

MEMORANDUM

October 24, 1975

To: Gerry Calkins

From: Shirley Prescott

Subject: Washougal Lagoon Efficiency Study

Scott Jeane and I conducted a routine efficiency study on the above lagoon on September 30, 1975. Flows were measured at the staff guage in the parshall flume (6 inch) and average flows of .042 MGD for the survey period were consistent with the meter readings. A lagoon plan of the three cells (drawn to scale) is attached as well as information on the meter.

Possibly a piece of pipe extending from the flow meter down to the grate under the stilling basin to protect the float wire from the wind action would tend to remove the very minor discrepancy (1%) between their flow readings and ours.

The operator samples and tests influent and effluent pH, DO, settleable solids, temperature,  $Cl_2$  residual and flow three times a week. The Health Department performs coliform tests monthly.

The grounds are fenced and locked; the operator has recently completed some dike repair and is using old rubber tires to stabilize bank erosion in some areas.

The attached survey report form shows the results of the lab and field tests. A BOD reduction of 66% and total suspended solids reduction of 47% was measured. The effluent loading was 64 mg/L (22 lbs/day) for BOD and 88 mg/L (30 lb/day) for T.S.S.

Lab analyses of nutrients discharged are as follow:

	mg/L	lbs/day
$NO_3-N$	.06	.02
$NO_2-N$	.08	.02
$NH_3-N$	5.0	1.7
T. Kjeldahl-H	16.8	5.7
O- $PO_4-P$	4.4	1.5
T- $PO_4-P$	6.9	2.3

## Washougal Lagoon Efficiency Study

The bacteria samples varied from 500 to 1000 colonies/100 mls total coliform and 12 to 200 colonies/100 mls fecal coliform. The final pond effluent chlorine residuals showed less than .05 mg/L in all tests. Glen Shore, the operator, said he checked  $Cl_2$  residuals at the manhole between cells 'B' and 'C' at which point he obtained a residual reading of 1.1 consistently. To compare, a test was run at the manhole between cells 'B' and 'C' by the operator and another member of our group. The test by the operator measured a residual of 1.1 while ours was 0.3 mg/L.

There is some question about equipment, chemicals and/or test procedure being used by the operator. The operator was to check with you at the next operator certification examination at the DOE Southwest Office on some of his other questions.

Basically, the Washougal Lagoons are operating within permit standards.

SP:ee  
Attachment

STP Survey Report Form

Efficiency Study

City Washougal Plant Type Lagoon Pop. Served 3500 Design 1 mgd  
 Receiving Water Gibbons Cr. - to Col. R. Perennial Yes Intermittent Capacity  
 Date 9/30/75 Survey Period \_\_\_\_\_ Survey Personnel \_\_\_\_\_  
 Comp. Sampling Frequency hourly Sampling Alequot 1000 mls  
 Weather Conditions (24 hr) windy, clear, dry Are facilities provided for complete by-  
 pass of raw sewage? Yes No/Frequency of bypass \_\_\_\_\_  
 Reason for bypass only occasion would be flooding Is bypass chlorinated? Yes No  
 Was DOE Notified? \_\_\_\_\_ Discharge - Intermittent \_\_\_\_\_ Continuous \_\_\_\_\_

Plant Operation

Total flow Avg. daily .042 How measured 6" Parshall Flume Staff guage and meter  
 Maximum flow .045 mgd Time of Max. 0930 - 1030  
 Minimum flow .037 mgd Time of Min. 1445 - 1545  
 Pre Cl<sub>2</sub> \_\_\_\_\_ #/day Post Cl<sub>2</sub> 9 1/2 #/day

Field Results

Influent

Effluent

Determinations	Influent				Effluent			
	Max.	Min.	Mean	Median	Max.	Min.	Mean	Median
Temp °C	22	20		21	21	18		19
pH (Units)	7.8	7.1		7.25	8.	7.5		7.6
Conductivity (µmhos/cm <sup>2</sup> )	725	500		650.	470	450		450
Settleable Solids (mls/l)	15	9.5	12	12	.25	trace	.075	trace

Laboratory Results on Composites

Laboratory No.	Influent	Effluent	% Reduction	lbs/day
	<u>75-4514</u>	<u>75-4515</u>		
5-Day BOD ppm	<u>190</u>	<u>64.</u>	<u>66%</u>	<u>22</u>
COD ppm	<u>400</u>	<u>200</u>		
T.S. ppm	<u>515</u>	<u>429</u>		
T.N.V.S. ppm	<u>231</u>	<u>228</u>		
T.S.S. ppm	<u>167</u>	<u>88</u>	<u>47%</u>	<u>30</u>
N.V.S.S. ppm	<u>24</u>	<u>26</u>		
pH (Units)	<u>7.2</u>	<u>7.5</u>		
Conductivity (µmhos/cm <sup>2</sup> )	<u>520</u>	<u>390</u>		
Turbidity (JTU's)				
Chlorides	<u>11</u>	<u>18</u>		

Lab No.	Sampling Time	Colonies/100 ml (MF)			Cl <sub>2</sub> Residual	
		Total Coliform	Fecal Coliform	Fecal Strep	15 sec.	3 min.
75-4516	0930	500	80		.05	.05
17	1330	1000	12		.05	.05
18	1600	500	200		.05	.05
	1330	B cell sampling point				1.1
	1600	B cell sampling point			our test	.3

Operator test 1.1

Additional Laboratory Results

		#/day
NO <sub>3</sub> -N ppm	-	.06
NO <sub>2</sub> -N ppm	-	.08
NH <sub>3</sub> -N ppm	-	5.0
T. Kjeldahl-N ppm	-	16.8
O-PO <sub>4</sub> -P ppm	-	4.4
T-PO <sub>4</sub> -P ppm	-	6.9

Operator's Name Glen Shore Phone No. \_\_\_\_\_

Furnish a flow diagram with sequence and relative size and points of chlorination.

*See attached.*

Type of Collection System

Combined  Separate  Both

Estimate flow contributed by surface or ground water (infiltration)

\_\_\_\_\_ MGD

Plant Loading Information

Annual average daily flow rate (mgd)

Peak flow rate (mgd)

Dry \_\_\_\_\_

Dry \_\_\_\_\_

Wet \_\_\_\_\_

Wet \_\_\_\_\_

COMMENTS: \_\_\_\_\_

PHILADELPHIA, PA. U.S.A.

DRAWN \_\_\_\_\_ DATE 11/27/65 CHECKED WJA SCALE \_\_\_\_\_

TRACED \_\_\_\_\_

NAME \_\_\_\_\_ REFERENCE DRAWING \_\_\_\_\_

USED ON SO 30902

EXCEPT AS NOTED

TOOL NO. \_\_\_\_\_ LIMITS ± \_\_\_\_\_

MATERIAL \_\_\_\_\_ FINISH \_\_\_\_\_

1 METER STYLE X701F SERIAL A30902

DIAL 3-161 RANGE 0-10

GEAR TRAIN 0.4167 RPM. DWG. Z6712

CAM Z3175

OTHER SPECIAL FEATURES SPECIAL MB-I TURNS.

AS BELOW.

1 TRANSMITTER STYLE MB-I SERIAL A30902 DWG Y1295A

SHEAVE DWG 100399EM 6-458

MOUNTING 100372 "A" 1.7725"

MB-I TRANSMITTER CASE 600002T

DIAL 0-1 MGD

CALIBRATION RANGE 10 TO 1

CALIBRATION CHECKED BY WJA  
12/27/65

QUART	HEIGHT RISE, INCHES	MGD
0	0	0
10	2.3	0.1
20	3.1	.2
30	4.65	.3
40	5.6	.4
50	6.45	.5
60	7.22	.6
70	8.0	.7
80	8.7	.8
90	9.38	.9
100	10.02	1.0

PROVIDE \_\_\_\_\_ INSTRUCTION BOOKS WITH FOLLOWING DATA.



STATE OF WASHINGTON  
DEPARTMENT OF ECOLOGY

WATER QUALITY LABORATORY

ORIGINAL TO: G.S.J.  
COPIES TO:  
.....  
.....  
LAB FILES

DATA SUMMARY

Source Washougal Lagoon

Collected By G.S. Jean II

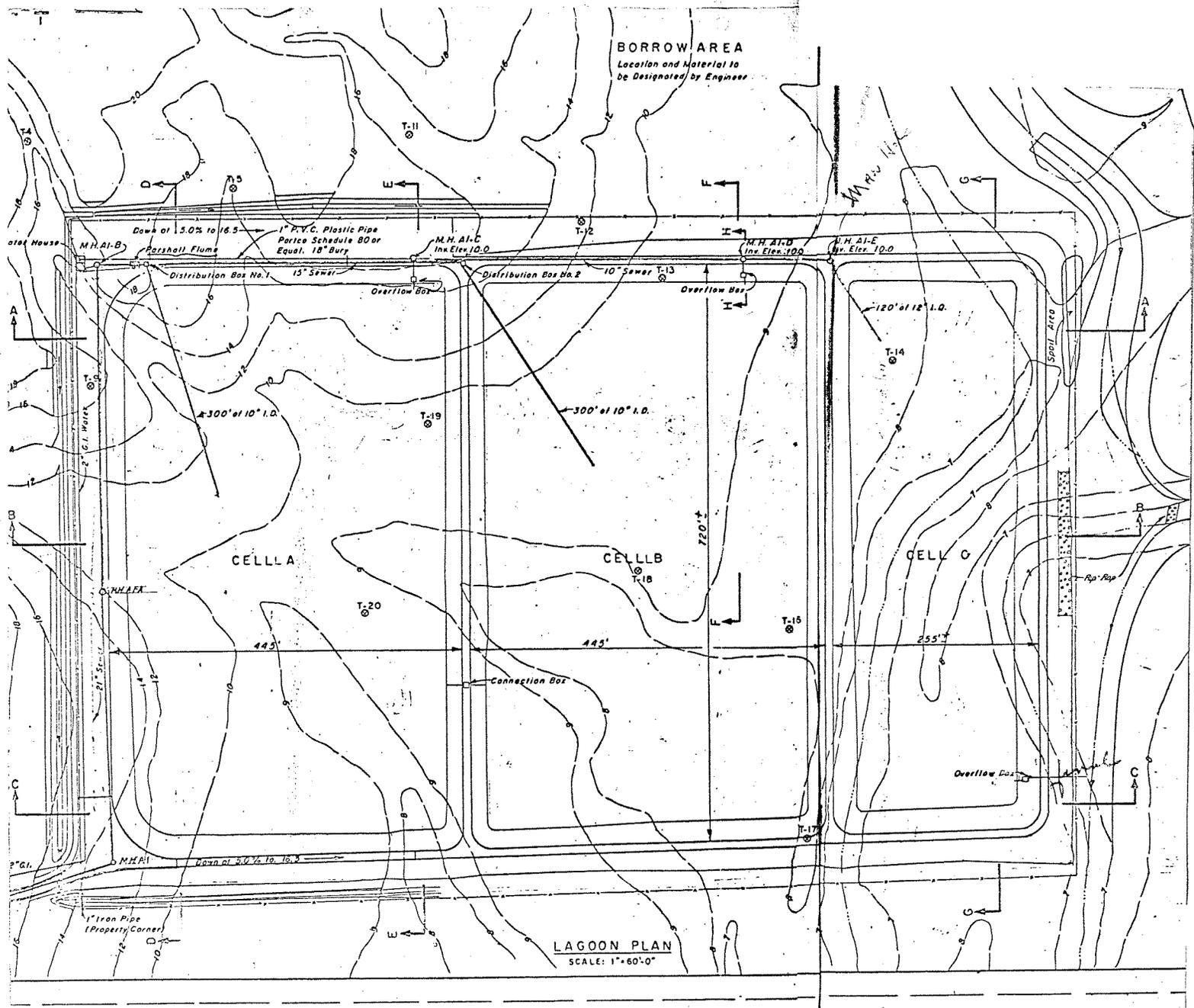
Date Collected 9-30-75

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

Log Number:	75-4514	15	16	17	18						STORET
Station:	INF	CPE	CFF 0930	1330	1600						
pH	7.2	7.5									00403
Turbidity (JTU)											00070
Conductivity (umhos/cm)@25°C	520	390									00095
COD	400.	200.									00340
BOD (5 day)	190	64									00310
Total Coliform (Col./100ml)			EST 500	EST 1000	EST 500						31504
Fecal Coliform (Col./100ml)			EST 80	EST 12	EST 200						31616
NO3-N (Filtered)		.06									00620
NO2-N (Filtered)		.08									00615
NH3-N (Unfiltered)		5.0									00610
T. Kjeldahl-N (Unfiltered)		16.8									00625
O-PO4-P (Filtered)		4.4									00671
Total Phos.-P (Unfiltered)		6.9									00665
Total Solids	515	429									00500
Total Non Vol. Solids	231	228									
Total Suspended Solids	167	98									00530
Total Sus. Non Vol. Solids	24	26									
<u>Chlorides</u>	11.	18.									

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

Summary By Stephen P. Roll Date 10-8-75



**BORROW AREA**  
 Location and Material to  
 be Designated by Engineer

**LAGOON PLAN**  
 SCALE: 1" = 60'-0"