Publication No. 77-e26
WA-26-1040

M E M O R A N D U M

April 5, 1977

State of Washington
Department of Ecology

To: Gerry Calkins

From: Dale Tucker

Re: Ostrander Creek - Woodbrook Lagoon Survey

Enclosed are summaries of analysis by the DOE laboratory on the samples collected from Ostrander Creek and Woodbrook Sewage Lagoon on March 16, 1977 by Brad Everson, yourself, and I.

Sampling sites and descriptions are given in Figures 1 and 2, and Table 1.

Comparison of analysis from the three sampling runs along the creek (begun at approximately 0800, 1200, 1400) reveals no significant variation throughout the day other than a gradual, overall rise in temperature.

However, examination of mean analytical values does yield information regarding the effects of the Woodbrook Sewage Lagoon on Ostrander Creek as well as suggest other possibilities for pollutant loading.

The small tributary entering just upstream of the sewage lagoons seems to have somewhat of a diluting effect on background NO_3-N levels observed at sample station 1. However, by the time flow reaches station 5, a return can be observed in NO_3-N to levels approximating those concentrations found upstream at station 1. Furthermore, a localized warming effect can be seen in Ostrander Creek as the small tributary (est. 2-5 cfs) seems to warm more rapidly throughout the day than Ostrander Creek (est. 50-60 cfs). Otherwise, that portion of Ostrander Creek above its confluence with the south fork appears quite homogeneous with no observable effects attributable to the Woodbrook Sewage Treatment Lagoons.

On the morning of March 15, 1977 two Isco Composite Samplers were set (see figure 2), one on the influent flow and one on the unchlorinated effluent line, by Cowlitz County personnel. The sampler on the influent failed to function properly and no 24 hr. influent composite sample was obtained.

However, analytical results on the unchlorinated effluent grab sample seem to parallel those of the unchlorinated effluent 24 hr. composite sample fairly well. Assuming that all the grab samples obtained, then, are reasonably representative, efficiency calculations based on the influent grab and chlorinated effluent grab are: 99% reduction of both total and fecal coliform counts, >79% reduction in BOD_5, 41% reduction in total suspended solids, and 28% reduction in total solids. Effluent chemistry seems to be within reasonable limits in spite of the short, 11 minute, retention time in the chlorine contact chamber (retention time was discerned by visual observation of peak concentrations of rhoadamine dye added above the chlorinator). Lagoon effluent flow is gaged at its point of discharge through a small v-notch weir and was recorded on the afternoon of March 16 as 0.07 MGD (approximately 0.10 cfs).

Below the confluence of the main and south forks NO_3-N concentrations and conductivity readings are higher, apparently a contribution of the south fork. Slightly higher temperatures can also be observed in the lower reach where the creek is deeper and slower. Other than these parameters, and total coliform densities, the remaining analysis seem fairly self-consistent throughout the entire stream reach sampled. Regarding total coliform bacteria, all sample values seem very low, though slightly higher concentrations appear in the small tributary just upstream of the sewage treatment lagoon, in the south fork, and in the runoff observed near sample station 8. Slightly higher values are also evident at stations 8 and 9. It seems doubtful that these increased densities could be due to the runoff at station 8A (est. < 0.1 cfs) as the small tributary upstream has higher densities and higher flows (est. 2-5 cfs) but no observable rise in concentrations result in the mainstream. The consistency and location of the higher total coliform values in the lower reach of Ostrander Creek suggest that they are associated with the dwellings along this portion of the stream. However, any conclusion on this as well as any statement as to the nature of the suggested association, is risky based on such low densities and slight increases.

In summary, then, the following relevant observations seem evident from the analysis:

a) the water quality of Ostrander Creek seems well within the limits of its Class A designation,

b) the effluent quality of the Woodbrook Sewage Treatment Lagoon seems within their NPDES permit limitation,

c) the effluent from the Woodbrook Sewage Treatment Lagoon appears to have no observable impact on Ostrander Creek,

d) increased NO_3-N levels in the lower reach of Ostrander Creek appear to be a result of NO_3-N loading from the South Fork Ostrander Creek,

e) there is a suggestion of slightly increased total coliform densities associated with the dwellings along the banks of the lower reach of Ostrander Creek.

DT:ee

cc: Brad Everson
Doug Houck
Mike Risley

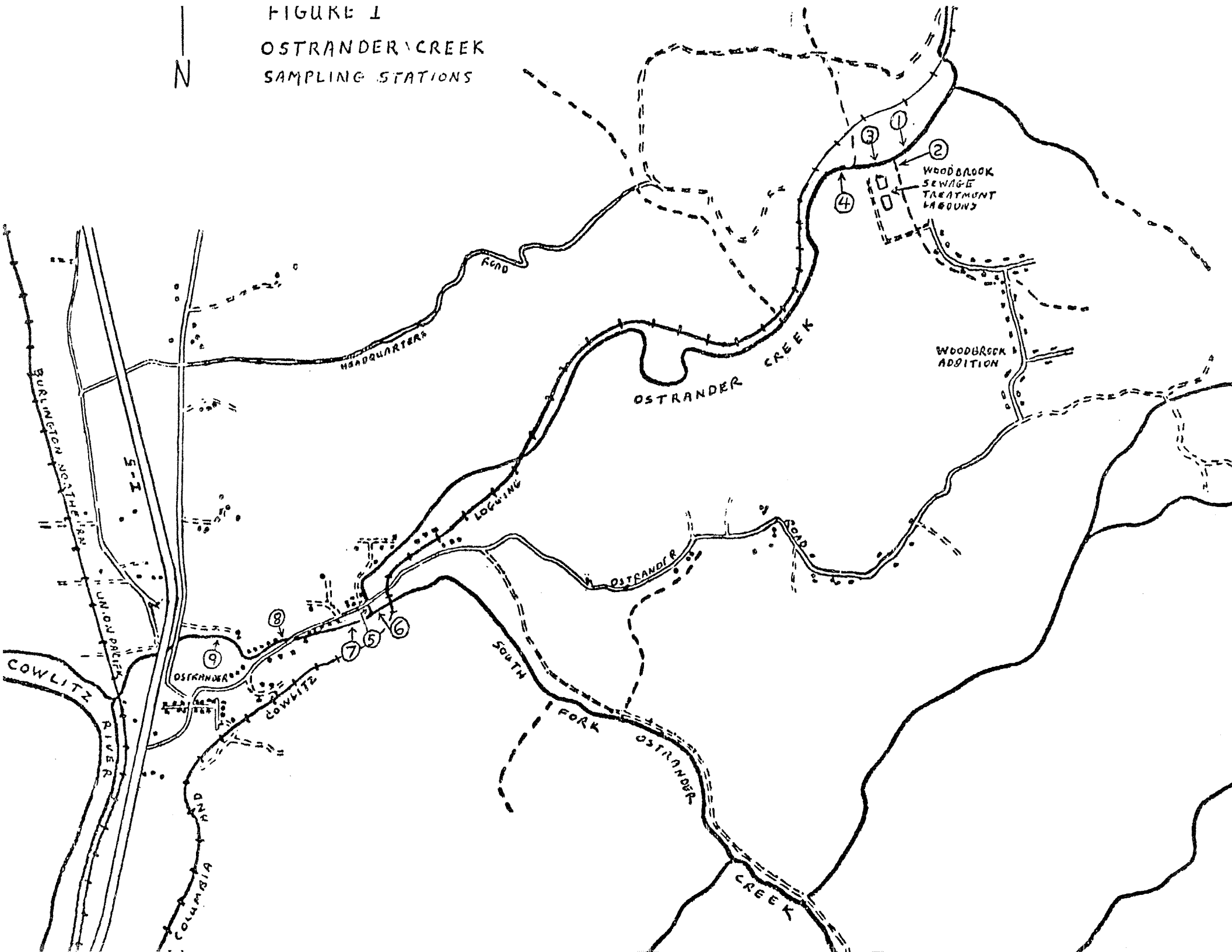
FIGURE 1
OSTRANDER CREEK
SAMPLING STATIONS
N
WOODBROOK SEWAGE TREATMENT LAGOONS
WOODBROOK ADDITION
HEADQUARTERS ROAD
OSTRANDER CREEK
LOGGING ROAD
OSTRANDER ROAD
SOUTH FORK OSTRANDER CREEK
I-5
BURLINGTON NORTHERN
UNION PACIFIC
COWLITZ RIVER
COLUMBIA
COWLITZ
OSTRANDER
1
2
3
4
5
6
7
8
9

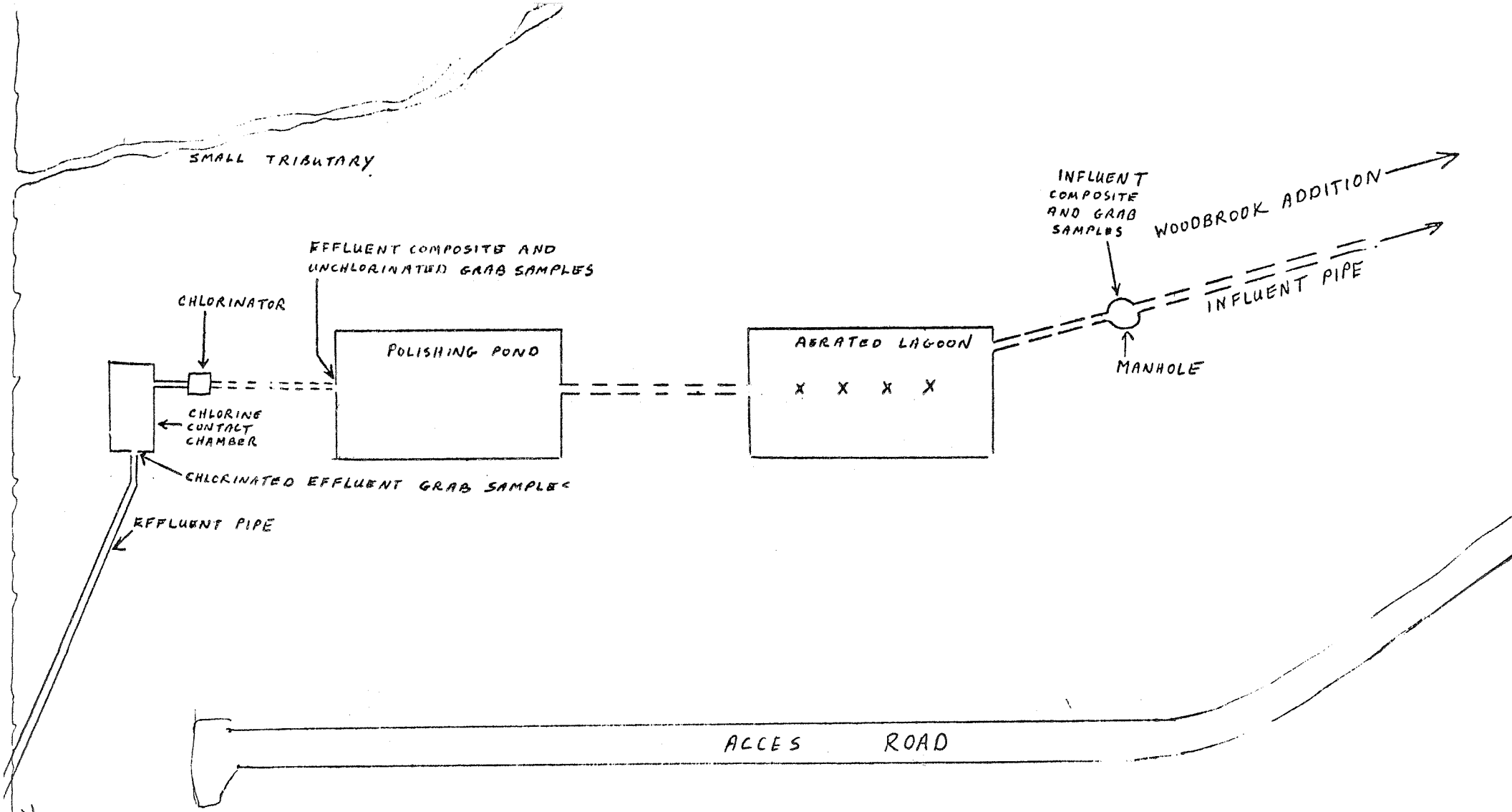

FIGURE 2

WOODBROOK LAGOON
COMPOSITE AND GRAB
SAMPLE SITES

TABLE 1

Ostrander Creek Sampling Stations

1) Approximately 15 feet upstream of confluence with small tributary [(2)], from south bank.

2) Upstream on small tributary approximately 10 feet above its confluence with Ostrander Creek.

3) Ostrander Creek approximately 15 feet below confluence with small tributary [(2)], south of mid channel.

4) Midstream at first bend in creek below STP, approximately 80 feet downstream from and of STP effluent pipe.

5) Approximately 6 feet downstream from Ostrander Road Bridge, east bank.

6) On the south fork of Ostrander Creek approximately 20 feet upstream of its confluence with mainstream, north bank.

7) Midchannel, approximately 50 feet downstream from confluence of Ostrander Creek and the south fork.

8) Approximately 10 feet downstream of Ostrander Road Bridge, south bank.

8A) Small runoff stream entering at [(8)] from north bank.

9) Approximately 1300 feet upstream from I-5, north bank.

TABLE 2

TEMPERATURE, pH, D.O. AND GEOMETRIC MEAN VALUES FOR CONDUCTIVITY, NUTRIENTS AND COLIFORM BACTERIA - OSTRANDER CREEK

Sta.	Total Coliform org/100 ml	Fecal Coliform org/100 ml	NO_3-N mg/l	NO_2-N mg/l	NH_3-N mg/l	OPO_4-P mg/l	Total Phos-P mg/l	Temperature °C			pH Field		pH Lab	Conductivity umhos/cm
1	28	2	.77	0	.02	<.02	.02	4.9	5.5	6.2	6.6	6.6	7.2	43
2	88	4	.44	0	.02	.01	.02	5.4	7.2	8.1	6.3	6.7	7.2	46
3	23	4	.68	0	.02	<.01	.02	5.2	6.0	6.7	6.3	6.8	7.2	42
4	27	4	.72	<.01	.02	.01	.03	5.2	5.6	6.8	6.7	6.7	7.2	42
5	25	2	.80	<.01	.02	.03	.04	5.7	5.8	6.4	6.4	6.0	7.3	43
6	46	3	1.73	0	.03	.02	.05	5.6	6.2	6.6	6.4	6.5	7.3	54
7	23	4	1.24	0	.02	.02	.03	5.7	5.9	6.4	6.4	6.7	7.3	49
8	44	6	1.15	0	.02	.01	.03	5.5	6.1	6.5	6.8	6.5	7.2	50
9	40	4	1.19	0	.02	.02	.03	5.5	6.2	6.6	6.7	6.5	7.2	51
8A	50	10											6.6	75

TABLE 2 . . . (Continued)

Station	D.O. (mg/l)		Turbidity (NTU)	Total Solids (mg/l)	Total Suspended Solids (mg/l)
1	12.38	12.04	4	49	10
2	12.25	12.42	6	45	9
3	12.30	12.42	5	46	11
4	12.35	12.37	4	56	10
5	12.44		4	53	11
6	12.42		5	62	11
7	12.52		4	55	12
8	12.39		5	57	11
9	12.38		5	55	10
8A				80	3

TABLE 3

SAMPLE VALUES FOR WOODBROOK LAGOON 3/16/77

	Influent (Grab)	Unchlorinated Effluent (Grab)	Unchlorinated Effluent (24 hr. composite)	Chlorinated Effluent (Grab)
Total Coliform (org./100 ml)	> 80,000	8600	- -	1000
Fecal Coliform (org./100 ml)	> 1,600	1000	- -	< 2
NO_3-N (mg/l)	0.30	0.70	0.80	0.90
NO_2-N (mg/l)	0	0.10	0.10	0
NH_3-N (mg/l)	2.0	4.30	4.60	4.0
OPO_4-P (mg/l)	0.90	3.80	3.90	4.0
Total Phos-P (mg/l)	- -	4.00	4.30	- -
D.O. (mg/l)	7.95	6.82	- -	9.2
BOD_5 (mg/l)	38	9	17	< 8
Temperature (°C)	11.2	7.3	- -	7.9
pH	6.5	7.0	- -	7.2
Turbidity (NTU)	21	10	12	10
Conductivity (umhos/cm)	270	220	230	230
Total Solids (mg/l)	220	155	175	159
Total Suspended Solids (mg/l)	29	23	25	17

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DATA SUMMARY

Source OSTRANDER CR. & STP pg 1 of 4 Collected By D. TUCKER

Date Collected 3-16-77

Log Number: 77-	1843	44	45	46	47	48	49	50	51	52
		GRAB			OSTRANDER CR. MORNING RUN					
Station:	WOODLAWN LAGOON INF	CHLOR. EFF	UNCHLOR EFF	UNCHLOR EFF. 24 hr. COMP	1	2	3	4	5	6
pH										
Turbidity (NTU)	21	10	10	12	4	6	5	5	4	5
Sp. Conductivity (umhos/cm)	270	230	220	230	43	51	43	43	45	56
COD										
BOD (5 day)	38.	<8	9.	17.						
Total Coliform (Col./100ml)	>80,000	EST 4,000	EST 8,600	—	140	EST 44	EST 18	EST 20	EST 20	EST 20
Fecal Coliform (Col./100ml)	>1,600	<2	EST 1000	—	<2	EST 8	EST 4	EST 4	EST 3	EST 10
NO3-N (Filtered)	.30	.40	.70	.80	.77	.51	.70	.71	.83	1.7
NO2-N (Filtered)	<.02	<.02	.10	.10	<.02					→
NH3-N (Unfiltered)	2.0	4.0	4.3	4.6	.02	.02	.02	.02	.02	.02
T. Kjeldahl-N (Unfiltered)										
O-PO4-P (Filtered)	.90	4.0	3.8	3.9	.02	.03	<.02	<.02	.04	<.02
Total Phos.-P (Unfiltered)	4.5	4.0	4.0	4.3	.03	.02	.02	.03	.04	.03
Total Solids	220	159	155	175	50	47	46	46	46	53
Total Non. Vol. Solids										
Total Suspended Solids	29	17	23	25	10	8	14	13	14	11
Total Sus. Non Vol. Solids										

Note: All results are in PPM (mg/L) unless otherwise specified. ND is "None Detected"
"<" is "Less Than" and ">" is "Greater Than"

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Summary By L. Rolf Date 4-7-77

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DATA SUMMARY

Source Ostrander Cr. Pg 2 of 4 Collected By DT

Date Collected 3-16-77

Log Number: (cont.) 77- 1853 54 55 56 57 58 59 60 61 62

MORNING NOON

Station:	7	8	9	1	2	3	4	5	6	7
pH										
Turbidity (NTU)	5	5	5	5	6	5	4	4	5	4
Sp. Conductivity (umhos/cm)	50	53	52	42	44	41	42	43	53	49
COD										
BOD (5 day)										
Total Coliform (Col./100ml)	EST 20	EST 48	EST 50	EST 15	EST 90	EST 22	EST 20	EST 20	EST 40	EST 20
Fecal Coliform (Col./100ml)	EST 6	EST 6	EST 6	<2	EST 4	EST 6	EST 6	EST 2	<2	EST 3
NO3-N (Filtered)	1.3	1.2	1.2	.72	.37	.70	.73	.80	1.7	1.3
NO2-N (Filtered)	<.02	→								→
NH3-N (Unfiltered)	.02	.02	.02	.02	.02	<.02	.02	.03	.02	.02
T. Kjeldahl-N (Unfiltered)										
O-PO4-P (Filtered)	.02	<.02	.02	<.02	<.02	<.02	.02	.02	.02	<.02
Total Phos.-P (Unfiltered)	.02	.03	.03	.02	.02	.02	.02	.04	.04	.03
Total Solids	53	55	51	46	42	43	60	56	65	53
Total Non. Vol. Solids										
Total Suspended Solids	11	15	13	11	10	11	10	10	11	14
Total Sus. Non Vol. Solids										

Note: All results are in PPM (mg/L) unless otherwise specified. ND is "None Detected"
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DATA SUMMARY

Source OSTRANDER Cr. Pg 3 of 4 Collected By DT

Date Collected 3-16-77

Log Number: (CONT.) 77 1863 64 65 66 67 68 69 70 71 72

NOON AFTERNOON

Station:	8	9	1	2	3	4	5	6	7	8
pH			7.2	7.2	7.2	7.2	7.3	7.3	7.3	7.2
Turbidity (NTU)	5	5	4	6	4	4	4	5	4	4
Sp. Conductivity (umhos/cm)	49	50	43	44	41	40	42	53	47	48
COD										
BOD (5 day)										
Total Coliform (Col./100ml)	EST 30	EST 30	EST 10	EST 170	EST 30	EST 50	EST 40	EST 120	EST 30	EST 60
Fecal Coliform (Col./100ml)	EST 4	EST 3	<2	EST 2	EST 2	<2	<2	EST 2	<5	<5
NO3-N (Filtered)	1.2	1.2	.76	.46	.63	.72	.77	1.8	1.1	1.1
NO2-N (Filtered)	<.02	→								
NH3-N (Unfiltered)	.02	.02	.02	.02	.05	.03	.02	.04	.03	.02
T. Kjeldahl-N (Unfiltered)										
O-PO4-P (Filtered)	<.02	.02	<.02	<.02	<.02	<.02	.03	.06	.02	<.02
Total Phos.-P (Unfiltered)	.03	.04	.02	.02	.03	.03	.04	.08	.04	.02
Total Solids	61	60	50	47	54	62	59	69	50	55
Total Non. Vol. Solids										
Total Suspended Solids	8	10	11	10	10	7	9	12	10	11
Total Sus. Non Vol. Solids										

Note: All results are in PPM (mg/L) unless otherwise specified. ND is "None Detected"
"<" is "Less Than" and ">" is "Greater Than"

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Summary By [signature] Date 4-27-77

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DATA SUMMARY

Source OSTRANDER Cr. pg 4 of 4 Collected By DT

Date Collected 3-16-77

Log Number: (CONT.) 77- 1873 (AFTERNOON) 74

Station:	8A	9								
pH	6.6	7.2								
Turbidity (NTU)	14	5								
Sp. Conductivity (umhos/cm)	75	51								
COD										
BOD (5 day)										
Total Coliform (Col./100ml)	EST 50	EST 44								
Fecal Coliform (Col./100ml)	EST 10	<5								
NO3-N (Filtered)		1.2								
NO2-N (Filtered)		<.02								
NH3-N (Unfiltered)		.03								
T. Kjeldahl-N (Unfiltered)										
O-PO4-P (Filtered)		<.02								
Total Phos.-P (Unfiltered)		.03								
Total Solids	80	53								
Total Non. Vol. Solids										
Total Suspended Solids	3	7								
Total Sus. Non Vol. Solids										

Note: All results are in PPM (mg/L) unless otherwise specified. ND is "None Detected"
"<" is "Less Than" and ">" is "Greater Than"

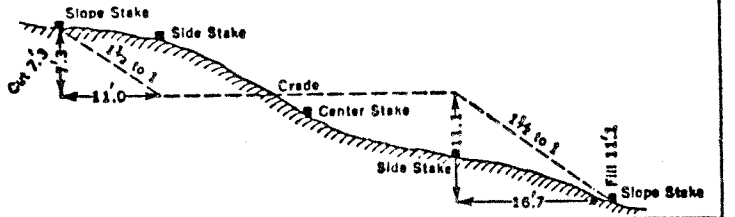
ECY 040-2-32

Summary By S. Rl Date 4-7-77

DISTANCES FROM SIDE STAKES FOR CROSS-SECTIONING

Roadway of any Width. Side Slopes 1½ to 1.

In the figure below: opposite 7 under "Cut or Fill" and under .3 read 11.0, the distance out from the side stake at left. Also, opposite 11 under "Cut or Fill" and under .1 read 16.7, the distance out from the side stake at right.



Cut or Fill	0	.1	.2	.3	.4	.5	.6	.7	.8	.9	Cut or Fill
	Distance out from Side or Shoulder Stake										
0	0.0	0.2	0.3	0.5	0.6	0.8	0.9	1.1	1.2	1.4	0
1	1.5	1.7	1.8	2.0	2.1	2.3	2.4	2.6	2.7	2.9	1
2	3.0	3.2	3.3	3.5	3.6	3.8	3.9	4.1	4.2	4.4	2
3	4.5	4.7	4.8	5.0	5.1	5.3	5.4	5.6	5.7	5.9	3
4	6.0	6.2	6.3	6.5	6.6	6.8	6.9	7.1	7.2	7.4	4
5	7.5	7.7	7.8	8.0	8.1	8.3	8.4	8.6	8.7	8.9	5
6	9.0	9.2	9.3	9.5	9.6	9.8	9.9	10.1	10.2	10.4	6
7	10.5	10.7	10.8	11.0	11.1	11.3	11.4	11.6	11.7	11.9	7
8	12.0	12.2	12.3	12.5	12.6	12.8	12.9	13.1	13.2	13.4	8
9	13.5	13.7	13.8	14.0	14.1	14.3	14.4	14.6	14.7	14.9	9
10	15.0	15.2	15.3	15.5	15.6	15.8	15.9	16.1	16.2	16.4	10
11	16.5	16.7	16.8	17.0	17.1	17.3	17.4	17.6	17.7	17.9	11
12	18.0	18.2	18.3	18.5	18.6	18.8	18.9	19.1	19.2	19.4	12
13	19.5	19.7	19.8	20.0	20.1	20.3	20.4	20.6	20.7	20.9	13
14	21.0	21.2	21.3	21.5	21.6	21.8	21.9	22.1	22.2	22.4	14
15	22.5	22.7	22.8	23.0	23.1	23.3	23.4	23.6	23.7	23.9	15
16	24.0	24.2	24.3	24.5	24.6	24.8	24.9	25.1	25.2	25.4	16
17	25.5	25.7	25.8	26.0	26.1	26.3	26.4	26.6	26.7	26.9	17
18	27.0	27.2	27.3	27.5	27.6	27.8	27.9	28.1	28.2	28.4	18
19	28.5	28.7	28.8	29.0	29.1	29.3	29.4	29.6	29.7	29.9	19
20	30.0	30.2	30.3	30.5	30.6	30.8	30.9	31.1	31.2	31.4	20
21	31.5	31.7	31.8	32.0	32.1	32.3	32.4	32.6	32.7	32.9	21
22	33.0	33.2	33.3	33.5	33.6	33.8	33.9	34.1	34.2	34.4	22
23	34.5	34.7	34.8	35.0	35.1	35.3	35.4	35.6	35.7	35.9	23
24	36.0	36.2	36.3	36.5	36.6	36.8	36.9	37.1	37.2	37.4	24
25	37.5	37.7	37.8	38.0	38.1	38.3	38.4	38.6	38.7	38.9	25
26	39.0	39.2	39.3	39.5	39.6	39.8	39.9	40.1	40.2	40.4	26
27	40.5	40.7	40.8	41.0	41.1	41.3	41.4	41.6	41.7	41.9	27
28	42.0	42.2	42.3	42.5	42.6	42.8	42.9	43.1	43.2	43.4	28
29	43.5	43.7	43.8	44.0	44.1	44.3	44.4	44.6	44.7	44.9	29
30	45.0	45.2	45.3	45.5	45.6	45.8	45.9	46.1	46.2	46.4	30
31	46.5	46.7	46.8	47.0	47.1	47.3	47.4	47.6	47.7	47.9	31
32	48.0	48.2	48.3	48.5	48.6	48.8	48.9	49.1	49.2	49.4	32
33	49.5	49.7	49.8	50.0	50.1	50.3	50.4	50.6	50.7	50.9	33
34	51.0	51.2	51.3	51.5	51.6	51.8	51.9	52.1	52.2	52.4	34
35	52.5	52.7	52.8	53.0	53.1	53.3	53.4	53.6	53.7	53.9	35
36	54.0	54.2	54.3	54.5	54.6	54.8	54.9	55.1	55.2	55.4	36
37	55.5	55.7	55.8	56.0	56.1	56.3	56.4	56.6	56.7	56.9	37
38	57.0	57.2	57.3	57.5	57.6	57.8	57.9	58.1	58.2	58.4	38
39	58.5	58.7	58.8	59.0	59.1	59.3	59.4	59.6	59.7	59.9	39
40	60.0	60.2	60.3	60.5	60.6	60.8	60.9	61.1	61.2	61.4	40

Ostrander Crk. 3/16/77

Project: Apparently complaints by local people have been lodged & our agency concerning aesthetic water quality of Ostrander Creek east of I-5 ~ 1 mile N. of Kelso, Wash. DOE has been requested to determine whether problem arises from Woodbrook sewage treatment lagoon or septic tanks from residences along creek.

Plan is to have county set two 24 hr composite samples on influent and effluent of treatment lagoon ~ 0900 3/15/77, and composite samples taken ~ 1000 3/16/77. Recent rainfall precludes setting sampler d/t of chlorine contact chamber, therefore effluent sample will be manually collected and similar grab samples will be taken of both

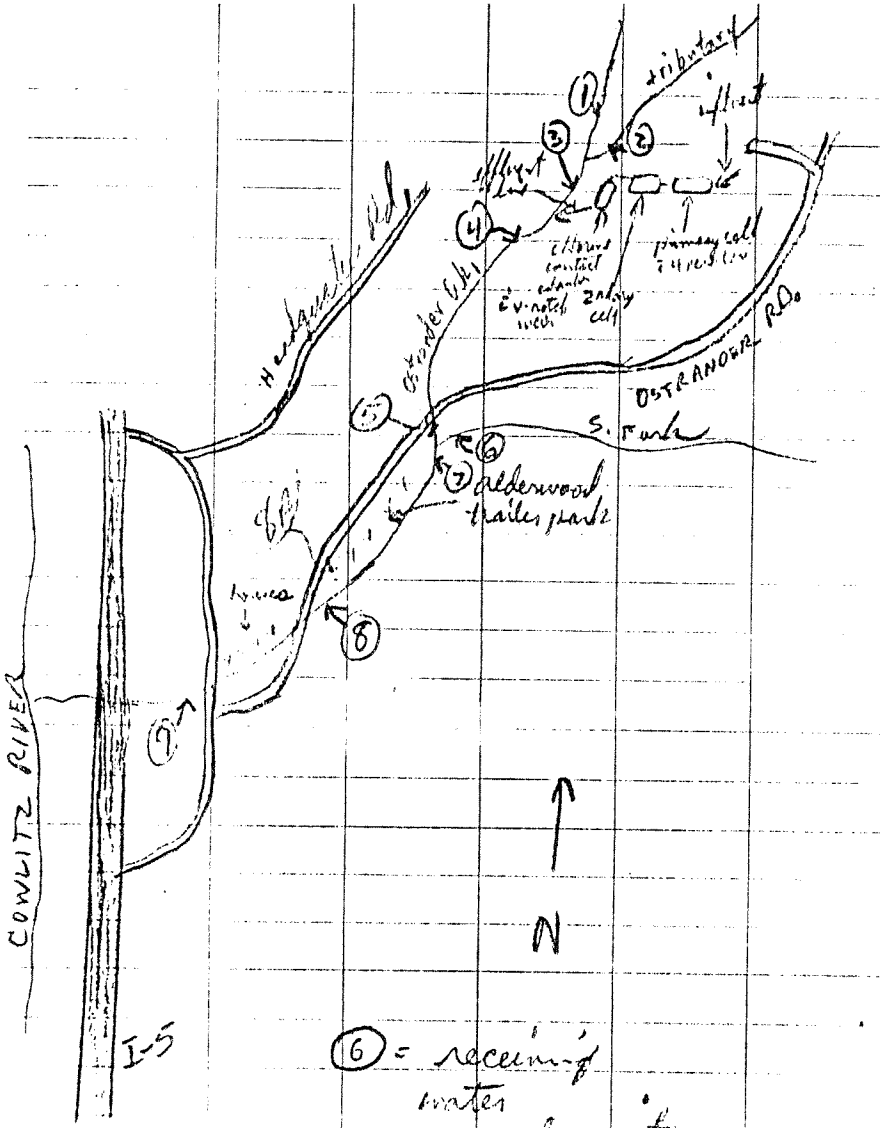
Ostrander Creek 3/16/77

project ... cont.

Chlorinated and unchlorinated effluent to determine differences in sample parameters.

In addition the creek will be sampled to determine resultant receiving water conditions. Three sets of samples will be taken for statistical validity.

Total & fecal coliform samples will be taken as coliform bacteria should show as a result of either septic tanks & the STP or both. BOD_5 samples and Total Solids (TS) & Total suspended solids (TSS) as well as measurements of pH, specific conductivity in micro-mhos/cm and temperature will be made of STP influent & effluent to determine treatment efficiency and further characterize effluent



(6) = receiving waters sample sites

(a), (b) = composite sample sites

(c), (d) = chlorinated, unchlorinated grab sample sites

Ostrander Creek 3/16/77

project . . . cont.

discharge. Similar national holds for sampling for NO_3-N, NH_3-N, NO_2-N, PO_4, OPO4. Samples for dissolved oxygen by the Winkler Method (azide modification) and other corresponding to STP samples will be taken to determine condition of creek.

Sample points are spaced as per drawing facing page.

Woodbrook lagoon is a two cell lagoon & small chlorine contact chamber, retention time unknown and is said to have been operating well. It serves ~ 1/0 hookups.

Ostrander Creek 3/16/77

Personnel: Dale Tucker, Brad Everson, Gerry [illegible]

Weather: % cloud cover — ≤ 20%
measured air temp — ~ 6°C
@ 0730 wind direction — minimal
wind velocity —
precipitation — none

Comments — Conductivity bridge [illegible] [illegible] battery [illegible]. Lab will [illegible] at specified conductance.
Influent [illegible] failed to [illegible] [illegible] [illegible] pile. Weir Box calibrated and effluent flow [illegible]
Must [illegible] [illegible] on return to lab due to [illegible] on last sampling run.
Added [illegible] runoff from culvert by [illegible]. [illegible] ≤ 0.1 [illegible].

6

Ostrander Creek 3/16/77

Calibrations

PH meter (±0.1 pH unit) Analytical Instr. Model 101 A

Time	pH	Standard
0733	7.0	7.0
0820	7.0	7.0
1145	7.0	7.0
1220	7.0	7.0
1330	7.0	7.0
1340	7.0	7.0

Conductivity Bridge is

Time	standard	temp	cond. bridge

Ostrander Creek 3/16/77

Station / time	cond. in µmhos/cm²	temp in °C	pH	Winkler / value	samples taken
1 / 0805		4.9°	6.6	6 / 12.32	Mid, TP, TS
2 / 0805		5.4°	6.7	80 / 12.25	"
3 / 0805		5.2°	6.7	23 / 12.30	"
4 / 0825		6.2	6.7	66 / 12.35	"
[illegible] / 0840		11.2	6.5	69 / 7.35	" MBD
[illegible] / 0930		7.3	7.0	3 / 6.82	"
[illegible] / 0950		7.9	7.15	12 / 9.20	"
1 / 1005		5.7	6.4	4 / 12.42	"
5 / 1005		5.7	6.4	30 / 12.44	"
6 / 1005		5.6	6.4	35 / 12.42	"

0.07 MGD <

Oatranky Creek 3/16/77

Station / time	cond. in µmhos/cm²	Temp. in °C	pH	Winkler, ml / value	samples Taken
9 1020		5.5	6.8	12.39	
9 1045		5.5	6.7	12.38	
[illegible]		5.5	6.6	[illegible] 12.34	
[illegible]		7.2	6.7	12.42	
[illegible]		6.0	6.8	12.42	
[illegible]		5.6	6.7	12.37	
[illegible]		5.8	6.0		
[illegible]		6.2	6.5		
[illegible]		5.9	6.0		
[illegible]		6.1	6.5		
[illegible]		6.2	6.5		

Woodcock Lagoon 3/16/77

Retention time:

Dye in effluent area 1303:30

Dye in effluent 1314:30

11 min.

Ostrander Cr. 3/16/77

Station	Time	Temp. in °C	pH	Samples taken
1	1340	6.2	4.5	Cond, Turb, TS, TSS, NVTS, TSF Col.
2	1340	8.1	4.5	"
4	1340	6.8	4.5	"
5	[illegible]	6.7		"
6	[illegible]	6.4		"
6	[illegible]	6.6		"
7	[illegible]	6.4		"
8	1430	6.5		"
8A	1430			TSF Col. [illegible]
9	1440	6.6		" + NVTS

January 21, 1974

Memo to: Gerry Calkins, Howard Steeley

From: Pat Lee

Subject: Efficiency Study at Woodbrook Lagoon, Cowlitz County.

An efficiency study was to be conducted on Woodbrook Lagoon in Cowlitz County on November 14, 1973, but due to inclement conditions and a locked gate, only grab samples were taken. The premises were well fenced although I was able to climb over in one spot. The key Gerry Calkins loaned to me opened the building but not the main gate.

The results of the grab samples are not indicative of the efficiency of the plant due to the lack of loading in the influent. Because of the long detention time in lagoons however, a grab of the effluent is relatively valid. The effluent results show good disinfection with both fecal coliform results less than 200 colonies per 100 ml. The BOD of the effluent was well below the new EPA Standards while the suspended solids were not. The plant grounds still seemed to be in a state of construction.

PL:jmh

(EFFICIENCY STUDY)

City Woodbrook Develop. Plant Type Aerated Lagoon Population Served 150 Design Capacity 600

Receiving Water Ostrander Creek Engineer Howard Steeley

Date 11-14-73 Survey Period _____ Survey Personnel P. Lee & D. Anderso

Comp. Sampling Frequency Grab Sample Weather Conditions (last 48 hours) Heavy Rain

Sampling Alequot Grab Sample

PLANT OPERATION

Total Flow _____ How Measured 90° V Notch Weir

Max. (Flow) .21 MGD Time of Max. 1400 Min. _____ Time of Min. _____

Pre Cl_2 0 #/day Post Cl_2 2 #/day

FIELD RESULTS

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

LABORATORY RESULTS ON COMPOSITE IN PPM

Laboratory Number	Influent	Effluent	% Reduction
	73-4207	4208	
5-Day BOD	80	15	
COD	12	54	
T.S.	80	185	
T.N.V.S.	24	92	
T.S.S.	26	64	
N.V.S.S.	12	31	
pH	6.5	7.6	
Conductivity	106	270	
Turbidity	10	11	

Woodbrook Development

BACTERIOLOGICAL RESULTS

$Na_2S_2O_3$ added to sample before sampling after _____ min.

LAB #	SAMPLING TIME	COLONIES/100 MLS (ME) Total	Fecal	Cl Residual ppm	Cl Residual (after secs.)
73-4209	1330	11,500	< 200	.4	180
4210	1400	13,000	< 200	.4	180

Operator's Name Cowlitz County Health District Phone # 423-6960

Comments: $T\text{-}PO_4\text{-}P$ = 4.45ppm

$O\text{-}PO_4$ = .10 ppm

T.Kjeldahl-N = 4.0 ppm

$NH_3\text{-}N$ = 3.4 ppm

$NO_2\text{-}N$ = .01 ppm

$NO_3\text{-}N$ = 1.0 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. 42-R1527

CHECK ONE	DATE OF AUDIT	PLANT DESCRIPTION CODE (For Official Use Only)
[X] 1ST AUDIT [ ] RE-AUDIT	11-14-73	Lagoon (aerated)

A. GENERAL INFORMATION

1. PROJECT (State, Number)	SCOPE OF PROJECT (new plant, additions, etc.)
Washington	Routine
2. PLANT LOCATION (City, county)	**IDENTIFICATION OF AREAS SERVED**
Cowlitz County	Woodbrook Development

3. POPULATION

3A. FRACTION OF AREA POPULATION SERVED (%)	3B. PLANT DESIGN (population equivalent)	3C. SERVED BY PLANT (domestic)
100	600 (?)	150

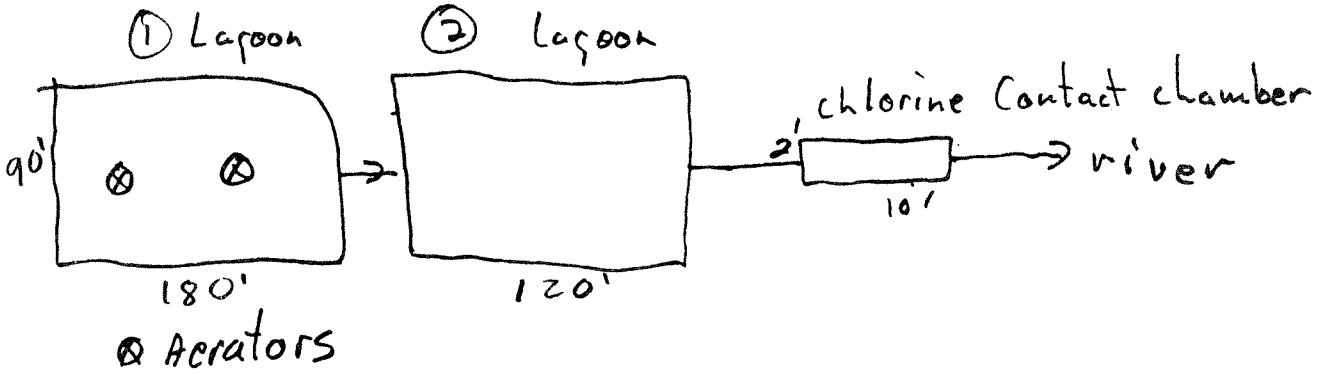
4. TYPE OF COLLECTION SYSTEM

4A.	4B. ESTIMATED FLOW CONTRIBUTED BY SURFACE OR GROUND WATER (infiltration, mgd)
[ ] COMBINED [ ] SEPARATE [ ] BOTH	.15

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

7A. SIZE OF PLANT SITE (acres)	7B. APPROXIMATE AREA LEFT FOR EXPANSION (acres)
3	3

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.

Aerators in primary lagoon

9. RECEIVING STREAM

9A. NAME OF STREAM

9B. STREAM FLOW IS			
[X] PERENNIAL [ ] INTERMITTENT	[X] NATURAL [ ] REGULATED	[ ] INTERSTATE [X] INTRASTATE [ ] COASTAL	

B. CURRENT PERFORMANCE AND PLANT LOADING INFORMATION

1A. ANNUAL AVERAGE DAILY FLOW RATE (mgd)	1B. PEAK FLOW RATE (mgd)		1C. MINIMUM FLOW RATE (mgd)
	DRY WEATHER	WET WEATHER	
.05		.21	?

2. AVERAGE BOD OF RAW SEWAGE (5 DAY 20°C) (ppm)	3. AVERAGE SETTLEABLE SOLIDS OF RAW SEWAGE (ml/l)
	1
4. AVERAGE SUSPENDED SOLIDS OF RAW SEWAGE (ml/l)	**5. AVERAGE COLIFORM DENSITY OF RAW SEWAGE**

6. ANNUAL AVERAGE PLANT REDUCTION

6A. BOD (%)	6B. SETTLEABLE SOLIDS (%)	6C. SUSPENDED SOLIDS (%)	6D. COLIFORM DENSITY (%)
	99%		

15. STABILIZATION PONDS

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

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

C. FENCING AND POSTING – "POLLUTED WATER" SIGNS PRESENT AND IN GOOD REPAIR? ☒ YES ☐ NO

D. FREQUENCY OF INSPECTION BY OPERATOR: daily

E. WATER DEPTH (feet)

_____ HIGH _____ 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

IF YES, NAME OF SPECIES IF KNOWN

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 answered, 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	MAIN-TENANCE	OTHER
DAILY		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?

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

☒ YES ☐ NO (If no, explain)

8. INDUSTRIAL WASTES DISCHARGED TO MUNICIPAL SYSTEM: NO	A. NUMBER AND TYPES OF INDUSTRIES DISCHARGING TO SYSTEMS
B. POPULATION EQUIVALENT (BOD) OF INDUSTRIAL WASTES (pe)	C. POPULATION EQUIVALENT (SS) OF INDUSTRIAL WASTES (pe)
D. VOLUME OF INDUSTRIAL WASTES (mgd)	E. COMPOSITION AND CHARACTERISTICS OF INDUSTRIAL WASTES

F. MAIN DIFFICULTY EXPERIENCED WITH INDUSTRIAL WASTE (explain)

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?

11. IS A MANUAL OF PRACTICE OR INSTRUCTIONS AVAILABLE? ☐ YES ☐ NO	IF YES, WHO WROTE AND PROVIDED IT?

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

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					
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
2 – 4, 5 or 6 per week
3 – 1, 2, or 3 per week
4 – as required
5 – 2 or 3 per month
6 – 1 per month
7 – Quarterly
8 – Semi-Annually
9 – 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		2				
4. SUSPENDED VOLATILE								
5. DISSOLVED OXYGEN	2	2		2				
6. TOTAL SOLIDS								
7. VOLATILE SOLIDS								
8. pH	2	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	TITLE	ORGANIZATION
R. Lee	E II	DOE

INFORMATION FURNISHED BY	TITLE	ORGANIZATION	DATE

7A. DOES PLANT HAVE STANDBY POWER GENERATOR FOR MAJOR PUMPING FACILITIES? ☐ YES ☐ NO

7B. ADEQUATE ALARM SYSTEM FOR POWER OR EQUIPMENT FAILURE? ☐ YES ☐ NO

8. ARE CHLORINATION FACILITIES PROVIDED? ☐ YES ☐ NO IF YES, ANSWER 8A THRU G

IF YES, IS CHLORINATION CONTINUOUS? ☐ YES ☐ NO
IF NO, EXPLAIN REASON FOR INTERMITTENT CHLORINATION

8A. PURPOSE OF CHLORINATION

8D. TYPE OF CHLORINATOR Wallace + Tiernan

8C. POINT OF APPLICATION OF CHLORINE Effluent

8D. CAN BYPASSED SEWAGE BE CHLORINATED? ☐ YES ☐ NO

8E. AVERAGE FEED RATE OF CHLORINE (lb/day) 2.

8F. CHLORINE RESIDUAL IN EFFLUENT _____ PPM AT END OF _____ MINUTES

8G. MINIMUM SUPPLY OF CHLORINE STORED ON PREMISES (lb) 150 165

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

12. USES OF RECEIVING STREAM WITHIN 10 MILES OF OUTFALL

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

STATE OF WASHINGTON

DEPARTMENT OF ECOLOGY

WATER QUALITY LABORATORY

ORIGINAL TO: P. Lee
COPIES TO:
LAB FILES

DATA SUMMARY

Source Woodbrook Lagoon (sw) Collected By P. Lee

Date Collected 11/14/73 Goal, Pro./Obj.

Log Number: 73- 4207 08 09 10

Station:	INF	EFF	1330	1400							STORET
pH	6.5	7.6									00403
Turbidity (JTU)	10.	11.									00070
Conductivity (umhos/cm)@25°C	106.	270.									00095
COD	12	54									00340
BOD (5 day)	<80	15									00310
Total Coliform (Col./100ml)	-	-	11,500	13,000							31504
Fecal Coliform (Col./100ml)	-	-	<200	<200							31616
NO3-N (Filtered)	-	1.00									00620
NO2-N (Filtered)	-	.01									00615
NH3-N (Unfiltered)	-	3.4									00610
T. Kjeldahl-N (Unfiltered)	-	4.0									00625
O-PO4-P (Filtered)	-	.10									00671
Total Phos.-P (Unfiltered)	-	4.45									00665
Total Solids	80	185									00500
Total Non Vol. Solids	24	92									
Total Suspended Solids	26	64									00530
Total Sus. Non Vol. Solids	12	31									
Color	16	70									
Chlorides	4	10									

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 D. Ruth Date 12-14-73