

**CITY OF SARTELL  
DEZURIK HAZARDOUS WASTE LAGOON #3  
SARTELL, MINNESOTA**

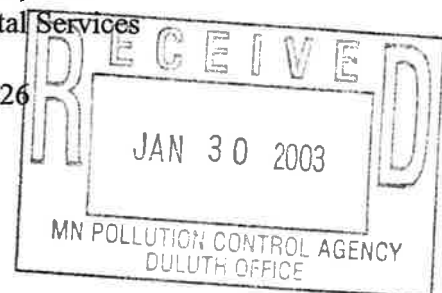
**2002 ANNUAL REPORT & STATISTICAL ANALYSIS  
GROUND-WATER MONITORING DATA**

Prepared for

City of Sartell/DeZurik Hazardous Waste Lagoon #3

January 28, 2003

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**CITY OF SARTELL  
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SARTELL, MINNESOTA**

**2002 ANNUAL REPORT & STATISTICAL ANALYSIS  
GROUND-WATER MONITORING DATA**

**INTRODUCTION**

Leggette, Brashears and Graham (LBG) has completed the ground-water monitoring and statistical analysis for the DeZurik Hazardous Waste Landfill Lagoon No.3 located in Sartell, Minnesota. This report was prepared in accordance with the terms of the landfill permit. Ground-water monitoring was performed during two sampling events in 2002. Sampling consisted of collecting ground water samples from four monitoring wells. The samples were analyzed for total metals, dissolved metals and inorganic parameters.

The goal of the ground-water monitoring was to provide information regarding depth and quality of the ground water. The goal of the statistical analysis was to show with statistical assurance that the hazardous waste lagoon is not adversely impacting the ground water and, if the ground water is impacted, to provide information regarding the nature and location of the impacts.

**BACKGROUND**

Background information was obtained from the reissued Part B Permit Application approved by the MPCA in September of 1994. The DeZurik Hazardous Lagoon No.3 (site) is located in the SW1/4 of Section 16, Township 125 North, Range 28 West within the city limits of the City of Sartell, Minnesota and is approximately 0.2 acres in size (Figure 1 ). Sludges were disposed of from various DeZurik operations in the city. The site was closed in 1987 with a multi-layer 6-foot cover system.

### **Scope of Work**

This report presents the sampling results from the April and October 2002 monitoring events. The 2002 ground-water monitoring results were compared to historical data for the site and to state and federal water quality standards.

This annual report incorporates information that was included in the semiannual report presented to the MPCA in July 2002, and also includes the following information:

- A narrative describing the effects that the site is exerting on surrounding ground-water quality and any changes made to or maintenance needed in the monitoring network;
- A description of sampling dates and procedures;
- Results of appropriate statistical procedures;
- Water level monitoring data and potentiometric maps for each sampling event;
- Calculation of ground-water flow velocities;
- Laboratory analytical reports;
- Graphs showing concentration versus time for target parameters historically detected above background levels in ground water; and
- Summary tables showing laboratory analysis and water elevation data for each well sampled to date.

### **Hydrogeologic Setting**

A detailed description of the geology and hydrogeology of the site is provided in the Part B Permit Application. The information below has been summarized from the application.

The general geology of the area in which the site is located consists of unconsolidated glacial deposits (approximately 80 to 100 feet) that overlie Precambrian granitic bedrock. Previous studies indicated there are three geologic/hydrogeologic units underneath the site that affect ground-water movement and flow. The surficial unit consists of silty fine-grained sands that soil borings indicate are approximately 15 feet thick. Outwash deposits are located below the fine sands and consist of silty sands and gravel. The outwash is considered the upper-most aquifer and is present to 70 to 80 feet below ground surface (bgs). The third layer consists of clayey weathered bedrock occurring at approximately 70 to 80 feet bgs which acts as an aquitard restricting the downward flow of ground water into the bedrock.

## GROUND-WATER MONITORING

### Ground-Water Monitoring Network

The wells that comprise the monitoring network for the site are shown on Figures 2 and 3. Upgradient well P-13 and downgradient wells P-5R, P-9R, and P-12R were sampled in 2002. Ground-water samples were collected by LBG field personnel according to the methods presented in Appendix II. The spring sampling round was completed on April 29, 2002 and the samples were sent to Energy Laboratories in Rapid City, South Dakota. Because Energy Labs was pursuing their Minnesota certification, a duplicate sample was sent to Pace Analytical Services in Minneapolis, Minnesota to compare with Energy's results. The fall sampling round was completed on October 16, 2002. Because Energy Labs did not continue to pursue their Minnesota certification, the ground-water samples were sent to Minnesota Valley Testing Laboratories (MVTL) in New Ulm, Minnesota.

Prior to sampling, the general condition of each well was noted and presented in Appendix II. All of the wells were in good condition during both sampling events in 2002.

### Ground-Water Elevation and Flow Monitoring

Ground-water elevations were measured in wells P-13, P-5R, P-5A, P-7, P-9R, and P-12R on April 29 and October 16, 2002 according to the methods presented in Appendix II. Water level data which includes historical information is summarized in Table 1. Ground-water flow is primarily to the southeast, which is consistent with historical results. Ground-water potentiometric maps are presented as Figures 2 and 3.

The hydraulic gradient remains consistent for the area. In 1994, for the Part B Permit Application, the average gradient was 0.006 ft/ft. In 1998, the average hydraulic gradient was 0.006 ft/ft. The hydraulic gradients in 2001 were 0.013 ft/ft and 0.009 ft/ft for spring and fall sampling events, respectively. In 2002, the hydraulic gradients were 0.008 ft/ft in the spring and 0.004 ft/ft in the fall. These gradients were calculated with elevations and distances from wells P-13 to P-9R.

The average linear ground-water flow rates can be calculated using the following equation and assumptions:

$$V = K \cdot I / n_e$$

Where:

V = ground-water velocity

K = hydraulic conductivity (assumed 0.39 ft/min)

I = hydraulic gradient (ft/ft)

$n_e$  = effective porosity (assumed 25%)

The calculated linear flow rates based on the above equation and assumptions are 17.97 ft/day for the spring sampling event and 8.99 ft/day for the fall sampling event. The spring velocity is lower than the previous spring velocity of 29.20 ft/day; and the fall velocity is lower than the 2001 fall velocity of 20.22 ft/day.

### **Ground-Water Quality Monitoring**

Field sampling data sheets for the fall sampling event are presented in Appendix I and the laboratory analytical report is presented in Appendix III. Ground-water quality data for the site was statistically analyzed and compared to various state water quality standards. The pertinent standards are described below.

- Maximum Contaminant Level (MCL) -The MCLs are enforceable standards that apply to public water systems, as established in the National Interim Primary Drinking Water Standards for the United States.
- Secondary Maximum Containment Level (SMCL) -The SMCL applies to public water systems. The standards are established primarily for taste, odor, and aesthetic reasons, not due to adverse health affects.
- Intervention Limits (IL) - The ILs are established for landfills in the State of Minnesota. The ILs apply to ground-water quality at the compliance boundary, generally located 200 feet from the waste boundaries.
- Health Risk Limits (HRLs) -The HRLs are risk-based levels for constituents in ground water. The HRLs are determined by the Minnesota Department of Health and are enforceable under Minnesota Rules 4717.7100 to 4717.7800.

Background concentrations for target contaminants (arsenic, barium, cadmium, lead, and selenium) are established at the upgradient well, P-13. The background data during the spring and fall sampling rounds of 2002 remained consistent with past data (Table 2) except for barium.

Background concentration results for barium increased over historical levels during the 1998 and 1999 sampling events; however, the background barium concentrations have decreased significantly in the 2001 and 2002 sampling events.

Background concentration results for arsenic, cadmium, lead, and selenium in well P-13 remain below the background detection limit. In well P-5, arsenic and selenium were detected for the first time during the spring 2002 event; however, concentrations of arsenic and selenium dropped below the detection limits during the fall event. In well P-9R and P-12R, arsenic was detected for the first time during the spring 2002 sampling event; however, the concentrations of arsenic dropped below the detection limit during the fall event. Selenium was detected for the first time in well P-9R during the fall sampling event; however this detection is due to the change in laboratory detection limits and concentrations remained below the background detection limit. Selenium was also detected in well P-12R in both the spring and fall sampling events; however, concentrations decreased to below the background detection limit in the fall sampling event.

Dissolved boron, manganese, nitrate, and total dissolved solids (TDS) levels exceeded federal or state water quality standards in the spring and/or fall in at least one monitoring well, as detailed below. A summary of the exceeded parameters is presented in Table 4.

- Concentrations of dissolved boron have remained above the HRL in well P-5R. Concentrations have been detected in wells P-9R, P-12R, and P-13 since 2000; however they have remained below the HRL.
- Concentrations of dissolved manganese have remained below the SMCL in wells P-5R, P-9R, and P-13. The concentration from the spring sampling event in well P-12R remained below the SMCL; however, the concentration increased above the SMCL in the fall.
- Concentrations of nitrates have remained above the IL in the spring and fall of 2002; however, the concentrations remain below the MCL and HRL.
- Concentrations of TDS have remained above the SMCL in wells P-5R, P-9R, and P-12R; however, in well P-13, the concentrations are below the SMCL.



## STATISTICAL ANALYSIS

Statistical analysis was performed on the results of the sampling events to determine if detections in downgradient wells (P-5R, P-9R, P-12R) are above background concentrations in the upgradient well (P-13). The statistical analysis was completed in accordance with the Part B Permit reissued in September 1994. The analysis is performed on dissolved concentrations of arsenic, barium, cadmium, lead and selenium.

The tolerance interval was calculated for each of the above analytes based on historical levels in upgradient well P-13. The Poisson Distribution was used to estimate the population mean and variance for arsenic, cadmium, lead and selenium. Since more than two detects occurred for barium, the arithmetic mean and standard deviation were used to calculate the tolerance interval for barium. The decreased background concentrations in 2001 and 2002 for barium lowered the tolerance interval from 230  $\mu\text{g/L}$  to 210  $\mu\text{g/L}$ . The assumed tolerance factor of 2.523 is based on a confidence factor of 95 percent with a typical set of background data ( $n=16$ ). The following equation was used to calculate the tolerance:

$$T = U + (k * s) . \text{ Where:}$$

T = Tolerance interval

U = Population mean

k = Tolerance factor

s = Standard deviation

As stated in the correspondence dated September 29, 1998 from DeZurik to the MPCA, even though laboratory detection limits are lower, tolerance levels continue to be calculated assuming the means are equal to the reporting limits identified in the November 1994 Quality Assurance Project Plan (QAPP), as long as the detects are less than the QAPP reporting limits.

The contaminants of concern were all below or decreased below background concentrations for the 2002 sampling events. No contaminants of concern have exceeded background concentrations since 1990. Graphs of concentration versus time for barium and cadmium are presented on Graphs

2 and 3. These parameters are the only contaminants of concern to have exceeded background concentrations in the past.

## CONCLUSIONS AND RECOMMENDATIONS

Review of the laboratory analytical results and the results of the statistical analysis indicate that concentrations of contaminants of concern (arsenic, barium, cadmium, lead, and selenium) were below or decreased below background concentrations in wells P-5R, P-9R and P-12R at the DeZurik Lagoon No.3 in 2002. Overall, the monitoring well network is in good condition and correctly placed to monitor potential releases from the site.

In at least one well, an IL, SMCL and/or HRL were exceeded during both the spring and fall sampling events. The SMCL standard of 500 mg/L for TDS was exceeded in P-5R, P-9R and P-12R; however, the concentrations remained relatively steady from 2001 sampling events. In Well P-13, concentrations of TDS remained below the SMCL.

The HRL for boron was only exceeded in P-5R and remained comparable with concentrations from the 2001 sampling events. Concentrations of boron were also detected in wells P-9R, P-12R and P-13; however they remain below the HRL.

Concentrations of manganese detected in well P-12R exceeded the SMCL, but did not exceed the HRL. Manganese was also detected in wells P-9R and P-13; however, the concentrations were below the SMCL.

The IL for nitrate was exceeded in P-5R, P-9R, P-12R, and P-13 during the spring and fall sampling events; however they remain comparable to concentrations detected in 2001.

The calculated ground-water flow velocities for the spring and fall 2002 sampling events are 17.97 ft/day and 8.99 ft/day, respectively.

Based on the data summarized above, continued monitoring at the site is recommended. No changes in the monitoring plan are warranted at this time.

**STANDARD OF CARE**

The recommendations contained in this report represent our professional opinions. These opinions were arrived at in accordance with currently accepted hydrogeologic and engineering practices at this time and location. Other than this, no warranty is implied or intended.

If you have any questions about this report, or need additional information, please contact me at (605) 334-6000.

Very truly yours,

LEGGETTE, BRASHEARS & GRAHAM, INC.

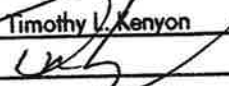


Melissa Karstens  
Environmental Scientist

Reviewed by:

**PROFESSIONAL GEOLOGIST**

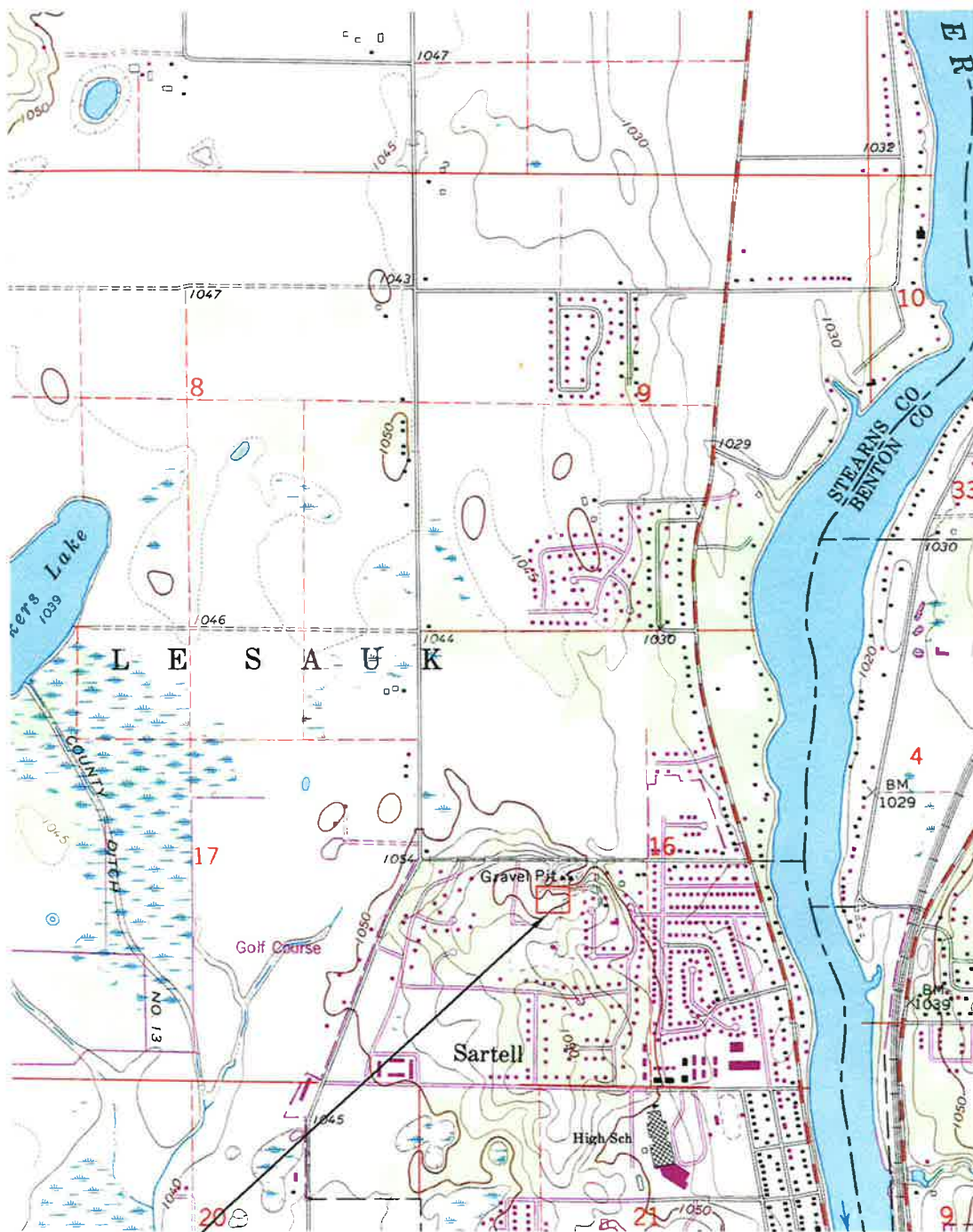
I hereby certify that this plan, document, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Geologist under the laws of the State of Minnesota

Print Name: Timothy L. Kenyon  
Signature:   
Date: 1-28-03 License # 30512

Tim Kenyon  
Senior Associate  
Minnesota Professional Geologist #30512

TK:kak  
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**FIGURES**



APPROXIMATE LOCATION  
OF SUBJECT PROPERTY



QUADRANGLE LOCATION

Revisions shown in purple and woodland compiled in cooperation with State of Minnesota agencies from aerial photographs taken 1991 and other sources. Contours not revised. This information not field checked. Map edited 1993.



DATE	REVISED

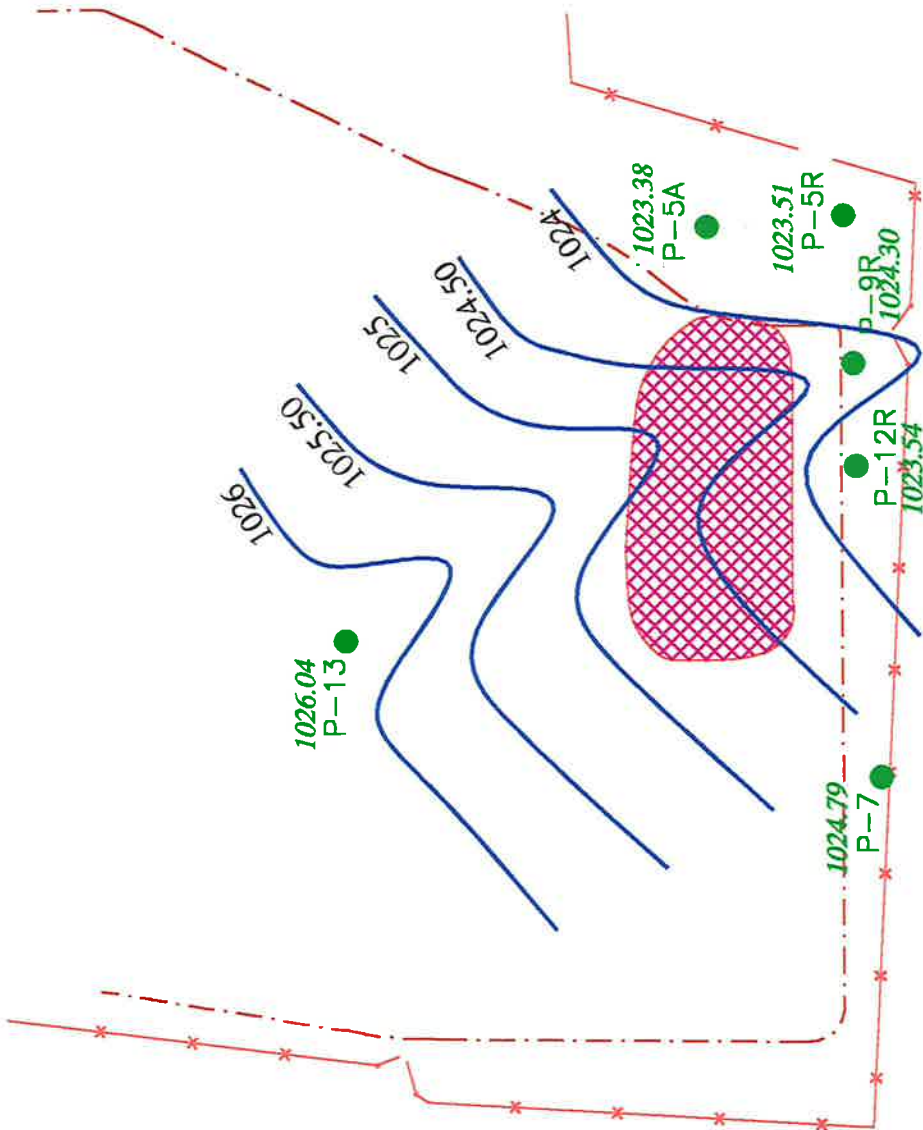
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**DEZURIK HAZARDOUS WASTE LAGOON #3**  
 SARTELL, MINNESOTA

Site Location Map  
 Source: USGS 7.5 Minute Series; Little Rock Lake Quad  
 FILE: Dez-topo.dwg | DATE: January, 2002 | FIGURE: 1

**LEGEND**

- P-13  
1026.04
- \*—\*— FENCE
- - - - - APPROXIMATE LIMIT OF LANDFILL WASTE
- ▨ APPROXIMATE LIMIT OF LAGOON
- 1025
- WATER TABLE CONTOUR (DASHED WHERE INFERRED)



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**DEZURIK HAZARDOUS WASTE LAGOON #3**  
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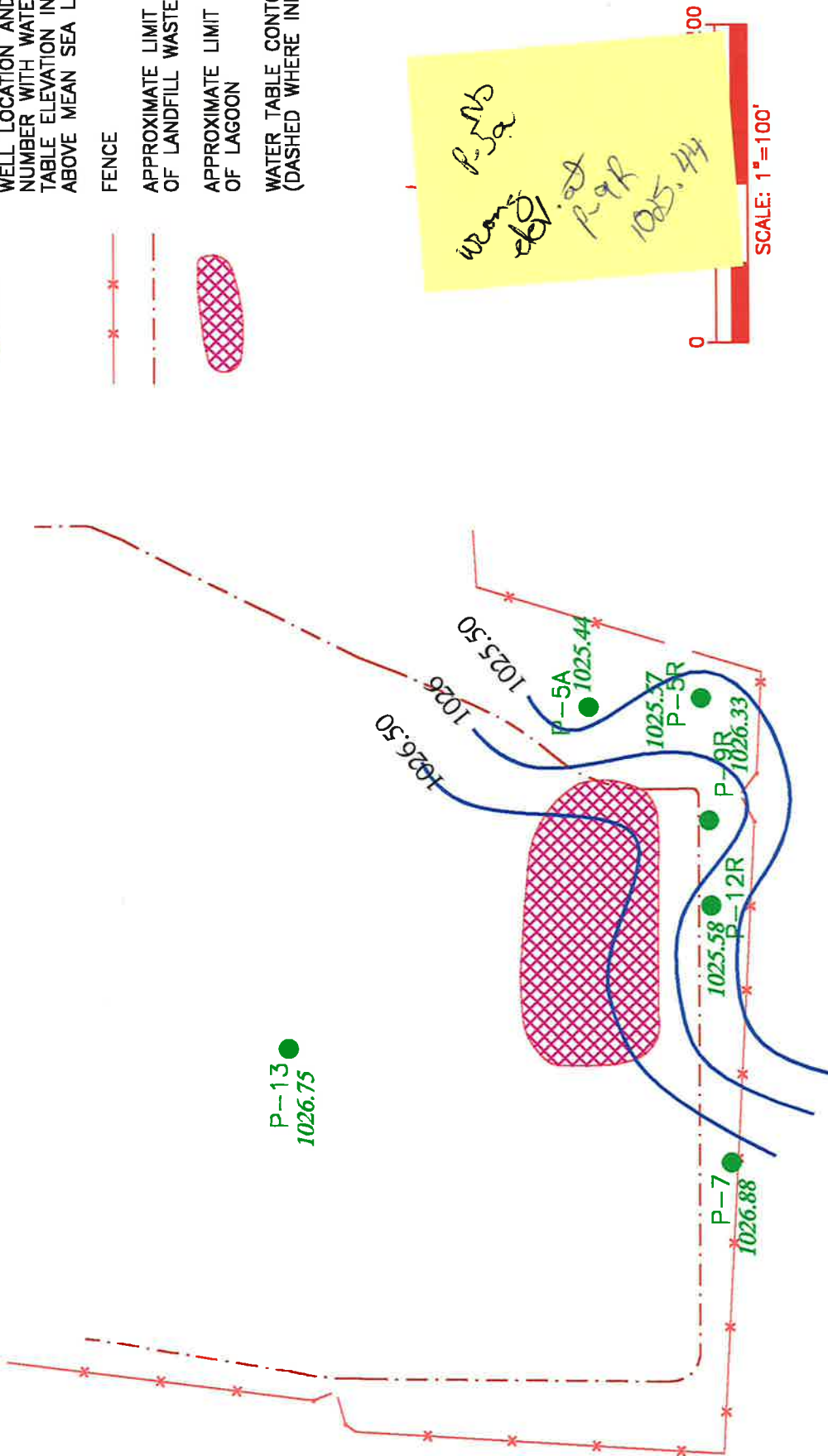
**GROUND-WATER ELEVATIONS AND INFERRED FLOW DIRECTION (29 APR 02)**

DATE	REVISED



**LEGEND**

- P-13  
GROUNDWATER MONITORING WELL LOCATION AND NUMBER WITH WATER TABLE ELEVATION IN FEET ABOVE MEAN SEA LEVEL
- \*—\*—  
FENCE
- · - · -  
APPROXIMATE LIMIT OF LANDFILL WASTE
- ▨  
APPROXIMATE LIMIT OF LAGOON
- - -  
WATER TABLE CONTOUR (DASHED WHERE INFERRED)



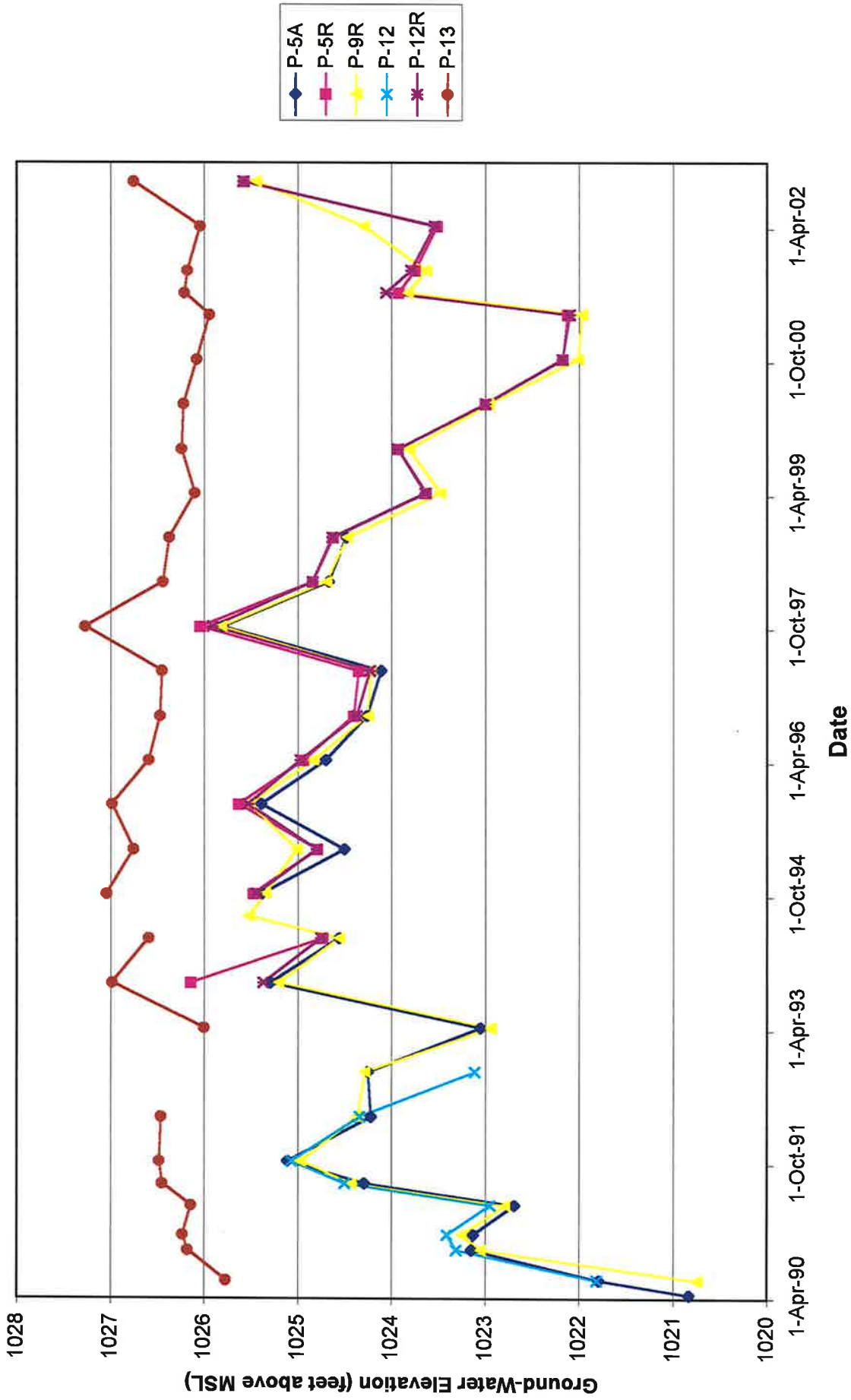
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**DEZURIK HAZARDOUS WASTE LAGOON #3**  
 SARTELL, MINNESOTA

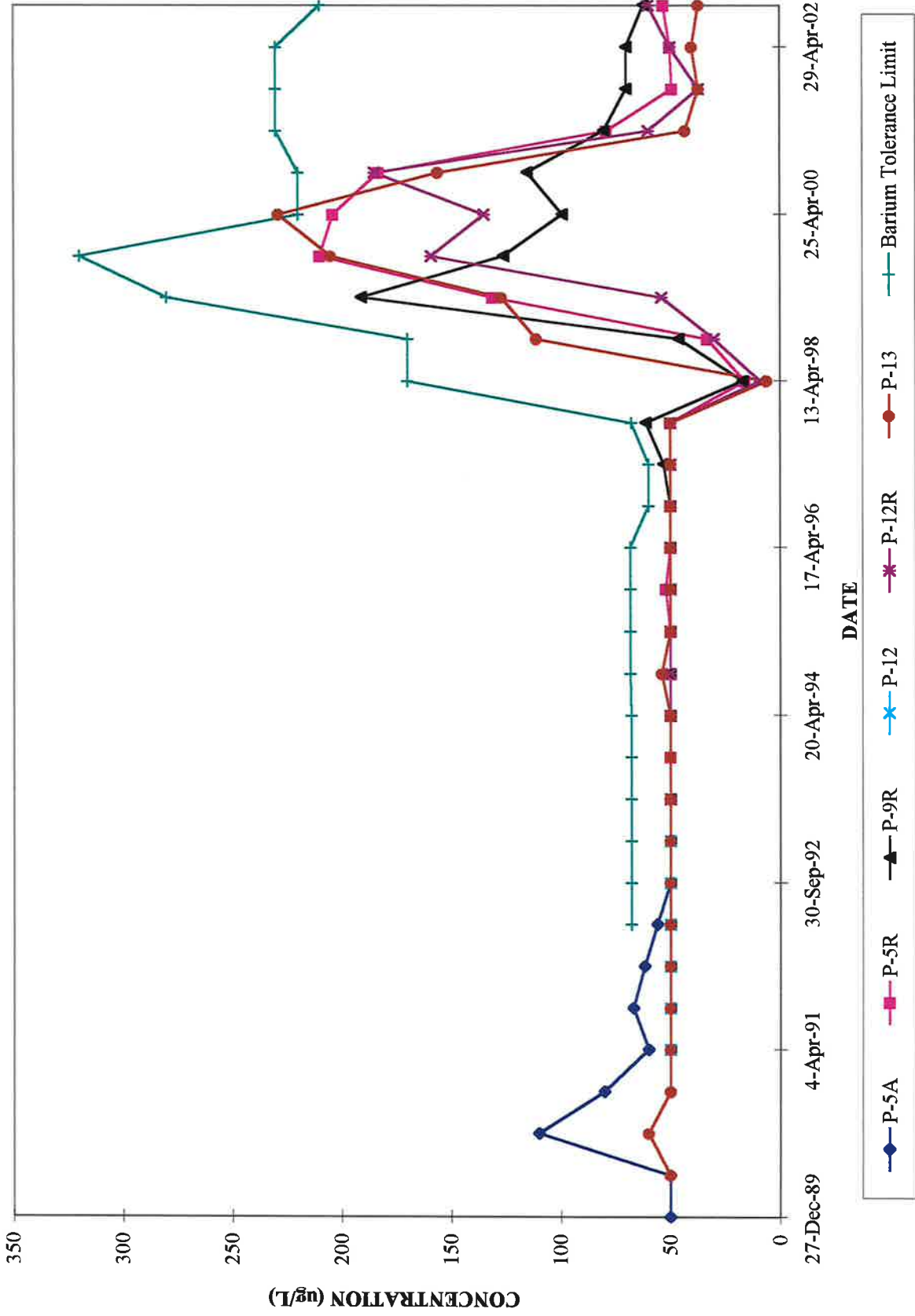
GROUND-WATER ELEVATIONS AND INFERRED FLOW DIRECTION (16 OCT 02)

**Graph 1**  
**DeZurik Ground-Water Elevation Data**

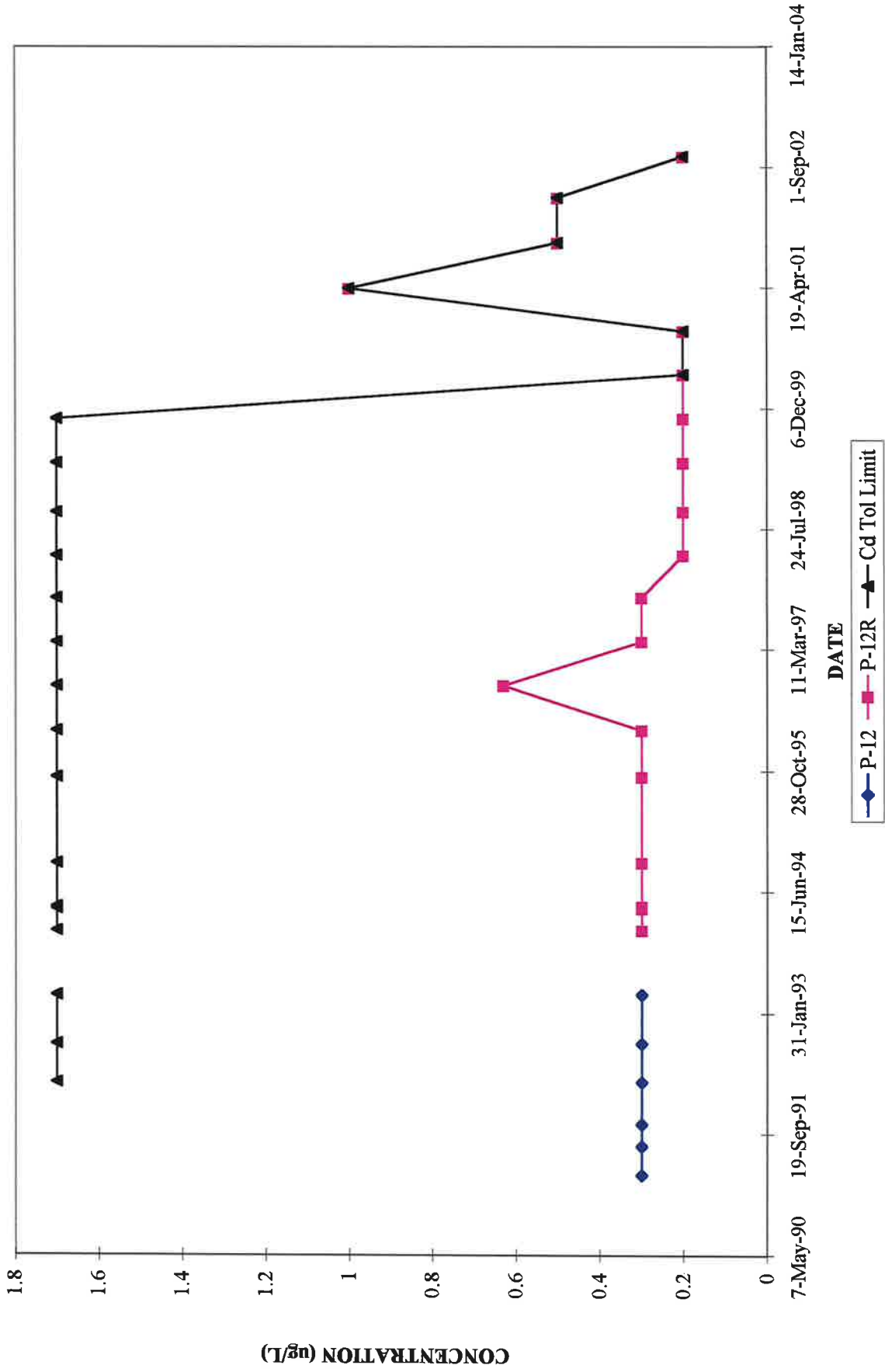




**Graph 2**  
**Historical Concentrations of Dissolved Barium**



### Graph 3 Historical Concentrations of Dissolved Cadmium



**TABLES**

**TABLE 1**  
**Water Elevations**  
**DeZurik Hazardous Waste Lagoon #3**

DATE	P-5A	P-5R	P-9R	P-12	P-12R	P-13
4/4/90	1020.83					
6/26/90	1021.79		1020.74	1021.81		1025.77
10/2/90	1023.15		1023.05	1023.31		1026.18
12/18/90	1023.13		1023.25	1023.41		1026.23
4/4/91	1022.69		1022.79	1022.95		1026.14
7/31/91	1024.29		1024.43	1024.5		1026.45
10/31/91	1025.11		1024.97	1025.07		1026.48
4/23/92	1024.22		1024.36	1024.34		1026.46
10/21/92	1024.25		1024.28			
4/20/93	1023.05		1022.94	1023.11		1026
10/27/93	1025.29	1026.14	1025.2		1025.37	1026.98
4/20/94	1024.56	1024.73	1024.56		1024.75	1026.59
7/11/94			1025.52			
10/17/94	1025.38	1025.47	1025.34		1025.44	1027.04
4/11/95	1024.50	1024.79	1025.01		1024.80	1026.75
10/9/95	1025.39	1025.63	1025.52		1025.53	1026.98
4/17/96	1024.70	1024.94	1024.83		1024.97	1026.59
10/15/96	1024.26	1024.40	1024.25		1024.37	1026.47
4/15/97	1024.11	1024.35	1024.22		1024.23	1026.45
10/14/97	1025.8	1026.04	1025.81		1025.91	1027.27
4/13/98	1024.67	1024.84	1024.69		1024.84	1026.44
10/6/98	1024.48	1024.62	1024.47		1024.63	1026.37
4/27/99		1023.63	1023.48		1023.64	1026.1
10/27/99		1023.93	1023.81		1023.93	1026.24
4/25/00		1023.00	1022.96		1023.00	1026.22
10/23/00		1022.17	1022.01		1022.18	1026.08
4/18/01		1022.12	1021.97		1022.10	1025.94
7/26/01		1023.92	1023.82		1024.06	1026.21
10/23/01		1023.75	1023.63		1023.79	1026.18
4/29/02		1023.51	1024.30		1023.54	1026.04
10/16/02		1025.57	1025.44		1025.58	1026.75

blank = not sampled

TABLE 2

DEZURIK HAZARDOUS WASTE LAGOON #3  
SARTELL, MINNESOTA

2002 Water Quality Data Summary

Analyte	Units	IL (mg/L)	HRL (mg/L)	P-9R 29-Apr-02	P-9R 16-Oct-02	P-13 29-Apr-02	Duplicate (P-13) 29-Apr-02	P-13 16-Oct-02	Duplicate (P-13) 16-Oct-02
Total Organic Carbon	mg/L			1	2.4	<1	<1	1.9	1.6
Chloride	mg/L			31	33.9	32	32	34.2	31.7
Conductivity	umhos/cm			913	1180	795	789	918	890
Chemical Oxygen Demand	mg/L			4	23	7	1	58	60
pH	su			7.2	7.10	7.31	7.26	7.10	7.20
Total Phenols	mg/L			<0.05	<0.005	<0.05	<0.05	<0.005	<0.005
Sodium	mg/L			14	10.8	8	7	4.88	4.89
Total Dissolved Solids	mg/L			520	592	430	410	308	250
Sulfate	mg/L			70	138	32	32	110	111
Total Cyanide	mg/L			<0.005	<0.02	<0.005	<0.005	<0.02	<0.02
Fluoride	mg/L			<1	<0.1	<1	<1	<0.1	<0.01
Nitrate as N	mg/L	2.5	10	5.2	6.05	4.1	5.2	5.23	5.05
Dissolved Arsenic	mg/L	0.0125	.110	0.01	<0.001	0.01	0.01	<0.001	<0.001
Dissolved Barium	mg/L	0.375	2	0.07	0.062	0.04	0.04	0.037	0.036
Dissolved Boron	mg/L		0.6	0.04	<0.1	0.04	0.03	<0.1	<0.1
Dissolved Cadmium	mg/L		1.004	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0002
Dissolved Calcium	mg/L			94	153	97	110	118	118
Dissolved Chromium	mg/L	0.03	0.10	<0.01	<0.002	<0.01	<0.01	<0.002	<0.002
Dissolved Iron	mg/L			0.02	<0.008	0.02	0.01	<0.008	<0.008
Dissolved Lead	mg/L		0.157	<0.002	<0.0005	<0.002	<0.002	<0.0005	<0.0005
Dissolved Magnesium	mg/L			46	42.5	36	39	29.4	29.2
Dissolved Manganese	mg/L		0.1	0.01	0.02	0.006	0.006	<0.003	0.003
Dissolved Mercury	mg/L	0.011	0.03	<0.0002	<0.00006	<0.0002	<0.0002	<0.00006	<0.00006
Dissolved Selenium	mg/L	0.011	0.03	<0.005	0.00154	<0.005	<0.005	<0.001	<0.001
Dissolved Zinc	mg/L		2	0.007	<0.007	0.009	0.008	<0.007	<0.007

Blank = not analyzed  
Detections are in **BOLD**

TABLE 2

DEZURIK HAZARDOUS WASTE LAGOON #3  
SARTELL, MINNESOTA

2002 Water Quality Data Summary

Analyte	Units	IL (mg/L)	HRL (mg/L)	P-5R	P-5R (Pace DUP)	P-5R	P-12R	P-12R
				29-Apr-02	29-Apr-02	16-Oct-02	29-Apr-02	16-Oct-02
Total Organic Carbon	mg/L			2		2.8	2	3
Chloride	mg/L		2.50	38	34.6	42	28	24.6
Conductivity	umhos/cm			1150	950	1322	898	1205
Chemical Oxygen Demand	mg/L			9	<10	62	9	37
pH	su			7.09	7.10	7.00	7.23	7.20
Total Phenols	mg/L		6.5-8.5	<0.05	<0.05	<0.005	<0.05	<0.005
Sodium	mg/L			44	29	26	24	36.3
Total Dissolved Solids	mg/L			680	717	436	500	1060
Sulfate	mg/L			160	141	237	76	142
Total Cyanide	mg/L			<0.005	<0.01	<0.02	<0.005	<0.02
Fluoride	mg/L			<1	0.16	<0.1	<1	<0.1
Nitrate as N	mg/L	2.5	10	5.8	6.37	6.32	5	5.11
Dissolved Arsenic	mg/L	0.0125	0.010	0.007	<0.01	<0.001	0.009	<0.001
Dissolved Barium	mg/L	0.375	2	0.05	0.054	0.053	0.05	0.06
Dissolved Boron	mg/L		0.6	1.1	0.916	0.62	0.04	0.10
Dissolved Cadmium	mg/L		0.04	<0.0005	<0.001	<0.0002	<0.0005	<0.0002
Dissolved Calcium	mg/L			86	137	161	110	141
Dissolved Chromium	mg/L	0.03	0.010	<0.01	<0.01	<0.002	<0.01	<0.002
Dissolved Iron	mg/L		0.010	0.04	<0.05	<0.008	0.02	0.156
Dissolved Lead	mg/L		0.015	<0.002	<0.006	<0.0005	<0.002	<0.0005
Dissolved Magnesium	mg/L			56	39.9	46.6	39	37
Dissolved Manganese	mg/L		0.1	<0.005	<0.005	<0.003	0.006	0.078
Dissolved Mercury	mg/L	0.011	0.005	<0.0002	<0.0002	<0.00006	<0.0002	<0.00006
Dissolved Selenium	mg/L	0.011	0.03	0.005	<0.015	<0.001	0.01	0.00628
Dissolved Zinc	mg/L		2	0.006	<0.02	<0.007	0.006	<0.007

Blank = not analyzed  
Detections are in **BOLD**

**TABLE 3**  
**Summary of Analytical and Statistical Analysis Results**  
**DeZurik Hazardous Waste Lagoon No. 3**  
**(units = µg/L, dissolved)**

WELL NUMBER	DATE	ARSENIC	BIARIUM	CADMIUM	LEAD	SELENIUM
P-5A	12/27/89	ND	50	ND	ND	ND
P-5A	6/28/90	ND	ND	0.5	5	ND
P-5A	10/4/90	ND	110	ND	ND	ND
P-5A	12/18/90	ND	80	ND	ND	ND
P-5A	4/4/91	ND	60	0.4	ND	ND
P-5A	8/1/91	ND	67	ND	ND	ND
P-5A-1	10/31/91	ND	63	0.32	ND	ND
P-5A-2	10/31/91	ND	60	0.43	ND	ND
P-5A-3	10/31/91	ND	62	0.38	ND	ND
P-5A-4	10/31/91	ND	62	0.55	ND	ND
P-5A	4/23/92	ND	56	ND	ND	ND
P-5A	9/30/92	ND	ND	ND	ND	ND
P-5A	4/20/93	ND	ND	ND	ND	ND
P-5R	10/27/93	ND	78	1.4	ND	ND
P-5R	1/10/94	--	ND	--	--	--
P-5R	4/20/94	ND	ND	ND	ND	<6.02
P-5R	10/17/94	ND	ND	ND	ND	ND
P-5R	4/11/95	ND	ND	ND	ND	ND
P-5R	10/11/95	ND	52	ND	ND	ND
P-5R	4/17/96	ND	ND	ND	ND	ND
P-5R	10/16/96	<3.0	ND	0.36	<3.0	<3.0
P-5R	4/17/97	<3.0	50	<0.30	<3.0	<3.0
P-5R	10/16/97	<3.0	ND	<0.30	<3.0	<3.0
P-5R	4/13/98	<2	16	<0.2	<1	<3
P-5R	10/6/98	<2	33	<0.2	<1	<3
P-5R	4/27/99	<2	131	<0.2	<1	<1
P-5R	10/27/99	<2	210*	<0.2	<1	<1
P-5R	4/24/00	<2	204	<0.2	<1	<1
P-5R	10/23/00	<2	183	<0.2	<1	<1
P-5R	4/18/01	<10	79	<1	<10	10
P-5R Resample	7/26/01	<5	66	<0.5	<2	<5
P-5R Resample Dup	7/26/01	<5	71	<0.5	<2	<5
P-5R	10/23/01	<5	49	<0.5	<2	<5
P-5R	4/29/02	7	50	<0.5	<2	5
P-5R	10/16/02	<1	53	<2	<0.5	<1
P-9R	4/4/91	ND	ND	ND	ND	ND
P-9R	8/1/91	ND	ND	ND	ND	ND
P-9R-1	10/31/91	ND	ND	ND	ND	ND
P-94-2	10/31/91	ND	ND	ND	ND	ND
P-9R-3	10/31/91	ND	ND	0.3	ND	ND
P-9R-4	10/31/91	ND	ND	ND	ND	ND
P-9R	4/23/92	ND	ND	0.19	ND	ND
P-9R	9/30/92	ND	ND	ND	ND	ND
P-9R	4/20/93	ND	ND	ND	ND	ND
P-9R	10/27/93	ND	ND	0.7	ND	ND
P-9R	4/20/94	ND	ND	ND	ND	<6.02
P-9R	10/17/94	ND	ND	ND	ND	ND
P-9R	4/11/95	ND	ND	ND	ND	ND
P-9R	10/10/95	ND	ND	ND	ND	ND
P-9R	4/17/96	ND	ND	ND	ND	ND
P-9R	10/16/96	<3.0	ND	<0.30	<3.0	<3.0
P-9R	4/16/97	<3.0	53	<0.30	<3.0	<3.0
P-9R	10/15/97	<3.0	61	1.4	<3.0	<3.0
P-9R	4/10/98	<2	17	0.7	2	<3



**TABLE 3**  
**Summary of Analytical and Statistical Analysis Results**  
**DeZurik Hazardous Waste Lagoon No. 3**  
(units = µg/L, dissolved)

WELL NUMBER	DATE	ARSENIC	BARIUM	CADMIUM	LEAD	SELENIUM
P-9R	10/6/98	<2	46	<0.2	<1	<3
P-9R	4/27/99	<2	191	<0.2	1.4	<1
P-9R	10/27/99	<2	126*	0.35	<1	<1
P-9R	4/25/00	<2	99	0.26	<1	<1
P-9R	10/23/00	<2	115	<0.2	<1	<1
P-9R	4/18/01	<10	80	<1	<10	10
P-9R Resample	7/25/01	<5	79	<0.5	<2	<5
P-9R	10/23/01	<5	70	<0.5	<2	<5
P-9R	4/29/02	10	70	<0.5	<2	<5
P-9R	10/16/02	<1	62	<0.2	<0.5	1.54
P-12	4/4/91	ND	ND	ND	ND	ND
P-12	8/1/91	ND	ND	0.32	ND	ND
P-12-1	10/31/91	ND	ND	0.31	ND	ND
P-12-2	10/31/91	ND	ND	0.33	ND	ND
P-12-3	10/31/91	ND	ND	ND	ND	ND
P-12-4	10/31/91	ND	ND	ND	ND	ND
P-12	4/23/92	ND	ND	ND	ND	ND
P-12	9/30/92	ND	ND	ND	ND	ND
P-12	4/20/93	ND	ND	ND	ND	ND
P-12R	10/27/93	ND	ND	13	ND	ND
P-12R	1/10/94	--	--	ND	--	--
P-12R	4/20/94	ND	ND	ND	ND	<6.02
P-12R	10/17/94	ND	ND	ND	ND	ND
P-12R	4/11/95	ND	ND	ND	ND	ND
P-12R	10/10/95	ND	ND	ND	5.2	ND
P-12R	4/17/96	ND	ND	ND	ND	ND
P-12R	10/16/96	<3.0	ND	0.63	<3.0	<3.0
P-12R	4/17/97	<3.0	ND	<0.30	<3.0	<3.0
P-12R	10/16/97	<3.0	ND	<0.30	<3.0	<3.0
P-12R	4/13/98	<2	9	<0.2	<1	<3
P-12R	10/6/98	<2	30	<0.2	<1	<3
P-12R	4/27/99	<2	54	<0.2	<1	<1
P-12R	10/27/99	<2	159*	<0.2	<1	<1
P-12R	4/25/00	<2	135	<0.2	1.1	<1
P-12R	10/24/00	<2	185	<0.2	<1	<1
P-12R	4/18/01	<10	60	<1	<10	<10
P-12R Resample	7/26/01	<5	64	<0.5	<2	<5
P-12R	10/23/01	<5	37	<0.5	<2	<5
P-12R	4/29/02	9	50	<0.5	<2	10
P-12R	10/16/02	<1	60	<0.2	<0.5	6.28
P-13	6/28/90	<3.0	<50	<0.3	<3.0	<3.0
P-13A	6/28/90	<3.0	<50	<0.3	<3.0	<3.0
P-13B	6/28/90	<3.0	<50	<0.3	<3.0	<3.0
P-13C	6/28/90	<3.0	<50	<0.3	<3.0	<3.0
P-13	10/4/90	<3.0	<50	<0.3	<3.0	<3.0
P-13A	10/4/90	<3.0	60	<0.3	<3.0	<3.0
P-13B	10/4/90	<3.0	<50	<0.3	<3.0	<3.0
P-13C	10/4/90	<3.0	<50	<0.3	<3.0	<3.0
P-13A	12/18/90	<3.0	<50	<0.3	<3.0	<3.0
P-13B	12/18/90	<3.0	<50	<0.3	<3.0	<3.0
P-13C	12/18/90	<3.0	<50	<0.3	<3.0	<3.0
P-13D	12/18/90	<3.0	<50	<0.3	<3.0	<3.0
P-13	4/4/91	<3.0	<50	<0.3	<3.0	<3.0
P-13	8/1/91	<3.0	<50	<0.3	<3.0	<3.0



**TABLE 3**  
**Summary of Analytical and Statistical Analysis Results**  
**DeZurik Hazardous Waste Lagoon No. 3**  
(units = µg/L, dissolved)

WELL NUMBER	DATE	ARSENIC	BARIUM	CADMIUM	LEAD	SELENIUM
P-13-1	10/31/91	< 3.0	< 50	< 0.3	< 3.0	< 3.0
P-13-2	10/31/91	< 3.0	< 50	0.88	< 3.0	< 3.0
P-13-3	10/31/91	< 3.0	< 50	< 0.3	< 3.0	< 3.0
P-13-4	10/31/91	< 3.0	< 50	< 0.3	< 3.0	< 3.0
P-13-1	4/23/92	< 3.0	< 50	< 0.3	< 3.0	< 3.0
P-13-2	4/23/92	< 3.0	< 50	< 0.3	< 3.0	< 3.0
P-13-3	4/23/92	< 3.0	< 50	< 0.3	< 3.0	< 3.0
P-13-4	4/23/92	< 3.0	< 50	< 0.3	< 3.0	< 3.0
P-13	9/30/92	< 3.0	< 50	< 0.3	< 3.0	< 3.0
P-13-1	10/8-9/92	< 3.0	< 50	< 0.3	< 3.0	< 3.0
P-13-2	10/8-9/92	< 3.0	< 50	< 0.3	< 3.0	< 3.0
P-13-3	10/8-9/92	< 3.0	< 50	< 0.3	< 3.0	< 3.0
P-13A	4/20/93	< 3.0	< 50	< 0.3	< 3.0	< 3.0
P-13B	4/20/93	< 3.0	< 50	< 0.3	< 3.0	< 3.0
P-13C	4/20/93	< 3.0	< 50	< 0.3	< 3.0	< 3.0
P-13D	4/20/93	< 3.0	< 50	< 0.3	< 3.0	< 3.0
P-13A	10/29/93	< 3.0	< 50	3.3*	< 3.0	< 3.0
P-13B	10/29/93	< 3.0	< 50	5.5*	< 3.0	< 3.0
P-13C	10/29/93	< 3.0	< 50	3.9*	< 3.0	< 3.0
P-13D	10/29/93	< 3.0	< 50	17*	< 3.0	< 3.0
P-13	4/20/94	< 3.0	< 50	< 0.3	< 3.0	< 6.02
P-13A	4/20/94	< 3.0	< 50	< 0.3	< 3.0	< 6.02
P-13B	4/20/94	< 3.0	< 50	0.31	< 3.0	< 6.02
P-13C	4/20/94	< 3.0	< 50	< 0.3	< 3.0	< 6.02
P-13	10/17/94	< 3.0	54	< 0.3	< 3.0	< 3.0
P-13A	10/18/94	< 3.0	< 50	< 0.3	< 3.0	< 3.0
P-13B	10/18/94	< 3.0	< 50	< 0.3	< 3.0	< 3.0
P-13C	10/18/94	< 3.0	< 50	< 0.3	< 3.0	< 3.0
P-13	4/11/95	< 3.0	< 50	< 0.3	< 3.0	< 3.0
P-13A	4/11/95	< 3.0	< 50	< 0.3	< 3.0	< 3.0
P-13B	4/11/95	< 3.0	< 50	< 0.3	< 3.0	< 3.0
P-13C	4/12/95	< 3.0	< 50	< 0.3	< 3.0	< 3.0
P-13	10/11/95	< 3.0	< 50	< 0.3	< 3.0	< 3.0
P-13A	10/11/95	< 3.0	< 50	< 0.3	< 3.0	< 3.0
P-13B	10/11/95	< 3.0	< 50	< 0.3	< 3.0	< 3.0
P-13C	10/11/95	< 3.0	< 50	< 0.3	< 3.0	< 3.0
P-13	4/17/96	< 3.0	< 50	< 0.3	< 3.0	< 3.0
P-13A	4/17/96	< 3.0	< 50	< 0.3	< 3.0	< 3.0
P-13B	4/17/96	< 3.0	< 50	< 0.3	< 3.0	< 3.0
P-13C	4/17/96	< 3.0	< 50	< 0.3	< 3.0	< 3.0
P-13	10/16/96	< 3.0	< 50	< 0.30	< 3.0	< 3.0
P-13A	10/16/96	< 3.0	< 50	< 0.30	< 3.0	< 3.0
P-13B	10/17/96	< 3.0	< 50	< 0.30	< 3.0	< 3.0
P-13C	10/17/96	< 3.0	< 50	< 0.30	< 3.0	< 3.0
P-13	4/16/97	< 3.0	< 50	< 0.30	< 3.0	< 3.0
P-13A	4/17/97	< 3.0	< 50	< 0.30	< 3.0	< 3.0
P-13B	4/17/97	< 3.0	< 50	< 0.30	< 3.0	< 3.0
P-13C	4/17/97	< 3.0	< 50	< 0.30	< 3.0	< 3.0
P-13	10/15/97	< 3.0	< 50	< 0.30	< 3.0	< 3.0
P-13A	10/16/97	< 3.0	< 50	< 0.30	< 3.0	< 3.0
P-13B	10/16/97	< 3.0	< 50	< 0.30	< 3.0	< 3.0
P-13C	10/16/97	< 3.0	< 50	< 0.30	< 3.0	< 3.0
P-13A	4/9/98	< 2	< 6	< 0.2	< 1	< 3
P-13B	4/10/98	< 2	< 6	< 0.2	< 1	< 3
P-13C	4/10/98	2.2	< 6	< 0.2	< 1	< 3

**TABLE 3**  
**Summary of Analytical and Statistical Analysis Results**  
**DeZurik Hazardous Waste Lagoon No. 3**  
**(units = µg/L, dissolved)**

WELL NUMBER	DATE	ARSENIC	BARIUM	CADMIUM	LEAD	SELENIUM
P-13D	4/13/98	<2	<6	<0.2	<1	<3
P-13A	10/5/98	<2	27	<0.2	<1	<3
P-13B	10/5/98	<2	101	<0.2	<1	<3
P-13C	10/6/98	<2	180	<0.2	<1	<3
P-13D	10/6/98	<2	135	<0.2	<1	<3
P-13A	4/26/99	<2	66	<0.2	<1	<1
P-13B	4/26/99	<2	178	<0.2	<1	<1
P-13C	4/27/99	<2	114	<0.2	<1	<1
P-13D	4/27/99	<2	151	<0.2	<1	<1
P-13A	10/26/99	<2	95*	<0.2	<1	<1
P-13B	10/27/99	<2	300*	<0.2	<1	<1
P-13C	10/27/99	<2	196*	<0.2	<1	<1
P-13D	10/27/99	<2	229*	<0.2	<1	<1
P-13A	4/24/00	<2	156	<0.2	<1	<1
P-13A	10/23/00	<2	115	<0.2	<1	<1
P-13	4/18/01	<10	43	<1	<10	<10
P-13Dup	4/18/01	<10	43	<1	<10	<10
P-13 Resample	7/26/01	<5	42	<0.5	<2	<5
P-13	10/23/01	<5	38	<0.5	<2	<5
P-13Dup	10/23/01	<5	37	<0.5	<2	<5
<b>P-13</b>	<b>4/29/02</b>	<b>10</b>	<b>40</b>	<b>&lt;0.5</b>	<b>&lt;2</b>	<b>&lt;5</b>
<b>P-13Dup</b>	<b>4/29/02</b>	<b>10</b>	<b>40</b>	<b>&lt;0.5</b>	<b>&lt;2</b>	<b>&lt;5</b>
<b>P-13</b>	<b>10/16/02</b>	<b>&lt;1</b>	<b>37</b>	<b>&lt;0.2</b>	<b>&lt;0.5</b>	<b>&lt;1</b>
<b>P-13 Dup</b>	<b>10/16/02</b>	<b>&lt;1</b>	<b>36</b>	<b>&lt;0.2</b>	<b>&lt;0.5</b>	<b>&lt;1</b>

Regulatory Limits:

MCL:	50	2000	5	15	50
SMCL:	N/A	N/A	N/A	N/A	N/A
HRL:	N/A	2000	4	N/A	30
IL:	12.5	375	1.25	5	11

Background Detection limit\*\*

Background Mean#

Background Standard deviation#

K<sub>0.95</sub>

Tolerance level#\*\*

3	50	0.3	3	3
3	79	0.3	3	3
1.732	52.152	0.548	1.732	1.732
2.523	2.523	2.523	2.523	2.523
7.4	210	1.7	7.4	7.4

ND Not detected.

-- Not measured.

# The Poisson Distribution method was used for calculating the Tolerance Level for background constituents with two or less reported results above the detection limit. For background constituents with three or more results above the detection limit, the arithmetic mean and standard deviation is calculated.

\* Data collected are considered suspect and are excluded from the tolerance limit and background mean calculations. As required in the August 1994 Part B Permit Application, the most recent and valid 16 samples were included in the tolerance limit calculation.

\*\* In 1998, new analytical equipment allowed the laboratory to obtain lower detection limits than that obtained in previous sampling years. These detection limits are lower than those required in the August 1994 Part B Permit Application for evaluating compliance of wells. Where the reported detection limit is lower than the required detection limit, the required detection limit is used for calculating the tolerance level to maintain continuity in evaluating compliance. Please note that the detection limits for the parameters are higher for the April 2001 event due to matrix interferences with the samples. Please refer to the analytical report for a complete explanation of the elevated detection limits.

Note: Sample results in bold type exceed MCL and/or HRL.

TABLE 4

DEZURIK HAZARDOUS WASTE LAGOON #3  
SARTELL, MINNESOTA

2000, 2001, and 2002 Water Quality Data - Exceeded Parameters (in mg/L)

Analyte	Well	Spring 2000	Fall 2000	Spring 2001	Fall 2001	Spring 2002	Fall 2002	MCL	SMCL	IL	HRL
Boron	P-5R	1.18	1.62	2.18	1.01	1.10	0.62				0.6
	P-9R	<0.1	<0.1	0.15	0.05	0.04	<0.1				
	P-12R	<0.1	<0.1	0.086	0.07	0.04	0.1				
	P-13	<0.1	<0.1	0.07	0.05	0.04	<0.1				
Manganese	P-5R	0.092	0.063	0.024	<0.005	<0.005	<0.003		0.05		0.1
	P-9R	0.024	0.036	0.03	0.03	0.01	0.02				
	P-12R	0.022	0.006	0.057	0.02	0.006	0.078				
	P-13	0.013	0.014	0.006	0.01	0.006	0.003				
Nitrate	P-5R	5.57	NS	4.52	5.78	5.8	6.32	10		2.5	10
	P-9R	4.59	NS	5.82	5.74	5.2	6.05				
	P-12R	4.72	NS	5.05	5.04	5.0	5.11				
	P-13	5.8	NS	5.46	5.21	5.2	5.23				
TDS	P-5R	717	852	820	710	680	436		500		
	P-9R	509	625	560	600	520	592				
	P-12R	582	585	520	510	500	1060				
	P-13	413	456	400	430	430	308				

- Lowest Standard

**BOLD** - Exceeded Lowest Standard

NS - Not Sampled

**APPENDIX I**

**Field Sampling Data Sheets**

FLUID-LEVEL DATA SHEET

DATE: 10.16.02

CLIENT NAME: DEZURIK LANDFILL LAGOON #3

CLIENT CODE: 6SARBT

LOCATION: 12 TH ST N, SARTELL, MN

JOB CODE: DESHWL

WEATHER CONDITIONS: P. Cloudy. 30°

RECORDED BY: CMH

MEASURING DEVICE: SOLINST

WELL	DEPTH TO HYDROCARBON	DEPTH TO WATER	ELEVATION TOC	ELEVATION WATER	PRODUCT THICKNESS	COMMENTS
P-5R		73.47				
P-9R		76.65				
P-12R		75.75				
P-13		78.37				

DAILY ACTIVITY LOG

8:18	ARRIVAL ON SITE - CALL CITY TO GAIN ACCESS TO WELLS IN LOCKED AREA. FLUID LEVELS - ALL WELLS ON SITE
9:20	CITY OF SARTELL EMPLOYEE ARRIVES TO OPEN GATE.
9:25	SAMPLING P-13.
10:34	LEE WALZ FROM DEZURIK ARRIVES TO SHOW ME SINK HOLE. APPARENTLY A 4'x4' BY 3' DEEP SINKHOLE APPEARED, CITY EMPLOYEES FILLED IN THE HOLE SOME TIME AGO AND JUST NOTIFIED LEE RECENTLY. THE CITY FILLED IT WITH NATIVE SOIL. IT NEEDS TO BE REPAIRED WITH 2' CLAY LAYER THEN 1' OF TOP SOIL. 30'x34' AREA HAS BEEN RESERVED JUST EAST OF SOFTBALL FIELD FENCE LINE. SEE ATTACHED MAP.
10:50	SAMPLING P-5R, P-12R, P-9R, DUPLICATE DUPLICATE SAMPLE P-13
12:55	COMPLETE DEZURIK WELL SAMPLING
13:00	SARTELL WELL SAMPLING.



# CHAIN OF CUSTODY RECORD

<b>PROJECT NAME</b> DEZURIK ANDERIL DEZURIK SAMPLERS: (Signature)		<b>CLIENT NAME</b> DEZURIK		<b>LABORATORY NAME:</b> MVTL	
<b>NO. OF CON-TAINERS</b> 6		<b>REMARKS</b>			
<b>SAMPLE NO.</b>	<b>DATE</b>	<b>TIME</b>	<b>COMP</b>	<b>GB</b>	<b>SAMPLE LOCATIONS</b>
	10/10/02	9:33	✓	✓	P 13
		11:05	✓	✓	P 5R
		11:32	✓	✓	P 12R
		12:39	✓	✓	P 9R
			-	-	DUPLICATE
DISK U.S. METALS    PHENOLS    CHANIDE    TOC    COP    N03    CL.FL 504 T05 PH CONTAINER					
<b>RELINQUISHED BY:</b> (Signature)		<b>RECEIVED BY:</b> (Signature)		<b>DATE/TIME RECEIVED BY:</b> (Signature)	
(Signature)		10/10/02 1620 106x 83574281 1788		TIM KENYON - LBG	
<b>RELINQUISHED BY:</b> (Signature)		<b>RECEIVED BY:</b> (Signature)		<b>REPORT TO:</b>	
(Signature)		106x 83574281 1794		1113 EAST 14th ST, SIOUX FALLS, SD 57104 (605) 334-6000	
<b>REMARKS/BILLING INFORMATION:</b> REGGIE BRASHEARS + GRAHAM TIM KENYON 1113 EAST 14th ST, SIOUX FALLS, SD 57104 (605) 334-6000					

LEGGETTE, BRASHEARS & GRAHAM, INC.  
 1210 WEST COUNTY ROAD E  
 ST. PAUL, MINNESOTA 55112  
 (612) 490-1405



## GROUND-WATER SAMPLING DATA SHEET

Client Code: 6SARBT

Project Title: DEZURIK LANDFILL LAGOON #3

Job Code: DESHWL

Address: 12TH ST N

Date:

10.16.02

City, State, Zip: SARTELL, MN.

### General Data

### Stabilization Data

Location ID:	Volume (gallons)	Well Volume	Temp (C)	ORP (mV)	SC (uS)	pH
P-5R	6.00	1.0	11.1	291	1105	7.09
Key Number: 10G013	11.00	2.0	11.1	265	1103	7.06
Casing Diameter (in): 4"	16.00	3.0	11.1	246	1107	7.08
Well Depth (ft): 81.35 TO 70C						
Depth to water (ft): 73.47						
Column length (ft): 7.88						
Column volume (gal): 5.15						
Total volume purged (gal): 16.00						

### Miscellaneous

Purge Method: PVC BAILER

Sampling Method: DISP. BAILER

Analysis Requested: Dissolved metals, CL, FL, NO3, SO4, COD, Cyanide, Phenols, TOC, TDS, pH, Conductivity

Weather Conditions: OVERCAST, 32°

Sample Description: SILTY, RUSTY TAN TINT, NO. 0002

Remarks:

Sampler: CMH

Time Sample Collected: 1105

Leggette, Brashears & Graham, Inc.  
1210 West County Road E  
St. Paul, Minnesota 55112

## GROUND-WATER SAMPLING DATA SHEET

Client Code: 6SARBT	Project Title: DEZURIK LANDFILL LAGOON #3
Job Code: DESHWL	Address: 12TH ST N
Date: 10.16.02	City, State, Zip: SARTELL, MN.

General Data	Stabilization Data					
	Volume (gallons)	Well Volume	Temp (C)	ORP (mV)	SC (uS)	pH
Location ID: P-9R						
Key Number: 10G013	7.00	1.0	10.6	121	930	7.25
Casing Diameter (in): 4"	13.00	2.0	10.5	88	974	7.24
Well Depth (ft): 86.20 TOTOC	19.00	3.0	10.5	89	996	7.23
Depth to water (ft): 76.65	28.00	4.0	10.5	93	1007	7.21
Column length (ft): 9.55						
Column volume (gal): 6.24						
Total volume purged (gal): 25.00						

### Miscellaneous

Purge Method:	PVE BAILER
Sampling Method:	DISP. BAILER
Analysis Requested:	Dissolved metals, CL, FL, NO3, SO4, COD, Cyanide, Phenols, TOC, TDS, pH, Conductivity
Weather Conditions:	OVERCAST 34°
Sample Description:	CLEAR NO ODO
Remarks:	

Sampler: CMH	Time Sample Collected: 1239
--------------	-----------------------------



## GROUND-WATER SAMPLING DATA SHEET

Client Code: 6SARBT

Project Title: DEZURIK LANDFILL LAGOON #3

Job Code: DESHWL

Address: 12TH ST N

Date: 10.16.02

City, State, Zip: SARTELL, MN.

### General Data

### Stabilization Data

Location ID:	Volume (gallons)	Well Volume	Temp (C)	ORP (mV)	SC (uS)	pH
P-12R	8.00	1.0	10.2	-53	996	7.23
Key Number: 106013	15.00	2.0	10.2	-22	1010	7.26
Casing Diameter (in): 4"	22.00	3.0	10.2	18	1005	7.25
Well Depth (ft): 86.80 TOTAL						
Depth to water (ft): 75.75						
Column length (ft): 11.05						
Column volume (gal): 7.22						
Total volume purged (gal): 22.00						

### Miscellaneous

Purge Method: **PVC** BAILER

Sampling Method: DISP. BAILER

Analysis Requested: Dissolved metals, CL, FL, NO3, SO4, COD, Cyanide, Phenols, TOC, TDS, pH, Conductivity

Weather Conditions: **OVERCAST, 33°**

Sample Description: **SILTY, TAN/RUST TINT, NO ODOUR**

Remarks:

Sampler: CMH

Time Sample Collected: 1132

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St. Paul, Minnesota 55112

## GROUND-WATER SAMPLING DATA SHEET

Client Code: 6SARBT

Project Title: DEZURIK LANDFILL LAGOON #3

Job Code: DESHWL

Address: 12TH ST N

Date: 10-16-02

City, State, Zip: SARTELL, MN.

**General Data**

**Stabilization Data**

Location ID:	Volume (gallons)	Well Volume	Temp (C)	ORP (mV)	SC (uS)	pH
P-13	6.00	1.0	11.0	129	750	7.05
Key Number: 10G013	12.00	2.0	10.9	144	753	7.24
Casing Diameter (in): 4"	17.00	3.0	10.8	153	753	7.25
Well Depth (ft): 86.90 TO TOP	23.00	4.0	10.8	152	755	7.27
Depth to water (ft): 70.5						
Column length (ft): 8.53						
Column volume (gal): 5.57						
Total volume purged (gal): 23.00						

**Miscellaneous**

Purge Method: PVC BAILER

Sampling Method: DISP. BAILER

Analysis Requested: Dissolved metals, CL, FL, NO3, SO4, COD, Cyanide, Phenols, TOC, TDS, pH, Conductivity

Weather Conditions: P. CLOUDY, 27°

Sample Description: SILTY TAN / RUST TINT, NO ODOOR

Remarks:

Sampler: CMH

Time Sample Collected: 9:53

Leggette, Brashears & Graham, Inc.  
1210 West County Road E  
St. Paul, Minnesota 55112

**APPENDIX II**

**Methods**

## METHODOLOGIES

### Monitor-Well Development

The monitor wells are developed by surging with dedicated stainless-steel bailers or by hand pumping until the discharge is relatively sediment free.

### Ground-Water Monitoring

Fluid-level elevations are measured to the nearest 0.01 foot using the top of well casing as a reference point with a steel tape, an electronic water-level indicator or an interface probe. Prior to insertion into each monitor well, the measuring device is cleaned with alcohol and rinsed with distilled water. The steel tapes are accurate to approximately  $\pm 0.01$  foot. The electronic water-level indicator manufacturer's reported accuracy is  $\pm 0.04$  foot. The interface probe has a manufacturer's reported accuracy of approximately  $\pm 0.01$  foot.

### Ground-Water Sampling

The monitor wells are sampled in order from the suspected cleanest to the suspected most contaminated. Wells containing measurable accumulations of free-phase product are not sampled. The sampling procedure is as follows.

- The fluid level in the well is measured to the nearest 0.01 foot as described in the ground-water monitoring section above.
  - The well volume is calculated.
  - A minimum of three standing well volumes are purged from the well. During purging, the temperature, pH and conductivity of each successive well volume removed is recorded. After 3 successive similar readings are obtained for these parameters, indicating stabilization, the ground-water sample is collected.
  - The water is purged with and the sample is collected with either a dedicated stainless steel bailer or a dedicated disposable polyethylene bailer. Samples for volatile analyses are collected first, followed by any other required parameters. A minimum of one field blank is collected per sampling day by pouring distilled water or deionized water into the bailer prior to use in a well as a quality control procedure.
- 
- All data are recorded on field sampling sheets

and chain of custody forms. Samples are transported to a laboratory following appropriate documentation, preservation and chain of custody procedures.

### Laboratory Analyses

The soil and/or ground-water samples are placed in clean jars supplied by the laboratory, preserved in an ice-filled cooler and shipped along with a chain of custody form via overnight courier to the laboratory. The samples are analyzed for total petroleum hydrocarbons and benzene, toluene, ethylbenzene, xylenes and methyl tertiary butyl ether by the USGS/California (modified 8015 method) or an equivalent method acceptable to the DENR.

**APPENDIX III**

**Laboratory Analytical Report**











**MINNESOTA VALLEY TESTING LABORATORIES, INC.**

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Page: 2 of 2

TIM KENYON  
 LEGGETTE BRASHEARS & GRAHAM INC  
 113 E 14TH ST  
 SIOUX FALLS SD 57104

Report Date: 8 Nov 02  
 Lab Number: 02-A34927  
 Work Order #: 12-9844  
 Account #: 019464  
 Sample Matrix: GROUNDWATER  
 Date Sampled: 16 Oct 02 11:05  
 Date Received: 17 Oct 02 10:00

Temperature at Receipt: 4.0C

Project Name: DEZURIK LANDFILL  
 Sample Description: P-5R

	As Received Result	Method RL	Method Reference	Date Analyzed	Analyst
Fluoride	< 0.1 mg/L	0.1	340.2	18 Oct 02 7:06	JD

01 = Analysis performed by an Outside Laboratory.

Approved by:

Michael K. Grob, Inorganic/Microbiology  
 Laboratory Manager New Ulm, MN

RL = Reporting Limit

Elevated "Less Than Result" (<): # = Due to sample matrix      ‡ = Due to sample concentration  
 ! = Due to sample quantity      † = Due to extract volume

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040 IA LAB #: 132

MVT L guarantees the accuracy of the analysis done on the sample submitted for testing. It is not possible for MVTL to guarantee that a test result obtained on a particular sample will be the same on any other sample unless all conditions affecting the sample are the same, including sampling by MVTL. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.

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Page: 1 of 2

TIM KENYON  
 LEGGETTE BRASHEARS & GRAHAM INC  
 113 E 14TH ST  
 SIOUX FALLS SD 57104

Report Date: 8 Nov 02  
 Lab Number: 02-A34928  
 Work Order #: 12-9844  
 Account #: 019464  
 Sample Matrix: GROUNDWATER  
 Date Sampled: 16 Oct 02 11:32  
 Date Received: 17 Oct 02 10:00

Project Name: DEZURIK LANDFILL  
 Sample Description: P-12R

Temperature at Receipt: 4.0C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Specific Conductance	1205	umhos/cm	0.1	SM 2510B	22 Oct 02 6:06	JD
pH	7.2	units	1.0	SM 4500 H-B	18 Oct 02 10:17	AKF
Carbon, Total Organic	3.0	mg/L	0.5	415.1	25 Oct 02 10:00	OL
Sulfate	142	mg/L	4.0	375.4	23 Oct 02 14:49	DAS
Chloride	24.6	mg/L	3.0	325.2	23 Oct 02 9:33	TMK
Nitrate+Nitrite	5.11	mg/L as N	0.20	353.2	18 Oct 02 11:04	TMK
Phenolics, Total	< 5	ug/L	5	420.1	18 Oct 02 4:21	JD
Cyanide, Total	< 0.02	mg/L	0.02	335.2	22 Oct 02 5:43	JD
Mercury, Dissolved	< 0.06	ug/L	0.06	245.1	29 Oct 02 11:01	TB
Chemical Oxygen Demand	37	mg/L	5	410.4	18 Oct 02 7:06	JD
Solids, Total Dissolved	1060	mg/L	1	SM 2540C	21 Oct 02 11:03	IMR
Calcium, Dissolved	141.0	mg/L	0.018	6010	28 Oct 02 12:48	JGS
Magnesium, Dissolved	37.00	mg/L	0.036	6010	28 Oct 02 12:48	JGS
Sodium, Dissolved	36.30	mg/L	0.096	6010	28 Oct 02 12:48	JGS
Barium, Dissolved	0.060	mg/L	0.001	6010	29 Oct 02 11:58	JGS
Chromium, Dissolved	< 0.002	mg/L	0.002	6010	29 Oct 02 11:58	JGS
Iron, Dissolved	0.156	mg/L	0.008	6010	29 Oct 02 11:58	JGS
Manganese, Dissolved	0.078	mg/L	0.003	6010	29 Oct 02 11:58	JGS
Zinc, Dissolved	< 0.007	mg/L	0.007	6010	29 Oct 02 11:58	JGS
Boron, Dissolved	0.10	mg/L	0.10	6010	7 Nov 02 8:51	JGS
Arsenic, Dissolved	< 1	ug/L	1	200.8	28 Oct 02 12:55	TB
Cadmium, Dissolved	< 0.2	ug/L	0.2	200.8	28 Oct 02 12:55	TB
Lead, Dissolved	< 0.5	ug/L	0.5	200.8	28 Oct 02 12:55	TB
Selenium, Dissolved	6.28	ug/L	1.00	200.8	28 Oct 02 12:55	TB

RL = Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix      # = Due to sample concentration  
 ! = Due to sample quantity    + = Due to extract volume

CERTIFICATION: MN LAB # 027-015-125    WI LAB # 999447680    ND MICRO # 1013-M    ND WW/DW # R-040    IA LAB #: 132

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Page: 2 of 2

TIM KENYON  
LEGGETTE BRASHEARS & GRAHAM INC  
113 E 14TH ST  
SIOUX FALLS SD 57104

Report Date: 8 Nov 02  
Lab Number: 02-A34928  
Work Order #:12-9844  
Account #: 019464  
Sample Matrix: GROUNDWATER  
Date Sampled: 16 Oct 02 11:32  
Date Received: 17 Oct 02 10:00

Project Name: DEZURIK LANDFILL  
Sample Description: P-12R

Temperature at Receipt: 4.0C

	As Received Result	Method RL	Method Reference	Date Analyzed	Analyst
Fluoride	< 0.1 ng/L	0.1	340.2	18 Oct 02 7:06	JD

OL = Analysis performed by an Outside Laboratory.

Approved by:

Michael K. Grob, Inorganic/Microbiology  
Laboratory Manager New Ulm, MN

RL = Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix  
! = Due to sample quantity

# = Due to sample concentration  
+ = Due to extract volume

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040 IA LAB #: 132

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TIM KENYON  
 LEGGETTE BRASHEARS & GRAHAM INC  
 113 E 14TH ST  
 SIOUX FALLS SD 57104

Report Date: 8 Nov 02  
 Lab Number: 02-A34929  
 Work Order #: 12-9844  
 Account #: 019464  
 Sample Matrix: GROUNDWATER  
 Date Sampled: 16 Oct 02 12:39  
 Date Received: 17 Oct 02 10:00

Project Name: DEZURIK LANDFILL  
 Sample Description: P-9R

Temperature at Receipt: 4.0C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Specific Conductance	1180	umhos/cm	0.1	SM 2510B	22 Oct 02 6:06	JD
pH	7.1	units	1.0	SM 4500 H-B	18 Oct 02 10:17	AKF
Carbon, Total Organic	2.4	mg/L	0.5	415.1	25 Oct 02 10:00	OL
Sulfate	138	ng/L	4.0	375.4	23 Oct 02 14:49	DAS
Chloride	33.9	mg/L	3.0	325.2	23 Oct 02 9:33	TWK
Nitrate+Nitrite	6.05	ng/L as N	0.20	353.2	18 Oct 02 11:04	TWK
Phenolics, Total	< 5	ug/L	5	420.1	18 Oct 02 4:21	JD
Cyanide, Total	< 0.02	mg/L	0.02	335.2	22 Oct 02 5:43	JD
Mercury, Dissolved	< 0.06	ug/L	0.06	245.1	29 Oct 02 11:01	TB
Chemical Oxygen Demand	23	mg/L	5	410.4	18 Oct 02 7:06	JD
Solids, Total Dissolved	592	mg/L	1	SM 2540C	21 Oct 02 11:03	IMR
Calcium, Dissolved	153.0	mg/L	0.018	6010	28 Oct 02 12:48	JGS
Magnesium, Dissolved	42.50	mg/L	0.036	6010	28 Oct 02 12:48	JGS
Sodium, Dissolved	10.00	mg/L	0.096	6010	28 Oct 02 12:48	JGS
Barium, Dissolved	0.062	mg/L	0.001	6010	29 Oct 02 11:58	JGS
Chromium, Dissolved	< 0.002	mg/L	0.002	6010	29 Oct 02 11:58	JGS
Iron, Dissolved	< 0.008	mg/L	0.008	6010	29 Oct 02 11:58	JGS
Manganese, Dissolved	0.020	mg/L	0.003	6010	29 Oct 02 11:58	JGS
Zinc, Dissolved	< 0.007	mg/L	0.007	6010	29 Oct 02 11:58	JGS
Boron, Dissolved	< 0.1	mg/L	0.1	6010	7 Nov 02 8:51	JGS
Arsenic, Dissolved	< 1	ug/L	1	200.8	28 Oct 02 14:05	TB
Cadmium, Dissolved	< 0.2	ug/L	0.2	200.8	28 Oct 02 14:05	TB
Lead, Dissolved	< 0.5	ug/L	0.5	200.8	28 Oct 02 14:05	TB
Selenium, Dissolved	1.54	ug/L	1.00	200.8	28 Oct 02 14:05	TB

RL = Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix      ‡ = Due to sample concentration  
 † = Due to sample quantity      † = Due to extract volume

CERTIFICATION: MN LAB # 027-015-125    WI LAB # 999447600    ND MICRO # 1013-M    ND WW/DW # R-040    IA LAB #: 132

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TIM KENYON  
 LEGGETTE BRASHEARS & GRAHAM INC  
 113 E 14TH ST  
 SIOUX FALLS SD 57104

Report Date: 8 Nov 02  
 Lab Number: 02-A34929  
 Work Order #: 12-9844  
 Account #: 019464  
 Sample Matrix: GROUNDWATER  
 Date Sampled: 16 Oct 02 12:39  
 Date Received: 17 Oct 02 10:00

Temperature at Receipt: 4.0C

Project Name: DEZURIK LANDFILL  
 Sample Description: P-9R

	As Received Result	Method RL	Method Reference	Date Analyzed	Analyst
Fluoride	< 0.1 mg/L	0.1	340.2	18 Oct 02 7:06	JD

OL = Analysis performed by an Outside Laboratory.

Approved by:   
 Michael K. Grob, Inorganic/Microbiology  
 Laboratory Manager New Ulm, MN

RL = Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix      # = Due to sample concentration  
 l = Due to sample quantity      + = Due to extract volume

CERTIFICATION: MN LAB # 027-015-125    WI LAB # 999447680    ND MICRO # 1013-M    ND WW/DW # R-040    IA LAB #: 132

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TIM KENYON  
 LEGGETTE BRASHEARS & GRAHAM INC  
 113 E 14TH ST  
 SIOUX FALLS SD 57104

Report Date: 8 Nov 02  
 Lab Number: 02-A34930  
 Work Order #: 12-9844  
 Account #: 019464  
 Sample Matrix: GROUNDWATER  
 Date Sampled: 16 Oct 02  
 Date Received: 17 Oct 02 10:00

Project Name: DEZURIK LANDFILL  
 Sample Description: DUPLICATE

Temperature at Receipt: 4.0C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Specific Conductance	890.0	umhos/cm	0.1	SM 2510B	22 Oct 02 6:06	JD
pH	7.2	units	1.0	SM 4500 H-B	18 Oct 02 10:17	AKF
Carbon, Total Organic Sulfate	1.6	mg/L	0.5	415.1	25 Oct 02 10:00	OL
Chloride	111	mg/L	4.0	375.4	23 Oct 02 14:49	DAS
Nitrate+Nitrite	31.7	mg/L	3.0	325.2	23 Oct 02 9:33	TMK
Phenolics, Total	5.05	mg/L as N	0.20	353.2	18 Oct 02 11:04	TMK
Cyanide, Total	< 5	ug/L	5	420.1	18 Oct 02 4:21	JD
Mercury, Dissolved	< 0.02	ng/L	0.02	335.2	22 Oct 02 5:43	JD
Chemical Oxygen Demand	< 0.06	ug/L	0.06	245.1	29 Oct 02 11:01	TB
Solids, Total Dissolved	60	ng/L	5	410.4	18 Oct 02 7:06	JD
Calcium, Dissolved	250	ng/L	1	SM 2540C	21 Oct 02 11:03	IMR
Magnesium, Dissolved	118.0	ng/L	0.010	6010	28 Oct 02 12:48	JGS
Sodium, Dissolved	29.20	ng/L	0.036	6010	28 Oct 02 12:48	JGS
Barium, Dissolved	4.890	ng/L	0.096	6010	28 Oct 02 12:48	JGS
Chromium, Dissolved	0.036	ng/L	0.001	6010	29 Oct 02 11:58	JGS
Iron, Dissolved	< 0.002	ng/L	0.002	6010	29 Oct 02 11:58	JGS
Manganese, Dissolved	< 0.008	ng/L	0.008	6010	29 Oct 02 11:58	JGS
Zinc, Dissolved	0.003	ng/L	0.003	6010	29 Oct 02 11:58	JGS
Boron, Dissolved	< 0.007	ng/L	0.007	6010	29 Oct 02 11:58	JGS
Arsenic, Dissolved	< 0.1	ng/L	0.1	6010	7 Nov 02 8:51	JGS
Cadmium, Dissolved	< 1	ug/L	1	200.8	28 Oct 02 14:05	TB
Lead, Dissolved	< 0.2	ug/L	0.2	200.8	28 Oct 02 14:05	TB
Selenium, Dissolved	< 0.5	ug/L	0.5	200.8	28 Oct 02 14:05	TB
	< 1	ug/L	1	200.8	28 Oct 02 14:05	TB

RL = Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix      ‡ = Due to sample concentration  
 † = Due to sample quantity      † = Due to extract volume

CERTIFICATION: MN LAB # 027-015-125    WI LAB # 999447600    ND MICRO # 1013-M    ND WW/DW # R-040    IA LAB #: 132

MVTL guarantees the accuracy of the analysis done on the sample submitted for testing. It is not possible for MVTL to guarantee that a test result obtained on a particular sample will be the same on any other sample unless all conditions affecting the sample are the same, including sampling by MVTL. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.

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Page: 2 of 2

TIM KENYON  
LEGGETTE BRASHEARS & GRAHAM INC  
113 E 14TH ST  
SIOUX FALLS SD 57104

Report Date: 8 Nov 02  
Lab Number: 02-A34930  
Work Order #: 12-9844  
Account #: 019464  
Sample Matrix: GROUNDWATER  
Date Sampled: 16 Oct 02  
Date Received: 17 Oct 02 10:00

Temperature at Receipt: 4.0C

Project Name: DEZURIK LANDFILL  
Sample Description: DUPLICATE

	As Received Result	Method RL	Method Reference	Date Analyzed	Analyst
Fluoride	< 0.1 mg/L	0.1	340.2	18 Oct 02 7:06	JD

OL = Analysis performed by an Outside Laboratory.

Approved by:

Michael K. Grob, Inorganic/Microbiology  
Laboratory Manager New Ulm, MN

RL = Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix # = Due to sample concentration  
! = Due to sample quantity + = Due to extract volume

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040 IA LAB #: 132

MVTL guarantees the accuracy of the analysis done on the sample submitted for testing. It is not possible for MVTL to guarantee that a test result obtained on a particular sample will be the same on any other sample unless all conditions affecting the sample are the same, including sampling by MVTL. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.

10-9844

# CHAIN OF CUSTODY RECORD

PROJECT NAME DEZURIK ANDRELL DEZURIK				CLIENT NAME				LABORATORY NAME: MVTL							
SAMPLERS: (Signature)								REMARKS							
SAMPLE NO.	DATE	TIME	COMP	GRAB	SAMPLE LOCATIONS	NO. OF CONTAINERS									
27	10-16-02	9:53	✓	✓	P-13	6	<p>DISSOLVED METALS PHENOLS CHANIDS TOC COD N03 GL, EL, SOL, TDS, PH, CONDUCIVITY</p>								
28		11:05	✓	✓	P-5R	6									
29		11:32	✓	✓	P-12R	6									
30		12:39	✓	✓	P-9R	6									
					DUPLICATE	6									
RELINQUISHED BY: (Signature)				RECEIVED BY: (Signature)				RELINQUISHED BY: (Signature)				RECEIVED BY: (Signature)			
RELINQUISHED BY: (Signature)				RECEIVED BY: (Signature)				REPORT TO: TIM KENYON - LBG				DATE/TIME			
RELINQUISHED BY: (Signature)				RECEIVED BY: (Signature)				RECEIVED FOR LABORATORY BY: (Signature)				DATE/TIME			



LEGGETT, BRASHEARS & GRAHAM, INC.  
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4°C

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