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CHEMICAL CONTAMINANT LEVELS IN GROUND WATER, SOIL AND SEDIMENTS FROM THE CHICAGO MILWAUKEE REAL ESTATE CORPORATION WASTE DISPOSAL SITE OTHELLO, WASHINGTON JULY 17-18, 1989

by
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ABSTRACT

Ground water, soil and sediment samples were collected July 17-18, 1989, from the Chicago Milwaukee Real Estate Corporation (CMC) waste disposal site in Othello, Washington. Samples were analyzed for volatile organics, semivolatile organics, priority pollutant and EP Tox metals, organophosphorus pesticides, PCBs, and a range of conventional parameters. In general, contaminant levels during this round of sampling were low and seem to confirm previous sampling at the site. Noteworthy exceptions were PCB 1260 (91 μg/kg, dry weight) in soil at ODH-5. Analysis of marsh sediments detected chlorpyrifos (mean=180 μg/kg, dry weight), total DDT analogs (mean=280 μg/kg, dry weight), and unknown hydrocarbons (estimated mean=4.5x10-6 μg/kg, dry weight). Contamination of marsh sediments with these compounds appears to be related to the application of pesticides for mosquito control.

INTRODUCTION

The CMC Real Estate Corporation (CMC) waste disposal site is located in Othello, Washington, on about 86 acres near the Potholes East irrigation canal (T15N, R29E, Sec.4) (Figure 1). Contamination of soil and ground water at the site with organic chemicals (primarily petroleum products) and metals has occurred as a result of discharge of stormwater and wastes from the abandoned Burlington Northern (BN) railroad maintenance facility which is located adjacent to the CMC site (Hydrometrics, 1989). The BN maintenance facility was established around 1910 and operated until 1980 as a major repair and refueling station.

To assist in evaluating remediation alternatives for the CMC site under the Model Toxics Control Act (MTCA), Ecology's Eastern Regional Office (ERO) requested that the Toxics Investigation Section (TIS) conduct an independent study with the primary objective of verifying concentrations of volatile and semivolatile organics and metals measured in ground water and soil by Hydrometrics (CMC's consultant) and Ecology in 1988. A secondary objective of this investigation was to conduct limited sampling for a broader range of contaminants then had been analyzed for in previous characterization studies.

Preliminary data from the present investigation was transmitted to CMC and the ERO in March 1990. Based on these results, the ERO decided to allow CMC to conduct a voluntary cleanup at the Othello site under the MTCA. This final report provides a detailed description of the investigation including sampling methods, quality assurance procedures and a detailed interpretation of the data.

METHODS

Sampling

Ground water, soil and sediment sampling was conducted July 17-18, 1989, by Dale Norton and Denis Erickson from TIS and Sherman Spencer from the ERO. Sampling locations are shown in Figure 1.

Ground Water

Six on-site monitoring wells were sampled during the present investigation. These wells were selected to replicate previous characterization studies by Hydrometrics (Hydrometrics, 1988) and Ecology (Ecology, 1988). All wells sampled are constructed of a 2-inch PVC pipe with a 2-inch stainless steel 20 slot screen and range in depth from 12-33 feet (well logs have been included as Appendix A). The single exception is Well ODH-4 which has a galvanized riser pipe.

Prior to sample collection, water level measurements were recorded using an electronic water level indicator, Slope Indicator Model #51453. All monitoring wells were purged with a centrifugal pump a minimum of three well volumes or until conductivity, pH and temperature

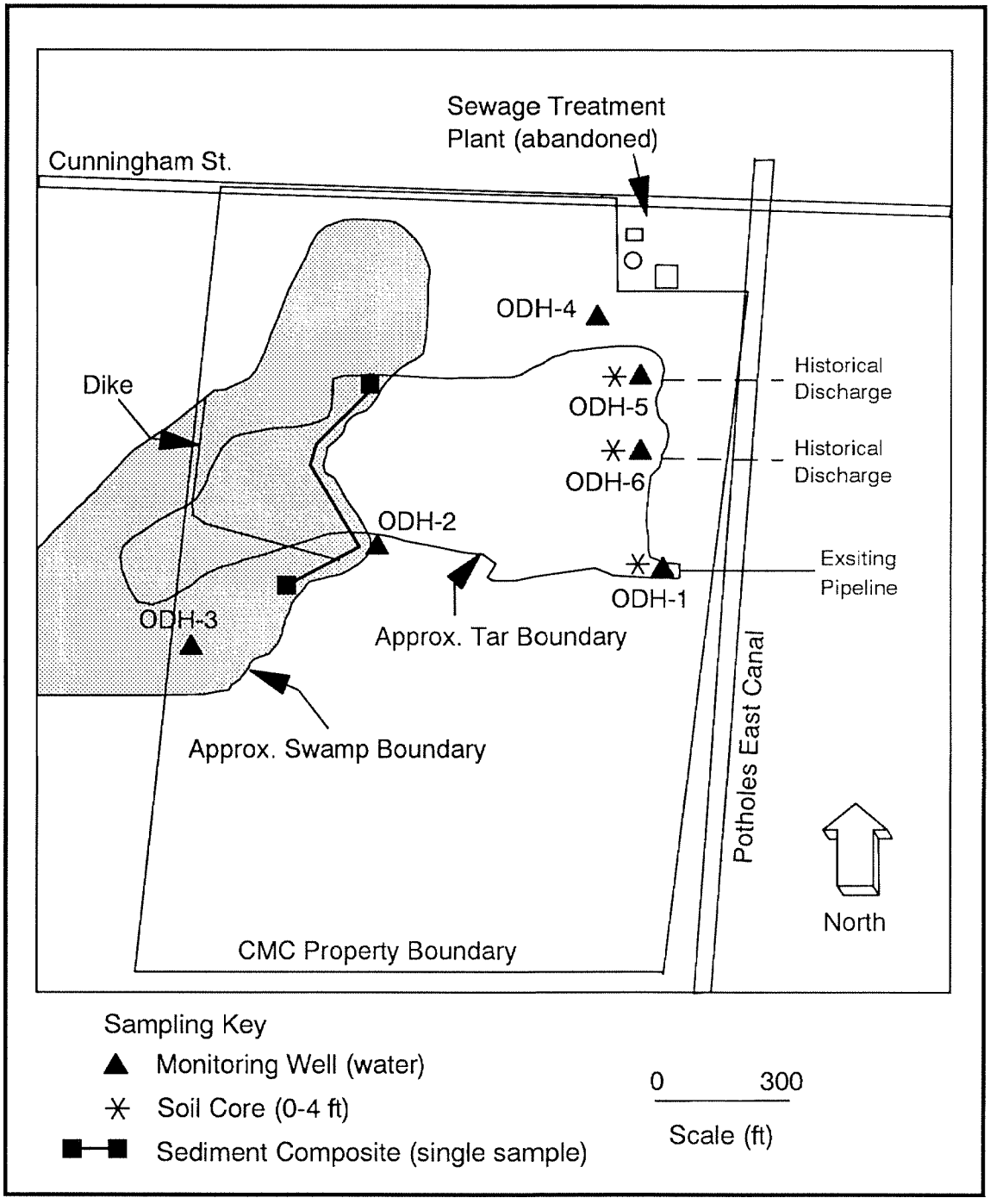

Figure 1: Site map and sampling locations for CMC waste disposal site Othello, Wa.

readings stabilized. Samples were then collected using a pre-cleaned (see Quality Assurance section for cleaning procedures) teflon bailer. Metal aliquots for dissolved metals determination were filtered in the field through a 0.45 um polycarbonate membrane filter using an all teflon filtration system. Metal and TOC samples were preserved with one mL of nitric acid to a pH <2, while volatile organics were preserved with two drops of $1+1$ hydrochloric acid. All samples were placed in priority pollutant cleaned containers supplied by I-Chem Hayward, California, wrapped in plastic bags and stored on ice for transport to the Ecology/EPA Environmental Laboratory at Manchester, Washington. Ecology chain-of-custody procedures were followed for all samples (Huntamer, 1986).

Soil Sampling

Soil samples were collected near the end of each historical and current discharge pipe leading from the BN railroad yard (see Figure 1). These locations were selected for sampling because they were considered to have the highest potential to detect contamination and were sampled during previous investigations.

At each sampling location, a four-foot soil core was obtained from beneath the tar layer with the use of a hand auger equipped with a one foot stainless steel auger head. To reduce the volume of material, each one foot increment was homogenized and subsampled. The four subsamples were then transferred to a stainless steel beaker. The final composite (0-4 feet) was then homogenized by stirring and aliquots removed to appropriate containers for the various analyses. All sample containers were priority pollutant-cleaned glass jars with teflon-lined lids supplied by I-Chem. Samples were handled according to Ecology chain-of-custody procedures (Huntamer, 1986).

Sediment Sampling

A single surface (0-2 cm) sediment composite was obtained from the marshy area along the western portion of the site to screen this area for potential contaminants of concern. To prepare a composite sample, surface sediments were collected at approximately 20-30 feet intervals along the eastern edge of the marsh, with the use of a stainless steel spoon, until a sufficient volume of material was obtained for analysis. The composite was then homogenized by stirring and split for individual analyses. Containers and cleaning procedures were similar to those previously described for water and soil sampling.

Quality Assurance/Quality Control

The chemical analyses, methods, and laboratories used in the investigation are listed in Table 1. Quality of the data set was evaluated through the use of transport, transfer, filter and method blanks; duplicates; replicates; and spiked samples analyses.

Prior to sample collection, all equipment (i.e., spoons, beakers, auger heads and bailers) were precleaned with sequential washes of hot tap water, LiquiNox detergent, ten percent nitric acid,

Table 1: Analytical Methods for CMC Real Estate Site Investigation Othello, WA.

ANALYSIS	METHOD	REFERENCE	LABORATORY
		WATER	
Water Level	Slope Indicator No. 51453	-	Field
Temperature	Precision Thermometer	APHA, 1985	"
pH	Beckman phi-11	"	"
Specific Conductance	Beckman RB-5	"	"
Total Dissolved Solids	Dry @ 180 C (No. 160.1)	EPA, 1983	Ecology/EPA Manchester-Manchester, Wa.
Total Hardness	Titrimetric (No. 130.2)	"	" " " " "
Total Organic Carbon	Combustion (No. 415.1)	"	" " " " "
Metals-Priority Pollutant			
As,Pb,Sb,Se,Th	GFAA	"	Analytical Resources, Inc.-Seattle, Wa.
Ag,Be,Cd,Cr,Cu,Ni,Zn	ICP	"	" " " " "
Hg	CVAA	"	" " " " "
Volatiles	Purge and Trap GC/MS No. 524	EPA, 1984a	PNEL-Redmond, Wa.
Semivolatiles	GC/MS No. 625	EPA, 1984b	Ecology/EPA Manchester-Manchester, Wa.
		SOIL/SEDIMENT	
Percent Solids	Dry @ 105 C	APHA, 1985	Analytical Resources, Inc.-Seattle, Wa.
Total Organic Carbon	Combustion CO2 Measurement	Tetra Tech, 1986	" " " " "
Grain Size	Seives and Pipettes	"	Laucks Testing Labs-Seattle, Wa.
Metals-EP Tox			
Ag,As,Ba,Cd,Cr,Pb,Se	ICP	EPA, 1986	Analytical Resources, Inc.-Seattle, Wa.
Hg	CVAA	"	" " " " "
Metals-Priority Pollutant			
As,Sb,Se,Th	GFAA	"	" " " " "
Ag,Be,Cd,Cr,Cu,Ni,Pb,Zn	ICP	"	" " " " "
Hg	CVAA	"	" " " " "
Semivolatiles	GC/MS No. 625	EPA, 1984b	Ecology/EPA Manchester-Manchester, Wa.
Organochlorine Pest/PCB	GC/ECD No. 8080	EPA, 1986	" " " " "
Organophosphorus Pest	GC/NPD No. 8140	"	" " " " "

distilled/deionized water, pesticide-grade methylene chloride, and pesticide-grade acetone, then air-dried and wrapped in aluminum until being used in the field.

Transfer, transport and filter blanks were collected for ground water sample quality assurance. Transfer blanks were obtained by rinsing teflon bailers with organic freewater and collecting the rinsate in sample bottles. A filter blank for metals analyses was run through the pump and filter bed to ensure field decontamination procedures were adequate. Duplicate and replicate samples were collected for both ground water and soil/sediment samples. Method blanks, matrix spikes, and matrix spike duplicates were run in the laboratory for ground water and soil/sediment samples.

Quality assurance review of metals data was performed by Craig Smith of the Ecology/EPA Manchester Laboratory. Volatile organics results were reviewed by Stuart Magoon, also with the Manchester Laboratory. In general, no major analytical problems were encountered in the analysis of these samples, and consequently the data set is considered acceptable with the following caveats.

Methylene chloride, acetone, and 2-butanone were detected at low levels in the transport and transfer blanks. All detected values for these compounds were less than five times the blank levels and consequently positive results for these compounds are not reported.

Overall precision (sampling + laboratory) calculated from detected values in blind field duplicates for ground water and sediment samples were excellent for most parameters ($\pm$10% for conventionals and metals) with the following exceptions; TOC in the water samples ($\pm$64%), and chromium and zinc were $\pm$28% and $\pm$47% respectively. Cadmium was $\pm$50% in the sediment samples. For organochlorine pesticides, precision ranged from $\pm$80% to $\pm$120%. Organophosphorus pesticide chlorpyrifos was $\pm$122% in the sediment samples.

Laboratory precision calculated from matrix spike/spike duplicate recoveries for volatile organics were acceptable, and within CLP QC limits. Laboratory precision for semivolatile organics calculated from matrix spike/spike duplicates was excellent for water being within $\pm$10% and poor for sediment which ranged from $\pm$30% to $\pm$180%.

Results of analysis of certified reference materials for water (NBS-1643b) and soil/sediments (NBS-2704) are shown in Table 2. Accuracy for most elements in water were excellent, being within $\pm$15%. Thallium was the single exception, with a slightly lower precision of $\pm$22%. Reference material results for beryllium, cadmium, copper, lead, mercury, nickel, selenium, silver, and zinc in soil/sediments were excellent being within $\pm$10% of the certified range. Results for antimony ($\pm$80%), arsenic and chromium ($\pm$30%), and thallium ($\pm$40%) were all below the certified range, consequently values derived from the analyses of the samples for these metals may underestimate actual environmental levels.

Table 2: Result of analysis of certified reference materials for water and soil/sediment.

	WATER (ug/l) NBS-1643b		SOIL/SEDIMENT (mg/kg, dry) NBS-2704	
Element	Certified Range	ARI Result	Certified Range	ARI Result
Antimony	-	-	3.79+/-0.15	0.8
Arsenic	-	-	23.4+/-0.8	15
Beryllium	19+/-2	18	-	-
Cadmium	20+/-1	19	3.45+/-0.22	3.6
Chromium	18.6+/-0.4	18	135+/-5	87.9
Copper	21.9+/-0.4	22	98.6+/-5	91.3
Lead	23.7+/-0.7	20	161+/-17	153
Mercury	-	-	1.44+/-0.07	1.53
Nickel	49+/-3	40	44.1+/-3	37
Selenium	9.7+/-0.5	9	-	-
Silver	9.8+/-0.8	9	-	-
Thallium	8+/-0.2	10	1.2+/-0.2	0.6u
Zinc	66+/-2	68	438+/-12	400

NBS-1643b = Trace Elements in Water - National Bureau of Standards
NBS- NBS-2704 = Buffalo River Sediment - National Bureau of Standards
u = N u = Not detected at detection limit shown
- =No - =Not analyzed

RESULTS/DISCUSSION

Ground Water

Results of conventionals, metals and organics analyses of ground water samples are summarized in Table 3. Water level measurements were recorded prior to sampling. Data collected indicates that the ground water flow is generally to the west. As observed, the water level of ODH-1 was approximately 15 feet higher than the rest of the monitoring wells. The high water level in Well ODH-1 may be attributed to leakage from Potholes East Canal. The relationship of Well ODH-1 to the rest of the monitoring wells is unclear and could not be determined due to insufficient data.

Results of conventional analysis of ground water samples can be summarized as follows: pH ranged from 7.1-7.6, specific conductivity ranged from 325-550 umhos/cm, total dissolved solids concentrations were 203-338 mg/L, hardness concentrations ranged from 132-206 mg/L, while TOC values were in the range of 2.2-5.8 mg/L. The highest values for all these parameters were measured in Well ODH-5, with the exception of hardness which was highest in ODH-3. Based on comparisons with ground water quality data from the Agricultural Chemicals Pilot Study (Erickson and Norton, 1990), these values appear to be typical of those measured in other counties (Yakima and Franklin) in Eastern Washington.

Results of the metal analyses indicate that most metals are low or near the detection limit in the wells sampled. Of the priority pollutant metals measured, only arsenic, chromium, copper, lead and zinc were present above detection limits. Arsenic and zinc were found in all the wells at concentrations of 1-7 μg/L and 6-2400 μg/L respectively. High levels of zinc (2400 μg/L) measured in monitoring Well ODH-4 are attributed to the galvanized casing. This is the only well with a galvanized casing.

Based on mean percentages, arsenic was present primarily in the dissolved form, while chromium, copper and lead were primarily associated with particulates. Zinc was present primarly in the dissolved form in approximately half of the samples tested.

None of the priority pollutant volatile or semivolatile organic compounds were present above the detection limits shown in Table 3 in any of the ground water samples. Several semivolatile compounds were tentatively identified including 6-aminohexanoic acid (0.9jn μg/L) in Well ODH-2, benzothiazole (0.7jn μg/L) in Well ODH-5 and bis-hexanedioic acid (0.8j μg/L) and 2-(2-butoxyethoxy) ethanol (0.1jn μg/L) in Well ODH-1. Benzothiazole is used in organic synthesis (Windholz, 1983) and bis-hexanedioic acid in the preparation of esters for use as plasticizers and lubricants (Sax and Lewis, 1987).

Table 4 compares ground water results from investigations conducted by Hydrometrics in 1988 and Ecology in 1988 to data from the present study. Ground water data were similar between these studies with the exception of high metal concentrations measured in the 1988 Ecology investigation. The apparent discrepancy between metals concentrations in Ecology's 1988 survey

Table 3: Summary of results of analysis of monitoring well samples collected by Ecology July 18, 1989 from the CMC Real Estate waste disposal site Othello, Wa. (ug/l unless otherwise specified).

Location	ODH-1					ODH-2		ODH-3		ODH-4		ODH-5		ODH-6	
Sample No. 29-	8230	8231	8242*	8243**	8244	8232	8233	8234	8235	8236	8237	8238	8239	8240	8241
Time	1000	-	-	1520	-	1315	-	1400	-	1200	-	1445	-	1100	-
Type	T	D	T	T	D	T	D	T	D	T	D	T	D	T	D
Water Level+ (ft)	16.5	-	-	-	-	3.73	-	1.23	-	6.5	-	14.35	-	13.7	-
Temperature (C)	19.5	-	-	19.1	-	17.3	-	16.8	-	16.4	-	14.7	-	15.5	-
pH (s.u.)	7.4	-	-	7.1	-	7.4	-	7.2	-	7.6	-	7.7	-	7.6	-
Spec. Cond. (umhos/cm)	325	-	-	340	-	400	-	490	-	340	-	550	-	380	-
Total Dissolved Solids (mg/l)	203	-	205	211	-	274	-	335	-	237	-	338	-	261	-
Total Hardness (mg/l)	133	-	137	132	-	176	-	206	-	158	-	177	-	173	-
Total Organic Carbon (mg/l)	2.2	-	4.3	4.9	-	3.5	-	4.1	-	3.4	-	5.8	-	5.1	-
Metals															
Antimony	5u	5u	1u	1u	1u	1u	1u	1u	1u	5u	1u	1u	1u	1u	1u
Arsenic	1	1	1	1	3	6	3	5	5	4	3	7	5	5	2
Beryllium	1u	1u	1u	1u	1u	1u	1u	1u	1u	1u	1u	1u	1u	1u	1u
Cadmium	2u	2u	2u	2u	2u	2u	2u	2u	2u	2u	2u	2u	2u	2u	2u
Chromium	6	5u	8	6	5u	30	5u	5u	6	5u	5u	5u	5u	5u	5u
Copper	2u	2	3	2u	2u	4	2u	2u	2	2u	9	18	6	5	4
Lead	1u	1u	1u	1u	1u	2	1u	1u	1u	7	1	2	1u	1	1
Mercury	0.1u	-	0.1u	0.1u	-	0.1u	-	0.1u	-	0.1u	-	0.1u	-	0.1u	-
Nickel	10u	10u	10u	10u	10u	10u	10u	10u	10u	10u	10u	10u	10u	10u	10u
Selenium	1u	1u	1u	1u	1u	1u	1u	1u	1u	1u	1u	1u	1u	1u	1u
Silver	3u	3u	3u	3u	3u	3u	3u	3u	3u	3u	3u	3u	3u	3u	3u
Thallium	1u	1u	1u	1u	1u	1u	1u	1u	1u	1u	1u	1u	1u	1u	1u
Zinc	13	21	21	27	8	12	4u	4u	7	2400+	230+	13	6	17	19
Volatiles	1u-2u	-	1u-2u	1u-2u	-	1u-2u	-	1u-2u	-	1u-2u	-	1u-2u	-	1u-2u	-
Semivolatiles	0.4u-2u	-	0.4u-2u	0.4u-2u	-	0.4u-2u	-	0.4u-2u	-	0.4u-2u	-	0.4u-2u	-	0.4u-2u	-
Tentatively Identified															
6-Aminohexanoic Acid	ND	-	ND	ND	-	0.9jn	-	ND	-	ND	-	ND	-	ND	-
Bis-Hexanedioic Acid	ND	-	ND	0.8j	-	ND	-	ND	-	ND	-	ND	-	ND	-
2-(2-Butoxyethoxy) ethanol	ND	-	ND	0.1jn	-	ND	-	ND	-	ND	-	ND	-	ND	-
Benzothiazole	ND	-	ND	ND	-	ND	-	ND	-	ND	-	0.7jn	-	ND	-

T = Whole water-unfiltered
D = Dissolved fraction-filtered thru 0.45um polycarbonate filter
* = Duplicate of 8242
** = Replicate
+ = Depth from top of casing

- = Not analyzed
u = Not detected at detection limit shown
ND = Not detected at unspecified detection limit
j = Estimated concentration
n = Presumptive evidence of material
+ = Elevated values attributed to galvanized well casing

Table 4: Comparison of analysis of ground water samples collected by Hydrometrics and Ecology from the CMC Real Estate waste disposal site Othello, Wa. (ug/l unless otherwise specified)

	ODH-1				ODH-2				ODH-3				ODH-4				ODH-5				ODH-6			
	HYDR 1988	Ecology 1988	Ecology 1989		HYDR 1988	Ecology 1988	Ecology 1989		HYDR 1988	Ecology 1988	Ecology 1989		HYDR 1988	Ecology 1988	Ecology 1989		HYDR 1988	Ecology 1988	Ecology 1989		HYDR 1988	Ecology 1988	Ecology 1989	
	D	T	T	D	D	T	T	D	D	T	T	D	D	T	T	D	D	T	T	D	D	T	T	D
Metals																								
Arsenic	ND	13	2	1	ND	15	6	3	6	8	5	5	ND	13	4	3	ND	12	7	5	ND	6	5	2
Berylium	ND	ND	ND	ND	ND	3	ND	ND	ND	ND	ND	ND	ND	2	ND	ND	ND	7	ND	ND	ND	ND	ND	ND
Chromium	ND	1500	7	ND	ND	39	30	ND	ND	13	ND	6	ND	10	ND	ND	ND	97	ND	ND	ND	ND	ND	ND
Copper	ND	53	3	2	ND	94	4	ND	ND	48	ND	2	ND	26	ND	9	ND	180	18	6	ND	27	5	4
Cyanide	20	ND	–	–	ND	ND	–	–	ND	ND	–	–	ND	ND	–	–	ND	ND	–	–	ND	ND	–	–
Lead	10	13	ND	ND	ND	27	2	ND	ND	11	ND	ND	ND	20	7	1	ND	55	2	ND	ND	ND	1	1
Mercury	ND	ND	–	–	ND	0.09	ND	–	ND	ND	ND	–	ND	ND	ND	–	ND	0.09	ND	–	ND	ND	ND	–
Nickel	ND	180	ND	ND	ND	33	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Selenium	ND	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Silver	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.45	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Thallium	ND	2	ND	ND	ND	ND	ND	ND	ND	1	ND	ND	ND	ND	ND	ND	ND	2	ND	ND	ND	1	ND	ND
Zinc	ND	160	20	15	ND	180	12	ND	ND	90	ND	7	ND	1300	2400	230	ND	310	13	6	ND	70	17	19
Semivolatiles																								
bis(2-Ethylhexyl phthalate	ND	ND	ND		ND	ND	ND		ND	ND	ND		ND	ND	ND		ND	34	ND		ND	ND	ND	
Total Petroleum Hydrocarbons (mg/l)	ND	–	–	–	0.6	–	–	–	ND	–	–	–	ND	–	–	–	0.11	–	–	–	ND	–	–	–

T = Whole water–unfiltered

D = Dissolved fraction–filtered thru

ND = Not Detected

– = Not Analyzed

Hydrometrics 1989 – Phase II Characterization of a Waste Disposal Area at Othello, Wa.

Ecology 1988 – Results of Analysis of Ground Water Samples Collected November 15, 1988

Ecology 1989 – Present Study

and the other two investigations can probably be attributed to the presence of solids in Ecology's 1988 samples (these samples were not field-filtered and were reported to be very turbid). This statement is supported by dissolved metals results from the other two investigations where metals concentrations were low.

Total xylene (6.0 μg/L) was detected in the Hydrometrics sample of Well ODH-1. The detection of xylene in this sample was attributed to field and/or laboratory decontamination procedures. During Ecology's 1988 investigation bis(2-Ethylhexyl)Phthalate was detected in Well ODH-5 (34 μg/L). Total petroleum hydrocarbons (TPH) were detected in Wells ODH-2 (0.6 mg/L) and ODH-5 (0.11 mg/L) during Hydrometrics 1988 investigation. However, when Hydrometrics resampled these wells in November 1988 the TPH results were below the detection limit.

Results from the investigations conducted on this site indicate that ground water does not appear to be contaminated for the parameters tested. Reported contaminant levels were low and substantially below drinking water levels established for metals and volatile organic (DSHS, 1983 and EPA, 1990).

Soil

Table 5 shows the results of conventionals and metals analysis of soil/sediment samples collected during this investigation. Based on visual observations, soil at the site consisted of silty sand with some underlying areas of sandy silt (soil logs have been included as Appendix B). Percent solids ranged from 40-94.2 in soil cores collected near the monitoring wells, while TOC concentrations ranged from 0.3-7.0 percent.

Soil cores were analyzed for EP Tox metals. The only EP Tox metal identified in the soil cores at detectable levels was barium which ranged from 90-460 μg/L. These levels were below the EP Tox criteria as defined in the Dangerous Waste Regulations, WAC 173-303-090.

Results of semivolatile organics and pesticides analysis of soil cores are summarized in Table 6. Semivolatile organic compounds, acenaphthene (60j μg/kg) and 1-methyl naphthalene (200 μg/kg) were detected in soil cores by monitoring Well ODH-5. Semivolatile organics were not detected in any of the remaining soil samples. PCB-1260 was detected near Well ODH-5 at a concentration of 90 μg/kg. Organochlorine pesticides were not detected in the remaining soil samples.

Tentatively identified semivolatile compounds included 3,2-cyclohexenone (100jn μg/kg) and an unknown chlorinated compound (80jnb μg/kg) in soil near ODH-6. Concentrations of an unknown hydrocarbon were detected in all three soil samples tested at levels ranging from 2000jn to 200,000jn μg/kg. The highest concentration was present in soil near ODH-5.

Volatile organics, semi-volatile organics and metals were not detected in soils during previous investigations at the site. However, elevated concentrations of TPH were found in soil samples

Table 5: Summary of conventionals and metals analysis of soil cores and marsh sediments collected July 17, 1989 from CMC Real Estate waste disposal site Othello, WA.

	SOIL				SEDIMENT	
Location	ODH-1	ODH-2	ODH-5	ODH-6	MS-1	
Sample No. 29-	8248	8251	8249	8250	8252	8253 (dup)
Depth (ft)	0-4	0-2.9	0-4	0-4	0-0.07	0-0.07
Solid (%)	79	-	94.2	40.0	52.5	48.5
Total Organic Carbon (%)	0.4	-	0.3	7	3	-
Grain Size (%)						
Gravel (>2mm)	-	-	-	-	4	4
Sand (2mm-62um)	-	-	-	-	42.9	52.7
Silt (62um-4um)	-	-	-	-	45.8	36.2
Clay (<4um)	-	-	-	-	7.3	7.1
Metal-EP Tox (ug/l)						
Arsenic	50u	50u	50u	50u	-	-
Barium	260	460	140	90	-	-
Cadmium	2u	2u	2u	2u	-	-
Chromium	5u	5u	5u	5u	-	-
Lead	30u	30u	30u	30u	-	-
Mercury	0.1u	0.1u	0.1u	0.1u	-	-
Selenium	50u	50u	50u	50u	-	-
Silver	3u	3u	3u	3u	-	-
Metals-PP (mg/kg, dry)						
Antimony	-	-	-	-	0.1u	0.2u
Arsenic	-	-	-	-	1.7	1.9
Beryllium	-	-	-	-	0.3	0.4
Cadmium	-	-	-	-	0.3u	0.5
Chromium	-	-	-	-	13	14
Copper	-	-	-	-	24	23
Lead	-	-	-	-	16	16
Mercury	-	-	-	-	0.07u	0.09u
Nickel	-	-	-	-	14	13
Selenium	-	-	-	-	0.8u	0.9u
Silver	-	-	-	-	0.5u	0.6u
Thallium	-	-	-	-	0.2u	0.2u
Zinc	-	-	-	-	45	47

u = Not detected at detection limit shown

- = Not analyzed

EP Tox = Extraction Procedure Toxicity Test

PP = Priority pollutant metals

Table 6: Summary of organics analysis of soil cores collected by Ecology July 17, 1989 from CMC Real Estate Waste Disposal Site Othello, WA. (ug/kg, dry weight)

	SOIL			SEDIMENT	
Location	ODH-1	ODH-5	ODH-6	MS-1	
Sample No. 29-	8248	8249	8250	8252	8253 (dup)
Semivolatiles					
Acenaphthene	150u	60j	250u	950u	460u
1-methyl napthalene	150u	200	250u	950u	460u
Isophrone	150u	130u	250u	70j	460u
Organochlorine Pest/PCB					
4,4' DDT	-	-	-	8	2j
o,p' DDD	-	-	-	79	30
4,4' DDD	-	-	-	260	100
4,4' DDE	-	-	-	63	20
Total DDT	-	-	-	410	150
PCB 1260	20u	90	20u	7j	20u
Organophosphorus Pest					
Chlorpyrifos	-	-	-	300	70
Tentatively Identified					
3,2 Cyclohexenone	100jn	ND	100jn	3000jn	1000jn
14-pentadecanoic acid	ND	ND	ND	ND	700jn
Unidentified hydrocarbon	3000jn	200000jn	2000jn	9000000jn	30000jn
Unidentified chlorinated	ND	ND	80jnb	ND	ND
Unidentified cholestane	ND	ND	ND	7000000j	20000jn

u = Not detected at detection limit shown
j = Estimated concentration
n = Presumptive evidence of compound
b = Also detected in blank at low levels relative to sample
ND = Not detected at unspecified detection limit
- = Not analyzed

collected at or near ground surface at five of the six monitoring well sites (Hydrometrics, 1989). Concentrations ranged from 2.2-2300 mg/kg. Samples collected near wells ODH-1 and ODH-6 recorded the highest concentrations of 1400 and 2300 mg/kg, respectively. These locations correspond to the highest levels of unidentified hydrocarbons detected in Ecology's 1989 investigation. Soil samples from both investigations were collected at the ends of historical pipelines used to discharge wastewater from the railroad facility. The presence of elevated hydrocarbon levels in soils at these locations apparently is not impacting ground water quality since no hydrocarbons were detected in corresponding monitoring well samples.

In general, contaminant levels measured in soil samples during all investigations at the CMC site were low, with the exception of TPHs found during Hydrometrics' 1988 survey exceeded the recommended cleanup level of 200 ppm in the Model Toxics Control Act, WAC 173-340-740.

Sediments

Percent solids ranged from 48.5-52.5 in the sediment samples collected from the marsh. The TOC concentration was 3.0 percent. Grain size analysis indicates that the sediments collected were primarily sandy silt.

Mean concentrations of priority pollutant metals (total metals) in marsh sediments, shown in Table 5, were as follows: arsenic (1.8 mg/kg), beryllium (0.4 mg/kg), cadmium (0.4 mg/kg), chromium (14 mg/kg), copper (24 mg/kg), lead (16 mg/kg), nickel (14 mg/kg), and zinc (46 mg/kg). For perspective, metals concentrations in the marsh sediments appear to fall in the range of concentrations typically reported in soils from the Western United States (Ebens and Shacklette, 1982).

Isophrone (70j μg/kg) was the only target semivolatile organic compound detected in marsh sediments during the present study.

Mean concentrations of organochlorine pesticides found in the marsh sediments were as follows: 4,4'-DDT (5 μg/kg); o,p'-DDD (57 μg/kg); 4,4'-DDD (185 μg/kg); and 4,4'-DDE (44 μg/kg). DDD (Rhothane) was widely used to control various pests including mosquitos (Matsumura, 1985). Records indicate that the marsh area regularly receives applications of pesticides at approximately two week intervals during the insect season to control mosquitos. (Adams County - Mosquito Control Taxing District, 1987). PCB 1260 was found only in one sample of a duplicate set at a concentration of 7j μg/kg.

Organophosphorus pesticides, chlorpyrifos (Dursban), was measured in the marsh sediment at a mean concentration of 180 μg/kg. Chlorpyrifos is an insecticide commonly used for mosquito control. It has an LD_{50} of 135 mg/kg based on rat oral tests (Thomson, 1989). Mean concentrations of tentatively identified semivolatile compounds found in sediment samples were 3,2-cyclohexenone (2000jn μg/kg), 14-pentadecanoic acid (700jn μg/kg), unidentified hydrocarbon (4,500,000jn μg/kg), and unidentified cholestane (3,500,000j μg/kg). The high levels of hydrocarbons present in the marsh sediments could be related to the use of oil carriers for

insecticide spraying. Marsh sediments were not collected during either of the previous investigations.

SUMMARY

Results of the 1989 Ecology investigation can be summarized as follows:

- Contaminant levels in ground water were low and appear to confirm previous sampling at the site. During this investigation, samples were collected and analyzed for both total metals and dissolved metals. Results from both analyses are substantially below drinking water standards established for metals.

- Contaminant levels found in soil samples collected during all investigations were low, with the exception of TPHs during Hydrometric, 1988 survey which were found to exceed the recommended cleanup level of 200 ppm.

- Contaminants of concern in the marsh sediments include: chlorpyrifos (135 μg/kg), and DDT and its analogues DDD and DDE.

- Marsh sediments appear to be impacted by applications of pesticides to control mosquitos.

RECOMMENDATIONS

Based on the findings of this investigation, the following recommendations are made:

- Soils contaminated with TPHs should be removed to the recommended cleanup level of 200 ppm.

- Alternative methods should be explored for controlling mosquitos in the marsh area including, but not limited to, the use of less persistent insecticides.

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Appendix A

TEST HOLE LOG

HYDROMETRICS HELENA, MONTANA

PROJECT CMC - OTHELLO JOB NUMBER _____ HOLE NUMBER ODH-1

STATE Washington COUNTY Adams LOCATION T 15N R 29E SEC. 4 TRACT NW¼ NE¼

SITE DESCRIPTION Near irrigation ditch up small gully ELEVATION G.S. 997.02 (mp) DATE 10/7/88

RECORDED BY JC DRILL METHOD Standard Air Rotary DRILLER Bill DRILLING COMPANY L & L

TOTAL DEPTH 33 Feet CASING TYPE AND DESCRIPTION 2 Inch PVC Schedule 40 Blank 2 Inch Stainless Steel 20 Slot Screen (10 ft.

TOTAL DEPTH CASED 33 Feet WELL COMPLETION DESCRIPTION Sand pack around screen with bentonite and cement above.

REMARKS The following soil samples were collected:
Surface sample 2.0 ft. - 4.0 ft., EPA 8240, 8270, TPH, 1310
Unsaturated sample 6.5 - 8.5, EPA 8270, 8240
Water table sample 25.0 - 27.0 ft., EPA 8240, 8270, TPH, 1310
*Additional sample: 9.0 - 11.0 ft and 14.0-16.0 ft., EPA 8240, 8270, TPH, 1310 (ODH-1A)

DEPTH	GRAPHICAL LOG	WELL COMPLETION	SAMPLE	SAMPLE TYPE / TIME / DATE			NOTES ON: WATER LEVELS, DRILLING FLUID, DRILLING RATE, WELL COMPLETION	DESCRIPTION AND CLASSIFICATION	
0			2.0-4.0 ft.	8240 8270 TPH 1310	Pushed	100	Strong diesel odor, visual contamination to 6.5 ft.	0 - 2.0 ft.	FILL DIRT - 90% fine sand and silt, upper 2 feet.
5			6 - ft.	8240 8270	Pushed	100		2.0 - 6.5 ft.	DARK BROWN SOIL COVER - Organic rich with roots, blackish streaks in core, diesel smell, obvious contamination, 90% silt, with 5% fine sand and clay below soil.
10			9.0-11.0 ft.*	8240 8270 TPH 1310	Pushed		Diesel odor still present.	6.5 - 15.0 ft.	BROWN TO TAN CLAY - Rich silts of fine sand, highly compactible, more clayey than from 2.0 - 6.5 feet.
15							*An additional bore hole was drilled to sample 9.0 - 11.0 ft. and 14.0 - 16.0 ft. missed in this bore hole. This bore hole, ODH-1A was 3-4 ft. east of ODH-1, drilled to 16 ft. and plugged/abandoned after the soil sample was removed.	15.0 - 33.0 ft.	BROWN SAND 80% - With 15% clay and 5% silt, more sandy (90%) at 26 feet, continued on through 33 feet.
20									
25			26.0-28.0 ft.	8240 8270 TPH 1310	Pushed				
30									
35									

TEST HOLE LOG

HYDROMETRICS HELENA, MONTANA

PROJECT CMC - OTHELLO JOB NUMBER _____ HOLE NUMBER DDH-2

STATE Washington COUNTY Adams LOCATION T 15N R 29E SEC. 4 TRACT NW¼ NE¼

SITE DESCRIPTION Just North of East edge of dike ELEVATION G.S. 969.1 (mp) DATE 10/6/88

RECORDED BY SP DRILL METHOD Standard Air Rotary DRILLER Bill DRILLING COMPANY I & I

TOTAL DEPTH 14 Feet CASING TYPE AND DESCRIPTION 2 Inch Schedule 40 PVC Blank, 2 Inch Stainless Steel 20 Slot Screen (10 ft.)

TOTAL DEPTH CASED 14 Feet WELL COMPLETION DESCRIPTION Sand pack around screen with bentonite and concrete above.

REMARKS The following soil sample was taken:
Wet sample, 6.5 - 8.5 ft., EPA 8310, TPH, 1310
No unsaturated sample was taken since the wet is above the ground surface (i.e., swamp) and no surface sample was taken since fill dirt was brought in to build the road to this site approximately 4 feet thick.

DEPTH	GRAPHICAL LOG	WELL COMPLETION	SAMPLE	SAMPLE TYPE / TIME / DATE			NOTES ON: WATER LEVELS, DRILLING FLUID, DRILLING RATE, WELL COMPLETION	DESCRIPTION AND CLASSIFICATION	
0							Expected to hit water at swamp water level (4 ft.), moist at best at this level.	0 - 4.0 ft.	TAN SURFACE FILL - Silty sand matrix with caliche gravel size clasts to 6 inch in size (±5%), fine to medium grained, moderate to poorly sorted, subrounded, 90% fine to medium sand with 5 - 10% fines (clay, etc.).
							1.5 ft. water level above bottom of fill and swamp level: - semi-confined? - confined?		
5			6.5-8.5 ft.	8310 TPH 1310	Pushed	50	No Bunker C noted Water first encountered during drilling. Hard drilling at 8 - 8.5 ft.	4.0 - 14.0 ft.	GRAYISH GREEN SAND - Fine grained, fairly well sorted, moist to wet at 7 feet, gravelly at 7.5 feet, lots of water at 8 feet, very organic rich with root above 8 foot mark, boulders at 8.5 feet, sandy, quartz rich with mafics (basalt), bog swamp-like smell from cuttings, 80 - 90% sand.
10									
15									

TEST HOLE LOG

HYDROMETRICS HELENA, MONTANA

PROJECT CMC - OTHELLO JOB NUMBER _____ HOLE NUMBER ODH-3

STATE Washington COUNTY Adams LOCATION T 15N R 29E SEC. 4 TRACT NW¼ NE¼

SITE DESCRIPTION Southwest of Dike 300 feet ELEVATION G.S. 966.43 (mp) DATE 10/6/88

RECORDED BY SP DRILL METHOD Standard Air Rotary DRILLER Bill DRILLING COMPANY I & I

TOTAL DEPTH 12 Feet CASING TYPE AND DESCRIPTION 2 Inch PVC Schedule 40 Blank 2 Inch Stainless Steel 20 Slot Screen (10 ft.)

TOTAL DEPTH CASED 11.7 Feet WELL COMPLETION DESCRIPTION Sand pack around screen and bentonite and cement above.

REMARKS The following soil samples were taken:
Water table sample 2.5 - 4.5 ft.; EPA 8240, 8270, TPH, 1310
No surface sample was taken since the site is covered with 2.5 ft. of fill brought in to construct a road to this location.
No unsaturated zone is present to sample.

DEPTH	GRAPHICAL LOG	WELL COMPLETION	SAMPLE	SAMPLE TYPE TIME /DATE			NOTES ON: WATER LEVELS DRILLING FLUID DRILLING RATE WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
0			2.5-4.5 ft.	8270 8240 TPH 1310	Pushed	100	Fill brought in to build road to this site *over swamp.* Visible surface water 6 inches deep surround road. Water table equals approximately ground surface.	0 - 2.5 ft. TAN SURFACE/ROAD FILL- Mostly silty sand with trace (5%) gravel chunks of sandstone and caliche composition, matrix is 80-90% sand with 5% fines (silt and clay), liner for road is a 1.5 foot, subangular grains, moderately well sorted, gravels range from 1/2 inch to 6 inches.
5								2.5 - 7.5 ft. DARK GREEN TO BLACKISH SAND - With trace silt and clay, mostly fine *grained, well sorted,* subangular, organic rich with lots of roots, very wet, bog/swamp-like smell, sand is quartz rich with trace mafics (basalt?), (somewhat cohesive, reduced?) Gravelly sand at 6 feet, 1/2 inch to 1.5 inch size, poorly sorted, still subangular.
			8.0-10.0 ft.	8270 8240 TPH 1310		0	Unable to get a core at this depth, boulder blocking core barrel.	
10								7.5 - 12.0 ft. DARK MEDIUM GRAINED SAND - With large boulders and cobbles, very dark, probably basalt in composition, some sandstone bits noted, very angular (due to rig grinding up boulders?) similar to sand description from 2.5 to 7.5 feet but contains boulders and cobbles from 7.5 feet down.

TEST HOLE LOG

HYDROMETRICS HELENA, MONTANA

PROJECT CMC - OTHELLO JOB NUMBER _____ HOLE NUMBER DDH-4

STATE Washington COUNTY Adams LOCATION T 15N R 29E SEC. 4 TRACT NW¼ NE¼

SITE DESCRIPTION 100 Feet South Sewage Treatment Plant ELEVATION G.S. 972.88 (mp) DATE 10/5/88

RECORDED BY SP DRILL METHOD Air Rotary Standard DRILLER Larry DRILLING COMPANY I & I

TOTAL DEPTH 19 Feet CASING TYPE AND DESCRIPTION 2 Inch Galvanized Blank 2 Inch Stainless Steel 20 Slot Screen (10 ft.)

TOTAL DEPTH CASED 18.25 Feet WELL COMPLETION DESCRIPTION Natural sand pack around screen with bentonite above and grout to surface.

REMARKS Soil sample as follows:
Surface sample 0 - 2 ft., EPA 8240, 8270, TPH, 1310
Unsaturated sample 5 - 7 ft., EPA 8270
Water table sample 13 - 15 ft., EPA 8240, 8270, TPH, 1310

DEPTH	GRAPHICAL LOG	WELL COMPLETION	SAMPLE	SAMPLE TYPE / TIME / DATE			NOTES ON: WATER LEVELS, DRILLING FLUID, DRILLING RATE, WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
0			0-2 ft.	8240 8270 TPH 1310	Pushed	100	No Bunker C. found	0 - 5.0 ft. LIGHT TAN SILTY SAND SOIL COVER - Dry, grades to a greenish brown, moist, organic rich, silty sand, ±2 ft., medium to fine grained with caliche gravel bits, fair to moderate sorting, Fe staining, 50-60% sand, 40-50% silt, 2% clay (?), rest coarse.
5			5-7 ft.	8270	Pushed	100	No Bunker C found (Photo 12 CMC)	
10								5.0 - 12.0 ft. BROWN SAND - With trace to some silt, quartz rich, with trace feldspar and mafics, fair to well sorting, subangular grains, more Fe staining with greater depth, bog type sediments, 80-90% sand, moist.
			13-15 ft	8240 8270 TPH 1310	Pushed	25	Hit water around 12-13 feet. Sand heaving, hard to complete well. Used natural pack to complete well. *Hydraulic line busted during well completion. Possible hydraulic fluid in well: dropped in well around ±9 ft., on top of well pack above the water table.	
15								12.0 - 19.0 ft. BROWN SAND - With some blackish gravel, a few gray clayey/silty zones noted; fairly well rounded, trace fines in sand, wet, lots of Fe staining, quartz rich sand and basalt gravel clasts, more sandy at 15 ft., 95% medium grained, well sorted, subangular grains.
20								

TEST HOLE LOG

HYDROMETRICS HELENA, MONTANA

PROJECT CMC - OTHELLO JOB NUMBER _____ HOLE NUMBER ODH-5

STATE Washington COUNTY Adams LOCATION T 15N R 29E SEC. 4 TRACT NW¼ NE¼

SITE DESCRIPTION Few Feet West of Irrigation Ditch Berm ELEVATION G.S. 980.78 (mp) DATE 10/5/88

RECORDED BY SP DRILL METHOD Standard Air Rotary DRILLER Larry DRILLING COMPANY I & I

TOTAL DEPTH 22 Feet CASING TYPE AND DESCRIPTION 2 Inch PVC Schedule 40 Blank
2 Inch Stainless Steel 20 Slot Screen (10 ft.)

TOTAL DEPTH CASED 22 Feet WELL COMPLETION DESCRIPTION Sand pack at screen with bentonite and concrete above.

REMARKS Soil was sampled as follows;
Surface sample 0 - 1 ft., EPA 8240, 8270, TPH, 1310
Unsaturated zone sample 5 - 6 ft., EPA 8240, 8270
Water table sample 15 - 16 ft., EPA 8240, 8270, TPH, 1310

DEPTH	GRAPHICAL LOG	WELL COMPLETION	SAMPLE	SAMPLE TYPE / TIME / DATE			NOTES ON: WATER LEVELS, DRILLING FLUID, DRILLING RATE, WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
0			0-1.0 ft	8240 8270 TPH 1310	Pushed	100	Bunker C .5-1.0 ft.	0 - 5.0 ft. TAN SILTY SAND - Organic rich, dry soil cover, well to fair sorting, fine grained, 60% sand, quartz rich, 40% silt, bunker just below land surface, same silty sand below Bunker C deposit, more sandy with depth.
5			5.0-6.0 ft.	8240 8270	Pushed	70	(CMC Photo 9)	
10							Harder drilling.	5.0 - 15.0 ft. CONTINUED FINE SAND AND SILT - A bit more sandy, very weakly cemented, hardpan at 6 ft. a few inches thick, lots of caliche, 70% fine sand with trace to some medium grained, 25% silt, rest gravels and clay, harder drilling at12 ft.; more sandy with gravel 1/4 in. to 1/2 in. size, dry.
15			15.0-16.0 ft.	8240 8270 TPH 1310	Pushed	60	Smooth drilling.	
20								15.0 - 22.0 ft. BROWN SAND - With trace to some silt, wet, medium grained, fairly well sorted, subangular to subround, trace to some peagravel, quartz rich, with some feldspar and trace mafics, hardpan at 17 ft., blackish gravels (basalt), coarse with depth, last few feet very coarse.

TEST HOLE LOG

HYDROMETRICS HELENA, MONTANA

PROJECT CMC - OTHELLO JOB NUMBER _____ HOLE NUMBER ODH-6

STATE Washington COUNTY Adams LOCATION T 15N R 29E SEC. 4 TRACT NW¼ NE¼

SITE DESCRIPTION Few Feet West of Irrigation Ditch Berm ELEVATION G.S. 980.15 (mp) DATE 10/5/88

RECORDED BY SP DRILL METHOD Standard Air Rotary DRILLER Larry DRILLING COMPANY L & L

TOTAL DEPTH 22.5 Feet CASING TYPE AND DESCRIPTION 2 Inch PVC Schedule 40 Blank; 2 Inch Stainless Steel 20 Slot Screen (10 ft.)

TOTAL DEPTH CASED 22 Feet WELL COMPLETION DESCRIPTION Sand pack around screen and bentonite and concrete above.

REMARKS The following soil samples were taken:
Surface sample 0 - 2 ft., EPA 8240, 8270, TPH, 1310
Unsaturated sample 5 - 7 ft., EPA 8240, 8270
Water table sample 18 - 20 ft., EPA 8240, 8270, TPH, 1310

DEPTH	GRAPHICAL LOG	WELL COMPLETION	SAMPLE	SAMPLE TYPE / TIME / DATE			NOTES ON: WATER LEVELS, DRILLING FLUID, DRILLING RATE, WELL COMPLETION	DESCRIPTION AND CLASSIFICATION
0			0-2.0 ft.	8240 8270 TPH 1310	Pushed	100	(Photo 10 CMC) Bunker deposit noted .5-1.0 ft.	0 - 5.5 ft. TAN HARDPAN SURFACE - Broken caliche gravel bit 1/2 in. size, Bunker C noted .5-1 ft., below is a tan silty sand, fairly well sorted organic rich, massive, mostly fine grained with some medium grained, less organic with depth.
5			5.0-7.0 ft.	8240 8270	Pushed	100	(Photo 11 CMC)	
10							A bit more difficult to drill.	5.5 - 18.0 ft. CONTINUED TAN SILTY SAND - With 2 inch thick Bunker C deposit at 6.0 ft., lots of caliche bits (fizzes with water application), greater sand content with depth Equal to 80 - 90%, 10% fines and gravel size bits 1/2 inch to 1 inch size.
15								
20			18.0-20.0 ft.	8240 8270 TPH 1310	Hard- had to air hammer a bit.	100		18.0 - 22.0 ft. BROWN SAND - Grades to a blackish hardpan (basalt with sandstone and caleche), gravels in hardpan are 1/4 inch to 1 inch size, poorly sorted approximately 20 ft., quartz rich sand with some feldspar, subangular, trace fines, more gravel with depth, 1 inch to 1.5 inch size, very angular, lots of water, subrounded at 22 ft.
								22.0 - 22.5 ft. GREEN GRAVELLY CLAY AND SILT - Cohesive, moist to wet, trace sandy, gravels, more rounded than above, gravels are basalt

Appendix B

Soil Logs for Cores Collected by Ecology in 1989 from the CMC Waste Disposal Site.

CMC Waste Disposal Site
SOIL LOGS

Station	Depth	Description
ODH-1	0.0-1.0	Sandy material, brown
	1.0-2.0	Silty sand, slightly moist. Gray material at 1.7 feet. Slight petroleum odor.
	2.0-3.0	Silty sand, gray material, fine grain. Strong petroleum odor.
	3.0-4.0	Gray material, petroleum odor.
ODH-5	0.0-1.0	Silty sand, brown, fine.
	1.0-2.0	Silty sand, brown, fine.
	2.0-3.0	Sandy silt, brown, fine.
	3.0-4.0	Sandy silt, brown, fine.
ODH-6	0.0-1.0	Silty material, brown, fine.
	1.0-2.0	Silty material, brown, fine.
	2.0-3.0	Silty sand material, brown, fine.
	3.0-4.0	Silty sand material, brown, fine.
ODH-2	0.0-0.5	Silty sand, dark brown, moist.
	0.5-1.0	Silt, dark gray, saturated
	1.0-2.0	Clayey silt, dark gray, saturated.
	2.0-2.9	Silty sand, dark to light gray, saturated.