

M E M O R A N D U M

April 21, 1976

To: Mark Premo

From: Phil Williams

Subject: Bioassay, Live Box, and Physical-Chemical Results
of Cedar Hills Landfill Survey

In response to your letter dated March 11, 1976 a survey was initiated to determine the current status of the Cedar Hills landfill leachate problem. On March 16, 1976 three live boxes were placed in Mason Creek at Station #1 (Figure 1) and allowed to acclimate for 72 hours. Test organisms were Fall Chinook (Oncorhynchus tshawytscha) obtained from the Issaquah hatchery and having similar dimensions to those used in the laboratory bioassay (attached memo). The cylindrical fiberglass live boxes were 12 inches in diameter by 20 inches long and each held ten fish. Two live boxes were also placed in Issaquah Creek just above its confluence with Mason Creek. After the three day acclimation period two of the live boxes on Mason Creek were relocated to downstream stations -- one 13 M and one 60 M below where the leachate stream enters Mason Creek. One live box from Issaquah Creek was relocated to 30 M below its confluence with Mason Creek. The subsequent 96-hour incubation produced no mortalities or apparent stress in any of the five live boxes.

In addition to the live box study a laboratory bioassay was conducted using Mason Creek water collected on March 19, 1976. Results of the bioassay can be found in the attached memo. In short, the landfill runoff did not affect fish mortality in Mason Creek sample water.

Samples for water quality analysis were also collected on March 19, 1976. Station numbers and locations appear in Figure 2 and are identical to those used by Ron Devitt in his survey dated January 10, 1974.

Results of these chemical analyses are compared with those from Devitt's April 18, 1973 samples in Figure 3. The effect of the leachate on the water quality of Mason Creek is significant but much less than it was in the April, 1973 samples. Improvements in leachate quality may be a consequence of recently installed collection facilities or they could simply be related to differences in rainfall and runoff rates between the two sampling dates. Data from the nearest weather station (Portage Bay) indicates that 0.61 inches of total precipitation fell during the four days preceding sampling in 1973 versus 0.39 inches in 1976. It is doubtful that this rather subtle difference in rainfall could account for all variation in chemical results between the two dates, therefore some of the improvement must be due to the leachate collection system.

PW:ee

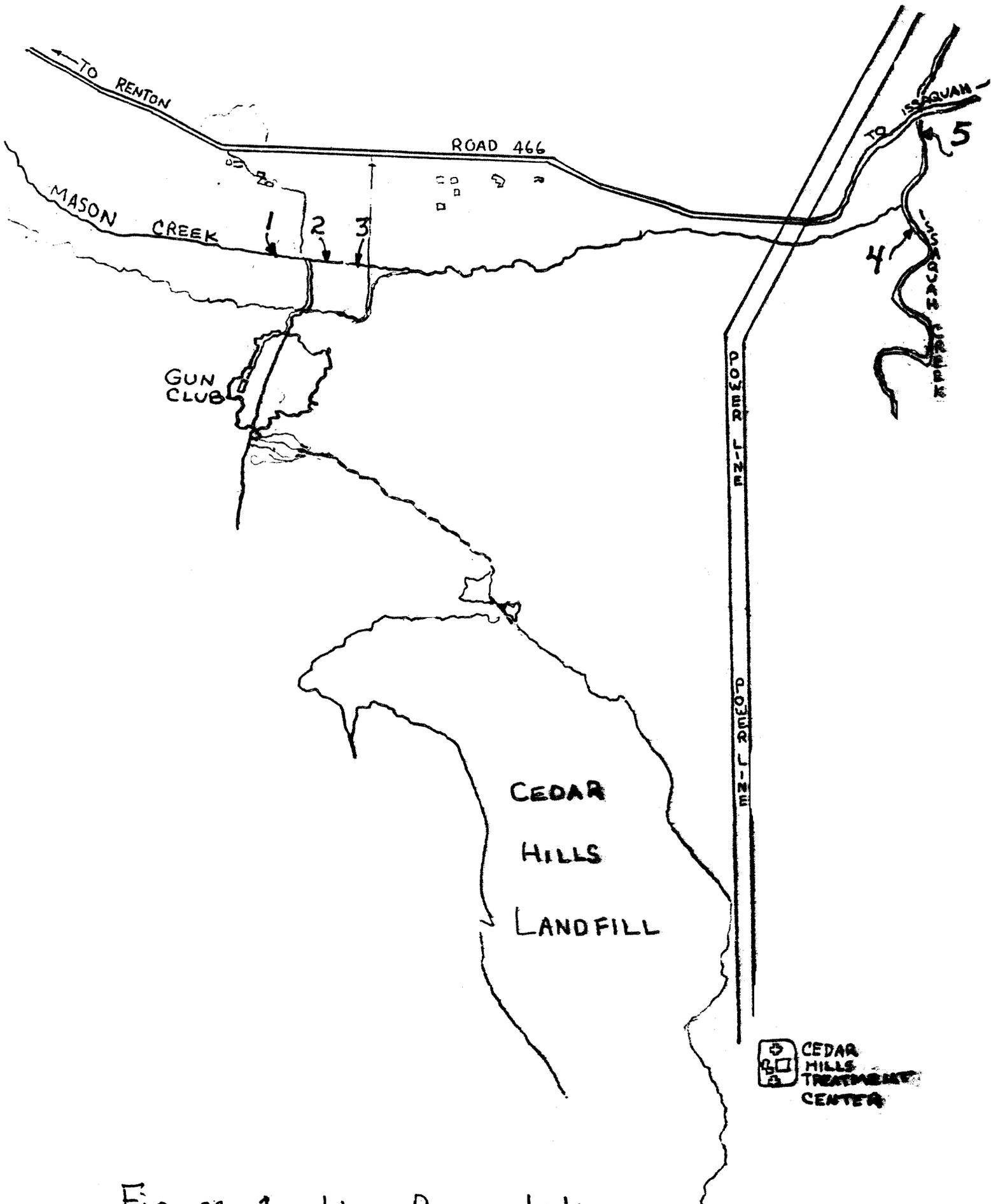


Figure 1. Live Box stations used in Mason creek study.

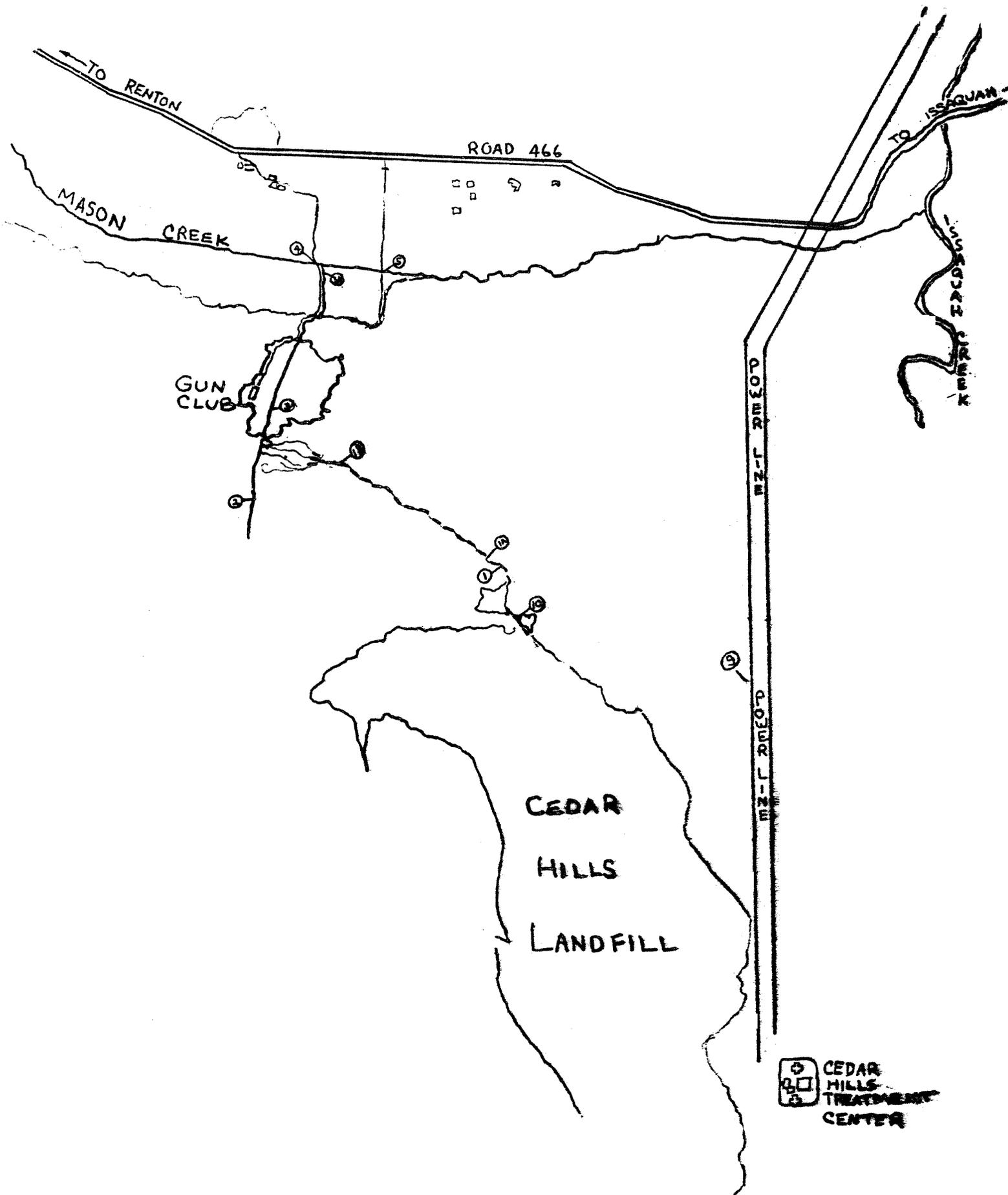


Figure 2. Map of the study area showing water chemistry stations.

Figure 3. Physical and Chemical Results
 (3-19-76) (4-18-73)

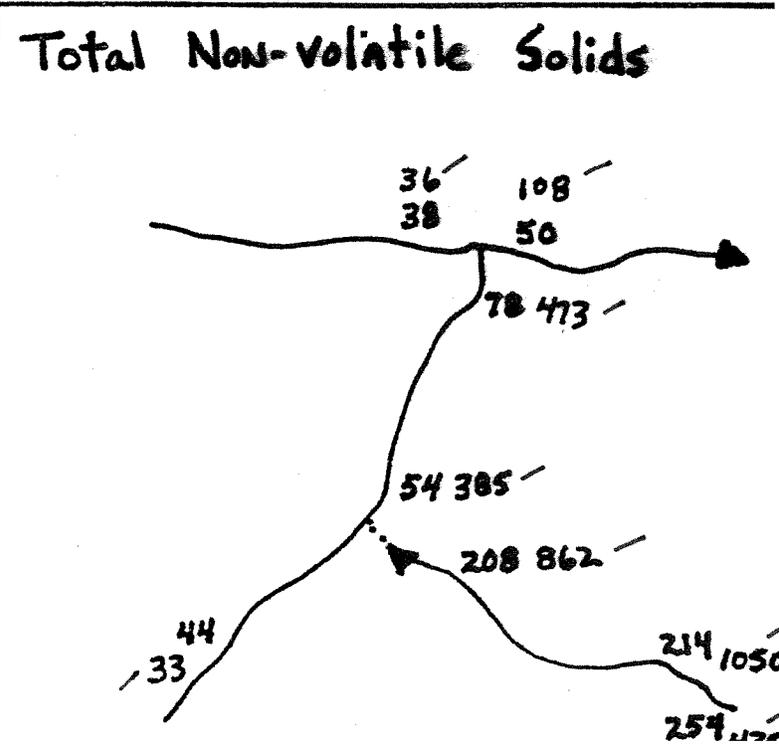
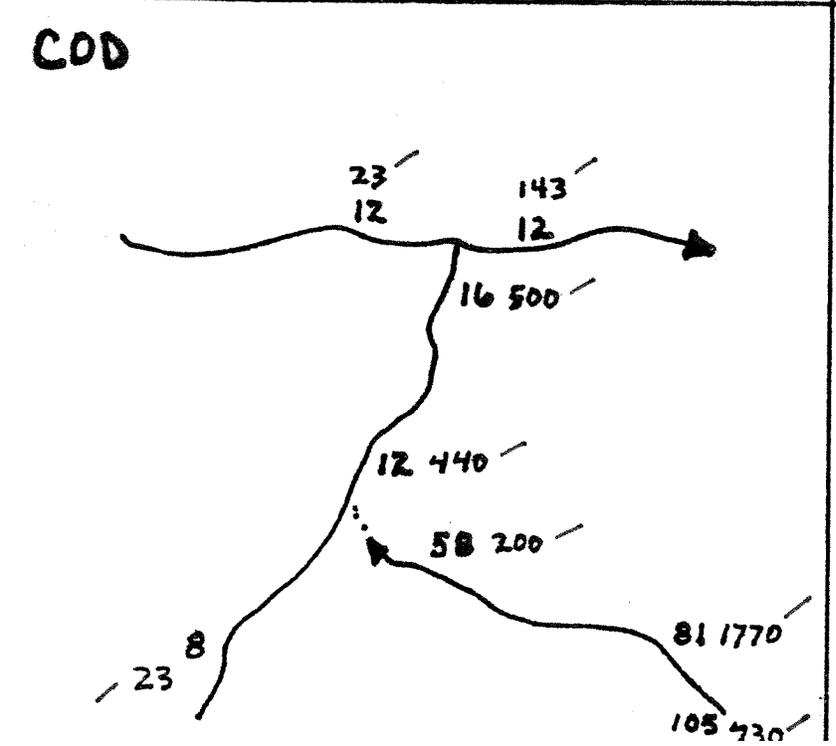
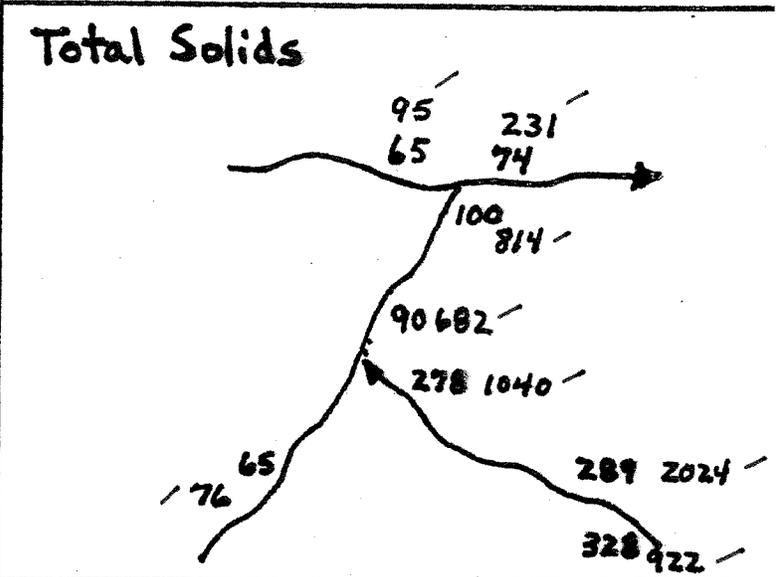
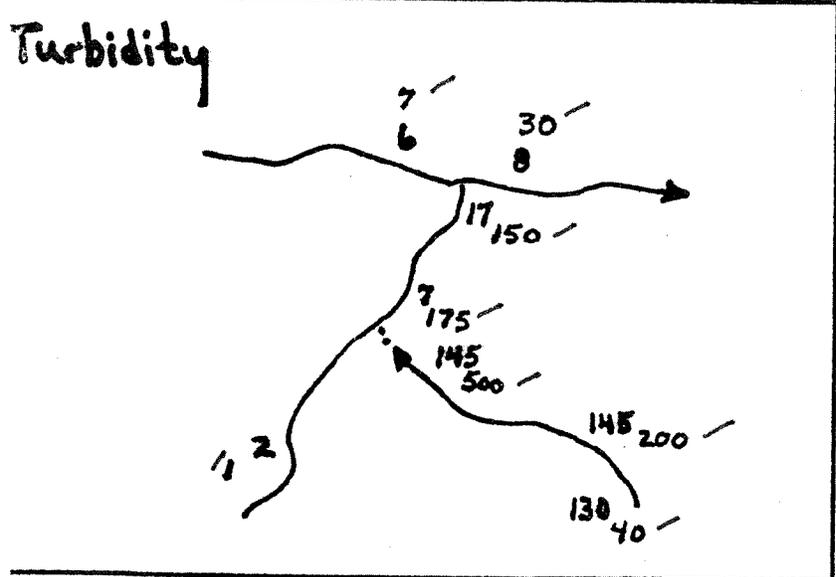
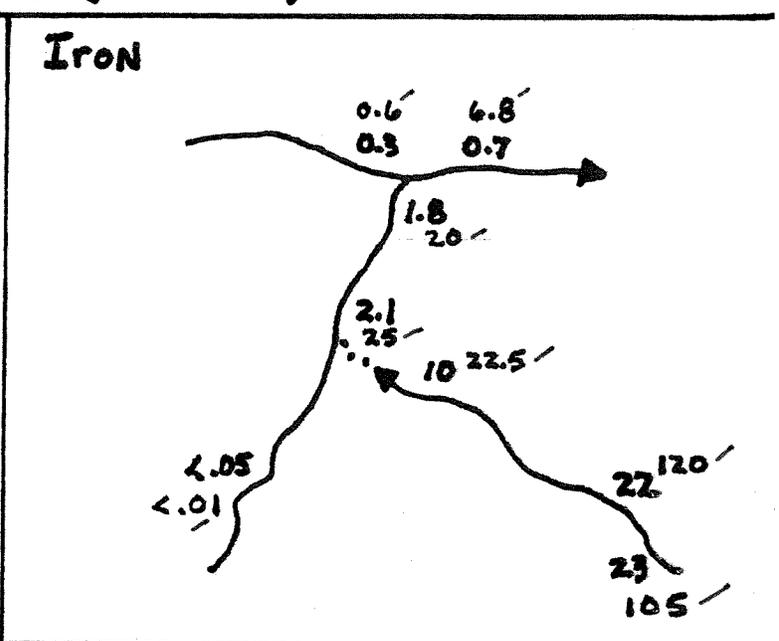
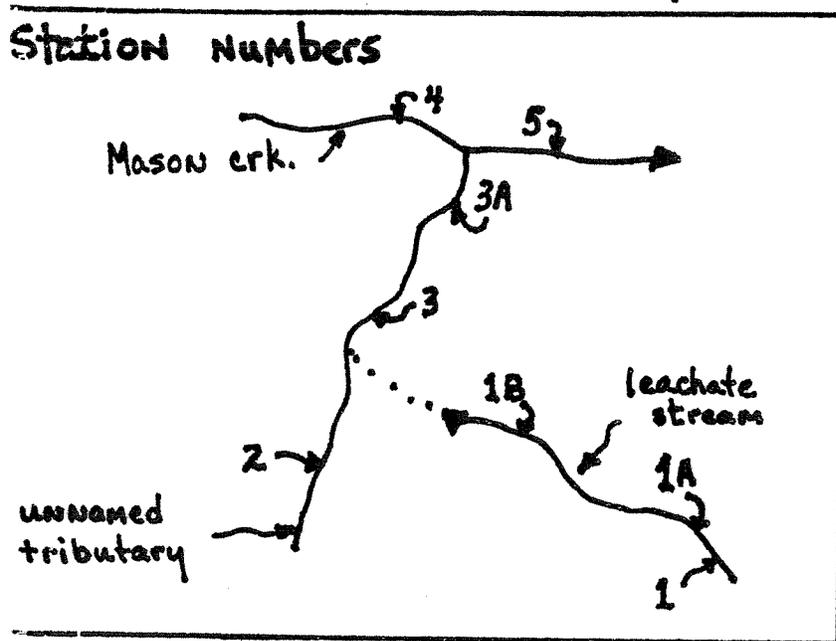
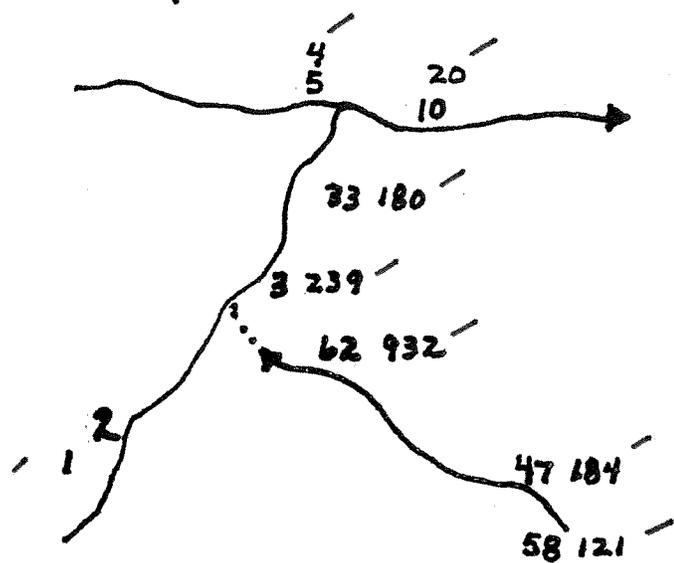
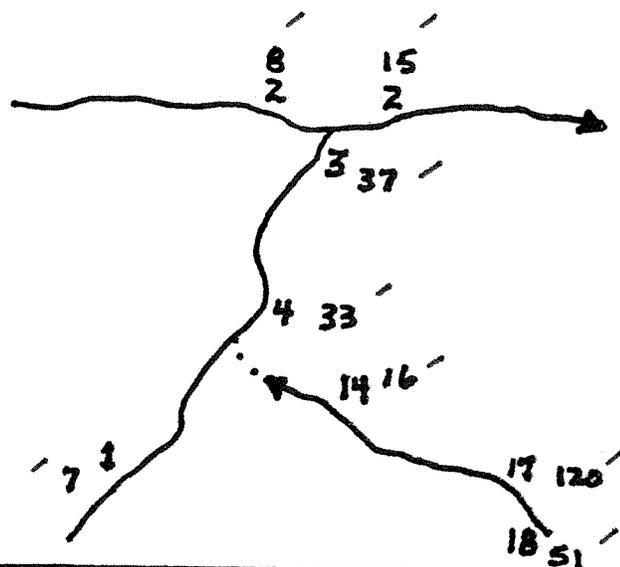


Figure 3. Physical and Chemical Results (cont.)
 (3-19-76) (4-18-73)

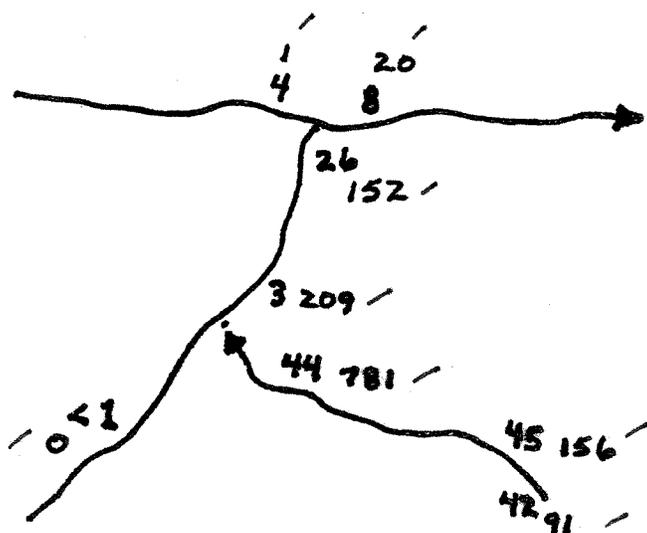
Total Suspended Solids



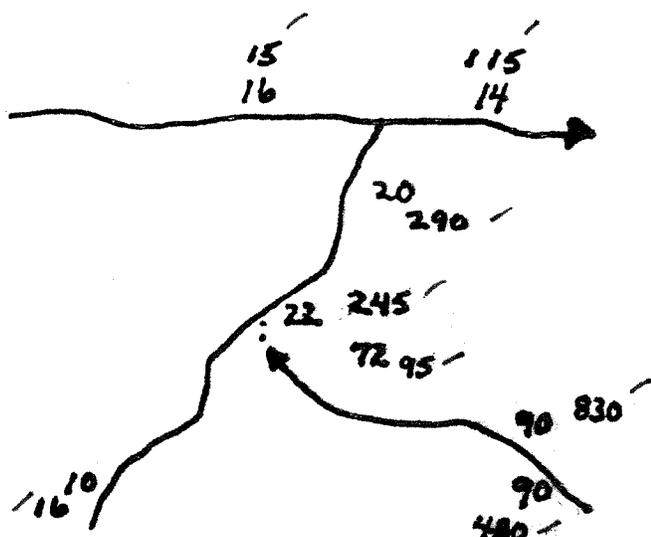
Chlorides



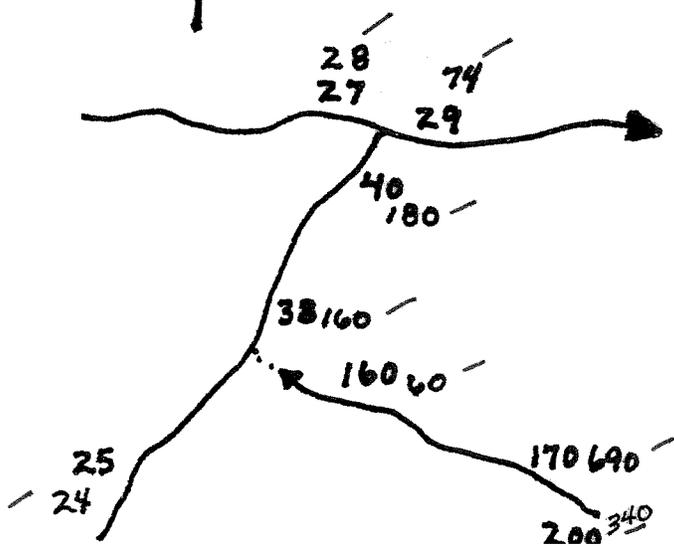
Total Susp. Non-volatile Solids



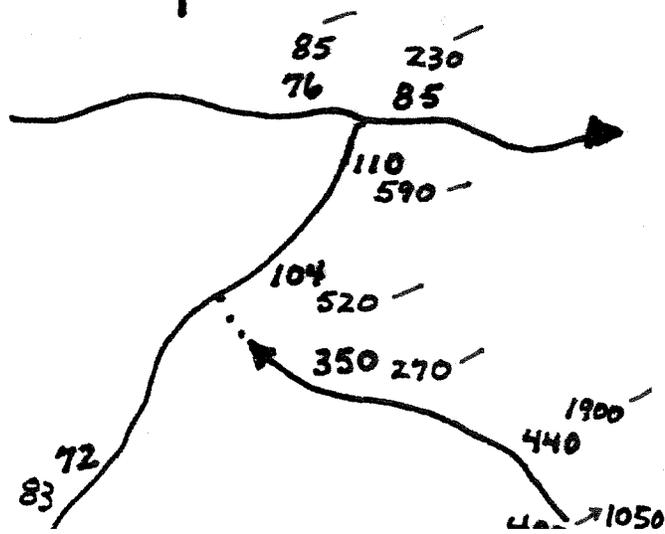
Hardness



Alkalinity



Conductivity



MEMORANDUM

March 30, 1976

To: Phil Williams

From: Don Kjosness, Aquatic Biologist

Subject: Bioassay on Mason Creek

A 96-hour static bioassay was conducted on the undiluted sample water collected from Mason Creek. The test was run from 1530 hours on 3/23/76 to 1530 hours on 3/27/76. The method and procedure used is described in Standard Methods 1971 (Page 562-577).

The test organisms used were Fall Chinook (*Oncorhynchus Tschawytscha*) obtained from the Issaquah Hatchery. They averaged 0.71 gm/fish in weight with a mean length of 46 mm. The longest was 53 mm and the shortest was 40 mm (length ratio 1: 1.33).

The test was run in triplicate with each test tank containing eight (8) liters of sample water and eight (8) fish per tank. This gave a flesh to sample ratio of 0.71 gms/liter. The control tank had 30 fish in 30 liters of tap water.

The results were as follows:

Control				
Date	Temp (C°)	D.O. (ppm)	pH	Mortalities
3/23	10.8	8.8	7.7	0
3/24	10.9	8.8	7.8	0
3/25	12.2	8.1	7.7	0
3/26	11.8	9.1	7.8	0
3/27	10.9	9.0	7.8	0
Total				0

Mason Creek above Cedar Hills Sanitary
Landfill Leachate Stream

Date	Temp (C°)	D.O. (ppm)	pH	Mortalities
3/23	10.3	11.2	6.9	0
3/24	10.5	9.4	7.4	0
3/25	10.5	9.4	7.4	0
3/26	10.5	10.3	7.5	2
3/27	9.9	10.3	7.4	0
Total				2 (8.3%)

Mason Creek below Cedar Hills Sanitary
Landfill Leachate Stream

Date	Temp (C°)	D.O. (ppm)	pH	Mortalities
3/23	10.2	11.2	7.0	0
3/24	10.7	9.4	7.3	0
3/25	10.6	9.3	7.3	0
3/26	10.5	10.2	7.5	0
3/27	10.0	10.5	7.3	0
			Total	0

No mortalities were exhibited in the sampled water collected from Mason Creek below the Cedar Hills Sanitary Landfill. There were no signs of stress or unusual behavior.

The water sampled from Mason Creek showed no dangerous effects on the test organism used.

DK:ee

cc: Merley McCall
Ron Pine



DATA SUMMARY

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

Source Cedar Hills Landfill

Page 1 of 2

Collected By P. Williams

Date Collected 3-19-76

Log Number:	76-844	45	46	47	48	49	50	51	52	(cont)
Station:	3-A	5	4	3	2	1	12	13	1-B	
T. HARDNESS (as CaCO ₃)	20	14	16	22	10	14	14	16	72	
Turbidity (NTU)	17	8	6	7	2	6	3	5	145	
Sp. Conductivity (umhos/cm)	110	85	76	104	72	86	78	79	350	
COD	16	12	12	12	8	12	18	8	58	
IRON	1.8	0.7	0.3	2.1	<.05	0.4	0.1	0.2	10.0	
Total Coliform (Col./100ml)										
Fecal Coliform (Col./100ml)										
NO ₃ -N (Filtered)	0.90	0.82	0.90	0.93	1.1	1.1	0.93	0.97	0.10	
NO ₂ -N (Filtered)	<.02	<.02	.04	<.02	<.02	<.02	<.02	<.02	<.02	
✓NH ₃ -N (Unfiltered)	0.38	0.18	0.10	0.37	0.08	0.11	0.05	0.06	2.6	
T. Kjeldahl-N (Unfiltered)										
O-PO ₄ -P (Filtered)										
Total Phos.-P (Unfiltered)										
Total Solids	100	74	65	90	65	80	78	74	278	
Total Non. Vol. Solids	78	50	38	54	44	54	42	44	208	
Total Suspended Solids	33	10	5	3	2	7	4	5	62	
Total Sus. Non Vol. Solids	26	8	4	3	<1.	5	2	3	44	
CHLORIDES	3	2	2	4	1	2	1	2	14	
T. ALKALINITY (as CaCO ₃)	40.	29.	27.	38.	25.	27.	31.	27.	160.	
ZINC	0.02	<.02	.02	.02	.02	.02	.02	.02	<.02	
CALCIUM	6.8	4.7	4.2	6.6	3.6	4.5	4.0	4.2	37.	
MAGNESIUM	0.7	0.6	1.3	1.3	0.2	0.7	1.0	1.3	8.1	

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



DATA SUMMARY

ORIGINAL TO:
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LAB. FILES.....

Source Cedar Hills Landfill

page 2 of 2

Collected By _____

Date Collected 3-19-76

Log Number: (cont.) 76-853 54 55 56

Station:	1	1-A	10	9					
T. HARDNESS (as CaCO ₃)	90	90	190	18					
Turbidity (NTU)	130	145	340	4					
Sp. Conductivity (umhos/cm)	480	440	1000	87					
CO ₂	105	81	400	8					
IRON	23.	22.	57.	0.05					
Total Coliform (Col./100ml)									
Fecal Coliform (Col./100ml)									
NO ₃ -N (Filtered)	<.02	0.03	<.02	1.0					
NO ₂ -N (Filtered)	0.02	<.02	<.02	<.02					
NH ₃ -N (Unfiltered)	3.4	10.0	14.8	0.14					
T. Kjeldahl-N (Unfiltered)									
O-PO ₄ -P (Filtered)									
Total Phos.-P (Unfiltered)									
Total Solids	328	289	751	66					
Total Non. Vol. Solids	254	214	526	42					
Total Suspended Solids	58	47	132	2					
Total Sus. Non Vol. Solids	42	45	102	2					
Chlorides	18	17	39	2					
T. ALKALINITY (as CaCO ₃)	200.	170.	420.	25.					
ZINC	0.02	.08	.08	0.12					
CALCIUM	42.	43.	105.	5.9					
MAGNESSUM	9.1	9.5	20.	2.0					

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



DATA SUMMARY

ORIGINAL TO: PW
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LAB FILES.....

Source Cedar Hills Landfill

Collected By P. Williams

Date Collected 3-23-76

Log Number: 76-885

Station:	3 A									
<u>T. HARDNESS (as CaCO₃)</u>	21.									
Turbidity (NTU)	12.									
Sp. Conductivity (umhos/cm)	105									
COD	8.									
<u>IRON</u>	2.4									
<u>PH</u>	7.5									
Fecal Coliform (Col./100ml)										
NO ₃ -N (Filtered)	0.92									
NO ₂ -N (Filtered)										
NH ₃ -N (Unfiltered)	0.30									
T. Kjeldahl-N (Unfiltered)										
O-PO ₄ -P (Filtered)										
Total Phos.-P (Unfiltered)										
Total Solids	90									
Total Non. Vol. Solids	63									
Total Suspended Solids	-*									
Total Sus. Non Vol. Solids	-*									
<u>CHLORIDES</u>	4.									
<u>T. ALKALINITY (as CaCO₃)</u>	41.									
ZINC	0.06									
CALCIUM	5.0									
MAGNESIUM	2.4									

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

* Lab error

Summary By Stenke D. Rell