March 26, 2024

Ms. Lisa Dunning
Task Order Contracting Officer's Representative
U.S. Environmental Protection Agency, Region 7
11201 Renner Boulevard
Lenexa, Kansas 66219

Subject: Contract No. 68HERH19D0018; Task Order No. 68HE0719F0190
Elkem Carbide, 365 Carbide Lane, Keokuk, Lee County, Iowa
Analysis of Brownfields Cleanup Alternatives

Dear Ms. Dunning:

Toeroek Associates, Inc. (Toeroek) and our teaming subcontractor, Tetra Tech, Inc. (Tetra Tech), (hereafter "Toeroek Team") are pleased to present the final Analysis of Brownfields Cleanup Alternatives of the Elkem Carbide Site (the Site) located in Keokuk, Lee County, Iowa. This deliverable has been reviewed internally as part of Tetra Tech's quality assurance program, as well as Toeroek's quality assurance program, and is consistent with Toeroek's Quality Management Plan for the Resource Conservation and Recovery Act (RCRA) Enforcement, Permitting and Assistance (REPA) contract. Documentation of this review is retained in the Toeroek Team's project files.

If you have any questions or comments, please contact Greg Hanna at 720-898-4102 or Kaitlyn Mitchell at 816-412-1742.

Sincerely,

Kaitlyn Mitchell

Greg Hanna
Toeroek Team Program Manager

Kaitlyn Mitchell
Toeroek Team Project Manager

Enclosure: Analysis of Brownfields Cleanup Alternatives

cc: Amber Krueger, EPA Region 7
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ANALYSIS OF BROWNFIELDS CLEANUP ALTERNATIVES

ELKEM CARBIDE SITE
365 CARBIDE LANE
KEOKUK, LEE COUNTY, IOWA

Prepared for

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION 7

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1.0 INTRODUCTION

The U.S. Environmental Protection Agency (EPA) tasked Toeroek Associates, Inc. (Toeroek) and its teaming subcontractor, Tetra Tech, Inc. (Tetra Tech), (hereafter "Toeroek Team") to provide technical support to the EPA Region 7 Brownfields Program under Contract number (No.) 68HERH19D0018, Task Order (TO) No. 68E0719F0190. EPA Region 7 requested that the Toeroek Team conduct an Analysis of Brownfields Cleanup Alternatives (ABCA) of the Elkem Carbide Site (the Site) located at 365 Carbide Lane, Keokuk, Lee County, Iowa (Appendix A, Figure 1).

The Site, known as Elkem Carbide, was historically used for zinc refining and manufacture of various carbide products, and is currently owned by the City of Keokuk. The Site hosted an industrial manufacturing facility from 1915 to 2007 and has been vacant since at least 2008.

The Site is in an area characterized by mixed land use including industrial, commercial, agricultural, and residential properties, with the nearest residence adjacent to the south. The Site includes nine buildings; however, the Toeroek Team surveyed only the Foundry Building and associated Boiler Building. Cleanup alternatives and costs address only the Foundry and Boiler Buildings.

The Site is depicted on the Keokuk, Iowa U.S. Geological Survey (USGS) 7.5-minute topographic series map (USGS 1977) (Appendix A, Figure 1). Coordinates at the approximate center of the subject property are 40.420145 degrees north latitude and 91.421856 degrees west longitude. The Site encompasses approximately 78.83 acres on one parcel of land. Figure 2 in Appendix A illustrates the Site boundaries.

The Toeroek Team performed this ABCA based on results of the Targeted Brownfields Assessment (TBA), which consisted of a Phase I Environmental Site Assessment (ESA), a Phase II Environmental ESA, and a Hazardous Materials Survey (HMS) conducted by the Toeroek Team (Toeroek Team 2024a, b, c). The Phase II ESA report concluded that further investigation and/or remediation appeared warranted based on analytical results from surface soil samples. The HMS identified presence of asbestos-containing materials (ACM) in the Foundry Building and associated Boiler Building. In addition, fire doors, cementitious pipe insulation, and roofing materials throughout the buildings are assumed to be ACM. Lead-based paint (LBP) was on a variety of substrates throughout the Foundry Building—including support beams, stair railing, bollards, and door frames. The HMS concluded that ACM and LBP should be appropriately addressed prior to building renovation or demolition.

According to the Brownfields Assessment Application (City of Keokuk 2022), the City of Keokuk has shown an interest in redeveloping the Site, with anticipated future industrial use, contingent on findings from the Phase II ESA and HMS. Therefore, industrial land use will be assumed for this ABCA.

This ABCA considers state and federal regulations regarding ACM. The federal Asbestos Hazard Emergency Response Act (AHERA) defines ACM as any material or product that contains more than 1 percent asbestos. Iowa Department of Natural Resources (IDNR) regulations outline ACM inspection, reporting, and disposal requirements for demolition or renovation of buildings (IDNR 2024).

For LBP, this ABCA considers federal regulations regarding LBP. The federal U.S. Department of Housing and Urban Development (HUD) guidelines considers LBP as paint with lead levels above 1.0 milligram per square centimeter (mg/cm^2) (HUD 2012).

This ABCA also considers state and federal regulations regarding soil. IDNR Statewide Standards (SWSs) are the standard of contamination used by the Iowa Land Recycling Program (LRP) voluntary cleanup program. During the Phase II ESA, data were compared to IDNR SWSs and to EPA Regional Screening Levels (RSLs) (IDNR 2024; EPA 2023). RSLs assumed a target hazard quotient (THQ) of 0.1 and a carcinogenic risk of 10^{-6}.

2.0 BACKGROUND AND DESCRIPTION

The currently vacant Site is within a mixed-use industrial, commercial, agricultural, and residential area, with the nearest residence adjacent to the south. The Site includes nine buildings; however, only the Foundry Building and the associated Boiler Building were surveyed as part of the Toeroek Team HMS in 2024 (Toeroek Team 2024a). The Toeroek Team Phase II ESA involved sampling of the southern and western portions of the Site, which were not previously sampled (Toeroek Team 2024b). Concurrently with the Phase II ESA, the Toeroek Team also conducted a Phase I ESA of the larger 79-acre Elkem Carbide property, which includes the Site (Toeroek Team 2024c).

The Site lies within the city limits of Keokuk, Iowa. This discussion of the Site history derives from a review of the following sources regarding the central portion of the Site:

- Phase I ESA in July 2009 by Terracon Consultants, Inc. (Terracon 2009);
- Phase II ESA in April 2010 by Terracon (Terracon 2010);
- Phase I TBA in March 2016 by Tetra Tech (Tetra Tech 2016a);
- Phase II TBA in September 2016 by Tetra Tech (Tetra Tech 2016b);
- Phase I ESA in November 2020 by Impact 7G (Impact) (Impact 2020);
- Phase II ESA of Lots #1 through #6 in April 2022 by Impact (Impact 2022a);
- Phase II ESA of Lots #7 through #15 in July 2022 by Impact (Impact 2022b); and
- TBA Application submitted to EPA by the City of Keokuk, Iowa (City of Keokuk 2022).

Historical documentation indicates that the Elkem Carbide 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 property in 1916 by United Lead (another subsidiary of National Lead Company), and produced Frary metal, a lead alloy hardened by calcium and barium. In 1919, smelting operations ceased and ball bearing production began. In 1929, the United Lead Company merged with Shawinigan Products to form Midwest Carbide Corporation (Midwest Carbide), and the property was used to produce calcium carbide (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 EPA proposed a closure plan for the Drum Storage and Carbide Waste Landfill site (identified as the landfill on Figure 2 in Appendix A). In 2007, production of all other products ceased

(Terracon 2009), and the plant was left idle. Carbide Lane Properties, LLC purchased the property from Elkem Metals Company in 2008. The property was then sold to 365 Carbide Lane in 2015. In 2021, the City of Keokuk condemned the property. Based on observations during the 2023 sampling, the Elkem Carbide property currently is inactive.

The Site is bounded north by Carbide Lane and portions of the larger Elkem Carbide property, with undeveloped land and Amsted Rail beyond; east by vacant land and Keokuk Animal Services, with Soap Creek, railroad tracks, Newberry Towing and Recovery, and industrial and commercial development beyond; south by wooded, undeveloped land, with agricultural land and Seither & Cherry (mechanical contractors), McDowell Crane, Tri-State Sheet Metal, and former Archer Daniels Midland Milling Company plant (closed in 2022 and purchased by Twin Rivers Storage) beyond; and west by U.S. Highway 61 (Blues Highway), with undeveloped land and Hog Thief Creek beyond.

3.0 PREVIOUS INVESTIGATIONS

Data from previous investigations are included in the Phase I ESA report completed by Impact in November 2020 (Impact 2020) and the Phase I ESA prepared by the Toeroek Team (2024c). Previous investigations at the larger Elkem Carbide property did not include the areas to the south and west of the manufacturing area, which are considered the Site for this TBA.

Interview documentation obtained during the 2016 Tetra Tech Phase I ESA revealed that the lower elevation areas on the west side Elkem Carbide property (the Site for this TBA) historically was used for the dumping of waste materials (Tetra Tech 2016a).

No other investigations are known to have occurred at the Site.

The Toeroek Team conducted a Phase II ESA and HMS in 2024 (Toeroek Team 2024a, b). Results of that investigation are discussed in Section 5.1.

4.0 PLANS FOR FUTURE USE

The current owner of the Site, the City of Keokuk, has shown an interest in redeveloping the Site for future industrial use. On-site structures that were surveyed as part of the Toeroek Team 2024 HMS include the approximately 35,440-square-foot Foundry Building and an approximately 200-square-foot Boiler Building just north of the Foundry Building.

The City of Keokuk's drinking water consumer confidence report indicates that the City of Keokuk derives its drinking water from the Mississippi River and its tributaries (City of Keokuk 2023).

In the absence of site-specific data or other indicators, direction of groundwater flow may be inferred from the regional topographic gradient. Therefore, regional groundwater flow is inferred to slope to the southeast toward Soap Creek, located approximately 0.8 mile southeast of the Site.

One well is within 1,000 feet of the Site—a private well listed in the Iowa Geological Survey (IGS) GeoSam well database (Toeroek Team 2024c). GeoSam lists the well as No. 4783. Well No. 4783 was constructed in 1950, completed to 82 feet below ground surface (bgs) and is a private well (IGS 2024).

Concurrent with the HMS, the Phase II ESA conducted by the Toeroek Team found concentrations of arsenic, cadmium, and lead at concentrations above IDNR SWSs and EPA industrial RSLs in surface soil in locations in the northeastern portion of the Site (Section 5.1.3). Based on the observation from the Phase II ESA, further investigation and/or remediation appears warranted given the proposed land use. In addition, ACM and LBP should be appropriately addressed prior to building renovation or demolition. No remedial activities have occurred at the Site.

5.0 POTENTIAL CLEANUP ALTERNATIVES

The overall goal of any brownfields cleanup action is to address environmental conditions preventing or impeding the preferred type of Site redevelopment, and to do so in a manner protective of human health and the environment. This ABCA considers ACM, LBP, and environmental media (soil). For ACM, this ABCA uses AHERA definitions, and considers the IDNR requirements for ACM inspection, reporting, and disposal for demolition or renovation of commercial buildings. HUD guidelines suggest that paint applied before 1978 may contain lead. HUD considers LBP as paint with lead levels above 1.0 mg/cm^2. Cleanup alternatives for soil would conform to IDNR SWSs for soil, based on enrollment in the Iowa LRP.

The Toeroek Team evaluated brownfields cleanup alternatives to address environmental effects identified during the Phase II ESA and HMS (Toeroek Team 2024a, b). The purpose of this ABCA is to present viable cleanup alternatives based on Site-specific conditions, technical feasibility, and preliminary cost evaluations.

The following sections describe brownfields cleanup alternatives for addressing presence of ACM, LBP, and contamination in soil, including a “No Action” alternative. Following the description, each alternative is evaluated in terms of its effectiveness, implementability, and cost. The purpose of evaluating each alternative is to determine its advantages and disadvantages relative to the other alternatives in order to identify key trade-offs that would affect selection of the preferred alternative.

Effectiveness of an alternative refers to its ability to meet objectives of the brownfields cleanup. Criteria applied to assess effectiveness of an alternative include all of the following:

- Overall protection of human health and the environment;
- Long-term effectiveness;
- Reduction of toxicity, mobility, or volume through treatment/removal; and
- Short-term effectiveness.

Criteria applied to assess implementability of an alternative are all of the following:

- Technical feasibility;
- Administrative feasibility;
- Availability of services and materials required during implementation of the alternative;

- State acceptance; and
- Community acceptance.

Each alternative is evaluated to determine its estimated cost. The evaluations compare the alternatives' respective direct capital costs, which include equipment, services, and contingency allowances, as well as longer-term institutional controls (ICs), engineering controls (ECs), and operations and maintenance (O&M) costs. Again, the purpose of evaluating each alternative is to determine its advantages and disadvantages relative to the other alternatives in order to identify key trade-offs that would affect selection of the preferred alternative.

5.1 EVALUATED CONTAMINATION

This ABCA evaluates ACM, LBP, and soil at the Site. The sections below discuss contaminants and materials identified during the Phase II ESA and HMS at the Site. Additional details regarding sampling methodology and detected constituents are in the Phase II ESA and HMS reports (Toeroek Team 2024a, b).

5.1.1 Asbestos-Containing Material

During the ACM survey portion of the HMS, the Toeroek Team collected bulk samples of suspect ACM from all interior areas of the Foundry Building and associated Boiler Building. Collection of samples of building materials accorded with National Emissions Standards for Hazardous Air Pollutants (NESHAP) as adopted by EPA, and with AHERA protocols. Suspect ACM samples were analyzed via polarized light microscopy. AHERA defines ACM as any material or product that contains more than 1 percent asbestos.

The HMS identified ACM in the following materials:

- Glue dots (approximately 200 square feet [SF]) behind wall covering in the 2nd floor northwest office within the Foundry Building; and
- White tank insulation (approximately 100 SF) in the Boiler Building.

In addition, five fire doors observed in the Foundry Building, approximately 5,500 SF of cementitious pipe insulation, and approximately 33,400 SF of roofing materials are assumed ACM. These locations were not sampled because of concerns with structural damage and safety.

5.1.2 Lead-Based Paint

During the LBP survey portion of the HMS, the Toeroek Team screened all areas of the buildings using a handheld x-ray fluorescence spectrometer. Approximately 4,432 SF of assorted colors of LBP were on a variety of substrates throughout the Foundry Building—including support beams, stair railing, bollards, and door frames.

5.1.3 Environmental Media

As part of the Phase II ESA in 2024, at each of 10 locations across the Site (soil boring (SB)-1 through SB-10), the Toeroek Team collected a surface and subsurface soil boring sample, along with a duplicate subsurface sample at SB-2. In addition to the soil boring samples, 36 composite surface soil samples were collected by application of Incremental Sampling Method (ISM)—three each within 12 decision units (DUs) on the southern and western portions of the Site. Figure 2 in Appendix A shows sample locations. During the Phase II ESA, sediment and surface water samples were also collected. Because no contaminant was detected in sediment or surface water at a concentration exceeding an IDNR SWS or an EPA industrial RSL, these media are not discussed further.

Surface and subsurface soil boring samples were analyzed for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), total extractable hydrocarbons (TEH), and Target Analyte List (TAL) metals. ISM composite surface soil samples were analyzed for SVOCs and TAL metals only.

Soil sample results from the Phase II ESA were compared to IDNR SWSs for soil (IDNR 2024) and to EPA RSLs, assuming a THQ of 0.1 (EPA 2023). Metals results from soil samples also were compared to Lee County average concentrations plus one standard deviation to determine if detected metals concentrations were consistent with naturally occurring concentrations (USGS 2024).

Comparisons of analytical data to IDNR SWSs and to EPA RSLs resulted in the following noteworthy findings:

- No detected concentration of a VOC or TEH exceeded a regulatory benchmark in any soil boring sample or ISM composite sample.
- SVOCs were detected in 19 of 20 soil boring samples. Concentrations of benzo(a)pyrene and dibenz(a,h)anthracene exceeded EPA RSLs for residential soil in surface soil at SB-3, but none exceeded EPA RSLs for industrial soil or IDNR SWSs.

- SVOCs were detected in all 36 of the ISM composite surface soil samples, with at least one sample in every DU yielding an exceedance of the EPA residential RSL for at least one analyte. The IDNR SWSs are based on residential exposure criteria and are generally lower than the EPA industrial RSL. Concentrations of dibenz(a.h)anthracene exceeded the IDNR SWS in samples from DU 13, DU-15, DU-22, and DU-24, with the highest concentrations in DU-22 and DU-24. The five SVOCs were detected at concentrations exceeding both the IDNR SWS and the EPA industrial RSL in the three samples from DU-24. In no other sample did an analyte concentration exceed an EPA RSL for industrial soil or an IDNR SWS. No other SVOC exceeded a screening level in soil boring samples.

- No metals detection exceeded an industrial RSL or IDNR SWS in a soil boring sample.

- Metals were detected in all 36 of the ISM composite surface soil samples, with at least one sample in every DU yielding an exceedance of the EPA residential RSL for at least one analyte. Concentrations of cobalt and iron exceeded EPA residential RSLs in every DU, and aluminum exceeded the residential RSL in all but one DU (all but DU-17). In addition, cadmium and lead concentrations were detected above EPA industrial RSLs and IDNR SWSs in DU-22 and DU-24, and arsenic was detected at concentration above the EPA industrial RSL and IDNR SWS in DU-22. No other detection exceeded an EPA residential RSL and significantly exceeded background.

5.2 EVALUATION OF CLEANUP ALTERNATIVES FOR ASBESTOS-CONTAINING MATERIAL

Evaluations of cleanup alternatives are based on potential future use scenarios at the Site. Based on information regarding planned future land use, industrial development is assumed. The Toeroek Team has developed three cleanup alternatives for ACM. Although demolition of the Site buildings is presumed, cleanup alternatives for ACM are developed to indicate alternatives for limited abatement of damaged ACM, as well as demolition or removal of all hazardous materials.

Regarding ACM, three options were evaluated: (1) no action; (2) abatement of all ACM wastes; and (3) enclosure of ACM with O&M and ICs. Alternatives 2 and 3 are expected to achieve clearance criteria under IDNR requirements.

5.2.1 Alternative 1: No Action (Baseline)

The no action alternative is included as a baseline for comparison to the other proposed alternatives. Alternative 1 (No Action) would leave ACM in place at the Site.

<u>Effectiveness</u>

Alternative 1 would not be effective if the Site buildings are demolished. Redevelopment of areas containing ACM would have to be restricted to ensure that those materials remain undisturbed.

Additionally, in accordance with NESHAP regulations, demolition of the Site buildings cannot proceed before proper abatement; therefore, demolition could not occur if Alternative 1 would be selected. Alternative 1 would also be ineffective in achieving the goal of reducing health risks.

Implementation

Implementation of Alternative 1 is straightforward—ACM left in place. Future redevelopment would have to consider the location and condition of the ACM and ensure that those materials remain undisturbed. Demolition could not occur prior to abatement.

Cost

Alternative 1 would not involve any direct costs.

5.2.2 Alternative 2: Abatement of All Asbestos-Containing Material

Alternative 2 would involve, prior to demolition or renovations, proper abatement of all ACM identified in the Site buildings. Abatement by a licensed State of Iowa asbestos abatement contractor would accord with applicable local, state, and federal regulations, and a pre-approved Remedial Action Plan (RAP). Regulatory clearance sampling would occur according to a pre-approved quality assurance project plan (QAPP), and IDNR may conduct pre/post-abatement inspections (if required).

Effectiveness

Removal of all identified ACM under Alternative 2 would meet the applicable or relevant and appropriate requirements (ARARs) established by the NESHAP regulation and would address the risk to human health posed by ACM. In addition, full abatement would allow redevelopment of the Site without restrictions pertaining to disturbance of ACM.

Implementation

Abatement of ACM by a licensed State of Iowa asbestos abatement contractor would accord with applicable local, state, and federal regulations. EPA, state, and OSHA requirements must be met during removal of ACM and during demolition. A RAP and Health and Safety Plan would address these regulations.

Cost

Table 1 breaks down abatement costs for Alternative 2, and Table 2 lists total costs. Estimated total cost of Alternative 2 is $17,250. Estimated abatement costs were gathered from local vendors. Listed cost per SF/linear foot (LF) includes removal and disposal costs. Estimated cost for abatement of the ACM associated with the Site buildings is $1,750. This estimate does not include restoration costs. Additional costs to be considered include those for three technical reports (RAP, QAPP, and Final Abatement Report) and for collection of clearance samples. Estimated cost of technical plans/reports is $3,500 per plan/report (cost of plans includes consideration of all environmental issues to be addressed by cleanup activities). Additional costs for oversight and clearance sampling are considered variable based on requirements and duration of abatement. Estimated cost associated with oversight and clearance is $5,000.

TABLE 1

ACM ALTERNATIVE 2 – ABATEMENT COSTS FOR ALL MATERIALS

Material Description	Material Locations	Estimated Quantity	Cost/Unit ($/square foot [SF] or $/linear foot [LF])	Total Cost
White Tank Insulation and associated Black Mastic	Boiler Building – Tank	100 SF	$15	$150
Glue Dots	Foundry Building – Behind Wall Covering in the 2nd floor Northwest Office	200 SF	$8	$1,600
Total Asbestos-containing Materials (ACM) Abatement Cost				**$1,750**

TABLE 2

ACM ALTERNATIVE 2 – TOTAL COSTS

Line Item	Cost
Abatement of asbestos-containing material (ACM)	$1,750
Development of Remedial Action Plan (RAP)	$3,500
Development of Quality Assurance Project Plan (QAPP)	$3,500
Final Abatement Report	$3,500
Oversight and clearance sampling	$5,000
Total Alternative 2 Cost	**$17,250**
Total Alternative 2 Cost (rounded)	**$17,000**

5.2.3 Alternative 3: Operations and Maintenance Plan

If demolition of one or more Site buildings is not to occur, Alternative 3 would involve preparing ICs and an O&M plan for the Site to address any ACM present. The damaged ACM would require proper abatement by a licensed State of Iowa asbestos abatement contractor in accord with applicable local, state, and federal regulations, and a pre-approved RAP. Regulatory clearance sampling would occur according to a pre-approved QAPP, and IDNR possibly would conduct pre/post-abatement inspections (if required). For the purpose of this ABCA, the regulated ACM identified in Section 5.1.1 is assumed in good condition and not requiring abatement. However, prior to implementation of Alternative 3, all ACM would have to be reassessed for damage. The buildings may not be demolished unless the ACM is abated, so selection of Alternative 3 would preclude demolition.

Effectiveness

Alternative 3 would be effective regarding rehabilitation of the subject property buildings containing ACM. Alternative 3 would also be effective in achieving the goal of reducing health risks and would allow redevelopment of the subject property as proposed. As such, regular monitoring of ACM remaining in place would be necessary to ensure it is not damaged, and future redevelopment plans would have to consider locations and condition of the remaining ACM and ensure those materials would not be disturbed.

Implementation

Implementation of Alternative 3 would include leaving some ACM in place and properly abating damaged ACM. An O&M Plan would be developed to document presence and locations of ACM, and future maintenance procedures regarding the ACM. Additionally, filing the O&M Plan on the property's chain-of-title as an IC would be required.

Cost

Estimated cost of an O&M plan is $3,500. Additional costs for oversight and regular inspections are considered variable based on requirements and duration of inspections. Estimated total cost of Alternative 3 starts at $3,500 for the O&M plan alone. Ongoing oversight and inspections should be expected for the duration of the life of the building and will accrue significant additional costs.

5.3 EVALUATION OF CLEANUP ALTERNATIVES FOR LEAD-BASED PAINT

Evaluations of cleanup alternatives are based on potential future use scenarios at the Site—industrial development is assumed. The Toeroek Team has developed three cleanup alternatives for LBP. Although demolition of the Site buildings is presumed, cleanup alternatives for LBP are developed to indicate alternatives for limited abatement of damaged LBP, as well as demolition or removal of all hazardous materials.

Regarding LBP, three options were evaluated: (1) no action; (2) abatement of all LBP wastes; and (3) encapsulation of LBP with O&M and ICs. Alternatives 2 and 3 are expected to achieve clearance criteria under IDNR requirements.

5.3.1 Alternative 1: No Action (Baseline)

The no action alternative is included as a baseline for comparison to the other proposed alternatives. Alternative 1 (No Action) would leave LBP in place at the Site.

Effectiveness

Alternative 1 would not be effective if Site buildings are renovated. Redevelopment of areas containing LBP would have to be restricted to ensure that those materials remain undisturbed. Alternative 1 would also be ineffective in achieving the goal of reducing health risks. If the buildings are remodeled, a sample of the demolition debris could be collected for toxicity characteristic leaching procedure (TCLP) analysis for Resource Conservation and Recovery Act (RCRA) metals to determine if demolition debris is hazardous waste.

Implementation

Implementation of Alternative 1 is straightforward—LBP left in place. Future redevelopment would have to consider the location and condition of the LBP and ensure that those materials remain undisturbed. Demolition could occur without abatement. If the buildings are completely demolished, the presumption is that the demolition debris, in bulk, would be considered non-hazardous waste (U.S. Army 1993). However, TCLP sampling would be required prior to disposal of demolition debris for any remodeling or partial demolition.

Cost

Alternative 1 would not involve any direct costs.

5.3.2 Alternative 2: Abatement of All Lead-Based Paint

Alternative 2 would involve, prior to demolition or renovations, proper abatement of all LBP identified in the Site buildings. All surfaces and components that contain LBP determined to be in good condition would be removed for proper disposal. LBP removal by a licensed LBP removal professional would comply with applicable local, state, and federal regulations. Regulatory clearance sampling would occur according to a pre-approved QAPP, and IDNR may conduct pre/post-abatement inspections (if required).

Effectiveness

Removal of all identified LBP under Alternative 2 would meet ARARs established by the NESHAP regulation and would address the risk to human health posed by LBP. In addition, full abatement would allow redevelopment of the Site without restrictions pertaining to disturbance of LBP.

Implementation

Abatement of LBP by a licensed LBP removal professional would accord with applicable local, state, and federal regulations. EPA, state, and Occupational Safety and Health Administration (OSHA) requirements must be met during removal of LBP and during demolition. A RAP and Health and Safety Plan would address these regulations.

Cost

Estimated total cost of Alternative 2 is $119,140. Table 3 lists total costs associated with Alternative 2. Listed cost per LF includes removal and disposal costs. Estimated cost for abatement of the LBP associated with the Site buildings is $88,640. This estimate does not include restoration costs. Additional costs to be considered include those for three technical reports (RAP, QAPP, and Final Abatement Report) and for collection of clearance samples. Estimated cost of technical plans/reports is $3,500 per plan/report (cost of plans includes consideration of all environmental issues to be addressed by cleanup activities). Additional costs for oversight and clearance sampling are considered variable based on requirements and duration of abatement. Estimated cost associated with oversight and clearance is $20,000.

TABLE 3

LBP ALTERNATIVE 2 – TOTAL COSTS

Line Item	Cost
Abatement of lead-based paint (LBP) (4,432 square feet at $20/square foot)	$88,640
Development of Remedial Action Plan (RAP)	$3,500
Development of Quality Assurance Project Plan (QAPP)	$3,500
Final Abatement Report	$3,500
Oversight and clearance sampling	$20,000
Total Alternative 2 Cost	**$119,140**
Total Alternative 2 Cost (rounded)	**$120,000**

5.3.3 Alternative 3: Lead-Based Paint Encapsulation and Operations and Maintenance

If demolition of Site buildings is not to occur, Alternative 3 would involve encapsulating LBP in Site buildings and preparing ICs and an O&M plan for the Site to address any LBP present. LBP-containing surfaces would be inspected, and removal of loose LBP would be required. Removed LBP residue would be segregated for proper disposal. LBP encapsulant would be a durable, air- and dust-tight surface coating. Application of the encapsulant would ensure that remaining LBP could not leach to the painted surface and pose a threat to future occupants. This will prevent access and disturbance of LBP identified during the Phase II ESA. The O&M plan would include the following: maps and drawings showing locations of remaining LBP, description of accessibility, protocols and schedules for regular inspections, and contingency plans for dealing with any damaged or necessarily disturbed LBP. In addition, filing the O&M Plan on the property's chain of title as an IC would be required. If renovation of a structure is to occur, the remaining LBP is not to be disturbed and may remain in place. The buildings may not be demolished unless the LBP is abated, so selection of Alternative 3 would preclude demolition.

Effectiveness

LBP encapsulation and O&M for the Site under Alternative 3 would meet ARARs established by the NESHAP regulation and would address the risk to human health posed by LBP. As such, LBP left to remain in place would have to be regularly monitored to ensure it is not damaged, and future redevelopment plans would have to consider locations and condition of the remaining LBP and ensure those materials would not be disturbed.

Implementation

Regular inspections of LBP by a licensed State of Iowa lead inspector would accord with applicable local, state, and federal regulations. A Health and Safety Plan would address these regulations.

Cost

Estimated cost of LBP Encapsulation and O&M plan is $66,480. Additional costs for oversight and regular inspections are considered variable based on requirements and duration of inspections. Estimated cost associated with oversight and clearance is $5,000. Estimated total cost of Alternative 3 is $71,480, with a rounded cost of $71,000.

5.4 EVALUATION OF CLEANUP ALTERNATIVES FOR SOIL

The Toeroek Team has also developed three cleanup alternatives for soil. Three options were evaluated for residential reuse: (1) no action; (2) wide-area removal with off-site disposal; and (3) on-site capping with ICs.

5.4.1 Alternative 1: No Action (Baseline)

The no action alternative is included as a baseline for comparison to the other proposed alternatives. Alternative 1 would involve no containment, treatment, removal, or monitoring of contaminants. All contaminated soil would be left in place, and no restrictions on future land use would be imposed.

Effectiveness

Because the no action alternative would not be protective of human health and the environment, it is not considered effective.

Implementation

Implementation of Alternative 1 would require no effort because no containment, treatment, removal, or monitoring of contaminants would occur. Future redevelopment would have to consider the potential threat to human health and the environment.

Cost

Alternative 1 would not involve any direct costs.

5.4.2 Alternative 2: On-Site Capping with Institutional Controls

Alternative 2 would involve installation of an asphalt cover in the areas where concentrations metals and SVOCs exceed EPA industrial RSLs—DU-22 and DU-24 (Appendix A, Figure 3). Alternative 2 would leave contaminated soil in place in areas where concentrations exceed EPA residential RSLs and IDNR SWSs. The cap would prevent the anticipated non-residential receptors from exposure to contaminated soil. Alternative 2 would involve capping the soils with a 6-inch base course layer and a 3-inch asphalt topping.

A soil management plan (SMP) would be necessary to guide proper handling of soil at the Site if the soil is disturbed (for example, during new structure construction). The SMP would present a tiered approach to soil management, regulatory approval, documentation, and record keeping in order to minimize administrative requirements.

ICs also would be necessary to ensure that an SMP is in place to protect potential site receptors from exposure to contaminated soils, to disallow excavation of the Site soil where arsenic, lead, and cadmium were detected at concentrations exceeding cleanup levels in DU-22 and DU-24, and to prevent future residential development at the Site.

Alternative 2 would allow redevelopment of the Site as planned; however, ICs would be required in perpetuity.

<u>Effectiveness</u>

Alternative 2 would be effective in limiting exposure of affected soils to Site occupants and would allow redevelopment of the Site. However, Alternative 2 would leave affected soil in place and would require long-term stewardship to ensure continuation of all restrictive measures over the life of the ICs.

<u>Implementation</u>

Capping would be easy to implement, as this is a common remediation practice and the materials, services, and equipment necessary for implementation are readily available. Implementation of ICs would include a restrictive covenant filed with the Register of Deeds to prohibit disturbance of contamination left in place under any future use scenario. Alternative 2 would mandate annual inspections to ensure that Site occupants comply with restrictive covenants.

<u>Cost</u>

Estimated total cost of Alternative 2 in 2024 dollars is $1,700,000. Table 4 lists total costs associated with Alternative 2: $1,299,220 for capital costs/institutional controls and $389,767 for contingency (3 percent contingency). Ongoing oversight and inspections should be expected for the duration of the life of the cap and will accrue significant additional costs that are not included here. Costs were estimated by applying selected functions of Remedial Action Cost Engineering Requirements (RACER) Version 11.2.16.0. Details of costs are in Appendix B; however, contingency costs are only included in the table below. Estimated costs for Alternative 2 could be reduced if additional sampling occurs to further delineate lateral and vertical extents of contamination, thereby possibly reducing excavation volume.

TABLE 4

SOIL ALTERNATIVE 2 – TOTAL COSTS

Line Item	Cost
Capital Costs	
Construction (Capping)	$1,160,107
Remedial Design	$37,018
Project Management and Site Close Out Documentation	$25,108
Contingency	$366,670
Institutional Controls	
Administrative Land Use Controls Plan	$76,987
Contingency	$23,097
Total Alternative 2 Cost	**$1,688,987**
Total Alternative 2 Cost (rounded)	**$1,700,000**

5.4.3 Alternative 3: Wide-Area Soil Removal with Off-Site Disposal

Alternative 3 would involve excavation of soils for which metal and SVOC concentrations exceeded EPA industrial RSLs, that is DU-22 and DU-24 (Appendix A, Figure 3). Following excavation, an estimated approximately 50 confirmation soil samples would be collected per 1,800 square feet from walls and floor of the approximately 91,476-square-foot excavation area to ensure contaminant concentrations in remaining soils are below EPA industrial RSLs.

Soil would be stockpiled on the Site for waste profile characterization before off-site disposal. Following characterization for disposal, excavated soils would be hauled for disposal to an off-site permitted disposal facility. Waste disposal may occur at a Class I, II, or III permitted facility, depending on results of TCLP analysis. Presumably, all excavated soil will be accepted at a landfill facility as non-hazardous waste.

- Soil Excavation: A total area of approximately 2.1 acres would be excavated to an average depth of 6 inches. The approximate area for excavation is depicted on Figure 3 in Appendix A. The excavation area was estimated based on comparisons of ISM composite soil sample results from the Phase II ESA to IDNR SWSs for soil and to EPA industrial RSLs (IDNR 2024, EPA 2024).

- Confirmation Sampling: Confirmation soil sampling will require collection of 50 samples from the excavated area—from walls and floor—to ensure contaminant concentrations in remaining soils are below cleanup levels. Excavation will extend laterally and vertically until concentrations of metals and SVOCs no longer exceed EPA industrial RSLs.

- Backfill and Restoration: Excavated areas will be backfilled with clean material from off of the Site, graded, and seeded as needed for redevelopment. Backfilled would then be topped with compacted clean fill material, graded, and seeded as appropriate.

- Waste Disposal: All waste soil excavated during this process will be transported for off-site disposal as either non-hazardous or hazardous waste, depending on results of TCLP analysis. Presumably, all excavated soil will be accepted at a landfill facility as non-hazardous waste.

Alternative 3 would allow redevelopment of the Site as planned, but residential development would be precluded. ICs also would be necessary to prevent future residential development at the Site.

<u>Effectiveness</u>

Alternative 3 would be effective in removing contaminated soil from the Site and would allow redevelopment of the Site as a commercial property. Because soil exceeding industrial RSLs would be removed, no capping would be required, thus eliminating the need for annual cap inspection and maintenance. An SMP would not be required. Because soil will remain that exceeds IDNR SWSs and EPA residential RSLs, ICs would be required to prevent future residential development.

<u>Implementation</u>

Alternative 3 rates easy for implementation, as soil excavation and off-site disposal are common remediation practices, and materials, services, and equipment necessary for implementation are readily available. Soil excavation by qualified equipment operators would accord with applicable state and federal regulations. All waste soil excavated during this process would be transported for off-site disposal as either non-hazardous or hazardous waste, depending on results of TCLP analysis. For cost estimating purposes, assumptions are that none of the excavated soil would be used as backfill, and all excavated soil would be handled as non-hazardous waste. In addition, planning this process would require careful consideration of precautions concerning worker health and safety. The actual extent of soil with concentrations of SVOCs and metals at concentrations above EPA industrial RSLs is only estimated. Actual extent and depth of excavation may be greater that estimated here, based on confirmation sampling.

Cost

Estimated total cost of Alternative 3 in 2024 dollars is $2,001,029. Table 5 lists total costs associated with Alternative 3: $1,539,253 for capital construction costs, and $461,776 for contingency (3 percent contingency). Costs were estimated by applications of selected functions of RACER Version 11.2.16.0 and professional judgment. Details of costs are in Appendix B; however, contingency costs are only included in the table below. The cost associated with excavation could be better constrained with additional sampling.

TABLE 5

SOIL ALTERNATIVE 3 – TOTAL COSTS

Line Item	Cost
Construction (Excavation and Off-site Transportation and Waste Disposal)	$1,493,972
Remedial Design	$31,781
Project Management and Site Close-Out Documentation	$13,500
Contingency	$461,776
Total Alternative 3 Cost	**$2,001,029**
Total Alternative 3 Cost (rounded)	**$2,000,000**

5.5 RECOMMENDED CLEANUP ALTERNATIVES

This section recommends cleanup alternatives for contaminated soil, LBP, and ACM at the Site.

5.5.1 Asbestos-Containing Material

Alternative 2 (Abatement of ACM) is the recommended cleanup alternative for ACM. Future plans at the Site include either substantial rehabilitation/renovation or demolition; therefore, removal of the identified ACM would be required prior to initiation of those activities.

5.5.2 Lead-Based Paint

Alternative 2 (Abatement of LBP) is the recommended cleanup alternative for LBP. Future plans at the Site include either substantial rehabilitation or renovation; therefore, removal of the identified LBP would be required prior to initiation of those activities. If buildings on the Site will be entirely demolished, Alternative 1 (No Action), would be recommended.

5.5.3 Affected Soils

Alternative 3 (Wide-Area Soil Removal with Off-Site Disposal) is the recommended cleanup alternative for soils. Although the cost is greater, Alternative 3 would be a direct approach and would allow fewer restrictions on use of the Site. It would achieve regulatory compliance and would allow redevelopment of the Site without requiring ongoing maintenance and inspection costs associated with a cap.

5.5.4 Total Cleanup Cost

Table 6 summarizes total cleanup costs for the recommended alternatives assuming future industrial land use. Based on the recommended cleanup alternatives, estimated total cleanup cost is approximately $2,100,000. As stated above, costs for demolition of the buildings, Site restoration, and any associated disposal costs for addressing construction and demolition waste materials were not included in this ABCA.

TABLE 6

SUMMARY OF COSTS FOR RECOMMENDED ALTERNATIVES

Contaminant / Material	Recommended Alternative	Total Cost
Asbestos-containing Material (ACM)	Alternative 2 – Abatement of all ACM	$17,000
Lead-based Paint (LBP)	Alternative 2 – Abatement of all LBP	$120,000
Affected Soils	Alternative 3 – Wide-Area Excavation with Off-Site Disposal	$2,000,000
Total Cost		**$2,137,000**
Total Cost (rounded)		**$2,100,000**

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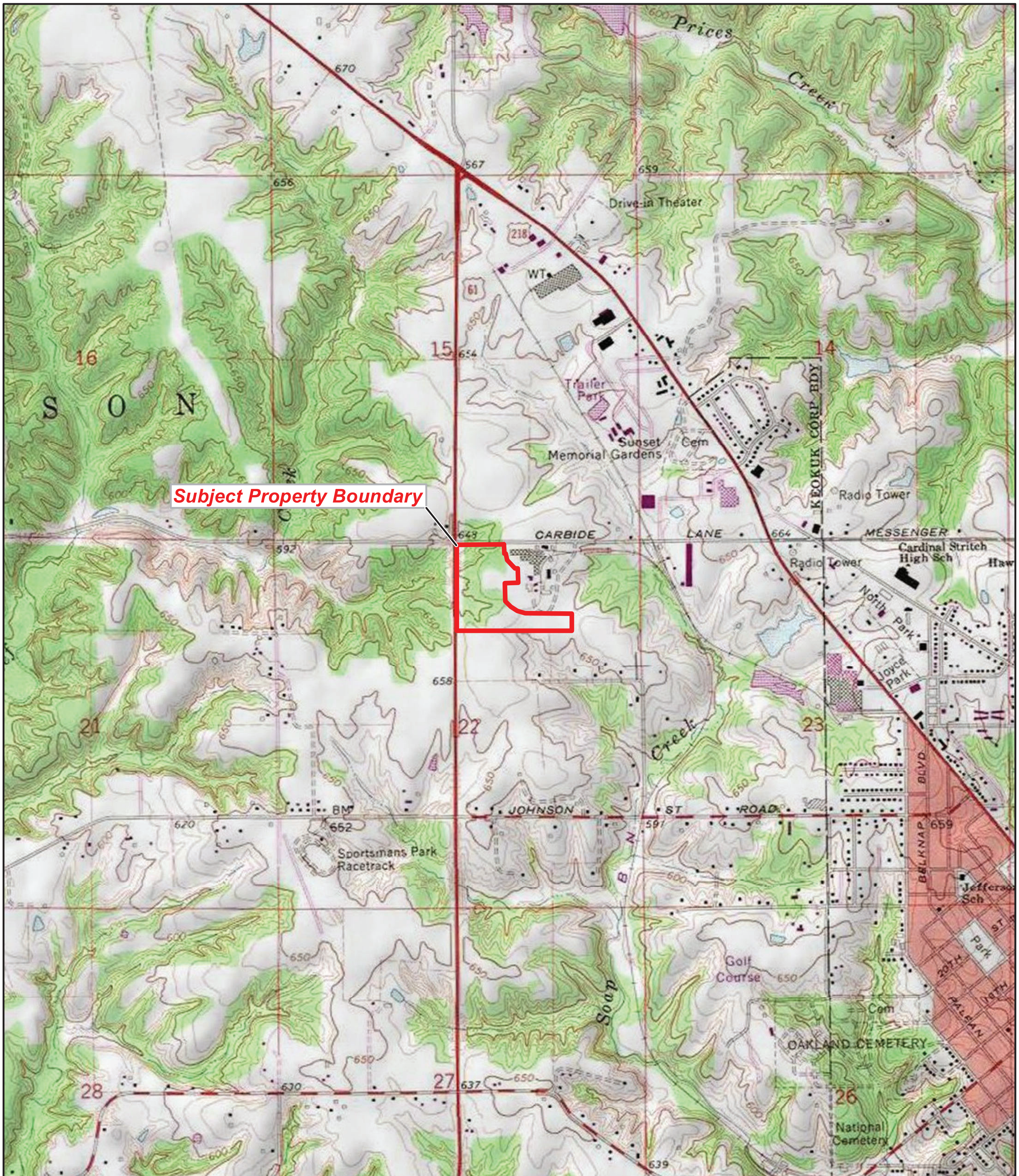
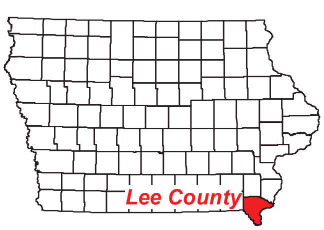
APPENDIX A

FIGURES

FIGURE 1 SITE LOCATION MAP





N

0 1,000 2,000

Feet

Source: USGS Keokuk, IA 7.5 Minute Topo Quad, 1977

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Elkem Carbide Site
365 Carbide Lane
Keokuk, Iowa

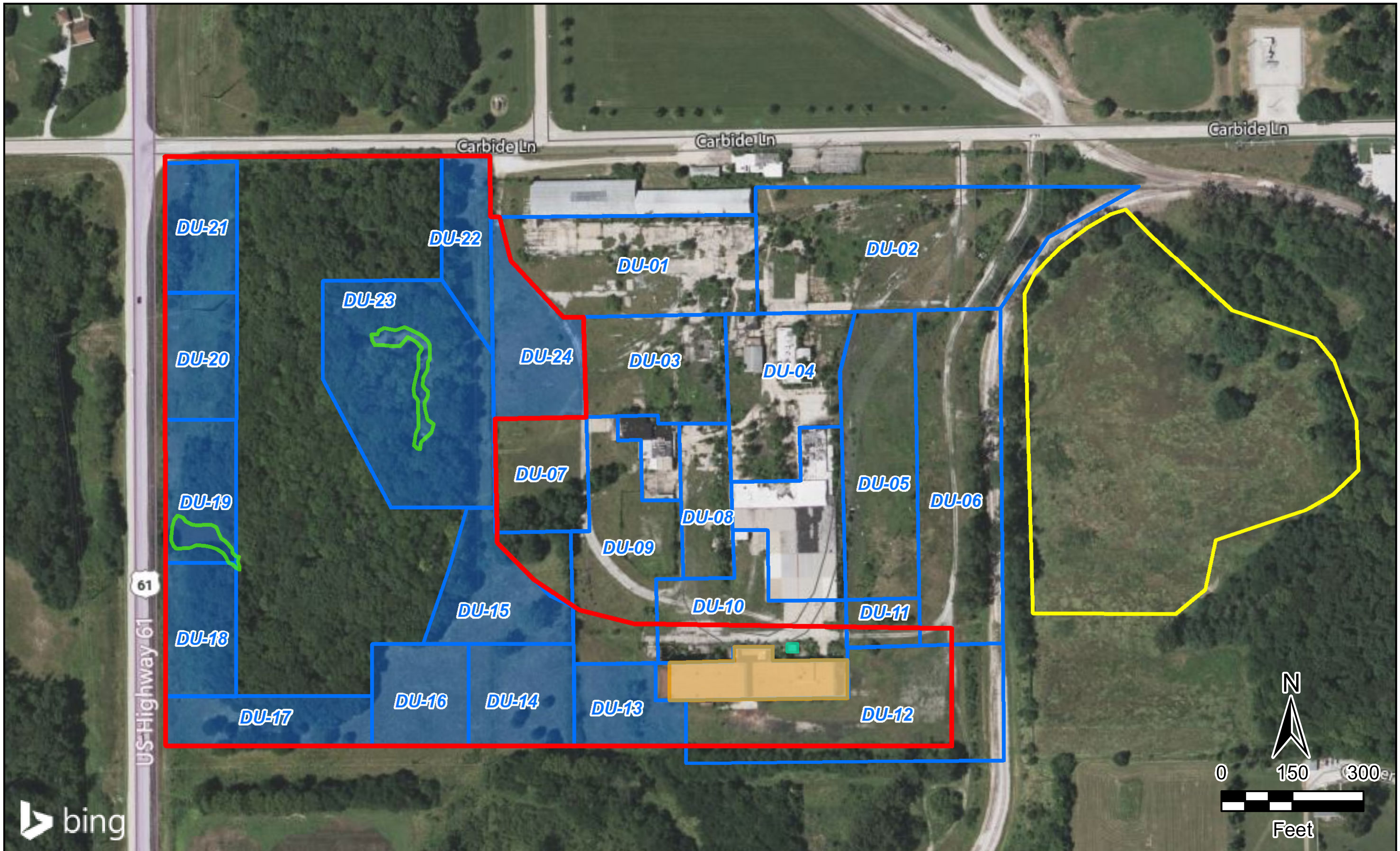
Figure 1
Site Location Map

TETRA TECH

TOEROEK ASSOCIATES, INC.

Date: 2/28/2023 | Drawn By: Nick Wiederholt | Project No: 103P65210190.16.02

FIGURE 2 SITE LAYOUT MAP



Legend

- Boiler Building
- Foundry
- Potential dumping site
- Boundary of the site
- Decision unit boundary (Previously sampled by Tetra Tech, Inc. in 2016 for Phase II TBA)
- Decision unit boundary (Sampled by the Toeroek Team in November 2023)
- Landfill (Closed in 1989)

Footnotes:
DU: Decision unit
TBA: Targeted Brownfields Assessment

Elkem Carbide Site
365 Carbide Lane
Keokuk, Iowa

Figure 2
Site Layout Map

TETRA TECH TOEROEK ASSOCIATES, INC.

Date: 2/28/2023 Drawn By: Nick Wiederholt Project No: 103P65210190.16.02

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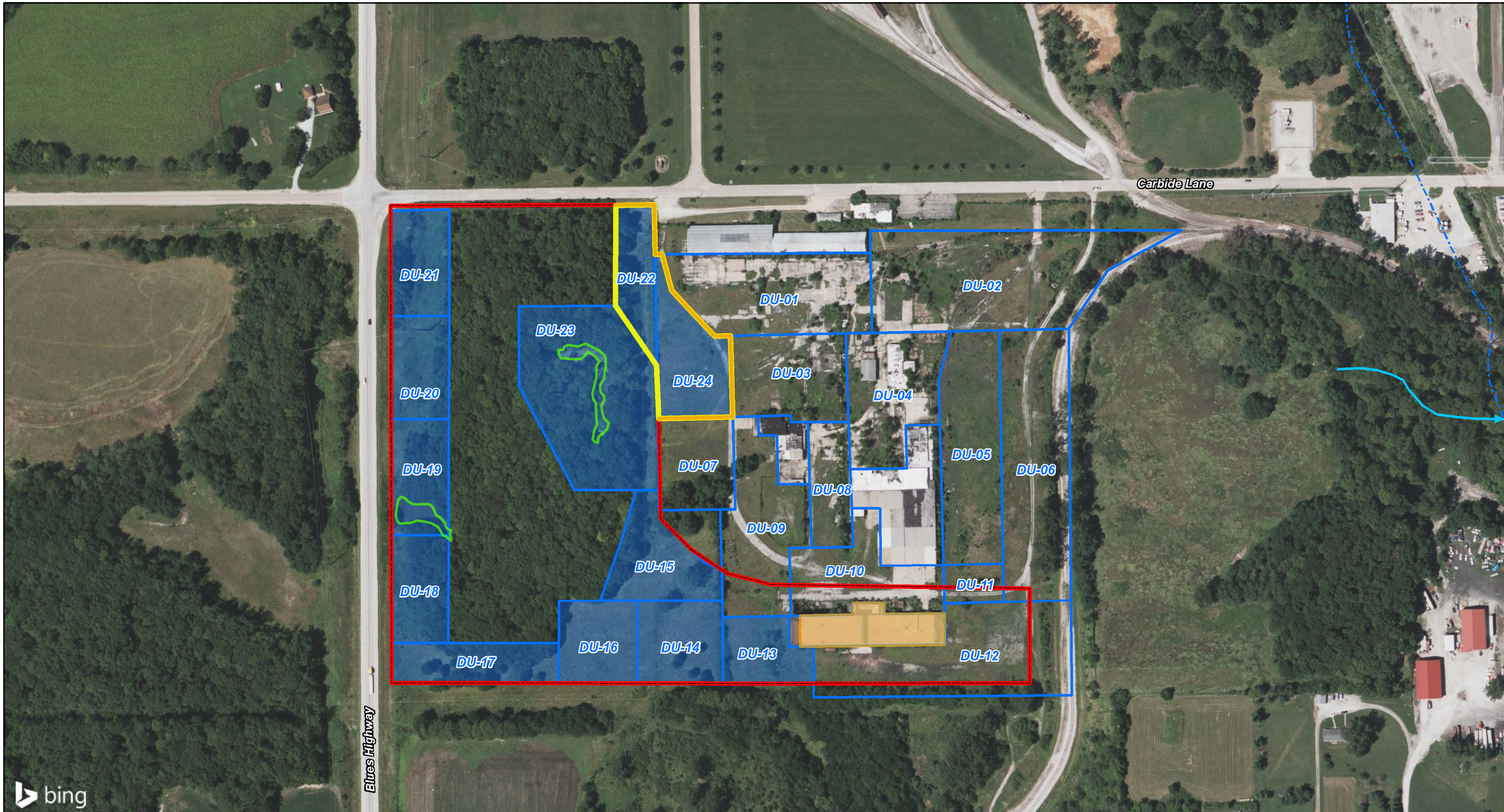
Source: ESRI, ArcGIS Online, Bing Maps

FIGURE 3 CLEANUP ALTERNATIVES 2 AND 3
WIDE AREA SOIL REMOVAL OR COVER



Legend

- Drainage swale
- Soap creek
- Boundary of the site
- Decision unit boundary (Previously sampled by Tetra Tech, Inc. in 2016 for Phase II TBA)
- Decision unit boundary (Sampled by the Toeroek Team in November 2023)
- Foundry
- Potential dumping site
- Wide area addressed by surface cover installation or excavation

Footnotes:
DU: Decision unit
TBA: Targeted Brownfields Assessment

N

0 125 250
Feet

Source: ESRI, ArcGIS Online, Bing Maps

Elkem Carbide Site
365 Carbide Lane
Keokuk, Iowa

Figure 3
Cleanup Alternatives 2 and 3
Wide Area Soil Removal or Cover

TETRA TECH
TOEROEK ASSOCIATES, INC.

Date: 2/9/2024 Drawn By: Susmita Shrestha Project No: 103P65210190.16.03

APPENDIX B

COST ESTIMATES

Soil Alternative 2 - Installation of Surface Cover								
Assembly Description	**Qty**	**UOM**	**Materials**	**Labor**	**Equipment**	**SubBid**	**Extended Cost**	**Marked-up Cost**
(A) Construction (Capping) - CAPITAL COST							**895,165.16**	**1,160,106.21**
Unclassified Fill, 6" Lifts, Off-Site, Includes Delivery, Spreading, and Compaction	8698.32	CY	28.61	1.04	0.83	0.01	265,271.69	343,764.28
Asphalt Pavement- 6" Base Course Layer, 3" Topping	10437.99	SY	35.44	4.26	1.62	0.00	431,334.79	559,009.88
Clay, Low Permeability, 6"Lifts, Off-Site	7306.59	CY	23.11	2.45	1.61	0.00	198,558.68	257332.05
(B) Project Management and Site Close-Out Documentation - CAPITAL COST							**11,624.02**	**25,107.89**
Senior Project Manager	6	HR	0.00	90.49	0.00	0.00	542.96	1,172.80
Project Manager	9	HR	0.00	86.71	0.00	0.00	780.41	1,685.69
Project Manager	52	HR	0.00	86.71	0.00	0.00	4,509.05	9,739.54
Senior Staff Engineer	2	HR	0.00	91.53	0.00	0.00	183.05	395.39
Senior Staff Engineer	4	HR	0.00	91.53	0.00	0.00	366.11	790.79
Staff Engineer	26	HR	0.00	75.72	0.00	0.00	1,968.62	4,252.23
Staff Scientist	6	HR	0.00	64.65	0.00	0.00	387.87	837.81
Word Processing/Clerical	32	HR	0.00	40.66	0.00	0.00	1,301.22	2,810.64
Word Processing/Clerical	11	HR	0.00	40.66	0.00	0.00	447.29	966.16
Draftsman/CADD	8	HR	0.00	47.39	0.00	0.00	379.14	818.95
Draftsman/CADD	16	HR	0.00	47.39	0.00	0.00	758.28	1,637.89
(C) Remedial Design - CAPITAL COST							**17,273.28**	**37017.65**
Project Manager	18	HR	0.00	86.71	0.00	0.00	1,560.82	3371.38
Office Manager	6	HR	0.00	71.74	0.00	0.00	430.42	929.7
Project Engineer	60	HR	0.00	73.51	0.00	0.00	4,410.88	9527.5
Staff Engineer	80	HR	0.00	75.72	0.00	0.00	6,057.31	13083.78
Project Scientist	30	HR	0.00	80.05	0.00	0.00	2,401.35	5186.92
QA/QC Officer	8	HR	0.00	59.35	0.00	0.00	474.77	1025.51
Word Processing/Clerical	30	HR	0.00	40.66	0.00	0.00	1,219.90	2634.97
Draftsman/CADD	8	HR	0.00	47.39	0.00	0.00	379.14	818.95
Other Direct Costs	1	LS	338.69	0.00	0.00	0.00	338.69	438.94
(D) Administrative Land Use Controls Plan - INSTITUTIONAL CONTROLS							**38,292.22**	**76987.52**
Construction Signs	36	SF	25.50	0.00	0.00	0.00	918.00	1189.73
Per Diem (per person)	2	DAY	0.00	0.00	0.00	149.00	298.00	298
Overnight Delivery, 8 oz Letter	6	EA	0.00	0.00	0.00	30.20	181.21	195.71
Project Manager	40	HR	0.00	71.10	0.00	0.00	2,844.17	6143.4
Project Manager	30	HR	0.00	71.10	0.00	0.00	2,133.13	4607.55
Project Manager	20	HR	0.00	71.10	0.00	0.00	1,422.08	3071.7
Project Engineer	60	HR	0.00	60.28	0.00	0.00	3,616.92	7812.55
Project Engineer	30	HR	0.00	60.28	0.00	0.00	1,808.46	3906.27
Staff Engineer	45	HR	0.00	62.09	0.00	0.00	2,793.93	6034.9
Staff Engineer	150	HR	0.00	62.09	0.00	0.00	9,313.11	20116.32
QA/QC Officer	20	HR	0.00	48.66	0.00	0.00	973.28	2102.29
QA/QC Officer	8	HR	0.00	48.66	0.00	0.00	389.31	840.92
Word Processing/Clerical	20	HR	0.00	33.34	0.00	0.00	666.88	1440.45
Word Processing/Clerical	6	HR	0.00	33.34	0.00	0.00	200.06	432.14
Word Processing/Clerical	60	HR	0.00	33.34	0.00	0.00	2,000.63	4321.36
Draftsman/CADD	38	HR	0.00	38.86	0.00	0.00	1,476.76	3189.79
Draftsman/CADD	40	HR	0.00	38.86	0.00	0.00	1,554.48	3357.68
Draftsman/CADD	16	HR	0.00	38.86	0.00	0.00	621.79	1343.07
Attorney, Partner, Real Estate	18	HR	0.00	142.00	0.00	0.00	2,556.08	3312.68
Attorney, Associate, Real Estate	6	HR	0.00	138.00	0.00	0.00	827.97	1073.06
Paralegal, Real Estate	6	HR	0.00	49.08	0.00	0.00	294.49	381.66
Other Direct Costs	1	LS	244.88	0.00	0.00	0.00	244.88	317.37
Other Direct Costs	1	LS	113.32	0.00	0.00	0.00	113.32	146.87
Other Direct Costs	1	LS	843.25	0.00	0.00	0.00	843.25	1092.85
Local Fees	1	LS	200.00	0.00	0.00	0.00	200.00	259.2
Alternative 2 Total							**962,354.67**	**1,299,219.27**

Soil Alternative 3 - Wide Area Soil Removal and Off-Site Disposal								
Assembly Description	**Qty**	**UOM**	**Materials**	**Labor**	**Equipment**	**SubBid**	**Extended Cost**	**Marked-up Cost**
(A) Construction (Excavation)							**1,007,788.53**	**1,328,279.77**
12 CY Dump Truck Haul/Hour	1259	HR	0.00	62.71	37.12	0.00	125,677.06	162,877.47
Excavate and load, bank measure, medium material, 3-1/2 C.Y. bucket, hydraulic excavator	20000	BCY	0.00	0.82	0.86	0.00	33,555.51	43,487.94
Unclassified Fill, 6" Lifts, Off-Site, Includes Delivery, Spreading, and Compaction	26426.4	CY	28.61	1.04	0.83	0.01	805,922.96	1,044,391.61
Seeding, Vegetative Cover	2.52	ACR	3,237.07	469.66	206.78	0.00	9,862.06	12,781.23
Disposable Materials per Sample	50	EA	4.75	0.00	0.00	0.00	237.55	307.86
Testing, TAL metals (6010/7000s)	50	EA	0.00	0.00	0.00	108.12	5,406.00	5,838.48
Project Manager	12	HR	0.00	86.71	0.00	0.00	1,040.55	2,247.59
Project Scientist	300	HR	0.00	80.05	0.00	0.00	24,013.54	51,869.24
QA/QC Officer	6	HR	0.00	59.35	0.00	0.00	356.08	769.13
Field Technician	16	HR	0.00	41.29	0.00	0.00	660.56	1,426.81
Word Processing/Clerical	12	HR	0.00	40.66	0.00	0.00	487.96	1,053.99
Draftsman/CADD	12	HR	0.00	47.39	0.00	0.00	568.71	1,228.42
(B) Construction (Off-site Transportation and Waste Disposal)							**149,593.48**	**165,691.54**
Bulk Solid Waste Loading Into Disposal Vehicle or Bulk Disposal Container	3920	BCY	1.78	1.18	0.38	0.00	13,095.50	16,971.77
Transport Bulk Solid Hazardous Waste, Maximum 20 CY (per Mile)	2940	MI	0.00	0.00	0.00	2.29	6,747.30	7,287.08
Waste Stream Evaluation Fee, Not Including 50% Rebate on 1st Shipment	1	EA	0.00	0.00	0.00	52.58	52.58	56.79
32 Ft. Dump Truck, 6 Mil Liner, disposable	196	EA	30.75	0.00	0.00	0.00	6,027.59	7,811.75
Landfill Nonhazardous Solid Bulk Waste by CY	3920	CY	0.00	0.00	0.00	31.55	123,670.51	133,564.15
(C) Project Management and Site Close-Out Documentation							**6,249.69**	**13,499.32**
Project Manager	8	HR	0.00	86.71	0.00	0.00	693.70	1,498.39
Senior Staff Engineer	6	HR	0.00	91.53	0.00	0.00	549.16	1,186.18
Staff Engineer	40	HR	0.00	75.72	0.00	0.00	3,028.65	6,541.89
Word Processing/Clerical	30	HR	0.00	40.66	0.00	0.00	1,219.90	2,634.97
Draftsman/CADD	16	HR	0.00	47.39	0.00	0.00	758.28	1,637.89
(D) Remedial Design							**14,829.59**	**31,780.67**
Project Manager	12	HR	0.00	86.71	0.00	0.00	1,040.55	2,247.59
Office Manager	10	HR	0.00	71.74	0.00	0.00	717.36	1,549.49
Project Engineer	40	HR	0.00	73.51	0.00	0.00	2,940.59	6,351.66
Staff Engineer	58	HR	0.00	75.72	0.00	0.00	4,391.55	9,485.74
Project Scientist	32	HR	0.00	80.05	0.00	0.00	2,561.44	5,532.72
QA/QC Officer	10	HR	0.00	59.35	0.00	0.00	593.47	1,281.89
Certified Industrial Hygienist	6	HR	0.00	78.55	0.00	0.00	471.31	1,018.04
Word Processing/Clerical	32	HR	0.00	40.66	0.00	0.00	1,301.22	2,810.64
Draftsman/CADD	11	HR	0.00	47.39	0.00	0.00	521.32	1,126.05
Other Direct Costs	1	LS	290.78	0.00	0.00	0.00	290.78	376.85
Alternative 3 Total							**1,178,461.28**	**1,539,251.30**