



11/48383

0990555005  
BLACK BROTHERS  
SR/TECH

Prepared Under Contract  
to Nicor Gas  
Prepared on Behalf of  
Nicor Gas and Commonwealth Edison

## Black Brothers Company Site

ORIGINAL

## Site Investigation Work Plan

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REVIEWER MD

Prepared July 2011



11-48383



August 8, 2011

Nicor Mendota  
File C4

Mr. Jeff Guy  
Illinois Environmental Protection Agency  
Bureau of Land  
Remedial Project Management Section  
Site Remediation Program  
1021 North Grand Avenue East  
P.O. Box 19276  
Springfield, Illinois 62794-9276

0990555005  
Black Brothers  
SR/tech

RE: 0990555005 - LaSalle County  
Black Brothers Company Site

Dear Mr. Guy:

Enclosed are three final copies of the *Black Brothers Company Site, Site Investigation Work Plan* for the Black Brothers Company Site and associated Site Remediation Program Form (DRM-2).

If you have any questions, please call me at (630) 724-3277.

Sincerely,

Joe Chittet

Enclosures.

cc: Joan Gonzalez, BMcD  
Linda Josupait, Nicor Gas  
Gail MacMillian, ComEd

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# Illinois Environmental Protection Agency

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## Site Remediation Program Form (DRM-2) (To be Submitted with all Plans and Reports)

You may complete this form online, save a copy, print, sign and mail it to the address above.

### I. Site Identification:

Site Name:	Black Brothers Company		
Street Address:	501 Ninth Avenue	P.O. Box:	410
City:	Mendota	State:	IL Zip Code: 61342 Phone: 630-724-3200
Illinois Inventory ID Number:	0990555005	IEMA Incident Number:	

### II. Remediation Applicant:

Applicant's Name:	Claudia Macholz		
Company:	Nicor Gas (On behalf of Nicor Gas and Commonwealth Edison)		
Street Address:	1844 Ferry Road	P.O. Box:	
City:	Naperville	State:	IL Zip Code: 60563 Phone: 630-388-2837
Email Address:	cmachol@nicor.com		
I hereby request that the Illinois EPA review and evaluate the attached project documents in accordance with the terms and conditions of the Environmental Protection Act (415 ILCS 5), implementing regulations, and the review and evaluation services agreement.			
Remediation Applicant's Signature:	<i>Claudia Macholz</i>		Date: 08/05/11

### III. Contact Person for Remediation Applicant:

### Contact Person for Consultant:

Contact's Name:	Joe Chittet		
Company:	Burns & McDonnell		
Street Address:	1431 Opus Place, Suite 400	P.O. Box:	
City:	Downers Grove	State:	IL Zip Code: 60515 Phone: 630-724-3200
Email Address:	jchittet@burnsmcd.com		

### IV. Review & Evaluation Licensed Professional Engineer or Geologist ("RELPEG"), if applicable:

RELPEG's Name:			
Company:			
Street Address:		P.O. Box:	
City:		State:	Zip Code: Phone:
Email Address:			

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**V. Project Documents Being Submitted:**

Page 3 of 4

<b>Document Title:</b> <u>Black Brothers Company Site Investigation Work Plan</u>	<b>Date of Preparation of Plan or Report:</b> <u>July 2011</u>
<b>Prepared by:</b> <u>Burns &amp; McDonnell Engineering Co.</u>	<b>Prepared For:</b> <u>Nicor Gas</u>
<b>Type of Document Submitted:</b>	
<input type="checkbox"/> Site Investigation Report - Comprehensive	<input type="checkbox"/> Sampling Plan
<input type="checkbox"/> Site Investigation Report - Focused	<input type="checkbox"/> Health and Safety Plan
<input type="checkbox"/> Remediation Objectives Report - Tier 1 or 2	<input type="checkbox"/> Community Relations Plan
<input type="checkbox"/> Remediation Objectives Report - Tier 3	<input type="checkbox"/> Risk Assessment
<input type="checkbox"/> Remedial Action Plan	<input type="checkbox"/> Containment Fate & Transport Modeling
<input type="checkbox"/> Remedial Action Completion Report	<input checked="" type="checkbox"/> Other: <u>Site Inv Work Plan - Focused</u>

<b>Document Title:</b> _____	<b>Date of Preparation of Plan or Report:</b> _____
<b>Prepared by:</b> _____	<b>Prepared For:</b> _____
<b>Type of Document Submitted:</b>	
<input type="checkbox"/> Site Investigation Report - Comprehensive	<input type="checkbox"/> Sampling Plan
<input type="checkbox"/> Site Investigation Report - Focused	<input type="checkbox"/> Health and Safety Plan
<input type="checkbox"/> Remediation Objectives Report - Tier 1 or 2	<input type="checkbox"/> Community Relations Plan
<input type="checkbox"/> Remediation Objectives Report - Tier 3	<input type="checkbox"/> Risk Assessment
<input type="checkbox"/> Remedial Action Plan	<input type="checkbox"/> Containment Fate & Transport Modeling
<input type="checkbox"/> Remedial Action Completion Report	<input type="checkbox"/> Other: _____

<b>Document Title:</b> _____	<b>Date of Preparation of Plan or Report:</b> _____
<b>Prepared by:</b> _____	<b>Prepared For:</b> _____
<b>Type of Document Submitted:</b>	
<input type="checkbox"/> Site Investigation Report - Comprehensive	<input type="checkbox"/> Sampling Plan
<input type="checkbox"/> Site Investigation Report - Focused	<input type="checkbox"/> Health and Safety Plan
<input type="checkbox"/> Remediation Objectives Report - Tier 1 or 2	<input type="checkbox"/> Community Relations Plan
<input type="checkbox"/> Remediation Objectives Report - Tier 3	<input type="checkbox"/> Risk Assessment
<input type="checkbox"/> Remedial Action Plan	<input type="checkbox"/> Containment Fate & Transport Modeling
<input type="checkbox"/> Remedial Action Completion Report	<input type="checkbox"/> Other: _____

**VI. Professional Engineer's or Geologist's Seal or Stamp:**

I attest that all site investigations or remedial activities that are subject of this plan(s) or report(s) were performed under my direction, and this document and all attachments were prepared under my direction or reviewed by e, and to the best of my knowledge and belief, the work described in the plan and report has been designed or completed in accordance with the Illinois Environmental Protection Act (415 ILCS 5), 35 Ill. Adm. Code 740, and generally accepted engineering practices or principles of professional geology, and the information presented is accurate and complete.

*Any person who knowingly makes a false, fictitious, or fraudulent material statement, orally or in writing, to the Illinois EPA commits a Class 4 Felony. A second or subsequent offense after conviction is a Class 3 felony. (415 ILCS 5/44(h))*

Engineer's or Geologist's Name: Joseph A. Chittet

Company: Burns & McDonnell Engineering Co.

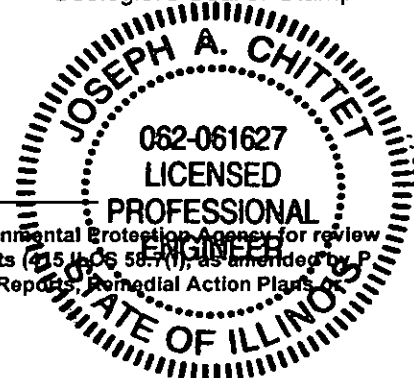
Registration Number: 062-061627 Phone: 630-724-3277

License Expiration Date: 11-30-2011

Signature:  Date: 8/8/11

**Note:** The authority of a Licensed Professional Geologist to certify documents submitted to the Illinois Environmental Protection Agency for review and evaluation pursuant to Title XVII of the Environmental Protection Act is limited to Site Investigation Reports (415 ILCS 58.7(h)), as amended by P.A. 92-0735, effective July 25, 2002. A Licensed Professional Geologist cannot certify Remediation Objectives Reports, Remedial Action Plans, or Remedial Action Completion Reports.

Professional Engineer's or  
Geologist's Seal or Stamp:



All information submitted is available to the public except when specifically designated by the Remediation Applicant to be treated confidentially as a trade secret or secret process in accordance with the Illinois Compiled Statutes, Section 7(a) of the Environmental Protection Act, applicable Rules and Regulations of the Illinois Pollution Control Board and applicable Illinois EPA rules and guidelines. The Illinois EPA is authorized to require this information under Sections 415 ILCS 5/58 - 58.12 of the Environmental Protection Act and regulations promulgated thereunder. Disclosure of this information is required as a condition of participation in the Site Remediation Program. Failure to do so may prevent this form from being processed and could result in your plan(s) or report(s) being rejected. This form has been approved by the Forms Management Center.

**Prepared On Behalf of  
Nicor Gas and Commonwealth Edison  
Prepared Under Contract to  
Nicor Gas**

ORIGINAL

**Black Brothers Company Site**

**Site Investigation  
Work Plan**

**Prepared July 2011**

**Burns & McDonnell  
1431 Opus Place, Suite 400  
Downers Grove, Illinois 60515**

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## ACRONYMS AND ABBREVIATIONS

bgs	below ground surface
BMcD	Burns & McDonnell
DPS	direct push sampling
EMC	electromagnetic conductivity
GPR	ground penetrating radar
IAC	Illinois Administrative Code
Illinois DNR	Illinois Department of Natural Resources
Illinois EPA	Illinois Environmental Protection Agency
ISGS	Illinois State Geological Survey
ISWS	Illinois State Water Survey
MGP	manufactured gas plant
MS/MSD	matrix spike/matrix spike duplicate
DNAPL	Dense non-aqueous phase liquid
QAPP	quality assurance project plan
QA/QC	quality assurance/quality control
PCBs	polychlorinated biphenyls
PID	photoionization detector
SB	soil boring
SI	site investigation
SP	soil probe
SVOC	semivolatile organic compound
TACO	Tiered Approach to Corrective Action Objectives
TAL	Target Analyte List
TCL	Target Compound List
TCLP	Toxicity Characteristic Leachate Procedure
VOC	volatile organic compound

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Appendix E	Soil Gas Sampling Procedures

## 1.0 INTRODUCTION

This work plan summarizes tasks and procedures for conducting an initial focused site investigation (SI) at a former manufactured gas plant (MGP) facility in Mendota, Illinois. This work plan outlines anticipated field activities, sampling procedures and protocols, analytical methods and quality assurance/quality control (QA/QC) methods and procedures that will be followed during the SI.

This work plan is organized into six sections and five appendices as follows:

- **Section 1.0–Introduction**  
This section presents investigation objectives, defines project team organization, key personnel and presents the anticipated project schedule.
- **Section 2.0–General Project Information**  
This section presents background information and discusses surrounding land use.
- **Section 3.0–Field Investigation Activities**  
This section outlines investigation activities and describes the locations and rationale for sample collection.
- **Section 4.0–Field Quality Assurance/Quality Control (QA/QC)**  
This section summarizes equipment decontamination procedures, site specific QC sampling procedures, and sample numbering system.
- **Section 5.0–Field Investigation Procedures**  
This section presents procedures for soil probing, soil boring, test pit investigation, sample collection and management of field investigation-derived waste.
- **Section 6.0–References**
- **Appendix A–Sanborn Maps**  
This section provides copies of Sanborn Fire Insurance Maps for the site.
- **Appendix B–Well Survey Documentation**  
This section provides copies of all relevant well survey information.
- **Appendix C– Quality Assurance Project Plan (QAPP)**  
This section establishes consistent field and laboratory procedures and methods for field activities.
- **Appendix D– En Core Soil Sampling Procedures**  
This section presents a detailed procedure for collecting soil samples for volatile organic compound (VOC) analysis.
- **Appendix E– Soil Gas Sampling Procedures**  
This section presents detailed procedures for collecting soil gas samples.

## **1.1 INVESTIGATION OBJECTIVES**

The overall objective of the focused SI is to determine the presence or absence of structures and impacts from past MGP activity on the property and if necessary evaluate the extent of possible impacts to soil and groundwater. The objective will be achieved by advancing soil borings/probes, excavating test pits, as well as collecting soil, groundwater and soil gas samples. The following tasks have been established to achieve the overall objective:

- Delineate the locations of below-ground structures to define the subsurface conditions of the soil both inside and outside structures.
- Evaluate areas of known historic activities.
- Define the subsurface geology at the site.
- Evaluate hydrogeologic conditions at the site.
- Evaluate and delineate MGP impacts.
- Evaluate all exposure pathways for potential risks to human health and the environment.

## **1.2 PROJECT TEAM ORGANIZATION AND KEY PERSONNEL**

Burns and McDonnell (BMcD) key personnel for the Mendota site SI are Joan Gonzalez, Joe Chittet and Amanda Haugen. Ms. Gonzalez is responsible for overall direction of project operations and will monitor and check overall project quality and provide technical support. Mr. Chittet will manage daily activities and be responsible for ensuring that project deliverables meet work plan and QAPP objectives. He will also be responsible for coordinating project activities with Nicor Gas and Commonwealth Edison, overseeing subcontractors, monitoring quality assurance/quality control and coordinating field activities. Ms. Haugen will be responsible for supervising field activities.

Ms. Linda Josupait of Tall Oak Associates, Ms. Somali Tomczak of Nicor Gas, and Ms. Gail MacMillan of ComEd will be the Nicor and ComEd contacts for this project, and Mr. Jeff Guy is the Illinois Environmental Protection Agency (Illinois EPA) project manager.

## **1.3 PROJECT SCHEDULE**

Field activities are anticipated to be completed in approximately 6 - 8 weeks from the date of commencement.

\* \* \* \* \*

## **2.0 GENERAL PROJECT INFORMATION**

### **2.1 SITE LOCATION AND EXISTING INFORMATION**

The Black Brothers Company Site (Site) is in the City of Mendota, LaSalle County, Township 36 North, Range 1 East, Section 33 as shown in Figure 1. The Site is located at the southeast corner of 5<sup>th</sup> Street and 9<sup>th</sup> Avenue and occupies 0.65 acres. The property was purchased by the Black Brothers Company from Northern Illinois Gas in 1966.

#### **2.1.1 Facility History**

The structures associated with the former Mendota MGP facility were located on the Site. The MGP was constructed in about 1875 and operated until 1941. Coal carbonization was the only known process to be used at the MGP and known production levels ranged from 3,200,00 cubic feet per year to more than 22,000,000 cubic feet per year. Major features historically located on the Site consisted of the following: two gas holders, two crude oil tanks, coal piles, and a tar well in addition to other MGP apparatus and buildings. Figure 2 is a historical layout of structures that existed at the Site, which is the location of the SI activities.

According to Sanborn Maps (Sanborn Map and Publishing Company 1885, 1891, 1897, 1902, 1929, 1949), buildings associated with the MGP facility were located on the Site from approximately 1885 to 1949. An 1885 Sanborn map shows the MGP facility on the Site and maps from 1897 and 1929 each show the MGP facility with additional structures. The addition of an oil tank is noted in the 1897 map and a gas holder of unknown capacity is introduced in the 1929 Sanborn map. Coal piles were shown in the northeast quarter of the Site on all Sanborn maps. All Sanborn maps depict railroad tracks along the eastern and southern property boundary of the Site. None of the gas plant buildings or above grade structures remain on the site and the date of demolition of those structures currently is not known. All Sanborn maps are presented in Appendix A.

#### **2.1.2 Existing Features and Surrounding Property Use**

The Black Brothers Company purchased the Site property in 1966 and it is currently covered by an asphalt parking lot as well as a one story brick building near the northwest corner of the site. The area immediately to the west of the Site consists of residential properties as well as a small asphalt parking lot to the southwest of the Site. The Site is bound to the north by Mendota Creek followed by residential properties and a service business district, to the east and south by a manufacturing district including the Black Brothers Company property followed by the Burlington Northern and Santa Fe railroad. The Site is currently zoned M Manufacturing District (Village of Mendota Zoning Department 2011).

#### **2.1.3 Topography and Drainage**

The topography of the Site is relatively flat, with an elevation approximately 737 feet above sea level. Currently the Site surface is covered by asphalt paving and a one story brick building, with landscaping and grassy areas along the west and northern boundaries as shown on Figure 3. Surface water that does not

infiltrate will result in runoff water that will flow north towards Mendota Creek bordering the northern site boundary. Catch basins for storm water runoff are located along the west side of the site, which grades to the north towards Mendota Creek.

#### **2.1.4 Regional and Site Geology**

Regional geology in northern Illinois consists primarily of alluvial deposits, glacial deposits, and bedrock underlying these units. The glacial units include silty clays of various compositions; sand and gravel deposited by streams and rivers flowing from the glaciers or by discharge from glacial lakes; and sand, silt, and clay deposited in lakes dammed by the glaciers. After glaciers retreated from the area, silty deposits accumulated; the rivers and streams deposited alluvium in their floodplains; and the modern soil developed on the deposits. Thousands of feet of Ordovician, Cambrian, and Precambrian age bedrock lie beneath these deposits (Kolata 2005). The following discussion provides additional detail on the alluvial and glacial deposits and the underlying bedrock units in northwestern LaSalle County.

The upper 20 feet or less of unconsolidated deposits is composed of modern soil and the silts of the Richland loess. Unconsolidated glacial and alluvial deposits in the Site vicinity vary in thickness from approximately 50 feet to as much as 300 feet and are composed primarily of the silty and clayey diamictons (tills) of the Wedron formation, which were deposited in multiple successions of moraines as glaciers periodically advanced and retreated through the region. Sand and gravel deposits of regionally limited extent are observed within the Wedron formation in the area (Piskin 1975, Berg and Kempton 1987, Willman et al. 1975). A map presented by Berg et al. (1984) indicates that a sand and gravel deposit of this nature may be present in close vicinity to the site within 20 to 50 feet of the surface.

Beneath the unconsolidated glacial deposits, upper bedrock formations consist primarily of Ordovician dolomite and sandstone. The first bedrock unit encountered, the Galena dolomite, unconformably underlies the unconsolidated deposits and is generally greater than 200 feet thick in the vicinity of the Site. Beneath the Galena dolomite lie alternating beds of dolomite and sandstone from the Ordovician and Cambrian periods (Kolata 2005, Willman et al. 1975).

#### **2.1.5 Regional and Site Hydrogeology**

As previously described, overburden in the Mendota area consists primarily of silty and clayey glacial diamicton. The typical range of hydraulic conductivities for silt is  $1 \times 10^{-6}$  to  $1 \times 10^{-4}$  centimeters per second (cm/sec) and for clay is  $1 \times 10^{-9}$  to  $1 \times 10^{-6}$  cm/sec (Fetter 1994). As a result of this low conductivity, the glacial diamicton generally will not yield pumpable quantities of groundwater and does not function as an aquifer. Groundwater derived from infiltration of precipitation and surface water is expected to be present primarily in the form of perched water, without a well-defined potentiometric surface. Lateral flow of shallow groundwater, though limited, is expected to be generally toward Mendota Creek along the north edge of the site.

Although the diamicton is primarily composed of silt and clay, isolated sand and gravel deposits are present within the diamicton. Some of these sand and gravel deposits may be large enough to function as an aquifer, and the water well search (described in Section 2.1.7) indicates that some wells have been installed within the overburden in the region.

The primary aquifer used for public and private water supplies in the Mendota area is known regionally as the Cambrian-Ordovician Aquifer (Visocky et al. 1985) which lies directly beneath the overburden diamicton. Sasman et al. (1974) indicate that within LaSalle County, groundwater withdrawals from the Galena dolomite are limited, and the majority of groundwater withdrawals are from the deeper Ordovician and Cambrian sandstone units.

### **2.1.6 Sensitive Habitats**

The Illinois Department of Natural Resources (Illinois DNR) Division of Natural Heritage indicates that there are no known occurrences of state-listed threatened or endangered species within a one-mile radius of the Site (Illinois DNR 2011).

### **2.1.7 Location and Description of Wells**

A well survey was performed to determine the presence of wells located within a 1,000-foot radius of the Site. The following agencies were contacted with requests for any public and private well information:

- City of Mendota Water Department
- Division of the LaSalle County Health Department
- Illinois State Water Survey (ISWS)
- Illinois EPA Bureau of Water
- Illinois State Geological Survey (ISGS)

The LaSalle County Environmental Health Division and the Illinois EPA Bureau of Water did not have any relevant information regarding wells in the area surrounding the Site. Information was obtained from the ISWS, City of Mendota Water Department and the ISGS. Based on information provided by the agencies, there are no wells within a 1,000 foot radius of the Site. Four public wells and two private wells are located outside the 1,000 foot radius of the Site. During investigation activities an effort will be made to locate the wells. Figure 4 presents the well survey location map. Appendix B presents the well search documentation received in response to the well survey inquiries.

The first private well, ISWS well number 285656 and ISGS well number 25333, is located 2,524 feet southwest of the Site. Queries of the ISWS and ISGS water well databases show the well was drilled in 1995 to a depth of 160 feet bgs. The well is owned by Meyer's Furniture and is used for industrial/commercial purposes. The second well, ISWS well number 382129 and ISGS well number 898,

# Documents Exempt from Public Disclosure

File No. L 0310815323 County Cook

Facility Name \_\_\_\_\_

The following documents have been removed and have been placed in a file folder marked "Documents Exempt from Public Disclosure."

Document Date	Specific Description Of Document	Exempt Cat. Pursuant To	Review Date And Initials
1. <u>06-17-2011</u>	<u>45 Day Rep</u>	<u>[21A]</u> 1828.202(a)(1)	<u>) 08-12-2011 HCB</u>
2. _____	_____	[ ] 1828.202(a)(1)	) _____
3. _____	_____	[ ] 1828.202(a)(1)	) _____
4. _____	_____	[ ] 1828.202(a)(1)	) _____
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18. _____	_____	[ ] 1828.202(a)(1)	) _____
19. _____	_____	[ ] 1828.202(a)(1)	) _____
20. _____	_____	[ ] 1828.202(a)(1)	) _____

Pursuant to 2 ILL. Adm. Code 1828.505, you may appeal the denial to disclose some or all of the public records requested by sending a written Notice Of Appeal to the Director of the Illinois EPA, post marked within thirty (30) days of the date of the denial letter.



FILE NO. L 0990555005

EXEMPT DOCUMENT NO. 001

THE AGENCY HAS DETERMINED THIS DOCUMENT  
IS EXEMPT IN PART FROM PUBLIC DISCLOSURE

EXEMPT  
IN  
PART  
DOCUMENT

FILE CATEGORY SR/TECH

DOCUMENT DATE 08-08-2011

is located 1,228 feet northeast of the Site. Both database queries show the well was drilled in 1941 and owned by Hunky Dory Dairy, and the well depth is listed as 115 feet by the ISWS and 113 feet by the ISGS. Hunky Dory Dairy is no longer in operation and the well's current owner and status is unknown.

One active municipal drinking well was identified by the City of Mendota Water Department. The well was said to be approximately [redacted] of the Site and matches the description ISGS well number [redacted] and ISWS well number [redacted] which has a depth of [redacted].

Queries of the ISGS database indicate the existence of City of Mendota well number 902, located 3,334 feet to the northeast of the Site. The ISGS records show the well was drilled to a depth of 478 feet by J.P. Miller Art Well, but provide no drilling date. The ISWS public water well database shows the existence of Mendota City water well number 407077, drilled by J.P. Miller Art Well to the northeast of the Site. The well was drilled in 1889 and was sealed in 1949. The ISWS records do not provide the depth of the well.

ISWS well number [redacted] and ISGS well number [redacted] is located [redacted] of the Site. Both database queries show the well was drilled in [redacted] and owned by the [redacted], and the well depth is listed as [redacted] by the ISWS and [redacted] by the ISGS. The ISWS records show that the well was deepened in [redacted] and is currently active.

ISWS well number 407078 was completed in 1917 and is believed to match records for ISGS well 900, although the ISGS lists a completion date of 1916. The well is located 1,035 feet northeast of the Site. The ISGS water well search lists the depth of the well as 502 feet but does not mention the well's current status. The ISWS water well database shows that the municipal well was drilled to 503 feet but was cleaned to 502 feet in 1943 and sealed in 1990. In a phone conversation with City of Mendota Water Department, there were no records of an active municipal well at that location.

\* \* \* \* \*

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AUG 12 2011

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### **3.0 FIELD INVESTIGATION ACTIVITIES**

This section describes the field activities that will be conducted during the SI. The field investigation activities are divided into the following tasks:

- Field investigation preparation;
- Structure investigation;
- Soil investigation and sampling;
- Groundwater investigation and sampling, if encountered;
- Soil gas sampling;
- Surveying of sampling locations;
- Ambient air monitoring.

#### **3.1 FIELD INVESTIGATION PREPARATION**

Before field activities begin, BMcD will accomplish the following tasks:

- Procure subcontractors to perform probing/drilling, test pit excavations, geophysical surveys and laboratory testing.
- Locate underground utilities in the investigation area.
- Conduct an initial site layout and topographic survey.

#### **3.2 STRUCTURE INVESTIGATION**

Sanborn Fire Insurance Maps will be used to identify the general location of the structures. Test pit excavations, soil probes, soil borings and geophysical surveys may be used during the field activities to confirm the locations and conditions of buried former MGP structures.

##### **3.2.1 Test Pits**

Test pits will be utilized to locate potential historic structures in the subsurface. Figure 5 indicates proposed test pit locations. Test pits will be excavated in the vicinity of structures previously identified by the historic Sanborn Fire Insurance Maps (Appendix A). Test pit excavations are expected to be performed only on the asphalt covered portion of the Site. The test pits will be excavated to the anticipated top of the buried structures, ranging from approximately 4 to 6 feet bgs, to determine the exact location and size of each structure. During the test pit excavation activities, all impacted soil will be directly loaded into roll-off boxes. Non-impacted soils will be placed on polyethylene sheeting on the ground surface near the test pits and then placed in roll-off boxes for off-site disposal. Impacted soils will be identified both visually and by photoionization detector (PID) readings. Test pit locations will be backfilled and compacted with imported, non-impacted stone and then restored to match existing surface conditions.

##### **3.2.2 Structure Area Soil Probes and Sampling**

Soil probes will be advanced using direct push methods to locate the smaller historic MGP structures located on the Site. Three to five soil probes will be advanced per suspected structure location to verify structure

dimensions and locations, as identified on Figure 5. The soil probes will be advanced to refusal or to 25 feet bgs to define structure depth and integrity and will be continuously logged by a qualified engineer or geologist. Inside the structures, samples will be collected at the depth where the greatest impacts are identified visually and/or with PID readings. Additional probes will be advanced immediately outside the structure. Soil samples will be collected at the same depths as on the interior of the structure, and additional samples potentially will be collected to determine the extent of any impacted areas based on field observations or PID readings. Soil probes will be backfilled with cement-bentonite grout and the surface will be restored to match existing conditions.

### **3.2.3 Structure Area Soil Borings and Sampling**

Soil borings will be advanced by hollow stem auger to define the subsurface conditions of the soil both inside and outside the larger structures as indicated on Figure 5. The soil borings will be continuously logged by a qualified engineer or geologist.

For each of the four larger structures, a soil boring will be advanced inside the structure walls to the bottom of the structure. Samples will be collected at a depth where the greatest impacts are identified visually and/or with PID readings. If no impacts are identified, a sample at the bottom of the structure will be collected. An additional soil boring will be advanced outside the structure, to a depth of 2 to 3 feet below the depth of the structure bottom. If impacted soil is encountered, the soil boring will be advanced to the extent of the impacts. A soil sample will be collected at a depth with the greatest impacts based on field observations or PID readings. If impacted soil is encountered inside of the structure, a soil sample will be taken outside the structure 2 to 3 feet below the depth of the structure bottom or at the extent of impacts for analysis. Figure 5 indicates proposed structure soil sampling locations.

### **3.2.4 Chemical Laboratory Analysis**

Representative soil samples from borings and probes within the former structure areas will be analyzed for the following constituents: benzene, ethylbenzene, toluene, xylenes (BTEX), styrene, phenols, polynuclear aromatic hydrocarbons (PAHs), resource conservation and recovery act (RCRA) metals and cyanide. Additionally, select samples may be analyzed for total petroleum hydrocarbons (TPH), soil pH, polychlorinated biphenyls (PCBs), and toxicity characteristic leaching procedure (TCLP) metals for a source material evaluation.

### **3.2.5 Geophysical Surveys**

A non-intrusive geophysical survey utilizing combined Ground penetrating radar (GPR) and electromagnetic conductivity (EMC) techniques may be performed over select areas within the Site to delineate buried structures not located during test pit and soil probe/boring activities.

Magnetometry is a nonintrusive electromagnetic geophysical surveying technique commonly used in the construction industry to detect and map buried drums, metallic pipes, utilities, cables, and piping before excavation, demolition and/or construction. Magnetometer surveys use an instrument that measures the varying intensity of magnetic fields produced by buried metallic objects. The magnetic readings

produced by the magnetometer can be interpreted so that conclusions can be drawn about the location of the buried objects. The magnetometer survey is performed on a grid pattern to obtain a general location of buried objects to depths of approximately 20 feet below ground surface (bgs).

GPR and EMC mapping are also non-intrusive geophysical surveying techniques that have traditionally been used to detect subsurface geologic and manmade features with a greater resolution than the magnetometer survey. EMC is a geophysical tool that uses different materials' ability to conduct electricity to profile the shallow surface and subsurface. EMC uses a variety of hand held transmitters and receivers that generate a time-varying magnetic field, which induces a current in the subsurface that can be measured by the receiver. The depth of penetration for a given subsurface media is determined by the frequency generated by the different transmitters. GPR is a geophysical tool that uses radio waves to image the shallow subsurface. GPR consists of the transmission of radio waves downward from into the earth and the reception of those waves reflected back to a receiving antenna. Variations in the return signal are continuously recorded, creating a profile of the subsurface. The GPR records data at specified distances based on field/soil conditions, along orthogonal transit lines.

### **3.3 SOIL INVESTIGATION**

Soil probes and borings will be used to collect samples to evaluate potential impacts encountered during the field activities outside of structure areas and to evaluate exposure pathways for potential risks. A combination of soil probes and soil borings will be performed on a 60-foot grid system. Approximately 8 probes will be advanced by direct push methods to a depth of 25 feet bgs or to a depth that penetrates at least 4 feet into unimpacted native soil. In addition to the soil probes, approximately 4 borings will be advanced to a depth of 40 feet bgs. If impacted soil is encountered within the probe/boring location, the soil probe/boring will be advanced to 4 feet below the extent of impacts. Soil probes and borings will be backfilled with cement-bentonite grout and the surface will be restored to match existing conditions. Figure 6 presents the proposed grid soil probe and boring layout.

#### **3.3.1 Grid System Soil Sampling**

Surface and subsurface soil samples will be collected to evaluate potential impacts and to evaluate exposure pathways for potential risks. A random sampling scheme will be generated for the grid system soil sampling portion of the investigation prior to the start of field activities. An anticipated 12 samples will be collected across the site from each of the following intervals; 0 to 3 feet bgs, 3 to 10 feet bgs, and below 10 feet bgs. Surface soil samples will be taken from 0 to 6 inches in the grassy areas. Samples will also be taken where impacts are visually observed and at the soil interval with the highest potential impacts as determined by visual observations or PID readings. Based on the planned sampling scheme, approximately 36 soil samples will be collected. Figure 6 indicates proposed grid locations.

#### **3.3.2 Chemical Laboratory Analysis**

Representative soil samples from soil probes and borings will be analyzed for the following constituents: BTEX, styrene, phenols, PAHs, RCRA metals and cyanide.

### **3.3.3 Physical Soil Evaluation**

Four soil borings will be advanced to approximately 40 feet bgs in non-impacted locations to collect select soil samples for geotechnical testing. Up to two soil samples will be collected from each stratigraphical layer soil matrix and submitted for physical analysis, which includes, but is not limited to, Atterberg limits, moisture content, pH, soil bulk density, permeability, sieve analysis, plasticity, soil particle density and unconfined compressive strength.

Boring locations will also be analyzed for fraction organic carbon content ( $f_{oc}$ ). At each of the four soil boring locations, one  $f_{oc}$  sample will be collected from 0 to 3 feet bgs and one  $f_{oc}$  sample will be collected from each geologic unit encountered below 3 feet bgs. Each  $f_{oc}$  sample will be also be analyzed for the focused analyte list including BTEX, styrene, phenols, PAHs, RCRA metals and cyanide. The locations of the geotechnical borings are also depicted in Figure 6.

### **3.4 GROUNDWATER INVESTIGATION**

Groundwater is not expected to be encountered during soil investigation activities. Four soil borings will be converted into groundwater monitoring wells and screened where water is encountered or to 25 feet bgs. The four groundwater monitoring wells will be installed to evaluate hydrogeologic conditions and groundwater flow direction at the Site. Proposed locations for the monitoring wells will be at the northeast, northwest, southeast and southwest corners of the Site, as presented in Figure 7. Groundwater samples will be collected from each monitoring well quarterly for the first year.

Slug tests and water level measurements will be performed on each newly-installed monitoring well to further characterize and evaluate subsurface hydrogeologic conditions at the Site. Section 5.3.2 outlines slug test procedures. At some MGP sites dense non-aqueous phase liquid (DNAPL) may be present in groundwater monitoring wells. Each well will be checked for DNAPL by lowering a weighted cotton string into each monitoring well and checking the string for tar staining. DNAPL determinations will be performed at least 48 hours after the monitoring wells have been completely developed. Section 5.2.2 discusses monitoring well development procedures.

#### **3.4.1 Chemical Laboratory Analysis**

Representative groundwater samples from monitoring wells will be analyzed for the following constituents: BTEX, styrene, phenols, PAHs, RCRA metals, and total and amenable cyanide.

### **3.5 VAPOR INTRUSION INVESTIGATION**

Potential impacts below the onsite one story brick building will be investigated utilizing two soil probe locations as indicated in Figure 8.

#### **3.5.1 Soil Sampling**

Two soil probes will be advanced by direct push methods to the water table or 25 feet bgs. Soil probes will be advanced and soil samples collected as described in Section 3.3 with the exception that a soil sample will be collected from the same depth interval in which a soil gas probe is installed as described in Section 3.5.3.

### **3.5.2 Water Table Sampling**

After soil samples are collected, a water table sample will be collected at each of the probe locations. Each soil probe location selected for water table sampling will be screened across the water table. Representative water table samples from each probe location will be analyzed for the following constituents: BTEX, styrene, phenol, 2-methylphenol, 2-methylnaphthalene, naphthalene, and mercury (IEPA 2010). Section 5.4.1 discusses water table sampling procedures.

### **3.5.3 Subsurface Soil Gas Sampling**

After water table samples are collected, subsurface soil gas probes will be installed at a depth that is at least 3 feet bgs and is above the capillary fringe (i.e., at least 1 foot above the water table in granular soil or at least 3 feet above the water table in cohesive soil). Soil gas samples will be analyzed for the following compounds if they are detected in soil or are above the 2010 proposed levels for the indoor inhalation exposure route in water table samples: BTEX, styrene, phenol, 2-methylphenol, 2-methylnaphthalene, naphthalene, and mercury. Figure 8 presents the soil gas probe locations.

### **3.5.4 Subslab Soil Gas Sampling**

Based on the results of soil sampling and subsurface soil gas sampling, subslab soil gas probes may potentially be installed to collect soil gas from immediately below the concrete building slab, adjacent to subsurface soil gas probe locations. Subsoil gas samples will be analyzed for the same compounds as the subsurface soil gas samples discussed in Section 3.5.3.

## **3.6 SURVEYING**

Prior to the commencement of field activities, a plat of survey will be generated to identify the Site boundaries. Following completion of field activities, each test pit, soil gas, soil probe/boring and groundwater monitoring well location will be surveyed using state plane coordinates to determine coordinate locations and ground surface elevations.

## **3.7 AIR MONITORING**

Ambient air monitoring will be performed during intrusive site investigation activities. The ambient air monitoring work plan can be found in a separately bound *Black Brothers Company Site Ambient Air Monitoring Work Plan for Site Investigation Activities* (Burns & McDonnell 2011). Air monitoring during investigation activities for worker health and safety will be addressed in a separately bound *Site Health & Safety Plan* (Burns & McDonnell 2011).

\* \* \* \* \*

## **4.0 FIELD QUALITY ASSURANCE/QUALITY CONTROL**

The primary objective of field QA/QC procedures is to ensure samples collected during the field investigation closely represent actual field conditions. The *Quality Assurance Project Plan* in Appendix C contains specific protocols to be followed for sampling, sample handling and storage, chain-of-custody, and laboratory analysis.

This section augments QAPP procedures with the following site-specific QA/QC information:

- Decontamination procedures.
- Sample numbering system.
- Site-specific QC procedures.
- Analytical detection limits.

### **4.1 DECONTAMINATION PROCEDURES**

Equipment decontamination procedures will be implemented to avoid cross-contamination of subsurface strata and various media sampled. Reusable soil boring/probing and sampling equipment will be thoroughly decontaminated before drilling and sampling at each location. The QAPP presents detailed procedures to be implemented. A decontamination station will be constructed; its location will be determined in the field. The station will be located away from frequently used areas and areas containing former MGP structures as shown in the Sanborn maps. The station will have a sturdy base with raised sides to prevent accidental spraying of surrounding areas. The station will be lined with plastic sheeting to accommodate drilling tools and equipment and collected decontamination water will be pumped into appropriate storage containers for off-site disposal.

### **4.2 SAMPLE NUMBERING SYSTEM**

Sample numbering for this investigation will consist of three components: a three-character alpha site identification code; a four- to five-character alpha numeric sample type code; and a three digit sample characteristic code. The rationale for this sample numbering system is described in the QAPP. For the Black Brothers Company site, the site identification code for all samples will be MEN. The following alpha-character codes may be used for this investigation: soil boring (SB), soil probe (SP), soil gas (SG), source material (SR), test pit (TP) and shallow monitoring well (SMW). Typical sample characteristic code designations are:

- 001 primary sample;
- 101 duplicate samples;
- 201 field QC sample; and
- 301 physical characterization sample.



An example of a completely numbered sample, with each component identified as follows:

Example: MEN-SB01-001

Where: MEN – Black Brothers Company site

SB01 – soil boring location No. 1,

001 – primary soil sample No.1

### **4.3 SITE SPECIFIC QC PROCEDURES**

Overall precision, accuracy and comparability of laboratory analytical data will be assessed, as appropriate. Quality control samples used to evaluate field procedures will consist of trip blanks, rinsate blanks, matrix spike/matrix spike duplicates (MS/MSDs) and field duplicate samples. The following subsections describe the frequency, rationale, and collection procedures for QC samples.

#### **4.3.1 Trip Blanks**

Trip blanks consist of laboratory grade water prepared by the analytical laboratory and sorbent tube media. The laboratory grade water will not be opened by field personnel. A trip blank will be placed in each cooler that contains water or soil gas samples for volatile analysis. Trip blanks will be analyzed for the same compounds as the water or soil gas samples.

#### **4.3.2 Rinsate Blanks**

Rinsate blanks will be collected to verify the adequacy of decontamination procedures for equipment and materials; they will be analyzed for all constituents and compounds analyzed for in soil samples collected during this investigation. Rinsate blanks will be collected by pouring laboratory grade water over previously decontaminated equipment or materials and collecting the water in appropriate sample containers. It is anticipated that the frequency of rinsate blanks analyzed for this investigation will be one rinsate blank per 20 samples per soil matrix. Blanks will be performed on major pieces of equipment used for sampling.

#### **4.3.3 MS/MSD Samples**

The purpose of MS/MSD samples is to determine the effect of sample matrix on compound and analyte recovery. Field MS/MSDs will be collected simultaneously with each designated primary sample. One MS/MSD sample will be collected for every 20 samples submitted for each matrix (i.e., soil or water). MS/MSDs will be collected from relatively un-impacted areas to minimize the potential for matrix interference from MGP-related constituents. MS/MSDs will be analyzed for the same parameters as the primary samples. Primary samples and MS/MSDs will be placed in identical sample containers and preserved in the same manner. The location and depth of collection of each MS/MSD will be recorded in the field logbook.

#### **4.3.4 Field Duplicate Samples**

The purpose of field duplicate samples is to evaluate field and laboratory precision. Field duplicate samples will be collected simultaneously with each designated primary sample. One field duplicate sample will be collected for every 10 samples collected for the water and soil gas matrices. Field duplicates will be analyzed for the same parameters as the primary sample. Field duplicates and primary samples will be placed in identical sample containers and preserved in the same manner. Duplicate samples will be assigned a unique

sample identification number. The location of collection of each field duplicate will be recorded in the field log book. Primary and duplicate samples for water and soil gas will be collected as described in Section 6.3 of the QAPP.

#### 4.4 ANALYTICAL METHODS AND DETECTION LIMITS

Analytical methods and detection limits for this investigation will conform to the Tiered Approach to Corrective Action Objectives (TACO) requirements specified in Chapter 35 of the Illinois Administrative Code (IAC) Parts 740 and 742, respectively. Detection limits will be at or below TACO Tier 1 residential screening levels for soil and the Tier 1 groundwater screening levels for the site-specific groundwater class. Data quality objectives/levels will be as discussed in the QAPP. Chemical and physical analysis methods are listed below:

##### Focused Analyte List

- |                                |                                                         |
|--------------------------------|---------------------------------------------------------|
| • BTEX plus Styrene            | SW846 624/8260B                                         |
| • Phenols                      | SW846 8270C                                             |
| • PAHs                         | SW846 8270C                                             |
| • RCRA metals                  | SW846 6010B/6020 & SW846<br>SW846 7470A/7471A (mercury) |
| • Cyanide (total and amenable) | SW846 9014/9010B                                        |

##### Source Material Evaluation List

- |                             |             |
|-----------------------------|-------------|
| • TPH                       | 8015B MOD   |
| • PCBs                      | SW846 8082  |
| • pH                        | SW846 9045C |
| • TCLP extractions (Metals) | SW846 1311  |

##### Physical Analysis List

- |                                   |                |
|-----------------------------------|----------------|
| • Fraction organic carbon         | ASTM D 2974    |
| • Grain-size distribution         | ASTM D 422     |
| • Soil bulk density               | ASTM D 2937    |
| • Soil particle density           | ASTM D 854     |
| • Moisture content                | ASTM D 2216-92 |
| • Atterberg limits                | ASTM D 4318    |
| • Permeability                    | ASTM D 5084    |
| • Unconfined compressive strength | ASTM D 2166    |

\* \* \* \* \*

## 5.0 FIELD INVESTIGATION PROCEDURES

### 5.1 DRILLING AND SOIL SAMPLING PROCEDURES

Surface and subsurface soil collected by a soil probe will use direct push sampling (DPS) equipment. Samples will be collected using a macro sampling tube lined with an acetate liner. The DPS method employs a pneumatic hammer to advance the macro sampling tube and acetate liner into the soil. The soil column at each probe location will be continuously sampled and visually characterized. Soil borings will be completed using hollow stem augers with a minimum inside diameter large enough to accommodate a 3-inch outside diameter thin-walled tube sampler, split-barrel sampler or continuous tube sampler.

Use of grease or other lubricants on drill bits, drill rods, sampling equipment or tools required for boring will be avoided, if possible. If grease or lubricants are needed, they will be environmentally safe, certified petroleum hydrocarbon free (Well Guard by Jet-Lube or equivalent). Soil cuttings generated during soil boring and probe advancement will be placed in 55-gallon drums and transferred to a roll-off box before activities begin at the next location, as outlined in Section 5.3 of this work plan. Water will not be generated during drilling or probing activities, and groundwater is not expected to be encountered during drilling activities. However, should groundwater be encountered during drilling or probing activities which may require removal from the boring or probe hole, the water will be placed in 55-gallon drums and transferred to a temporary water tank prior to beginning activities at the next location.

For soil borings, soil sampling will be performed with a split spoon or split-barrel sampler and with acetate liners for soil probes. Resistance to soil penetration will be measured, in accordance with ASTM D1586 for all soil borings. The entire length of each soil sample will be screened immediately after retrieval using a PID by slicing the sample open with a clean decontaminated knife and screening on the split spoon or sleeve of the soil probe samples. If impacted soil is encountered based on either visual or PID readings, a sample from this interval will be collected. If impacted intervals were not proposed in the original grid sampling scheme, additional samples will be collected at these locations. PID readings will be recorded on soil boring log forms. The split spoon or split-barrel sampler will be decontaminated prior to use at each location according to procedures outlined in Section 5.2 of the QAPP.

Samples for laboratory analysis will be collected as follows:

**VOCs**—Soil samples for VOCs will be collected immediately after sample retrieval. Samples will be collected in accordance with SW-846 Method 5035 using the En Core 5 gram sampling method. Appendix D contains detailed En Core sampling procedures.

**SVOCs, Metals, Cyanide (TPH, PCBs, pH, and TCLP Metals in the Source Evaluation)**—Soil samples for these analytes will be collected after collecting VOCs. Samples will be collected using clean stainless steel mixing bowls, spoons, knives, etc. Sample aliquots will be placed directly from the sample retrieval device into a stainless steel bowl. The soil will be thoroughly mixed in the bowl

to homogenize the sample and then placed directly into appropriate clean sample containers. Container lids will be secured and samples will be placed in a cooler with ice.

In designated geotechnical soil boring locations, a thin-walled sampler or shelby tube will be used as necessary to collect undisturbed samples for physical testing purposes.

Soil probe and bore holes will be cement-bentonite grouted by using the tremie method, which consists of pumping the slurry down the annular space through a pipe. The bottom of the pipe will be placed near the bottom of the zone to be grouted and raised as the slurry is injected, keeping the bottom of the tremie pipe below the top of the slurry. The top of the boreholes will be restored with asphalt patch or with topsoil to previous surface conditions depending on location of probe/boring.

## **5.2 MONITORING WELL CONSTRUCTION AND DEVELOPMENT**

### **5.2.1 Monitoring Well Construction**

Each monitoring well will be constructed of new Schedule 5 type 304 stainless steel pipe and screen. Sections will be joined using threaded flush-joints. No solvents or lubricants will be used during well construction. The riser pipe for monitoring wells will have a diameter of 2 inches. The screened section will be factory-slotted or wrapped, Schedule 5 type 304 stainless steel with 0.010-inch slots. The length of the screened interval for each well will be determined based on the presence and thickness of the water-bearing unit. A 1-foot section of blank stainless steel riser pipe will be installed below the bottom of the screen as a silt trap. A flush-threaded bottom cap will be installed at the bottom of the well and a threaded stainless steel cap will be provided for the top of the riser pipe. Section 5.2 of the QAPP describes decontamination procedures for well installation materials. Clean gloves will be used during installation.

After the screen and riser have been installed, washed silica sand will be placed around the screened section and will extend up to 2 feet above the top of the screened section. The washed silica sand will be placed in a slow, steady stream around the well screen. The washed silica sand will conform to screen gradation analysis requirements of not less than 95 percent of the sand passing U.S. standard sieve #8 and not more than 5 percent passing U.S. standard sieve #2. A 3-foot minimum bentonite pellet or comparable bentonite slurry seal will be installed directly above the washed silica sand. If water is not present in the bore hole, bentonite pellets will be hydrated after placement by pouring clean potable water in the annulus of the bore hole. The remainder of the annulus around the well will be backfilled with cement-bentonite grout slurry.

Monitoring wells will be constructed flush with the ground surface. The riser pipe will be cut 4 inches bgs; a temporary cap will be placed on the riser pipe to prevent deleterious materials from entering the well during remaining completion activities. A protective casing, consisting of a cast-iron vault box will be installed. A 1.5- to 2-foot diameter concrete pad will be constructed around the vault box. Free drainage will be maintained away from the vault box and a compressible gasket-type-casing cap will be provided to prevent surface water infiltration into the well. Figure 9 presents a typical well construction diagram.

### **5.2.2 Monitoring Well Development**

Monitoring wells will be initially developed by surging then bailing or pumping water at 15-minute intervals until ten casing volumes of water have been removed from the well and sounding indicates loose materials have been removed. Before well development, equipment will be decontaminated following procedures outlined in Section 5.2 of the QAPP. Well development will be the responsibility of the drilling subcontractor under the direction of BMcD personnel. Section 5.4 describes the collection and containment of development water.

## **5.3 GROUNDWATER SAMPLING PROCEDURES**

### **5.3.1 Water Level Measurements**

Before sampling each monitoring well, a static water level measurement will be obtained. An Olympic Well Probe Model 150, or equivalent, will be used for water level measurements. Field personnel will use the following procedure to measure water levels:

- Wash cable portion that will enter the well with laboratory detergent and potable water and rinse with distilled water.
- Check well probe batteries. Turn on probe and place probe tip in a glass of distilled water. Note instrument response as the tip contacts water. If no response occurs, replace batteries and check again. Repeat procedure each day that well measurements are taken.
- Lower probe into well by pulling cable from hand-held reel until the indicator light comes on or the buzzer sounds.
- Move cable up and down while indicator is observed. Record exact cable length to nearest 1/100<sup>th</sup> of a foot, extended from probe tip to the top of the well casing or bore hole surface. Record station number and time and date of measurement in a field logbook. Repeat process to verify water level, as necessary.
- Decontaminate cable by spraying with distilled water and wiping with paper towels as cable is rewound. If any residue remains on the cable, wash it with laboratory detergent and potable water and rinse with distilled water.

### **5.3.2 Slug Testing**

Slug tests will be performed on new monitoring wells before installation of low flow purge and sampling systems following groundwater sampling to estimate hydraulic conductivity and transmissivity values of the water-bearing unit in which the well is screened. Slug tests will be performed using an electronic data logger with pressure transducers. If a well contains free product, electronic slug test equipment will not be used and a manual slug test will be performed, if practicable. The following procedures will be used to perform electronic slug tests:

- Measure water level as described in Section 5.3.1.
- Place pressure transducer from data logger below water surface to a depth sufficient to allow a reasonable change in head and to allow water to return to a static level.
- Create head differential while simultaneously starting data logger.
- Discontinue test once the change in water column height is less than 0.01 feet for a minimum of

three consecutive readings. Label and save printer paper.

- Press stop button and reset.
- Remove equipment from the well.
- Decontaminate equipment according to procedures outlined in Section 5.2 of the QAPP.

### **5.3.3 Groundwater Sampling and Field Measurements**

Each new monitoring well will have a dedicated low flow purge and sampling system installed. After installation of the low flow purge and sampling system, a sufficient amount of time will be allowed to pass for the groundwater to stabilize before sampling procedures begin. Following static water level determination and measurement, wells will be purged until the following parameters stabilize: turbidity, dissolved oxygen, pH, specific conductance and temperature. Purged water will be collected as specified in Section 5.4.2. Sample containers for BTEX and styrene analysis will be filled first. Forty milliliter (ml) vials will be filled completely for the BTEX and styrene analysis, with no visible air bubbles, and placed in an iced cooler for preservation. Next, containers for phenols, PAHs, RCRA metals, and cyanide analyses will be filled.

## **5.4 VAPOR INTRUSION SAMPLING PROCEDURES**

### **5.4.1 Water Table Sampling Procedures**

At each soil probe location selected for water table sampling, one temporary, dedicated, disposable, 1-inch diameter, 10-slot PVC screen will be installed, at depths where the water table is encountered. The depth to groundwater will be measured from the top of the concrete slab. A peristaltic pump and dedicated, disposable tubing will be used to collect the sample. Low-flow groundwater sampling procedures will not be used due to the temporary nature of the wells. Water table samples will be collected in a method-appropriate manner, in certified-clean sampling bottles with method required chemical preservatives as applicable. Following sample collection, sample containers will be sealed, labeled, and placed on ice in a cooler for transport to the analytical laboratory under proper chain of custody procedures.

### **5.4.2 Soil Gas Sampling Procedures**

The subsurface soil gas and subslab soil gas sampling probes will be installed as described in the soil gas sampling procedures presented in Appendix E. Subsurface soil gas sampling probes will be installed at a depth that is at least 3 feet bgs and is above the capillary fringe (i.e., at least 1 foot above the water table in granular soil or at least 3 feet above the water table in cohesive soil). Subslab sampling probes will be installed to collect soil gas from immediately beneath the slab. Figures 10 and 11 illustrate typical soil gas probe construction and subslab soil gas probe construction diagrams, respectively.

After installation, the soil gas sampling probes will be allowed to equilibrate for a minimum of 24 hours prior to sampling. Prior to sample collection, both helium tracer and mechanical leak tests will be performed at each location to verify the integrity of the probe and the sample train assembly. Samples will then be collected from each probe using method-appropriate containers, including 1-liter passivated canisters and/or sorbent tubes. Following collection, soil gas samples will be labeled and transported under proper chain-of-

custody procedures to the laboratory for analysis using USEPA Methods TO-15 and/or TO-17, or additional methods as necessary based on constituents of concern identified in soil and groundwater samples.

## **5.5 FIELD INVESTIGATION DERIVED WASTES**

Investigation-derived wastes include excavation soils, drilling cuttings, plastic sheeting, decontamination fluids, groundwater, disposable sampling equipment, and disposable health and safety materials. BMcD will assist Nicor Gas in the proper disposal of investigation-derived wastes. The following sub-sections discuss procedures for handling these wastes and labeling drums.

### **5.5.1 Solid Materials**

Excavation soils, drill cuttings, plastic sheeting, and equipment that cannot be reasonably decontaminated will be placed in Department of Transportation (DOT) specified 55-gallon drums or in covered roll-off boxes lined with polyethylene. The disposal materials will be analyzed for paint filter test, open cup flashpoint, TCLP metals, TCLP VOCs, TCLP SVOCs, Total PCBs, EOX, pH, cyanide(total), sulfide(Reactive), phenol (total) and BTEX. Disposal of these materials will be based on analytical results.

Disposable sampling equipment and health and safety materials not visibly contaminated will be double-bagged in plastic trash bags and disposed of at a solid waste disposal location (i.e., trash dumpster or container).

### **5.5.2 Liquid Materials**

Decontamination fluids and liquid source materials will be placed in DOT specified 55-gallon drums or in a temporary storage tank. Disposal of these liquids will be based on analytical results.

### **5.5.3 Labeling**

If used, the following information will be placed on both the side and top of each DOT-specification drum:

#### **Example**

- |                        |                             |
|------------------------|-----------------------------|
| • Site location        | Black Brothers Company Site |
| • Sampling location(s) | SB001                       |
| • Waste type           | Soil cuttings               |
| • Investigation date   | 08/29/11                    |

\* \* \* \* \*

## 6.0 References

- Berg, R.C. and Kempton, J.P., and Cartwright, K., 1984. Potential for contamination of shallow aquifers in Illinois. Circular 532, Illinois State Geological Survey (ISGS), Champaign.
- Berg, R.C. and Kempton, J.P., 1987. Stack-unit mapping of geologic materials in Illinois to a depth of 15 meters. Circular 542, ISGS, Champaign.
- Burns & McDonnell, 2011. *Site Health & Safety Plan for the Nicor Gas Black Brothers Company Site in Mendota, Illinois.*
- Burns & McDonnell, 2011. *Black Brothers Company Site Ambient Air Monitoring Work Plan for Site Investigation Activities.*
- Fetter, C.W., 1994. *Applied Hydrogeology*, 3rd Ed. Prentice Hall, Inc., Englewood Cliffs, New Jersey.
- Illinois Department of Natural Resources (Illinois DNR), 2011. Illinois Natural Heritage Database.
- Illinois State Geological Survey (ISGS), 2011. Well Database Search.
- Illinois State Water Survey (ISWS), 2011. Well Database Search.
- Illinois Pollution Control Board, 2010. *Proposed Amendments to Tiered Approach to Corrective Action Objectives, Illinois Pollution Control Board Case No. R2010-009*, <http://www.ipcb.state.il.us/documents/dsweb/Get/Document-70510/>
- Kolata, D.R., 2005. Bedrock Geology of Illinois (map). Scale 1:500,000. Illinois Map 14, ISGS, Champaign.
- Piskin, K., 1975. Thickness of Glacial Drift in Illinois (map). Scale 1:500,000. Circular 490, ISGS, Urbana.
- Sanborn Map and Publishing Company, 1885, 1891, 1897, 1902, 1929 and 1949. Sanborn Fire Insurance Maps of southeast corner of 9<sup>th</sup> Avenue and 5<sup>th</sup> Street, Mendota, Illinois.
- Sasman, R.T. et al., 1974. Groundwater pumpage in northern Illinois, 1960-1970. Report of Investigation 73, ISWS, Urbana.
- Village of Mendota Zoning Department, 2011. Zoning Map of Mendota, LaSalle County, Illinois <http://www.mendota.il.us/images/ZONING.2009.pdf>



Visocky, A.P., Sherrill, M.G., and Cartwright, K., 1985. Geology, hydrology, and water quality of the Cambrian and Ordovician systems in northern Illinois. Cooperative Groundwater Report 10, ISGS, Champaign.

Willman et al., 1975. Handbook of Illinois Stratigraphy. Bulletin 95, ISGS, Urbana.

\* \* \* \* \*

**FIGURES**  
**Black Brothers Company Site**

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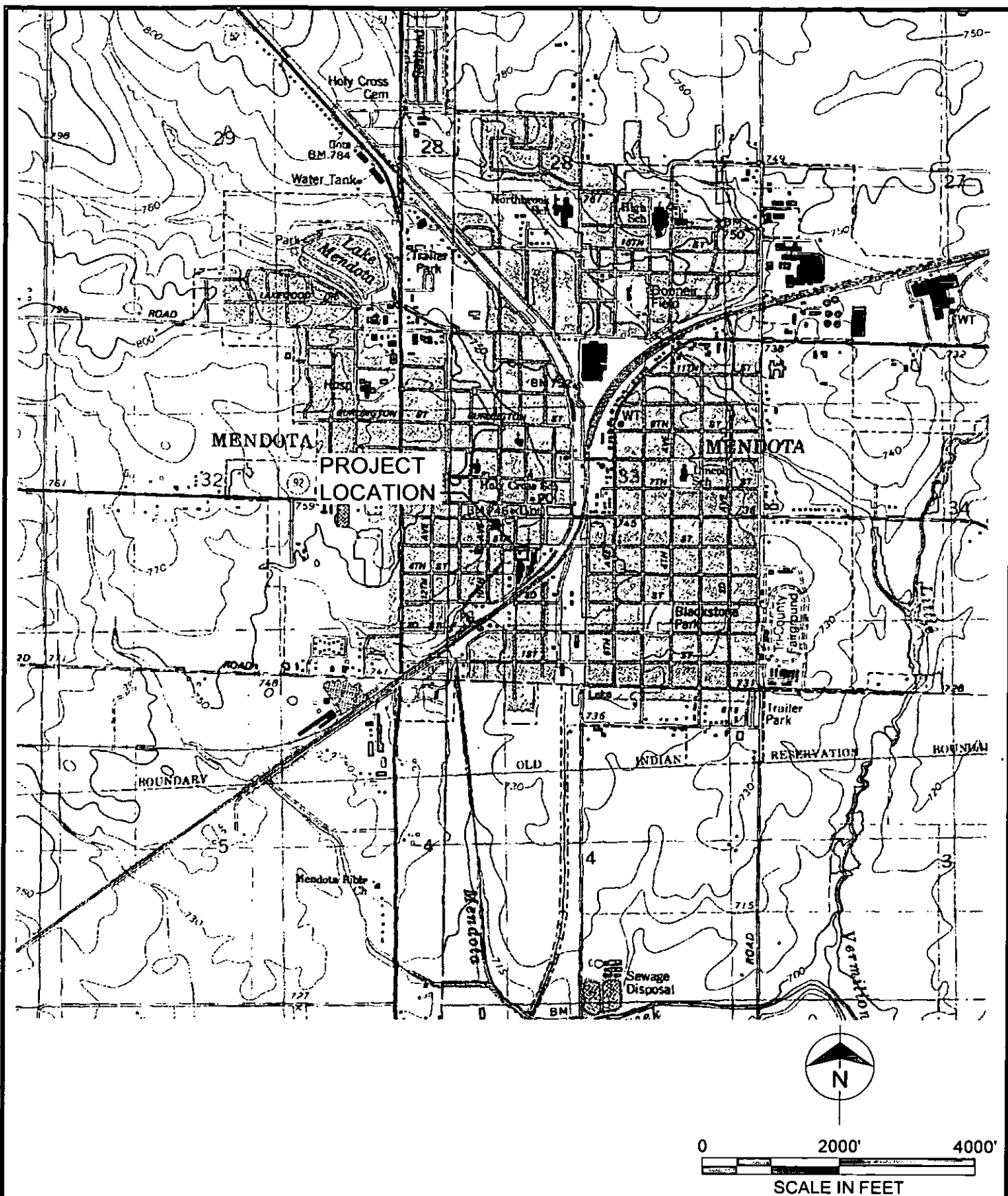
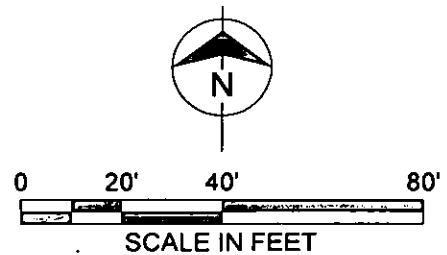
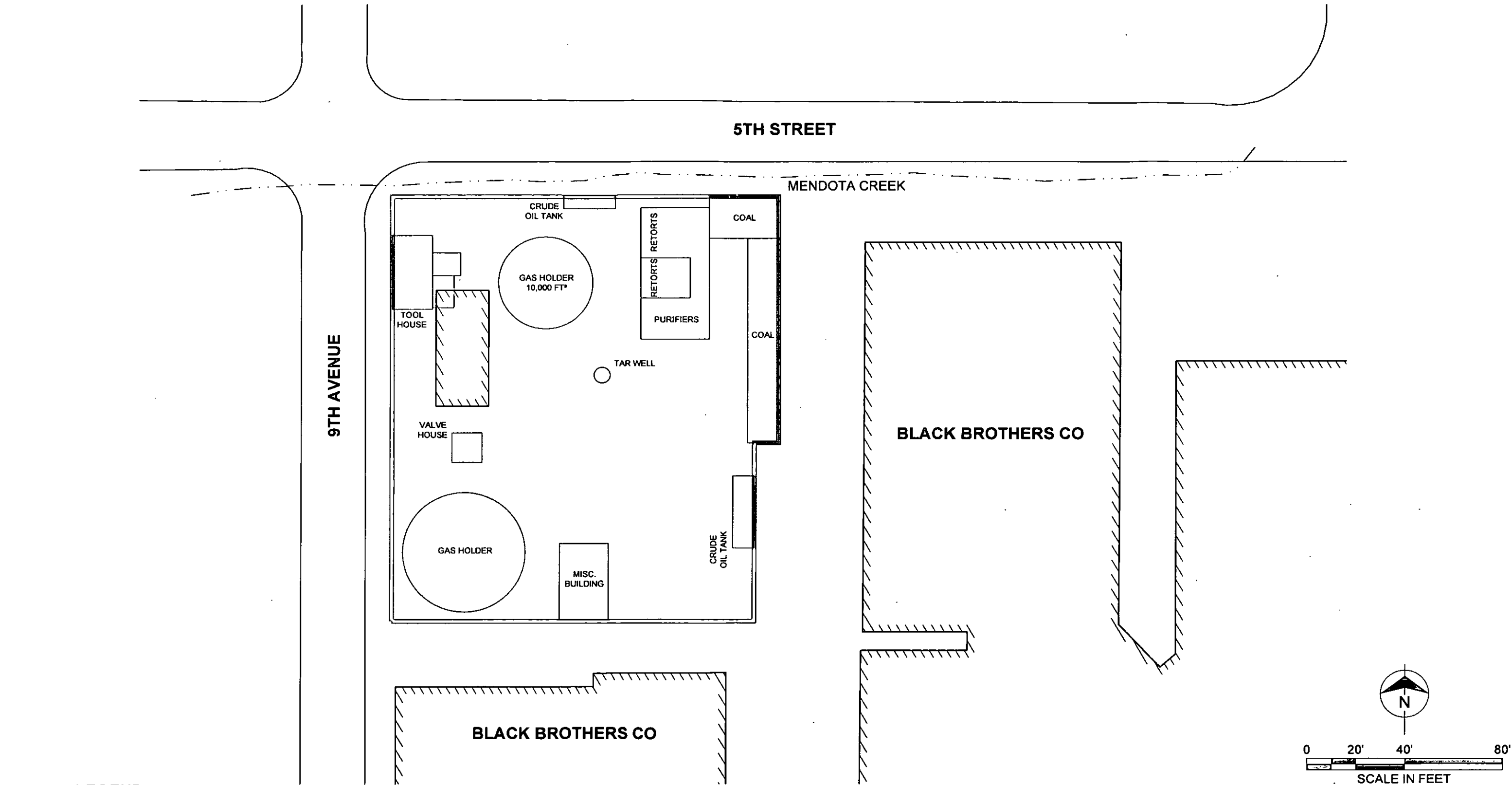


Figure 1  
SITE LOCATION MAP  
SITE INVESTIGATION WORK PLAN  
BLACK BROTHERS COMPANY SITE  
MENDOTA, ILLINOIS

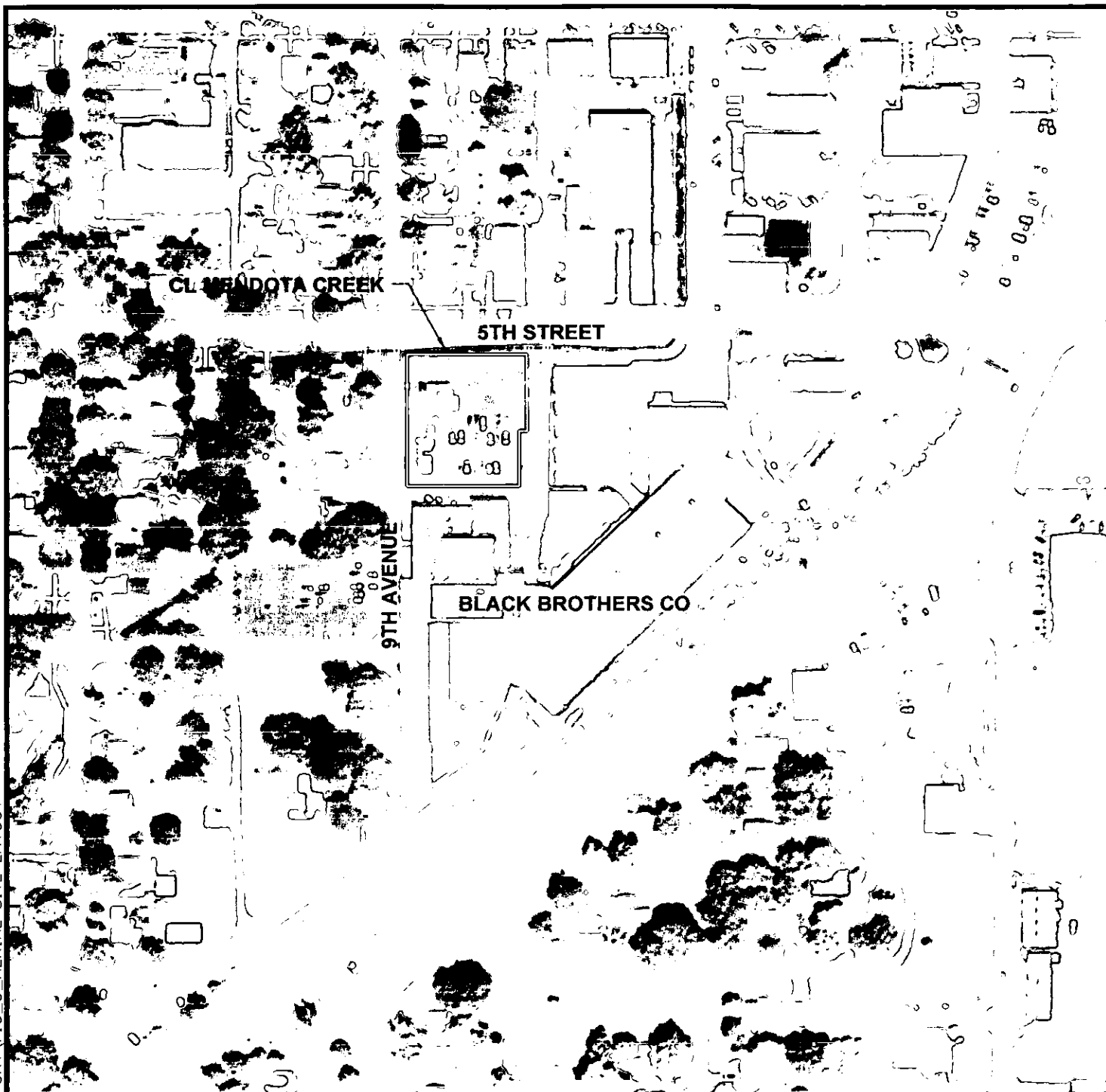


**LEGEND**

- FORMER MGP BOUNDARY
- EXISTING BUILDING
- FORMER STRUCTURES
- CENTERLINE OF CREEK



Figure 2  
MGP SITE HISTORICAL LAYOUT  
MENDOTA MGP SITE  
MENDOTA, ILLINOIS



**LEGEND**

— FORMER MGP BOUNDARY



0 200' 400'  
SCALE IN FEET



Figure 3  
AERIAL SITE LAYOUT MAP  
SITE INVESTIGATION WORK PLAN  
BLACK BROTHERS COMPANY SITE  
MENDOTA, ILLINOIS

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EXEMPT DOCUMENT NO. 002

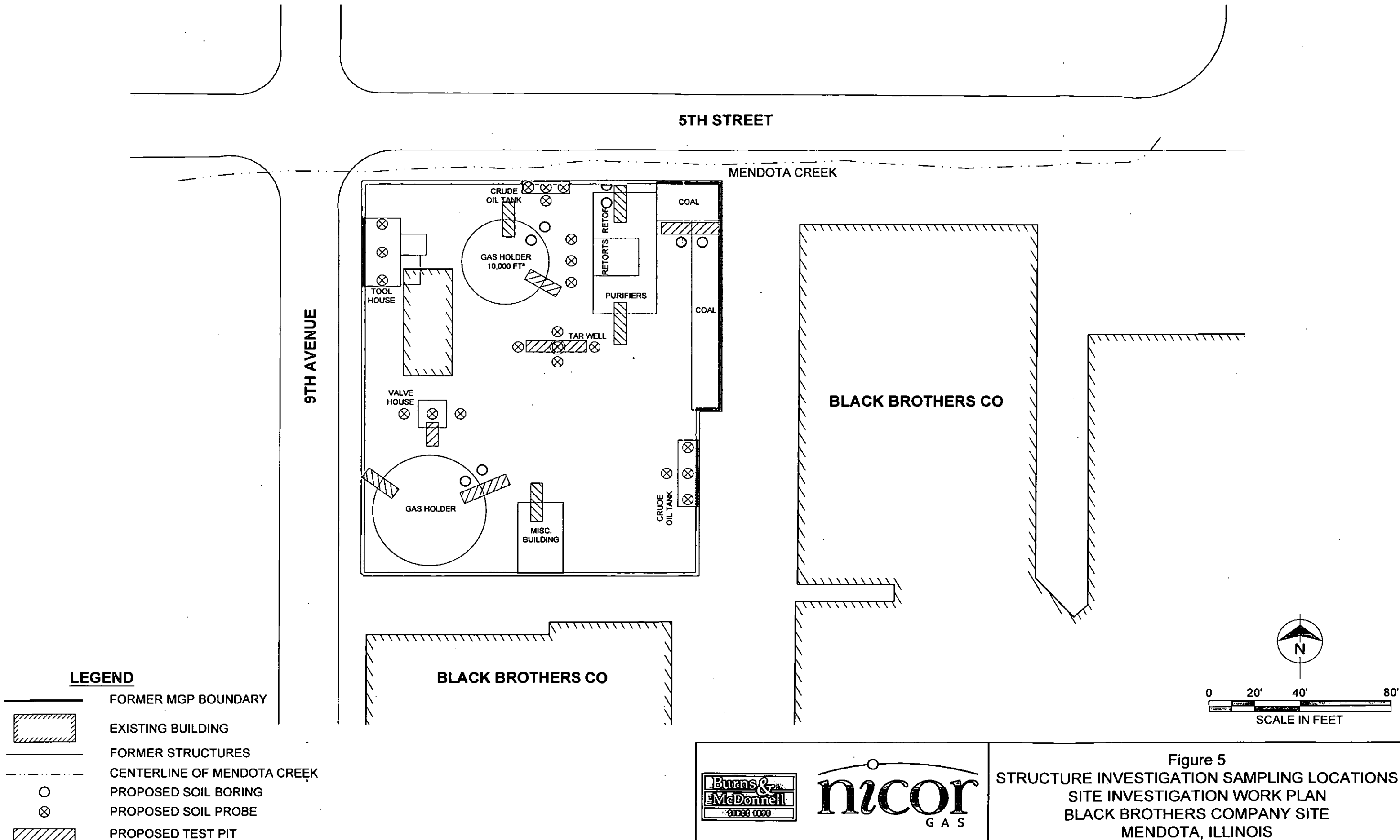
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EXEMPT  
DOCUMENT

FILE CATEGORY SR/TECH

DOCUMENT DATE 08-08-2011

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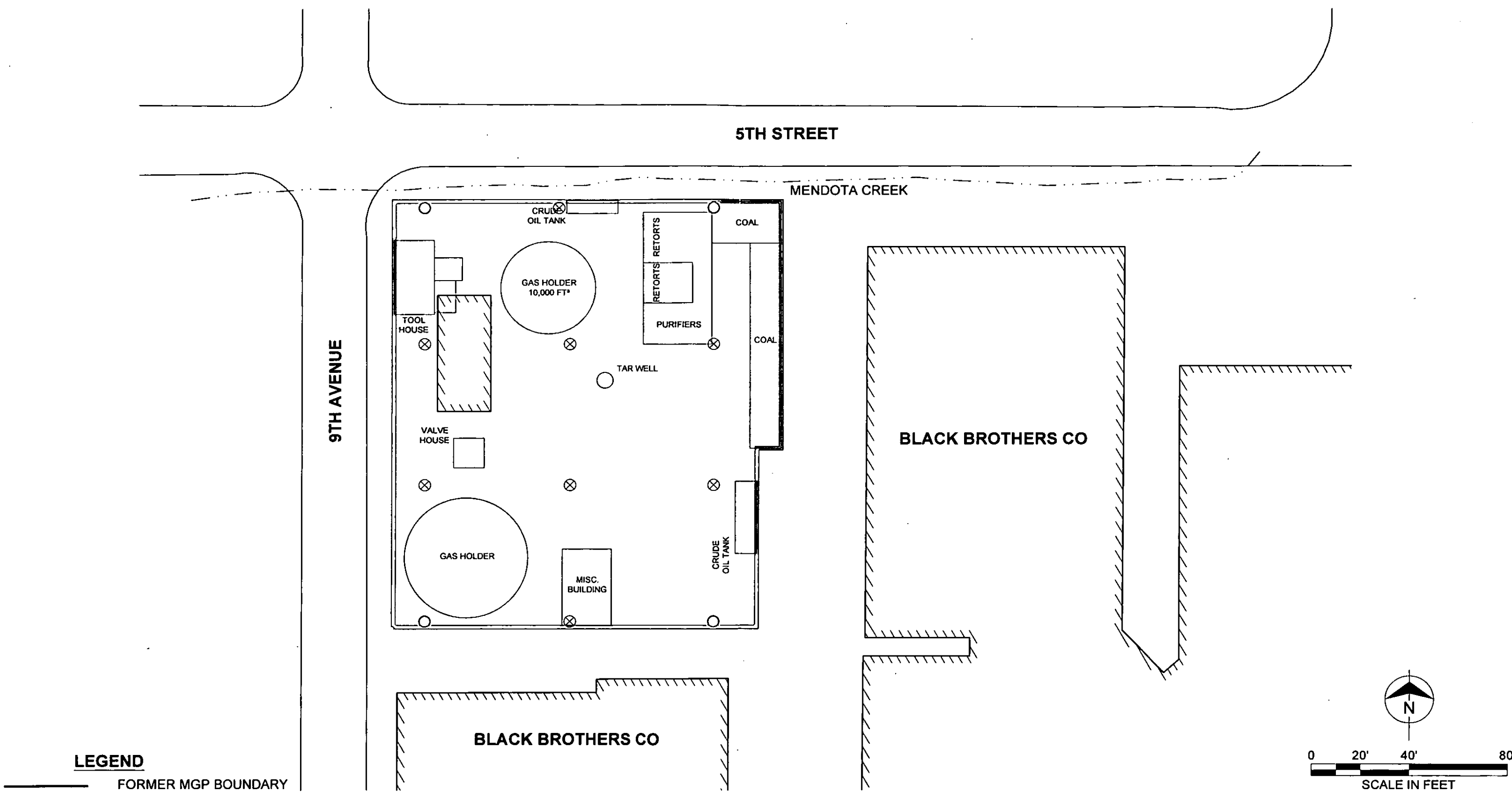


Figure 6  
SOIL INVESTIGATION SAMPLING LOCATIONS  
SITE INVESTIGATION WORK PLAN  
BLACK BROTHERS COMPANY SITE  
MENDOTA, ILLINOIS

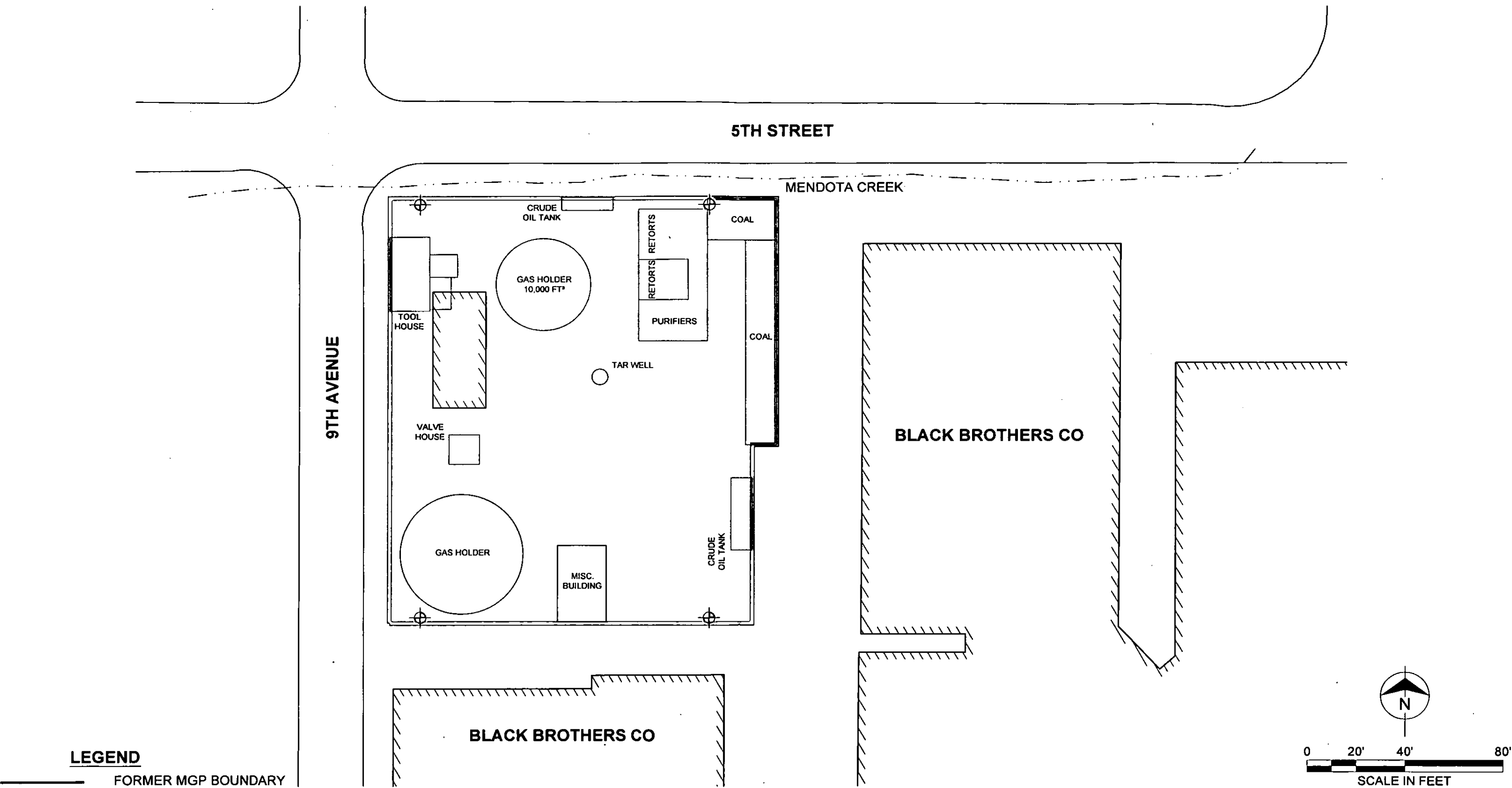
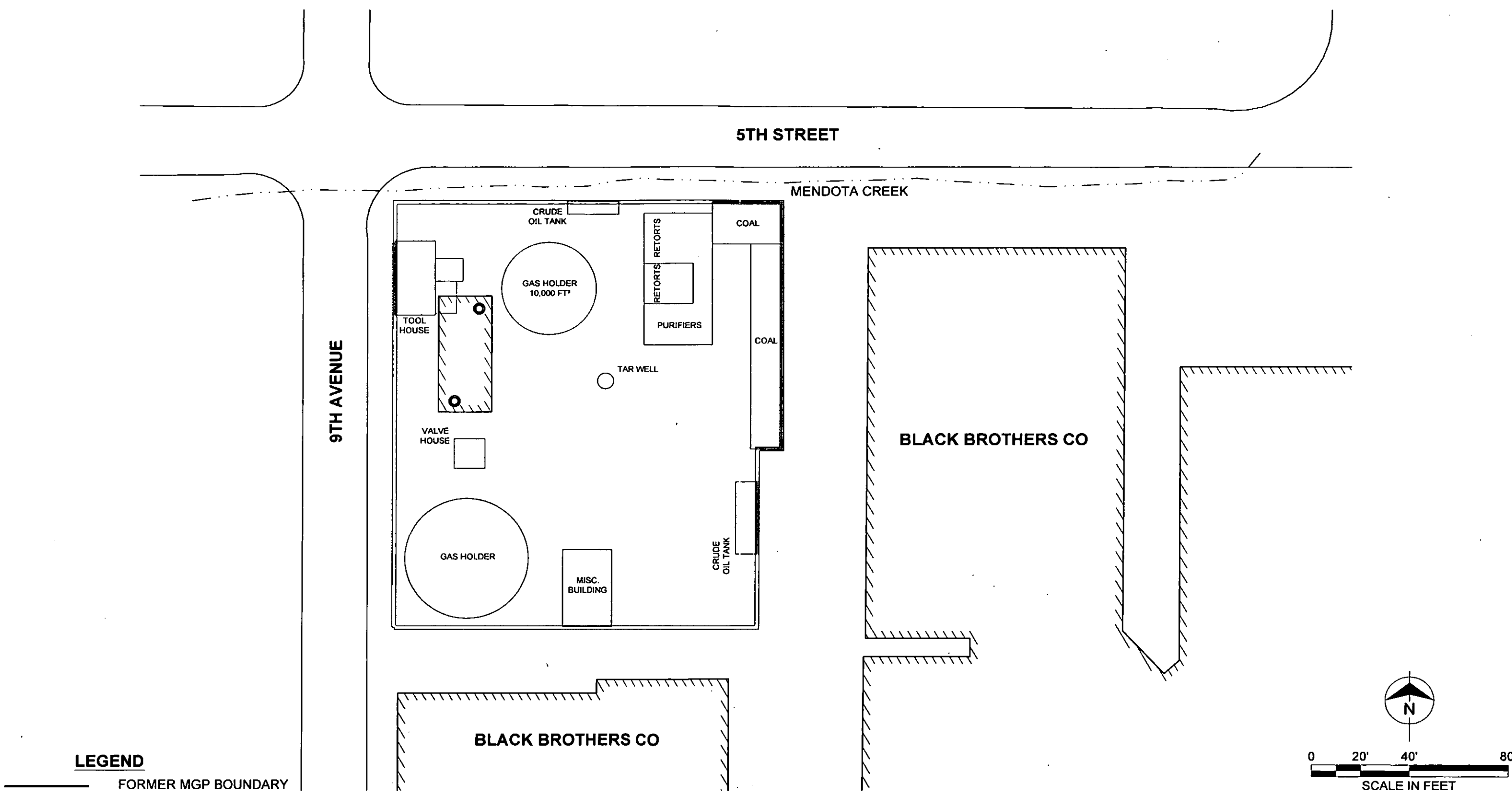


Figure 7  
GROUNDWATER INVESTIGATION SAMPLING LOCATIONS  
SITE INVESTIGATION WORK PLAN  
BLACK BROTHERS COMPANY SITE  
MENDOTA, ILLINOIS



**LEGEND**

- FORMER MGP BOUNDARY
- EXISTING BUILDING
- FORMER STRUCTURES
- CENTERLINE OF MENDOTA CREEK
- PROPOSED SOIL GAS LOCATION



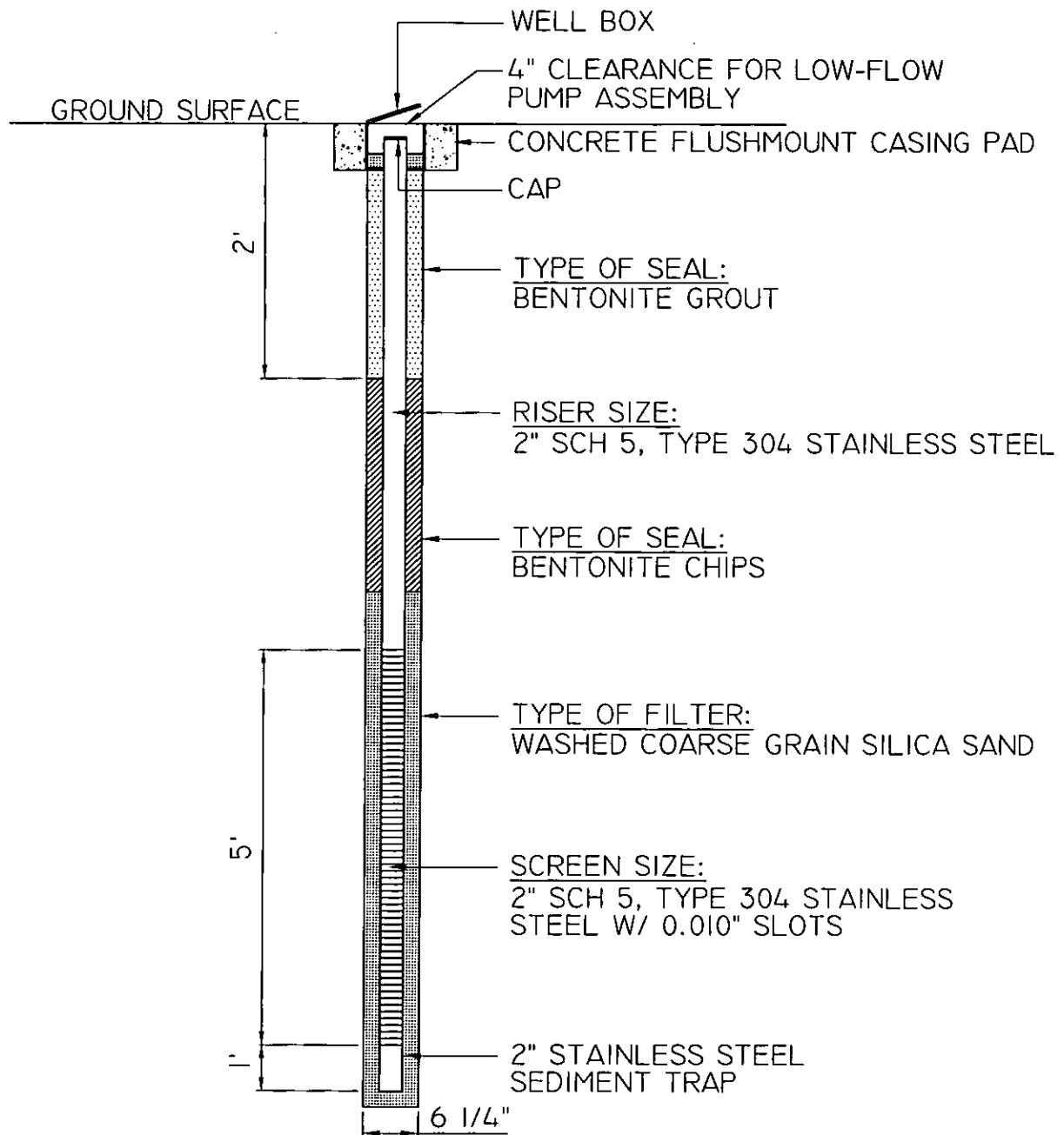


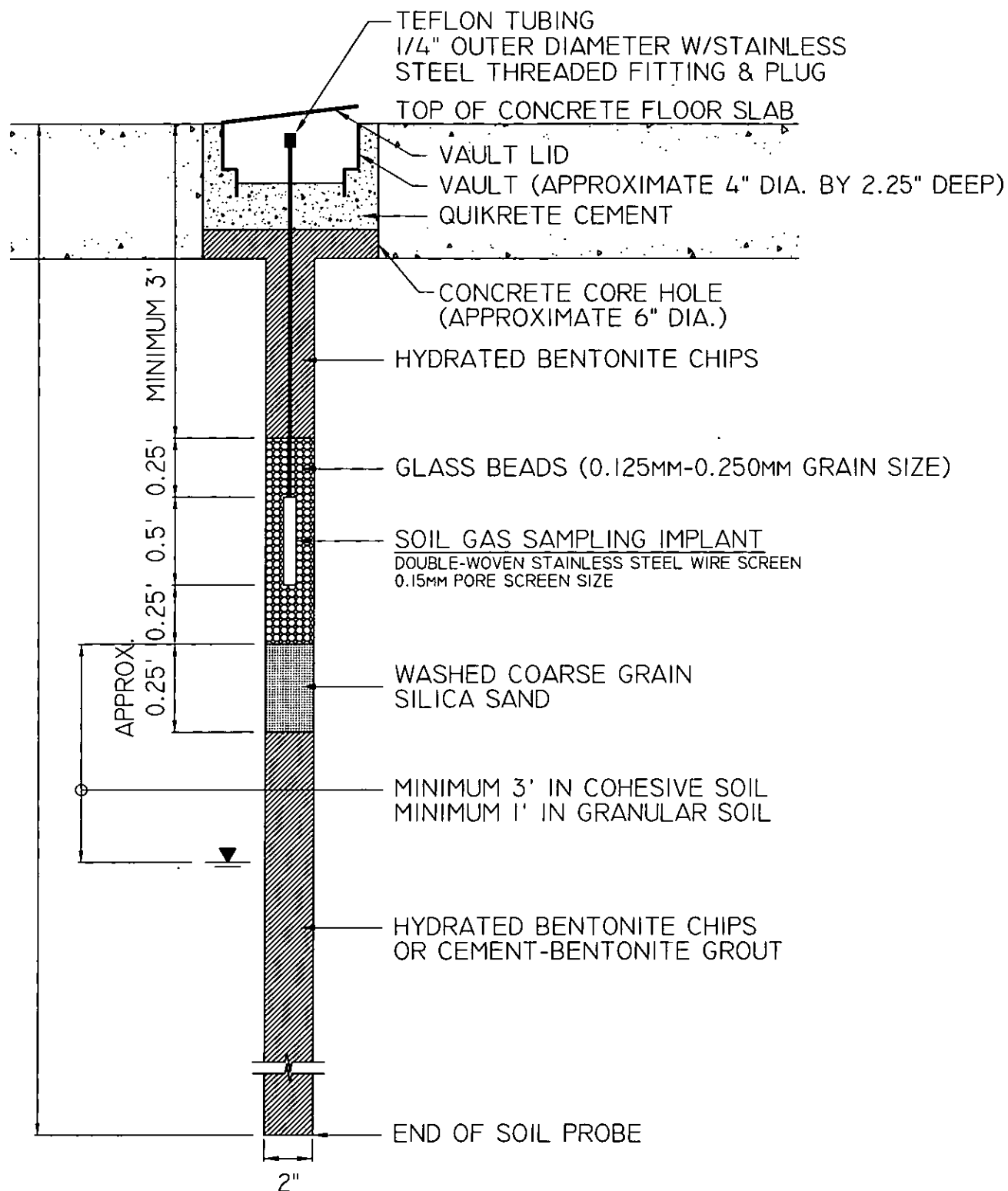
Figure 8  
VAPOR INTRUSION INVESTIGATION SAMPLING LOCATIONS  
SITE INVESTIGATION WORK PLAN  
BLACK BROTHERS COMPANY SITE  
MENDOTA, ILLINOIS



NOT TO SCALE



Figure 9  
WELL CONSTRUCTION DIAGRAM  
SITE INVESTIGATION WORK PLAN  
BLACK BROTHERS COMPANY SITE  
MENDOTA, ILLINOIS

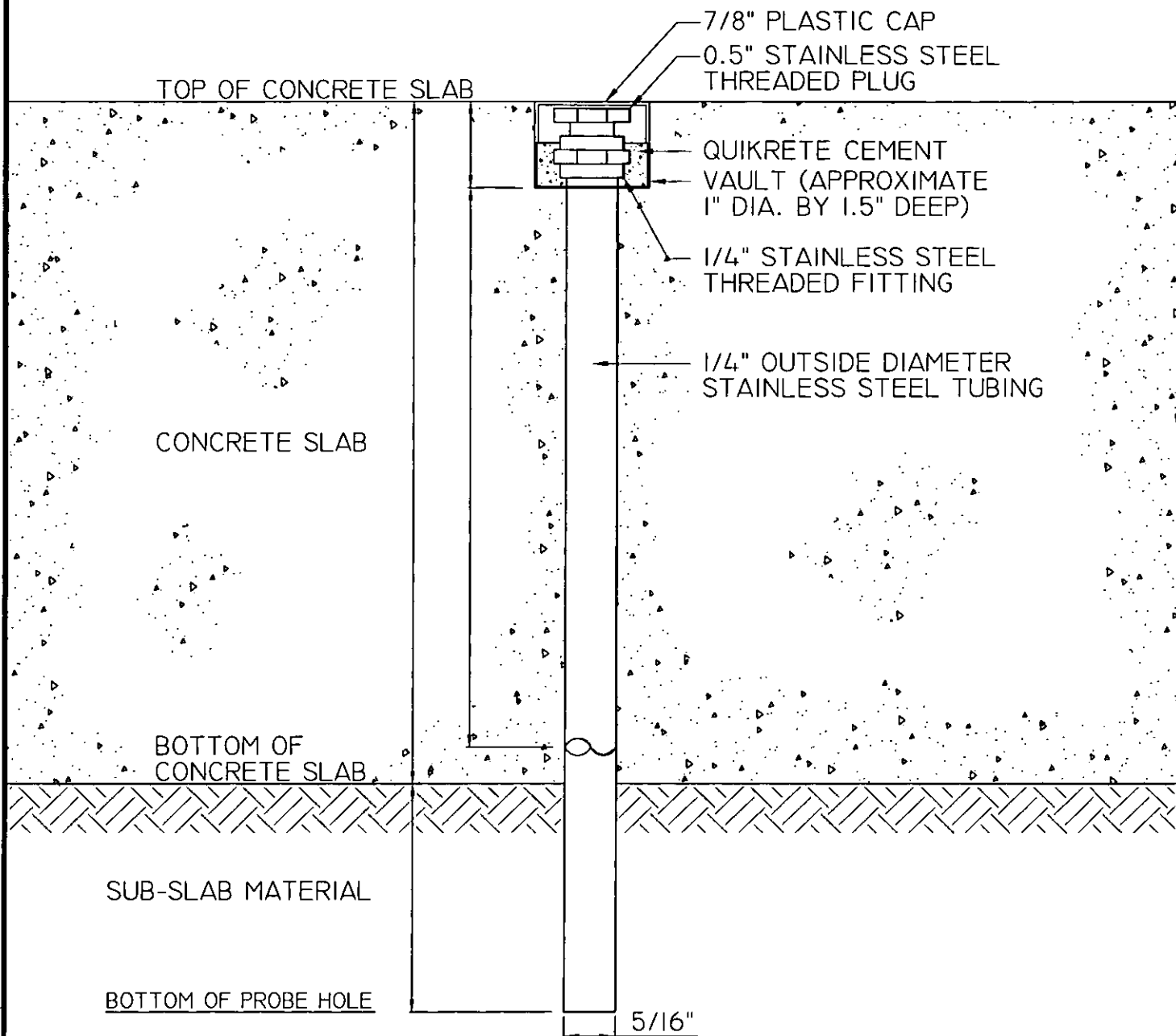


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**Figure 10**  
**SOIL GAS PROBE DIAGRAM**  
**SITE INVESTIGATION WORK PLAN**  
**BLACK BROTHERS COMPANY SITE**  
**MENDOTA, ILLINOIS**

I:\NICOR GAS\10/6/18--MENDOTA\CAD\SI REPORT\FIG\_11\_SUB-SLAB CONSTRUCTION DIA



NOT TO SCALE



Figure 11  
SUB-SLAB SOIL GAS PROBE DIAGRAM  
SITE INVESTIGATION WORK PLAN  
BLACK BROTHERS COMPANY SITE  
MENDOTA, ILLINOIS

**APPENDIX A**  
**Sanborn Maps**  
**Black Brothers Company Site**

**Mendota**

SE Corner of 5th Street and 9th Ave  
Mendota, IL 61342

Inquiry Number: 2886259.3

October 05, 2010

**Certified Sanborn® Map Report**



**EDR®** Environmental Data Resources Inc

440 Wheelers Farms Road  
Milford, CT 06461  
800.352.0050  
[www.edrnet.com](http://www.edrnet.com)



## Certified Sanborn® Map Report

10/05/10

**Site Name:**

Mendota  
SE Corner of 5th Street and 9th  
Mendota, IL 61342

**Client Name:**

Burns & McDonnell Eng. Co Inc  
1431 Opus Place  
Downers Grove, IL 60515



EDR Inquiry # 2886259.3

Contact: Amanda Haugen

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### Certified Sanborn Results:

**Site Name:** Mendota  
**Address:** SE Corner of 5th Street and 9th Ave  
**City, State, Zip:** Mendota, IL 61342  
**Cross Street:**  
**P.O. #** NA  
**Project:** NA  
**Certification #** F36D-46D4-8007



Sanborn® Library search results  
Certification # F36D-46D4-8007

### Maps Provided:

1949      1885  
1929  
1909  
1902  
1897  
1891

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- ☒ Library of Congress
- ☒ University Publications of America
- ☒ EDR Private Collection

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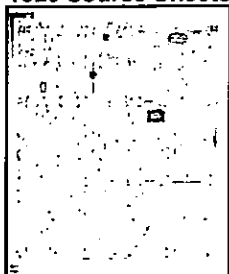


Volume 1, Sheet 12



Volume 1, Sheet 13

### 1929 Source Sheets



Volume 1, Sheet 12

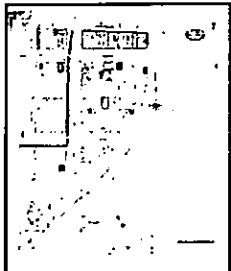


Volume 1, Sheet 13

### 1909 Source Sheets



Volume 1, Sheet 6



Volume 1, Sheet 7

### 1902 Source Sheets



Volume 1, Sheet 6

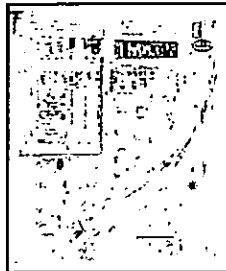


Volume 1, Sheet 7

**1897 Source Sheets**

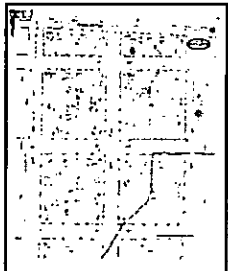


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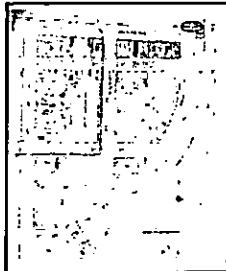


Volume 1, Sheet 7

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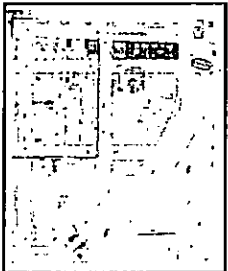


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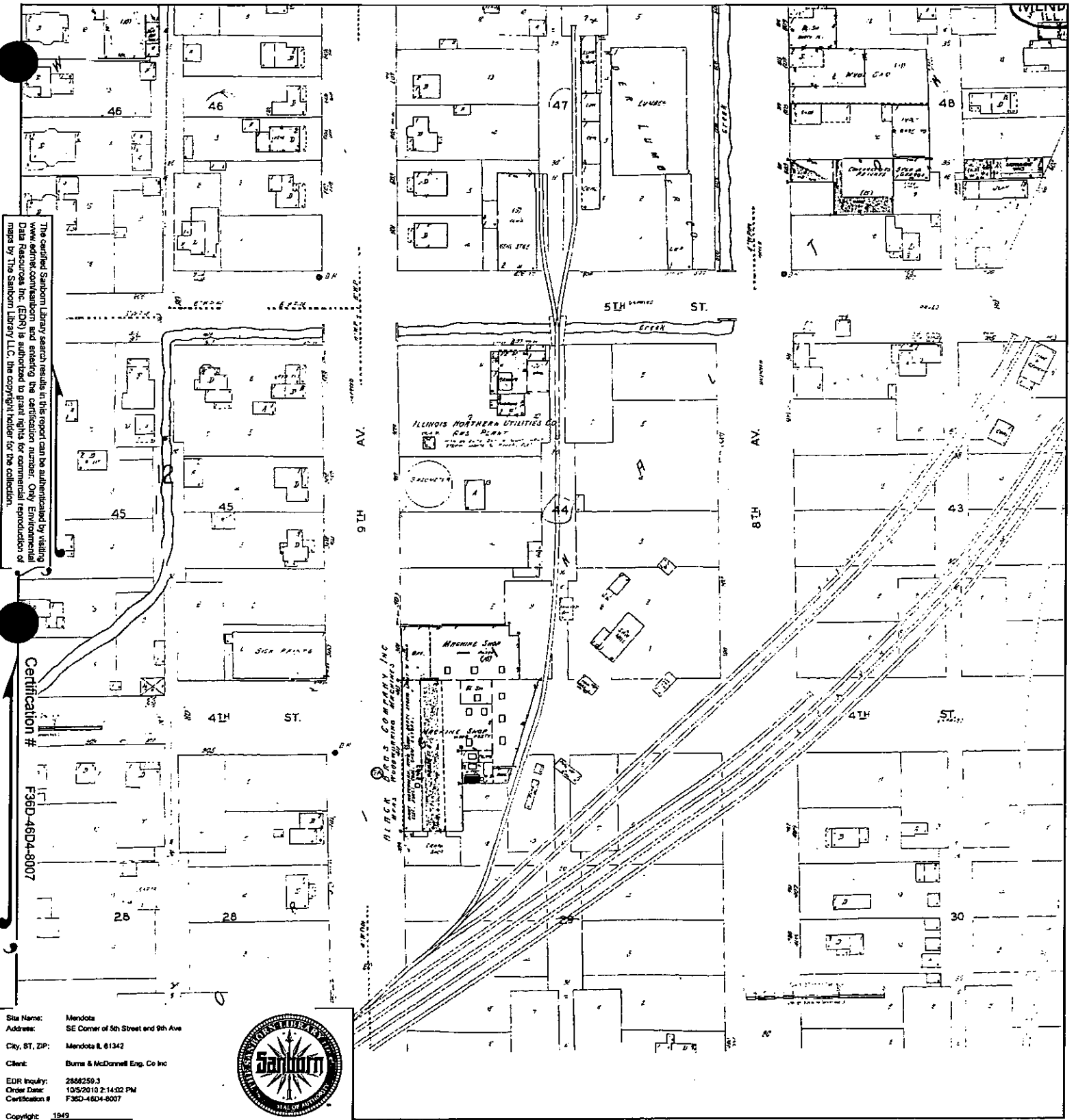
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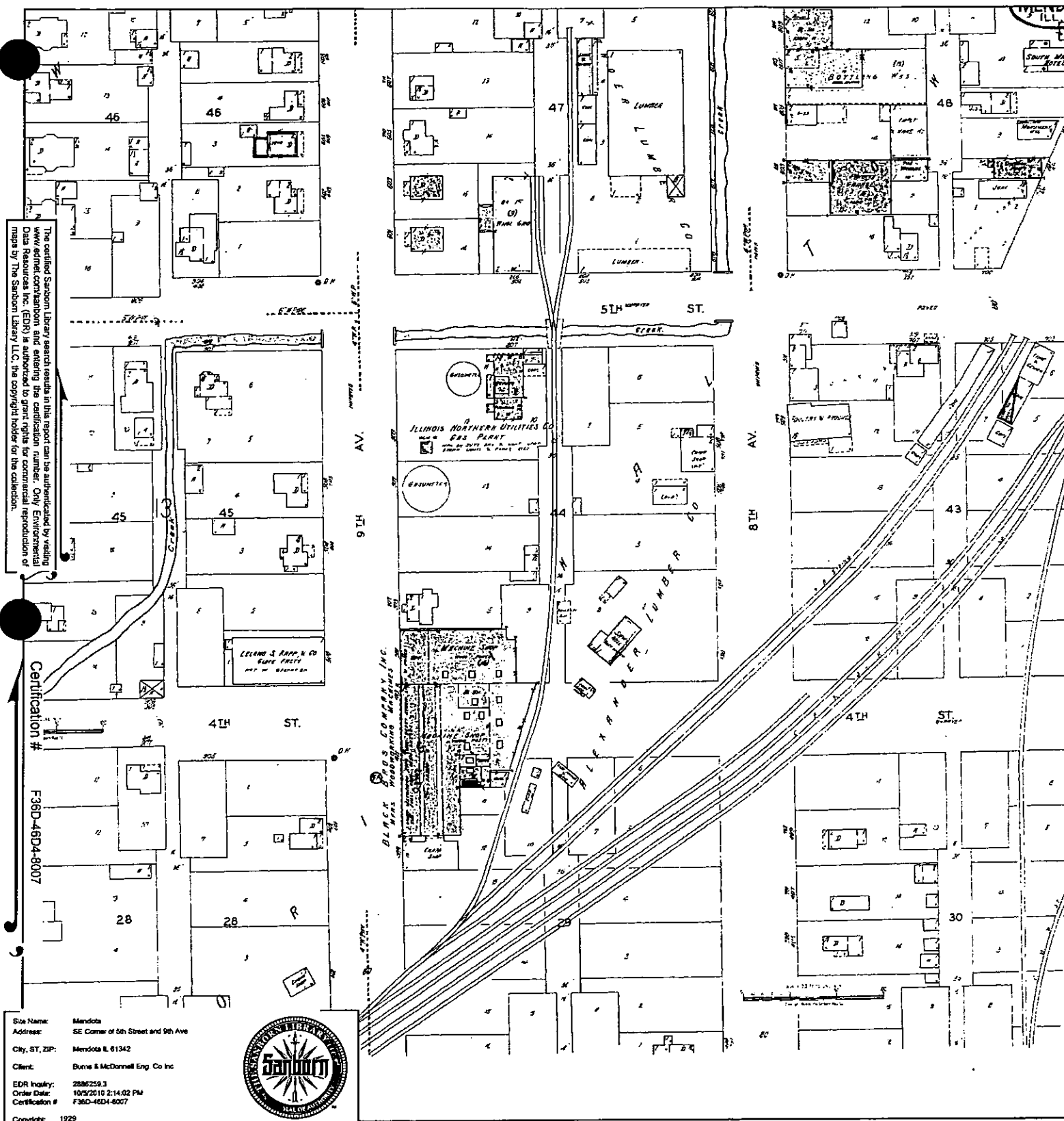


Volume 1, Sheet 3

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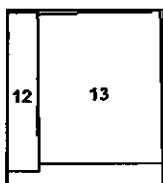
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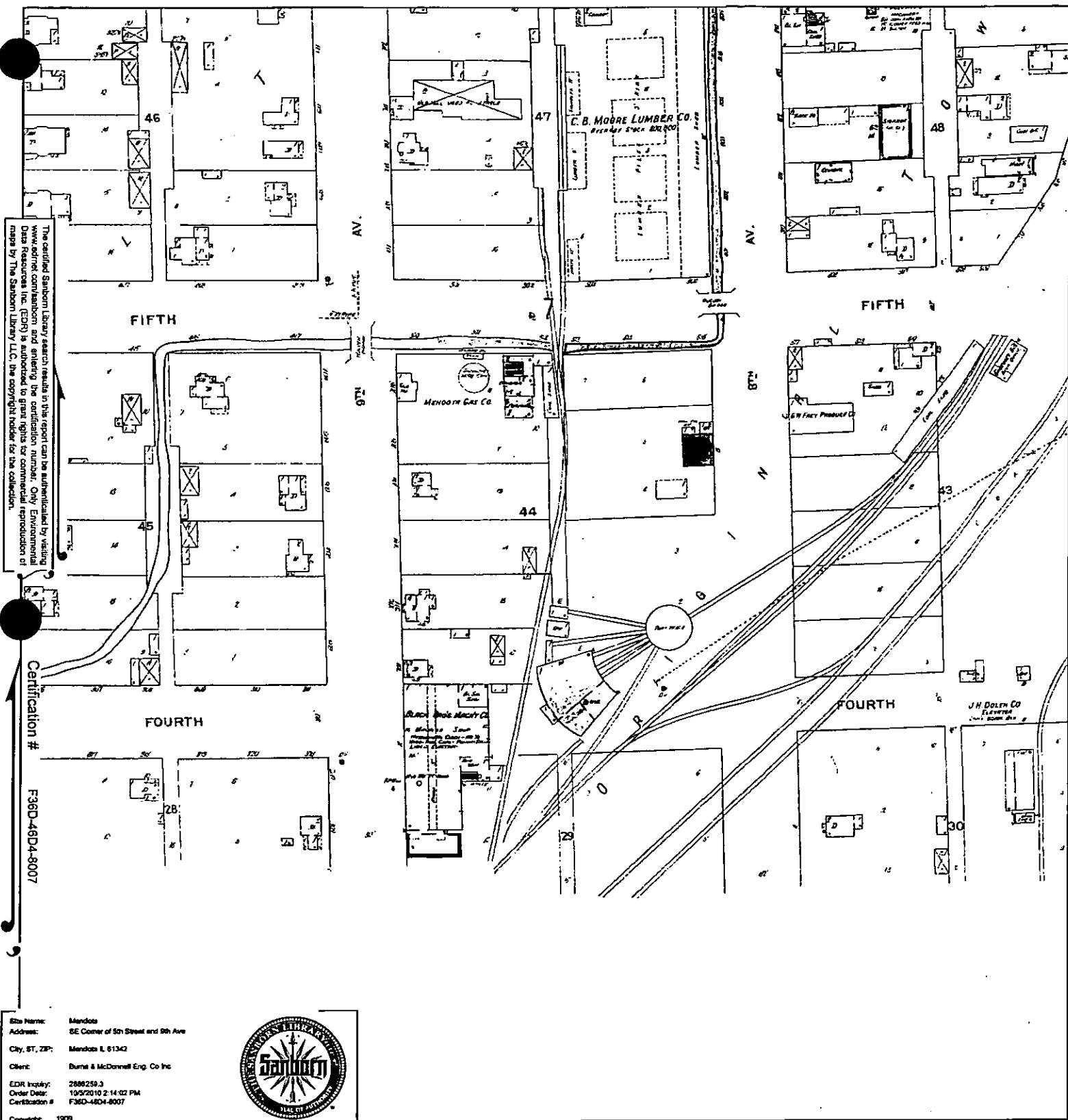
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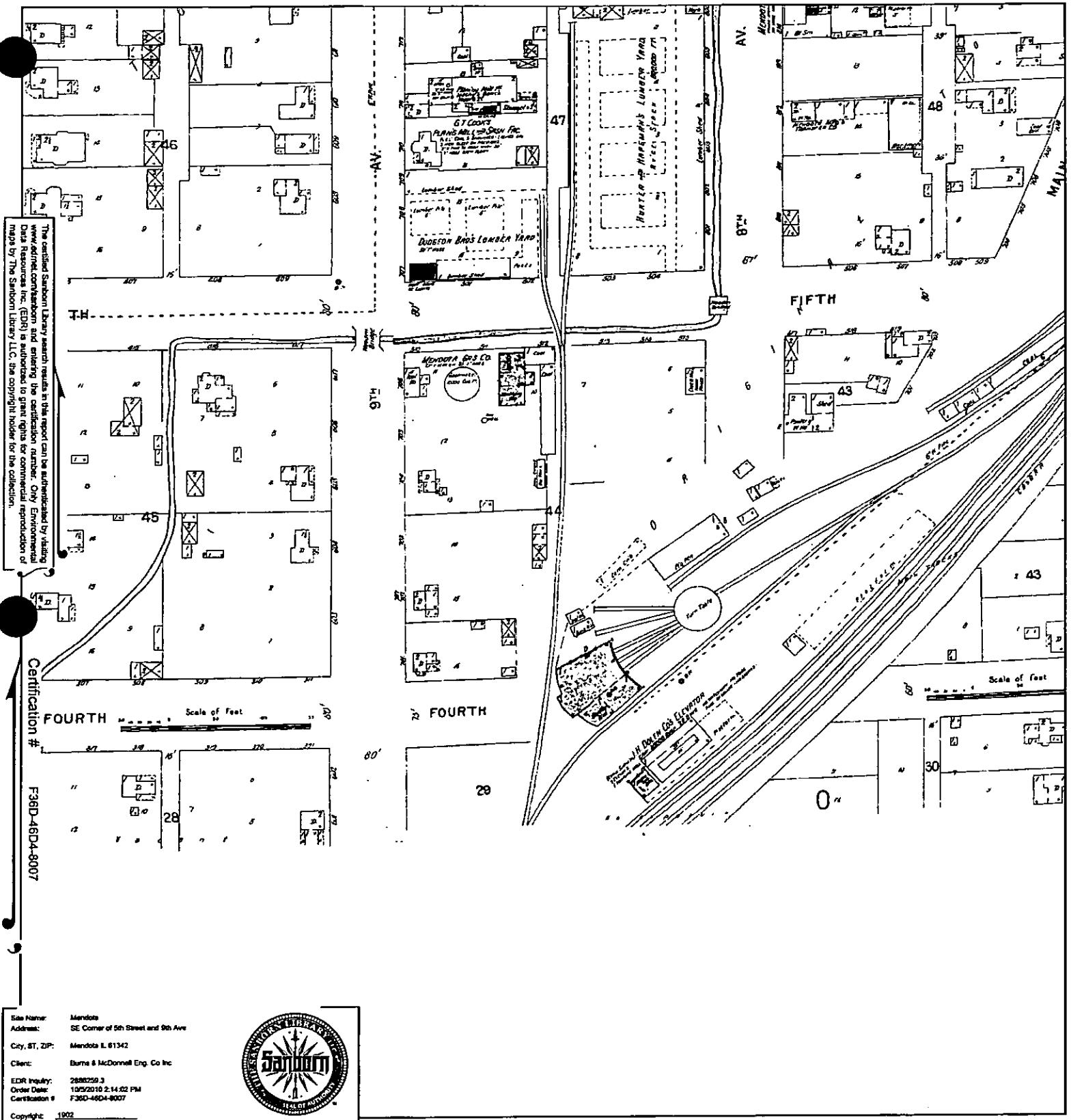
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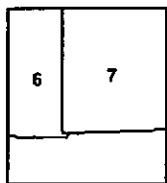
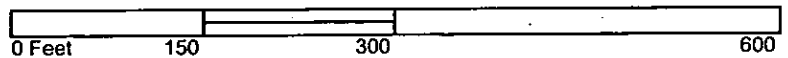
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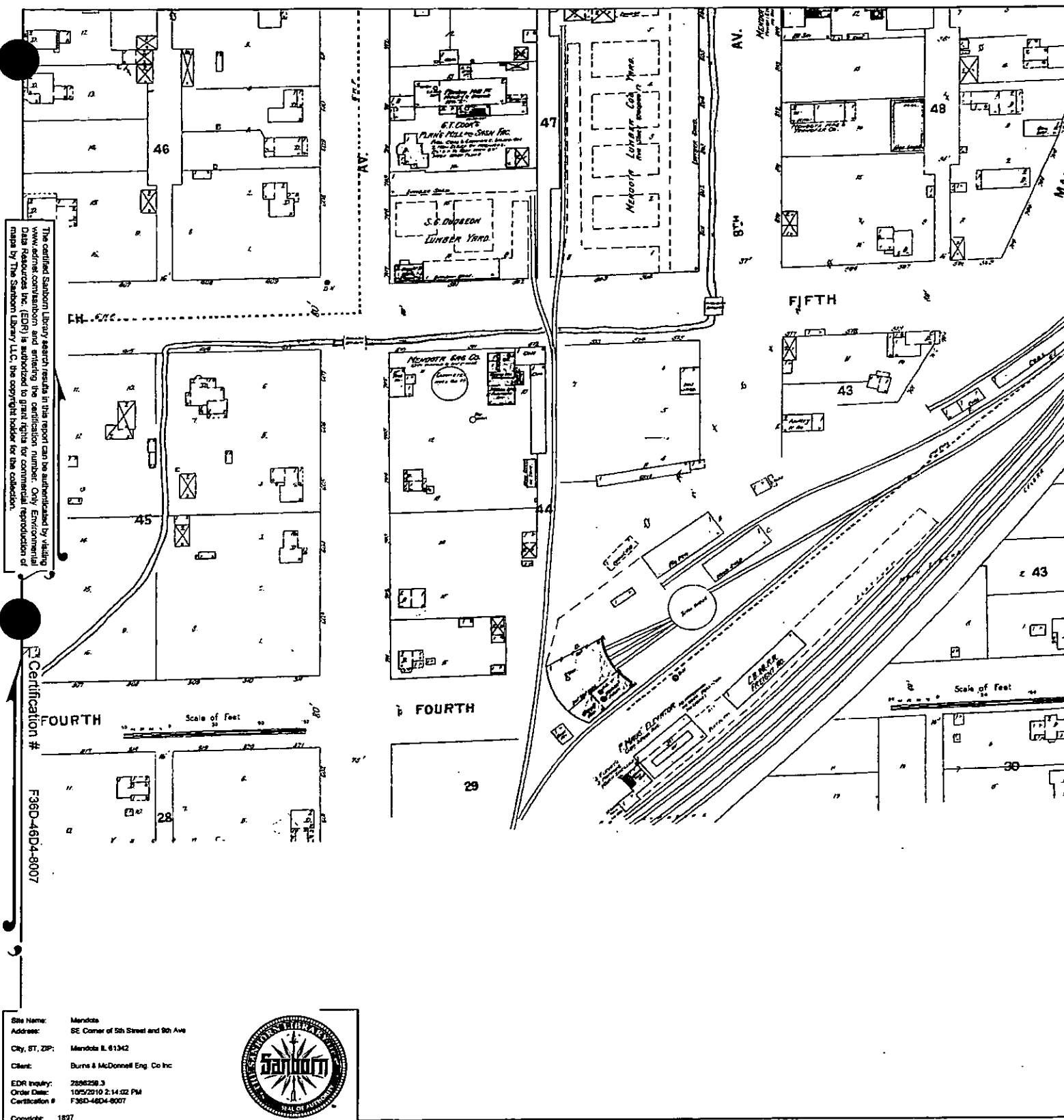
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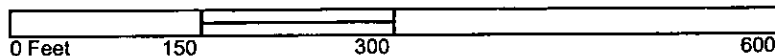
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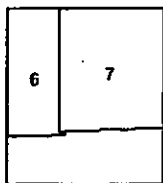
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 Address: SE Corner of 5th Street and 9th Ave  
 City, ST, ZIP: Mandota IL 61342  
 Client: Burns & McDonnell Eng. Co Inc  
 EDR Inquiry: 2886259.3  
 Order Date: 10/5/2010 2:14:02 PM  
 Certification #: F36D-46D4-8007  
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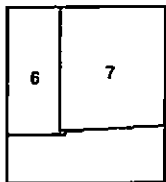


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Mendota  
SE Corner of 5th Street and 9th Ave  
Mendota IL 61342  
Burns & McDonnell Eng. Co Inc.  
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Map of Mendota, Ill.  
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Volume 1, Sheet 3



**APPENDIX B**  
**Well Survey Documentation**  
**Black Brothers Company Site**

Wednesday, May 4, 2011

County: LASALLE

Township: 36N

Range: 01E

Sections: 32-33

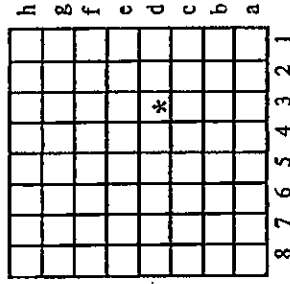
Records Found: 27

Questions: Contact the Illinois State Water Survey's Center for Groundwater Science @ (217)-333-9043

Publication: Please cite the Illinois State Water Survey's Well Database in all publications based wholly or partially on this information.

Note: The data listed in this printout includes non-municipal wells which are known to the Illinois State Water Survey (ISWS). This information has been entered verbatim from well logs submitted by the driller, chemical analysis reports, well sealing forms, well inventory forms from the 1930-1934 well survey, and other special projects. The accuracy of this data is controlled by those submitting the forms. Information in the Well Database has not been verified.

This data cannot be resold or redistributed. The Illinois State Water Survey must be acknowledged in any use of this material.



Location of a 10-acre-plot within a section:

The origin can be found at the lower right-hand-corner of an 8 x 8 grid. In this example, the well is in the 10-acre plot '3d'.

FILE NO. L 0 9 9 0 5 5 5 0 0 5

EXEMPT DOCUMENT NO. 0 0 3

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EXEMPT  
DOCUMENT

FILE CATEGORY SR/TECH

DOCUMENT DATE 08-08-2011



Permit #:

33 - 36N - 1E

## ILLINOIS STATE GEOLOGICAL SURVEY

Water Well for Business	Top	Bottom
topsoil - fill	0	2
yellow clay	2	8
yellow clay till, sand & gravel	8	13
gray clay	13	28
gray clay till, sand & gravel	28	32
gray clay	32	56
grade #2 gravel	56	60
red clay	60	67
lyr red clay till-shale-limestone-gravel	67	70
limestone	70	160
Total Depth		160
Casing: 5" PVC from -1' to 80'		
Grout: BENTONITE from 1 to 80.		
Size hole below casing: 4.78"		
Water from limestone at 70' to 160'.		
Static level 45' below casing top which is 1' above GL		
Pumping level 80' when pumping at 30 gpm for 2 hours		
Permanent pump installed at 80' on November 27, 1995, with a capacity of 30 gpm		
Location source: Location from permit		
Permit Date: October 4, 1995	Permit #: W95-165	

COMPANY Dober, Darrel

FARM Meyers Furniture

DATE DRILLED November 6, 1995

NO.

ELEVATION 0

COUNTY NO. 25333

LOCATION NW NW NW

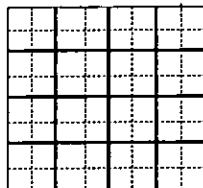
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LONGITUDE -89.12634

COUNTY LaSalle

API 120992533300

4 - 35N - 1E





**APPENDIX C**  
**Quality Assurance Project Plan**  
**Black Brothers Company Site**

**Black Brothers Company Site  
Quality Assurance Project Plan**

**Prepared July 2011**

## ACRONYMS AND ABBREVIATIONS

ASTM	American Society for Testing and Materials
BMcD	Burns & McDonnell
DMW	deep monitoring well
DQOs	data quality objectives
HDPE	high-density polyethylene
Illinois EPA	Illinois Environmental Protection Agency
MDL	method detection limit
MGP	manufactured gas plant
MS/MSD	matrix spike/matrix spike duplicate
NELAC	National Environmental Laboratory Accreditation Certified
PQL	practical quantitation limit
QA	quality assurance
QAPP	quality assurance project plan
QC	quality control
RPD	relative percent difference
SB	soil boring
SD	sediment
SI	site investigation
SMW	shallow monitoring well
SP	soil probe
SR	source material
SRP	Site Remediation Program
SS	surface soil
SW	surface water
TP	test pit

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## 1.0 INTRODUCTION

This quality assurance project plan (QAPP) establishes consistent field and laboratory procedures and methods for environmental investigations at Nicor Gas manufactured gas plant (MGP) sites. This plan will be used in conjunction with the site investigation (SI) work plan(s) for each MGP site.

The QAPP has 15 sections:

- **Section 1.0–Introduction**  
This section presents the purpose and organization of the QAPP.
- **Section 2.0–Project Description and Objectives**  
This section outlines data quality and overall objectives of the project and identifies sections in the work plan where additional project specific information can be found.
- **Section 3.0–Project Organization and Responsibility**  
This section defines the roles and responsibilities of the Burns & McDonnell (BMcD) project manager, project engineer/review team leader and site manager.
- **Section 4.0–Quality Assurance Objectives for Measurement Data**  
This section presents the level of quality control (QC) that will be adhered to; analytical detection limits; and precision, accuracy, representativeness, completeness and comparability criteria and objectives.
- **Section 5.0–Sampling and Decontamination Procedures**  
This section presents decontamination procedures and identifies section(s) in the site-specific SI work plan that further describe decontamination and sampling procedures.
- **Section 6.0–Sample Custody**  
This section presents sample documentation and custody procedures.
- **Section 7.0–Calibration Procedures and Frequency**  
This section presents procedures for maintaining the accuracy of instruments and measuring equipment used to perform field measurement and laboratory analyses.
- **Section 8.0–Sample Transport and Analytical Procedures**  
This section discusses sample transport and laboratory analytical procedures.
- **Section 9.0–Internal Quality Control Checks**  
This section presents procedures that will be followed to ensure that QC samples and field QC procedures are performed in accordance with this QAPP.
- **Section 10.0–Data Reduction, Validation and Reporting**  
This section presents data reduction and validation procedures.
- **Section 11.0–Performance and System Audits**  
This section describes auditing procedures that will be done to ensure adherence to field and laboratory procedures.
- **Section 12.0–Preventative Maintenance Procedures**  
This section defines procedures that will be followed by field and laboratory personnel to maintain equipment and instruments in proper working condition.

- **Section 13.0–Procedures to Assess Data Precision, Accuracy and Completeness**

This section discusses procedures that will be used to assess compliance with precision, accuracy and completeness criteria.

- **Section 14.0–Corrective Actions**

This section defines corrective actions to be implemented if QC procedures are not met.

- **Section 15.0–Quality Assurance Report**

This section details quality assurance (QA) reporting procedures.

\* \* \* \* \*

## 2.0 PROJECT DESCRIPTION AND OBJECTIVES

### 2.1 PROJECT OBJECTIVES

Section 1.1 of each site-specific work plan presents project objectives for MGP site investigation activities.

### 2.2 DATA QUALITY OBJECTIVES

Section 4.0 of each site-specific SI work plan presents data quality objectives (DQO) to be used for field and laboratory operations to ensure that all data is scientifically valid. DQOs specify the analytical data quality required for SI. DQOs used for MGP SIs will be consistent with established analytical DQOs that address various data uses, methods of analysis and QA/QC efforts required.

- All field sampling activities relative to sample collection, documentation, preparation labeling, storage, shipment and security, quality assurance and quality control, acceptance criteria, corrective action, and decontamination procedures shall be conducted in accordance with “Test Methods for Evaluating Solid Waste, Physical/Chemical Methods” (SW-846), Vol. One, Ch. One (Quality Control) and Vol. Two (Field Manual), incorporated by reference in the Illinois Site Remediation Program (SRP) at 35 Illinois Administrative Code (IAC) 740 at section 740.125. If approved, such activities also may be conducted in accordance with American Society for Testing and Materials (ASTM) standards, methods identified OSWER Directive 9355.0-14, December 1987), “Subsurface Characterization and Monitoring Techniques: A Desk Reference Guide, Volume I: Solids and Ground Water, Appendices A and B” (EPA/625/R-93/003a, May 1993), “Subsurface Characterization and Monitoring Techniques: A Desk Reference Guide, Volume II: The Vadose Zone, Field Screening and Analytical Methods, Appendices C and D” (EPA/625/R-93/003b, May 1993), incorporated by reference at Section 740.125 of Title 35, or other procedures.
- All field measurement activities relative to equipment and instrument operation, calibration and maintenance, corrective action, and data handling shall be conducted in accordance with “Test Methods for Evaluating Solid Waste, Physical/Chemical Methods” (SW-846), Vol. One, Ch. One (Quality Control), incorporated by reference at Section 740.125 of Title 35, or with an equipment or instrument manufacturer’s or vendor’s published standard operating procedures.
- All laboratory quantitative analysis of samples to determine concentrations of regulated substances or pesticides shall be conducted fully in accordance with “Test Methods for Evaluating Solid Waste, Physical/Chemical Methods” (SW-846), incorporated by reference at Section 740.125 of Title 35, relative to all facilities, equipment and instrumentation, operating procedures, sample management, test methods, equipment calibration and maintenance, quality assurance and quality control, corrective action, data reduction and validation, reporting, and records management. The practical quantitation limit (PQL) of the test methods selected must be less than or equal to the most protective soil remediation objectives in the Tiered Approach



to Corrective Action Objectives (TACO) at 35 IAC 742 Appendix B, applicable groundwater remediation objectives under 35 IAC 742 Appendix B, or, if already determined, the remediation objective concentrations for the site. If a contaminant of concern is not identified in Part 742 or the remediation objectives for the site have not been determined, the PQL shall equal the lowest concentration that reliably can be achieved within specified limits of precision and accuracy during routine laboratory operating conditions but shall not be greater than ten times the method detection limit.

- All field or laboratory measurements of samples to determine physical or geophysical characteristics shall be conducted in accordance with ASTM standards.
- All laboratory quantitative analyses of samples to determine concentrations of any regulated substances or pesticides that require more exacting detection limits or cannot be analyzed by standard methods identified in “Test Methods for Evaluating Solid Waste, Physical/Chemical Methods” (SW-846), incorporated by reference at Section 740.125 of Title 35, shall be conducted in accordance with analytical protocols developed in consultation with and approved by appropriate agency(s).

## **2.3 SITE BACKGROUND AND CURRENT INFORMATION**

Section 2.1 of each site-specific work plan presents general MGP site background and historical information; site characteristics; existing features and climatological data; and topography, drainage, hydrology, geology and hydrogeology.

## **2.4 PREVIOUS INVESTIGATIONS**

Section 2.2 of each site-specific work plan presents information on past investigations or studies performed at the MGP site.

## **2.5 INVESTIGATION ACTIVITIES AND RATIONALE**

Section 3.0 of each site-specific work plan describes field investigation activities and rationale for sample collection locations. It also describes sample matrices, analytical parameters and sample frequency.

## **2.6 PROJECT SCHEDULE**

Section 1.3 of each site-specific work plan provides the anticipated project schedule for the investigation of the MGP site.

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### **3.0 PROJECT ORGANIZATION AND RESPONSIBILITY**

Each site-specific investigation will include the following key Burns & McDonnell personnel: project manager, project engineer/review team leader and site manager. The project manager has the primary responsibility for ensuring project deliverables meet project objectives. The project engineer/review team leader is responsible for QA/QC activities and providing technical support, as needed. Each site will also have a site manager who will be in charge of daily field activities, coordination of field team members and subcontractor coordination. Section 1.2 of the site-specific work plan contains anticipated names and titles of the individuals who will perform these roles.

\* \* \* \* \*

## 4.0 QUALITY ASSURANCE OBJECTIVES FOR MEASUREMENT DATA

The overall QA objective is to develop and implement procedures for field sampling, laboratory analysis and information reporting that will achieve the data quality objectives described in Section 2.2 of this QAPP. This section addresses the level of quality control; analytical methods, presentation and holding times; analytical detection limits; and the accuracy, precision, completeness, representativeness and comparability of the sample data. To ensure sample analyses and laboratory QA/QC procedures are consistent with Illinois Environmental Protection Agency (EPA) protocols, laboratories performing soil and water chemical analyses will be accredited by the Illinois Environmental Laboratory Accreditation Laboratory Program (IL ELAP) as required by the SRP.

### 4.1 LEVEL OF QUALITY CONTROL

To assess the quality of the data obtained during the field investigation, rinsate blanks, trip blanks, field duplicates and matrix spike/matrix spike duplicate (MS/MSD) samples will be collected and analyzed. Rinsate and trip blanks, made with laboratory grade water or sorbent tube media used for TO-17 analysis, will be analyzed to assess field sampling activity data quality. Rinsate blanks are analyzed to verify decontamination procedure adequacy. Trip blanks are used to ensure that no volatile organic contamination is introduced into the samples as a result of sampling or shipping activities. Field duplicates are analyzed to check the precision of sampling and analytical methods. MS/MSD samples are analyzed to evaluate the effect of the sample matrix on compound or analyte recovery. Table 4-1 presents the frequency of QA/QC collection. Site-specific work plans will discuss additional or alterations to the QC samples presented in Table 4-1.

<b>Table 4-1</b> <b>Quality Control Sample Frequency</b>		
<b>QC Sample</b>	<b>Matrix</b>	<b>Frequency</b>
Field Duplicate	Water and Soil Gas	1 per 10 or fewer samples
MS/MSD	Soil and Water	1 per 20 or fewer samples
Rinsate Blank	Water	1 per 20 or fewer samples for each major piece of equipment used during sampling*
Trip Blank	Water and Sorbent Tube for TO-17 analysis	1 per cooler containing volatile sample(s)

\* Major pieces of equipment include monitoring well bailers, split spoon sampler, mixing bowl/spoon, drilling equipment (e.g., auger flight), etc.

## 4.2 ANALYTICAL METHODS, PRESERVATION AND HOLDING TIMES

The analytical methods that will be used to determine chemical concentrations are presented in each site-specific work plan. The methods used will be consistent with acceptable methods listed in the Illinois EPA Site Remediation Program, primarily with "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods" (SW-846). Preservation requirements and holding times will as specified for SW-846 or other analytical methods used.

## 4.3 DETECTION LIMITS

Detection limits for selected analytical methods will be consistent with the guidelines established in the Illinois EPA SRP. (See Section 2.2)

## 4.4 ACCURACY AND PRECISION

Accuracy and precision measure the reproducibility of analytical results and the bias of the measurement method. Overall, accuracy and precision of analytical data are affected by field sampling and laboratory techniques. Data accuracy and precision will be monitored through the collection and analysis of duplicate, MS/MSD, rinsate and trip blank samples; and the analysis of laboratory quality control (QC) samples including surrogates (organic compounds only), laboratory control samples (LCS) and laboratory control sample duplicates (LCSD).

Accuracy is the ability of a measurement to match an accepted reference value. This is typically measured as percent recovery (% R). Laboratory surrogates are used to measure accuracy of the method for recovering specific organic compounds and LCS are used to measure accuracy of the instrument to detect the analytes (organic and inorganic analytes). Percent recoveries of surrogates and LCS are calculated using Equation 4.1.

$$\% R = \frac{Q_d}{Q_a} \times 100 \quad \text{Equation 4 - 1}$$

Where:  $Q_d$  = Quantity determined by analysis  
 $Q_a$  = Quantity added to sample/blank.

Accuracy of laboratory results also will be assessed by evaluating MS/MSD % R, which will be calculated using Equation 4-2.

$$\% R = \frac{A - B}{C} \times 100 \quad \text{Equation 4 - 2}$$

Where: A = Concentration of spiked sample.  
B = Concentration of unspiked sample.  
C = Amount of spike added.

Evaluating rinsate blanks and trip blanks prepared in the field, as well as laboratory method and

reagent/preparation blanks, assists in the assessment of accuracy and precision by measuring the presence of any compounds/analytes due to field or laboratory contamination that might bias the sample results.

Precision is the ability of a measurement to be consistently reproduced. This is typically measured as a relative percent difference (RPD) in recovery for a pair of samples. Field duplicates, MS/MSD or LCS/LCSD pairs are used to measure precision. RPD is calculated using Equation 4-3.

$$\% RPD = \frac{S - D}{(S + D)/2} \times 100 \quad \text{Equation 4 - 3}$$

Where: S = First sample value (original or MS value).  
D = Second sample value (duplicate or MSD value).

The laboratory establishes statistically-valid acceptance criteria for % R and RPD for the methods used to analyze the samples. The acceptance criterion is a range of values for % R or an upper limit value for RPD. When QC sample results are within acceptance criteria, associated primary sample results are valid without bias. QC sample results that fall marginally outside the acceptance criteria may indicate that a bias is present in the primary sample results and data will be considered valid with bias. (Bias may be high or low depending on QC sample results.) QC sample results that fall grossly outside the acceptance may indicate a problem with the sample or the analytical procedure that causes the data to be considered invalid. Laboratory data will be validated in accordance with the procedures presented in Section 10.0 of this QAPP. Results of the accuracy and precision evaluation will be documented in a data validation memorandum.

## **4.5 COMPLETENESS, REPRESENTATIVENESS, COMPARABILITY AND SENSITIVITY**

### **4.5.1 Completeness**

Completeness measures the amount of valid data obtained compared to the amount expected to be obtained under normal conditions. A goal of 90 percent (%) completeness is anticipated for this environmental investigation. The percent completeness will be calculated using Equation 4-3.

$$\text{Completeness (\%)} = \frac{\text{Valid data obtained}}{\text{Total data set}} \times 100 \quad \text{Equation 4 - 3}$$

### **4.5.2 Representativeness**

Representativeness is the degree to which data accurately and precisely represent site conditions. The determination of the data representativeness will be performed in the following manner:

- Compare actual sampling procedures to those delineated in the site-specific work plan and QAPP.
- Verify that analytical procedures and sample holding times are consistent with the methodologies specified in this QAPP.
- Compare analytical results of field duplicates to determine the spread in analytical results.
- Examine the results of QC blanks for evidence of contamination; contamination may cause

invalidation or qualification of affected samples.  
Results of the representativeness analysis will be documented in a data validation memorandum.

#### **4.5.3 Comparability**

Comparability expresses the confidence with which one analytical data set may be compared with another. Comparability is maintained by being aware of previous analytical work and through the use of standard analytical methods and units. Available analytical results from previous studies will be compared with data generated during this investigation. Comparability will be achieved through adherence to procedures specified in this QAPP.

#### **4.5.4 Sensitivity**

Sensitivity or method detection limit (MDL) is the minimum amount of a substance that can be measured with a 99% confidence that the amount is greater than zero using a specific measurement system. The MDL should be achievable all instruments that are to be used in routine performance of the test method. The MDL must be verified, and the MDL records shall be retained as part of the laboratory's quality records for the same required period as analytical data

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## **5.0 SAMPLING AND DECONTAMINATION PROCEDURES**

### **5.1 SAMPLING PROCEDURES**

Section 5.0 of each site-specific work plan presents sampling procedures.

### **5.2 DECONTAMINATION PROCEDURES**

#### **5.2.1 Drilling Equipment**

Procedures for equipment decontamination will be implemented to avoid cross-contamination of subsurface strata and various media sampled. The drill rig and all drilling and sampling tools will be thoroughly cleaned and decontaminated before initial use.

Initial decontamination will be performed in two separate phases. The first phase will be performed before moving equipment to the site. In this phase, equipment required to perform drilling and sampling will be thoroughly cleaned. Any encrusted soil, mud or organic matter adhering to the equipment will be removed using a high-pressure potable water wash. Equipment and materials subjected to this decontamination phase will include, but not be limited to, the drill rig, pumps, drill rods, augers, drill bits, threads, steel casing, sampling equipment and other tools and materials required to complete soil borings and monitoring wells. All drill rig, drilling and sampling tools brought to the site by the driller will be inspected by the BMcD field personnel for cleanliness prior to commencement of drilling activities.

The second phase of initial decontamination will be performed onsite at a location where spread of contamination before and during field activities can be controlled. The area will be made into a decontamination pad consisting of a sturdy base, lined with plastic sheeting of high-density polyethylene (HDPE). The decontamination pad will have four raised sides and a sump for collection of fluids. All decontamination pad wastewater and any potentially contaminated materials remaining on the pad after the decontamination process is performed will be managed as specified in each site-specific work plan.

The second phase of initial decontamination for sampling equipment includes the following steps:

- Wash with laboratory detergent and potable water.
- Rinse with potable water.
- Rinse with reagent grade ethanol or isopropanol if grease or oil is observed.
- Rinse with distilled water.
- Air dry.
- Wrap in aluminum foil, if necessary, to prevent contamination before use.

The second phase of initial decontamination for drilling equipment consists of the following steps:

- Wash with a high-pressure steam cleaner using laboratory detergent and potable water.
- Rinse with high-pressure steam cleaner using potable water.
- Rinse with reagent grade ethanol or isopropanol, if necessary to remove grease or oil.

- Air dry.
- Rinse with potable water.

Decontamination of drilling equipment between borings and monitoring wells (i.e., intermediate decontamination) will include augers, drill rods, drill bits and all other tools and equipment considered contaminated. The procedure used during the second phase of initial decontamination for drilling equipment will be used during intermediate decontamination.

Intermediate decontamination of sampling equipment will be required between sampling attempts, as well as between different boring locations. Intermediate decontamination procedures for sampling equipment are the same as those outlined for the second phase of initial decontamination.

Because tar contamination may be encountered, a more intense procedure may be required to perform intermediate decontamination of drilling and sampling tools and equipment. The following decontamination procedure will be used for drilling equipment that cannot be decontaminated using the standard procedure:

- Remove soil with high-pressure steam cleaner using potable water.
- Wash with Stoddard solvent, or equivalent, to remove tar.
- Wash with a high-pressure steam cleaner using laboratory detergent and potable water.
- Rinse with high-pressure steam cleaner using potable water.

The following decontamination procedure will be used for sampling equipment that cannot be decontaminated using the standard procedure:

- Remove soil with high-pressure steam cleaner using potable water.
- Wash with Stoddard solvent, or equivalent, to remove tar.
- Wash with high-pressure steam cleaner using laboratory detergent and potable water.
- Rinse with high-pressure steam cleaner using potable water.
- Rinse with reagent grade ethanol or isopropanol.
- Rinse with distilled water.

To prevent the movement of contaminants into off-site areas, final decontamination of all equipment used to drill and sample borings and construct monitoring wells will be required before equipment demobilization from the site. Final decontamination will be performed at the decontamination pad and will be verified by BMcD field personnel. Final decontamination will include, at a minimum, the drill rig, pumps, augers, sampling equipment and any tools used during drilling. The procedures used during intermediate decontamination will be used during final decontamination.



### **5.2.2 Sampling Equipment and Monitoring Well Materials**

Sampling equipment and monitoring well materials including stainless steel riser pipe, screen, bailers and soil sampling equipment will be decontaminated before installation or use by steam cleaning followed by a distilled water rinse. No solvent rinse will be used to decontaminate the riser pipe, screen or bailers.

The pH meter probe, specific conductance probe and thermometer used for field measurements will be rinsed with ethanol or isopropanol, if necessary to remove visible oil or grease and washed with distilled water after each use.

Field measurement permeability equipment (i.e., slug bombs) will be decontaminated before, between and at the completion of usage. The decontamination procedure to be implemented will consist of the following:

- Wash with laboratory detergent and potable water.
- Rinse with potable water.
- Rinse with reagent grade ethanol or isopropanol.
- Rinse with distilled water.

Field measurement permeability equipment will not be used in wells known to be oily or in a condition that would make decontamination of the equipment difficult.

\* \* \* \* \*

## 6.0 SAMPLE CUSTODY

Each sample or field measurement must be properly documented to identify, track and monitor them from the point of collection through final data reporting. Proper sample documentation and custody procedures help ensure data are accurate and usable. This section discusses the following areas of field investigation documentation: field logbook, photographs, sample numbering system, sample documentation and custody, corrections to documentation, document control and project files.

### 6.1 FIELD RECORDS

Information pertinent to a field survey or sampling event will be recorded in a bound field logbook with consecutively numbered pages or on site-specific field log forms. Entries in logbooks and on sample documentation forms will be made in waterproof ink. Corrections will consist of single line-out deletions that are initialed and dated. Entries will include the following, as applicable:

- Name and title of author, date and time of entry and physical/environmental conditions during field activity;
- Names and addresses of field contacts;
- Names and responsibilities of field crew members;
- Names and titles of site visitors;
- Location, description and log of photographs of sampling points, as needed;
- References for maps and photographs of sampling site.
- Information concerning sampling changes, scheduling modifications and change orders;
- Information concerning drilling decisions;
- Details of sampling location (sketches of sampling locations may be appropriate);
- Date and time of sample collection;
- Field observations;
- Field measurements (pH, specific conductance, temperature, depth to water and measuring point);
- Calibration and maintenance information concerning field analytical and monitoring equipment;
- Sample identification number(s);
- Information from reagent container labels (laboratory grade water used for blanks);
- Sample distribution and transportation (e.g., name of laboratory and overnight delivery service);
- Sample documentation, such as chain-of-custody form numbers and shipment airbill numbers;
- Decontamination procedures;
- Documentation for investigation-derived wastes, such as contents and approximate waste volume in each drum, number of drums generated and type and predicted level of contamination.
- Summary of daily tasks;
- Documentation for cost or scope of work changes required by field conditions; and
- Signature of personnel responsible for observations and date.

Sampling situations vary widely; therefore, the exact information that must be entered in the logbook and field log forms will vary from site to site. However, the logbook and field log forms should contain enough information to allow anyone to reconstruct the sampling activity without relying on the collector's memory. During the investigation activities, field records will be kept in the possession of a BMcD field team member or in a secure place on-site. Following the investigation, field records will become part of the final project file.

## **6.2 PHOTOGRAPHS**

Digital photographs will be downloaded from the camera each day or as soon after the sampling event as reasonably possible to the field office computer or BMcD office computer. Photograph file names will provide enough information to identify files by date and activity type.

When photographing soil samples, an informational sign will be prepared and photographed with each sample. This sign will have the site name, initials of photographer, date and a brief description of the sample photographed.

Example: Mendota (or MEN) Site  
08/1/11  
MEN-SB005-001  
RAD

When photographing sampling locations, a nearby structure or other reference point will be included in the photograph frame to establish orientation and scale whenever possible.

## **6.3 SAMPLE NUMBERING SYSTEM**

A sample numbering system will be used to identify each sample collected for chemical and physical analysis. The numbering system provides accurate sample tracking and facilitates retrieval of sample data. Sample identification numbers will be used on sample labels, chain-of-custody forms and other applicable sampling activity documentation. A list of sample identification numbers will be maintained in field records. Each sample collected will be assigned a unique sample number. Sample numbers will change when the media (soil, water, etc.) or location changes. Sample numbers will not change because different analyses are requested.

Sample identification numbers consist of three components: a three-character alpha site identification code; a four to five-character alpha-numeric sample type code; and a three-digit sample characteristic code. The following is an example of a completely numbered sample, with each component identified:

Example: MEN-SP01-001

Where: MEN—Black Brothers Company Site  
SB01—soil probe location No. 1  
001—primary soil sample No.1

The site identification code (e.g., MEN in the example above) will remain the same for all samples collected at the site. Section 4.0 of each site-specific work plan designates the specific site identification code.

The sample type code (SB01) will vary depending on sample type and location. The following are typical MGP alpha codes to be used in the alphanumeric sample type code:

- DMW deep monitoring well
- SB soil boring
- SD sediment
- SG soil gas
- SMW shallow monitoring well
- SP soil probe
- SS surface soil
- SR source material
- SW surface water
- TP test pit

When completing soil borings and probes, if a water sample is collected from an open boring or probe location a "W" will be attached to the end of the alpha-numeric sample type code (e.g., SB01W). Section 4.0 of each site-specific work plan defines additional or alternate sample type codes. The numerical portion of the sample type code will indicate the sample location (i.e., boring location 01, 02, 03, etc.).

The three-digit sample characteristic code (001) indicates the type of analyses (chemical, QC or physical) and the number of samples collected from each media at a specific sampling location. The first digit will be zero through two for all chemical analyses: zero (0) for primary samples, one (1) for duplicate samples and two (2) for QC samples. The first digit will be three (3) for physical analyses. The last two digits of the sample characteristic code will indicate the number of each sample collected from each medium at a specific location.

## **6.4 SAMPLE DOCUMENTATION AND CUSTODY**

The following subsections describe sample documents and procedures for completing these documents for each soil, surface water, groundwater and source sample collected.

### **6.4.1 Sample Containers**

Sample containers will be obtained in sealed cartons from the laboratory. Each carton will contain a cleanliness certification appropriate to the analyses to be performed on soil collected in the container. A record will be kept in the field office of sampling containers used for individual samples and the corresponding certification lots.

### **6.4.2 Sample Labels**

The following information will be included on each sample label: site name, sample number, initials of sampler, sample collection date and time, analysis requested and preservatives added.

Information known before field activities (site name, sample numbers, etc.) can be preprinted on sample labels. Duplicate sample labels can be prepared when various sample aliquots must be submitted separately for individual analyses.

#### **6.4.3 Chain-of-Custody Forms**

A chain-of-custody form will be completed for each sample shipment. After completion of the chain-of-custody form, the original signature (top) copy will be enclosed in a plastic bag and secured to the inside of the cooler lid. A copy of the original custody form will be retained for BMcD files.

#### **6.4.4 Custody Seals**

Custody seals will be used to ensure the integrity of samples from the time they are relinquished to a delivery service or the laboratory by the sampling team until they are opened in the laboratory. Samples will be shipped in coolers. Each cooler will be sealed with at least two custody seals. Seals must be attached to each cooler so that it is necessary to break them to open the cooler.

#### **6.4.5 Receipt for Samples Form**

A receipt-for-samples form will be completed when split samples are requested. After completion of this form, the original copy, which is to be signed by both BMcD and the receiving party, will be retained for BMcD files; the bottom copy will be given to the sample recipient.

#### **6.4.6 Airbill**

If samples are to be shipped, an airbill will be completed for each different laboratory address to which samples are to be shipped. More than one cooler may be shipped to the same address under one airbill. A copy of the airbill will be given to the BMcD representative and will be retained for the BMcD project file. For each shipment of samples, the appropriate Federal Express Airbill numbers will be recorded on chain-of-custody forms to assist in tracking laboratory shipments.

#### **6.4.7 Sample Documentation Procedures**

The following itemized list will be used as a general reference for completion of sample documentation:

- Make or obtain a list of samples to be packaged and shipped that day.
- Determine number of coolers required to accommodate the day's shipment based on number of samples to be shipped, number of containers per sample and number of sample containers that will fit in each cooler.
- If samples are shipped by Federal Express, complete an airbill.
- Assign a chain-of-custody form to each cooler and determine which sample containers will be shipped in each cooler. (Note: More than one chain-of-custody form may be needed to accommodate number of samples to be shipped in one cooler).

- Determine which samples will be shipped under each chain-of-custody form. Each day that samples are shipped, record chain-of-custody form numbers and air bill numbers (if used) in field logbook. Cross-reference airbill and chain-of-custody numbers.
- Assign custody seals to each cooler and temporarily clip seals to each chain-of-custody form.
- Group all paperwork associated with each cooler with a separate clip.
- Obtain necessary field team members' full signatures or initials on appropriate paperwork.
- Package samples for shipment.

## **6.5 CORRECTIONS TO DOCUMENTATION**

Original information will be recorded with waterproof ink. If an error is made on a document, corrections will be made by making a single line through the error and entering the correct information. Erroneous information should not be obliterated. Any error discovered on a document should be corrected by the person who identified the error. Corrections must be initialed and dated.

## **6.6 DOCUMENT CONTROL**

The goal of document control is to ensure all documents for a group of samples will be accounted for when the project is complete. Project file audits may be scheduled. The document control audit consists of checking each document submitted for accountability. Written explanations must be made for missing documents.

## **6.7 PROJECT FILES**

At the completion of the project, individual files will be assembled, organized and stored as final evidence for the project. Hard copies of analytical data will be stored with project files. In addition, all analytical data results will be submitted electronically and stored in a BMcD database.

\* \* \* \* \*

## **7.0 CALIBRATION PROCEDURES AND FREQUENCY**

This section describes procedures for maintaining the accuracy of instruments and measuring equipment used to perform field measurements and laboratory analyses.

### **7.1 FIELD INSTRUMENTS/EQUIPMENT**

Instruments and equipment used to gather, generate or measure environmental data will be calibrated daily before each use according to manufacturer's specifications. Equipment and field instruments will also be examined daily to verify proper operating conditions. The manufacturer's operating instructions and manuals for each instrument will be read and understood to ensure maintenance requirements are being observed. If the equipment or instruments were used in a previous investigation, field notes will be checked or the equipment manager will be contacted to verify that prior equipment problems were not overlooked and necessary equipment repairs have been performed.

### **7.2 LABORATORY INSTRUMENTS**

Laboratory personnel will be responsible for calibration procedures and frequency of calibration for laboratory instruments. Calibration procedures and frequencies will comply with appropriate instrument specifications and laboratory standard operating procedures (SOPs).

\* \* \* \* \*

## **8.0 SAMPLE SHIPPING AND ANALYTICAL PROCEDURES**

In general, samples collected during remedial action activities will be delivered to the laboratory within 48 hours of collection. Volatile EnCore soil samples must be sent to the lab within 24 hours to ensure preservation within the 48-hour holding time for preservation. The preferred method of transporting samples is to have the laboratory pick up samples at the site. If this is not possible, BMCD will hand deliver or ship the samples by overnight carrier (overnight priority). Laboratory pickups and sample shipment deliveries will occur daily. Burns & McDonnell will notify and coordinate weekend deliveries with the laboratory no later than 3 p.m. on the Friday preceding the weekend delivery.

The laboratory will perform sample analyses by the specified methods in accordance with its (SOP) for each method.

\* \* \* \* \*



## **9.0 INTERNAL QUALITY CONTROL CHECKS**

### **9.1 FIELD SAMPLE COLLECTION**

Section 3.0 of the site-specific work plan describes sample collection frequency, and Section 5.0 details collection procedures. The site project manager and engineer will ensure field sampling quality control by verifying that sample collection frequencies and procedures outlined in the site-specific work plan are maintained. Field duplicates, blanks and MS/MSD samples will also be collected and analyzed to check field QC procedures.

### **9.2 FIELD MEASUREMENT**

Field measurement QC procedures will be checked by obtaining multiple readings and by calibrating field instruments daily according to manufacturer's specifications. Field personnel will read and understand applicable sections in manufacturer's literature and operations manuals before field instrument usage. Additionally, field personnel will be trained in proper instrument calibration and handling procedures before using field instruments.

### **9.3 LABORATORY ANALYSIS**

The laboratory will follow QC procedures provided in method SOPs and its quality assurance manual (QAM).

\* \* \* \* \*

## **10.0 DATA REDUCTION, VALIDATION AND REPORTING**

### **10.1 FIELD MEASUREMENTS AND SAMPLE COLLECTION**

Field measurement and sample collection activities will be documented in a field logbook or on field data sheets. Data used in project reports will be reduced, validated (to the extent possible) and summarized consistent with other sampling data. A data validation memorandum will be produced, detailing reduction and validation procedures.

### **10.2 LABORATORY SERVICES**

Data reduction includes processes that change either the form of expression, quantity of data values or number of data items. If data reduction is required, methods used for data reduction will be described in the final report.

Burns & McDonnell personnel will perform data assessment evaluations (determine whether analytical work is of acceptable quality). Analytical work will be performed in accordance with approved protocols and procedures capable of meeting DQOs specified in Section 2.2 of this QAPP. Data will be validated using United States Environmental Protection Agency (USEPA) Contract Laboratory Program (CLP) National Functional Guidelines for organic and inorganic data review. Professional judgment will be applied to validation where discrepancies exist between CLP analytical methods and USEPA SW-846 analytical methods. A data validation memorandum will be produced, detailing validation procedures and results of the validation.

\* \* \* \* \*

## **11.0 PERFORMANCE AND SYSTEM AUDITS**

Performance and system audits of field and laboratory activities will be conducted to verify that sampling and analysis are performed in accordance with procedures established in this QAPP and the site-specific work plan. The following sections describe field and laboratory activity audits.

### **11.1 FIELD AUDITS**

The project manager or project engineer/review team leader will conduct a field activity audit during field sampling activities. The audit will include examination of field sampling and field instrument operating records, verification of sample collection procedures, compliance with sample handling and packaging procedures and maintenance of QA documents (chain-of-custody forms, log books and forms, sampling tracking forms, etc.). Following the audit, a brief report will be prepared summarizing the audit results. Deviations from this QAPP or the site-specific work plan noted during the audit will be remedied immediately.

### **11.2 LABORATORY AUDITS**

Once the laboratory is selected, an audit will be performed of the laboratory by Burns & McDonnell personnel prior to the start of field investigation activities. (Out-of-state laboratories may be audited by review of its QA documents and performance measurement sample results only.) The laboratory selected for soil and water analyses will also be accredited through the Illinois Environmental Laboratory Accreditation Program (IL ELAP) as required by the Illinois EPA. The laboratory selected for soil gas sampling will be accredited through the National Environmental Laboratory Accreditation Program (NELAP) for air (soil gas) analyses.

\* \* \* \* \*

## **12.0 PREVENTATIVE MAINTENANCE PROCEDURES**

### **12.1 FIELD EQUIPMENT/INSTRUMENTS**

Field equipment to be used during the investigation may include PIDs, temperature thermometers, pH meter, conductivity meter or dissolved oxygen meter. Manufacturers' specifications for preventative maintenance and calibration will be followed while using field equipment. Field instruments will be checked and calibrated before being taken to the field. Instruments will be checked and calibrated daily before use. Calibration checks will be performed periodically and documented in a field logbook or on calibration log sheets. Critical spare parts and backup equipment for field instruments will be available for delivery within one day to avoid delays in field activities.

### **12.2 LABORATORY INSTRUMENTS**

Preventative maintenance of laboratory instruments is the responsibility of the laboratory. Laboratory instruments are maintained in accordance with manufacturer's specifications and requirements of the specific method employed. Maintenance is carried out on a regular, scheduled basis and is documented in laboratory instrument service logbook(s) for each instrument. Emergency repair or scheduled manufacturer's maintenance is provided under repair and maintenance contracts with factory representatives.

\* \* \* \* \*

## **13.0 PROCEDURES TO ASSESS DATA PRECISION, ACCURACY AND COMPLETENESS**

### **13.1 FIELD MEASUREMENTS**

The field team leader will assess field measurements daily. The field team leader will review field results for compliance with established QA/QC criteria specified in this QAPP and the site-specific work plan. Accuracy of field measurements will be assessed by calibrating or field checking field instruments daily and, when necessary, by performing field instrument performance checks (testing known solutions). Precision will be assessed by obtaining multiple instrument readings. Completeness will be evaluated by checking field notes to verify that appropriate measurements and frequency of measurements are performed and obtained.

### **13.2 LABORATORY MEASUREMENTS**

The laboratory will conduct all analyses using quality control requirements for precision, accuracy, representativeness, and completeness as established in its method SOPs and QAM.

\* \* \* \* \*

## **14.0 CORRECTIVE ACTIONS**

The following subsections describe corrective actions for sample collection/field measurements and laboratory analyses. Nonconformance with established QC procedures outlined in this QAPP or the site-specific work plan will be identified and corrected.

The project engineer/review team leader will be notified immediately of any nonconformance issue. The project engineer/review team leader will promptly report nonconformance to the project manager, who will discuss major problems, if any, with Nicor Gas representatives.

### **14.1 SAMPLE COLLECTION/FIELD MEASUREMENTS**

Technical staff and project personnel will be responsible for reporting all nonconformance issues to the project engineer/review team leader. The project engineer/review team leader will be responsible for assessing suspected problem(s), and deciding whether the problem(s) will affect data quality. Corrective actions for field measurements may include the following measures:

- Repeat measurements.
- Check for proper adjustments for ambient conditions, such as temperature.
- Check batteries.
- Check instrument calibrations.
- Recalibrate instrument.
- Replace or repair instrument or measurement device.
- Stop work.
- Contact and consult with project manager.

The project engineer/review team leader is responsible for controlling, tracking and implementing corrective actions. The project engineer/review team leader will inform the project manager of field changes.

### **14.2 LABORATORY ANALYSES**

If audits or data reviews result in detection of unacceptable data, the project manager will be responsible for developing and initiating corrective action, which may include the following measures:

- Re-analyzing soil samples if holding time criteria permit and adequate sample volumes exist.
- Re-sampling and analyzing groundwater.
- Evaluating and amending sampling and analytical procedures.
- Accepting data and acknowledging that the level of uncertainty that exists.

\* \* \* \* \*

## **15.0 QUALITY ASSURANCE REPORTS**

Separate quality assurance reports will not be submitted. The final Black Brothers Company Site Investigation report will summarize data quality information for data collected during field activities. Memoranda that address field activity results may be submitted to Nicor Gas.

\* \* \* \* \*

**APPENDIX D**  
**En Core Handle Soil Sampling Procedures**  
**Black Brothers Company Site**



## EN CORE SOIL SAMPLING PROCEDURE

- Remove En Core sampler and cap from its re-sealable pouch and attach T-handle to sampler body. (Note: when dealing with soft or sandy solid, it may be necessary to retract the plunger in the sampler before sample collection.)
- Using the T-handle for leverage, push the sampler into a freshly exposed surface of soil until the sampler is full.
- Brush any soil off the sampler head and securely attach the sampler cap by pushing with a twisting motion.
- Complete the sample label and attach to the sampler body; place labeled sampler in its re-sealable pouch and seal the pouch.
- Repeat the procedure for two additional samples collected from the same soil stratum or the same area. (Note: this step may be eliminated or the number of samples reduced if the suspected level of VOCs is known [i.e., low or high concentration sample]. Consult method 5035 or discuss procedure with the analytical laboratory for further details.)
- Use a stainless steel spoon or similar tool to collect an additional sample from the same soil stratum or the same area. Place collected material in a 2-ounce, wide-mouth jar with no preservatives. (Note: this additional soil volume is for dry weight and percent moisture determination. This step is not necessary if additional soil from the sample location is collected for other parameter analyses upon which dry weight and percent moisture will be determined.)
- Immediately place samples in a cooler with ice.
- Ship En Core samples (next day priority delivery) to the contracted laboratory the day they are collected. Alternatively, arrange to have samples picked-up by the laboratory or delivered to the laboratory by field personnel within 24 hours of collection.

**APPENDIX E**  
**Soil Gas Sampling Procedures**  
**Black Brothers Company Site**

## PROCEDURES FOR ACTIVE SOIL GAS SAMPLING

These procedures provide information on soil-gas sampling using an active sampling approach. Procedures are described for sampling of both sub-slab soil gas and soil gas deeper than 3 feet below ground surface (bgs).

### 1.0 SOIL GAS PROBE INSTALLATION

Sub-slab soil gas will be sampled using dedicated sub-slab gas probes as described in Section 1.1. Soil gas deeper than 3 feet bgs will be sampled using a dedicated soil gas sampling implant described in Section 1.2.

#### 1.1 SUB-SLAB SOIL GAS PROBE INSTALLATION

These sub-slab soil gas probe installation procedures are derived from the United States Environmental Protection Agency's *Draft Standard Operating Procedure for Installation of Sub-Slab Vapor Probes and Sampling Using EPA Method TO-15 to Support Vapor Intrusion Investigations*.

If the thickness of the slab is not known and/or has not been previously field-confirmed, a 7/8 inch diameter hole will be drilled in a convenient and representative location to allow for measurement of the slab thickness. Following measurement, this hole will be backfilled with a quick-drying portland cement which expands upon drying.

When selecting locations for sub-slab soil gas probe installation, areas of visible staining on the slab or known previous chemical spills on the slab will be avoided. The procedures for installing a sub-slab soil gas probe will be as follows:

1. Using a rotary hammer drill and a clean drill bit, an outer hole 1 inch deep and 7/8 inch in diameter will be drilled. Because the outer hole does not penetrate the floor slab, a dedicated drill bit is not required.
2. A small brush and dust pan or hand-held vacuum will be used to collect concrete dust and cuttings from the outer hole. Because the outer hole does not penetrate the floor slab, vacuuming will not compromise the sample.
3. After completing the outer hole, a rotary hammer drill will be used to create a smaller diameter (5/16 inch) inner hole through the remainder of the slab and approximately 3 inches into sub-slab material. The inner hole should be drilled using a dedicated drill bit. Drilling into sub-slab material will create an open cavity, which will help to prevent obstruction of probe inlets during soil gas sampling.

4. After completing drilling, the outer hole will be cleaned using a towel moistened with deionized water to increase the potential of obtaining a good seal during cement application.
5. A probe will be constructed using a 3-inch long piece of chromatography grade 316 stainless steel tubing (1/4 inch outer diameter x 3/16 inch inner diameter) and a stainless-steel compression to thread fitting (e.g., 1/4 inch outer diameter x 1/8 inch NPT [National Pipe Tapered] Swagelok female thread connector).
6. The probe will be set in the hole such that the fitting rests at the base of the outer hole and the top of the probe is completed flush with the slab.
7. The probe will be closed using a 1/8 inch stainless steel or brass socket plug.
8. A quick-drying portland cement that expands upon drying will be injected or pushed into the annular space between the probe and outside of the outer hole to ensure a tight seal.

The probes will be constructed to a length no greater than three inches to reduce the likelihood of becoming obstructed with fill material from underneath the building slab.

Each probe will be allowed to set for at least 24 hours before sampling takes place. The soil gas probe opening will remain capped during this time to isolate the soil gas from the atmosphere.

## **1.2 SOIL GAS PROBE INSTALLATION (DEEPER THAN 3 FEET BGS)**

Prior to installation at each soil gas probe location, the area will be inspected for clearance of existing utility lines and other below-ground obstructions near the sample location. Soil gas probes may be installed using either a hammer drill or a direct-push drill rig. Each probe will be allowed to set for at least 24 hours before sampling takes place. The soil gas probe opening will remain capped during this time to isolate the soil gas from the atmosphere.

### **1.2.1 Hammer Drill method**

Gas vapor tip (GVT) probes will be installed into the ground surface to the desired sample depth using a hammer drill connected to drive rods. The rods will then be removed and a filter pack consisting of sand will be set to within 2 inches above and below the GVT probe. Above the sand filter pack, bentonite will be placed to ground surface and hydrated to provide an airtight seal between the sampling interval and the ambient air.

### **1.2.2 Direct-push Drill Rig method**

A direct-push drill rig will be used to advance a hole to the desired depth of installation of a soil gas sampling probe. If the hole is advanced deeper for other sampling purposes, it will be tremie grouted back up to the desired depth using cement-bentonite grout, taking care to isolate the grout from the walls of the hole near the soil gas probe installation depth. After the hole is advanced and any backfill grout has cured for at least 24 hours, a 6" stainless steel soil gas sampling implant screen will be installed in a

filter pack of glass bead sand, with Teflon tubing extending from the implant screen to the ground surface. Above the filter pack, bentonite will be placed to ground surface and hydrated to provide an airtight seal between the sampling interval and the ambient air.

## **2.0 SOIL GAS SAMPLING PROCEDURES**

Soil gas will not be sampled if soil moisture is present at the sampling location due to measurable precipitation or irrigation. The increased soil moisture can cause the soil gas sample results to be biased low.

### **2.1 SAMPLE TRAIN ASSEMBLY**

For each soil gas probe, a sampling train will be assembled as indicated in the figure provided as Attachment 1.

Samples to be analyzed for VOCs will be collected using evacuated batch-certified 1 liter (L) Summa or equivalent canisters equipped with dedicated flow regulators and integrated particulate filters. A flow regulator/particulate filter and vacuum gauge will be attached to each canister using a 9/16 inch wrench or as otherwise instructed by the laboratory. Canisters, flow regulators/particulate filters, and vacuum gauges will be supplied by the laboratory.

Dedicated Teflon tubing will be connected to the soil gas probe. Use of dedicated tubing will avoid cross-contamination between probes. The Teflon tubing will be connected to a second piece of Teflon tubing using a ball valve and Swagelok fittings. The second piece of Teflon tubing will be connected to either the purge pump or the canister assembly described in the previous paragraph. All connections and valves in the sampling train will be Swagelok type. A new pair of nitrile gloves should be worn while connecting the sample assembly for each soil gas probe.

When collecting duplicate samples, two separate canister assemblies will be connected using a stainless steel tee fitting (Swagelok or equivalent), and the tee fitting is then connected to the Teflon tubing assembly described in the previous paragraph.

### **2.2 PURGING SOIL GAS PROBES**

Allow the probe to equilibrate for a minimum of 24 hours from the time of installation before initiating purge procedures. Teflon tubing coming from the soil gas probe will be connected to a peristaltic pump. The soil gas probe will be purged using the peristaltic pump by removing a volume of air equal to three times the volume of the sample probe. Purging will be conducted using a flow rate of 100 to 200 milliliters per minute (mL/min). Given the small volume of the sample probes, purge air can be discharged to the atmosphere.

## **2.3 CHEMICAL LEAK TESTING**

Prior to sampling, a chemical leak test using helium will be performed. The ambient air inside the shroud will be replaced with 99.9% grade helium until the atmosphere is at least 20% helium. This will be accomplished by inserting Teflon tubing through the side of the shroud and attaching the other end to a helium canister. The helium canister will then be opened, and the shroud atmosphere will be monitored by a Model MGD-2002 or equivalent multi-gas detector until the desired helium content in air is attained. After the target atmosphere is established, the two-way and three-way stopcocks will be opened to the lung box, which contains a 1 L Tedlar bag. An air pump attached to the lung box via Teflon tubing will be used to evacuate the existing air inside the lung box, which will in turn cause the 1 L Tedlar bag to fill. Once filled, the 1 L Tedlar bag will be removed from the lung box and the air inside will be measured by the multi-gas detector for the presence of helium. Corrective actions to mitigate leaks in the soil gas probe will be performed when the sample's helium concentration exceeds 10 percent of the starting concentration in the helium shroud. Corrective actions may include resealing the probe base and retesting or installation of a new soil gas probe. Samples will not be submitted for laboratory analysis when the helium concentration in the sample exceeds 10 percent of the starting helium concentration in the shroud.

## **2.4 MECHANICAL LEAK TESTING**

Perform a mechanical leak test immediately prior to sampling by connecting an evacuated 1 L Summa canister to the Teflon tubing assembly and closing the ball valve connecting the two pieces of Teflon tubing. Vacuum test the connections between the Summa canister and valve by opening the canister valve to place a test vacuum on the assembly for 5 minutes. The start time and initial vacuum, as well as the stop time and final vacuum, will be recorded on a Field Soil Gas Sampling Data Form (an example is provided in Attachment 2) or in the field logbook. If gauge vacuum cannot be maintained for 5 minutes, work shall be suspended and all fittings in the sample assembly will be checked. Retest the sample assembly. If vacuum still can not be maintained for 5 minutes, sampling activities will be discontinued until the leak can be identified and addressed.

If gauge vacuum was maintained for 5 minutes, close the canister valve and immediately proceed with sample collection as described in Section 2.5.

## **2.5 SAMPLE COLLECTION**

Sample location information, meteorological conditions (temperature, barometric pressure, wind speed/direction, and relative humidity), and results of the field screening analysis shall be recorded on a Field Soil Gas Sampling Data Form. Meteorological data will be obtained online from the nearest National Weather Service measuring station. Digital photos will be taken of each sample location and sample assembly.

Open the sample canister valve to begin sample collection. The time and initial vacuum when sample collection starts shall be recorded on the Field Soil Gas Sampling Data Form. The laboratory-provided flow regulators will be calibrated for a 5- to 10-minute sample duration, which correlates to a flow rate of 100 to 200 mL/min. Close the sample canister valve when the vacuum gauge indicates approximately

5 inches Hg (mercury) of vacuum remain in the canister. Sample collection should take approximately 5 minutes for a 1 L Passivated canister connected to a 200 mL/min flow regulator. The time sample collection was stopped and final vacuum shall be recorded on the Field Soil Gas Sampling Data Form. Remove the flow regulator/particulate filter and vacuum gauge assembly and replace the laboratory-supplied brass plug on the canister. Disconnect the sample tubing assembly and replace the plug on the soil gas probe.

Attach the sample label to the tag attached to the canister by the laboratory. On the chain of custody, record the sample name; date and time the sample was collected; the canister and flow controller serial numbers; and the final vacuum gauge reading. Samples shall not be chilled or subjected to extreme temperature or pressure fluctuations. Samples will be shipped to the laboratory for analysis.

## **2.6 QUALITY CONTROL**

Quality control samples, including trip blanks and field duplicates, will be collected as necessary in accordance with the QAPP during soil gas sampling activities. A trip blank will be shipped with the vapor samples to be analyzed by method TO-17. Trip blanks consist of sorbent tube media provided by the laboratory. Field duplicates will be collected at the rate of one duplicate sample per 10 soil gas samples.

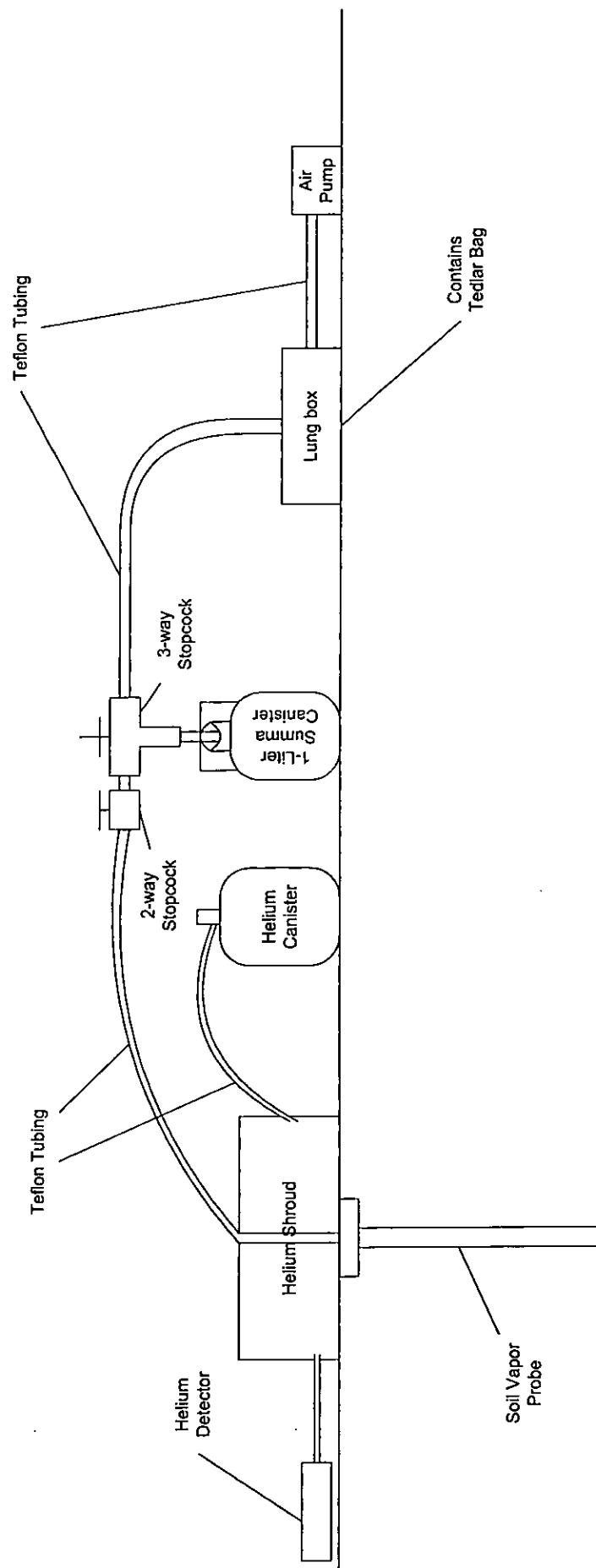
## **2.7 EQUIPMENT DECONTAMINATION PROCEDURES**

All equipment that could potentially contact contaminated media will be dedicated and/or disposable. Therefore, no equipment decontamination will be required.

\* \* \* \* \*

**SOIL GAS SAMPLING PROCEDURES ATTACHMENT 1**  
**SAMPLING TRAIN ASSEMBLY FIGURE**





**SOIL GAS SAMPLING PROCEDURES ATTACHMENT 2**  
**FIELD SOIL GAS SAMPLING DATA FORM**

## SOIL GAS SAMPLING FIELD DATA FORM

Site Name: Mendota MGP Site

Sampler(s): \_\_\_\_\_

Sample ID: \_\_\_\_\_ Sample Depth: \_\_\_\_\_ Date Sampled: \_\_\_\_\_

Outdoor Weather: \_\_\_\_\_ (note approximate temperature and any precipitation)

### Mechanical Leak Test

Time

Pressure

Start: \_\_\_\_\_ in. Hg

Stop: \_\_\_\_\_ in. Hg

### Chemical Leak Test and Purge

Leak Test Compound: helium

Helium concentration in tedlar bag: \_\_\_\_\_

Purge Flow Rate: \_\_\_\_\_ mL/min

Volume Purged: \_\_\_\_\_ mL (minimum 3 sample train volumes)

### Preliminary PID and LEL/O<sub>2</sub> Screening

PID Model #: \_\_\_\_\_

Instrument Serial #: \_\_\_\_\_

Concentration: \_\_\_\_\_ ppm

Time: \_\_\_\_\_

LEL/O<sub>2</sub> Model #: \_\_\_\_\_

Instrument Serial #: \_\_\_\_\_

LEL Measurement: \_\_\_\_\_ %

O<sub>2</sub> Measurement: \_\_\_\_\_ %

Time: \_\_\_\_\_

### Summa Sampling - VOCs

Canister Serial #: \_\_\_\_\_

Flow Controller Serial #: \_\_\_\_\_

Time: Start \_\_\_\_\_

Pressure: \_\_\_\_\_ in. Hg

Stop \_\_\_\_\_

\_\_\_\_\_ in. Hg

### Sorbent Tube Sampling - SVOCs

Desired Flow Rate: \_\_\_\_\_ mL/min

Calibrated Pump Flow Rate: \_\_\_\_\_ mL/min

*Tube 1* Desired Sample Volume: \_\_\_\_\_ mL

Desired Flow Time: \_\_\_\_\_ min

Sample Begin Time: \_\_\_\_\_

Sample End Time: \_\_\_\_\_

Sampled Volume: \_\_\_\_\_

Tube Serial #: \_\_\_\_\_

*Tube 2* Desired Sample Volume: \_\_\_\_\_ mL

Desired Flow Time: \_\_\_\_\_ min

Sample Begin Time: \_\_\_\_\_

Sample End Time: \_\_\_\_\_

Sampled Volume: \_\_\_\_\_

Tube Serial #: \_\_\_\_\_

Notes: