

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
DANIEL J. EVANS
GOVERNOR
JOHN A.
DIREC

Publication No. 71-e27

MEMORANDUM

MEMO TO: DAN NEAL

FROM: RON PINE

SUBJECT: Yakima River Study Near the Utah and Idaho Sugar Company
Toppenish, Washington

DATE: November 16, 1971

A water quality study of the Yakima River was made on the above date in the immediate vicinity of the U and I Sugar Company discharge at Toppenish. The study objective was to determine the effects of the discharge on the water quality of the Yakima River. The effluent loading study at the subject industry was conducted during the same period (Ref. Memo to Dan Neal, DTD, November 15, 1971).

Results of the sample analysis are presented in Table 1. The station descriptions and locations are given in Table 2 and shown in Figure 1, respectively.

The data indicates that the waste discharged by the subject industry has a detrimental effect upon the water quality of the Yakima River downstream as far as the Toppenish-Zilla Bridge (Station 7). At Station 3, and to a lesser degree at Stations 4, 6, and 7, nearly all of the nitrogen is in the unoxidized form and is organic. The discharge raises the temperature of the river from 8.0 C to 20.5 C and reduces the dissolved oxygen from 114% to 96% of saturation; however, recovery occurs 200 yards downstream in the plume of the discharge (Station 4). Biochemical Oxygen Demand values are not high but there is a significant increase at Station 3 in the immediate vicinity of the discharge.

The high ammonia values are what concern me the most. At pH values of between 7.5 and 8.5 (well within the range noted during the present study) 1.0 mg/l of ammonia is toxic to salmon and trout. The higher the pH the greater the toxicity. The physiological effect of ammonia on fish is that it decreases the ability of hemoglobin to combine with oxygen, thus the fish suffocate. The concentrations of ammonia being discharged by the subject industry is in violation of the Toxic, Radioactive or Deleterious Materials Concentration clause of the State water quality standards, and cannot be tolerated. There would be no opportunity for avoidance by a fish caught in concentrations such as those found at Station 3. Any fish unfortunate enough to wander into the plume would immediately suffocate.

Heavy Sphaerolitus growths were noted along the west shore as far downstream as Station 4. The amount of Sphaerolitus and the length of the filaments indicates that the discharge is high in carbohydrates (sugars).

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Memo to Dan Neal

As you are aware the condenser water discharge line passes through a large lagoon before it reaches the river. It would seem appropriate for the industry to use the lagoon in treating the condenser water. They could be divided into two or three cells, reconditioned, and in this way provide at least minimum treatment. It may also be necessary to require aeration in the primary cells in order to oxidize all of the ammonia. There may also be something they can do within the plant to cut down on the ammonia loss.

RP:mh
66/11

cc: John R. Raymond
Tom Haggarty
Dick Cunningham

Table 1. Analysis of samples collected November 16, 1971, from the Yakima River in the vicinity of the Utah and Idaho Sugar Company Discharge near Toppenish, Washington. Values are expressed in mg/l unless otherwise noted.

PARAMETERS	STATION NUMBER									
	1	2	2E	3	3E	4	4E	5	6	7
Temp. C	8.0	7.5	8.0	20.5	9.0	8.7	8.2	8.5	8.5	8.5
D.O.	12.8	13.1	13.1	8.4	12.8	12.7	13.1	13.0	12.8	12.8
% Sat.	112	113	114	96	114	112	116	115	113	113
pH	8.5	8.5	8.5	8.6	8.5	8.6	8.6	8.7	8.6	8.6
Cond. μ mhos/cm	270	270	270	360	270	280	270	280	280	300
Total Coliform Colonies/100 ml.	400	700	500	250	400	350	600		700	500
Fecal Coliform Colonies/100 ml.	29	27	37	<20	36	35	23		32	20
BOD ₅	2.0	2.0	2.0	6.0	2.0	2.0	nil		nil	2.0
COD	8.0	8.0	8.0	19.0	14.0	8.0	8.0		11.0	11.0
NO ₃ -N (Filt.)	0.13	0.16	0.16	0.14	0.18	0.18	0.18		0.21	0.20
NO ₂ -N (Filt.)	0.01	0.01	0.01	0.03	0.01	0.01	0.01		0.01	0.01
NH ₃ -N	0.02	0.04	0.04	10.8	0.04	0.40	0.02		0.20	0.10
Kjeldahl-N	0.16	0.10	0.10	0.56	0.16	0.04	0.04		0.03	0.10
T-PO ₄	0.04	0.04	0.03	0.04	0.05	0.04	0.04		0.03	0.01
T.S.	110	119	101	113	99	105	109		86	122
T.N.V.S.	67	90	54	88	62	74	65		59	77
T.S.S.	8	10	7	6	6	7	6		6	8
T.S.N.V.S.	1	1	0	3	0	5	0		4	6
S.V.S.	7	9	7	3	6	2	6		2	2

Table 2. Station descriptions for samples collected from the Yakima River on November 16, 1971, in the vicinity of U and I Sugar Company, Toppenish, Washington

STATION	DESCRIPTION
1	200 yards downstream from the Toppenish-Buena Bridge (State Route 22)
2	Near west bank of river at second bend 1/4 mile below Toppenish-Buena Bridge.
2E	Same location as Station 2 except near east bank of river.
3	50 feet below U & I Sugar Co. Discharge near west bank of river.
3E	Same location as Station 3 except near east bank of river.
4	Near west bank of river 200 yards below U & I Sugar Co. Discharge.
4E	Same location as Station 4 except near east bank of river.
5	1/4 mile below U & I Sugar Co. Discharge in main channel.
6	1/3 mile below U & I Sugar Co. Discharge in main channel.
7	1/4 mile upstream from the Toppenish-Zilla Bridge

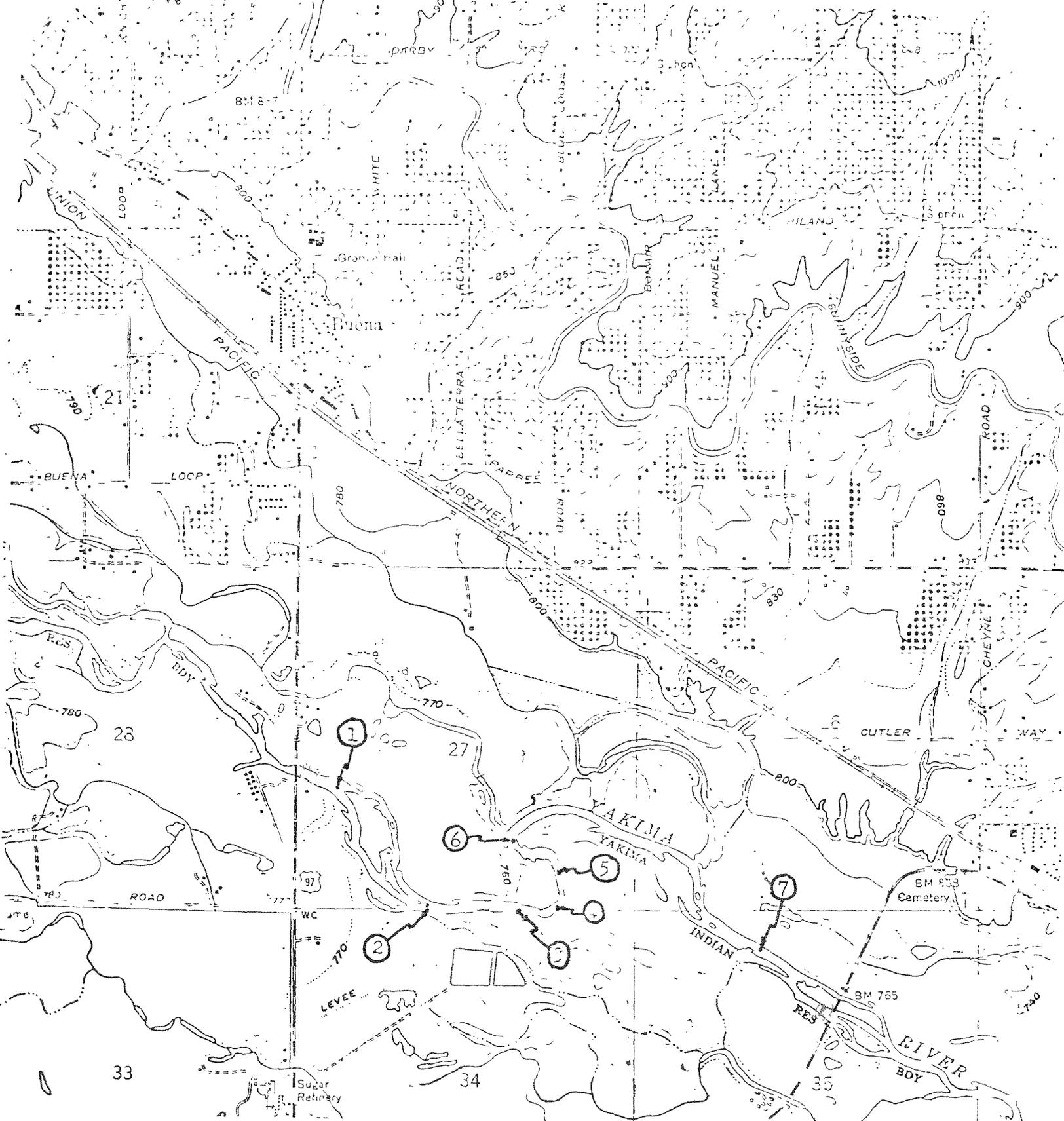


Figure 1. Station locations Yakima River in the vicinity of U & I Sugar Co. discharge November 16, 1971.

STATE OF WASHINGTON

Routing

DEPARTMENT OF ECOLOGY

OFFICE OF TECHNICAL SERVICES

Original to JAMES

Copies to:

ANALYTICAL REPORT SHEET

Ken Pine

NO: _____

Merley McCall

The following are the analytical results from survey conducted at:

The Yakima River

03-02.21

Collected 11/15/71

LAB. NO.	STATION NO.	colouies		ppm		pH	J.T.U.		specific cond. d.w.
		Total Col'f m	Fecal Coliform	BOD	CEO		Turbidity	units/cm	
71-3694	1	400.	29.	2.	8.	7.7	2.		
95	2	700.	27.	2.	8.	7.9	2.		
96	2A	500.	37.	2.	8.	8.9	2.		
97	3	250.	420.	6.	19.	9.2	2.	209.	
98	3A	400.	36.	2.	14.	8.3	3.		
99	4	350.	35.	2.	8.	8.3	2.		
00	4A	600.	23.	1/2 nil	8.	8.3	2.		
01	6	700.	32.	1/2 nil	11.	8.3	3.		
02	7	500.	20.	2.	11.	8.3	2.		
		ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
		NO ₃ -N Filtered	NO ₂ -N Filtered	NH ₃ -N	Organic Kjeldahl-N	T-PO ₄ -P	T.S.	TDS	TSS
71-3694		.13	.01	.02	.16	.04	110.	67.	8.
2 95		.16	.01	.04	.10	.04	119.	90.	10.
2A 96		.16	.01	.04	.16	.03	101.	54.	7.
3 97		.14	.03	10.8	.56	.04	113.	88.	6.
3A 98		.18	.01	.04	.16	.05	99.	62.	1.
- 99		.18	.01	.40	.04	.04	105.	74.	7.
4A 00		.18	.01	.02	.04	.04	109.	65.	6.
6 01		.21	.01	.20	.10	.03	86.	59.	6.
0A		.20	.01	.10	.10	.01	122.	77.	8.

Notes: BODs of less than 2 ppm depletion are considered unreliable and should be reported as nil.

Summarized by Palmer
Date 11/19/71