Publication No. 75-e53

WA-28-2030

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

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 Capacity 1 mgd

Receiving Water Gibbons Cr. - to Col. R. Perennial Yes Intermittent ____

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_2 ____ #/day Post Cl_2 9 1/2 #/day

Field Results

Determinations	Influent Max.	Influent Min.	Influent Mean	Influent Median	Effluent Max.	Effluent Min.	Effluent Mean	Effluent Median
Temp °C	22.	20		21	21	18		19
pH (Units)	7.8	7.1		7.25	8.	7.5		7.6
Conductivity (μmhos/cm²)	725	500		650.	470	450		450
Settleable Solids (mls/l)	15	9.5	12	12	.25	trace	.075	trace

Laboratory Results on Composites

	Influent	Effluent	% Reduction	lbs/day
Laboratory No.	75-4514	75-4515		
5-Day BOD ppm	190	64.	66%	22
COD ppm	400	200		
T.S. ppm	515	429		
T.N.V.S. ppm	231	228		
T.S.S. ppm	167	88	47%	30
N.V.S.S. ppm	24	26		
pH (Units)	7.2	7.5		
Conductivity (μmhos/cm²)	520	390		
Turbidity (JTU's)				
Chlorides	11	18		

Lab No.	Sampling Time	Colonies/100 ml (MF) Total Coliform	Fecal Coliform	Fecal Strep	Cl_2 Residual 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_3-N ppm -	.06	.02
NO_2-N ppm -	.08	.02
NH_3-N ppm -	5.0	1.7
T. Kjeldahl-N ppm -	16.8	5.7
O-PO_4-P ppm -	4.4	1.5
T-PO_4-P ppm -	6.9	2.3

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 X Both

Estimate flow contributed by surface or ground water (infiltration

_____ MGD

Plant Loading Information

Annual average daily flow rate (mgd)

Dry _____

Wet _____

Peak flow rate (mgd)

Dry _____

Wet _____

COMMENTS: _____

PHILADELPHIA, PA. U.S.A.

DRAWN | TRACED | DATE 12/27/65 CHECKED | APPROVED WJQ | SCALE | A30

NAME | USED ON | REFERENCE DRAWING | SO 30902

TOOL NO. | LIMITS ± | EXCEPT AS NOTED

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 TRANS. AS BELOW.

1 TRANSMITTER STYLE MB-I SERIAL A30902 DWG Y1295A 6-458

SHEAVE DWG 100399 EM

MOUNTING 100372 "A" 1.7725"

MB-I TRANSMITTER CASE 600002T

DIAL 0-1 MGD

CALIBRATION RANGE 10 TO 1

CALIBRATION CHECKED BY WJQ 12/27/65

% CHART	FLOAT 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 DWGS.

FORM AEP

USER (A) CITY OF WASHOUGAL
ADDRESS WASHOUGAL, WASHINGTON
PURCHASER (B) JAMES G. ROBERTSON
ADDRESS BOX 86 CLACKAMUS, OREGON
CONS. ENG. (C) W.F. PERLEY & ASSOC.
PURCHASE ORDER NO. LETTER 11-22-65 ISSUED BY (A) (B) (C)
ORDER REP. INSTRUMENTATION ENGR. ORDER NO. 040465-1R

FIM SO 902 PAGE NO. 1 OF 1

LEGEND FOR APPLICATION STRIPS, MULTI-PEN METERS
RED
GREEN
PURPLE
BLUE

1. METER SERIAL* A 30902
2. RECEIVER STYLE X-701
3. TRANSMITTER STYLE MBI
4. CURRENT 120 V, 60C X; 50C ☐; 25C ☐
5. TRANS. TO REC. ____ FT. ____ GAUGE
6. MAXIMUM DIFF. IN INCHES WATER ____ IN. WET ☐; DRY ☐
7. MERCURY REQ.* ____
8. MERCURY BY: PENN ☐; CUSTOMER ☐
9. CHART DRIVE: ELEC. X; SPRING ☐
10. " REV.; 24 HR. ☐; 7 DAY X
11. MAXIMUM METER CAPACITY 1.0 MGD
12. MAX. FLOW 1.0 MGD
13. AV. FLOW ____
14. MIN. FLOW 0.1 MGD
15. METER MOUNTING: WALL X; PANEL ☐; PIPE ☐
OTHER ____
16. AMBIENT TEMPERATURE RANGE
TRANSMITTER ____ TO ____ F.
RECEIVER ____ TO ____ F.
17. CHART NO. 0403 (0 TO 10)
18. " UNITS MGPD
19. " MULT. 0.1
20. INDICATOR SCALE 0 TO 10
21. " UNITS MGPD
22. " MULT. 0.1
23. TOTALIZER UNITS GALLONS
24. " MULT. 1,000
25. GEAR TRAIN* Z-5172 0.4157 RPM
26. ELECTRICAL CONTACTS: { HIGH SET AT ____ LOW SET AT ____
27. TOTALIZER CONTACTS: NUMBER PER HOUR AT MAX. METER CAP. ____
28. POTENTIOMETER ____ OHMS
OPERATES ____
29. VACUUM ☐; PNEUMATIC ☐
TRANS. OPERATES ____
AIR PRESS. RANGE ____
30. CHECK ROD X
31. AIR FLOW DIFFERENTIAL PRESSURE 0 TO ____ IN. WATER
32. INTERNAL ILLUM. ☐
33. DOOR LOCK ☐
34. ____
35. ____
36. ____
37. ____
38. ____
39. ____
40. ____
41. ____
42. ____

FLUID

43. FLUID IS SANITARY SEWAGE
44. OPERATING PRESSURE ____ PSIG
45. " TEMPERATURE ____ F.
46. SUPERHEAT ____ F.
47. TOTAL TEMPERATURE ____ F.
48. MOISTURE ____ %
49 DENSITY LB/CU FT. ____ AT
50. TEMP. ____ F.; PR. ____ PSIG
51. VISCOSITY ____
SPECIFIC GR. ____
52. FOR GAS, BASE REFER. CONDITIONS
53. TEMP. ____ F.; PR. ____ PSIA
54. BAROMETER ____ IN. HG
55. FLOW PULSATES ☐

O.K. ____
Representative or Customer Signature

DATE 12/15/65

PRIMARY ELEMENT

56. KIND PARSHALL FLUME
57. STYLE 6" BY OTHERS
58. MATERIAL ____
59. THICKNESS* ____
60. DWG* ____
61. CAT. NO.* ____

PIPE LINE

62. NOMINAL SIZE ____ IN.
63. MEASURED I.D. ____ IN.
64. SCHEDULE ____
65. FLANGE TYPE ____
66. " RATING ____ LB.
67. FLOW IS: UP ☐; DN. ☐; HORIZ. ☐
68. UP STREAM STRAIGHT RUN ____ FOLLOWS ____
69. DOWN STREAM STRAIGHT RUN ____
70. PRESSURE TAPS: FLANGE ☐; VENA ☐
71. TAP DIST. C.L. TO UP STREAM FACE UP ____ IN.; DN ____ IN.
72. TAP SIZE: UP ____ IN.; DN ____ IN.

FURNISH ACCESSORIES

73. PAIR RESERVOIRS NO. ____
74. PR. ORIF. FL. UNIONS ____
75. ORIFICE VALVE SET NO. ____
76. METER VALVE SET NO. ____
77. CONNECTION SET NO. ____
78. STRAIGHTENING VANE ____
79. ____
80. ____
81. 100 CHARTS NO. 0403
82. 3 INSTRUCTION BOOKS
7 DIGIT TOTALIZER

*FACTORY WILL FILL IN

DRAWINGS:
RECEIVER Z-2160
TRANSMITTER Z-10641
WIRING Z-3579
PIPING ____
PRIMARY ____
ACCESSORIES ____

PENN METER COMPANY

4110 Haverford Ave., Phila. 4, Pa. U.S.A.

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. Jeane II

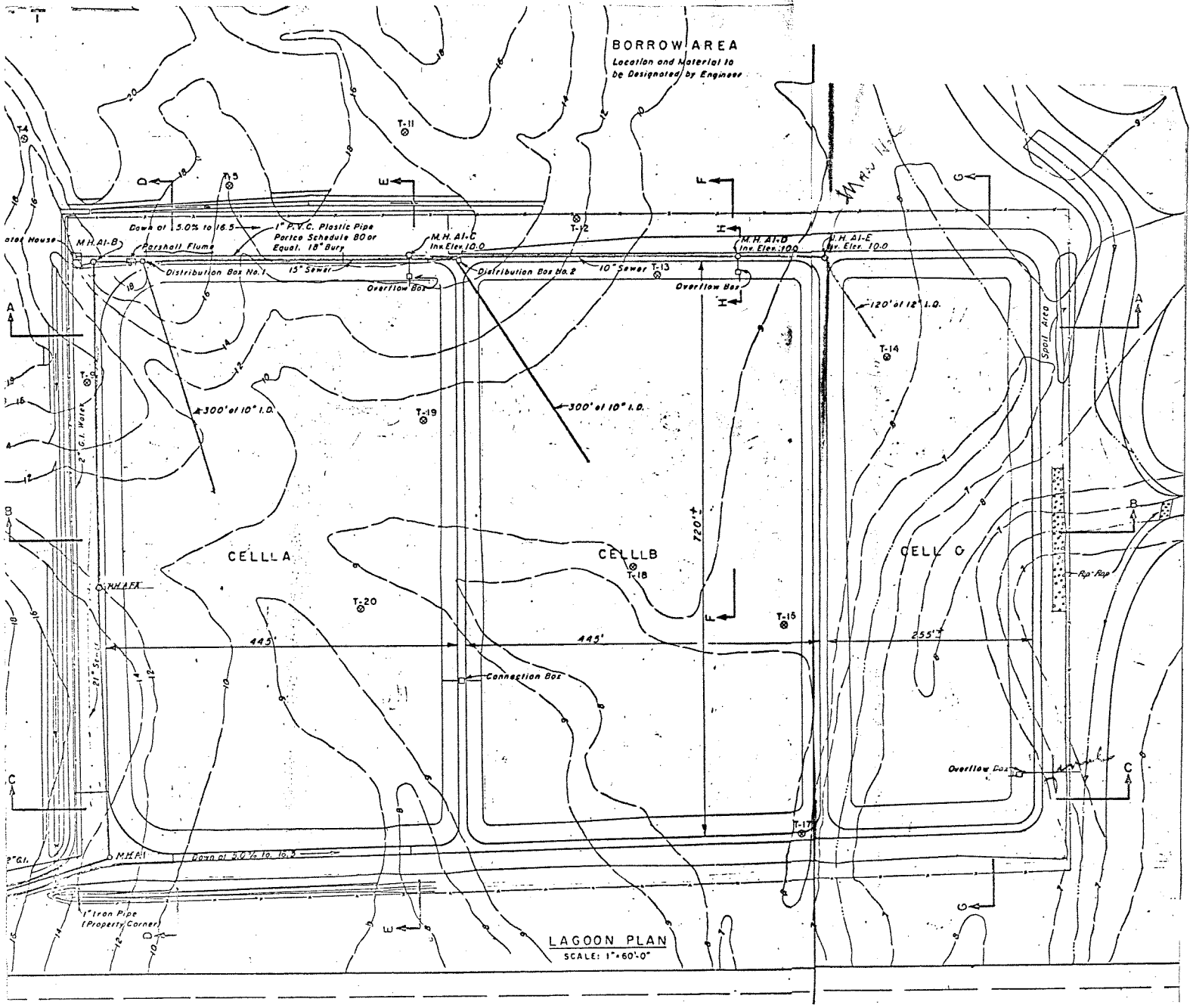
Date Collected 9-30-75

Goal, Pro./Obj.

Log Number:	75-4514	15	16	17	18						STORET
Station:	INF	EFF	EFF 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									
Chlorides	11.	18.									

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

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


BORROW AREA
Location and Material to be Designated by Engineer
Down at 5.0% to 16.5
1" P.V.C. Plastic Pipe Parco Schedule 80 or Equal. 18" Bury
M.H. A1-B
Parshall Flume
M.H. A1-C Inv. Elev. 10.0
M.H. A1-D Inv. Elev. 10.0
M.H. A1-E Inv. Elev. 10.0
Distribution Box No. 1
15" Sewer
Overflow Box
Distribution Box No. 2
10" Sewer
Overflow Box
120' of 12" I.D.
300' of 10" I.D.
300' of 10" I.D.
Spoil Area
Rip-Rap
CELL A
CELL B
CELL C
720'
445'
445'
255'
Connection Box
Overflow Box
M.H. A1
Down at 5.0% to 16.5
1" Iron Pipe (Property Corner)
T-4
T-5
T-11
T-12
T-13
T-14
T-15
T-16
T-17
T-18
T-19
T-20
LAGOON PLAN
SCALE: 1" = 60'-0"