



March 30, 2016

Mr. Todd Davis  
Site Assessment Manager  
U.S. Environmental Protection Agency, Region 7  
11201 Renner Boulevard  
Lenexa, Kansas 66219

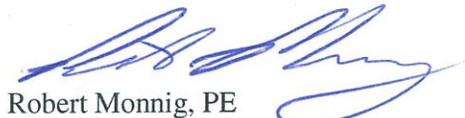
**Subject: Quality Assurance Project Plan for a Phase II Targeted Brownfields Assessment  
Elkem Carbide, Keokuk, Iowa  
U.S. EPA Region 7 START 4, Contract No. EP-S7-13-06, Task Order No. 0002.019.017  
Task Monitor: Todd Davis, Site Assessment Manager**

Dear Mr. Davis:

Tetra Tech, Inc. is submitting the attached Quality Assurance Project Plan (QAPP) for a Phase II Targeted Brownfields Assessment (TBA) of the Elkem Carbide site in Keokuk, Iowa. The TBA will include investigations to determine whether hazardous substances are associated with recognized environmental conditions and if asbestos and/or lead-based paint are present in the on-site structures.

If you have any questions or comments, please contact the Project Manager at (816) 412-1775.

Sincerely,



Robert Monnig, PE  
START Project Manager



Ted Faile, PG, CHMM  
START Program Manager

Enclosures

cc: Debra Dorsey, START Project Officer (cover letter only)

**QUALITY ASSURANCE PROJECT PLAN  
FOR A PHASE II TARGETED BROWNFIELDS ASSESSMENT**

**ELKEM CARBIDE  
KEOKUK, IOWA**

**Superfund Technical Assessment and Response Team (START) 4 Contract  
Contract No. EP-S7-13-06, Task Order 0002.019.017**

Prepared For:

U.S. Environmental Protection Agency  
Region 7  
Superfund Division  
11201 Renner Boulevard  
Lenexa, Kansas 66219

March 30, 2016

Prepared By:

Tetra Tech, Inc.  
415 Oak Street  
Kansas City, Missouri 64106  
(816) 412-1741

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**1.6 Special Training/Certification Requirements:**

- OSHA 1910       Special Equipment/Instrument Operator (describe below):       Other (describe below):

The lead-based paint (LBP) inspection will be conducted by a licensed Iowa inspector experienced in use of field-portable x-ray fluorescence (XRF) analyzers. The asbestos inspection will be conducted by someone who has received training and certification in compliance with the Asbestos Hazard Emergency Response Act (AHERA).

**1.7 Documentation and Records:**

- Field Sheets       Site Log       Trip Report       Site Maps       Video  
 Chain of Custody       Health and Safety Plan       Letter Report       Photos
- Sample documentation will follow EPA Region 7 SOP 2420.05.  
 A copy of this QAPP and any future amendments will be available to all personnel throughout sampling activities. Original documents will be maintained by EPA.  
 Other: Analytical information will be handled according to procedures identified in Table 2. A combined Phase II ESA, LBP, and asbestos-containing material (ACM) survey report will be completed.

**2.0 Measurement and Data Acquisition:**

**2.1 Sampling Process Design:**

- Random Sampling       Transect Sampling       Biased/Judgmental Sampling       Stratified Random Sampling  
 Search Sampling       Systematic Grid       Systematic Random Sampling       Definitive Sampling  
 Screening w/o Definitive Confirmation       Screening w/ Definitive Confirmation  
 Sample Map Attached
- Other (Provide rationale behind each sample): See Appendix A for additional sampling information.

The proposed sampling scheme for surface soil sampling to quantify polycyclic aromatic hydrocarbons (PAH) and metals contamination includes application of an Incremental Sampling Methodology (ISM). In applying this method, START will use a random number generator to locate unbiased aliquots within a Simple Random Sampling Pattern in accordance with the *Incremental Sampling Methodology, Technical and Regulatory Guidance* (Interstate Technology Regulatory Council [ITRC] 2012). All other sampling will be judgmental, in accordance with the *Guidance for Performing Site Inspections Under CERCLA*, Office of Solid Waste and Emergency Response (OSWER) Directive #9345.1-05, September 1992, and *Removal Program Representative Sampling Guidance, Volume 1: Soil*, OSWER Directive 9360.4-10, November 1991. Judgmental sampling is the subjective selection of sampling locations based on historical information, visual inspection, and best professional judgment of the sampler(s). See Appendices A and B for additional site-specific information and figures.

The on-site structures will undergo LBP and asbestos inspections; "household" hazardous waste and hazardous materials will also be inventoried. During the LBP inspection, paint-covered surfaces will be screened for lead by use of an XRF analyzer. No laboratory confirmation samples for lead will be collected, as standard practice is to rely solely on XRF readings during LBP inspections.

During the asbestos inspection, samples of suspect building materials will be collected to determine if they contain asbestos. Approximately 220 samples are proposed to characterize pipe wrap, floor tiles, ceiling tiles, and other materials. The inspection is designed to quantify the amount of asbestos-containing building material on the subject property.

A summary of anticipated maximum number of samples to be collected for laboratory analysis is as follows. The proposed number of samples represents a balance between cost and coverage, and a reasonable attempt to meet the study objectives while staying within the budget constraints of a typical Brownfields Assessment.

Sample Summary Location	Matrix	# of Samples	Analysis
On-site Structure	Structural Materials	220	Asbestos via Polarized Light Microscopy (PLM)
On-site Structure	Structural Materials	7 (approximately 3% of PLM samples)	Asbestos via EPA Point Count 400
Shallow soil within decision units (DU) defined to assess PAH and metals (including lead) contamination	Soil	36	Recourse Conservation Recovery Act (RCRA) metals (including lead) and semivolatile organic compounds (SVOC) (including PAHs)
Bulk spills of coal-tar pitch, coke, or coal onto the ground surface identified during sampling of DUs	Solid	4 (estimated)	Toxicity Characteristic Leaching Procedure (TCLP) SVOCs and TCLP RCRA metals
Subsurface soil sampling to investigate an area in the central portion of the former manufacturing area where a lead concentration of 20,000 milligrams per kilogram (mg/kg) was detected (Terracon boring B-8)	Soil	20	RCRA metals (including lead)
Subsurface soil sampling to investigate an area in the southeast portion of the former manufacturing area where maximum PAH soil concentrations have been detected (Terracon boring B-48)	Soil	20	SVOCs (including PAHs)

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Subsurface sampling to investigate five areas of concern related to underground storage tanks (UST) and a former hydraulic lift	Soil	10	Volatile organic compounds (VOC), Total Extractable Hydrocarbons (TEH), RCRA metals (including lead)
	Groundwater (if encountered)	5	VOCs, TEH, RCRA metals (including lead)
Area of transformer oil release, including one soil sample at the point of release and a sediment sample from Soap Creek	Soil/Sediment	2	Polychlorinated biphenyls (PCB)
Shallow soil near Buildings #2 (Carbide Container Storage), #6 (Maintenance Shop), and #9 (Paste Block).	Soil	6 (estimated)	TEH, RCRA metals (including lead)

**2.2 Sample Methods Requirements:**

Matrix	Sampling Method	EPA SOP(s) or other Method
Structural Materials	Samples will be collected by application of techniques appropriate for the suspect building materials. A coring device will be used at interior and exterior wall locations.	ASTM E 2356-10
Soil (shallow) by ISM	Surface soil sampling within DUs established over the former manufacturing area of the subject property will conform to an ISM sampling scheme. Increments (aliquots) will be collected by use of a soil core sampler.	EPA SOPs 4231.2012, 4220.03, 4230.19, and guidelines outlined in ITRC's <i>Incremental Sampling Methodology, Technical and Regulatory Guidance</i>
Soil (subsurface)	Soil samples will be collected in disposable polyvinyl chloride (PVC) sleeves inserted into a soil core sampler, which will be manually driven to desired sampling depths. Soil will be collected from the sleeves by use of disposable stainless steel spoons, and will be transferred to appropriate sample containers.	EPA SOP 4231.2012
Soil (shallow) / Sediment	Surface soil and sediment samples will be collected by use of a garden trowel or disposable stainless steel spoons.	EPA SOP 4231.2012
Groundwater	Groundwater samples will be collected from Geoprobe temporary monitoring wells. These groundwater samples will be collected through Geoprobe rods via disposable polyethylene tubing and a peristaltic pump or check valve.	EPA SOPs 4230.07 and 4231.2007

**2.3 Sample Handling and Custody Requirements:**

- Samples will be packaged and preserved in accordance with procedures defined in Region 7 EPA SOP 2420.06.
- COC will be maintained as directed by Region 7 EPA SOP 2420.04.
- Samples submitted to the EPA Region 7 laboratory will be accepted according to Region 7 EPA SOP 2420.01.
- Other (Describe): Samples will be accepted in accordance with procedures established by the START-contracted laboratories.

**2.4 Analytical Methods Requirements:**

- Identified in attached table.
- Rationale: The requested analyses have been selected based on historical information about the site and program experience with similar types of sites.
- Other (Describe):

**2.5 Quality Control (QC) Requirements**

- Not Applicable
- Identified in attached table.
- In accordance with the Generic Quality Assurance Project Plan for Superfund Site Assessment and Targeted Brownfields Assessment Programs (updated October 2012).
- Field QC Samples: Field QC samples will include duplicate and triplicate samples collected from each DU to assess reliability of the ISM sampling approach to estimate mean contaminant concentrations within the DUs. A water rinsate blank sample will be collected to assess adequacy of decontamination procedures. A water trip blank sample will be collected to assess field- and transportation-related contamination.
- Other (Describe):

**2.6 Instrument/Equipment Testing, Inspection, and Maintenance Requirements:**

- Not Applicable
- In accordance with the Generic Quality Assurance Project Plan for Superfund Site Assessment and Targeted Brownfields Assessment Programs (updated October 2012).
- Testing, inspection, and maintenance of analytical instrumentation will accord with the previously referenced SOPs and/or manufacturers' recommendations. Testing, inspection, and maintenance of field instruments (Global Positioning System [GPS] units, field-portable XRF units, etc.) will accord with manufacturers' recommendations.

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**2.7 Instrument Calibration and Frequency:**

- Not Applicable
- In accordance with the Generic Quality Assurance Project Plan for Superfund Site Assessment and Targeted Brownfields Assessment Programs (updated October 2012).
- Calibration of laboratory equipment will proceed as described in the previously referenced SOPs and/or manufacturers' recommendations.
- Other (Describe): Calibration checks of field instruments will occur daily, as specified in the manufacturers' recommendations.

**2.8 Inspection/Acceptance Requirements for Supplies and Consumables:**

- Not Applicable
- In accordance with the Generic Quality Assurance Project Plan for Superfund Site Assessment and Targeted Brownfields Assessment Programs (updated October 2012).
- All sample containers will meet EPA criteria for cleaning procedures for low-level chemical analysis. Sample containers will have Level II certifications provided by the manufacturer in accordance with pre-cleaning criteria established by EPA in *Specifications and Guidelines for Obtaining Contaminant-Free Containers*.
- Other (Describe):

**2.9 Data Acquisition Requirements:**

- Not Applicable
- In accordance with the Generic Quality Assurance Project Plan for Superfund Site Assessment and Targeted Brownfields Assessment Programs (updated October 2012).
- Previous data or information pertaining to the site (including other analytical data, reports, photos, maps, etc., that are referenced in this QAPP) have been compiled by EPA and/or its contractor(s) from other sources. Some of that data have not been verified by EPA and/or its contractor(s); however, that unverified information will not be used for decision-making purposes by EPA without verification by an independent professional qualified to verify such data or information.
- Other (Describe):

**2.10 Data Management:**

- All data acquired by the EPA Region 7 laboratory will be managed in accordance with Region 7 EPA SOP 2410.01.
- Other (Describe): Laboratory data acquired at the START-contracted laboratory will be managed in accordance with its established procedures.

**3.0 Assessment and Oversight:**

**3.1 Assessment and Response Actions:**

- Peer Review                       Management Review                       Field Audit                       Lab Audit
- Assessment and response actions pertaining to analytical phases of the project associated with the EPA Region 7 laboratory are addressed in Region 7 EPA SOPs 2430.06 and 2430.12.
- Other (Describe): Assessment and response actions pertaining to analytical phases of the project will accord with procedures established by the START-contracted laboratory.

**3.1A Corrective Action:**

- Corrective actions will be at the discretion of the EPA Project Manager whenever problems appear that could adversely affect data quality and/or resulting decisions affecting future response actions pertaining to the site.
- Other (Describe):

**3.2 Reports to Management:**

- Audit Report                       Data Validation Report                       Project Status Report                       None Required
- A combined LBP, ACM, and "household" hazardous waste survey report will be completed by START and submitted to EPA. A separate Phase II ESA report will address all other sampling.
- Reports will be prepared in accordance with the Generic Quality Assurance Project Plan for Superfund Site Assessment and Targeted Brownfields Assessment Programs (updated October 2012).
- Other (Describe): The analytical data package from the START-contracted laboratory will be validated internally by the contracted laboratory in accordance with the laboratory's established SOPs. A START chemist will conduct an external verification and validation of the laboratory data package.

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**4.0 Data Validation and Usability:**

**4.1 Data Review, Validation, and Verification Requirements:**

- Identified in attached table.
- Reports will be prepared in accordance with the Generic Quality Assurance Project Plan for Superfund Site Assessment and Targeted Brownfields Assessment Programs (updated October 2012).
- Data review and verification of analytical results generated by the EPA Region 7 laboratory will be performed by a qualified analyst and the laboratory's section manager as described in Region 7 EPA SOPs 2430.06, 2430.12, and 2410.10.
- Other (Describe):

**4.2 Validation and Verification Methods:**

- Identified in attached table.
- The data generated by the EPA Region 7 laboratory will be validated in accordance with Region 7 EPA SOPs 2430.06, 2430.12, and 2410.10.
- The EPA project manager will inspect the data to provide a final review. The EPA project manager will also compare the sample descriptions with field sheets for consistency, and will ensure appropriate documentation of any anomalies in the data.
- Other (Describe): The data will be validated using methods consistent with a Stage 2B validation, as described in the EPA Contract Laboratory Program (CLP) *Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use* (EPA 2009). A Stage 2B validation includes verification and validation based on a completeness and compliance check of sample receipt conditions and sample-related and instrument-related QC results. The EPA Project Manager will be responsible for overall validation and final approval of the data, in accordance with the projected use of the results.

**4.3 Reconciliation with User Requirements:**

- Identified in attached table.
- If data quality indicators do not meet the project's requirements as outlined in this QAPP, the data may be discarded, and re-sampling or re-analysis of the subject samples may be required by the EPA Project Manager.
- Other (Describe):

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**Table 1: Sample Summary**

<b>Site Name:</b> Elkem Carbide				<b>Location:</b> Keokuk, Iowa			
<b>START Project Manager:</b> Rob Monnig				<b>Activity/ASR #:</b> Not applicable			<b>Date:</b> March 2016
<b>No. of Samples</b>	<b>Matrix</b>	<b>Location</b>	<b>Purpose</b>	<b>Depth or other Descriptor</b>	<b>Requested Analysis</b>	<b>Sampling Methods</b>	<b>Analytical Method</b>
220	Structural Materials	Site building	To quantify asbestos in building materials	Bulk material from floors, walls, ceilings, and pipes	Asbestos via PLM	ASTM E 2356-10	National Institute for Occupational Safety and Health (NIOSH) Method 9002
7	Structural Materials	Site building	To verify asbestos concentrations in building materials	Bulk material from floors, walls, ceilings, and pipes	Asbestos via EPA Point Count 400	ASTM E 2356-10	EPA 600/R-93/116
36	Soil (shallow)	Surface soil within 12 defined decision units (DU) (see Appendix B, Figure 6)	To characterize the mean concentrations of PAHs and lead within DUs. Data will also be used to characterize potential contamination related to historical railroad lines.	0 to 6 inches	SVOCs (including PAHs) and total RCRA metals (including lead)	EPA SOPs 4231.2012, 4220.03, 4230.19, and guidelines outlined in the ITRC's <i>Incremental Sampling Methodology, Technical and Regulatory Guidance</i>	EPA 8270, 6010B
4 (estimated)	Solid	Bulk spills of coal-tar pitch, coke, or coal onto the ground surface identified during sampling of DUs	To characterize the material for selection of an appropriate disposal method	0 to 2 inches	TCLP SVOCs and TCLP RCRA metals	EPA SOPs 4231.2012, 4220.03, 4230.19	EPA 1311, 8270, 6010B
20	Soil (subsurface)	Subsurface soil near previous Terracon boring B-8 (see proposed borings B-51 through B-55 on Figure 7, Appendix B)	To investigate an area of concern where a lead concentration of 20,000 mg/kg was detected within the 0- to 2-foot bgs interval (Terracon boring B-8)	2 to 8 feet bgs (4 samples per boring)	RCRA metals (including lead)	EPA SOP 4231.2012	EPA 6010B
20	Soil (subsurface)	Subsurface soil near previous Terracon boring B-48 (see proposed borings B-56 through B-60 on Figure 7, Appendix B)	To investigate an area in the southeast portion of the former manufacturing area where maximum PAH soil concentrations have been detected (Terracon boring B-48 within the 0- to 2-foot bgs interval)	2 to 8 ft bgs (4 samples per boring)	SVOCs (including PAHs)	EPA SOP 4231.2012	EPA 8270
10	Soil (subsurface)	Four underground storage tank (UST) closure areas and one former hydraulic lift area	To investigate areas of concern related to USTs and a former hydraulic lift	0 to 30 ft bgs (2 samples per boring)	VOCs, TEH, Dissolved RCRA metals (including lead)	EPA SOP 4231.2012	EPA 8260, EPA 6010B, Iowa OA-1/OA-2
5	Groundwater	(see proposed borings B-61 through B-65 on Figure 7, Appendix B)		Top of water table		SOPs 4230.07 and 4231.2007	

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**Table 1: Sample Summary**

<b>Site Name:</b> Elkem Carbide				<b>Location:</b> Keokuk, Iowa			
<b>START Project Manager:</b> Rob Monnig				<b>Activity/ASR #:</b> Not applicable		<b>Date:</b> March 2016	
<b>No. of Samples</b>	<b>Matrix</b>	<b>Location</b>	<b>Purpose</b>	<b>Depth or other Descriptor</b>	<b>Requested Analysis</b>	<b>Sampling Methods</b>	<b>Analytical Method</b>
1	Soil (shallow)	A grab sample from the point of release (or a multi-aliquot composite sample from the probable area of release if the release point cannot be determined exactly) and a multi-aliquot sample of sediment from Soap Creek immediately downstream of outfall (see SS-65 and SED-66 on Figure 7, Appendix B)	To assess for PCB contamination related to an approximately 400-gallon oil release from a transformer on December 20, 2000.	0 – 6 inches	PCBs	EPA SOP 4231.2012	EPA 8082
1	Sediment			0 – 2 inches		EPA SOP 4231.2012	
6 (estimated)	Soil (shallow)	During the 2016 Phase I ESA and previous investigations, oil staining was observed in buildings #2 (Carbide Container Storage), #6 (Maintenance Shop), and #9 (Paste Block). The sampler will attempt to determine if releases other than de minimis amounts have occurred to the environment. If such a release is found, a shallow soil sample will be collected at the point of release to surface soil.	To assess for impacts on surface soil possibly related to staining observed in building #2, #6, and #9.	0 – 6 inches	TEH, Metals (including lead)	EPA SOP 4231.2012	EPA 6010B, Iowa OA-1/OA-2
<b>Quality Control Samples</b>							
3 replicates per DU	Soil (shallow)	DU sampling includes collection of primary, duplicate, and triplicate samples in each DU	To quantify uncertainty in contaminant concentrations	0-6 inches bgs	SVOCs (including PAHs) and total metals (including lead)	EPA SOPs 4231.2012, 4220.03, 4230.19, and guidelines outlined in the ITRC's <i>Incremental Sampling Methodology, Technical and Regulatory Guidance</i>	EPA 8270, 6010B
1	Water	Rinsate blank	To assess adequacy of decontamination procedures	N/A	VOCs, TEH, RCRA metals	N/A	EPA 8260, EPA 6010B, Iowa OA-1/OA-2
1	Water	Trip blank	To assess field/transportation-related contamination	N/A	VOCs	N/A	Trip blank

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**Table 2: Data Quality Objectives Summary**

<b>Site Name:</b> Elkem Carbide				<b>Location:</b> Keokuk, Iowa				
<b>START Project Manager:</b> Rob Monnig				<b>Activity/ASR #:</b> Not applicable			<b>Date:</b> March 2016	
Analysis	Analytical Method	Data Quality Measurements					Sample Handling Procedures	Data Management Procedures
		Accuracy	Precision	Representativeness	Completeness	Comparability		
Asbestos via PLM	See Table 1	Per analytical method	Per analytical method	Judgmental sampling based on professional judgment of the sampling team	100%; No specific critical samples have been identified.	Standardized procedures for sample collection and analysis will be used.	See Section 2.3 of QAPP form.	See Section 2.10 of QAPP form.
Asbestos via EPA Point Count 400	See Table 1	Per analytical method	Per analytical method	Judgmental sampling based on professional judgment of the sampling team	100%; No specific critical samples have been identified.	Standardized procedures for sample collection and analysis will be used.	See Section 2.3 of QAPP form.	See Section 2.10 of QAPP form.
SVOCs, metals	See Table 1	Per analytical method	Per analytical method	Random sampling within DUs by application of ISM	100%; No specific critical samples have been identified.	Standardized procedures for sample collection and analysis will be used.	See Section 2.3 of QAPP form.	See Section 2.10 of QAPP form.
VOCs, SVOCs, metals, TEH, PCBs	See Table 1	Per analytical method	Per analytical method	Judgmental sampling based on professional judgment of the sampling team	100%; No specific critical samples have been identified.	Standardized procedures for sample collection and analysis will be used.	See Section 2.3 of QAPP form.	See Section 2.10 of QAPP form.

**APPENDIX A**

**SITE-SPECIFIC INFORMATION REGARDING ELKEM CARBIDE**

## INTRODUCTION

The Tetra Tech, Inc. (Tetra Tech) Superfund Technical Assessment and Response Team (START) has been tasked by the U.S. Environmental Protection Agency (EPA) Region 7 Superfund Division to conduct a Phase II Targeted Brownfields Assessment (TBA) of the Elkem Carbide site, an approximately 79-acre property (subject property) at 365 Carbide Lane in the City of Keokuk (City), Lee County, Iowa (see Appendix B, Figures 1 and 2). The subject property has historically been used for zinc refining, production of hardened lead alloy (Frary metal), and manufacture of various carbide products. The subject property is currently not in use and is owned by 365 Carbide Lane, LLC (365 Carbide Lane).

The primary purpose of the investigation is to assess potential impact on the subject property of hazardous substances that may have been released into the soil and groundwater. The scope of the TBA will include:

- Inspecting on-site structures for presence of asbestos-containing building materials (ACBM) and lead-based paint (LBP)
- Inventorying containerized hazardous waste and hazardous materials
- Sampling shallow soil to determine mean concentrations of polycyclic aromatic hydrocarbons (PAH) and lead—two contaminants of concern identified by previous sampling—within defined decision units (DU)
- Identifying and characterizing coal-tar pitch, coke, and coal spills for disposal
- Sampling subsurface soil to confirm previous findings of particularly high concentrations of PAHs and lead in soil samples
- Sampling subsurface soil and groundwater to investigate concerns regarding previously closed underground storage tanks (UST)
- Sampling shallow soil and sediment to assess possible presence of polychlorinated biphenyls (PCB) related to a release of 400 gallons of oil from a transformer on December 20, 2000
- Investigating oil staining within buildings of the subject property and sampling shallow soil if other than de minimis amounts of oil appear to have been released to the environment.

The TBA will accord with industry standard practice for Phase II Environmental Site Assessments (ESA). This Quality Assurance Project Plan (QAPP) identifies site-specific features and addresses elements of the sampling strategy and analytical methods proposed for this investigation.

## **SITE LOCATION/DESCRIPTION**

The subject property is a 78.83-acre parcel (number 21-22-200-031) owned by 365 Carbide Lane, at the southeast corner of Carbide Lane and U.S. Highway 61 in Keokuk, Lee County, Iowa. The site is included on the Keokuk, IA, U.S. Geological Survey (USGS) 7.5-minute topographic series map (USGS 1975) (see Appendix B, Figure 1). The site is in the north ½ of the northeast ¼ of Section 22, and in the northwest ¼ of Section 23, all in Township 65 North, Range 5 West. Coordinates at the approximate center of the subject property are 40.41956 degrees north latitude and 91.42108 degrees west longitude.

On the central portion of the subject property are buildings, roads, rail lines, and other improvements that from 1915 to 2007 supported manufacturing operations of previous owners, including River Smelting and Refining Company, United Lead Company, Midwest Carbide Corporation, and Elkem Metals. A capped and closed landfill that received calcium carbide and other wastes generated in the manufacturing process covers the east portion of the subject property. Unimproved grass and forest-covered areas are on the western portion of the subject property (see Appendix B, Figure 2).

The subject property is in a mixed use area of the City including industrial, commercial, agricultural, and residential properties. Figure 2 in Appendix B illustrates the location and boundaries of the subject property. The subject property is bounded north by Carbide Lane; east by industrial properties; south by residential, industrial, and commercial properties; and west by U.S. Highway 61. Industrial properties are beyond to the north, northeast, east, southeast, south, and southwest. Agricultural and forested land are beyond to the west and northwest.

## **CURRENT AND PAST USES OF THE SITE**

Historical documentation indicates that the subject property was converted from farm use to industrial manufacturing in 1915 when a secondary zinc smelter plant was constructed on the property by River Smelting and Refining Company, a subsidiary of National Lead Company. The smelter operated on the property until around 1919. Before the smelter closed, an additional plant was constructed on the subject property in 1916 by United Lead (another subsidiary of National Lead Company), and produced Frary metal, a lead alloy hardened by calcium and barium (Tetra Tech 2016). In 1929, the United Lead Company merged with Shawinigan Products to form Midwest Carbide Corporation (Midwest Carbide), and the subject property was used to produce calcium carbide (Terracon Consultants, Inc. [Terracon] 2009). In 1952, Midwest Carbide reportedly began production of Soderberg electrode paste by combining calcinated anthracite coal with coal tar pitch (Terracon 2009). In the late 1980s, the carbide plant was shut down, and in 2007, production of all other products ceased (Terracon 2009). Carbide Lane

Properties, LLC purchased the subject property from Elkem Metals Company in 2008. The property was then sold to 365 Carbide Lane in 2015. The subject property is currently inactive.

## **PREVIOUS INVESTIGATIONS**

EPA Region 7 provided previous reports related to past investigations and management of the subject property as a Resource Conservation and Recovery Act (RCRA) facility, reports documenting a Phase I and II ESA of the subject property by Terracon in 2009 and 2010 as part of an EPA Brownfields Assessment Grant Project, and a report documenting a site investigation of the subject property conducted for EPA by USGS. The individual reports are summarized in Appendix H. The following are summaries of findings from the reports organized by particular subject property features.

### **Landfill and Underlying Groundwater**

Landfilling of manufacturing wastes on the eastern portion of the subject property began as early as 1914 (CDM Federal Programs Corporation [CDM] 1987). According to an EPA questionnaire completed by Midwest Carbide Corporation (MCC) in 1985, the eastern portion of the subject property was used as a landfill for disposal of “dusts from the furnace dust collector, carbide magnetic separator, packing room, coke drying, raw material dust collector, and flue gas dust collector, as well as wastes from gas testing residues, scrap pastes, spilled bond material, construction rubbles, and other miscellaneous solid wastes” (MCC 1985). The bulk of the landfilled material is reportedly waste calcium carbide that the facility first stabilized by allowing the waste to react with water. This reaction of calcium carbide with water yielded hydrated calcium hydroxide (lime) (which was landfilled) and acetylene gas (which was allowed to escape to the atmosphere).

EPA required MCC to assess groundwater underlying the landfill to determine if the landfill had caused any adverse effects. Groundwater investigation appeared to have begun as early as 1980 and included installation of groundwater monitoring wells between the landfill and Soap Creek to the east. In 1985, Shive-Hattery Engineers (Shive-Hattery) installed additional groundwater monitoring wells (monitoring wells 5S, 5D, 6S, 6D, 7S, 7D, 8, and 9) (Shive-Hattery 1986). Assessment of groundwater sampling data appeared to largely concern whether the groundwater monitoring well network could adequately characterize upgradient/background groundwater quality (U.S. Army Corps of Engineers [USACE] 1987), but some previous reports did convey groundwater monitoring results of potential environmental concern. A 1987 report indicated elevated radiological parameters in groundwater (gross beta average of 182 picoCuries per liter (pCi/L) and a gross alpha average of 122 pCi/L in well 9) (USACE 1987), and a 1988 report indicated “elevated” levels of sulfates, total organic carbon (TOC), total organic halides

(TOX), cadmium, chromium, and gross alpha, but concluded that information was insufficient to determine whether the elevated measurements were related to the landfill or traced to naturally occurring groundwater conditions (Jacobs Engineering Group, Inc. 1988).

Landfill closure activities began in January 1989 when the landfill was graded to create stable slopes, and a soil cover over the landfill was installed; these activities were completed in May 1989 (Hunter/ESE, Inc. 1989). In 1988, in anticipation of the landfill closure, samples from the landfill were collected via soil borings and submitted for laboratory analysis to characterize the landfill material. Sampling of the landfill material established presence of coal tar pitch constituents—primarily PAHs—and elevated metals concentrations. Comparing results from a leaching analysis of the landfill samples to EPA Maximum Contaminant Levels (MCL) (drinking water standards), the facility concluded that coal tar pitch constituents (including PAHs and metals) in the landfill material did not raise concerns regarding possible groundwater impact (Hunter/ESE, Inc. 1989).

Based on information presented in a June 1989 clean closure report, an EPA geologist presented this conclusion in an EPA memorandum (EPA 1989a):

“Midwest Carbide has adequately demonstrated that hazardous waste or hazardous waste constituents have not impacted the groundwater underlying their Keokuk facility. This conclusion is based on the following criteria:

1. The groundwater monitoring system is placed in such a way as to have been impacted by a release of hazardous waste if one had occurred.
2. The rate of groundwater movement across the site from the most upgradient well to the furthest downgradient well has been estimated to be on the order of 14 years. Since the plant has been in operation since 1914, groundwater in the vicinity of the downgradient wells should be within any plumes of contamination if they exist.
3. Statistical increases in indicator parameters during past monitoring is thought to be as a result of the non-hazardous portions of the waste management unit. Large quantities of lime disposed of at the site would impact specific conductivity as well as pH. Detection of hazardous waste or hazardous waste constituents have not been verified by groundwater monitoring to date even though all possible suspected compounds have been tested for.”

In November 1989, EPA notified MCC that the agency had accepted the facility’s closure certification and that the facility was no longer required to conduct groundwater monitoring under 40 *Code of Federal Regulations* (CFR) Part 265 Subpart F (EPA 1989b). During a 1990 inspection by EPA, MCC told the EPA inspector that the facility was in the process of plugging all monitoring wells associated with the closed landfill (EPA 1990).

The 2010 Phase II ESA and 2012 sampling by USGS for EPA included sampling groundwater underlying/downgradient of the landfill. Results from these groundwater samples do not appear to indicate adverse effects on groundwater from the closed landfill (Terracon 2009, USGS 2013).

Considering that the closed landfill appears to have been addressed to the satisfaction of the EPA Region 7 RCRA program without subjecting the landfill to any required controls, presence of the closed landfill poses an historical recognized environmental condition (HREC) to the subject property.

### **Container Storage Yard/DT-167 Solvent Storage Area**

In August 1987, Environmental Science and Engineering, Inc. (ESE) conducted soil sampling for MCC to determine if storage of used DT-167 solvent (which contains 63 percent dichlorobenzene) had affected soils around the container storage yard. The sampling identified dichlorobenzene in soil at concentrations requiring excavation and removal of soil from the subject property (ESE 1987). In January 1988, a contractor for MCC conducted a removal action at the DT-167 solvent storage area, excavating contaminated soil and transporting it off site to a disposal facility. Following excavation, soil samples were collected to confirm effectiveness of remediation (ESE 1988a). A closure report prepared by ESE presented a basis for a proposed “clean closure” status of the DT-167 solvent storage area following the January 1988 removal action. The report indicated that concentrations of o-dichlorobenzene in the closure soil samples ranged from less than detection levels to 0.60 mg/kg, and chlorobenzene concentrations ranged from less than detection levels to 0.07 mg/kg. These concentrations were below the allowable soil limits established during the removal action (2,550 mg/kg for o-dichlorobenzene and 500 mg/kg for chlorobenzene) (ESE 1988b).

### **Storm Sewer System/Soap Creek Area of Concern/Acid Treatment Shed**

A 1987 interim RCRA Facility Assessment report prepared by CDM Federal Programs Corporation (CDM) for EPA Region 7 identified Soap Creek as an “area of concern.” The report describes a permit application dated June 25, 1971, for an outfall of a storm sewer system that discharged into Soap Creek. The sources of wastewater reportedly included sanitary sewage, laboratory wastes, contact cooling water from the paste block production area, lime sludge, and general drainage from the manufacturing area and storage piles at the facility. In September 1974, the facility reportedly connected with the city sewer system for disposal of its sanitary wastes, and, in October 1975, the facility installed an American Petroleum Institute (API) oil separator that allowed the City to direct the facility’s contact cooling water from the Soap Creek outfall to the City’s sanitary sewer system. The assessment report also included analytical data reports from previous sediment sampling of Soap Creek; although the analytical results are

difficult to discern due to poor reproduction quality, some sediment samples apparently contained elevated PAH concentrations (CDM 1987).

A 1988 RCRA Facility Assessment Report, also prepared by CDM for EPA Region 7, notes detections of elevated pH (between 12 and 13 standard units), phenol constituents, metals, and PAHs in leachate and sediments affected by the landfill. In addition, elevated concentrations of lead and zinc were detected in a sediment sample collected below a storm sewer outfall to a drainage of Soap Creek. A downstream water sample from Soap Creek had an elevated lead concentration (0.25 parts per million [ppm]); lead was not detected in an upstream Soap Creek water sample. High concentrations of PAHs and lead were reported in a downstream sediment sample of Soap Creek (CDM 1988).

The 2009 Phase I ESA identified the Soap Creek area of concern as a recognized environmental condition (REC) (Terracon 2009), and sediment sampling at the creek and outfalls leading to the creek occurred during the 2010 Phase II ESA and 2012 USGS sampling event. The sediment samples collected during the 2010 Phase II ESA did not exhibit contaminant concentrations exceeding Iowa statewide soil standards (Terracon 2010); however, sediment samples collected by USGS in 2012 did exhibit PAH concentrations exceeding residential and industrial EPA Regional Screening Levels (RSL) (USGS 2013). The 2009 Phase I ESA also had noted an “Acid Treatment Shed” situated on drainage of Soap Creek between the eastern slope of the closed landfill and Soap Creek. The shed apparently housed a treatment system that would dispense hydrochloric acid, presumably to adjust the pH of drainage flowing into Soap Creek.

Overall, the Soap Creek area of concern, with associated storm sewer outfalls and the former Acid Treatment Shed, poses a REC to the subject property.

### **Storage, Handling, and Use of Coke, Coal, and Coal Tar Pitch**

The 1987 interim RCRA Facility Assessment recognized MCC’s storage, handling, and use of coke, coal, and coal tar pitch as an environmental concern, and identified the coal tar pitch pumping area, a working coke pile, a coal stock pile, and a coke stockpile as Solid Waste Management Units (SWMU). The inspector noted a release of coal tar pitch on the ground beneath five coal tar pitch aboveground storage tanks (AST). In addition, the inspector reported entry of surface water runoff from the coke and coal piles into the stormwater sewer system that discharges to Soap Creek (CDM 1987). The 1988 RCRA Facility Assessment report noted that a sludge sample collected from beneath a coal tar pitch bond tank had exhibited elevated PAH and metals concentrations.

The 2009 Phase I ESA identified the coal tar pitch tank area and former coal stockpiles as RECs (Terracon 2009), and shallow soil samples were collected in these areas during the 2010 Phase II ESA and 2012 USGS sampling event. Numerous soil samples collected at the subject property within the manufacturing areas, including within the footprint of the former coal and coke piles and coal tar pitch tanks, exhibited PAH concentrations exceeding Iowa statewide soil standards, as well as EPA residential and industrial RSLs. Based on the sampling results, PAH contamination of soil appeared to be widespread across the former manufacturing area of the subject property. In addition, lead and arsenic concentrations in some samples exceeded soil screening values.

Overall, past storage, handling, and use of coke, coal, and coal tar pitch appears to be associated with elevated PAH concentrations in shallow soil of the manufacturing area, and poses a REC to the subject property.

### **Groundwater Underlying Manufacturing Area**

During the 2012 sampling event, USGS collected a groundwater sample from a temporary well constructed at the approximate center of the former manufacturing area of the subject property (location 005). This sample contained *cis*-1,2-dichloroethene at concentration of 210 micrograms per liter ( $\mu\text{g/L}$ ), exceeding the EPA MCL of 70  $\mu\text{g/L}$ . Trichloroethene (TCE), 1,2-dichloroethane, and vinyl chloride were also detected in the groundwater sample. This detection of chlorinated volatile organic compounds (VOC) in groundwater beneath the former manufacturing area poses a REC to the subject property.

### **Elevated Lead Concentrations in Soil**

Several soil samples collected within the manufacturing areas during the 2010 Phase II ESA and 2012 USGS investigation exhibited lead concentrations exceeding Iowa statewide soil standards, as well as EPA residential and industrial RSLs. The highest lead concentration detected was 20,000 milligrams per kilogram ( $\text{mg/kg}$ ) in sample B-8, collected in the area of the former coal tar pitch tanks within the depth interval of 0-2 feet bgs. These elevated lead soil concentrations pose a REC to the subject property.

### **Other Previously Identified RECs**

The 2009 Phase I ESA identified the following features as also posing RECs to the subject property:

- API oil-water separator system
- Release from non-polychlorinated biphenyl (PCB) transformer near calcine furnace

- Former USTs at north side of carbon block plant, near oil-water separator, and at east side of container storage building
- Presence of foundry sand landfill on adjacent Griffin Wheel Foundry property
- Former waste water pit
- Former 560-gallon AST
- Former diesel and gasoline ASTs
- Staining near 55-gallon petroleum barrels.

Sampling to confirm or eliminate these RECs occurred during the 2010 Phase II ESA and 2012 USGS investigation. Soil samples exhibited elevated PAH concentrations. Although the elevated PAH concentrations could be related to the above-listed features, sample results appear more likely to indicate widespread PAH contamination of soil within the former manufacturing area, possibly related to former use, storage, and handling of coal, coke, or coal tar pitch.

The 2009 Phase I ESA also identified a former hydraulic lift adjacent to the Maintenance Shop as a REC and, during the 2010 Phase II ESA, a shallow soil sample collected to assess this area did not exhibit metals, PAH, or total extractable hydrocarbons (TEH) concentrations exceeding Iowa state standards. Deeper soil samples were not collected, and an attempt was made to sample groundwater at this location; however, groundwater was not encountered. Because only a shallow soil sample was collected, sampling information was insufficient to confirm this REC.

One REC identified during the 2009 Phase I ESA was not subsequently confirmed or eliminated via sampling—oil staining observed near two air compressors at the northwest corner of the Paste Block structure accompanied by a heavy oil sheen observed on standing water in a nearby trench drain. Sampling of the trench water was planned for the 2010 Phase II ESA; however, the water was frozen during the Phase II sampling, and no sample could be collected. Therefore, no sampling data were obtained to confirm or eliminate this REC.

### **Phase I ESA (February 2016)**

In February 2016, as part of the TBA for the Elkem Carbide site, START conducted a Phase I TBA to identify RECs (Tetra Tech 2016). Findings from the Phase I ESA included the following:

- Former uses of the subject property as a secondary zinc smelter and Frary metal (hardened lead alloy) production plant pose a REC to the subject property.

- Several containers of motor oil were observed in building #6. Heavy staining was observed surrounding the oil containers. Presence of the leaking/staining in building #6 poses a REC to the subject property.
- Two piles of solid waste were observed on the subject property—one approximately 150 feet north of building #3 and one on the northwest portion of the subject property in the wooded area. The waste appeared to be primarily building materials, possibly from previous building demolition. Because of the age of the buildings on the property, ACM or LBP likely had been present in the buildings prior to demolition. No records of inspection or abatement were provided. Possible presence of ACM and LBP in the pile of solid waste poses a REC to the subject property.
- Standing water was observed in the basement of building #6. A sheen and floating debris were observed on the water. No odor was detected; however, possible leaking petroleum products in the basement of building #6 pose a REC to the subject property.
- Staining was observed on the concrete south of building #2. The source of the staining was not apparent, but could be related to the former coal and coke stockpiles. Presence of the staining poses a REC to the subject property.
- Staining was observed surrounding a trench drain in building #6. The staining appeared to be motor oil, but the source was not apparent. The stained concrete in the maintenance building poses a REC to the subject property based on amount of staining, length of time the staining has been present based on previous reports, and potential for contamination to have reached the soil given the age and porosity of the concrete.
- The subject property was listed in the Integrated Compliance Information System (ICIS) database, which provides information on enforcement and compliance across most of EPA's programs. The subject property was cited for various RCRA violations in 1987, and underwent various RCRA enforcements. Based on the regulatory status and number of RCRA violations, these listings pose a REC to the subject property.
- The subject property is listed in the Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) No Further Remedial Action Planned (NFRAP) database, which lists sites for which no further action to place these sites on the National Priorities List (NPL) is planned. The subject property was assessed during 1979-1981, did not qualify for the NPL, and was given a low priority status for further assessment. The subject property is also listed in the Corrective Action Report (CORRACTS) database, which lists sites with RCRA corrective action activity, and according to this listing, has been assigned a low corrective action priority. Based on the regulatory status and number of RCRA violations, these listings pose a REC to the subject property.
- The subject property was listed on the RCRA Non Generators / No Longer Regulated (NonGen/NLR) database. This database lists facilities that generate, transport, store, treat, and/or dispose of hazardous waste as defined by RCRA. The subject property was assigned a medium corrective action priority on January 28, 1992, and classified as a conditionally exempt small quantity generator on July 18, 2005. The subject property was also listed in the RCRA Administrative Action Tracking System (RAATS). This database contains records based on enforcement actions issued under RCRA pertaining to major violators, and includes administrative and civil actions brought by EPA. Multiple violations were listed for the subject property between 1984 and 1989. Although each violation appears to have been addressed to

gain compliance, the number of RCRA violations identified is evidence of poor waste management practices, and thus these listings pose a REC to the subject property.

- The subject property is listed in the Iowa (IA) SPILLS and Missouri (MO) SPILLS databases. A report dated December 20, 2000, stated that at least 400 gallons of mineral oil not containing PCBs was spilled into a storm drain leading to Soap Creek. Because of ice cover on the creek, none of the product could be recovered. Based on the amount of product spilled and the cleanup status, these SPILLS listings pose a REC to the subject property.
- The subject property is also listed in the Emergency Response Notification System (ERNS) database due to the spill reported on December 20, 2000. According to the ERNS report, the spill was from a transformer near the calcine furnace. Oil dry was applied and other absorbents were reportedly applied. Based on the amount of product spilled and the cleanup status, this ERNS listing poses a REC to the subject property.
- The subject property is listed in the IA ALLSITES database, a listing of all sites included in the contaminated sites tracking database. The site was in the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Preremedial program, and the status is listed as closed. According to the Iowa Department of Natural Resources (IDNR) contaminated sites database, very high concentrations of PAHs were detected in surface soil samples near the former coal tar pitch tank farm and petroleum storage area. Contamination was not identified in surface water or groundwater. Additional investigation and/or remediation of the area was recommended (IDNR 2016b). Based on the known surface soil contamination on site, this listing poses a REC to the subject property.
- The subject property is listed in the Iowa Underground Storage Tank (UST) database. Three USTs are listed as no longer in use. No further information was available in the Environmental Data Resources, Inc. (EDR) report (EDR 2016a). According to the IDNR storage tanks database, the following USTs were installed at the subject property: a 1,000-gallon diesel UST on December 1, 1974; a 14,000-gallon used oil UST on September 1, 1976; a 560-gallon gasoline UST on June 1, 1977; and a 12,000-gallon heating oil UST on December 1, 1977. Each of these USTs was removed on June 1, 1987 (EDR 2016a). Based on lack of information regarding presence of contamination during removal, these former USTs pose a REC to the subject property.
- The Amsted Rail Company, Inc. site at 416 Carbide Lane is approximately 45 feet north of the subject property. This site is listed in the Iowa Solid Waste Facilities / Landfill Sites (SWF/LS) database, an inventory of permitted facilities, and in the RCRA – Large Quantity Generator (LQG) database. The facility is a foundry sand landfill approximately 1,000 feet north-northwest of the subject property. The facility uses the following chemicals: graphite, calcium oxide (lime), magnesium oxide, iron, resin (phenol), carbon, manganese, silicon, rice hulls, silica, propane, oxygen, aluminum oxide, and aluminum silicate. The facility is listed in the RCRA-LQG database for the following chemicals: cadmium, lead, mercury, used oil, cadmium, lead, tetrachloroethylene, mercury, M-Cresol, chromium, P-Cresol, and silver. The facility has been cited for various violations regarding its management of hazardous and universal wastes. Based on close proximity of a landfill to the subject property, chemicals used at the Amsted Rail Company, Inc. site, and violations that have occurred at that facility indicating poor waste management practices, this listing poses a REC to the subject property.

- The Keokuk Ferro-Sil, Inc. Industrial Waste Landfill site is approximately 174 feet west of the subject property. The site is listed in the IA SWF/LS database as an industrial landfill. The site is currently closed. Based on close proximity of an industrial landfill to the subject property, this site poses a REC to the subject property.
- Tetra Tech completed a Tier 1 non-invasive vapor encroachment screen of the subject property. Based on results of the initial vapor encroachment screen, the following facilities (all discussed in Section 6.1.1) with chemicals of concern were identified in the EDR report within the minimum search distances (EDR 2016b):
  - 365 Carbide Lane (subject property)
  - Amsted Rail Company, Inc. (~45 feet north of the subject property).

Presence of these facilities within the minimum search distance poses a REC to the subject property because of the possibility of a vapor encroachment condition (VEC).

- Given ages of the buildings on the subject property, LBP and ACM could be present within the structures, posing an environmental concern to the subject property.
- The subject property includes an active railroad line. Railroads are associated with various contaminants including creosote, lead, and arsenic, and leaking or spilled oils and fuels from locomotives. Presence of the active railroad line poses a REC to the subject property.
- Review of previous reports and an interview with Mr. Jerry Hamilton, former maintenance manager of Elkem Metals, revealed previous storage, handling, and use of coal, coke, and coal tar pitch on the subject property. Coke and coal were previously stored on the subject property in outdoor stockpiles, and releases of coal tar pitch onto the ground have been documented. During the site reconnaissance, black coal-like granular material—likely related to the former coal and coke stockpiles—was observed over large areas of the subject property. Soil sampling during the 2010 Phase II ESA and 2012 site investigation revealed elevated PAH concentrations in shallow soil likely attributable to past storage, handling, and use of coal, coke, and/or coal tar pitch. These elevated PAH soil concentrations pose a REC to the subject property.
- Review of previous reports and the interview with Mr. Hamilton revealed presence of the closed landfill on the eastern portion of the subject property. Because the closed landfill appears to have been addressed to the satisfaction of the EPA Region 7 RCRA program without subjecting the landfill to any required controls, presence of the closed landfill poses an HREC to the subject property.
- During the 2012 sampling event, USGS collected a groundwater sample from a temporary well constructed at the approximate center of the former manufacturing area of the subject property (location 005); the sample was found to contain chlorinated VOCs, including cis-1,2-dichloroethene at a concentration exceeding the EPA MCL. These detections of chlorinated VOCs in groundwater beneath the former manufacturing area pose a REC to the subject property.
- Detections of elevated lead concentrations in soil samples collected during the 2010 Phase II ESA and 2012 USGS investigation at the subject property pose a REC to the subject property.

Based on these findings of the Phase I TBA, START recommended a Phase II TBA of the subject property.

## **EVALUATION OF PREVIOUS SAMPLING DATA**

The 2010 Phase II ESA and the 2012 USGS investigation provided soil and groundwater sampling results that have been compiled and evaluated herein to help inform decisions regarding proposed sampling for this Phase II ESA. These previous sampling locations are shown on Figure 3 in Appendix B. The previously collected data were first compared to (IDNR Statewide Standards for contaminants in soil and groundwater (IDNR 2016a). IDNR states that each of these standards represents “a concentration of a contaminant in a specific medium of an affected area at which normal, unrestricted exposure through a specific exposure pathway is considered unlikely to pose a threat to human health.”

### **Screening of Previous Soil Sampling Results**

Comparison of the previous soil sampling data to the statewide standards, shown in Appendix C, Tables C-1 and C-2, identified the following contaminants exceeding statewide standards for soil:

- Benzo(a)anthracene
- Benzo(a)pyrene
- Benzo(b)fluoranthene
- Benzo(k)fluoranthene
- Carbazole
- Chrysene
- Dibenz(a,h)anthracene
- Dibenzofuran
- Indeno(1,2,3-cd)pyrene
- Lead.

Except for lead, the contaminants listed above are in a category of semivolatile organic compounds (SVOC) referred to as PAHs. PAHs occur naturally in coal and are associated with production of coal-tar pitch and coke from coal, and are also ubiquitous in the environment due to their production from burning of fossil fuels, wood, and other carbon-containing materials (ATSDR 2009). The soil sampling results appear to indicate widespread PAH contamination of soil within the former manufacturing area of the subject property, likely related to former use, storage, and handling of coal, coke, or coal-tar pitch at the subject property (see Appendix A, Figure 4).

Soil samples collected within the former manufacturing area of the subject property also were found to contain lead concentrations high enough to be likely attributable to former manufacturing operations at the subject property (see Appendix A, Figure 5).

PAH compounds are generally of environmental concern due to their associated carcinogenic (cancer) risks, whereas lead poses a non-carcinogenic toxic hazard. These respective risks are evaluated below.

### Evaluation of PAH Concentrations in Soil

Cumulative cancer risk values corresponding to PAH soil concentrations detected in individual soil samples were determined so that the sample results could be compared to the IDNR Land Recycling Program (LRP) cumulative cancer risk criteria of 1 in 10,000 (or 1E-04) for site resident, site worker, and construction worker scenarios. For each soil sample, a cumulative cancer risk value for each of the three scenarios was calculated using information obtained from the IDNR Cumulative Risk Calculator (IDNR 2016b) and sample-specific PAH concentrations. All PAHs (including those PAHs detected at concentrations not exceeding Statewide Soil Standards) were included in the calculation of cancer risk because each PAH could contribute to overall cumulative cancer risk. The risk calculations are presented in Appendix D and summarized in Appendix C, Table C-3. Maximum sample-specific risk values and the number of samples with respective calculated risk values exceeding the 1E-04 criterion for each scenario are:

<b>Exposure Scenario</b>	<b>Sample Depths Considered</b>	<b>Maximum Cumulative Cancer Risk<sup>1</sup></b>	<b>Number of Samples Above 1E-04 Criteria</b>
Site Resident	All	<b>1.2E-02</b>	16
Site Worker	< 2 feet	<b>3.3E-03</b>	8
Construction Worker	All	<b>2.9E-04</b>	2
Construction Worker	> 2 feet	1.4E-05	0

Note:

<sup>1</sup> Bold values exceed 1E-04 criteria

Based on this screening, the soil profiles of concern regarding PAH contamination are less than 2 feet in depth, and geographically, the areas of concern are within the former manufacturing area of the subject property (see Appendix B, Figure 4).

### Evaluation of Lead Concentrations in Soil

Specific standards for lead have been prescribed or derived by Iowa DNR: 400 mg/kg for soils in a residential area, 1,100 mg/kg for soils less than 2 feet deep in a nonresidential area, and 2,100 mg/kg for construction worker scenarios (IDNR 2016c). Soil samples collected at five locations across the former manufacturing area of the subject property contained lead exceeding 1,100 mg/kg. The highest lead concentration was 20,000 mg/kg. Maximum lead concentrations detected in the soil samples with respect to relevant soil profiles and exposure scenarios are:

Exposure Scenario	Criteria for Lead (mg/kg) <sup>1</sup>	Sample Depths Considered	Maximum Lead Concentration (mg/kg) <sup>2</sup>	Number of Samples Above Criteria
Site Resident	400	All	<b>20,000</b>	8
Site Worker	1,100	< 2 feet	<b>20,000</b>	3
Construction Worker	2,000	All	<b>20,000</b>	5
Construction Worker	2,000	> 2 feet	1,370	0

Notes

<sup>1</sup> Values are statewide criteria or are derived from statewide criteria; see <https://programs.iowadnr.gov/riskcalc/pages/background.htm>

<sup>2</sup> Bold values exceed criteria

mg/kg Milligrams per kilogram

As with the PAH soil screening, this screening of soil lead concentrations indicates that soil profiles of concern are less than 2 feet in depth. Geographically, areas of concern for lead contamination appear to be less widespread than the PAH area of concern, but still within the former manufacturing area of the subject property (see Appendix B, Figure 5).

### **Screening of Previous Groundwater Results**

IDNR specifies statewide standards for groundwater of two classes: protected groundwater and non-protected groundwater. The two classes differ in likelihood that an aquifer would be used for a drinking-water supply, based on its hydraulic conductivity and presence of total dissolved solids. Based on the previously reported low hydraulic conductivity of the shallow aquifer at the subject property (Terracon 2010), the non-protected groundwater standards are likely the relevant standards. Comparisons of previous groundwater sampling data to statewide standards (listed in Appendix C, Tables C-4 and C-5) identified one contaminant—cobalt—as exceeding the statewide standard for a non-protected groundwater source (bis[2-ethylhexyl]phthalate, a common laboratory contaminant, was detected in a trip blank sample at a concentration exceeding the statewide standard for protected groundwater). Cobalt occurs naturally in soil and rock, and reportedly is typically present in groundwater at concentrations ranging from 1 to 10 µg/L (ATSDR 2004). A maximum cobalt concentration of 18 µg/L was detected during the 2012 investigation. This concentration is within the same magnitude as the upper background range specified by ATSDR. Further, detection of cobalt at this concentration may have been influenced by the presence of sediment in the groundwater sample.

### **SAMPLING STRATEGY AND METHODOLOGY**

Sampling for this Phase II TBA is tentatively scheduled for April or May 2016, and will require approximately 5 days to complete. Where applicable, the standard operating procedures (SOP) and chain-of-custody (COC) procedures referenced in the QAPP will be followed throughout the sampling

activities to verify the integrity of the samples from the time of collection until submittal to the laboratory for analysis. Disposal of investigation-derived wastes (IDW) and procedures for equipment and personal decontamination will be addressed in a site-specific health and safety plan prepared by START. The laboratory data obtained from all samples collected during this project will be compared to all applicable or relevant and appropriate requirements (ARAR) to assess whether further response is warranted.

Descriptions of proposed samples to be collected for this Phase II TBA are as follows:

### **Structural Materials Sampling**

Bulk samples will be collected from building materials suspected to contain asbestos. Selection of sampling locations will be based on a site inspection by Tetra Tech START. Bulk samples will be collected by use of sampling devices appropriate for the suspect building materials. The samples will be placed into Whirl-pak bags. Non-dedicated sampling equipment will be decontaminated by application of a dry wipe method after sampling terminates at each sampling location. Sample locations and material quantities will be recorded on an inspection log. All samples will be stored in coolers, pending submittal to a Tetra Tech-contracted laboratory for analysis for asbestos via polarized light microscopy (PLM). Additionally, bulk samples that yield low asbestos results (less than 3% asbestos) via PLM analysis will be re-analyzed via EPA Point Count 400.

### **LBP Screening**

Paint-covered surfaces will be screened for lead by use of an x-ray fluorescence (XRF) spectrometer to assess presence and determine quantity of LBP. Screening locations and results will be recorded on an inspection log. XRF screening results exceeding 1 milligram per square centimeter (mg/cm<sup>2</sup>) of lead will be considered positive for LBP. Because standard protocol is to rely solely on XRF results during these types of inspections, no collection of laboratory confirmation samples for lead analysis is proposed.

### **Surface Soil Sampling to Investigate PAH and Metals Contamination**

START will collect soil samples for SVOC (including PAHs) and metals analyses applying incremental sampling methodology (ISM) to determine mean concentrations of PAHs and metals (including lead) within decision units (DU). ISM is a structured composite sampling and processing protocol that reduces data variability and provides a reasonably unbiased estimate of mean contaminant concentrations in a volume of soil targeted for sampling (Interstate Technology Regulatory Council [ITRC] 2012). START will follow techniques established in ITRC's *Incremental Sampling Methodology, Technical and Regulatory Guidance* (ITRC 2012).

The former manufacturing portion of the subject property (where elevated lead levels, and PAH concentrations indicating cumulative cancer risks exceeding 1E-04 have been identified) will be divided into 12 DUs (DU-01 through DU-12) (see Table A-1 below and Appendix B, Figures 4 and 5).

**TABLE A-1**  
**SURFACE SOIL SAMPLING DECISION UNITS**  
**ELKEM CARBIDE SITE, KEOKUK, IOWA**

Proposed Sample ID	Rationale
DU-01	Former manufacturing area.
DU-02	Former manufacturing area.
DU-03	Coke pile formerly located in this DU. Previous sampling indicates elevated PAH in this DU.
DU-04	Former manufacturing area.
DU-05	Area of former coal stockpile.
DU-06	Former coal unloading area.
DU-07	Area of former coal or coke stockpile.
DU-08	Area of former coal-tar pitch tanks and a “coal-tar pitch area of concern” noted on historical facility drawings. Previous sampling results indicate elevated PAH in this DU.
DU-09	Former manufacturing area.
DU-10	Former manufacturing area.
DU-11	DU includes location of maximum previous PAH detection (with a corresponding cancer risk for a site worker exceeding 1E-03). Due to the relatively high PAH concentrations detected in the sample, the size of this DU was kept small.
DU-12	Area of former coal and coke stockpiles.

Notes:

DU      Decision Unit  
PAH     Polycyclic aromatic hydrocarbon

This configuration was selected so that the DUs encompass portions of the subject property that, based on historical site features and previous sampling results, may reasonably be expected to have different potentials for contamination (e.g., DU-05 encompasses the area of a large former coal stockpile, and DU-08 encompasses an area where releases of coal-tar pitch have been documented). Also, the DUs are anticipated to be of size and configuration that could approximate human health exposure areas, and therefore, provide data usable as exposure point concentrations (EPC) in a human health risk assessment. The data will also be used to characterize possibly present contamination related to historical railroad lines that crossed the former manufacturing area.

START will follow a simple random sampling (SRS) pattern when collecting aliquots from DUs. To preclude any field team sampling bias, aliquot locations have been predetermined by use of the “Create Random Points” tool in ArcMap, which randomly places a specified number of points within the DU (see

Appendix B, Figure 6). Constraints were set to ensure aliquot locations would not be within 5 feet of each other.

Three ISM sample replicates will be collected from each of the 12 DUs; thus a total of 36 ISM samples will be collected. Data from replicate samples can be used to assess reliability of the ISM sampling approach to estimate mean contaminant concentrations within DUs. Such an assessment can be particularly useful when individual ISM samples results are close to an action level. In addition, replicate data can be used to calculate 95% upper confidence limits (95UCL) of the mean (ITRC 2012).

Each ISM sample will consist of approximately 30 aliquots of equal mass collected within 0 to 6 inches bgs. To ensure collection of equal mass at each aliquot location, a 0.75-inch-diameter soil probe (Arts Manufacturing Supply, Inc. [AMS] Gator Probe) will be used. The increments from each DU will be composited into a labeled, 1-gallon bag for laboratory processing. A START-contracted laboratory will complete all post-collection sample processing, including drying (if required), sieving, and subsampling. Upon receiving samples, laboratory personnel will determine if drying is required to reduce sample moisture content in order to ensure proper mechanical function of subsequent processing equipment. If drying is required, samples will be placed on drying racks to be air dried until moisture content is below approximately 10 percent. Next, samples will be mixed and sent through a #10 (2-millimeter [mm]) sieve. Laboratory personnel will then collect an incremental subsample of each processed sample for target analyte determination. The ISM samples will be analyzed for SVOCs (including PAHs) and metals (including lead).

### **Sampling for Waste Characterization of Coal-Tar Pitch, Coke, or Coal Spills**

During sampling of the DUs, if an area is obviously covered by a bulk amount of coal-tar pitch, coke, or coal (e.g., see Photograph 1 below), the spill will be assumed to require future remediation and will not be sampled as part of the surrounding DU. Instead, a 9-point composite sample will be collected within the spill area to be analyzed via toxicity characteristic leaching procedures (TCLP) to characterize the material for selection of an appropriate disposal method. Such spills will also be photographed and their approximate boundaries will be recorded by use of a global positioning system (GPS) device.



**PHOTOGRAPH 1. Coal-tar pitch spill near sampling site 007 encountered during July 2012 USGS investigation.**

### **Sampling to Further Investigate High Lead and PAH Concentrations**

In addition to the surface soil assessment, START will sample subsurface soils to investigate two particular areas of concern related to: (1) a lead concentration of 20,000 mg/kg detected within the 0- to 2-foot bgs interval of the previous Terracon boring B-8 advanced near the center of the former manufacturing area, and (2) a relatively high PAH soil concentration detected within the 0- to 2-foot bgs interval of the previous Terracon boring B-48 advanced in the southeast portion of the former manufacturing area. These areas will be sampled as described in Table 1 of the QAPP form by use of a Geoprobe to collect soil cores to 8 feet bgs. Soil samples will be collected at approximately 2, 4, 6, and 8 feet bgs. Proposed sampling locations are depicted on Figure 7 in Appendix B—borings B-51 through -55 (to investigate elevated lead concentrations) and B-56 through -60 (to investigate elevated PAH concentrations).

### **Sampling to Investigate Former UST Closures and a Former Hydraulic Lift**

To investigate four areas of concern where USTs have been closed and a fifth area of concern related to a former hydraulic lift, START will sample subsurface soils and attempt to collect groundwater samples. Proposed sample locations are depicted on Figure 7 in Appendix B—proposed borings B-61 through -65.

Soil samples will be collected by use of a Geoprobe DPT rig, and the borings will advance to groundwater, anticipated to be at about 30 feet bgs. Soil cores will be collected by use of Geoprobe 4- or 5-foot-long Macro-Core® samplers with disposable PVC liners. Soils will be logged by a field geologist. Samples exhibiting elevated photoionization detector (PID) readings, staining, or other indicators of possible contamination will undergo laboratory analyses listed in Table 1. If no elevated PID readings or other field evidence of contamination is detected, two samples will be collected at depth intervals based on judgment of the field geologist.

Groundwater samples from temporary wells will be collected by use of a Geoprobe Screen Point 15 sampling apparatus containing either disposable, 4-foot-long, PVC screens or a Geoprobe reusable stainless steel screen. At each location, the sampler will be advanced below the anticipated depth of the water table (around 30 ft bgs); then the screen will be exposed to the aquifer. After the screen is deployed at the bottom of the boring, about 1 gallon of water will be purged, and a sample will be collected through disposable polyethylene tubing by use of a check valve placed at the bottom of the tubing. Groundwater samples will undergo laboratory analyses listed in Table 1. The groundwater sampler and rods will be decontaminated following sampling at each well, and new tubing will be used at each well location.

#### **Sampling to Investigate Oil Release from Transformer**

To assess for PCB contamination related to an approximately 400-gallon oil release from a transformer on December 20, 2000, a grab sample will be collected at the point of release (or a multi-aliquot composite sample will be collected within the probable area of release if the release point cannot be determined exactly), and a multi-aliquot sample of sediment will be collected from Soap Creek immediately downstream of the outfall (see SS-66 and SED-67 on Figure 7, Appendix B).

#### **Sampling to Investigate Oil Staining Observed in Building #6**

During the 2016 Phase I ESA and previous investigations, oil staining was observed in buildings #2 (Carbide Container Storage), #6 (Maintenance Shop), and #9 (Paste Block). To assess for potential impacts on surface soil possibly related to the observed staining, START will attempt to determine if releases, other than de minimis amounts, have occurred to the environment. If such a release is suspected, a shallow soil sample will be collected at the point of release to surface soil to undergo laboratory analyses listed in Table 1.

## **QUALITY CONTROL**

### **Structural Materials Sampling**

Routine checks of XRF standards will occur to ensure accuracy of XRF readings for LBP.

### **ISM**

Field replicate samples—consisting of a duplicate sample and a triplicate sample—will be collected within each DU to assess reliability of the ISM sampling approach to estimate mean contaminant concentrations within DUs.

### **Groundwater Sampling**

A water rinsate blank sample will be collected to assess adequacy of decontamination procedures. A water trip blank sample will be collected to assess field- and transportation-related contamination.

## **ANALYTICAL METHODS**

Samples of bulk structural materials will be analyzed for asbestos according to National Institute for Occupational Safety and Health (NIOSH) Method 9002, which is analysis via PLM. Approximately 3% of samples determined by PLM analysis to contain less than 3% asbestos will be analyzed via EPA Point Count 400 (EPA Method 600/R-93/116). Bulk materials samples will be submitted for analysis to a START-contracted, licensed laboratory that also is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP).

Soil and groundwater samples will be submitted to a START-contracted laboratory for analyses listed in Table 1. Standard turnaround times and detection limits for those methods will be adequate for this project. Appropriate containers and physical/chemical preservation techniques will be employed during field activities to help verify that representative analytical results are obtained.

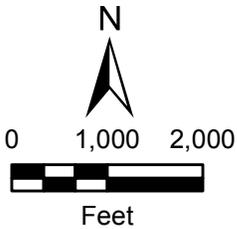
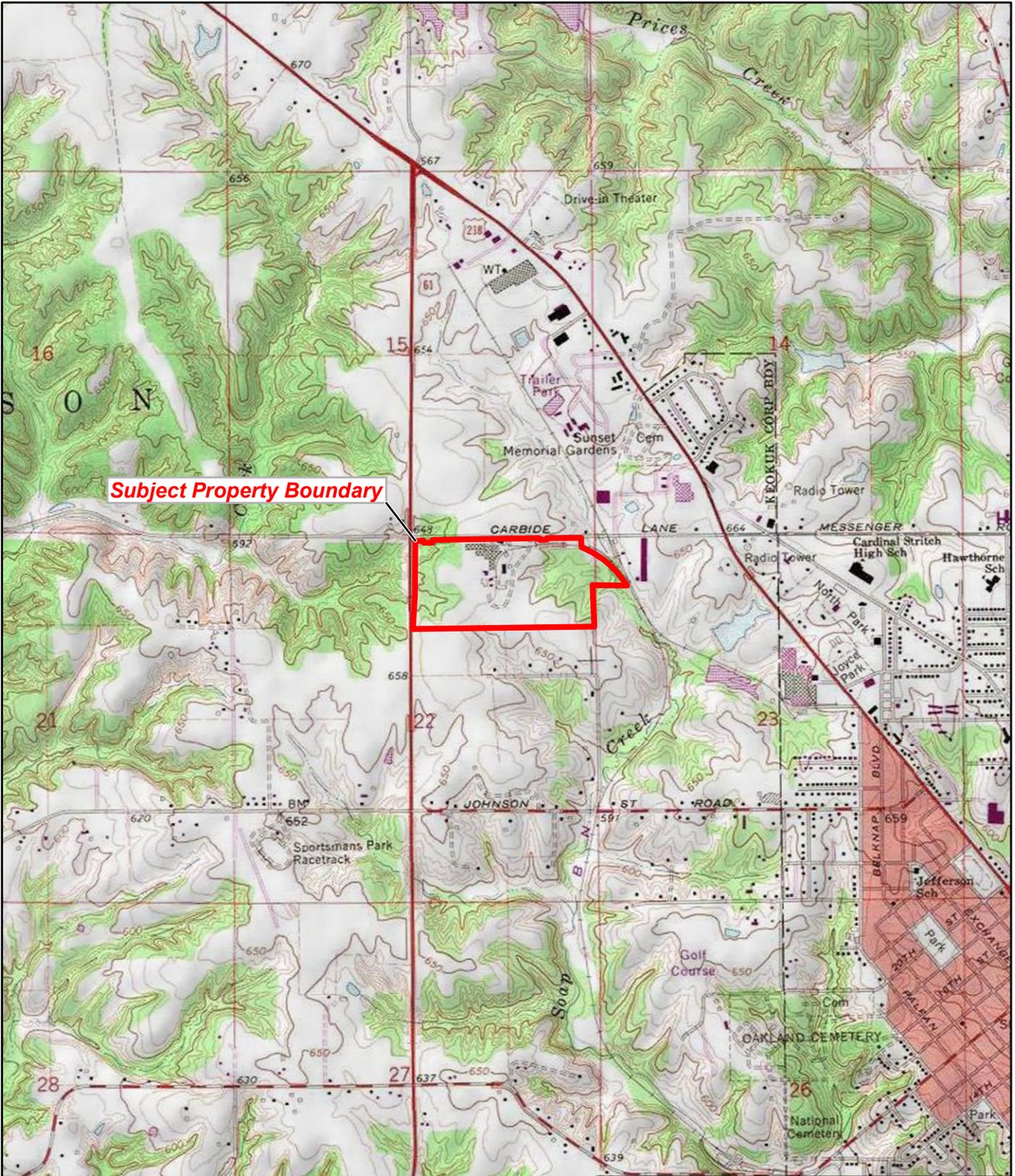
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**APPENDIX B**

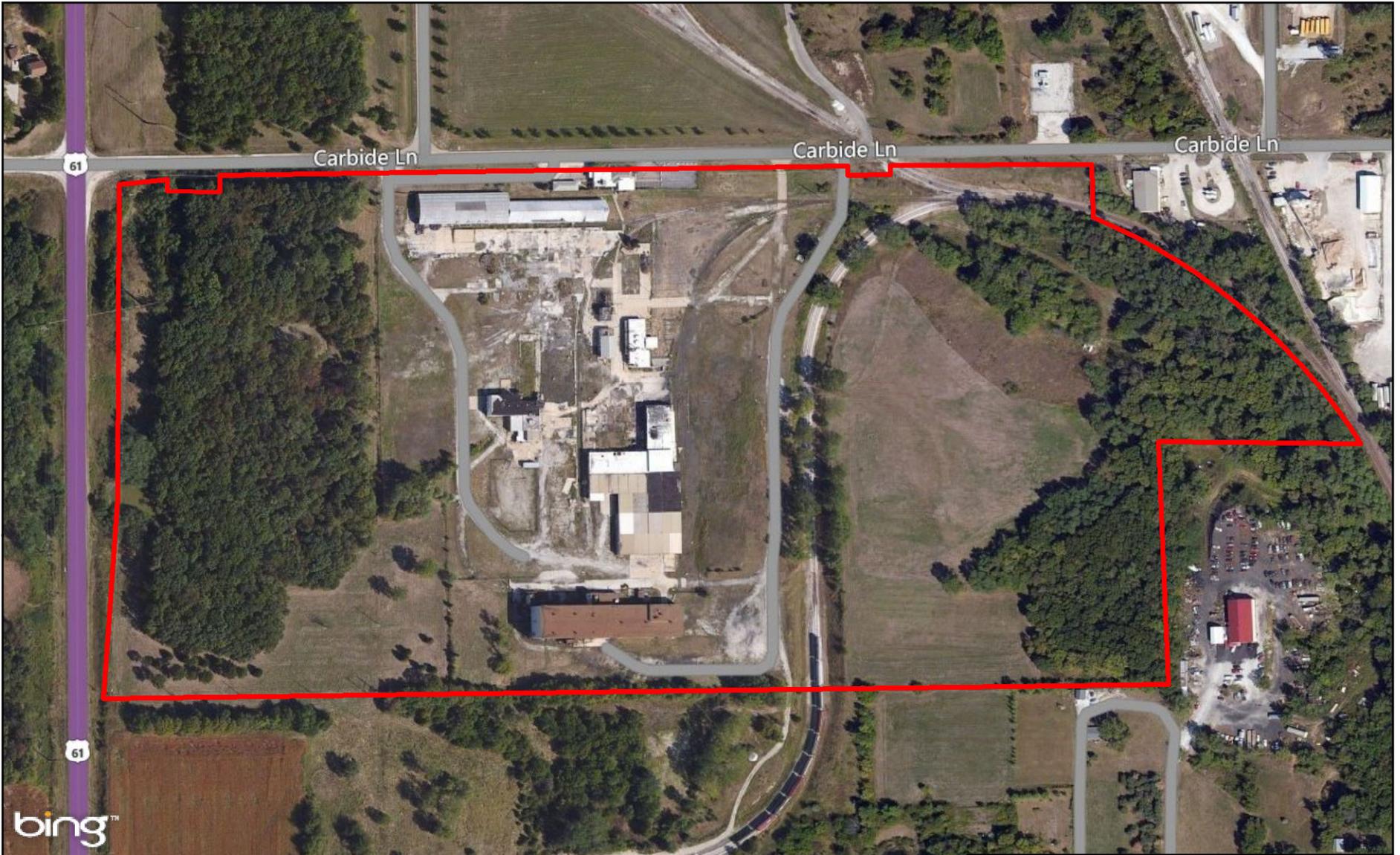
**FIGURES**



Elkem Carbide  
365 Carbide Lane  
Keokuk, Iowa

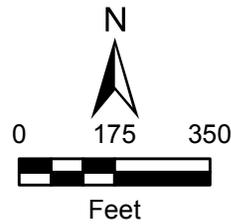
**Figure 1**  
Site Location Map





**Legend**

 Subject property boundary



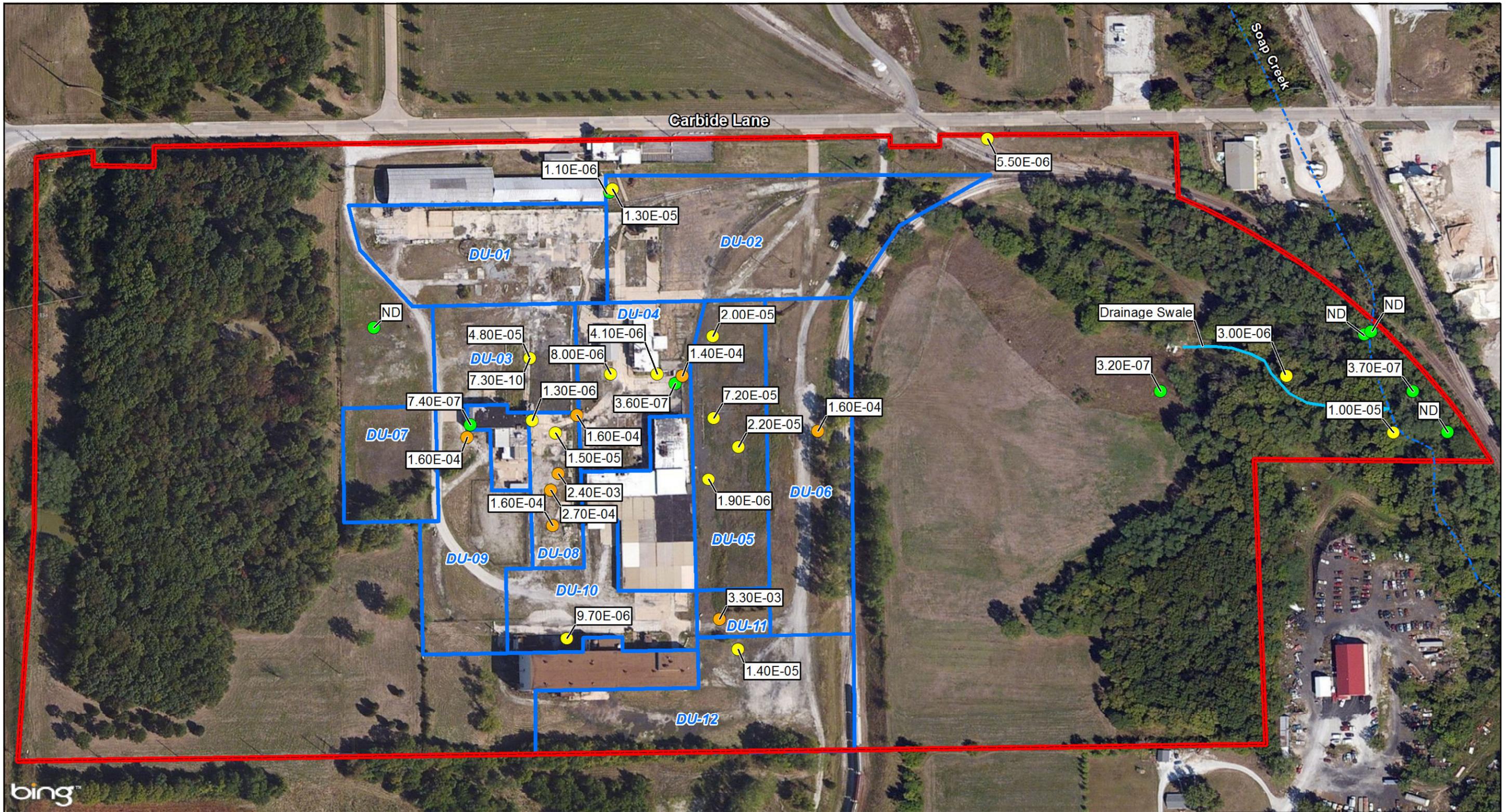
Elkem Carbide  
365 Carbide Lane  
Keokuk, Iowa

**Figure 2**  
Site Layout Map



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**Legend**

Previous soil sample location  
(Cancer risk value corresponding to maximum PAH concentration for location indicated)

- Cancer risk  $< 1 \times 10^{-6}$
- Cancer risk between  $1 \times 10^{-6}$  and  $1 \times 10^{-4}$
- Cancer risk  $> 1 \times 10^{-4}$

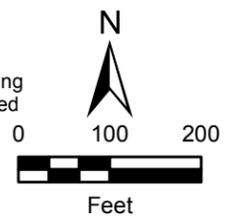
- Drainage swale
- - - Soap Creek
- Decision unit boundary
- Subject property boundary

DU Decision unit

ND PAH compounds not detected

PAH Polycyclic aromatic hydrocarbon

**Notes:** Cancer risk values are cumulative values corresponding to sample-specific PAH concentrations and are derived using the Iowa Department of Natural Resources Cumulative Cancer Risk Calculator using the Site Worker Scenario.

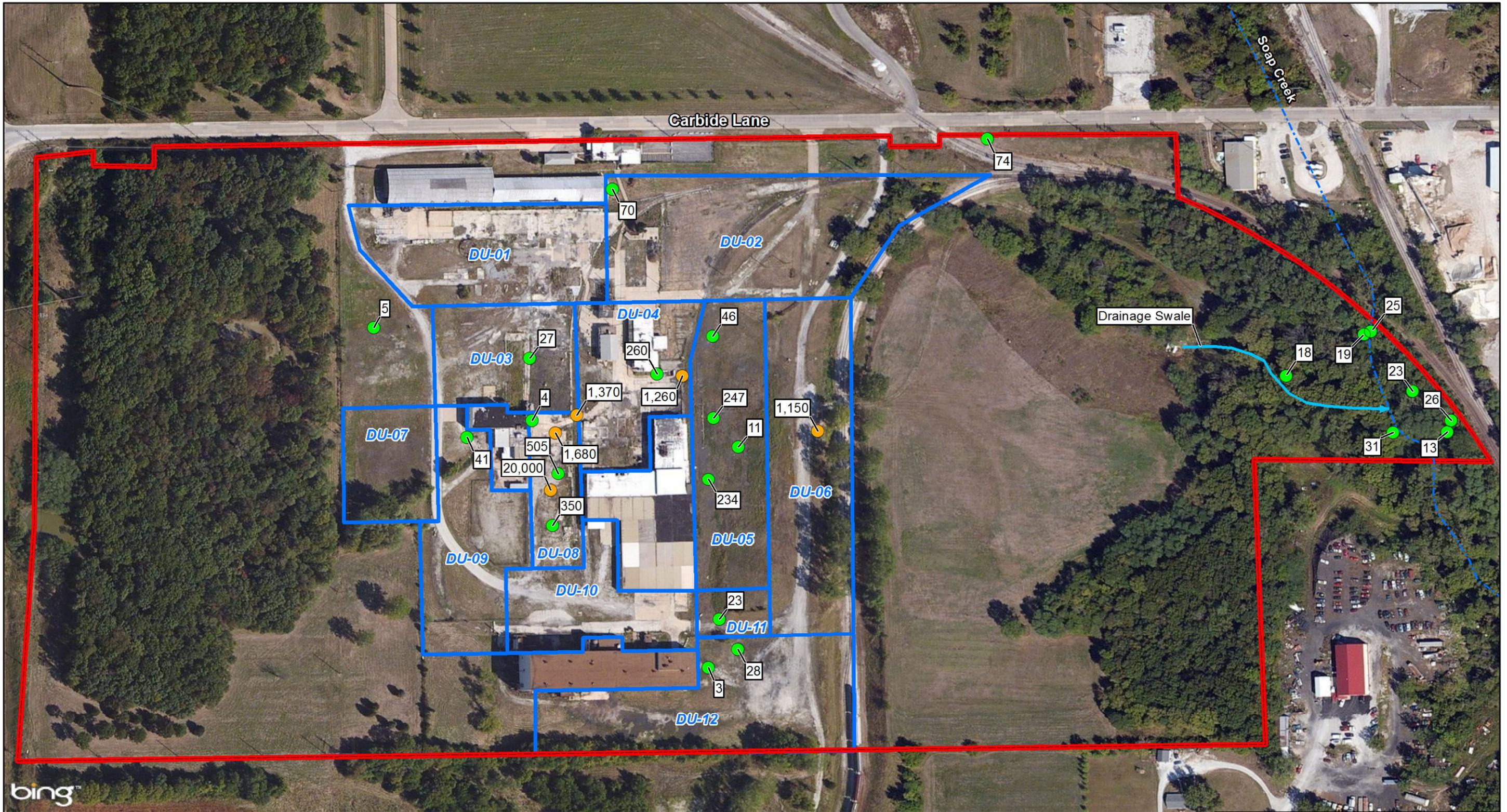


Source: ESRI, ArcGIS Online, Bing Maps, 2011; Terracon, Phase II Environmental Site Assessment, Former Elkem Metals, 2010; U.S. Geological Survey (USGS), RCRA Site Sampling at the Former Elkem Metals, Iowa Water Science Center, 2012.

Elkem Carbide  
365 Carbide Lane  
Keokuk, Iowa

**Figure 4**  
Decision Units and Site Worker Cancer Risk Screening Values

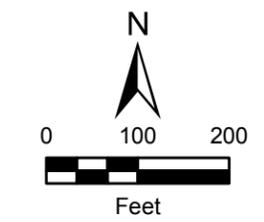




**Legend**

- Previous soil sample location (Maximum lead concentration of location indicated in mg/kg)
  - < 1,100 mg/kg lead
  - > 1,100 mg/kg lead
- Drainage swale
- Soap Creek
- Decision unit boundary
- Subject property boundary

DU Decision unit  
mg/kg Milligrams per kilogram



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365 Carbide Lane  
Keokuk, Iowa

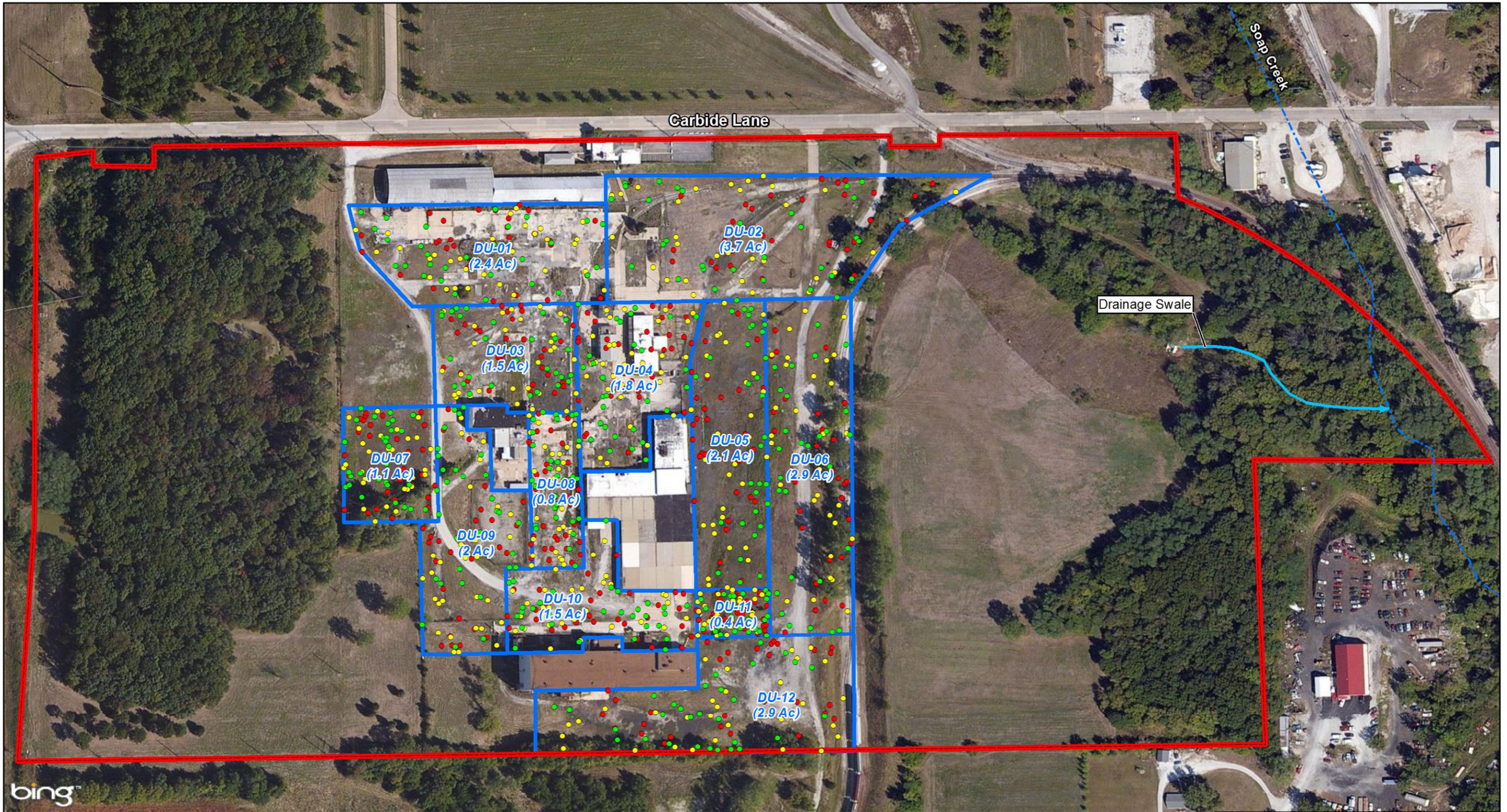
**Figure 5**  
Decision Units and Soil Lead Concentrations

**TETRA TECH**

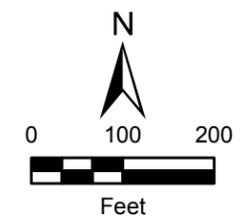
Date: 3/30/2016 Drawn By: Nick Wiederholt Project No: X9025.14.0002.019.017

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Source: ESRI, ArcGIS Online, Bing Maps, 2011



- Legend**
- Primary aliquot sample location
  - Duplicate aliquot sample location
  - Triplicate aliquot sample location
  - Drainage swale
  - Soap Creek
  - Decision unit boundary
  - Subject property boundary
  - Ac Acre
  - DU Decision unit



Elkem Carbide  
365 Carbide Lane  
Keokuk, Iowa

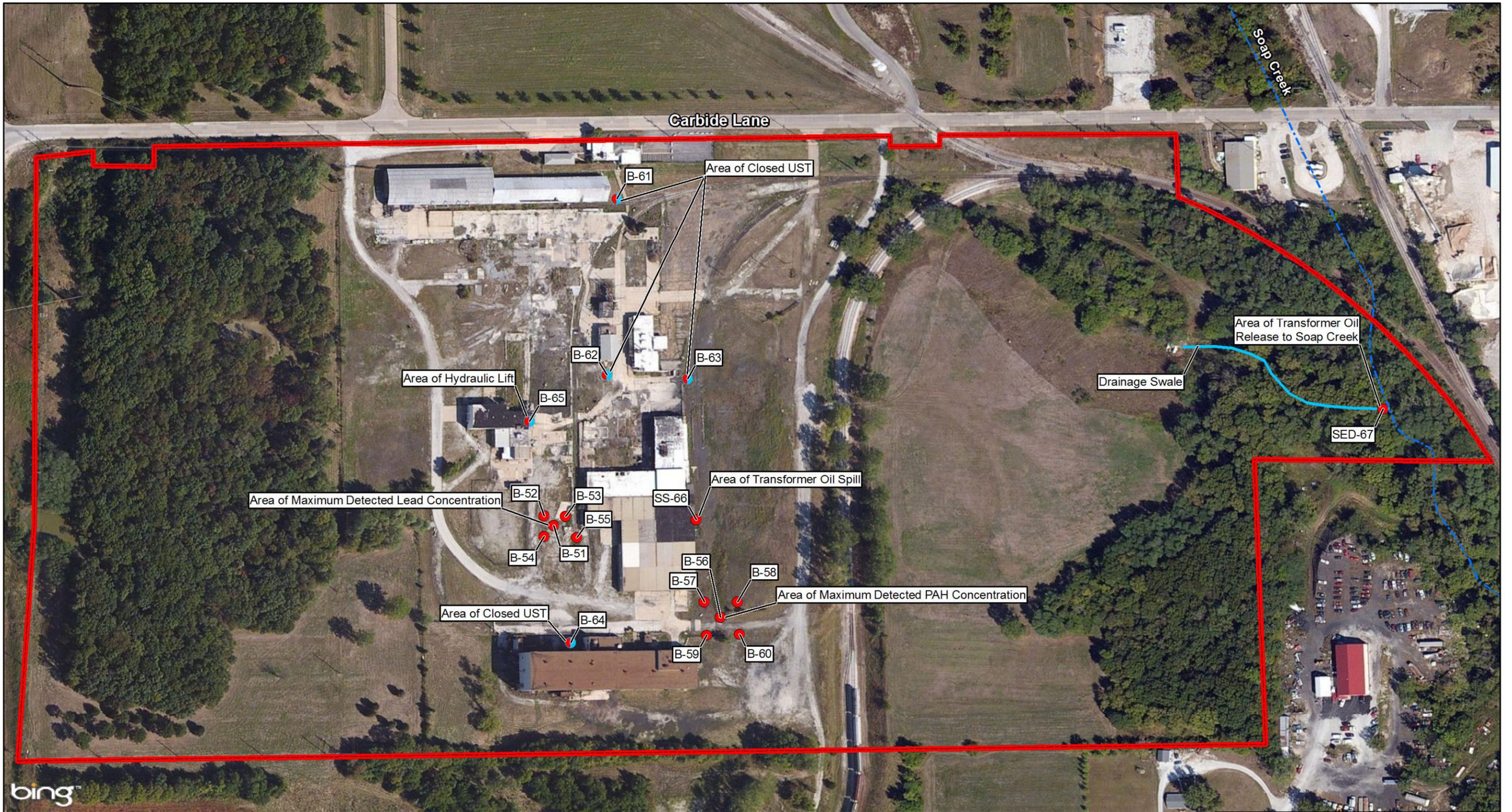
**Figure 6**  
Decision Unit Sampling Aliquots

**TETRA TECH**

Date: 3/30/2016 Drawn By: Nick Wiederholt Project No: X9025.14.0002.019.017

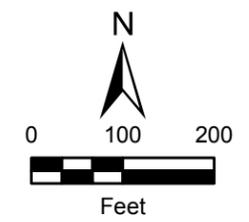
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Source: ESRI, ArcGIS Online, Bing Maps, 2011



- Legend**
- Proposed soil sample location
  - Proposed soil/groundwater sample location
  - ➔ Drainage swale
  - Soap Creek

- ▭ Subject property boundary
- PAH Polycyclic aromatic hydrocarbon
- UST Underground storage tank



Elkem Carbide  
365 Carbide Lane  
Keokuk, Iowa

**Figure 7**  
Targeted Sampling Locations

**TT** TETRA TECH

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Source: ESRI, ArcGIS Online, Bing Maps, 2011

Date: 3/30/2016 Drawn By: Nick Wiederholt Project No: X9025.14.0002.019.017

**APPENDIX C**

**TABLES**

TABLE C-1

## SOIL SAMPLING RESULTS (ORGANIC COMPOUNDS) COMPARED TO IOWA STATEWIDE STANDARDS

Location	Depth (ft bgs)	Sample	Date	2-Methylnaphthalene	4-Nitroaniline	Acenaphthene	Acenaphthylene	Acetone	Anthracene	Benzene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	bis(2-Ethylhexyl)phthalate	Carbazole	Chrysene	Dibenz(a,h)anthracene	Dibenzofuran	Ethyl Benzene	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyrene	Naphthalene	Phenanthrene	Pyrene	TEH-Diesel	Toluene	Total Organic Carbon	Xylenes, Total	
<b>Iowa Statewide Standard for Soil</b>				230	NE	3400	1700	68000	17000	56	3.1	0.31	3.1	170	31	170	120	310	0.31	76	7600	2300	2300	3.1	1100	1700	1700	28000	6100	NE	15000	
Terracon B-1	0 to 2	L442760.01	01/26/10	-	-	0.033 U	0.033 U	0.31	0.033 U	0.032	0.033 U	0.033 U	0.033 U	0.033 U	0.033 U	0.33 U	-	0.033 U	0.033 U	-	0.005 U	0.033 U	0.033 U	0.033 U	0.033 U	0.033 U	0.033 U	0.033 U	0.033 U	0.033 U	0.033 U	0.033 U
Terracon B-2	0 to 2	L442760.02	01/28/10	-	-	0.033 U	0.033 U	-	0.047	0.005 U	0.17	0.13	0.2	0.056	0.073	-	-	0.14	0.033 U	-	0.005 U	0.33	0.033 U	0.048	0.033 U	0.24	0.3	14	0.025 U	-	0.015 U	
Terracon B-5	0 to 2	L442760.03	01/27/10	-	-	0.065	0.033 U	-	0.13	-	0.38	0.18	0.37	0.11	0.13	-	-	0.29	0.047	-	-	0.83	0.06	0.085	0.033 U	0.66	0.64	4 U	-	-	-	
Terracon B-8	0 to 2	L442760.04	01/28/10	-	-	13	3.3 U	-	42	-	<71>	<37>	<89>	21	28	-	-	53	<8.1>	-	-	190	20	<17>	6.8	200	130	-	-	-	-	
Terracon B-8	6 to 8	L452661.01	01/28/10	-	-	0.059	0.033 U	-	0.16	-	0.22	0.18	0.36	0.051	0.35	-	-	0.2	0.033 U	-	-	0.66	0.066	0.05	0.033 U	0.64	0.43	-	-	-	-	
Terracon B-13	0 to 2	L442760.05	01/29/10	-	-	0.047	0.18	-	1.7	0.005 U	2.7	<1.2>	3.1	0.97	1.1	-	-	1.7	<0.4>	-	0.005 U	6.6	0.033 U	0.77	0.033 U	5.6	5.1	16	0.025 U	-	0.015 U	
Terracon B-13	4 to 7	L442760.06	01/29/10	-	-	0.033 U	0.033 U	-	0.033 U	0.005 U	0.033 U	0.041	0.033 U	0.033 U	0.033 U	-	-	0.033 U	0.033 U	-	0.005 U	6.6	0.033 U	0.77	0.033 U	5.6	5.1	16	0.025 U	-	0.015 U	
Terracon B-19	0 to 2	L442760.07	01/28/10	-	-	0.033 U	0.033 U	-	0.036	0.005 U	0.19	0.16	0.27	0.058	0.05	-	-	0.18	0.036	-	0.005 U	0.22	0.033 U	0.04	0.033 U	0.26	0.24	4.6	0.025 U	-	0.015 U	
Terracon B-25	0 to 2	L442760.08	01/28/10	-	-	0.092	0.033 U	-	0.4	0.005 U	1.7	<1.2>	2.6	0.31	0.68	-	-	1	0.19	-	0.005 U	3.2	0.1	0.32	0.06	1.8	2.1	14	0.025 U	-	0.015 U	
Terracon B-26	0 to 2	L442760.09	01/28/10	-	-	0.16	0.033 U	0.25 U	0.38	0.005 U	0.72	<0.72>	0.59	0.14	0.29	0.33 U	-	0.69	0.09	-	0.005 U	1.7	0.16	0.15	0.039	1.4	1.3	71	0.025 U	-	0.015 U	
Terracon B-29	2 to 4	L442760.10	01/26/10	-	-	0.033 U	0.033 U	-	0.033 U	0.005 U	0.033 U	0.071	0.1	0.05	0.033 U	-	-	0.055	0.033 U	-	0.005 U	0.033 U	0.033 U	0.035	0.033 U	0.064	0.044	4 U	0.025 U	-	0.015 U	
Terracon B-38	0 to 2	L442760.11	01/28/10	-	-	0.79	0.16 U	0.25 U	1.4	0.005 U	<3.9>	<3.3>	2.9	1.2	0.87	1.7 U	-	3.5	<0.64>	-	0.005 U	7.4	0.88	1.2	0.64	5.9	6.2	-	0.025 U	-	0.015 U	
Terracon B-48	0 to 2	L442760.12	01/27/10	-	-	190	13 U	0.25 U	300	0.005 U	<560>	<550>	<560>	150	<140>	130 U	-	<560>	<578>	-	0.021	1500	200	<140>	33	1500	1200	-	0.029	-	0.04	
Terracon B-48	8 to 10	L452661.02	01/27/10	-	-	0.033 U	-	-	0.033 U	-	0.033 U	0.033 U	0.033 U	0.033 U	0.033 U	-	-	0.033 U	0.033 U	-	-	0.069	0.033 U	0.033 U	0.033 U	0.072	0.051	-	-	-	-	
Terracon B-49	0 to 4	L442760.13	01/27/10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Terracon B-53	0 to 2	L442760.14	01/29/10	-	-	0.078	0.033 U	0.25 U	0.22	0.005 U	1.1	<0.91>	0.81	0.3	0.31	0.33 U	-	1.4	0.15	-	0.005 U	1.5	0.066	0.21	0.18	1.5	1.9	12	0.025 U	-	0.015 U	
Terracon B-57	0 to 1	L442760.15	01/29/10	-	-	0.033 U	0.033 U	-	0.037	0.005 U	0.085	0.056	0.11	0.033 U	0.034	-	-	0.076	0.033 U	-	0.005 U	0.16	0.033 U	0.033 U	0.068	0.25	0.13	4 U	0.025 U	-	0.015 U	
Terracon B-63	0 to 1	L442760.16	01/29/10	-	-	0.033 U	0.033 U	0.25 U	0.033 U	0.005 U	0.074	0.075	0.046	0.038	0.033 U	0.33 U	-	0.097	0.033 U	-	0.005 U	0.11	0.033 U	0.033 U	0.033 U	0.11	0.12	-	0.025 U	11000	0.015 U	
Terracon B-65	0 to 1	L442760.17	01/29/10	-	-	0.033 U	0.033 U	0.25 U	0.033 U	0.005 U	0.033 U	0.033 U	0.033 U	0.033 U	0.033 U	0.33 U	-	0.033 U	0.033 U	-	0.005 U	0.033 U	0.033 U	0.033 U	0.033 U	0.033 U	0.033 U	0.025 U	8500	0.015 U		
Terracon B-67	0 to 4	L442760.18	01/27/10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Terracon DUPLICATE	0 to 1	L442760.19	01/29/10	-	-	0.033 U	0.033 U	0.25 U	0.033 U	0.005 U	0.033 U	0.033 U	0.033 U	0.033 U	0.033 U	0.33 U	-	0.033 U	0.033 U	-	0.005 U	0.033 U	0.033 U	0.033 U	0.033 U	0.038	0.033 U	4 U	0.025 U	17000	0.015 U	
Terracon DUPLICATE	2 to 4	L442760.20	01/28/10	-	-	0.033 U	0.033 U	-	0.033 U	0.0066	0.033 U	0.033 U	0.033 U	0.033 U	0.033 U	-	-	0.033 U	0.033 U	-	0.15	0.033 U	0.033 U	0.033 U	2.7	0.068	0.033 U	-	0.041	-	0.37	
USGS-002	0 to 2	5789-1	07/31/12	0.68 U	3.4 U	0.68 U	0.68 U	-	0.68 U	-	2	<2.5>	2.4	1.7	1.4 U	1.7 U	1.7 U	3	1.4 U	0.68 U	-	3	0.68 U	1.4 U	0.68 U	3.4	3.4	-	-	-	-	
USGS-002	2 to 4	5789-2	07/31/12	0.13 U	0.64 U	0.13 U	0.13 U	-	0.2	-	0.59	1.3 U	1.3 U	1.3 U	0.32 U	0.32 U	0.85	1.3 U	0.13 U	-	1.1	0.13 U	1.3 U	0.13	1.2	1.1	-	-	-	-		
USGS-003	0 to 2	5789-19	08/01/12	5.5	7.2 U	1.4 U	1.4 U	-	1.9	-	<8.7>	<7.7>	<8.8>	2.6	2.3	3.6 U	16	<1.6>	1.4 U	-	7.5	1.4 U	2.3	2.9	27	14	-	-	-	-		
USGS-003	2 to 4	5789-20	08/01/12	0.14 U	0.68 U	0.14 U	0.14 U	-	0.14 U	-	0.14 U	0.14 U	0.14 U	0.14 U	0.14 U	0.34 U	0.34 U	0.17	0.14 U	0.14 U	-	0.14 U	0.14 U	0.14 U	0.14 U	0.23	0.16	-	-	-		
USGS-004	0 to 2	5789-17	07/31/12	1.4 U	6.8 U	7.4	1.4 U	-	15	-	<31>	<27>	<38>	6.9	13	3.4 U	10	31	<2.7>	3.6	-	65 J	7.2	<9.6>	2.6	51	55	-	-	-		
USGS-004	2 to 4	5789-18	07/31/12	0.14 U	0.69 U	0.15	0.14 U	-	0.47	-	1.7	<1.7>	2.5	0.67	0.91	0.35 U	0.35 U	2	0.14 U	0.14 U	-	4	0.17	0.8	0.14 U	2	3.4	-	-	-		
USGS-005	0 to 2	5789-21	08/01/12	1.2 U	6.1 U	2.1	1.2 U	-	4.8	-	<19>	<20>	<30>	5.3	10	3.1 U	3.1 U	21	<2>	1.2 U	-	38	1.8	<6.7>	1.2 U	22	31	-	-	-		
USGS-005	2 to 4	5789-22	08/01/12	1.8 J	0.68 U	3.6 J	0.15	-	14 J	-	<36 J>	<30 J>	<38 J>	8.3 J	15 J	1.7 U	4.4 J	38 J	6.7 U	2.7 J	-	71 J	4.5 J	<8.8 J>	2 J	61 J	57 J	-	-	-		
USGS-006	0 to 2	5789-15	07/31/12	1.3 U	6.4 U	1.3 U	1.3 U	-	1.3 U	-	3	<2.8>	2.8	1.6	1.3 U	3.2 U	3.2 U	6	1.3 U	1.3 U	-	1.6	1.3 U	1.3 U	1.3 U	6.5	4.1	-	-	-		
USGS-006	2 to 4	5789-16	07/31/12	0.14 U	0.69 U	0.14 U	0.14 U	-	0.14 U	-	0.14 U	0.14 U	0.14 U	0.14 U	0.14 U	0.34 U	0.34 U	0.14 U	0.14 U	0.14 U	-	0.14 U	0.14 U	0.14 U	0.14 U	0.14 U	0.14 U	0.14 U	0.14 U	0.14 U	0.14 U	
USGS-007	0 to 2	5789-11	07/31/12	31	14 U	140	2.8 U	-	300	-	<430>	<410>	<560>	83	<200>	6.9 U	<150>	91	<28>	<96>	-	1000	150	<120>	100	950	800	-	-	-		
USGS-007	2 to 4	5789-12	07/31/12	1.3 U	6.6 U	1.3 U	1.3 U	-	2.8	-	<6>	<6>	<8>	1.4	3.2	3.3 U	3.3 U	6.4	1.3 U	1.3 U	-	15	1.3 U	1.8	1.3 U	11	11	-	-	-		
USGS-008	0 to 2	5789-13	07/31/12	2.7 U	13 U	2.9	2.7 U	-	7.6	-	<26>	<26>	<33>	8.7	12	6.7 U	6.7 U	30	<3.2>	2.7 U	-	52	2.7	<11>	2.7 U	35	42	-	-	-		
USGS-008	2 to 4	5789-14	07/31/12	0.15 U	0.75 U	0.15 U	0.15 U	-	0.15 U	-	0.15	0.15 U	0.16	0.15 U	0.15 U	0.37 U	0.37 U	0.18	0.15 U	0.15 U	-	0.32	0.15 U	0.15 U	0.15 U	0.25	0.26	-	-	-		
USGS-009	0 to 2	5789-23	08/01/12	1.6	6.5 U	5.2	1.3 U	-	11	-	<25>	<24>	<35>	6.8	13	3.3 U	5.4	27	<2.5>	3.4	-	28	4.8	<9.1>	2.1	21	42	-	-	-		
USGS-009	0 to 2	5789-23-FD	08/01/12																													

TABLE C-2

## SOIL SAMPLING RESULTS (METALS) COMPARED TO IOWA STATEWIDE STANDARDS

Location	Depth (ft bgs)	Sample	Date	Aluminum	Antimony	Arsenic	Barium	Cadmium	Calcium	Chromium	Cobalt	Copper	Iron	Lead	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Potassium	Selenium	Silver	Sodium	Vanadium	Zinc
<b>Iowa Statewide Standard for Soil</b>				NE	31	17	15000	70	NE	NE	31	15000	NE	400	NE	10000	23	390	1500	NE	390	370	NE	350	23000
Terracon B-1	0 to 2	L442760.01	01/26/10	-	-	5 U	30	0.25 U	-	13	-	-	-	5.1	-	-	0.02 U	-	-	-	2.6	0.5 U	-	-	-
Terracon B-2	0 to 2	L442760.02	01/28/10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Terracon B-5	0 to 2	L442760.03	01/27/10	-	-	1 U	61	0.25 U	-	9.9	-	-	-	4	-	-	0.02 U	-	-	-	2.8	0.5 U	-	-	-
Terracon B-8	0 to 2	L442760.04	01/28/10	-	-	5 U	91	1.4	-	9.9	-	-	-	<20000>	-	-	0.15	-	-	-	3.1	0.5 U	-	-	-
	6 to 8	L452661.01	01/28/10	-	-	-	-	-	-	-	-	-	-	8.9	-	-	-	-	-	-	-	-	-	-	-
Terracon B-13	0 to 2	L442760.05	01/29/10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	4 to 7	L442760.06	01/29/10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Terracon B-19	0 to 2	L442760.07	01/28/10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Terracon B-25	0 to 2	L442760.08	01/28/10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Terracon B-26	0 to 2	L442760.09	01/28/10	-	-	5.5	250	0.59	-	22	-	-	-	260	-	-	0.069	-	-	-	5.7	0.67	-	-	-
Terracon B-29	2 to 4	L442760.10	01/26/10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Terracon B-38	0 to 2	L442760.11	01/28/10	-	-	10 U	2	0.61	-	2.4	-	-	-	46	-	-	0.02 U	-	-	-	2.1	0.5 U	-	-	-
Terracon B-48	0 to 2	L442760.12	01/27/10	-	-	2.1	67	0.56	-	13	-	-	-	23	-	-	0.02 U	-	-	-	3.1	0.5 U	-	-	-
	8 to 10	L452661.02	01/27/10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Terracon B-49	0 to 4	L442760.13	01/27/10	-	-	10 U	18	0.25 U	-	18	-	-	-	3.3	-	-	0.02 U	-	-	-	1 U	0.5 U	-	-	-
Terracon B-53	0 to 2	L442760.14	01/29/10	-	-	6.4	95	2.6	-	15	-	-	-	74	-	-	0.035	-	-	-	3.7	0.5 U	-	-	-
Terracon B-57	0 to 1	L442760.15	01/29/10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Terracon B-63	0 to 1	L442760.16	01/29/10	-	-	3.4	95	0.25 U	-	14	-	-	-	23	-	-	0.02 U	-	-	-	3.8	0.5 U	-	-	-
Terracon B-65	0 to 1	L442760.17	01/29/10	-	-	6.7	180	0.25 U	-	21	-	-	-	13	-	-	0.022	-	-	-	5 U	0.5 U	-	-	-
Terracon B-67	0 to 4	L442760.18	01/27/10	-	-	3.5	150	0.68	-	13	-	-	-	26	-	-	0.02 U	-	-	-	1 U	0.5 U	-	-	-
Terracon DUPLICATE	0 to 1	L442760.19	01/29/10	-	-	2.9	92	0.25 U	-	9.5	-	-	-	14	-	-	0.02 U	-	-	-	1 U	0.5 U	-	-	-
	2 to 4	L442760.20	01/28/10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
USGS-002	0 to 2	5789-1	07/31/12	9280	2.7 J	7.4	166 J	2.2	36200	14.3	12	13.3	14800	70.4 J	3040	1040	0.0461	2.2 U	14.6	857	10.9 UJ	2.2 U	94.9	30.3	151 J
	2 to 4	5789-2	07/31/12	9320	2.5	5.9 U	107	1.9	10400	13.5	5.4	7.6	11900	32.7	1890	197	0.13	2.4 U	11.1	549	11.8 U	2.4 U	101	22.7	158
USGS-003	0 to 2	5789-19	08/01/12	23900	4.8	6.3 U	168	1.3 U	11300	25.6	4.6	14.6	22400	26.5	3800	386	0.15	2.5 U	17.5	1200	12.5 U	2.5 U	215	35.5	132
	2 to 4	5789-20	08/01/12	19200	4.7	10.6	253	1.2 U	4100	22.2	9.1	19.6	28500	6	4760	542	0.0493	2.4 U	25.6	1370	12 U	2.4 U	298	42.7	71.8
USGS-004	0 to 2	5789-17	07/31/12	14500	3.6	8.7	165	1.1 U	17000	18.7	8.7	17.1	20600	12.6	4510	650	0.0578	2.2 U	21.2	1140	10.8 U	2.2 U	219	35.7	157
	2 to 4	5789-18	07/31/12	14000	3.8	6	177	1.7	49500	19.6	4.5	22.6	18300	41.4	4800	404	0.0361	2.4 U	17.1	1180	11.8 U	2.4 U	187	34.8	323
USGS-005	0 to 2	5789-21	08/01/12	3330	3.7 J	6.9 J	59.7 J	3.7	103000	19.5	4.3	104 J	11400	241	13100 J	305	0.161	2.1 U	24.6	426	10.5 UJ	2.1 U	142	9.5	176 J
	2 to 4	5789-22	08/01/12	7150	8.3	8.3	457	5.6	94000	18.1	6.1	45.2	11200	<1370>	3510	702	0.412	2.2 U	19.8	639	11 U	2.2 U	268	25.6	422
USGS-006	0 to 2	5789-15	07/31/12	12000	28.6	7.9	948	5.3	4010	15.3	15.6	38.4	20100	<1680>	2130	1410	3.21	2.1 U	16.5	890	10.4 U	2.1 U	155	36.7	1460
	2 to 4	5789-16	07/31/12	15000	4.1	6.1	183	1.2 U	4220	18	5.8	21	18300	180	2430	281	18.3	2.3 U	10.8	867	11.7 U	2.3 U	257	42.6	379
USGS-007	0 to 2	5789-11	07/31/12	6440	11.4	5.8 U	296	5.1	81300	13.9	4	61.2	14900	<505>	12300	347	0.254	2.3 U	16	762	11.7 U	2.3 U	449	18.1	251
	2 to 4	5789-12	07/31/12	16700	4.5	11.3	243	1.2 U	4040	21.3	18.3	17.5	23000	12.7	4130	807	0.0388	2.5 U	21.3	1370	12.5 U	2.5 U	107	41.1	348
USGS-008	0 to 2	5789-13	07/31/12	6510	6.6	5.4 U	126	1.1 U	47800	9.8	3.8	22.1	13100	350	5060	485	0.571	2.2 U	10.4	753	10.9 U	2.2 U	148	23	172
	2 to 4	5789-14	07/31/12	18800	4.2	6.2 U	196	1.2 U	3900	22.7	3.4	16.6	21200	6.2 U	4900	143	0.0464	2.5 U	20.8	1410	12.4 U	2.5 U	192	35.4	57.4
	0 to 2	5789-23	08/01/12	2990	3.5	5.2 U	41.8	3.6	65700	10.3	3	23.1	8800	278	16500	221	0.101	36.3	9.4	299	10.5 U	2.1 U	106	10.8	181
USGS-009	0 to 2	5789-23-FD	08/01/12	3700	2.1 U	6	51.8	6.1	73700	10	2.9	23.7	9560	<414>	15000	250	0.132	81.5	9.8	306	10.5 U	2.1 U	104	9.7	298
	2 to 4	5789-24	08/01/12	15600	4.9	13.6	215	28.9	17000	18.3	11.1	31.6	20100	<1060>	6280	1200	0.441	2.3 U	20.6	821	11.3 U	2.3 U	119	26.4	2140
	2 to 4	5789-24-FD	08/01/12	14800	7.7	8.5	194	17.5	14700	18.8	7.3	31.5	16700	<1260>	5200	533	0.465	2.4 U	14.8	815	11.8 U	2.4 U	114	28.7	1520
USGS-010	0 to 2	5789-3	07/31/12	4390	2.4	5.5 U	111	1.2	52600	16.8	3.6	54.8	16600	146	2720	238	0.43	2.4	14.6	435	10.9 U	2.2 U	140	11.2	217
	2 to 4	5789-4	07/31/12	4580	4.4	5.9 U	366	1.2 U	121000	11.4	3.1	27.3	9000	247	4190	443	0.367	2.4 U	9.8	478	11.8 U	2.4 U	189	15.4	114
USGS-011	0 to 2	5789-5	07/31/12	16100	3.4	5.7 U	325	1.1 U	4280	20.4	3.6	14.6	21200	10.5	4020	195	0.201	2.3 U	18.6	1080	11.4 U	2.3 U	214	31.8	42
	2 to 4	5789-6	07/31/12	12900	3.7	5.9 U	144	1.2 U	2690	15	4.8	6.5	15900	5.9 U	2600	219	0.0377	2.4 U	12.1	630	11.8 U	2.4 U	224	29.4	17.5
	0 to 2	5789-7	07/31/12	13800	3.1	5.6 U	135	1.1 U	3790	21.8	6.2	11.2	16700	5.6 U	3130	257	0.102	2.2 U	14.2	844	11.2 U	2.2 U	217	28.6	30.9
USGS-012	0 to 2	5789-7-FD	07/31/12	14000	8.3	5.8 U	168	1.2 U	3460	19.2	1.9	680	16500	234	3360	80.2	0.105	2.3 U	15	871	11.7 U	2.3 U	208	28.6	36
	2 to 4	5789-8	07/31/12	14900	3.2	5.9 U	213	1.2 U	2890	16.8	1.6	7.3	15300	5.9 U	2430	72.5	0.0354	2.3 U	7.4	524	11.7 U	2.3 U	225	30.6	14.7
	2 to 4	5789-8-FD	07/31/12	18400	4	6 U	84.5	1.2 U	3190	19.2	7.2	12	19400	13.3	2680	271	0.0325	2.4 U	7.3	524	12 U	2.4 U	259	40.2	11.3
USGS-013	0 to 2	5789-29	08/01/12	18400	4.8	14.8	246	4.4	4200	24.2	6	20.6	24300	6.9	4460	317	0.0479	2.3 U	22.8	981	11.5 U	2.3 U	305	34.9	60.9
	2 to 4	5789-30	08/01/12	20800	3.6	5.7	347	3.5	7390	23.9	4.8														

TABLE C-3

**SUMMARY OF CUMULATIVE CANCER RISK VALUES  
CORRESPONDING TO PAH CONCENTRATIONS IN SOIL SAMPLES**

Location	Depth	Sample	Date	Cumulative Cancer Risk		
				Associated with PAH Concentrations of Sample		
				Site Resident Scenario	Site Worker Scenario	Construction Worker Scenario
<b>Soil Depth Considered for Screening of Exposure Scenario</b>				<b>All</b>	<b>2 feet or less</b>	<b>All</b>
Terracon B-1	0 to 2	L442760.01	01/26/10	ND	ND	ND
Terracon B-2	0 to 2	L442760.02	01/28/10	2.8E-06	7.4E-07	6.5E-08
Terracon B-5	0 to 2	L442760.03	01/27/10	5.0E-06	1.3E-06	1.2E-07
Terracon B-8	0 to 2	L442760.04	01/28/10	1.0E-03	2.7E-04	2.4E-05
	6 to 8	L452661.01	01/28/10	4.0E-06	1.1E-06	9.2E-08
Terracon B-13	0 to 2	L442760.05	01/29/10	3.7E-05	9.7E-06	8.5E-07
	4 to 7	L442760.06	01/29/10	6.6E-08	1.8E-08	1.5E-09
Terracon B-19	0 to 2	L442760.07	01/28/10	4.0E-06	1.1E-06	9.2E-08
Terracon B-25	0 to 2	L442760.08	01/28/10	3.0E-05	7.9E-06	7.0E-07
Terracon B-26	0 to 2	L442760.09	01/28/10	1.5E-05	4.1E-06	3.6E-07
Terracon B-29	2 to 4	L442760.10	01/26/10	1.4E-06	3.6E-07	3.2E-08
Terracon B-38	0 to 2	L442760.11	01/28/10	7.7E-05	2.0E-05	1.8E-06
Terracon B-48	0 to 2	L442760.12	01/27/10	1.2E-02	3.3E-03	2.9E-04
	8 to 10	L452661.02	01/27/10	ND	ND	ND
Terracon B-49	0 to 4	L442760.13	01/27/10	-	-	-
Terracon B-53	0 to 2	L442760.14	01/29/10	2.1E-05	5.5E-06	4.8E-07
Terracon B-57	0 to 1	L442760.15	01/29/10	1.2E-06	3.2E-07	2.8E-08
Terracon B-63	0 to 1	L442760.16	01/29/10	1.4E-06	3.7E-07	3.3E-08
Terracon B-65	0 to 1	L442760.17	01/29/10	ND	ND	ND
Terracon B-67	0 to 4	L442760.18	01/27/10	-	-	-
Terracon DUPLICATE	0 to 1	L442760.19	01/29/10	-	-	-
Terracon DUPLICATE	2 to 4	L442760.20	01/28/10	-	-	-
USGS-002	0 to 2	5789-1	07/31/12	4.7E-05	1.3E-05	1.1E-06
	2 to 4	5789-2	07/31/12	9.7E-07	2.6E-07	2.2E-08
USGS-003	0 to 2	5789-19	08/01/12	1.8E-04	4.8E-05	4.2E-06
	2 to 4	5789-20	08/01/12	2.7E-09	7.3E-10	6.3E-11
USGS-004	0 to 2	5789-17	07/31/12	6.1E-04	1.6E-04	1.4E-05
	2 to 4	5789-18	07/31/12	3.6E-05	9.4E-06	8.3E-07
USGS-005	0 to 2	5789-21	08/01/12	4.5E-04	1.2E-04	1.0E-05
	2 to 4	5789-22	08/01/12	6.2E-04	1.6E-04	1.4E-05
USGS-006	0 to 2	5789-15	07/31/12	5.5E-05	1.4E-05	1.3E-06
	2 to 4	5789-16	07/31/12	ND	ND	ND
USGS-007	0 to 2	5789-11	07/31/12	8.9E-03	2.4E-03	2.1E-04
	2 to 4	5789-12	07/31/12	1.2E-04	3.3E-05	2.9E-06
USGS-008	0 to 2	5789-13	07/31/12	5.9E-04	1.6E-04	1.4E-05
	2 to 4	5789-14	07/31/12	5.0E-07	1.3E-07	1.2E-08
USGS-009	0 to 2	5789-23	08/01/12	5.4E-04	1.4E-04	1.3E-05
	0 to 2	5789-23-FD	08/01/12	2.5E-04	6.6E-05	5.8E-06
	2 to 4	5789-24	08/01/12	1.5E-04	4.0E-05	3.5E-06
	2 to 4	5789-24-FD	08/01/12	2.7E-05	7.1E-06	6.2E-07
USGS-010	0 to 2	5789-3	07/31/12	2.7E-04	7.2E-05	6.3E-06
	2 to 4	5789-4	07/31/12	1.9E-04	4.9E-05	4.3E-06
USGS-011	0 to 2	5789-5	07/31/12	8.1E-05	2.2E-05	1.9E-06
	2 to 4	5789-6	07/31/12	ND	ND	ND
USGS-012	0 to 2	5789-7	07/31/12	7.1E-06	1.9E-06	1.6E-07
	0 to 2	5789-7-FD	07/31/12	1.8E-06	4.7E-07	4.2E-08
	2 to 4	5789-8	07/31/12	ND	ND	ND
	2 to 4	5789-8-FD	07/31/12	ND	ND	ND
USGS-013	0 to 2	5789-29	08/01/12	5.1E-05	1.4E-05	1.2E-06
	2 to 4	5789-30	08/01/12	ND	ND	ND
USGS-014	0 to 2	5789-27	08/01/12	6.2E-04	1.6E-04	1.4E-05
	2 to 4	5789-28	08/01/12	4.4E-04	1.2E-04	1.0E-05
USGS-016	0 to 1	5789-31	09/24/12	1.1E-05	3.0E-06	2.7E-07
	0 to 1	5789-31-FD	09/24/12	8.5E-06	2.3E-06	2.0E-07
USGS-017	0 to 1	5789-34	09/25/12	ND	ND	ND
USGS-018	0 to 1	5789-33	09/25/12	ND	ND	ND
USGS-019	0 to 1	5789-32	09/25/12	3.9E-05	1.0E-05	9.1E-07

**Notes:**

Shading indicates a cumulative cancer risk exceeding 1E-04 and the sample was collected from a depth considered in the screening evaluation.

FD	Field duplicate
ft bgs	Feet below ground surface
ND	PAHs not detected in sample
PAH	Polycyclic aromatic hydrocarbon
-	Sample not analyzed for PAHs

TABLE C-4

GROUNDWATER SAMPLING RESULTS (ORGANIC COMPOUNDS) COMPARED TO IOWA STATEWIDE STANDARDS

Location	Sample	Date	1,2-Dichloroethane	1,2,3-Trichlorobenzene	1,2,4-Trichlorobenzene	Acetone	bis(2-Ethylhexyl)phthalate	Chlorobenzene	cis-1,2-Dichloroethene	Cyclohexane	Di-n-butylphthalate	Diethylphthalate	Dimethylphthalate	TEH-Diesel	TEH-Waste Oil	Tetrachloroethene	trans-1,2-Dichloroethene	Trichloroethene	Vinyl Chloride
<b>Iowa Statewide Standard for Protected Groundwater</b>			5	NE	70	6300	6	100	70	NE	700	5600	NE	2200	730	5	100	5	2
<b>Iowa Statewide Standard for Non-Protected Groundwater</b>			38	NE	350	32000	250	700	350	NE	3500	28000	NE	44000	15000	1700	700	76	10
Terracon B-56	L442750.01	01/29/10	1 U	1 U	10 U	50 U	1 U	1 U	1 U	-	1 U	1 U	1 U	-	-	1 U	1 U	1 U	1 U
Terracon B-56	L442750.03	01/29/10	1 U	1 U	10 U	50 U	1 U	1 U	1 U	-	1 U	1 U	1 U	-	-	1 U	1 U	1 U	1 U
Terracon B-63	L442750.02	01/29/10	1 U	1.7	1	50 U	1 U	1 U	1 U	-	1 U	1 U	1 U	-	-	1 U	1 U	1 U	1 U
Terracon BLANK	L442750.04	01/29/10	1 U	1 U	10 U	50 U	<<260>>	1 U	1 U	-	13	1 U	1 U	100 U	560	1 U	1 U	1 U	1 U
Terracon TRIP BLANK	L442760.21	01/26/10	1 U	1 U	1 U	50 U	-	1 U	1 U	-	-	-	-	-	-	1 U	1 U	1 U	1 U
Terracon TRIP BLANK	L442760.22	01/26/10	1 U	1 U	1 U	50 U	-	1 U	1 U	-	-	-	-	-	-	1 U	1 U	1 U	1 U
Terracon EQUIP	L442760.23	01/28/10	-	-	-	-	-	-	-	-	-	-	-	270	<1000>	-	-	-	-
USGS-005	5789-101	08/28/12	3.9 J	1 UJ	2 U	5 UJ	5 U	1 UJ	<210 J>	1 UJ	5 U	12	2.1	-	-	1 UJ	1.9 J	2.7 J	1 UJ
	5789-101-FD	08/28/12	4.3 J	1 UJ	1 UJ	8.1 J	-	1 UJ	<210 J>	1.3 J	-	-	-	-	-	1.6 J	4 J	4.5 J	1.3 J
USGS-015	5789-104	08/30/12	1 UJ	1 UJ	2 U	5 UJ	5 U	1 UJ	1 UJ	1 UJ	5 U	5.9	2 U	-	-	1 UJ	1 UJ	1 UJ	1 UJ
	5789-104-FD	08/30/12	1 UJ	1 UJ	2 U	5 UJ	5 U	1 UJ	1 UJ	1 UJ	5 U	5.7	2 U	-	-	1 UJ	1 UJ	1 UJ	1 UJ
USGS-016	5789-107	09/24/12	1 U	4 U	2 U	5 UJ	5 U	1 U	1 U	1 U	5 U	2 U	2 U	-	-	1 U	1 U	1 U	1 U
	5789-107-FD	09/24/12	1 U	4 U	2 U	5 UJ	5 U	1 U	1 U	1 U	5 U	2 U	2 U	-	-	1 U	1 U	1 U	1 U
USGS-018	5789-112	09/25/12	1 U	4 U	2 U	5 UJ	5 U	1 U	1 U	1 U	5 U	2 U	2 U	-	-	1 U	1 U	1 U	1 U
USGS-019	5789-111	09/25/12	1 U	4 U	2 U	8.8 J	5 U	1 U	1 U	1 U	5 U	2 U	2 U	-	-	1 U	1 U	1 U	1 U
USGS Equipment Blank	5789-106	08/31/12	1 U	1 UJ	2 U	5 UJ	5 U	1 U	1 U	1 U	5 U	8.6	2 U	-	-	1 U	1 U	1 U	1 U
USGS Equipment Blank	5789-114	09/25/12	-	-	2 U	-	5 U	-	-	-	5 U	2 U	2 U	-	-	-	-	-	-
USGS Equipment Blank	5789-115	09/25/12	1 U	4 U	2 U	5 UJ	5 U	1 U	1 U	1 U	5 U	2 U	2 U	-	-	1 U	1 U	1 U	1 U
USGS Field Blank	5789-116FB	07/31/12	-	-	2 U	-	5 U	-	-	-	5 U	2 U	2 U	-	-	-	-	-	-
USGS Trip Blank	5789-117FB	09/25/12	1 U	4 U	2 U	5 UJ	-	1.4	1 U	1 U	-	-	-	-	-	1 U	1 U	1 U	1 U

Notes:

All concentrations are micrograms per liter (µg/L).

Only analytes detected in at least one groundwater sample are shown.

Shading indicates a detected concentration exceeded an Iowa Statewide Standard for Groundwater.

- < > The concentration exceeds the standard for protected groundwater.
- << >> The concentration exceeds the standard for non-protected groundwater.
- FB Field blank
- FD Field duplicate
- ft bgs Feet below ground surface
- NE Not established
- TEH Total extractable hydrocarbons
- Not analyzed

Data Qualifiers:

- J The identification of the analyte is acceptable; the reported value is an estimate.
- U The analyte was not detected at or above the reporting limit.
- UJ The analyte was not detected at or above the reporting limit. The reporting limit is an estimate.

TABLE C-5

GROUNDWATER SAMPLING RESULTS (METALS) COMPARED TO IOWA STATEWIDE STANDARDS

Location	Sample	Date	Aluminum	Barium	Cadmium	Calcium	Chromium	Cobalt	Copper	Iron	Lead	Magnesium	Manganese	Molybdenum	Nickel	Potassium	Selenium	Sodium	Titanium	Vanadium	Zinc
<b>Iowa Statewide Standard for Protected Groundwater</b>			NE	2000	5	NE	100	2.8	1300	NE	15	NE	300	40	100	NE	50	NE	NE	35	2000
<b>Iowa Statewide Standard for Non-Protected Groundwater</b>			NE	10000	NE	NE	500	14	6600	NE	75	NE	4900	200	700	NE	250	NE	NE	180	10000
Terracon B-56	L442750.01	01/29/10	-	88	5 U	-	10 U	-	-	-	5 U	-	-	-	-	-	20 U	-	-	-	-
Terracon B-56	L442750.03	01/29/10	-	85	5 U	-	10 U	-	-	-	5 U	-	-	-	-	-	26	-	-	-	-
Terracon B-63	L442750.02	01/29/10	-	110	5 U	-	10 U	-	-	-	5 U	-	-	-	-	-	24	-	-	-	-
Terracon BLANK	L442750.04	01/29/10	-	5 U	5 U	-	10 U	-	-	-	5 U	-	-	-	-	-	20 U	-	-	-	-
Terracon TRIP BLANK	L442760.21	01/26/10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Terracon TRIP BLANK	L442760.22	01/26/10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Terracon EQUIP	L442760.23	01/28/10	-	110	5 U	-	19	-	-	-	<26>	-	-	-	-	-	20 U	-	-	-	-
USGS-005	5789-101	08/28/12	1140	144	<9>	1E+05	15 U	<11.6>	12	3650	50 U	49800	<937>	26	37	2490	50 U	91600	20 U	10	245
	5789-101-FD	08/28/12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
USGS-015	5789-104	08/30/12	6730	413	<20>	2E+05	31	<<15>>	12	7960	50 U	57100	<908>	15 U	23	2720	50 U	63000	30	30	134
	5789-104-FD	08/30/12	8090	469	<23>	2E+05	37	<<18>>	16	9960	50 U	58000	<1140>	15 U	27	2990	50 U	65100	32	<36>	161
USGS-016	5789-107	09/24/12	50 U	200	3 U	83100	15 U	10 U	5 U	118	50 U	18200	27	15 U	20 U	15100	50 U	51000	20 U	10 U	25 U
	5789-107-FD	09/24/12	50 U	194	3 U	81600	15 U	10 U	5 U	104	50 U	17800	26	15 U	20 U	15000	50 U	50700	20 U	10 U	25 U
USGS-018	5789-112	09/25/12	115	35	3 U	35800	15 U	10 U	5 U	273	50 U	3550	98	20	20 U	3060	50 U	16500	20 U	10 U	25 U
USGS-019	5789-111	09/25/12	116	40	3 U	40200	15 U	10 U	5	324	50 U	4290	88	<43>	20 U	3540	50 U	19100	20 U	10 U	25 U
USGS Equipment Blank	5789-106	08/31/12	50 U	10 U	3 U	2000 U	15 U	10 U	8	50 U	50 U	2000 U	5 U	15 U	20 U	2000 U	50 U	5000 U	20 U	10 U	25 U
USGS Equipment Blank	5789-114	09/25/12	50 U	10 U	3 U	2000 U	15 U	10 U	5 U	50 U	50 U	2000 U	5 U	15 U	20 U	2000 U	50 U	5000 U	20 U	10 U	25 U
USGS Equipment Blank	5789-115	09/25/12	50 U	10 U	3 U	2000 U	15 U	10 U	5 U	50 U	50 U	2000 U	5 U	15 U	20 U	2000 U	50 U	5000 U	20 U	10 U	25 U
USGS Field Blank	5789-116FB	07/31/12	50 U	10 U	3 U	2000 U	15 U	10 U	17	142	50 U	2000 U	5 U	15 U	20 U	2000 U	50 U	5000 U	20 U	10 U	25 U
USGS Trip Blank	5789-117FB	09/25/12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes:

All concentrations are micrograms per liter (µg/L). Only analytes detected in at least one groundwater sample are shown.

Shading indicates a detected concentration exceeded an Iowa Statewide Standard for Groundwater.

< > The concentration exceeds the standard for protected groundwater.  
 << >> The concentration exceeds the standard for non-protected groundwater.

FB Field blank  
 FD Field duplicate  
 ft bgs Feet below ground surface  
 NE Not established  
 - Not analyzed

Data Qualifiers:

U The analyte was not detected at or above the reporting limit.

**APPENDIX D**  
**CUMULATIVE RISK CALCULATIONS**

**Appendix D  
Cumulative Cancer Risk Calculations**

Sample Information and Results							Site-Specific Screening Level <sup>1</sup> (Cancer Risk = 1E-06)			Cancer Risk		
							<u>Site Resident</u>	<u>Site Worker</u>	<u>Construction Worker</u>	<u>Site Resident</u>	<u>Site Worker</u>	<u>Construction Worker</u>
<u>Location</u>	<u>Depth</u>	<u>Sample</u>	<u>Date</u>	<u>Analyte</u>	<u>Cas Number</u>	<u>Result</u>						
B-1	0 to 2	L442760.01	01/26/10	2-Chloronaphthalene	91-58-7	0.033 U	-	-	-	-	-	-
B-1	0 to 2	L442760.01	01/26/10	Acenaphthene	83-32-9	0.033 U	-	-	-	-	-	-
B-1	0 to 2	L442760.01	01/26/10	Anthracene	120-12-7	0.033 U	-	-	-	-	-	-
B-1	0 to 2	L442760.01	01/26/10	Benzo(a)anthracene	56-55-3	0.033 U	0.62	2.34	26.7	-	-	-
B-1	0 to 2	L442760.01	01/26/10	Benzo(a)pyrene	50-32-8	0.033 U	0.062	0.234	2.67	-	-	-
B-1	0 to 2	L442760.01	01/26/10	Benzo(b)fluoranthene	205-99-2	0.033 U	0.62	2.34	26.7	-	-	-
B-1	0 to 2	L442760.01	01/26/10	Benzo(k)fluoranthene	207-08-9	0.033 U	6.2	23.4	267	-	-	-
B-1	0 to 2	L442760.01	01/26/10	Chrysene	218-01-9	0.033 U	62	234	2700	-	-	-
B-1	0 to 2	L442760.01	01/26/10	Dibenz(a,h)anthracene	53-70-3	0.033 U	0.062	0.234	2.67	-	-	-
B-1	0 to 2	L442760.01	01/26/10	Fluoranthene	206-44-0	0.033 U	-	-	-	-	-	-
B-1	0 to 2	L442760.01	01/26/10	Fluorene	86-73-7	0.033 U	-	-	-	-	-	-
B-1	0 to 2	L442760.01	01/26/10	Indeno(1,2,3-cd)pyrene	193-39-5	0.033 U	0.62	2.34	26.7	-	-	-
B-1	0 to 2	L442760.01	01/26/10	Naphthalene	91-20-3	0.033 U	-	-	-	-	-	-
B-1	0 to 2	L442760.01	01/26/10	Pyrene	129-00-0	0.033 U	-	-	-	-	-	-
Cumulative Cancer Risk					-	-	-	-	-	0.00E+00	0.00E+00	0.00E+00

**Notes:**

<sup>1</sup> Site-specific screening level calculated using the Iowa Department of Natural Resources Cumulative Risk Calculator

J The reported value is an estimate.

U The analyte was not detected.

**Appendix D  
Cumulative Cancer Risk Calculations**

<b>Sample Information and Results</b>							<b>Site-Specific Screening Level<sup>1</sup></b>			<b>Cancer Risk</b>		
							<b>(Cancer Risk = 1E-06)</b>			<b>Site Resident</b>	<b>Site Worker</b>	<b>Construction Worker</b>
<b>Location</b>	<b>Depth</b>	<b>Sample</b>	<b>Date</b>	<b>Analyte</b>	<b>Cas Number</b>	<b>Result</b>						
B-13	0 to 2	L442760.05	01/29/10	Acenaphthene	83-32-9	0.047	-	-	-	-	-	-
B-13	0 to 2	L442760.05	01/29/10	Anthracene	120-12-7	1.7	-	-	-	-	-	-
B-13	0 to 2	L442760.05	01/29/10	Benzo(a)anthracene	56-55-3	2.7	0.62	2.34	26.7	4.35E-06	1.15E-06	1.01E-07
B-13	0 to 2	L442760.05	01/29/10	Benzo(a)pyrene	50-32-8	1.2	0.062	0.234	2.67	1.94E-05	5.13E-06	4.49E-07
B-13	0 to 2	L442760.05	01/29/10	Benzo(b)fluoranthene	205-99-2	3.1	0.62	2.34	26.7	5.00E-06	1.32E-06	1.16E-07
B-13	0 to 2	L442760.05	01/29/10	Benzo(k)fluoranthene	207-08-9	1.1	6.2	23.4	267	1.77E-07	4.70E-08	4.12E-09
B-13	0 to 2	L442760.05	01/29/10	Chrysene	218-01-9	1.7	62	234	2700	2.74E-08	7.26E-09	6.30E-10
B-13	0 to 2	L442760.05	01/29/10	Dibenz(a,h)anthracene	53-70-3	0.4	0.062	0.234	2.67	6.45E-06	1.71E-06	1.50E-07
B-13	0 to 2	L442760.05	01/29/10	Fluoranthene	206-44-0	6.6	-	-	-	-	-	-
B-13	0 to 2	L442760.05	01/29/10	Fluorene	86-73-7	0.033 U	-	-	-	-	-	-
B-13	0 to 2	L442760.05	01/29/10	Indeno(1,2,3-cd)pyrene	193-39-5	0.77	0.62	2.34	26.7	1.24E-06	3.29E-07	2.88E-08
B-13	0 to 2	L442760.05	01/29/10	Naphthalene	91-20-3	0.033 U	-	-	-	-	-	-
B-13	0 to 2	L442760.05	01/29/10	Pyrene	129-00-0	5.1	-	-	-	-	-	-
Cumulative Cancer Risk					-	-	-	-	-	3.66E-05	9.70E-06	8.50E-07

**Notes:**

<sup>1</sup> Site-specific screening level calculated using the Iowa Department of Natural Resources Cumulative Risk Calculator

J The reported value is an estimate.

U The analyte was not detected.

**Appendix D  
Cumulative Cancer Risk Calculations**

<b>Sample Information and Results</b>							<b>Site-Specific Screening Level<sup>1</sup></b>			<b>Cancer Risk</b>		
							<b>(Cancer Risk = 1E-06)</b>			<b>Site</b>	<b>Site</b>	<b>Construction</b>
<b>Location</b>	<b>Depth</b>	<b>Sample</b>	<b>Date</b>	<b>Analyte</b>	<b>Cas Number</b>	<b>Result</b>	<b>Resident</b>	<b>Worker</b>	<b>Worker</b>	<b>Resident</b>	<b>Worker</b>	<b>Worker</b>
B-13	4 to 7	L442760.06	01/29/10	Acenaphthene	83-32-9	0.033 U	-	-	-	-	-	-
B-13	4 to 7	L442760.06	01/29/10	Anthracene	120-12-7	0.033 U	-	-	-	-	-	-
B-13	4 to 7	L442760.06	01/29/10	Benzo(a)anthracene	56-55-3	0.033 U	0.62	2.34	26.7	-	-	-
B-13	4 to 7	L442760.06	01/29/10	Benzo(a)pyrene	50-32-8	0.033 U	0.062	0.234	2.67	-	-	-
B-13	4 to 7	L442760.06	01/29/10	Benzo(b)fluoranthene	205-99-2	0.041	0.62	2.34	26.7	6.61E-08	1.75E-08	1.54E-09
B-13	4 to 7	L442760.06	01/29/10	Benzo(k)fluoranthene	207-08-9	0.033 U	6.2	23.4	267	-	-	-
B-13	4 to 7	L442760.06	01/29/10	Chrysene	218-01-9	0.033 U	62	234	2700	-	-	-
B-13	4 to 7	L442760.06	01/29/10	Dibenz(a,h)anthracene	53-70-3	0.033 U	0.062	0.234	2.67	-	-	-
B-13	4 to 7	L442760.06	01/29/10	Fluoranthene	206-44-0	0.033 U	-	-	-	-	-	-
B-13	4 to 7	L442760.06	01/29/10	Fluorene	86-73-7	0.033 U	-	-	-	-	-	-
B-13	4 to 7	L442760.06	01/29/10	Indeno(1,2,3-cd)pyrene	193-39-5	0.033 U	0.62	2.34	26.7	-	-	-
B-13	4 to 7	L442760.06	01/29/10	Naphthalene	91-20-3	0.033 U	-	-	-	-	-	-
B-13	4 to 7	L442760.06	01/29/10	Pyrene	129-00-0	0.033 U	-	-	-	-	-	-
				Cumulative Cancer Risk	-	-	-	-	-	6.61E-08	1.75E-08	1.54E-09

**Notes:**

<sup>1</sup> Site-specific screening level calculated using the Iowa Department of Natural Resources Cumulative Risk Calculator

J The reported value is an estimate.

U The analyte was not detected.

**Appendix D  
Cumulative Cancer Risk Calculations**

<b>Sample Information and Results</b>							<b>Site-Specific Screening Level<sup>1</sup></b>			<b>Cancer Risk</b>		
							<b>(Cancer Risk = 1E-06)</b>			<b>Site</b>	<b>Site</b>	<b>Construction</b>
<b>Location</b>	<b>Depth</b>	<b>Sample</b>	<b>Date</b>	<b>Analyte</b>	<b>Cas Number</b>	<b>Result</b>	<b>Resident</b>	<b>Worker</b>	<b>Worker</b>	<b>Resident</b>	<b>Worker</b>	<b>Worker</b>
B-19	0 to 2	L442760.07	01/28/10	Acenaphthene	83-32-9	0.033 U	-	-	-	-	-	-
B-19	0 to 2	L442760.07	01/28/10	Anthracene	120-12-7	0.036	-	-	-	-	-	-
B-19	0 to 2	L442760.07	01/28/10	Benzo(a)anthracene	56-55-3	0.19	0.62	2.34	26.7	3.06E-07	8.12E-08	7.12E-09
B-19	0 to 2	L442760.07	01/28/10	Benzo(a)pyrene	50-32-8	0.16	0.062	0.234	2.67	2.58E-06	6.84E-07	5.99E-08
B-19	0 to 2	L442760.07	01/28/10	Benzo(b)fluoranthene	205-99-2	0.27	0.62	2.34	26.7	4.35E-07	1.15E-07	1.01E-08
B-19	0 to 2	L442760.07	01/28/10	Benzo(k)fluoranthene	207-08-9	0.05	6.2	23.4	267	8.06E-09	2.14E-09	1.87E-10
B-19	0 to 2	L442760.07	01/28/10	Chrysene	218-01-9	0.18	62	234	2700	2.90E-09	7.69E-10	6.67E-11
B-19	0 to 2	L442760.07	01/28/10	Dibenz(a,h)anthracene	53-70-3	0.036	0.062	0.234	2.67	5.81E-07	1.54E-07	1.35E-08
B-19	0 to 2	L442760.07	01/28/10	Fluoranthene	206-44-0	0.22	-	-	-	-	-	-
B-19	0 to 2	L442760.07	01/28/10	Fluorene	86-73-7	0.033 U	-	-	-	-	-	-
B-19	0 to 2	L442760.07	01/28/10	Indeno(1,2,3-cd)pyrene	193-39-5	0.04	0.62	2.34	26.7	6.45E-08	1.71E-08	1.50E-09
B-19	0 to 2	L442760.07	01/28/10	Naphthalene	91-20-3	0.033 U	-	-	-	-	-	-
B-19	0 to 2	L442760.07	01/28/10	Pyrene	129-00-0	0.24	-	-	-	-	-	-
Cumulative Cancer Risk					-	-	-	-	-	3.98E-06	1.05E-06	9.24E-08

**Notes:**

<sup>1</sup> Site-specific screening level calculated using the Iowa Department of Natural Resources Cumulative Risk Calculator

J The reported value is an estimate.

U The analyte was not detected.

**Appendix D  
Cumulative Cancer Risk Calculations**

<b>Sample Information and Results</b>							<b>Site-Specific Screening Level<sup>1</sup></b>			<b>Cancer Risk</b>		
							<b>(Cancer Risk = 1E-06)</b>			<b>Site Resident</b>	<b>Site Worker</b>	<b>Construction Worker</b>
<b>Location</b>	<b>Depth</b>	<b>Sample</b>	<b>Date</b>	<b>Analyte</b>	<b>Cas Number</b>	<b>Result</b>						
B-2	0 to 2	L442760.02	01/28/10	Acenaphthene	83-32-9	0.033 U	-	-	-	-	-	-
B-2	0 to 2	L442760.02	01/28/10	Anthracene	120-12-7	0.047	-	-	-	-	-	-
B-2	0 to 2	L442760.02	01/28/10	Benzo(a)anthracene	56-55-3	0.17	0.62	2.34	26.7	2.74E-07	7.26E-08	6.37E-09
B-2	0 to 2	L442760.02	01/28/10	Benzo(a)pyrene	50-32-8	0.13	0.062	0.234	2.67	2.10E-06	5.56E-07	4.87E-08
B-2	0 to 2	L442760.02	01/28/10	Benzo(b)fluoranthene	205-99-2	0.2	0.62	2.34	26.7	3.23E-07	8.55E-08	7.49E-09
B-2	0 to 2	L442760.02	01/28/10	Benzo(k)fluoranthene	207-08-9	0.073	6.2	23.4	267	1.18E-08	3.12E-09	2.73E-10
B-2	0 to 2	L442760.02	01/28/10	Chrysene	218-01-9	0.14	62	234	2700	2.26E-09	5.98E-10	5.19E-11
B-2	0 to 2	L442760.02	01/28/10	Dibenz(a,h)anthracene	53-70-3	0.033 U	0.062	0.234	2.67	-	-	-
B-2	0 to 2	L442760.02	01/28/10	Fluoranthene	206-44-0	0.33	-	-	-	-	-	-
B-2	0 to 2	L442760.02	01/28/10	Fluorene	86-73-7	0.033 U	-	-	-	-	-	-
B-2	0 to 2	L442760.02	01/28/10	Indeno(1,2,3-cd)pyrene	193-39-5	0.048	0.62	2.34	26.7	7.74E-08	2.05E-08	1.80E-09
B-2	0 to 2	L442760.02	01/28/10	Naphthalene	91-20-3	0.033 U	-	-	-	-	-	-
B-2	0 to 2	L442760.02	01/28/10	Pyrene	129-00-0	0.3	-	-	-	-	-	-
Cumulative Cancer Risk					-	-	-	-	-	2.79E-06	7.38E-07	6.47E-08

**Notes:**

<sup>1</sup> Site-specific screening level calculated using the Iowa Department of Natural Resources Cumulative Risk Calculator

J The reported value is an estimate.

U The analyte was not detected.

**Appendix D  
Cumulative Cancer Risk Calculations**

<b>Sample Information and Results</b>							<b>Site-Specific Screening Level<sup>1</sup></b>			<b>Cancer Risk</b>		
							<b>(Cancer Risk = 1E-06)</b>			<b>Site</b>	<b>Site</b>	<b>Construction</b>
<b>Location</b>	<b>Depth</b>	<b>Sample</b>	<b>Date</b>	<b>Analyte</b>	<b>Cas Number</b>	<b>Result</b>	<b>Resident</b>	<b>Worker</b>	<b>Worker</b>	<b>Resident</b>	<b>Worker</b>	<b>Worker</b>
B-25	0 to 2	L442760.08	01/28/10	Acenaphthene	83-32-9	0.092	-	-	-	-	-	-
B-25	0 to 2	L442760.08	01/28/10	Anthracene	120-12-7	0.4	-	-	-	-	-	-
B-25	0 to 2	L442760.08	01/28/10	Benzo(a)anthracene	56-55-3	1.7	0.62	2.34	26.7	2.74E-06	7.26E-07	6.37E-08
B-25	0 to 2	L442760.08	01/28/10	Benzo(a)pyrene	50-32-8	1.2	0.062	0.234	2.67	1.94E-05	5.13E-06	4.49E-07
B-25	0 to 2	L442760.08	01/28/10	Benzo(b)fluoranthene	205-99-2	2.6	0.62	2.34	26.7	4.19E-06	1.11E-06	9.74E-08
B-25	0 to 2	L442760.08	01/28/10	Benzo(k)fluoranthene	207-08-9	0.68	6.2	23.4	267	1.10E-07	2.91E-08	2.55E-09
B-25	0 to 2	L442760.08	01/28/10	Chrysene	218-01-9	1	62	234	2700	1.61E-08	4.27E-09	3.70E-10
B-25	0 to 2	L442760.08	01/28/10	Dibenz(a,h)anthracene	53-70-3	0.19	0.062	0.234	2.67	3.06E-06	8.12E-07	7.12E-08
B-25	0 to 2	L442760.08	01/28/10	Fluoranthene	206-44-0	3.2	-	-	-	-	-	-
B-25	0 to 2	L442760.08	01/28/10	Fluorene	86-73-7	0.1	-	-	-	-	-	-
B-25	0 to 2	L442760.08	01/28/10	Indeno(1,2,3-cd)pyrene	193-39-5	0.32	0.62	2.34	26.7	5.16E-07	1.37E-07	1.20E-08
B-25	0 to 2	L442760.08	01/28/10	Naphthalene	91-20-3	0.06	-	-	-	-	-	-
B-25	0 to 2	L442760.08	01/28/10	Pyrene	129-00-0	2.1	-	-	-	-	-	-
				Cumulative Cancer Risk	-	-	-	-	-	3.00E-05	7.95E-06	6.97E-07

**Notes:**

<sup>1</sup> Site-specific screening level calculated using the Iowa Department of Natural Resources Cumulative Risk Calculator

J The reported value is an estimate.

U The analyte was not detected.

**Appendix D  
Cumulative Cancer Risk Calculations**

Sample Information and Results							Site-Specific Screening Level <sup>1</sup> (Cancer Risk = 1E-06)			Cancer Risk		
							<u>Site Resident</u>	<u>Site Worker</u>	<u>Construction Worker</u>	<u>Site Resident</u>	<u>Site Worker</u>	<u>Construction Worker</u>
<u>Location</u>	<u>Depth</u>	<u>Sample</u>	<u>Date</u>	<u>Analyte</u>	<u>Cas Number</u>	<u>Result</u>						
B-26	0 to 2	L442760.09	01/28/10	2-Chloronaphthalene	91-58-7	0.033 U	-	-	-	-	-	-
B-26	0 to 2	L442760.09	01/28/10	Acenaphthene	83-32-9	0.16	-	-	-	-	-	-
B-26	0 to 2	L442760.09	01/28/10	Anthracene	120-12-7	0.38	-	-	-	-	-	-
B-26	0 to 2	L442760.09	01/28/10	Benzo(a)anthracene	56-55-3	0.72	0.62	2.34	26.7	1.16E-06	3.08E-07	2.70E-08
B-26	0 to 2	L442760.09	01/28/10	Benzo(a)pyrene	50-32-8	0.72	0.062	0.234	2.67	1.16E-05	3.08E-06	2.70E-07
B-26	0 to 2	L442760.09	01/28/10	Benzo(b)fluoranthene	205-99-2	0.59	0.62	2.34	26.7	9.52E-07	2.52E-07	2.21E-08
B-26	0 to 2	L442760.09	01/28/10	Benzo(k)fluoranthene	207-08-9	0.29	6.2	23.4	267	4.68E-08	1.24E-08	1.09E-09
B-26	0 to 2	L442760.09	01/28/10	Chrysene	218-01-9	0.69	62	234	2700	1.11E-08	2.95E-09	2.56E-10
B-26	0 to 2	L442760.09	01/28/10	Dibenz(a,h)anthracene	53-70-3	0.09	0.062	0.234	2.67	1.45E-06	3.85E-07	3.37E-08
B-26	0 to 2	L442760.09	01/28/10	Fluoranthene	206-44-0	1.7	-	-	-	-	-	-
B-26	0 to 2	L442760.09	01/28/10	Fluorene	86-73-7	0.16	-	-	-	-	-	-
B-26	0 to 2	L442760.09	01/28/10	Indeno(1,2,3-cd)pyrene	193-39-5	0.15	0.62	2.34	26.7	2.42E-07	6.41E-08	5.62E-09
B-26	0 to 2	L442760.09	01/28/10	Naphthalene	91-20-3	0.039	-	-	-	-	-	-
B-26	0 to 2	L442760.09	01/28/10	Pyrene	129-00-0	1.3	-	-	-	-	-	-
Cumulative Cancer Risk					-	-	-	-	-	1.55E-05	4.10E-06	3.59E-07

**Notes:**

<sup>1</sup> Site-specific screening level calculated using the Iowa Department of Natural Resources Cumulative Risk Calculator

J The reported value is an estimate.

U The analyte was not detected.

**Appendix D  
Cumulative Cancer Risk Calculations**

<b>Sample Information and Results</b>							<b>Site-Specific Screening Level<sup>1</sup></b>			<b>Cancer Risk</b>		
							<b>(Cancer Risk = 1E-06)</b>			<b>Site Resident</b>	<b>Site Worker</b>	<b>Construction Worker</b>
<b>Location</b>	<b>Depth</b>	<b>Sample</b>	<b>Date</b>	<b>Analyte</b>	<b>Cas Number</b>	<b>Result</b>						
B-29	2 to 4	L442760.10	01/26/10	Acenaphthene	83-32-9	0.033 U	-	-	-	-	-	-
B-29	2 to 4	L442760.10	01/26/10	Anthracene	120-12-7	0.033 U	-	-	-	-	-	-
B-29	2 to 4	L442760.10	01/26/10	Benzo(a)anthracene	56-55-3	0.033 U	0.62	2.34	26.7	-	-	-
B-29	2 to 4	L442760.10	01/26/10	Benzo(a)pyrene	50-32-8	0.071	0.062	0.234	2.67	1.15E-06	3.03E-07	2.66E-08
B-29	2 to 4	L442760.10	01/26/10	Benzo(b)fluoranthene	205-99-2	0.1	0.62	2.34	26.7	1.61E-07	4.27E-08	3.75E-09
B-29	2 to 4	L442760.10	01/26/10	Benzo(k)fluoranthene	207-08-9	0.033 U	6.2	23.4	267	-	-	-
B-29	2 to 4	L442760.10	01/26/10	Chrysene	218-01-9	0.055	62	234	2700	8.87E-10	2.35E-10	2.04E-11
B-29	2 to 4	L442760.10	01/26/10	Dibenz(a,h)anthracene	53-70-3	0.033 U	0.062	0.234	2.67	-	-	-
B-29	2 to 4	L442760.10	01/26/10	Fluoranthene	206-44-0	0.033 U	-	-	-	-	-	-
B-29	2 to 4	L442760.10	01/26/10	Fluorene	86-73-7	0.033 U	-	-	-	-	-	-
B-29	2 to 4	L442760.10	01/26/10	Indeno(1,2,3-cd)pyrene	193-39-5	0.035	0.62	2.34	26.7	5.65E-08	1.50E-08	1.31E-09
B-29	2 to 4	L442760.10	01/26/10	Naphthalene	91-20-3	0.033 U	-	-	-	-	-	-
B-29	2 to 4	L442760.10	01/26/10	Pyrene	129-00-0	0.044	-	-	-	-	-	-
				Cumulative Cancer Risk	-	-	-	-	-	1.36E-06	3.61E-07	3.17E-08

**Notes:**

<sup>1</sup> Site-specific screening level calculated using the Iowa Department of Natural Resources Cumulative Risk Calculator

J The reported value is an estimate.

U The analyte was not detected.

**Appendix D  
Cumulative Cancer Risk Calculations**

<b>Sample Information and Results</b>							<b>Site-Specific Screening Level<sup>1</sup></b>			<b>Cancer Risk</b>		
							<b>(Cancer Risk = 1E-06)</b>			<b>Site Resident</b>	<b>Site Worker</b>	<b>Construction Worker</b>
<b>Location</b>	<b>Depth</b>	<b>Sample</b>	<b>Date</b>	<b>Analyte</b>	<b>Cas Number</b>	<b>Result</b>						
B-38	0 to 2	L442760.11	01/28/10	2-Chloronaphthalene	91-58-7	0.16 U	-	-	-	-	-	-
B-38	0 to 2	L442760.11	01/28/10	Acenaphthene	83-32-9	0.79	-	-	-	-	-	-
B-38	0 to 2	L442760.11	01/28/10	Anthracene	120-12-7	1.4	-	-	-	-	-	-
B-38	0 to 2	L442760.11	01/28/10	Benzo(a)anthracene	56-55-3	3.9	0.62	2.34	26.7	6.29E-06	1.67E-06	1.46E-07
B-38	0 to 2	L442760.11	01/28/10	Benzo(a)pyrene	50-32-8	3.3	0.062	0.234	2.67	5.32E-05	1.41E-05	1.24E-06
B-38	0 to 2	L442760.11	01/28/10	Benzo(b)fluoranthene	205-99-2	2.9	0.62	2.34	26.7	4.68E-06	1.24E-06	1.09E-07
B-38	0 to 2	L442760.11	01/28/10	Benzo(k)fluoranthene	207-08-9	0.87	6.2	23.4	267	1.40E-07	3.72E-08	3.26E-09
B-38	0 to 2	L442760.11	01/28/10	Chrysene	218-01-9	3.5	62	234	2700	5.65E-08	1.50E-08	1.30E-09
B-38	0 to 2	L442760.11	01/28/10	Dibenz(a,h)anthracene	53-70-3	0.64	0.062	0.234	2.67	1.03E-05	2.74E-06	2.40E-07
B-38	0 to 2	L442760.11	01/28/10	Fluoranthene	206-44-0	7.4	-	-	-	-	-	-
B-38	0 to 2	L442760.11	01/28/10	Fluorene	86-73-7	0.88	-	-	-	-	-	-
B-38	0 to 2	L442760.11	01/28/10	Indeno(1,2,3-cd)pyrene	193-39-5	1.2	0.62	2.34	26.7	1.94E-06	5.13E-07	4.49E-08
B-38	0 to 2	L442760.11	01/28/10	Naphthalene	91-20-3	0.64	-	-	-	-	-	-
B-38	0 to 2	L442760.11	01/28/10	Pyrene	129-00-0	6.2	-	-	-	-	-	-
				Cumulative Cancer Risk	-	-	-	-	-	7.66E-05	2.03E-05	1.78E-06

**Notes:**

<sup>1</sup> Site-specific screening level calculated using the Iowa Department of Natural Resources Cumulative Risk Calculator

J The reported value is an estimate.

U The analyte was not detected.

**Appendix D  
Cumulative Cancer Risk Calculations**

Sample Information and Results							Site-Specific Screening Level <sup>1</sup> (Cancer Risk = 1E-06)			Cancer Risk		
							<u>Site Resident</u>	<u>Site Worker</u>	<u>Construction Worker</u>	<u>Site Resident</u>	<u>Site Worker</u>	<u>Construction Worker</u>
<u>Location</u>	<u>Depth</u>	<u>Sample</u>	<u>Date</u>	<u>Analyte</u>	<u>Cas Number</u>	<u>Result</u>						
B-48	0 to 2	L442760.12	01/27/10	2-Chloronaphthalene	91-58-7	13 U	-	-	-	-	-	-
B-48	0 to 2	L442760.12	01/27/10	Acenaphthene	83-32-9	190	-	-	-	-	-	-
B-48	0 to 2	L442760.12	01/27/10	Anthracene	120-12-7	300	-	-	-	-	-	-
B-48	0 to 2	L442760.12	01/27/10	Benzo(a)anthracene	56-55-3	660	0.62	2.34	26.7	1.06E-03	2.82E-04	2.47E-05
B-48	0 to 2	L442760.12	01/27/10	Benzo(a)pyrene	50-32-8	550	0.062	0.234	2.67	8.87E-03	2.35E-03	2.06E-04
B-48	0 to 2	L442760.12	01/27/10	Benzo(b)fluoranthene	205-99-2	560	0.62	2.34	26.7	9.03E-04	2.39E-04	2.10E-05
B-48	0 to 2	L442760.12	01/27/10	Benzo(k)fluoranthene	207-08-9	140	6.2	23.4	267	2.26E-05	5.98E-06	5.24E-07
B-48	0 to 2	L442760.12	01/27/10	Chrysene	218-01-9	560	62	234	2700	9.03E-06	2.39E-06	2.07E-07
B-48	0 to 2	L442760.12	01/27/10	Dibenz(a,h)anthracene	53-70-3	78	0.062	0.234	2.67	1.26E-03	3.33E-04	2.92E-05
B-48	0 to 2	L442760.12	01/27/10	Fluoranthene	206-44-0	1500	-	-	-	-	-	-
B-48	0 to 2	L442760.12	01/27/10	Fluorene	86-73-7	200	-	-	-	-	-	-
B-48	0 to 2	L442760.12	01/27/10	Indeno(1,2,3-cd)pyrene	193-39-5	140	0.62	2.34	26.7	2.26E-04	5.98E-05	5.24E-06
B-48	0 to 2	L442760.12	01/27/10	Naphthalene	91-20-3	33	-	-	-	-	-	-
B-48	0 to 2	L442760.12	01/27/10	Pyrene	129-00-0	1200	-	-	-	-	-	-
Cumulative Cancer Risk					-	-	-	-	-	1.24E-02	3.27E-03	2.87E-04

**Notes:**

<sup>1</sup> Site-specific screening level calculated using the Iowa Department of Natural Resources Cumulative Risk Calculator

J The reported value is an estimate.

U The analyte was not detected.

**Appendix D  
Cumulative Cancer Risk Calculations**

<b>Sample Information and Results</b>							<b>Site-Specific Screening Level<sup>1</sup></b>			<b>Cancer Risk</b>		
							<b>(Cancer Risk = 1E-06)</b>			<b>Site Resident</b>	<b>Site Worker</b>	<b>Construction Worker</b>
<b>Location</b>	<b>Depth</b>	<b>Sample</b>	<b>Date</b>	<b>Analyte</b>	<b>Cas Number</b>	<b>Result</b>						
B-48	8 to 10	L452661.02	01/27/10	Acenaphthene	83-32-9	0.033 U	-	-	-	-	-	-
B-48	8 to 10	L452661.02	01/27/10	Anthracene	120-12-7	0.033 U	-	-	-	-	-	-
B-48	8 to 10	L452661.02	01/27/10	Benzo(a)anthracene	56-55-3	0.033 U	0.62	2.34	26.7	-	-	-
B-48	8 to 10	L452661.02	01/27/10	Benzo(a)pyrene	50-32-8	0.033 U	0.062	0.234	2.67	-	-	-
B-48	8 to 10	L452661.02	01/27/10	Benzo(b)fluoranthene	205-99-2	0.033 U	0.62	2.34	26.7	-	-	-
B-48	8 to 10	L452661.02	01/27/10	Benzo(k)fluoranthene	207-08-9	0.033 U	6.2	23.4	267	-	-	-
B-48	8 to 10	L452661.02	01/27/10	Chrysene	218-01-9	0.033 U	62	234	2700	-	-	-
B-48	8 to 10	L452661.02	01/27/10	Dibenz(a,h)anthracene	53-70-3	0.033 U	0.062	0.234	2.67	-	-	-
B-48	8 to 10	L452661.02	01/27/10	Fluoranthene	206-44-0	0.069	-	-	-	-	-	-
B-48	8 to 10	L452661.02	01/27/10	Fluorene	86-73-7	0.033 U	-	-	-	-	-	-
B-48	8 to 10	L452661.02	01/27/10	Indeno(1,2,3-cd)pyrene	193-39-5	0.033 U	0.62	2.34	26.7	-	-	-
B-48	8 to 10	L452661.02	01/27/10	Naphthalene	91-20-3	0.033 U	-	-	-	-	-	-
B-48	8 to 10	L452661.02	01/27/10	Pyrene	129-00-0	0.051	-	-	-	-	-	-
Cumulative Cancer Risk					-	-	-	-	-	0.00E+00	0.00E+00	0.00E+00

**Notes:**

<sup>1</sup> Site-specific screening level calculated using the Iowa Department of Natural Resources Cumulative Risk Calculator

J The reported value is an estimate.

U The analyte was not detected.

**Appendix D  
Cumulative Cancer Risk Calculations**

<b>Sample Information and Results</b>							<b>Site-Specific Screening Level<sup>1</sup></b>			<b>Cancer Risk</b>		
							<b>(Cancer Risk = 1E-06)</b>			<b>Site</b>	<b>Site</b>	<b>Construction</b>
<b>Location</b>	<b>Depth</b>	<b>Sample</b>	<b>Date</b>	<b>Analyte</b>	<b>Cas Number</b>	<b>Result</b>	<b>Resident</b>	<b>Worker</b>	<b>Worker</b>	<b>Resident</b>	<b>Worker</b>	<b>Worker</b>
B-5	0 to 2	L442760.03	01/27/10	Acenaphthene	83-32-9	0.065	-	-	-	-	-	-
B-5	0 to 2	L442760.03	01/27/10	Anthracene	120-12-7	0.13	-	-	-	-	-	-
B-5	0 to 2	L442760.03	01/27/10	Benzo(a)anthracene	56-55-3	0.38	0.62	2.34	26.7	6.13E-07	1.62E-07	1.42E-08
B-5	0 to 2	L442760.03	01/27/10	Benzo(a)pyrene	50-32-8	0.18	0.062	0.234	2.67	2.90E-06	7.69E-07	6.74E-08
B-5	0 to 2	L442760.03	01/27/10	Benzo(b)fluoranthene	205-99-2	0.37	0.62	2.34	26.7	5.97E-07	1.58E-07	1.39E-08
B-5	0 to 2	L442760.03	01/27/10	Benzo(k)fluoranthene	207-08-9	0.13	6.2	23.4	267	2.10E-08	5.56E-09	4.87E-10
B-5	0 to 2	L442760.03	01/27/10	Chrysene	218-01-9	0.29	62	234	2700	4.68E-09	1.24E-09	1.07E-10
B-5	0 to 2	L442760.03	01/27/10	Dibenz(a,h)anthracene	53-70-3	0.047	0.062	0.234	2.67	7.58E-07	2.01E-07	1.76E-08
B-5	0 to 2	L442760.03	01/27/10	Fluoranthene	206-44-0	0.83	-	-	-	-	-	-
B-5	0 to 2	L442760.03	01/27/10	Fluorene	86-73-7	0.06	-	-	-	-	-	-
B-5	0 to 2	L442760.03	01/27/10	Indeno(1,2,3-cd)pyrene	193-39-5	0.085	0.62	2.34	26.7	1.37E-07	3.63E-08	3.18E-09
B-5	0 to 2	L442760.03	01/27/10	Naphthalene	91-20-3	0.033 U	-	-	-	-	-	-
B-5	0 to 2	L442760.03	01/27/10	Pyrene	129-00-0	0.64	-	-	-	-	-	-
Cumulative Cancer Risk					-	-	-	-	-	5.03E-06	1.33E-06	1.17E-07

**Notes:**

<sup>1</sup> Site-specific screening level calculated using the Iowa Department of Natural Resources Cumulative Risk Calculator

J The reported value is an estimate.

U The analyte was not detected.

**Appendix D  
Cumulative Cancer Risk Calculations**

<b>Sample Information and Results</b>							<b>Site-Specific Screening Level<sup>1</sup></b>			<b>Cancer Risk</b>		
							<b>(Cancer Risk = 1E-06)</b>			<b>Site Resident</b>	<b>Site Worker</b>	<b>Construction Worker</b>
<b>Location</b>	<b>Depth</b>	<b>Sample</b>	<b>Date</b>	<b>Analyte</b>	<b>Cas Number</b>	<b>Result</b>						
B-53	0 to 2	L442760.14	01/29/10	2-Chloronaphthalene	91-58-7	0.033 U	-	-	-	-	-	-
B-53	0 to 2	L442760.14	01/29/10	Acenaphthene	83-32-9	0.078	-	-	-	-	-	-
B-53	0 to 2	L442760.14	01/29/10	Anthracene	120-12-7	0.22	-	-	-	-	-	-
B-53	0 to 2	L442760.14	01/29/10	Benzo(a)anthracene	56-55-3	1.1	0.62	2.34	26.7	1.77E-06	4.70E-07	4.12E-08
B-53	0 to 2	L442760.14	01/29/10	Benzo(a)pyrene	50-32-8	0.91	0.062	0.234	2.67	1.47E-05	3.89E-06	3.41E-07
B-53	0 to 2	L442760.14	01/29/10	Benzo(b)fluoranthene	205-99-2	0.81	0.62	2.34	26.7	1.31E-06	3.46E-07	3.03E-08
B-53	0 to 2	L442760.14	01/29/10	Benzo(k)fluoranthene	207-08-9	0.31	6.2	23.4	267	5.00E-08	1.32E-08	1.16E-09
B-53	0 to 2	L442760.14	01/29/10	Chrysene	218-01-9	1.4	62	234	2700	2.26E-08	5.98E-09	5.19E-10
B-53	0 to 2	L442760.14	01/29/10	Dibenz(a,h)anthracene	53-70-3	0.15	0.062	0.234	2.67	2.42E-06	6.41E-07	5.62E-08
B-53	0 to 2	L442760.14	01/29/10	Fluoranthene	206-44-0	1.5	-	-	-	-	-	-
B-53	0 to 2	L442760.14	01/29/10	Fluorene	86-73-7	0.066	-	-	-	-	-	-
B-53	0 to 2	L442760.14	01/29/10	Indeno(1,2,3-cd)pyrene	193-39-5	0.21	0.62	2.34	26.7	3.39E-07	8.97E-08	7.87E-09
B-53	0 to 2	L442760.14	01/29/10	Naphthalene	91-20-3	0.18	-	-	-	-	-	-
B-53	0 to 2	L442760.14	01/29/10	Pyrene	129-00-0	1.9	-	-	-	-	-	-
Cumulative Cancer Risk					-	-	-	-	-	2.06E-05	5.46E-06	4.78E-07

**Notes:**

<sup>1</sup> Site-specific screening level calculated using the Iowa Department of Natural Resources Cumulative Risk Calculator

J The reported value is an estimate.

U The analyte was not detected.

**Appendix D  
Cumulative Cancer Risk Calculations**

Sample Information and Results							Site-Specific Screening Level <sup>1</sup> (Cancer Risk = 1E-06)			Cancer Risk		
							<u>Site Resident</u>	<u>Site Worker</u>	<u>Construction Worker</u>	<u>Site Resident</u>	<u>Site Worker</u>	<u>Construction Worker</u>
<u>Location</u>	<u>Depth</u>	<u>Sample</u>	<u>Date</u>	<u>Analyte</u>	<u>Cas Number</u>	<u>Result</u>						
B-57	0 to 1	L442760.15	01/29/10	Acenaphthene	83-32-9	0.033 U	-	-	-	-	-	-
B-57	0 to 1	L442760.15	01/29/10	Anthracene	120-12-7	0.037	-	-	-	-	-	-
B-57	0 to 1	L442760.15	01/29/10	Benzo(a)anthracene	56-55-3	0.085	0.62	2.34	26.7	1.37E-07	3.63E-08	3.18E-09
B-57	0 to 1	L442760.15	01/29/10	Benzo(a)pyrene	50-32-8	0.056	0.062	0.234	2.67	9.03E-07	2.39E-07	2.10E-08
B-57	0 to 1	L442760.15	01/29/10	Benzo(b)fluoranthene	205-99-2	0.11	0.62	2.34	26.7	1.77E-07	4.70E-08	4.12E-09
B-57	0 to 1	L442760.15	01/29/10	Benzo(k)fluoranthene	207-08-9	0.034	6.2	23.4	267	5.48E-09	1.45E-09	1.27E-10
B-57	0 to 1	L442760.15	01/29/10	Chrysene	218-01-9	0.076	62	234	2700	1.23E-09	3.25E-10	2.81E-11
B-57	0 to 1	L442760.15	01/29/10	Dibenz(a,h)anthracene	53-70-3	0.033 U	0.062	0.234	2.67	-	-	-
B-57	0 to 1	L442760.15	01/29/10	Fluoranthene	206-44-0	0.16	-	-	-	-	-	-
B-57	0 to 1	L442760.15	01/29/10	Fluorene	86-73-7	0.033 U	-	-	-	-	-	-
B-57	0 to 1	L442760.15	01/29/10	Indeno(1,2,3-cd)pyrene	193-39-5	0.033 U	0.62	2.34	26.7	-	-	-
B-57	0 to 1	L442760.15	01/29/10	Naphthalene	91-20-3	0.068	-	-	-	-	-	-
B-57	0 to 1	L442760.15	01/29/10	Pyrene	129-00-0	0.13	-	-	-	-	-	-
Cumulative Cancer Risk					-	-	-	-	-	1.22E-06	3.24E-07	2.84E-08

**Notes:**

<sup>1</sup> Site-specific screening level calculated using the Iowa Department of Natural Resources Cumulative Risk Calculator

J The reported value is an estimate.

U The analyte was not detected.

**Appendix D  
Cumulative Cancer Risk Calculations**

<b>Sample Information and Results</b>							<b>Site-Specific Screening Level<sup>1</sup></b>			<b>Cancer Risk</b>		
							<b>(Cancer Risk = 1E-06)</b>			<b>Site Resident</b>	<b>Site Worker</b>	<b>Construction Worker</b>
<b>Location</b>	<b>Depth</b>	<b>Sample</b>	<b>Date</b>	<b>Analyte</b>	<b>Cas Number</b>	<b>Result</b>						
B-63	0 to 1	L442760.16	01/29/10	2-Chloronaphthalene	91-58-7	0.033 U	-	-	-	-	-	-
B-63	0 to 1	L442760.16	01/29/10	Acenaphthene	83-32-9	0.033 U	-	-	-	-	-	-
B-63	0 to 1	L442760.16	01/29/10	Anthracene	120-12-7	0.033 U	-	-	-	-	-	-
B-63	0 to 1	L442760.16	01/29/10	Benzo(a)anthracene	56-55-3	0.074	0.62	2.34	26.7	1.19E-07	3.16E-08	2.77E-09
B-63	0 to 1	L442760.16	01/29/10	Benzo(a)pyrene	50-32-8	0.075	0.062	0.234	2.67	1.21E-06	3.21E-07	2.81E-08
B-63	0 to 1	L442760.16	01/29/10	Benzo(b)fluoranthene	205-99-2	0.046	0.62	2.34	26.7	7.42E-08	1.97E-08	1.72E-09
B-63	0 to 1	L442760.16	01/29/10	Benzo(k)fluoranthene	207-08-9	0.033 U	6.2	23.4	267	-	-	-
B-63	0 to 1	L442760.16	01/29/10	Chrysene	218-01-9	0.097	62	234	2700	1.56E-09	4.15E-10	3.59E-11
B-63	0 to 1	L442760.16	01/29/10	Dibenz(a,h)anthracene	53-70-3	0.033 U	0.062	0.234	2.67	-	-	-
B-63	0 to 1	L442760.16	01/29/10	Fluoranthene	206-44-0	0.11	-	-	-	-	-	-
B-63	0 to 1	L442760.16	01/29/10	Fluorene	86-73-7	0.033 U	-	-	-	-	-	-
B-63	0 to 1	L442760.16	01/29/10	Indeno(1,2,3-cd)pyrene	193-39-5	0.033 U	0.62	2.34	26.7	-	-	-
B-63	0 to 1	L442760.16	01/29/10	Naphthalene	91-20-3	0.033 U	-	-	-	-	-	-
B-63	0 to 1	L442760.16	01/29/10	Pyrene	129-00-0	0.12	-	-	-	-	-	-
Cumulative Cancer Risk					-	-	-	-	-	1.40E-06	3.72E-07	3.26E-08

**Notes:**

<sup>1</sup> Site-specific screening level calculated using the Iowa Department of Natural Resources Cumulative Risk Calculator

J The reported value is an estimate.

U The analyte was not detected.

**Appendix D  
Cumulative Cancer Risk Calculations**

Sample Information and Results							Site-Specific Screening Level <sup>1</sup> (Cancer Risk = 1E-06)			Cancer Risk		
							<u>Site Resident</u>	<u>Site Worker</u>	<u>Construction Worker</u>	<u>Site Resident</u>	<u>Site Worker</u>	<u>Construction Worker</u>
<u>Location</u>	<u>Depth</u>	<u>Sample</u>	<u>Date</u>	<u>Analyte</u>	<u>Cas Number</u>	<u>Result</u>						
B-65	0 to 1	L442760.17	01/29/10	2-Chloronaphthalene	91-58-7	0.033 U	-	-	-	-	-	-
B-65	0 to 1	L442760.17	01/29/10	Acenaphthene	83-32-9	0.033 U	-	-	-	-	-	-
B-65	0 to 1	L442760.17	01/29/10	Anthracene	120-12-7	0.033 U	-	-	-	-	-	-
B-65	0 to 1	L442760.17	01/29/10	Benzo(a)anthracene	56-55-3	0.033 U	0.62	2.34	26.7	-	-	-
B-65	0 to 1	L442760.17	01/29/10	Benzo(a)pyrene	50-32-8	0.033 U	0.062	0.234	2.67	-	-	-
B-65	0 to 1	L442760.17	01/29/10	Benzo(b)fluoranthene	205-99-2	0.033 U	0.62	2.34	26.7	-	-	-
B-65	0 to 1	L442760.17	01/29/10	Benzo(k)fluoranthene	207-08-9	0.033 U	6.2	23.4	267	-	-	-
B-65	0 to 1	L442760.17	01/29/10	Chrysene	218-01-9	0.033 U	62	234	2700	-	-	-
B-65	0 to 1	L442760.17	01/29/10	Dibenz(a,h)anthracene	53-70-3	0.033 U	0.062	0.234	2.67	-	-	-
B-65	0 to 1	L442760.17	01/29/10	Fluoranthene	206-44-0	0.033 U	-	-	-	-	-	-
B-65	0 to 1	L442760.17	01/29/10	Fluorene	86-73-7	0.033 U	-	-	-	-	-	-
B-65	0 to 1	L442760.17	01/29/10	Indeno(1,2,3-cd)pyrene	193-39-5	0.033 U	0.62	2.34	26.7	-	-	-
B-65	0 to 1	L442760.17	01/29/10	Naphthalene	91-20-3	0.033 U	-	-	-	-	-	-
B-65	0 to 1	L442760.17	01/29/10	Pyrene	129-00-0	0.033 U	-	-	-	-	-	-
Cumulative Cancer Risk					-	-	-	-	-	0.00E+00	0.00E+00	0.00E+00

**Notes:**

<sup>1</sup> Site-specific screening level calculated using the Iowa Department of Natural Resources Cumulative Risk Calculator

J The reported value is an estimate.

U The analyte was not detected.

**Appendix D  
Cumulative Cancer Risk Calculations**

<b>Sample Information and Results</b>							<b>Site-Specific Screening Level<sup>1</sup></b>			<b>Cancer Risk</b>		
							<b>(Cancer Risk = 1E-06)</b>			<b>Site Resident</b>	<b>Site Worker</b>	<b>Construction Worker</b>
<b>Location</b>	<b>Depth</b>	<b>Sample</b>	<b>Date</b>	<b>Analyte</b>	<b>Cas Number</b>	<b>Result</b>						
B-8	0 to 2	L442760.04	01/28/10	Acenaphthene	83-32-9	13	-	-	-	-	-	-
B-8	0 to 2	L442760.04	01/28/10	Anthracene	120-12-7	42	-	-	-	-	-	-
B-8	0 to 2	L442760.04	01/28/10	Benzo(a)anthracene	56-55-3	71	0.62	2.34	26.7	1.15E-04	3.03E-05	2.66E-06
B-8	0 to 2	L442760.04	01/28/10	Benzo(a)pyrene	50-32-8	37	0.062	0.234	2.67	5.97E-04	1.58E-04	1.39E-05
B-8	0 to 2	L442760.04	01/28/10	Benzo(b)fluoranthene	205-99-2	89	0.62	2.34	26.7	1.44E-04	3.80E-05	3.33E-06
B-8	0 to 2	L442760.04	01/28/10	Benzo(k)fluoranthene	207-08-9	28	6.2	23.4	267	4.52E-06	1.20E-06	1.05E-07
B-8	0 to 2	L442760.04	01/28/10	Chrysene	218-01-9	53	62	234	2700	8.55E-07	2.26E-07	1.96E-08
B-8	0 to 2	L442760.04	01/28/10	Dibenz(a,h)anthracene	53-70-3	8.1	0.062	0.234	2.67	1.31E-04	3.46E-05	3.03E-06
B-8	0 to 2	L442760.04	01/28/10	Fluoranthene	206-44-0	190	-	-	-	-	-	-
B-8	0 to 2	L442760.04	01/28/10	Fluorene	86-73-7	20	-	-	-	-	-	-
B-8	0 to 2	L442760.04	01/28/10	Indeno(1,2,3-cd)pyrene	193-39-5	17	0.62	2.34	26.7	2.74E-05	7.26E-06	6.37E-07
B-8	0 to 2	L442760.04	01/28/10	Naphthalene	91-20-3	6.8	-	-	-	-	-	-
B-8	0 to 2	L442760.04	01/28/10	Pyrene	129-00-0	130	-	-	-	-	-	-
Cumulative Cancer Risk					-	-	-	-	-	1.02E-03	2.70E-04	2.36E-05

**Notes:**

<sup>1</sup> Site-specific screening level calculated using the Iowa Department of Natural Resources Cumulative Risk Calculator

J The reported value is an estimate.

U The analyte was not detected.

**Appendix D  
Cumulative Cancer Risk Calculations**

<b>Sample Information and Results</b>							<b>Site-Specific Screening Level<sup>1</sup></b>			<b>Cancer Risk</b>		
							<b>(Cancer Risk = 1E-06)</b>			<b>Site Resident</b>	<b>Site Worker</b>	<b>Construction Worker</b>
<b>Location</b>	<b>Depth</b>	<b>Sample</b>	<b>Date</b>	<b>Analyte</b>	<b>Cas Number</b>	<b>Result</b>						
B-8	6 to 8	L452661.01	01/28/10	Acenaphthene	83-32-9	0.059	-	-	-	-	-	-
B-8	6 to 8	L452661.01	01/28/10	Anthracene	120-12-7	0.16	-	-	-	-	-	-
B-8	6 to 8	L452661.01	01/28/10	Benzo(a)anthracene	56-55-3	0.22	0.62	2.34	26.7	3.55E-07	9.40E-08	8.24E-09
B-8	6 to 8	L452661.01	01/28/10	Benzo(a)pyrene	50-32-8	0.18	0.062	0.234	2.67	2.90E-06	7.69E-07	6.74E-08
B-8	6 to 8	L452661.01	01/28/10	Benzo(b)fluoranthene	205-99-2	0.36	0.62	2.34	26.7	5.81E-07	1.54E-07	1.35E-08
B-8	6 to 8	L452661.01	01/28/10	Benzo(k)fluoranthene	207-08-9	0.35	6.2	23.4	267	5.65E-08	1.50E-08	1.31E-09
B-8	6 to 8	L452661.01	01/28/10	Chrysene	218-01-9	0.2	62	234	2700	3.23E-09	8.55E-10	7.41E-11
B-8	6 to 8	L452661.01	01/28/10	Dibenz(a,h)anthracene	53-70-3	0.033 U	0.062	0.234	2.67	-	-	-
B-8	6 to 8	L452661.01	01/28/10	Fluoranthene	206-44-0	0.66	-	-	-	-	-	-
B-8	6 to 8	L452661.01	01/28/10	Fluorene	86-73-7	0.066	-	-	-	-	-	-
B-8	6 to 8	L452661.01	01/28/10	Indeno(1,2,3-cd)pyrene	193-39-5	0.05	0.62	2.34	26.7	8.06E-08	2.14E-08	1.87E-09
B-8	6 to 8	L452661.01	01/28/10	Naphthalene	91-20-3	0.033 U	-	-	-	-	-	-
B-8	6 to 8	L452661.01	01/28/10	Pyrene	129-00-0	0.43	-	-	-	-	-	-
				Cumulative Cancer Risk	-	-	-	-	-	3.98E-06	1.05E-06	9.24E-08

**Notes:**

<sup>1</sup> Site-specific screening level calculated using the Iowa Department of Natural Resources Cumulative Risk Calculator

J The reported value is an estimate.

U The analyte was not detected.

**Appendix D  
Cumulative Cancer Risk Calculations**

<b>Sample Information and Results</b>							<b>Site-Specific Screening Level<sup>1</sup></b>			<b>Cancer Risk</b>		
							<b>(Cancer Risk = 1E-06)</b>			<b>Site Resident</b>	<b>Site Worker</b>	<b>Construction Worker</b>
<b>Location</b>	<b>Depth</b>	<b>Sample</b>	<b>Date</b>	<b>Analyte</b>	<b>Cas Number</b>	<b>Result</b>						
USGS-002	0 to 2	5789-1	07/31/12	2-Chloronaphthalene	91-58-7	0.68 U	-	-	-	-	-	-
USGS-002	0 to 2	5789-1	07/31/12	2-Methylnaphthalene	91-57-6	0.68 U	-	-	-	-	-	-
USGS-002	0 to 2	5789-1	07/31/12	Acenaphthene	83-32-9	0.68 U	-	-	-	-	-	-
USGS-002	0 to 2	5789-1	07/31/12	Anthracene	120-12-7	0.68 U	-	-	-	-	-	-
USGS-002	0 to 2	5789-1	07/31/12	Benzo(a)anthracene	56-55-3	2	0.62	2.34	26.7	3.23E-06	8.55E-07	7.49E-08
USGS-002	0 to 2	5789-1	07/31/12	Benzo(a)pyrene	50-32-8	2.5	0.062	0.234	2.67	4.03E-05	1.07E-05	9.36E-07
USGS-002	0 to 2	5789-1	07/31/12	Benzo(b)fluoranthene	205-99-2	2.4	0.62	2.34	26.7	3.87E-06	1.03E-06	8.99E-08
USGS-002	0 to 2	5789-1	07/31/12	Benzo(k)fluoranthene	207-08-9	1.4 U	6.2	23.4	267	-	-	-
USGS-002	0 to 2	5789-1	07/31/12	Carbazole	86-74-8	1.7 U	24.3	95.8	1040	-	-	-
USGS-002	0 to 2	5789-1	07/31/12	Chrysene	218-01-9	3	62	234	2700	4.84E-08	1.28E-08	1.11E-09
USGS-002	0 to 2	5789-1	07/31/12	Dibenz(a,h)anthracene	53-70-3	1.4 U	0.062	0.234	2.67	-	-	-
USGS-002	0 to 2	5789-1	07/31/12	Dibenzofuran	132-64-9	0.68 U	-	-	-	-	-	-
USGS-002	0 to 2	5789-1	07/31/12	Fluoranthene	206-44-0	3	-	-	-	-	-	-
USGS-002	0 to 2	5789-1	07/31/12	Fluorene	86-73-7	0.68 U	-	-	-	-	-	-
USGS-002	0 to 2	5789-1	07/31/12	Indeno(1,2,3-cd)pyrene	193-39-5	1.4 U	0.62	2.34	26.7	-	-	-
USGS-002	0 to 2	5789-1	07/31/12	Naphthalene	91-20-3	0.68 U	-	-	-	-	-	-
USGS-002	0 to 2	5789-1	07/31/12	Pyrene	129-00-0	3.4	-	-	-	-	-	-
Cumulative Cancer Risk					-	-	-	-	-	4.75E-05	1.26E-05	1.10E-06

**Notes:**

<sup>1</sup> Site-specific screening level calculated using the Iowa Department of Natural Resources Cumulative Risk Calculator

J The reported value is an estimate.

U The analyte was not detected.

**Appendix D  
Cumulative Cancer Risk Calculations**

<b>Sample Information and Results</b>							<b>Site-Specific Screening Level<sup>1</sup></b>			<b>Cancer Risk</b>		
							<b>(Cancer Risk = 1E-06)</b>			<b>Site Resident</b>	<b>Site Worker</b>	<b>Construction Worker</b>
<b>Location</b>	<b>Depth</b>	<b>Sample</b>	<b>Date</b>	<b>Analyte</b>	<b>Cas Number</b>	<b>Result</b>						
USGS-002	2 to 4	5789-2	07/31/12	2-Chloronaphthalene	91-58-7	0.13 U	-	-	-	-	-	-
USGS-002	2 to 4	5789-2	07/31/12	2-Methylnaphthalene	91-57-6	0.13 U	-	-	-	-	-	-
USGS-002	2 to 4	5789-2	07/31/12	Acenaphthene	83-32-9	0.13 U	-	-	-	-	-	-
USGS-002	2 to 4	5789-2	07/31/12	Anthracene	120-12-7	0.2	-	-	-	-	-	-
USGS-002	2 to 4	5789-2	07/31/12	Benzo(a)anthracene	56-55-3	0.59	0.62	2.34	26.7	9.52E-07	2.52E-07	2.21E-08
USGS-002	2 to 4	5789-2	07/31/12	Benzo(a)pyrene	50-32-8	1.3 U	0.062	0.234	2.67	-	-	-
USGS-002	2 to 4	5789-2	07/31/12	Benzo(b)fluoranthene	205-99-2	1.3 U	0.62	2.34	26.7	-	-	-
USGS-002	2 to 4	5789-2	07/31/12	Benzo(k)fluoranthene	207-08-9	1.3 U	6.2	23.4	267	-	-	-
USGS-002	2 to 4	5789-2	07/31/12	Carbazole	86-74-8	0.32 U	24.3	95.8	1040	-	-	-
USGS-002	2 to 4	5789-2	07/31/12	Chrysene	218-01-9	0.85	62	234	2700	1.37E-08	3.63E-09	3.15E-10
USGS-002	2 to 4	5789-2	07/31/12	Dibenz(a,h)anthracene	53-70-3	1.3 U	0.062	0.234	2.67	-	-	-
USGS-002	2 to 4	5789-2	07/31/12	Dibenzofuran	132-64-9	0.13 U	-	-	-	-	-	-
USGS-002	2 to 4	5789-2	07/31/12	Fluoranthene	206-44-0	1.1	-	-	-	-	-	-
USGS-002	2 to 4	5789-2	07/31/12	Fluorene	86-73-7	0.13 U	-	-	-	-	-	-
USGS-002	2 to 4	5789-2	07/31/12	Indeno(1,2,3-cd)pyrene	193-39-5	1.3 U	0.62	2.34	26.7	-	-	-
USGS-002	2 to 4	5789-2	07/31/12	Naphthalene	91-20-3	0.13	-	-	-	-	-	-
USGS-002	2 to 4	5789-2	07/31/12	Pyrene	129-00-0	1.1	-	-	-	-	-	-
				Cumulative Cancer Risk	-	-	-	-	-	9.65E-07	2.56E-07	2.24E-08

**Notes:**

<sup>1</sup> Site-specific screening level calculated using the Iowa Department of Natural Resources Cumulative Risk Calculator

J The reported value is an estimate.

U The analyte was not detected.

**Appendix D  
Cumulative Cancer Risk Calculations**

Sample Information and Results							Site-Specific Screening Level <sup>1</sup> (Cancer Risk = 1E-06)			Cancer Risk		
							<u>Site Resident</u>	<u>Site Worker</u>	<u>Construction Worker</u>	<u>Site Resident</u>	<u>Site Worker</u>	<u>Construction Worker</u>
<u>Location</u>	<u>Depth</u>	<u>Sample</u>	<u>Date</u>	<u>Analyte</u>	<u>Cas Number</u>	<u>Result</u>						
USGS-003	0 to 2	5789-19	08/01/12	2-Chloronaphthalene	91-58-7	1.4 U	-	-	-	-	-	-
USGS-003	0 to 2	5789-19	08/01/12	2-Methylnaphthalene	91-57-6	5.5	-	-	-	-	-	-
USGS-003	0 to 2	5789-19	08/01/12	Acenaphthene	83-32-9	1.4 U	-	-	-	-	-	-
USGS-003	0 to 2	5789-19	08/01/12	Anthracene	120-12-7	1.9	-	-	-	-	-	-
USGS-003	0 to 2	5789-19	08/01/12	Benzo(a)anthracene	56-55-3	8.7	0.62	2.34	26.7	1.40E-05	3.72E-06	3.26E-07
USGS-003	0 to 2	5789-19	08/01/12	Benzo(a)pyrene	50-32-8	7.7	0.062	0.234	2.67	1.24E-04	3.29E-05	2.88E-06
USGS-003	0 to 2	5789-19	08/01/12	Benzo(b)fluoranthene	205-99-2	8.8	0.62	2.34	26.7	1.42E-05	3.76E-06	3.30E-07
USGS-003	0 to 2	5789-19	08/01/12	Benzo(k)fluoranthene	207-08-9	2.3	6.2	23.4	267	3.71E-07	9.83E-08	8.61E-09
USGS-003	0 to 2	5789-19	08/01/12	Carbazole	86-74-8	3.6 U	24.3	95.8	1040	-	-	-
USGS-003	0 to 2	5789-19	08/01/12	Chrysene	218-01-9	16	62	234	2700	2.58E-07	6.84E-08	5.93E-09
USGS-003	0 to 2	5789-19	08/01/12	Dibenz(a,h)anthracene	53-70-3	1.6	0.062	0.234	2.67	2.58E-05	6.84E-06	5.99E-07
USGS-003	0 to 2	5789-19	08/01/12	Dibenzofuran	132-64-9	1.4 U	-	-	-	-	-	-
USGS-003	0 to 2	5789-19	08/01/12	Fluoranthene	206-44-0	7.5	-	-	-	-	-	-
USGS-003	0 to 2	5789-19	08/01/12	Fluorene	86-73-7	1.4 U	-	-	-	-	-	-
USGS-003	0 to 2	5789-19	08/01/12	Indeno(1,2,3-cd)pyrene	193-39-5	2.3	0.62	2.34	26.7	3.71E-06	9.83E-07	8.61E-08
USGS-003	0 to 2	5789-19	08/01/12	Naphthalene	91-20-3	2.9	-	-	-	-	-	-
USGS-003	0 to 2	5789-19	08/01/12	Pyrene	129-00-0	14	-	-	-	-	-	-
Cumulative Cancer Risk					-	-	-	-	-	1.83E-04	4.84E-05	4.24E-06

**Notes:**

<sup>1</sup> Site-specific screening level calculated using the Iowa Department of Natural Resources Cumulative Risk Calculator

J The reported value is an estimate.

U The analyte was not detected.

**Appendix D  
Cumulative Cancer Risk Calculations**

<b>Sample Information and Results</b>							<b>Site-Specific Screening Level<sup>1</sup></b>			<b>Cancer Risk</b>		
							<b>(Cancer Risk = 1E-06)</b>			<b>Site Resident</b>	<b>Site Worker</b>	<b>Construction Worker</b>
<b>Location</b>	<b>Depth</b>	<b>Sample</b>	<b>Date</b>	<b>Analyte</b>	<b>Cas Number</b>	<b>Result</b>						
USGS-003	2 to 4	5789-20	08/01/12	2-Chloronaphthalene	91-58-7	0.14 U	-	-	-	-	-	-
USGS-003	2 to 4	5789-20	08/01/12	2-Methylnaphthalene	91-57-6	0.14 U	-	-	-	-	-	-
USGS-003	2 to 4	5789-20	08/01/12	Acenaphthene	83-32-9	0.14 U	-	-	-	-	-	-
USGS-003	2 to 4	5789-20	08/01/12	Anthracene	120-12-7	0.14 U	-	-	-	-	-	-
USGS-003	2 to 4	5789-20	08/01/12	Benzo(a)anthracene	56-55-3	0.14 U	0.62	2.34	26.7	-	-	-
USGS-003	2 to 4	5789-20	08/01/12	Benzo(a)pyrene	50-32-8	0.14 U	0.062	0.234	2.67	-	-	-
USGS-003	2 to 4	5789-20	08/01/12	Benzo(b)fluoranthene	205-99-2	0.14 U	0.62	2.34	26.7	-	-	-
USGS-003	2 to 4	5789-20	08/01/12	Benzo(k)fluoranthene	207-08-9	0.14 U	6.2	23.4	267	-	-	-
USGS-003	2 to 4	5789-20	08/01/12	Carbazole	86-74-8	0.34 U	24.3	95.8	1040	-	-	-
USGS-003	2 to 4	5789-20	08/01/12	Chrysene	218-01-9	0.17	62	234	2700	2.74E-09	7.26E-10	6.30E-11
USGS-003	2 to 4	5789-20	08/01/12	Dibenz(a,h)anthracene	53-70-3	0.14 U	0.062	0.234	2.67	-	-	-
USGS-003	2 to 4	5789-20	08/01/12	Dibenzofuran	132-64-9	0.14 U	-	-	-	-	-	-
USGS-003	2 to 4	5789-20	08/01/12	Fluoranthene	206-44-0	0.14 U	-	-	-	-	-	-
USGS-003	2 to 4	5789-20	08/01/12	Fluorene	86-73-7	0.14 U	-	-	-	-	-	-
USGS-003	2 to 4	5789-20	08/01/12	Indeno(1,2,3-cd)pyrene	193-39-5	0.14 U	0.62	2.34	26.7	-	-	-
USGS-003	2 to 4	5789-20	08/01/12	Naphthalene	91-20-3	0.14 U	-	-	-	-	-	-
USGS-003	2 to 4	5789-20	08/01/12	Pyrene	129-00-0	0.16	-	-	-	-	-	-
				Cumulative Cancer Risk	-	-	-	-	-	2.74E-09	7.26E-10	6.30E-11

**Notes:**

<sup>1</sup> Site-specific screening level calculated using the Iowa Department of Natural Resources Cumulative Risk Calculator

J The reported value is an estimate.

U The analyte was not detected.

**Appendix D  
Cumulative Cancer Risk Calculations**

Sample Information and Results							Site-Specific Screening Level <sup>1</sup> (Cancer Risk = 1E-06)			Cancer Risk		
							<u>Site Resident</u>	<u>Site Worker</u>	<u>Construction Worker</u>	<u>Site Resident</u>	<u>Site Worker</u>	<u>Construction Worker</u>
<u>Location</u>	<u>Depth</u>	<u>Sample</u>	<u>Date</u>	<u>Analyte</u>	<u>Cas Number</u>	<u>Result</u>						
USGS-004	0 to 2	5789-17	07/31/12	2-Chloronaphthalene	91-58-7	1.4 U	-	-	-	-	-	-
USGS-004	0 to 2	5789-17	07/31/12	2-Methylnaphthalene	91-57-6	1.4 U	-	-	-	-	-	-
USGS-004	0 to 2	5789-17	07/31/12	Acenaphthene	83-32-9	7.4	-	-	-	-	-	-
USGS-004	0 to 2	5789-17	07/31/12	Anthracene	120-12-7	15	-	-	-	-	-	-
USGS-004	0 to 2	5789-17	07/31/12	Benzo(a)anthracene	56-55-3	31	0.62	2.34	26.7	5.00E-05	1.32E-05	1.16E-06
USGS-004	0 to 2	5789-17	07/31/12	Benzo(a)pyrene	50-32-8	27	0.062	0.234	2.67	4.35E-04	1.15E-04	1.01E-05
USGS-004	0 to 2	5789-17	07/31/12	Benzo(b)fluoranthene	205-99-2	38	0.62	2.34	26.7	6.13E-05	1.62E-05	1.42E-06
USGS-004	0 to 2	5789-17	07/31/12	Benzo(k)fluoranthene	207-08-9	13	6.2	23.4	267	2.10E-06	5.56E-07	4.87E-08
USGS-004	0 to 2	5789-17	07/31/12	Carbazole	86-74-8	10	24.3	95.8	1040	4.12E-07	1.04E-07	9.62E-09
USGS-004	0 to 2	5789-17	07/31/12	Chrysene	218-01-9	31	62	234	2700	5.00E-07	1.32E-07	1.15E-08
USGS-004	0 to 2	5789-17	07/31/12	Dibenz(a,h)anthracene	53-70-3	2.7	0.062	0.234	2.67	4.35E-05	1.15E-05	1.01E-06
USGS-004	0 to 2	5789-17	07/31/12	Dibenzofuran	132-64-9	3.6	-	-	-	-	-	-
USGS-004	0 to 2	5789-17	07/31/12	Fluoranthene	206-44-0	65 J	-	-	-	-	-	-
USGS-004	0 to 2	5789-17	07/31/12	Fluorene	86-73-7	7.2	-	-	-	-	-	-
USGS-004	0 to 2	5789-17	07/31/12	Indeno(1,2,3-cd)pyrene	193-39-5	9.6	0.62	2.34	26.7	1.55E-05	4.10E-06	3.60E-07
USGS-004	0 to 2	5789-17	07/31/12	Naphthalene	91-20-3	2.6	-	-	-	-	-	-
USGS-004	0 to 2	5789-17	07/31/12	Pyrene	129-00-0	55	-	-	-	-	-	-
Cumulative Cancer Risk					-	-	-	-	-	6.09E-04	1.61E-04	1.41E-05

**Notes:**

<sup>1</sup> Site-specific screening level calculated using the Iowa Department of Natural Resources Cumulative Risk Calculator

J The reported value is an estimate.

U The analyte was not detected.

**Appendix D  
Cumulative Cancer Risk Calculations**

<b>Sample Information and Results</b>							<b>Site-Specific Screening Level<sup>1</sup></b>			<b>Cancer Risk</b>		
							<b>(Cancer Risk = 1E-06)</b>			<b>Site Resident</b>	<b>Site Worker</b>	<b>Construction Worker</b>
<b>Location</b>	<b>Depth</b>	<b>Sample</b>	<b>Date</b>	<b>Analyte</b>	<b>Cas Number</b>	<b>Result</b>						
USGS-004	2 to 4	5789-18	07/31/12	2-Chloronaphthalene	91-58-7	0.14 U	-	-	-	-	-	-
USGS-004	2 to 4	5789-18	07/31/12	2-Methylnaphthalene	91-57-6	0.14 U	-	-	-	-	-	-
USGS-004	2 to 4	5789-18	07/31/12	Acenaphthene	83-32-9	0.15	-	-	-	-	-	-
USGS-004	2 to 4	5789-18	07/31/12	Anthracene	120-12-7	0.47	-	-	-	-	-	-
USGS-004	2 to 4	5789-18	07/31/12	Benzo(a)anthracene	56-55-3	1.7	0.62	2.34	26.7	2.74E-06	7.26E-07	6.37E-08
USGS-004	2 to 4	5789-18	07/31/12	Benzo(a)pyrene	50-32-8	1.7	0.062	0.234	2.67	2.74E-05	7.26E-06	6.37E-07
USGS-004	2 to 4	5789-18	07/31/12	Benzo(b)fluoranthene	205-99-2	2.5	0.62	2.34	26.7	4.03E-06	1.07E-06	9.36E-08
USGS-004	2 to 4	5789-18	07/31/12	Benzo(k)fluoranthene	207-08-9	0.91	6.2	23.4	267	1.47E-07	3.89E-08	3.41E-09
USGS-004	2 to 4	5789-18	07/31/12	Carbazole	86-74-8	0.35 U	24.3	95.8	1040	-	-	-
USGS-004	2 to 4	5789-18	07/31/12	Chrysene	218-01-9	2	62	234	2700	3.23E-08	8.55E-09	7.41E-10
USGS-004	2 to 4	5789-18	07/31/12	Dibenz(a,h)anthracene	53-70-3	0.14 U	0.062	0.234	2.67	-	-	-
USGS-004	2 to 4	5789-18	07/31/12	Dibenzofuran	132-64-9	0.14 U	-	-	-	-	-	-
USGS-004	2 to 4	5789-18	07/31/12	Fluoranthene	206-44-0	4	-	-	-	-	-	-
USGS-004	2 to 4	5789-18	07/31/12	Fluorene	86-73-7	0.17	-	-	-	-	-	-
USGS-004	2 to 4	5789-18	07/31/12	Indeno(1,2,3-cd)pyrene	193-39-5	0.8	0.62	2.34	26.7	1.29E-06	3.42E-07	3.00E-08
USGS-004	2 to 4	5789-18	07/31/12	Naphthalene	91-20-3	0.14 U	-	-	-	-	-	-
USGS-004	2 to 4	5789-18	07/31/12	Pyrene	129-00-0	3.4	-	-	-	-	-	-
Cumulative Cancer Risk					-	-	-	-	-	3.57E-05	9.45E-06	8.28E-07

**Notes:**

<sup>1</sup> Site-specific screening level calculated using the Iowa Department of Natural Resources Cumulative Risk Calculator

J The reported value is an estimate.

U The analyte was not detected.

**Appendix D  
Cumulative Cancer Risk Calculations**

Sample Information and Results							Site-Specific Screening Level <sup>1</sup> (Cancer Risk = 1E-06)			Cancer Risk		
							<u>Site Resident</u>	<u>Site Worker</u>	<u>Construction Worker</u>	<u>Site Resident</u>	<u>Site Worker</u>	<u>Construction Worker</u>
<u>Location</u>	<u>Depth</u>	<u>Sample</u>	<u>Date</u>	<u>Analyte</u>	<u>Cas Number</u>	<u>Result</u>						
USGS-005	0 to 2	5789-21	08/01/12	2-Chloronaphthalene	91-58-7	1.2 U	-	-	-	-	-	-
USGS-005	0 to 2	5789-21	08/01/12	2-Methylnaphthalene	91-57-6	1.2 U	-	-	-	-	-	-
USGS-005	0 to 2	5789-21	08/01/12	Acenaphthene	83-32-9	2.1	-	-	-	-	-	-
USGS-005	0 to 2	5789-21	08/01/12	Anthracene	120-12-7	4.8	-	-	-	-	-	-
USGS-005	0 to 2	5789-21	08/01/12	Benzo(a)anthracene	56-55-3	19	0.62	2.34	26.7	3.06E-05	8.12E-06	7.12E-07
USGS-005	0 to 2	5789-21	08/01/12	Benzo(a)pyrene	50-32-8	20	0.062	0.234	2.67	3.23E-04	8.55E-05	7.49E-06
USGS-005	0 to 2	5789-21	08/01/12	Benzo(b)fluoranthene	205-99-2	30	0.62	2.34	26.7	4.84E-05	1.28E-05	1.12E-06
USGS-005	0 to 2	5789-21	08/01/12	Benzo(k)fluoranthene	207-08-9	10	6.2	23.4	267	1.61E-06	4.27E-07	3.75E-08
USGS-005	0 to 2	5789-21	08/01/12	Carbazole	86-74-8	3.1 U	24.3	95.8	1040	-	-	-
USGS-005	0 to 2	5789-21	08/01/12	Chrysene	218-01-9	21	62	234	2700	3.39E-07	8.97E-08	7.78E-09
USGS-005	0 to 2	5789-21	08/01/12	Dibenz(a,h)anthracene	53-70-3	2	0.062	0.234	2.67	3.23E-05	8.55E-06	7.49E-07
USGS-005	0 to 2	5789-21	08/01/12	Dibenzofuran	132-64-9	1.2 U	-	-	-	-	-	-
USGS-005	0 to 2	5789-21	08/01/12	Fluoranthene	206-44-0	38	-	-	-	-	-	-
USGS-005	0 to 2	5789-21	08/01/12	Fluorene	86-73-7	1.8	-	-	-	-	-	-
USGS-005	0 to 2	5789-21	08/01/12	Indeno(1,2,3-cd)pyrene	193-39-5	6.7	0.62	2.34	26.7	1.08E-05	2.86E-06	2.51E-07
USGS-005	0 to 2	5789-21	08/01/12	Naphthalene	91-20-3	1.2 U	-	-	-	-	-	-
USGS-005	0 to 2	5789-21	08/01/12	Pyrene	129-00-0	31	-	-	-	-	-	-
Cumulative Cancer Risk					-	-	-	-	-	4.47E-04	1.18E-04	1.04E-05

**Notes:**

<sup>1</sup> Site-specific screening level calculated using the Iowa Department of Natural Resources Cumulative Risk Calculator

J The reported value is an estimate.

U The analyte was not detected.

**Appendix D  
Cumulative Cancer Risk Calculations**

Sample Information and Results							Site-Specific Screening Level <sup>1</sup> (Cancer Risk = 1E-06)			Cancer Risk		
							<u>Site Resident</u>	<u>Site Worker</u>	<u>Construction Worker</u>	<u>Site Resident</u>	<u>Site Worker</u>	<u>Construction Worker</u>
<u>Location</u>	<u>Depth</u>	<u>Sample</u>	<u>Date</u>	<u>Analyte</u>	<u>Cas Number</u>	<u>Result</u>						
USGS-005	2 to 4	5789-22	08/01/12	2-Chloronaphthalene	91-58-7	0.14 U	-	-	-	-	-	-
USGS-005	2 to 4	5789-22	08/01/12	2-Methylnaphthalene	91-57-6	1.8 J	-	-	-	-	-	-
USGS-005	2 to 4	5789-22	08/01/12	Acenaphthene	83-32-9	3.6 J	-	-	-	-	-	-
USGS-005	2 to 4	5789-22	08/01/12	Anthracene	120-12-7	14 J	-	-	-	-	-	-
USGS-005	2 to 4	5789-22	08/01/12	Benzo(a)anthracene	56-55-3	36 J	0.62	2.34	26.7	5.81E-05	1.54E-05	1.35E-06
USGS-005	2 to 4	5789-22	08/01/12	Benzo(a)pyrene	50-32-8	30 J	0.062	0.234	2.67	4.84E-04	1.28E-04	1.12E-05
USGS-005	2 to 4	5789-22	08/01/12	Benzo(b)fluoranthene	205-99-2	38 J	0.62	2.34	26.7	6.13E-05	1.62E-05	1.42E-06
USGS-005	2 to 4	5789-22	08/01/12	Benzo(k)fluoranthene	207-08-9	15 J	6.2	23.4	267	2.42E-06	6.41E-07	5.62E-08
USGS-005	2 to 4	5789-22	08/01/12	Carbazole	86-74-8	4.4 J	24.3	95.8	1040	1.81E-07	4.59E-08	4.23E-09
USGS-005	2 to 4	5789-22	08/01/12	Chrysene	218-01-9	38 J	62	234	2700	6.13E-07	1.62E-07	1.41E-08
USGS-005	2 to 4	5789-22	08/01/12	Dibenz(a,h)anthracene	53-70-3	6.7 U	0.062	0.234	2.67	-	-	-
USGS-005	2 to 4	5789-22	08/01/12	Dibenzofuran	132-64-9	2.7 J	-	-	-	-	-	-
USGS-005	2 to 4	5789-22	08/01/12	Fluoranthene	206-44-0	71 J	-	-	-	-	-	-
USGS-005	2 to 4	5789-22	08/01/12	Fluorene	86-73-7	4.5 J	-	-	-	-	-	-
USGS-005	2 to 4	5789-22	08/01/12	Indeno(1,2,3-cd)pyrene	193-39-5	8.8 J	0.62	2.34	26.7	1.42E-05	3.76E-06	3.30E-07
USGS-005	2 to 4	5789-22	08/01/12	Naphthalene	91-20-3	2 J	-	-	-	-	-	-
USGS-005	2 to 4	5789-22	08/01/12	Pyrene	129-00-0	57 J	-	-	-	-	-	-
Cumulative Cancer Risk					-	-	-	-	-	6.21E-04	1.64E-04	1.44E-05

**Notes:**

<sup>1</sup> Site-specific screening level calculated using the Iowa Department of Natural Resources Cumulative Risk Calculator

J The reported value is an estimate.

U The analyte was not detected.

**Appendix D  
Cumulative Cancer Risk Calculations**

Sample Information and Results							Site-Specific Screening Level <sup>1</sup> (Cancer Risk = 1E-06)			Cancer Risk		
							<u>Site Resident</u>	<u>Site Worker</u>	<u>Construction Worker</u>	<u>Site Resident</u>	<u>Site Worker</u>	<u>Construction Worker</u>
<u>Location</u>	<u>Depth</u>	<u>Sample</u>	<u>Date</u>	<u>Analyte</u>	<u>Cas Number</u>	<u>Result</u>						
USGS-006	0 to 2	5789-15	07/31/12	2-Chloronaphthalene	91-58-7	1.3 U	-	-	-	-	-	-
USGS-006	0 to 2	5789-15	07/31/12	2-Methylnaphthalene	91-57-6	1.3 U	-	-	-	-	-	-
USGS-006	0 to 2	5789-15	07/31/12	Acenaphthene	83-32-9	1.3 U	-	-	-	-	-	-
USGS-006	0 to 2	5789-15	07/31/12	Anthracene	120-12-7	1.3 U	-	-	-	-	-	-
USGS-006	0 to 2	5789-15	07/31/12	Benzo(a)anthracene	56-55-3	3	0.62	2.34	26.7	4.84E-06	1.28E-06	1.12E-07
USGS-006	0 to 2	5789-15	07/31/12	Benzo(a)pyrene	50-32-8	2.8	0.062	0.234	2.67	4.52E-05	1.20E-05	1.05E-06
USGS-006	0 to 2	5789-15	07/31/12	Benzo(b)fluoranthene	205-99-2	2.8	0.62	2.34	26.7	4.52E-06	1.20E-06	1.05E-07
USGS-006	0 to 2	5789-15	07/31/12	Benzo(k)fluoranthene	207-08-9	1.3 U	6.2	23.4	267	-	-	-
USGS-006	0 to 2	5789-15	07/31/12	Carbazole	86-74-8	3.2 U	24.3	95.8	1040	-	-	-
USGS-006	0 to 2	5789-15	07/31/12	Chrysene	218-01-9	6	62	234	2700	9.68E-08	2.56E-08	2.22E-09
USGS-006	0 to 2	5789-15	07/31/12	Dibenz(a,h)anthracene	53-70-3	1.3 U	0.062	0.234	2.67	-	-	-
USGS-006	0 to 2	5789-15	07/31/12	Dibenzofuran	132-64-9	1.3 U	-	-	-	-	-	-
USGS-006	0 to 2	5789-15	07/31/12	Fluoranthene	206-44-0	1.6	-	-	-	-	-	-
USGS-006	0 to 2	5789-15	07/31/12	Fluorene	86-73-7	1.3 U	-	-	-	-	-	-
USGS-006	0 to 2	5789-15	07/31/12	Indeno(1,2,3-cd)pyrene	193-39-5	1.3 U	0.62	2.34	26.7	-	-	-
USGS-006	0 to 2	5789-15	07/31/12	Naphthalene	91-20-3	1.3 U	-	-	-	-	-	-
USGS-006	0 to 2	5789-15	07/31/12	Pyrene	129-00-0	4.1	-	-	-	-	-	-
				Cumulative Cancer Risk	-	-	-	-	-	5.46E-05	1.45E-05	1.27E-06

**Notes:**

<sup>1</sup> Site-specific screening level calculated using the Iowa Department of Natural Resources Cumulative Risk Calculator

J The reported value is an estimate.

U The analyte was not detected.

**Appendix D  
Cumulative Cancer Risk Calculations**

<b>Sample Information and Results</b>							<b>Site-Specific Screening Level<sup>1</sup></b>			<b>Cancer Risk</b>		
							<b>(Cancer Risk = 1E-06)</b>			<b>Site Resident</b>	<b>Site Worker</b>	<b>Construction Worker</b>
<b>Location</b>	<b>Depth</b>	<b>Sample</b>	<b>Date</b>	<b>Analyte</b>	<b>Cas Number</b>	<b>Result</b>						
USGS-006	2 to 4	5789-16	07/31/12	2-Chloronaphthalene	91-58-7	0.14 U	-	-	-	-	-	-
USGS-006	2 to 4	5789-16	07/31/12	2-Methylnaphthalene	91-57-6	0.14 U	-	-	-	-	-	-
USGS-006	2 to 4	5789-16	07/31/12	Acenaphthene	83-32-9	0.14 U	-	-	-	-	-	-
USGS-006	2 to 4	5789-16	07/31/12	Anthracene	120-12-7	0.14 U	-	-	-	-	-	-
USGS-006	2 to 4	5789-16	07/31/12	Benzo(a)anthracene	56-55-3	0.14 U	0.62	2.34	26.7	-	-	-
USGS-006	2 to 4	5789-16	07/31/12	Benzo(a)pyrene	50-32-8	0.14 U	0.062	0.234	2.67	-	-	-
USGS-006	2 to 4	5789-16	07/31/12	Benzo(b)fluoranthene	205-99-2	0.14 U	0.62	2.34	26.7	-	-	-
USGS-006	2 to 4	5789-16	07/31/12	Benzo(k)fluoranthene	207-08-9	0.14 U	6.2	23.4	267	-	-	-
USGS-006	2 to 4	5789-16	07/31/12	Carbazole	86-74-8	0.34 U	24.3	95.8	1040	-	-	-
USGS-006	2 to 4	5789-16	07/31/12	Chrysene	218-01-9	0.14 U	62	234	2700	-	-	-
USGS-006	2 to 4	5789-16	07/31/12	Dibenz(a,h)anthracene	53-70-3	0.14 U	0.062	0.234	2.67	-	-	-
USGS-006	2 to 4	5789-16	07/31/12	Dibenzofuran	132-64-9	0.14 U	-	-	-	-	-	-
USGS-006	2 to 4	5789-16	07/31/12	Fluoranthene	206-44-0	0.14 U	-	-	-	-	-	-
USGS-006	2 to 4	5789-16	07/31/12	Fluorene	86-73-7	0.14 U	-	-	-	-	-	-
USGS-006	2 to 4	5789-16	07/31/12	Indeno(1,2,3-cd)pyrene	193-39-5	0.14 U	0.62	2.34	26.7	-	-	-
USGS-006	2 to 4	5789-16	07/31/12	Naphthalene	91-20-3	0.14 U	-	-	-	-	-	-
USGS-006	2 to 4	5789-16	07/31/12	Pyrene	129-00-0	0.14 U	-	-	-	-	-	-
Cumulative Cancer Risk					-	-	-	-	-	0.00E+00	0.00E+00	0.00E+00

**Notes:**

<sup>1</sup> Site-specific screening level calculated using the Iowa Department of Natural Resources Cumulative Risk Calculator

J The reported value is an estimate.

U The analyte was not detected.

**Appendix D  
Cumulative Cancer Risk Calculations**

<b>Sample Information and Results</b>							<b>Site-Specific Screening Level<sup>1</sup></b>			<b>Cancer Risk</b>		
							<b>(Cancer Risk = 1E-06)</b>			<b>Site Resident</b>	<b>Site Worker</b>	<b>Construction Worker</b>
<b>Location</b>	<b>Depth</b>	<b>Sample</b>	<b>Date</b>	<b>Analyte</b>	<b>Cas Number</b>	<b>Result</b>						
USGS-007	0 to 2	5789-11	07/31/12	2-Chloronaphthalene	91-58-7	2.8 U	-	-	-	-	-	-
USGS-007	0 to 2	5789-11	07/31/12	2-Methylnaphthalene	91-57-6	31	-	-	-	-	-	-
USGS-007	0 to 2	5789-11	07/31/12	Acenaphthene	83-32-9	140	-	-	-	-	-	-
USGS-007	0 to 2	5789-11	07/31/12	Anthracene	120-12-7	300	-	-	-	-	-	-
USGS-007	0 to 2	5789-11	07/31/12	Benzo(a)anthracene	56-55-3	430	0.62	2.34	26.7	6.94E-04	1.84E-04	1.61E-05
USGS-007	0 to 2	5789-11	07/31/12	Benzo(a)pyrene	50-32-8	410	0.062	0.234	2.67	6.61E-03	1.75E-03	1.54E-04
USGS-007	0 to 2	5789-11	07/31/12	Benzo(b)fluoranthene	205-99-2	560	0.62	2.34	26.7	9.03E-04	2.39E-04	2.10E-05
USGS-007	0 to 2	5789-11	07/31/12	Benzo(k)fluoranthene	207-08-9	200	6.2	23.4	267	3.23E-05	8.55E-06	7.49E-07
USGS-007	0 to 2	5789-11	07/31/12	Carbazole	86-74-8	150	24.3	95.8	1040	6.17E-06	1.57E-06	1.44E-07
USGS-007	0 to 2	5789-11	07/31/12	Chrysene	218-01-9	91	62	234	2700	1.47E-06	3.89E-07	3.37E-08
USGS-007	0 to 2	5789-11	07/31/12	Dibenz(a,h)anthracene	53-70-3	28	0.062	0.234	2.67	4.52E-04	1.20E-04	1.05E-05
USGS-007	0 to 2	5789-11	07/31/12	Dibenzofuran	132-64-9	96	-	-	-	-	-	-
USGS-007	0 to 2	5789-11	07/31/12	Fluoranthene	206-44-0	1000	-	-	-	-	-	-
USGS-007	0 to 2	5789-11	07/31/12	Fluorene	86-73-7	150	-	-	-	-	-	-
USGS-007	0 to 2	5789-11	07/31/12	Indeno(1,2,3-cd)pyrene	193-39-5	120	0.62	2.34	26.7	1.94E-04	5.13E-05	4.49E-06
USGS-007	0 to 2	5789-11	07/31/12	Naphthalene	91-20-3	100	-	-	-	-	-	-
USGS-007	0 to 2	5789-11	07/31/12	Pyrene	129-00-0	800	-	-	-	-	-	-
Cumulative Cancer Risk					-	-	-	-	-	8.89E-03	2.36E-03	2.07E-04

**Notes:**

<sup>1</sup> Site-specific screening level calculated using the Iowa Department of Natural Resources Cumulative Risk Calculator

J The reported value is an estimate.

U The analyte was not detected.

**Appendix D  
Cumulative Cancer Risk Calculations**

<b>Sample Information and Results</b>							<b>Site-Specific Screening Level<sup>1</sup></b>			<b>Cancer Risk</b>		
							<b>(Cancer Risk = 1E-06)</b>			<b>Site</b>	<b>Site</b>	<b>Construction</b>
<b>Location</b>	<b>Depth</b>	<b>Sample</b>	<b>Date</b>	<b>Analyte</b>	<b>Cas Number</b>	<b>Result</b>	<b>Resident</b>	<b>Worker</b>	<b>Worker</b>	<b>Resident</b>	<b>Worker</b>	<b>Worker</b>
USGS-007	2 to 4	5789-12	07/31/12	2-Chloronaphthalene	91-58-7	1.3 U	-	-	-	-	-	-
USGS-007	2 to 4	5789-12	07/31/12	2-Methylnaphthalene	91-57-6	1.3 U	-	-	-	-	-	-
USGS-007	2 to 4	5789-12	07/31/12	Acenaphthene	83-32-9	1.3 U	-	-	-	-	-	-
USGS-007	2 to 4	5789-12	07/31/12	Anthracene	120-12-7	2.8	-	-	-	-	-	-
USGS-007	2 to 4	5789-12	07/31/12	Benzo(a)anthracene	56-55-3	6	0.62	2.34	26.7	9.68E-06	2.56E-06	2.25E-07
USGS-007	2 to 4	5789-12	07/31/12	Benzo(a)pyrene	50-32-8	6	0.062	0.234	2.67	9.68E-05	2.56E-05	2.25E-06
USGS-007	2 to 4	5789-12	07/31/12	Benzo(b)fluoranthene	205-99-2	8	0.62	2.34	26.7	1.29E-05	3.42E-06	3.00E-07
USGS-007	2 to 4	5789-12	07/31/12	Benzo(k)fluoranthene	207-08-9	3.2	6.2	23.4	267	5.16E-07	1.37E-07	1.20E-08
USGS-007	2 to 4	5789-12	07/31/12	Carbazole	86-74-8	3.3 U	24.3	95.8	1040	-	-	-
USGS-007	2 to 4	5789-12	07/31/12	Chrysene	218-01-9	6.4	62	234	2700	1.03E-07	2.74E-08	2.37E-09
USGS-007	2 to 4	5789-12	07/31/12	Dibenz(a,h)anthracene	53-70-3	1.3 U	0.062	0.234	2.67	-	-	-
USGS-007	2 to 4	5789-12	07/31/12	Dibenzofuran	132-64-9	1.3 U	-	-	-	-	-	-
USGS-007	2 to 4	5789-12	07/31/12	Fluoranthene	206-44-0	15	-	-	-	-	-	-
USGS-007	2 to 4	5789-12	07/31/12	Fluorene	86-73-7	1.3 U	-	-	-	-	-	-
USGS-007	2 to 4	5789-12	07/31/12	Indeno(1,2,3-cd)pyrene	193-39-5	1.8	0.62	2.34	26.7	2.90E-06	7.69E-07	6.74E-08
USGS-007	2 to 4	5789-12	07/31/12	Naphthalene	91-20-3	1.3 U	-	-	-	-	-	-
USGS-007	2 to 4	5789-12	07/31/12	Pyrene	129-00-0	11	-	-	-	-	-	-
Cumulative Cancer Risk					-	-	-	-	-	1.23E-04	3.26E-05	2.85E-06

**Notes:**

<sup>1</sup> Site-specific screening level calculated using the Iowa Department of Natural Resources Cumulative Risk Calculator

J The reported value is an estimate.

U The analyte was not detected.

**Appendix D  
Cumulative Cancer Risk Calculations**

Sample Information and Results							Site-Specific Screening Level <sup>1</sup> (Cancer Risk = 1E-06)			Cancer Risk		
							<u>Site Resident</u>	<u>Site Worker</u>	<u>Construction Worker</u>	<u>Site Resident</u>	<u>Site Worker</u>	<u>Construction Worker</u>
<u>Location</u>	<u>Depth</u>	<u>Sample</u>	<u>Date</u>	<u>Analyte</u>	<u>Cas Number</u>	<u>Result</u>						
USGS-008	0 to 2	5789-13	07/31/12	2-Chloronaphthalene	91-58-7	2.7 U	-	-	-	-	-	-
USGS-008	0 to 2	5789-13	07/31/12	2-Methylnaphthalene	91-57-6	2.7 U	-	-	-	-	-	-
USGS-008	0 to 2	5789-13	07/31/12	Acenaphthene	83-32-9	2.9	-	-	-	-	-	-
USGS-008	0 to 2	5789-13	07/31/12	Anthracene	120-12-7	7.6	-	-	-	-	-	-
USGS-008	0 to 2	5789-13	07/31/12	Benzo(a)anthracene	56-55-3	26	0.62	2.34	26.7	4.19E-05	1.11E-05	9.74E-07
USGS-008	0 to 2	5789-13	07/31/12	Benzo(a)pyrene	50-32-8	26	0.062	0.234	2.67	4.19E-04	1.11E-04	9.74E-06
USGS-008	0 to 2	5789-13	07/31/12	Benzo(b)fluoranthene	205-99-2	33	0.62	2.34	26.7	5.32E-05	1.41E-05	1.24E-06
USGS-008	0 to 2	5789-13	07/31/12	Benzo(k)fluoranthene	207-08-9	12	6.2	23.4	267	1.94E-06	5.13E-07	4.49E-08
USGS-008	0 to 2	5789-13	07/31/12	Carbazole	86-74-8	6.7 U	24.3	95.8	1040	-	-	-
USGS-008	0 to 2	5789-13	07/31/12	Chrysene	218-01-9	30	62	234	2700	4.84E-07	1.28E-07	1.11E-08
USGS-008	0 to 2	5789-13	07/31/12	Dibenz(a,h)anthracene	53-70-3	3.2	0.062	0.234	2.67	5.16E-05	1.37E-05	1.20E-06
USGS-008	0 to 2	5789-13	07/31/12	Dibenzofuran	132-64-9	2.7 U	-	-	-	-	-	-
USGS-008	0 to 2	5789-13	07/31/12	Fluoranthene	206-44-0	52	-	-	-	-	-	-
USGS-008	0 to 2	5789-13	07/31/12	Fluorene	86-73-7	2.7	-	-	-	-	-	-
USGS-008	0 to 2	5789-13	07/31/12	Indeno(1,2,3-cd)pyrene	193-39-5	11	0.62	2.34	26.7	1.77E-05	4.70E-06	4.12E-07
USGS-008	0 to 2	5789-13	07/31/12	Naphthalene	91-20-3	2.7 U	-	-	-	-	-	-
USGS-008	0 to 2	5789-13	07/31/12	Pyrene	129-00-0	42	-	-	-	-	-	-
				Cumulative Cancer Risk	-	-	-	-	-	5.86E-04	1.55E-04	1.36E-05

**Notes:**

<sup>1</sup> Site-specific screening level calculated using the Iowa Department of Natural Resources Cumulative Risk Calculator

J The reported value is an estimate.

U The analyte was not detected.

**Appendix D  
Cumulative Cancer Risk Calculations**

<b>Sample Information and Results</b>							<b>Site-Specific Screening Level<sup>1</sup></b>			<b>Cancer Risk</b>		
							<b>(Cancer Risk = 1E-06)</b>			<b>Site</b>	<b>Site</b>	<b>Construction</b>
<b>Location</b>	<b>Depth</b>	<b>Sample</b>	<b>Date</b>	<b>Analyte</b>	<b>Cas Number</b>	<b>Result</b>	<b>Resident</b>	<b>Worker</b>	<b>Worker</b>	<b>Resident</b>	<b>Worker</b>	<b>Worker</b>
USGS-008	2 to 4	5789-14	07/31/12	2-Chloronaphthalene	91-58-7	0.15 U	-	-	-	-	-	-
USGS-008	2 to 4	5789-14	07/31/12	2-Methylnaphthalene	91-57-6	0.15 U	-	-	-	-	-	-
USGS-008	2 to 4	5789-14	07/31/12	Acenaphthene	83-32-9	0.15 U	-	-	-	-	-	-
USGS-008	2 to 4	5789-14	07/31/12	Anthracene	120-12-7	0.15 U	-	-	-	-	-	-
USGS-008	2 to 4	5789-14	07/31/12	Benzo(a)anthracene	56-55-3	0.15	0.62	2.34	26.7	2.42E-07	6.41E-08	5.62E-09
USGS-008	2 to 4	5789-14	07/31/12	Benzo(a)pyrene	50-32-8	0.15 U	0.062	0.234	2.67	-	-	-
USGS-008	2 to 4	5789-14	07/31/12	Benzo(b)fluoranthene	205-99-2	0.16	0.62	2.34	26.7	2.58E-07	6.84E-08	5.99E-09
USGS-008	2 to 4	5789-14	07/31/12	Benzo(k)fluoranthene	207-08-9	0.15 U	6.2	23.4	267	-	-	-
USGS-008	2 to 4	5789-14	07/31/12	Carbazole	86-74-8	0.37 U	24.3	95.8	1040	-	-	-
USGS-008	2 to 4	5789-14	07/31/12	Chrysene	218-01-9	0.18	62	234	2700	2.90E-09	7.69E-10	6.67E-11
USGS-008	2 to 4	5789-14	07/31/12	Dibenz(a,h)anthracene	53-70-3	0.15 U	0.062	0.234	2.67	-	-	-
USGS-008	2 to 4	5789-14	07/31/12	Dibenzofuran	132-64-9	0.15 U	-	-	-	-	-	-
USGS-008	2 to 4	5789-14	07/31/12	Fluoranthene	206-44-0	0.32	-	-	-	-	-	-
USGS-008	2 to 4	5789-14	07/31/12	Fluorene	86-73-7	0.15 U	-	-	-	-	-	-
USGS-008	2 to 4	5789-14	07/31/12	Indeno(1,2,3-cd)pyrene	193-39-5	0.15 U	0.62	2.34	26.7	-	-	-
USGS-008	2 to 4	5789-14	07/31/12	Naphthalene	91-20-3	0.15 U	-	-	-	-	-	-
USGS-008	2 to 4	5789-14	07/31/12	Pyrene	129-00-0	0.26	-	-	-	-	-	-
Cumulative Cancer Risk					-	-	-	-	-	5.03E-07	1.33E-07	1.17E-08

**Notes:**

<sup>1</sup> Site-specific screening level calculated using the Iowa Department of Natural Resources Cumulative Risk Calculator

J The reported value is an estimate.

U The analyte was not detected.

**Appendix D  
Cumulative Cancer Risk Calculations**

Sample Information and Results							Site-Specific Screening Level <sup>1</sup> (Cancer Risk = 1E-06)			Cancer Risk		
							<u>Site Resident</u>	<u>Site Worker</u>	<u>Construction Worker</u>	<u>Site Resident</u>	<u>Site Worker</u>	<u>Construction Worker</u>
<u>Location</u>	<u>Depth</u>	<u>Sample</u>	<u>Date</u>	<u>Analyte</u>	<u>Cas Number</u>	<u>Result</u>						
USGS-009	0 to 2	5789-23	08/01/12	2-Chloronaphthalene	91-58-7	1.3 U	-	-	-	-	-	-
USGS-009	0 to 2	5789-23	08/01/12	2-Methylnaphthalene	91-57-6	1.6	-	-	-	-	-	-
USGS-009	0 to 2	5789-23	08/01/12	Acenaphthene	83-32-9	5.2	-	-	-	-	-	-
USGS-009	0 to 2	5789-23	08/01/12	Anthracene	120-12-7	11	-	-	-	-	-	-
USGS-009	0 to 2	5789-23	08/01/12	Benzo(a)anthracene	56-55-3	25	0.62	2.34	26.7	4.03E-05	1.07E-05	9.36E-07
USGS-009	0 to 2	5789-23	08/01/12	Benzo(a)pyrene	50-32-8	24	0.062	0.234	2.67	3.87E-04	1.03E-04	8.99E-06
USGS-009	0 to 2	5789-23	08/01/12	Benzo(b)fluoranthene	205-99-2	35	0.62	2.34	26.7	5.65E-05	1.50E-05	1.31E-06
USGS-009	0 to 2	5789-23	08/01/12	Benzo(k)fluoranthene	207-08-9	13	6.2	23.4	267	2.10E-06	5.56E-07	4.87E-08
USGS-009	0 to 2	5789-23	08/01/12	Carbazole	86-74-8	5.4	24.3	95.8	1040	2.22E-07	5.64E-08	5.19E-09
USGS-009	0 to 2	5789-23	08/01/12	Chrysene	218-01-9	27	62	234	2700	4.35E-07	1.15E-07	1.00E-08
USGS-009	0 to 2	5789-23	08/01/12	Dibenz(a,h)anthracene	53-70-3	2.5	0.062	0.234	2.67	4.03E-05	1.07E-05	9.36E-07
USGS-009	0 to 2	5789-23	08/01/12	Dibenzofuran	132-64-9	3.4	-	-	-	-	-	-
USGS-009	0 to 2	5789-23	08/01/12	Fluoranthene	206-44-0	28	-	-	-	-	-	-
USGS-009	0 to 2	5789-23	08/01/12	Fluorene	86-73-7	4.8	-	-	-	-	-	-
USGS-009	0 to 2	5789-23	08/01/12	Indeno(1,2,3-cd)pyrene	193-39-5	9.1	0.62	2.34	26.7	1.47E-05	3.89E-06	3.41E-07
USGS-009	0 to 2	5789-23	08/01/12	Naphthalene	91-20-3	2.1	-	-	-	-	-	-
USGS-009	0 to 2	5789-23	08/01/12	Pyrene	129-00-0	42	-	-	-	-	-	-
				Cumulative Cancer Risk	-	-	-	-	-	5.42E-04	1.44E-04	1.26E-05

**Notes:**

<sup>1</sup> Site-specific screening level calculated using the Iowa Department of Natural Resources Cumulative Risk Calculator

J The reported value is an estimate.

U The analyte was not detected.

**Appendix D  
Cumulative Cancer Risk Calculations**

<b>Sample Information and Results</b>							<b>Site-Specific Screening Level<sup>1</sup></b>			<b>Cancer Risk</b>		
							<b>(Cancer Risk = 1E-06)</b>			<b>Site</b>	<b>Site</b>	<b>Construction</b>
<b>Location</b>	<b>Depth</b>	<b>Sample</b>	<b>Date</b>	<b>Analyte</b>	<b>Cas Number</b>	<b>Result</b>	<b>Resident</b>	<b>Worker</b>	<b>Worker</b>	<b>Resident</b>	<b>Worker</b>	<b>Worker</b>
USGS-009	0 to 2	5789-23-FD	08/01/12	2-Chloronaphthalene	91-58-7	1.3 U	-	-	-	-	-	-
USGS-009	0 to 2	5789-23-FD	08/01/12	2-Methylnaphthalene	91-57-6	4.7	-	-	-	-	-	-
USGS-009	0 to 2	5789-23-FD	08/01/12	Acenaphthene	83-32-9	2.1	-	-	-	-	-	-
USGS-009	0 to 2	5789-23-FD	08/01/12	Anthracene	120-12-7	3.6	-	-	-	-	-	-
USGS-009	0 to 2	5789-23-FD	08/01/12	Benzo(a)anthracene	56-55-3	11	0.62	2.34	26.7	1.77E-05	4.70E-06	4.12E-07
USGS-009	0 to 2	5789-23-FD	08/01/12	Benzo(a)pyrene	50-32-8	12	0.062	0.234	2.67	1.94E-04	5.13E-05	4.49E-06
USGS-009	0 to 2	5789-23-FD	08/01/12	Benzo(b)fluoranthene	205-99-2	18	0.62	2.34	26.7	2.90E-05	7.69E-06	6.74E-07
USGS-009	0 to 2	5789-23-FD	08/01/12	Benzo(k)fluoranthene	207-08-9	6.8	6.2	23.4	267	1.10E-06	2.91E-07	2.55E-08
USGS-009	0 to 2	5789-23-FD	08/01/12	Carbazole	86-74-8	3.2 U	24.3	95.8	1040	-	-	-
USGS-009	0 to 2	5789-23-FD	08/01/12	Chrysene	218-01-9	13	62	234	2700	2.10E-07	5.56E-08	4.81E-09
USGS-009	0 to 2	5789-23-FD	08/01/12	Dibenz(a,h)anthracene	53-70-3	1.3 U	0.062	0.234	2.67	-	-	-
USGS-009	0 to 2	5789-23-FD	08/01/12	Dibenzofuran	132-64-9	1.9	-	-	-	-	-	-
USGS-009	0 to 2	5789-23-FD	08/01/12	Fluoranthene	206-44-0	22	-	-	-	-	-	-
USGS-009	0 to 2	5789-23-FD	08/01/12	Fluorene	86-73-7	1.3 U	-	-	-	-	-	-
USGS-009	0 to 2	5789-23-FD	08/01/12	Indeno(1,2,3-cd)pyrene	193-39-5	4.4	0.62	2.34	26.7	7.10E-06	1.88E-06	1.65E-07
USGS-009	0 to 2	5789-23-FD	08/01/12	Naphthalene	91-20-3	1.3 U	-	-	-	-	-	-
USGS-009	0 to 2	5789-23-FD	08/01/12	Pyrene	129-00-0	19	-	-	-	-	-	-
Cumulative Cancer Risk					-	-	-	-	-	2.49E-04	6.59E-05	5.78E-06

**Notes:**

<sup>1</sup> Site-specific screening level calculated using the Iowa Department of Natural Resources Cumulative Risk Calculator

J The reported value is an estimate.

U The analyte was not detected.

**Appendix D  
Cumulative Cancer Risk Calculations**

Sample Information and Results							Site-Specific Screening Level <sup>1</sup> (Cancer Risk = 1E-06)			Cancer Risk		
							<u>Site Resident</u>	<u>Site Worker</u>	<u>Construction Worker</u>	<u>Site Resident</u>	<u>Site Worker</u>	<u>Construction Worker</u>
<u>Location</u>	<u>Depth</u>	<u>Sample</u>	<u>Date</u>	<u>Analyte</u>	<u>Cas Number</u>	<u>Result</u>						
USGS-009	2 to 4	5789-24	08/01/12	2-Chloronaphthalene	91-58-7	0.26 U	-	-	-	-	-	-
USGS-009	2 to 4	5789-24	08/01/12	2-Methylnaphthalene	91-57-6	0.51	-	-	-	-	-	-
USGS-009	2 to 4	5789-24	08/01/12	Acenaphthene	83-32-9	2.1	-	-	-	-	-	-
USGS-009	2 to 4	5789-24	08/01/12	Anthracene	120-12-7	4.2	-	-	-	-	-	-
USGS-009	2 to 4	5789-24	08/01/12	Benzo(a)anthracene	56-55-3	6.8	0.62	2.34	26.7	1.10E-05	2.91E-06	2.55E-07
USGS-009	2 to 4	5789-24	08/01/12	Benzo(a)pyrene	50-32-8	6.9	0.062	0.234	2.67	1.11E-04	2.95E-05	2.58E-06
USGS-009	2 to 4	5789-24	08/01/12	Benzo(b)fluoranthene	205-99-2	8.8	0.62	2.34	26.7	1.42E-05	3.76E-06	3.30E-07
USGS-009	2 to 4	5789-24	08/01/12	Benzo(k)fluoranthene	207-08-9	3.3	6.2	23.4	267	5.32E-07	1.41E-07	1.24E-08
USGS-009	2 to 4	5789-24	08/01/12	Carbazole	86-74-8	1.3	24.3	95.8	1040	5.35E-08	1.36E-08	1.25E-09
USGS-009	2 to 4	5789-24	08/01/12	Chrysene	218-01-9	6.4	62	234	2700	1.03E-07	2.74E-08	2.37E-09
USGS-009	2 to 4	5789-24	08/01/12	Dibenz(a,h)anthracene	53-70-3	0.58	0.062	0.234	2.67	9.35E-06	2.48E-06	2.17E-07
USGS-009	2 to 4	5789-24	08/01/12	Dibenzofuran	132-64-9	1.1	-	-	-	-	-	-
USGS-009	2 to 4	5789-24	08/01/12	Fluoranthene	206-44-0	21	-	-	-	-	-	-
USGS-009	2 to 4	5789-24	08/01/12	Fluorene	86-73-7	2.1	-	-	-	-	-	-
USGS-009	2 to 4	5789-24	08/01/12	Indeno(1,2,3-cd)pyrene	193-39-5	2.2	0.62	2.34	26.7	3.55E-06	9.40E-07	8.24E-08
USGS-009	2 to 4	5789-24	08/01/12	Naphthalene	91-20-3	0.35	-	-	-	-	-	-
USGS-009	2 to 4	5789-24	08/01/12	Pyrene	129-00-0	17	-	-	-	-	-	-
				Cumulative Cancer Risk	-	-	-	-	-	1.50E-04	3.98E-05	3.48E-06

**Notes:**

<sup>1</sup> Site-specific screening level calculated using the Iowa Department of Natural Resources Cumulative Risk Calculator

J The reported value is an estimate.

U The analyte was not detected.

**Appendix D  
Cumulative Cancer Risk Calculations**

Sample Information and Results							Site-Specific Screening Level <sup>1</sup> (Cancer Risk = 1E-06)			Cancer Risk		
							<u>Site Resident</u>	<u>Site Worker</u>	<u>Construction Worker</u>	<u>Site Resident</u>	<u>Site Worker</u>	<u>Construction Worker</u>
<u>Location</u>	<u>Depth</u>	<u>Sample</u>	<u>Date</u>	<u>Analyte</u>	<u>Cas Number</u>	<u>Result</u>						
USGS-009	2 to 4	5789-24-FD	08/01/12	2-Chloronaphthalene	91-58-7	1.5 U	-	-	-	-	-	-
USGS-009	2 to 4	5789-24-FD	08/01/12	2-Methylnaphthalene	91-57-6	1.5 U	-	-	-	-	-	-
USGS-009	2 to 4	5789-24-FD	08/01/12	Acenaphthene	83-32-9	1.5 U	-	-	-	-	-	-
USGS-009	2 to 4	5789-24-FD	08/01/12	Anthracene	120-12-7	1.5 U	-	-	-	-	-	-
USGS-009	2 to 4	5789-24-FD	08/01/12	Benzo(a)anthracene	56-55-3	1.5 U	0.62	2.34	26.7	-	-	-
USGS-009	2 to 4	5789-24-FD	08/01/12	Benzo(a)pyrene	50-32-8	1.5	0.062	0.234	2.67	2.42E-05	6.41E-06	5.62E-07
USGS-009	2 to 4	5789-24-FD	08/01/12	Benzo(b)fluoranthene	205-99-2	1.6	0.62	2.34	26.7	2.58E-06	6.84E-07	5.99E-08
USGS-009	2 to 4	5789-24-FD	08/01/12	Benzo(k)fluoranthene	207-08-9	1.5 U	6.2	23.4	267	-	-	-
USGS-009	2 to 4	5789-24-FD	08/01/12	Carbazole	86-74-8	3.7 U	24.3	95.8	1040	-	-	-
USGS-009	2 to 4	5789-24-FD	08/01/12	Chrysene	218-01-9	1.5	62	234	2700	2.42E-08	6.41E-09	5.56E-10
USGS-009	2 to 4	5789-24-FD	08/01/12	Dibenz(a,h)anthracene	53-70-3	1.5 U	0.062	0.234	2.67	-	-	-
USGS-009	2 to 4	5789-24-FD	08/01/12	Dibenzofuran	132-64-9	1.5 U	-	-	-	-	-	-
USGS-009	2 to 4	5789-24-FD	08/01/12	Fluoranthene	206-44-0	2.2	-	-	-	-	-	-
USGS-009	2 to 4	5789-24-FD	08/01/12	Fluorene	86-73-7	1.5 U	-	-	-	-	-	-
USGS-009	2 to 4	5789-24-FD	08/01/12	Indeno(1,2,3-cd)pyrene	193-39-5	1.5 U	0.62	2.34	26.7	-	-	-
USGS-009	2 to 4	5789-24-FD	08/01/12	Naphthalene	91-20-3	1.5 U	-	-	-	-	-	-
USGS-009	2 to 4	5789-24-FD	08/01/12	Pyrene	129-00-0	2	-	-	-	-	-	-
Cumulative Cancer Risk					-	-	-	-	-	2.68E-05	7.10E-06	6.22E-07

**Notes:**

<sup>1</sup> Site-specific screening level calculated using the Iowa Department of Natural Resources Cumulative Risk Calculator

J The reported value is an estimate.

U The analyte was not detected.

**Appendix D  
Cumulative Cancer Risk Calculations**

<b>Sample Information and Results</b>							<b>Site-Specific Screening Level<sup>1</sup></b>			<b>Cancer Risk</b>		
							<b>(Cancer Risk = 1E-06)</b>			<b>Site Resident</b>	<b>Site Worker</b>	<b>Construction Worker</b>
<b>Location</b>	<b>Depth</b>	<b>Sample</b>	<b>Date</b>	<b>Analyte</b>	<b>Cas Number</b>	<b>Result</b>						
USGS-010	0 to 2	5789-3	07/31/12	2-Chloronaphthalene	91-58-7	0.26 U	-	-	-	-	-	-
USGS-010	0 to 2	5789-3	07/31/12	2-Methylnaphthalene	91-57-6	1.6	-	-	-	-	-	-
USGS-010	0 to 2	5789-3	07/31/12	Acenaphthene	83-32-9	2.8	-	-	-	-	-	-
USGS-010	0 to 2	5789-3	07/31/12	Anthracene	120-12-7	4.3	-	-	-	-	-	-
USGS-010	0 to 2	5789-3	07/31/12	Benzo(a)anthracene	56-55-3	13	0.62	2.34	26.7	2.10E-05	5.56E-06	4.87E-07
USGS-010	0 to 2	5789-3	07/31/12	Benzo(a)pyrene	50-32-8	13	0.062	0.234	2.67	2.10E-04	5.56E-05	4.87E-06
USGS-010	0 to 2	5789-3	07/31/12	Benzo(b)fluoranthene	205-99-2	17	0.62	2.34	26.7	2.74E-05	7.26E-06	6.37E-07
USGS-010	0 to 2	5789-3	07/31/12	Benzo(k)fluoranthene	207-08-9	6.3	6.2	23.4	267	1.02E-06	2.69E-07	2.36E-08
USGS-010	0 to 2	5789-3	07/31/12	Carbazole	86-74-8	2.4	24.3	95.8	1040	9.88E-08	2.51E-08	2.31E-09
USGS-010	0 to 2	5789-3	07/31/12	Chrysene	218-01-9	12 J	62	234	2700	1.94E-07	5.13E-08	4.44E-09
USGS-010	0 to 2	5789-3	07/31/12	Dibenz(a,h)anthracene	53-70-3	2.6 U	0.062	0.234	2.67	-	-	-
USGS-010	0 to 2	5789-3	07/31/12	Dibenzofuran	132-64-9	2.5	-	-	-	-	-	-
USGS-010	0 to 2	5789-3	07/31/12	Fluoranthene	206-44-0	30	-	-	-	-	-	-
USGS-010	0 to 2	5789-3	07/31/12	Fluorene	86-73-7	1.7	-	-	-	-	-	-
USGS-010	0 to 2	5789-3	07/31/12	Indeno(1,2,3-cd)pyrene	193-39-5	8.5	0.62	2.34	26.7	1.37E-05	3.63E-06	3.18E-07
USGS-010	0 to 2	5789-3	07/31/12	Naphthalene	91-20-3	1	-	-	-	-	-	-
USGS-010	0 to 2	5789-3	07/31/12	Pyrene	129-00-0	24	-	-	-	-	-	-
Cumulative Cancer Risk					-	-	-	-	-	2.73E-04	7.24E-05	6.34E-06

**Notes:**

<sup>1</sup> Site-specific screening level calculated using the Iowa Department of Natural Resources Cumulative Risk Calculator

J The reported value is an estimate.

U The analyte was not detected.

**Appendix D  
Cumulative Cancer Risk Calculations**

<b>Sample Information and Results</b>							<b>Site-Specific Screening Level<sup>1</sup></b>			<b>Cancer Risk</b>		
							<b>(Cancer Risk = 1E-06)</b>			<b>Site</b>	<b>Site</b>	<b>Construction</b>
<b>Location</b>	<b>Depth</b>	<b>Sample</b>	<b>Date</b>	<b>Analyte</b>	<b>Cas Number</b>	<b>Result</b>	<b>Resident</b>	<b>Worker</b>	<b>Worker</b>	<b>Resident</b>	<b>Worker</b>	<b>Worker</b>
USGS-010	2 to 4	5789-4	07/31/12	2-Chloronaphthalene	91-58-7	0.27 U	-	-	-	-	-	-
USGS-010	2 to 4	5789-4	07/31/12	2-Methylnaphthalene	91-57-6	1.7	-	-	-	-	-	-
USGS-010	2 to 4	5789-4	07/31/12	Acenaphthene	83-32-9	2.6	-	-	-	-	-	-
USGS-010	2 to 4	5789-4	07/31/12	Anthracene	120-12-7	4.2	-	-	-	-	-	-
USGS-010	2 to 4	5789-4	07/31/12	Benzo(a)anthracene	56-55-3	8.3	0.62	2.34	26.7	1.34E-05	3.55E-06	3.11E-07
USGS-010	2 to 4	5789-4	07/31/12	Benzo(a)pyrene	50-32-8	9.2	0.062	0.234	2.67	1.48E-04	3.93E-05	3.45E-06
USGS-010	2 to 4	5789-4	07/31/12	Benzo(b)fluoranthene	205-99-2	10	0.62	2.34	26.7	1.61E-05	4.27E-06	3.75E-07
USGS-010	2 to 4	5789-4	07/31/12	Benzo(k)fluoranthene	207-08-9	3.7	6.2	23.4	267	5.97E-07	1.58E-07	1.39E-08
USGS-010	2 to 4	5789-4	07/31/12	Carbazole	86-74-8	2.5	24.3	95.8	1040	1.03E-07	2.61E-08	2.40E-09
USGS-010	2 to 4	5789-4	07/31/12	Chrysene	218-01-9	9.9	62	234	2700	1.60E-07	4.23E-08	3.67E-09
USGS-010	2 to 4	5789-4	07/31/12	Dibenz(a,h)anthracene	53-70-3	2.7 U	0.062	0.234	2.67	-	-	-
USGS-010	2 to 4	5789-4	07/31/12	Dibenzofuran	132-64-9	1.9	-	-	-	-	-	-
USGS-010	2 to 4	5789-4	07/31/12	Fluoranthene	206-44-0	21	-	-	-	-	-	-
USGS-010	2 to 4	5789-4	07/31/12	Fluorene	86-73-7	2.2	-	-	-	-	-	-
USGS-010	2 to 4	5789-4	07/31/12	Indeno(1,2,3-cd)pyrene	193-39-5	4.7	0.62	2.34	26.7	7.58E-06	2.01E-06	1.76E-07
USGS-010	2 to 4	5789-4	07/31/12	Naphthalene	91-20-3	1.4	-	-	-	-	-	-
USGS-010	2 to 4	5789-4	07/31/12	Pyrene	129-00-0	18	-	-	-	-	-	-
Cumulative Cancer Risk					-	-	-	-	-	1.86E-04	4.94E-05	4.33E-06

**Notes:**

<sup>1</sup> Site-specific screening level calculated using the Iowa Department of Natural Resources Cumulative Risk Calculator

J The reported value is an estimate.

U The analyte was not detected.

**Appendix D  
Cumulative Cancer Risk Calculations**

Sample Information and Results							Site-Specific Screening Level <sup>1</sup> (Cancer Risk = 1E-06)			Cancer Risk		
							<u>Site Resident</u>	<u>Site Worker</u>	<u>Construction Worker</u>	<u>Site Resident</u>	<u>Site Worker</u>	<u>Construction Worker</u>
<u>Location</u>	<u>Depth</u>	<u>Sample</u>	<u>Date</u>	<u>Analyte</u>	<u>Cas Number</u>	<u>Result</u>						
USGS-011	0 to 2	5789-5	07/31/12	2-Chloronaphthalene	91-58-7	0.13 U	-	-	-	-	-	-
USGS-011	0 to 2	5789-5	07/31/12	2-Methylnaphthalene	91-57-6	0.19	-	-	-	-	-	-
USGS-011	0 to 2	5789-5	07/31/12	Acenaphthene	83-32-9	0.62	-	-	-	-	-	-
USGS-011	0 to 2	5789-5	07/31/12	Anthracene	120-12-7	1.5	-	-	-	-	-	-
USGS-011	0 to 2	5789-5	07/31/12	Benzo(a)anthracene	56-55-3	3.4	0.62	2.34	26.7	5.48E-06	1.45E-06	1.27E-07
USGS-011	0 to 2	5789-5	07/31/12	Benzo(a)pyrene	50-32-8	4	0.062	0.234	2.67	6.45E-05	1.71E-05	1.50E-06
USGS-011	0 to 2	5789-5	07/31/12	Benzo(b)fluoranthene	205-99-2	4.5	0.62	2.34	26.7	7.26E-06	1.92E-06	1.69E-07
USGS-011	0 to 2	5789-5	07/31/12	Benzo(k)fluoranthene	207-08-9	1.8	6.2	23.4	267	2.90E-07	7.69E-08	6.74E-09
USGS-011	0 to 2	5789-5	07/31/12	Carbazole	86-74-8	0.63	24.3	95.8	1040	2.59E-08	6.58E-09	6.06E-10
USGS-011	0 to 2	5789-5	07/31/12	Chrysene	218-01-9	3.4	62	234	2700	5.48E-08	1.45E-08	1.26E-09
USGS-011	0 to 2	5789-5	07/31/12	Dibenz(a,h)anthracene	53-70-3	1.3 U	0.062	0.234	2.67	-	-	-
USGS-011	0 to 2	5789-5	07/31/12	Dibenzofuran	132-64-9	0.55	-	-	-	-	-	-
USGS-011	0 to 2	5789-5	07/31/12	Fluoranthene	206-44-0	9.9	-	-	-	-	-	-
USGS-011	0 to 2	5789-5	07/31/12	Fluorene	86-73-7	0.5	-	-	-	-	-	-
USGS-011	0 to 2	5789-5	07/31/12	Indeno(1,2,3-cd)pyrene	193-39-5	2.3	0.62	2.34	26.7	3.71E-06	9.83E-07	8.61E-08
USGS-011	0 to 2	5789-5	07/31/12	Naphthalene	91-20-3	0.45	-	-	-	-	-	-
USGS-011	0 to 2	5789-5	07/31/12	Pyrene	129-00-0	6.6 J	-	-	-	-	-	-
				Cumulative Cancer Risk	-	-	-	-	-	8.13E-05	2.16E-05	1.89E-06

**Notes:**

<sup>1</sup> Site-specific screening level calculated using the Iowa Department of Natural Resources Cumulative Risk Calculator

J The reported value is an estimate.

U The analyte was not detected.

**Appendix D  
Cumulative Cancer Risk Calculations**

<b>Sample Information and Results</b>							<b>Site-Specific Screening Level<sup>1</sup></b>			<b>Cancer Risk</b>		
							<b>(Cancer Risk = 1E-06)</b>			<b>Site Resident</b>	<b>Site Worker</b>	<b>Construction Worker</b>
<b>Location</b>	<b>Depth</b>	<b>Sample</b>	<b>Date</b>	<b>Analyte</b>	<b>Cas Number</b>	<b>Result</b>						
USGS-011	2 to 4	5789-6	07/31/12	2-Chloronaphthalene	91-58-7	0.14 U	-	-	-	-	-	-
USGS-011	2 to 4	5789-6	07/31/12	2-Methylnaphthalene	91-57-6	0.14 U	-	-	-	-	-	-
USGS-011	2 to 4	5789-6	07/31/12	Acenaphthene	83-32-9	0.14 U	-	-	-	-	-	-
USGS-011	2 to 4	5789-6	07/31/12	Anthracene	120-12-7	0.14 U	-	-	-	-	-	-
USGS-011	2 to 4	5789-6	07/31/12	Benzo(a)anthracene	56-55-3	0.14 U	0.62	2.34	26.7	-	-	-
USGS-011	2 to 4	5789-6	07/31/12	Benzo(a)pyrene	50-32-8	1.4 U	0.062	0.234	2.67	-	-	-
USGS-011	2 to 4	5789-6	07/31/12	Benzo(b)fluoranthene	205-99-2	1.4 U	0.62	2.34	26.7	-	-	-
USGS-011	2 to 4	5789-6	07/31/12	Benzo(k)fluoranthene	207-08-9	1.4 U	6.2	23.4	267	-	-	-
USGS-011	2 to 4	5789-6	07/31/12	Carbazole	86-74-8	0.34 U	24.3	95.8	1040	-	-	-
USGS-011	2 to 4	5789-6	07/31/12	Chrysene	218-01-9	0.14 U	62	234	2700	-	-	-
USGS-011	2 to 4	5789-6	07/31/12	Dibenz(a,h)anthracene	53-70-3	1.4 U	0.062	0.234	2.67	-	-	-
USGS-011	2 to 4	5789-6	07/31/12	Dibenzofuran	132-64-9	0.14 U	-	-	-	-	-	-
USGS-011	2 to 4	5789-6	07/31/12	Fluoranthene	206-44-0	0.24	-	-	-	-	-	-
USGS-011	2 to 4	5789-6	07/31/12	Fluorene	86-73-7	0.14 U	-	-	-	-	-	-
USGS-011	2 to 4	5789-6	07/31/12	Indeno(1,2,3-cd)pyrene	193-39-5	1.4 U	0.62	2.34	26.7	-	-	-
USGS-011	2 to 4	5789-6	07/31/12	Naphthalene	91-20-3	0.14 U	-	-	-	-	-	-
USGS-011	2 to 4	5789-6	07/31/12	Pyrene	129-00-0	0.2	-	-	-	-	-	-
Cumulative Cancer Risk					-	-	-	-	-	0.00E+00	0.00E+00	0.00E+00

**Notes:**

<sup>1</sup> Site-specific screening level calculated using the Iowa Department of Natural Resources Cumulative Risk Calculator

J The reported value is an estimate.

U The analyte was not detected.

**Appendix D  
Cumulative Cancer Risk Calculations**

Sample Information and Results							Site-Specific Screening Level <sup>1</sup> (Cancer Risk = 1E-06)			Cancer Risk		
							Site Resident	Site Worker	Construction Worker	Site Resident	Site Worker	Construction Worker
Location	Depth	Sample	Date	Analyte	Cas Number	Result						
USGS-012	0 to 2	5789-7	07/31/12	2-Chloronaphthalene	91-58-7	0.13 U	-	-	-	-	-	-
USGS-012	0 to 2	5789-7	07/31/12	2-Methylnaphthalene	91-57-6	0.13 U	-	-	-	-	-	-
USGS-012	0 to 2	5789-7	07/31/12	Acenaphthene	83-32-9	0.13 U	-	-	-	-	-	-
USGS-012	0 to 2	5789-7	07/31/12	Anthracene	120-12-7	0.13 U	-	-	-	-	-	-
USGS-012	0 to 2	5789-7	07/31/12	Benzo(a)anthracene	56-55-3	0.33	0.62	2.34	26.7	5.32E-07	1.41E-07	1.24E-08
USGS-012	0 to 2	5789-7	07/31/12	Benzo(a)pyrene	50-32-8	0.34 J	0.062	0.234	2.67	5.48E-06	1.45E-06	1.27E-07
USGS-012	0 to 2	5789-7	07/31/12	Benzo(b)fluoranthene	205-99-2	0.46 J	0.62	2.34	26.7	7.42E-07	1.97E-07	1.72E-08
USGS-012	0 to 2	5789-7	07/31/12	Benzo(k)fluoranthene	207-08-9	0.17	6.2	23.4	267	2.74E-08	7.26E-09	6.37E-10
USGS-012	0 to 2	5789-7	07/31/12	Carbazole	86-74-8	0.32 U	24.3	95.8	1040	-	-	-
USGS-012	0 to 2	5789-7	07/31/12	Chrysene	218-01-9	0.41	62	234	2700	6.61E-09	1.75E-09	1.52E-10
USGS-012	0 to 2	5789-7	07/31/12	Dibenz(a,h)anthracene	53-70-3	0.13 U	0.062	0.234	2.67	-	-	-
USGS-012	0 to 2	5789-7	07/31/12	Dibenzofuran	132-64-9	0.13 U	-	-	-	-	-	-
USGS-012	0 to 2	5789-7	07/31/12	Fluoranthene	206-44-0	0.8 J	-	-	-	-	-	-
USGS-012	0 to 2	5789-7	07/31/12	Fluorene	86-73-7	0.13 U	-	-	-	-	-	-
USGS-012	0 to 2	5789-7	07/31/12	Indeno(1,2,3-cd)pyrene	193-39-5	0.17	0.62	2.34	26.7	2.74E-07	7.26E-08	6.37E-09
USGS-012	0 to 2	5789-7	07/31/12	Naphthalene	91-20-3	0.13 U	-	-	-	-	-	-
USGS-012	0 to 2	5789-7	07/31/12	Pyrene	129-00-0	0.6 J	-	-	-	-	-	-
Cumulative Cancer Risk					-	-	-	-	-	7.07E-06	1.87E-06	1.64E-07

**Notes:**

<sup>1</sup> Site-specific screening level calculated using the Iowa Department of Natural Resources Cumulative Risk Calculator

J The reported value is an estimate.

U The analyte was not detected.

**Appendix D  
Cumulative Cancer Risk Calculations**

Sample Information and Results							Site-Specific Screening Level <sup>1</sup> (Cancer Risk = 1E-06)			Cancer Risk		
							<u>Site Resident</u>	<u>Site Worker</u>	<u>Construction Worker</u>	<u>Site Resident</u>	<u>Site Worker</u>	<u>Construction Worker</u>
<u>Location</u>	<u>Depth</u>	<u>Sample</u>	<u>Date</u>	<u>Analyte</u>	<u>Cas Number</u>	<u>Result</u>						
USGS-012	0 to 2	5789-7-FD	07/31/12	2-Chloronaphthalene	91-58-7	0.13 U	-	-	-	-	-	-
USGS-012	0 to 2	5789-7-FD	07/31/12	2-Methylnaphthalene	91-57-6	0.13 U	-	-	-	-	-	-
USGS-012	0 to 2	5789-7-FD	07/31/12	Acenaphthene	83-32-9	0.13 U	-	-	-	-	-	-
USGS-012	0 to 2	5789-7-FD	07/31/12	Anthracene	120-12-7	0.7	-	-	-	-	-	-
USGS-012	0 to 2	5789-7-FD	07/31/12	Benzo(a)anthracene	56-55-3	1.1	0.62	2.34	26.7	1.77E-06	4.70E-07	4.12E-08
USGS-012	0 to 2	5789-7-FD	07/31/12	Benzo(a)pyrene	50-32-8	1.3 U	0.062	0.234	2.67	-	-	-
USGS-012	0 to 2	5789-7-FD	07/31/12	Benzo(b)fluoranthene	205-99-2	1.3 U	0.62	2.34	26.7	-	-	-
USGS-012	0 to 2	5789-7-FD	07/31/12	Benzo(k)fluoranthene	207-08-9	1.3 U	6.2	23.4	267	-	-	-
USGS-012	0 to 2	5789-7-FD	07/31/12	Carbazole	86-74-8	0.32 U	24.3	95.8	1040	-	-	-
USGS-012	0 to 2	5789-7-FD	07/31/12	Chrysene	218-01-9	1.1	62	234	2700	1.77E-08	4.70E-09	4.07E-10
USGS-012	0 to 2	5789-7-FD	07/31/12	Dibenz(a,h)anthracene	53-70-3	1.3 U	0.062	0.234	2.67	-	-	-
USGS-012	0 to 2	5789-7-FD	07/31/12	Dibenzofuran	132-64-9	0.17	-	-	-	-	-	-
USGS-012	0 to 2	5789-7-FD	07/31/12	Fluoranthene	206-44-0	3	-	-	-	-	-	-
USGS-012	0 to 2	5789-7-FD	07/31/12	Fluorene	86-73-7	0.22	-	-	-	-	-	-
USGS-012	0 to 2	5789-7-FD	07/31/12	Indeno(1,2,3-cd)pyrene	193-39-5	1.3 U	0.62	2.34	26.7	-	-	-
USGS-012	0 to 2	5789-7-FD	07/31/12	Naphthalene	91-20-3	0.13 U	-	-	-	-	-	-
USGS-012	0 to 2	5789-7-FD	07/31/12	Pyrene	129-00-0	2.5	-	-	-	-	-	-
Cumulative Cancer Risk					-	-	-	-	-	1.79E-06	4.75E-07	4.16E-08

**Notes:**

<sup>1</sup> Site-specific screening level calculated using the Iowa Department of Natural Resources Cumulative Risk Calculator

J The reported value is an estimate.

U The analyte was not detected.

**Appendix D  
Cumulative Cancer Risk Calculations**

<b>Sample Information and Results</b>							<b>Site-Specific Screening Level<sup>1</sup></b>			<b>Cancer Risk</b>		
							<b>(Cancer Risk = 1E-06)</b>			<b>Site</b>	<b>Site</b>	<b>Construction</b>
<b>Location</b>	<b>Depth</b>	<b>Sample</b>	<b>Date</b>	<b>Analyte</b>	<b>Cas Number</b>	<b>Result</b>	<b>Resident</b>	<b>Worker</b>	<b>Worker</b>	<b>Resident</b>	<b>Worker</b>	<b>Worker</b>
USGS-012	2 to 4	5789-8	07/31/12	2-Chloronaphthalene	91-58-7	0.12 U	-	-	-	-	-	-
USGS-012	2 to 4	5789-8	07/31/12	2-Methylnaphthalene	91-57-6	0.12 U	-	-	-	-	-	-
USGS-012	2 to 4	5789-8	07/31/12	Acenaphthene	83-32-9	0.12 U	-	-	-	-	-	-
USGS-012	2 to 4	5789-8	07/31/12	Anthracene	120-12-7	0.12 U	-	-	-	-	-	-
USGS-012	2 to 4	5789-8	07/31/12	Benzo(a)anthracene	56-55-3	0.12 U	0.62	2.34	26.7	-	-	-
USGS-012	2 to 4	5789-8	07/31/12	Benzo(a)pyrene	50-32-8	0.12 U	0.062	0.234	2.67	-	-	-
USGS-012	2 to 4	5789-8	07/31/12	Benzo(b)fluoranthene	205-99-2	0.12 U	0.62	2.34	26.7	-	-	-
USGS-012	2 to 4	5789-8	07/31/12	Benzo(k)fluoranthene	207-08-9	0.12 U	6.2	23.4	267	-	-	-
USGS-012	2 to 4	5789-8	07/31/12	Carbazole	86-74-8	0.31 U	24.3	95.8	1040	-	-	-
USGS-012	2 to 4	5789-8	07/31/12	Chrysene	218-01-9	0.12 U	62	234	2700	-	-	-
USGS-012	2 to 4	5789-8	07/31/12	Dibenz(a,h)anthracene	53-70-3	0.12 U	0.062	0.234	2.67	-	-	-
USGS-012	2 to 4	5789-8	07/31/12	Dibenzofuran	132-64-9	0.12 U	-	-	-	-	-	-
USGS-012	2 to 4	5789-8	07/31/12	Fluoranthene	206-44-0	0.12 U	-	-	-	-	-	-
USGS-012	2 to 4	5789-8	07/31/12	Fluorene	86-73-7	0.12 U	-	-	-	-	-	-
USGS-012	2 to 4	5789-8	07/31/12	Indeno(1,2,3-cd)pyrene	193-39-5	0.12 U	0.62	2.34	26.7	-	-	-
USGS-012	2 to 4	5789-8	07/31/12	Naphthalene	91-20-3	0.12 U	-	-	-	-	-	-
USGS-012	2 to 4	5789-8	07/31/12	Pyrene	129-00-0	0.12 U	-	-	-	-	-	-
Cumulative Cancer Risk					-	-	-	-	-	0.00E+00	0.00E+00	0.00E+00

**Notes:**

<sup>1</sup> Site-specific screening level calculated using the Iowa Department of Natural Resources Cumulative Risk Calculator

J The reported value is an estimate.

U The analyte was not detected.

**Appendix D  
Cumulative Cancer Risk Calculations**

Sample Information and Results							Site-Specific Screening Level <sup>1</sup> (Cancer Risk = 1E-06)			Cancer Risk		
							<u>Site Resident</u>	<u>Site Worker</u>	<u>Construction Worker</u>	<u>Site Resident</u>	<u>Site Worker</u>	<u>Construction Worker</u>
<u>Location</u>	<u>Depth</u>	<u>Sample</u>	<u>Date</u>	<u>Analyte</u>	<u>Cas Number</u>	<u>Result</u>						
USGS-012	2 to 4	5789-8-FD	07/31/12	2-Chloronaphthalene	91-58-7	0.13 U	-	-	-	-	-	-
USGS-012	2 to 4	5789-8-FD	07/31/12	2-Methylnaphthalene	91-57-6	0.13 U	-	-	-	-	-	-
USGS-012	2 to 4	5789-8-FD	07/31/12	Acenaphthene	83-32-9	0.13 U	-	-	-	-	-	-
USGS-012	2 to 4	5789-8-FD	07/31/12	Anthracene	120-12-7	0.13 U	-	-	-	-	-	-
USGS-012	2 to 4	5789-8-FD	07/31/12	Benzo(a)anthracene	56-55-3	0.13 U	0.62	2.34	26.7	-	-	-
USGS-012	2 to 4	5789-8-FD	07/31/12	Benzo(a)pyrene	50-32-8	0.13 U	0.062	0.234	2.67	-	-	-
USGS-012	2 to 4	5789-8-FD	07/31/12	Benzo(b)fluoranthene	205-99-2	0.13 U	0.62	2.34	26.7	-	-	-
USGS-012	2 to 4	5789-8-FD	07/31/12	Benzo(k)fluoranthene	207-08-9	0.13 U	6.2	23.4	267	-	-	-
USGS-012	2 to 4	5789-8-FD	07/31/12	Carbazole	86-74-8	0.32 U	24.3	95.8	1040	-	-	-
USGS-012	2 to 4	5789-8-FD	07/31/12	Chrysene	218-01-9	0.13 U	62	234	2700	-	-	-
USGS-012	2 to 4	5789-8-FD	07/31/12	Dibenz(a,h)anthracene	53-70-3	0.13 U	0.062	0.234	2.67	-	-	-
USGS-012	2 to 4	5789-8-FD	07/31/12	Dibenzofuran	132-64-9	0.13 U	-	-	-	-	-	-
USGS-012	2 to 4	5789-8-FD	07/31/12	Fluoranthene	206-44-0	0.13 U	-	-	-	-	-	-
USGS-012	2 to 4	5789-8-FD	07/31/12	Fluorene	86-73-7	0.13 U	-	-	-	-	-	-
USGS-012	2 to 4	5789-8-FD	07/31/12	Indeno(1,2,3-cd)pyrene	193-39-5	0.13 U	0.62	2.34	26.7	-	-	-
USGS-012	2 to 4	5789-8-FD	07/31/12	Naphthalene	91-20-3	0.13 U	-	-	-	-	-	-
USGS-012	2 to 4	5789-8-FD	07/31/12	Pyrene	129-00-0	0.13 U	-	-	-	-	-	-
Cumulative Cancer Risk					-	-	-	-	-	0.00E+00	0.00E+00	0.00E+00

**Notes:**

<sup>1</sup> Site-specific screening level calculated using the Iowa Department of Natural Resources Cumulative Risk Calculator

J The reported value is an estimate.

U The analyte was not detected.

**Appendix D  
Cumulative Cancer Risk Calculations**

Sample Information and Results							Site-Specific Screening Level <sup>1</sup> (Cancer Risk = 1E-06)			Cancer Risk		
							<u>Site Resident</u>	<u>Site Worker</u>	<u>Construction Worker</u>	<u>Site Resident</u>	<u>Site Worker</u>	<u>Construction Worker</u>
<u>Location</u>	<u>Depth</u>	<u>Sample</u>	<u>Date</u>	<u>Analyte</u>	<u>Cas Number</u>	<u>Result</u>						
USGS-013	0 to 2	5789-29	08/01/12	2-Chloronaphthalene	91-58-7	0.29 U	-	-	-	-	-	-
USGS-013	0 to 2	5789-29	08/01/12	2-Methylnaphthalene	91-57-6	0.35	-	-	-	-	-	-
USGS-013	0 to 2	5789-29	08/01/12	Acenaphthene	83-32-9	0.29 U	-	-	-	-	-	-
USGS-013	0 to 2	5789-29	08/01/12	Anthracene	120-12-7	0.53	-	-	-	-	-	-
USGS-013	0 to 2	5789-29	08/01/12	Benzo(a)anthracene	56-55-3	2	0.62	2.34	26.7	3.23E-06	8.55E-07	7.49E-08
USGS-013	0 to 2	5789-29	08/01/12	Benzo(a)pyrene	50-32-8	2.3	0.062	0.234	2.67	3.71E-05	9.83E-06	8.61E-07
USGS-013	0 to 2	5789-29	08/01/12	Benzo(b)fluoranthene	205-99-2	2.4	0.62	2.34	26.7	3.87E-06	1.03E-06	8.99E-08
USGS-013	0 to 2	5789-29	08/01/12	Benzo(k)fluoranthene	207-08-9	0.84	6.2	23.4	267	1.35E-07	3.59E-08	3.15E-09
USGS-013	0 to 2	5789-29	08/01/12	Carbazole	86-74-8	0.72 U	24.3	95.8	1040	-	-	-
USGS-013	0 to 2	5789-29	08/01/12	Chrysene	218-01-9	2.7	62	234	2700	4.35E-08	1.15E-08	1.00E-09
USGS-013	0 to 2	5789-29	08/01/12	Dibenz(a,h)anthracene	53-70-3	0.36	0.062	0.234	2.67	5.81E-06	1.54E-06	1.35E-07
USGS-013	0 to 2	5789-29	08/01/12	Dibenzofuran	132-64-9	0.29 U	-	-	-	-	-	-
USGS-013	0 to 2	5789-29	08/01/12	Fluoranthene	206-44-0	2.9	-	-	-	-	-	-
USGS-013	0 to 2	5789-29	08/01/12	Fluorene	86-73-7	0.29 U	-	-	-	-	-	-
USGS-013	0 to 2	5789-29	08/01/12	Indeno(1,2,3-cd)pyrene	193-39-5	0.71	0.62	2.34	26.7	1.15E-06	3.03E-07	2.66E-08
USGS-013	0 to 2	5789-29	08/01/12	Naphthalene	91-20-3	0.51	-	-	-	-	-	-
USGS-013	0 to 2	5789-29	08/01/12	Pyrene	129-00-0	3	-	-	-	-	-	-
				Cumulative Cancer Risk	-	-	-	-	-	5.13E-05	1.36E-05	1.19E-06

**Notes:**

<sup>1</sup> Site-specific screening level calculated using the Iowa Department of Natural Resources Cumulative Risk Calculator

J The reported value is an estimate.

U The analyte was not detected.

**Appendix D  
Cumulative Cancer Risk Calculations**

<b>Sample Information and Results</b>							<b>Site-Specific Screening Level<sup>1</sup></b>			<b>Cancer Risk</b>		
							<b>(Cancer Risk = 1E-06)</b>			<b>Site Resident</b>	<b>Site Worker</b>	<b>Construction Worker</b>
<b>Location</b>	<b>Depth</b>	<b>Sample</b>	<b>Date</b>	<b>Analyte</b>	<b>Cas Number</b>	<b>Result</b>						
USGS-013	2 to 4	5789-30	08/01/12	2-Chloronaphthalene	91-58-7	0.15 U	-	-	-	-	-	-
USGS-013	2 to 4	5789-30	08/01/12	2-Methylnaphthalene	91-57-6	0.15 U	-	-	-	-	-	-
USGS-013	2 to 4	5789-30	08/01/12	Acenaphthene	83-32-9	0.15 U	-	-	-	-	-	-
USGS-013	2 to 4	5789-30	08/01/12	Anthracene	120-12-7	0.15 U	-	-	-	-	-	-
USGS-013	2 to 4	5789-30	08/01/12	Benzo(a)anthracene	56-55-3	0.15 U	0.62	2.34	26.7	-	-	-
USGS-013	2 to 4	5789-30	08/01/12	Benzo(a)pyrene	50-32-8	0.15 U	0.062	0.234	2.67	-	-	-
USGS-013	2 to 4	5789-30	08/01/12	Benzo(b)fluoranthene	205-99-2	0.15 U	0.62	2.34	26.7	-	-	-
USGS-013	2 to 4	5789-30	08/01/12	Benzo(k)fluoranthene	207-08-9	0.15 U	6.2	23.4	267	-	-	-
USGS-013	2 to 4	5789-30	08/01/12	Carbazole	86-74-8	0.37 U	24.3	95.8	1040	-	-	-
USGS-013	2 to 4	5789-30	08/01/12	Chrysene	218-01-9	0.15 U	62	234	2700	-	-	-
USGS-013	2 to 4	5789-30	08/01/12	Dibenz(a,h)anthracene	53-70-3	0.15 U	0.062	0.234	2.67	-	-	-
USGS-013	2 to 4	5789-30	08/01/12	Dibenzofuran	132-64-9	0.15 U	-	-	-	-	-	-
USGS-013	2 to 4	5789-30	08/01/12	Fluoranthene	206-44-0	0.15 U	-	-	-	-	-	-
USGS-013	2 to 4	5789-30	08/01/12	Fluorene	86-73-7	0.15 U	-	-	-	-	-	-
USGS-013	2 to 4	5789-30	08/01/12	Indeno(1,2,3-cd)pyrene	193-39-5	0.15 U	0.62	2.34	26.7	-	-	-
USGS-013	2 to 4	5789-30	08/01/12	Naphthalene	91-20-3	0.15 U	-	-	-	-	-	-
USGS-013	2 to 4	5789-30	08/01/12	Pyrene	129-00-0	0.15 U	-	-	-	-	-	-
Cumulative Cancer Risk					-	-	-	-	-	0.00E+00	0.00E+00	0.00E+00

**Notes:**

<sup>1</sup> Site-specific screening level calculated using the Iowa Department of Natural Resources Cumulative Risk Calculator

J The reported value is an estimate.

U The analyte was not detected.

**Appendix D  
Cumulative Cancer Risk Calculations**

<b>Sample Information and Results</b>							<b>Site-Specific Screening Level<sup>1</sup></b>			<b>Cancer Risk</b>		
							<b>(Cancer Risk = 1E-06)</b>			<b>Site</b>	<b>Site</b>	<b>Construction</b>
<b>Location</b>	<b>Depth</b>	<b>Sample</b>	<b>Date</b>	<b>Analyte</b>	<b>Cas Number</b>	<b>Result</b>	<b>Resident</b>	<b>Worker</b>	<b>Worker</b>	<b>Resident</b>	<b>Worker</b>	<b>Worker</b>
USGS-014	0 to 2	5789-27	08/01/12	2-Chloronaphthalene	91-58-7	1.3 U	-	-	-	-	-	-
USGS-014	0 to 2	5789-27	08/01/12	2-Methylnaphthalene	91-57-6	3.8	-	-	-	-	-	-
USGS-014	0 to 2	5789-27	08/01/12	Acenaphthene	83-32-9	4.3	-	-	-	-	-	-
USGS-014	0 to 2	5789-27	08/01/12	Anthracene	120-12-7	12	-	-	-	-	-	-
USGS-014	0 to 2	5789-27	08/01/12	Benzo(a)anthracene	56-55-3	28	0.62	2.34	26.7	4.52E-05	1.20E-05	1.05E-06
USGS-014	0 to 2	5789-27	08/01/12	Benzo(a)pyrene	50-32-8	28	0.062	0.234	2.67	4.52E-04	1.20E-04	1.05E-05
USGS-014	0 to 2	5789-27	08/01/12	Benzo(b)fluoranthene	205-99-2	37	0.62	2.34	26.7	5.97E-05	1.58E-05	1.39E-06
USGS-014	0 to 2	5789-27	08/01/12	Benzo(k)fluoranthene	207-08-9	14	6.2	23.4	267	2.26E-06	5.98E-07	5.24E-08
USGS-014	0 to 2	5789-27	08/01/12	Carbazole	86-74-8	4.8	24.3	95.8	1040	1.98E-07	5.01E-08	4.62E-09
USGS-014	0 to 2	5789-27	08/01/12	Chrysene	218-01-9	30	62	234	2700	4.84E-07	1.28E-07	1.11E-08
USGS-014	0 to 2	5789-27	08/01/12	Dibenz(a,h)anthracene	53-70-3	2.9	0.062	0.234	2.67	4.68E-05	1.24E-05	1.09E-06
USGS-014	0 to 2	5789-27	08/01/12	Dibenzofuran	132-64-9	4.6	-	-	-	-	-	-
USGS-014	0 to 2	5789-27	08/01/12	Fluoranthene	206-44-0	47	-	-	-	-	-	-
USGS-014	0 to 2	5789-27	08/01/12	Fluorene	86-73-7	4.2	-	-	-	-	-	-
USGS-014	0 to 2	5789-27	08/01/12	Indeno(1,2,3-cd)pyrene	193-39-5	7.7	0.62	2.34	26.7	1.24E-05	3.29E-06	2.88E-07
USGS-014	0 to 2	5789-27	08/01/12	Naphthalene	91-20-3	4.9	-	-	-	-	-	-
USGS-014	0 to 2	5789-27	08/01/12	Pyrene	129-00-0	44	-	-	-	-	-	-
Cumulative Cancer Risk					-	-	-	-	-	6.19E-04	1.64E-04	1.44E-05

**Notes:**

<sup>1</sup> Site-specific screening level calculated using the Iowa Department of Natural Resources Cumulative Risk Calculator

J The reported value is an estimate.

U The analyte was not detected.

**Appendix D  
Cumulative Cancer Risk Calculations**

<b>Sample Information and Results</b>							<b>Site-Specific Screening Level<sup>1</sup></b>			<b>Cancer Risk</b>		
							<b>(Cancer Risk = 1E-06)</b>			<b>Site</b>	<b>Site</b>	<b>Construction</b>
<b>Location</b>	<b>Depth</b>	<b>Sample</b>	<b>Date</b>	<b>Analyte</b>	<b>Cas Number</b>	<b>Result</b>	<b>Resident</b>	<b>Worker</b>	<b>Worker</b>	<b>Resident</b>	<b>Worker</b>	<b>Worker</b>
USGS-014	2 to 4	5789-28	08/01/12	2-Chloronaphthalene	91-58-7	1.4 U	-	-	-	-	-	-
USGS-014	2 to 4	5789-28	08/01/12	2-Methylnaphthalene	91-57-6	2.8	-	-	-	-	-	-
USGS-014	2 to 4	5789-28	08/01/12	Acenaphthene	83-32-9	1.4 U	-	-	-	-	-	-
USGS-014	2 to 4	5789-28	08/01/12	Anthracene	120-12-7	2.6	-	-	-	-	-	-
USGS-014	2 to 4	5789-28	08/01/12	Benzo(a)anthracene	56-55-3	12	0.62	2.34	26.7	1.94E-05	5.13E-06	4.49E-07
USGS-014	2 to 4	5789-28	08/01/12	Benzo(a)pyrene	50-32-8	19	0.062	0.234	2.67	3.06E-04	8.12E-05	7.12E-06
USGS-014	2 to 4	5789-28	08/01/12	Benzo(b)fluoranthene	205-99-2	16	0.62	2.34	26.7	2.58E-05	6.84E-06	5.99E-07
USGS-014	2 to 4	5789-28	08/01/12	Benzo(k)fluoranthene	207-08-9	3.8	6.2	23.4	267	6.13E-07	1.62E-07	1.42E-08
USGS-014	2 to 4	5789-28	08/01/12	Carbazole	86-74-8	3.5 U	24.3	95.8	1040	-	-	-
USGS-014	2 to 4	5789-28	08/01/12	Chrysene	218-01-9	22	62	234	2700	3.55E-07	9.40E-08	8.15E-09
USGS-014	2 to 4	5789-28	08/01/12	Dibenz(a,h)anthracene	53-70-3	5	0.062	0.234	2.67	8.06E-05	2.14E-05	1.87E-06
USGS-014	2 to 4	5789-28	08/01/12	Dibenzofuran	132-64-9	1.9	-	-	-	-	-	-
USGS-014	2 to 4	5789-28	08/01/12	Fluoranthene	206-44-0	7.3	-	-	-	-	-	-
USGS-014	2 to 4	5789-28	08/01/12	Fluorene	86-73-7	1.4 U	-	-	-	-	-	-
USGS-014	2 to 4	5789-28	08/01/12	Indeno(1,2,3-cd)pyrene	193-39-5	4.2	0.62	2.34	26.7	6.77E-06	1.79E-06	1.57E-07
USGS-014	2 to 4	5789-28	08/01/12	Naphthalene	91-20-3	4.1	-	-	-	-	-	-
USGS-014	2 to 4	5789-28	08/01/12	Pyrene	129-00-0	12	-	-	-	-	-	-
Cumulative Cancer Risk					-	-	-	-	-	4.40E-04	1.17E-04	1.02E-05

**Notes:**

<sup>1</sup> Site-specific screening level calculated using the Iowa Department of Natural Resources Cumulative Risk Calculator

J The reported value is an estimate.

U The analyte was not detected.

**Appendix D  
Cumulative Cancer Risk Calculations**

<b>Sample Information and Results</b>							<b>Site-Specific Screening Level<sup>1</sup></b>			<b>Cancer Risk</b>		
							<b>(Cancer Risk = 1E-06)</b>			<b>Site</b>	<b>Site</b>	<b>Construction</b>
<b>Location</b>	<b>Depth</b>	<b>Sample</b>	<b>Date</b>	<b>Analyte</b>	<b>Cas Number</b>	<b>Result</b>	<b>Resident</b>	<b>Worker</b>	<b>Worker</b>	<b>Resident</b>	<b>Worker</b>	<b>Worker</b>
USGS-016	0 to 1	5789-31	09/24/12	2-Chloronaphthalene	91-58-7	0.28 UJ	-	-	-	-	-	-
USGS-016	0 to 1	5789-31	09/24/12	2-Methylnaphthalene	91-57-6	0.28 UJ	-	-	-	-	-	-
USGS-016	0 to 1	5789-31	09/24/12	Acenaphthene	83-32-9	0.28 U	-	-	-	-	-	-
USGS-016	0 to 1	5789-31	09/24/12	Anthracene	120-12-7	0.28 UJ	-	-	-	-	-	-
USGS-016	0 to 1	5789-31	09/24/12	Benzo(a)anthracene	56-55-3	0.54 J	0.62	2.34	26.7	8.71E-07	2.31E-07	2.02E-08
USGS-016	0 to 1	5789-31	09/24/12	Benzo(a)pyrene	50-32-8	0.53	0.062	0.234	2.67	8.55E-06	2.26E-06	1.99E-07
USGS-016	0 to 1	5789-31	09/24/12	Benzo(b)fluoranthene	205-99-2	0.43	0.62	2.34	26.7	6.94E-07	1.84E-07	1.61E-08
USGS-016	0 to 1	5789-31	09/24/12	Benzo(k)fluoranthene	207-08-9	0.32	6.2	23.4	267	5.16E-08	1.37E-08	1.20E-09
USGS-016	0 to 1	5789-31	09/24/12	Carbazole	86-74-8	0.69 U	24.3	95.8	1040	-	-	-
USGS-016	0 to 1	5789-31	09/24/12	Chrysene	218-01-9	0.73	62	234	2700	1.18E-08	3.12E-09	2.70E-10
USGS-016	0 to 1	5789-31	09/24/12	Dibenz(a,h)anthracene	53-70-3	0.69 UJ	0.062	0.234	2.67	-	-	-
USGS-016	0 to 1	5789-31	09/24/12	Dibenzofuran	132-64-9	0.28 UJ	-	-	-	-	-	-
USGS-016	0 to 1	5789-31	09/24/12	Fluoranthene	206-44-0	0.71 J	-	-	-	-	-	-
USGS-016	0 to 1	5789-31	09/24/12	Fluorene	86-73-7	0.28 U	-	-	-	-	-	-
USGS-016	0 to 1	5789-31	09/24/12	Indeno(1,2,3-cd)pyrene	193-39-5	0.79	0.62	2.34	26.7	1.27E-06	3.38E-07	2.96E-08
USGS-016	0 to 1	5789-31	09/24/12	Naphthalene	91-20-3	0.28 UJ	-	-	-	-	-	-
USGS-016	0 to 1	5789-31	09/24/12	Pyrene	129-00-0	0.92 J	-	-	-	-	-	-
Cumulative Cancer Risk					-	-	-	-	-	1.15E-05	3.03E-06	2.66E-07

**Notes:**

<sup>1</sup> Site-specific screening level calculated using the Iowa Department of Natural Resources Cumulative Risk Calculator

J The reported value is an estimate.

U The analyte was not detected.

**Appendix D  
Cumulative Cancer Risk Calculations**

<b>Sample Information and Results</b>							<b>Site-Specific Screening Level<sup>1</sup></b>			<b>Cancer Risk</b>		
							<b>(Cancer Risk = 1E-06)</b>			<b>Site Resident</b>	<b>Site Worker</b>	<b>Construction Worker</b>
<b>Location</b>	<b>Depth</b>	<b>Sample</b>	<b>Date</b>	<b>Analyte</b>	<b>Cas Number</b>	<b>Result</b>						
USGS-016	0 to 1	5789-31-FD	09/24/12	2-Chloronaphthalene	91-58-7	0.26 U	-	-	-	-	-	-
USGS-016	0 to 1	5789-31-FD	09/24/12	2-Methylnaphthalene	91-57-6	0.26 U	-	-	-	-	-	-
USGS-016	0 to 1	5789-31-FD	09/24/12	Acenaphthene	83-32-9	0.26 U	-	-	-	-	-	-
USGS-016	0 to 1	5789-31-FD	09/24/12	Anthracene	120-12-7	0.26 U	-	-	-	-	-	-
USGS-016	0 to 1	5789-31-FD	09/24/12	Benzo(a)anthracene	56-55-3	0.37	0.62	2.34	26.7	5.97E-07	1.58E-07	1.39E-08
USGS-016	0 to 1	5789-31-FD	09/24/12	Benzo(a)pyrene	50-32-8	0.39	0.062	0.234	2.67	6.29E-06	1.67E-06	1.46E-07
USGS-016	0 to 1	5789-31-FD	09/24/12	Benzo(b)fluoranthene	205-99-2	0.3	0.62	2.34	26.7	4.84E-07	1.28E-07	1.12E-08
USGS-016	0 to 1	5789-31-FD	09/24/12	Benzo(k)fluoranthene	207-08-9	0.26 U	6.2	23.4	267	-	-	-
USGS-016	0 to 1	5789-31-FD	09/24/12	Carbazole	86-74-8	0.66 U	24.3	95.8	1040	-	-	-
USGS-016	0 to 1	5789-31-FD	09/24/12	Chrysene	218-01-9	0.56	62	234	2700	9.03E-09	2.39E-09	2.07E-10
USGS-016	0 to 1	5789-31-FD	09/24/12	Dibenz(a,h)anthracene	53-70-3	0.66 U	0.062	0.234	2.67	-	-	-
USGS-016	0 to 1	5789-31-FD	09/24/12	Dibenzofuran	132-64-9	0.26 U	-	-	-	-	-	-
USGS-016	0 to 1	5789-31-FD	09/24/12	Fluoranthene	206-44-0	0.39	-	-	-	-	-	-
USGS-016	0 to 1	5789-31-FD	09/24/12	Fluorene	86-73-7	0.26 U	-	-	-	-	-	-
USGS-016	0 to 1	5789-31-FD	09/24/12	Indeno(1,2,3-cd)pyrene	193-39-5	0.7	0.62	2.34	26.7	1.13E-06	2.99E-07	2.62E-08
USGS-016	0 to 1	5789-31-FD	09/24/12	Naphthalene	91-20-3	0.26 U	-	-	-	-	-	-
USGS-016	0 to 1	5789-31-FD	09/24/12	Pyrene	129-00-0	0.61	-	-	-	-	-	-
Cumulative Cancer Risk					-	-	-	-	-	8.51E-06	2.25E-06	1.98E-07

**Notes:**

<sup>1</sup> Site-specific screening level calculated using the Iowa Department of Natural Resources Cumulative Risk Calculator

J The reported value is an estimate.

U The analyte was not detected.

**Appendix D  
Cumulative Cancer Risk Calculations**

<b>Sample Information and Results</b>							<b>Site-Specific Screening Level<sup>1</sup></b>			<b>Cancer Risk</b>		
							<b>(Cancer Risk = 1E-06)</b>			<b>Site Resident</b>	<b>Site Worker</b>	<b>Construction Worker</b>
<b>Location</b>	<b>Depth</b>	<b>Sample</b>	<b>Date</b>	<b>Analyte</b>	<b>Cas Number</b>	<b>Result</b>						
USGS-017	0 to 1	5789-34	09/25/12	2-Chloronaphthalene	91-58-7	0.26 U	-	-	-	-	-	-
USGS-017	0 to 1	5789-34	09/25/12	2-Methylnaphthalene	91-57-6	0.26 U	-	-	-	-	-	-
USGS-017	0 to 1	5789-34	09/25/12	Acenaphthene	83-32-9	0.26 U	-	-	-	-	-	-
USGS-017	0 to 1	5789-34	09/25/12	Anthracene	120-12-7	0.26 U	-	-	-	-	-	-
USGS-017	0 to 1	5789-34	09/25/12	Benzo(a)anthracene	56-55-3	0.26 U	0.62	2.34	26.7	-	-	-
USGS-017	0 to 1	5789-34	09/25/12	Benzo(a)pyrene	50-32-8	0.26 U	0.062	0.234	2.67	-	-	-
USGS-017	0 to 1	5789-34	09/25/12	Benzo(b)fluoranthene	205-99-2	0.26 U	0.62	2.34	26.7	-	-	-
USGS-017	0 to 1	5789-34	09/25/12	Benzo(k)fluoranthene	207-08-9	0.26 U	6.2	23.4	267	-	-	-
USGS-017	0 to 1	5789-34	09/25/12	Carbazole	86-74-8	0.65 U	24.3	95.8	1040	-	-	-
USGS-017	0 to 1	5789-34	09/25/12	Chrysene	218-01-9	0.26 U	62	234	2700	-	-	-
USGS-017	0 to 1	5789-34	09/25/12	Dibenz(a,h)anthracene	53-70-3	0.65 U	0.062	0.234	2.67	-	-	-
USGS-017	0 to 1	5789-34	09/25/12	Dibenzofuran	132-64-9	0.26 U	-	-	-	-	-	-
USGS-017	0 to 1	5789-34	09/25/12	Fluoranthene	206-44-0	0.26 U	-	-	-	-	-	-
USGS-017	0 to 1	5789-34	09/25/12	Fluorene	86-73-7	0.26 U	-	-	-	-	-	-
USGS-017	0 to 1	5789-34	09/25/12	Indeno(1,2,3-cd)pyrene	193-39-5	0.65 U	0.62	2.34	26.7	-	-	-
USGS-017	0 to 1	5789-34	09/25/12	Naphthalene	91-20-3	0.26 U	-	-	-	-	-	-
USGS-017	0 to 1	5789-34	09/25/12	Pyrene	129-00-0	0.26 U	-	-	-	-	-	-
Cumulative Cancer Risk					-	-	-	-	-	0.00E+00	0.00E+00	0.00E+00

**Notes:**

<sup>1</sup> Site-specific screening level calculated using the Iowa Department of Natural Resources Cumulative Risk Calculator

J The reported value is an estimate.

U The analyte was not detected.

**Appendix D  
Cumulative Cancer Risk Calculations**

<b>Sample Information and Results</b>							<b>Site-Specific Screening Level<sup>1</sup></b>			<b>Cancer Risk</b>		
							<b>(Cancer Risk = 1E-06)</b>			<b>Site Resident</b>	<b>Site Worker</b>	<b>Construction Worker</b>
<u>Location</u>	<u>Depth</u>	<u>Sample</u>	<u>Date</u>	<u>Analyte</u>	<u>Cas Number</u>	<u>Result</u>						
USGS-018	0 to 1	5789-33	09/25/12	2-Chloronaphthalene	91-58-7	0.32 U	-	-	-	-	-	-
USGS-018	0 to 1	5789-33	09/25/12	2-Methylnaphthalene	91-57-6	0.32 U	-	-	-	-	-	-
USGS-018	0 to 1	5789-33	09/25/12	Acenaphthene	83-32-9	0.32 U	-	-	-	-	-	-
USGS-018	0 to 1	5789-33	09/25/12	Anthracene	120-12-7	0.32 U	-	-	-	-	-	-
USGS-018	0 to 1	5789-33	09/25/12	Benzo(a)anthracene	56-55-3	0.32 U	0.62	2.34	26.7	-	-	-
USGS-018	0 to 1	5789-33	09/25/12	Benzo(a)pyrene	50-32-8	0.32 U	0.062	0.234	2.67	-	-	-
USGS-018	0 to 1	5789-33	09/25/12	Benzo(b)fluoranthene	205-99-2	0.32 U	0.62	2.34	26.7	-	-	-
USGS-018	0 to 1	5789-33	09/25/12	Benzo(k)fluoranthene	207-08-9	0.32 U	6.2	23.4	267	-	-	-
USGS-018	0 to 1	5789-33	09/25/12	Carbazole	86-74-8	0.81 U	24.3	95.8	1040	-	-	-
USGS-018	0 to 1	5789-33	09/25/12	Chrysene	218-01-9	0.32 U	62	234	2700	-	-	-
USGS-018	0 to 1	5789-33	09/25/12	Dibenz(a,h)anthracene	53-70-3	0.81 U	0.062	0.234	2.67	-	-	-
USGS-018	0 to 1	5789-33	09/25/12	Dibenzofuran	132-64-9	0.32 U	-	-	-	-	-	-
USGS-018	0 to 1	5789-33	09/25/12	Fluoranthene	206-44-0	0.37	-	-	-	-	-	-
USGS-018	0 to 1	5789-33	09/25/12	Fluorene	86-73-7	0.32 U	-	-	-	-	-	-
USGS-018	0 to 1	5789-33	09/25/12	Indeno(1,2,3-cd)pyrene	193-39-5	0.81 U	0.62	2.34	26.7	-	-	-
USGS-018	0 to 1	5789-33	09/25/12	Naphthalene	91-20-3	0.32 U	-	-	-	-	-	-
USGS-018	0 to 1	5789-33	09/25/12	Pyrene	129-00-0	0.38	-	-	-	-	-	-
Cumulative Cancer Risk					-	-	-	-	-	0.00E+00	0.00E+00	0.00E+00

**Notes:**

<sup>1</sup> Site-specific screening level calculated using the Iowa Department of Natural Resources Cumulative Risk Calculator

J The reported value is an estimate.

U The analyte was not detected.

**Appendix D  
Cumulative Cancer Risk Calculations**

<b>Sample Information and Results</b>							<b>Site-Specific Screening Level<sup>1</sup></b>			<b>Cancer Risk</b>		
							<b>(Cancer Risk = 1E-06)</b>			<b>Site</b>	<b>Site</b>	<b>Construction</b>
<b>Location</b>	<b>Depth</b>	<b>Sample</b>	<b>Date</b>	<b>Analyte</b>	<b>Cas Number</b>	<b>Result</b>	<b>Resident</b>	<b>Worker</b>	<b>Worker</b>	<b>Resident</b>	<b>Worker</b>	<b>Worker</b>
USGS-019	0 to 1	5789-32	09/25/12	2-Chloronaphthalene	91-58-7	0.27 U	-	-	-	-	-	-
USGS-019	0 to 1	5789-32	09/25/12	2-Methylnaphthalene	91-57-6	0.27 U	-	-	-	-	-	-
USGS-019	0 to 1	5789-32	09/25/12	Acenaphthene	83-32-9	0.4	-	-	-	-	-	-
USGS-019	0 to 1	5789-32	09/25/12	Anthracene	120-12-7	0.72	-	-	-	-	-	-
USGS-019	0 to 1	5789-32	09/25/12	Benzo(a)anthracene	56-55-3	1.9	0.62	2.34	26.7	3.06E-06	8.12E-07	7.12E-08
USGS-019	0 to 1	5789-32	09/25/12	Benzo(a)pyrene	50-32-8	1.9	0.062	0.234	2.67	3.06E-05	8.12E-06	7.12E-07
USGS-019	0 to 1	5789-32	09/25/12	Benzo(b)fluoranthene	205-99-2	1.7	0.62	2.34	26.7	2.74E-06	7.26E-07	6.37E-08
USGS-019	0 to 1	5789-32	09/25/12	Benzo(k)fluoranthene	207-08-9	1.2	6.2	23.4	267	1.94E-07	5.13E-08	4.49E-09
USGS-019	0 to 1	5789-32	09/25/12	Carbazole	86-74-8	0.67 U	24.3	95.8	1040	-	-	-
USGS-019	0 to 1	5789-32	09/25/12	Chrysene	218-01-9	2.2	62	234	2700	3.55E-08	9.40E-09	8.15E-10
USGS-019	0 to 1	5789-32	09/25/12	Dibenz(a,h)anthracene	53-70-3	0.69 U	0.062	0.234	2.67	-	-	-
USGS-019	0 to 1	5789-32	09/25/12	Dibenzofuran	132-64-9	0.27 U	-	-	-	-	-	-
USGS-019	0 to 1	5789-32	09/25/12	Fluoranthene	206-44-0	3.6	-	-	-	-	-	-
USGS-019	0 to 1	5789-32	09/25/12	Fluorene	86-73-7	0.34	-	-	-	-	-	-
USGS-019	0 to 1	5789-32	09/25/12	Indeno(1,2,3-cd)pyrene	193-39-5	1.6	0.62	2.34	26.7	2.58E-06	6.84E-07	5.99E-08
USGS-019	0 to 1	5789-32	09/25/12	Naphthalene	91-20-3	0.27 U	-	-	-	-	-	-
USGS-019	0 to 1	5789-32	09/25/12	Pyrene	129-00-0	3.6	-	-	-	-	-	-
Cumulative Cancer Risk					-	-	-	-	-	3.93E-05	1.04E-05	9.12E-07

**Notes:**

<sup>1</sup> Site-specific screening level calculated using the Iowa Department of Natural Resources Cumulative Risk Calculator

J The reported value is an estimate.

U The analyte was not detected.

**Appendix D  
Cumulative Cancer Risk Calculations**

<b>Sample Information and Results</b>							<b>Site-Specific Screening Level<sup>1</sup></b>			<b>Cancer Risk</b>		
							<b>(Cancer Risk = 1E-06)</b>			<b>Site Resident</b>	<b>Site Worker</b>	<b>Construction Worker</b>
<b>Location</b>	<b>Depth</b>	<b>Sample</b>	<b>Date</b>	<b>Analyte</b>	<b>Cas Number</b>	<b>Result</b>						
DUPLICATE	0 to 1	L442760.19	01/29/10	2-Chloronaphthalene	91-58-7	0.033 U	-	-	-	-	-	-
DUPLICATE	0 to 1	L442760.19	01/29/10	Acenaphthene	83-32-9	0.033 U	-	-	-	-	-	-
DUPLICATE	0 to 1	L442760.19	01/29/10	Anthracene	120-12-7	0.033 U	-	-	-	-	-	-
DUPLICATE	0 to 1	L442760.19	01/29/10	Benzo(a)anthracene	56-55-3	0.033 U	0.62	2.34	26.7	-	-	-
DUPLICATE	0 to 1	L442760.19	01/29/10	Benzo(a)pyrene	50-32-8	0.033 U	0.062	0.234	2.67	-	-	-
DUPLICATE	0 to 1	L442760.19	01/29/10	Benzo(b)fluoranthene	205-99-2	0.033 U	0.62	2.34	26.7	-	-	-
DUPLICATE	0 to 1	L442760.19	01/29/10	Benzo(k)fluoranthene	207-08-9	0.033 U	6.2	23.4	267	-	-	-
DUPLICATE	0 to 1	L442760.19	01/29/10	Chrysene	218-01-9	0.033 U	62	234	2700	-	-	-
DUPLICATE	0 to 1	L442760.19	01/29/10	Dibenz(a,h)anthracene	53-70-3	0.033 U	0.062	0.234	2.67	-	-	-
DUPLICATE	0 to 1	L442760.19	01/29/10	Fluoranthene	206-44-0	0.033 U	-	-	-	-	-	-
DUPLICATE	0 to 1	L442760.19	01/29/10	Fluorene	86-73-7	0.033 U	-	-	-	-	-	-
DUPLICATE	0 to 1	L442760.19	01/29/10	Indeno(1,2,3-cd)pyrene	193-39-5	0.033 U	0.62	2.34	26.7	-	-	-
DUPLICATE	0 to 1	L442760.19	01/29/10	Naphthalene	91-20-3	0.033 U	-	-	-	-	-	-
DUPLICATE	0 to 1	L442760.19	01/29/10	Pyrene	129-00-0	0.033 U	-	-	-	-	-	-
Cumulative Cancer Risk					-	-	-	-	-	0.00E+00	0.00E+00	0.00E+00

**Notes:**

<sup>1</sup> Site-specific screening level calculated using the Iowa Department of Natural Resources Cumulative Risk Calculator

J The reported value is an estimate.

U The analyte was not detected.

**Appendix D  
Cumulative Cancer Risk Calculations**

<b>Sample Information and Results</b>							<b>Site-Specific Screening Level<sup>1</sup></b>			<b>Cancer Risk</b>		
							<b>(Cancer Risk = 1E-06)</b>			<b>Site Resident</b>	<b>Site Worker</b>	<b>Construction Worker</b>
<b>Location</b>	<b>Depth</b>	<b>Sample</b>	<b>Date</b>	<b>Analyte</b>	<b>Cas Number</b>	<b>Result</b>						
DUPLICATE	2 to 4	L442760.20	01/28/10	Acenaphthene	83-32-9	0.033 U	-	-	-	-	-	-
DUPLICATE	2 to 4	L442760.20	01/28/10	Anthracene	120-12-7	0.033 U	-	-	-	-	-	-
DUPLICATE	2 to 4	L442760.20	01/28/10	Benzo(a)anthracene	56-55-3	0.033 U	0.62	2.34	26.7	-	-	-
DUPLICATE	2 to 4	L442760.20	01/28/10	Benzo(a)pyrene	50-32-8	0.033 U	0.062	0.234	2.67	-	-	-
DUPLICATE	2 to 4	L442760.20	01/28/10	Benzo(b)fluoranthene	205-99-2	0.033 U	0.62	2.34	26.7	-	-	-
DUPLICATE	2 to 4	L442760.20	01/28/10	Benzo(k)fluoranthene	207-08-9	0.033 U	6.2	23.4	267	-	-	-
DUPLICATE	2 to 4	L442760.20	01/28/10	Chrysene	218-01-9	0.033 U	62	234	2700	-	-	-
DUPLICATE	2 to 4	L442760.20	01/28/10	Dibenz(a,h)anthracene	53-70-3	0.033 U	0.062	0.234	2.67	-	-	-
DUPLICATE	2 to 4	L442760.20	01/28/10	Fluoranthene	206-44-0	0.033 U	-	-	-	-	-	-
DUPLICATE	2 to 4	L442760.20	01/28/10	Fluorene	86-73-7	0.033 U	-	-	-	-	-	-
DUPLICATE	2 to 4	L442760.20	01/28/10	Indeno(1,2,3-cd)pyrene	193-39-5	0.033 U	0.62	2.34	26.7	-	-	-
DUPLICATE	2 to 4	L442760.20	01/28/10	Naphthalene	91-20-3	2.7	-	-	-	-	-	-
DUPLICATE	2 to 4	L442760.20	01/28/10	Pyrene	129-00-0	0.033 U	-	-	-	-	-	-
Cumulative Cancer Risk					-	-	-	-	-	0.00E+00	0.00E+00	0.00E+00

**Notes:**

<sup>1</sup> Site-specific screening level calculated using the Iowa Department of Natural Resources Cumulative Risk Calculator

J The reported value is an estimate.

U The analyte was not detected.