MEMORANDUM

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FOR
INFORMATION
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TO John Glynn

FROM Ron Devitt

SUBJECT Cedar Hills Landfill, Mason Creek and Issaquah Creek Surveys

DATE January 10, 1973

State of Washington
Department of Ecology

Introduction

This memo is to document survey modifications and field observations made on December 5, 1972; and to [illegible] data from lab analyses conducted on the samples collected.

Survey Modifications

1. We decided to discontinue any sampling of Issaquah Creek until it can be demonstrated that the leachate from Cedar Hills landfill is affecting Mason Creek.

2. We added sampling sites to better characterize the leachate and the effects of natural purification and dilution before entering Mason Creek.

3. Flow determinations are to be made in an attempt to determine how much of the combined leachate and tributary does not flow to Mason Creek above ground. As described in a memo of November 29, a portion of this flow goes underground before assumed entry to ground water and/or Mason Creek. Gurley meter readings above and below the pool should give us the quantity lost to ground water.

4. Dye is to be added at the pool where the flow goes underground at the earliest convenience to pinpoint the location of entry to Mason Creek. This will not be possible until the flow reduces enough to quit flowing above ground.

5. Anchors were put out at stations 4 and 5 to detect differences in biological colonization above and below the confluence of the combined leachate and tributary to Mason Creek.

   The growth media consists of two different materials. A wood lattice was used specifically for insect habitat. An asbestos growth plate was used in hopes of quantitatively evaluating the colonization of the "slime mold" that is expected to be evident in the spring.

6. The "spring" (station #1) should be channelled and funneled to facilitate sampling.

Field Observations

Station #1 - The spring below the landfill was very similar to the condition observed on 10-31-72; but because of previous rains, the flow was greater. The whole area stunk; Sphaerotilus was abundant. Temp. = $9^{o}C$. Time - 1040 hours.

Station #1A - This new station was established about 10 yards downstream from the emergence of the spring. The ditch above was frozen over in spots but the flow through the "creek" was greater than last time. There was no upstream sample taken since all flow in the creek at this point is leachate, surface runoff, and drainage from the fill area. The temperature upstream of the "spring" was 6^{o}; downstream 10 yards (station #1A) the temperature was $7^{o}C$. Irridescent sheens were present in low velocity areas. Time - 1050 hours.

We met Bill Moore and Larry Southwick of Moore, Wallace, and Kennedy (consulting Engineering firm) and Walt Kenny, landfill project supervisor. They were making observations in the general area. We inspected the manhole near the conifer and leachate pond. The flow was very low. The odor was gross.

Station #9 (below powerline) - Flow had increased slightly over last observation. Sphaerotilus like growth was developing. Oil like sheen was present in slack flow areas, there was no odor present, however.

We returned toward Issaquah and took Coalfield-Issaquah Road to the Mason Creek area. The sign "Freeguard" which I have referred to before is southwest of mail box 5417. After consulting the owner of a nearby residence, we obtained permission to drive through the locked gate. We obtained the combination to the gate (9020).

Station #5 (downstream bridge in Mason Creek) - Temp. = $4^{o}C$. Time - 1250 hours.

Station #4 (Mason Creek control; upstream bridge) - Time - 1305 hours. No visual difference was obvious between stations 4 and 5. Artificial substrate were situated in similar locations at both stations, above and below the surface flow from the tributary and leachate.

The pool area from which there was no above ground flow to Mason Creek on 10-31-72, had an overflow at least equal to what was flowing underground before. This situation made the use of dye to determine subsurface routing impossible.

Station #3A - Samples were taken about 10 yards upstream of the confluence of Mason Creek. The flow at this point consists of the combined leachate and ground water (#1 and 1B) and the flow from station #2. The total volume is less than the combined flows because of the underground flow from the upstream pool.

Station #1B - Another new station situated downstream of 1A. We arrived there by following a trail from the right perimeter of the clearing at the gun club. There were fresh footprints in the snow and evidently Food, Chemical and Research Laboratories, Inc. uses this location as a sampling point. There was a red and white #3 attached to a nearby tree. Temp. = 2^{o}C.

Station #2 - Temperature = 2^{o}C. Time - 1415 hours.

Discussion

Additional stations (1A and 1B) located downstream of station #1, before confluence with the flow from station #2, indicate that some of the parameters suggested 10-31-72 are more useful than others for detecting the presence of leachate. There appears to be chemical, physical, and/or biological reaction/reactions which decrease the concentrations of various parameters as the leachate travels away from the fill. Comparing 1A to 1B, note the decline in conductivity, BOD, nitrogen, iron, magnesium, calcium, hardness, T. carbon, T. I. carbon, and T. O. carbon. Chloride values remained the same. The pH change between stations 1A and 1B from 6.8 to 7.5 is strange. Additional sampling is required to explain this. None of these values indicated a detectable water quality change at station #3A.

The parameters listed above were significantly higher at station #9 than at stations where the effects of the leachate were not observed. The sphaerotilus like growth developing was another (visual) indication that the leachate was affecting this drainage. The values are also higher at this station than last sampling (10-31-72).

Summary

1. The most useful parameters for tracing the leachate appear to be: COD, conductivity, chlorides, calcium, iron, magnesium, hardness, total carbon, T. inorganic carbon, and T. organic carbon.

2. These values excepting chlorides decrease between stations 1A and 1B.

3. These parameters failed to demonstrate an effect at station 3A.

4. Increased runoff has increased above ground flow to cause direct discharge to Mason Creek.

5. The effect on Mason Creek was not demonstrated.

6. Station #9 is being affected by the leachate more than the first (control) survey in October.

RCD:bj

DATA REPORT FORM

LAB RESULTS

Location: Cedar Hills - Landfill Leachate

	Station							
	1	1A	1B	2	3A	4	5	9
pH	6.6	6.8	7.5	7.5	7.4	6.7	6.8	6.8
Turbidity	20	20	20	1	3	5	5	6
COD	62	520	450	8	8	--	--	110
NH_3-N	ND	1.7	1.6	ND	ND	ND	ND	ND
T Kjeldahl-N	ND	2.2	1.8	ND	ND	.04	.04	ND
T Kjeldahl-N (filtered)	ND	2.6	1.8	0.2	ND	.04	.04	ND
Iron	18	60	24	<0.1	<0.1	0.4	0.3	3.6
Magnesium	8.2	28	24	2.7	2.3	2.8	2.5	9.0
Calcium	40	116	106	2.9	2.8	3.0	2.7	31
Hardness	130	400	360	18	15	17	16	110
Sulfates	ND	ND	ND	3	6	5	6	3
Chlorides	32	77	77	29	25	27	27	38
Conductivity	410	890	850	75	65	82	85	240
T. Carbon	71	250	210	11	11	18.5	17.5	60.5
T. I. Carbon	37	66	45	4	4	6	7	5
T. O. Carbon	34	184	165	7	7	12.5	10.5	45.5

Conductivity = μmhos/cm @ 25^{o}C
Turbidity = JTU
Remaining in ppm