

January 21, 1974

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WA-28-2030

Memo to: Gerry Calkins, Howard Steeley

From: Pat Lee

Subject: Efficiency Study at the Washougal Lagoon



An efficiency study was conducted on the Washougal Lagoon system on November 13, 1973. Samples were composited on the half hour proportionate to flow at the influent and effluent. Results of the survey show excellent disinfection, with fecal coliform counts all less than 200 colonies/100 ml. The BOD of the effluent was good at 25 ppm while the suspended solids in the effluent exceeded the new EPA Standards. The plant personnel showed much interest in their job and in the new EPA requirements. The plant grounds were in good shape except that the protective fence was down in places (due to hunters) and the banks of the lagoons were eroding due to wind action and muskrats. The BOD loading of the lagoons could not have been helped by the number of duck bodies at the west end of lagoons 1 and 2. The system seems to support quite a zoo with carp, turtles, muskrats, ducks and gulls all calling the lagoons home.

PL:jmh

(EFFICIENCY STUDY)

City Washougal Plant Type Lagoon Population 3,500 Design 10,000  
Served Capacity  
Receiving Water Gibbon's Creek, Columbia River Engineer Howard Steeley  
Date 11-13-73 Survey Period 0830-1530 hours Survey Personnel Pat Lee  
Comp. Sampling Frequency half hour Weather Conditions Sunny  
(last 48 hours)  
Sampling Alequot (MGD) (2000) = sampling alequot in mls.

PLANT OPERATION

Total Flow 124,000 gallons in 7 hours How Measured Totalizer  
Max. (Flow) .50 MGD Time of Max. 0930 - 1100 Min. .40 MGD Time of Min. 1200  
Pre Cl<sub>2</sub> 0 #/day Post Cl<sub>2</sub> 10 #/day

FIELD RESULTS

Influent

Effluent

7 Determinations

	Max.	Min.	Mean	Median	Max.	Min.	Mean	Median
Temp. °C	15.1	14.8	---	15.0	8.8	8.4	---	8.7
pH	7.5	7.2	---	7.4	6.9	6.8	---	6.8
Conductivity (umhos/cm)	---	---	---	---	---	---	---	---
Settleable Solids	12.0	8.0	9.8	9.5	nil	nil	nil	nil

LABORATORY RESULTS ON COMPOSITE IN PPM

Laboratory Number	Influent	Effluent	% Reduction
	73-4186	73-4187	
5-Day BOD	190	25	87%
COD	240	70	71%
T.S.	431	266	38%
T.N.V.S.	194	173	11%
T.S.S.	217	59	73%
N.V.S.S.	57	23	60%
pH	7.7	7.6	
Conductivity	480	400	
Turbidity	55	15	

Washougal

BACTERIOLOGICAL RESULTS

Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub> added to sample before sampling after \_\_\_\_\_ min.

LAB #	SAMPLING TIME	COLONIES/100 MLS (MF)		Cl Residual	
		Total	Fecal	ppm	(after secs.)
73-4188	0830	5000	< 200	< .05	180
4189	0930	5000	< 200	↓	↓
4190	1030	7500	< 200		
4191	1130	5500	< 200		
4192	1230	4500	< 200		
4193	1330	4900	< 200		

Operator's Name Elmer Jueds Phone # 835-5556

Comments: NO<sub>3</sub>-N = 6.5 ppm  
NO<sub>2</sub>-N = .01 ppm  
NH<sub>3</sub>-N = 9.4 ppm  
T-Kjeldahl-N = 15.0 ppm  
O-PO<sub>4</sub>-P = 4.25 ppm  
T-PO<sub>4</sub>-P = 9.2 ppm

U.S. DEPARTMENT OF THE INTERIOR  
 FEDERAL WATER POLLUTION CONTROL ADMINISTRATION  
 SEWAGE TREATMENT PLANT OPERATION AND MAINTENANCE  
 PRACTICES QUESTIONNAIRE

FORM APPROVED  
 BUDGET BUREAU NO. 45-01527

CHECK ONE:  1ST AUDIT  RE-AUDIT      DATE OF AUDIT: **11/13/73**      PLANT DESCRIPTION CODE (For Official Use Only): **Lagoon**

A. GENERAL INFORMATION

1. PROJECT (State, Number): **Washington**      SCOPE OF PROJECT (new plant, additions, etc.): **Routine**  
 2. PLANT LOCATION (City, county): **Washougal - Clark**      IDENTIFICATION OF AREAS SERVED: **Washougal**

3. POPULATION  
 3A. FRACTION OF AREA POPULATION SERVED (%): **100**      3B. PLANT DESIGN (population equivalent): **10,000**      3C. SERVED BY PLANT (domestic): **3,500**

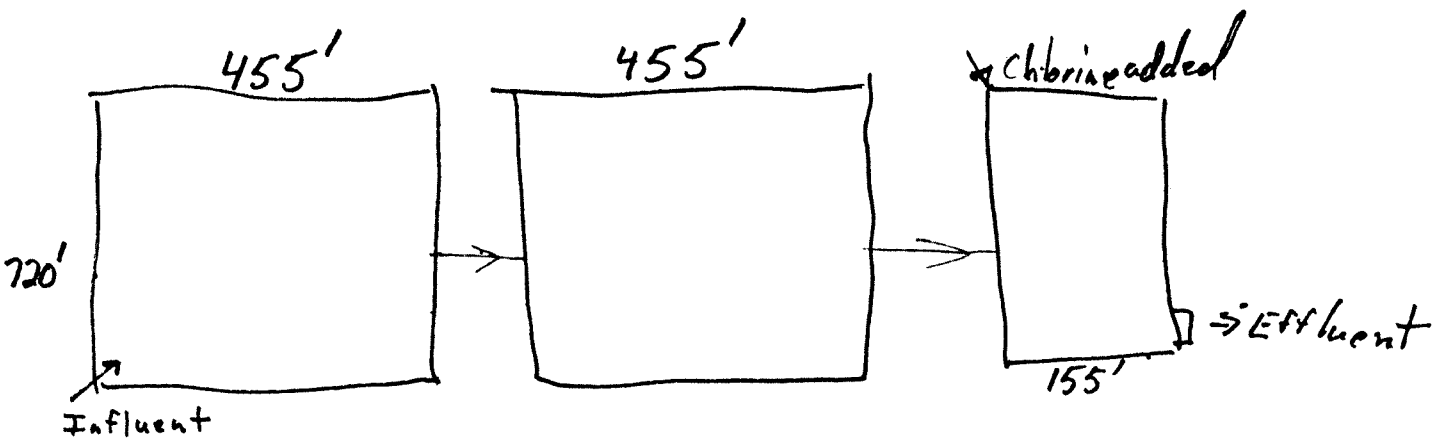
4. TYPE OF COLLECTION SYSTEM

4A.  COMBINED  SEPARATE  BOTH      4B. ESTIMATED FLOW CONTRIBUTED BY SURFACE OR GROUND WATER (infiltration, mgd): **.025**

5. YEAR COMMUNITY BEGAN SEWAGE TREATMENT: **1965**  
 6. YEAR PRESENT SYSTEM PLACED IN OPERATION:  
 6A. SEWER: **1965**      6B. PLANT: **1965**      6C. ANCILLARY WORKS:

7A. SIZE OF PLANT SITE (acres): **15**      7B. APPROXIMATE AREA LEFT FOR EXPANSION (acres): **15**

8A. IN THE SPACE PROVIDED BELOW FURNISH A SIMPLIFIED FLOW DIAGRAM OR A WRITTEN DESCRIPTION OF THE PLANT UNITS IN FLOW SEQUENCE. INCLUDE THE METHOD OF ULTIMATE SLUDGE DISPOSAL. SHOW APPROXIMATE SURFACE AREA OF STABILIZATION PONDS AND NUMBER OF CELLS. INDICATE WHETHER FLOW TO AND FROM PLANT IS BY PUMPING OR GRAVITY.



8B. NOTE ANY SIGNIFICANT OR UNIQUE PROCESSING CONDITIONS.

9. RECEIVING STREAM

9A. NAME OF STREAM: **Gibbons Creek (1 mile) - Columbia River**  
 9B. STREAM FLOW IS:  PERENNIAL  INTERMITTENT       NATURAL  REGULATED       INTERSTATE  INTRASTATE  
 COASTAL

B. CURRENT PERFORMANCE AND PLANT LOADING INFORMATION

1A. ANNUAL AVERAGE DAILY FLOW RATE (mgd): **.375**      1B. PEAK FLOW RATE (mgd):  
 DRY WEATHER: **.290**      WET WEATHER: **.320**      1C. MINIMUM FLOW RATE (mgd): **.050**  
 2. AVERAGE BOD OF RAW SEWAGE (5 DAY 20°C) (ppm):  
 3. AVERAGE SETTLEABLE SOLIDS OF RAW SEWAGE (mg/l):  
 4. AVERAGE SUSPENDED SOLIDS OF RAW SEWAGE (mg/l):  
 5. AVERAGE COLIFORM DENSITY OF RAW SEWAGE (100 ml):  
 6. ANNUAL AVERAGE PLANT REDUCTION:  
 6A. BOD (%)      6B. SETTLEABLE SOLIDS (%)      6C. SUSPENDED SOLIDS (%)      6D. COLIFORM DENSITY (%)

7A. DOES PLANT HAVE STANDBY POWER GENERATOR FOR MAJOR PUMPING FACILITIES?  YES  NO  
8. ARE CHLORINATION FACILITIES PROVIDED?  YES  NO  
IF YES, ANSWER 8A THRU G

7B. ADEQUATE ALARM SYSTEM FOR POWER OR EQUIPMENT FAILURES?  YES  NO  
IF YES, IS CHLORINATION CONTINUOUS?  YES  NO  
IF NO, EXPLAIN REASON FOR INTERMITTENT CHLORINATION

8A. PURPOSE OF CHLORINATION

Disinfection

8B. TYPE OF CHLORINATOR

Wallace + Tiernan

8C. POINT OF APPLICATION OF CHLORINE

before last pond

8D. CAN BYPASSED SEWAGE BE CHLORINATED?

YES  NO

8E. AVERAGE FEED RATE OF CHLORINE (lb/day)

10

8F. CHLORINE RESIDUAL IN EFFLUENT

PPM AT END OF \_\_\_\_\_ MINUTES

8G. MINIMUM SUPPLY OF CHLORINE STORED ON PREMISES (lb)

300 lb

9. ARE FACILITIES PROVIDED FOR COMPLETE BYPASS OF RAW SEWAGE?

YES  NO

IF YES, ANSWER A THRU G BELOW, ANSWER H IN EITHER CASE.

9A. FREQUENCY (times monthly)

9B. AVERAGE DURATION (hours)

9C. REASON FOR BYPASSING

9D. ESTIMATED FLOW RATE DURING BYPASS IS

- WITHIN HYDRAULIC CAPACITY OF PLANT  
 BEYOND HYDRAULIC CAPACITY OF PLANT BY

9E. DOES SEWAGE OVERFLOW IN DRY WEATHER?

YES  NO

9F. TYPE OF DIVERSION STRUCTURE

9G. AGENCIES NOTIFIED OF BYPASS ACTION

9H. DO OPERATORS HAVE OPTION TO BYPASS INDIVIDUAL PLANT UNITS? (If no, has this caused any operational problems?)

YES  NO

10A. ARE BACK FLOW DEVICES PROVIDED AT ALL CONNECTIONS TO CITY WATER SUPPLY? (If no, explain)

YES  NO

10B. CHECK TYPE OF BACK FLOW PREVENTION DEVICE

DOUBLE CHECK VALVE  PRESSURE OPERATED  PHYSICAL DISCONNECT  OTHER (specify)

11. USES OF TREATMENT PLANT EFFLUENT

none

12. USES OF RECEIVING STREAM WITHIN 10 MILES OF OUTFALL

fishing

13. HAVE THERE BEEN ANY ODOR COMPLAINTS BEYOND THE PLANT PROPERTY? (If yes, explain)

YES  NO

14. OBSERVED APPEARANCE AND CONDITION OF EFFLUENT, RECEIVING STREAM, OR DRAINAGE WAY

15. STABILIZATION POND(S)

A. WEEDS CUT AND VEGETATIVE GROWTH IN PONDS ELIMINATED?  YES  NO

B. BANKS AND DIKES MAINTAINED (erosion etc.)?  YES  NO

C. FENCING AND WEARING - POLLUTED WATER? SIGNS PRESENT AND IN GOOD REPAIR?  YES  NO

D. FREQUENCY OF INSPECTION BY OPERATOR

E. WATER DEPTH (feet) 4 HIGH 3 LOW \_\_\_\_\_ MEDIUM

F. ADEQUATE CONTROL OF DEPTH?  YES  NO

G. SEEPAGE REPORTED?  YES  NO

H. ANY REPORTS OF GROUND WATER CONTAMINATION FROM POND (If yes, give details)?  YES  NO

I. MOSQUITO BREEDING PROBLEM?  YES  NO

J. CAN SURFACE RUN-OFF ENTER POND?  YES  NO

C. SUPERVISORY SERVICES

1. IS A CONSULTING ENGINEER RETAINED OR AVAILABLE FOR CONSULTATION ON OPERATING AND MAINTENANCE PROBLEMS?  YES  NO IF YES IS IT ON:  CONTINUING BASIS OR  UPON REQUEST BASIS IF CONTINUING BASIS, WHAT IS THE FREQUENCY OF VISITS:

2. DO OPERATORS AND OTHER PERSONNEL ROUTINELY ATTEND SHORT COURSES, SCHOOLS OR OTHER TRAINING ACTIVITIES?  YES  NO IF YES, CITE COURSE SPONSOR AND DATE OF LAST COURSE ATTENDED IF NO, DO YOU KNOW OF ANY COURSES AVAILABLE TO SERVE THIS AREA?

3A. ARE ALL EQUIPMENT AND PARTS OF THE PRESENT PLANT STILL IN OPERATION?  YES  NO (If no, explain)

B. ARE PROCESSING UNITS OPERATING AT DESIGN EFFICIENCY?  YES  NO (If no, explain)

4. HAVE THERE BEEN ANY DIFFICULTIES WITH THE SEWAGE TREATMENT PLANT? A. STRUCTURAL  YES  NO (If yes explain)

B. MECHANICAL  YES  NO (If yes, explain)

C. OPERATIONAL  YES  NO (If yes, explain)

D. BASED ON OPERATING EXPERIENCE TO DATE WHAT IF ANY CHANGES WOULD YOU RECOMMEND TO IMPROVE OPERATION OF THE PLANT?

5. ARE OPERATING RECORDS MAINTAINED?  YES  NO  
 (If automated, check general items included)

REPORTED?  YES  NO

TO WHOM? **DOE**

FREQUENCY	WEATHER	FLOW	SLUDGE HANDLED	CHEMICALS USED	DIGESTER	GRIT HANDLED	ELEC. USED	COST DATA	AIR USED	MAINTENANCE	OTHER
DAILY	X	X									
WEEKLY											
MONTHLY											
ANNUALLY											

6. ARE LABORATORY RECORDS MAINTAINED? (check appropriate box)

NOT AT ALL  DAILY  WEEKLY  MONTHLY  ANNUALLY

IF MAINTAINED CHECK FORM OF RECORD BELOW:

LOG BOOK  TABULAR SHEET  SEPARATE BY OPERATION  CONTROL CHARTS  GRAPHS

WHAT PLANT AND/OR LABORATORY EQUIPMENT, GAGES AND METERS ARE CALIBRATED PERIODICALLY?

**none**

7. IS LABORATORY TESTING ADEQUATE FOR THE CONTROL REQUIRED FOR THIS SIZE AND TYPE OF PLANT?

YES  NO (If no, explain)

B. INDUSTRIAL WASTES DISCHARGED TO MUNICIPAL SYSTEM **none**

B. POPULATION EQUIVALENT (BOD) OF INDUSTRIAL WASTES (pc)

D. VOLUME OF INDUSTRIAL WASTES (mgd)

F. MAIN DIFFICULTY EXPERIENCED WITH INDUSTRIAL WASTE (explain)

A. NUMBER AND TYPES OF INDUSTRIES DISCHARGING TO SYSTEMS

C. POPULATION EQUIVALENT (SS) OF INDUSTRIAL WASTES (pc)

E. COMPOSITION AND CHARACTERISTICS OF INDUSTRIAL WASTES

G. HAVE INDUSTRIAL EFFLUENT PROBLEMS BEEN SOLVED?  YES  NO (If yes, how?)

9A. METHOD OR METHODS USED TO ASSESS INDUSTRIAL WASTE TREATMENT COST (check appropriate box)

NO CHARGE BY CITY  PROPERTY TAX  WATER USE ASSESSMENT  CHARGE BASED ON FLOW  
 CHARGED BASED ON BOD  CHARGE BASED ON SS  OTHER METHODS (Describe)

COMMENT ON HOW CHARGE IS COLLECTED (fixed charge, sliding scale, etc.)

9B. IS INDUSTRIAL WASTE ORDINANCE IN EFFECT AND ENFORCED?  YES  NO

10. WHO PROVIDED INITIAL INSTRUCTION IN THE OPERATION OF THE PLANT?

**W. F. Perley**

11. IS A MANUAL OF PRACTICE OR INSTRUCTIONS AVAILABLE?

YES  NO

IF YES, WHO WROTE AND PROVIDED IT?

**Same**

12. ESTIMATE OF MAN-HOURS PER WEEK DEVOTED TO LABORATORY WORK AND MAINTENANCE OF RECORDS AND REPORTS

**4 2**

D. PLANT PERSONNEL (Annual Average Staff for Most Recent Year Reported in Section "F")

JOB CATEGORY	NUMBER	TOTAL MAN-HOURS PER WEEK	TOTAL NUMBER CERTIFIED OR LICENSED	RANGE IN YEARS EMPLOYED AT PRESENT PLANT	RANGE IN YEARS OF EXPERIENCE IN TREATMENT
1. SUPERINTENDENT					
2. OPERATORS	1	8	0	3	
3. LABORATORY TECHNICIANS					
4. LABORERS					
5. PART-TIME LABORERS					
6. TOTAL					

E. LABORATORY CONTROL

Enter test codes opposite appropriate items. If any of the below tests are used to monitor industrial wastes place an "X" in addition to the test code.

CODES

1 - 7 or more per week      3 - 1, 2, or 3 per week      5 - 2 or 3 per month      7 - Quarterly      9 - Annually  
 2 - 4, 5 or 6 per week      4 - as required      6 - 1 per month      8 - Semi-Annually

ITEM	RAW	PRIMARY EFFLUENT	MIXED LIQUOR	FINAL	SLUDGE		DIGESTOR	RECEIVING STREAM
					RAW	SUPER-NATANT		
1. BOD								
2. SUSPENDED SOLIDS								
3. SETTLEABLE SOLIDS	2	2						
4. SUSPENDED VOLATILE								
5. DISSOLVED OXYGEN		3						
6. TOTAL SOLIDS								
7. VOLATILE SOLIDS								
8. pH	2	2						
9. TEMPERATURE		2						
10. COLIFORM DENSITY								
11. RESIDUAL CHLORINE		2						
12. VOLATILE ACIDS								
13. M. B. STABILITY								
14. ALKALINITY								
15.								
16.								
17.								
18.								
19.								

F. OPERATION AND MAINTENANCE COST FOR PLANT

YEAR OF OPERATION	SALARIES/WAGES	ELECTRICITY	CHEMICALS	MAINTENANCE	OTHER ITEMS	TOTAL
MOST CURRENT YEAR 19						
PRIOR YEAR 19						
PRIOR YEAR 19						
PRIOR YEAR 19						

EVALUATION PERFORMED BY <i>Pat Lee</i>	TITLE <i>EST</i>	ORGANIZATION <i>DOE</i>
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INFORMATION FURNISHED BY <i>Elmer Juels</i> <i>Darrell Marugg</i>	TITLE <i>operator</i> <i>sub</i>	ORGANIZATION <i>city</i> <i>" "</i>	DATE <i>11/03</i> <i>✓</i>
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STATE OF WASHINGTON  
DEPARTMENT OF ECOLOGY

WATER QUALITY LABORATORY

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

DATA SUMMARY

Source WASHOUEAL STP

Collected By P. Lee

Date Collected 11-13-73

Goal, Pro./Obj. \_\_\_\_\_

Log Number:	73	87	88	89	90	91	92	93	STORET
Station:	INF	EFF	0830	1030	1130	?	?	?	
pH	7.7	7.6							00403
Turbidity (JTU)	56.	17.							00070
Conductivity (umhos/cm)@25°C	480.	400.							00095
COD	240.	70.							00340
BOD (5 day)	191	25							00310
Total Coliform (Col./100ml)	-	-	5000	5000	7500	5500	4500	4900	31504
Fecal Coliform (Col./100ml)	-	-	<200	<200	<200	<200	<200	<200	31616
NO3-N (Filtered)	-	6.50							00620
NO2-N (Filtered)	-	.010							00615
NH3-N (Unfiltered)	-	9.4							00610
T. Kjeldahl-N (Unfiltered)	-	15.							00625
O-PO4-P (Filtered)	-	4.25							00671
Total Phos.-P (Unfiltered)	-	9.2							00665
Total Solids	431	266							00500
Total Non Vol. Solids	194	173							
Total Suspended Solids	217	59							00530
Total Sus. Non Vol. Solids	57	23							
<u>COCOE</u>	270.	190.							
<u>CHLORIDES</u>	20.	22.							

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

518 58975  
48419865  
41 865

Summary By Stephen P. Hall Date 12-14-73