

November 21, 1973

WA-37-1040

Memo to: John Hodgson and John Arnquist

From: Pat Lee

Subject: Yakima STP Efficiency Study.

State of
Washington
Department
of Ecology



An efficiency study was conducted at the Yakima STP on October 17, 1973. The domestic plant was sampled at four places through the system. These were:

- 1) Influent after grit chamber and comminutor.
- 2) After primary clarifier.
- 3) After trickling filter.
- 4) After secondary clarifier.

Sewage was composited at these four points every half hour proportionate to flow. Grab samples were also collected at three other points. These were:

- 1) Industrial influent.
- 2) Effluent from industrial runoff pond.
- 3) Drain emptying into the Yakima River immediately upstream of the domestic STP effluent.

The results of the laboratory tests are summarized on the efficiency study forms enclosed with this report.

The plant itself was not operating at peak efficiency due to the shutdown of one of the trickling filters. Two of the primary clarifiers were also shutdown due to lack of sufficient flow. The plant grounds were relatively neat and clean except for the abundance of "filter flies".

The results of the study show that the Yakima STP is still operating very efficiently with BOD reduction of 94% and suspended solids reduction of 92%. Disinfection was also very good. The efficiency of the industrial system was pretty good with both BOD reduction and total and suspended solids reduction of greater than 90%. The single coliform sample taken showed high total and fecal counts. The drain right next to the STP effluent showed a total coliform count of greater than 80,000 colonies and a fecal count of 360 colonies/100 ml. From the same drain, total phosphate was 19.5 ppm.

PL:jmh

STP SURVEY REPORT FORM

(EFFICIENCY STUDY)

City Yakima Plant Type Secondary Population 47,000 Design 71,000
 Served Capacity
 Receiving Water Yakima River Engineer John Hodgson
 Date October 17, 1973 Survey Period 0930 to 1730 hrs. Survey Personnel Pat Lee
 Comp. Sampling Frequency 1/2 hour Weather Conditions Sunny
 (last 48 hours)
 Sampling Alequot 1 liter/10 MGD

PLANT OPERATION

Total Flow 3,070,000 in 8 hours. How Measured Totalizer
 Max. (Flow) 11.5 MGD Time of Max. 1030 Min. 7.5 MGD Time of Min. 0930
 Pre Cl₂ 0 #/day Post Cl₂ 600 #/day

FIELD RESULTS

	Influent				Final Effluent			
	Max.	Min.	Mean	Median	Max.	Min.	Mean	Median
9 Determinations								
Temp. °C	20.5	19.0	20.2	20.0	20.0	18.0	19.1	19.5
pH	7.4	6.7	--	6.8	7.1	6.9	--	7.0
Conductivity (umhos/cm)	680	480	530	520	490	400	450	450
Settleable Solids	20	8	14	14	0.1	0.1	0.1	0.1

LABORATORY RESULTS ON COMPOSITE IN PPM

Laboratory Number	Influent	Effluent	% Reduction
	73-3827	73-3830	
5-Day BOD	230	15 X	94%
COD	500	90	82%
T.S.	592	301	49%
T.N.V.S.	243	190	22%
T.S.S.	288	24 X	92%
N.V.S.S.	18	<1	99%
pH	6.9	7.3	
Conductivity	600	510	
Turbidity	80	15	81%

BACTERIOLOGICAL RESULTS

Na₂S₂O₃ added to sample Before Sampling after min.

LAB #	SAMPLING TIME	COLONIES/100 MLS (MF)		Cl Residual	
		Total	Fecal	ppm	(after secs.)
73-3833	1000	<400	<200	2.0	180 secs.
3834	1100	<400	<200	"	"
3835	1200	<400	<200	"	"
3836	1400	<400	<200	"	"
3837	1600	<400	<200	"	"
3838	1700	<400	<200	"	"

Operator's Name Al Miller Phone # CH 8-2620

Comments: Nutrient concentrations in effluent NO₃ = .02 ppm O-PO₄ = 5.7 ppm
 NO₂ = .03 ppm T-PO₄ = 18.5 ppm
 NH₃ = 8.6 ppm
 Total Kjeldahl - N = 9.8 ppm

LABORATORY RESULTS ON COMPOSITE IN PPM

After primary clar. After trickling filt.

Laboratory Number	Influent	Effluent	% Reduction
5-Day BOD	170	35	
COD	270	150	
T.S.	409	364	
T.N.V.S.	203	205	
T.S.S.	83	89	
N.V.S.S.	<1	<1	
pH	6.8	7.2	
Conductivity	560	550	
Turbidity	40	30	

STP SURVEY REPORT FORM

(EFFICIENCY STUDY)

City Yakima Plant Type Disposal Population Served Industria¹ Wastes Design Capacity 2.0 MGD

Receiving Water Field-then Yakima River Engineer John Hodgson

Date October 17, 1973 Survey Period Grab Survey Personnel Pat Lee

Comp. Sampling Frequency Grab Weather Conditions Sunny
(last 48 hours)

Sampling Alequot _____

PLANT OPERATION

Total Flow 1.5 - 2.0 MGD How Measured _____

Max. (Flow) _____ Time of Max. _____ Min. _____ Time of Min. _____

Pre Cl₂ 0 #/day Post Cl₂ 0 #/day

FIELD RESULTS

Determinations	Influent				Effluent			
	Max.	Min.	Mean	Median	Max.	Min.	Mean	Median
Temp. °C								
pH								
Conductivity (umhos/cm)								
Settleable Solids								

LABORATORY RESULTS ON COMPOSITE IN PPM

Laboratory Number	Influent	Effluent	% Reduction
	73-3845	73-3831	
5-Day BOD	>600	<80 ✓	---
COD	3940	110	97%
T.S.	3288	359	90%
T.N.V.S.	289	233	20%
T.S.S.	512	36 ✓	93%
N.V.S.S.	28	28	0
pH	6.1	6.7	
Conductivity	490	500	
Turbidity	60	40	67%

BACTERIOLOGICAL RESULTS

Na₂S₂O₃ added to sample _____ after _____ min.

LAB #	SAMPLING TIME	COLONIES/100 MLS (MF)		Cl Residual	
				ppm	(after secs.)
		Total	Fecal		
73-3831	1200	>40,000	900		

Operator's Name Al Miller Phone # CH 8-2620

Comments: Additional Tests NO₃-N = .05 ppm T-PO₄ = 1.7 ppm

NO₂-N = .01 ppm O-PO₄ = .05 ppm

Total Oils = 2.0 ppm NH₃-N = .2 ppm 1.75

T-Kjedahl-N= 1.8 ppm

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

WATER QUALITY LABORATORY

DATA SUMMARY

ORIGINAL TO: P. Lee
COPIES TO:
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LAB FILES:

Source YAKIMA STP (page 10E2)

Collected By PML

Date Collected 10-17-73

Goal, Pro./Obj. _____

Log Number:	73-3827	28	29	30	31	32	32	34	35	36	STORET
Station:	INF	PRIM. AFTER CLAR.	AFTER TRICK. FILTER	FINAL EFF.	INDUS EFF. (POND)	DRAIN NEXT TO EFF.	1000	1100	1200	1400	
pH	6.9	6.8	7.2	7.3	6.7						00403
Turbidity (JTU)	80.	40	30.	17.	40.						00070
Conductivity (umhos/cm)@25°C	600	560	550	570	500						00095
COD	500	270	150	91	110						00340
BOD (5 day)	230	170	34	<50	<80						00310
Total Coliform (Col./100ml)					>4x10 ⁴	>8x10 ⁴	<400	<400	<400	<400	31504
* Fecal Coliform (Col./100ml)					900	360	<200	<200	<200	<200	31616
NO3-N (Filtered)				.02	.05	.01					00620
NO2-N (Filtered)				.03	.01	ND					00615
NH3-N (Unfiltered)				8.6	.20						00610
T. Kjeldahl-N (Unfiltered)				9.8	1.8						00625
O-PO4-P (Filtered)				5.65	.05	4.9					00671
Total Phos.-P (Unfiltered)				18.5	1.7	19.5					00665
Total Solids	592	409	364	301	359						00500
Total Non Vol. Solids	243	203	205	190	233						
Total Suspended Solids	288	83	89	24	36						00530
Total Sus. Non Vol. Solids	18	<1	<1	<1	28						
Color	330	300	170	150	110						
TOTAL OILS					2.						
Chlorides	33.	25.	28.	28.							

Note: All results are in PPM unless otherwise specified. ND is "None Detected"
Convert those marked with a * to PPB (PPM X 10³) prior to entry into STORET

* TURBID SAMPLES

Summary By Stephen P. Roll Date 11-14-73

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

WATER QUALITY LABORATORY

ORIGINAL TO:
COPIES TO:
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LAB FILES

DATA SUMMARY

Source YAKIMA STP (PAGE 2002)

Collected By _____

Date Collected _____

Industrial

Goal, Pro./Obj. _____

Log Number:	27	28	38-3845								STORET
Station:	1600	1700	GRAV INDUS REF #1200								
pH			6.1								00403
Turbidity (JTU)			60								00070
Conductivity (umhos/cm)@25C			490								00095
COD			3940								00340
BOD (5 day)			>600								00310
Total Coliform (Col./100ml)	<400	<400									31504
Fecal Coliform (Col./100ml)	<200	<200									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			3298								00500
Total Non Vol. Solids			289								
Total Suspended Solids			512								00530
Total Sus. Non Vol. Solids			28								
COLOR			740								

Note: All results are in PPM unless otherwise specified. ND is "None Detected"
Convert those marked with a * to PPB (PPM X 10³) prior to entry into STORET

Summary By Stephen D. Roll Date 11-14-73