set	6.0	5.8	5.3	5.3	5.4	5.0	5.1	5.3	5.6	5.8	7.5	Low Tide
	3rd Set	6.9	6.9	6.6	6.5	6.3	6.3	6.0	6.2	6.1	5.5	5.4	High Tide
8/21	1st Set	5.8	5.3	5.2	5.2	5.1	5.3	5.2	5.1	5.6	6.3	7.8	Low Tide
	2nd Set	5.9	5.7	5.3	5.3	5.1	4.9	5.0	5.3	5.3			Mid Tide

10 Feet

8/20	1st Set	6.1	5.7	5.1	5.1	5.1	5.0	5.0	5.0	5.4	5.7	6.8
	3rd Set	7.1	6.8	6.4	6.5	6.4	6.3	6.1	6.2	5.8	5.4	5.4
8/21	1st Set	5.7	5.3	5.1	5.0	5.0	5.1	5.0	4.9	5.4	6.0	7.8
	2nd Set	5.8	5.4	5.2	5.2	4.9	4.9	4.9	5.1	5.0		

Bottom

8/20	1st Set	6.1	5.6	5.2	5.1	5.0			4.9	5.2	5.6	
	3rd Set	7.1	6.9	6.4	6.4				6.1	5.8	5.4	
8/21	1st Set	6.1	5.4	5.0	5.0				4.9	5.3	6.0	
	2nd Set	6.0	5.4	5.2	5.2				4.9	4.9		

WILLAPA RIVER

Salinities

Surface

		A	B	C	D	E	F	G	H	I	J	K
8/20	1st Set	26.2	23.4	22.0	21.8	22.1	22.3	21.6	18.8	14.8	12.5	0.2
	2nd Set	27.2	26.2	25.2	25.2	25.2	25.2	26.2	25.2	21.8	20.5	17.2
	3rd Set	33.2	28.6	27.2	27.2	27.2	27.2	27.2	26.6	25.2	23.4	20.8

10 Feet

8/20	1st Set	26.2	23.4	22.8	22.6	21.8	22.0	22.8	20.5	15.6	13.2	8.8
	2nd Set	28.6	26.8	25.2	25.2	25.2	25.2	26.2	25.2	20.8	20.5	17.2
	3rd Set	31.6	29.4	28.6	28.2	28.2	28.2	27.2	26.6	25.2	24.2	22.0

Bottom

8/20	1st Set	26.2	24.2	22.5	22.6	22.8			21.8	17.2	13.2	
	2nd Set	28.6	26.8	25.2	24.2				25.2	23.4	20.5	
	3rd Set	32.0	29.2	28.6	28.2				27.2	25.2	24.2	

Surface

8/21	1st Set	26.8	25.4	24.6	23.8	23.8	22.8	22.0	20.5	15.7	12.6	5.6
	2nd Set	27.2	25.4	25.4	22.8	23.4	24.2	23.8	20.8	19.9		

10 Feet

8/21	1st Set	27.4	25.4	23.4	24.2	23.4	23.4	22.0	21.8	16.6	12.6	6.4
	2nd Set	27.2	26.2	25.4	24.6	22.8	25.2	24.2	23.2	22.0		

Bottom

8/21	1st Set	28.2	26.2	23.4	23.4				21.8	17.9	13.4	
	2nd Set	27.4	26.2	25.4	24.6				25.4	22.8		

WILLAPA RIVER

Temperatures °C

Surface

		A	B	C	D	E	F	G	H	I	J	K
8/20	1st Set	17.5	18.0	18.0	18.3	18.3	18.0	18.3	18.3	18.0	18.0	15.0
	2nd Set	17.5	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.5	18.0	18.0
	3rd Set	16.0	17.0	17.5	17.5	17.5	17.5	17.5	18.0	18.0	18.0	18.5
8/21	1st Set	17.0	17.5	17.5	17.5	17.5	18.0	18.0	17.5	17.5	17.5	15.0
	2nd Set	17.5	17.5	17.5	18.0	18.0	18.0	17.5	18.5	18.5		

10 Feet

8/20	1st Set	17.5	18.0	18.0	18.3	18.3	18.0	18.0	18.0	18.0	18.0	15.0
	2nd Set	17.0	17.5	18.0	18.0	18.0	18.0	18.0	18.0	18.5	18.0	18.0
	3rd Set	16.0	16.5	17.0	17.0	17.0	17.0	17.5	18.0	18.0	18.0	18.0
8/21	1st Set	17.0	17.5	18.0	18.0	18.0	18.0	18.0	18.0	17.5	17.5	15.0
	2nd Set	17.5	17.5	17.5	17.5	18.0	18.0	18.0	18.5	18.5	18.0	

Bottom

8/20	1st Set	17.5	18.0	18.0	18.3	18.0			18.0	18.0	18.0	
	2nd Set	17.0	17.5	18.0	18.0				18.0	18.0	18.0	
	3rd Set	15.5	16.0	17.0	17.0				17.5	18.0	18.0	
8/21	1st Set	17.0	17.5	18.0	18.0				18.0	18.0	17.5	
	2nd Set	17.0	17.5	17.5	17.5				17.5	18.0		

WILLAPA RIVER

pH

Surface

		A	B	C	D	E	F	G	H	I	J	K
8/20	1st Set	6.5	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4
	2nd Set	6.4	6.6	6.5	6.5	6.5	6.5	6.5	6.5	6.3	6.2	6.2
	3rd Set	6.8	6.7	6.7	6.6	6.6	6.7	6.6	6.6	6.5	6.5	6.4
8/21	1st Set	7.4	7.3	7.3	7.2	7.2	7.2	7.1	7.1	7.1	7.0	7.0
	2nd Set	7.2	7.1	7.1	7.1	7.1	7.1	7.1	7.0	7.0		

10 Feet

8/20	1st Set	6.6	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4
	2nd Set	6.4	6.6	6.5	6.5	6.5	6.5	6.5	6.5	6.3	6.3	6.2
	3rd Set	6.8	6.7	6.7	6.7	6.7	6.7	6.7	6.6	6.5	6.5	6.4
8/21	1st Set	7.4	7.3	7.3	7.3	7.2	7.2	7.2	7.1	7.1	7.0	7.1
	2nd Set	7.2	7.2	7.1	7.1	7.2	7.2	7.1	7.0	7.0		

Bottom

8/20	1st Set	6.6	6.4	6.4	6.4	6.4	6.4		6.4	6.4	6.4
	2nd Set	6.4	6.6	6.6	6.6				6.6	6.5	6.3
	3rd Set	6.8	6.8	6.7	6.7				6.7	6.6	6.5
8/21	1st Set	7.5	7.4	7.3	7.3				7.1	7.1	6.9
	2nd Set	7.3	7.2	7.2	7.1				7.1	7.0	

STATE OF WASHINGTON

DEPARTMENT OF ECOLOGY

WATER QUALITY LABORATORY

ORIGINAL TO: D. Glantz

COPIES TO:

LAB FILES

DATA SUMMARY

Source Weyerhaeuser @ Raymond (Page 1 of 2) Collected By D. Glantz

Date Collected 8/20 & 8/21/74 Goal, Pro./Obj.

Log Number: 74-	3458	59	60	61	62	63	64	65	3470	71	STORET
Station:	CLARIFIER INF. COMP.	CLARIFIER EFF. COMP.	COOLING	DEBARKER 0800-1600	0920 INF.	0915 EFF.	0945 FROG PONDS	DEBARKER EFF.	CLARIFIER INF.	CLARIFIER EFF.	
pH	8.2	6.9	7.3	6.8					6.6	6.6	00403
Turbidity (JTU)	55	32	6	90					182	75	00070
Conductivity (μmhos/cm)@25°C											00095
COD	480	360	330	1,110					1,000	300	00340
BOD (5 day)	66	87	2	>131					116	83	00310
Total Coliform (Col./100ml)					0.2×10^6	2×10^6	1,900	Est 1.6×10^5			31504
Fecal Coliform (Col./100ml)					1,200	Est 7,600	Est 13	480			31616
NO3-N (Filtered)											00620
NO2-N (Filtered)											00615
NH3-N (Unfiltered)											00610
T. Kjeldahl-N (Unfiltered)											00625
O-PO4-P (Filtered)											00671
Total Phos.-P (Unfiltered)											00665
Total Solids											00500
Total Non Vol. Solids											
Total Suspended Solids	370	190	32	958					878	183	00530
Total Sus. Non Vol. Solids	100	57	9	244					294	116	
Color	---	293	--	285						278	
PBI	54	204	5	312					267	270	

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 Stephen D. Robb Date 9/3/74

STATE OF WASHINGTON

DEPARTMENT OF ECOLOGY

WATER QUALITY LABORATORY

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DATA SUMMARY

Source Weyerhaeuser @ Raymond (Page 2 of 2)

Collected By

Date Collected

Goal, Pro./Obj.

Log Number:	3472	(1230) 73	(0910) 74	(0915) 75							STORET
Station:	BARKER COMP	INF. CLARIFIER COOLING	CLARIFIER EFF.	COMB. COOLING INF. TO CLARIFIER	AND BARKER						
pH	6.7										00403
Turbidity (JTU)	133										00070
Conductivity (umhos/cm)@25°C											00095
COD	870										00340
BOD (5 day)	101										00310
Total Coliform (Col./100ml)		Est 5,000	2.8 x 10^6	>8 x 10^5							31504
Fecal Coliform (Col./100ml)		<20	Est 1,300	2,400							31616
NO_3-N (Filtered)											00620
NO2-N (Filtered)											00615
NH3-N (Unfiltered)											00610
Kjeldahl-N (Unfiltered)											00625
O-PO4-P (Filtered)											00671
Total Phos.-P (Unfiltered)											00665
Total Solids											00500
Total Non Vol. Solids											
Total Suspended Solids	752										00530
Total Sus. Non Vol. Solids	262										
Color	251										
PBI	217										

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 Stephen D. Robb Date 9/3/74

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DATA SUMMARY

Source East Pt. Seafoods @ South Bend

Collected By Pat Lee

Date Collected 8/20 & 8/21/74

Goal, Pro./Obj.

Log Number: 74	3453	54	55	56	57	76	77	78	79	80	STORET
	8/20/74					8/21/74					
Station:	COMP. INF.	COMP. EFF.	EFFLUENT 0900	1230	1500	INF.	EFF.	1000	1400	1600	
pH	8.5	8.6				8.5	7.8				00403
Turbidity (JTU)	310	295				530	490				00070
Conductivity (umhos/cm)@25°C	670	670				640	630				00095
COD	3,500	3,500				4,460	3,960				00340
BOD (5 day)	>1650	>1700				>3200	3040		Est.		00310
Total Coliform (Col./100ml)	---	---	1×10^5	2.2×10^5	1.6×10^5	---	---	1.3×10^5	1.5×10^5	1.3×10^5	31504
Fecal Coliform (Col./100ml)	---	---	>40000	6000	21000	---	---	5400	2700	4100	31616
NO3-N (Filtered)							.34				00620
NO2-N (Filtered)							ND				00615
NH3-N (Unfiltered)							191				00610
T. Kjeldahl-N (Unfiltered)							184*				00625
O-PO4-P (Filtered)							8.10				00671
Total Phos.-P (Unfiltered)							18.60				00665
Total Solids	3433	2891				3447	4035				00500
Total Non Vol. Solids	417	331				428	347				
Total Suspended Solids	1720	1370				1910	1620				00530
Total Sus. Non Vol. Solids	140	90				210	80				
Color (Color unit)	1060	1780				1500	2240				
Chlorides	53	128				50	57				

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
*D.F. = 500 so error is increased

Summary By Stephen D. Robb Date 9/30/74

State of Washington Department of Ecology

DEPARTMENT OF ECOLOGY

WATER QUALITY LABORATORY

DATA SUMMARY

ORIGINAL TO:

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Source Willapa R. - Eastpoint Seafoods Survey

Collected By Allen Moore

Date Collected 8/20/74

Goal, Pro./Obj.

Log No.	Sta.	Depth	PBI	T.S.S.		Log No.	Sta.	Depth	PBI	T.Colif	F.Colif (col/100 ml)		
7434-12	A	0	ND			7434-30	H	25	ND				
434-66	A	10	18			31	I	0	ND				
13	A	25	ND			32	I	10	ND				
14	B	0	ND	40		33	I	25	5				
15	B	10	ND			69	J	0	5				
16	B	25	ND			34	J	10	ND				
17	C	0	ND	39		35	J	15	5				
18	C	10	ND			36	K	0	5				
19	C	15	ND			37	K	10	5				
67	D	0	5			38	Coliforms-all surface A			Est. 10	<2		
20	D	10	ND			39	B			Est. 20	<2		
21	D	15	ND			40	C			Est. 45	Est. 4		
22	E	0	ND	259		41	D			Est. 45	Est. 2		
23	E	10	ND			42	E			Est. 80	Est. 8		
68	E	15	ND			43	F			Est. 1,500	Est. 12		
24	F	0	ND			44	G			10,000	120		
25	F	8	5			45	H			120	Est. 10		
26	G	0	ND			46	I			120	Est. 12		
27	G	10	ND			47	J			880	Est. 34		
28	H	0	ND			48	K			180	Est. 26		
29	H	10	ND										

Note: All results are in PPM unless otherwise specified. ND is "None Detected"

Summary by Stephen D. Robb Date 8/28/74