

Off-Site Investigation Work Plan Former Manufactured Gas Plant Champaign, Illinois

Prepared for:

AMERENIP

St. Louis, Missouri



Columbia, Illinois

**Off-Site Investigation Work Plan
Former Manufactured Gas Plant
Champaign, Illinois**

February 14, 2008

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Between 1890 and 1907, approximate annual production grew from 6,000,000 cubic feet (c.f.) per year to approximately 30,000,000 c.f. per year. The 1907 Brown's Directory indicates that gas production was a combination of coal gas and oil gas, which continued through 1911. However, the 1902 Sanborn Map suggests that both coal gas and water gas processes were in operation by 1902. During the period 1907 to 1911, gas production increased from 30,000,000 c.f. per year to approximately 50,000,000 c.f. per year.

In the 1910 Brown's Directory, the gas holder capacity was identified as 120,000 c.f. This holder capacity is consistent with the approximate combined capacity of gas holders GH-1 and GH-2. The original construction date for these two gas holders is unknown; however, GH-1 was constructed prior to 1869 and Sanborn Maps for 1897 and 1902 indicate that gas holder GH-2 was constructed sometime during that five year period. The 1902 Sanborn Map indicates the capacity of GH-1 was 23,000 c.f. and the capacity of GH-2 was 49,000 c.f.

The 1909-1911 time frame was a period of change and expansion at the facility. A 1910 site layout drawing illustrates the plant facilities, which included both retorts and water gas sets, indicating another change in the gas making processes. This 1910 drawing also shows three tar wells, two oil storage tanks, and an ammonia storage tank. There are two gas holders shown (consistent with GH-1 and GH-2) plus a note that a third, two-lift 340,000 c.f., gas holder was located to the south across Hill Street (GH-3). The 1909 Sanborn Map indicates that a second lift had been added to holder GH-2, increasing the capacity to 100,699 c.f. The 1911 Brown's Directory indicates that gas holder capacity for the plant was 500,000 c.f., confirming the note on the 1910 drawing. The 1912 Brown's Directory also confirms the installation of water gas equipment during this time period. The 1902 and 1909 Sanborn Maps also confirm the presence of water gas equipment.

Brown's Directories between 1912 and 1918 indicate little change occurred at the plant other than a steady increase in production from approximately 50,000,000 c.f. to approximately 130,800,000 c.f. In 1915, the gas produced was approximately 60% water gas and 40% coal gas. The 1915 Sanborn Map shows the facility layout approximately the same as the 1910 site map and identifies gas holder capacities as follows: GH-1 at 25,440 c.f., GH-2 at 100,700 c.f., and GH-3 at 150,000 c.f. The gas holder capacity for GH-3 conflicts with other site data and is believed to be an error by the Sanborn recorder.

Brown's Directories from 1919 through 1921 indicate total gas holder capacity was 500,000 c.f. In 1922, total capacity had decreased to 440,000 c.f. and by 1923 the capacity had increased to 600,000 c.f. These changes are consistent with: 1) the removal of GH-1 from service as a gas holder and eventual conversion to a tar well/separator; and 2) the addition of a third lift to holder GH-3, increasing capacity

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from 340,000 c.f. to 500,000 c.f. A November 2, 1922 site drawing and the 1922 Brown's Directory confirm these changes as well as the termination of coal gas operations and complete conversion of the facility to water gas production. In addition, this 1922 site drawing shows the relocation of purifiers from inside the building north of Hill Street to a location south of Hill Street and west of the largest gas holder (GH-3). The drawing also shows pipe sizes and location of inlets and outlets for holders GH-2 and GH-3 and distribution lines from the site. There are also seven oil tanks shown along the southwestern edge of the site. An AmerenIP file drawing indicates that conversion of GH-1 to a tar well/separator was completed in late 1924.

Brown's Directories from between 1918 and 1927 indicate that gas production increased during that period from approximately 130,800,000 c.f. to approximately 298,500,000 c.f. Site drawings from December 1926 and October 1927 illustrate only minor site changes, but indicate expansion of some process operations. There are only two oil tanks along the southwestern edge of the site and the "Gas Experiment Station of the University of Ill." is shown at the east end of the site north of the Hill St. right-of-way. The 1924 and 1929 Sanborn Maps are generally consistent with both the 1926 and 1927 site maps; however, the Sanborn Maps indicate that gas holder GH-3 had a capacity of 1,500,000 c.f. Although successive Sanborn Maps for 1941, 1949, 1951 and 1959 also indicate a capacity of 1,500,000 c.f., this is an obvious error in the 1926 map that carried throughout since the holder would have to be more than 200 feet tall and have eight or nine lifts for this capacity. Based on both Brown's Directory and IP drawings, gas holder GH-3 had a maximum capacity of approximately 500,000 c.f. and was a three-lift, on-slab above-grade water seal tank.

Brown's Directories for 1933 and 1934 indicate that production of gas on a regular basis was terminated in 1932 or 1933. The 1934 Brown's Directory indicates that natural gas was being purchased from Panhandle Illinois Pipe Line Co. of Kansas City, Mo. Based on the 1941 and 1949 Sanborn Maps, the plant was maintained in standby condition through at least 1949 and a circa 1953 photograph indicates that the plant was still standing. The photograph also shows several high-pressure gas cylinders on the eastern end of the site. These cylinders do not appear on any of the site maps or Sanborn Maps. The 1959 Sanborn Map indicates that all structures north of the Hill St. right-of way had been removed. Based on interviews with AmerenIP employees, demolition of the above ground on-site facilities, with the exception of the booster house, occurred between 1955 and 1960. The site remained vacant and unused from 1960 until the property was sold to American Legion Post 559 in 1979. AmerenIP repurchased the property from the American Legion in 1991 and the site has remained vacant since that time.

Copies of Sanborn Maps and additional information regarding the history of the site are included in the *Comprehensive Site Investigation Report for AmerenIP*

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3 PREVIOUS ACTIVITIES

Information obtained during previous site activities provides the basis for developing this scope of work. A summary of the previous activities is provided below.

3.1 Phase IA/IB Investigation

Warzyn conducted two phases of investigation during 1986. Phase IA consisted of a detailed site inspection and interviews, and Phase IB included soil gas sampling and geophysical exploration. Evidence of buried structures and MGP residuals were observed on the site. Phase IA/IB activities were used to direct Phase IC/ID RECON Investigation activities.

3.2 Phase IC/ID RECON® Investigation

Mathes conducted Phase IC/ID RECON® Investigation activities on-site and off-site in 1990 to evaluate the nature and extent of MGP impact in shallow soils and groundwater. Soil and groundwater samples were collected at 34 locations on-site and 37 locations off-site for headspace analysis using an on-site gas chromatograph (GC). The combined results of the on-site and off-site surveys indicated subsurface impacts from MGP related residuals over much of the site and also off-site primarily to the northeast, north, and west.

3.3 Phase II Site Investigation

Phase II site investigation activities began in November 1990, continued throughout 1991, and were completed in January 1992. Phase II activities, both on-site and off-site included completion of soil borings, installation of piezometers and monitoring wells, excavation of test pits, chemical analysis of soil and groundwater samples, aquifer characteristic tests, and ambient air monitoring. Thirty-four soil samples were collected for analysis from 28 boring locations. A groundwater monitoring program began during the Phase II activities and has been continued to the present. Phase II SI activities also included collection and analysis of five (5) surface soil samples, excavation and sampling of test pits, sampling and analysis of storm sewers, and residential air sampling and analysis.

The results of the Phase II SI confirmed the results of the Phase I assessments; however it did not fully define the degree and extent of MGP impacts. Impacts from MGP constituents were identified both on-site and off-site. Ameren conducted additional investigations at the site beginning in 2004 in order to complete the site

investigation according to current Illinois regulations. The data from the Phase II SI as well as newly collected data were the basis for the December 2007 Comprehensive SIR.

3.4 Supplemental Site Investigation

A Supplemental Site Investigation was completed in March 1997 to further assess extent and impacts of off-site residuals east of the site and to characterize materials within the below grade gas holder (GH-1) with respect to planned source removal. SSI activities included geoprobe soil sampling along the Sixth Street right-of-way, test pit excavations near GH-1 and immediately west of Sixth Street, and sampling of liquids within GH-1. Impacts from MGP residuals were observed at several locations within the vacated Sixth Street right-of-way; however, neither a source nor a pathway for these residuals was identified. No obvious migration pathways were discovered during the SSI activities.

3.5 Interim Remedial Measures

Interim remedial measures were completed at the site between October 1997 and May 1998. The objective was the removal of source material from within grade gas holder (GH-1), tar wells and a tar separator, and an area of purifier waste. Source materials and residuals were treated on-site to render the materials non-hazardous. These impacted materials were subsequently excavated and shipped off-site for treatment at Illinova Resource Recovery's Baldwin Thermal Treatment (BTT) Facility. Approximately 1,500 tons of MGP impacted material were excavated and disposed of at BTT and an additional 100 cubic yards of concrete and rubble were disposed of at a landfill.

3.6 Comprehensive Site Investigation

A Comprehensive Site Investigation was completed during June through August 2004 to define the extent of MGP-related impacts on the AmerenIP property. The principal CSI activities completed during 2004 included excavation and sampling of test pits, logging and sampling of probeholes, and groundwater sampling. Nine test pits were excavated to investigate below grade MGP structures not addressed during the interim remedial measures and to evaluate potential off-site migration pathways to the north and east of the site. Evidence of MGP-related impact was observed in all test pits and six soil samples were collected for chemical analysis. Although heavily impacted material was identified in test pits in the north and east edges of the site, the relatively shallow depths suggested that they were not likely the pathways for off-site migration.

Twenty-seven probeholes were completed to depths ranging from twenty-four to thirty-two feet. Three probeholes were completed within the vacated Sixth Street right-of-way and seven probeholes were completed within the railroad right-of-way. The remaining seventeen probeholes were completed on the AmerenIP owned parcel. Evidence of MGP-related impact was noted at all probehole locations with the exception of two. Observed impacts tended to be both greater and deeper in the northern portion of the site, including the railroad right-of-way north of the site.

Fourteen monitoring wells were also sampled for chemical analysis. Water level measurements, total well depths, and presence of MGP-related impact were recorded. BTEX and PAH constituents were identified above detection limits in five samples. Additional information and analytical results are presented in the *Comprehensive Site Investigation Report for AmerenIP Champaign, Illinois Former Manufactured Gas Plant State ID 0190100008* dated December 2007.

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4 EXISTING CONDITIONS

The following sections provide a brief description of the existing conditions at the site. The existing conditions are categorized by potential areas of impact and by subsurface hydrogeology. Details of findings from the investigations performed at the site are presented in the *Comprehensive Site Investigation Report for AmerenIP Champaign, Illinois Former Manufactured Gas Plant State ID 0190100008* dated December 2007.

4.1 Geological and Hydrological Setting

Champaign County, Illinois is situated within the Bloomington Ridge Plain in the Till Plains section of the Central Lowland Physiographic Province. The landscape is characterized by widely spaced continental glacial moraines with nearly featureless ground moraine plains. The geology beneath Champaign County can be summarized as 100 to 400 feet of Wisconsinan, Illinoian, and Kansan glacial drift deposited on Paleozoic bedrock which dips eastward and southward toward the Illinois Basin.

The major geologic units present at the site, in descending order, are the surficial fill layer, the weathered and unweathered till units of the Wedron Formation, Upper Glasford Formation, and the sand member of the Lower Glasford Formation. Below the Glasford formations are the Upper and Middle Banner formations, beneath which is the bedrock at an estimated depth of 290 feet bgs in the vicinity of the site.

Two groundwater systems are beneath the Champaign site have been monitored for groundwater flow direction and quality. The shallow groundwater system is in the surficial fill layer and uppermost till unit and is currently monitored by 14 wells. Groundwater in the shallow system beneath most of the study area generally flows in a north/northwest direction. In the south and southeast part of the site, groundwater flows to the south and southeast, respectively. Depth to the shallow groundwater system typically ranges from 3 to 10 feet bgs.

The deepest groundwater system monitored at the site is a sand and gravel zone within the Lower Glasford Formation beginning at a depth of about 151 feet bgs to a depth greater than 177 feet bgs. The sand and gravel layers encountered in this zone were much thicker and laterally continuous than the silty sand and sand units encountered in the weathered and unweathered till units. The water levels for the three wells screened in this zone stabilized at depths of approximately 120 feet bgs. The regional gradient is to the west-southwest.

The three deep wells installed in the Lower Glasford Formation during the Phase II site investigation were plugged and abandoned in 1999. During the period between 1992 and 1998 when these wells were being monitored, no impacts were detected in

groundwater. Since there is a downward gradient from the shallow groundwater unit to the deeper aquifer, these wells were plugged to prevent them from acting as a potential conduit from shallow impacted soils to the deeper unit.

4.2 Subsurface Impact

MGP-related impact was identified both on-and off-site during previous site activities; however additional investigation of this area is required to fully delineate the extent of impact.

4.2.1 Northern Property Line

The northern AmerenIP property line extends from Sixth Street just north of vacated Hill Street northeast along the railway to the alley, and continues west along the alley to Fifth Street. No MGP activities occurred north of the railroad tracks; however, impact appears to have migrated to that area. CSI test pit and boring activities focused on locating an environmental pathway from the site MGP operations to the north side of the railroad tracks.

4.2.2 Eastern Property Line and Former Gas Experiment Station

The eastern property line extends from the railway south down the center of Sixth Street to the abandoned alley. MGP-related impact was identified in a monitoring well located in the vacated Sixth Street right-of-way on the current eastern boundary of the AmerenIP property. Historical MGP activities did not occur in this area; however, the "Gas Experiment Station of the University of Illinois" was located near the northeast corner of the AmerenIP property and MGP impact appears to have migrated into the vacated Sixth Street right-of-way. In addition, a sixteen-inch diameter gas main is known to exist within the vacated Sixth Street right-of-way.

4.2.3 Vacated Hill Street Right-Of-Way

Although no actual MGP operating activities occurred in the Hill Street right-of-way, gas mains were located within the right-of-way and piping between various operations was buried under the street. Due to impacts identified during CSI activities in borings and test pits located within the right-of-way, Hill Street is identified as a recognized environmental condition that will be addressed.

4.2.4 Western Property Line

The western property line extends from the corner of Fifth Street and the alley located on the north side of Hill Street south to the corner of Fifth Street and the alley located on the south side of Hill Street. Soil borings collected during CSI activities indicated that the western edge of impact is bounded by two borings west of Fifth Street; however it is possible that that impacts likely extend under Fifth Street considering the close proximity of the borings to the corner of the site.

4.2.5 Southern Property Line

The southern property line extends from Fifth Street along the southern alley to the center of Sixth Street. MGP-related impact along the southern boundary of the site has been identified.

5 SITE INVESTIGATION PLAN

The scope of work for the site investigation activities will include drilling boreholes, the installation of monitoring wells, soil and groundwater sampling along the remediation site boundaries and off-site, and vapor intrusion sampling of residences in which MGP-related impact is determined to be present in the vicinity of a residential structure. Results of soil and groundwater samples from these locations are intended to provide a more clearly defined extent of impact off-site and will be used to supplement data from previous investigation activities completed at the site. Once the environmental impacts at the site are fully delineated, a Remedial Objectives Report (ROR) and a Remedial Action Plan will be developed.

This work plan anticipates that soil borings will be completed at nine locations on-site and 29 locations off-site. Table 5-1 presents boring locations, depths and the general rationale for each location. As data is obtained during the investigation activities, field engineering will be utilized to modify this work to better ensure that a complete delineation of off-site impacts is defined.

5.1 Site Preparation and Mobilization

Prior to performing any off-site activities, AmerenIP and/or its site representatives will obtain access from the appropriate property owners. In addition, AmerenIP will provide each owner and tenant with an explanation of the activities and purpose of the investigation on that tract.

Joint Utility Locating Information for Excavators (J.U.L.I.E.) will be contacted by PSC prior to the start of any intrusive field activities. All underground utilities will be marked by the respective company, both within the boundary of the site and within the off-site areas to be investigated. The PSC site engineer/geologist will stake approximate locations to be investigated. As site work progresses, some of these locations may be modified and additional locations may be included.

Excavation and drilling equipment will be mobilized to the site and a lay-down area will be established for storage of equipment and supplies. The former MGP booster house will be used as both an office and storage facility throughout the investigation activity. A temporary decontamination pad will be constructed at the site for cleaning drilling and sampling equipment. A poly-storage tank will be located adjacent to the decontamination pad for temporary storage of decontamination fluids and waste water. A roll-off box or one cubic yard landfill boxes will also be transported to the site for temporary storage of drill cuttings and other investigation generated solid waste.

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All equipment will be inspected upon arrival at the site and will be decontaminated prior to any on-site use. Augers and sampling equipment will be cleaned with a pressure washer after completion of each borehole prior to moving to the next sample location. Sampling equipment will be rinsed with a clean water rinse after pressure washing.

5.2 On-Site Soil Boring and Sampling

Soil borings will be completed at nine locations on-site during the investigation. Figure 5-1 illustrates the approximate boring locations. In general, soil borings will be advanced to a depth of approximately 30 feet bgs or to a minimum of eight feet below visual/olfactory impact, using a truck-mounted hydraulic hammer probe rig with Macro-Core samplers. The final boring depth at each location will be determined in the field based on observations by the site engineer/geologist. The following criteria will be used to determine final depth:

- Refusal indicating buried structure, contact with impenetrable geologic unit, or limits of the equipment. If refusal is encountered within five feet of the ground surface, the boring location will be shifted a few feet and re-drilled.
- Termination in the unweathered till or sand units after eight feet with no apparent MGP impacts.

All borings will be continuously sampled using appropriate methods. The site engineer/geologist will log each sample and record information in a waterproof field note book. Soil type, recovery, observations relative to odors and impacts will be recorded. Soil samples will be classified in accordance with ASTM Standard D2488-90 (Standard Practice for Description and Identification of soils (Visual-Manual Procedure)). Each sample will be field screened for organic vapor concentrations using a photoionization detector (PID) and the results recorded in the field note book.

In general, a minimum of three soil samples will be collected from each boring for laboratory analyses. A surface soil sample will be collected from the interval from ground surface to three feet bgs at each location. A second sample will be collected from the three to ten foot bgs interval and a third from the interval below ten feet at each boring location. In addition, if MGP impacts are observed, at least one sample from the impacted interval will be collected. The impacted sample will be based on PID reading and odor and visual observations. If the observed most heavily impacted interval is not consistent with the highest PID reading, two samples may be collected, one representing each interval. The goal of this sampling rationale is to define the degree and extent of MGP impacts in both horizontal and vertical directions.

The surface soil samples (i.e. 0 to 3' bgs) will be analyzed for VOCs, SVOCs, cyanide, metals, and organic carbon (F_{oc}) (10%) and pH. Non-impacted subsurface soils will be analyzed for VOCs, SVOCs, cyanide, metals, F_{oc} (10%), and pH. Impacted subsurface soil samples will be analyzed for VOCs, SVOCs, metals, and cyanide. Section 7 of this work plan presents the analytical methods to be used for this investigation and specific chemical constituents to be reported.

5.3 Off-site Soil Boring and Sampling

Soil borings will be completed at a minimum of 29 locations off-site. These locations are shown on Figure 5-1. The primary objective of these borings is to define the lateral and horizontal extent of MGP residuals identified in previous investigation activities. Based on previous observations, these borings will be at least 30 to 45 feet bgs (or to a minimum of eight feet below visual/olfactory impact) and will be drilled using the same methodology as described for the on-site borings in the previous section. Criteria for depth of termination will be the same as for the on-site borings.

Ten borings will be drilled north of the north railroad right-of-way, and eight will be drilled along the Fifth Street right-of-way west of the remediation site. Seven boreholes will be drilled along the south side of the alley to the south, and four will be drilled east of the Sixth Street right-of-way. Additional off-site borings may be added if necessary based on observations of the initial 29 borings. All borings will be logged and sampled following the same criteria described in Section 5.2 for the on-site borings. Should the planned borings identify that the extent has not been defined, the field engineer/geologist will continue the investigation in the appropriate direction. Criteria for soil sample analysis will be the same as for the on-site borings.

5.4 Evaluation of Groundwater Conditions

The groundwater evaluation will consist of evaluating the hydrogeologic conditions at the site and assessing the extent of groundwater impact associated with the former MGP operations. The evaluation of hydrogeologic conditions will include the installation of monitoring wells on-site and off-site, surveying of monitoring wells, and recording of groundwater level measurements. The assessment of the groundwater impact will include the purging of wells and collection of groundwater samples for the applicable constituents of concern.

5.4.1 Monitoring Well Installation

Based on field observations and analytical data from previous investigation activities, one additional monitoring well will be installed on-site, and nine

additional monitoring wells will be installed off-site. The locations of the proposed monitoring wells are illustrated on Figure 5-2. The on-site well will be located within the vacated Hill Street area near the center of the remediation site, screened in the intermediate depth of 35-45 feet to encounter a suspected sand unit beneath the site. Off-site wells will consist of five wells installed to a depth of twenty feet bgs, and four wells installed to a depth of forty-five feet bgs. To prevent possible cross-contamination issues, the deeper wells will be outer-cased to a minimum depth of 30 feet bgs with 10-foot screens. Monitoring well locations, depths, and descriptions are listed on Table 5-2.

Well construction will be two-inch diameter PVC well screens and risers. The well screen slot size will be 0.010 inches. The annular space will be backfilled with sand pack to two feet above the top of the well screen. A minimum of a two-foot seal of bentonite will be placed above the sand pack. The remainder of the annular space will be backfilled with bentonite grout. Each monitoring well will be completed with a flushmount well vault.

5.4.2 Monitoring Well Development, Purging, and Groundwater Sampling

After well installation, each monitoring well will be developed using pump and surge methods to evacuate a minimum of five well volumes of water. Field parameters of pH, conductivity, and temperature will be measured throughout the development process to ensure that groundwater conditions have stabilized. The quantity of water removed, the groundwater conditions, and the beginning and ending groundwater levels will be recorded on field data sheets.

Groundwater sampling activities will be initiated approximately two weeks after well installation and development has been completed. Water level measurements will be obtained from all wells using an electronic water level indicator and recorded in a field log-book. Each of the wells will be purged of a minimum of three well casing volumes of water. During purging, groundwater conditions will be monitored for pH, conductivity, temperature, and dissolved oxygen. Groundwater purging will continue until conditions have stabilized or three well casing volumes have been removed.

Groundwater samples will be collected from each monitoring well for laboratory analysis. Samples will be collected with disposable bailers or by peristaltic pump with disposable tubing, and will be placed directly into glass bottles with appropriate preservatives provided by the laboratory.

Groundwater samples will be analyzed for VOCs, SVOCs, cyanide and total metals. If MGP-related impact is identified, an attempt will be made to sample and characterize the liquid. Section 7 of this work plan presents detail relative to analytical methods to be used for this investigation.

5.4.3 Hydrogeologic Testing and Evaluation

Following the completion of wells, hydrogeologic testing will be performed to characterize the hydrogeologic conditions. The testing will include performing slug-testing on each of the monitoring wells for calculating site hydraulic conductivity. Static groundwater level measurements will be recorded and groundwater elevation contours will be generated to depict the groundwater flow conditions at the site.

Slug testing will consist of the instantaneous introduction or removal of a stainless-steel rod or a slug into and out of each monitoring well. The instantaneous change in water level and the subsequent return of the water level to static conditions is recorded. Groundwater levels will be monitored with an electronic water level indicator and a pressure transducer and data logger. Groundwater levels will be monitored for a minimum of 10 minutes and until groundwater levels have reached 90 percent of static conditions. Groundwater levels will not be monitored beyond 60 minutes. The recorded data will be evaluated using the Geraghty & Miller, Inc. model AQTESOLV™ to calculate a hydraulic conductivity at each well and the site.

5.5 Vapor Intrusion Sampling

An evaluation for the potential of vapor intrusion will be conducted on off-site properties within 100-feet of MGP-defined impact in either soil or groundwater media. The evaluation will consist of an initial property screening to evaluate for inhalation risk. Additional activities may be conducted based on the results of the screening.

5.5.1 Buildings Parameters

For each of the buildings within or adjacent to a potentially MGP- impacted area, sufficient information will be collected to complete Form 1 (Appendix A) for property screening purposes. Should access to the building not be available, the form will be completed based on the best available information and observation of the buildings.

5.5.2 Soil Geotechnical Parameters

The following soil geotechnical parameters will be collected using the following methods:

- Porosity – ASTM Method D854
- Moisture Content – ASTM Method D2216

A minimum of one soil sample will be collected from each of the following borings for geotechnical parameters: B-803, B-807, B-810, B-813, B-820, B-825, B-830 and B-834. The number of samples collected per boring will depend on the heterogeneity of the vertical strata with a minimum of one sample per boring from about 5- to 10-foot bgs. All samples will be collected above the capillary fringe. Water content of each sample will be reported for potential future use calculations.

5.5.3 Evaluation of data for Vapor Intrusion

Available data at the site will be used to estimate the potential risks due to VIP. The estimate will be calculated using the following site specific data:

- Representative groundwater concentrations,
- Soil moisture and porosity characteristics,
- Building characteristics, and
- Depth to groundwater.

If the above data indicate that there is a potential concern with respect to vapor intrusion, additional data will be collected such as the collection of soil vapor samples.

6 CHAIN OF CUSTODY PROCEDURES

The site engineer/geologist is responsible for the care and security of soil and groundwater samples from the point of collection until they are transferred to the shipper or the laboratory. A sample is considered to be in custody if the sample is in the physical possession of the sampler or other designated person, or stored in a locked place.

An original chain-of-custody (COC) form will be filled out at the time of sampling. All information in the upper part of the COC must be filled in clearly and legibly. Every sample container must be accounted for on the COC. The signature blocks will be completed at the time of sample transfer.

Copies of the COC forms will be placed in the project file. The original COC form will accompany the samples during transportation to the carrier and upon arrival at the laboratory. A second copy of the COC form will be provided to PSC's laboratory QA/QC officer.

Any person accepting responsibility for the samples will sign and date the form on the date accepted. The courier service (if used), however, will only be designated on the COC form and no signature will be required. Custody seals will be utilized to identify possible tampering during the transportation process.

7 ANALYTICAL PROGRAM AND DATA HANDLING

As identified in Section 5, both soil and water samples will be collected during investigation activities for chemical analysis at an off-site laboratory. During sample collection, soil or water will be placed in laboratory provided containers and labeled according to matrix, sample location, date, and analytical method. Quality control (QC) samples, which will include trip blanks, field (rinsate) blanks, duplicates, and matrix spikes will be collected to assess the quality of the data resulting from the field sampling program.

Samples will be protected from breakage and shipped in coolers. Each cooler will be sealed with custody seals and covered with clear tape, so that any opening of the cooler during shipment will be indicated. Ice will be used to maintain a temperature of 4° C. A shipment method will be selected that will ensure delivery to the laboratory within 24 to 48 hours after collection. All soil and water samples will be shipped or delivered to Teklab, Inc. in Collinsville, Illinois. The laboratory will provide a data quality objective (DQO) level III data package upon completion of analysis.

7.1 Soil Sample Analytical

Soil samples will be collected from on-site and off-site soil borings (Sections 5.2 & 5.3). It is anticipated that in excess of one-hundred soil samples will be sent to the laboratory for analysis. Since analytical data are available from the Phase II investigation and a relatively large number of additional samples will be collected, complete analyses for all parameters will not be necessary as a site-specific constituent of concern (COC) list is presented in the Comprehensive Site Investigation Report. The total number of soil samples includes a minimum of three samples from most boring locations. In addition, at least one QA/QC sample will be collected for every twenty soil samples.

The analytical methods to be used will include the following:

- SW-846 Method 5035/8260B (BTEX)
- SW-846 Method 8270 SIMS (PAHs)
- SW-846 Method 9010 (total and amenable cyanide)
- SW- 846 Methods 6000 & 7000 series (chromium, lead, arsenic)
- SW-846 Method 9045C (pH)
- ASTM – D2974-87 (f_{cc})

Due to BTEX and PAHs being the primary drivers for remedial action at MGP sites, each soil sample will be analyzed for BTEX and PAH constituents. Analysis for cyanide, metals, f_{oc} , and pH will not be performed at all sample locations. Cyanide and metals will be performed on not less than 40% of samples and pH on not less than 10% in a manner to fully represent the overall site conditions. A minimum of six (6) f_{oc} samples will be collected from three interval depths in non-impacted areas to be averaged for site representation purposes. Soil samples analyzed for metals will include; arsenic, chromium, lead, and mercury.

7.2 Groundwater Sample Analytical

Groundwater samples will be collected from fourteen pre-existing monitoring wells and ten new wells. In addition, two duplicate samples will be collected for QA/QC purposes.

The analytical methods will include the following:

- SW-846 Method 8260 (BTEX)
- SW-846 Method 8270 SIMS (PAHs)
- SW-846 Method 9010 (total cyanide)
- SW-846 Methods 6000 & 7000 series (chromium, lead, arsenic)

8 DATA EVALUATION AND REPORT PREPARATION

Upon completion of the field activities and receipt of laboratory analytical results, PSC will perform an evaluation and comparison of results to the ROs outlined in 35 IAC Section 742 (TACO guidance). Analytical results will be compared to the Tier 1 ROs for the soil ingestion exposure pathway, the soil inhalation exposure pathway, the soil component of the groundwater ingestion pathway, and the groundwater ingestion exposure pathway. PSC will prepare a Site Investigation Report for each property parcel as outlined in 35 IAC Section 740.425/435. The report will provide the IEPA clearly defined delineation of the impacted area, which exceeds the Tier 1 ROs. Following IEPA review of the SIR, a Remedial Objectives Report (ROR) will be prepared in accordance with 35 IAC Section 740.445.

Off-Site Investigation Work Plan
Former Manufactured Gas Plant
Champaign, Illinois

Prepared for AmerenIP

Prepared by Philip Environmental Services Corporation
February 14, 2008

List of Tables

| Table Number | Table Name |
|---------------------|---|
| 5-1 | Rationale of Proposed Borehole Locations |
| 5-2 | Rationale of Proposed Monitoring Well Locations |

Table 5-1

RATIONALE OF PROPOSED BOREHOLE LOCATIONS

CHAMPAIGN, MGP
CHAMPAIGN, ILLINOIS

| BORING NUMBER | APPROXIMATE DEPTH (Ft. bgs) | LOCATION | RATIONALE* |
|---------------|-----------------------------|--|---|
| B-800 | 30 | 501 East Washington; along northern boundary of railroad right-of-way | Located between UTB-09 where no impact was identified, and UTB-11 where BTEX/PAH exceed Tier 1 ROs to define extent of off-site MGP impact to northwest; proposed location of monitoring well UMW 118 |
| B-801 | 30 | 503 East Washington; along northern boundary of railroad right-of-way | Determine extent of off-site MGP impact north of remediation site boundaries; shallow groundwater flow is to north/northeast |
| B-802 | 30 | 505 East Washington; north of railroad right-of-way near center of plot | Determine extent of off-site MGP impact north of remediation site boundaries; shallow groundwater flow is to north/northeast |
| B-803 | 45 | 507 East Washington; north of railroad right-of-way near center of plot | Determine extent of off-site MGP impact north of remediation site boundaries; shallow groundwater flow is to north/northeast; proposed location of monitoring well cluster UMW-119/300 |
| B-804 | 30 | 509 East Washington; north of railroad right-of-way near center of plot | Determine extent of off-site MGP impact north of remediation site boundaries |
| B-805 | 30 | 511 East Washington; north of railroad right-of-way | Determine extent of off-site MGP impact north of remediation site boundaries; proposed location of monitoring well UMW-120 |
| B-806 | 30 | Intersection of 509, 511 East Washington, and the alley adjacent to northern railroad right-of-way | Located between UTB-01 where MGP-related impact was identified and UTB-02 where no impact was identified to determine extent of off-site impact to north |
| B-807 | 30 | Northeast of remediation site; along east side of Sixth Street, north of railroad right-of-way | Located northeast of former "Gas Experiment Station"; Determine extent of off-site MGP impact northeast of remediation site boundaries |
| B-808 | 30 | Northeast of remediation site; along northern boundary of railroad right-of-way | Located northeast of former "Gas Experiment Station"; Determine extent of off-site MGP impact northeast of remediation site boundaries |
| B-809 | 30 | East of remediation site along southern boundary of railroad right-of-way | Determine aerial extent and depth of off-site MGP impact east of remediation site boundaries; proposed location of monitoring well UMW-301 |
| B-810 | 45 | East of remediation site between railway and alley | Determine aerial extent and depth of off-site MGP impact east of remediation site boundaries |
| B-811 | 30 | East of remediation site, south of B-810 | Determine extent of off-site MGP impact east of remediation site boundaries |
| B-812 | 30 | East of remediation site; at corner of Sixth Street and alley | Determine extent of off-site MGP impact east of remediation site boundaries |
| B-813 | 30 | In center of Sixth Street, just south of remediation site boundaries | Located south of UTB-04; no previous data was obtained from this area |
| B-814 | 30 | Located within site boundaries in southeast corner | Located south of impacted B-510; to determine extent of impact in southeast corner of site |
| B-815 | 30 | North central portion of property at 512 East Church near the alley | No previous data for this area; to determine if off-site impact is present along southeastern site boundary |
| B-816 | 30 | Located along southern boundary within site boundaries | Located along southern boundary, between impacted boring B-510 and impacted well UMW-114 |

| BORING NUMBER | APPROXIMATE DEPTH (Ft. bgs) | LOCATION | RATIONALE* |
|---------------|-----------------------------|--|---|
| B-817 | 30 | North central portion of property at 510 East Church | Determine extent of off-site MGP impact south of remediation site boundaries |
| B-818 | 30 | Along southern site boundary near center of site | Located south of former gas holder structures and impacted UTB-21 |
| B-819 | 45 | South of remediation site near alley | Determine aerial extent and depth of off-site MGP impact south of remediation site boundaries; proposed location of monitoring well cluster UMW-121/302 |
| B-820 | 30 | South of site in north central portion of property at 506 East Church | Located between impacted B-512 and UTB-05 |
| B-821 | 30 | North central portion of property at 504 East Church | Located south of alley; south of former above ground fuel tanks |
| B-822 | 30 | Southwest boundary of site along fence | Located in area of former above ground fuel tanks, between impacted B-512 and non-impacted B-513 |
| B-823 | 30 | Southwest corner of site | Located near former MGP structures; no previous data from this corner of site |
| B-824 | 30 | Northwest corner of 502 East Church | Determine extent of off-site MGP impact southwest of remediation site boundaries |
| B-825 | 30 | Southwest of site at corner of Fifth Street and alley | Determine extent of off-site MGP impact southwest of remediation site boundaries |
| B-826 | 30 | Along Fifth Street near 411 East Hill | Located north of non-impacted UTB-06 to determine extent of impact west of site |
| B-827 | 30 | Along western site boundary between alley and Hill Street | Located in area of former MGP structures; no previous data was collected in this area |
| B-828 | 30 | Off-site at corner of Fifth Street and Hill Street on property at 411 East Hill | Determine extent of off-site impact to west of site |
| B-829 | 30 | Within vacated Hill Street on western boundary | South of impacted B-501 near former MGP piping structures |
| B-830 | 30 | Corner of Fifth Street and Hill Street on property at 412 East Hill | Located west of impacted B-501; to determine extent of off-site impact to west |
| B-831 | 45 | East central boundary of 412 East Hill | Define extent of off-site impact to west of site; proposed location of monitoring well cluster UMW-117/303 |
| B-832 | 30 | Northeast corner of property at 412 East Hill | Located between non-impacted UTB-08 and impacted UTB 16 |
| B-833 | 30 | In northwest corner of site near fence | Location of former MGP structures; to determine extent of impact in northwest corner of site |
| B-834 | 30 | Located along west side of Fifth Street at southern railroad boundary | Groundwater flow is to north/northwest; to determine extent of off-site impact northwest of site |
| B-835 | 30 | Located along fence east of B-833 | North of tar well removal area; adjacent to impacted B-503; to address IEPA comment |
| B-836 | 30 | Northwest of site near 411 East Washington, south of railway | Determine extent of impact northwest of site |
| B-837 | 30 | Northwest of site, in Washington Street along northern boundary of railroad right-of-way | Determine extent of impact northwest of site |

* General objective of the rationale is to provide complete aerial coverage of the site.

Table 5-2

**RATIONALE OF PROPOSED MONITORING WELL LOCATIONS
CHAMPAIGN FORMER MGP SITE
CHAMPAIGN, ILLINOIS**

| WELL NUMBER | APPROXIMATE DEPTH (Ft. bgs) | LOCATION | RATIONALE* |
|-------------|-----------------------------|---|---|
| UMW-117 | 30 | Formerly UPZ-103, located west of site in Fifth Street | Located in area of shallow groundwater impact identified during previous investigations |
| UMW-118 | 30 | Off-site on property at 501 East Washington; north of railroad right-of-way | Located north of site to encounter shallow groundwater; estimated direction of groundwater flow is north/northwest |
| UMW-119 | 30 | Off-site on property at 507 East Washington; north of railroad right-of-way | Located north of site to encounter shallow groundwater; estimated direction of groundwater flow is north/northwest |
| UMW-120 | 30 | Off-site near center of property at 511 East Washington; north of railroad right-of-way | No wells currently in this plot; to determine extent of groundwater impact north of site |
| UMW-121 | 30 | South of site in northwest portion of property at 508 East Church | Determine extent of groundwater impact south of site |
| UMW-300 | 45 | North of site adjacent to UMW-119 | Determine extent of intermediate groundwater impact north of site |
| UMW-301 | 45 | Off-site east of abandoned well UMW-103 | In area of soil impact; to determine determine extent of intermediate groundwater impact east of site |
| UMW-302 | 45 | South of site adjacent to UMW-121 | Determine extent of intermediate groundwater impact south of site |
| UMW-303 | 45 | West of site adjacent to UMW-117 | Located in an area of shallow groundwater contamination identified during previous investigations; determine extent of intermediate groundwater impact west of site |
| UMW-304 | 45 | On-site, in vacated Hill Street near center of remediation site | Located in area of heaviest impact, adjacent to UMW-105; determine extent of intermediate groundwater impact on-site |

* General objective of the rationale is to provide complete aerial coverage of the site.

List of Figures

| Figure Number | Figure Name |
|----------------------|--|
| 2-1 | Site Location Map |
| 2-2 | Site Map |
| 5-1 | Proposed Boring Locations |
| 5-2 | Proposed Groundwater Monitoring Well Locations |

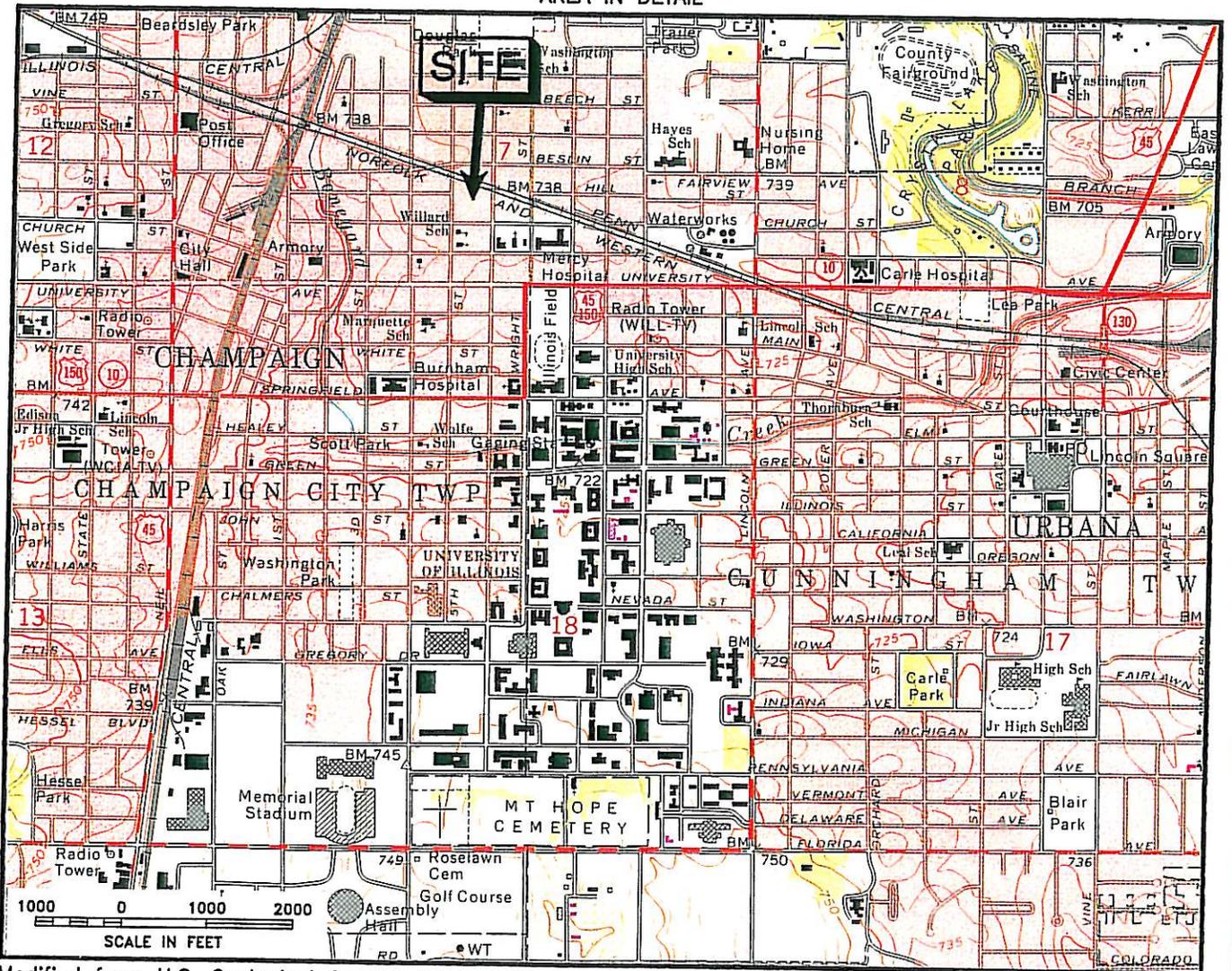
ILLINOIS



CHAMPAIGN COUNTY



AREA IN DETAIL



Modified from U.S. Geological Survey, Urbana, Illinois, quadrangle, Photorevised 1975.

SCALE IS VARIABLE



COL 624 00345E-001



TITLE:

SITE LOCATION MAP

DWN: TMM

DES.: SPB

PROJECT NO.: 62400345

CHKD:

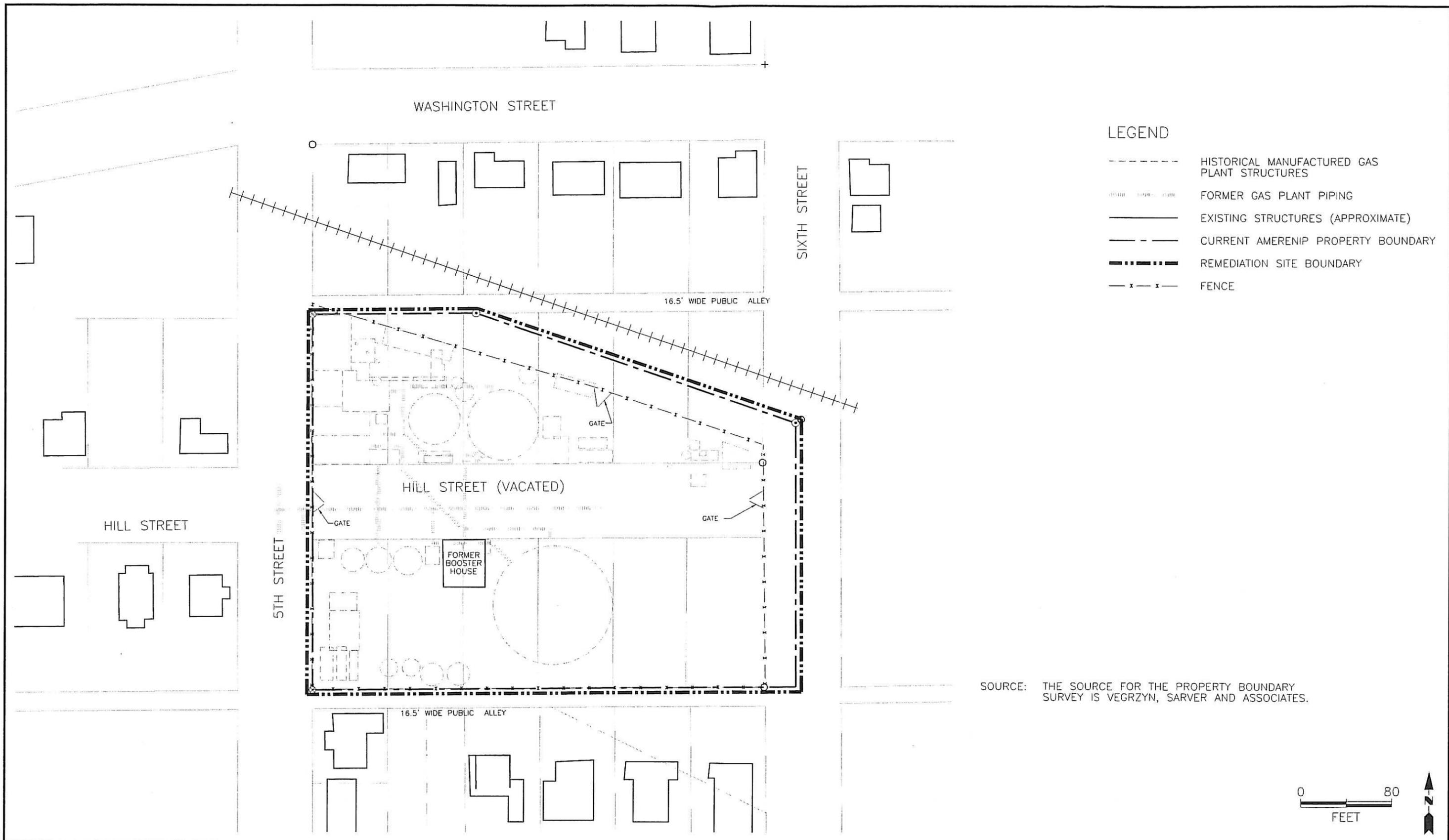
APPD:

AMEREN IP
CHAMPAIGN, ILLINOIS

DATE: 2/24/00

REV.: 0

FIGURE 2-1



SOURCE: THE SOURCE FOR THE PROPERTY BOUNDARY SURVEY IS VEGRZYN, SARVER AND ASSOCIATES.

COL J:\624\02647B-033

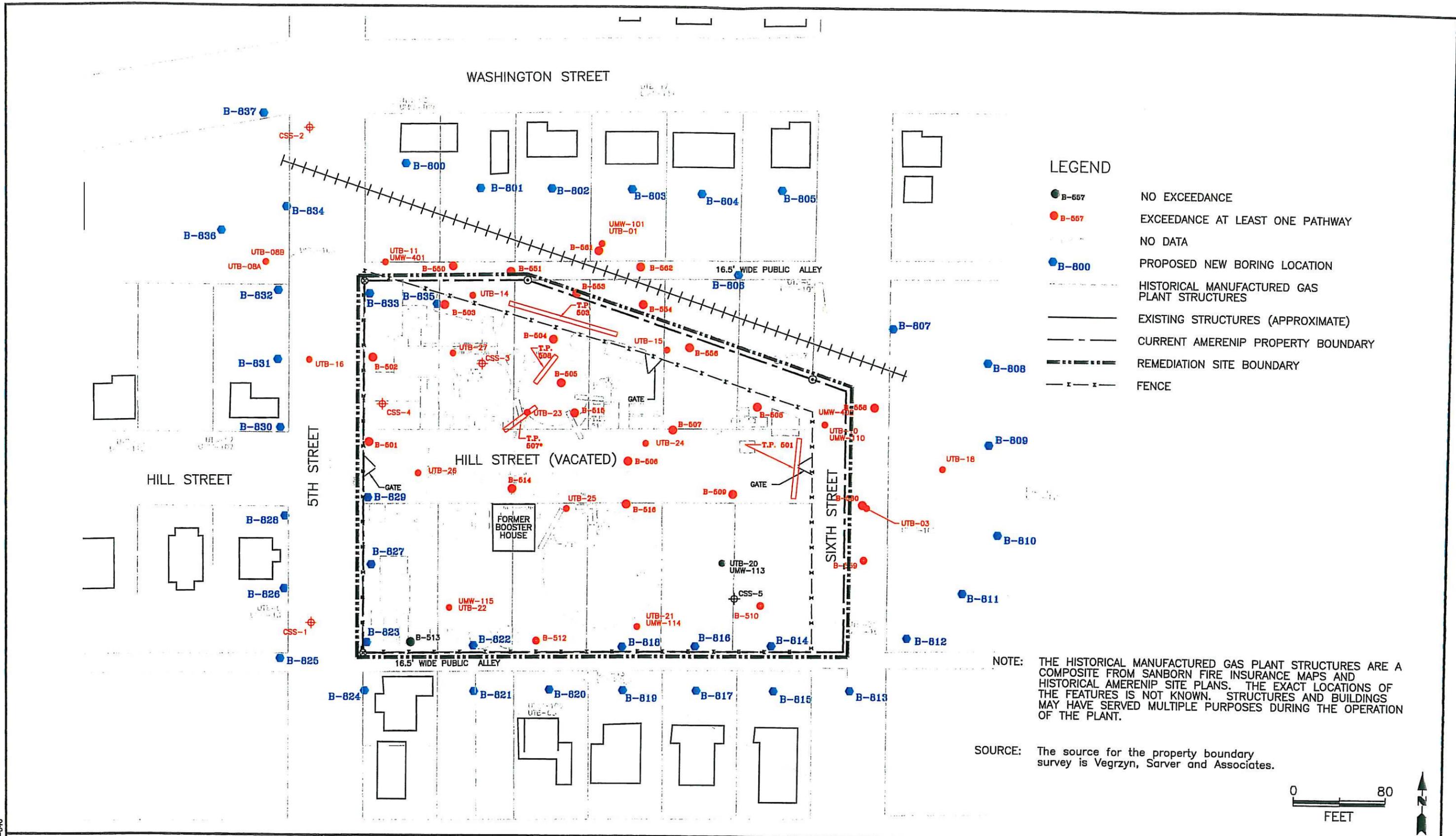


TITLE:
SITE MAP

| | |
|-----------------|-------------|
| DWN: TMM | DES: MRC |
| CHKD: | APPD: |
| DATE: 2/4/08 | REV: |

PROJECT NO. 62402647
AMERENIP
CHAMPAIGN, ILLINOIS

FIGURE 2-2

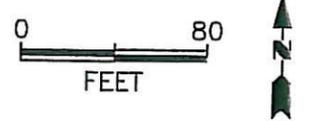


LEGEND

- B-557 NO EXCEEDANCE
- B-557 EXCEEDANCE AT LEAST ONE PATHWAY
- NO DATA
- B-800 PROPOSED NEW BORING LOCATION
- HISTORICAL MANUFACTURED GAS PLANT STRUCTURES
- EXISTING STRUCTURES (APPROXIMATE)
- CURRENT AMERENIP PROPERTY BOUNDARY
- REMEDIATION SITE BOUNDARY
- FENCE

NOTE: THE HISTORICAL MANUFACTURED GAS PLANT STRUCTURES ARE A COMPOSITE FROM SANBORN FIRE INSURANCE MAPS AND HISTORICAL AMERENIP SITE PLANS. THE EXACT LOCATIONS OF THE FEATURES IS NOT KNOWN. STRUCTURES AND BUILDINGS MAY HAVE SERVED MULTIPLE PURPOSES DURING THE OPERATION OF THE PLANT.

SOURCE: The source for the property boundary survey is Vegrzyn, Sarver and Associates.

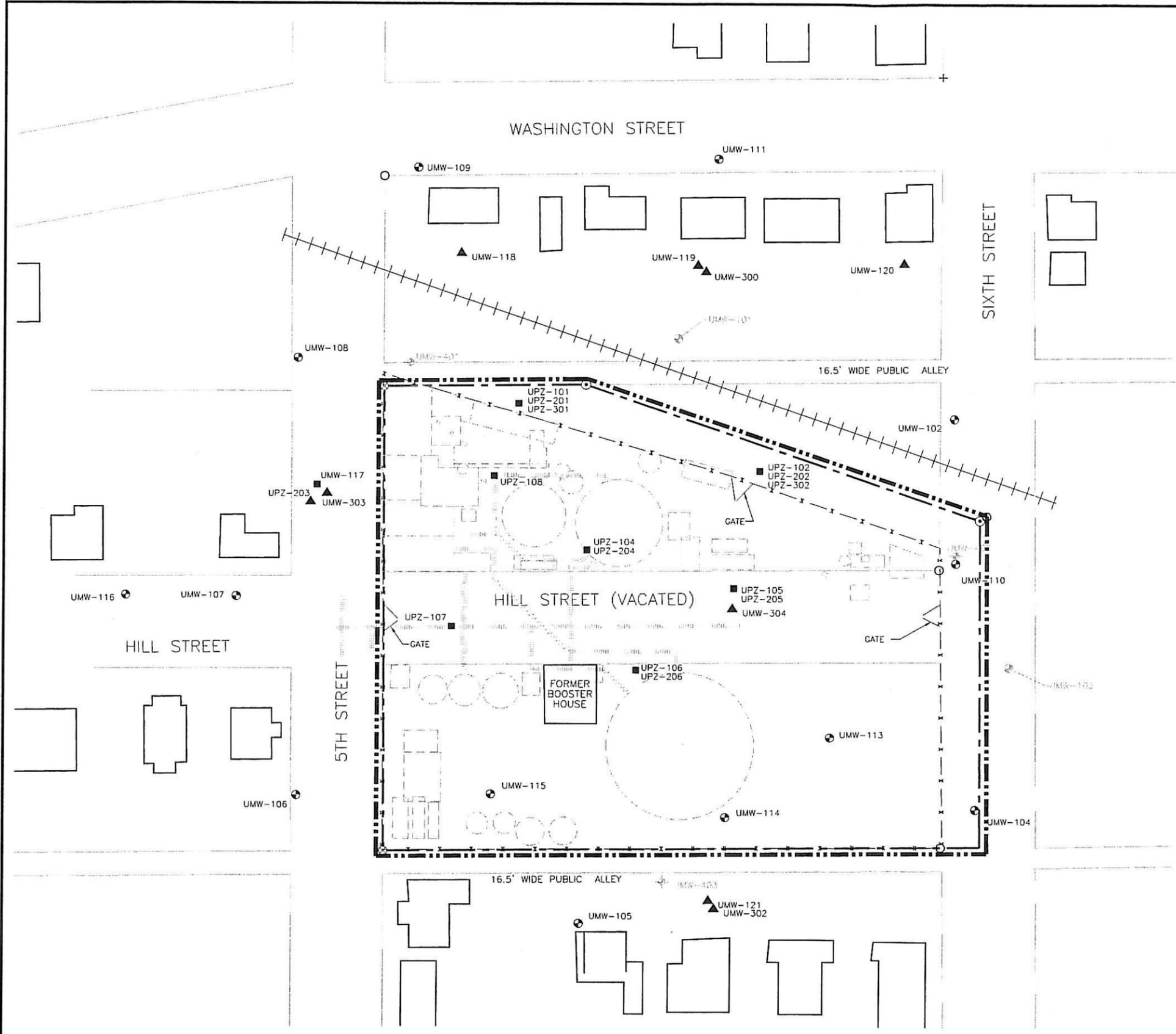


TITLE:
PROPOSED BORING LOCATIONS



| | | |
|-----------------|------------|---|
| DWN: TMM | DES: JG | PROJECT NO: 62402647 AMERENIP CHAMPAIGN, ILLINOIS FIGURE 5-1 |
| CHKD: | APPD: | |
| DATE: 2/4/08 | REV: | |

COL J:\624\02647A-040

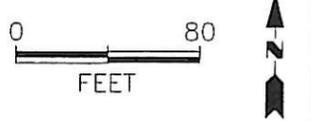


LEGEND

- HISTORICAL MANUFACTURED GAS PLANT STRUCTURES
- FORMER GAS PLANT PIPING
- EXISTING STRUCTURES (APPROXIMATE)
- CURRENT AMERENIP PROPERTY BOUNDARY
- REMEDIATION SITE BOUNDARY
- FENCE
- UPZ-102
■ UPZ-202
■ UPZ-302 NESTED PIEZOMETERS (SHALLOW 5' TO 10', MEDIUM 20' TO 25', AND DEEP 30' TO 35') COMPLETED IN GLACIAL TILL
- ⊕ UMW-113 SHALLOW GROUNDWATER MONITORING WELLS (APPROXIMATELY 20') COMPLETED IN UPPER GLACIAL TILL
- ⊕ UMW-401 DEEP GROUNDWATER MONITORING WELLS (APPROXIMATELY 150') COMPLETED IN GLASFORD FORMATION
- ⊕ UMW-402 WELLS THAT HAVE BEEN ABANDONED
- ▲ UMW-118 PROPOSED NEW WELL LOCATIONS

NOTE: THE HISTORICAL MANUFACTURED GAS PLANT STRUCTURES ARE A COMPOSITE FROM SANBORN FIRE INSURANCE MAPS AND HISTORICAL AMERENIP SITE PLANS. THE EXACT LOCATIONS OF THE FEATURES IS NOT KNOWN. STRUCTURES AND BUILDINGS MAY HAVE SERVED MULTIPLE PURPOSES DURING THE OPERATION OF THE PLANT.

SOURCE: THE SOURCE FOR THE PROPERTY BOUNDARY SURVEY IS VEGRZYN, SARVER AND ASSOCIATES.



COL J:\624\02647B-032



TITLE:
PROPOSED MONITORING WELL LOCATIONS

| | | |
|-----------------|-------------|--|
| DWN: TMM | DES: MRC | PROJECT NO: 62402647 AMERENIP CHAMPAIGN, ILLINOIS |
| CHKD: | APPD: | |
| DATE: 2/4/08 | REV: | FIGURE 5-2 |

APPENDIX A

| Building Characteristics to be Determined Before Finalization of Work Plan | | | | | Form 1 |
|--|--|--|--|--|--------|
| Building Identification | | | | | |
| Ownership | | | | | |
| Age of Building | | | | | |
| Number of Floors (Yes/No) | | | | | |
| Number of Elevators (Yes/No) | | | | | |
| First Floor Footprint Dimensions (L x W in ft) | | | | | |
| Crawl Space Dimensions (L x W x H in ft) | | | | | |
| Basement Footprint Dimensions (L x W in ft) | | | | | |
| Basement Height (ft) | | | | | |
| Basement Height Above Ground Surface (ft) | | | | | |
| First Floor Height (ft) | | | | | |
| Basement Floor Type | | | | | |
| Thickness of Basement Walls (ft) | | | | | |
| Thickness of Slab (ft) | | | | | |
| Condition of Slab | | | | | |
| Vapor Barrier (Yes/No) | | | | | |
| Post-Tension Slab (Yes/No) | | | | | |
| Sump Characteristics | | | | | |
| HVAC Characteristics | | | | | |
| Information on Doors/Windows | | | | | |
| Locations of floor drains, sinks, toilets on lowest floor of building | | | | | |
| As-Built Drawings or Plans Reviewed (Yes/No) | | | | | |
| Exposure Characteristics: | | | | | |
| Building Activities-General | | | | | |
| First Floor Activities | | | | | |
| Basement Activities | | | | | |
| Number of Workers | | | | | |
| Work-week number of days | | | | | |
| Work-day number of hours | | | | | |

Note: Add additional sheets for relevant comments/information; Locate all buildings on a site map.