

***Petroleum Release Remedial  
Investigation Addendum***

***Lake & Hiawatha Site  
(Former Clark Station)***

***Prepared for  
Minnesota Department of Transportation***

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***Barr***

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# Petroleum Release Remedial Investigation Addendum Lake and Hiawatha Site

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# Section 1 Introduction

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This report presents the results of additional investigations performed at the Lake and Hiawatha site (the site) in South Minneapolis (Figure 1), which is owned by the Minnesota Department of Transportation (Mn/DOT). A Petroleum Release Remedial Investigation was performed at the site during the fall of 1995. A Petroleum Release Remedial Investigation Report including recommendations for future site activities was submitted to the Minnesota Pollution Control Agency (MPCA) in February 1996 (Barr, 1996). In a letter to Mn/DOT dated April 18, 1996 (Kania, 1996), the MPCA approved the implementation of the following recommendations:

1. Leave contaminated soils in place and address them as needed during future intrusive activities on the site, including road construction and utility installation associated with the rebuilding of Trunk Highway (TH) 55 along Hiawatha Avenue.
2. Perform a vapor risk assessment on the Lake Street sewer line east of the intersection of Lake Street and Hiawatha Avenue.
3. Continue free-product collection at existing site monitoring wells in which product has been detected, using passive collectors.
4. Continue groundwater monitoring using the existing site monitoring network, analyzing groundwater samples for benzene, ethyl benzene, toluene, xylenes, gasoline-range organic compounds, and diesel-range organic compounds.

Recommendation 1 is being carried out by Mn/DOT, which will issue a report following completion of the TH 55 project. Recommendation 2 was completed during the spring and summer of 1996 and the results are described in this report. Recommendations 3 and 4 were continued as long as possible until most of the site monitoring wells were abandoned during TH 55 road construction in April 1996. Section 2 of this report describes the additional investigation activities performed at the site in accordance with the recommendations. Section 3 presents the results of those activities. A discussion of the results and recommendations for site management are presented in Section 4.

As stated above, most of the site monitoring wells were abandoned during TH 55 road construction. The wells abandoned include MW101 and MW102, and also M & H wells MW1 through MW6 (Figure 2).

## Section 2 Additional Investigation Activities

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Additional investigation activities began in April 1996 and were completed in August 1996. These activities included a storm/sanitary sewer vapor risk assessment and groundwater monitoring.

### 2.1 Vapor Risk Assessment and Survey

As stated in Section 1, the MPCA requested that a vapor risk assessment be performed on the Lake Street sewer line, east of the intersection of East Lake Street and Hiawatha Avenue South (Figure 2). The objective of the vapor risk assessment and survey was to determine if petroleum-related contaminants or petroleum-related vapors had migrated from the site into the sewer line which runs underneath Lake Street. In addition, a vapor survey was also performed along the Hiawatha Avenue sewer line, north of the intersection of East Lake Street and Hiawatha Avenue South, since free product had been observed on the water table at the M & H site west of the Street (Geraghty and Miller, 1996), as well as the former Clark Station site on the east side of the street. Although the Hiawatha Avenue sewer line is located at an elevation that is higher than the water table, it would be possible for petroleum-related vapors to rise upward into the sewer line from free product present at the water table.

The vapor surveys were conducted in accordance with the MPCA Tanks and Emergency Response Section's Fact Sheet #3.20, Risk Assessment Procedures at Petroleum Release Sites, Section II, Vapor Risk Assessment and Survey (MPCA, 1996). The general locations of the sewers were documented during the investigation of the M & H site (Geraghty and Miller, 1996). These locations were confirmed by contacting the City of Minneapolis. The locations of the sewer lines are shown on Figure 2. The Lake Street sewer line is a combined storm/sanitary line. The line beneath Hiawatha is a storm sewer.

The sewer access sampling locations are shown on Figure 2. Vapor readings were taken using a photoionization detector (PID), an explosimeter, and an oxygen meter. Each manhole cover was opened and readings were taken. Depth to fluid, fluid thickness, and total sewer depth were noted. Then vapor readings were taken at the mid-depth and bottom at each sampling location. If fluid was present at a location, a sample was collected and observed for the presence of a sheen or odor. The PID was then used to perform a jar headspace analysis on the fluid sample. This

procedure was repeated at the catch basins that feed into the sewer lines. One manhole and a few of the catch basins were inaccessible due to ongoing TH 55 road construction (Figure 2).

## 2.2 Groundwater Monitoring

The MPCA requested that groundwater monitoring continue using the existing monitoring well network, with analysis for benzene, ethyl benzene, toluene, xylene (BETX), gasoline-range organic (GRO) compounds, and diesel-range organic (DRO) compounds (Kania, 1996). One additional round of groundwater samples was collected from wells MW101 and MW103 on April 19, 1996. Well MW102 was not sampled due to the presence of free product. Product that had collected in the wick stick installed in MW102 was removed from the device. Approximately 0.2 gallons of product have been recovered from well MW102. Fluid levels were measured in the wells, and also in the six M & H site monitoring wells, MW1 through MW6 (Figure 3). With the exception of wells MW103 and MW3, all of the wells were abandoned immediately following the sampling event due to TH 55 road construction (Reed, 1996).

Groundwater samples were field analyzed for temperature, conductivity, and pH. New laboratory-cleaned vials were filled with the groundwater samples and placed in ice-filled cooler. The samples were submitted to Quality Analytical Laboratories of Redding, California, to be analyzed for the parameters listed above. The field sampling report is in Appendix A. The laboratory report is in Appendix B.

## Section 3 Additional Investigation Results

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The additional investigation activities indicate that the sewers adjacent to the site have not been impacted by petroleum-related contamination at the site. They also indicate that groundwater quality and flow conditions are similar to those observed during the RI.

### 3.1 Vapor Survey Results

Organic vapors, explosive atmospheres, or oxygen-deficient atmospheres were not detected at any of the sampling locations along the Lake Street or Hiawatha Avenue sewer lines (Table 1). Water was encountered at sampling locations L-2, L-3, L-8, and H-2 (Figure 2) at thicknesses of 0.2 feet or less. Samples of the water from locations L-3, L-8, and H-2 exhibited no odors, sheens, or the presence of measurable organic vapors (Table 1). The manhole cover could not be removed at location L-2, therefore no sample was recovered for inspection and headspace testing.

### 3.2 Groundwater Elevations

The groundwater elevations measured during the April 1996 sampling event are summarized in Table 2 and shown on Figure 3. Groundwater elevations were approximately 1.2 feet to 1.9 feet lower than those observed during the December 1995 sampling event (Barr, 1996). The groundwater elevation pattern indicates a divide across the eastern portion of the site with a general flow direction to the northwest and east (Figure 3). This is consistent with previous measurements during the RI (Barr, 1996).

### 3.3 Groundwater Analytical Results

BETX and GRO compounds were not detected in the groundwater samples collected from wells MW101 and MW103. DRO compounds were not detected in the sample from well MW101. DRO compounds were detected in the sample from MW103 at 0.36 mg/L. (Table 3). However, after the chromatograms for this sample and its duplicate were analyzed, the analytical laboratory indicated that the pattern of peaks does not match those expected for diesel fuel. It is likely that the compounds detected are naturally occurring dissolved organic matter or are laboratory contaminants and have produced a false positive result for this sample.

## Section 4 Discussion and Recommendations

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The results of the vapor survey indicate that the sewer lines along Lake Street and Hiawatha Avenue have not been impacted by the release of petroleum products at the site. It is recommended that no further action be taken with regard to the vapor risk in the sewer lines.

The northwesterly groundwater flow direction is generally consistent with the data gathered during the RI (Barr, 1996). During the RI, an apparent groundwater flow divide was observed across the site. Figure 3 shows that the divide, although not as well-defined, is likely still present, which may indicate that the groundwater flow was still being influenced by the Lake Street sewer line. However, since groundwater flow is in a direction away from the sewer line, petroleum-related contaminants from the site have not been able to migrate to the sewer line.

The groundwater results indicate that free product is still present in the vicinity of wells MW102 and MW4. It is recommended that a replacement for well MW102 be installed following completion of the TH 55 project, if feasible, so that passive free-product recovery may be resumed at that time.

The analytical results indicate that groundwater in the vicinities of wells MW101 and MW103 have not been impacted by petroleum-related contamination. Replacements for abandoned monitoring wells MW101 and MW6 should be installed, if feasible, following completion of the TH 55 project. Groundwater samples should be collected from these wells and well MW103 and analyzed for BETX, GRO compounds, and DRO compounds in order to assess groundwater quality during free-product removal. The samples should also be analyzed for parameters that are used to evaluate natural attenuation mechanisms. The results of this monitoring would serve to determine plume stability and whether site conditions are adequate to support natural biodegradation.



## References

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- Barr Engineering Company (Barr), 1996, "Petroleum Release Remedial Investigation Report, Lake and Hiawatha Site (Former Clark Station)," prepared for Minnesota Department of Transportation.
- Geraghty and Miller, Inc., 1996. "Supplemental Remedial Investigation/Corrective Action Design Report, Former M&H Station Number 27, 2300 East Lake Street, Minneapolis, Minnesota," prepared for Miller and Holmes, Inc.
- Kania, Laurie, 1996. Letter dated April 18, 1996, from Laurie Kania of the Minnesota Pollution Control Agency Tanks and Emergency Response Section to Scott Reed of the Minnesota Department of Transportation.
- Minnesota Pollution Control Agency (MPCA), 1996. "MPCA Leaking Underground Storage Tank Investigation and Cleanup Policy," prepared April 1996.
- Reed, Scott, 1996. Personal communication on April 25, 1996, between Scott Reed of the Minnesota Department of Transportation and Gary Remple of Barr Engineering Company.

TABLE 1

Vapor Survey Summary  
Lake & Hiawatha

Location	Depth to Water (feet)	Total Sewer Depth (feet)	Water Appearance			Vapor Survey					
			Odor	Sheen	Headspace (ppm)	Top		Midlevel		Bottom	
						Organic Vapors (ppm)	%LEL	Organic Vapors (ppm)	%LEL	Organic Vapors (ppm)	%LEL
L-1	NP	3.8	--	--	--	ND	0	ND	0	ND	0
L-2	12.4	12.6	NA	NA	NA	ND	0	ND	0	ND	0
L-3	3	3.1	none	none	ND	ND	0	ND	0	ND	0
L-4	NP	4.0	--	--	--	ND	0	ND	0	ND	0
L-5	4	4.2	none	none	ND	ND	0	ND	0	ND	0
L-6	NP	12.7	--	--	--	ND	0	ND	0	ND	0
H-1	NP	2.5	--	--	--	ND	0	ND	0	ND	0
H-2	9.7	9.9	none	none	ND	ND	0	ND	0	ND	0
H-3	NP	3.0	--	--	--	ND	0	ND	0	ND	0
H-4	NP	2.3	--	--	--	ND	0	ND	0	ND	0
H-5	NP	3.5	--	--	--	ND	0	ND	0	ND	0
H-6	NP	10.5	--	--	--	ND	0	ND	0	ND	0

NP - not present

NA - not analyzed; could not obtain water sample

ND - none detected

%LEL - percent of lower explosive limit

TABLE 2

Groundwater Elevation Summary  
 April 19, 1996  
 Lake & Hiawatha

Well	Top of Riser Elevation (feet MSL)	Product			Water		Corrected Water Elevation (feet MSL)
		Depth (feet)	Elevation (feet MSL)	Thickness (feet)	Depth (feet)	Elevation (feet MSL)	
MW101	844.17	NP	--	--	17.57	826.60	--
MW102	843.36	17.22	826.14	0.13	17.35	826.01	826.10
MW103	844.58	NP	--	--	18.38	826.20	--
MW1	845.76	NP	--	--	21.11	824.65	--
MW2	845.55	NP	--	--	19.80	825.75	--
MW3	848.98	NP	--	--	24.47	824.51	--
MW4	846.61	20.37	826.24	0.04	20.41	826.20	826.23
MW5	845.55	NP	--	--	17.41	828.14	--
MW6	847.82	NP	--	--	24.63	823.19	--

NP - not present

TABLE 3

GROUNDWATER QUALITY DATA  
LAKE AND HIAWATHA RI

(concentrations in ug/L)

	MW101			MW103				
	11/02/95	12/04/95	04/19/96	11/02/95	12/04/95 Sample	12/04/95 Duplicate	04/19/96 Sample	04/19/96 Duplicate
Acetone	<5.0	<5.0	--	<5.0	<5.0	<5.0	--	--
Allyl Chloride	<5.0	<5.0	--	<5.0	<5.0	<5.0	--	--
Benzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bromobenzene	<1.0	<1.0	--	<1.0	<1.0	<1.0	--	--
Bromochloromethane	<1.0	<1.0	--	<1.0	<1.0	<1.0	--	--
Bromodichloromethane	<1.0	<1.0	--	<1.0	<1.0	<1.0	--	--
Bromoform	<1.0	<1.0	--	<1.0	<1.0	<1.0	--	--
Bromomethane	<1.0	<1.0	--	<1.0	<1.0	<1.0	--	--
Butylbenzene	<1.0	<1.0	--	<1.0	<1.0	<1.0	--	--
Sec-butylbenzene	<1.0	<1.0	--	<1.0	<1.0	<1.0	--	--
Tert-Butylbenzene	<1.0	<1.0	--	<1.0	<1.0	<1.0	--	--
Carbon Tetrachloride	<1.0	<1.0	--	<1.0	<1.0	<1.0	--	--
Chlorobenzene	<1.0	<1.0	--	<1.0	<1.0	<1.0	--	--
Chloroethane	<1.0	<1.0	--	<1.0	<1.0	<1.0	--	--
Chloroform	<1.0	<1.0	--	<1.0	<1.0	<1.0	--	--
Chloromethane	<1.0	<1.0	--	<1.0	<1.0	<1.0	--	--
o-Chlorotoluene	<1.0	<1.0	--	<1.0	<1.0	<1.0	--	--
p-Chlorotoluene	<1.0	<1.0	--	<1.0	<1.0	<1.0	--	--
1,2-Dibromo-3-chloropropane	<1.0	<1.0	--	<1.0	<1.0	<1.0	--	--
Chlorodibromomethane	<1.0	<1.0	--	<1.0	<1.0	<1.0	--	--
Dichlorofluoromethane	<1.0	<1.0	--	<1.0	<1.0	<1.0	--	--
1,2-Dibromoethane	<1.0	<1.0	--	<1.0	<1.0	<1.0	--	--
Dibromomethane (Methylene Bromide)	<1.0	<1.0	--	<1.0	<1.0	<1.0	--	--
1,2-Dichlorobenzene	<1.0	<1.0	--	<1.0	<1.0	<1.0	--	--
1,3-Dichlorobenzene	<1.0	<1.0	--	<1.0	<1.0	<1.0	--	--
1,4-Dichlorobenzene	<1.0	<1.0	--	<1.0	<1.0	<1.0	--	--
Dichlorodifluoromethane	<1.0	<1.0	--	<1.0	<1.0	<1.0	--	--
1,1-Dichloroethane	<1.0	<1.0	--	<1.0	<1.0	<1.0	--	--
1,2-Dichloroethane	<1.0	<1.0	--	<1.0	<1.0	<1.0	--	--
1,1-Dichloroethylene	<1.0	<1.0	--	<1.0	<1.0	<1.0	--	--
1,2-Dichloroethylene, cis	<1.0	<1.0	--	<1.0	<1.0	<1.0	--	--
1,2-Dichloroethylene, trans	<1.0	<1.0	--	<1.0	<1.0	<1.0	--	--
1,2-Dichloropropane	<1.0	<1.0	--	<1.0	<1.0	<1.0	--	--
1,3-Dichloropropane	<1.0	<1.0	--	<1.0	<1.0	<1.0	--	--
2,2-Dichloropropane	<1.0	<1.0	--	<1.0	<1.0	<1.0	--	--
1,1-Dichloro-1-propene	<1.0	<1.0	--	<1.0	<1.0	<1.0	--	--
Cis-1,3-Dichloro-1-propene	<1.0	<1.0	--	<1.0	<1.0	<1.0	--	--
Trans-1,3-Dichloro-1-propene	<1.0	<1.0	--	<1.0	<1.0	<1.0	--	--
Ethyl Benzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Ethyl Ether	<1.0	<1.0	--	<1.0	<1.0	<1.0	--	--
Hexachlorobutadiene	<1.0	<1.0	--	<1.0	<1.0	<1.0	--	--
Cumene	<1.0	<1.0	--	<1.0	<1.0	<1.0	--	--
p-Cymene (Isopropyltoluene)	<1.0	<1.0	--	<1.0	<1.0	<1.0	--	--
Methyl Ethyl Ketone	<5.0	<5.0	--	<5.0	<5.0	<5.0	--	--
Methyl Isobutyl Ketone	<5.0	<5.0	--	<5.0	<5.0	<5.0	--	--
tert-Butyl Methyl Ether	<1.0	<1.0	--	<1.0	<1.0	<1.0	--	--
Methylene Chloride	<5.0	<5.0	--	<5.0	<5.0	<5.0	--	--
Naphthalene	<1.0	<1.0	--	<1.0	<1.0	<1.0	--	--
Propylbenzene	<1.0	<1.0	--	<1.0	<1.0	<1.0	--	--
Styrene	<1.0	<1.0	--	<1.0	<1.0	<1.0	--	--

-- Not analyzed.

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TABLE 3 (cont.)

GROUNDWATER QUALITY DATA  
LAKE AND HIAWATHA RI

(concentrations in ug/L, unless noted otherwise)

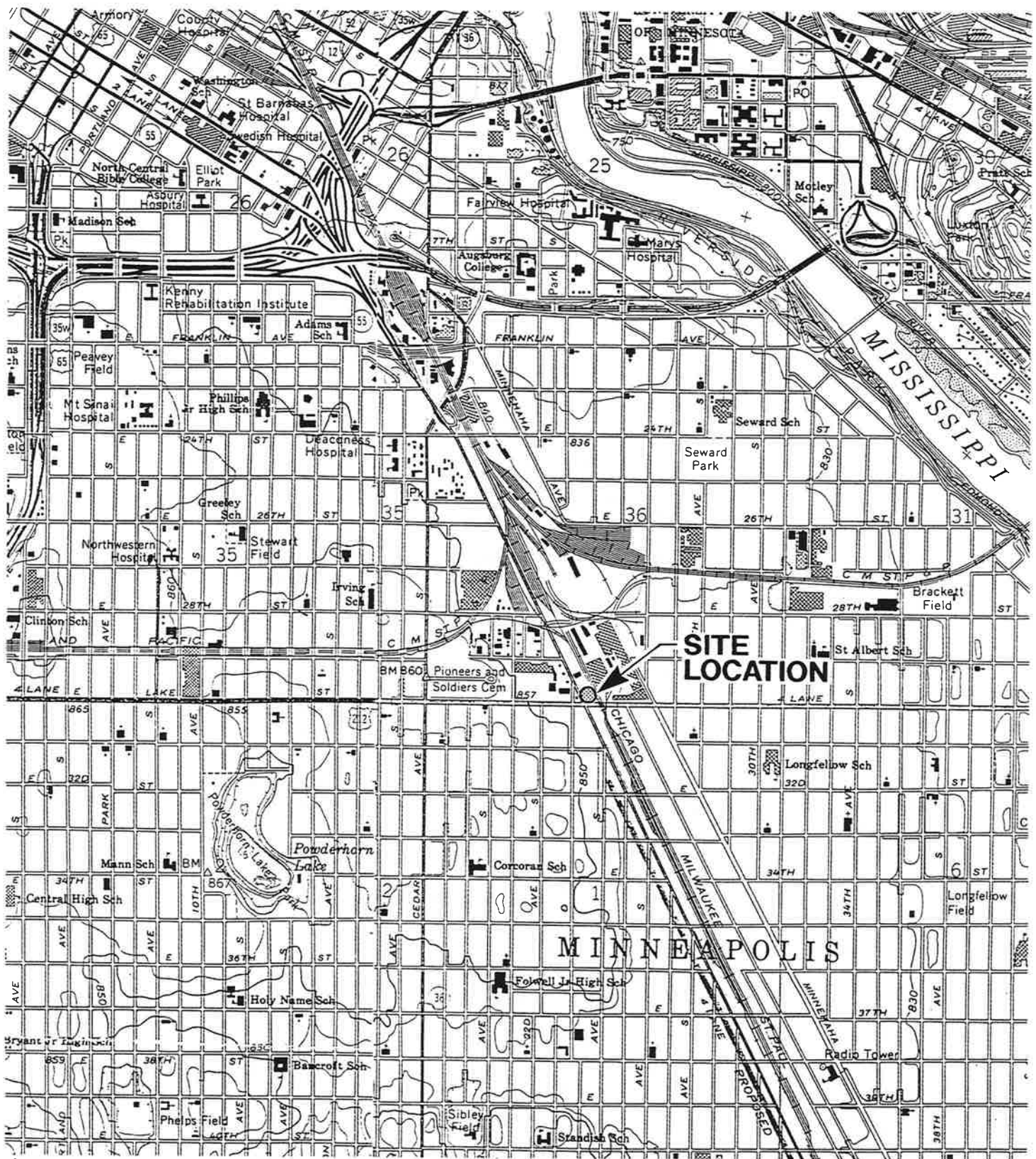
	MW101			MW103				
	11/02/95	12/04/95	04/19/96	11/02/95	12/04/95 Sample	12/04/95 Duplicate	04/19/96 Sample	04/19/96 Duplicate
1,1,1,2-Tetrachloroethane	<1.0	<1.0	--	<1.0	<1.0	<1.0	--	--
1,1,2,2-Tetrachloroethane	<1.0	<1.0	--	<1.0	<1.0	<1.0	--	--
Tetrachloroethylene	<1.0	<1.0	--	<1.0	<1.0	<1.0	--	--
Tetrahydrofuran	<5.0	<5.0	--	<5.0	<5.0	<5.0	--	--
Toluene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2,3-Trichlorobenzene	<1.0	<1.0	--	<1.0	<1.0	<1.0	--	--
1,2,4-Trichlorobenzene	<1.0	<1.0	--	<1.0	<1.0	<1.0	--	--
1,1,1-Trichloroethane	<1.0	<1.0	--	<1.0	<1.0	<1.0	--	--
1,1,2-Trichloroethane	<1.0	<1.0	--	<1.0	<1.0	<1.0	--	--
Trichloroethylene	<1.0	<1.0	--	<1.0	<1.0	<1.0	--	--
Trichlorofluoromethane	<1.0	<1.0	--	<1.0	<1.0	<1.0	--	--
1,2,3-Trichloropropane	<1.0	<1.0	--	<1.0	<1.0	<1.0	--	--
Trichlorotrifluoroethane	<1.0	<1.0	--	<1.0	<1.0	<1.0	--	--
1,2,4-Trimethylbenzene	<1.0	<1.0	--	<1.0	<1.0	<1.0	--	--
1,3,5-Trimethylbenzene	<1.0	<1.0	--	<1.0	<1.0	<1.0	--	--
Vinyl Chloride	<1.0	<1.0	--	<1.0	<1.0	<1.0	--	--
m & p Xylene	<2.0	<2.0	--	<2.0	<2.0	<2.0	--	--
o-Xylene	<1.0	<1.0	--	<1.0	<1.0	<1.0	--	--
Xylenes (total)	--	--	<1.0	--	--	--	<1.0	<1.0
Gasoline Range Organics, mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Diesel Range Organics, mg/L	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	0.36 (1)	0.21 (1)
Lead, mg/L	0.0013	0.0010	--	<0.0006	<0.0006	<0.0006	--	--

-- Not analyzed.

(1) Peak pattern atypical of diesel, single peak present.

lake2.prn

09/26/96



Source: Minneapolis South and St. Paul West, Minnesota Quadrangles, 7.5 Minute Series, 1972.



0 2000 4000

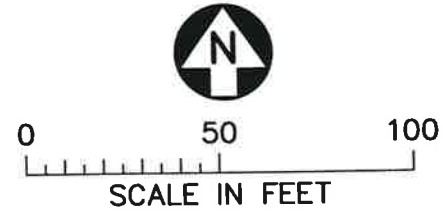
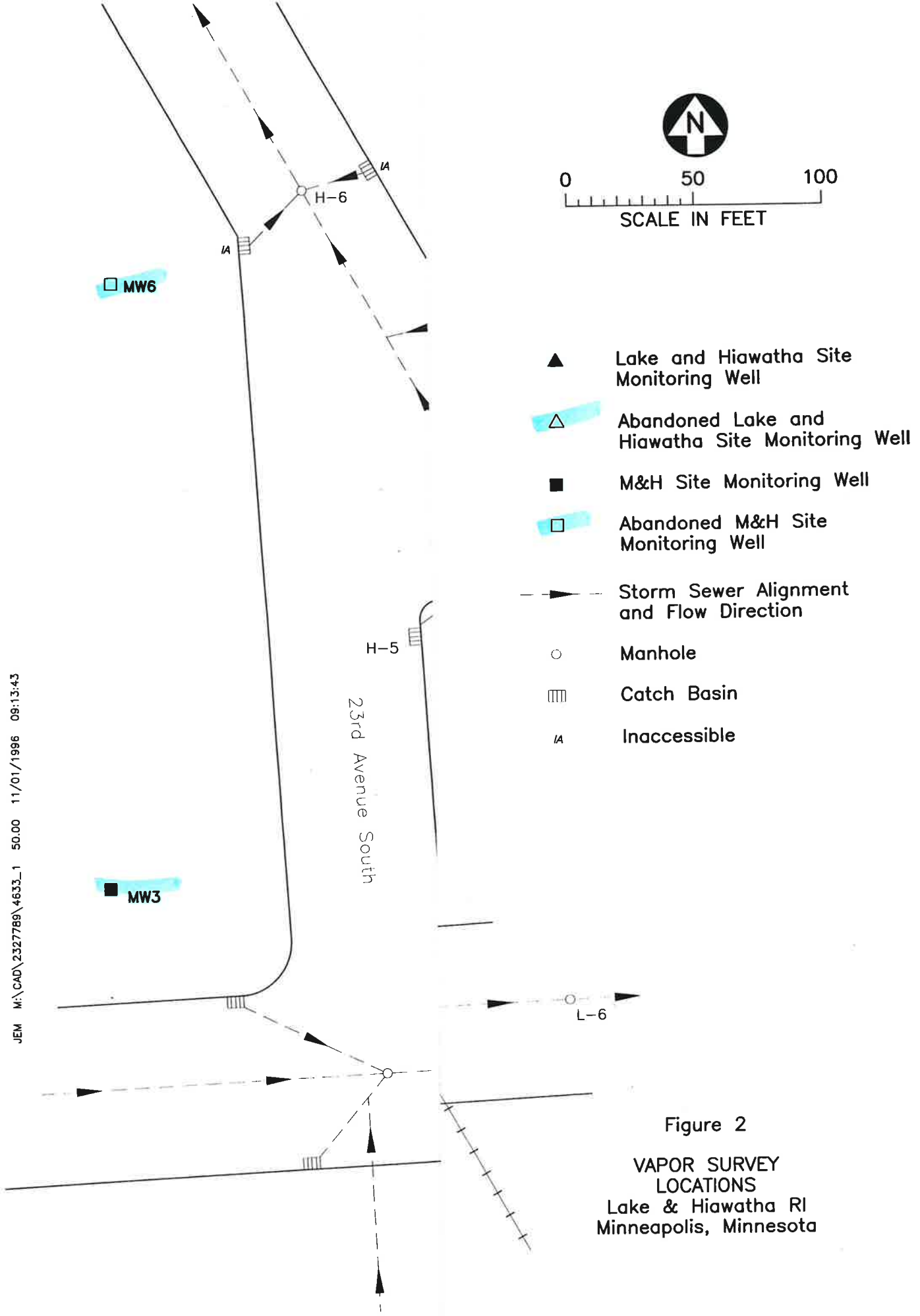
Scale in Feet



QUADRANGLE LOCATION

Figure 1  
SITE LOCATION MAP  
Lake & Hiawatha RI Site

JEM M:\CAD\2327789\4633\_1 50.00 11/01/1996 09:13:43



- ▲ Lake and Hiawatha Site Monitoring Well
- △ Abandoned Lake and Hiawatha Site Monitoring Well
- M&H Site Monitoring Well
- Abandoned M&H Site Monitoring Well
- ▶ Storm Sewer Alignment and Flow Direction
- Manhole
- ▤ Catch Basin
- IA Inaccessible

Figure 2  
VAPOR SURVEY  
LOCATIONS  
Lake & Hiawatha RI  
Minneapolis, Minnesota