

ADDENDUM NO.1 TO
REMEDIAL INVESTIGATION REPORT

ARKANSAS CITY, KANSAS

Prepared for
Westar Energy

FINAL

Prepared by



BLACK & VEATCH
Corporation

RECEIVED

OCT 07 2004

BUREAU OF
ENVIRONMENTAL REMEDIATION

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Arkansas City MGP Site

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1.0 Introduction

Additional investigation (AI) activities were performed in June 2004 at the Westar Energy former manufactured gas plant (MGP) site located west of the intersection of South 1st Street and Quincy Avenue in Arkansas City, Kansas. These activities were completed to address regulatory comments by the Kansas Department of Health and Environment (KDHE) on the Remedial Investigation (RI) report (B&V 2003a) prepared following the completion of the RI in July 2003.

This report summarizes the results of the field activities conducted at the site in 2004 and serves as the first addendum to the RI report. The specific objectives of the investigation were as follows:

- Further characterize the elevated levels of polynuclear aromatic hydrocarbons (PAHs) observed in shallow soil samples collected during the RI near the southwest corner of the property near well MW-2.
- Further characterize the alleged surface depression in the area of RI probe SP-7.
- Further delineate the presence of tar and a possible source structure/area in the location of RI probe SP-6.
- Further characterize the extent and magnitude of ground water contamination at the site by collecting ground water samples from the four existing site monitoring wells for chemical analysis.

This addendum report includes a discussion of the field activities (Section 2.0), a summary of the site geology and hydrogeology (Section 3.0), a discussion of the nature and extent of contamination (Section 4.0), a comparison to the applicable state regulatory levels (Section 5.0), summary and conclusions (Section 6.0), and references cited throughout the report (Section 7.0). Detailed descriptions of the physical properties of the site, site history, surrounding property uses, and the results of previous investigations are presented in the RI report.

2.0 Additional Investigation Field Activities

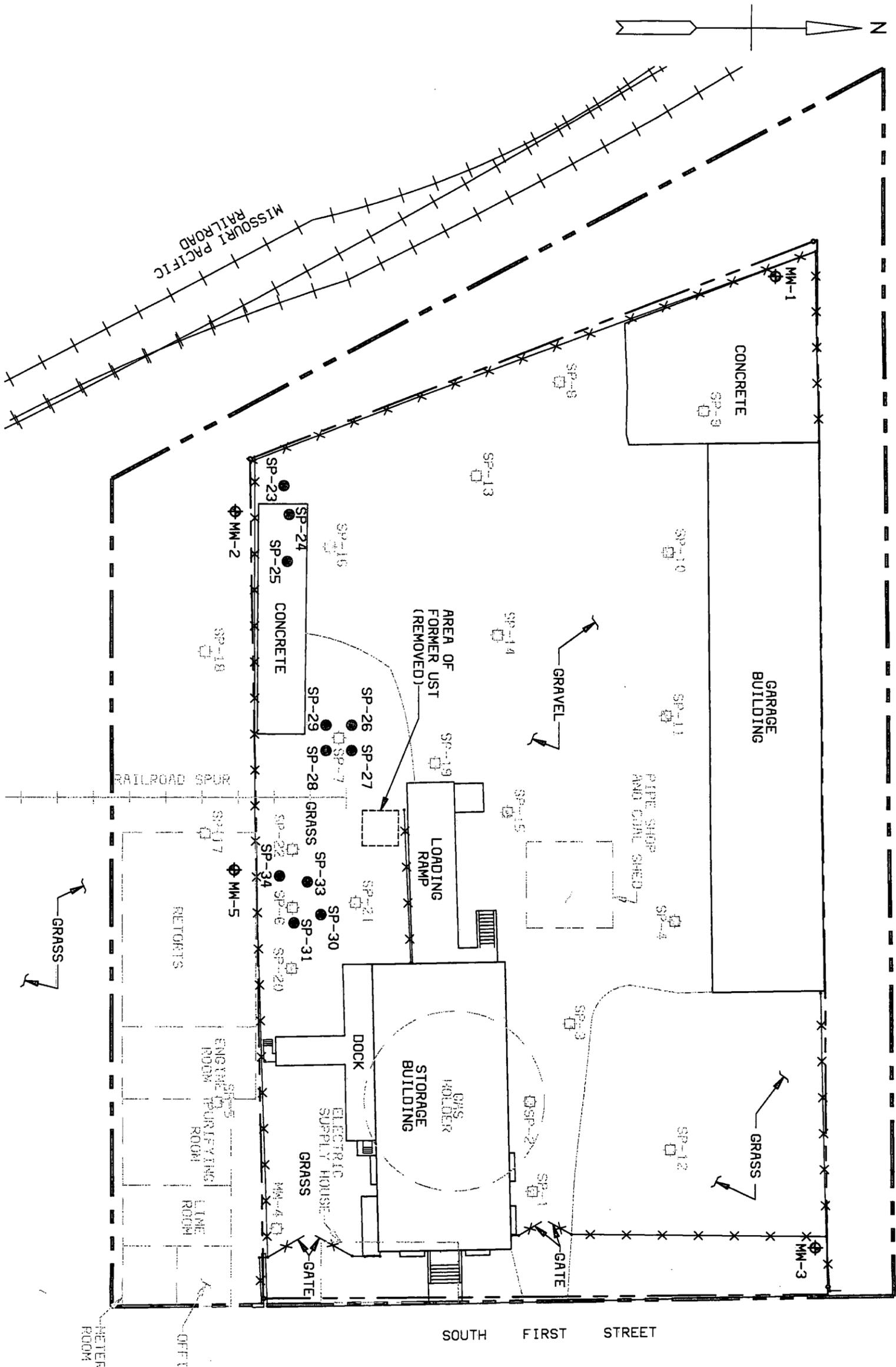
The AI field activities were conducted at the Arkansas City MGP site on June 23, 2004. These activities included advancing 11 soil probes in 3 general areas of the site; collecting soil samples for chemical analysis from selected probes; collecting ground water levels and samples from the 4 existing site monitoring wells. Probing services were provided by Below Ground Surface, Inc., of Lawrence, Kansas. Soil and ground water samples were sent by overnight courier to Gulf Coast Analytical Laboratories, Inc., of Baton Rouge, Louisiana, for chemical analysis. Management of investigation-derived wastes was completed by Black & Veatch.

The fieldwork was completed as described in the response letter (B&V 2004) to KDHE comments on the RI report dated May 12, 2004, and according to the procedures outlined in the *Quality Assurance Project Plan* (QAPP) and *Field Sampling Plan* (FSP), both of which were included as appendices to the RI work plan (B&V 2003b). Any deviations encountered during the field work are described in the following subsections. The locations of the soil probes, monitoring wells, and former and existing site features are presented on Figure 2-1.

2.1 Soil Investigation

The probes for the subsurface soil investigation were pushed through fill and unconsolidated materials using 2-inch outside diameter direct push samplers advanced by a truck-mounted hydraulic probing rig. Each of the probes was stratigraphically logged to delineate the changes in subsurface units and identify visible contamination, and the soil cores were screened with a photoionization detector (PID) to detect volatile organic contamination. The stratigraphic logs for the probes advanced during the AI are presented in Appendix A.

As shown on Figure 2-1, soil probes SP-23, SP-24, and SP-25 were advanced in the southwest corner of the property north of well MW-2 to further characterize the elevated levels of PAHs observed in the shallow soil sample (0.5 to 4.5 feet) collected from the probe of this monitoring well. The probes were pushed to approximately 6 feet below ground surface (bgs) and stratigraphically logged. One soil sample was collected from 1 to 5 feet in each probe, composited, and submitted for chemical analysis of benzene, toluene, ethylbenzene, and total xylenes (BTEXs) and PAHs by SW-846 Methods 8021



LEGEND:

- FORMER GAS PLANT PROPERTY BOUNDARY
- USD 470 PROPERTY BOUNDARY
- EXISTING STRUCTURE
- FORMER STRUCTURE
- x — FENCE
- ⊕ MONITORING WELL
- JULY 2003 SOIL PROBE
- JUNE 2004 SOIL PROBE

NOTES:

1. FORMER STRUCTURE LOCATIONS ARE APPROXIMATE.

REFERENCE: SANBORN FIRE INSURANCE MAPS: 1890, 1899, 1905, 1912, AND 1920
 OWNERSHIP/AERIAL MAP, BOURBON COUNTY, KANSAS, 1988
 SMITH & OAKES, INC ENGR: 2003

FIGURE 2-1
 ADDITIONAL INVESTIGATION SITE MAP
 ARKANSAS CITY MGP SITE
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and 8310, respectively. Surface soil samples were not collected in this area based on the existence of debris and fill material placed in this area by Unified School District (USD) 470 personnel. Probes SP-24 and SP-25 were advanced through approximately 4 inches of concrete at the ground surface.

Probes SP-26 through SP-29 were advanced equidistant (approximately 5 feet) from RI probe SP-7 to further characterize the alleged surface depression observed at this location during a site visit previous to the RI. The probes were pushed to refusal on limestone bedrock (between approximately 13 to 25 feet bgs) and continuously logged to compare the presence of subsurface fill materials to what was encountered in probe SP-7. No soil samples for chemical analysis were collected from these probes because of their proximity to probe SP-7, from which soil samples for chemical analysis had already been collected.

Four soil probes (SP-30, SP-31, SP-33, and SP-34) were advanced around RI probe SP-6 to further delineate the presence of tar and a possible source structure/area at that location. The probes were located in a radial pattern within approximately 7 feet of probe SP-6, and were pushed to refusal on bedrock (between approximately 17 and 28 feet bgs). Soil samples were collected for chemical analysis from the most visibly contaminated intervals of probes SP-31 (11 to 12 feet bgs) and SP-34 (12.2 to 12.8 feet bgs). These two probes contained the greatest amount of visible contamination of these four probes, although none of the probes contained the extent of tar encountered in probe SP-6. The soil samples were submitted for chemical analysis of BTEXs and PAHs, which are typically associated with byproducts and residuals resulting from former MGP processes.

Two minor deviations to the work activities occurred during the field work. Probes SP-23, SP-24, and SP-25 were laterally moved 5 feet or less from their proposed locations because of the presence of large piles of fill and pieces of metal debris in the area. In addition, five probes (SP-30 through SP-34) were proposed around former probe SP-6. However, probe SP-32 (proposed south of probe SP-6 and adjacent to the chain link fence) could not be advanced because of the presence of a large metal garage door stored in that area. The obstruction was not moved because the extent of contamination in the area of probe SP-6 had been adequately defined as suggested by the lack of visible tar in adjacent probes SP-31 and SP-33, as well as existing subsurface stratigraphic data available for nearby former probes SP-17 through SP-22 and well MW-5.

All of the probe holes were backfilled to the ground surface with bentonite chips following the logging and sampling activities. Soil cuttings and decontamination water generated during the probing and sampling activities were containerized on site in separate steel 55-gallon drums.

2.2 Ground Water Investigation

The ground water investigation conducted at the site included collecting the depth to ground water in the site wells to determine ground water flow directions, and collecting ground water samples for chemical analysis. The water level measurements and corresponding ground water flow patterns are discussed in Section 3.0. The monitoring well purging and sampling activities are described in the following paragraphs.

A peristaltic pump and new disposable polyethylene tubing were used to purge and sample the four site monitoring wells according to the procedures outlined in the FSP and QAPP. Ground water quality parameters including pH, temperature, specific conductivity, oxidation reduction potential, dissolved oxygen, and turbidity were collected during the purging activities. Monitoring well MW-1 was purged dry at 1.75 liters during the purging activities and continued to pump dry during sample collection, which is consistent with the 2003 sampling activities. Purge volumes in the other three monitoring wells ranged from 3 to 4 liters. The volume of water removed from each of the wells, the rate of removal, and ground water quality parameters recorded during the purging activities are documented on the monitoring well field sampling data sheets presented in Appendix B.

Ground water samples were collected from each well after the water quality parameters had stabilized during purging. The ground water samples were submitted for analysis of BTEXs by SW-846 Method 8021, PAHs by SW-846 Method 8310, total and dissolved arsenic by SW-846 Methods 3020/7060, and total and free/weak acid dissociable (WAD) cyanide by EPA Method 335.3. A field duplicate sample was collected from well MW-5. Additional sample volumes for internal laboratory quality control (matrix spike/matrix spike duplicate samples) were collected from well MW-3.

2.3 Investigation-Derived Wastes

Investigation-derived wastes including soil cuttings from the probes and water from the decontamination and well purging activities were generated during the 2003 RI field

activities. Solid and liquid wastes generated at that time had been stored in separate 55-gallon drums and staged on site, and the wastes generated in 2004 were added to these drums. Composite soil and water samples had been collected from the respective drums in July 2003, and the drums were not resampled in 2004 because the material added to the drums was anticipated to contain fewer organic and inorganic compounds than what already existed in the drums. The drum containing soil cuttings was transferred to the Westar Energy facility in Arkansas City for disposal at a later date, and the drum containing waste fluids was transported to Redi Industries in Wichita, Kansas (a state-licensed waste handler), for handling and disposal.

3.0 Site Geology and Hydrogeology

The information regarding site geology and hydrogeology obtained during the June 2004 AI field activities was used to supplement existing subsurface data, and is discussed in the following subsections. The regional geology and hydrogeology are discussed in greater detail in the RI report.

3.1 Site Geology

The subsurface materials encountered during the AI probing activities included fill, alluvium, and limestone bedrock, which is consistent with the results of the RI.

The fill unit consists of cohesive and granular materials generally less than 4 feet in thickness; however, the fill materials encountered in probe SP-31 extended to 5.6 feet bgs. Consistent with the RI, cohesive fill materials were encountered in the southern and western portions of the site and consisted of silt and sandy silt. Granular fill materials were present more often in the northern and eastern portions of the site, and consisted of gravelly sand or silty sand similar to that observed during the RI.

The alluvium consists of both cohesive and granular materials, although the cohesive alluvium was not encountered at all of the probing locations. When present, the cohesive alluvium is typically suspended within the granular alluvium or overlying bedrock, and occurs primarily in the western and southern portions of the site. It consists of silt, sandy silt, or clay, ranges from brown to tan to gray in color, non plastic to low plasticity, dry to wet, and contains trace amounts of clay or fine sand.

Consistent with the RI probes, granular alluvial materials were present in all of the probes advanced during the AI. These materials consist primarily of silty sand, with some areas of sand or gravelly sand, all of which are typically brown to tan at depths shallower than 10 feet bgs and sometimes grading to gray and saturated at depths greater than 10 feet bgs or when overlying bedrock. The granular alluvium is generally poorly graded and fine grained, but becomes well graded and fine to coarse grained with some rounded gravel at depths greater than 10 feet bgs, which is typical of alluvial depositional environments.

Limestone bedrock was identified during the RI and AI. The bedrock ranged from tan to reddish-brown to dark gray in color. The physical condition and strength of the limestone varied greatly from fresh to extremely weathered with a high instance of fractures. As

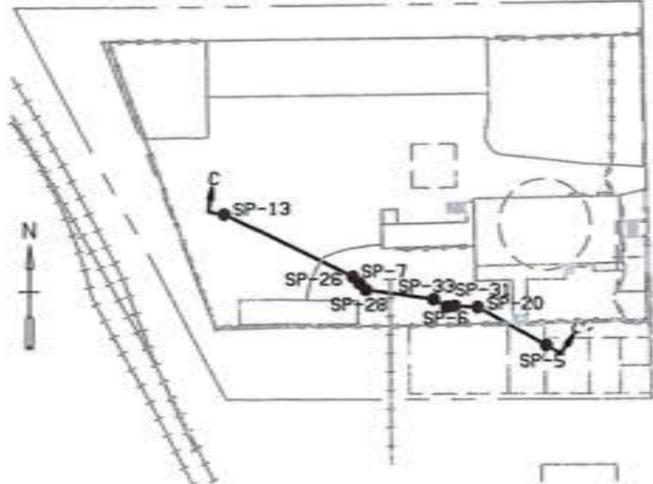
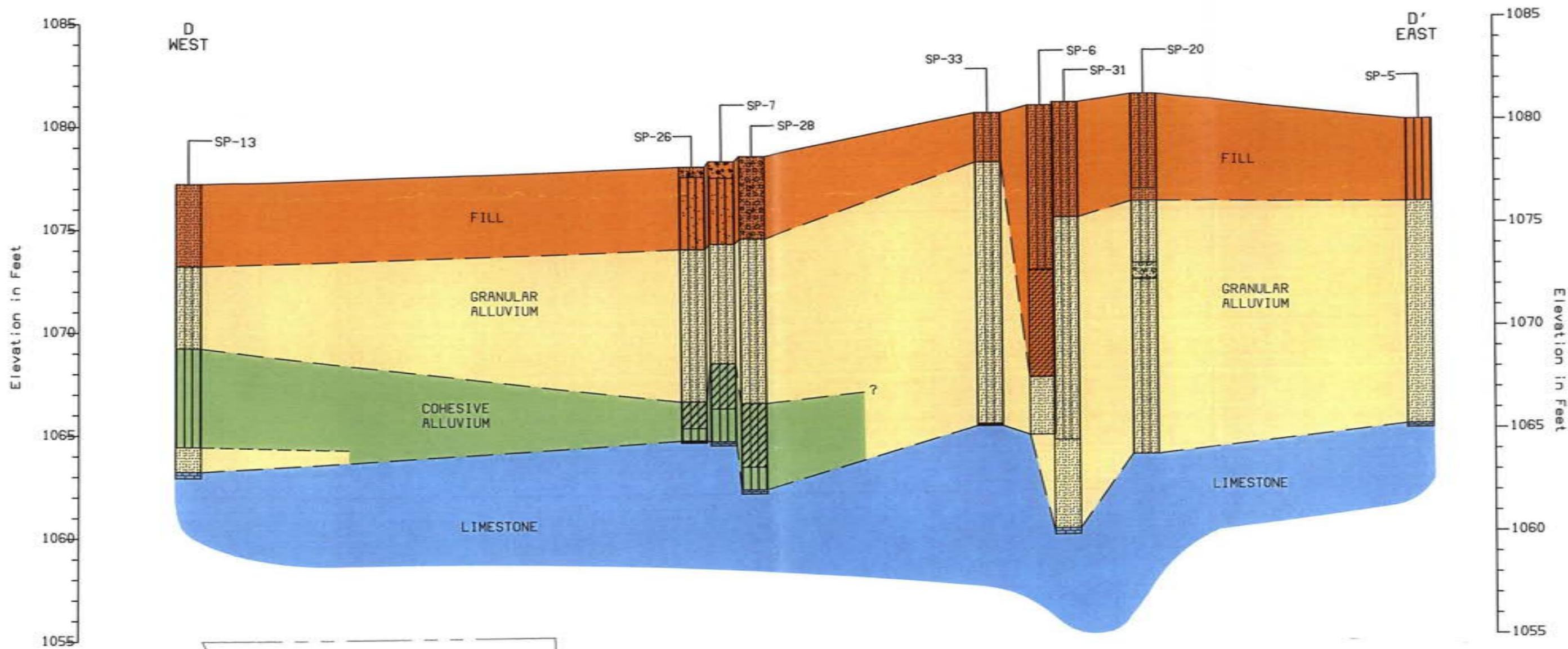
encountered during the RI, the depth to the bedrock surface (sampler refusal) varied considerably between probes. This surface is irregular across the site, with the exception of the area near the storage building and the southeast corner of the former MGP property where the bedrock is relatively flat. Otherwise, the bedrock contains a depression and a general dip to the southwest and to the northeast, respectively.

Probe SP-7 was advanced during the RI field activities in an area in which a depression in the ground surface had been observed during a previous site visit. As noted during the RI and shown on cross section D-D' (Figure 3-1), fill materials were present in probe SP-7 to approximately 4 feet bgs. AI probes SP-26 through SP-29 were advanced within 5 feet of the former probe, and each encountered native alluvium between 2 and 4 feet bgs. In addition, no voids or other conditions that might explain the reason for the surface depression were identified in these 5 probes. The consistency of subsurface materials (other than the increased depth to bedrock in probe SP-29) suggests that the former surface depression is isolated and does not extend vertically or horizontally far from the area observed during the December 1992 site visit. Other than a small area of fuel staining and odor around 14.3 feet bgs in probe SP-29 [likely associated with the former underground storage tank (UST)], no visible contamination was identified in these probes.

The boring log for former probe SP-6 and Figure 3-1 indicate that fill materials were encountered at this location to a depth of 13.2 feet bgs, including approximately 4 feet of tar-coated slag beginning at 9.2 feet bgs. AI probes SP-30, SP-31, SP-33, and SP-44 were advanced within 7 feet of RI probe SP-6. Native alluvium was present in these four probes at depths ranging from 2.4 to 5.6 feet bgs. Probe SP-6 was likely located within a former man-made disposal area considering that the slag materials present were not encountered at depth in the surrounding probes, and the increased thickness (nearly triple) of fill materials in probe SP-6 relative to the surrounding probes. No wood or other materials that may have indicated a structure were encountered in the interface between the fill and alluvium in probe SP-6 or in the surrounding probes.

3.2 Site Hydrogeology

The four site monitoring wells are screened in alluvial materials above the alluvium/bedrock interface. The depth to ground water in the wells measured on June 29, 2004, ranged from approximately 9 to 18 feet bgs. The depth to ground water relative to



GEOLOGIC CROSS SECTION LOCATION KEY

LEGEND

	SILTY SAND		SILTY CLAY
	LIMESTONE		SANDY SILT
	SILT		GRAVELLY SAND
	SLAG AND CINDERS		SANDY GRAVEL
	SAND		

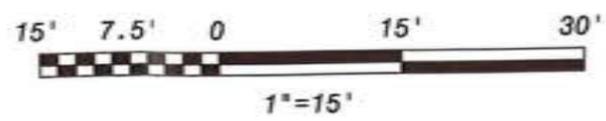


FIGURE 3-1
 GEOLOGIC CROSS SECTION D-D'
 ARKANSAS CITY MGP SITE
 RI REPORT
 65541-2010-516-C-T00007RTS

the top of casing (TOC) and the corresponding ground water elevations, along with the July 2003 ground water elevations, are presented in Table 3-1. The ground water elevations in wells MW-1 and MW-2 were more than one foot higher than those measured in the wells in 2003, while the ground water elevations in wells MW-3 and MW-5 were similar during both events.

TABLE 3-1
GROUND WATER DEPTHS AND ELEVATIONS
Addendum No.1 to RI Report
Arkansas City MGP Site

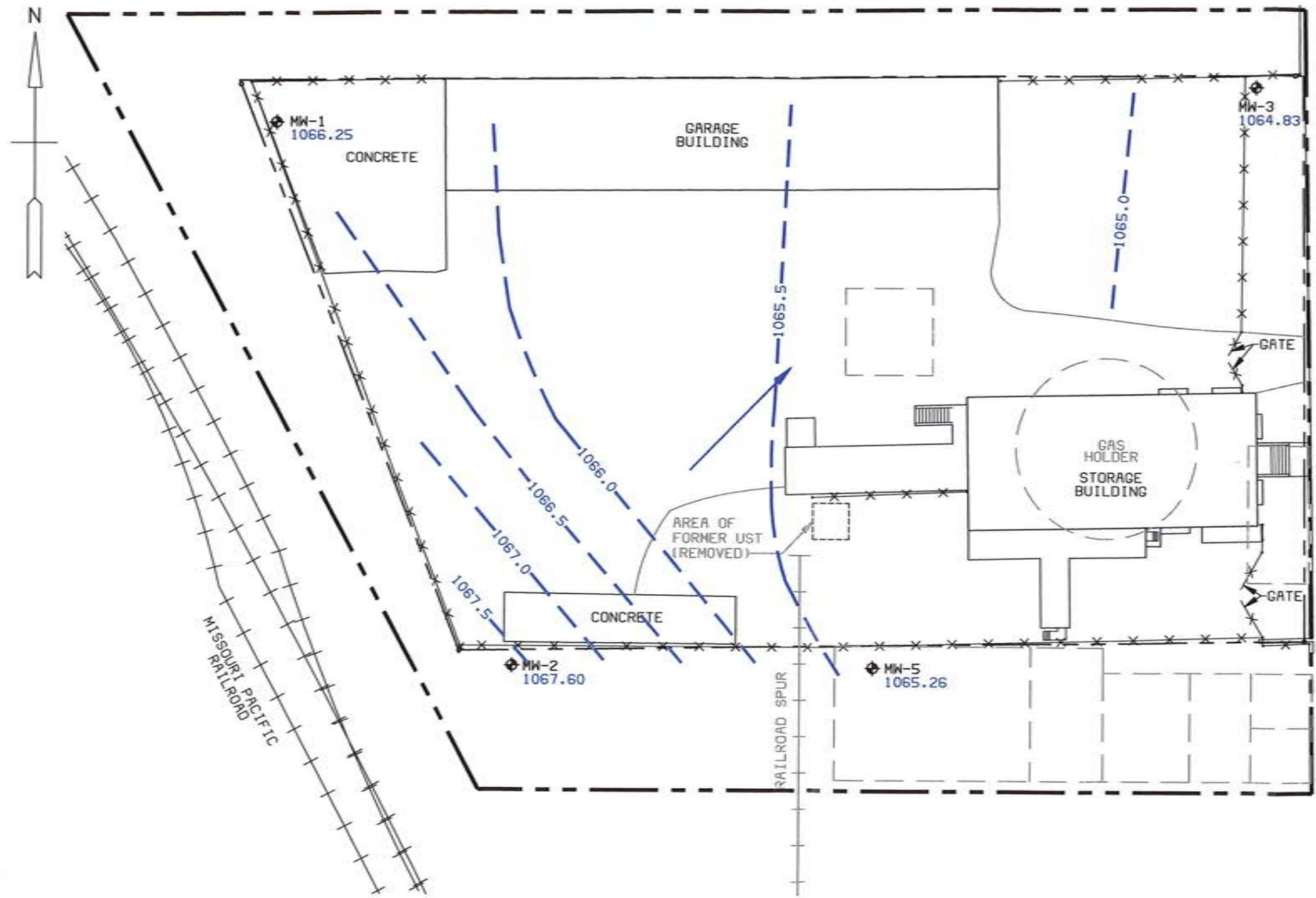
Monitoring Well	Top of Casing Elevation (feet above msl)	June 2004 Depth to Ground Water (feet below TOC)	June 2004 Ground Water Elevation (feet above msl)	July 2003 Ground Water Elevation (feet above msl)
MW-1	1,077.35	11.10	1,066.25	1,065.35
MW-2	1,076.90	9.30	1,067.60	1,066.25
MW-3	1,082.83	18.00	1,064.83	1,064.92
MW-5	1,079.57	14.31	1,065.26	1,065.26

Abbreviations:
msl Mean sea level
TOC Top of casing

Figure 3-2 shows the ground water elevation contours and the estimated flow direction across the site. The contours indicate that ground water flow in the alluvium is to the northeast in the western portion of the site, and to the east in the eastern portion of the site. The slight change in the 2004 ground water elevations in the western portion of the site is the result of the higher water levels in wells MW-1 and MW-2 relative to wells MW-3 and MW-5, compared to the 2003 water levels. As encountered during the RI, these flow directions are opposite to that of the slope of the ground surface, which is to the west-southwest toward the canal. The direction of ground water flow at the site is most likely influenced by infiltration of recent rains and the shallow irregular bedrock surface underlying the granular alluvium.

The estimated hydraulic conductivities at the wells monitoring the alluvium range from 6.5×10^{-5} centimeters per second (cm/sec) at well MW-5 to 6.5×10^{-6} cm/sec at well MW-1 (Bouwer & Rice method). The geometric mean of the hydraulic conductivities of the four wells is 4.1×10^{-5} cm/sec.

Darcy's law was used to calculate estimates of the average horizontal ground water flow velocity across the site. The calculation for the flow velocity within the saturated



- LEGEND:**
- FORMER GAS PLANT PROPERTY BOUNDARY
 - ... USD 470 PROPERTY BOUNDARY
 - EXISTING STRUCTURE
 - - - FORMER STRUCTURE
 - x-x- FENCE
 - ◆ MONITORING WELL
 - - - GROUND WATER CONTOUR
 - GROUND WATER FLOW DIRECTION

- NOTE:**
1. FORMER STRUCTURE LOCATIONS ARE APPROXIMATE.
 2. GROUND WATER ELEVATIONS COLLECTED JUNE 29, 2004.
 3. CONTOUR INTERVAL IS 0.5 FEET.
 4. ELEVATIONS ARE PRESENTED AS FEET ABOVE MEAN SEA LEVEL.

REFERENCE: SANBORN FIRE INSURANCE MAPS: 1890, 1899, 1905, 1912, OWNERSHIP/AERIAL MAP, BOURBON COUNTY, KANSAS, 1988 SMITH & OAKES, INC ENGR: 2003

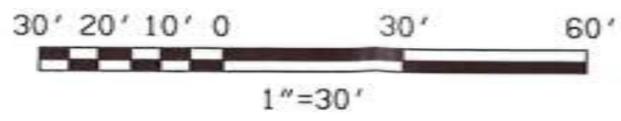


FIGURE 3-2
GROUND WATER CONTOURS
ARKANSAS CITY MGP SITE
ADDENDUM NO. 1 TO RI REPORT
65541-1000-GEMUP-C-T00007GHF

alluvium was based on the geometric mean of the hydraulic conductivities (4.1×10^{-5} cm/sec) from the four site wells, the hydraulic gradient between monitoring wells MW-2 and MW-3 (1.1 percent), and an effective porosity of 20 percent for poorly graded sand. This calculation indicates that ground water is flowing through the alluvium at a rate of approximately 2 feet per year to the east-northeast. This flow rate is approximately twice that observed in 2003; however, the increase is proportional to the doubling of the hydraulic gradient across the site (0.5 to 1.1 percent) resulting from the increased ground water elevations in wells MW-1 and MW-2. The ground water calculations are presented in Appendix C.

Additional details on bedrock units, regional hydrology, surface water flow, sensitive environments, and wetlands are presented in the RI report and the preliminary site assessment (BVWST 1993).

4.0 Analytical Results

The field observations and analytical results for the soil and ground water samples collected at the Arkansas City MGP site during the AI field activities are discussed in this section. The results of the validation of the analytical data are also presented in this section.

4.1 Field Observations and Measurements

Visible contamination encountered during the RI and AI field activities consisted of petroleum hydrocarbons and tar. Tar and/or fuel staining, odors, and/or PID readings were observed in the AI probes advanced adjacent to former probes SP-6 and SP-7. These probes are located within 20 to 30 feet of the former 1,000-gallon gasoline UST (Figure 2-1) that was removed in 1990. Observed traces of visible contamination and odors in the probes and PID readings are recorded on the probe logs presented in Appendix A and are described in the following paragraphs.

Fuel odors and a PID reading of 43.4 parts per million (ppm) were observed from 14.3 to 14.4 feet bgs in a fuel-stained interval of probe SP-29. No stained soil, odors, or PID readings were present in the adjacent probes. The fuel odors and PID readings in probe SP-29 are consistent with observations in nearby probes (SP-16, SP-18, SP-19, MW-2) at similar depths, and likely are associated with the former UST.

A "burnt" odor similar to that of soot or burned wood was observed from 9.6 to 17 feet and 11.2 to 16.6 feet in probes SP-30 and SP-31, respectively. These depths correspond to intervals in the probes in which the granular alluvium had graded to dark brown or black in color. In addition to the burnt odor, a slight tar odor was present from 12.9 to 13.4 feet bgs in probe SP-30. PID readings in this interval were approximately 30 ppm. Slight tar and fuel odors with PID readings ranging from 0 to 15.3 ppm were noted from 16.6 to 18 feet bgs in probe SP-31.

A tar odor was observed from 12.2 to 12.8 feet bgs in probe SP-34, which corresponds to an interval that graded black with some tar staining. PID readings in this interval ranged from 0 to 96 ppm. These depths coincide approximately with the tar and fuel contamination observed in probe SP-6, but the adjacent probes did not contain any tar-coated soil and the PID readings were all an order of magnitude less than those recorded in probe SP-6. No visible contamination was encountered in probe SP-33.

4.2 Soil Sample Analytical Results

Soil samples were collected from 1 to 5 feet bgs from probes SP-23 through SP-25, and from the most visibly contaminated intervals of probes SP-31 (11 to 12 feet bgs) and SP-34 (12.2 to 12.8 feet bgs). The samples were submitted for chemical analyses of BTEXs and PAHs. The analytical results are presented on Figure 4-1, discussed in the following subsections, and the complete analytical results are presented in Appendix E.

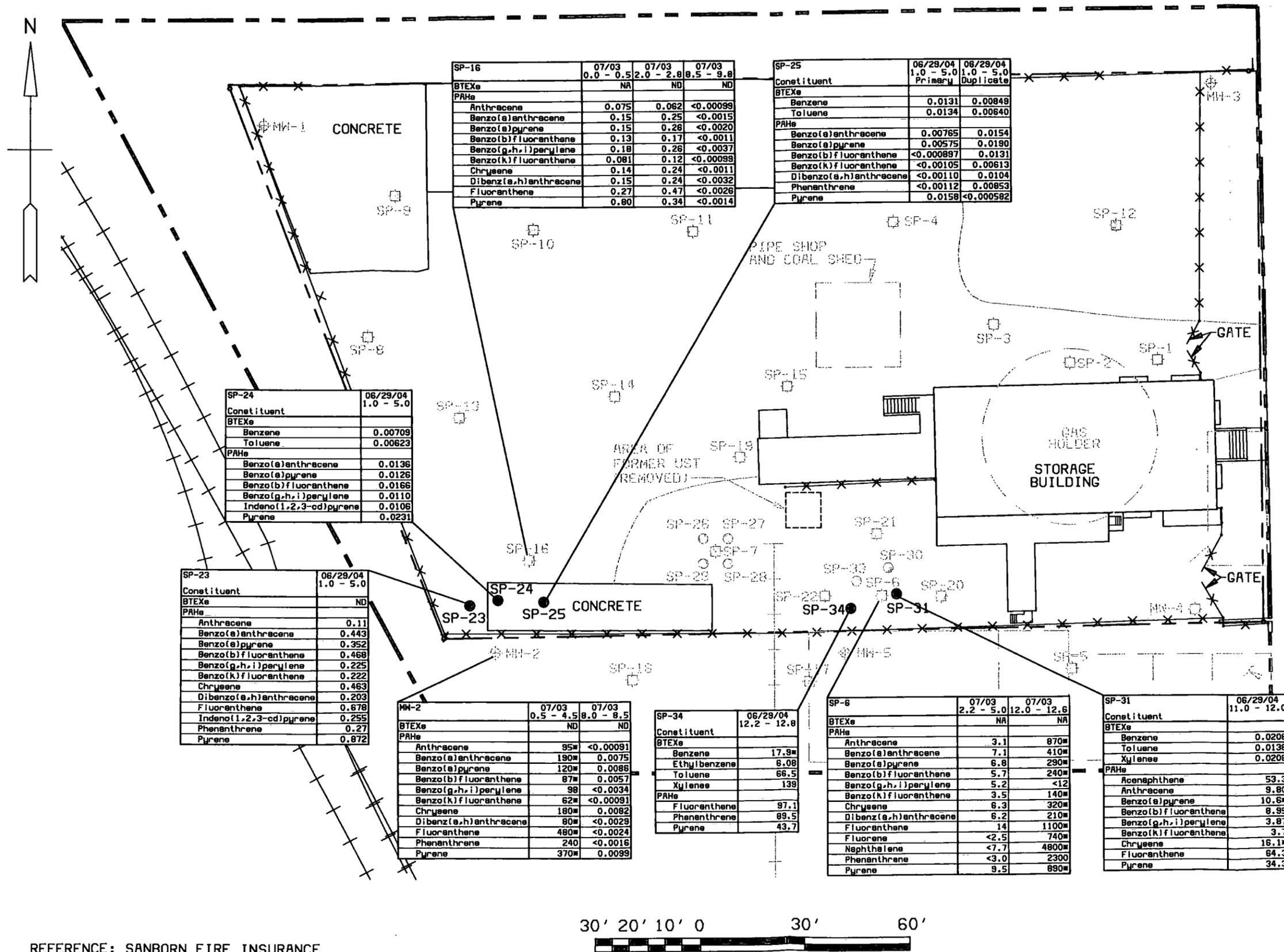
4.2.1 BTEXs In Soil Samples

Trace levels of BTEXs were detected in the soil samples collected from probes SP-24 and SP-25 located in the southwest corner of the site. The concentrations ranged from 0.0062 milligrams per kilogram (mg/kg) of toluene in probe SP-24 to 0.0134 mg/kg of benzene and toluene in probe SP-25. No BTEXs were detected in the soil sample collected from probe SP-23. Soil samples for analysis of BTEXs were also collected from similar depths in nearby RI probes SP-16 and MW-2; however, no BTEXs were detected in the shallow soil samples from those probes.

BTEXs were detected in probes SP-31 and SP-34 located adjacent to former probe SP-6. BTEX concentrations ranging from 6.08 milligrams per kilogram (mg/kg) of ethylbenzene to 139 mg/kg of total xylenes were detected in the soil sample collected from probe SP-34 (12.2 to 12.8 feet bgs). BTEXs were also detected in probe SP-31 at a similar depth, but at concentrations that were several orders of magnitude lower (0.0138 to 0.0208 mg/kg) than those detected in probe SP-31. A soil sample for analysis of BTEXs was not collected from probe SP-6 during the RI.

4.2.2 PAHs in Soil Samples

PAHs were detected in all of the subsurface soil samples collected during the AI. PAHs were detected at trace (less than 1 mg/kg) concentrations in probes SP-23 through SP-25 located in the southwestern corner of the site. These concentrations were highest (0.11 to 0.872 mg/kg) in probe SP-23 and decreased to the east at probe SP-25 (0.0058 to 0.019 mg/kg). Trace concentrations of PAHs were also detected in RI probe SP-16 (approximately 15 feet to the north), and at much higher concentrations (62 to 370 mg/kg) in RI probe MW-2 (approximately 15 feet to the south), both of which were sampled at similar depths. The increased concentrations in probe MW-2 are likely associated with the fill materials (silty sand with some slag and cinders) encountered in that area, but not in the southwestern corner of the USD property.



LEGEND:

- FORMER GAS PLANT PROPERTY BOUNDARY
- - - USD 470 PROPERTY BOUNDARY
- EXISTING STRUCTURE
- - - FORMER STRUCTURE
- × × FENCE
- ⊕ MONITORING WELL
- JULY 2003 SOIL PROBE
- JUNE 2004 SOIL PROBE

NOTES:

1. FORMER STRUCTURE LOCATIONS ARE APPROXIMATE.
2. CONCENTRATIONS ARE PRESENTED AS mg/kg.
3. COMPOUNDS NOT LISTED WERE NOT DETECTED ABOVE THEIR RESPECTIVE DETECTION LIMITS.
4. ND - NOT DETECTED.
5. NA - NOT ANALYZED.
6. * - CONCENTRATION DETECTED IS GREATER THAN KDHE TIER 2 RISK-BASED LEVEL

REFERENCE: SANBORN FIRE INSURANCE MAPS: 1890, 1899, 1905, 1912, AND 1920
 OWNERSHIP/AERIAL MAP, BOURBON COUNTY, KANSAS, 1988
 SMITH & OAKES, INC ENGR: 2003

FIGURE 4-1
CONCENTRATIONS OF ORGANIC COMPOUNDS IN SOIL
 ARKANSAS CITY MGP SITE
 ADDENDUM NO. 1 TO RI REPORT
 65541-2010- 516-C-T00007GHG

PAHs were also detected in AI probes SP-31 and SP-34 located near RI probe SP-6. Fluoranthene, phenanthrene, and pyrene were detected at concentrations ranging from 43.7 to 97.1 mg/kg in probe SP-34, while nine individual PAHs were detected in probe SP-31 at concentrations ranging from 3.7 to 64.3 mg/kg. These concentrations are typically an order of magnitude less than those detected in RI probe SP-6 (140 to 4,800 mg/kg). Although the sampling depths were similar in these three probes (approximately 11 to 13 feet bgs), the sample from probe SP-6 was collected from fill materials consisting of tar-coated slag rather than the slightly stained alluvium present in probes SP-31 and SP-34.

4.3 Ground Water Sample Analytical Results

The ground water samples collected during the AI were submitted for chemical analysis of BTEXs, PAHs, total and dissolved arsenic, and total and free cyanide. The results of these analyses are presented on Figure 4-2 and discussed in the following subsections. The complete analytical results are presented in Appendix F.

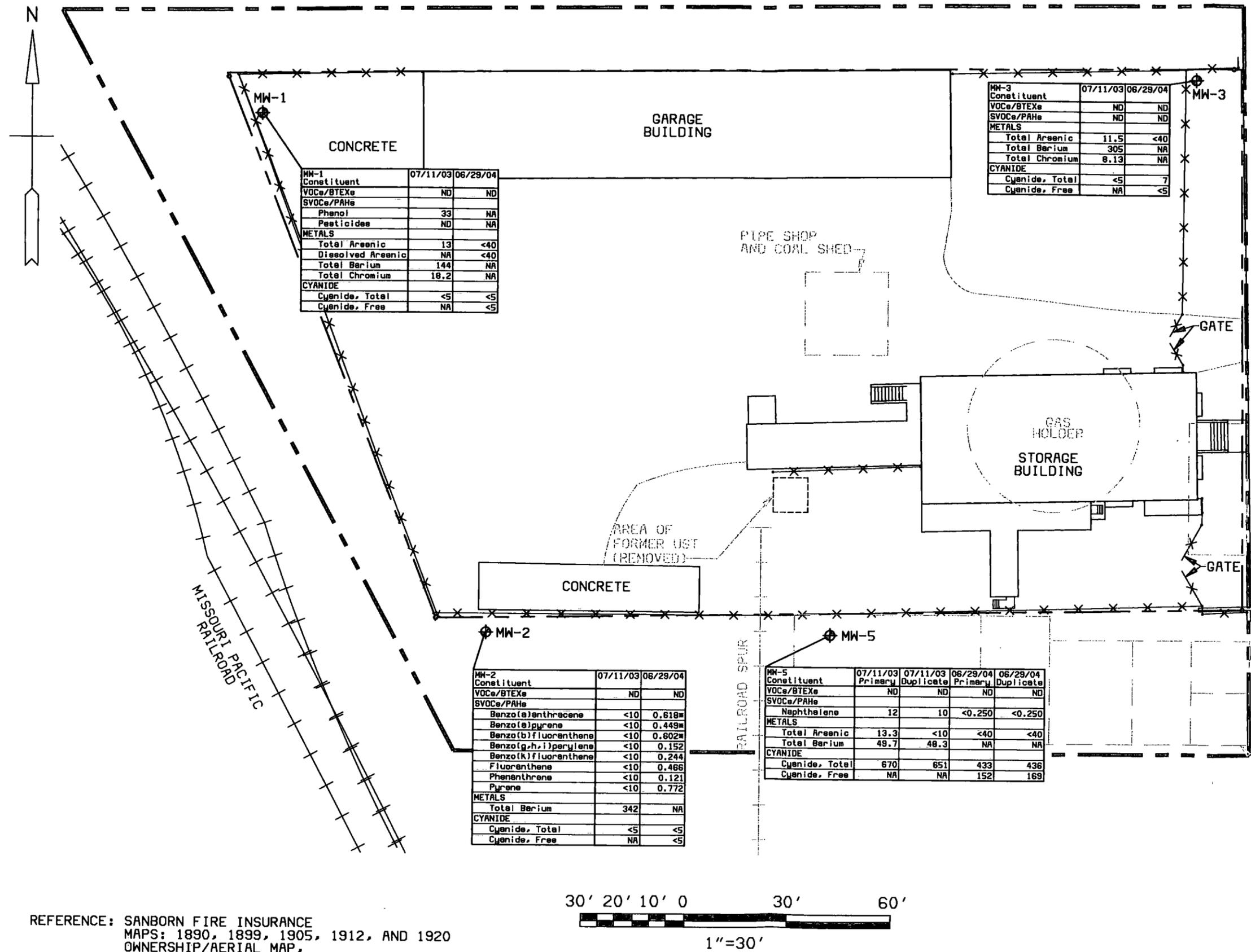
4.3.1 Organic Compounds in Ground Water Samples

No BTEXs were detected in the ground water samples collected in June 2004. In addition, no BTEXs were detected in the RI samples collected in July 2003; however, the detection limits provided by GCAL during the AI were approximately two orders of magnitude lower than those provided by the RI laboratory.

A set of trip blanks was submitted with the ground water samples and analyzed for BTEXs to detect the presence of contaminants that might have been introduced into the samples during shipping and handling. No BTEXs were detected in the trip blanks.

Trace levels of PAHs were only detected in well MW-2 during the 2004 AI. Concentrations of PAHs in this well ranged from 0.121 micrograms per liter ($\mu\text{g/L}$) of phenanthrene to 0.772 $\mu\text{g/L}$ of pyrene in this well.

No PAHs were detected in wells MW-1, MW-3, or MW-5 during the AI. PAHs also were not detected in wells MW-1, MW-2, and MW-3 during the RI, but naphthalene was detected in well MW-5 during that investigation.



- LEGEND:**
- FORMER GAS PLANT PROPERTY BOUNDARY
 - USD 470 PROPERTY BOUNDARY
 - EXISTING STRUCTURE
 - FORMER STRUCTURE
 - FENCE
 - ⊕ MONITORING WELL

- NOTES:**
1. FORMER STRUCTURE LOCATIONS ARE APPROXIMATE.
 2. CONCENTRATIONS ARE PRESENTED AS ug/L.
 3. COMPOUNDS NOT LISTED WERE NOT DETECTED ABOVE THEIR RESPECTIVE DETECTION LIMITS.
 4. ND - NOT DETECTED
 5. * - CONCENTRATION DETECTED IS GREATER THAN KDHE TIER 2 RISK - BASED LEVEL

REFERENCE: SANBORN FIRE INSURANCE MAPS: 1890, 1899, 1905, 1912, AND 1920 OWNERSHIP/AERIAL MAP, BOURBON COUNTY, KANSAS, 1988 SMITH & OAKES, INC ENGR: 2003

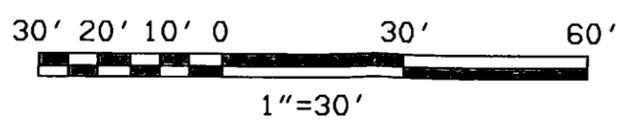


FIGURE 4-2
 CONCENTRATIONS OF ORGANIC AND INORGANIC COMPOUNDS IN GROUND WATER
 ARKANSAS CITY MGP SITE
 ADDENDUM NO. 1 TO RI REPORT
 65541-2010-516-C-T00007GHH

4.3.2 Inorganic Compounds in Ground Water Samples

Total and dissolved arsenic were not detected above the quantitation limit (40 µg/L) in any of the ground water samples collected during the AI. However, total arsenic was detected in wells MW-1, MW-3, and MW-5 during the RI at concentrations ranging from 11.5 to 13.3 µg/L. Samples were not collected for analysis of dissolved arsenic during that investigation.

Total and free cyanide were detected in well MW-5 at concentrations of 433/436 µg/L (primary/duplicate) and 152/169 µg/L, respectively. The concentrations of total cyanide were less than those detected in the well in 2003 (670/651 µg/L in primary/duplicate). This well is located west of the former gas plant/foundry building. The ground water samples collected during the RI were not analyzed for free cyanide.

Total cyanide was detected during the AI in well MW-3 at a concentration of 7 µg/L, but was not detected in that well during the RI. Free cyanide was not detected in well MW-3 or in wells MW-1 and MW-2. Total and free cyanide also were not detected in well MW-1s or MW-2 during either sampling event.

4.4 Data Validation

The chemical analytical results were reviewed and evaluated before incorporation into this report. Validata Chemical Services, Inc., of Norcross, Georgia, performed the validation services, which were in accordance with the Environmental Protection Agency's (EPA) *Contract Laboratory Program National Functional Guidelines for Organic Data Review* (EPA 1999) and *Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (EPA 1994).

With the exception of the following two minor qualifications, the data were considered to be of good quality. The complete data validation reports are presented in Appendix F.

The surrogate recoveries associated with the soil sample for BTEX analysis from probe SP-34 exceeded the quality control (QC) limits. Therefore, all associated positive data for this sample were flagged as estimated, J. Percent recovery represents how much interference the sample matrix introduces into the accuracy of an analysis.

The total and free cyanide results for the primary and duplicate ground water samples collected from well MW-5 exceeded the upper limit of the linear calibration curve.

Therefore, the analytical results for both samples were qualified as estimated, J. The linear calibration range is the range of concentrations that the instrument is calibrated to read.

5.0 Extent of Contamination

This section summarizes the extent of soil and ground water contamination on site based on the analytical results of the AI field activities, and compares those results to the applicable regulatory levels. Detailed descriptions of contaminant fate and transport for compounds detected during the RI and AI are presented in the RI report.

5.1 Soil

Soil sample analytical results were compared with the KDHE Tier 2 Risk-Based (RSK) levels for the Soil Pathway and the Soil to Ground Water Pathway for the non-resident scenario (KDHE 2003). Table 5-1 presents the RSK levels for BTEXs and PAHs, and the range of concentrations detected in the AI probes.

BTEXs and/or PAHs were detected in all of the soil samples. However, the only exceedences of the RSK levels occurred in probes SP-31 and SP-34. These exceedences included benzo(a)pyrene (10.6 mg/kg) and chrysene (16.1 mg/kg) in probe SP-31, and benzene (17.9 mg/kg) in probe SP-34. These samples were collected from granular alluvium at approximately 11 to 13 feet bgs. Individual PAHs were present at or above their respective RSK levels at three probe locations (SP-6, SP-7, and MW-2) during the 2003 RI.

As described in the RI report, the presence of a large interval of slag, cinders, and fill material in probe SP-6 and its proximity to the former retort room suggest that by-products of manufactured gas production or residuals associated with the former foundry were placed into a man-made pit at this location. However, the lack of extensive visible contamination and reduced contaminant concentrations in adjacent probes suggest that the contamination in the area of probe SP-6 is well defined, isolated, and has not significantly migrated horizontally or vertically from that location.

5.2 Ground Water

The organic and inorganic analytical results for the ground water samples were compared with the KDHE Tier 2 RSK levels under the Ground Water Pathway for the non-resident scenario. These levels, along with the concentrations detected during the AI, are presented in Table 5-2.

TABLE 5-1
PAHs EXCEEDING KDHE TIER 2 RISK-BASED LEVELS IN SOIL
Addendum No.1 to RI Report
Arkansas City MGP Site

Compound	RSK Level (mg/kg) ⁽¹⁾		Concentrations Detected During the 2004 AI ⁽²⁾ (mg/kg)		
	Soil Pathway	Soil to Ground Water Protection Pathway	SP-23, SP-24, SP-25	SP-31	SP-34
BTEXs					
Benzene	9.8	0.08	ND - 0.013	0.0208	17.9
Toluene	930	40	ND - 0.013	0.0138	66.5
Ethylbenzene	650	55	ND	ND	6.08
Total Xylenes	700	700	ND	0.0206	139
PAHs					
Acenaphthene	300	190	ND	53.3	ND
Anthracene	13	13	ND	9.80	ND
Benzo(a)anthracene	26	35	ND	ND	ND
Benzo(a)pyrene	2.6	16	ND	10.6	ND
Benzo(b)fluoranthene	19	19	ND	8.95	ND
Benzo(k)fluoranthene	10	10	ND	3.7	ND
Chrysene	6.4	6.4	ND	16.1	ND
Dibenzo(a,h)anthracene	2.6	11	ND	ND	ND
Fluoranthene	220	220	ND	64.3	97.1
Fluorene	270	270	ND	ND	ND
Naphthalene	320	140	ND	ND	ND
Phenanthrene	Not Listed	Not Listed	ND	ND	89.5
Pyrene	140	140	ND	34.3	43.7
Abbreviations: mg/kg Milligrams per kilogram ND Not detected					
Notes: (1) From <i>Risk-Based Standards for Kansas, RSK Manual - 3rd Version</i> , dated March 2003. (2) Bolded concentrations exceed their RSK level for the soil pathway for the non-resident scenario.					

None of the concentrations of BTEXs, arsenic, or free cyanide detected in the ground water during the AI exceeded their respective RSK levels. However, the concentrations of benzo(a) anthracene (0.618 µg/L), benzo(a)pyrene (0.449 µg/L) and benzo(k) anthracene (0.602 µg/L) in well MW-2 exceeded their RSK levels of 0.4, 0.2, and 0.3 µg/L, respectively. None of these compounds exceeded their RSK levels in any of the wells during the RI.

TABLE 5-2
 KDHE TIER 2 RISK-BASED LEVELS FOR ORGANIC AND INORGANIC
 COMPOUNDS IN GROUND WATER
 Addendum No.1 to RI Report
 Arkansas City MGP Site

Compound	RSK Level for Ground Water Pathway ⁽¹⁾ (µg/L)	Concentration Detected During the 2004 AI ⁽²⁾ (µg/L)		
		MW-2	MW-3	MW-5
BTEXs				
Benzene	5	ND	ND	ND
Toluene	1,000	ND	ND	ND
Ethylbenzene	700	ND	ND	ND
Total Xylenes	10,000	ND	ND	ND
PAHs				
Acenaphthene	490	ND	ND	ND
Acenaphthylene	Not Listed	ND	ND	ND
Anthracene	2,300	ND	ND	ND
Benzo(a)anthracene	0.4	0.618	ND	ND
Benzo(a)pyrene	0.2	0.449	ND	ND
Benzo(b)fluoranthene	0.3	0.602	ND	ND
Benzo(g,h,i)perylene	Not Listed	0.152	ND	ND
Benzo(k)fluoranthene	3	0.244	ND	ND
Chrysene	40	ND	ND	ND
Dibenzo(a,h)anthracene	0.01	ND	ND	ND
Indeno(1,2,3-cd)pyrene	Not Listed	ND	ND	ND
Fluoranthene	890	0.466	ND	ND
Fluorene	280	ND	ND	ND
Naphthalene	350	ND	ND	ND
Phenanthrene	Not Listed	0.121	ND	ND
Pyrene	720	0.772	ND	ND
Inorganics				
Arsenic	10	ND	ND	ND
Free cyanide	200	ND	ND	152/169 ⁽²⁾
Abbreviations: µg/L Micrograms per liter ND Not detected				
Notes: ⁽¹⁾ From <i>Risk-Based Standards for Kansas, RSK Manual -3rd Version</i> , dated March 2003. ⁽²⁾ Includes primary/duplicate samples. ⁽³⁾ Bolded concentrations exceed their RSK level for the ground water pathway.				

Free cyanide was detected in well MW-5 during the AI at concentrations of 152 and 169 µg/L for the primary and duplicate samples, respectively. These concentrations are below the RSK level of 200 µg/L for free cyanide. Ground water samples analyzed during the RI were only analyzed for total cyanide and, therefore, those results cannot be compared to the RSK level for free cyanide.

Total and dissolved arsenic were not detected in the ground water during the AI. However, concentrations of total arsenic detected in the ground water samples from wells MW-1, MW-3, and MW-5 (11.5 to 13.3 $\mu\text{g/L}$) during the RI were slightly greater than the RSK level of 10 $\mu\text{g/L}$. KDHE guidance does not indicate whether the promulgated RSK value is for total or dissolved arsenic.

6.0 Summary and Conclusions

This section contains a brief summary of the AI results, conclusions, and recommendations for future actions for this site.

6.1 Summary of Investigation

Eleven soil probes were advanced at the site to further characterize and delineate the extent of PAHs in the near surface soil in the southwestern corner of the site, the alleged surface depression in the area of RI probe SP-7, and the presence of tar and a possible source structure in the location of RI probe SP-6. In addition, ground water samples were collected from all site monitoring wells to further characterize the extent and magnitude of ground water contamination. Soil and ground water samples were submitted for various analyses with the purpose of detecting chemicals typically associated with MGP processes (e.g., PAHs).

The soil samples collected in the southwest corner of the site confirmed that the PAH contamination detected in probe MW-2 during the RI was likely associated with the increased amount of slag, cinders, and other fill materials present in that area. It is unknown whether those fill materials are associated with former MGP operations, foundry operations, or some other activity. None of the BTEXs or PAHs detected in AI probes SP-23, SP-24, or SP-25 exceeds the RSK levels.

The probes advanced around RI probe SP-7 confirmed that the nature of and depth to native soil was similar to that encountered in the probe. The reason for the depression at probe SP-7 is unknown, considering the similarity in depth to and composition of native materials in the adjacent probes, as well as the lack of voids in the subsurface or other visible causes for the settlement at the ground surface.

The probes advanced around RI probe SP-6 indicate that no subsurface source structure is present in the area. No wood or other materials that could have composed walls or floors of a structure were encountered in the probes. In addition, no significant tar or heavy soil staining was observed that might suggest a leaking subsurface structure. Soil samples collected from probes SP-31 and SP-34 (east and west of probe SP-6, respectively) contained BTEXs and PAHs at concentrations with RSK exceedences for benzo(a) pyrene, chrysene, and benzene. However, these samples were collected below the depth

of ground water; therefore, direct exposure of these chemicals to human populations is unlikely. The lack of fill material at depths greater than 5 feet bgs and of source material or heavy staining in adjacent probes, and the significantly reduced (one order of magnitude or more) concentration of PAHs relative to the tar-coated slag sampled in probe SP-6 suggest that the area in which probe SP-6 was located may have been a man-made pit. The area does not appear to have been lined, but the contamination is localized and has not migrated significantly horizontally or vertically. Because of the proximity of well MW-5 to probe SP-6, any significant impact on the ground water from soil contamination at that probe would be expected to be evident in the well.

For ground water, a greater number of individual PAHs were detected during the AI relative to those detected during the RI. However, the increase in the number of compounds is likely related to the decreased detection limits achieved in 2004 by using a different analytical laboratory. Three PAHs detected in well MW-2 exceeded their respective RSK levels in 2004. However, these trace concentrations were near their respective RSK levels. In addition, based on the estimated direction of ground water flow to the east-northeast (Figure 3-2), well MW-2 should monitor ground water conditions upgradient of the site and, subsequently, be representative of background, offsite conditions.

Free cyanide was detected in well MW-5 at concentrations below the RSK level of 200 µg/L. Other than total cyanide in well MW-3, no other organic or inorganic compounds were detected in the ground water samples collected from wells MW-1, MW-3, and MW-5 during the AI.

6.2 Conclusions

The soil and ground water samples collected at the site, subsurface stratigraphic information, and ground water flow direction and velocity data have been used to characterize the nature and extent of contamination at the MGP site. As described in this report and the RI report, the samples exceeding RSK levels have been identified and found to be localized. The areas have been reviewed with respect to potential exposure and future migration of contaminants related to the former gas plant. The resulting potential for exposure and migration is low based on the following rationale:

- Areas of subsurface soil contamination in excess of RSK levels are isolated and at deep intervals (>11 feet bgs) below which direct contact would not be expected.

Only probe SP-7 contained contaminants exceeding RSK levels in the near surface soil. However, the sample collected from 0 to 0.5 feet bgs is likely more representative of fill material placed over the years by USD 470 personnel than residuals associated with the former gas plant.

- The only exceedences of RSK levels in ground water were in well MW-2 at concentrations near the regulatory levels. Ground water elevations and flow patterns suggest that well MW-2 is located hydrologically upgradient of the site.
- The horizontal flow velocity is low and the ground water surface is relatively flat, indicating that any contaminant migration in ground water related to former MGP operations would have been identified in downgradient well MW-3.
- The organic and inorganic compounds encountered at the site typically have high affinities for adhering to soil particles, as well as low water solubilities, further reducing their potential to migrate through the subsurface and off site.
- No defined structure is present on site that contains a significant amount of source material with a potential to release contamination to the subsurface.

6.3 Recommendations for Future Actions

Considering the lack of shallow contamination on site associated with the former gas plant, the lack of contamination migrating off site, and the fact that the only RSK exceedences in ground water occurred in the hydraulically upgradient monitoring well, it is recommended that no additional actions be completed to further investigate this site. At this time, Westar Energy requests that the KDHE authorize the preparation of a Corrective Action Decision (CAD) without completion of a feasibility study. The CAD should consist of ground water monitoring at the Arkansas City MGP site.

As part of the CAD and in support of site closure and reclassification, it is recommended that ground water monitoring be performed semiannually at the site for a minimum of two years to evaluate changes in contaminant concentrations in the ground water and to determine if contaminants with concentrations above the RSK levels are migrating off site. Ground water samples will be collected from the four site wells and analyzed for BTEXs, PAHs, total and free cyanide, and total and dissolved arsenic under the methods described in the AI. The ground water samples will be collected following the protocol outlined in the FSP and QAPP. Water levels will be collected from all wells before sample collection. The results of the semiannual sampling events will be presented in annual ground water monitoring reports.

7.0 References

B&V 2003a. Black & Veatch, *Remedial Investigation Report, Arkansas City, Kansas, Manufactured Gas Plant Site*, prepared for Westar Energy, October 2004.

B&V 2003b. Black & Veatch, *Remedial Investigation Work Plan, Arkansas City, Kansas, Manufactured Gas Plant Site*, prepared for Westar Energy, March 2003.

B&V 2004. Black & Veatch, letter from Barbara Butler of Black & Veatch to John Cook of KDHE regarding the planned additional investigation RI field activities, dated May 21, 2004.

BVWST 1993. Black & Veatch Waste Science and Technology, *Final Preliminary Assessment, Former Manufactured Gas Plant, Arkansas City, Kansas*, prepared for Western Resources, Inc., June 1993.

EPA 1994. United States Environmental Protection Agency, *Laboratory Data Validation Functional Guidelines For Evaluating Inorganics Analyses*, 1994.

EPA 1999. United States Environmental Protection Agency, *Laboratory Data Validation Functional Guidelines For Evaluating Organics Analyses*, 1999.

KDHE 2003. Kansas Department of Health and Environment, *Risk-Based Standards for Kansas, RSK Manual – 3rd Version*, dated March 1, 2003.

APPENDIX A
BORING LOGS

BORING LOG SYMBOLS AND TERMINOLOGY

GENERAL

PP	-Compressive strength as determined by pocket penetrometer.
TV	-Compressive strength as determined by torvane.
Gravel	-From 1/4 inch to 3 inches in diameter.
Cobble	-From 3 to 12 inches in diameter.
Boulder	-Greater than 12 inches in diameter.
Trace	-Represents 0 to 10 percent by volume.
Some	-Represents 10 to 20 percent by volume.
N Value	-Indicates the number of blows to drive a standard split spoon sampler 12 inches with a 140-pound weight falling 30 inches.
WOH	- Weight of 140 lb. hammer during Standard Penetration Test
RQD	-A modified core run recovery in which all pieces of sound core over 4 inches in length are counted as recovery. The modified sum of the core recovery is then expressed as a percentage of the total length of the core run.
---	-Dashed line in classification column indicates approximate or gradational change.

WEATHERING

Fresh	-The rock shows no dissolution, loss of strength, or other effects due to weathering (unweathered rock).
Slightly Weathered	-Rock is slightly discolored with a slightly lower strength than unweathered rock.
Moderately Weathered	-Rock is considerably discolored with a slightly lower strength than unweathered rock.
Highly Weathered	-Rock is discolored and weakened so intensely that 2-inch diameter rock cores can be broken readily by hand. Wet strength is usually much lower than dry strength

BEDDING

Laminated	-Less than 0.001 foot to 0.1 foot (0.1 inch).
Thin Bedded	-0.01 foot to 0.1 foot (0.1 to 1.0 inches).
Medium Bedded	-0.1 foot to 1.0 foot (1.2 to 12 inches).
Thick Bedded	-Greater than 1.0 foot.
Massive	-Denotes no discernable internal bedding structure.

SYMBOLS LEGEND

	<u>SILT (MH)</u>
	Sandy <u>SILT</u>
	Silty <u>SAND</u>
	<u>CONCRETE</u>
	Description not given for: "DGS"
	Silty <u>CLAY</u>
	<u>LIMESTONE</u>
	Gravelly <u>SAND</u>
	<u>SAND</u>



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BORING LOG

BORING NO. SP-23

SHEET 1 OF 1

CLIENT Westar Energy		PROJECT Arkansas City MGP Site		PROJECT NO. 65541.2010
PROJECT LOCATION Arkansas City, KS		COORDINATES N 749341	GROUND ELEVATION (DATUM) E 2280066	TOTAL DEPTH 6.0 (ft)
SURFACE CONDITIONS Gravel area in southwest corner of site.			DATE START 6/29/04	DATE FINISHED 6/29/04

SAMPLING		LOGGED BY C. Ferguson	CHECKED BY C. Ferguson	APPROVED BY M. Murphy
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SAMPLE TYPE	SAMPLE NUMBER	SET 6 INCHES	2ND 6 INCHES	3RD 6 INCHES	N VALUE	SAMPLE RECOVERY	DEPTH (FEET)	SAMPLE TYPE	PID (ppm)	GRAPHIC LOG	CLASSIFICATION OF MATERIALS	REMARKS
DP	1						0.0				SILT; brown; nonplastic; moist; w/ trace sand and organics (Fill). Trace coal at 1.1'.	Probe advanced w/ 2-1/8" OD direct push sampler. Collected sample ACSP23S01-P-MS-MSD from 1.0' to 5.0' for chemical analysis. Bottom of probe at 6.0'. Ground water level not measured. Probe backfilled to ground surface w/ bentonite pellets on 6/29/04.
						2.25	0.0				Sandy SILT; brown; nonplastic; moist (Fill).	
DP	2					4.5	0.0				Silty SAND; dark brown; poorly graded; fine grained; subangular; moist (Alluvium).	
						6.0'	6.75					
							9					
							11.25					
							13.5					
							15.75					
							18					
							20.25					
							22.5					
							24.75					
							27					
							29.25					
							31.5					
							33.75					

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BORING LOG

BORING NO. SP-24

SHEET 1 OF 1

CLIENT Westar Energy		PROJECT Arkansas City MGP Site		PROJECT NO. 65541.2010
PROJECT LOCATION Arkansas City, KS		COORDINATES N 749342	GROUND ELEVATION (DATUM) E 2280074	TOTAL DEPTH 6.0 (ft)
SURFACE CONDITIONS Concrete slab in southwest corner of site.			DATE START 6/29/04	DATE FINISHED 6/29/04

SAMPLING		LOGGED BY C. Ferguson	CHECKED BY C. Ferguson	APPROVED BY M. Murphy
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SAMPLE TYPE	SAMPLE NUMBER	SET 6 INCHES	2ND 6 INCHES	3RD 6 INCHES	N VALUE	SAMPLE RECOVERY	DEPTH (FEET)	SAMPLE TYPE	PID (ppm)	GRAPHIC LOG	CLASSIFICATION OF MATERIALS	REMARKS
DP	1		0.3'				0				CONCRETE.	Probe advanced w/ 2-1/8" OD direct push sampler. Collected sample ACSP24S01-P from 1.1' to 5.0' for chemical analysis. Bottom of probe at 6.0'. Ground water level not measured. Probe backfilled to ground surface w/ bentonite pellets on 6/29/04.
							2.25	0.0			Sandy SILT; light brown; nonplastic; moist (Fill). Sand and gravel layer from 1.0' to 1.1'.	
DP	2		4.0'				4.5	0.0			Silty SAND; dark brown; poorly graded; fine grained; subangular; moist (Alluvium).	
			6.0'				6.75	0.0				
							9					
							11.25					
							13.5					
							15.75					
							18					
							20.25					
							22.5					
							24.75					
							27					
							29.25					
							31.5					
							33.75					

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BORING LOG

BORING NO. SP-25

SHEET 1 OF 1

CLIENT Westar Energy		PROJECT Arkansas City MGP Site		PROJECT NO. 65541.2010
PROJECT LOCATION Arkansas City, KS		COORDINATES N 749342	GROUND ELEVATION (DATUM) E 2280087	TOTAL DEPTH 6.0 (ft)
SURFACE CONDITIONS Concrete slab in southwest corner of site.			DATE START 6/29/04	DATE FINISHED 6/29/04

SAMPLING		LOGGED BY C. Ferguson	CHECKED BY C. Ferguson	APPROVED BY M. Murphy
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SAMPLE TYPE	SAMPLE NUMBER	SET 6 INCHES	2ND 6 INCHES	3RD 6 INCHES	N VALUE	SAMPLE RECOVERY	DEPTH (FEET)	SAMPLE TYPE	PID (ppm)	GRAPHIC LOG	CLASSIFICATION OF MATERIALS	REMARKS
DP	1		0.3'				0		0.0		CONCRETE	2' of gravel fill overlying concrete slab. Probe advanced w/ 2-1/8" OD direct push sampler. Collected sample ACSP25501-P-D from 1.0' to 5.0' for chemical analysis. Bottom of probe at 6.0'. Ground water level not measured. Probe backfilled to ground surface w/ bentonite pellets on 6/29/04.
							2.25		0.0		Sandy SILT; light to dark brown; nonplastic; moist (Fill).	
DP	2		4.0'				4.5		0.0		Silty SAND; dark brown; poorly graded; fine grained; subangular; moist (Alluvium).	
			6.0'				6.0		0.0		Grades brown at 5.7'.	
							5.75					
							9					
							11.25					
							13.5					
							15.75					
							18					
							20.25					
							22.5					
							24.75					
							27					
							29.25					
							31.5					
							33.75					



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BORING LOG

BORING NO. SP-26

SHEET 1 OF 1

CLIENT Westar Energy		PROJECT Arkansas City MGP Site		PROJECT NO. 65541.2010
PROJECT LOCATION Arkansas City, KS		COORDINATES N 749359	GROUND ELEVATION (DATUM) E 2280133	TOTAL DEPTH 13.4 (ft)
SURFACE CONDITIONS Gravel area northwest of surface depression.			DATE START 6/29/04	DATE FINISHED 6/29/04

LOGGED BY C. Ferguson		CHECKED BY C. Ferguson	APPROVED BY M. Murphy
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SAMPLING								DEPTH (FEET)	SAMPLE TYPE	PID (ppm)	GRAPHIC LOG	CLASSIFICATION OF MATERIALS	REMARKS
SAMPLE TYPE	SAMPLE NUMBER	SET 6 INCHES	2ND 6 INCHES	3RD 6 INCHES	N VALUE	SAMPLE RECOVERY							
CORING								DEPTH (FEET)	SAMPLE TYPE	PID (ppm)	GRAPHIC LOG	CLASSIFICATION OF MATERIALS	REMARKS
CORE SIZE	RUN NUMBER	RUN LENGTH	RUN RECOVERY	RQD RECOVERY	PERCENT RECOVERY	RQD							
DP	1						2.4'	0 - 2.25				Gravelly SAND; tan; well graded; fine to medium grained; subangular; moist; w/ trace silt (Fill).	Probe advanced w/ 2-1/8" OD direct push sampler.
		4.0'					4.5'	2.25 - 4.5				Sandy SILT; brown; nonplastic; moist; w/ trace fine gravel (Fill).	
DP	2						3.7'	4.5 - 8.0				Silty SAND; dark brown; poorly graded; fine grained; subangular; moist (Alluvium). Grades brown at 5.1'.	
		8.0'					6.75'	8.0 - 9.0					
DP	3						3.6'	9.0 - 11.25					
		12.0'					11.25'	11.25 - 13.4					
DP	4						1.4'	13.4 - 13.5				Silty CLAY; light brown w/ trace gray mottles; high plasticity; moist (Alluvium).	Sampler refusal at 13.4'. Bottom of probe at 13.4'. Ground water level not measured. Probe backfilled to ground surface w/ bentonite chips on 6/29/04.
		13.4'					13.5'	13.5 - 15.75				SILT; grayish tan; low plasticity; moist; w/ trace clay (Alluvium).	
							15.75'	15.75 - 18.0				LIMESTONE; gray; highly weathered; highly fractured (Nolans Limestone).	
							18.0'	18.0 - 20.25					
							20.25'	20.25 - 22.5					
							22.5'	22.5 - 24.75					
							24.75'	24.75 - 27.0					
							27.0'	27.0 - 29.25					
							29.25'	29.25 - 31.5					
							31.5'	31.5 - 33.75					
							33.75'	33.75 - 36.0					

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BORING LOG

BORING NO. SP-27

SHEET 1 OF 1

CLIENT Westar Energy		PROJECT Arkansas City MGP Site		PROJECT NO. 65541.2010
PROJECT LOCATION Arkansas City, KS		COORDINATES N 749359	GROUND ELEVATION (DATUM) E 2280140	TOTAL DEPTH 13.5 (ft)
SURFACE CONDITIONS Gravel area northeast of surface depression.			DATE START 6/29/04	DATE FINISHED 6/29/04

SAMPLING		LOGGED BY C. Ferguson		CHECKED BY C. Ferguson	APPROVED BY M. Murphy
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CORING								DEPTH (FEET)	SAMPLE TYPE	PID (ppm)	GRAPHIC LOG	CLASSIFICATION OF MATERIALS	REMARKS
CORE SIZE	RUN NUMBER	RUN LENGTH	RUN RECOVERY	RQD RECOVERY	PERCENT RECOVERY	RQD							
DP	1					2.3'	0.0 2.25				Gravelly SAND; tan; well graded; fine to medium grained; subangular; moist (Fill). Coal layer from 1.2' to 1.6'. Brick fragments from 1.6' to 2.0'. 2.0'	Probe advanced w/ 2-1/8" OD direct push sampler.	
DP	2	4.0'				3.4'	0.0 4.5 6.75				Silty SAND; light brown; poorly graded; fine grained; subangular; moist (Alluvium). Grades brown at approximately 4'.		
DP	3	8.0'				2.0'	0.0 9 11.25				Silty CLAY; light brown w/ trace gray mottles; high plasticity; moist (Alluvium). 9.6'		
DP	4	12.0'				1.3'	0.0 13.5				SILT; gray; nonplastic; wet (Alluvium). 12.4'		
		13.5'					15.75 18 20.25 22.5 24.75 27 29.25 31.5 33.75					Bottom of probe at 13.5'. Ground water level not measured. Probe backfilled to ground surface w/ bentonite pellets on 6/29/04.	



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BORING LOG

BORING NO. SP-28

SHEET 1 OF 1

CLIENT Westar Energy		PROJECT Arkansas City MGP Site		PROJECT NO. 65541.2010
PROJECT LOCATION Arkansas City, KS		COORDINATES N 749352	E 2280140	GROUND ELEVATION (DATUM) 1078.5 ft (feet msl)
SURFACE CONDITIONS Gravel area southeast of surface depression.			DATE START 6/29/04	DATE FINISHED 6/29/04

SAMPLING		LOGGED BY C. Ferguson	CHECKED BY C. Ferguson	APPROVED BY M. Murphy
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SAMPLE TYPE	SAMPLE NUMBER	SET 6 INCHES	2ND 6 INCHES	3RD 6 INCHES	N VALUE	SAMPLE RECOVERY	DEPTH (FEET)	SAMPLE TYPE	PID (ppm)	GRAPHIC LOG	CLASSIFICATION OF MATERIALS	REMARKS
DP	1					2.6'	0.0 2.25		0.0 0.0		Gravelly SAND; light brown; well graded; fine to medium grained; subangular; moist (Fill). Trace slag and cinders from 0.9' to 1.3'. Coal layer from 1.3' to 1.6'. Trace porcelain or ceramic fragments at 2.4'.	Probe advanced w/ 2-1/8" OD direct push sampler.
DP	2		4.0'			3.6'	4.5 6.75		0.0 0.0 0.0		Silty SAND; dark brown; poorly graded; fine grained; subangular; moist (Alluvium). Grades brown at 6.0'.	
DP	3					3.4'	9 11.25		0.0 0.0		Grades w/ some clay at 11.2'.	
DP	4		12.0'			3.2'	13.5		0.0		Silty CLAY; light brown w/ trace gray mottles; high plasticity; moist (Alluvium).	
DP	5		16.0'			0.4'	15.75 16.2		0.0 0.0		SILT; tan; nonplastic; wet (Alluvium).	
			16.4'				18 20.25 22.5 24.75 27 29.25 31.5 33.75				LIMESTONE; gray; moderately weathered; highly fractured (Nolans Limestone).	Sampler refusal at 16.4'. Bottom of probe at 16.4'. Ground water level not measured. Probe backfilled to ground surface w/ bentonite chips on 6/29/04.



BLACK & VEATCH

BORING LOG

BORING NO. SP-29

SHEET 1 OF 1

CLIENT Westar Energy		PROJECT Arkansas City MGP Site		PROJECT NO. 65541.2010
PROJECT LOCATION Arkansas City, KS		COORDINATES N 749352	GROUND ELEVATION (DATUM) E 2280133	TOTAL DEPTH 1078.5 ft (feet msl)
SURFACE CONDITIONS Gravel area southwest of surface depression.			DATE START 6/29/04	DATE FINISHED 6/29/04

SAMPLING		LOGGED BY C. Ferguson		CHECKED BY C. Ferguson	APPROVED BY M. Murphy
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SAMPLE TYPE	SAMPLE NUMBER	SET 6 INCHES	2ND 6 INCHES	3RD 6 INCHES	N VALUE	SAMPLE RECOVERY	DEPTH (FEET)	SAMPLE TYPE	PID (ppm)	GRAPHIC LOG	CLASSIFICATION OF MATERIALS	REMARKS
DP	1					2.4'	0.0		0.0		Gravelly SAND; light brown; well graded; fine to medium grained; subangular; moist (Fill).	Probe advanced w/ 2-1/8" OD direct push sampler.
			4.0'				2.25		0.0		Silty SAND; brown; poorly graded; fine grained; subangular; moist (Fill). Grades w/ some brick and trace slag and coal at 2.0'.	
DP	2					2.7'	4.5		0.0		Silty SAND; dark brown; poorly graded; fine grained; subangular; moist (Alluvium). Grades brown at 6.1'.	
			8.0'				5.75		0.0			
DP	3					2.0'	9		0.0		Grades w/ trace clay at 9.8'.	
			12.0'				11.25		0.0			
DP	4					2.5'	13.5		0.0		Silty CLAY; light brown w/ trace gray mottles; high plasticity; moist (Alluvium). 1" silt lens at 13.9'. Black w/ heavy fuel staining from 14.3' to 14.4'.	
			16.0'				15.75		0.0		1/2" sand lens at 16.5'.	
DP	5					2.3'	18		0.0		SILT; yellowish tan; nonplastic; extremely soft; wet (Alluvium). Grades gray w/ trace clay at 18.2'.	
			20.0'				20.25		0.0		Grades light brown at approximately 20'.	
DP	6					3.6'	22.5		0.0			Sampler refusal at 25.0'.
			24.0'				24.75		0.0			
DP	7					1.0'	24.75		0.0		LIMESTONE; gray; extremely weathered; highly fractured (Nolans Limestone).	Bottom of probe at 25.0'. Ground water level not measured. Probe backfilled to ground surface w/ bentonite pellets on 6/29/04.
			25.0'				27					
							29.25					
							31.5					
							33.75					

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BORING LOG

BORING NO. SP-30

SHEET 1 OF 1

CLIENT Westar Energy		PROJECT Arkansas City MGP Site		PROJECT NO. 65541.2010
PROJECT LOCATION Arkansas City, KS		COORDINATES N 749351	GROUND ELEVATION (DATUM) E 2280186 1080.5 ft (feet msl)	TOTAL DEPTH 17.0 (ft)
SURFACE CONDITIONS Sandy area southwest of storage building.			DATE START 6/29/04	DATE FINISHED 6/29/04

SAMPLING		LOGGED BY C. Ferguson		CHECKED BY C. Ferguson	APPROVED BY M. Murphy
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SAMPLING		CORING		DEPTH (FEET)	SAMPLE TYPE	PID (ppm)	GRAPHIC LOG	CLASSIFICATION OF MATERIALS	REMARKS				
SAMPLE TYPE	SAMPLE NUMBER	SET 6 INCHES	2ND 6 INCHES							3RD 6 INCHES	N VALUE	SAMPLE RECOVERY	CORE SIZE
DP	1			3.5'				Silty SAND; brown; well graded; fine to medium grained; subangular; moist; w/ trace gravel (Fill). Silt layer from 0.9' to 1.1'. Brick fragments from 1.8' to 2.1'. Concrete fragments (Fill).	Probe advanced w/ 2-1/8" OD direct push sampler.				
DP	2			2.2'				Silty SAND; brown; poorly graded; fine grained; subangular; moist (Alluvium).					
DP	3			3.2'				Grades black at 10.4'.	Grades w/ very slight burnt odor at 9.6'.				
DP	4			3.4'				Grades dark brown at 13.7'.	Heavy burnt odor and slight tar odor from 12.9' to 13.4'. Slight burnt odor from 13.4' to bottom of probe. Sampler refusal at 17.0'. Bottom of probe at 17.0'. Ground water level not measured. Probe backfilled to ground surface w/ bentonite pellets on 6/29/04.				
DP	5			1.0'				SAND; gray; poorly graded; fine grained; subangular, wet (Alluvium). Grades well graded and fine to medium grained at 16.7'.					

9/14/2004 9:47 AM Westar Energy



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BORING LOG

BORING NO. SP-31
SHEET 1 OF 1

CLIENT Westar Energy		PROJECT Arkansas City MGP Site		PROJECT NO. 65541.2010
PROJECT LOCATION Arkansas City, KS		COORDINATES N 749343	GROUND ELEVATION (DATUM) E 2280188	TOTAL DEPTH 21.0 (ft)
SURFACE CONDITIONS Sandy area southwest of storage building.			DATE START 6/29/04	DATE FINISHED 6/29/04

SAMPLING		LOGGED BY C. Ferguson		CHECKED BY C. Ferguson	APPROVED BY M. Murphy
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SAMPLE TYPE	SAMPLE NUMBER	SET 6 INCHES	2ND 6 INCHES	3RD 6 INCHES	N VALUE	SAMPLE RECOVERY	DEPTH (FEET)	SAMPLE TYPE	PID (ppm)	GRAPHIC LOG	CLASSIFICATION OF MATERIALS	REMARKS
DP	1					2.4'	0 2.25		0.0 0.0		Silty SAND; brown; poorly graded; fine grained; subangular; moist; w/ trace gravel (Fill). Cinders from 1.0' to 1.3'. Grades w/ trace slag and clay from 1.9' to approximately 4'.	Probe advanced w/ 2-1/8" OD direct push sampler.
DP	2		4.0'			2.6'	4.5 6.75		0.0 0.0		1" sand layer at 4.7'. Silty SAND; brown; poorly graded; fine grained; subangular; moist (Alluvium).	5.6'
DP	3		8.0'			4.0'	9 11.25		0.0 0.0		Grades dark brown at 9.7'. Grades black at 11.3'.	
DP	4		12.0'			1.0'	13.5		0.2			Collected sample ACSP31S01-P from 11.0' to 12.0' for chemical analysis.
DP	5		13.0'			4.0'	15.75		1.4 0.6			Grades dark gray at 15.8'. Grades light brown at 16.1'. Slight tar and fuel odor from 16.6' to 18.0'.
DP	6		17.0'			3.7'	18 20.25		15.3 11.2			SAND; gray; well graded; fine to medium grained; rounded; wet (Alluvium). Grades dark gray to black at 16.6'. Grades w/ trace limestone fragments at 20.1'. Sampler refusal at 21.0'.
			21.0'				22.5		0.0 0.2 0.0			LIMESTONE; gray; slightly weathered; slightly fractured (Nolans Limestone). Bottom of probe at 21.0'. Ground water level not measured. Probe backfilled to ground surface w/ bentonite pellets on 6/29/04.
							24.75					
							27					
							29.25					
							31.5					
							33.75					



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BORING LOG

BORING NO. SP-33

SHEET 1 OF 1

CLIENT Westar Energy		PROJECT Arkansas City MGP Site		PROJECT NO. 65541.2010
PROJECT LOCATION Arkansas City, KS		COORDINATES N 749347	E 2280177	GROUND ELEVATION (DATUM) 1080.5 ft (feet msl)
SURFACE CONDITIONS Sandy area southwest of storage building.			DATE START 6/29/04	DATE FINISHED 6/29/04

SAMPLING		LOGGED BY C. Ferguson	CHECKED BY C. Ferguson	APPROVED BY M. Murphy
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SAMPLE TYPE	SAMPLE NUMBER	SET 6 INCHES	2ND 6 INCHES	3RD 6 INCHES	N VALUE	SAMPLE RECOVERY	DEPTH (FEET)	SAMPLE TYPE	PID (ppm)	GRAPHIC LOG	CLASSIFICATION OF MATERIALS	REMARKS
DP	1					2.7'	0.0		0.0		Silty SAND; brown; well graded; fine to medium grained; subangular; moist; w/ trace gravel (Fill). Gravel grades out and grades reddish brown at 1.2'. 2.4'	Probe advanced w/ 2-1/8" OD direct push sampler.
DP	2		4.0'			3.8'	0.0		0.0		Silty SAND; brown; poorly graded; fine grained; subangular; dry; (Alluvium). Grades dark brown at approximately 4'. Grades brown at 6.4'.	
DP	3					3.9'	0.0		0.0			
DP	4		8.0'			3.0'	0.0		0.0		Grades medium grained at 14.0'. Grades wet at 14.8'. 15.1'	Sampler refusal at 15.2'.
			12.0'				0.0		0.0		LIMESTONE; tannish gray; highly weathered; highly fractured (Nolans Limestone).	Bottom of probe at 15.2'. Ground water level not measured. Probe backfilled to ground surface w/ bentonite pellets on 6/29/04.
			15.2'				0.0		0.0			
							15.75					
							18					
							20.25					
							22.5					
							24.75					
							27					
							29.25					
							31.5					
							33.75					



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BORING LOG

BORING NO. SP-34

SHEET 1 OF 1

CLIENT Westar Energy		PROJECT Arkansas City MGP Site		PROJECT NO. 65541.2010
PROJECT LOCATION Arkansas City, KS		COORDINATES N 749339	GROUND ELEVATION (DATUM) E 2280175	TOTAL DEPTH 1081.0 ft (feet msl)
SURFACE CONDITIONS Sandy area southwest of storage building.			DATE START 6/29/04	DATE FINISHED 6/29/04

SAMPLING		LOGGED BY C. Ferguson		CHECKED BY C. Ferguson		APPROVED BY M. Murphy	
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SAMPLE TYPE	SAMPLE NUMBER	SET 6 INCHES	2ND 6 INCHES	3RD 6 INCHES	N VALUE	SAMPLE RECOVERY	DEPTH (FEET)	SAMPLE TYPE	PID (ppm)	GRAPHIC LOG	CLASSIFICATION OF MATERIALS	REMARKS
DP	1					3.3'	0		0.0		Silty SAND; light brown; poorly graded; fine grained; subangular; moist (Fill). Coal and cinders from 1.1' to 1.2'.	Probe advanced w/ 2-1/8" OD direct push sampler.
			4.0'				2.5		0.0		Silty SAND; light brown; poorly graded; fine grained; subangular; moist (Alluvium).	
DP	2					2.9'	5		0.0		Grades dark brown at 5.4'.	
			8.0'				7.5		0.0		Grades brown at approximately 8'.	
DP	3					3.5'	10		0.0			
			12.0'				12.5		0.0		Grades black and tar stained from 12.3' to 12.6'. Grades dark gray at 12.6'. Grades tan at 13.2'.	Collected sample ACSP34S01-P from 12.2' to 12.8' for chemical analysis. Tar odor from 12.2' to 12.8'.
DP	4					2.7'	15		0.0		Grades wet at 14.6'.	
			16.0'				17.5		0.0		Grades well graded and fine to coarse grained at 17.8'.	
DP	5					1.9'	20		0.2			
			20.0'				22.5		0.0			Sample recovery decreased below the water table.
DP	6					1.9'	25		0.0		Grades yellowish-tan at 24.8'.	
			24.0'				27.5		0.0		Grades w/ trace limestone chips at 26.7'.	Sampler refusal at 27.9'.
DP	7					2.7'	30		0.0			Bottom of probe at 27.9'. Ground water level not measured. Probe backfilled to ground surface w/ bentonite pellets on 6/29/04.
			27.9'				32.5		0.0			
							35		0.0			
							37.5		0.0			

APPENDIX B
MONITORING WELL SAMPLING SHEETS

APPENDIX C
GROUND WATER CALCULATIONS

CALCULATION OF ESTIMATED HORIZONTAL FLOW VELOCITY

Client: Westar Energy
Site: Arkansas City MGP
Project No: 65541.201

Computed By: C. Ferguson
Verified By: E. Schwartz
Date: 09/13/04

Purpose: To estimate the average horizontal flow velocity of ground water in the alluvium at the Arkansas City MGP site in Arkansas City, Kansas.

Assumption: All subsurface materials are homogeneous and isotropic.

References: 1.) *Applied Hydrogeology, Third Edition*, C.W. Fetter, Prentice Hall, 1992.
2.) Slug test results presented in the *Remedial Investigation Report for the Arkansas City MGP Site*, October 2003.
3.) Survey plot of wells and ground water elevations presented in the RI Report.
4.) Ground water elevations collected on June 29, 2004.

1.) Calculation of the estimated horizontal ground water flow velocity.

$$V_{\text{horz}} = (K)(i) / n_e$$

K = Hydraulic Conductivity

i = Hydraulic Gradient

n_e = Effective Porosity

A.) Calculation of hydraulic gradient.

$$i = (h_1 - h_2) / L$$

For Shallow Unit:

h_1 = MW-2 ground water elevation in feet above msl

1067.60

h_2 = MW-3 ground water elevation in feet above msl

1064.83

L = Horizontal distance between wells (feet).

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$$i_{\text{shallow}} = 0.011$$

B.) Calculation of geometric mean of hydraulic conductivities.

Monitoring Well	K (cm/sec)	Natural Log (K)
MW-1	6.50E-06	-11.944
MW-2	8.20E-05	-9.409
MW-3	8.00E-05	-9.433
MW-5	6.50E-05	-9.641

Average = -10.10678

$$e^{\text{average } K} = K_{\text{mean}}$$

$K_{\text{mean}} = \underline{4.08E-05}$ (cm/sec)

C.) Calculation of estimated horizontal velocity.

$$V_{\text{horz}} = (K)(i) / n_e \quad n_e = \text{Effective porosity (\%)} \text{ for poorly graded sand}$$

$n_e = 0.20$

$$V_{\text{horz}} = (K_{\text{mean}})(i) / n_e$$

$V_{\text{horz}} = 2.17E-06$ cm/sec

$\sim V_{\text{horz}} = \underline{2.2}$ ft/yr

APPENDIX D
SOIL ANALYTICAL RESULTS

APPENDIX D
SOIL ANALYTICAL RESULTS
Addendum No.1 to RI Report
Arkansas City MGP Site

Sample Location	Date	Parameter	Conc.	Units	MDL	PQL	Method
ACSP23S01P	06/29/04	Benzene	ND	< ug/kg	0.957	5.98	8021
ACSP23S01P	06/29/04	Ethylbenzene	ND	< ug/kg	0.407	5.98	8021
ACSP23S01P	06/29/04	Toluene	ND	< ug/kg	0.502	5.98	8021
ACSP23S01P	06/29/04	Xylene (total)	ND	< ug/kg	1.02	12	8021
ACSP23S01P	06/29/04	Anthracene	110	ug/kg	5.63	39.5	8310
ACSP23S01P	06/29/04	Pyrene	872	ug/kg	5.69	39.5	8310
ACSP23S01P	06/29/04	Benzo(g,h,i)perylene	225	ug/kg	4.43	39.5	8310
ACSP23S01P	06/29/04	Indeno(1,2,3-cd)pyrene	255	ug/kg	10.9	99.3	8310
ACSP23S01P	06/29/04	Benzo(b)fluoranthene	468	ug/kg	8.61	39.5	8310
ACSP23S01P	06/29/04	Fluoranthene	678	ug/kg	11	39.5	8310
ACSP23S01P	06/29/04	Benzo(k)fluoranthene	222	ug/kg	10.1	39.5	8310
ACSP23S01P	06/29/04	Acenaphthylene	ND	< ug/kg	44.5	398	8310
ACSP23S01P	06/29/04	Chrysene	463	ug/kg	11.3	39.5	8310
ACSP23S01P	06/29/04	Benzo(a)pyrene	352	ug/kg	13.3	39.5	8310
ACSP23S01P	06/29/04	Dibenz(a,h)anthracene	203	ug/kg	10.5	39.5	8310
ACSP23S01P	06/29/04	Benzo(a)anthracene	443	ug/kg	14.2	39.5	8310
ACSP23S01P	06/29/04	Acenaphthene	ND	< ug/kg	116	398	8310
ACSP23S01P	06/29/04	Phenanthrene	270	ug/kg	10.8	39.5	8310
ACSP23S01P	06/29/04	Fluorene	ND	< ug/kg	42	200	8310
ACSP23S01P	06/29/04	Naphthalene	ND	< ug/kg	36.8	99.3	8310
ACSP23S01P	06/29/04	Total Solids	83.6	%	0.01	0.01	2540G
ACSP24S01P	06/29/04	Benzene	7.09	ug/kg	0.955	5.97	8021
ACSP24S01P	06/29/04	Ethylbenzene	ND	< ug/kg	0.406	5.97	8021
ACSP24S01P	06/29/04	Toluene	6.23	ug/kg	0.501	5.97	8021
ACSP24S01P	06/29/04	Xylene (total)	ND	< ug/kg	1.01	11.9	8021
ACSP24S01P	06/29/04	Anthracene	ND	< ug/kg	0.562	3.94	8310
ACSP24S01P	06/29/04	Pyrene	23.1	ug/kg	0.568	3.94	8310
ACSP24S01P	06/29/04	Benzo(g,h,i)perylene	11	ug/kg	0.441	3.94	8310
ACSP24S01P	06/29/04	Indeno(1,2,3-cd)pyrene	10.6	ug/kg	1.09	9.9	8310
ACSP24S01P	06/29/04	Benzo(b)fluoranthene	16.6	ug/kg	0.859	3.94	8310
ACSP24S01P	06/29/04	Fluoranthene	ND	< ug/kg	1.09	3.94	8310
ACSP24S01P	06/29/04	Benzo(k)fluoranthene	ND	< ug/kg	1.01	3.94	8310
ACSP24S01P	06/29/04	Acenaphthylene	ND	< ug/kg	4.44	39.7	8310
ACSP24S01P	06/29/04	Chrysene	ND	< ug/kg	1.13	3.94	8310
ACSP24S01P	06/29/04	Benzo(a)pyrene	12.6	ug/kg	1.32	3.94	8310
ACSP24S01P	06/29/04	Dibenz(a,h)anthracene	ND	< ug/kg	1.05	3.94	8310
ACSP24S01P	06/29/04	Benzo(a)anthracene	13.6	ug/kg	1.42	3.94	8310
ACSP24S01P	06/29/04	Acenaphthene	ND	< ug/kg	11.6	39.7	8310
ACSP24S01P	06/29/04	Phenanthrene	ND	< ug/kg	1.07	3.94	8310
ACSP24S01P	06/29/04	Fluorene	ND	< ug/kg	4.19	19.9	8310
ACSP24S01P	06/29/04	Naphthalene	ND	< ug/kg	3.67	9.9	8310
ACSP24S01P	06/29/04	Total Solids	83.8	%	0.01	0.01	2540G
ACSP25S01P	06/29/04	Benzene	13.1	ug/kg	0.996	6.23	8021
ACSP25S01P	06/29/04	Ethylbenzene	ND	< ug/kg	0.423	6.23	8021

APPENDIX D
SOIL ANALYTICAL RESULTS
Addendum No.1 to RI Report
Arkansas City MGP Site

Sample Location	Date	Parameter	Conc.	Units	MDL	PQL	Method
ACSP25S01P	06/29/04	Toluene	13.4	ug/kg	0.523	6.23	8021
ACSP25S01P	06/29/04	Xylene (total)	ND	< ug/kg	1.06	12.5	8021
ACSP25S01P	06/29/04	Anthracene	ND	< ug/kg	0.587	4.11	8310
ACSP25S01P	06/29/04	Pyrene	15.8	ug/kg	0.593	4.11	8310
ACSP25S01P	06/29/04	Benzo(g,h,i)perylene	ND	< ug/kg	0.461	4.11	8310
ACSP25S01P	06/29/04	Indeno(1,2,3-cd)pyrene	ND	< ug/kg	1.13	10.3	8310
ACSP25S01P	06/29/04	Benzo(b)fluoranthene	ND	< ug/kg	0.897	4.11	8310
ACSP25S01P	06/29/04	Fluoranthene	ND	< ug/kg	1.14	4.11	8310
ACSP25S01P	06/29/04	Benzo(k)fluoranthene	ND	< ug/kg	1.05	4.11	8310
ACSP25S01P	06/29/04	Acenaphthylene	ND	< ug/kg	4.63	41.5	8310
ACSP25S01P	06/29/04	Chrysene	ND	< ug/kg	1.17	4.11	8310
ACSP25S01P	06/29/04	Benzo(a)pyrene	5.75	ug/kg	1.38	4.11	8310
ACSP25S01P	06/29/04	Dibenz(a,h)anthracene	ND	< ug/kg	1.1	4.11	8310
ACSP25S01P	06/29/04	Benzo(a)anthracene	7.65	ug/kg	1.48	4.11	8310
ACSP25S01P	06/29/04	Acenaphthene	ND	< ug/kg	12.1	41.5	8310
ACSP25S01P	06/29/04	Phenanthrene	ND	< ug/kg	1.12	4.11	8310
ACSP25S01P	06/29/04	Fluorene	ND	< ug/kg	4.37	20.8	8310
ACSP25S01P	06/29/04	Naphthalene	ND	< ug/kg	3.84	10.3	8310
ACSP25S01P	06/29/04	Total Solids	80.3	%	0.01	0.01	2540G
ACSP25S01D	06/29/04	Benzene	8.49	ug/kg	0.979	6.12	8021
ACSP25S01D	06/29/04	Ethylbenzene	ND	< ug/kg	0.416	6.12	8021
ACSP25S01D	06/29/04	Toluene	6.4	ug/kg	0.514	6.12	8021
ACSP25S01D	06/29/04	Xylene (total)	ND	< ug/kg	1.04	12.2	8021
ACSP25S01D	06/29/04	Anthracene	ND	< ug/kg	0.576	4.04	8310
ACSP25S01D	06/29/04	Pyrene	ND	< ug/kg	0.582	4.04	8310
ACSP25S01D	06/29/04	Benzo(g,h,i)perylene	ND	< ug/kg	0.453	4.04	8310
ACSP25S01D	06/29/04	Indeno(1,2,3-cd)pyrene	ND	< ug/kg	1.11	10.2	8310
ACSP25S01D	06/29/04	Benzo(b)fluoranthene	13.1	ug/kg	0.881	4.04	8310
ACSP25S01D	06/29/04	Fluoranthene	ND	< ug/kg	1.12	4.04	8310
ACSP25S01D	06/29/04	Benzo(k)fluoranthene	6.13	ug/kg	1.03	4.04	8310
ACSP25S01D	06/29/04	Acenaphthylene	ND	< ug/kg	4.55	40.7	8310
ACSP25S01D	06/29/04	Chrysene	ND	< ug/kg	1.15	4.04	8310
ACSP25S01D	06/29/04	Benzo(a)pyrene	19	ug/kg	1.36	4.04	8310
ACSP25S01D	06/29/04	Dibenz(a,h)anthracene	10.4	ug/kg	1.08	4.04	8310
ACSP25S01D	06/29/04	Benzo(a)anthracene	15.4	ug/kg	1.46	4.04	8310
ACSP25S01D	06/29/04	Acenaphthene	ND	< ug/kg	11.9	40.7	8310
ACSP25S01D	06/29/04	Phenanthrene	8.53	ug/kg	1.1	4.04	8310
ACSP25S01D	06/29/04	Fluorene	ND	< ug/kg	4.29	20.4	8310
ACSP25S01D	06/29/04	Naphthalene	ND	< ug/kg	3.77	10.2	8310
ACSP25S01D	06/29/04	Total Solids	81.7	%	0.01	0.01	2540G
ACSP31S01P	06/29/04	Benzene	20.8	ug/kg	0.868	5.42	8021
ACSP31S01P	06/29/04	Ethylbenzene	ND	< ug/kg	0.369	5.42	8021
ACSP31S01P	06/29/04	Toluene	13.8	ug/kg	0.456	5.42	8021
ACSP31S01P	06/29/04	Xylene (total)	20.6	ug/kg	0.922	10.8	8021

APPENDIX D
SOIL ANALYTICAL RESULTS
Addendum No.1 to RI Report
Arkansas City MGP Site

Sample Location	Date	Parameter	Conc.	Units	MDL	PQL	Method
ACSP31S01P	06/29/04	Anthracene	9830	ug/kg	511	3580	8310
ACSP31S01P	06/29/04	Pyrene	34300	ug/kg	516	3580	8310
ACSP31S01P	06/29/04	Benzo(g,h,i)perylene	3870	ug/kg	401	3580	8310
ACSP31S01P	06/29/04	Indeno(1,2,3-cd)pyrene	ND	< ug/kg	988	9010	8310
ACSP31S01P	06/29/04	Benzo(b)fluoranthene	8950	ug/kg	781	3580	8310
ACSP31S01P	06/29/04	Fluoranthene	64300	ug/kg	994	3580	8310
ACSP31S01P	06/29/04	Benzo(k)fluoranthene	3700	ug/kg	917	3580	8310
ACSP31S01P	06/29/04	Acenaphthylene	ND	< ug/kg	4040	36100	8310
ACSP31S01P	06/29/04	Chrysene	16100	ug/kg	1020	3580	8310
ACSP31S01P	06/29/04	Benzo(a)pyrene	10600	ug/kg	1200	3580	8310
ACSP31S01P	06/29/04	Dibenz(a,h)anthracene	ND	< ug/kg	957	3580	8310
ACSP31S01P	06/29/04	Benzo(a)anthracene	ND	< ug/kg	1290	3580	8310
ACSP31S01P	06/29/04	Acenaphthene	53300	ug/kg	10500	36100	8310
ACSP31S01P	06/29/04	Phenanthrene	ND	< ug/kg	976	3580	8310
ACSP31S01P	06/29/04	Fluorene	ND	< ug/kg	3810	18100	8310
ACSP31S01P	06/29/04	Naphthalene	ND	< ug/kg	3340	9010	8310
ACSP31S01P	06/29/04	Total Solids	92.2	%	0.01	0.01	2540G
ACSP34S01P	06/29/04	Benzene	17900	ug/kg	883	5520	8021
ACSP34S01P	06/29/04	Ethylbenzene	6080	ug/kg	375	5520	8021
ACSP34S01P	06/29/04	Toluene	66500	ug/kg	463	5520	8021
ACSP34S01P	06/29/04	Xylene (total)	139000	ug/kg	938	11000	8021
ACSP34S01P	06/29/04	Anthracene	ND	< ug/kg	5200	36400	8310
ACSP34S01P	06/29/04	Pyrene	43700	ug/kg	5250	36400	8310
ACSP34S01P	06/29/04	Benzo(g,h,i)perylene	ND	< ug/kg	4080	36400	8310
ACSP34S01P	06/29/04	Indeno(1,2,3-cd)pyrene	ND	< ug/kg	10100	91600	8310
ACSP34S01P	06/29/04	Benzo(b)fluoranthene	ND	< ug/kg	7940	36400	8310
ACSP34S01P	06/29/04	Fluoranthene	97100	ug/kg	10100	36400	8310
ACSP34S01P	06/29/04	Benzo(k)fluoranthene	ND	< ug/kg	9320	36400	8310
ACSP34S01P	06/29/04	Acenaphthylene	ND	< ug/kg	41000	367000	8310
ACSP34S01P	06/29/04	Chrysene	ND	< ug/kg	10400	36400	8310
ACSP34S01P	06/29/04	Benzo(a)pyrene	ND	< ug/kg	12200	36400	8310
ACSP34S01P	06/29/04	Dibenz(a,h)anthracene	ND	< ug/kg	9730	36400	8310
ACSP34S01P	06/29/04	Benzo(a)anthracene	ND	< ug/kg	13100	36400	8310
ACSP34S01P	06/29/04	Acenaphthene	ND	< ug/kg	107000	367000	8310
ACSP34S01P	06/29/04	Phenanthrene	89500	ug/kg	9930	36400	8310
ACSP34S01P	06/29/04	Fluorene	ND	< ug/kg	38700	184000	8310
ACSP34S01P	06/29/04	Naphthalene	ND	< ug/kg	34000	91600	8310
ACSP34S01P	06/29/04	Total Solids	90.6	%	0.01	0.01	2540G

APPENDIX E
GROUND WATER ANALYTICAL RESULTS

APPENDIX E
GROUND WATER ANALYTICAL RESULTS
Addendum No.1 to RI Report
Arkansas City MGP Site

Sample Location	Date	Parameter	Conc.	Units	MDL	PQL	Method
ACMW1W01P	06/29/04	Benzene	ND	< ug/l	0.054	5	8021
ACMW1W01P	06/29/04	Ethylbenzene	ND	< ug/l	0.077	5	8021
ACMW1W01P	06/29/04	Toluene	ND	< ug/l	0.125	5	8021
ACMW1W01P	06/29/04	Xylene (total)	ND	< ug/l	0.233	10	8021
ACMW1W01P	06/29/04	Anthracene	ND	< ug/l	0.024	0.1	8310
ACMW1W01P	06/29/04	Pyrene	ND	< ug/l	0.034	0.1	8310
ACMW1W01P	06/29/04	Benzo(g,h,i)perylene	ND	< ug/l	0.016	0.1	8310
ACMW1W01P	06/29/04	Indeno(1,2,3-cd)pyrene	ND	< ug/l	0.041	0.25	8310
ACMW1W01P	06/29/04	Benzo(b)fluoranthene	ND	< ug/l	0.016	0.1	8310
ACMW1W01P	06/29/04	Fluoranthene	ND	< ug/l	0.044	0.1	8310
ACMW1W01P	06/29/04	Benzo(k)fluoranthene	ND	< ug/l	0.033	0.1	8310
ACMW1W01P	06/29/04	Acenaphthylene	ND	< ug/l	0.153	1	8310
ACMW1W01P	06/29/04	Chrysene	ND	< ug/l	0.03	0.1	8310
ACMW1W01P	06/29/04	Benzo(a)pyrene	ND	< ug/l	0.033	0.1	8310
ACMW1W01P	06/29/04	Dibenz(a,h)anthracene	ND	< ug/l	0.029	0.1	8310
ACMW1W01P	06/29/04	Benzo(a)anthracene	ND	< ug/l	0.032	0.1	8310
ACMW1W01P	06/29/04	Acenaphthene	ND	< ug/l	0.331	1	8310
ACMW1W01P	06/29/04	Phenanthrene	ND	< ug/l	0.025	0.1	8310
ACMW1W01P	06/29/04	Fluorene	ND	< ug/l	0.099	0.5	8310
ACMW1W01P	06/29/04	Naphthalene	ND	< ug/l	0.124	0.25	8310
ACMW1W01P	06/29/04	Cyanide, Total	ND	< mg/l	0.000	0.005	335.3
ACMW1W01P	06/29/04	Free Cyanide	ND	< mg/l	0.000	0.005	335.3
ACMW1W01P	06/29/04	Arsenic (Total)	ND	< mg/l	0.0038	0.04	6010
ACMW1W01P	06/29/04	Arsenic (Dissolved)	ND	< mg/l	0.0038	0.04	6010
ACMW2W01P	06/29/04	Benzene	ND	< ug/l	0.054	5	8021
ACMW2W01P	06/29/04	Ethylbenzene	ND	< ug/l	0.077	5	8021
ACMW2W01P	06/29/04	Toluene	ND	< ug/l	0.125	5	8021
ACMW2W01P	06/29/04	Xylene (total)	ND	< ug/l	0.233	10	8021
ACMW2W01P	06/29/04	Anthracene	ND	< ug/l	0.024	0.1	8310
ACMW2W01P	06/29/04	Pyrene	0.772	ug/l	0.034	0.1	8310
ACMW2W01P	06/29/04	Benzo(g,h,i)perylene	0.152	ug/l	0.016	0.1	8310
ACMW2W01P	06/29/04	Indeno(1,2,3-cd)pyrene	ND	< ug/l	0.041	0.25	8310
ACMW2W01P	06/29/04	Benzo(b)fluoranthene	0.602	ug/l	0.016	0.1	8310
ACMW2W01P	06/29/04	Fluoranthene	0.466	ug/l	0.044	0.1	8310
ACMW2W01P	06/29/04	Benzo(k)fluoranthene	0.244	ug/l	0.033	0.1	8310
ACMW2W01P	06/29/04	Acenaphthylene	ND	< ug/l	0.153	1	8310
ACMW2W01P	06/29/04	Chrysene	ND	< ug/l	0.03	0.1	8310
ACMW2W01P	06/29/04	Benzo(a)pyrene	0.449	ug/l	0.033	0.1	8310
ACMW2W01P	06/29/04	Dibenz(a,h)anthracene	ND	< ug/l	0.029	0.1	8310
ACMW2W01P	06/29/04	Benzo(a)anthracene	0.618	ug/l	0.032	0.1	8310
ACMW2W01P	06/29/04	Acenaphthene	ND	< ug/l	0.331	1	8310
ACMW2W01P	06/29/04	Phenanthrene	0.121	ug/l	0.025	0.1	8310
ACMW2W01P	06/29/04	Fluorene	ND	< ug/l	0.099	0.5	8310
ACMW2W01P	06/29/04	Naphthalene	ND	< ug/l	0.124	0.25	8310
ACMW2W01P	06/29/04	Cyanide, Total	ND	< mg/l	0.000	0.005	335.3

APPENDIX E
GROUND WATER ANALYTICAL RESULTS
Addendum No.1 to RI Report
Arkansas City MGP Site

Sample Location	Date	Parameter	Conc.	Units	MDL	PQL	Method
ACMW2W01P	06/29/04	Free Cyanide	ND <	mg/l	0.000	0.005	335.3
ACMW2W01P	06/29/04	Arsenic (Total)	ND <	mg/l	0.0038	0.04	6010
ACMW2W01P	06/29/04	Arsenic (Dissolved)	ND <	mg/l	0.0038	0.04	6010
ACMW3W01P	06/29/04	Benzene	ND <	ug/l	0.054	5	8021
ACMW3W01P	06/29/04	Ethylbenzene	ND <	ug/l	0.077	5	8021
ACMW3W01P	06/29/04	Toluene	ND <	ug/l	0.125	5	8021
ACMW3W01P	06/29/04	Xylene (total)	ND <	ug/l	0.233	10	8021
ACMW3W01P	06/29/04	Anthracene	ND <	ug/l	0.024	0.1	8310
ACMW3W01P	06/29/04	Pyrene	ND <	ug/l	0.034	0.1	8310
ACMW3W01P	06/29/04	Benzo(g,h,i)perylene	ND <	ug/l	0.016	0.1	8310
ACMW3W01P	06/29/04	Indeno(1,2,3-cd)pyrene	ND <	ug/l	0.041	0.25	8310
ACMW3W01P	06/29/04	Benzo(b)fluoranthene	ND <	ug/l	0.016	0.1	8310
ACMW3W01P	06/29/04	Fluoranthene	ND <	ug/l	0.044	0.1	8310
ACMW3W01P	06/29/04	Benzo(k)fluoranthene	ND <	ug/l	0.033	0.1	8310
ACMW3W01P	06/29/04	Acenaphthylene	ND <	ug/l	0.153	1	8310
ACMW3W01P	06/29/04	Chrysene	ND <	ug/l	0.03	0.1	8310
ACMW3W01P	06/29/04	Benzo(a)pyrene	ND <	ug/l	0.033	0.1	8310
ACMW3W01P	06/29/04	Dibenz(a,h)anthracene	ND <	ug/l	0.029	0.1	8310
ACMW3W01P	06/29/04	Benzo(a)anthracene	ND <	ug/l	0.032	0.1	8310
ACMW3W01P	06/29/04	Acenaphthene	ND <	ug/l	0.331	1	8310
ACMW3W01P	06/29/04	Phenanthrene	ND <	ug/l	0.025	0.1	8310
ACMW3W01P	06/29/04	Fluorene	ND <	ug/l	0.099	0.5	8310
ACMW3W01P	06/29/04	Naphthalene	ND <	ug/l	0.124	0.25	8310
ACMW3W01P	06/29/04	Cyanide, Total	0.007	mg/l	0.000	0.005	335.3
ACMW3W01P	06/29/04	Free Cyanide	ND <	mg/l	0.000	0.005	335.3
ACMW3W01P	06/29/04	Arsenic (Total)	ND <	mg/l	0.0038	0.04	6010
ACMW3W01P	06/29/04	Arsenic (Dissolved)	ND <	mg/l	0.0038	0.04	6010
ACMW5W01P	06/29/04	Benzene	ND <	ug/l	0.054	5	8021
ACMW5W01P	06/29/04	Ethylbenzene	ND <	ug/l	0.077	5	8021
ACMW5W01P	06/29/04	Toluene	ND <	ug/l	0.125	5	8021
ACMW5W01P	06/29/04	Xylene (total)	ND <	ug/l	0.233	10	8021
ACMW5W01P	06/29/04	Anthracene	ND <	ug/l	0.024	0.1	8310
ACMW5W01P	06/29/04	Pyrene	ND <	ug/l	0.034	0.1	8310
ACMW5W01P	06/29/04	Benzo(g,h,i)perylene	ND <	ug/l	0.016	0.1	8310
ACMW5W01P	06/29/04	Indeno(1,2,3-cd)pyrene	ND <	ug/l	0.041	0.25	8310
ACMW5W01P	06/29/04	Benzo(b)fluoranthene	ND <	ug/l	0.016	0.1	8310
ACMW5W01P	06/29/04	Fluoranthene	ND <	ug/l	0.044	0.1	8310
ACMW5W01P	06/29/04	Benzo(k)fluoranthene	ND <	ug/l	0.033	0.1	8310
ACMW5W01P	06/29/04	Acenaphthylene	ND <	ug/l	0.153	1	8310
ACMW5W01P	06/29/04	Chrysene	ND <	ug/l	0.03	0.1	8310
ACMW5W01P	06/29/04	Benzo(a)pyrene	ND <	ug/l	0.033	0.1	8310
ACMW5W01P	06/29/04	Dibenz(a,h)anthracene	ND <	ug/l	0.029	0.1	8310
ACMW5W01P	06/29/04	Benzo(a)anthracene	ND <	ug/l	0.032	0.1	8310
ACMW5W01P	06/29/04	Acenaphthene	ND <	ug/l	0.331	1	8310
ACMW5W01P	06/29/04	Phenanthrene	ND <	ug/l	0.025	0.1	8310

APPENDIX E
GROUND WATER ANALYTICAL RESULTS
Addendum No.1 to RI Report
Arkansas City MGP Site

Sample Location	Date	Parameter	Conc.	Units	MDL	PQL	Method
ACMW5W01P	06/29/04	Fluorene	ND	< ug/l	0.099	0.5	8310
ACMW5W01P	06/29/04	Naphthalene	ND	< ug/l	0.124	0.25	8310
ACMW5W01P	06/29/04	Cyanide, Total	0.433	mg/l	0.000	0.005	335.3
ACMW5W01P	06/29/04	Free Cyanide	0.152	mg/l	0.000	0.005	335.3
ACMW5W01P	06/29/04	Arsenic (Total)	ND	< mg/l	0.0038	0.04	6010
ACMW5W01P	06/29/04	Arsenic (Dissolved)	ND	< mg/l	0.0038	0.04	6010
ACMW5W01D	06/29/04	Benzene	ND	< ug/l	0.054	5	8021
ACMW5W01D	06/29/04	Ethylbenzene	ND	< ug/l	0.077	5	8021
ACMW5W01D	06/29/04	Toluene	ND	< ug/l	0.125	5	8021
ACMW5W01D	06/29/04	Xylene (total)	ND	< ug/l	0.233	10	8021
ACMW5W01D	06/29/04	Anthracene	ND	< ug/l	0.024	0.1	8310
ACMW5W01D	06/29/04	Pyrene	ND	< ug/l	0.034	0.1	8310
ACMW5W01D	06/29/04	Benzo(g,h,i)perylene	ND	< ug/l	0.016	0.1	8310
ACMW5W01D	06/29/04	Indeno(1,2,3-cd)pyrene	ND	< ug/l	0.041	0.25	8310
ACMW5W01D	06/29/04	Benzo(b)fluoranthene	ND	< ug/l	0.016	0.1	8310
ACMW5W01D	06/29/04	Fluoranthene	ND	< ug/l	0.044	0.1	8310
ACMW5W01D	06/29/04	Benzo(k)fluoranthene	ND	< ug/l	0.033	0.1	8310
ACMW5W01D	06/29/04	Acenaphthylene	ND	< ug/l	0.153	1	8310
ACMW5W01D	06/29/04	Chrysene	ND	< ug/l	0.03	0.1	8310
ACMW5W01D	06/29/04	Benzo(a)pyrene	ND	< ug/l	0.033	0.1	8310
ACMW5W01D	06/29/04	Dibenz(a,h)anthracene	ND	< ug/l	0.029	0.1	8310
ACMW5W01D	06/29/04	Benzo(a)anthracene	ND	< ug/l	0.032	0.1	8310
ACMW5W01D	06/29/04	Acenaphthene	ND	< ug/l	0.331	1	8310
ACMW5W01D	06/29/04	Phenanthrene	ND	< ug/l	0.025	0.1	8310
ACMW5W01D	06/29/04	Fluorene	ND	< ug/l	0.099	0.5	8310
ACMW5W01D	06/29/04	Naphthalene	ND	< ug/l	0.124	0.25	8310
ACMW5W01D	06/29/04	Cyanide, Total	0.436	mg/l	0.000	0.005	335.3
ACMW5W01D	06/29/04	Free Cyanide	0.169	mg/l	0.000	0.005	335.3
ACMW5W01D	06/29/04	Arsenic (Total)	ND	< mg/l	0.0038	0.04	6010
ACMW5W01D	06/29/04	Arsenic (Dissolved)	ND	< mg/l	0.0038	0.04	6010
TRIP BLANK		Ethylbenzene	ND	< ug/l	0.077	5	8021
TRIP BLANK		Toluene	ND	< ug/l	0.125	5	8021
TRIP BLANK		Xylene (total)	ND	< ug/l	0.233	10	8021
TRIP BLANK		Benzene	ND	< ug/l	0.054	5	8021

APPENDIX F
DATA VALIDATION REPORTS

VALIDATA

Chemical Services, Inc.

4070 Balleycastle Lane, Duluth, GA 30097

(770) 232-0130

(770) 232-5082 (Fax)

www.datavalidator.com

DATA VALIDATION SUMMARY REPORT

COMPANY: Black and Veatch
SITE NAME: Westar Energy/Arkansas City
TASK ORDER #: 65541.2010(P.O.)
CONTRACTED LAB: Gulf Coast Analytical Laboratories, Inc.
QA/QC LEVEL: EPA Level IV
EPA SOW/METHOD: EPA 1990 SOW
VALIDATION GUIDELINES: USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review, 1999; USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, 1999.
SAMPLE MATRICES: Soil and Water
TYPES OF ANALYSES: Benzene, Toluene, Ethylbenzene, Xylene (BTEX), Polynuclear Aromatic Hydrocarbons (PAH), Total Arsenic, Dissolved Arsenic, Total Cyanide, Free Cyanide
SAMPLING DATE: June 29,2004
SDG NUMBER: 204070204 (Workorder Number)

<u>Client Sample #</u>	<u>Lab Sample #</u>	<u>Matrix</u>	<u>BTEX</u>	<u>PAH</u>	<u>Total Arsenic</u>
ACSP23S01P	20407020401	Soil	X	X	
ACSP23S01MS	20407020402	Soil	X	X	
ACSP23S01MSD	20407020403	Soil	X	X	
ACSP24S01P	20407020404	Soil	X	X	
ACSP25S01P	20407020405	Soil	X	X	
ACSP25S01D	20407020406	Soil	X	X	
ACSP31S01P	20407020407	Soil	X	X	
ACSP34S01P	20407020408	Soil	X		
ACSP34S01PMS	179724	Soil	X		
ACSP34S01PMSD	179725	Soil	X		
ACMW5W01P	20407020409	Water	X	X	X
ACMW5W01D	20407020410	Water	X	X	X
ACMW2W01P	20407020411	Water	X	X	X
ACMW1W01P	20407020412	Water	X	X	X
ACMW3W01P	20407020413	Water	X	X	X
ACMW3W01MS	20407020414	Water	X	X	
ACMW3W01MSD	20407020415	Water	X	X	

<u>Client Sample #</u>	<u>Lab Sample #</u>	<u>Matrix</u>	<u>BTEX</u>	<u>PAH</u>	<u>Total Arsenic</u>
ACMW3W01DUP	20407020416	Water			X
TRIP BLANK	20407020424	Water	X		

<u>Client Sample #</u>	<u>Lab Sample #</u>	<u>Matrix</u>	<u>Total Cyanide</u>	<u>Free Cyanide</u>
ACMW5W01P	20407020409	Water	X	X
ACMW5W01D	20407020410	Water	X	X
ACMW2W01P	20407020411	Water	X	X
ACMW1W01P	20407020412	Water	X	X
ACMW3W01P	20407020413	Water	X	X
ACMW3W01MS	20407020414	Water	X	X
ACMW3W01DUP	20407020416	Water	X	X

<u>Client Sample #</u>	<u>Lab Sample #</u>	<u>Matrix</u>	<u>Dissolved Arsenic</u>
ACMW5W01P	20407020417	Water	X
ACMW5W01D	20407020418	Water	X
ACMW2W01P	20407020419	Water	X
ACMW1W01P	20407020420	Water	X
ACMW3W01P	20407020421	Water	X
ACMW3W01MS	20407020422	Water	X
ACMW3W01DUP	20407020423	Water	X

DATA REVIEWERS:

Timothy Morris, Amy Hogan, Monalisa B. Beasley

RELEASE SIGNATURE:

Monalisa B. Beasley

Data Qualifier Definitions

- J - The associated numerical value is an estimated quantity.
- R - The data are unusable (the compound/analyte may or may not be present). Resampling and reanalysis are necessary for verification.
- U - The compound/analyte was analyzed for, but not detected. The associated numerical value is the sample quantitation limit.
- UJ - The compound/analyte was analyzed for, but not detected. The sample quantitation limit is an estimated quantity.

DATA VALIDATION SUMMARY

GCAL, Inc. - 204070204 Organics and Inorganics

SAMPLES: ACSP23S01P, ACSP23S01MS, ACSP23S01MSD, ACSP24S01P, ACSP25S01P, ACSP25S01D, ACSP31S01P, ACMW5W01P, ACMW5W01D, ACMW2W01P, ACMW1W01P, ACMW3W01P, ACMW3W01MS, ACMW3W01MSD

BENZENE, TOLUENE, ETHYLBENZENE, XYLENES (BTEX)

SUMMARY

BTEX analyses were performed using SW-846 Method 8021.

All laboratory data were acceptable with qualification.

MAJOR ISSUES

There were no major problems observed in this fraction of the SDG.

MINOR ISSUES

I.) Holding Times:

All Holding Time criteria were met. No action was required.

II.) Instrument Performance:

All Instrument Performance criteria were met. No action was taken.

III.) Calibration:

All Initial and Continuing Calibration criteria were met. No action was required.

IV.) Blanks:

There were no detections in the method and trip blanks for this SDG. No action was required.

V.) Surrogate Recoveries:

Samples ACSP34S01P, ACSP34S01PMS, and ACSP34S01PMSD had surrogate recoveries (251%, 239% and 267% respectively) which exceed the QC limits of 47% to 149%. All associated positive data were flagged as estimated (J).

VI.) Laboratory Control Samples (LCS):

Three LCSs were analyzed for this SDG. All LCS Recovery criteria were met. No action was required.

VII.) Matrix Spike / Matrix Spike Duplicate (MS / MSD):

MS / MSD analyses (samples ACSP23S01MS, ACSP23S01MSD, ACSP34S01PMS, ACSP34S01PMSD, ACMW3W01MS AND ACMW2W01MSD) were associated with this fraction of the SDG. All MS / MSD criteria were met. No action was required.

VIII.) Field Duplicates:

Two sets of field duplicate samples were submitted for analysis (ACSP25S01P/ ACSP25S01D and ACMW5W01P/ACMW5W01D). Only the set (ACSP25S01P/ ACSP25S01D) was calculable in this SDG. The calculable Relative Percent Differences (RPDs) were:

<u>Compound</u>	<u>ACSP25S01P</u>	<u>ACSP25S01D</u>	<u>RPD</u>
benzene	13.1 ug/kg	8.5 ug/kg	43%
toluene	13.4 ug/kg	6.4 ug/kg	71%

One RPD exceeded the 60% QC limit for soil samples. Data qualification based on field duplicate criteria was not required. No action was taken.

IX.) Internal Standards Performance (ISTD):

All ISTD criteria were met. No action was required.

X.) TCL Compound Identification:

All TCL Compound Identification criteria were met. No action was taken.

XI.) Compound Quantitation and Reported Contract Required Quantitation Limits (CRQL):

All CRQL criteria were met. No action was required.

XII.) Tentatively Identified Compounds (TICs):

TIC data were not required for this SDG. No action was required.

XIII.) System Performance:

All System Performance criteria were met. No action was taken.

POLYNUCLEAR AROMATIC HYDROCARBONS (PAH)

SUMMARY

PAH analyses were performed using SW-846 Method 8310.

All laboratory data were acceptable without qualification.

MAJOR ISSUES

There were no major problems observed in this fraction of the SDG.

MINOR ISSUES

I.) Holding Times:

All Holding Time criteria were met. No action was required.

II.) Instrument Performance:

All Instrument Performance criteria were met. No action was required.

III.) Calibration:

Initial Calibration:

All Initial Calibration criteria were met. No action was required.

Continuing Calibration:

The Percent Difference (%D) for pyrene at 18.3% in the continuing calibration verification sample analyzed on July 14, 2004 at 12:38 on instrument HPLC1 exceeded the QC limit of 15%. There were no associated SDG samples, no action was taken.

IV.) Blanks:

There were no detections in the method blanks. No action was necessary.

Tentatively Identified Compounds (TIC):

TIC data were not included in this SDG. No action was required.

V.) Surrogate Recoveries:

The surrogates were diluted out of samples ACSP23S01P, ACSP23S01MS, ACSP23S01MSD, ACSP31S01P, and ACSP34S01P. No action was necessary.

VI.) Laboratory Control Samples (LCS):

Two LCS/LCD pairs were analyzed in this fraction of the SDG. The soil LCS/LCD pair had 2 Relative Percent Differences (RPDs) exceed the QC limit. All water LCS criteria were met. Data qualification based on LCS criteria was not required. No action was taken.

VII.) Matrix Spike / Matrix Spike Duplicate (MS / MSD):

MS / MSD analyses were performed on soil SDG sample ACSP23S01P. Five Relative Percent Differences (RPDs) and thirty-one Percent Recoveries (%Rs) were outside the QC limits. Data qualification based on MS / MSD criteria were not required for this fraction of the SDG. No action was taken.

VIII.) Field Duplicates:

One field duplicate sample set (ACSP25S01P/ACSP25S01D) was analyzed in the soil fraction in this SDG. The calculable Relative Percent Differences (RPDs) were:

<u>Compound</u>	<u>ACSP25S01P</u>	<u>ACSP25S01D</u>	<u>RPD</u>
benzo(a)anthracene	7.65 ug/L	15.4 ug/L	67 %
benzo(a)pyrene	5.75 ug/L	19.0 ug/L	107%

The RPDs for two compounds exceeded the 60% QC limit for soil samples. Data qualification based on field duplicate criteria was not required. The water fraction field duplicate set (ACMW5W01P/ACMW5W01D) had no calculable RPDs. No action was taken.

IX.) TCL Compound Identification:

All TCL Compound Identification criteria were met. No action was taken.

X.) Compound Quantitation and Reported Contract Required Quantitation Limits (CRQL):

All CRQL criteria were met. No action was required.

XI.) System Performance:

All System Performance criteria were met. No action was taken.

TOTAL AND DISSOLVED ARSENIC

SUMMARY

Total and Dissolved Arsenic analyses were performed using SW-846 Method 6010B.

All laboratory data were acceptable without qualifications.

MAJOR ISSUES

There were no major problems observed for this fraction of the SDG.

MINOR ISSUES

I.) Holding Times:

All Holding Time criteria were met. No action was taken.

II.) Calibration:

All Initial and Continuing Calibration criteria were met. No action was taken.

III.) Blanks:

There were no detections in the blanks associated with this fraction of the SDG. No action was required.

IV.) ICP Interference Check Sample Results:

All Interference Percent Recovery criteria were met. There were no interferences observed in the Interference Check Solution. No action was required.

V.) ICP Serial Dilution Analysis:

All Serial Dilution Analysis criteria were met. No action was required.

VI.) Laboratory Control Samples (LCS):

All LCS Recovery criteria were met. No action was necessary.

VII.) Duplicate Sample Analysis:

All Duplicate Sample Analysis criteria were met.

VIII.) Matrix Spike / Matrix Spike Duplicate (MS / MSD):

All Matrix Spike/Matrix Spike Duplicate criteria were met. No action was required.

IX.) Field Duplicates:

The water fraction field duplicate set (ACMW5W01P/ACMW5W01D) had no calculable results. No action was required.

X.) Sample Result, Calculation/Transcription Verification:

All criteria were met. No action was taken.

XI.) Quarterly Verification of Instrumental Parameters:

Quarterly Verification data were not submitted for this SDG. No action was taken.

TOTAL AND FREE CYANIDE

SUMMARY

The analyses for Total and Free Cyanide were performed using EPA Method 335.3.

All laboratory data were acceptable with qualification.

MAJOR ISSUES

No major problems were observed in this fraction of the SDG.

MINOR ISSUES

I.) Holding Times:

All Holding Time criteria were met. No action was taken.

II.) Calibration:

All Calibration criteria were met. No action was required.

III.) Blanks:

All Method Blank criteria were met. No action was required.

IV.) Laboratory Control Samples (LCS):

One LCS sample was analyzed in this fraction of the SDG. All LCS criteria were met. No action was necessary.

V.) Matrix Spike / Matrix Spike Duplicate (MS / MSD):

Batch MS analyses were analyzed for this SDG fraction. No form ones were provided for the MS. MS was evaluated based on the bench sheets provided. All MS criteria were met. No action was required.

VI.) Field Duplicates:

There was one set of field duplicate samples (ACMW5W01P/ACMW5W01D) for this fraction of the SDG. Field duplicate samples were estimated due to exceedance of the linear range of the calibration curve. Results were not compared. No action was taken.

VII.) Sample Result, Calculation/Transcription Verification:

Samples ACMW5W01P and ACMW5W01D results exceeded the upper limit of the calibration curve. Both samples were qualified as estimated (J). The duplicate sample met criteria, however a form one was not provided.



October 6, 2004

Mr. John Cook
Kansas Department of Health and Environment
Charles Curtis State Office Building
1000 SW Jackson, Suite 410
Topeka, KS 66612

Re: Addendum No. 1 to the Remedial Investigation Report
For the Arkansas City Manufactured Gas Site

Dear Mr. Cook,

As referenced by your letter dated May 12, 2004, Westar Energy has coordinated additional characterizations of the above site in the summer of 2004. Enclosed for your review are two signed and sealed copies of the Addendum No. 1 to the Remedial Investigation Report for the Arkansas city manufactured gas plant (MGP) site.

As referenced in Section 6.3 of the report, Westar Energy is requesting that KDHE authorize the preparation of a Corrective Action Decision (CAD) without the completion of a feasibility study. The CAD should consist of ground water monitoring at the site. If this decision is received before March, 2005, ground water monitoring of this site could be concurrent with the ground water monitoring at the Newton MGP site.

If you have any additional questions or concerns about the report, please feel free to contact me at 785-575-1548 or by e-mail at tom_brown@wr.com. If necessary, I can coordinate any additional requests with a representative from Black & Veatch.

Sincerely,

Tom Brown P.E.
Manager, Water and Waste Programs

Cc: B. Eastman, 2nd and Jackson, file IV – 30.702

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OCT 07 2004

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