Petroleum Remediation Program

Minnesota Pollution Control Agency

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Investigation Report Form

Guidance Document 4-06

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Complete this form to document site investigation activities, including Limited Site Investigations (LSIs) and full Remedial Investigations (RIs). Do not revise or delete any text or questions from this report form. Include any additional information that is important for making a site cleanup decision. If only an LSI is necessary, you may skip Section 6 and Section 7 of this report form.

Refer to Minnesota Pollution Control Agency (MPCA) Guidance Document 1-01 *Petroleum Remediation Program General Policy* for the overall site investigation objectives, and to other MPCA guidance document for details on investigation methods. When a tank has been excavated, refer to Guidance Documents 3-01 *Excavation of Petroleum Contaminated Soil* and 3-02 *General Excavation Report Worksheet* for reporting requirements. Document the occurrence of free product using Guidance Document 2-02 *Free Product: Evaluation and Recover,* and Guidance Document 2-03 *Free Product Recovery Report Worksheet.*

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MPCA Site ID: Leak: 00015971 Date: 08/04/05

Responsible Party: Mr. Charles Hatch R.P. phone #: 612.729.8381

Responsible Party Address: 3745 Hiawatha Avenue City: Minneapolis

County: Hennepin Zip Code: 55406

Alternate Contact (if any) for Responsible Party: phone #:

Consultant: Summit Envirosolutions, Inc. Consultant phone #: (651) 644-8080

Facility Name: Archer Daniels Midland (ADM) – Atkinson Mill

Facility Address: 3745 Hiawatha Avenue City: Minneapolis

County: Hennepin Zip Code: 55406

Site Location Information: Complete Guidance Document 1-03a *Spatial Data Reporting Form* and include in Appendix G.

Section 1: Emergency and High Priority Sites

1.1 Is an existing drinking water well impacted or likely to be impacted within a two-year travel time? ☐*Yes*☒*No*

1.2 Are there any existing field-detectable vapor impacts (OVM, explosimeter, odors, etc.)? ☐*Yes*☒*No*

1.3 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 (ppm) range in ground water in a well located close to the surface water? ☐*Yes*☒*No*

1.4 Has the release occurred in the last 30 days? ☐*Yes*☒*No*

1.5 Has free product been detected at the site? **If *YES***, attach Guidance Document 2-03 *Free Product Recovery Report Worksheet.* ☐*Yes*☒*No*

1.6 Is a hydrogeologically sensitive aquifer impacted which is tapped by water wells within 500 feet from the release source? **If *YES***, explain: ☒*Yes*☐*No*

An unused industrial well, located approximately 15 feet from the former fuel storage vault, is impacted with petroleum hydrocarbons. According to available records, the well is completed to 502 feet bg in the Prairie du Chien aquifer. The well is no longer used for industrial uses.

1.7 Has the public water supply risk assessment concluded that the site is a high priority site with respect to a public water supply well (see Guidance Document 4-18 *Public Water Supply Risk Assessment at Petroleum Remediation Sites*)? **If *YES***, provide the name of the public water supply system(s) at risk. ☐*Yes*☒*No*

1.8 Did the vapor intrusion assessment detect exceedences of soil gas action levels (see Guidance Document 4-01a *Vapor Intrusion Assessments Performed during Site Investigations*)? ☐*Yes*☒*No*

If you answered *YES* to any of questions 1 through 8 above describe below the actions taken to date to reduce or eliminate the risk posed by the release.

Section 2: Site and Release Information

2.1 Attach Table 1 - Tank Information. Describe the status of the other components of the tank system(s), (i.e., piping and dispensers).

The fuel oil was stored inside a concrete vault within the building foundation under the maintenance shop at the ADM Atkinson Mill. The vault was reportedly drained and taken out of service in 1990.

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

The site is located east of Hiawatha Avenue (State Hwy 55) and north of 38th Street East (Figures 1 and 2). The site is located in a mixed industrial, commercial and residential area of Minneapolis.

2.3 List other potential leak sources within 500 feet of the site.

General Mills has a facility located across the railroad tracks directly to the east of the site. There is reportedly a mineral oil tank there and may have had other petroleum tanks in the past. Also there were reportedly gas stations located to the west of the site.

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

The source of the release appears to be associated with the fuel oil storage vault located under the maintenance shop.

2.5 What was the volume of the release? (if known): **Unknown gallons**

2.6 When did the release occur? (if known): **Unknown**

2.7 Provide aerial photos and Sanborn Maps of the area for the various time periods they are available.

Section 3: Excavated Soil Information

3.1 Include the Guidance Document 3-02 *General Excavation Report Worksheet* in Appendix A.

N/A.

3.2 Was soil excavated for off-site treatment? ☐*Yes* ☒*No*

Date excavated:

Total Volume removed: cubic yards

How much of the Total Volume removed was petroleum saturated: cubic yards

3.3 Indicate soil treatment type:

☐ land treatment
☐ thermal treatment
☐ composting/biopiling
☐ other ( )

Name and location of treatment facility:

Section 4: Extent and Magnitude of Soil Contamination

4.1 Were soil borings conducted in or immediately adjacent to all likely sources including: ☒ *YES* ☐ *NO*

dispensers,	☐ *yes*	☐ *no*	☒ *not present*
transfer areas,	☐ *yes*	☐ *no*	☒ *not present*
underground storage tank basins,	☒ *yes*	☐ *no*	☐ *not present*
above ground storage tank areas,	☐ *yes*	☐ *no*	☒ *not present*
piping,	☐ *yes*	☐ *no*	☒ *not present*
remote fill pipes,	☐ *yes*	☐ *no*	☒ *not present*
valves	☐ *yes*	☐ *no*	☒ *not present*
known spill areas	☐ *yes*	☐ *no*	☒ *not present*

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? ☒ *YES* ☐ *NO*

4.3 To adequately evaluate site stratigraphy complete at least one boring to 20 feet below the deepest site contamination. If the water table is encountered, at least one boring a minimum of 20 feet below the water table is necessary. If a confining layer is present, drill the boring in an uncontaminated area. Was this done? ☒ *YES* ☐ *NO*

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 Guidance Document 4-01 *Soil and Ground Water Assessments Performed during Site Investigations* regarding exceptions and MPCA approval for depth of drilling):

The tank vault is located under the maintenance shop building; therefore, test borings were advanced immediately to the east and west, adjacent to the building.

4.4 Indicate the drilling method:

- ☐ hollow-stem auger
- ☐ sonic drilling
- ☒ push probes
- ☐ other .

Note: MPCA staff hydrologist approval is required before use of flight augers

4.5 Discuss soil borings drilled and provide rationale for their locations. Attach boring logs in Appendix D.

Test borings were advanced to the east and west of the building from 23 to 38 feet below grade (bg) in the vicinity where the tank vault was located. The tank vault was the only known location where fuel oil was stored on this site. Test borings were not advanced

directly north of the tank vault due to the presence of grain storage silos extending approximately 250 feet to the north. In addition, the building extends approximately 350 feet to the south; therefore, test borings could not be advanced in this area. Four test borings (TB-01, TB-02, TB-03, and TB-05) were advanced to the east and one boring (TB-04) was advanced to the west of the building of the tank vault to determine the horizontal and vertical extent of the petroleum impacts (Figure 3). Copies of the test boring logs are included in Appendix IV.

4.6 Attach Table 2 - Results of Soil Headspace Screening. In Appendix C, discuss soil headspace screening method and describe any deviation from recommended and/or required methods and procedures.

4.7

Table 2
Results of Soil Headspace Screening

Depth (ft)	Soil Boring								
	TB-01	TB-02	TB-03	TB-04	TB-05				
2	0	0	0	0	0				
4	0	0	0	0	0				
6	0	0	0	0	0				
8	0	0	0	0	0				
10	0	0	0	0	0				
11	0								
12		0	0	0	0				
13	0								
14		0	0	0	0				
15		0	0						
16	0			0	0				
18		0	0						
19	0	86	6	0					
19.5					0				
20		0	60	0	180				
21			20		54				
22	0		0						
23		0		0					
24					0				
25	0		0		0				
27	0	0							
29		0							
32	0								
37	0								

List instruments used and discuss field methods and procedures in Appendix C.
Notes:

A Thermo Environmental Instruments 580B organic vapor monitor (OVM) equipped with an 11.8 eV lamp was used during this assessment. This instrument was calibrated at the beginning of the day using ambient air as a zero gas and 100 parts-per-million (ppm) isobutylene in air as the calibration gas. This calibration procedure was followed to allow for direct readings of benzene in ppm on a volume basis. The PID results are found on the test probe logs located in Appendix II.

Summit's field methods and procedures are located in Appendix III.

4.8 Attach Table 3 - Analytical Results of Soil Samples. Provide analytical results in Appendix B. In Appendix C, discuss soil sampling and analytical methods used and describe any deviation from recommended and/or required methods and procedures.

Table 3
Analytical Results of Soil Samples

Boring, Depth(ft)	Date Sampled	Benzene	Toluene	Ethylbenzene	Xylenes	GRO	DRO	Lab Type
TB-01 (25')	6/1/2005	<0.027	<0.027	<0.027	<0.058	NS	<4.2	Fixed Based
TB-02 (19')	6/1/2005	<0.068	< 0.068	0.12	0.234	NS	1,600	Fixed Based
TB-02 (29')	6/1/2005	<0.029	<0.029	<0.029	<0.058	NS	<4.6	Fixed Based
TB-03 (20')	6/2/2005	<0.21	<0.21	<0.21	<0.42	NS	4,700	Fixed Based
TB-03 (30')	6/2/2005	<0.028	<0.028	<0.028	<0.056	NS	<4.0	Fixed Based
TB-04 (23')	6/2/2005	<0.028	<0.028	<0.028	<0.056	NS	<4.1	Fixed Based
TB-05 (20')	6/2/2005	<0.055	<0.055	0.18	0.65	NS	5,600	Fixed Based
TB-05 (25')	6/2/2005	<0.028	<0.028	<0.028	<0.056	NS	<4.1	Fixed Based

Report results in mg/kg. Use less than symbols to show detection limit. Indicate mobile or fixed based in the lab type column.
Notes:

< - Less than Estimated Quantitation Limit (EQL).
NS – Not Sampled.

The analytical results are reported as milligrams per kilogram (mg/kg) or parts-per-million.

4.9 Describe the vertical and horizontal extent and magnitude of soil contamination. Provide a plan-view map and two cross-sections that illustrate both soil head space and laboratory analytical results (Section 14).

Summit submitted eight soil samples to Pace Analytical for analysis of benzene, toluene, ethylbenzene, and xylenes (BTEX) and diesel range organics (DRO). Concentrations of BTEX were detected at TB-02 (19 feet bg) and TB-05 (20 feet bg). Concentrations of DRO were detected at TB-02 (19 feet bg), TB-03 (20 feet bg) and TB-05 (20 feet bg) respectively. Borings could not be advanced to the south of TB-02 and TB-03 due to an underground tunnel. In addition, test borings could not be conducted further to the east due to fiber optic utilities and railroad right-of-way. The analytical reports are located in Appendix B. Soil sampling and analytical methods are discussed in Appendix III.

Based on the field screening data, the vertical extent of the petroleum impacts appears to be limited from 19 to 21 feet bg at TB-02, TB-03, and TB-05. The horizontal extent appears to be defined to the west by TB-04. The horizontal extent of petroleum impacts appear to extend 15 feet to 20 feet to the east, northeast and southeast of the former tank vault at TB-02, TB-03 and TB-05. Figure 3 depicts the test boring locations. Figures 5, 6 and 7 depict the cross-section locations and cross-section maps including soil head space results. Test borings could not be advanced to the north or to the south of the former tank vault, due to the grain storage silos extending approximately 250 feet to the north and the building extending approximately 350 feet to the south.

4.9 Is surface soil contamination present at the site (i.e., soil in the uppermost 2 feet that is visibly stained, contaminated at greater than 10 ppm (PID) or petroleum saturated)? ☐ *Yes* ☒ *No*

If *YES*, attach site map identifying extent(s) of surface soil contamination (Section 14). If borings were used to define extent, complete Table 4.

4.10 Attach Table 5 - Other Contaminants Detected in Soils (Petroleum or Non-petroleum Derived). Discuss the possible sources of these compounds.

Other petroleum contaminants were not detected in the soil samples collected at the site.

4.11 Is contaminated soil in contact with ground water? ☐ *Yes* ☒ *No*

If *YES* or if ground water contamination appears likely, then complete Section 5.

If *NO* (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? **The distance was measured during site activities.**

Approximately 10 feet.

The soil impacts appear to be limited to the fine to medium grained sand or clayey sand within the less permeable clay matrix. The contaminated soil is underlain by very stiff clay. The intermittent groundwater encountered at the site appears to be associated with sand layers within the clay layer. Based on the relative lack of measurable groundwater in test borings TB-04 and TB-05, a shallow continuous aquifer does not appear to be present beneath the site.

4.12 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.

Mottling was not observed in soil samples recovered during the drilling activities.

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

If *YES*, a ground water contamination assessment is not necessary as part of the LSI.

The petroleum contaminated soil at the site appears to be underlain by a very stiff clay layer. The groundwater encountered at the site may be associated with sand layers within the less permeable glacial till. The groundwater does not appear to represent a continuous aquifer. Groundwater was encountered and sampled at borings TB-01, TB-02, and TB-03 to the east and southeast of the former tank vault location. Groundwater was not encountered at the other test borings advanced at the site or groundwater or was encountered, but in insufficient quantities for sample collection. The groundwater appears to be a non-continuous water table and does not appear to represent a resource aquifer as defined by the MPCA.

If *NO*, a ground water contamination assessment is necessary. Complete Section 5.

Section 5: Aquifer Characteristics/Ground Water Contamination Assessment

Complete Section 5 if groundwater has been contaminated or may become contaminated. Aquifer determination is made during the LSI. It is based upon the stratigraphy and a hydraulic conductivity measurement calculated from grain size distribution analysis. The site stratigraphy gives the context within which the hydraulic conductivity measurement can be interpreted. Please refer to Guidance Document 4-01 *Soil and Ground Water Assessments Performed during Site Investigations* for methods and requirements.

5.1 Provide an average hydraulic conductivity value (K) measured:

K = 2.55 x 10^{-2} ft/day

Indicate the method of measurement (i.e., Hazen, Masch and Denny, Kozeny-Carmen, etc.):

Grain-size distribution approximations were conducted using *ASTM D422* and calculated using the Hazen method.

Indicate the locations and depths of soil samples submitted for grain size analyses. Provide the results of grain size analyses and other information used for the determination of K-values in Appendix F.

TB-01(25') – typical of groundwater bearing sand layer which underlies a stiff clay layer.
TB-04(23') – typical of clayey sand underlying the water-bearing sand layer.

See Appendix VI for results of grain size analyses.

5.2 Calculate a range for aquifer transmissivity (T) using the equation T = Kb, where b is the thickness of the aquifer:

T_{High} = ??? ft^2/day
T_{Low} = ??? ft^2/day

Determine the aquifer thickness (b) from geologic logs of soil borings, water well logs, and available published information. Attach water well logs in Appendix D. If the transmissivity of a contaminated hydrogeologic unit is greater than 50 ft^2/day, it is considered an aquifer (for the purpose of the Petroleum Remediation Program), and monitoring wells will be necessary.

5.3 Discuss in detail the site geology and stratigraphy, including a discussion of local and regional hydrogeology, using soil boring data and cross sections, geologic logs of near-by water wells, and available published information.

The subject property is relatively flat at approximately 835 feet above mean sea level (MSL). According to the Minnesota Geological Survey (MGS), Geologic Atlas of Hennepin County, Minnesota (County Atlas Series Atlas C-4, 1989), the surficial geology is associated with terrace deposits and primarily consists of sand, gravelly sand, and loamy sand overlain by thin layers of silt, sand, loam or organic sediment. The depth to bedrock is reportedly less than 50 feet. The terrace deposits overlie the Platteville-Glenwood Formation, which consists of dolostone and limestone underlain by green, sandy shale. According to the MGS publication the groundwater elevation in the Quaternary geology is at approximately 810 feet above MSL and groundwater flow is toward the Mississippi River to the east.

5.4 Attach Table 6- Water Level Measurements and Depths of Water Samples Collected from Borings. Indicate the method used to measure the water levels in borings and the depth water samples were collected from borings. Allow water levels in borings to equilibrate to static conditions and then adjust the effective screened intervals in borings to intercept the static water table prior to water sample collection. Discuss groundwater flow direction.

Table 6
Water Level Measurements and Depths of Water Samples Collected from Borings

	Soil Boring									
	TB-01	**TB-02**	**TB-03**	**TB-04**	**TB-05**					
Static Water level depth (ft)	**21.0**	**23.0**	**26.5**	**NM**	**NM**					
Sampled Depth (ft)	**22-27**	**23-28**	**24-29**							

Describe in Appendix C, the methods and procedures used to measure water levels in borings.
Notes: Sample Depth is reported as the screened interval.

NM – Not Measured; groundwater not encountered in the test boring.

Groundwater flow is reportedly towards the Mississippi River to the east.

5.5 Attach Table 7 - Analytical Results of Water Samples Collected from Borings. Summarize the analytical results of groundwater samples collected as part of an LSI. Discuss the extent and magnitude of groundwater contamination. Also provide a discussion on QA/QC, including information on the samples collected and laboratory analyses performed.

Table 7
Analytical Results of Water Samples Collected from Borings and Industrial Well

Boring Number	Date Sampled	Sample Depth	Benzene	Toluene	Ethyl benzene	Xylenes	MTBE	GRO	DRO	Lab Type
TB-01	6/1/2005	22-27	< 1.0	< 1.0	< 1.0	< 3.0	< 1.0	NS	560	Fixed Based
TB-02	6/1/2005	23-28	< 1.0	1.3	< 1.0	3.4	< 1.0	NS	5,500	Fixed Based
TB-03	6/2/2005	24-29	< 1.0	< 1.0	< 1.0	< 3.0	< 1.0	NS	120	Fixed Based
W-1	6/1/2005	30	< 1.0	< 1.0	< 1.0	1.9	< 1.0	NS	120,000	Fixed Based
Trip Blank	6/1/2005	ND	ND	ND	ND	ND	ND	NA	NA	Fixed Based
HRL			10	1,000	700	10,000				

Report results in ug/L. Use less than symbols to show detection limit. Indicate mobile or fixed based in the lab type column.
Notes: Sample Depth is reported as the depth to water (ft).

< - Less than Estimated Quantitation Limit (EQL).
NA – Not Applicable
ND – Not Detected.
NS – Not Sampled.
W-1 – On-site industrial well.

The analytical results are reported as micrograms per liter (ug/L) or parts-per-billion. .

Groundwater was encountered and sampled at borings TB-01, TB-02, and TB-03 to the east and southeast of the former tank vault. Groundwater in sufficient quantities for sampling was not encountered at the other test borings advanced at the site. The groundwater samples were analyzed for volatile organic compounds (VOCs) and diesel range organics (DRO). Laboratory analysis of groundwater at TB-01, located directly to the east of the former fuel storage vault, did not detect BTEX and MTBE compounds above the Estimated Quantitation Limit (EQL). DRO was quantified at a concentration of

560 ug/L. Concentrations of toluene, xylenes, and DRO at TB-02, located to the southeast, were reported at 1.3 ug/L, 3.4 ug/L, and 5,500 ug/L respectively. Benzene, MTBE, and ethyl benzene concentrations were not detected above the EQL at TB-02. Laboratory analysis of the groundwater sample collected at TB-03, located to the southeast, did not detect BTEX and MTBE concentrations at or above the EQL. A DRO concentration of 120 ug/L was quantified at TB-03. The analytical reports are located in Appendix II. Groundwater samping and analytical methods are discussed in Appendix III.

The analytical results from the groundwater entering the on-site industrial well W-1 indicated toluene and DRO concentrations of 1.9 and 120,000 ug/L, respectively.

Attach Table 8 - Other Contaminants Detected in Water Samples Collected from Borings (Petroleum or Non-petroleum Derived). Discuss the possible sources of these contaminants and provide a discussion of QA/QC information.

See Table 8 on next page.

Table 8
Other Contaminants Detected in Water Samples
Collected from Borings and Industrial Well (Petroleum or Non-petroleum Derived)

Boring Number	Date Sampled	1,3,5 Trimethyl benzene	1,2,4-Trimethyl-benzene	Sec-Butyl benzene	p-Isopropyl-toluene	n-Butyl benzene	Isopropyl benzene	Naphthalene	Acetone	Chloro-methane	MEK	Bromo-methane
TB-01	6/1/2005	ND	ND	1.4	ND	ND	ND	69	7.3	ND	ND	ND
TB-02	6/1/2005	7.5	2.3	8	4.8	3.5	1.8	34	17	ND	5.9	ND
TB-03	6/2/2005	ND	ND	ND	ND	ND	ND	ND	7.5	180	ND	2.9
W-1		1.1	11	1.6	2.2	2.0	ND	18	30	ND	ND	ND
Trip Blank	6/2/2005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
HRL (ug/L)		NA	NA	NA	NA	NA	NA	NA	700	NA	300	10

Report results in ug/L. Indicate other contaminants (either petroleum or non-petroleum derived) detected in water samples collected from the borings, temporary wells or push probes.
Notes:

ND – Not detected above EQL.

Other contaminants were detected in the groundwater samples from test borings TB-01, TB-02, and TB-03. These contaminants are primarily associated with petroleum. Most of the compounds detected do not have Minnesota Department of Health (MDH) Health Risk Limits (HRLs). For those compounds that do have HRLs, the concentrations were detected below MDH HRL values. The source of the other contaminants is unknown.

5.6 Laboratory certification number: **Pace Laboratories No. 027-053-137**

Additional Ground Water Investigation

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

Section 6. Extent and Magnitude of Ground Water Contamination

6.1 Discuss drilling and installation of wells, including the rationale for their locations. Attach boring logs in Appendix D.

6.2 Attach Table 9 - Monitoring Well Completion Information.

6.3 Attach Table 10 - Summary of Water Levels Measured in Wells.

6.4 Attach Table 11 - Analytical Results of Water Samples Collected from Wells. Indicate here whether samples were purged or unpurged (see Guidance Document 4-05). If purged, indicate purging method.

6.5 Attach Table 12 - Other Contaminants Detected in Water Samples Collected from Wells (Petroleum or Non-Petroleum Derived). Indicate here whether samples were purged or unpurged (see Guidance Document 4-05). If purged, indicate purging method.

6.6 Describe the extent and magnitude of the ground water contamination. Discuss the presence of non-petroleum compounds, if detected, and identify possible sources of these compounds. Also provide a discussion on QA/QC, including information on the samples collected and laboratory analyses performed.

6.7 Is there a clean or nearly clean (below HRLs) down-gradient monitoring well located along the longitudinal axis of the contaminant plume? (approximately 20 degrees plus or minus the axis) ☐*Yes* ☐*No*

6.8 Is there a worst case well completed through the source area(s) of the release? ☐*Yes* ☐*No*

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

6.9 Provide an estimate of the longitudinal length of the dissolved _____ feet

contaminant plume:

6.10 Calculate groundwater flow velocity (based on Darcy's Law) using the average K-value, average horizontal hydraulic gradient, and effective porosity. Provide documentation in Appendix F.

Hydraulic Conductivity (K) = Method
Porosity (n) = method/reference
Average horizontal gradient (dh/dl) =
Calculated GW velocity (v) = cm/s ft/day

6.11 Using the calculated groundwater flow velocity (above), is there a receptor within a five-year travel time? ☐*Yes* ☐*No*

If *YES*, provide the unique well number and identify the location of the receptor(s).

6.12 Were any deep monitoring wells completed at the site? ☐*Yes* ☐*No*

If *YES*, list them and indicate their depths:

Contact the MPCA project hydrologist before installing a deep monitoring well. A deep monitoring well may be necessary if: 1) Contamination exists more than 10 feet below the water table or 2) the impacted aquifer is a drinking water aquifer or is hydraulically connected to the aquifer(s) presently utilized by a water supply well located within 500 feet of the release source.

If contamination is present at depth in the aquifer or in deeper aquifers, additional deep wells may be required. Provide the following information if deep wells are installed:

Vertical Gradient (dv/dl)
Inferred GW Flow Direction

Provide the following information for the deep aquifer unit if it appears to be hydrogeologically distinct from the upper unit.

Porosity (n):
Hydraulic Conductivity (K)

Submit this RI report after completing a minimum of *two quarterly sampling events.* Groundwater monitoring should continue until MPCA response is received.

Section 7: Evaluation of Natural Attenuation

Refer to the Guidance Document 4-03 *Assessment of Natural Attenuation at Petroleum Release Sites.* **Note**: Evaluation of natural attenuation is not required unless requested by MPCA staff.

7.1 Attach Table 13 - Natural Attenuation Parameters. Discuss the results. Specifically, compare the concentrations of the inorganic parameters inside and outside the plume.

7.2 In your judgment, is natural biodegradation occurring at this site? Please explain. ☐*Yes* ☐*No*

If active remediation is anticipated, discuss reasons why natural attenuation (including biodegradation) can not adequately remediate the contaminants to acceptable risk levels.

Section 8: Well Receptor Information/Assessment

Include in Appendix E, copies of the water supply well logs obtained from MGS, MDH, drillers, and where applicable, from County well management authorities.

8.1 Attach Table 14 - Properties Located Within 500 Feet of the Release Source. Provide a map identifying the features listed in Table 13.

Table 14
Properties Located Within 500 Feet of the Release Source.

# (From Map)	Property Address	Water Well (Y or N)	How Determined*	Well Use**	Public Water Supply (Y or N)	Confirmed By City (Y or N)	Basement Or Sumps (Y or N)	Possible Petroleum Sources (Y or N)	Comments (including property use)
Site	3745 Hiawatha Avenue	Y (502')	PC	I (not being used)	Y	N	Y	Tank Closed in Place	ADM Mill
1	37th St. & Hiawatha Ave.	Left Survey Letter - No Response							EZ Storage
2	37th & Dight	Left Survey Letter - No Response							General Mills Grain Storage
3	3648 Snelling Avenue	N	PC		Y	N	N	N	Warehouse
4	3644 Snelling Avenue	Left Survey Letter - No Response							Residence
5	3112 37th Street	Left Survey Letter - No Response							Residence
6	3101 37th Av & 3703-3711 Dight & 3704-3712 Snelling	N	PC		Y	N	N	N	KAM Stratamatic, SC Imports, etc
7	3716 Dight Avenue	N	PC		Y	N	Y	Y (mineral oil tank)	General Mills Grain Storage
8	3720 Snelling Avenue	Left Survey Letter - No Response							Residence
9	3724 Snelling Avenue	Left Survey Letter - No Response							Residence
10	3728 Snelling Avenue	N	PC		Y	N	Y	N	Residence
11	3732 Snelling Avenue	Left Survey Letter - No Response							Residence
12	38** Hiawatha Ave.	Left Survey Letter - No Response							Land O' Lakes
13	3801 30th Avenue	Left Survey Letter - No Response							Residence
14	2920 38th Street	N	PC		Y	N	Y	N	Cardinal Bar
15	3737 29th Avenue	Left Survey Letter - No Response							Residence
16	3733 29th Avenue	N	PC		Y	N	Y	N	Residence

**E.g., visual observation, personal contact, telephone, returned postcard, assumed (i.e., no postcard returned).*

***E.g., domestic, industrial, municipal, livestock, lawn/gardening, irrigation.*

PC = Personal contact.
DO = Domestic water supply well.
I = Industrial water supply well.
NA = Not Applicable.
Unk = Unknown.
RL=Returned survey letter.

8.2 Were all property owners within 500 feet of the release source successfully contacted to determine if water wells are present? **If *NO***, please explain. ☒*Yes* ☐*No*

The individual property owners were contacted and interviewed during the 500-foot survey. A survey letter with a stamped return envelope was left at those residences where the property owner was absent at the time of the survey.

8.3 Attach Table 15 - Water Supply Wells Located within 500 Feet of the Release Source and Municipal or Industrial Wells Within ½ Mile.

Table 15
Water Supply Wells Located Within 500 Feet of the Release Source and Municipal or Industrial Wells Within ½ Mile

Unique Well #	Ground Elevation	Total Depth (ft)	Base of Casing (ft)	Static Elevation	Aquifer	Use	Owner	Distance & Direction from source
00200602	835 ft	502	238	775 ft	OPDC	Industrial	ADM - Atkinson	On Site
00559411	833 ft	410	245	758 ft	CJDN	Industrial	Chemstar	1800 ft SW

Notes:

Figure 9 depicts wells within one-half-mile from the site. The well logs are included in Appendix E.

8.4 Discuss the results of the ground water receptor survey and any analytical results from sampling conducted at nearby water wells. Comment on the risks to water supply wells identified within 500 feet from the release source as well as the risk posed by or to any municipal or industrial wells found within ½ mile. Specifically indicate whether water supply wells identified utilize the impacted aquifer. (Note: an impacted aquifer separated from another aquifer by a clay lens may not be considered a separate aquifer).

There is one industrial well (W-1) on site (Figure 5). The well is 502 feet deep, and is cased to 238 feet. The static water level is approximately 60 feet deep. An ADM employee noticed a petroleum odor within the well casing upon removing the locking cover. Summit screened the air within the well casing with a PID and documented a maximum organic vapor concentration of 39 ppm. Water appears to be entering the well at approximately 30 feet bg. Summit collected a sample of the water entering the well (W-1) at 30 feet bg using a disposable bailer. Laboratory analytical results indicate concentrations of 120,000 ug/L of DRO.

8.5 Is municipal water available in the area? ☒*Yes* ☐*No*

8.6 Are there any plans for ground water development in the impacted aquifer within ½ mile of the site, or one mile down-gradient of the site if the aquifer is fractured? Please give the name, title and telephone number of the person that was contacted for this information (below). ☐*Yes* ☒*No*

Name: **Mr. Paul Ogren**
Title: **Engineer Department**
Telephone: **612-673-2456**

Section 9: Surface Water Risk Assessment

9.1 Are there any surface waters or wetlands located within ¼ mile of the site? ☐*Yes* ☒*No*

If *YES*, list them:

Also list any potential pathway such as ditches, drain tiles, storm sewers, etc., that may lead to the identified surface water features.

9.2 If surface water is present down-gradient of the site, is there a clean down-gradient monitoring well (temporary or permanent) located between the site and the surface water?

☐*YES*
☐*NO*
☒*N/A*

9.3 If you answered ***NO*** to question 9.2, we assume that contamination discharges to surface water. Therefore, complete the following information:

Name of receiving water:	
Receiving water classification	
ORVW?	☐*Yes* ☐*No*
Plume width, (W):	feet
Plume thickness, (H):	feet
Hydraulic conductivity, (K):	gal/day/ft^2
Horizontal gradient, (dh/dl):	(unit less)
Discharge, (Q) = H*W*K*(dh/dl)/1440	gal/min
Applicable chronic standard (7050 or 7052)	
Applicable max. standard (7050 or 7052)	
Applicable FAV (7050 or 7052)	
Contaminant concentration in ground water	

9.4 If you answered ***YES*** to question 9.2, identify the clean down-gradient boring or monitoring well, the distance to the surface water feature, and discuss the contamination risk potential.

Section 10: Field-Detectable Vapor Risk Assessment/Survey

10.1 Is there a history of vapor impacts in the vicinity of the site? ☐*Yes* ☒*No*

If *YES*, describe:

10.2 Is there any indication that free product or contaminated ground water may be traveling off-site within the utility corridors? ☐*Yes* ☒*No*

If *YES*, utility backfill investigation is required (refer to Guidance Document 4-01). Discuss the investigation rationale and results.

10.3 Discuss the potential for vapor migration/accumulation near the site. Your discussion should consider: Soil types, product type, presence and distribution of free product or high concentrations of dissolved product. Also, using cross-sections to illustrate the relationship, 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 and sumps.

The potential for the petroleum hydrocarbon impacts migrating at the site appears relatively low. The local non-continuous groundwater table was encountered at a depth of 21 to 26.5 feet bg. The sanitary sewer utility conduit for the site is located south of the investigation area. The water supply line is located outside the area of petroleum impacts. There is a fiber-optic line located adjacent to the petroleum investigation area; however, the line is buried at a depth that is assumed to be above the documented petroleum impacts.

10.4 Conduct a vapor survey if the vapor risk assessment indicated a risk of vapor impacts to buildings or utilities. Ask occupants of nearby buildings if they have smelled petroleum odors. See Guidance Document 4-02 *Potential Receptor Surveys and Risk Evaluation Procedures at Petroleum Release Sites*. Identify all vapor monitoring locations on an attached site map by labeling each monitoring location with a number. Tabulate the list of vapor monitoring locations in Table 16. Vapor monitoring methods, including instruments used, must be discussed in Appendix C. Provide a detailed description of each vapor monitoring location and an interpretation of the vapor monitoring results below.

PID measurements indicate organic vapors were not observed above the instrument detection limits. Based on the site geology and hydrogeology, along with the absence of utility conduits in the area of soil impacts, the potential for vapor migration and accumulation appears to be relatively low. A vapor survey was conducted in adjacent sanitary sewer and storm sewer manholes. Figure 4 presents vapor survey locations.

10.5 Attach Table 16 - Results of Vapor Monitoring.

Table 16
Results of Vapor Monitoring

Location # and description	Date	PID reading (ppm)	Percent of the LEL
S-1 – storm drain northwest	6/1/05	0	0
S-2 – storm drain northwest	6/1/05	0	0
S-3 – storm drain northwest	6/1/05	0	0
S-4 – storm drain southwest	6/1/05	0	0
S-5 – storm drain southwest	6/1/05	0	0
S-6 – storm drain southwest	6/1/05	0	0
MH-1 – sewer maintenance hole south	6/1/05	0	0
MH-2 – sewer maintenance hole south	6/1/05	0	0
MH-3 – sanitary sewer maintenance hole	6/1/05	0	0

Notes: Location numbers must match locations on the site map. Provide a brief description of the monitoring point (e.g., sump, basement corner, sanitary sewer manhole, storm sewer basin, etc.).

Section 11: Soil Gas-Based Vapor Intrusion Screening Assessment

11.1 When significant contamination and receptors are present at a site, a vapor intrusion screening assessment must be conducted (See Guidance Document 4-01a *Vapor Intrusion Assessments Performed during Site Investigations*). Soil gas samples must be completed in the worst case area and at four radial points within a 100' radius. The radial points should be located near inhabited buildings, if there are four or less. If not, they should be located uniformly within the 100' radius. Was this done? ☒*Yes* ☐*No*

***If NO**, explain why.*

11.2 Do any of the soil gas samples from points located near inhabited buildings exceed the action levels found in GD 4-01a? ☐*Yes* ☒*No*

If *YES*, is sub-slab vapor or indoor air sampling needed for these buildings? *Describe and discuss locations needing further assessment.* ☐*Yes* ☐*No*

11.3 Has sufficient data been collected to propose a conceptual Corrective Action Design (CAD) for buildings that are likely to be impacted by elevated soil gas levels and/or field detectable vapor impacts? *Describe your justification for corrective action and proposed conceptual CAD.* ☒*Yes* ☐*No*

Based on the relative lack of soil gas vapors in the samples collected during the LSI, the likelihood for vapor impacts to the on-site structures appears to be minimal.

11.4 Do any of the soil gas samples from the non-building specific samples within the 100' radius exceed action levels? ☐*Yes* ☒*No*

If *YES*, and there are many inhabited buildings nearby, is additional building specific soil gas sampling recommended for all these buildings? *Describe your proposal for additional sampling. **If NO**, explain.* ☐*Yes* ☒*No*

☐*Yes* ☒*No*

Additional soil gas sampling is not warranted at this time due to the lack of nearby inhabited buildings on and adjacent to the site.

If *YES*, are additional soil gas samples recommended to assess the full extent of the soil gas cloud? *Describe your proposal for additional sampling. **If NO**, explain.*

See comment in Section 11.4.

11.5 Were recommended field sampling procedures and QA/QC from Guidance Document 4-01a followed? Were required laboratory QA/QC ☒*Yes* ☐*No*

objectives met?
If NO, explain why and discuss implications on data quality.

11.6 Include a map (Section 14) which shows locations of all soil gas samples and buildings within and at the 100' radius and locations of all soil gas samples exceeding action levels. Include other locational information that may help in evaluating the questions above.

Figure 3 depicts the soil vapor intrusion sample locations. Three soil vapor intrusion samples were completed at the locations based on telephone conversations with the MPCA on June 1, 2005. Based on the site configuration and conditions, a total of three soil gas samples were determined to be sufficient for this site. The vapor concentrations did not exceed the MDH Acute HRL values. Benzene (SV-1, 2 and 3), 1,3-Butadiene (SV-1, 2 and 3), and Trichoroethene (at SV-2) exceeded the MDH Chronic HRL, Chloroform (SV-2 and 3) and 1,2-Dichloroethane (SV-3), exceeded the MDH Interim Screening Concentration (ISC). Many of the exceeded samples had reporting limits higher than the reported action levels. Table 17 presents a summary of the soil vapor intrusion sampling results.

Table 17
Results of Soil Gas Sampling for Vapor Intrusion Screening

	SV-1		SV-2		SV-3					
Sample Location	Worst Case		Radial #1		Radial #2		ACTION LEVEL			
Date	6/2/05		6/2/05		6/3/15			Source: HRV, ISC, or RFC		µg/m³
Depth (feet)	8 ft		8 ft		8 ft					
COMPOUNDS	Result	Report Limit	Result	Report Limit	Result	Report Limit	MDH Acute HRV	MDH Chronic HRV	EPA RFC	MDH ISC
Acetone	17.5	0.66	9.8	0.69	14.9	0.66			350	
Benzene	**28.7**	0.90	**2.4**	0.93	**1.7**	0.9	1,000	1.3 to 4.5		
1,3-Butadiene	**45.1**	**0.62**	**9.8**	**0.64**	**6.5**	**0.62**		0.04		
2-Butanone (MEK)	13.5	0.83	9.1	0.86	16.4	0.62	10,000			
Carbon disulfide	11.3	0.87	ND	0.9	2.0	0.83	Action Level Not Listed			
Carbon tetrachloride	3.9	1.8	19.9	1.9	9.2	1.8	6,000	700		
Chloroform	ND	1.4	**3.9**	**1.4**	**6.2**	**1.4**				0.67
Chloromethane	ND	0.58	0.58	0.58	0.87	0.58	Action Level Not Listed			
Cyclohexane	ND	0.94	ND	0.9	1.7	0.94			90	6,000
1,2-Dichloroethane	ND	1.1	ND	1.1	**1.4**	**1.1**				0.38
Ethyl benzene	29.6	1.2	2.5	1.3	2.9	1.2	10,000			
4-Ethyltoluene	40.9	3.4	ND	3.6	4.5	3.4	Action Level Not Listed			
n-Heptane	35	1.1	3.3	1.2	2.5	1.1	Action Level Not Listed			
n-Hexane	29.5	0.99	ND	1	ND	1		2,000		
2-Hexanone	ND	1.2	2.1	1.2	4.3	1.1	Action Level Not Listed			
Propylene	ND	0.48	ND	0.48	8.6	0.48	Action Level Not Listed			

	SV-1		SV-2		SV-3					
Sample Location	**Worst Case**		**Radial #1**		**Radial #2**		**ACTION LEVEL**			
Date	**6/2/05**		**6/2/05**		**6/3/15**			**Source: HRV, ISC, or RFC**		**µg/m³**
Depth (feet)	**8 ft**		**8 ft**		**8 ft**					
COMPOUNDS	**Result**	**Report Limit**	**Result**	**Report Limit**	**Result**	**Report Limit**	**MDH Acute HRV**	**MDH Chronic HRV**	**EPA RFC**	**MDH ISC**
Styrene	3.8	1.2	ND	1.2	ND	1.2	21,000	1,000		
1,1,2,2-Tetrachloroethane	4.6	1.9	ND	2	ND	1.9	Action Level Not Listed			
Tetrachloroethene	ND	1.9	ND	1.9	119	1.9	20,000			3.33
Tetrahydrofuran	4.6	0.83	1.2	0.86	1.4	0.83	Action Level Not Listed			
Toluene	135	5.3	9.1	1.1	10.1	1.1	37,000	400		
1,1,1-Trichoroethane	5.7	1.5	3.5	1.6	37.6	1.5	Action Level Not Listed			
Trichoroethene	12.4	1.5	**1,260**	29.3	ND	1.5	37,000	400		
Trichlorofluoromethane	18.7	1.5	36.8	1.6	4.4	2.2	Action Level Not Listed			
1,2,4-Trimethybenzene	48.4	3.4	5.8	3.6	8.2	3.4	37,000	400		
1,3,5-Trimethybenzene	**13**	3.4	ND	3.6	ND	3.4			6	
Total Xylenes	139.8	3.6	13.5	3.8	15.5	3.6	43,000		700	

Report results in µg/m³. The Action Level should be indicated along with the source. When selecting the Action Level, keep in mind the priority of sources we have requested you use.

Notes: Priority for action level should be HRV; RFC, then ISC.
Concentrations reported in micrograms per cubic meter (ug/m³).
Bold – At or above specified reference concentration limit.
HRV - MDH Health Risk Value
RFC – EPA Reference Concentration.
ISC – MDH Interim Screening Concentration.

Section 12: Discussion

12.1 Discuss the risks associated with the remaining soil contamination:

Petroleum hydrocarbon impacts are present in the soil at the subject site. Based on the field screening measurements and soil analytical results associated with the site activities, it appears that the vertical extent of petroleum hydrocarbon-impacted is limited to an approximate two foot interval at 19 to 21 feet bg at test borings TB-02, TB-03 and TB-05. The horizontal extent appears to be limited to the area east of the building where the fuel oil vault was located. The utility lines do not appear to pass through the impacted soil associated with the subject property. Considering: 1) the geology and hydrogeology of the site; 2) the separation distance of the impacted soil above the local resource aquifer; and 3) the distance from potential receptors, Summit believes the risks associated with the remaining impacted soil appears to be relatively low.

12.2 Discuss the risks associated with the impacted ground water:

Groundwater samples were collected from three of the five test borings advanced at the site. The highest concentration of petroleum impacts in the groundwater were detected at TB-02, which is located to the southeast of the fuel oil vault. The groundwater samples collected from test borings indicated VOCs below the MDH HRLs.

A groundwater sample was also collected from the industrial well located in the maintenance shop adjacent to the former fuel storage vault. Summit collected a sample of the water that appeared to be leaking into the well casing from approximately 30 feet bg. Laboratory analytical results indicate concentrations of 120,000 ug/L of DRO. The VOC concentrations in the water sample leaking into the industrial well were below MDH HRLs. Based on the results of the water sampling, impacted groundwater appears to be entering the on-site industrial well. This well is no longer used for industrial purposes and should be properly abandoned following current MDH well sealing guidelines.

12.3 Discuss the risks for vapor intrusion associated with any soil gas impacts detected:

The petroleum vapor concentrations did not exceed the MN Acute HRL values; therefore, the risk for vapor intrusion to the surrounding subsurface structures at the site appears to be low.

12.4 Discuss other concerns not mentioned above:

Section 13: Conclusions and Recommendations

13.1 Recommendation for site:

- ☒ site closure
- ☐ additional ground water monitoring
- ☐ additional field detectable vapor monitoring
- ☐ additional soil gas/vapor intrusion investigation
- ☐ corrective action

13.2 Base the recommendation above on Guidance Document 1-01 *Petroleum Remediation Program General Policy*. Describe below how you applied the policy to support your recommendation. If closure is recommended, please summarize significant site investigative events and describe how site specific risk issues have been adequately addressed or minimized to acceptable low risk levels.

The results of the subsurface assessment accomplished several objectives:

1) The vertical extent of petroleum hydrocarbon impacts to soil has been defined and appears to be limited to a two foot interval at approximately 19 to 21 feet bg;

2) The horizontal extent of petroleum hydrocarbons have been defined to the area that can be investigated. Further drilling to the east is not possible due to railroad right-of-way issues or to the south due to a tunnel;

3) Free product has not been observed at the site;

4) The vapor risk and surface water risk appear to be relatively low; and,

5) The potential for vertical and horizontal migration of petroleum hydrocarbons observed at the site to the local utilities and subsurface structures appears to be relatively low.

Summit recommends the following:

1) The on-site industrial well be abandoned following MDH water well sealing guidelines; and

2) Based on the relative low risk and the surrounding property use, Summit recommends that the site be considered for closure status by the MPCA.

13.3 If additional ground water and/or vapor monitoring is recommended, indicate the proposed monitoring schedule and frequency. Conduct quarterly monitoring until the MPCA responds to this report.

N/A

13.4 If additional soil gas/vapor intrusion investigation is recommended, indicate whether there is risk to a specific building or whether additional soil gas definition is necessary. Provide a detailed analysis of the initial soil gas and receptor information leading to these recommendations. Provide details of proposed activities such as sub-slab vapor and/or indoor air sampling, or locations of additional borings for sampling soil gas. If vapor intrusion, or conditions indicative of a high risk of vapor intrusion, has already been established, then corrective action is required. Refer to 13.5 below.

Additional soil gas/vapor intrusion investigation is not warranted at this time.

13.5 If corrective action is recommended, provide a conceptual approach by completing Guidance Document 4-19 *Conceptual Corrective Action Design Worksheet* and include it as Appendix H. See Guidance Document 4-10 *Elements of the Corrective Action Design* for more information on the corrective action design process and other requirements. (Note: MPCA staff will review this report at a higher-than-normal priority to determine if corrective action is required.)

Section 14: Figures

Attach the following figures in order of discussion in the text:

☒ Site location map using a U.S. Geological Survey 7.5 minute quadrangle map.

☒ One or more site maps showing:

- Structures
- Locations and depths of on-site buried utilities
- All past and present petroleum storage tanks, piping, dispensers, and transfer areas.
- Extent of soil excavation
- Boring and well locations (including any drinking water wells on site)
- Horizontal extent of soil contamination
- Extent of surface soil contamination
- Soil gas sampling locations and extent of the soil gas cloud
- Horizontal extent of ground water contamination
- Location of end points for all geologic cross sections.
- Potential pathways to surface water features within ¼ mile of the site.

Distinguish sequential elements of investigations by dates, symbols, etc. in the key.

☐ Ground water gradient contour maps (for sites with monitoring wells) for each gauging event.

☒ Well receptor survey map showing 1/2 mile radius, 500 foot radius, water

supply wells, other potential sources of contamination, using a U.S. Geological Survey 7.5 minute quadrangle.

☒ Vapor survey map showing utilities and buildings with basements and monitoring locations (if a survey was required).

☒ Provide at least two (2) geologic cross sections, including utilities.

☒ Vapor intrusion assessment map showing all soil gas boring locations and buildings within and at a 100 feet radius of the worst case soil gas boring

☒ Aerial photos and Sanborn Maps of the immediate area.

Section 16: Appendices

Attach the following appendices.

☐ *Appendix I* Guidance Document 3-02 *General Excavation Report Worksheet.*

N/A

☒ *Appendix II* Laboratory Analytical Reports for Soil, Soil Gas/Sub-slab Vapor/Indoor Air/Ambient Air, and Ground Water. Include laboratory QA/QC data, Chromatograms, and laboratory certification number.

☒ *Appendix III* Methodologies and Procedures, Including Field Screening of Soil, Other Field Analyses, Soil Boring, Soil Sampling, Soil Gas/Sub-Slab/Indoor air/Ambient Air Sampling, Well Installation, and Water Sampling.

☒ *Appendix IV* Geologic Logs of Soil Borings, Including Construction Diagrams of Temporary and Permanent Wells, and Copies of the Minnesota Department of Health Well Record.

☒ *Appendix V* Copies of Water Supply Well Logs With Legible Unique Numbers.

☒ *Appendix VI* Grain Size Analysis, Hydraulic Conductivity Measurements, and Other Calculations.

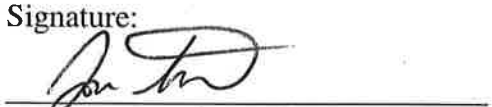
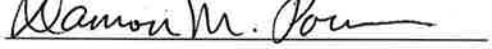
☒ *Appendix VII* Guidance Document 1-03a *Spatial Data Reporting Form.*

☐ *Appendix VIII* Guidance Document 4-19 *Conceptual Corrective Action Design Worksheet*

Section 17: 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 leak site. 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 leak site 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. R. 7000.0300 (Duty of Candor), and that the responsible person or volunteer may be liable for civil penalties.

MPCA staff are instructed to reject unsigned investigation reports or if the report form has been altered.

Name and Title:	Signature:	Date signed:
Jon Turner Geologist		8/4/05
Damon Powers Senior Project Manager		8/4/05

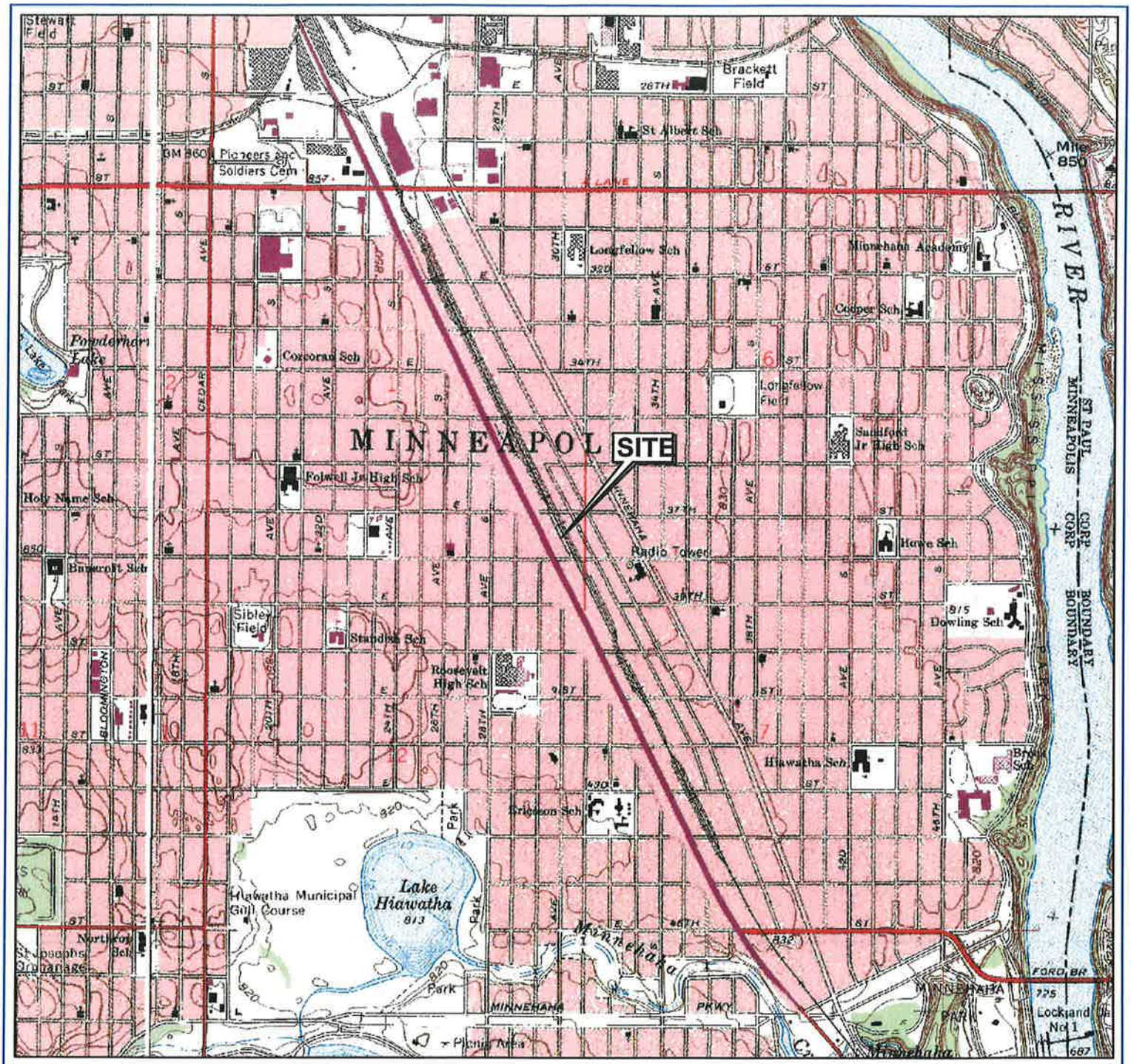
Company and mailing address: **Summit Envirosolutions, Inc.**

1217 Bandana Blvd. N

St. Paul, MN 55108

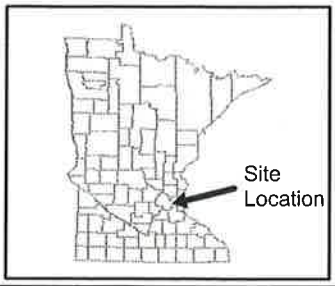
Phone: **651-644-8080**

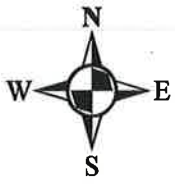
Fax: **651-647-0888**



Map adapted from USGS 7.5 minute topographic map(s): Minneapolis South, St. Paul West, MN

LEGEND





0 1,000 2,000 Feet

1 inch equals 2,000 feet
1:24,000

GENERAL SITE LOCATION MAP

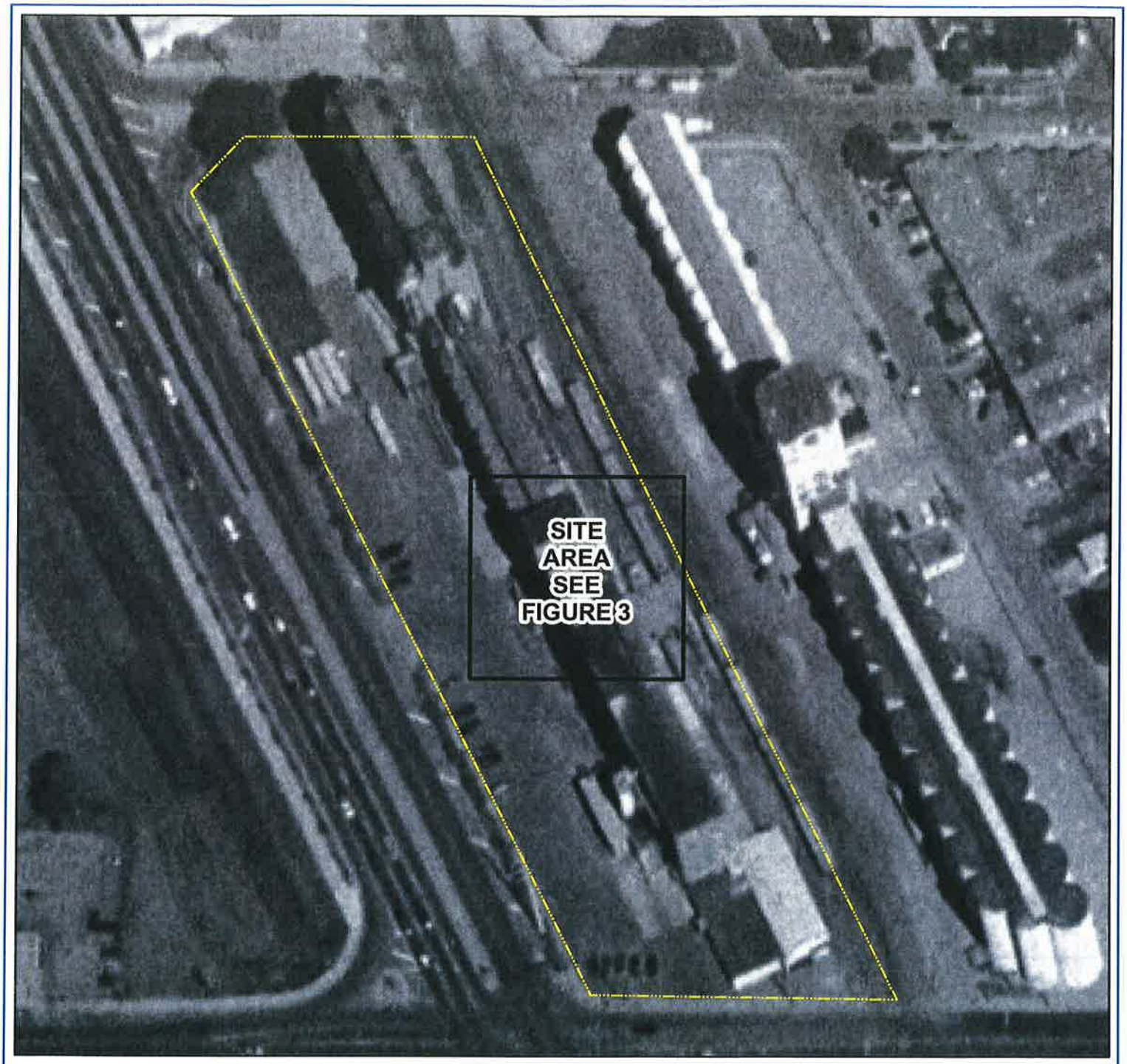
ADM-Atkinson Mill
3745 Hiawatha Avenue
Minneapolis, Minnesota

Summit Envirosolutions

Figure 1

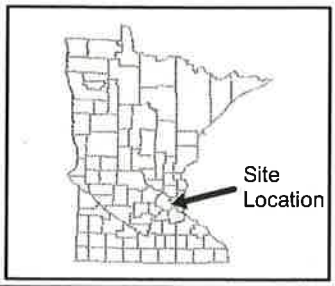
File: Fig1.mxd
Summit Proj. No.: 1710-002
Plot Date: 05-27-05
Arc Operator: PRB
Reviewed by: DMP

181973.15
1975756.51



Map adapted from Met Council DOQQ: St. Paul West-SW, MN; 2000

LEGEND



N
W E
S

0 50 100 Feet

1 inch equals 100 feet
1:1,200

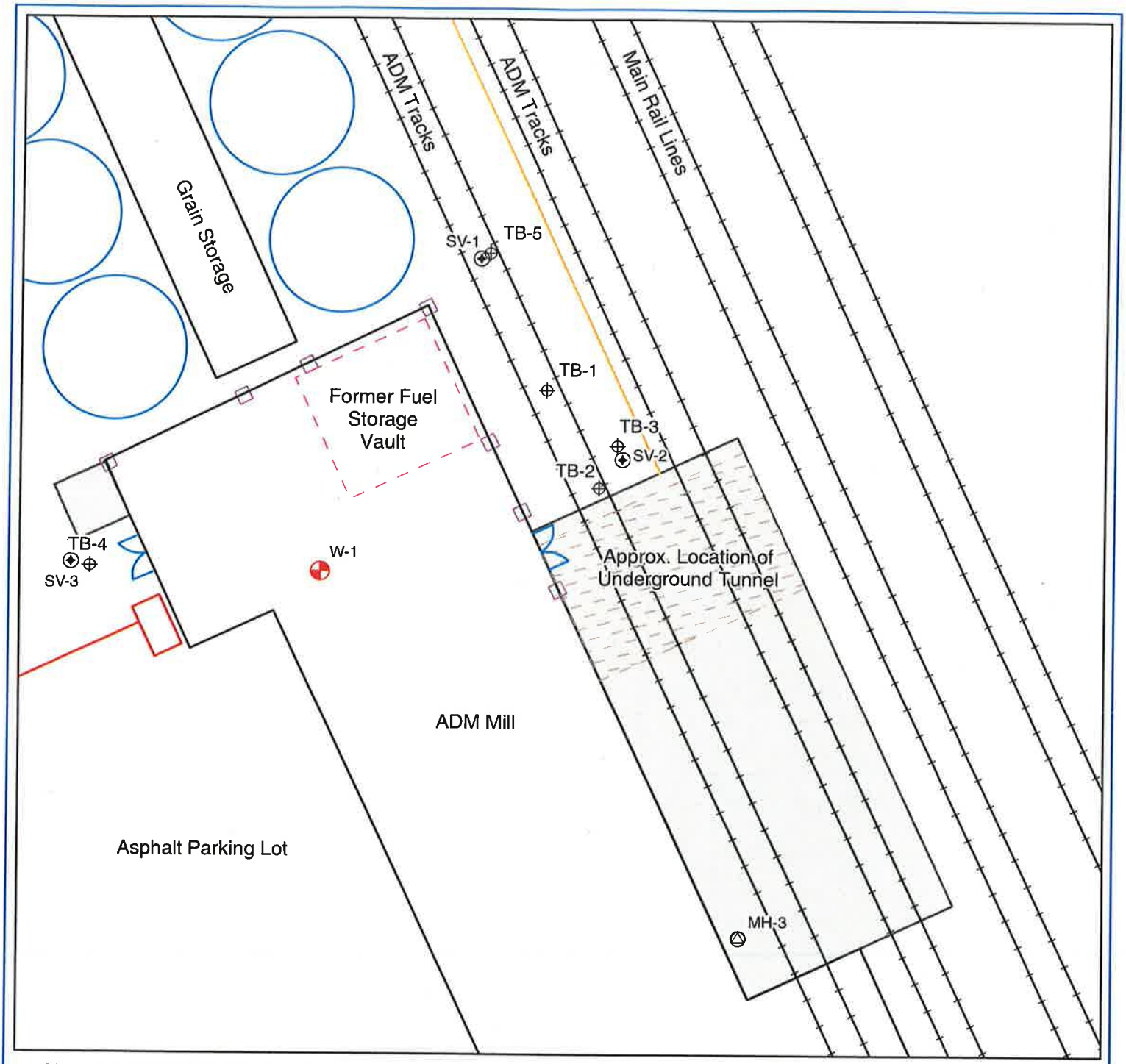
AERIAL PHOTO OF SITE

ADM-Atkinson Mill
3745 Hiawatha Ave.
Minneapolis, Minnesota

Summit Envirosolutions

Figure 2

File: Fig2.mxd
Summit Proj. No.: 1710-002
Plot Date: 05-27-05
Arc Operator: PRB
Reviewed by: DMP



Map adapted from field notes and Met Council DOQQ: St. Paul West-SW, MN; 2000

Legend

- Geoprobe test boring
- Soil vapor extraction point
- Well
- Maintenance hole
- Railroad
- Fiber optic line
- Electric line and transformer
- Former UST basin
- Tunnel
- Building
- Column
- Concrete

N W E S

Site Location

0 20 Feet

1 inch equals 20 feet

SITE MAP

ADM-Atkinson Mill
3745 Hiawatha Ave.
Minneapolis, Minnesota

Summit Envirosolutions

Figure 3

File: Fig3SiteMap.mxd
Summit Proj. No.: 1710-002
Plot Date: 06-21-05
Arc Operator: PRB
Reviewed by: DMP

Map adapted from Met Council DOQQ: St. Paul West-SW, MN; 2000

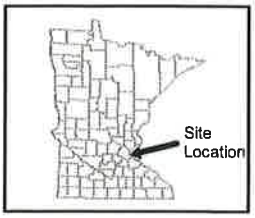
Legend

- ⊗ Storm drain
- △ Maintenance hole

0 50 100 Feet

1 inch equals 100 feet
1:1,200

N
W E
S



VAPOR RECEPTOR SURVEY MAP

ADM-Atkinson Mill
3745 Hiawatha Ave.
Minneapolis, Minnesota

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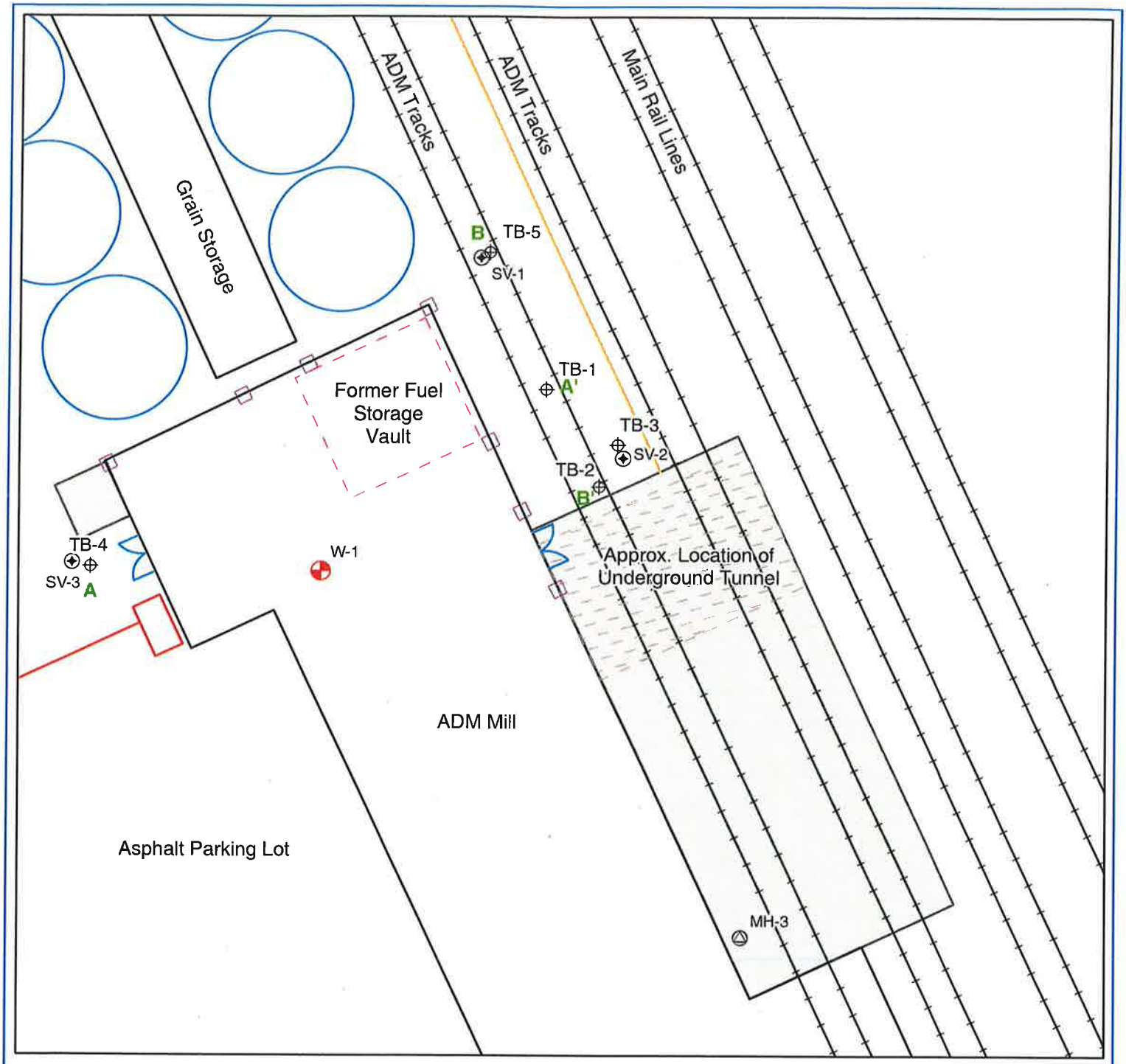
Figure 4

File: VaporReceptor.mxd
Summit Proj. No.: 1710-002
Plot Date: 06-21-05
Arc Operator: PRB
Reviewed by: DMP



Map adapted from field notes and Met Council DOQQ: St. Paul West-SW, MN; 2000

Legend

- Geoprobe test boring
- Soil vapor extraction point
- Well
- Maintenance hole
- Railroad
- Fiber optic line
- Electric line and transformer
- Line of Cross Section
- Former UST basin
- Tunnel
- Building
- Column
- Concrete

N W E S

Site Location

0 20 Feet

1 inch equals 20 feet

CROSS SECTION MAP

ADM-Atkinson Mill
3745 Hiawatha Ave.
Minneapolis, Minnesota

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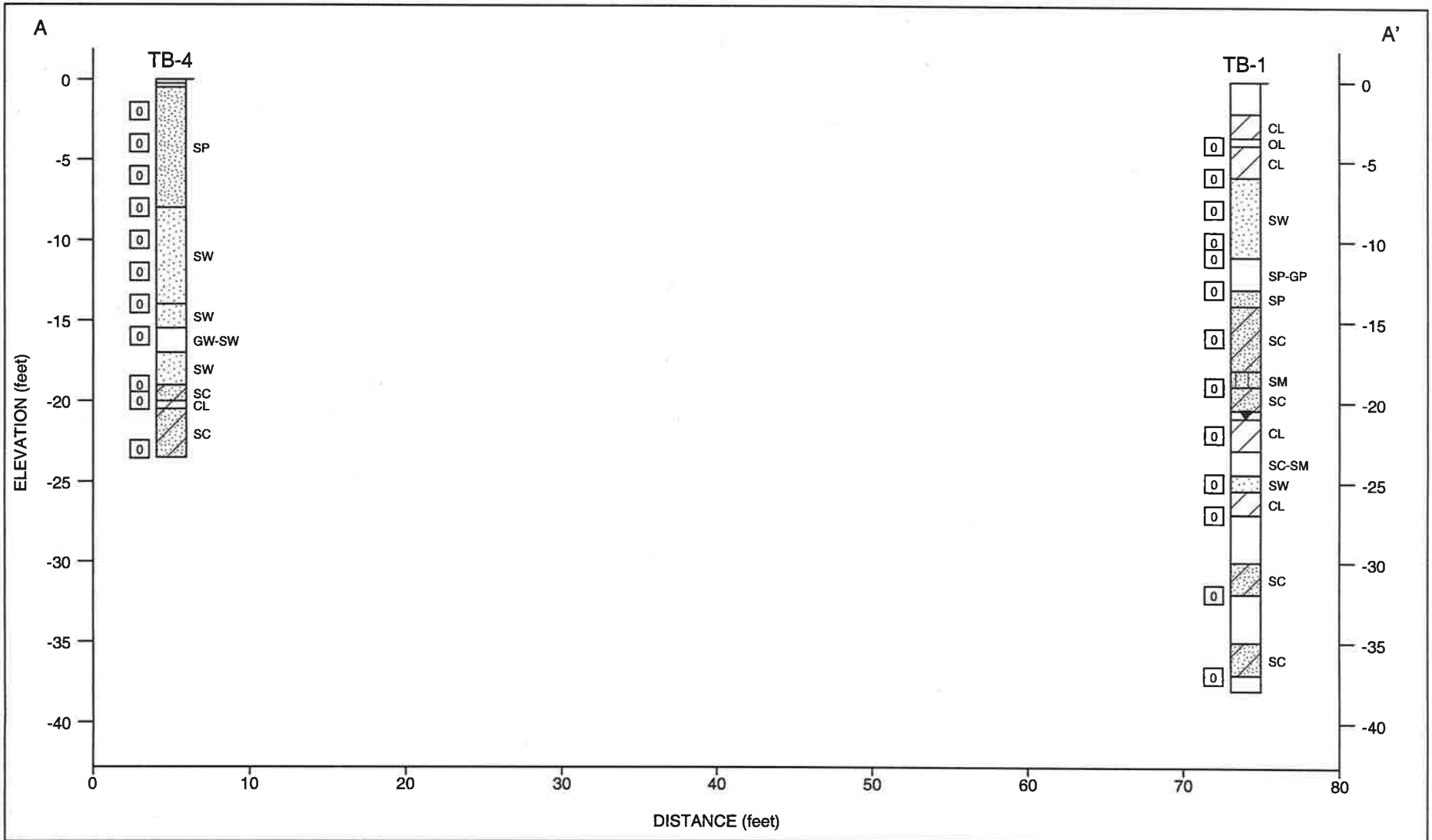
Figure 5

File: XSectionMap.mxd
Summit Proj. No.: 1710-002
Plot Date: 06-30-05
Arc Operator: PRB
Reviewed by: DMP



ADM-Atkinson Mill
3745 Hiawatha Ave.
Minneapolis, MN

Summit Project No. 1710-002

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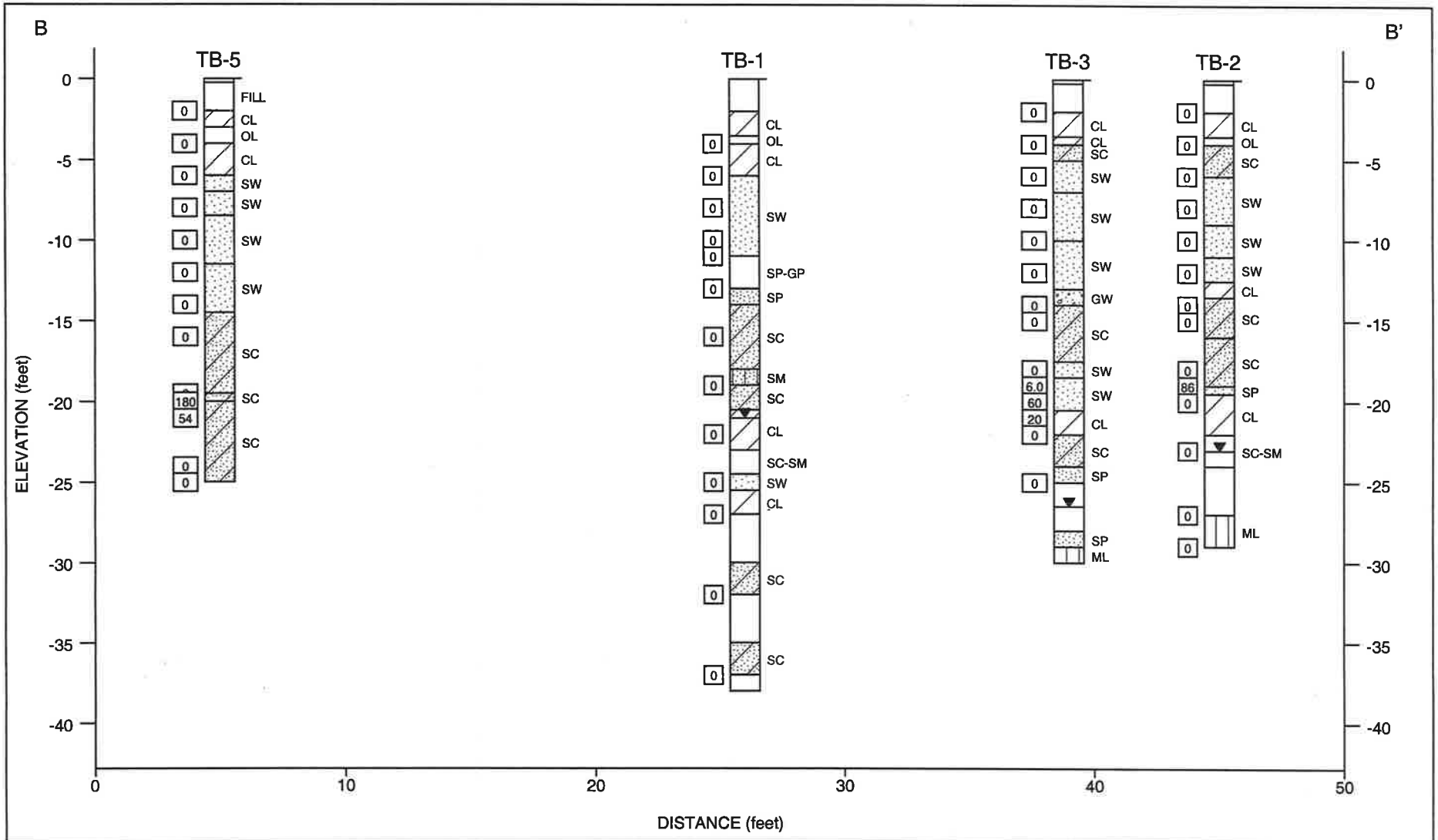
FIGURE 6

GEOLOGIC CROSS SECTION
Section A-A'

LEGEND

- GW: Well Graded Gravel
- GP: Poorly Graded Gravel
- SW: Well Graded Sand
- SP: Poorly Graded Sand
- SM: Silty Sand
- SC: Clayey Sand
- CL: Inorganic Clay
- OL: Organic Silt

06-30-2005 s:\Projects\QRS\StanleyConsultants1710\ADM_Minneapolis002\Field\CrossSection\A-A'.CRO



ADM-Atkinson Mill
3745 Hiawatha Ave.
Minneapolis, MN

Summit Project No. 1710-002

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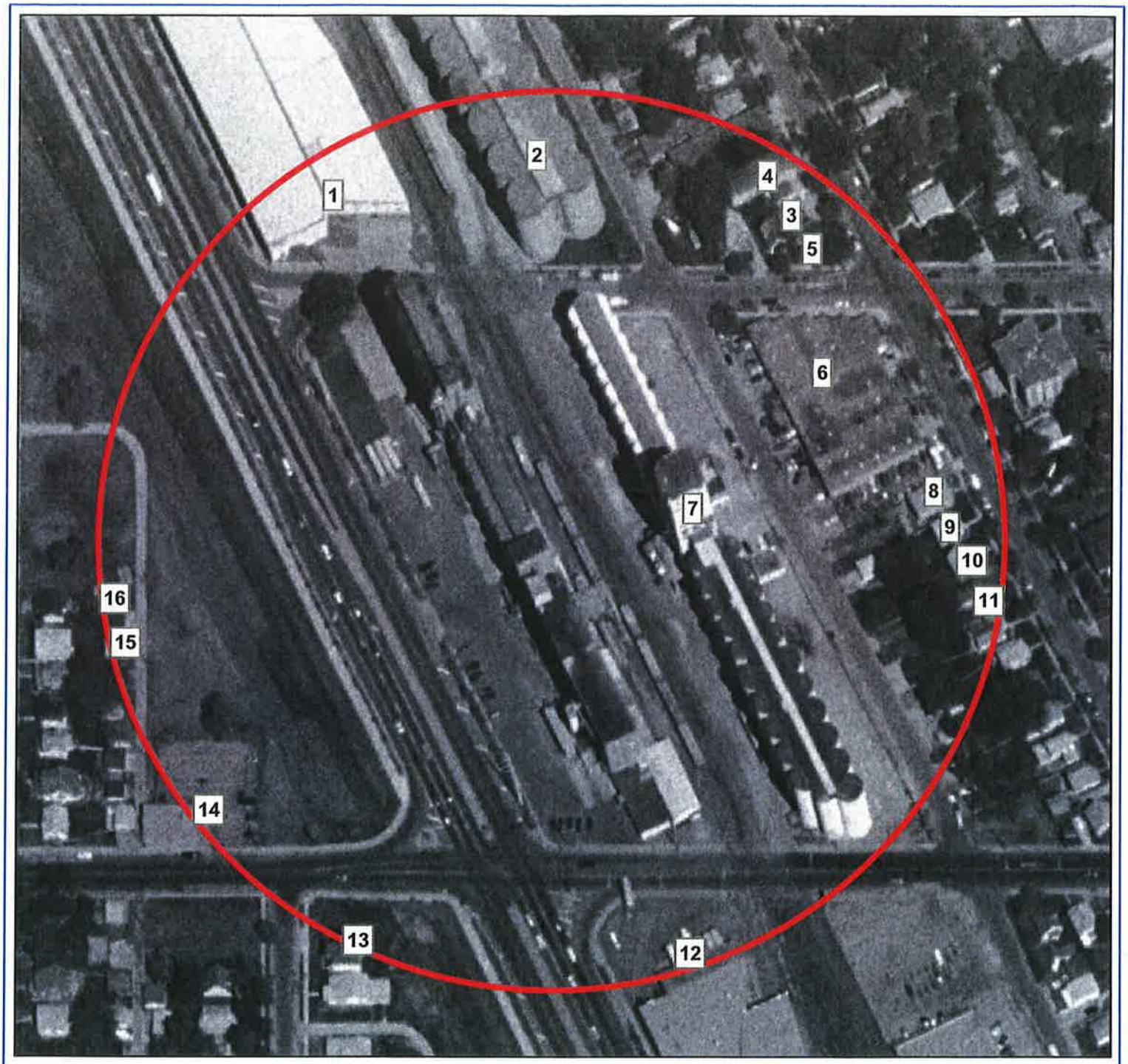
FIGURE 7

GEOLOGIC CROSS SECTION
Section B-B'

LEGEND

- GW: Well Graded Gravel
- GP: Poorly Graded Gravel
- SW: Well Graded Sand
- SP: Poorly Graded Sand
- SM: Silty Sand
- SC: Clayey Sand
- CL: Inorganic Clay
- OL: Organic Silt

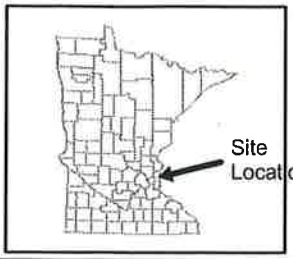
06-30-2005 s:\Projects\QRS\StanleyConsultants1710\ADM_Minneapolis002\Field\CrossSection\B-B'.CRO



Map adapted from Met Council DOQQ: St. Paul West-SW, MN; 2000

LEGEND

14 Property ID From Table 14



N

0 80 160 Feet

1 inch equals 160 feet

500 Foot Well Receptor Survey Map

ADM-Atkinson Mill
3745 Hiawatha Ave.
Minneapolis, Minnesota

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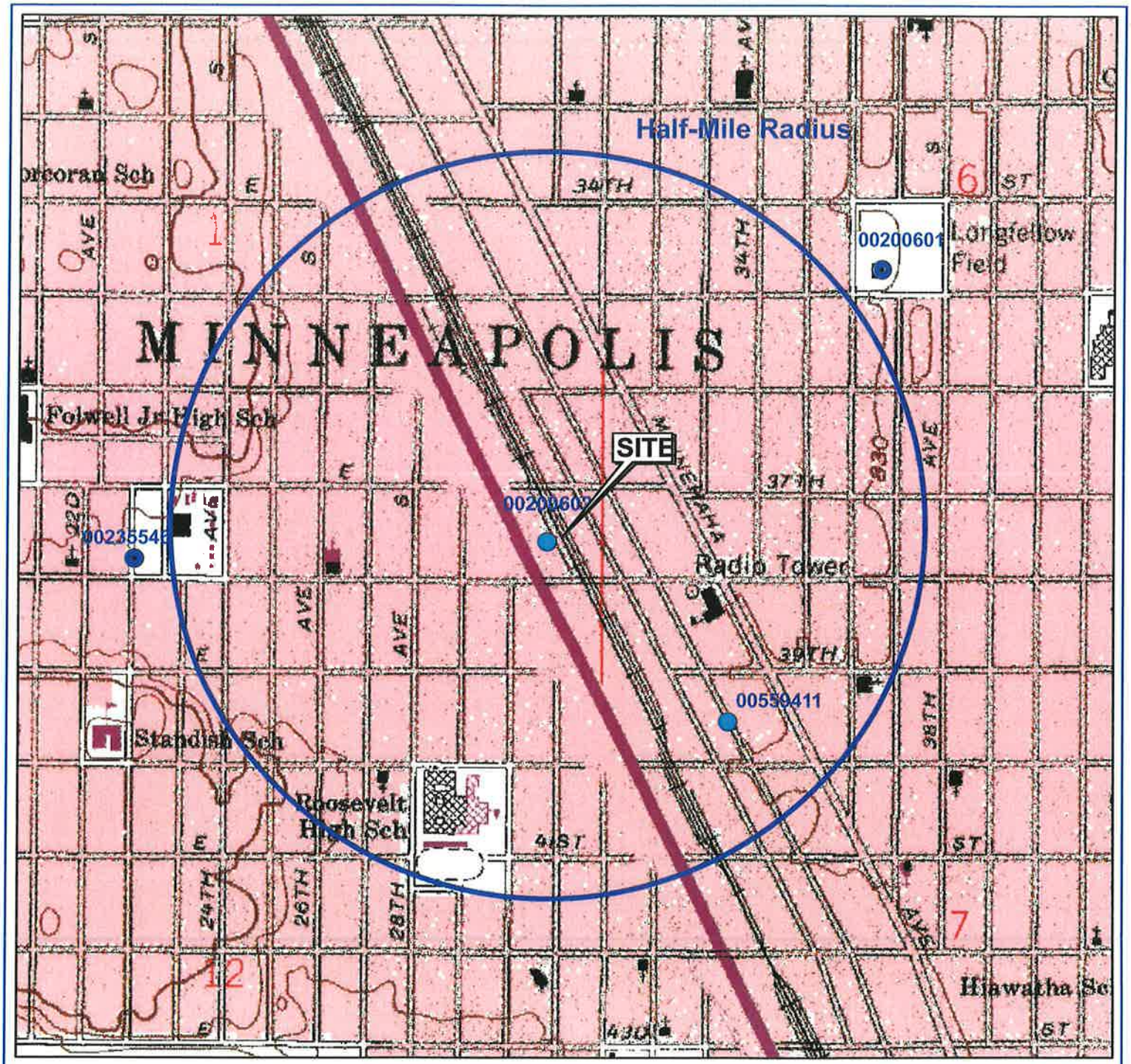
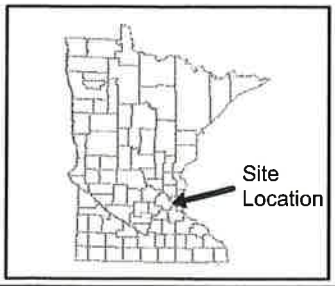
Figure 8

File: Fig2.mxd
Summit Proj. No.: 1710-002
Plot Date: 05-27-05
Arc Operator: PRB
Reviewed by: DMP



Map adapted from USGS 7.5 minute topographic map(s): Minneapolis South, St. Paul West, MN

LEGEND



CWI Wells

N

0 1,000 Feet

1 inch equals 1,000 feet
1:12,000

HALF-MILE WELL RECEPTOR SURVEY MAP

ADM-Atkinson Mill
3745 Hiawatha Avenue
Minneapolis, Minnesota

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Figure 9

File: halfmile.mxd
Summit Proj. No.: 1710-002
Plot Date: 07-01-05
Arc Operator: JLT
Reviewed by: DMP

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Summit Envirosolutions, Inc.
1217 Bandana Boulevard North
St. Paul, MN 55180-5114

Project Name	: Stanley Consultants - ADM
Summit Project No.	: 1710-002
Project Location	: Minneapolis, MN
County	: Hennepin
Form Completed By	: PRB

LOG OF BORING TB-01

Date	: 06/01/05
Company/Method	: Summit/Geoprobe
Sample Method	: Macro Core
Observer(s)	: JLT/PRB
Weather	: Cloudy 60F

Depth in feet	W.L. (ft)	PID (ppm)	GRAPHIC	DESCRIPTION	REMARKS
0				Asphalt	
-1				FILL: GRAVEL, coarse grained. (Railroad ballast)	
-2		0		CL: CLAY, dark brown to black, organic, soft.	
-3					
-4		0		OL: SILT, black, soft, trace fine sand, slightly moist.	
-5				CL: CLAY, brown, soft, trace fine sand, slightly moist.	
-6		0		SW: SAND, brown, fine to medium grained, well graded, trace fine grained gravel, slightly moist.	
-7					
-8		0			
-9					
-10		0			Iron stained sand, 1" thick at 10'.
-11		0		SP-GP: GRAVEL to SAND, brown, medium to coarse grained sand, trace fine grained sand, fine to coarse grained gravel, poorly graded.	
-12					
-13		0		SP: SAND, brown, fine grained, trace medium grained sand, trace fine grained gravel, trace clay.	
-14				SC: CLAYEY SAND, brown, fine grained, trace medium grained, trace fine grained gravel, trace silt.	
-15					
-16		0			
-17					
-18				SM: SILTY SAND, gray, fine grained, trace medium grained, trace fine grained gravel, trace clay.	
-19		0		SC: CLAYEY SAND, brown, fine grained, trace medium grained, trace fine grained gravel, trace silt, slightly moist.	
-20					
-21	▼			CL: CLAY, reddish brown, very stiff, trace fine grained sand, trace fine grained gravel, moist.	
-22		0			
-23				SC-SM: SILTY to CLAYEY SAND, reddish brown, very dense, fine grained, trace medium grained, trace clay, moist.	
-24					
-25		0		SW: SAND, brown, fine to medium grained, trace fine grained gravel, very moist to wet.	
-26				CL: CLAY, brown, stiff, trace fine grained sand, trace silt, fine grained sand stringers throughout, moist.	
-27		0			
-28				Interval Not Sampled	
-29					

End of Boring at 38 feet.
Soil Sample TB-01 (25') @ 10:45
Water Sample TB-01 @12:45
Grain Size sample at 21' and 25'.

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1217 Bandana Boulevard North
St. Paul, MN 55180-5114

Project Name : Stanley Consultants - ADM
Summit Project No. : 1710-002
Project Location : Minneapolis, MN
County : Hennepin
Form Completed By : PRB

LOG OF BORING TB-01

Date : 06/01/05
Company/Method : Summit/Geoprobe
Sample Method : Macro Core
Observer(s) : JLT/PRB
Weather : Cloudy 60F

Depth in feet	W.L. (ft)	PID (ppm)	GRAPHIC	DESCRIPTION	REMARKS
-29					
-30				SC: CLAYEY SAND, brown, fine to medium grained , trace fine grained gravel, trace silt, very moist to wet.	
-31					
-32		0		Interval Not Sampled	
-33					
-34					
-35				SC: Clayey Sand, brown, fine to medium grained, trace fine grained gravel, very moist to wet.	
-36					Refusal at 38'.
-37		0		Interval Not Sampled	
-38					

End of Boring at 38 feet.
Soil Sample TB-01 (25') @ 10:45
Water Sample TB-01 @12:45
Grain Size sample at 21' and 25'.

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St. Paul, MN 55180-5114

LOG OF BORING TB-02

Project Name	: Stanley Consultants - ADM
Summit Project No.	: 1710-002
Project Location	: Minneapolis, MN
County	: Hennepin
Form Completed By	: PRB

Date	: 06/01/05
Company/Method	: Summit/Geoprobe
Sample Method	: Macro Core
Observer(s)	: JLT/PRB
Weather	: Cloudy 60F

Depth in feet	W.L. (ft)	PID (ppm)	GRAPHIC	DESCRIPTION	REMARKS
0				Asphalt	
-1				FILL: GRAVEL, coarse grained. (Railroad ballast)	
-2		0		CL: CLAY, black, organic, soft, trace silt, trace fine grained sand.	
-3					
-4		0		OL: SILT, black, organic, trace clay.	
-5				SC: CLAYEY SAND, brown, fine to medium grained, trace fine grained gravel.	
-6		0		SW: SAND, brown with trace iron staining, fine grained, well graded, moist.	
-7					
-8		0			
-9				SW: SAND, brown with some iron staining, medium to coarse grained, trace fine grained gravel, very moist.	
-10		0			
-11				SW: SAND, grayish brown and black, fine to coarse grained, well graded, some fine to coarse grained gravel, moist to very moist.	
-12		0			
-13				CL: SANDY CLAY, brown, fine grained sand, medium stiff, slightly moist.	
-14		0		SC: CLAYEY SAND, brown, fine grained, trace medium grained, dense, trace silt, trace fine grained gravel.	
-15		0			
-16				SC: CLAYEY SAND, as above. Poor recovery due to jammed liner.	
-17					
-18		0			
-19		86		SP: SAND, gray, fine to medium grained, trace silt, poorly graded.	
-20		0		CL: CLAY, reddish brown, trace fine grained sand, very stiff, moist.	
-21					
-22				SC-SM: SILTY to CLAYEY SAND, reddish brown, fine to medium grained, trace medium grained, dense, trace fine grained gravel, moist.	
-23	▼	0			
-24				Interval Not Sampled	
-25					
-26					
-27		0		ML: CLAYEY SILT, dark gray, hard, slightly moist.	
-28					
-29					

End of Boring at 29 feet.
Soil Sample TB-02 (19') @ 15:40 and TB-02 (29') @17:00
Water Sample TB-02 @ 17:15

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St. Paul, MN 55180-5114

Project Name : Stanley Consultants - ADM
Summit Project No. : 1710-002
Project Location : Minneapolis, MN
County : Hennepin
Form Completed By : PRB

LOG OF BORING TB-03

Date : 06/02/05
Company/Method : Summit/Geoprobe
Sample Method : Macro Core
Observer(s) : JLT/PRB
Weather : Sunny 80F

Depth in feet	W.L. (ft)	PID (ppm)	GRAPHIC	DESCRIPTION	REMARKS
0				Asphalt	
-1					
-2		0		FILL: SAND, black and brown, fine to coarse grained, trace fine grained gravel.	
-3				CL: CLAY, brown to black, trace fine to medium sand, soft.	
-4		0		CL: CLAY, black, organic, soft, trace silt, trace fine grained sand.	
-5				SC: CLAYEY SAND, brown, fine to medium grained, trace coarse grained gravel.	
-6		0			
-7				SW: SAND, brown, fine to medium grained, trace coarse grained, well graded, trace clay, slightly moist.	
-8		0		SW: SAND, brown with iron staining, fine grained, slightly moist.	
-9					
-10		0		SW: SAND, brown, fine to coarse grained, well graded, some fine to coarse grained gravel, moist.	
-11					
-12		0			
-13				GW: GRAVEL, fine to coarse grained, some fine to coarse grained brown sand, trace silt, very moist.	
-14		0			
-15		0		SC: CLAYEY SAND, brown, fine grained, dense, trace medium to coarse grained sand, trace fine grained gravel, trace silt.	
-16					
-17					
-18		0		SW: SAND, brown, fine to coarse grained, well graded, trace fine grained gravel, trace silt.	
-19		6.0			
-20		60		SW: SAND, brown to light gray brown, fine to coarse grained, trace fine grained gravel.	
-21		20		CL: CLAY, reddish brown, trace fine grained sand, very silty.	
-22		0		SC: CLAYEY SAND, reddish brown, fine grained, trace medium grained, dense, trace silt, trace fine grained gravel, moist.	
-23					
-24				SP: SAND, brown to reddish brown, fine to medium grained, loose, trace clay, trace fine grained gravel, very moist to wet.	
-25		0			
-26	▼			Interval Not Sampled	
-27					
-28					
-29				SP: SAND, gray, fine grained, loose, trace silt, wet.	

End of Boring at 30 feet.
Soil Sample TB-03 (20') @ 9:05 and TB-03 (30') @ 10:05
Water Sample TB-03 @ 10:25

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1217 Bandana Boulevard North
St. Paul, MN 55180-5114

Project Name : Stanley Consultants - ADM
Summit Project No. : 1710-002
Project Location : Minneapolis, MN
County : Hennepin
Form Completed By : PRB

LOG OF BORING TB-03

Date : 06/02/05
Company/Method : Summit/Geoprobe
Sample Method : Macro Core
Observer(s) : JLT/PRB
Weather : Sunny 80F

Depth in feet	W.L. (ft)	PID (ppm)	GRAPHIC	DESCRIPTION	REMARKS
-29				ML: CLAYEY SILT, dark gray, mottled, hard, slightly moist.	
-30					

End of Boring at 30 feet.
Soil Sample TB-03 (20') @ 9:05 and TB-03 (30') @ 10:05
Water Sample TB-03 @ 10:25

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1217 Bandana Boulevard North
St. Paul, MN 55180-5114

LOG OF BORING TB-04

Project Name	: Stanley Consultants - ADM
Summit Project No.	: 1710-002
Project Location	: Minneapolis, MN
County	: Hennepin
Form Completed By	: PRB

Date	: 06/02/05
Company/Method	: Summit/Geoprobe
Sample Method	: Macro Core
Observer(s)	: JLT/PRB
Weather	: Sunny 80F

Depth in feet	W.L. (ft)	PID (ppm)	GRAPHIC	DESCRIPTION	REMARKS
0				Asphalt	
-1				FILL: GRAVEL and SAND	
-2		0		SP: SAND, dark brown, fine grained, trace medium grained, trace clay, very moist.	
-3					
-4		0			
-5					
-6		0			
-7					
-8		0		SW: SAND, brown with iron staining, fine to coarse grained, loose, moist.	
-9					
-10		0			
-11					
-12		0			
-13					
-14		0		SW: SAND, brown, medium to coarse grained, trace fine grained, trace fine to coarse grained gravel, very moist.	
-15					
-16		0		GW-SW: GRAVEL and SAND, brown, fine to coarse grained gravel, coarse grained sand, trace fine to medium grained sand, very moist.	
-17				SW: SAND, brown, fine to medium grained, trace coarse grained, loose, very moist.	
-18					
-19		0		SC: CLAYEY SAND, dark brown, fine grained, trace medium to coarse grained.	
-20		0		CL: CLAY, brown, trace fine to medium grained sand, trace silt, soft.	
-21				SC: CLAYEY SAND, brown, fine grained, trace medium to coarse grained, stiff, trace fine to coarse grained gravel.	
-22					
-23		0			Refusal at 23.5'.

End of Boring at 23.5 feet.
Soil Sample TB-04 (23') @ 12:30
Grain Size sample at 23'.

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1217 Bandana Boulevard North
St. Paul, MN 55180-5114

Project Name : Stanley Consultants - ADM
Summit Project No. : 1710-002
Project Location : Minneapolis, MN
County : Hennepin
Form Completed By : PRB

LOG OF BORING TB-05

Date : 06/02/05
Company/Method : Summit/Geoprobe
Sample Method : Macro Core
Observer(s) : JLT/PRB
Weather : Sunny 80F

Depth in feet	W.L. (ft)	PID (ppm)	GRAPHIC	DESCRIPTION	REMARKS
0				Asphalt	
-1				FILL: GRAVEL, coarse grained. (Railroad ballast)	
-2		0		CL: CLAY, dark brown to black, trace silt.	
-3				OL: SILT, black, organic, soft, trace fine grained sand, trace clay.	
-4		0		CL: CLAY, gray, trace fine grained sand.	
-5					
-6		0		SW: SAND, brown, medium to coarse grained, trace fine grained, trace clay, very moist.	
-7					
-8		0		SW: SAND, brown, fine grained, slightly moist.	
-9				SW: SAND, brown with iron staining, fine to medium grained, trace coarse grained, trace fine grained gravel, very moist.	
-10		0			
-11					
-12		0		SW: SAND, brown, medium to coarse grained, trace fine grained, loose, trace fine grained gravel, very moist.	
-13					
-14		0			
-15				SC: CLAYEY SAND, brown, fine grained, trace medium to coarse grained, dense, trace silt, trace fine grained gravel.	
-16		0			
-17					SAND STRINGER, fine to medium grained, 2" thick @17'.
-18					
-19					
-20		0		SC: CLAYEY SAND, gray, fine grained, trace medium grained, trace fine grained gravel, trace silt, moist.	
-21		180			
-22		54		SC: CLAYEY SAND, reddish brown, fine grained, trace medium grained, dense, trace silt, moist.	
-23					
-24		0			
-25		0			
-26					
-27					Refusal at 29' while attempting to collect discrete sample.
-28					
-29					

End of Boring at 29 feet.
Soil Sample TB-05 (20') @ 14:50 and TB-05 (25') @ 15:45