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Phase II Investigation Report

Urbana Landfill

Town of Urbana, New York

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Site Number 8-51-007
Work Assignment #D002925-12

Prepared for:

New York State
Department of Environmental Conservation
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August 1997

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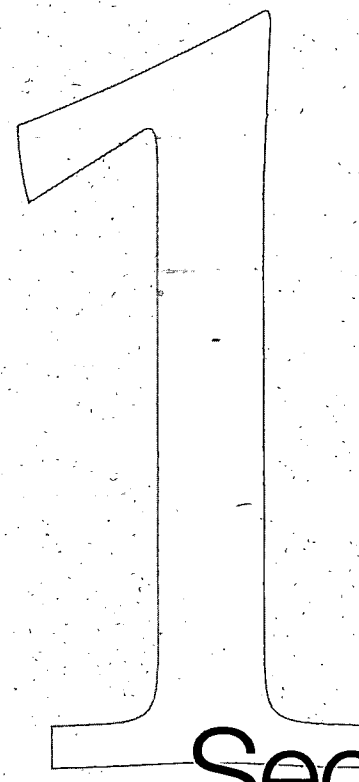


Section One

Section 1
Background

1.1 Introduction

In March 1997, Camp Dresser & McKee (CDM), under contract with New York State Department of Environmental Conservation, prepared a Remedial Investigation (RI) Report for the Urbana Landfill under the New York State Superfund Standby Contract (Work Assignment #D002925-12). This RI Report discussed the findings and presented conclusions based on the results of the RI conducted between June and November, 1996 in accordance with the NYSDEC Remedial Investigation/Feasibility Study (RI/FS) approved May 1996 Work Plan and Site Operations Plan (SOP) (CDM 1996a: 1996b).

The purpose of the RI/FS was to define the nature and extent of contamination at the Urbana Landfill to support an informed risk management decision regarding which remedy, if any, appears to be the most appropriate, cost-effective and protective of public health and the environment.

Based on the Scope of Work defined in the Final Workplan (CDM, April 1996), findings of the RI performed in the summer and fall of 1996, and the subsequent identification of data gaps necessary to finalize a site remedy, several additional field activities were recommended. These activities included:

- Installation of two additional well pairs down gradient of groundwater flow, situated to the east and west of the unnamed creek to a) obtain a better understanding of the hydraulic connection between the shallow and deep aquifers and the unnamed stream west of the landfill; b) refine the conceptual model of contaminant transport in the ground water and surface water systems; c) determine if groundwater and surface water controls and treatment are necessary; and d) further define the extent of contamination in the shallow and deep aquifers off-site, down gradient of ground water flow;

- Collection of three additional leachate samples that were not present and available to sample during the initial investigation conducted in early October, 1996; and

- Collection of four surface (0 to 2" below the ground surface) soil samples.

A second round of ground water and surface water samples were also collected in fulfillment of the requirements specified in the Final Workplan, dated April, 1996. The second round of sampling included the ground water samples collected from the two newly installed well pairs situated off-site, as mentioned previously, as well as an additional surface water sample collected from a drainage swale situated southeast of the site.

This Phase II Investigation Report also includes the results of the last two rounds of perimeter landfill gas sampling conducted in the year 1997 and supplements the results of the July 11 and October 16 sampling rounds presented in the Final RI Report, dated March 1997.

Section 1 of this report provides a brief review of the background and history of the site. Sampling methodologies utilized for the supplemental investigations are discussed in Section 2, followed by a summary of findings in Section 3. Conclusions are presented in Section 4.

1.2 Site Location

The Urbana Landfill site is located on Crows Nest Road, west of the intersection of Van Ness Road, approximately one mile northwest of the Village of Hammondsport, Steuben County, New York (Figure 1-1). The landfill site encompasses an area of approximately 20 acres. However, information from the Phase II Investigation Report (Recra Research, 1985) indicates that approximately 10 to 15 acres were used for disposal of wastes. The site is bounded on the west by an unnamed stream, on the south by Crows Nest Road, and by a private residence to the east (Plate 1). A pond and wooded area are located beyond the northern end of the site. The area surrounding the site is hilly, rural terrain consisting of farmland and wooded areas.

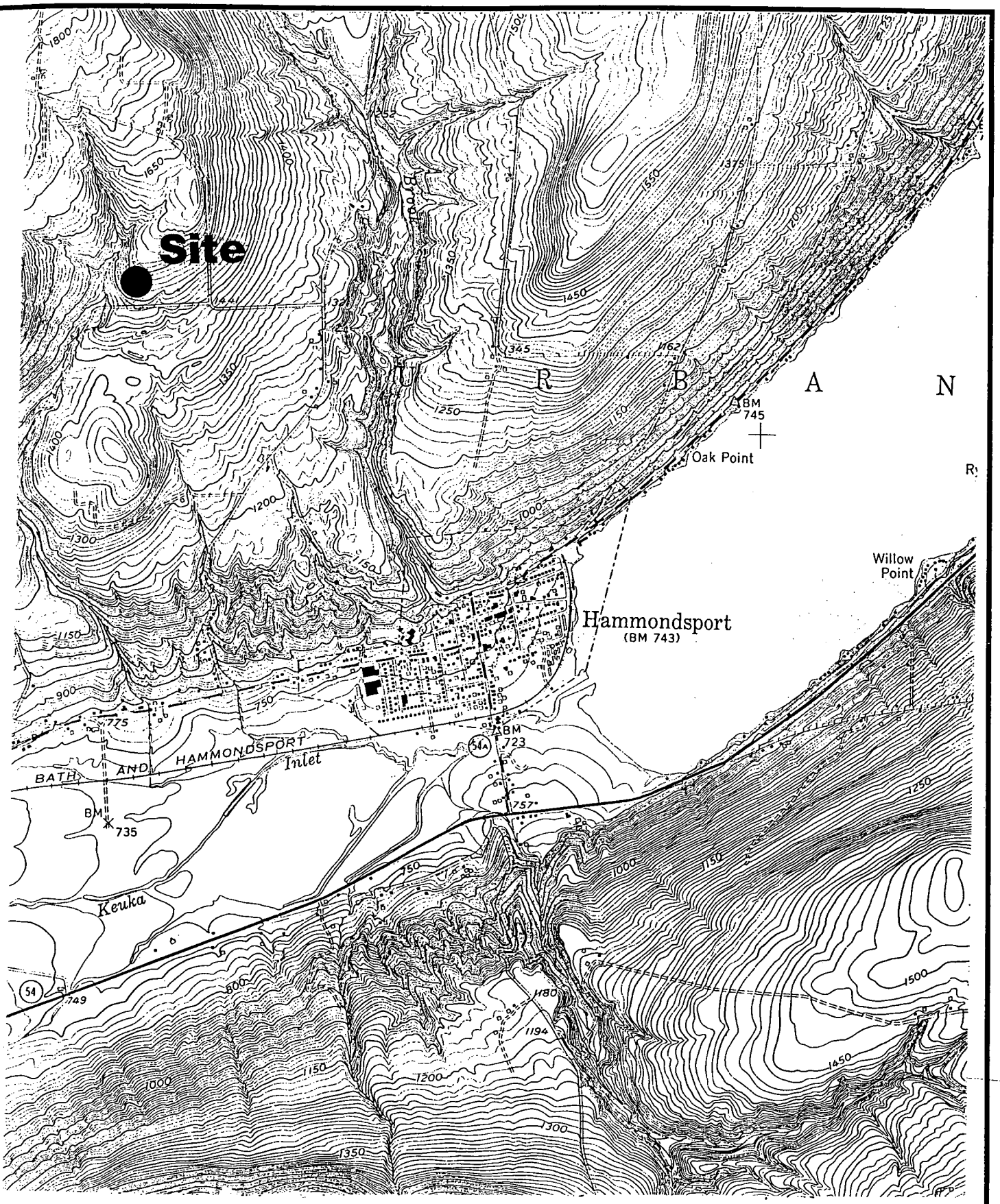
1.3 Site Background

The Urbana Landfill site is an inactive landfill located in a rural area northwest of the Village of Hammondsport, Steuben County, New York. The landfill, which had received municipal and industrial wastes, has been classified by the New York State Department of Environmental Conservation (NYSDEC) as a Class 2 inactive hazardous waste disposal site, indicating that the site poses a significant threat to public health or the environment, and remedial action is required. The landfill is made up of three distinct elevations or terraces. These are referred to as the upper, middle and lower terraces, depicted in **Plate 1.**

The upper terrace is relatively flat, encompassing approximately 6 acres, with the western portion of the landfill sloping steeply to the west and northwest to the unnamed stream. There are visible depressions in the upper terrace that are believed to be septic disposal pits. Junked cars that previously littered the northern section of the terrace have been removed and all that remains is an abandoned house trailer. The eastern slope of the stream valley is littered with exposed debris, white goods and drums. The upper terrace slopes downward in the south and southwest portion of the site to form the middle terrace.

The middle terrace is the smallest of the three terraces, encompassing approximately 2 acres. The terrace is relatively flat with barely visible east-west trending depressions that are believed to result from settling of the wastes within the trenches. Junked cars that previously littered the eastern portion of the terrace, adjacent to the access road, have been removed. As with the upper terrace, the western portion of the middle terrace slopes steeply to the west toward the unnamed stream. A slope separates the middle terrace from the lower terrace at the southern end of the landfill.

The lower terrace cover approximately 5 acres of the landfill. The access road divides the lower terrace into two sections. Very shallow east-west trending depressions are barely visible at the surface, similar to those observed on the middle terrace. The eastern section of the lower terrace also shows evidence of historic trenches, as well as the remnants of a small building which is



CDM Camp Dresser & McKee
environmental services

Figure 1-1
Location Map
Urbana Landfill, Urbana, New York

believed to have been used by the landfill operators. Because of its lower elevation relative to the and middle terraces. It is reported that the site received municipal waste from the Town of Urbana and the Village of Hammondsport. Local wineries in the area reportedly used the landfill for disposal of winery waste. The largest source of industrial waste was reported to be Mercury Aircraft, who, between 1971 and 1978, reportedly disposed of approximately 3,300 gallons per year of still bottoms containing halogenated solvents and approximately 13,200 gallons per year of paint sludges and slurries (Recra Research , 1985). It is reported that drums were received at the landfill once a week and were reportedly dumped over the side of the landfill in the northwestern portion of the site (Ref. 1). According to another eyewitness, however, drums were first perforated and then allowed to drain on the ground along the western edge of the landfill on the upper terrace (Ref. 2). The eyewitness accounts are supported by the presence of discolored soil apparent in undated photographs (Ref. 2) and in existing drums containing dried-up paint sludges observed along the western slope of the landfill. It was reported to CDM (Ref. 2) that the Town of Urbana used the landfill as an area to dispose clean fill as an attempt to cover the exposed waste on the western slope of the landfill.

In 1971, a septic pumping and disposal service was in operation at the landfill for the Town of Urbana and Village of Hammondsport. It is reported that associated septic wastes were disposed of in fan-shaped pits located on the upper terrace (Ref. 2).

According to a report prepared by NYSDOH, the landfill was cited for open burning of wood and cardboard in March 1972. The burning pit was located on the bottom terrace just below the middle terrace, north of the main access road (north of MW-110, see Plate 1) (Clark 1972; Ref. 2).

The landfill was officially closed in September 1978. Two feet of cover was placed over the landfill at that time. In 1982, it was reported that the site had uncontrolled site access, improper final cover, and debris protruding through the final cover. In the same year, the site was listed as a Class 2a. The site was added to the Registry of Inactive Hazardous Waste Disposal Sites as a Class 2a, meaning "sites for which additional information is needed before the Department can classify them according to the classes established by the Environmental Conservation Law." Subsequently, the NYSDEC and New York State Department of Health (DOH) conducted additional sampling in 1988 and again in 1992. In 1994, based on available information gained from past investigations, the site was reclassified to a Class 2, indicating that the site poses a significant threat to the environment and/or human health and that remedial action is required. In March 1995, following the Potential Responsible Party's (PRPs) refusal to pursue further action, the site was referred to the State Superfund for a state-funded remedial investigation/feasibility study.

1.4 Results of the Phase I Investigation

The results of the Phase I Remedial Investigation performed by Camp Dresser & McKee (CDM) in the summer and fall of 1996, indicated that both the shallow and deep aquifers beneath the landfill were contaminated principally by chlorinated solvents, similar to those detected in earlier studies. Low levels of chlorinated solvents were also detected in surface water samples collected in the unnamed stream west of the landfill, down gradient of ground water flow, but

at significantly lower concentrations than reported in earlier studies. The presence of 1,2 DCE in the surface water of sample SW-1, situated southwest of the site, suggested that contaminated groundwater was discharging to the unnamed stream further down gradient.

Elevated concentrations of aromatic compounds, including toluene, ethylbenzene and xylenes, were detected in soil gas samples collected in the former trench areas along the lower terrace. The highest constituents were detected A-19. The western portion of both the lower and middle terraces exhibited elevated concentrations of chlorinated solvents, including c-1,2-DCE and TCE. The highest concentrations were detected in the vicinity of A-9. The highest concentrations of chlorinated solvents anywhere on site were detected in the upper terrace in the area of soil vapor probe A-32. Samples collected along the western toe of the slope consistently revealed elevated concentrations of c-1,2-DCE and TCE.

VOCs were detected in 6 of the 7 samples collected from test pits. Samples from test pit TP-10, situated in the upper terrace near soil vapor probe A-32, revealed the presence of chlorinated solvents and petroleum-based aromatic compounds. The primary contaminants detected included TCE, 1,1,1-TCA, toluene and xylene. The high concentration of both chlorinated solvents and aromatic compounds detected in this test pit indicated that this area was a potential source of contamination.

Aromatic compounds, principally xylenes, were detected in a sample of black sludge collected from test pit TP-11, situated on the western portion of the upper terrace. Similar constituents were detected in a sample of the silty clay and tan sand collected 3 feet below this material in the same test pit, indicating that this area represented a potential source of contamination.

Results of the soil gas analysis and subsurface soil samples indicated that there were at least four hot spot areas within the landfill. These include areas in and around soil vapor probes A-32 in the upper terrace, A-19 in the lower terrace, and in the area of monitoring well MW-105S, situated in the western portion of the landfill. Sludge and soil samples collected from test pit TP-11 in the upper terrace also indicated another hot spot area of contamination.

Surface/shallow subsurface soils on the landfill did not represent a source of volatile organic contamination. However, heavy metals detected in the surface/shallow subsurface soil samples that exceeded NYSSCGs were also detected at concentrations exceeding NYSSCGs in the sediments of the unnamed stream situated to the west of the site.

The one leachate sample collected at the site did not represent a potential source of volatile organic contamination. Calcium and iron were the only two metals that exceeded NYSSCGs and/or background concentrations.
(b:\urbRI/IIsec1)

Section Two

Section 2
Sampling Methodology

2.1 Groundwater Monitoring Wells

A total of 24 monitoring wells were installed in and around the Urbana Landfill during the Phase I RI, conducted between August and October 1996. Twelve shallow wells were installed in the overburden material and eleven deep wells were installed in the bedrock. One additional intermediate depth well was also installed.

To supplement the information gained from the existing 24 wells, two additional well pairs (201S, 201D, 202S, and 202D) were completed during the Phase II Investigation in the vicinity of the unnamed stream, southwest of the landfill. The location of all monitoring wells are depicted on Plate 1, found at the rear of this report. Table 2-1 provides a summary of relevant physical data obtained on all wells installed during both phases of the RI.

In April 1997, CDM completed a second round of ground water sampling on all 24 monitoring wells installed during the Phase I RI. In addition, ground water samples were collected from each of the four newly installed wells.

Prior to sampling, each well was unlocked, the well cap removed, and the headspace measured for organic vapors. Purging was then accomplished with dedicated Teflon disposable bailers for 25 wells, and with a submersible pump and dedicated PVC hose for the remaining three wells (113D, 201D, and 202D). Submersible pumps were decontaminated prior to well purging. All samples were collected using the dedicated Teflon bailers.

A minimum of three well volumes were purged from each monitoring well. Water quality parameters for pH, conductivity, turbidity, and temperature were measured after each purged volume. Parameters were stabilized to within ten percent of the previous readings prior to initiating groundwater sampling.

Groundwater was poured directly from the dedicated bailer into laboratory supplied sample containers in which appropriate preservatives had been previously added by the laboratory. The pH of each sample was then measured and adjusted to below 2, as necessary. Sample containers were placed in ice-packed laboratory supplied coolers and shipped the day of collection to the laboratory via priority overnight delivery.

Samples from each well were analyzed for volatile organic compounds and heavy metals only (the primary contaminants of concern identified from the first sampling round). Additional samples were collected from eleven wells (103S, 103D, 104S, 105S, 107S, 108S, 108I, 111S, 112S, 114S, 201D) for analysis of alkalinity, sulfate, Total Dissolved Solids (TDS), Chemical Oxygen Demand (COD), Total Kjeldahl Nitrogen (TKN), hardness, Biological Oxygen Demand (BOD), ammonia and Total Organic Carbon (TOC).

Table 2-1
Monitoring Well Information
Urbana Landfill Remedial Investigation/Feasability Study
Stuben County, NY
NYSDEC Site No. 8-51-007
January 1997

Monitoring Well	Ground Elevation (MSL)1	Riser Elevation (MSL)	Stickup (ft)	Depth To Bedrock (bls)	Bedrock Elevation (bls)	Screened/ Open Hole Interval (ft.bls)	Total Depth (bls)	Bottom Elevation (MSL)	Well Yield2 (gpm)	Water Level 9/23/96 (BPVC)	Water Elevation 9/23/96 (MSL)	Water Level 11/5/96 (BPVC)	Water Elevation 11/5/96 (MSL)	Water Elevation 4/97 (MSL)
MW-101D	1596.65	1598.77	2.12	12	1584	19-44.31	44.31	1552.34	0	23.59	1575.18	22.62	1576.15	1579.87
MW-101S	1596.48	1598.93	2.45	12	1584	3.90-13.90	14.1	1582.38	0.14	16.22	**1582.71**	15.1	1583.83	1588.67
MW-102D	1579.11	1581.2	2.09	9	1570	20-28.43	28.43	1550.68	0.04	19.12	1562.08	17.73	1563.47	1566.08
MW-103D	1578.57	1581.09	2.52	8	1570	23-28.28	28.28	1550.29	0.09	21.94	1559.15	21.26	1559.83	1561.02
MW-103S	1578.97	1581.15	2.18	8	1570	4.18-14.18	14.38	1564.59	<0.1	11.3	1569.85	11.13	1570.02	1571.28
MW-104S	1505.9	1507.92	2.02	>18	?	5.97-15.97	16.17	1489.73	<0.2	8.98	1498.94	6.9	1501.02	1501.95
MW-105S	1520.95	1522.91	1.96	?	?	10.64-20.64	20.84	1500.15	<0.1	18.48	1504.43	14.26	1508.65	1509.2
MW-106D	1486.44	1488.14	1.7	7	1479	17-26.88	26.88	1459.56	0.05	1.97	1486.17	1.39	1486.75	1486.29
MW-107D	1471.66	1473.27	1.61	12	1469	20-24.65	24.65	1447.01	0.07	9.94	1463.33	8.13	1465.14	1465.14
MW-107S	1471.74	1473.96	2.22	12	1469	5.01-15.01	15.21	1456.19	0.02	6	1467.96	5.28	1468.68	1468.04
MW-108D	1451.87	1453.91	2.04	29	1423	36.5-40.59	40.59	1411.28	0.06	7.67	1446.24	6.89	1447.02	1446.61
MW-108I	1451.2	1453.25	2.05	29	1423	16.88-26.88	27.08	1424.12	>1	9.13	1444.12	8.01	1445.24	1446.8
MW-108S	1450.46	1452.9	2.44	29	1423	5.94-15.94	16.14	1434.32	<0.1	8.73	1444.17	7.69	1445.21	1446.64
MW-109D	1491.4	1493.84	2.44	17	1474	28-47.8	47.8	1443.6	0.02	19.66	1474.18	18.46	1475.38	1478.01
MW-109S	1491.54	1494.03	2.49	17	1474	9.42-19.42	19.62	1471.92	<0.1	9.6	1484.43	8.82	1485.21	1486.04
MW-110D	1517.12	1519.54	2.42	13	1504	22-41.62	41.62	1475.5	>0.1	19.2	1500.34	18.35	1501.19	1503.04
MW-110S	1516.25	1518.59	2.34	13	1504	4.29-14.29	14.49	1501.76	>1	8.98	1509.61	6.35	1512.24	1513.73
MW-111D	1488.82	1490.89	2.07	32	1457	45-64.5	64.5	1424.32	0.08	40.5	1450.39	30.59	1460.3	1451.89
MW-111S	1488.61	1491.4	2.79	32	1457	19.49-29.49	29.69	1458.92	0.06	24.21	1467.19	23.22	1468.18	1472.22
MW-112D	1485.33	1487.17	1.84	32	1453	47-51.92	51.92	1433.41	0.15	31.97	1455.2	39.63	1447.54	1459.06
MW-112S	1485.96	1488.21	2.25	32	1453	20.11-30.11	30.31	1455.65	<0.1	25.94	1462.27	22.76	1465.45	1468.68
MW-113D	1416.62	1418.97	2.35	27	1389	35-59.45	59.45	1357.17	0.06	0.15	1418.82	0+3	1418.97+3	1418.97
MW-113S	1416.74	1419.28	2.54	27	1389	17.83-27.83	28.03	1388.71	0.01	2.73	1416.58	2.44	1416.84	1419.11
MW-114S	1578.79	1581.83	3.04	12	1566	2.76-12.76	12.96	1565.83	0.02	10.8	1571.03	10.81	1571.02	1576.03
MW-201S	1466.25	1468.22	1.97	57	1410	47.2-57.2	57.6	1410	N/A	N/A	N/A	N/A	N/A	1428.97
MW-201D	1466.7	1468.73	2.03	57	1410	1416-1387	80	1387	N/A	N/A	N/A	N/A	N/A	1428.3
MW-202S	1448.69	1450.72	2.03	24	1427	13-23	23	1428	N/A	N/A	N/A	N/A	N/A	1440.73
Mw-202D	1448.83	1450.8	1.97	24	1427	30-81.5	81.5	1367.3	N/A	N/A	N/A	N/A	N/A	1431.53

Quality Assurance and Quality Control (QA/QC) samples were also collected from select wells. Blind duplicate samples from monitoring wells 104S and 105S (120S and 121S, respectively) were collected for analyses of volatile organic compounds (VOCs) and metals. Matrix spikes and matrix spike duplicates were collected from monitoring wells 102D and 107D for analyses of VOCs and metals. Trip blanks were also prepared for VOC analysis for each cooler shipment.

Several observations were noted during the second round of ground water sampling. These included:

- The turbidity of the ground water in several wells (101S, 107S, 108S, 108I, 109S, 111S, 112S, 113S, 113D, 202S, and 202D) exceeded 50 NTU after the third well volume was purged. Under these conditions, NYSDEC directed CDM to leave the wells idle until the end of the sampling day, at which time a sample was collected for metals analyses.
- A diesel fuel odor was prevalent during the initial purging activities for well 104S.
- Rust colored sediments were present at the bottom of well 110S.
- Wells 201S and 201D appeared to be contaminated with grout and purged water was grey in color.

Using the water level information collected during the second sampling round, groundwater contour maps were constructed for both the shallow overburden and deep bedrock aquifers (figures 2-1 and 2-2). Ground water levels measured in the existing and newly installed well pairs indicate general groundwater flow patterns similar to those observed during the Phase I RI.

As shown in Figures 2-1 and 2-2, horizontal groundwater flow directions are to the south and southwest of the landfill, with westerly components in the stream valley in both the shallow and deep aquifers. Generally, both the shallow and deep ground water contours mimic the topography. As with the Phase I RI wells, groundwater levels indicated that the direction of flow is predominately downward.

During the April 1997 sampling round, a downward vertical gradient was observed in well clusters located near the unnamed stream. However, water level measurement in October 1996 indicated an upward vertical gradient within this area. The apparent reversal in the hydraulic gradient may be attributable to the high water table conditions present within the shallow overburden aquifer during the early-April 1997 sampling event.

2.2 Surface Water Samples

Five surface water locations were sampled in the unnamed stream west of the landfill. An additional surface water sample was collected from a drainage swale situated to the southeast of the landfill (south of Crows Nest Road).

Prior to sampling, each surface water sample location was screened with an OVM and analyzed in the field for pH, conductivity, turbidity, and temperature. The depth of water at each sample

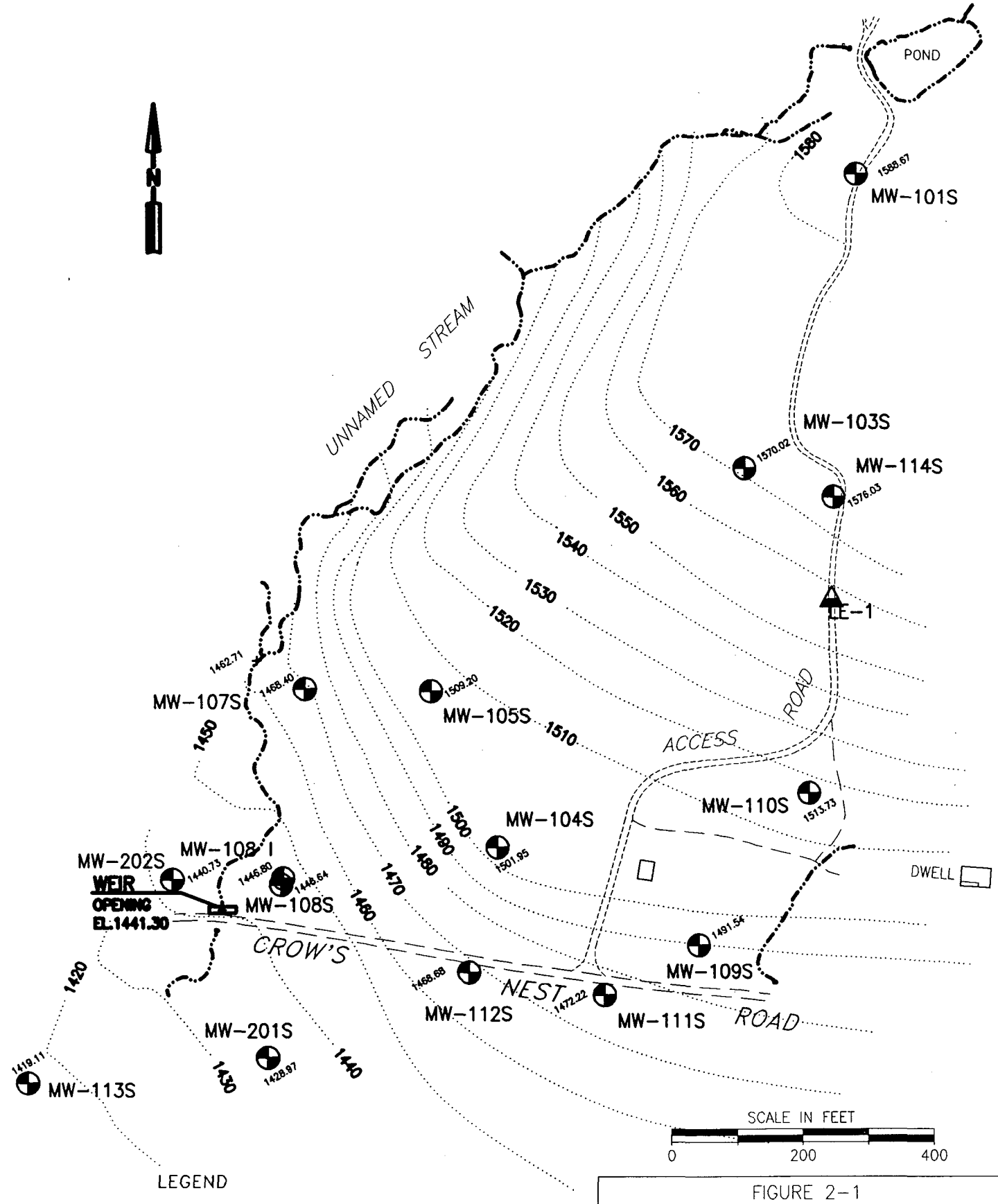
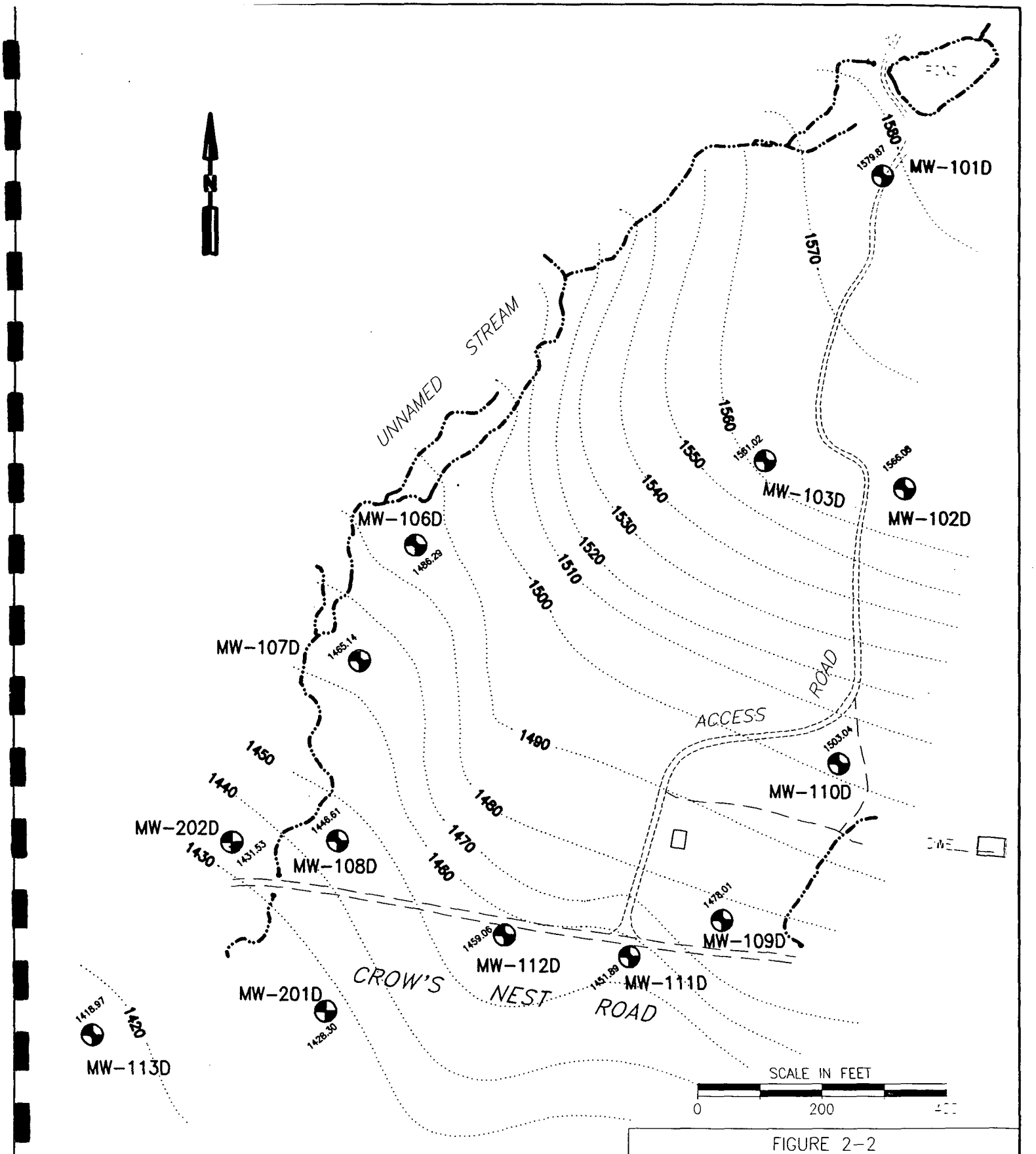


FIGURE 2-1

URBANA LANDFILL RI/FS

OVERBURDEN AQUIFER GROUNDWATER CONTOURS

NYSDEC SITE NO. 8-51-007



LEGEND

- MONITORING WELL LOCATION (D-DEEP)
- 10' GROUNDWATER CONTOURS OF BEDROCK AQUIFER AS INTERPRETED FROM WATER LEVEL MEASUREMENTS (4/97)
- 1416.62 SURFACE ELEVATION

FIGURE 2-2

URBANA LANDFILL PHASE

BEDROCK AQUIFER GROUNDWATER CONTOURS

NYSDEC SITE NO. 8-51-

location was noted and a photograph was taken. Where appropriate, samples were collected at the downstream location first, proceeding upstream with each additional sample. Samples were collected using laboratory supplied containers. All samples were collected by submerging the containers below the water surface, allowing water to flow into the containers. Collected samples were measured for pH, and adjusted as required, to a pH of less than 2. Sample containers were placed in ice-packed laboratory supplied coolers and shipped the day of collection to the laboratory via priority overnight delivery.

Each surface water sample was analyzed for VOCs and metals, in addition to alkalinity, ammonia, hardness, nitrate, nitrite, sulfate, TKN, TOC, and TDS. Sample SW7, collected southeast of the site, was analyzed for VOCs and metals, only, at NYSDEC's direction.

For QA/QC purposes, a blind duplicate sample (SW6) was collected at surface water location SW4 and analyzed for VOCs and metals. Matrix spike and matrix spike duplicates were collected for the analysis of VOCs and metals at sample location SW3. Trip blanks were prepared for VOC analysis for each cooler shipped to the laboratory.

2.3 Leachate Sampling

Leachate seep locations were identified by CDM based on a site inspection. Three leachate seep locations were identified and sampled. The locations were staked and a photograph taken for identification. Each sampled location appeared to contain a combination of surface runoff and leachate. The areas sampled were ponded, which allowed for collection of grab samples. Prior to sampling, each leachate location was analyzed in the field for pH, conductivity, turbidity, and temperature. The depth of the sample collection area was also measured.

At each leachate location, laboratory-supplied sample containers were used to collect the sample. Samples were subsequently analyzed for VOCs and metals, in addition to conventional water quality parameters, including alkalinity, sulfate, TDS, COD, TKN, hardness, BOD, TOC, and ammonia. All samples were collected by submerging, to the extent possible, the containers below the leachate/water surface, allowing flow into the containers. Collected samples were measured for pH and adjusted as required to a pH of less than 2. Sample containers were placed in ice-packed laboratory supplied coolers and shipped the day of collection to the laboratory via priority overnight delivery.

For QA/QC purposes, a blind duplicate sample (LE4) was collected at leachate sampling location LE3 and analyzed for VOCs and metals. Matrix spike and matrix spike duplicates were also collected for analysis of VOCs and metals at sample location LE3. Trip blanks were prepared for VOC analysis for each cooler shipped to the laboratory.

2.4 Surface Soil Sampling

Four surface soil samples (0 to 2" below the ground surface) were collected in locations designated by NYSDEC and photographs were taken at each location. Debris and vegetation were removed from the surface of the sampling locations and dedicated trowels were used to collect the samples.

Soil samples were placed in a stainless steel bowl and homogenized prior to placing into laboratory-supplied sample containers. Samples were analyzed for full TCL/TAL parameters.

Sample containers were placed in ice-packed laboratory supplied coolers and shipped the day of collection to the laboratory via priority overnight delivery. No QA/QC samples were required by NYSDEC.

2.5 Perimeter Probe Monitoring

Perimeter probe monitoring was performed at twelve locations surrounding the eastern and southern perimeters of the landfill. A GEM-500 landfill gas meter was used during sampling to monitor for the Lower Explosive Limit (LEL). methane, oxygen and carbon dioxide. Perimeter gas samples were collected by connecting the GEM-500 intake to the existing probes installed in the landfill. The probe was then purged for approximately one minute he GEM-500 pump was purged for approximately one minute. During sampling the pump operation time, peak and sustained readings for the required parameters were recorded. Table 2-2 provides a summary of the results from all four sampling rounds.

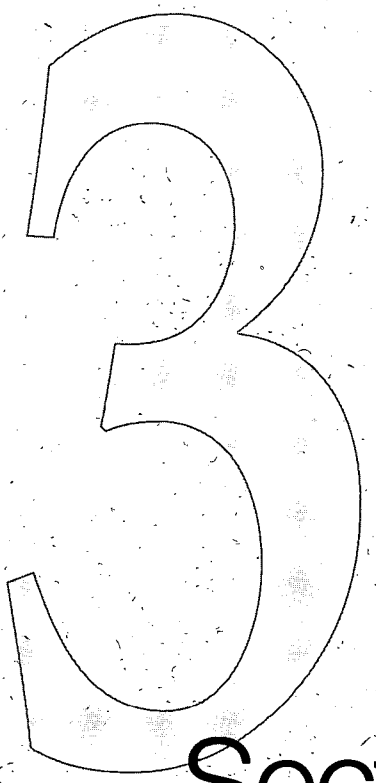
(w:urbana/sec2)

Table 2-2
Landfill Gas Monitoring Data
Urbana Landfill Remedial Investigation / Feasibility Study
Steuben County, NY

Perimeter Probe No.	Round No.	Diff Press. (in. H20)	Lower Explosive Level (%)	Methane (CH4) (%)	Carbon Dioxide (CO2) (%)	Oxygen (O2) (%)
PP-1	1	NA(a)		0	2.1	18
	2	-3.06	0	0	0	20.5
	3	-0.48	0	0	2.3	15.5
	4	-0.19	0	0	0.4	19.3
PP-2	1	NA(a)		0.3	0	19.9
	2	-3.69	0	0	0	20.5
	3	-5.24	0	0	2.1	15.5
	4	-0.01	0	0	0	21.4
PP-3	1	NA(a)		0.1	0	19.9
	2	-6.06	0	0	0	20.4
	3	-7.21	0	0	1.2	14.8
	4	-3.6	0	0	0	22.4
PP-4	1	NA(a)		0.3	0	20.2
	2	-0.01	0	0	0	20.4
	3	-4.21	0	0	1.2	14.8
	4	-2.75	0	0	0	21.4
PP-5	1	NA(a)	NA(b)	NA(b)	NA(b)	NA(b)
	2	-6.08	NA(b)	NA(b)	NA(b)	NA(b)
	3	-9.58	0	0	1.3	13.5
	4	-4.43	0	0	0	23.1
PP-6	1	NA(a)		0.3	3.2	18.1
	2	-0.02	0	0	2.9	18.4
	3	-7.56	0	0	0.1	17.2
	4	-4.94	0	0	0	21.9
PP-7	1	NA(a)		0.4	0	20.8
	2	0	0	0	1.6	19.1
	3	-5.16	0	0	0	17.2
	4	-2.99	0	0	0	21.8
PP-8	1	NA(a)		0.4	0	20.1
	2	-5.35	NA(b)	NA(b)	NA(b)	NA(b)
	3	-4.6	0	0	0	17.2
	4	-5.22	0	0	0	21.9
PP-9	1	NA(a)		0.3	0	20.3
	2	-2.02	0	0	0	20.5
	3	-0.26	0	0	0	17.2
	4	-0.02	0	0	0	21.6
PP-10	1	NA(a)		0.2	0.7	18.9
	2	-7.58	NA(b)	NA(b)	NA(b)	NA(b)
	3	-0.6	0	0	1.3	15.8
	4	-4.19	0	0	0	21.9
PP-11	1	NA(a)		0	0	19.5
	2	-2.11	NA(b)	NA(b)	NA(b)	NA(b)
	3	-4.02	0	0	0.2	15.9
	4	-5.04	0	0	0	21.4
PP-12	1	NA(a)		0.2	6.4	13.8
	2	-0.02	0	0	3.7	17.3
	3	-1.45	0	0	1.5	16.3
	4	-3.31	0	0	0.2	20.1

Notes:

1. Rounds 1 and 2 performed on 7/11/96 and 10/16/96, respectively.
2. NA(a) denotes data not available due to equipment problem.
3. NA(b) denotes samples not collected because probe was saturated.



Section Three

Section 3
Findings

3.1 Introduction

The Phase II RI data was compared to available New York State Standards, Criteria and Guidance (NYSSCG), and/or background samples of each corresponding medium to further define the nature and extent of contamination at the site. These criteria and standards are described in detail in the RI Report, dated March 1997. In addition, results of the second round of ground water samples were compared to those of the first round in order to assess the consistency in the data and identify potential contaminant trends. Because this round of sampling results did not receive third party validation, the comparison of the data between the two sampling rounds was both necessary and important from a standpoint of assigning an acceptable degree of confidence in the accuracy of the data.

A comparison of the analytical data to the NYSSCGs is presented in the following tables. Only constituents exceeding their respective SCGs are reported in these tables. Table 3-1 presents the volatile organic compounds (VOCs) exceeding SCGs in the ground water and leachate samples; metal concentrations exceeding SCGs in groundwater, leachate and surface water samples are presented in tables 3-2, 3-3, and 3-4, respectively. The conventional water quality parameters exceeding their respective SCGs for groundwater, leachate and surface water samples are presented in tables 3-5, 3-6, and 3-7, respectively. (Note, no VOCs were detected in the surface water samples at concentrations exceeding their SCGs, therefore, no analytical data summary is provided). Table 3-8 presents a summary of the volatile, semi-volatile organic compounds, and metals exceeding their respective SCGs for the surface soil samples.

3.2 Groundwater

The following section presents the results of the second round of ground water sampling. This discussion focuses on the 5 geographical areas of the landfill, as described in the Final RI Report. These geographical areas include: the upper, middle and lower terrace; western portion of the landfill; and toe of the western slope.

3.2.1 Background Monitoring Wells

No VOCs were detected in ground water samples from background monitoring wells MW-101S and MW-101D. Trace concentrations of chromium (16.8 ug/l), cobalt (2 ug/l), nickel (15.3 ug/l) and vanadium (4.6 ug/l) were detected in MW-101S. The concentration of iron in MW-101S (2,810 ug/l) and MW-101D (2,530 ug/l) exceeded the corresponding SCG of 300 ug/l. The concentration of manganese (513 ug/l) also exceeded the corresponding SCG of 300 ug/l in the ground water sample from MW-101D.

3.2.2 Upper Terrace

As with the first sampling round, the highest concentrations of chlorinated VOCs were detected in ground water samples from monitoring wells MW-103S and MW-103D which are located

Table 3-1
Volatile Organic Compounds Exceeding SCGs in Groundwater and Leachate Samples
Urbana Landfill
Phase II Investigation

Parameters	103S	Q	103D	Q	104S	Q	105S	Q	107S	Q	108S	Q	108I	Q	113S	Q	114S	Q	120S	Q	121S	Q	202S	Q	LE2	Q
Vinyl Chloride									360		69		43		3	J										
Chloroethane			13	J																						
1,1-Dichloroethene	370		32																							
1,1-Dichloroethane	70	J	110														11									
1,2-Dichloroethene	790		43						1100		750		360										35			
1,1,1-Trichloroethane	3400		370																							
Trichloroethene	3100		340						350		250		150								5	J	26			
Benzene					8	J	1	J											8	J	1	J				
Toluene					11														12							
Chlorobenzene					13												32		14							
Ethylbenzene					7	J													8	J						
Xylene					190														200							
Acetone																									70	

Inorganic

Units = ug/l

J = Reported value is estimated due to variance from quality control limits.
B = Indicates analyte result is between (IDL) and (CRDL).
U = Indicates analyte was not detected at or below (CRDL), or the compound is not detected due to qualification through the method or field blank.

Organic

J = The associated numerical value is an estimated quantity.
B = Indicates that the compound was also detected in the laboratory blank.
U = Indicated that the compound was analyzed for but not detected above the (CRQL), or the compound is not detected due to qualification through the method or field blank.

Table 3-2

Metal Concentrations Exceeding SCGs in Groundwater Samples
Urbana Landfill
Phase II Investigation

Parameters	101S	Q	101D	Q	102s(DILUTE)	Q	102D	Q	102D(DILUTE)	Q	103S	Q	103D	Q	104S	Q	104S (DUP)	Q	105S	Q	106D	Q	107S	Q	107S(DILUTE)	Q	107D	Q	107D(DILUTE)	Q	108S	Q	108I	Q	108D	Q
ALUMINUM	2100		434		2120						2290.0				2860		2360				1060		12600		2190											
ANTIMONY					459												4.3	U							503											
ARSENIC			5.3	B	36.5												6	B			8.2	B			41.9											
BARIUM	42.6	B	204		1940						42.9	B	247		398.00		375		131	B			380		2180		218		217		99.7	B	77.2	B	252	
BERYLLIUM					45.8												0.2	U							49.1											
CADMIUM					45.8																				49.5											
CALCIUM	9660		49300		36900						67300.0		58700		108000.00		103000		74000				79800		54400		54800		54500		112000		92800		73800	
CHROMIUM	16.8				187																		42.9		202											
COBALT	2	B			467						2.9	B			7.30	B	6.4	B	5.6	B			11.2	B	501						3.6	B	3.1	B		
COPPER	8.6	B	1.2	B	231										18.40	B	14.7	B			33.6		30.6		248											
IRON	2810		2530		1250				324		3240.0		748		133000.00		126000		65200		2100		24500		1670		629		638		1600		751			
LEAD															64.10		55.6																			
MAGNESIUM	4650	B	13900		8970						18700.0		18400		29900.00		28400		21400				21500		10100						34700		25600		16500	
MANGANESE	40.9		513		678						396.0		1630		636.00		586		4340				1260		652						3640		334			
MERCURY																																				
NICKEL	15.3	B			467										29.20	B	23.7	B					46.9		499											
POTASSIUM	1720	B	2300	B	1870	B					1820.0	B			17700.00		17000		10500		4290	B	6190		5090		5110		5090		2880	B	5600		4260	B
SELENIUM					10.9																															
SILVER																									51.1											
SODIUM	2750	B	6840		5130						7180.0				20900.00		20000		14800		90600		31900		61700		62000		61400		24800		18200		34200	
THALLIUM					47.7		6.5	B	5.1	B	5.9	B	8.3	B	5.90	B	5.2	B	7.6	B					49.6											
VANADIUM	4.6	B			469										6.90	B	6	B					23.6	B	504											
ZINC	12.9	B	4.9	B	465						18.4	B	5	B	89.60		74.8				12.5	B	74.6		498										6.3	B

Units = ug/l

Inorganic
J = Reported value is estimated due to variance from quality control limits.
B = Indicates analyte result is Between (IDL) and (CRDL).
U = Indicates analyte was not detected at or Below (CRDL), or the compound is not detected due to qualification through the method or field Blank.

Organic
J = The associated numerical value is an estimated quantity.
B = Indicates that the compound was also detected in the laBoratory Blank.
U = Indicated that the compound was analyzed for But not detected aBove the (CRQL), or the compound is not detected due to qualification through the method or field Blank.

Table 3-2 (cont.)

Metal Concentrations Exceeding SCGs in Groundwater Samples
Urbana Landfill
Phase II Investigation

Parameters	109S	Q	109D	Q	110s	Q	110D	Q	110D	Q	111S	Q	111D	Q	112S	Q	112D	Q	113S	Q	113D	Q	114S	Q	121S	Q	201S	Q	201D	Q	202S	Q	202D	Q
ALUMINUM	2470										13800		575		8530						1360						10600		2000		2790			
ANTIMONY																																		
ARSENIC																													7.8	B				
BARIUM	335		268		104	B	212		206		279				231				71.6	B	791				144	B	259							
BERYLLIUM					0.2	u																												
CADMIUM					0.87	B																												
CALCIUM	120000		63900		70300		142000		144000		118000		113000		161000		99600		49700				30900.00		78200		107000		57300		10300			
CHROMIUM											43				21												57.1							
COBALT	2.6	B			8.3	B					22.9	B			13	B							6.20	B	6.3	B	17.8	B			2.9	B		
COPPER	9.5	B									26.1		1.3	B	24.1	B					1.8	B					107		7.6	B	10.8	B		
IRON	3570		331		16600		669		530		26400		2120		17400		638		1340		2960		792.00		58400		25400		3800		3730		441	
LEAD																																		
MAGNESIUM	35000		14300		22600		32300		33200		43700		31500		58600		30300		13100				10900.00		21900		34400							
MANGANESE	195				2440		798		842		588		321		3200				343				3340.00		4380		1090				80.6			
MERCURY																																		
NICKEL	13.2	B			20.7	B					64.3				59.5				65.6								90.7							
POTASSIUM	2180	B	3470	B			5520		5670		5430		4580	B	5740		7330		1820	B	3900	B			10600		4930	B	12400				15800	
SELENIUM																																		
SILVER																																		
SODIUM	13200		7070		9800		17900		18600		14200		11500		26400		15400		56700		149000		5100.00		16500		10100		34600				138000	
THALLIUM			7.3	B	11.5														6.6	B			9.50	B	6.1	B							7.9	B
VANADIUM	4.6	B									21.9	B			14.2	B											19.3	B			5.7	B		
ZINC	16.3	B			24						78.9		38.6		48.9						15.8	B			18	B	205		18.7	B	17.3	B		

Units = ug/l

Table 3-3
Metal Concentrations Exceeding SCGs in Leachate Samples
Urbana Landfill
Phase II Investigation

Parameters	LE1	Q	LE2	Q	LE3	Q	LE3(DUP)	Q	LE3D	Q	Q
ALUMINUM											
ANTIMONY											
ARSENIC											
BARIUM			53	B							
BERYLLIUM											
CADMIUM											
CALCIUM	13400		78700		48700		48400		49200		
CHROMIUM											
COBALT			11.6	B							
COPPER											
IRON	3400		12100		4250		3380		4200		
LEAD											
MAGNESIUM			20700		10100		10100		10200		
MANGANESE	143		6490		296		272		299		
MERCURY											
NICKEL											
POTASSIUM	4920	B	13400		3120	B	3160	B	3150	B	B
SELENIUM											
SILVER											
SODIUM			10600		5120		5060		5150		
THALLIUM			8.4	B					5.2	B	
VANADIUM											
ZINC			19.5	B							

Units = ug/l

Inorganic
J= Reported value is estimated due to variance from quality control limits.
B= Indicates analyte result is between (IDL) and (CRDL).
U= Indicates analyte was not detected at or below (CRDL), or the compound is not detected due to qualification through the method or field blank.

Organic
J= The associated numerical value is an estimated quantity.
B= Indicates that the compound was also detected in the laboratory blank.
U= Indicated that the compound was analyzed for but not detected above the (CRQL), or the compound is not detected due to qualification through the method or field blank.
D= Diluted Sample
Dup= Duplicate Sample

Table 3-4

Metal Concentrations Exceeding SCGs in Surface Water Samples
Urbana Landfill
Phase II Investigation

Parameters	SW1	Q	SW2	Q	SW3	Q	SW3S	Q	SW3D	Q	SW4	Q	SW4(DUP)	Q	SW7	Q
ALUMINUM	269		179	B			2130		106	B			110	B		
ANTIMONY																
ARSENIC																
BARIUM	18.6	B	19.6	B			1960								25.1	B
BERYLLIUM																
CADMIUM																
CALCIUM	23800		25700												46500	
CHROMIUM	1.4	B					200									
COBALT							498									
COPPER	1.3	B					248									
IRON	376						1190								714	
LEAD																
MAGNESIUM	5950		6640		6260		6110		6240						14400	
MANGANESE	7.4	B					498								256	
MERCURY							1									
NICKEL																
POTASSIUM	1360	B	1460	B	1400	B	1370	B	1370	B	1360	B			2540	B
SELENIUM							7.6									
SILVER							50.3									
SODIUM	7510		7820												9110	
THALLIUM							47.3									
VANADIUM							497									
ZINC							492									

Units = ug/l

Inorganic

J = Reported value is estimated due to variance from quality control limits.
B = Indicates analyte result is between (IDL) and (CRDL).
U = Indicates analyte was not detected at or below (CRDL), or the compound is not detected due to qualification through the method or field blank.

Organic

J = The associated numerical value is an estimated quantity.
B = Indicates that the compound was also detected in the laboratory blank.
U = Indicated that the compound was analyzed for but not detected above the (CRQL, or the compound is not detected due to qualification through the method or field blank.

Table 3-5
Conventional Water Quality Parameters Exceeding SCGs in Groundwater Samples
Urbana Landfill
Phase II Investigation

Parameters	103S	Q	103D	Q	104S	Q	105S	Q	107S	Q	108S	Q	108I	Q	111S	Q	112S	Q	114S	Q	201D	Q
ALKALINITY	194		204		593		334		281		408		336		410		562		114		106	
BOD5																					3.6	
TOTAL HARDNESS	240		230		380						380		320		400		610		140			
TOTAL DISSOLVED SOLIDS					655						502						653					
AMMONIA-NITROGEN					33																	
TOTAL KJELDAHL NITROGEN	0.25		0.21		30.6		9.2		3		0.54		0.6		2.4		4.4		0.88		0.58	

Units = mg/l

Inorganic
J= Reported value is estimated due to variance from quality control limits.
B= Indicates analyte result is between (IDL) and (CRDL).
U= Indicates analyte was not detected at or below (CRDL), or the compound is not detected due to qualification through the method or field blank.

Organic
J= The associated numerical value is an estimated quantity.
B= Indicates that the compound was also detected in the laboratory blank.
U= Indicated that the compound was analyzed for but not detected above the (CRQL), or the compound is not detected due to qualification through the method or field blank.

Table 3-6
Conventional Water Quality Parameters Exceeding SCGs in Leachate Samples
Urbana Landfill
Phase II Investigation

Parameters	LE1	Q	LE2	Q	LE3	Q	LE 3(DUP)	Q
ALKALINITY			307		134		160	
BOD5			44					
TOTAL KJELDAHL NITROGEN	0.91		2.2		1.5		1.2	

Units = mg/l

Inorganic
J= Reported value is estimated due to variance from quality control limits.
B= Indicates analyte result is between (IDL) and (CRDL).
U= Indicates analyte was not detected at or below (CRDL), or the compound is not detected due to qualification through the method or field blank.

Organic
J= The associated numerical value is an estimated quantity.
B= Indicates that the compound was also detected in the laboratory blank.
U= Indicated that the compound was analyzed for but not detected above the (CRQL), or the compound is not detected due to qualification through the method or field blank.

Table 3-7
Conventional Water Quality Parameters Exceeding SCGs in Surface Water Samples
Urbana Landfill
Phase II Investigation

Parameters	SW1	Q	SW2	Q	SW3	Q	SW4	Q	SW5	Q
ALKALINITY										
BOD5										
TOTAL HARDNESS			84							
TOTAL DISSOLVED SOLIDS										
TOC BY LLOYD KAHN										
AMMONIA-NITROGEN										
TOTAL KJELDAHL NITROGEN	0.33		0.33		0.17		0.28		0.21	

Units = mg/l

Inorganic
J= Reported value is estimated due to variance from quality control limits.
B= Indicates analyte result is between (IDL) and (CRDL).
U= Indicates analyte was not detected at or below (CRDL), or the compound is not detected due to qualification through the method or field blank.

Organic
J= The associated numerical value is an estimated quantity.
B= Indicates that the compound was also detected in the laboratory blank.
U= Indicated that the compound was analyzed for but not detected above the (CRQL), or the compound is not detected due to qualification through the method or field blank.

Table 3-8
Contaminants Exceeding SCGs in Surface Soil Samples
Urbana Landfill
Phase II Investigation

Volatiles	SS1	Q	SS2	Q	SS3	Q	SS4	Q	SS4RE	Q
Acetone	6	JB	9	JB	5	JB	4	JB	23	B
Semi Volatiles	**SS1**	**Q**	**SS2**	**Q**	**SS3**	**Q**	**SS4**	**Q**		
bis(2-Ethylhexyl)phthalate	420	U	52	J	48	J	110	J		
Metals	**SS1**	**Q**	**SS2**	**Q**	**SS3**	**Q**	**SS4**	**Q**		
ALUMINUM	12100		15300							
ARSENIC			8		8.3		8.6			
BERYLLIUM	0.34	B	0.46	B	0.16	B				
CADMIUM			1	B						
CALCIUM	969	B	1760		2190		11800			
CHROMIUM	12.2		18.8		13.1		15.2			
COPPER							27			
IRON	18900		30000		22300		26900			
LEAD	15.1		19.4		15.6		16.7			
MAGNESIUM	2160		4560		3710		6110			
MANGANESE	179		412		691		488			
NICKEL	13.4		28.9		22.5		24.7			
ZINC	63.3		74.2		64.3		81.4			

Organic Units = ug/kg
Inorganic Units = mg/kg

Inorganic
J= Reported value is estimated due to variance from quality control limits.
B= Indicates analyte result is between (IDL) and (CRDL).
U= Indicates analyte was not detected at or below (CRDL), or the compound is not detected due to qualification through the method or field blank.

Organic
J= The associated numerical value is an estimated quantity.
B= Indicates that the compound was also detected in the laboratory blank.
U= Indicated that the compound was analyzed for but not detected above the (CRQL), or the compound is not detected due to qualification through the method or field blank.

approximately 100 feet south (down gradient) from soil vapor probe A-32 in the upper terrace of the landfill. Soil vapor probe A-32 exhibited the highest chlorinated VOC concentrations in soil gas during the Phase I RI. Additionally, soil samples collected from test pit TP-10, located within the same general area of the upper terrace exhibited similar VOCs. Total VOC concentrations detected in the ground water samples from MW-103S and MW-103D were 7,730 ug/l and 908 ug/l, respectively. The predominant VOCs detected in these wells were 1,1 dichloroethene (1,1-DCE), 1,1-dichloroethane (1,1 DCA), 1,2 dichloroethene (1,2DCE), 1,1,1 Trichloroethane (1,1,1 TCA) and trichloroethene (TCE).

The ground water sample from MW-114S, situated approximately 140 feet east of MW-103S, showed a decrease in the total VOC concentration of 268 ug/l, detected in the first sampling round, to 52 ug/l in the second round. Both 1,1 DCA (ll ug/l) and chlorobenzene (32 ug/l) exceeded their respective SCGs in MW-114S during the second sampling round. In addition, an estimated concentration of 1,1,1 TCA (3 ug/l) was detected in monitoring well MW-102D, located approximately 220 feet east of MW-103S. No VOCs were detected above the method detection limits in ground water samples collected from this well during the first sampling round.

The concentration of inorganic constituents indicate that the water quality at this location has been impacted by landfill leachate, with magnesium and sodium concentrations in monitoring wells MW-103S and MW-114S more than twice that of the background sample. The remaining inorganic and water quality parameters are at, or near, background concentrations.

3.2.3 Toe of Western Slope

Monitoring wells MW-108S, MW-108I and MW-107S exhibited the highest total VOC concentrations, of 1,069 ug/l, 584 ug/l and 1,810 ug/l, respectively. Predominant VOCs identified in the groundwater samples from these wells include vinyl chloride, 1,2 DCE and TCE. The concentration of total VOCs in MW-107S increased significantly from the first sampling round of 173 ug/l.

With the exception of 1,2 DCE (estimated at 1 ug/l) detected in MW-108D, no VOCs were detected in the deep monitoring wells.

Vinyl chloride and 1,2 DCE (each estimated at 3 ug/l) were the only VOCs detected in the shallow monitoring well MW-113S; no VOCs were detected in the corresponding deep well (MW-113D).

The concentration of calcium detected in ground water sample MW-113S indicates that leachate has impacted the groundwater quality at this location. Here, calcium and sodium were detected at approximately five times, and over 18 times the background concentration, respectively. Leachate has also impacted the water quality in the bedrock aquifer at this location, as evidenced by the elevated concentration of sodium (20 times the background concentration) in the groundwater sample from MW-113D.

The ground water sample from MW-107S also exhibited elevated concentrations of iron, magnesium, potassium and sodium at concentrations ranging from three to fifteen times site background concentrations. Ground water samples from monitoring wells MW-106D, MW-108S, MW-108I and MW-108D generally revealed the presence of most inorganic constituents at or near,

background concentrations, with the exception of sodium, which ranged between two and twelve times the background concentration.

3.2.4 Western Portion of Landfill

Trace concentrations of TCE (estimated at 4 ug/l) was detected in the ground water sample from MW-105S during the second sampling round, compared to 14ug/l of TCE detected in this same well during the first sampling round. In addition, benzene (estimated at 1 ug/l), chlorobenzene (estimated at 2 ug/l), and 1,2 DCE (estimated 2 ug/l) were also detected in MW-105S during the second sampling round. The compound 1,1 DCA (estimated at 1 ug/l), chloroethane (estimated at 1 ug/l), and acetone (estimated at 6 ug/l) were also detected in the second-round ground water sample. The concentration of benzene in this sample exceeded the corresponding SCG of 0.70 ug/l.

While no heavy metals were detected at concentrations exceeding SCGs in MW-105S, calcium, iron, magnesium, potassium and sodium were detected at concentrations two to eight times that of the background samples. The elevated concentrations of inorganic constituents indicate that leachate has impacted ground water quality at this location.

A low concentration (estimated at 3 ug/l) of vinyl chloride was detected in the ground water sample from MW-113S. Elevated concentrations of calcium (approximately five times that of the background sample) and sodium (over 18 times that of the background sample) were also detected in samples from this well. Generally, the concentration of most inorganic constituents in the ground water sample from MW-113D was at, or near the background concentration. However, the sodium concentration in this sample was measured at over 20 times that of the background sample. These results indicate that ground water quality at this location has been impacted by leachate from the landfill.

3.2.5 Lower Terrace

Monitoring well MW-104S, situated in the lower terrace, exhibited elevated concentrations of aromatic hydrocarbons (total of 231 ug/l). Predominant VOCs identified in ground water from this well included benzene, toluene and xylene (total).

The ground water sample from monitoring well MW-104S was the only one to exhibit a heavy metal concentration exceeding an SCG. Here, lead was detected at a concentration of 64.10 ug/l, compared to the SCG of 25 ug/l.

The elevated concentrations of inorganic constituents detected in MW-104S (calcium, iron, magnesium and sodium) indicated that the ground water at this location was significantly impacted by leachate from the landfill. Additionally, alkalinity, total hardness, TDS, ammonia-nitrogen and COD were observed to be significantly above background concentrations. The inorganic constituents measured in samples collected from this well, along with MW-109S, MW-111S, MW-112S, and MW-112D indicate that leachate from the landfill has impacted the water quality at these locations. Similarly, ground water samples from MW-110S and MW-110D also showed a low to moderate degree of impact on water quality resulting from landfill leachate.

Two VOCs were detected in the ground water sample from the newly installed shallow well (MW-202S) , situated southwest of the landfill. These included 1,2 DCE (35 ug/l) and TCE (26 ug/l). The remaining three Phase II RI wells exhibited trace concentrations of VOCs, with acetone detected at an estimated concentration of 4 ug/l and 5 ug/l in MW-202D and MW-201D, respectively. Chloroform was also detected at 1 ug/l in MW-201D.

The ground water sample from shallow monitoring well MW-201S showed a significant impact from landfill leachate, with elevated concentrations of calcium, iron, sodium, and magnesium. Leachate has had less of an impact on water quality in ground water wells MW-202S and MW-202D than in areas previously mentioned. At these locations, sodium and potassium were detected at concentrations approximately five times greater than that of background and the surface water sample (SW-4 and duplicate SW-6) collected in the immediate vicinity of this well pair.

3.3 Surface Water

Laboratory analysis of the six surface water samples collected from the unnamed stream located west of the landfill indicates only trace concentrations of VOCs in surface water samples SW-2, SW-4, and SW-5. The two VOCs detected in the surface water samples, 1,2- DCE and TCE, were also the most prevalent VOC compounds detected in shallow monitoring wells located in the toe of the western slope, including: MW-107S, MW-108S and MW-108I. Surface water samples SW-2 and SW-4 were collected from points within the unnamed stream within close proximity of these monitoring wells. The VOCs 1,2 DCE and TCE were detected in surface water sample SW-5 at estimated concentrations of 8 and 2 ug/l , respectively (note: surface water sample SW-5 is the farthest downstream sampling point from the landfill. Similarly, both 1,2 DCE and TCE were also detected in surface water sample SW-6 (duplicate to SW-4) at estimated concentrations of 7 and 2 ug/l, respectively. The same concentration of 1,2 DCE (estimated at 7 ug/l) detected in SW-6 was also detected in SW-4. An estimated concentration of 1 ug/l of 1,2 DCE was also detected in SW-2. While trace concentrations of VOCs were detected in these samples, no SCGs were exceeded.

No significant difference was observed in the water quality of the upstream sample SW-1 when compared to the four downstream surface water sample locations. These findings suggest that the discharge of contaminated groundwater and/or leachate has had a minor impact on the water quality within the stream. No heavy metals, such as cadmium, chromium, lead, mercury, or selenium, where detected at concentrations above the surface water SCGs in any of the surface water samples collected.

No VOCs were detected in the surface water sample (SW-7) collected from a drainage swale situated southeast of the landfill (south of Crows Nest Road). The elevated concentrations of calcium, iron, magnesium and potassium (approximately twice the concentrations observed in the background sample, SW-1) indicated that the water quality at this location is impacted by landfill leachate.

3.4 Leachate

Acetone was detected in three leachate samples, including LE-2, LE-3 and LE-4 (blind duplicate of LE-3), at concentrations of 70 ug/l.9 ug/l and 10 ug/l, respectively. The concentration of acetone in sample LE-2 exceeded the corresponding SCG of 50 ug/l. The compound 2-butanone was also detected in LE-2 (18 ug/l), but did not exceed the corresponding SCG of 50 ug/l.

Leachate sample LE-2 was collected from an open seep within the middle terrace located approximately 80 feet east of monitoring well MW-105S. Acetone was also detected in MW-105S at 6 ug/l during the second round. However, acetone was also detected in the corresponding laboratory method blank and, therefore, its presence in the sample is considered suspect.

The three leachate samples exhibited elevated concentrations of inorganic constituents, including calcium, iron, magnesium, potassium, sodium, alkalinity and TDS. Generally, however, the concentration of these parameters was lower than those observed in those samples most significantly impacted by landfill leachate. As discussed previously, the leachate samples were collected from surface leachate seeps observed on the landfill and were a mixture of leachate and surface runoff. As a result, the leachate samples were diluted to some degree by surface water runoff. Generally, the metal concentrations detected in the leachate samples did not exceed their corresponding SCGs, with the exception of barium (53 ug/l) and zinc (19.5 ug/l) in sample LE-2.

3.5 Surface Soil Samples

With the exception of low concentrations of acetone, no volatile organic compounds were detected in the four surface soil samples. Bis (2-ethylhexyl) phthalate, however, was detected in soil samples SS-2 (estimated at 52 ug/kg), SS-3 (estimated at 48 ug/kg) and SS-4 (estimated at 110 ug/kg).

Several pesticides were detected in SS-2, including heptachlor (1.3 ug/kg, estimated) and 4,4- DDD (17 ug/kg). Additionally, the pesticides 4,4-DDE (12 ug/kg), 4,4' -DDT (12 ug/kg) and Endrin ketone (2.1 ug/kg, estimated) were detected within SS-3. All pesticide concentrations were below respective SCGs. No PCBs were detected in the four soil samples.

A number of heavy metals were detected in the samples that exceeded SCGs, including arsenic, chromium, lead, nickel and zinc. However, the majority of these exceedances were less than twice their respective SCGs.

The total organic carbon (TOC) content of the surface soil samples ranged from 1.9 to 4.6 percent. These included: SS1 (19400 mg/kg), SS2 (23,200 mg/kg), SS3 (25,200 mg/kg), and SS4 (46,000 mg/kg).

3.6 Perimeter Landfill Gas Probes

Subsequent to completing the Final RI Report, two additional perimeter landfill gas monitoring rounds have been performed. The third round was completed on January 31, 1997; a fourth round was completed on May 23, 1997. As with the previous rounds, both sampling rounds performed in 1997 indicated percent Lower Explosive Limit (%LEL) and percent methane (% CH4) to be below instrument detection limits in all 12 probes. It should be noted, however, that 8 of the 12 probes were saturated with water due to high water table conditions during the May 1997 monitoring round. The elevated water table prevented an adequate sample to be drawn from these probes.

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Section Four

Section 4
Conclusions

In general, the contaminant distribution observed in the second round of groundwater sampling is consistent with the results of the first sampling round.

Shallow monitoring wells exhibit significantly greater contamination when compared to the water quality in the bedrock wells. Groundwater samples from MW-103S and MW-103D, situated in the upper terrace, are contaminated with chlorinated VOCs at concentrations that significantly exceed SCGs. Ground water samples from monitoring wells MW-108S, 108I, and 104S, situated at the toe of the slope, were also found to be contaminated with VOCs, although to a lesser degree than ground water samples from the upper terrace. Groundwater contamination by aromatic hydrocarbon VOCs was primarily observed in MW-104S, situated in the lower terrace.

Elevated concentrations of calcium, magnesium, potassium, sodium, iron, alkalinity and TDS, were most prevalent in MW-104S, indicating that the water quality at this location is significantly impacted from landfill leachate. Ground water samples from several other wells also exhibit a significant impact from landfill leachate, including MW-109S, MW-111S, MW-112S and MW-112D, all of which are located immediately down gradient or within the lower terrace.

As with the first sampling round, the concentrations of heavy metals detected in the ground water samples, such as chromium, selenium, lead, cadmium or mercury, did not exceed SCGs, with the exception of lead at MW-104S.

The second round of surface water sampling indicated the presence of trace concentrations of TCE and 1-2 DCE within the unnamed stream west of the landfill, indicating VOC contaminated groundwater is discharging to this surface water. All VOCs were below respective surface water SCGs. The concentration of inorganic constituents of samples from the unnamed creek indicate only minimal leachate discharge to the stream. No VOC contamination was detected in the one surface water sample (SW-7) collected from the drainage swale southeast of the landfill. However, elevated concentrations of inorganic constituents indicated suggested that leachate has impacted the surface water and/or ground water at this location.

Acetone was detected in two out of three leachate seep locations within the landfill. Leachate sample LE-2 exhibited an acetone concentrations of 70 ug/l, exceeding the SCG of 50 ug/l. The concentrations of inorganic constituents in the leachate samples were well above background groundwater concentrations, but were below the concentrations observed in the more significantly impacted groundwater monitoring wells, such as MW-104S. This can be attributed to the fact that the leachate seeps were diluted to some degree by the mixing of landfill leachate with surface water run off at the sample locations.

Based on the groundwater flow direction and chemical data for groundwater and surface water, it appears that leachate impacted groundwater is primarily located in the lower terrace of the

landfill and is migrating in a south westerly direction through the shallow overburden aquifer and, to a lesser degree, discharging to the unnamed creek located along the western edge of the landfill. In the southeastern portion of the landfill, groundwater movement is in a more southerly direction, with leachate-impacted groundwater migrating in this direction.

Observed VOC contaminant distribution in groundwater does not closely correlate with those locations where there was a significant impact to water quality from landfill leachate. These findings suggest that the VOC sources are localized hot spots in the upper terrace, western portion, and lower terrace of the landfill.

Leachate impacted groundwater was observed in the down gradient monitoring wells MW-111S and MW-112S. Therefore, the extent of the landfill leachate plume has not been defined within the shallow overburden aquifer. VOC contamination has been detected in MW-113S at trace concentrations, with vinyl chloride detected at an estimated concentration of 3 ug/l, suggesting that the extent of VOC migration within the shallow overburden aquifer, or VOC plume boundary, is within the general area of this monitoring well. However, as discussed above, VOC contaminated groundwater is able to migrate offsite via discharge to the unnamed creek located to the west of the landfill.

Two VOCs were detected in the ground water sample from the newly installed shallow well (MW-202S), situated southwest of the landfill. These included 1,2 DCE (35 ug/l) and TCE (26 ug/l). The remaining three Phase II RI wells exhibited trace concentrations of VOCs, with acetone detected at an estimated concentration of 4 ug/l and 5 ug/l in MW-202D and MW-201D, respectively. Elevated concentrations of inorganic constituents detected in the ground water sample from the deep monitoring well MW-201D indicated that leachate from the landfill may also be impacting the water quality at this location.

The four surface soil samples collected from areas on the landfill contain heavy metal concentrations marginally exceeding SCGs. This is generally consistent with previous soil sample analysis conducted as part of the Phase I RI. Additionally, trace concentrations of several pesticides and one semi-volatile organic compound (bis (2-ethylhexyl) phthalate) were detected in three of four soil samples at concentrations below their respective SCGs.

Perimeter landfill gas monitoring conducted during two rounds in 1997 did not identify any gas readings above the instrument detection limits. It should be noted that 8 of the 12 landfill gas probes were saturated with groundwater during the fourth round of sampling due to high water table conditions. Although this limited the ability to collect measurable gas samples, it suggests that offsite landfill gas migration through soil will be naturally restricted by the high water table at the site.