



Remedial Action Options Report

**Third Ward Manufactured Gas Plant Site
City of Milwaukee Property
and
Peters=Johnson Property
Milwaukee, Wisconsin**

Prepared by:

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RETEC Project No.: 1-2824-200

Prepared for:

**Wisconsin Gas Company
5400 N. Green Bay Avenue
Milwaukee, Wisconsin 53209**

August 18, 1997



Remedial Action Options Report

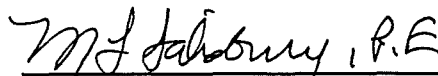
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Technically Reviewed by:


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August 18, 1997

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1 Introduction

1.1 Background

This Remedial Action Options Report (RAOR) is submitted in conjunction with the document *Preliminary Feasibility Study Report, Former Third Ward Manufactured Gas Plant Site, Milwaukee, Wisconsin*, dated July 1994 (Preliminary FS). This RAOR has been prepared to fulfill the reporting requirement for a Remedial Action Options Report as specified in NR 722.13. This RAOR has been prepared on behalf of Wisconsin Gas Company for a portion of the former Third Ward Manufactured Gas Plant (MGP) site located in Milwaukee, Wisconsin (Site).

The Preliminary FS, which was submitted to the Wisconsin Department of Natural Resources (WDNR) in September 1994, presented a complete discussion of the Site history, Site environmental conditions, remedial action objectives, potentially applicable remedial technologies, screening of the technologies, and preliminary soil cleanup standards.

The document, *Remedial Action Options Report, Third Ward Manufactured Gas Plant Site, City Property, Milwaukee, Wisconsin, March 14, 1997* (March 1997 RAOR) was submitted to WDNR in March 1997. The March 1997 RAOR involved short-term and long-term remedial actions for the City of Milwaukee property. Since March 1997, Wisconsin Gas had decided to implement an alternative approach for remedial actions on two portions of the Site.

The RAOR presents proposed residual contaminant levels (RCLs), and screens specific remedial action options for a portion of the Site. The portion of the Site included in this RAOR is identified in the Preliminary FS as the City of Milwaukee property and the Peters=Johnson property. The City of Milwaukee property is bounded by North Jefferson Street, East Menomonee Avenue, North Jackson Street, and East Corcoran Avenue (City Property). The Peters=Johnson property is bounded by North Milwaukee Street, East Menomonee Avenue, North Jefferson Street, and East Corcoran Avenue (P=J Property). Figure 1-1 shows the location of the Site. Figure 1-2 shows the location of the entire former Third Ward MGP. Figure 1-3 shows the City Property and the P=J Property.



SOURCE: MILWAUKEE 7-1/2 MINUTE TOPOGRAPHIC QUADRANGLE



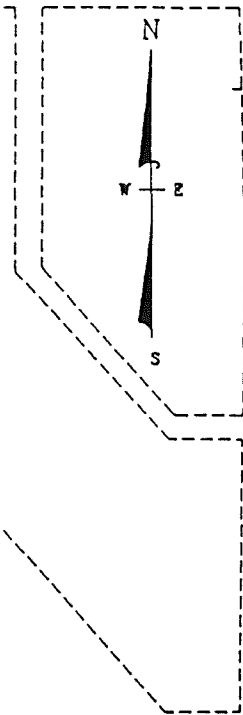
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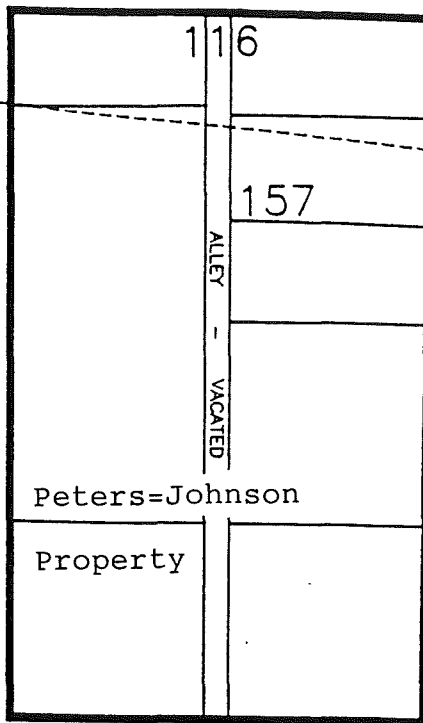
FORMER THIRD WARD MGP SITE SITE LOCATION MAP

**FIGURE
1-1**

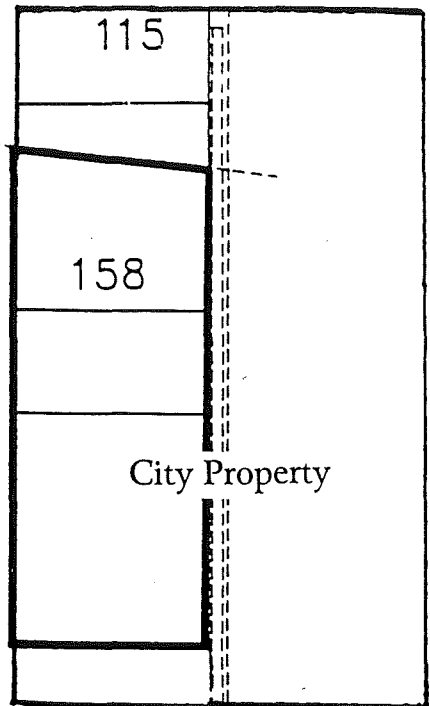
EAST MEMOMONEE



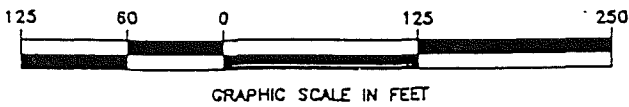
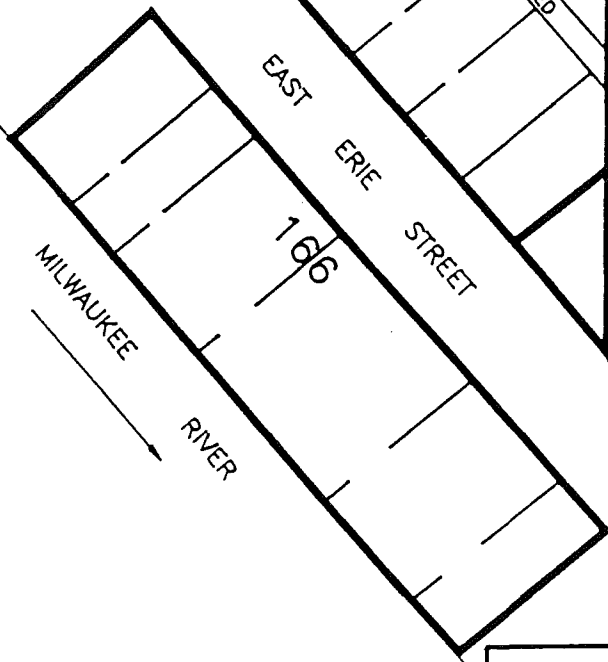
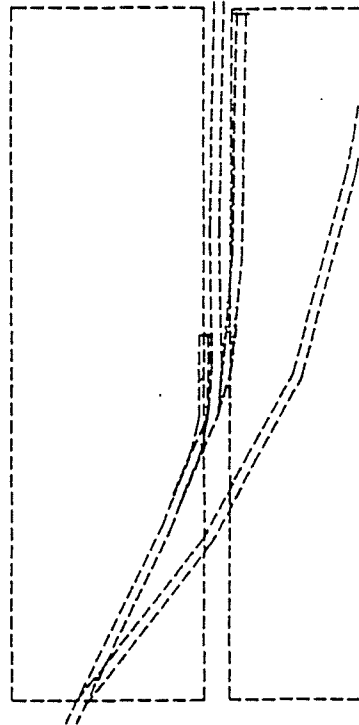
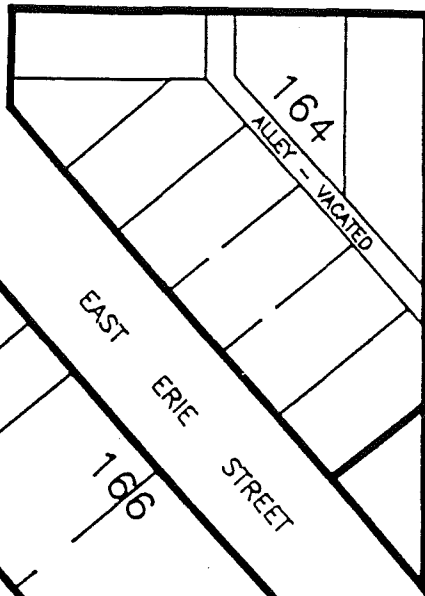
NORTH MILWAUKEE STREET



NORTH JEFFERSON STREET



EAST CORCORAN AVENUE



SITE MAP
FORMER THIRD WARD MGP SITE
MILWAUKEE, WISCONSIN



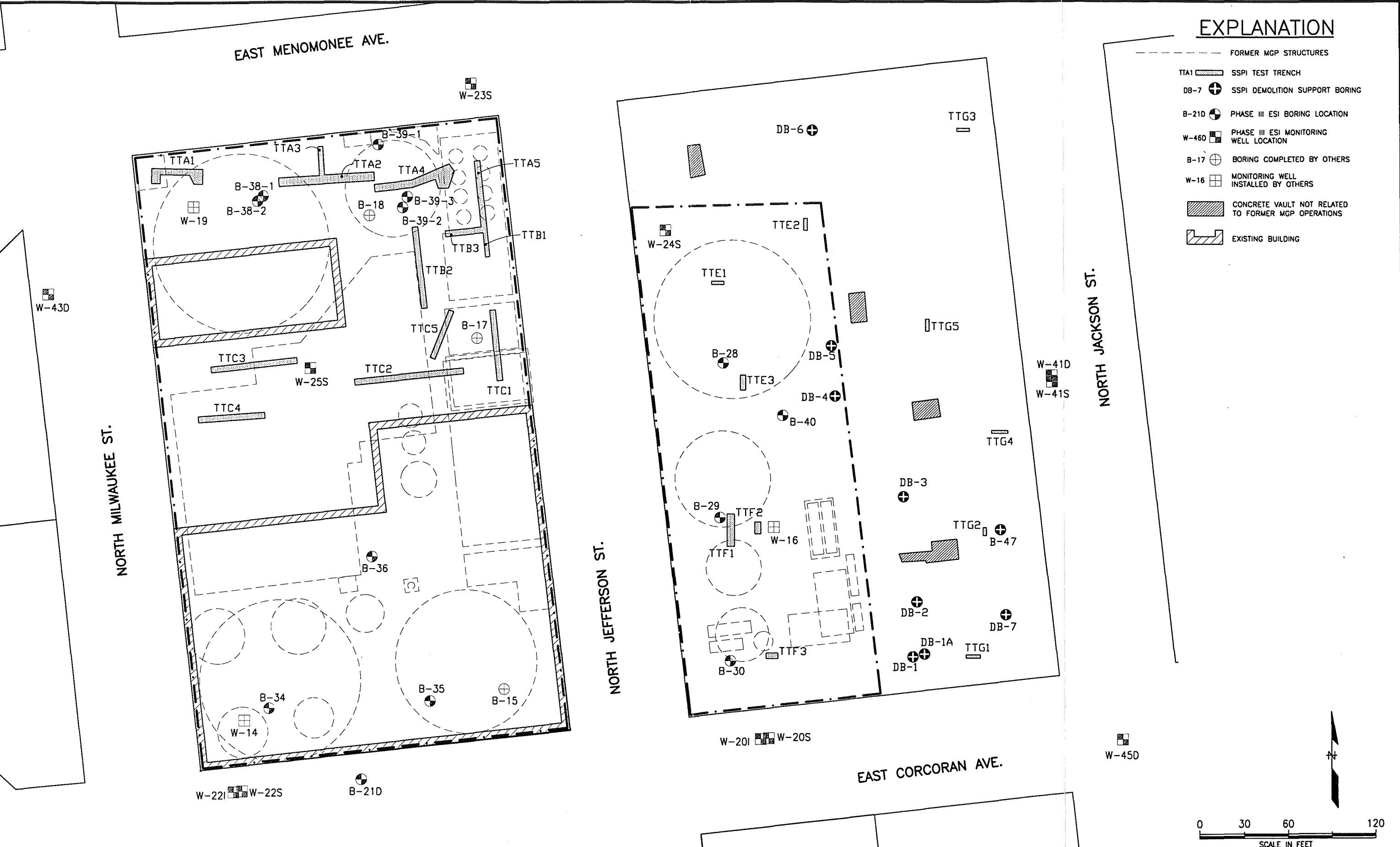
REMEDIATION
TECHNOLOGIES INC

DRAWN BY	DATE	CHECKED BY	DATE	SCALE	FIGURE NUMBER
R.K.K.	2/93			1"=125'	FIGURE 1-2

EAST MENOMONEE AVE.

EXPLANATION

- FORMER MGP STRUCTURES
- TTA1 [Symbol] SSPI TEST TRENCH
- DB-7 [Symbol] SSPI DEMOLITION SUPPORT BORING
- B-210 [Symbol] PHASE III ESI BORING LOCATION
- W-460 [Symbol] PHASE III ESI MONITORING WELL LOCATION
- B-17 [Symbol] BORING COMPLETED BY OTHERS
- W-16 [Symbol] MONITORING WELL INSTALLED BY OTHERS
- [Symbol] CONCRETE VAULT NOT RELATED TO FORMER MGP OPERATIONS
- [Symbol] EXISTING BUILDING



NORTH MILWAUKEE ST.

NORTH JEFFERSON ST.

NORTH JACKSON ST.

**THIRD WARD MGP SITE
MILWAUKEE, WISCONSIN
3-0887-603**

**CITY AND
PETERS = JOHNSON
PROPERTIES**

RETEC
REMEDIATION
TECHNOLOGIES INC.
FIGURE 1-3

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The RAOR is based on the findings presented in the following two documents:

- *Phase III Environmental Site Investigation Report, Former Third Ward Manufactured Gas Plant Site, April 1993* (Phase III ESI Report), which presents the results of the Phase III Environmental Site Investigation (Phase III ESI), conducted in 1992 and 1993
- *Shallow Soil Predesign Investigation Report, Former Third Ward Manufactured Gas Plant Site, May 1996* (SSPI Report), which presents the results of the shallow soil pre-remedial design investigation (SSPI), conducted during 1995

1.2 Abbreviated Operational History

Gas was made at the former Third Ward MGP from the 1850s to the 1950s. The methods used to manufacture gas evolved during the life of the plant and involved three different gas manufacturing processes. MGP operations were conducted on land comprising an area of approximately 5.5 acres. The Third Ward MGP site consists of three distinct parcels of land, as shown on Figure 1-2, which includes portions or all of Blocks 116, 157, 158, 164 and 166. All of the land on which the MGP was formerly located was sold to other parties after the decommissioning and demolition of the MGP was completed in 1959. This RAOR addresses soil impacts located on Blocks 115 and 158, and Blocks 116 and 157, consisting of the parcel of land shown on Figure 1-3 (City Property and P=J Property). The Phase III ESI Report contains additional information regarding the history of the Site.

1.3 Summary of Environmental Conditions

A complete discussion of impacts observed at the Site is provided in the Phase III ESI and in the Preliminary FS. This subsection provide a summary of impacts present in the City Property and P=J Property.

Subsurface Structures associated with the former MGP, as well as post- or non-MGP structures, have been identified to exist at the Site through a review and compilation of historical Site information and the completion of the subsurface drilling program. Organic chemical compounds, consisting of Polycyclic Aromatic Hydrocarbons (PAHs) and certain Volatile Organic Compounds (VOCs) have been detected in soil groundwater samples collected at the Site.

The following provides a summary of the types of impacted media at the Site:

- Soil - The Soil medium consists of fine-grained, non-native fill material, primarily silty sand, with areas of gravel and clay.
- Debris - The Debris medium consists of coarse-grained and large-sized materials such as cinders, ash, coal, coal slag, brick, piping, other metal, wood, ties, asphalt, and concrete.
- Subsurface Structures - The Subsurface Structures medium consists of the structures illustrated on Figures 1-3, 3-1 and 3-2. This medium includes both MGP (e.g., gas holders, tar wells) and non-MGP structures (e.g., building foundations, vaults).

Tables 1-1 and 1-2 provides a summary of the environmental conditions on each of the two properties. Tables 1-1 and 1-2 provide information on the following:

- Subsurface Structures - these are both MGP and Non-MGP structures
- Summary of Soil Impacts - these relate to impacts present inside Subsurface Structures and impacts present in the soil outside of any subsurface

The City Property has been cleared of any buildings. The Peters=Johnson Property contains two buildings. The Lurie Glass Building is located on the southern portion of the block, and an inactive vehicle maintenance facility is located on northern portion of the block.

Table 1-1 Summary Evaluation of Site Investigation Data - City Property

Subsurface Structures			
Structure	Estimated Depth (Feet)	Areal Dimensions (Feet)	Contents/Comments
Gas Holder #3 (Oil tank #2)	20	110	<ul style="list-style-type: none"> • saturated at depth of 5 to 7 feet below ground • primarily soil fill material, scattered bricks, concrete, and metal • scattered sheens, odors, staining unsaturated portion
Oil Tank #1	17	70	<ul style="list-style-type: none"> • saturated at depth of 5 to 7 feet below ground • significant (>50%) debris fill including brick, concrete, metal, wood • significant odors, staining sheens (saturated and saturated)
Badger By-Product Vaults	8 to 10	Various	<ul style="list-style-type: none"> • at least 4 concrete vaults containing black liquid (several are covered) • not related to MGP operation
Miscellaneous	NA	NA	<ul style="list-style-type: none"> • shallow foundations, piping, flooring • predominant at central/western portions of property
Summary of Soil Impacts			
Inside of Structures			
Parameter	Distribution - Magnitude		
Benzene	<ul style="list-style-type: none"> • gas holder #3 - 6.5 ug/kg in unsaturated soil and ND to 12 ug/kg in saturated soil • oil tank #1 - 48 ug/kg in saturated soil 		
Total cPAH	<ul style="list-style-type: none"> • gas holder #3 - 65 ug/kg in unsaturated soil and 23 mg/kg in saturated soil • oil tank #1 - 47 mg/kg in saturated soil 		
Cyanide	<ul style="list-style-type: none"> • gas holder #3 - <1 mg/kg • oil tank #1 - <1 mg/kg 		
RCRA Haz. Characteristics	<ul style="list-style-type: none"> • gas holder #3 - testing indicates non-hazardous according to RCRA • oil tank #1 - testing indicates non-hazardous according to RCRA 		
Outside of Structures			
Parameter	Distribution - Magnitude		
Benzene	<ul style="list-style-type: none"> • ranged from 3 to 24,000 ug/kg • highest concentration adjacent to oil tank #1 		
Total cPAH	<ul style="list-style-type: none"> • ranged from <1 to 94 mg/kg • highest concentration adjacent to oil tank #1 		
Cyanide	<ul style="list-style-type: none"> • detected only in certain samples from western half of property • ranged from <1 to 12 mg/kg • highest concentration adjacent to oil tank #1 		
RCRA Haz. Characteristics	<ul style="list-style-type: none"> • unsaturated soil - testing indicates non-hazardous according to RCRA • saturated soil - testing indicates non-hazardous according to RCRA 		

NA - Not Applicable

ND - Not Detected

Total cPAH - Total Carcinogenic PAHs

Single number for areal dimensions denotes diameter of circular structure

**Table 1-2 Summary Evaluation of Site Investigation Data
Peters=Johnson Property**



Subsurface Structures			
Structure	Estimated Depth (Feet)	Areal Dimensions (Feet)	Contents/Comments
Gas Holder #1	16 to 20	100	<ul style="list-style-type: none"> • saturated at depth of 9 feet below surface of building floor • primarily soil fill materials encountered • odors throughout/several inches tar observed at bottom • difficult to estimate debris content
Gas Holder #2	13 to 20	115	<ul style="list-style-type: none"> • saturated at depth of 9 feet below surface of building floor • primarily soil fill materials encountered • strong odors throughout , tar likely at bottom • difficult to estimate debris content
Gas Holder #4	13 to 20 (no hard bottom)	120	<ul style="list-style-type: none"> • saturated at depth of 8 feet below ground • 20 to 50% debris fill including brick, concrete, and metal • scattered odors throughout
Gas Holder #5	10 to 12	75	<ul style="list-style-type: none"> • unable to drill or trench in holder • appears to be solid concrete • surrounded by wood cribbing
Tar Well #1	12	25	<ul style="list-style-type: none"> • not observed • beneath Lurie Glass floor
Tar Well #2	12	13x13	<ul style="list-style-type: none"> • not observed • beneath Lurie Glass floor
Tar Well #4	12	10x18	<ul style="list-style-type: none"> • not observed
Tar Well #5	12	30x20x37	<ul style="list-style-type: none"> • not observed
Tar Well #6	12	50x31	<ul style="list-style-type: none"> • saturated at depth of 2 feet below ground • 40 to 70% debris fill including bricks, concrete, wood, and metal • black liquids, sheens, strong odors throughout
Drip Well #1	12	20	<ul style="list-style-type: none"> • not observed • partially beneath Lurie Glass floor
Drip Well #2	12	20	<ul style="list-style-type: none"> • not observed • beneath Lurie Glass floor
Oil/Tar Settling Tank	12	25	<ul style="list-style-type: none"> • not observed • beneath Lurie Glass floor
Oil Well	12	13x13	<ul style="list-style-type: none"> • not observed • beneath Lurie Glass floor
Miscellaneous	NA	NA	<ul style="list-style-type: none"> • shallow foundations, piping, and flooring prevalent over entire property



**Table 1-2 Summary Evaluation of Site Investigation Data
Peters=Johnson Property (Continued)**

Summary of Soil Impacts	
Inside of Structures	
Parameter	Distribution - Magnitude
Benzene/GRO	<ul style="list-style-type: none"> • benzene not detected in sample collected from gas holder #4 • Gasoline Range Organics concentrations range from 22 to 1,300 mg/kg in gas holders • benzene 20 mg/kg in tar well #6
Total cPAH/DRO	<ul style="list-style-type: none"> • total cPAH ranged from <1 to 18 mg/kg in soils from gas holder #4 • Diesel Range Organics concentrations range from 63 to 4,600 mg/kg in gas holders
Cyanide	<ul style="list-style-type: none"> • 100 mg/kg in tar well#6 • 5.7 mg/kg in Gas Holder #4
RCRA Haz. Characteristics	<ul style="list-style-type: none"> • gas holders - testing indicates non-hazardous according to RCRA • Tar wells - testing of discrete sample indicates certain materials in tar well #6 are hazardous according to RCRA
Outside of Structures	
Parameter	Distribution - Magnitude
Benzene	<ul style="list-style-type: none"> • ranged from ND to 5,000 ug/kg • highest concentration near Gas Holder #5
Total cPAH	<ul style="list-style-type: none"> • ranged from <1 to 220 mg/kg • highest concentration near tar wells beneath Lurie Glass building
Cyanide	<ul style="list-style-type: none"> • ranged from ND to 3.1 mg/kg • highest concentration near tar well #6
RCRA Haz. Characteristics	<ul style="list-style-type: none"> • testing indicates non-hazardous according to RCRA

ND - Not Detected

Total cPAH - Total Carcinogenic PAHs

Single number for areal dimensions denotes diameter of circular structure

2 Residual Contaminant Levels

Remedial action objectives are site-specific goals for protecting public health and the environment. A complete discussion of the remedial action objectives for the Site is presented in the Preliminary FS. This section presents the soil cleanup goals, or residual contaminant levels (RCLs) for the remedial action. Soil, Debris, and Subsurface Structures are the media addressed in this RAOR. The procedures outlined in NR 720.09, NR 720.19, and NR 722.11, soil RCLs were used to develop RCLs which are protective of human health and the environment. Table 2-1 provides a RCLs based upon the following scenarios:

- Lifetime Exposure Scenario - as stated for the direct contact exposure scenario in NR 720.19
- Long Term Exposure - as stated for the direct contact exposure scenario in NR 720.19
- Groundwater protection - as stated in NR 720.09

Complete discussions of the chemical of interests, the media at the Site, potential receptors, and exposure pathways are presented in the Preliminary FS.

The direct contact RCLs (i.e., long term and lifetime) were developed using the default assumptions in NR 720.19. The RCLs for the PAH compounds are also presented in the document, *Soil Cleanup Levels for Polycyclic Aromatic Hydrocarbons (PAHs) Interim Guidance*, dated March 1997.



**Table 2-1 Soil Residual Contaminant Levels
Third Ward MGP Site**

Chemical of Interest	Soil Residual Contaminant Levels (mg/Kg)		
	Long-Term Direct Contact Based RCLs (1,3)	Lifetime Direct Contact Based RCLs (1,3)	Groundwater Protection Based RCLs (2,3)
PAHs			
Acenaphthene	60,000	900	69
Acenaphthylene	360	18	1.2
Anthracene	300,000	5,000	6,000
* Benzo(a)anthracene	3.9	0.088	30
* Benzo(b)fluoranthene	3.9	0.088	650
* Benzo(k)fluoranthene	39	0.88	16,000
Benzo(g,h,i)perylene	39	1.8	12,000
* Benzo(a)pyrene	0.39	0.0088	90
* Chrysene	390	8.8	66
* Dibenzo(a,h)anthracene	0.39	0.0088	69
Fluoranthene	40,000	600	1,000
Fluorene	40,000	600	200
* Indeno(1,2,3-cd)pyrene	3.9	0.088	12,000
1-Methylnaphthalene	70,000	1,100	42
2-Methylnaphthalene	40,000	600	30
Naphthalene	110	20	0.7
Phenanthrene	390	18	3.3
Pyrene	30,000	500	16,000
VOCs			
* Benzene	99	NC	0.0055
Toluene	139,918	NC	1.5
Ethylbenzene	69,992	NC	2.9
Xylenes	1,000,000	NC	4.1

Notes:

- (1) Long-term and lifetime direct contact-based RCLs for PAHs from Table 1, WDNR March 1997 PAH Guidance. VOC RCLs were calculated by RETEC using exposure assumptions in NR 720.19.
 - (2) Groundwater protection RCLs for PAHs from Table 1, WDNR March 1997 PAH Guidance. VOC RCLs were obtained from Table 1 in NR 720.
 - (3) Soil will be treated to the extent practicable,
- NC Not Calculated
*=Carcinogenic

3 Media Volumes

The RCLs allow the identification of the areas and/or volumes of impacted Soil, Debris, And Subsurface Structures on the City Property and on the Peters=Johnson Property.

3.1 City Property

The impacted media at the City Property is identified in Table 1-1. The average depth to groundwater on the City Property is approximately seven feet. Figure 3-1 shows the distribution of impacts on this portion of the Site. Impacted media is potentially present through the entire block.

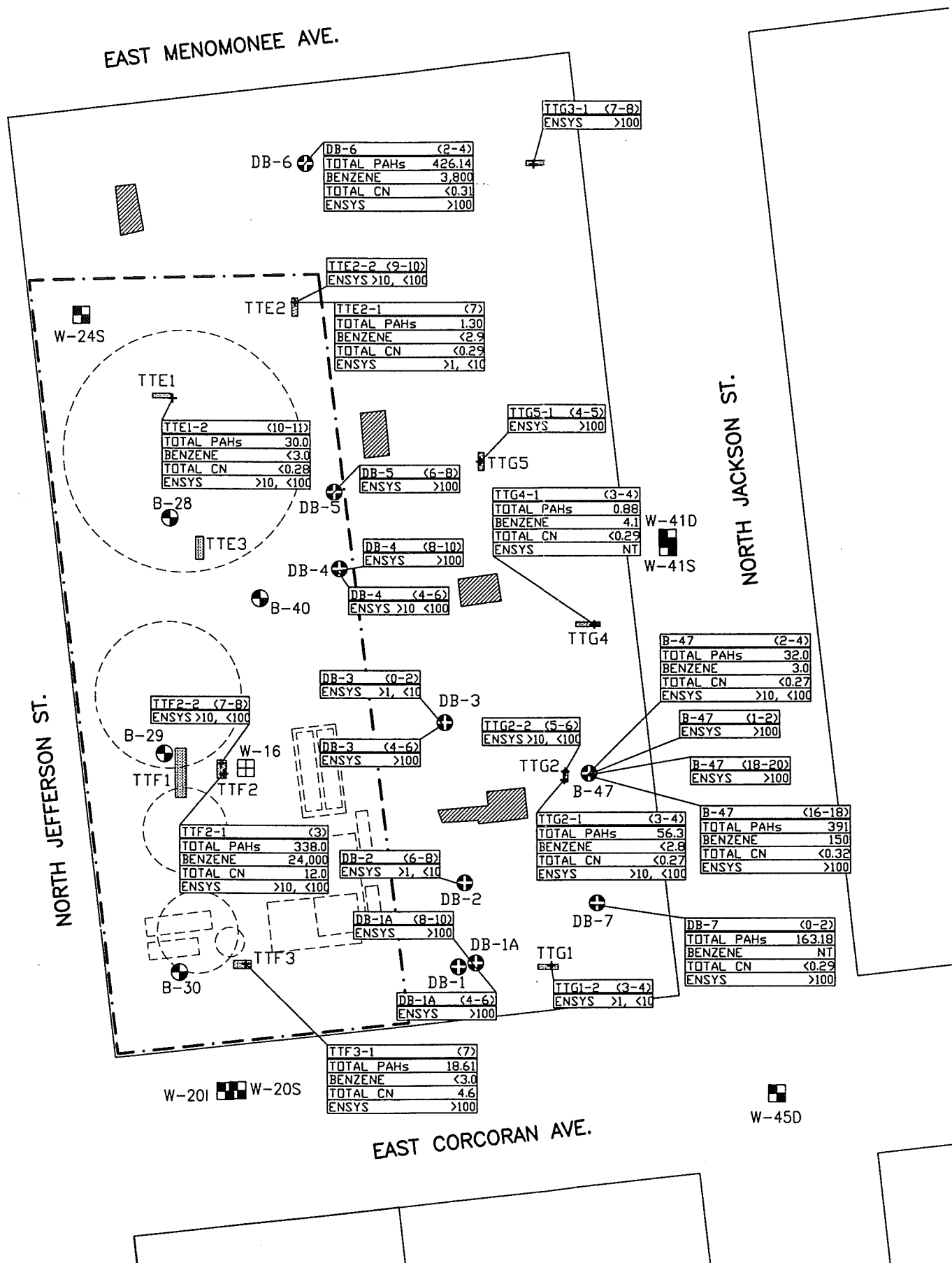
A portion of the media is expected to meet the RCLs. The volume of material estimated to be impacted on the City Property above the RCLs is approximately 17,500 to 21,000 cubic yards (29,000 to 39,000 tons). Based upon analytical results, all of the impacted material on the City Property is expected to be non-hazardous solid waste.

3.2 P=J Property

The impacted media at the P=J Property is identified in Table 1-2. The average depth to groundwater on the P=J Property is approximately 10 feet. Figure 3-2 shows the distribution of impacts on this portion of the Site. Impacted media is potentially present through the entire block.

A portion of the media is expected to meet the RCLs. The volume of material estimated to be impacted on the P=J Property above the RCLs is approximately 7,000 to 10,000 cubic yards (12,000 to 17,000 tons). Based upon analytical results, most of the impacted material on the P=J Property is expected to be non-hazardous solid waste. A small portion of the impacted material, estimated to be 130 cubic yards, is expected to be characteristic hazardous waste due to the presence of benzene at concentrations exceeding the toxicity characteristic as defined in Title 40 of the Code of Federal Regulations Part 261 (40 CFR 261).

EAST MENOMONEE AVE.

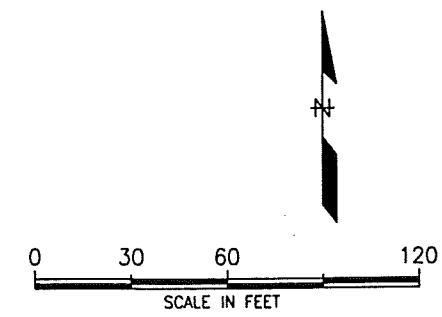


EXPLANATION

- LIMIT OF MGP OPERATIONS
- - - FORMER MGP STRUCTURES
- EXISTING BUILDING
- TTA3-2 + TRENCH SAMPLE LOCATION
- TTA3 SSPI TEST TRENCH
- DB-1 ⊕ DEMOLITION SOIL BORING
- B-21D ⊕ PHASE III ESI BORING LOCATION
- W-46D ⊕ PHASE III ESI MONITORING WELL LOCATION
- B-17 ⊕ BORING COMPLETED BY OTHERS
- W-16 ⊕ MONITORING WELL INSTALLED BY OTHERS
- CONCRETE VAULT - NOT RELATED TO MGP OPERATIONS

SAMPLE DEPTH (FEET)	TOTAL PAHs	mg/Kg
	BENZENE	ug/Kg
	TOTAL CN	mg/Kg
	ENSYS	ppm TOT. PAHs

SAMPLE DEPTH (FEET)	ENSYS <th>ppm TOT. PAHs</th>	ppm TOT. PAHs
	NT = NOT TESTED	



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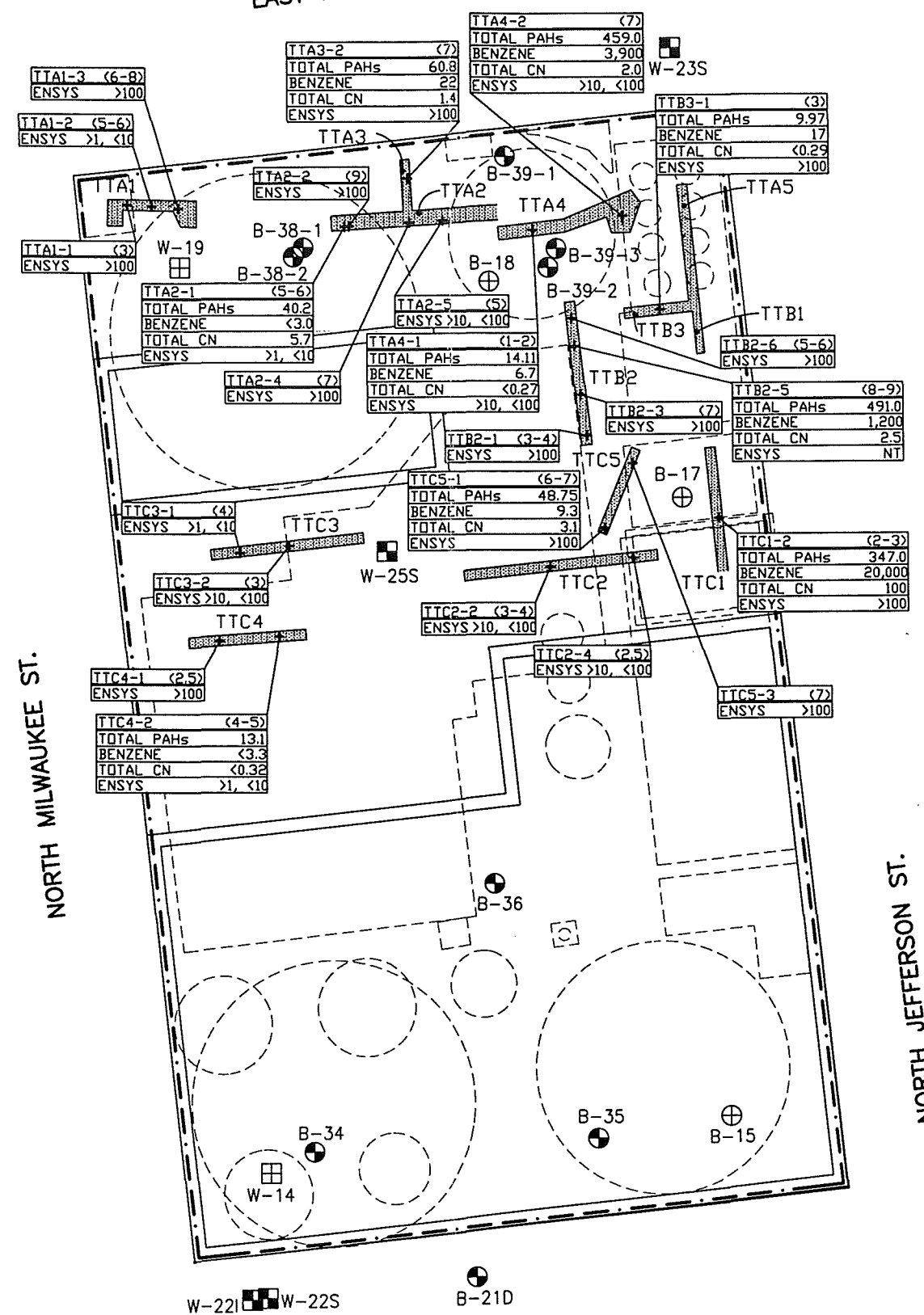
THIRD WARD MGP SITE
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SELECTED SOIL FIELD AND LABORATORY ANALYTICAL RESULTS
CITY PROPERTY

RETEC
REMEDIATION TECHNOLOGIES INC.
FIGURE 3-1

EAST MENOMONEE AVE.



EXPLANATION

- LIMIT OF MGP OPERATIONS
- - - FORMER MGP STRUCTURES
- ▨ EXISTING BUILDING
- TTA3-2 + TRENCH SAMPLE LOCATION
- TTA3 SSPI TEST TRENCH
- B-210 ⊕ PHASE III ESI BORING LOCATION
- W-460 ⊞ PHASE III ESI MONITORING WELL LOCATION
- B-17 ⊕ BORING COMPLETED BY OTHERS
- W-16 ⊞ MONITORING WELL INSTALLED BY OTHERS

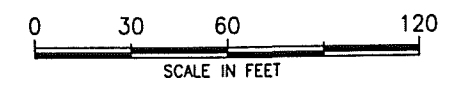
SAMPLE DEPTH (FEET)	
TOTAL PAHs	mg/Kg
BENZENE	ug/Kg
TOTAL CN	mg/Kg
ENSYS	ppm TOT. PAHs

SAMPLE DEPTH (FEET)	
ENSYS	ppm TOT. PAHs

NT = NOT TESTED

NORTH MILWAUKEE ST.

NORTH JEFFERSON ST.



6					
5					
4					
3					
2					
1					
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MILWAUKEE, WISCONSIN
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PETERS=JOHNSON PROPERTY
DISTRIBUTION OF IMPACTS

RETEC
REMEDIATION
TECHNOLOGIES INC.
FIGURE 3-2

4 Development and Evaluation of Remedial Alternatives

An evaluation has been performed of a wide array of remedial technologies and process options. This evaluation is presented in the Preliminary FS. This section presents and evaluates two remedial action options for the City Property and the P=J Property.

4.1 Remedial Technology Evaluation

A description of selected applicable remedial process options is provided in Table 4-1. Table 4-1 provides a summary of a subset of the applicable technologies identified in the Preliminary FS. These selected process options are included in the remedial options presented in Section 4.2.

4.2 Description of Remedial Options

Two remedial action options are described in Table 4-2. The following subsections provide a description of the remedial action options as they pertain to the City Property and the P=J Property.

Table 4-2 Remedial Action Alternatives

Alternative	Soil > RCLs	Debris > RCL	Subsurface Structures > RCLs
1	No Action	No Action	No Action
2	Excavation and <i>ex situ</i> Thermal Treatment	Excavation and <i>ex situ</i> Thermal Treatment	Excavation and <i>ex situ</i> Thermal Treatment

4.2.1 Alternative 1: No Action

Remedial action option Alternative 1 involves implementation of institutional controls and monitoring only, including implementation of the following:



**Table 4-1 Summary of Selected Retained Remedial Technologies
Former Third Ward MGP Site Milwaukee, Wisconsin**

General Response Action	Remedial Technology	Process Option	Description	Soil and Subsurface Structures	Shallow Groundwater
No Action	None	None	No action.	✓	✓
Institutional Controls	Access Restriction	Deed Restriction	Attaching use restrictions or warnings on deeds for property containing impacted media.	✓	✓
		Fencing	Construction of a perimeter barrier to prevent outside contact with impacted media.	✓	
		Buried Utility Notification	Provide written notification to utility companies with warnings about potentially impacted areas.	✓	✓
Monitoring	Monitoring	Groundwater Monitoring Wells	Collection of groundwater and/or soil samples to monitor affected or potentially affected areas.	✓	✓
Removal	Decontamination	Decontamination	Pressure cleaning or other method to remove impacted surface materials from structures and debris prior to handling or disposal.	✓	
	Excavation	Excavation	Removal of soil, debris, and/or NAPL from the ground by means of mechanical equipment for <i>ex situ</i> treatment, storage, or disposal.		✓
Disposal	Permitted Landfill	Permitted Landfill	Removal and transport of wastes to the site of an existing secure landfill, and placement and compaction within that facility.	✓	
Treatment	<i>Ex Situ</i> Physical/Chemical	Screening	Separation of fine solids from coarse solids by running all solids through a sieve.	✓	
	<i>Ex Situ</i> Thermal	Thermal Decomposition	Thermal decomposition at high temperature in a direct-fired rotary aggregate dryer-type unit.	✓	
Resource Recovery	Reuse	Use as Feedstock (Asphalt Plants, Brick Mfg., or Cement Kilns)	Recovery, pretreatment, if needed, and transport of waste materials and impacted soils for addition as supplemental material in asphalt batch plants or cement kilns.	✓	

- **Institutional Controls:**
 - ▶ **Deed Restriction/Ordinance Restriction:** Amend the property deeds by adding warnings and/or restrictions for invasive construction activities such as excavation and drilling. These restrictions would also stipulate limitations on groundwater usage.
 - ▶ **Fencing:** Maintain a fence around the perimeter of the City Property and the P=J Property.
 - ▶ **Buried Utility Notification:** A provision for written notification of all local utility companies and service providers about potential impacts in the subsurface. This warning would include detailed descriptions of the type of impacts and would identify potentially impacted areas.
- **Monitoring:** Long-Term Groundwater Monitoring: Groundwater monitoring would include regularly scheduled collection of groundwater samples for laboratory analysis for chemicals of interest. Monitoring will also include water level measurements to ascertain the direction of groundwater flow.

4.2.2 Alternative 2: Soil, Debris, and Subsurface Structure Removal with Thermal Treatment

Remedial action option Alternative 2 involves implementation of the following:

- **Institutional Controls:** Construct a fence around work areas during excavation and removal activities to prevent unauthorized entry. Fencing will also be placed around areas used for process equipment and treatment systems to secure these areas from unauthorized access during implementation of the remedial action
- **Removal:**
 - ▶ **Subsurface Structures and Contents:** Removal, treatment, or disposal of materials within the structure that are impacted above the RCLs. The structure walls will be removed to the depth of the water table and treated. The resulting excavation would be backfilled with treated material and/or clean fill.

- ▶ Soil: Removal and treatment of soil impacted above the RCLs. The resulting excavation would be backfilled with treated material and/or clean fill.
- ▶ Debris: Removal and treatment of debris impacted above the RCLs. The resulting excavation would be backfilled with treated material and/or clean fill.
- *Ex-Situ Treatment*: Subsurface structures, debris, and soil will be thermally treated to attain the best available treatment level for this technology. The treated material would be used as backfill.
- *Recycle/Disposal*: Selected Debris will be managed by recycling and/or disposal at off-Site facilities.
- *Monitoring*: Long-term groundwater monitoring will include regularly scheduled collection of groundwater samples for laboratory analysis for chemicals of interest. Monitoring will also include water level measurements to ascertain the direction of groundwater flow.

4.3 Evaluation of Remedial Action Options

In this section, the remedial action options are evaluated in compliance with NR 722.07(3). Detailed evaluation as specified in NR 722.07(4) is not required because land disposal of impacted material is not a part of any of the remedial action options. The options are evaluated to determine whether they meet the RCLs specified in Section 2 of this RAOR.

4.3.1 Evaluation of Alternative 1

Remedial action option Alternative 1 does not meet the RCLs presented in Section 2; therefore, Alternative 1 is eliminated from further consideration.

4.3.2 Evaluation of Alternative

Remedial action option Alternative 2 meets the RCLs presented Section 2.

5 Selection of Preferred Remedial Action Option

Alternative 2 is selected as the preferred remedial action option because it meets the RCLs presented in Section 2.

5.1 Description of Remedial Action Option

The primary activities include the following:

- Demolition and removal of two existing buildings on the Peters=Johnson Property.
- Excavation of Soil, Debris, and Subsurface Structures with concentrations of chemical-of-interest greater than the RCLs, nominally to depth of water table.
- Dewatering, as necessary, to facilitate excavation activities.
- Segregation and appropriate management of excavated material, based on physical composition and chemical characteristics.
- Thermal Treatment of Soil and Debris that is suitable for such treatment according to particle size and material characteristics.
- Recycling/disposal of selected Debris and Subsurface Structures according to material characteristics (e.g., metals debris, masonry debris).
- Placement and compaction of backfill, which may consist of treated soil, imported backfill, or resized on-site material, as necessary. Such placement will be to the depth of the approximate groundwater level at the Site.

5.2 Implementation Approach

The thermal treatment will be utilized to attain the best achievable treatment goals. The treatment goal attained by use of thermal treatment will dictate the RCL that is achieved by the remedial action.

The following describes the process that will be used to determine the need for engineering controls after the placement of the treated soil:

- Thermal Treatment Attains Lifetime RCLs and Groundwater Protection RCLs - treated soil backfill to be placed without engineering controls
- Thermal Treatment Attains Long Term RCLs and Groundwater Protection RCLs - treated soil backfill to be covered with a soil or synthetic cap

5.3 Implementation Schedule

Remedial planning and engineering design activities are underway. Remedial activities are scheduled to be conducted during the fall and winter of 1997 and the spring of 1998.

5.4 Required Local, State, and Federal Licenses or Approvals

All required local, state, and federal licenses or approvals will be identified in the design documents.