COMPLETION REPORT

THE WILLOW STREET/HAWTHORNE AVENUE STATION OPERABLE UNIT CHICAGO, ILLINOIS

Prepared for:

The Peoples Gas Light and Coke Company
130 East Randolph Drive
Chicago, Illinois 60601

Prepared By:

Burns & McDonnell Engineering, Inc.
1431 Opus Place, Suite 400
Downers Grove, Illinois 60515
630-724-3200

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ACROYNMS AND ABBREVIATIONS

ARA	Adjacent River Area
ASTM	American Society for Testing and Materials International
Barr	Barr Engineering Company
bgs	below ground surface
BTEX	Benzene, Toluene, Ethylbenzene, Xylenes
Btu	British thermal units
ComEd	Commonwealth Edison Company
Comprehensive SI	Comprehensive Site Investigation
CR	Completion Report
Finkl	A. Finkl and Sons Company
Ft	foot
GI	General Iron
GI North	General Iron North Property, LLC
GPS	Global Positioning System
Hanson	Hanson Engineers, Inc.
HDPE	high density polyethylene
IAC	Illinois Administrative Code
Illinois EPA	Illinois Environmental Protection Agency
LIF	Laser-Induced Fluorescence
Marcey	Marcey Properties, LLC
META	META Environmental Laboratories
MGP	Manufactured Gas Plant
NAPL	Nonaqueous Phase Liquid
NELAP	National Environmental Laboratory Accreditation Program
PAHs	Polynuclear Aromatic Hydrocarbons
PCBs	Polychlorinated Biphenyls
PD	Planned Development
Peoples Gas	The Peoples Gas Light and Coke Company
PID	Photoionization Detector
PMD	Planned Manufacturing District
QAPP	Quality Assurance Project Plan
RACR	Remedial Action Completion Report
RAP	Remedial Action Plan
River	Chicago River
ROs	Remediation Objectives
ROR	Remediation Objectives Report
SI	Site Investigation
SRP	Site Remediation Program
SSI	Supplemental Site Investigation
SVE	Soil vapor extraction
SVOCs	Semivolatile Organic Compounds
TACO	Tiered Approach To Corrective Action Objectives
TarGOST®	Tar specific Green Optical Screening Tool

TPH	total petroleum hydrocarbons
USEPA	United States Environmental Protection Agency
VOCs	Volatile Organic Compounds
WMI	Waste Management, Inc.

1 INTRODUCTION

This Completion Report (CR), prepared by Burns & McDonnell on behalf of The Peoples Gas Light and Coke Company (Peoples Gas), addresses the Willow Street/Hawthorne Avenue Station Operable Unit (OU) of the North Branch Site, located at the intersection of North Kingsbury Street and West Willow Avenue in Chicago, Cook County, Illinois. The purpose of the CR is to summarize the environmental investigation and remediation activities completed on and adjacent to the Willow/Hawthorne OU. Figure 1 is a map showing the location of the Willow/Hawthorne OU.

Substantial site investigation (SI) and remediation activities were performed on the Willow/Hawthorne OU pursuant to the Illinois Environmental Protection Agency (Illinois EPA) Site Remediation Program (SRP), defined in Chapter 35 of the Illinois Administrative Code (IAC), Part 740 (35 IAC, Part 740). Investigation and remediation activities spanned from 2002 through 2006 on various parcels within the Willow/Hawthorne OU. During SI activities, manufactured gas plant (MGP) source material was identified within and near former MGP structures and in the adjacent river area (ARA), which is defined as the portion of the North Branch of the Chicago River (the River) that is directly adjacent to the Willow/Hawthorne OU. As used herein, "MGP source material" refers to contaminant source or free product conditions as one condition that would prevent the exclusion of exposure routes from consideration. Further, MGP source material contains chemical constituents at levels that exceed criteria set forth in Tiered Approach to Corrective Action Objectives (TACO), Parts 742.215 and 742.220 or contains tar, tarry residues or related sheen, identified by visual inspection and/or laboratory analyses. MGP source material and impacted soil were removed throughout the historical MGP process areas.

More specifically, the purpose of this CR is to:

- Summarize the work performed on the property under the Illinois EPA SRP;
- Assess the environmental effectiveness of the remedial actions completed to date;
- Document potential data gaps and areas that may warrant additional investigation; and
- Document the areas where further remedial measures and/or other response actions may be necessary.

The CR is divided into the following sections:

- Section 1: Introduction;
- Section 2: Pre-Remedial Site Investigations;
- Section 3: River Investigation and Results;
- Section 4: Remedial Action Activities;
- Section 5: Identified Pathways and Conclusions; and
- Section 6: References.

Following the report sections, tables summarizing all post-remediation soil data for the various parcels are presented. These tables present a combination of investigation samples that were not removed during remediation activities and remaining soil confirmation samples collected from bottoms and side walls of excavation areas. Figures are included that present the locations of all of the samples pre- and post-remediation. Appendices include CD copies of all previous reports that contain data. These reports have been included in their entirety, although they are summarized within this CR.

1.1 General Property Information

The Willow/Hawthorne OU encompasses approximately 8.4 acres owned by five parties and is divided into eastern and western portions by North Kingsbury Street. The eastern portion is approximately 4 acres and the western portion is approximately 3.4 acres. Figure 2 indicates the former MGP boundary and the current property owners. Figure 3 presents the zoning and land use for the Willow/Hawthorne OU and surrounding area.

On the west side of North Kingsbury Street, the Willow/Hawthorne OU is now owned by two parties: GI North Property, LLC (GI North) and A. Finkl and Sons Company (Finkl). GI North owns the southern parcel west of North Kingsbury Street, which comprises approximately 3.3 acres and is occupied by General Iron Industries, Inc. for use as a laydown area for unprepared steel (hereinafter referred to as the "General Iron parcel"). Immediately north of the General Iron parcel is approximately 0.57 acres of vacant land owned by Finkl (the Finkl parcel). The former Willow/Hawthorne property occupied approximately 0.1 acres of the Finkl parcel, consisting of a narrow strip along the northern Willow/Hawthorne property boundary. The River is located immediately west of the General Iron parcel and the Finkl parcel. The Finkl parcel and northern half of the General Iron parcel are zoned as Planned

Manufacturing District (PMD-1) and the southern half of the General Iron parcel is zoned as Planned Development (PD-475). Chain-link fences restrict access to the General Iron and Finkl parcels.

The portion of the former Willow/Hawthorne property located east of North Kingsbury Street consists of a city block (bound by North Kingsbury Street to the west, North Marcey Street to the east, West Willow Street to the south and West Wisconsin Street to the north) owned by three parties: Commonwealth Edison Company (ComEd); Marcey Properties, LLC (Marcey); and Peoples Gas.

The northern third of the block, comprising approximately 1.1 acres and used as an electric utility substation, is owned by ComEd (the ComEd parcel). The ComEd parcel, zoned PMD-1, is paved with asphalt except for the far eastern edge, which is covered by gravel. Transformers are present on the western half of the ComEd parcel and a building occupies the eastern half. Two other small buildings are also present on the south portion of the ComEd parcel. The ComEd parcel is surrounded by a fence.

Marcey owns the southern half of the block, consisting of approximately 2.5 acres (the Marcey parcel). The Marcey parcel is leased to commercial retail shops (and associated automobile parking areas) including Sam's Wines & Spirits to the southeast and Smith & Hawken (a home and garden furnishings store) to the northwest. Peoples Gas sold the 30-foot (ft) wide strip of land along the west Marcey parcel boundary (referred to as "Marcey West" herein and "A Portion of Willow" in appended documents to the CR) to Marcey in 2004, upon completion of remediation activities conducted in 2003. The Marcey West portion of the Marcey parcel is 0.18 acres that is asphalt parking area, zoned PMD-1, and the remainder of the Marcey parcel, occupied by stores, asphalt parking areas and limited landscaped areas, is zoned as Planned Development (PD-514).

Peoples Gas owns an irregularly shaped 0.4-acre parcel of the Willow/Hawthorne OU that is called the Hawthorne Avenue Regulator Station and is referred to in this CR as the Peoples Gas parcel. The parcel is used as a natural gas utility regulator station and the parcel separates the ComEd and Marcey parcels. The Peoples Gas parcel is covered with gravel and three small valve houses are present on the western portion of the property and is zoned PMD-1. The Peoples Gas parcel is surrounded by a fence.

Plats of survey for the General Iron, Finkl, Marcey West and Peoples Gas parcels are included in Appendix A. A Plat of Survey for the ComEd parcel and eastern portion of the Marcey parcel is not available.

Information regarding the historical MGP operator, current owners, facility location and regulatory agencies identification numbers are presented below.

Former MGP Operator:	The Peoples Gas Light and Coke Company Contact: Mr. Steven J. Matuszak 130 East Randolph Drive, 22nd Floor Chicago, Illinois 60601-6207
General Iron– parcel Owner:	GI North Property, LLC Contact: Ms. Marilyn Labkon, President 1909 N Clifton Chicago IL 60614-4803
Finkl parcel Owner:	A Finkl & Sons Co. Contact: Bruce Liimatainen, President 2011 N Southport Avenue Chicago IL 60614-4015
Peoples Gas parcel Owner:	The Peoples Gas Light and Coke Company Contact: Mr. Steven J. Matuszak 130 East Randolph Drive, 22nd Floor Chicago, Illinois 60601-6207
Marcey parcel Owner:	Marcey Properties, LLC 1000 W North Avenue Chicago IL 60622-2544
Marcey West parcel Owner	Marcey Properties, LLC 1000 W North Avenue Chicago IL 60622-2544
ComEd parcel -Owner:	Commonwealth Edison Company Contact: Mr. Frank M. Clark Commonwealth Edison 440 S. LaSalle Street Chicago IL 60605-1028 Mr. John VanVranken Asst General Counsel, Exelon Business Services 10 S. Dearborn, 35th Floor Chicago Il 60603
Facility Location:	Section 32, Township 40 North, Range 14 East 1640 North Kingsbury Street (General Iron) 1740 North Kingsbury Street (Finkl) 1720 North Marcey Street (Marcey Properties)

	1135 West Wisconsin Street (ComEd) 1729 North Kingsbury Street (Peoples Gas) Chicago, Illinois Cook County
USEPA ID:	ILD982074783
Illinois EPA ID:	0316005885

1.2 Historic Property Use

According to historic information, the Ogden Gas Company constructed the former Willow Street Station MGP between approximately 1895 and 1897 to produce low British thermal unit (Btu) gas using the carbureted water gas method. The production facility on the General Iron parcel included: a 420,000-cubic-foot (ft^3) gas holder; a 100,000-ft^3 gas holder; a 70,000-gallon oil tank; a 73,000-gallon oil tank; a 158,000-gallon tar tank; two tar wells; two scrubbers; a purifying house; hydrometers; a production building that housed generators, carburetors, super heaters, scrubbers, condensers and engines; a coal shed, a coke pile and other buildings. The northern edge of the coke pile was located on the strip of the Finkl parcel immediately north of the General Iron parcel. A 2,500,000-ft^3 gas holder was located on the Marcey Properties parcel.

Circa 1905, the Ogden Gas Company constructed a 5,000,000-ft^3 water-sealed gas holder on the ComEd parcel, with the southeastern edge of the holder extending into the Peoples Gas parcel. Piping and the drip oil tank for the holder were located on the Peoples Gas parcel. A compressor building was located on the western portion of the Peoples Gas and southwest corner of the ComEd properties.

In 1907, Peoples Gas began leasing portions of the Willow/Hawthorne OU from the Ogden Gas Company. In 1910, phasing out of production operations began, and production activities ceased in 1921; however, the gas holders east of Kingsbury remained and by 1935, a boiler and engine house (now used as a retail store) was added to the northeast corner of the Marcey Properties parcel and an automobile shop building was added to the east side of the Marcey Properties parcel along Marcey Street.

In 1938, most of the aboveground structures of the production facility were dismantled, and in 1944 the original gas holders were dismantled. Peoples Gas acquired a portion of Ogden Gas Company and later began leasing portions of the General Iron parcel in 1944 and selling portions in 1947. Between 1949 and

1951, Peoples Gas leased a portion of the General Iron parcel to Construction Aggregates Company, later Material Services Corporation and E. L. Hedstrom Coal Company for the storage of construction-related materials and coal.

In 1953, the General Iron parcel was reactivated by Peoples Gas as a storage and distribution station. A 17,000,000-ft^3 tar-sealed (waterless) gas holder was constructed over the former production facilities. The diameter of the gas holder was approximately 255 ft with a maximum height of approximately 339 ft. The 17,000,000-ft^3 gas holder was retired in 1972.

Historical Sanborn fire insurance maps, aerial photographs, topographical maps and facility drawings showing the former MGP structures are included in Appendix B. Figure 3 depicts the former locations of the historical MGP structures.

1.3 Surrounding Area Use

The area surrounding the former Willow/Hawthorne OU is currently occupied by industrial and commercial properties. The Transitions Learning Center, a yoga and meditation center, is present immediately north of the Finkl parcel. Additional property owned by GI North and used for scrap metal processing is immediately south of the General Iron parcel. City Scrap Metal, LLC, a commercial scrap metal facility is located north of the ComEd parcel, north of West Wisconsin Street. Commercial properties are located east of North Marcey Street, including the Goose Island Brewery, shops, offices and the mixed-use Clybourn Galleria, which houses a self-storage facility, children's day care facility, restaurant and other commercial businesses. Additional commercial properties (a home electronics retailer, grocery store and other shops) are present south of the Marcey parcel, south of West Willow Street.

Historically, surrounding properties were used for industrial and commercial purposes. Businesses east of the former Willow/Hawthorne OU have included a paint and solvent company, a fuel product company, a metal springs manufacturing plant, a can manufacturing plant, and a baking company (Hanson, 1992). A coal yard, metal foundry, lumber yard, brewer machine manufacturing plant, and plastics factory were formerly located south of the MGP (Hanson, 1991). To the north of the MGP, historical facilities included a solvent handling/transfer facility, a bulk oil terminal immediately north of the former process area, a brick manufacturer, a pickling company, and a piano manufacturer.

2 PRE-REMEDIAL INVESTIGATIONS

2.1 Overview

This section presents a summary of pre-remedial soil and groundwater investigations performed on the Willow/Hawthorne OU. Pre-remedial investigations focused on identifying the nature and extent of impacts and locating underground structures. The investigations were conducted during 2001 through 2005 on various parcels of land within the boundaries of the Willow/Hawthorne OU. Investigations were previously conducted on the General Iron parcel, the Finkl parcel, the Peoples Gas parcel and the Marcey West portion of the Marcey parcel. No investigation data is available for the remainder of the Marcey parcel or any portion of the ComEd parcel. Investigation activities were also conducted within the ARA during 2006. Figure 5 presents an overview of the investigation efforts previously conducted at the former Willow/Hawthorne property. Investigation activities included advancing and sampling of soil borings and probes, installation and sampling of groundwater monitoring wells and piezometers, excavation and sampling of test pits, and advancing and sampling of river borings and probes.

All data developed by Burns & McDonnell and its subcontracted laboratory, STAT Analysis, Inc. (STAT), was collected and analyzed in accordance with the Peoples Gas Quality Assurance Project Plan (QAPP). STAT has National Environmental Laboratory Accreditation Program (NELAP) certification. Some of the parcels were enrolled in the Illinois SRP, so results were evaluated pursuant to TACO requirements. The soil and groundwater sample analytical results and the soil boring log documentation collected were ultimately used to establish remediation objectives (ROs) for soil and groundwater.

In addition to data generated during investigation activities, confirmation soil samples were collected from post remediation borings and excavation floors/sidewalls to evaluate removal efforts and to provide a data set for additional evaluation and verification. The results of confirmation soil sampling activities and the quality of soil remaining at the former Willow/Hawthorne OU is discussed in Section 4.

2.2 Investigation Chronology

Hanson Engineers, Inc. (Hanson) prepared Preliminary SI reports for the MGP production facility in 1991 and the storage facility in 1992. The reports discussed the historical use of the property formerly occupied by the MGP and concluded that subsurface historical structures and impacts related to former MGP operations may be present.

Barr Engineering Company (Barr) conducted SI activities on the Marcey West portion of the Marcey parcel during 2001 and Burns & McDonnell conducted supplement SI (SSI) activities during 2002. Also during 2002, Burns & McDonnell conducted SI activities at both the Peoples Gas and General Iron parcels. Burns & McDonnell conducted SSI activities at the General Iron parcel in 2004. During 2005, Burns & McDonnell conducted SI activities on the Finkl parcel. Burns & McDonnell conducted a river investigation in the ARA during 2006. No known investigations have been conducted on the remainder of the Marcey parcel or the ComEd parcel.

The following is a chronological list of reports and data books which have been prepared by various entities. References for each of these reports are included in Section 6. Copies of the reports that contain SI or SSI data are included in Appendix C as indicated below.

- Hanson 1991. *Preliminary Site Investigation – Willow Street Station Gas Production and Storage Facility – Chicago, Illinois.* November.
- Hanson, 1992. *Preliminary Site Investigation – Hawthorne Avenue Station Gas Storage Facility – Chicago, Illinois.* January.
- Barr, 2001. *Site Investigation Summary Report – A Portion of Willow Street Station MGP Site*, February. (Appendix C1 and referred to herein as the Marcey West portion of the Marcey parcel)
- Burns & McDonnell, 2002. *Supplemental Site Investigation Summary Report – A Portion of Willow Street Station Manufactured Gas Plant Site*, September. (Appendix C2 and referred to herein as the Marcey West portion of the Marcey parcel)
- Burns & McDonnell, 2003b. *Comprehensive Site Investigation Report – Hawthorne Regulator Station Former Manufactured Gas Plant Site*, June. (Appendix C3 referred to herein as the Peoples Gas parcel)
- Burns & McDonnell, 2003d. *Remedial Action Completion Report – A Portion of Willow Street Station Manufactured Gas Plant Site*, August. (Appendix C4 and referred to herein as the Marcey West portion of the Marcey parcel)

- Burns & McDonnell, 2005a. *Comprehensive Site Investigation Report – Former Willow Street Station Manufactured Gas Plant Site, 1640 North Kingsbury Portion*, February. (Appendix C5 referred to herein as the General Iron parcel)
- Burns & McDonnell, 2005b. *Supplemental Site Investigation Report/Remedial Objectives Report/Remedial Action Plan – Former Willow Street Station Manufactured Gas Plant Site, 1640 North Kingsbury Portion*, November. (Appendix C6 referred to herein as the General Iron parcel)
- Burns & McDonnell, 2005c. *Remedial Action Completion Report – Hawthorne Regulator Station Former Manufactured Gas Plant Site*, December. (Appendix C7 referred to herein as the Peoples Gas parcel)
- Burns & McDonnell, 2006a. *DRAFT Site Investigation Report/Remedial Objectives Report/Remedial Action Plan/Remedial Action Completion Report – A. Finkl & Sons Property*, June. (Appendix C8 referred to herein as the Finkl parcel)
- Burns & McDonnell, 2006b. *DRAFT River Sediment Investigation Summary – Former Willow Street Station*, December. (Appendix C9)
- Burns & McDonnell, 2007. *Remedial Action Completion Report – Former Willow Street Station Manufactured Gas Plant Site, 1640 North Kingsbury Portion*, June. (Appendix C10 referred to herein as the General iron parcel)

Each individual report provides detailed information on specific activities; however, brief summaries, focusing strictly on investigation activities conducted before remediation, for select key reports listed above follows:

- Marcey West portion of the Marcey parcel SI (A Portion of Willow) (2000). Barr performed SI field activities including advancement of eight soil borings and installation of two piezometers. Stained soil and odors were observed in the borings; however, no evidence of MGP tars or other free-phase product was identified. Fourteen soil and two groundwater samples were collected for laboratory analysis. Soil samples were analyzed for: benzene, toluene, ethylbenzene and xylenes (BTEX); semivolatile organic compounds (SVOCs); metals and cyanide. Groundwater samples were analyzed for: volatile organic compounds (VOCs); SVOCs; metals; cyanide; nitrate; ammonia and sulfide. Concentrations of constituents in soil (benzene, benzo[a]pyrene and lead) and groundwater (benzene, polynuclear aromatic hydrocarbons [PAHs], cyanide and sulfate) samples exceeded TACO Tier 1 screening levels.
- Marcey West portion of the Marcey parcel (A Portion of Willow) (2002). Burns & McDonnell conducted SSI activities including advancement of fifteen soil probes and three test pits. Black and blue staining was observed at the investigation locations, and the former 2,500,000-ft^3 gas holder wall was located in one test pit. A total of 21 soil samples were collected from the soil probes and one soil sample was collected from a test pit. Soil probe samples were analyzed for VOCs, SVOCs, polychlorinated biphenyls (PCBs), metals and cyanide. The test pit soil sample was analyzed for waste characterization parameters and total petroleum hydrocarbons (TPH). The soil sample from the test pit exceeded TACO criteria for soil attenuation capacity based on TPH content exceeding allowable total organic carbon screening level. Soil samples collected from the

soil probes contained benzene, PAHs, carbazole, arsenic and lead at concentrations exceeding TACO Tier 1 screening levels.

- Peoples Gas parcel Comprehensive Site Investigation (Comprehensive SI) (Hawthorne Regulator Station) (2002-2003). Burns & McDonnell conducted SI activities including advancement of 26 soil probes and collection of 42 soil samples for laboratory analysis of VOCs, SVOCs, PCBs, metals and cyanide. Based on the presence of underground utility structures throughout the parcel, soil probe locations were predominantly located around the parcel perimeter. Staining and odors were encountered in soil located near the former 5,000,000-ft^3 gas holder. VOCs (benzene, ethylbenzene, xylenes and carbon disulfide), PAHs, carbazole, PCBs, arsenic, lead, chromium and cyanide were found at concentrations exceeding TACO Tier 1 screening levels. The majority of the exceedances, particularly for VOCs and PAHs, were located in soil samples collected south of the former 5,000,000-ft^3 gas holder.
- General Iron parcel Comprehensive SI (Willow General Iron) (2002). Burns & McDonnell conducted SI activities including advancement of 18 soil probes, 21 soil borings and construction of 5 groundwater monitoring wells. Eighty-nine soil samples were collected for laboratory analysis from the soil probes/borings and three groundwater samples were collected for laboratory analyses (two of the wells did not produce enough water to sample). Contaminant source was identified within the former MGP process area near the former tar wells and gas holders. Soil concentrations of benzene, PAHs, PCBs and metals (lead, chromium and selenium) and groundwater concentrations of benzene, benzo(a)anthracene and metals (copper, lead and thallium) exceeded TACO Tier 1 screening levels.
- General Iron parcel SSI (Willow General Iron (2004). Burns & McDonnell conducted SSI activities to evaluate impacts adjacent to the ARA. SSI activities included advancement of 17 soil borings (15 environmental and 3 geotechnical) and excavation of two test pits. A total of 30 soil samples were collected for laboratory analyses from the soil borings. An additional contaminant source was identified west of the former MGP process area. Soil concentrations of benzene, ethylbenzene, PAHs, carbazole and 2-methylnaphthalene exceeded TACO Tier 1 screening levels.
- Finkl parcel SI (2005). Burns & McDonnell conducted SI activities including advancement of 14 soil probes and collection of 43 soil samples for analysis of VOCs, SVOCs, PCBs, metals and cyanide. Soil at four locations was determined to be TACO-defined source material: at one location due to the total organic compounds present and at three locations based on elevated levels of PCBs. Soil concentrations of VOCs (benzene and methylene chloride), PAHs, and metals (antimony, chromium, selenium, lead, arsenic and mercury) exceeded TACO Tier 1 screening levels.
- River Investigation (2006). Burns & McDonnell conducted a river investigation along the ARA including advancing 45 TarGOST® probes and 38 borings. Samples collected from thirteen of the borings were submitted for laboratory analyses. Tar was visually identified on one auger stem during the investigation; however, forensic evaluations supported the presence of MGP tar in samples collected. Further discussion of the river investigation is included in Section 3.

2.3 Site Geology and Hydrogeology

Based on the pre-remediation investigations conducted at the Willow/Hawthorne OU, soil units consist of a historical fill material ranging in thickness from 2 to 25 ft overlying a native silty clay unit that is present to the maximum depth investigated (35 ft below ground surface [bgs]). The silty clay unit contained traces of sand and gravel and became increasingly stiff as depth increases.

The geologic conditions described above may exist at the ComEd and majority of the Marcey parcels where no investigation or remediation efforts are known to have been conducted. In areas where soil removal has occurred, as discussed in Section 4, the upper soil unit was replaced with aggregate backfill. On the Peoples Gas parcel and Marcey West portion of the Marcey parcel, the upper 3 ft of soil was removed and replaced with aggregate, and some areas have aggregate backfill present up to 12 ft bgs. On the west side of North Kingsbury Street (the General Iron and Finkl parcels), remediation activities that were conducted resulted in removal and replacement of existing soil with aggregate backfill to depths of up to 21 ft bgs on the General Iron parcel and 14 ft bgs on the Finkl parcel.

Barr encountered groundwater at 5 to 7 ft bgs in the piezometers installed during the 2000 SI activities conducted on the Marcey West portion of the Marcey parcel, and Burns & McDonnell encountered groundwater at 5 to 7 ft bgs on the Peoples Gas parcel during 2003 SI activities. Depth to groundwater on the General Iron parcel during 2002 and 2004 SI activities ranged from 2 to 16 ft. Based on groundwater elevations and water levels of the River, it is likely that groundwater on the Willow/Hawthorne OU flows in the general direction of the River and some groundwater interfaces with surface water in the River.

2.4 Summary of Findings

MGP source material was identified in several locations at the Willow/Hawthorne OU:

- Peoples Gas parcel – Soil containing xylene at a concentration above the saturation limit was present in the eastern portion of the parcel south of the former 5,000,000-ft^3 gas holder.
- Marcey West portion of the Marcey parcel– Soil containing TPH concentrations above the soil attenuation capacity was identified in a test pit excavated west of the former 2,500,000-ft^3 gas holder.

- General Iron parcel – Soil containing visible MGP tar and/or containing TPH above the soil attenuation capacity was identified at multiple locations within the MGP production area (near the former tar wells and gas holders) and west of the former production area.
- Finkl parcel – Soil containing PCBs and total organic compounds at concentrations greater than criteria set forth in TACO that define contaminant source was identified at four locations.

Soil throughout the Willow/Hawthorne OU contained BTEX, PAHs, other SVOCs, metals (predominantly arsenic, lead and chromium with limited exceedances of copper, iron, manganese and thallium), PCBs and cyanide above TACO Tier 1 levels. Groundwater samples collected from Marcey West portion of the Marcey parcel and the General Iron parcel contained PAHs, benzene, cyanide, metals (copper, lead and thallium) and sulfate above TACO Tier 1 screening levels.

To address the presence of MGP source material and TACO exceedances, remedial actions were conducted at Marcey West portion of the Marcey parcel and the General Iron, Finkl and Peoples Gas parcels, as described in Section 4.

3 SEDIMENT INVESTIGATION AND RESULTS

3.1 Investigation Chronology

Burns & McDonnell conducted a River Investigation in the ARA during June 2006.

The following tasks were performed as part of the investigation:

- ARA laser-induced fluorescence (LIF) investigation;
- ARA sediment and underlying bed investigation; and,
- Surveying.

Twelve east-west transects across the River were established in the ARA. The northernmost (upstream) transect was approximately located at the northern Finkl parcel property boundary. The southernmost (downstream) transect was located at the approximate southern boundary of the Willow/Hawthorne OU. Parallel transects were located at approximately 50-ft intervals between the northernmost and southernmost transects.

3.1.1 Laser-Induced Fluorescence Investigation

A barge with a track mounted direct-push drill rig was mobilized with the Tar-specific Green Optical Screening Tool (TarGOST®) sensor. TarGOST is a LIF screening tool that is designed to detect nonaqueous phase liquid (NAPL), and more specifically, MGP tar. A TarGOST® sensor was installed on a rod and pushed directly into the sediment or river bottom. Fiber optic lines connected the TarGOST® sensor with a computer for evaluation of laser detections. The TarGOST® sensor sent a laser beam into the sediment/river bottom and collected measurements on the laser returning back to the sensor. If tar was present, the returning laser light was altered, which the TarGOST® computer system recorded.

TarGOST® probing occurred along pre-determined intervals on the established transects although these locations were modified when field conditions warranted. Predetermined TarGOST® probing locations commenced approximately 10 ft from the shore and continued every subsequent 25 ft along the transect.

A minimum of three TarGOST® probes were advanced on each transect. Probe locations are presented in Figure 4.

Probes were typically advanced to a minimum depth of 4 ft into the underlying bed or until significant resistance or refusal occurred. When refusal was apparent, the probe was offset approximately 5 ft from the original location and advanced again. A total of 45 TarGOST® probes were advanced in the ARA. The TarGOST® operators (Dakota Technologies, Inc.) provided a copy of the TarGOST® log upon completion of each probe. Copies of the TarGOST® logs are included in Appendix C9.

3.1.2 Sediment and Underlying Bed Investigation

Burns & McDonnell investigated the ARA sediment and underlying bed material by advancing borings into the sediment using a barge with a track-mounted drilling rig. A drill rig with 8.25-inch outer diameter hollow-stem auger and 2- and 3-inch outer diameter, 2-ft long split spoon sampler was used to collect samples of the sediment and the ARA bed underneath the sediment. Sediment borings were advanced into the ARA bed at the approximate locations of previous TarGOST® probes to facilitate collection of samples for forensic evaluations and evaluation against TarGOST® probing results. Not all TarGOST® locations were followed up by advancing borings. River boring locations are presented on Figure 5.

Recovered samples were logged and information was recorded on boring logs by a Burns & McDonnell geologist. Samples were described in accordance with the 2006 American Society for Testing and Materials International (ASTM) Method D 2487 (ASTM D 2487-06). Drill logs are presented in Appendix C9.

ARA samples were screened for total volatiles with a photoionization detector (PID) and visually inspected for tar, tarry residue, odor, sheen and/or staining. Fifteen samples were collected from the borings and sent to META Environmental Laboratories (META) for forensic evaluations. The META laboratory analytical reports are included in Appendix C10.

3.1.3 Surveying

Global positioning system (GPS) equipment was used to establish sample locations before probes or borings were advanced. In the few instances where GPS measurements were unavailable, a laser level was used to determine probe and/or boring locations by cross-bearings. The water elevations were monitored during investigation activities to reconcile the depth to sediment. A bathymetric survey was conducted to determine depth contours for the top of the sediment adjacent to the Willow/Hawthorne OU.

3.2 Investigation Results

Tar material was visually identified on one auger stem advanced into the river (RSB019C); however, no tar was observed in the split spoon sampler used to collect the samples. Tar-like odor was observed in numerous borings, and forensic analysis indicated the presence of constituents found in weathered petroleum and MGP tar. Because of the historic use of the River, the TarGOST® system was sometimes confounded by other PAH sources. In addition, the River sediments adjacent to the property may have been disturbed previously by dredging and barge traffic.

4 REMEDIAL ACTION ACTIVITIES

4.1 Overview

Remedial actions were undertaken at Marcey West portion of the Marcey parcel and the General Iron, Finkl and Peoples Gas parcels. No known remediation was conducted on either the ComEd parcel or the remainder of the Marcey parcel. Remedial actions were conducted based on remediation objectives (ROs) and remedial action plans (RAPs) developed for the Illinois EPA SRP. Copies of these documents were not included in Appendix C unless data was included in the document. As such, the SSI/Remediation Objectives Report/Remedial Action Plan (ROR/RAP) for the General Iron parcel is included but the other ROR/RAPs were not included.

4.2 Remedial Action Objectives

ROs were developed and evaluated on a parcel-by-parcel basis. Based on the SI findings at each parcel and conditions encountered during the SIs, the following ROs were established. The Marcey West portion of the Marcey parcel was never enrolled in the SRP, but it was remediated in anticipation of the sale of the land by Peoples Gas to Marcey in 2004.

4.2.1 Marcey West Portion of the Marcel Parcel

The ROs for Marcey West portion of the Marcey parcel included:

- Remove MGP source material which was defined as soil containing TPH in concentrations that exceeded the soil attenuation capacity; and
- Prevent ingestion of soil that exceeded TACO Tier 1 ROs by removing the upper 3 ft of soil and replacing it with imported unimpacted soil to serve as an engineered barrier.

4.2.2 General Iron Parcel

The ROs for the General Iron parcel included:

- Remove MGP source material by removing soil that contained tar or TPH in concentrations exceeding the soil attenuation capacity;
- Prevent exposure to soil that exceeded TACO Tier 1 screening levels for residential and construction receptors by removing the soil; and
- Prevent exposure to groundwater by relying on the City of Chicago ordinance preventing the installation of potable wells.

4.2.3 Finkl Parcel

The ROs for the Finkl parcel included:

- Remove soil impacted by PCBs at concentrations above the TACO-defined criterion of 50 mg/kg or by TPH at concentrations exceeding the soil attenuation capacity;
- Prevent exposure to soil that exceeded TACO Tier 1 screening levels for residential and construction receptors by removing the soil; and
- Prevent exposure to groundwater by relying on the City of Chicago ordinance preventing the installation of potable wells.

4.2.4 Peoples Gas Parcel

The ROs for the Peoples Gas parcel included:

- Remediate soil containing xylene at a concentration greater than the soil saturation limit by using soil vapor extraction (SVE) system to reduce the concentrations to below the saturation limit;
- Prevent ingestion of soil that exceeded TACO Tier 1 ROs by removing the upper 3 ft of soil and replacing it with imported unimpacted soil to serve as an engineered barrier.
- Prevent industrial/commercial worker exposure to constituents exceeding TACO Tier 1 inhalation screening levels using an impervious vapor barrier; and
- Remove soil containing cyanide at concentrations exceeding TACO tier 1 screening level for soil migration to groundwater.

4.3 Remedial Actions

Remedial action activities were conducted as described in the following subsections. Remedial Action Completion Reports (RACRs) presenting detailed descriptions of the activities conducted for each of the properties, including the results of soil confirmation samples are included on CDs in Appendix C.

4.3.1 Marcey West Portion of the Marcey Parcel

Between April and July 2003, approximately 800 tons of impacted soil was excavated from the area and transported to the Waste Management, Inc. (WMI) CID facility for disposal as non-hazardous special waste. Figure 6 shows the excavation limits and depths. The majority of the strip of land was excavated to 3 ft bgs; however, the southernmost portion was excavated up to 12 ft bgs. Subsequent to excavation activities, confirmation soil samples were collected to evaluate for the presence of residual impacts and the excavated areas were backfilled with unimpacted imported aggregate or inert flowable fill. The corner of a suspected former holder was encountered along the eastern portion of the strip of land that is believed to extend underneath the Sam's store on the Marcey parcel. Confirmation soil sampling locations are presented on Figure 7.

4.3.2 General Iron Parcel

From December 2004 through April 2006, over 117,000 tons of impacted soil were excavated from the General Iron parcel and disposed as non-hazardous special waste at the WMI CID facility. Figure 6 presents the excavation limits and depths. All historical MGP structures (e.g., concrete foundations, piping, etc.) were removed during the remediation activities. To accomplish excavation to depths up to 20 ft bgs along the River, an anchor wall was first installed to brace the existing seawall. Subsequent to excavation activities, confirmation soil samples were collected to demonstrate that ROs were achieved and the excavated areas were backfilled with unimpacted imported aggregate. Confirmation soil sampling locations are presented on Figure 7.

4.3.3 Finkl Parcel

Approximately 14,400 tons of impacted soil were excavated from the Finkl parcel and disposed as non-hazardous special waste at the WMI CID facility. In addition, approximately 80 tons of PCB-impacted soil was excavated and disposed at The Environmental Quality Company Wayne Disposal, Inc. facility in Belleville, Michigan. Figure 6 indicates the excavation limits and depths. Impacts to soil were observed at the northern boundary of the parcel that are believed to be associated with a former bulk terminal that was located directly north of the parcel. A slurry wall was installed along the northern boundary of the parcel to prevent future migration of impacts from that property onto the Finkl parcel.

Concurrent to soil removal activities, a historical surface water intake in the northwest corner of the parcel was abandoned by capping the intake pipes at the River seawall and filling the wet well with flowable fill. Subsequent to excavation activities, confirmation soil samples were collected to demonstrate that ROs were achieved and the excavated areas were backfilled with unimpacted imported aggregate. Confirmation soil sampling locations are presented on Figure 7.

4.3.4 Peoples Gas Parcel

Remedial action at the Peoples Gas parcel was conducted in two phases. During the initial phase, which occurred from April to September 2003, the upper 3 ft of soil was removed and replaced. Limited areas were excavated deeper; up to 8 ft bgs (as shown on Figure 6), to remove soil impacted with lead and cyanide. Approximately 3,200 tons of soil were excavated and transported to the WMI CID facility for disposal as non-hazardous special waste. Confirmation soil samples were collected from the deeper excavation areas. Confirmation soil sampling locations are presented on Figure 7. To address impacted material in and/or around the former 5,000,000-ft^3 gas holder immediately north of the Peoples Gas parcel on, a 40-mil high density polyethylene (HDPE) liner was placed over the segment of the former gas holder extending onto the People Gas parcel immediately before placement of backfill material. The remainder of the holder is believed to lie under the ComEd parcel. Excavated areas were backfilled with unimpacted imported aggregate.

During the second phase of remediation activities at the Peoples Gas parcel, a SVE system was installed and operated to abate VOC impacts on the east portion of the parcel, south of the former 5,000,000-ft^3 gas holder. Three extraction wells and piping were installed during September 2003 and routed to a trailer housing the extraction and vapor treatment systems. The SVE system was operated through October 2004. Confirmation soil samples were collected from soil probes to evaluate for the presence of residual impacts within the SVE system treatment area. Confirmation soil sampling probe locations are presented on Figure 7.

4.4 Soil Quality Remaining

Soil samples were collected during SI and SSI activities, and confirmation soil samples were collected as part of the remedial action activities. Figure 7 presents the locations of all soil samples remaining after remedial action activities were completed.

4.4.1 Marcey West Portion of Marcey Parcel

Table 1 presents the analytical results for all soil samples remaining on the Marcey West portion of the Marcey parcel. Impacted soil remains in some areas although either an asphalt or concrete engineered barrier is present in areas where residual impacts remain.

4.4.2 General Iron Parcel

Table 2 presents the analytical results for all soil samples remaining on the General Iron parcel subsequent to the remediation. All impacted soil has been removed and replaced by imported unimpacted backfill material.

4.4.3 Finkl Parcel

Table 3 presents the analytical results for all soil samples remaining on the General Iron parcel subsequent to the remediation. The majority of the impacted soil was removed and replaced by imported unimpacted backfill material. Impacts from the property north of the Finkl parcel were blocked by the installation of a slurry wall installed during the remediation.

4.4.4 Peoples Gas Parcel

Table 4 presents the analytical results for all soil samples remaining on the Peoples Gas parcel subsequent to the soil excavation and operation of the SVE system.. Residual impacts remain, but are covered with either 3 feet of imported unimpacted backfill material or are covered by the HDPE liner in addition to the backfill.

4.4.5 ComEd and Marcey Parcels

No information about soil quality is available for either the ComEd parcel or the majority of the Marcey parcel. However, asphalt, concrete and buildings cover the majority of the surface area of the Marcey parcel and access to the ComEd parcel is restricted.

4.5 Groundwater Quality Remaining

As discussed in detail, significant volumes of impacted soil were removed from several parcels and excavation depths exceeded 20 feet bgs in some areas. Groundwater samples were collected during SI and SSI activities, but no information about post-remediation groundwater is available. Groundwater quality should be greatly improved.

Pursuant to TACO, groundwater ingestion is prevented by the City of Chicago ordinance prohibiting installation of potable wells. Furthermore, SI groundwater from the General Iron parcel was modeled to estimate the quality of groundwater at the surface water interface. The predicted concentrations were well below the applicable surface water quality standards. Finally, the improved groundwater quality should not cause indoor air issues, although groundwater has not been investigated on the Marcey parcel or the ComEd parcel and there could be a continuing source of impact in the subsurface on these parcels.

4.6 Summary

Existing soil data for the Marcey West portion of the Marcey parcel, General Iron, Finkl and Peoples Gas parcels is sufficient to delineate the nature and extent of impacts remaining after remediation activities were completed. The remediation components have accomplished their objectives and any residuals that may be present are overlain with either impervious pavement or HDPE liners, or a minimum of 3 feet of unimpacted imported backfill material. No residual impacts remain on a large portion of the Willow/Hawthorne OU.

No groundwater data exists that represents the post-remediation conditions. The quality of groundwater should be improved as a result of contaminant source removal, but the degree of improvement is not known. In the interim, however, the City of Chicago ordinance is in place that prevents ingestion of groundwater.

No remediation activities are known to have been conducted for the majority of the Marcey parcel or the ComEd parcel. Furthermore, no remediation has occurred in the ARA.

5 IDENTIFIED PATHWAYS AND CONCLUSIONS

5.1 Exposure Pathway Analysis

Remediation to address the following exposure pathways has been conducted on Marcey West portion of the Marcey parcel, and the General Iron, Finkl and Peoples Gas parcels:

- Surface Soil;
- Subsurface Soil; and
- Groundwater.

The following exposure pathways have not been addressed by remediation, but warrant discussion.

- Sediment; and
- Soil Gas.

5.1.1 Surface Soil

Surface soil, located from the ground surface to 3 ft bgs, was removed from the Marcey West portion of the Marcey parcel and the General Iron, Finkl and Peoples Gas parcels during remediation activities. All surface soil has been replaced with unimpacted imported material or has been covered with asphalt, concrete or HDPE. As such, maintenance of the engineered barriers prevents human exposure to soil underneath the barriers.

Surface soil on the eastern portion of the Marcey parcel and the ComEd parcel has not been evaluated for potential impacts. Although the eastern portion of the Marcey parcel is predominantly covered with structures and asphalt pavement that may serve as an engineered barrier and structures are present on the ComEd parcel that limit access or exposure to soil in areas, additional evaluation of potential impacts and exposure pathways is required.

5.1.2 Subsurface Soil

Source material on the Marcey West portion of the Marcey parcel and the General Iron, Finkl and Peoples Gas parcels has been addressed by either removal or treatment. Also, much of the subsurface soil on these parcels has been removed. The nature and extent of impacts in remaining subsurface soil on these parcels has been adequately characterized in previous investigations for the purposes of evaluations including the potential for vapor intrusion and subsequent inhalation of indoor air.

Subsurface soil on the eastern portion of the Marcey parcel and the ComEd parcel has not been investigated or evaluated for potential impacts. As stated previously, the eastern portion of the Marcey parcel is predominantly covered with structures and asphalt pavement. Additional evaluation of potential impacts and exposure pathways is required.

5.1.3 Groundwater

Groundwater was eliminated as an exposure pathway because the SRP allowed the pathway to be excluded from consideration where a groundwater ordinance prohibits the installation of new wells; such an ordinance is in place in the City of Chicago. No post-remediation data exists for the Willow/Hawthorne OU to evaluate the current water quality as it relates to potential vapor intrusion or the groundwater to surface water interface at the River. However, pre-remediation groundwater from the General Iron parcel did not result in exceedences of surface water quality standards. Furthermore, if tar is present in the holder underneath the Marcey parcel, the inert impervious flowable fill that was placed in the adjacent West Marcey portion of the parcel will prevent potential migration from the area toward the River. Nonetheless, groundwater requires further evaluation.

5.1.4 Sediment

Sediment quality in the River has not been fully investigated. The River investigation identified potential residual MGP impacts in limited areas. Further evaluation is needed to establish the nature and extent of impacts in River and evaluate the findings.

5.1.5 Soil Gas

No soil gas samples have been collected from any of the parcels. Although tar associated with the former MGP process area has been removed, confirmation of the removal in the form of soil gas testing or post-remediation soil and groundwater evaluations have not been conducted. The structures on the eastern portion of the Marcey parcel and the ComEd parcel have not been evaluated for vapor intrusion. Additional evaluation of the vapor intrusion exposure pathway is required.

5.2 Data Gaps

As described in this CR, a significant amount of investigation and remediation has been conducted on most of the Willow/Hawthorne OU and the ARA; however, additional investigation and evaluation should include the following:

- The nature and extent of impacts in soil, groundwater and possibly soil gas on the ComEd parcel and the eastern portion of the Marcey parcel, as well as the possibility of impacts downgradient (west) of these properties has not been investigated.
- The nature and extent of impacts associated with the former bulk oil terminal and solvent handling facility immediately north of the Finkl parcel has not been defined. Limited areas of impacts were observed along the excavation wall at the north Finkl parcel property line. The potential for migration of impacts onto the Finkl parcel was prevented by the slurry wall that was installed during the remediation.
- No groundwater sampling activities have been conducted on the Willow/Hawthorne OU subsequent to the remedial action activities. The effect of groundwater on vapor intrusion and surface water quality is unknown.
- The nature and extent of MGP-related impacts within the River is not well-defined. Also, an assessment of ambient conditions within the River have not been established.

6 REFERENCES

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