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MPCA, HAZARDOUS
WASTE DIVISION

Limited Site Investigation/RI Report

Leak #00008723

Holiday Stationstore #022

5247 Minnehaha Avenue South

Minneapolis, Minnesota

Prepared for

Holiday Stationstores, Inc.

August 1996

Barr

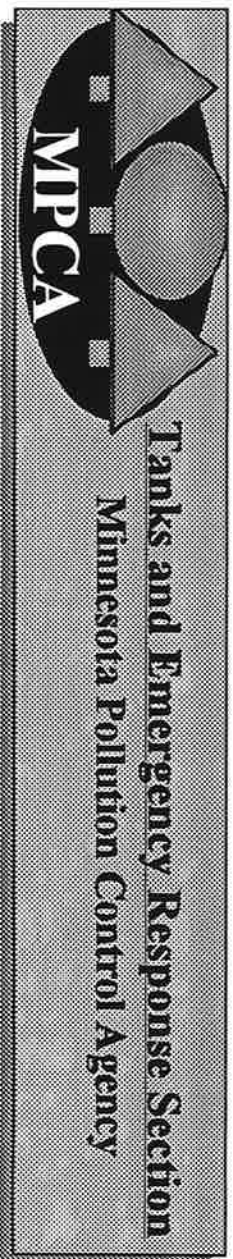
Engineering Company

8300 Norman Center Drive

Minneapolis, MN 55437

Phone: (612) 833-2600

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Remedial Investigation Report Form RECEIVED

Fact Sheet #3.24

April 1996

AUG 12 1996

~~MPCA HAZARDOUS~~

~~WASTE DIVISION~~

This form must be completed for all sites in which a remedial investigation (RI) is conducted. This form will provide the information necessary for a *Limited Site Investigation (LSI)* or a *full RI*. Additional information should be included if deemed important for making a site cleanup decision. If the consultant has concluded that a *Limited Site Investigation* is applicable to this site, Section 6 and Section 7 may be deleted from this report.

Refer to MPCA fact sheet #3.19 "Leaking Underground Storage Tank Investigation and Cleanup Policy" for guidance for the overall objectives of an RI and other MPCA fact sheets regarding investigations.

When a tank has been excavated, refer to fact sheets #3.6 "Excavation of Petroleum Contaminated Soil" and #3.7 "Excavation Report Worksheet for Petroleum Release Sites" for reporting requirements.

If free product is discovered, the initial reporting should be done in accordance with fact sheet #3.3 "Free Product: Evaluation and Recovery" and fact sheet #3.4 "Free Product Recovery Report Worksheet."

Leak Number: LEAK0000 8723

Date: August 29, 1995

Responsible Party: Holiday Stationstores, Inc.

R.P. phone #: (612)830-8899

Facility Name: Holiday Stationstore No. 022

Facility Address: 5247 Minnehaha Avenue

City: Minneapolis, MN

County: Hennepin

Zip Code: 55417

Location of site: LAT: 483.831 LONG: 4.973.726 Circle one: UTM

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Section 1: Emergency and High Priority Sites

1. *Is an existing drinking water well impacted?* NO
2. *Are there existing vapor impacts?* NO
3. *Is there an existing surface water impact as indicated by 1) a product sheen on the surface water or 2) a product sheen or volatile organic compounds in the part per million range in ground water in a well located close to the surface water.* NO
4. *Has the release occurred in the last 30 days?* NO
5. *Has free product been detected at the site?* NO
6. *Is sand or gravel aquifer impacted which is tapped by water wells within or potentially within 500 feet from the edge of the plume or does impacted soil overlie a karsted limestone or fractured bedrock? If yes, explain:* YES
Platteville limestone is present at about 20 feet beneath the site. The water table corresponds approximately with the soil/bedrock interface.

If you answered YES to any of questions 1 through 6 above describe below the actions taken to date to reduce or eliminate the risk posed by the release.

The groundwater in the bedrock was investigated to determine whether it had been impacted. See Section 6.

Section 2: Site and Release Information

- 2.1 *Describe the land use and pertinent geographic features within 1,000 feet of the site.*

The land use adjacent to the site along Minnehaha Avenue is primarily commercial. Residential areas occupy the area west and south of the site. East of the site is open parkland (Minnehaha Park and the Mississippi River bluffs).

Table 1.

Provide the following for all tanks that have been at the site:

Tank #	UST or AST	Capacity	Contents	Age	Status*	Condition
1	UST	10,000 gal.	Gasoline	~25 yrs.	Removed 8/29/95	Fair—rust/pits
2	UST	12,000 gal.	Gasoline	~25 yrs.	Removed 8/29/95	Good—some rust
3	UST	12,000 gal.	Gasoline	~25 yrs.	Removed 8/29/95	Good—some rust

*Indicate: removed (date), abandoned in place (date), or currently used

Notes:

- 2.2 Describe the status of the other components of the tank system(s), (i.e., piping and dispensers) for those tanks listed above.

All tanks, piping, and dispensers were removed from the site and were replaced with three 8,000-gallon gasoline tanks. All piping and dispensers were also removed and replaced with up-to-date systems with leak prevention/detection devices (see Figure 2).

- 2.3 Identify and describe the source or suspected source(s) of the release.

Actual source(s) of release are unknown. It is suspected that the sources were via tank overfills and dispenser leaks based on the pattern of soil contamination (see Figures 3 and 4).

- 2.4 What was the volume of the release? (if known): Unknown gallons

- 2.5 When did the release occur? (if known): Unknown

Section 3: Excavated Soil Information

- 3.1 Was soil excavated for off-site treatment?

YES

If YES then complete the fact sheet #3.7 "Excavation Report Worksheet for Petroleum Release Sites" and include it as an appendix.

Date excavated:

8/29-9/12/95

Volume removed:

593 cubic yards

3.2 Indicate soil treatment type:

- land treatment
- thermal treatment
- composting/biopiling
- other (_____)

Name and location of treatment facility:

C.S. McCrossan, Inc.; Maple Grove, MN

Section 4: Extent and Magnitude of Soil Contamination

- 4.1 Were soil borings conducted in or immediately adjacent to all likely source areas (e.g., UST basins, AST areas, piping, dispensers, remote fill pipes, known spill areas)? YES
- 4.2 To adequately define the vertical extent of contamination soil borings should be completed at least five feet below the water table or ten feet below the deepest measurable (field screening and visual observation) contamination, whichever is deeper. Were all soil borings completed to the required depth? NO
- Borings were advanced to the top of bedrock.

- 4.3 To adequately evaluate site stratigraphy at least one boring should be completed 20 feet below the water table, unless a confining layer is present. Was this done? NO

The water table was approximately coincident with the bedrock surface.

If you answered NO to any of the three previous questions, explain why the borings were not conducted in the required locations or to the required depths (see fact sheet #3.19 "Soil and Ground Water Investigations Performed During Remedial Investigations" regarding exceptions and MPCA approval for depth of drilling):

- 4.4 Indicate the drilling method: hollow-stem auger—upper well bores (3)

sonic drilling

push probes—soil borings (5)

other (_____)

Note: contact MPCA staff hydro before use of flight augers)

Table 4.

Indicate other notable contaminants (either petroleum or non-petroleum derived) detected in soil samples. Indicate contaminant and list in reported units mg/kg.

Well/Boring, Depth (ft)	Date Analyzed								
NA									

Notes:

4.5 If any non-petroleum compounds were detected list them below and identify possible sources of these compounds.

NA

4.6 Describe the vertical and horizontal extent and magnitude of soil contamination.

The horizontal extent of soil contamination is depicted on Figures 3 and 4 based on the excavation sampling (Appendix A) and the soil borings. Soil contamination in the two tank basins was removed to a depth of 15 to 16 feet. These were the most impacted areas of the site. Contaminated soil remains beneath each basin and in the west sidewall of basin No. 1. The base of tank basin No. 2/3 had GRO soil contamination remaining of 3,000 to 4,300 ppm. Basin No. 1 showed GRO at 450 ppm remaining at the base and 770 ppm in the west sidewall soil.

The soil contamination in the area of the dispensers appeared to be less than in the basin areas. Soil in the dispenser areas was generally discolored, light grey, with stale petroleum odors. The most impacted soil (upper 5 feet) was removed from the dispenser areas. The bottom samples from the north and middle dispensers after excavation had GRO concentrations of 40 and 68 ppm, the south had no detected concentrations. Boring GP-3 through GP-5 showed limited horizontal spreading from the dispenser areas.

5.4 Based on the aquifer characteristics and water supply availability, is the aquifer at the site a resource aquifer?

YES

5.5 If other water supplies are available, explain.

The site is within the city limits of Minneapolis. City water has been available in the area for many years.

5.6 Are there any other reasons the impacted aquifer should not be considered a resource aquifer?

The Platteville Formation is generally not considered an aquifer in the area. Areas wells are completed within the St. Peter Formation or deeper aquifers.

Table 5.

Indicate the water level measured in all of the soil borings.

	Soil Boring				
	GP-1	GP-2	GP-3	GP-4	GP-5
Water Level Depth, ft.	19	18.5	NA	18	NA

Notes: See boring logs (Appendix D).

5.7 Is contaminated soil in contact with ground water?

YES

If YES or if ground water contamination appears likely then complete tables 6 and 7 below.

Table 6.

Indicate the laboratory analytical results for water samples collected from the borings, temporary wells or push probes.

Well/Boring Number	Date Analyzed	Benzene	Toluene	Ethylbenzene	Xylene	GRO	DRO
GP-1	9/5/95	4.0	<1.0	3.0	14	170	<250
GP-2	9/5/95	<200	2,200	2,100	17,000	43,000	<50,000
GP-4	9/5/95	<1.0	<1.0	<1.0	2	<100	<250

Notes: Concentrations in µg/L. See Matrix Report in Appendix B.

Table 7.

Indicate other notable contaminants (either petroleum or non-petroleum derived) detected in water samples collected from the borings, temporary wells or push probes. Indicate contaminant and report in units of µg/L (ppb).

Well/Boring Number	Date Analyzed						
NA							

Notes: No other compounds were analyzed.

5.8 If any non-petroleum compounds were detected list them below and indicate whether they exceed the HRLs. Also, identify possible sources of these compounds.

No other compounds were analyzed.

5.9 *If contaminated soil is not in contact with ground water, what is the distance separating the deepest contamination from the surface of the water table? Was this distance measured during site activities, referenced from geologic information, or estimated based on professional opinion during a site visit?* 0 feet

A limited area of contaminated soil is in contact with groundwater in the former tank basin areas.

5.10 *Describe observations of any evidence of a fluctuating water table and a seasonal high water table (e.g., mottling). Also, from other sources of information describe the range of natural water table fluctuations in the area.*

No field evidence of fluctuating water table in borings. Up to 2 feet of fluctuation was observed in the monitoring wells over a two-month period.

5.11 *In your judgment, is there a sufficient distance separating the petroleum contaminated soil (or an impacted non-resource aquifer) from the underlying resource aquifer to prevent petroleum contamination of the resource aquifer? Please explain in detail. In your explanation consider the data and information of this section as well as the nature of the petroleum release (i.e., volume, when it occurred, petroleum product).* NO

Contaminated soil is in contact with the groundwater, however, the bulk of soil was removed from the site. Only a thin zone of impacted soil remains at the water table beneath the former tanks. No further migration of soil contaminants to the water table would be anticipated beyond what is already present at the water table. The site is capped by concrete (limiting infiltration) and further contributing sources to the soil (former unlined tanks/dispensers) have been removed.

Additional Ground Water Investigation

Complete Section 6 and Section 7 only if: 1) a resource aquifer has been impacted at or above Minnesota Department of Health Health Risk Limits (HRLs), 2) a resource aquifer has been impacted below the HRLs, but the levels are likely to reach the HRLs, or 3) there is an insufficient distance separating the petroleum contaminated soil (or an impacted non-resource aquifer) from the underlying resource aquifer. Regardless of whether you are submitting a Limited Site Investigation or a full RI, all sections following Section 7 must be completed.

Section 6. Extent and Magnitude of Groundwater Contamination

Table 8.

Monitoring well construction.

Well Number	Unique Well Number	Date Installed	Relative Surface Elevation	Riser Height Above Grade	Bottom of Well (Elevation)	Screen Interval (Elev. - Elev.)
MW-1	578612	4/30-5/10/96	99.61	2.0'	65.6'	74.6-65.6'
MW-2	578611	4/30-5/10/96	100.21	1.9'	62.3'	73.3-62.3'
MW-3	578613	4/30-5/10/96	99.88	At-grade	68.9'	77.0-68.9'

Notes: Site relative elevation reference from "x" on top of light pole concrete base in northwest corner of property along Minnehaha Avenue (B.M. relative elevation = 100.00 ft.).

Table 9.

Water table summary.

Well Number	Date	Depth of Water from Top of Casing	Product Thickness	Depth of Water Below Grade	Relative Groundwater Elevation
MW-1	5/16/96	20.72	NA	18.7'	80.45'
	7/2/96	20.51	NA	18.5'	80.66'
MW-2	5/16/96	23.65	NA	21.8'	77.94'
	7/2/96	21.05	NA	19.2'	80.54'
MW-3	5/16/96	16.21	NA	16.2'	82.51'
	7/2/96	17.93	NA	17.9'	80.79'

Notes: See Figures 7 and 8 for groundwater contours. Groundwater is above open-hole intervals.

6.1 Were any deep monitoring wells completed at the site?
If YES, which are deep wells?

NO

Since groundwater is below the rock interface in some portions of the site and above the interface in others and wells could not be completed across the rock interface according to well code, all three

wells were constructed as open to bedrock boreholes below the rock interface in order to provide a monitorable groundwater unit. Caving weathered bedrock in the upper 2 to 3 feet caused need to set casings several feet into the rock to keep an open hole.

Before a deep well is installed contact the MPCA project hydrologist for guidance on its necessity and placement. A deep monitoring well may be necessary if 1) contamination exist more than 10 feet below the water table or 2) the impacted aquifer is a resource aquifer or is hydraulically connected to a resource aquifer presently utilized by a water supply well located within 500 feet of the site.

Provide estimates of the following additional aquifer parameters:

Horizontal Gradient (dh/dl): 2 x 10⁻³ to 4 x 10⁻²

Vertical Gradient (dv/dl): Unknown

Porosity: 0.20

Flow direction: East

Hydraulic Conductivity (K) 2 x 10⁻⁴ m/s

Pore velocity: 63 to 1,200 meters/year
(average linear velocity)

Table 10.

All ground water monitoring data should be collected from a minimum of two quarterly sampling events.

Indicate the laboratory analytical results for water samples.

Well #	Date	Benzene	Toluene	Ethylbenzene	Xylene	MTBE	GRO	DRO
MW-1	5/20/96	<1.0	<1.0	<1.0	<1.0	<1.0	<50	—
	7/11/96	<0.6	<1.0	<1.0	<1.0	—	<50	—
MW-2	5/20/96	<1.0	<1.0	<1.0	<1.0	<1.0	<50	—
	7/11/96	<0.6	<1.0	<1.0	<1.0	—	<50	—
MW-3	5/20/96	<1.0	<1.0	<1.0	<1.0	<1.0	<50	—
	7/11/96	<0.6	<1.0	<1.0	<1.0	—	<50	—

Notes: (All units µg/L, < denotes detection limits.)

Table 11.

Indicate other notable contaminants (either petroleum or non-petroleum derived) detected in water samples.

Well #	Date Analyzed	1,2 DCA						
MW-1	5/20/96	<1.0						
MW-2	5/20/96	1.9						
MW-3	5/20/96	2.7						

Notes: units in µg/L

6.2 If any non-petroleum compounds were detected list them below and indicate whether they exceed the HRLs. Also, identify possible sources of these compounds.

1,2-Dichloroethane was detected at the site in MW-2 and MW-3 samples at concentrations below the HRL of 4 µg/L. Potential source upgradient of the site is unknown.

6.3 Is there a clean or nearly clean (below HRLs) downgradient monitoring well located along the longitudinal axis of the contaminant plume? (approximately 20 degrees plus or minus the axis) YES

Wells MW-2 and MW-1 are situated downgradient or slightly sidegradient of the plume and have shown no impacts.

6.4 Is there a worst case well completed through the source area of the release? NO

If you have answered NO to any of the above three questions, please explain why a well was not completed in the required location.

A groundwater sample was collected at each of the worst-case locations during the limited site investigation (see Table 6 and Figure 5).

6.5 Provide an estimate of the longitudinal length of the dissolved contaminant plume: NA feet

No plume was identified.

6.6 *Describe the extent and magnitude of the ground water contamination:*

The maximum groundwater concentrations were detected at the locations of the former tank basins (GP-1 at 170 µg/L GRO; GP-2 at 43,000 µg/L GRO). Only trace amounts of xylenes were detected in the dispenser area water sample. No impacts were noted in water samples collected from within the bedrock downgradient of the site.

Section 7: Evaluation of Natural Attenuation

Table 12.

Complete the bioactivity data in the table below. Data should be from two quarterly rounds of sampling. Refer to the fact sheet #3.21 "Assessment of Natural Biodegradation at Petroleum Tank Release Sites" for acceptable methodologies and indicate the chosen method in the Methodologies appendix.

Monitoring Well	Temp. °C	pH	Dissolved Oxygen (mg/L)	Nitrate (mg/L)	(Fe II) (mg/L)	(H ₂ S, HS ⁻) (mg/L)	
MW-1	5/16/96	11.5	6.9	0.2	0-2.5	6	0
	7/2/96	12	7.0	0.2	—	9	0
MW-2	5/16/96	12.9	6.9	0.2	0	6	0
	7/2/96	13	7.1	0.2	—	7	0
MW-3	5/16/96	13.3	6.9	0.2	0	7	0
	7/2/96	13	7.1	0.2	0	7	0.15

Notes:

7.1 Discuss the results of the bioactivity evaluation. Specifically, compare the concentrations of the inorganic parameters inside and outside the plume.

None of the wells showed impacts from petroleum compounds; therefore, there is no significant variation of inorganic parameters between wells. Temperature and pH conditions are optimal to support natural degradation.

7.2 In your judgment, is natural biodegradation occurring at this site? Please explain. YES

It is difficult to evaluate with certainty the degree of natural attenuation at the site based on the site data. However, the thin, sandy, porous water table area where the contaminants were noted should provide optimal conditions for biologic activity. The bulk of the source area has been removed and remaining impacted groundwater appears to be of limited areal extent.

impacted aquifer. (Note: an impacted aquifer separated from another aquifer by a clay lens is not considered a separate aquifer.)

The two wells located upgradient of the site are screened within the St. Peter Sandstone and the wells are located 3/8 to 1/2 mile away. The well located in the most downgradient direction (241537) is a deep well open to the Prairie du Chien, Jordan, to the Mt. Simon formations. Impacted groundwater from the site does not appear to be present in the bedrock downgradient of the release areas where groundwater intersects the bedrock. Therefore, the location, distance, and depths of the potential receptors suggest limited risks associated with groundwater from the site to area wells.

- 8.4 Are there any plans for groundwater development in the impacted aquifer within one half mile of the site, or one mile downgradient of the site if the aquifer is fractured? Please give the name, title and phone number of the person that was contacted for this information.
- NO

Phone _____

The unconsolidated alluvium in the area would not be used as a source of water due to its limited thickness. The Platteville formation may not be used as a source of groundwater in the area per Minnesota Department of Health well code due to an insufficient overburden thickness above the Platteville (MGS Hennepin County Geologic Atlas, 1989; Plate 8 of 9).

Section 9: Surface Water Risk Assessment

- 9.1 Are there any surface waters or wetlands located within 1/4 mile of the site? YES

If YES, indicate its name: Mississippi River and Minnehaha Creek

- 9.2 If surface water is present downgradient of the site, is there a clean downgradient soil boring or monitoring well located between the site and the surface water? YES

If NO, we assume that contamination discharges to surface water. Therefore, complete the following information:

Name of receiving water: _____

Plume width, (W): _____ feet

Plume thickness, (H): _____ feet

Hydraulic conductivity, (K): _____ gal/day/ft²

Horizontal gradient, (dh/dl): _____ (unitless)

Discharge, (Q) = $H^*W^*K^*(dh/dl)/1440$ _____ gal/min

If YES, identify them and indicate the distance to these features and discuss the contamination risk potential.

Wells MW-1 and MW-2 showed no petroleum impacts to the groundwater. The risk of petroleum contaminants from the groundwater to be discharging to the surface water appears to be minimal.

Section 10: Vapor Risk Assessment/Survey

10.1 *Is there a history of vapor impacts in the vicinity of the site ?*

NO

If YES, describe:

10.2 *Is there any indication that free product or highly contaminated groundwater may be traveling offsite within the utility corridors? If YES, have they been investigated with borings or push probes?*

NO

10.3 *Discuss the potential for vapor migration/accumulation near the site. In your discussion consider: soil types, product type, presence and distribution of free product or high concentrations of dissolved product. Also, compare the depth of contamination with the location of underground utility lines, location and depth of storm and sanitary sewers and location of nearby basements.*

Vapor migration potential is low at the site. No basements are located on-site and contamination appears to be confined to the site in a small area. Remaining significant contamination is confined to a narrow band of soil below a depth of 15 to 16 feet in the former tank areas. Utility corridors are located along or beneath the streets away from areas of contamination. Utility locations are included in Appendix F.

If the vapor risk assessment indicated a risk of vapor impacts to buildings or utilities, complete the following table with vapor monitoring data collected. Location numbers should be mapped on an accompanying figure of the surveyed area.

Table 14.

Location #	Date	PID reading (ppm)	Percent of the LEL
NA			

Notes: No vapor monitoring data collected.

10.4 *Describe and interpret the results of the vapor survey.*

A vapor survey was not conducted. See response No. 10.3 for a discussion of the relative vapor risks.

Section 11: Discussion

11.1 Discuss the risks associated with the remaining soil contamination?

Soil contamination remains on-site, primarily within a thin (1- to 3-foot thick) zone above the shallow water table. Although significant concentrations of petroleum compounds were detected in the bottom samples collected from the tank basins, remaining soil did not appear to be heavily impacted (no free product saturation or oiliness). Soil contamination does not pose any direct contact or vapor migration risks at the site due to the depth and limited extent of the remaining soil. No basements or utility corridors intersect contaminated soil; these structures are located off-site, away from the source areas. Contaminated soil in contact with the groundwater is a source to shallow groundwater contamination. This impact to groundwater is lessened due to removal of the bulk of the source material, and an impervious concrete cap limiting further downgradient migration.

11.2 Discuss the risks associated with the impacted ground water?

The impacted groundwater at the site does not appear to pose any significant risks to the public or environment. The site water table straddles alluvial sediments and the Platteville limestone. With the exception of the former tank basin locations, limited groundwater impacts were identified at the site. No impacts were identified within the Platteville limestone. The only potential receptors to groundwater have wells screened in the St. Peter or deeper formations, separated from the water table aquifer by the Platteville and Glenwood formations. Groundwater flow is to the east toward the Mississippi River, located approximately 1/4 mile away. It does not appear that dissolved-phase contamination in site groundwater is migrating to the river.

11.3 Discuss other concerns not mentioned above:

The property is located within an established commercial/light industry corridor along Minnehaha Avenue. It is unlikely that land-use patterns would change in that area.

Section 12: Conclusions and Recommendations

Recommendation for site: site closure
 additional vapor monitoring
 additional ground water monitoring
 active cleanup

The recommendation above should be based on fact sheet #3.1 "Leaking Underground Storage Tank Investigation and Cleanup Policy." Describe below how you applied the policy to support your recommendation.

The policy strives to limit risks to public health and the environment. Based on the investigations at the site, risks to potential receptors appear to be very low. Vapor risks are not present and groundwater risks appear minimal under the current land use. With the bulk of contamination removed from the site, sources to future contamination removed/upgraded, and existing conditions showing very limited threat to public health and the environment, the remaining contamination should be left to degrade naturally over time.

If additional monitoring is recommended, indicate the proposed monitoring schedule and frequency:

No additional monitoring is recommended.

If active cleanup is proposed then MPCA staff will review this remedial investigation report at a higher than normal priority to determine if active cleanup is required. We will respond with either a request for proposal for additional monitoring or a corrective action design report. Please indicate below what cleanup technology you are considering at this time.

Section 13: Required Figures

Indicate attached figures:

- Figure 1* Site location map
- Figure 2* Site map
- Figure 3* Excavation soil screening locations
- Figure 4* Excavation analytical soil sampling locations
- Figure 5* Boring and well locations
- Figure 6* Geologic cross section A'-A'
- Figures 7 and 8* Groundwater contours
- Figure 9* Well search results

Section 14: Appendices

Indicate attached appendices.

- Appendix A* Excavation Report Worksheet for Petroleum Release Sites.
- Appendix B* Laboratory analytical reports for soil and ground water.
- Appendix C* Methodologies and procedures, including field screening of soil, other field analyses, soil boring, soil sampling, well installation, and water sampling.
- Appendix D* Geologic logs for each well or boring using attached template.
- Appendix E* Well construction diagrams and copies of the Minnesota Department of Health Well Record using attached template.
- Appendix F* Copies of water supply well logs with legible unique numbers.
- Appendix G* A list of addresses within 500 feet from the edge of the plume and confirmation of status of water supply from the city utility billing department.

Section 15: Consultant (or other) information

By signing this document, I/we acknowledge that we are submitting this document on behalf of and as agents of the responsible person or volunteer for this leaksite. I/we acknowledge that if information in this document is inaccurate or incomplete, it will delay the completion of remediation and may harm the environment and may result in reduction of reimbursement awards. In addition, I/we acknowledge on behalf of the responsible person or volunteer for this leaksite that if this document is determined to contain a false material statement, representation, or certification, or if it omits material information, the responsible person or volunteer may be found to be in violation of Minn. Stat. § 115.075 (1994) or Minn. Rules 7000.0300 (Duty of Candor), and that the responsible person or volunteer may be liable for civil penalties.

Name and Title:

Signature:

Date signed:

Michael A. Carnes - Hydrogeologist

Michael Carnes

8/6/96

_____ / ____
_____ / ____
_____ / ____

Company and mailing address:

Barr Engineering Company

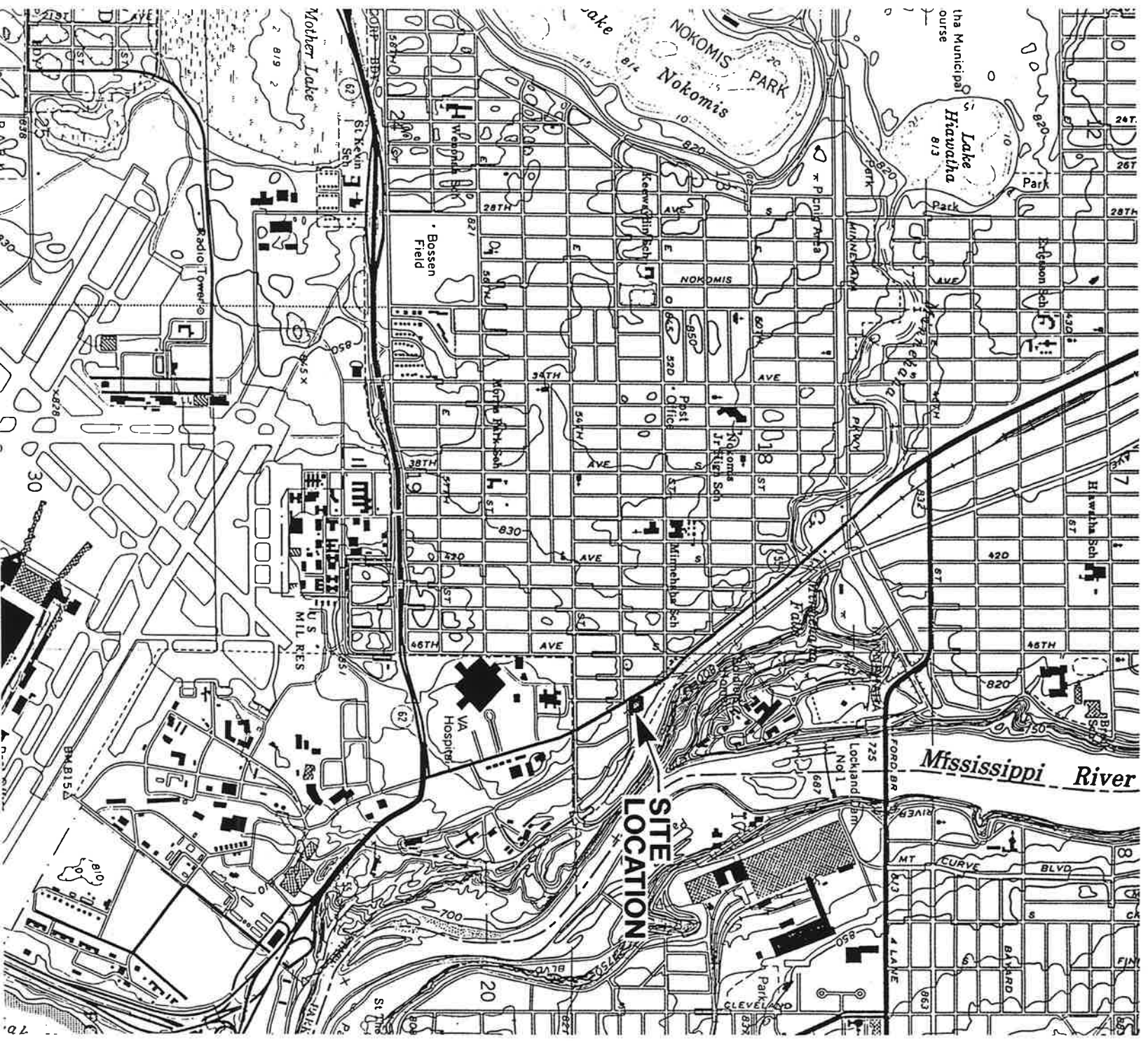
8300 Norman Center Drive

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Fax: (612)832-2601

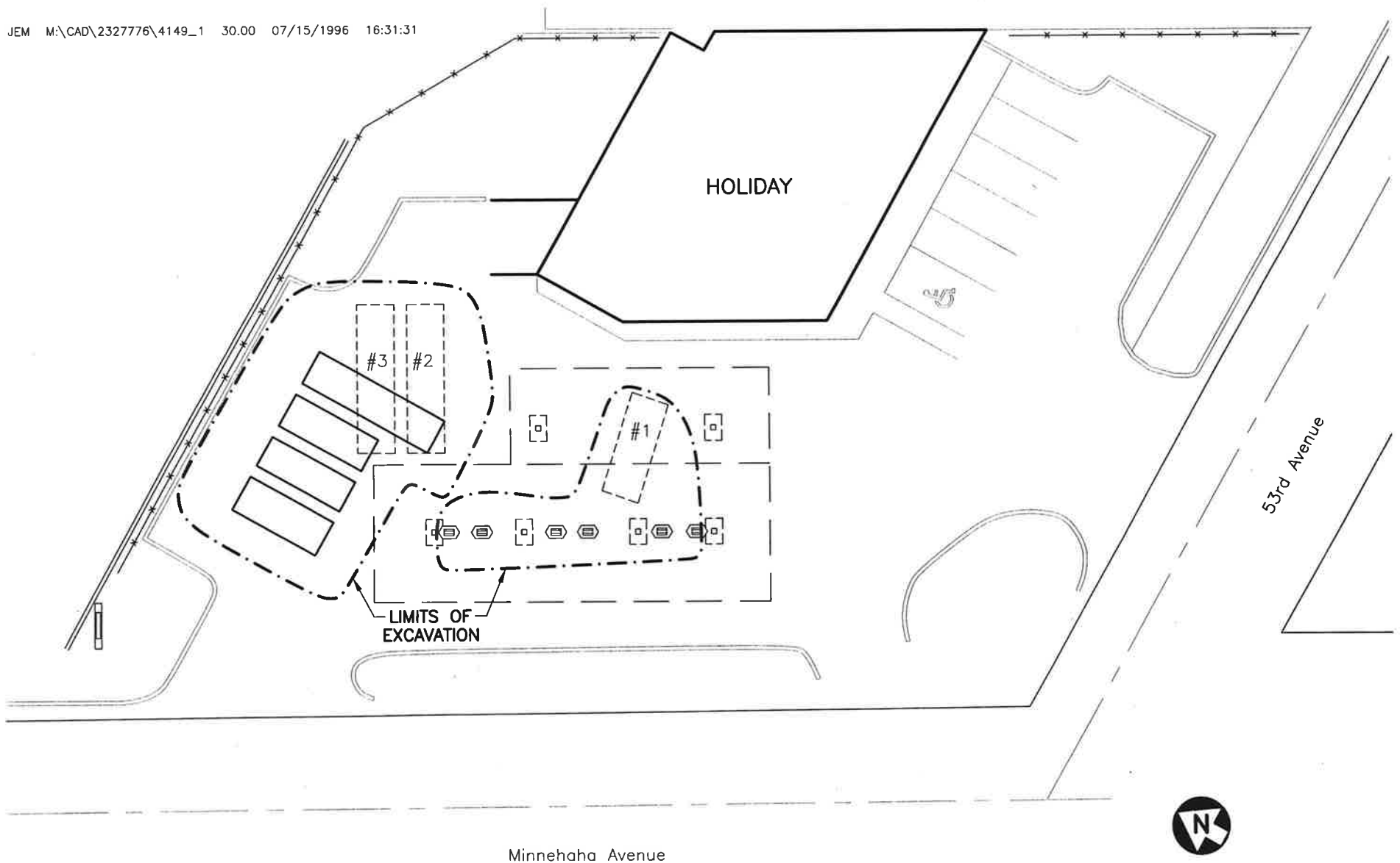
Upon request, this document can be made available in other formats, including Braille, large print and audio tape. TTY users call 612/282-5332 or Greater Minnesota 1-800-657-3864.






Source: St. Paul West, Minnesota Quadrangle, 7.5 Minute Series, 1993.



Figure 1
 SITE LOCATION
 Holiday-Minnehaha Avenue



-  Former Tank Locations
-  New Tank Locations
-  Former Dispenser Locations

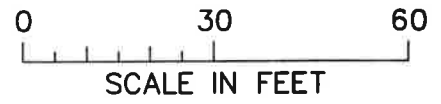
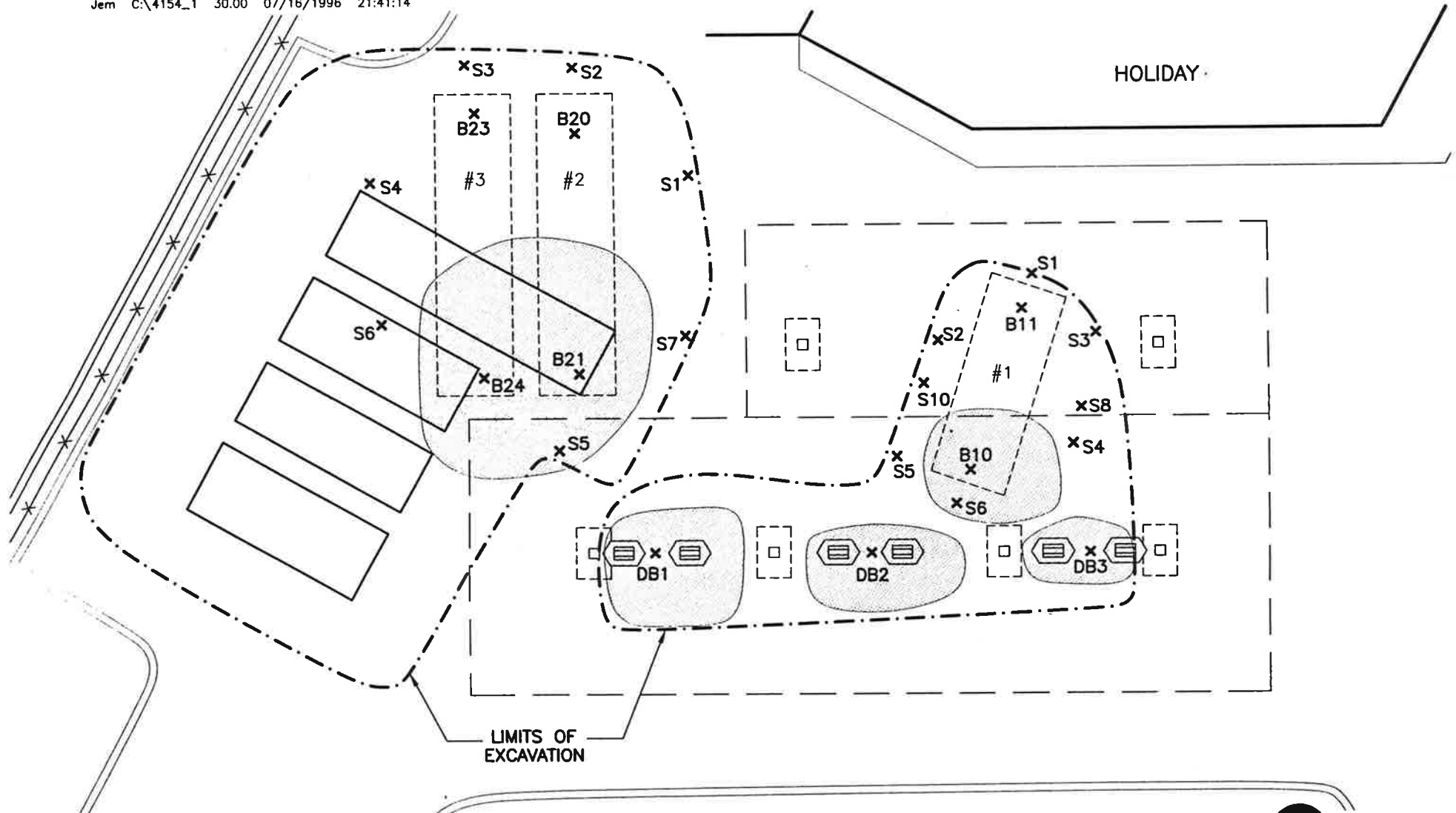


Figure 2
SITE MAP
Holiday- 5247 Minnehaha Avenue



- Former Tank Locations
- New Tank Locations
- Former Dispenser Locations

- Areas of Contaminated Soil Identified During Excavation
- x Soil Screening Locations (B=Bottom, S=Sidewall)

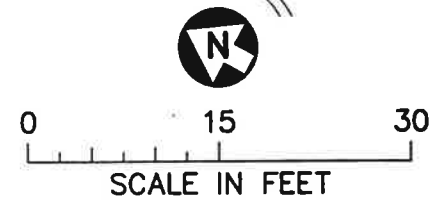
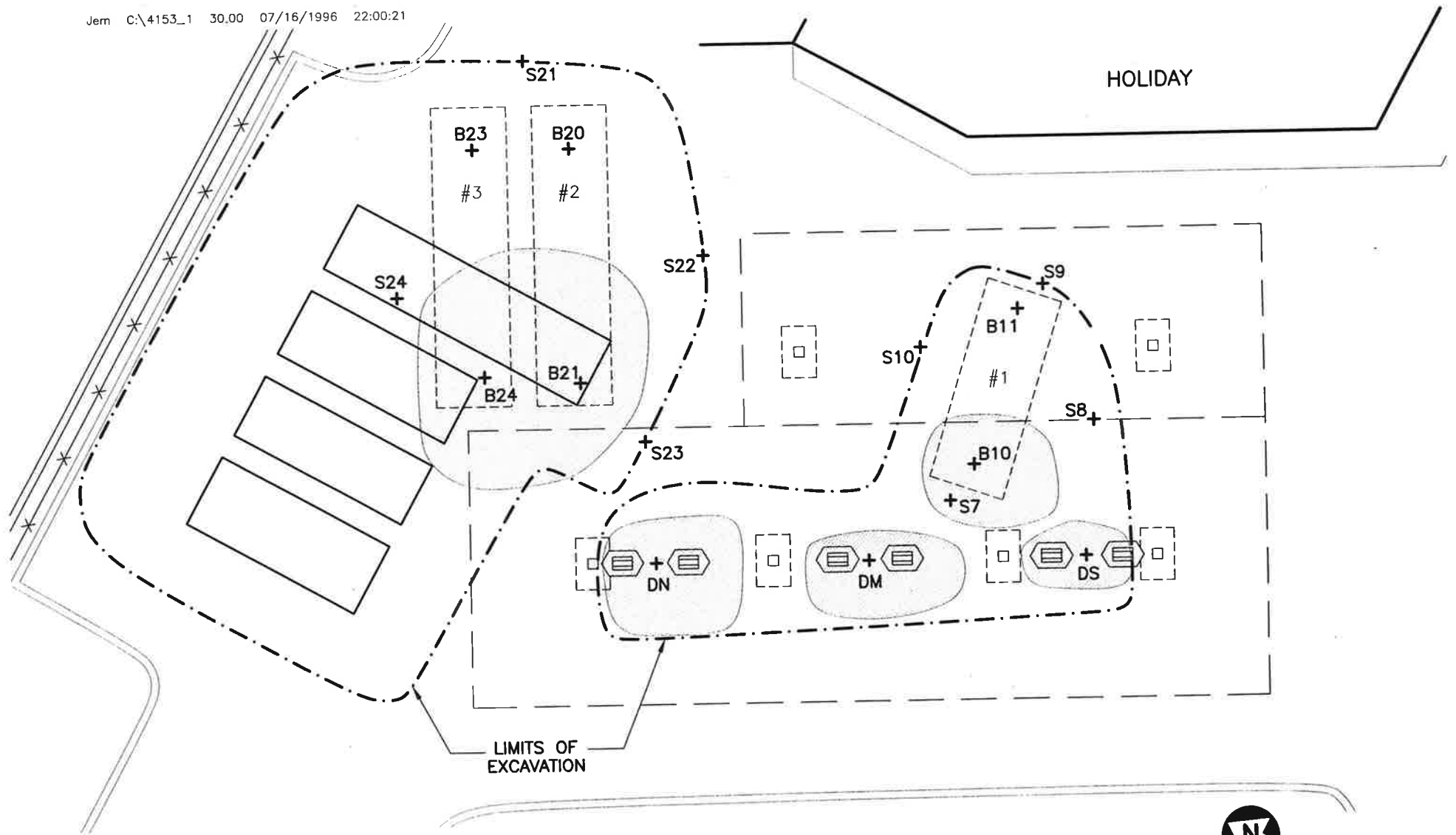

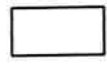





Figure 3
 EXCAVATION SOIL
 SCREENING LOCATIONS
 Holiday- 5247 Minnehaha Avenue



-  Former Tank Locations
-  New Tank Locations
-  Former Dispenser Locations

-  Areas of Contaminated Soil Identified During Excavation
-  Analytical Soil Sample Location
(B=Bottom, S=Sidewall, D=Dispenser Bottom)

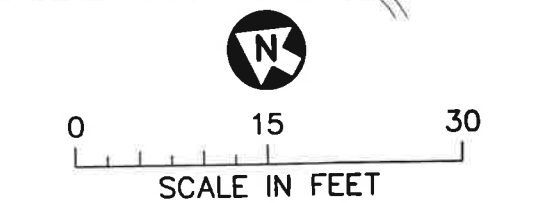
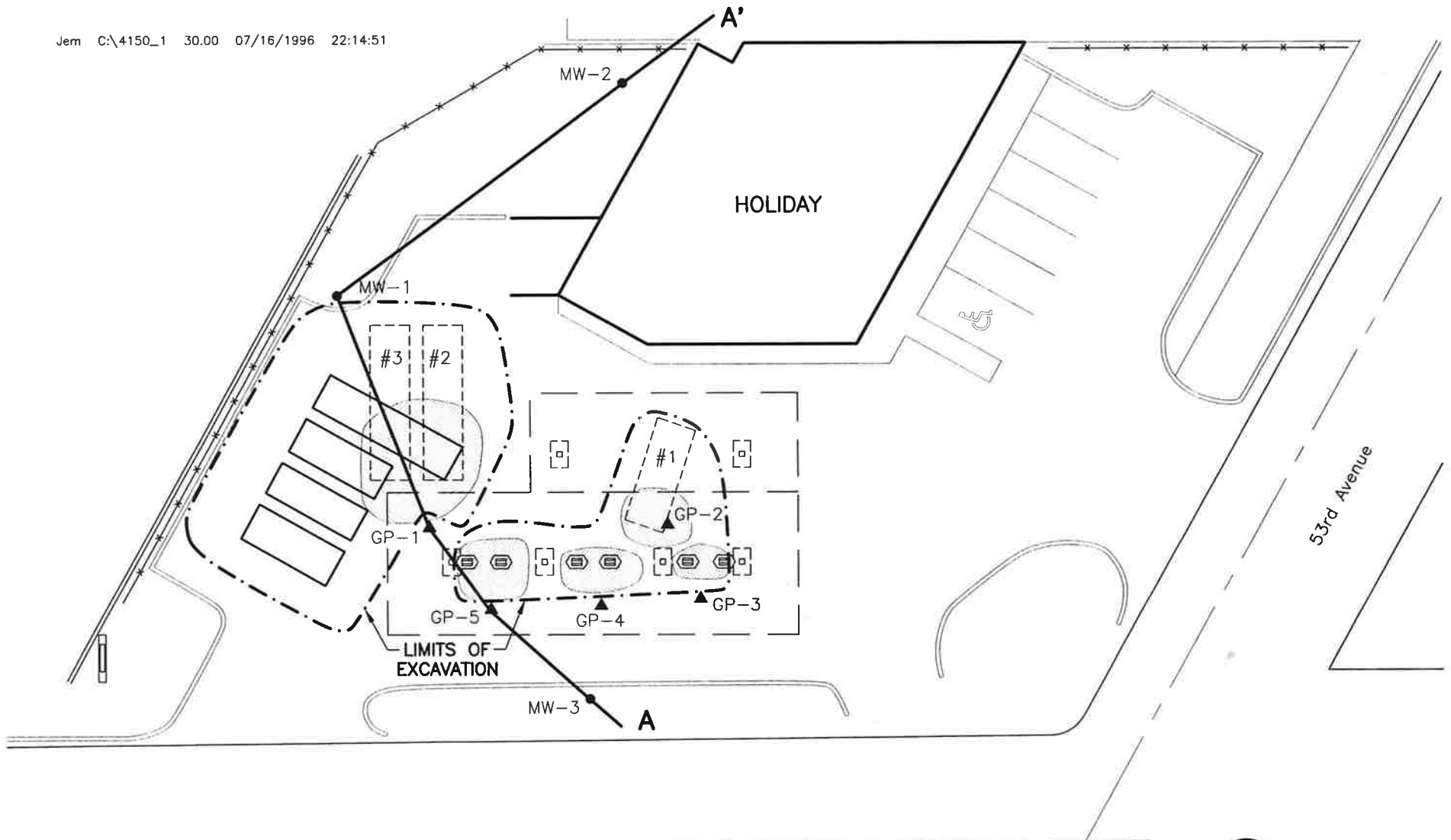








Figure 4
EXCAVATION ANALYTICAL
SOIL SAMPLING LOCATIONS
Holiday- 5247 Minnehaha Avenue



-  Former Tank Locations
-  New Tank Locations
-  Former Dispenser Locations
- A—A'** Cross-Section Location

-  Monitoring Well
-  Geoprobe Sample
-  Areas of Contaminated Soil Identified During Excavation

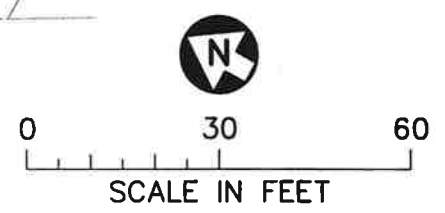


Figure 5
BORING AND WELL LOCATIONS
Holiday— 5247 Minnehaha Avenue

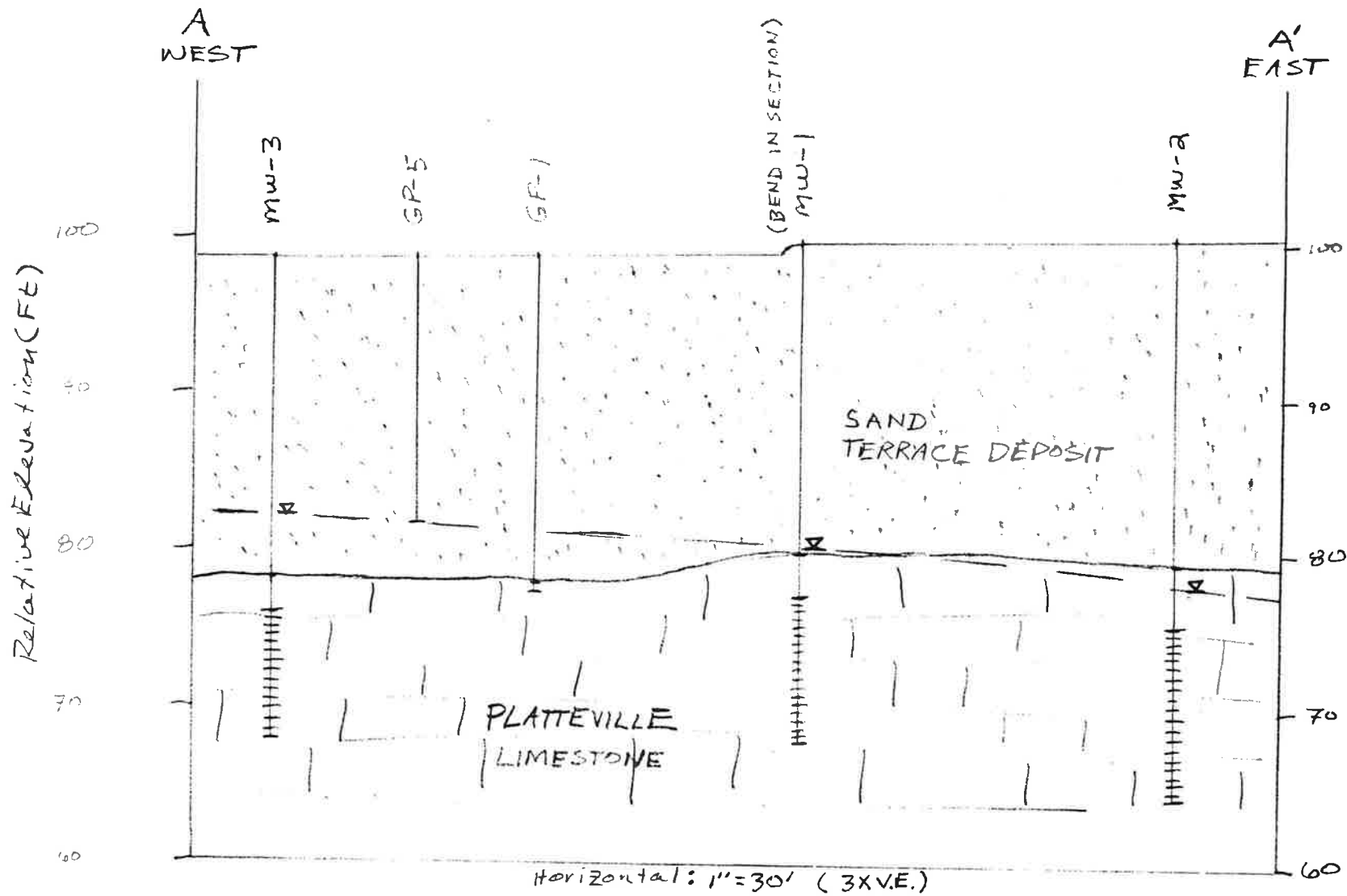
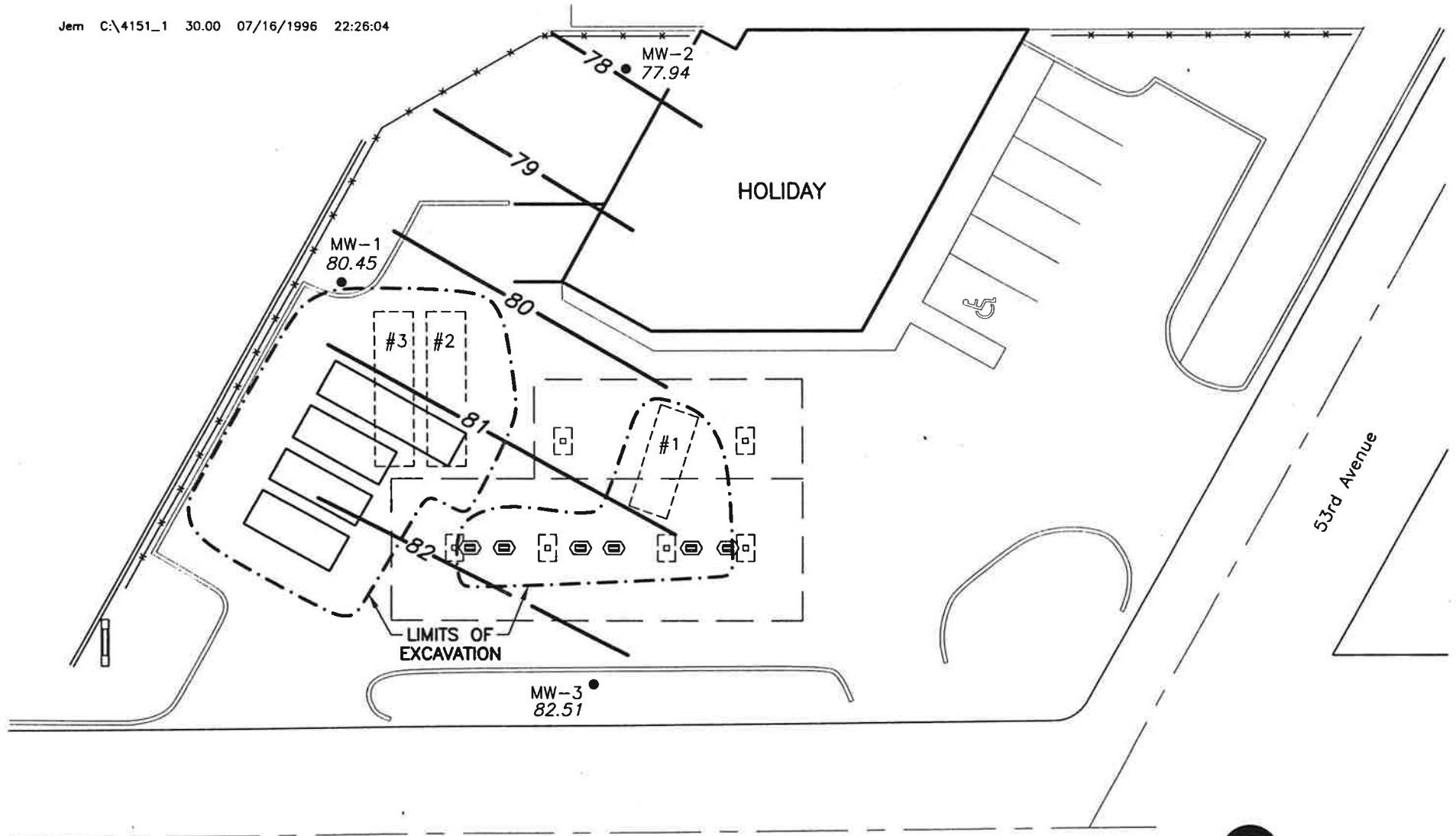




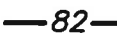



Figure 6
 Cross Section A-A'
 Holiday — 5247 Minnehaha Ave



-  Former Tank Locations
-  New Tank Locations
-  Former Dispenser Locations
-  Monitoring Well
-  82 Groundwater Contour
-  82.51 Relative Groundwater Elevation (Ft.)

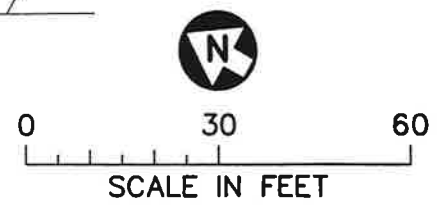
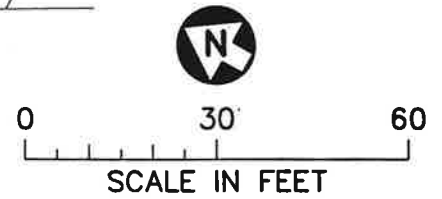
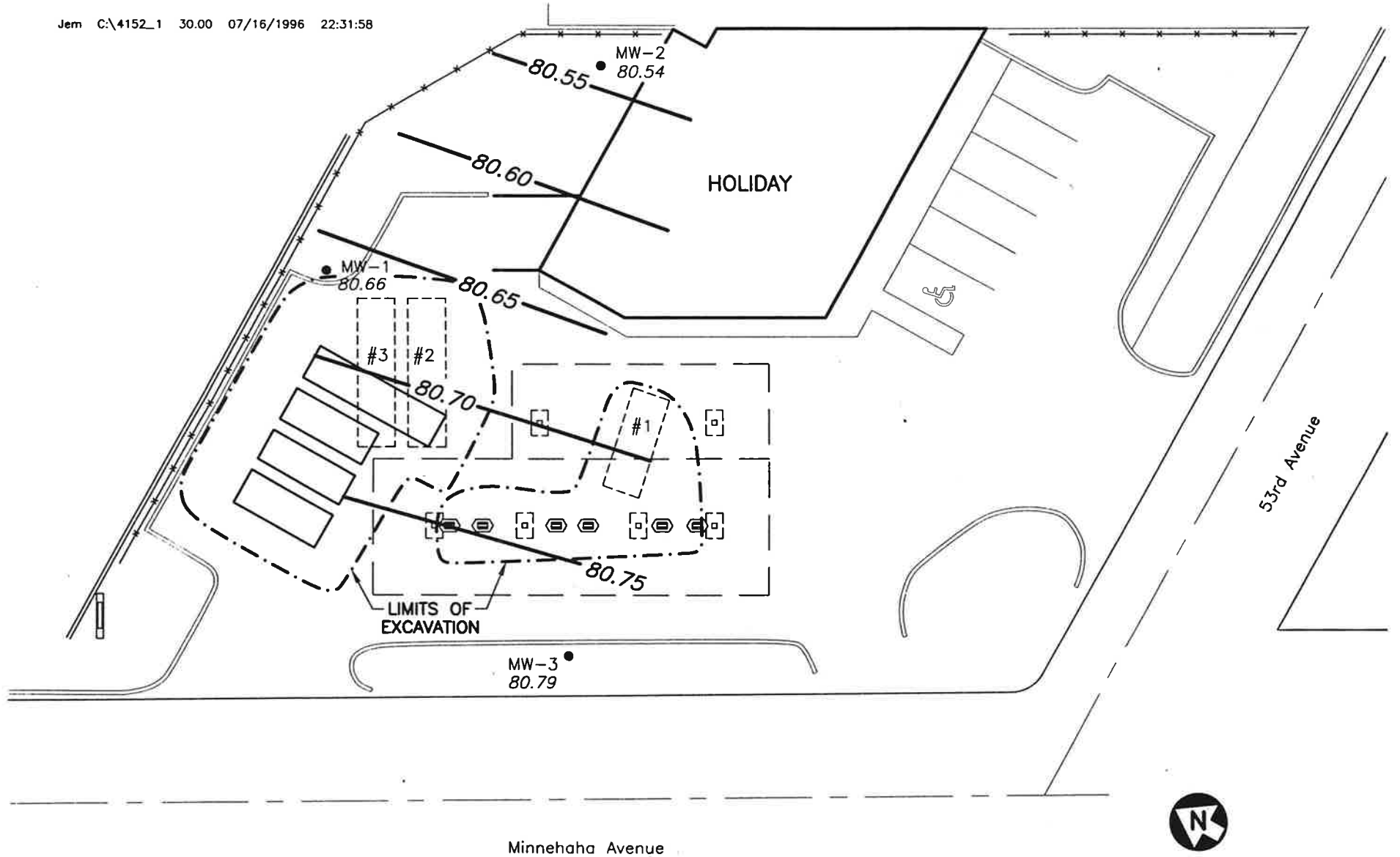
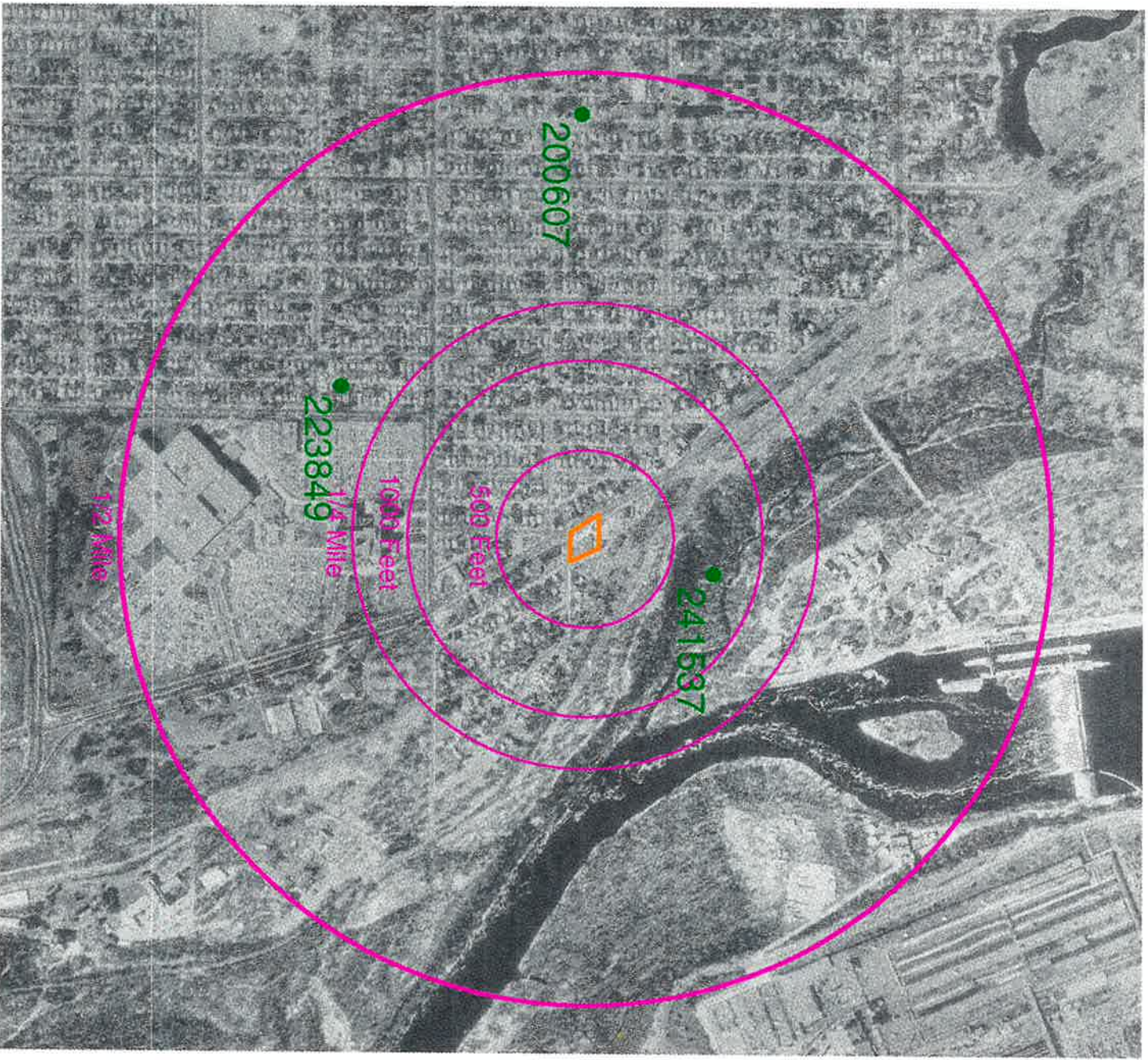


Figure 7
GROUNDWATER CONTOURS
MAY 16, 1996
Holiday- 5247 Minnehaha Avenue



- Former Tank Locations
- New Tank Locations
- Former Dispenser Locations
- Monitoring Well
- 80.75 Groundwater Contour
- 80.66 Relative Groundwater Elevation (Ft.)

Figure 8
GROUNDWATER CONTOURS
JULY 2, 1996
Holiday- 5247 Minnehaha Avenue





 Site Location (Minnehaha Site)
 Well Location (Minnehaha Site)



Figure 9

Well Search Results
Holiday Minnehaha Site

EXCAVATION REPORT WORKSHEET FOR PETROLEUM RELEASE SITES

Fact Sheet #4
Minnesota Pollution Control Agency
LUST Cleanup Program
April 1993

Complete the information below and submit to the Minnesota Pollution Control Agency (MPCA) Tanks and Spills Section to document excavation and treatment of petroleum contaminated soil. Conduct excavations in accordance with "Excavation of Petroleum Contaminated Soil" (Fact Sheet #13). Please attach any available preliminary site investigation reports to this excavation report.

Attach additional pages if necessary. Please type or print clearly.

The excavation report deadline is 10 months from the date of receipt of the standard letter. A shorter deadline may be established by MPCA staff for high-priority sites.

I. BACKGROUND

A. Site: **Holiday Stationstore #022** B. Tank Owner/Operator: **Holiday Stationstores, Inc.**

Street: **5247 Minnehaha Ave.**
City, Zip: **Minneapolis, MN 55417**
County: **Hennepin**

MPCA Site ID#: **LEAK0000 8723**

Mailing Address: **PO Box 1224**
Street/Box: **4567 W. 80th St.**
City, Zip: **Minneapolis, MN 55440**
Telephone: **(612) 830-8899**

C. Excavating Contractor:
Westside Equipment
Contact: **Joe Schmidt**
Telephone: **(612) 478-9572**
Tank Contractor Certification
Number: **0011**

D. Consultant: **Barr Engineering Co.**
Contact: **Michael A. Carnes**
Street/Box: **8300 Norman Center Dr.**
City, Zip: **Minneapolis, MN 55437**
Telephone: **(612) 832-2600**

E. Others on-site during site work (e.g., fire marshall, local officials, MPCA staff, etc.):
Sherry Bridell, Lorin Plant—Minneapolis Fire Inspectors
Roger Van Tassel—Minneapolis Environmental Section

NOTE: If person other than tank owner and/or operator is conducting the cleanup, provide name, address, and relationship to site on a separate attached sheet.

II. DATES

A. Date release reported to MPCA: **August 29, 1995**

B. Dates site work performed:

Work Performed	Date
• Tank removal, basin excavation, tank replacement	<u>August 29-Sept. 5, 1995</u>
• Dispenser and line removal and excavation	<u>Sept. 7-12, 1995</u>
• Contaminated soil stockpile removal to treatment unit	<u>Sept. 1-13, 1995</u>
_____	_____
_____	_____

III. RELEASE INFORMATION

A. Provide the following information for all removed tanks.

Tank 1: Capacity 10,000 gal. Type Asphalt-coated steel Age ~25 years

Condition: Fair—Rust-pitted near east end; no visible holes.

Product history: Gasoline dispensation.

Approximate quantity of petroleum released, if known: Unknown.

Cause of release: Appeared to be associated with overfills.

Tank 2: Capacity 12,000 gal. Type Asphalt-coated steel Age ~25 years

Condition: Good—Slight rusting; no visible holes.

Product history: Gasoline dispensation.

Approximate quantity of petroleum released, if known: Unknown.

Cause of release: Appeared to be associated with overfills.

Tank 3: Capacity 12,000 gal. Type Asphalt-coated steel Age ~25 years

Condition: Good—Slight rusting; no visible holes.

Product history: Gasoline dispensation.

Approximate quantity of petroleum released, if known: Unknown.

Cause of release: Appeared to be associated with overfills.

B. Provide the following information for all existing tanks. All tanks removed, replaced with three 8,000-gallon and one 12,000-gallon tanks at general location of former tanks #2 and #3.

Tank No.	Capacity	Contents	Type	Age
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

C. If the release was associated with the lines or dispensers, briefly describe the problem: **Contaminated soil was also present beneath the dispensers at the site.**

D. If the release was a surface spill, briefly describe the problem: **Release was not a surface spill.**

IV. EXCAVATION

A. Dimensions of excavation: **59 ft. x 44 ft. x 15 ft. deep (includes expansion for new tanks)**

B. Original tank backfill material (sand, gravel, etc.): **Sand**

C. Native soil type (clay, sand, etc.): **Sand**

D. Quantity of contaminated soil removed (cubic yards): **593**

E. Was ground water encountered or was there evidence of a seasonally high ground water table? **At what depth? Groundwater was not encountered in the excavation. Groundwater was encountered in borings at 17 to 18 feet deep.**

F. If a soil boring was required (see Fact Sheet #13, "Excavation of Petroleum Contaminated Soil," Part VI Additional Investigation), describe the soil screening and analytical results. Attach the boring logs and laboratory results to this report. **Soil borings were placed using Geoprobe. Both jar headspace screening and on-site Geoprobe analytical lab were used. The logs and results are presented in the Limited Site Investigation Report.**

G. If no soil boring was required, explain.

April 1998

H. If groundwater was encountered or if a soil boring was conducted, was there evidence of ground water contamination? Specify, e.g., free product (specify thickness), product sheen, ground water in contact with petroleum contaminated soil, water analytical results, etc. **Impacted groundwater was encountered in soil borings. No free product was present, although sheen was present at one location. The results are presented in the Limited Site Investigation Report.**

[Note: If free product was observed, contact MPCA staff immediately as outlined in "Petroleum Tank Release Reports" (Fact Sheet #3). Also consult Fact Sheet #18, "Free Product: Evaluation and Recovery."]

- I. Was bedrock encountered in the excavation? At what depth? **Bedrock was not encountered in the excavation. Bedrock (Platteville Limestone) was encountered at 20 to 22 feet in borings.**
- J. Were there other unique conditions associated with this site? If so, explain. **None**

V. SAMPLING

A. Briefly describe the field screening methods used to distinguish contaminated from uncontaminated soil: **Field methods involved visual and olfactory screening in conjunction with jar headspace screening in accordance with Tanks & Spills Section guidance. Headspace measurements were performed using an HNU DL-101 photoionization detector with a 10.2 eV lamp.**

B. List soil vapor headspace analysis results. Indicate sampling locations using sample codes (with sampling depths in parenthesis), e.g. R-1 (2 feet), R-2 (10 feet), etc. "R" stands for "removed." Samples collected at different depths at the same location should be labeled R-1A (2 feet), R-1B (4 feet), R-1C (6 feet), etc. If the sample was collected from the sidewall or bottom after excavation was complete, label it S-1 (for "sidewall") or B-1 (for "bottom"). Be sure the sample codes correspond with the site map required in Part VI, below.

See attached Table 1.

Sample Code	Soil Type	Reading, ppm	Sample Code	Soil Type	Reading, ppm
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

VII. SUMMARY

Briefly summarize evidence indicating whether additional investigation is necessary at the site, as discussed in part VI of "Excavation of Petroleum Contaminated Soil" (Fact Sheet #13). If no further action is recommended, the MPCA staff will review this report following notification of soil treatment. Contaminated soil remained in the basins above the recommended action levels, and shallow groundwater was believed to be present beneath the site. Therefore, additional investigation was necessary.

VIII. SOIL TREATMENT INFORMATION

- A. Soil treatment method used (thermal, land application, other). If you choose "other" specify treatment method: Thermal
- B. Location of treatment site/facility: C.S. McCrossan, Inc., Maple Grove, Minnesota
- C. Date MPCA approved soil treatment (if thermal treatment was used after May 1, 1991, indicate date that the MPCA permitted thermal treatment facility agreed to accept soil):
August 31, 1995
- D. Identify the location of stockpiled contaminated soil: Contaminated soil was temporarily stockpiled on plastic sheeting in the southwest corner of the site. All soil was removed to C.S. McCrossan on September 1-5 and 12-13, 1995.

IX. CONSULTANT (OR OTHER) PREPARING THIS REPORT

Company Name: Barr Engineering Co.
Street/Box: 8300 Norman Center Drive
City, Zip: Minneapolis, 55437-1026
Telephone: (612) 832-2600
Contact: Michael A. Carnes

Signature: Michael A. Carnes Date: 8/1/96

If additional investigation is not required at the site, please mail this form and all necessary attachments to:

Dave Holst
Minnesota Pollution Control Agency
Hazardous Waste Division
Tanks and Spills Section
520 Lafayette Road
St. Paul, MN 55155-4194

If additional investigation is required at the site, include this form as an appendix to the Remedial Investigation/Corrective Action Design report. Excavation reports indicating a remedial investigation (RI) is necessary will not be reviewed by MPCA staff until the RI has been completed.

Table 1
Excavation
Soil Field Screening Results

Sample No.	Headspace (ppm)	Soil Type	Sample No.	Headspace (ppm)	Soil Type
Removed/Stockpiled Soil			Tank #2 & 3 Bottom/Sidewall		
R-1 (3')	1.5	SP	S-1 (4')	0.5	SP
R-2 (3')	10.7	SP	S-1 (12')	4.2	SP
R-3 (3')	8.5	SP	S-2 (6')	ND	SP
R-4 (5')	130	SP	S-3 (7')	32	SP
R-5 (5')	270	SP	S-4 (4')	ND	SP
R-6 (5')	210	SP	S-4 (12')	1.7	SP
R-7 (7')	240	SP	S-5 (4')	82	SP
R-8 (7')	220	SP	S-5 (12')	110	SP
R-9 (7')	88	SP	S-6 (6')	ND	SP
R-10 (7')	120	SP	S-7 (6')	42	SP
R-11 (10')	35	SP	B-20 (16')	2.7	SP
R-12 (10')	250	SP	B-21 (16')	280	SP
R-13 (10')	210	SP	B-23 (16')	9.0	SP
R-14 (10')	130	SP	B-24 (16')	250	SP
R-15 (15')	110	SP	Dispenser Bottom Samples		
R-16 (15')	210	SP	DB-1 (5')	55	SP
R-17 (15')	95	SP	DB-2 (5')	75	SP
R-18 (15')	45	SP	DB-3 (5')	1.8	SP
Tank #1 Basin Bottom/Sidewalls			Notes:		
S-1 (5')	2.5	SM	<ul style="list-style-type: none"> • Basin #1 excavated to 16' in contaminated area. Basin backfilled with clean borrow from basin #2/3. • Basin #2/3 excavated to 15' and expanded for new tank placement. Basin expansion soils screened periodically to confirm absence of contamination. • Dispenser area screened as soils removed for line replacement. Primarily gray soils with stale gasoline odors, headspace ND to 110 ppm. 		
S-1 (8')	2.1	SP			
S-2 (4')	1.8	SP			
S-2 (10')	2.1	SP			
S-3 (5')	3.0	SP			
S-4 (6')	45	SP			
S-5 (4')	45	SP			
S-5 (10')	32	SP			
S-6 (3')	9.5	SM			
S-6 (8')	195	SP			
S-8 (8')	15	SP			
S-10 (8')	4.2	CL			
B-10 (12')	340	SP			
B-11 (16')	8.5	SP			

Table 2
Excavation
Soil Analytical Data Summary
Holiday Stationstore No. 022

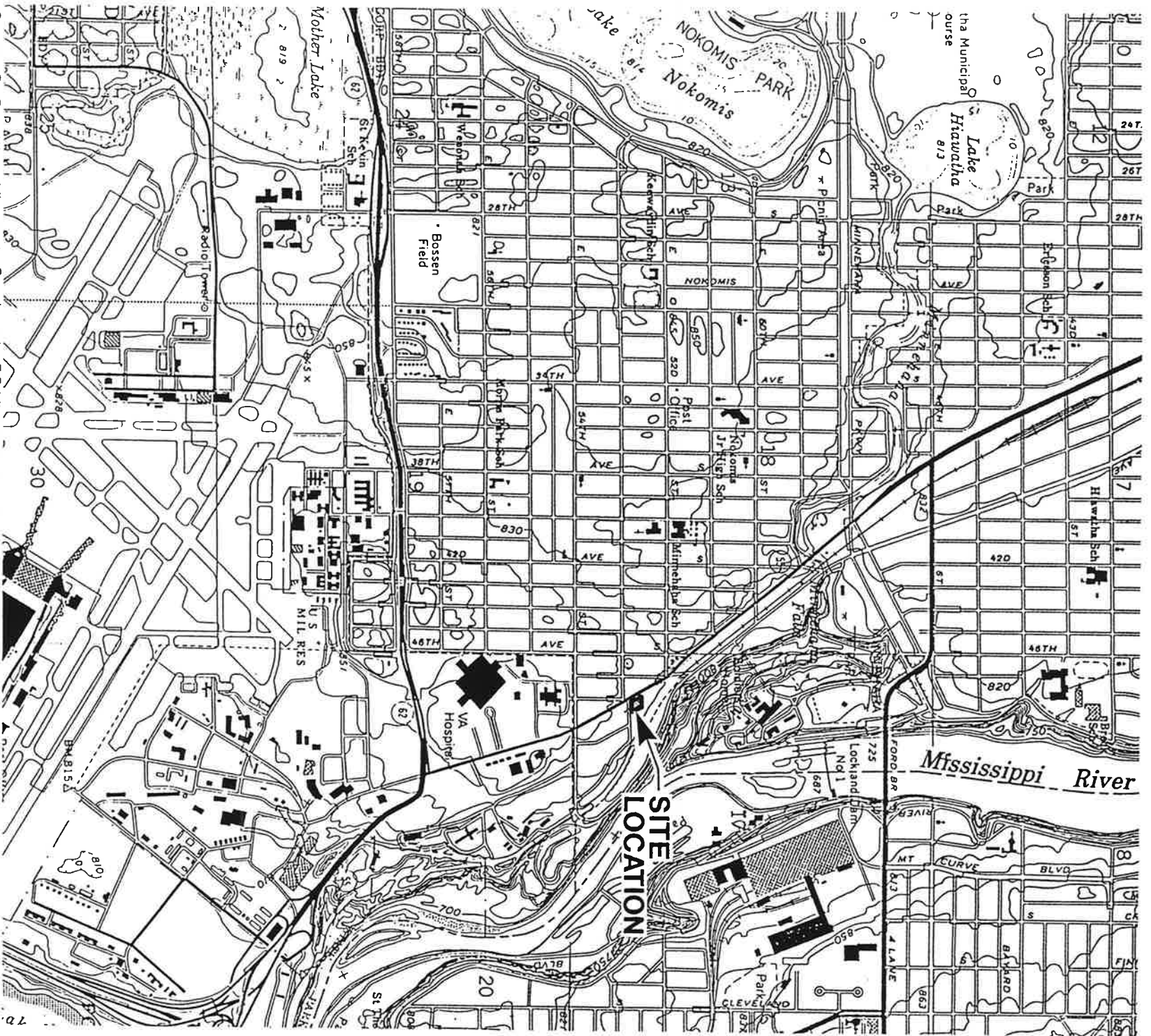
Sample Code	GRO (ppm)	Benzene (ppm)	Ethylbenzene (ppm)	Toluene (ppm)	Xylene (ppm)	MTBE (ppm)	Lead (ppm)
Stockpile Samples							
P-1	320	<0.13	0.42	0.72	15.6	<0.13	12
P-3	990	<0.31	2.10	2.10	116	<0.31	8.3
Basin Samples							
B-10	450	0.27	3.2	4.6	29	<0.2	19
B-11	<2.6	<0.025	<0.025	<0.025	<0.025	<0.025	<3.3
B-20	<2.6	<0.025	<0.025	<0.025	<0.025	<0.025	<3.3
B-21	3,000	<1.3	6.6	9.9	360	<1.3	15
B-23	14	<0.025	0.040	<0.025	0.176	<0.025	5.1
B-24	4,300	<2.0	11	23	590	<2.0	11
S-7	770	1.1	4.0	6.5	25.3	<0.31	21
S-8	3.1	<0.025	<0.025	<0.025	0.071	<0.025	3.5
S-9	<2.7	<0.025	<0.025	<0.025	<0.025	<0.025	6.4
S-10	<3.6	<0.025	<0.025	<0.025	<0.025	<0.025	11
S-21	<3.0	<0.025	<0.025	<0.025	<0.025	<0.025	4.6
S-22	<2.8	<0.025	<0.025	<0.025	<0.025	<0.025	4.9
S-23	<2.7	<0.025	<0.025	<0.025	0.037	<0.025	5.7
S-24	<2.6	<0.025	<0.025	<0.025	<0.025	<0.025	<3.4
Dispenser Area Samples							
D-N	40	<0.025	0.170	<0.025	1.10	<0.025	4.6
D-M	68	<0.025	0.220	<0.025	1.69	<0.025	4.5
D-S	<2.7	<0.025	<0.025	<0.025	<0.025	<0.025	4.2

Table 3
Geoprobe Borings
Soil Analytical Data Summary
Holiday Stationstore No. 022

Sample Code	Benzene (ppm)	Ethylbenzene (ppm)	Toluene (ppm)	Xylene (ppm)	GRO (ppm)	TPH-Fuel Oil (ppm)
GP-1 (17-19)	<0.050	<0.050	<0.050	<0.050	<2.5	<2.5
GP-3 (15-17')	<0.050	<0.050	<0.050	<0.050	<2.5	<2.5
GP-4 (15-17')	<0.050	<0.050	<0.050	<0.050	<2.5	<2.5
GP-5 (15-17')	<0.050	<0.050	<0.050	<0.050	<2.5	<2.5

Table 4
Geoprobe Borings
Groundwater Analytical Data Summary
Holiday Stationstore No. 022

Sample Code	Benzene (ppm)	Ethylbenzene (ppm)	Toluene (ppm)	Xylene (ppm)	GRO (ppm)	TPH-Fuel Oil (ppm)
GP-1	0.004	0.003	<0.001	0.014	0.17	<0.25
GP-2	<0.2	2.1	2.2	17	43	<50
GP-4	<0.001	<0.001	<0.001	0.002	<0.10	<0.25



Source: St. Paul West, Minnesota Quadrangle, 7.5 Minute Series, 1993.

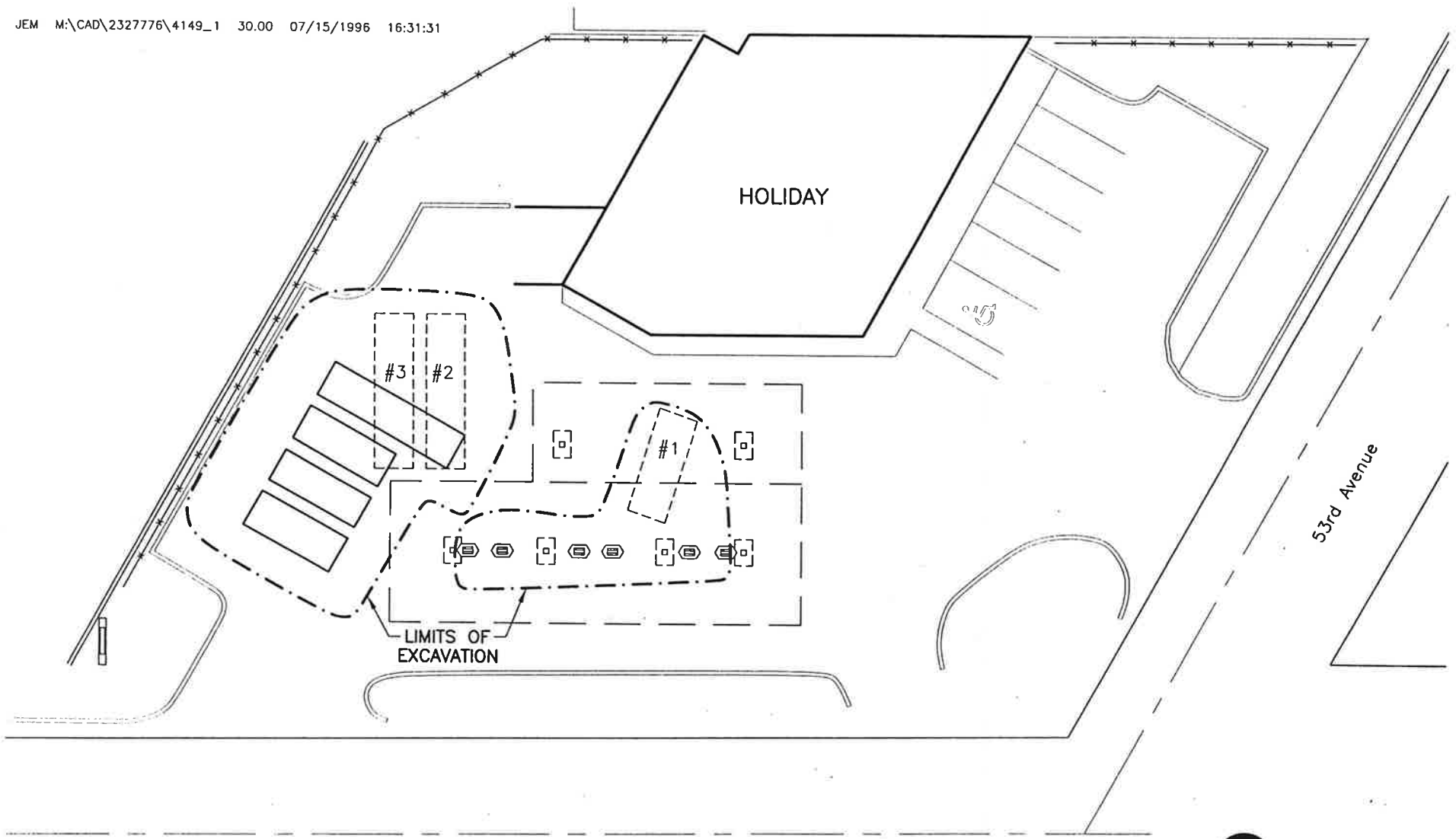


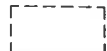


0 2000 4000
Scale in Feet



QUADRANGLE LOCATION

Figure 1
SITE LOCATION
Holiday-Minnehaha Avenue



-  Former Tank Locations
-  New Tank Locations
-  Former Dispenser Locations

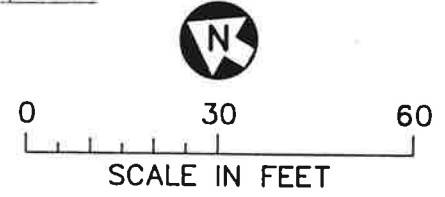
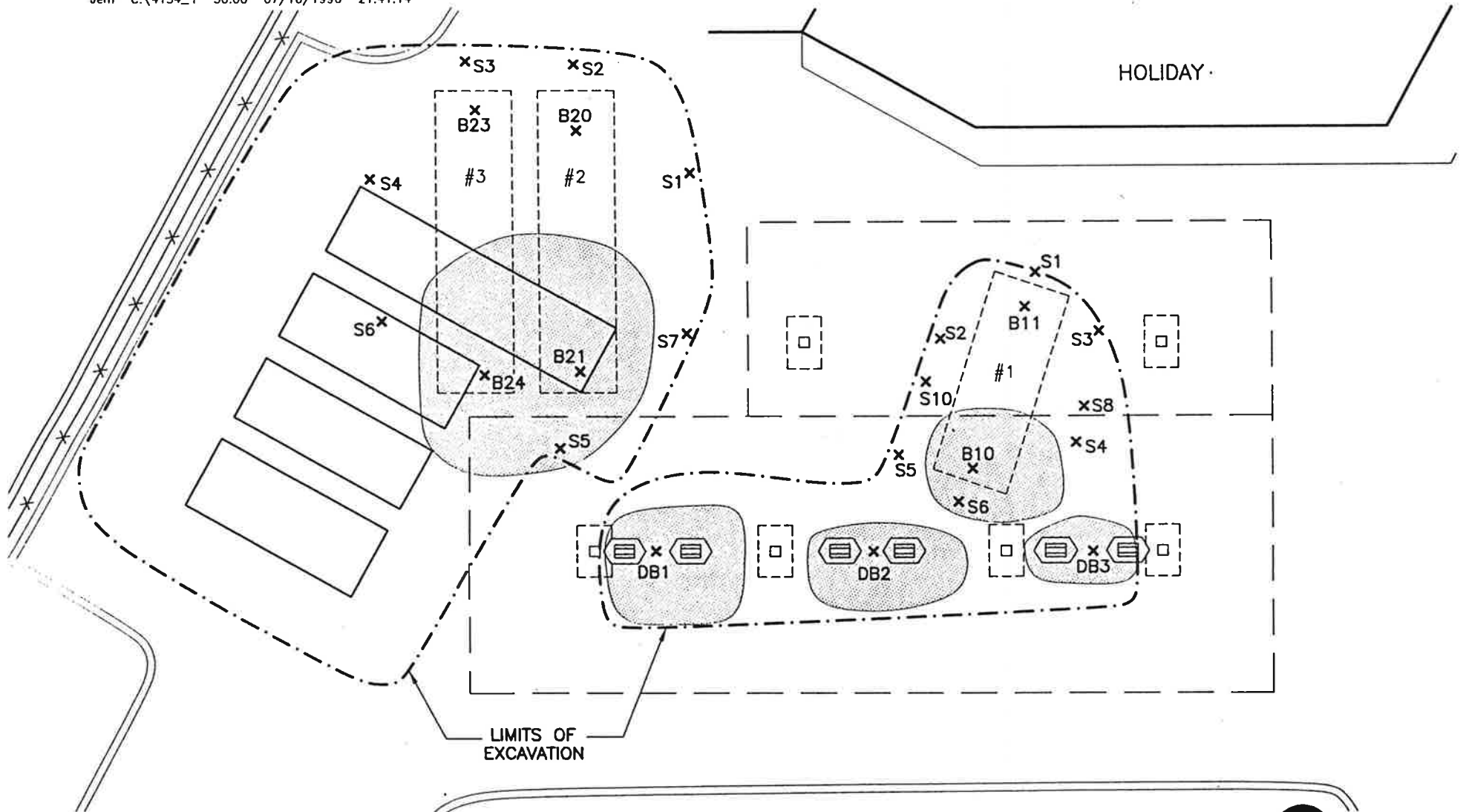







Figure 2
SITE MAP
Holiday- 5247 Minnehaha Avenue



-  Former Tank Locations
-  New Tank Locations
-  Former Dispenser Locations

-  Areas of Contaminated Soil Identified During Excavation
-  Soil Screening Locations (B=Bottom, S=Sidwall)

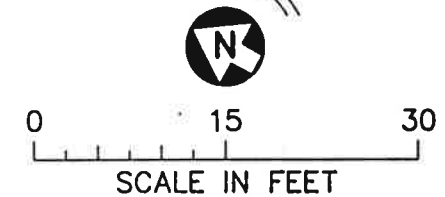
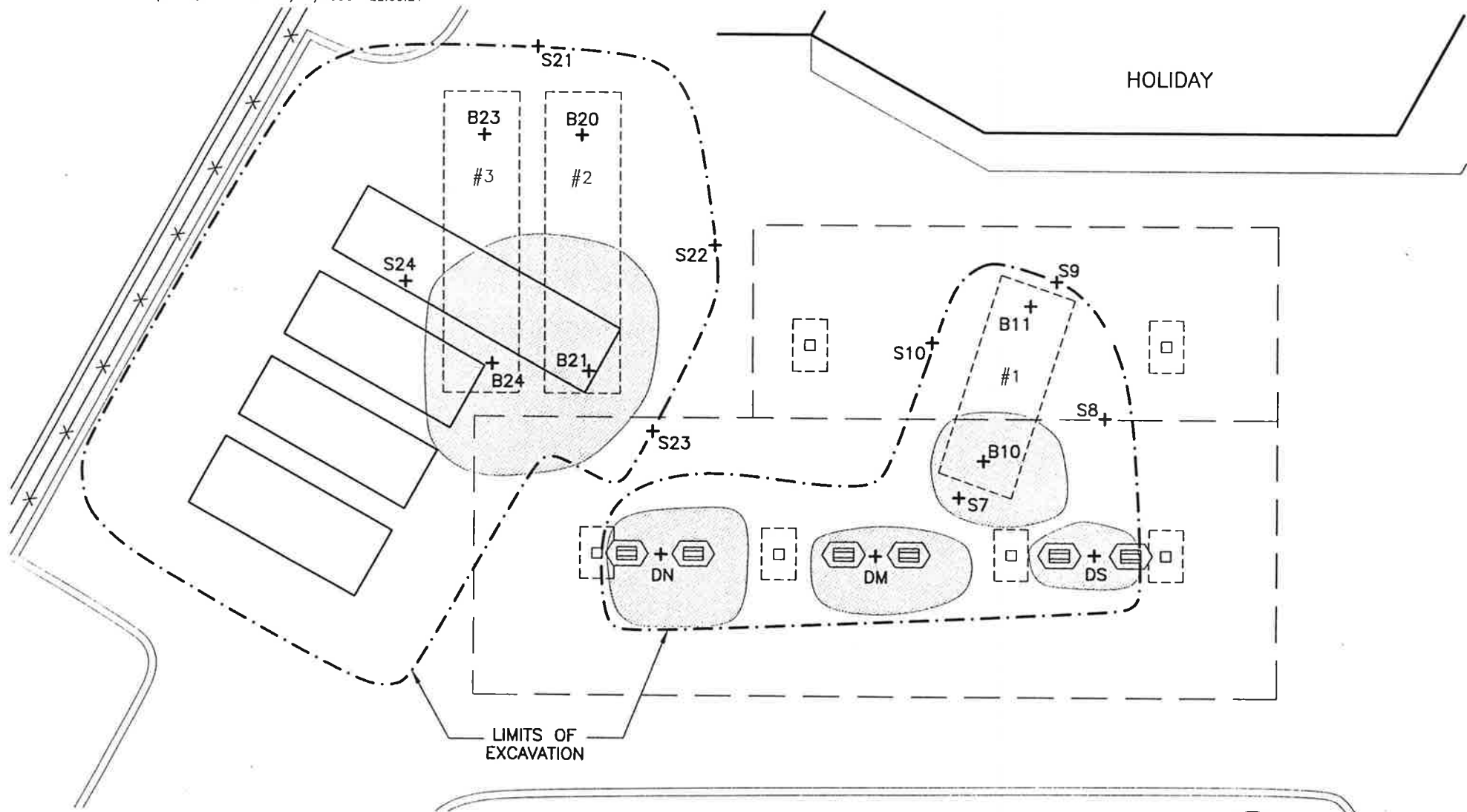


Figure 3
 EXCAVATION SOIL
 SCREENING LOCATIONS
 Holiday- 5247 Minnehaha Avenue



- Former Tank Locations
- New Tank Locations
- ⊕ Former Dispenser Locations

- Areas of Contaminated Soil Identified During Excavation
- + Analytical Soil Sample Location (B=Bottom, S=Sidewall, D=Dispenser Bottom)

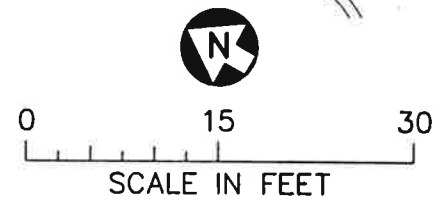


Figure 4
EXCAVATION ANALYTICAL
SOIL SAMPLING LOCATIONS
Holiday- 5247 Minnehaha Avenue

BORING LOG

PROJECT: Holiday #22 - Minnehaha Ave
 DATE STARTED: 09/06/95
 DATE COMPLETED: 09/06/95
 FIELD INSPECTOR: M. Carnes
 CREW CHIEF: R. Satoskar

BORING NUMBER: GP-1
 GROUND SURFACE ELEVATION:
 TOTAL DEPTH OF HOLE (FT): 21.5
 DEPTH TO GROUNDWATER (FT): 19
 DRILLING METHOD: Push Probe

Depth (Feet)	Sample Type/No. Recovery (Ft.)	Analytical Sample Number	Composite Sample Number	P.I.D. Headspace (ppm)	Oil Sheen	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS
25									
20	GP/O3 0.1	GP1 (water)				S			
15	GP/O2 1.6	GP1-01 (soil)		2.7					
10	GP/O1 0.5		28	N o S a m p l i n g t o 1 5 F e e t	n	M	Terrace Sand	SP	Sand - Light brown, fine to medium-grained sand (Terrace Sand). <i>No sampling in 0 to 15 foot interval. Soil type and low contamination documented in adjacent excavation sidewall. Boring placed adjacent to excavation to document soil and groundwater quality below level of excavation.</i>
5									
0									
25							LST		Limestone - Hard, tan limestone. Refusal at 21.5 feet. (Platteville Limestone) End of Boring at 21.5 feet.

COMMENTS: The boring was advanced to 21.5 feet by Geoprobe push-probe drilling. The boring was sampled according to ASTM D-1586, and samples were described in general accordance with ASTM D-2488. D=dry, M=moist, W=wet, S=saturated.

BORING LOG

PROJECT: Holiday #22 - Minnehaha Ave
 DATE STARTED: 09/06/95
 DATE COMPLETED: 09/06/95
 FIELD INSPECTOR: M. Carnes
 CREW CHIEF: R. Satoskar

BORING NUMBER: GP-2
 GROUND SURFACE ELEVATION:
 TOTAL DEPTH OF HOLE (FT): 22
 DEPTH TO GROUNDWATER (FT): 18.5
 DRILLING METHOD: Push Probe

Depth (Feet)	Sample Type/No.	Recovery (Ft.)	Analytical	Composite	P.I.D. Headspace	Oil Sheen	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Feet)
0											0
5											5
10											10
15	GP/01 1.8				310			Terrace Sand	SP		15
20	GP/02 1.2				230						20
20.1	GP/03 0.1		GP2 (water)								20.1
22								Limestone	LST		22
25											25

COMMENTS: The boring was advanced to 22 feet by Geoprobe push-probe drilling. The boring was sampled according to ASTM D-1586, and samples were described in general accordance with ASTM D-2488. D=dry, M=moist, W=wet, S=saturated.

BFM107, Rev. 11/30/94 MCJ

BORING LOG

PROJECT: Holiday #22 - Minnehaha Ave
 DATE STARTED: 09/06/95
 DATE COMPLETED: 09/06/95
 FIELD INSPECTOR: M. Carnes
 CREW CHIEF: R. Satoskar

BORING NUMBER: GP-3
 GROUND SURFACE ELEVATION:
 TOTAL DEPTH OF HOLE (FT): 17
 DEPTH TO GROUNDWATER (FT): NA
 DRILLING METHOD: Push Probe

Depth (Feet)	Sample Type/No. Recovery (Ft.)	Analytical Sample Number	Composite Sample Number	P.I.D. Headspace (ppm)	Oil Sheen	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS
5	GP/01 1.6			0.3	n	M	Terrace Sand	SP	4 Gray sandy clay lense at 5.5 feet.
10	GP/02 0.8			1.1					Color change to light gray below 15 feet.
15	GP/03 1.2	GP3-03 (soil)		4.8					End of Boring at 17 feet.
20									
25									

COMMENTS: The boring was advanced to 17 feet by Geoprobe push-probe drilling. The boring was sampled according to ASTM D-1586, and samples were described in general accordance with ASTM D-2488. D=dry, M=moist, W=wet, S=saturated.

BORING LOG

PROJECT: Holiday #22 - Minnehaha Ave
 BORING NUMBER: GP-4
 DATE STARTED: 09/06/95
 GROUND SURFACE ELEVATION:
 DATE COMPLETED: 09/06/95
 TOTAL DEPTH OF HOLE (FT): 20
 FIELD INSPECTOR: M. Carnes
 DEPTH TO GROUNDWATER (FT): 18
 CREW CHIEF: R. Satoskar
 DRILLING METHOD: Push Probe

Depth (Feet)	Sample Type/No. Recovery (Ft.)	Analytical Sample Number	Composite Sample Number	P.L.D. Headspace (ppm)	Oil Sheen	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Feet)
5	GP/01 16			5.0					Sand - Light gray, medium to coarse-grained sand (Terrace Sand). <i>/ Possible faint odors in upper 7 feet; no odors present below 7 feet.</i>	5
10	GP/02 08			2.1	u	M	Terrace Sand	SP		10
15	GP/03 12	GP4-03 (soil)		9.0						15
20		GP4 (water)				S			End of Boring at 20 feet on Platteville limestone.	20
25										25

COMMENTS: The boring was advanced to 20 feet by Geoprobe push-probe drilling. The boring was sampled according to ASTM D-1586, and samples were described in general accordance with ASTM D-2488. D=dry, M=moist, W=wet, S=saturated.

BORING LOG

PROJECT: Holiday #22 - Minnehaha Ave
 DATE STARTED: 09/06/95
 DATE COMPLETED: 09/06/95
 FIELD INSPECTOR: M. Carnes
 CREW CHIEF: R. Satoskar

BORING NUMBER: GP-5
 GROUND SURFACE ELEVATION:
 TOTAL DEPTH OF HOLE (FT): 17
 DEPTH TO GROUNDWATER (FT): NA
 DRILLING METHOD: Push Probe

Depth (Feet)	Sample Type/No. Recovery (Ft.)	Analytical Sample Number	Composite Sample Number	P.I.D. Headspace (ppm)	Oil Sheen	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS
25									
20									
15	GP/O3 1.9	GP5-03 (soil)		32					End of Boring at 17 feet.
10	GP/O2 1.8			8.7	n	M	Terrace Sand	SP	<i>Primarily fine grained sand to 6 feet with medium to coarse-grained sand below 6 feet.</i>
5	GP/O1 1.7			8.2					Sand - Light gray, fine to coarse-grained sand, possible faint odors in upper intervals; no discoloration (Terrace Sand).
25									

COMMENTS: The boring was advanced to 17 feet by Geoprobe push-probe drilling. The boring was sampled according to ASTM D-1586, and samples were described in general accordance with ASTM D-2488. D=dry, M=moist, W=wet, S=saturated.

BORING LOG

PROJECT: Holiday #22 - Minnehaha Ave
 DATE STARTED: 04/30/96
 DATE COMPLETED: 05/10/96
 FIELD INSPECTOR: T. Warner (Barr)
 CREW CHIEF: N. Herboldt (Thein)

BORING NUMBER: MW-1
 GROUND SURFACE ELEVATION: 99.61 Feet Relative
 TOTAL DEPTH OF HOLE (FT): 32
 DEPTH TO GROUNDWATER (FT): 19.2
 DRILLING METHOD: HSA/Air rotary

Depth (Feet)	Sample Type/No. Recovery (Ft.)	Analytical Sample Number	Composite Sample Number	P.I.D. Headspace (ppm)	Oil Sheen	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Feet)
0-5	SB/01 2.0			1.3					Sand - Brown, fine to coarse-grained sand interspersed with sparse, fine lenses of clay; no odor (Terrace Sand).	0-5
5-10	SB/02 1.8			1.0	n	M	Terrace Sand	SP		5-10
10-15	SB/03 1.5			0.4					Sand - Gray, medium to coarse-grained sand, faint odor (Terrace Sand). <i>4 Soil color is brown with no odor below 19.5 feet.</i>	10-15
15-20	SB/04 1.0			52						15-20
20-25					NA	S	Platteville Limestone	LST	Limestone - Tan limestone; weathered and prone to collapse in upper 2 feet of formation (Platteville Limestone). End of Well-bore at 32 feet. Well completed as 4-inch steel casing to 23 feet, grouted in place in 10.25 inch borehole, and 4-inch diameter open-bedrock borehole to 32 feet.	20-25
25-30										25-30
30-35										30-35
35-40										35-40

COMMENTS: The upper borehole was advanced with hollow-stem augers and/or rotary; lower borehole advanced with air rotary. The upper borehole was sampled according to ASTM D-1586, and samples were described in general accordance with ASTM D-2488. D=dry, M=moist, W=wet, S=saturated. Open rock well MW-1 installed per Thein's well log.

MINNESOTA DEPARTMENT OF HEALTH
WELL AND BORING RECORD
Minnesota Statutes Chapter 1031

MINNESOTA UNIQUE WELL NO.

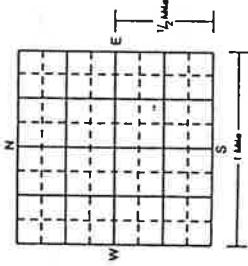
578612

WELL LOCATION
County Name **HENNEPIN**
Township Name **28N** Range No. **23W** Section No. **17**

WELL DEPTH (completed) **32** ft. Date Work Completed **4-30-96**

Fraction **NW 1/4 SW 1/4**
or Fire Number
House Number, Street Name, City, and Zip Code of Well Location
5247 MINNEHAHA AVE MPLS, MN

Show exact location of well in section grid with 'X'.
Sketch map of well location, showing property lines, roads and buildings.



DRILLING FLUID **NONE USED**

USE
 Domestic
 Irrigation
 Test Well

Monitoring
 Community PWS
 Noncommunity PWS
 Dewatering

Heating/Cooling
 Industry/Commercial
 Remedial

CASING Drive Shoe? Yes No
 Steel Threaded Welded
 Plastic

HOLE DIAM.

CASING DIAMETER WEIGHT
4 in. to 23 ft. lbs./ft. **10-25**
in. to ft. lbs./ft. **4** in. to **32** ft.
in. to ft. lbs./ft.

SCREEN **NONE** OPEN HOLE
Make _____ from _____ 23 ft. to 32 ft.
Type _____ Diam. _____
Slot/Gauze _____ Length _____
Set between _____ ft. and _____ ft. FITTINGS: _____

STATIC WATER LEVEL
18.8 ft. below above land surface Date measured **4-30-96**
PUMPING LEVEL (below land surface)
N/A ft. after _____ hrs. pumping _____ g.p.m.

WELL OWNER'S NAME
SAME AS ABOVE
Well owner's mailing address if different than property owner's address indicated above.

PROPERTY OWNER'S NAME
HOLIDAY COMPANIES
Property owner's mailing address if different than well location address indicated above.
**4567 WEST 80TH STREET
MINNEAPOLIS MN 55440**

WELL HEAD COMPLETION
 Pileless adapter manufacturer
 Casing Protection **6" PRO TOP** Model _____
 At-grade (Environmental Wells and Borings ONLY)

Well grouted? Yes No
Grout Material Neat cement Bentonite Concrete High Solids Bentonite
from **0** to **23** ft. yds. bags
from _____ to _____ ft. yds. bags
from _____ to _____ ft. yds. bags

GEOLOGICAL MATERIALS	COLOR	HARDNESS OF MATERIAL	FROM	TO
GRASS SAND	DEBRIS BRN		0	4
SAND	BRN	MED	4	9
SAND	BRN	MED-FINE	9	14
SAND	BRN	MED	14	19
WET SAND	ROCK		19	20
LIMESTONE			20	32

NEAREST KNOWN SOURCE OF CONTAMINATION **UNKNOWN**
Well disinfected upon completion? Yes No

Not installed
Manufacturer's name _____ Date installed _____
Model number _____ HP _____ Volts _____
Length of drop pipe _____ ft. Capacity _____ g.p.m.
Pressure Tank Capacity _____
Type: Submersible L.S. Turbine Reciprocating Jet

ABANDONED WELLS

Does property have any not in use and not sealed well(s)? Yes No
VARIANCE

Was a variance granted from the MDH for this well? Yes No

WELL CONTRACTOR CERTIFICATION

This well was drilled under my supervision and in accordance with Minnesota Rules, Chapter 4725. The information contained in this report is true to the best of my knowledge.

THEIN WELL CO 34050
Licensee Business Name Lic. or Reg. No.
Nathan Herrboldt
Authorized Representative Signature Date
6-3-96

REMARKS, ELEVATION, SOURCE OF DATA, etc.

MW # **1**

barr

NATHAN HERRBOLDT 6-3-96
Name of Driller Date

IMPORTANT - FILE WITH PROPERTY PAPERS 578612
WELL OWNER COPY

BORING LOG

PROJECT: Holiday #22 - Minnehaha Ave
 DATE STARTED: 04/30/96
 DATE COMPLETED: 05/10/96
 FIELD INSPECTOR: T. Warner (Barr)
 CREW CHIEF: N. Herboldt (Thein)

BORING NUMBER: MW-2
 GROUND SURFACE ELEVATION: 100.21 Feet Relative
 TOTAL DEPTH OF HOLE (FT): 36
 DEPTH TO GROUNDWATER (FT): 22.2
 DRILLING METHOD: HSA/Air rotary

Depth (Feet)	Sample Type/No. Recovery (Ft.)	Analytical Sample Number	Composite Sample Number	P.I.D. Headspace (ppm)	Oil Sheen	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Feet)
0-5	SB/01 2.0			11					Sand - Brown, fine to coarse-grained sand interspersed with sparse, fine lenses of clay; no odor (Terrace Sand).	0-5
5-10	SB/02 1.8			12	n	M	Terrace Sand	SP		<p> ▲ Approximately 6 to 8-inch thickness of clay in 9 to 11 foot interval. </p>
10-15	SB/03 1.0			10					Limestone - Tan limestone, weathered and prone to collapse in upper 2 feet of formation (Platteville Limestone).	10-15
15-20	SB/04 1.1			0.4			Platteville Limestone	LST		<p> End of Well-bore at 36 feet. Well completed as 4-inch steel casing to 25 feet, grouted in place in 10.25 inch borehole, and 4-inch diameter open-bedrock borehole to 36 feet. </p>
20-25										20-25
25-30										25-30
30-35										30-35
35-40										35-40

COMMENTS: The upper borehole was advanced with hollow-stem augers and/or rotary; lower borehole advanced with air rotary. The upper borehole was sampled according to ASTM D-1588, and samples were described in general accordance with ASTM D-2488. D=dry, M=moist, W=wet, S=saturated. Open rock well MW-2 installed per Thein's well log.

MINNESOTA DEPARTMENT OF HEALTH
WELL AND BORING RECORD
Minnesota Statutes Chapter 1031

MINNESOTA UNIQUE WELL NO.

578611

WELL LOCATION
County Name **HENNEPIN**
Township Name **28N** Range No. **23W** Section No. **17** Fraction **NW SW SW**
House Number, Street Name, City, and Zip Code of Well Location
5247 MINNEHAHA AVE MPLS, MN

WELL DEPTH (completed) **36** ft Date Work Completed **4-30-96**

DRILLING METHOD
 Cable Tool Driven Dug Rotary Jetted Auger Jettied

DRILLING FLUID **NONE USED**

USE
 Domestic Monitoring Heating/Cooling
 Irrigation Community PWS Industry/Commercial
 Test Well Noncommunity PWS Remedial
 Dewatering

CASING Drive Shoes? Yes No Welded HOLE DIAM.
 Steel Threaded Plastic

CASING DIAMETER WEIGHT
4 in. to **25** ft. lbs./ft. **25**
in. to _____ ft. lbs./ft. **25**
in. to _____ ft. lbs./ft. **26**

SCREEN **NONE** OPEN HOLE
Make _____ from **25** ft. to **36** ft.
Type _____ Diam. _____
Slot/Gauze _____ Length _____
Set between _____ ft. and _____ ft. FITTINGS: _____

STATIC WATER LEVEL
PUMPING LEVEL (below land surface) **22.3** ft. below above land surface Date measured **4-30-96**
N/A ft. after _____ hrs. pumping _____ g.p.m.

WELL HEAD COMPLETION
 Pileless adapter manufacturer Model _____
 Casing Protection **6 ft PRO TOP** 12 in. above grade
 At-grade (Environmental Wells and Boreings ONLY)

GROUTING INFORMATION
Well grouted? Yes No
Grout Material Neat cement Bentonite Concrete High Solids Bentonite
from **0** to **25** ft. yds. bags
from _____ to _____ ft. yds. bags
from _____ to _____ ft. yds. bags

NEAREST KNOWN SOURCE OF CONTAMINATION
Well disinfected upon completion? Yes No **UNKNOWN**
_____ feet _____ direction _____ type

PUMP
 Not installed Date installed _____
Manufacturer's name _____ HP _____ Volts _____
Model number _____ ft. Capacity _____ g.p.m.
Length of drop pipe _____ ft.
Pressure Tank Capacity _____
Type: Submersible L.S. Turbine Reciprocating Jet

ABANDONED WELLS
Does property have any not in use and not sealed well(s)? Yes No
VARIANCE

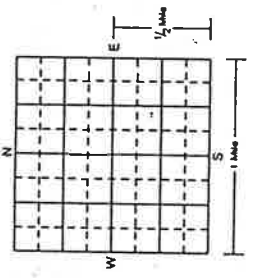
WELL CONTRACTOR CERTIFICATION
Was a variance granted from the MDH for this well? Yes No

REMARKS, ELEVATION, SOURCE OF DATA, etc.
This well was drilled under my supervision and in accordance with Minnesota Rules, Chapter 4725.
The information contained in this report is true to the best of my knowledge.

MW # **2**
THEIN WELL CO **34050**
Licensee Business Name Lic. or Reg. No.
Nathan Herrboldt
Authorized Representative Signature **6-3-96**
Date

NATHAN HERRBOLDT **6-3-96**
Name of Owner Date

Show exact location of well in section grid with "X".
Sketch map of well location, showing property lines, roads and buildings.



PROPERTY OWNER'S NAME
HOLIDAY COMPANIES
Property owner's mailing address if different than well location address indicated above.
4567 WEST 80TH STREET
MINNEAPOLIS, MN 55440

WELL OWNER'S NAME
Well owner's mailing address if different than property owner's address indicated above.

GEOLOGICAL MATERIALS	COLOR	HARDNESS OF MATERIAL	FROM	TO
GRASS SANDY SILTY CLAY	BRN	BRN	0	4
SANDY	BRN	MED	4	9
SAND/CLAY	BRN	MED	9	11
SAND	BRN	MED	11	14
GRAVELY SAND	BRN	MED-C	14	19
GRAVELY SAND WET BRN			19	21
LIMESTONE			21	36

Use a second sheet, if needed

IMPORTANT-FILE WITH PROPERTY PAPERS
WELL OWNER COPY **578611**

BORING LOG

PROJECT: Holiday #22 - Minnehaha Ave
 DATE STARTED: 04/30/96
 DATE COMPLETED: 05/10/96
 FIELD INSPECTOR: T. Warner (Barr)
 CREW CHIEF: N. Herboldt (Thein)

BORING NUMBER: MW-3
 GROUND SURFACE ELEVATION: 98.88 Feet Relative
 TOTAL DEPTH OF HOLE (FT): 31
 DEPTH TO GROUNDWATER (FT): 16.4
 DRILLING METHOD: HSA/Air rotary

Depth (Feet)	Sample Type/No. Recovery (Ft.)	Analytical Sample Number	Composite Sample Number	P.I.D. Headspace (ppm)	Oil Sheen	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Feet)	
0	SB/01 1.8			21					Sand - Brown, fine to coarse-grained sand interspersed with sparse, fine lenses of clay; no odor (Terrace Sand).	0	
5	SB/02 1.7			4.0	n	M	Terrace Sand	SP		dandy clay lense at 9.5 to 11 feet; no odor.	5
10	SB/03 1.2			1.8						◁ Thin (3-inch thick) clay lense at 14.5 feet; no odor.	10
15				2.4					Limestone - Tan limestone, weathered and prone to collapse in upper 2 feet of formation (Platteville Limestone).	15	
20					NA	S	Platteville Limestone	LST			20
25									End of Well-bore at 31 feet. Well completed as 4-inch steel casing to 22.9 feet, grouted in place in 10.25 inch borehole, and 4-inch diameter open-bedrock borehole to 31 feet.	25	
30											30
35										35	
40										40	

COMMENTS: The upper borehole was advanced with hollow-stem augers and/or rotary; lower borehole advanced with air rotary. The upper borehole was sampled according to ASTM D-1586, and samples were described in general accordance with ASTM D-2488. D=dry, M=moist, W=wet, S=saturated. Open rock well MW-3 installed per Thein's well log.

MINNESOTA DEPARTMENT OF HEALTH
WELL AND BORING RECORD
Minnesota Statutes Chapter 103f

MINNESOTA UNIQUE WELL NO.

578613

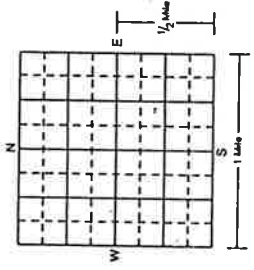
WELL LOCATION

County Name **HENNEPIN**

Township Name **28N** Range No. **23W** Section No. **17** Fraction **NW SW SW**

House Number, Street Name, City, and Zip Code of Well Location
5247 MINNEHAHA AVE MPLS, MN

Show exact location of well in section grid with "X".



Sketch map of well location, showing property lines, roads and buildings.

WELL DEPTH (completed) **31** ft Date Work Completed **4-30-96**

DRILLING METHOD
 Cable Tool
 Auger
 Driven
 Rotary
 Jetted

DRILLING FLUID
NONE USED

USE
 Domestic
 Irrigation
 Test Well
 Monitoring
 Community PWS
 Noncommunity PWS
 Dewatering
 Heating/Cooling
 Industry/Commercial
 Remedial

CASING Drive Shoe? Yes No
 Steel Threaded Welded
 Plastic

HOLE DIAM. _____

CASING DIAMETER
4 in. to **22.9** ft.
 _____ in. to _____ ft.
 _____ in. to _____ ft.

WEIGHT
 _____ lbs./ft. **22.9** ft.
 _____ lbs./ft. **0.25** ft.
 _____ lbs./ft. **4** in. to **31** ft.

SCREEN **NONE**

Make _____ Type _____
 Slot/Gauze _____ ft. and _____ ft. FITTINGS: _____
 Set between _____ ft. and _____ ft.

OPEN HOLE
 from **22.9** ft. to **31** ft.

STATIC WATER LEVEL
16.2 ft. below above land surface Date measured **4-30-96**

PUMPING LEVEL (below land surface)
N/A ft. after _____ hrs. pumping _____ g.p.m.

WELL HEAD COMPLETION
 Pitless adapter manufacturer _____ Model _____
 Casing Protection _____ 12 in. above grade
 At-grade (Environmental Wells and Borings ONLY)

GROUTING INFORMATION
 Well grouted? Yes No
 Grout Material Mortar cement Bentonite Concrete High Solids Bentonite
 from **0** to **22.9** ft. yds. bags
 from _____ to _____ ft. yds. bags
 from _____ to _____ ft. yds. bags

NEAREST KNOWN SOURCE OF CONTAMINATION
 _____ feet _____ direction **UNKNOWN** type _____
 Well disinfected upon completion? Yes No

PUMP
 Not installed Date installed _____
 Manufacturer's name _____
 Model number _____ HP _____ Volts _____
 Length of drop pipe _____ ft. Capacity _____ g.p.m.
 Pressure Tank Capacity _____
 Type: Submersible L.S. Turbine Reciprocating Jet _____

ABANDONED WELLS
 Does property have any not in use and not sealed well(s)? Yes No

VARIANCE
 Was a variance granted from the MDH for this well? Yes No

WELL CONTRACTOR CERTIFICATION
 This well was drilled under my supervision and in accordance with Minnesota Rules, Chapter 4725. The information contained in this report is true to the best of my knowledge.

THEIN WELL CO **34050**
 License Business Name Lic. or Reg. No.
Patricia J. Thein
 Authorized Representative Signature **6-3-96**
 Date

NATHAN HERBOLDT **6-3-96**
 Name of Driller Date

GEOLOGICAL MATERIALS	COLOR	HARDNESS OF MATERIAL	FROM	TO
CONCRETE GRAVELLY CLAY	BRN	BRN	0	4
SAND	BRN	MED	4	11
SAND GRAVELLY	BRN	MED	11	14
SAND	BRN	MED-C	14	19
WET GRAVELLY SAND ROCK			19	21
LIMESTONE			21	31

REMARKS, ELEVATION, SOURCE OF DATA, etc.

MW #3

barr

IMPORTANT-FILE WITH PROPERTY PAPERS
WELL OWNER COPY

578613