November 3, 2022

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. 68E0719F0190
Former Rath Buildings, 1442, 1508, 1620, and 1656 Sycamore Street,
Waterloo, Black Hawk 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 Analysis of Brownfields Cleanup Alternatives for the Former Rath Buildings site (the subject property) at 1442, 1508, 1620, and 1656 Sycamore Street, Waterloo, Black Hawk 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 and Permitting 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,

Greg Hanna
Toeroek Team Program Manager

Kaitlyn Mitchell
Toeroek Team Project Manager

Enclosure: Analysis of Brownfields Cleanup Alternatives

cc: Leeanna Balsley, EPA Region 7
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ANALYSIS OF BROWNFIELDS CLEANUP ALTERNATIVES

FORMER RATH BUILDINGS
1442, 1508, 1620, 1656 SYCAMORE STREET, WATERLOO, IOWA

Prepared for

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION 7

Task Order	:	68E0719F0190
Subtask	:	010.03
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Date Prepared	:	November 3, 2022
Contract No.	:	68HERH19D0018
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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 68HERH19D0018, Task Order (TO) 68E0719F0190. EPA Region 7 requested that the Toeroek Team conduct an Analysis of Brownfields Cleanup Alternatives (ABCA) of the Former Rath Buildings site (the subject property) at 1442, 1508, 1620, 1656 Sycamore Street in Waterloo, Iowa. The subject property name refers to multiple buildings and has multiple addresses due to the various additions over the years; however, only one building is currently present on-site.

The Toeroek Team has performed this ABCA based on results of the Targeted Brownfields Assessment (TBA) Phase II Environmental Site Assessment (ESA) and Hazardous Materials Survey (HMS) by the Toeroek Team (Toeroek Team 2022a, b). According to the Brownfields Assessment Application (EPA 2021), the current property owner, Crystal Distribution Services, Inc., has shown an interest in demolishing the building for future expansion, contingent on findings from the Phase II ESA and HMS. The building currently is in use as cold storage. The Phase II ESA report concluded that based on analytical results from sub-slab soil vapor and indoor air samples, further investigation and/or remediation appeared warranted, including sampling of soil and groundwater under the building. The HMS identified the presence of both asbestos-containing materials (ACM) and lead-based paint (LBP) throughout the building and concluded that these materials should be appropriately addressed prior to building renovation or demolition.

The current property owner is expected to enroll the subject property in the Iowa voluntary cleanup program, known as the Land Recycling Program (LRP), which was adopted in 1997 as Iowa Code Chapter 455H, the Iowa Land Recycling and Environmental Remediation Standards Act. The LRP is administered by the Iowa Department of Natural Resources (IDNR). This act also required that the state identify statewide standards for soil and groundwater. Therefore, this ABCA considers cleanup alternatives that would be based on Iowa Statewide Standards (SWSs) for soil and groundwater. In the absence of SWSs for air, the ABCA considers EPA Vapor Intrusion Screening Levels (VISLs) for soil gas and sub-slab soil vapor and EPA Risk-based Screening Levels (RSLs) for indoor air.

This ABCA also considers state and federal regulations regarding ACM and LBP. The federal Asbestos Hazard Emergency Response Act (AHERA) defines ACM as any material or product that contains more than 1% asbestos. The U.S. Department of Housing and Urban Development (HUD) considers LBP as paint with lead levels greater than or equal to 1.0 milligram per square centimeter (mg/cm^2). IDNR regulations outline ACM and LBP inspection, reporting, and disposal requirements for demolition or renovation of commercial buildings (IDNR 2022b).

2.0 BACKGROUND AND DESCRIPTION

The subject property is at 1442, 1508, 1620, and 1656 Sycamore Street in Waterloo, Black Hawk County, Iowa, and is depicted on the Waterloo South, Iowa, U.S. Geological Survey (USGS) 7.5-minute topographic series map (USGS 1972) (Appendix A, Figure 1). Coordinates at the approximate center of the subject property are 42.491811 degrees north latitude and 92.324435 degrees west longitude. The subject property is on an approximately 5.5-acre parcel and is improved with an approximately 150,000 square-foot (SF) footprint, five- to seven-story building (Appendix A, Figure 2). The building also has a basement.

The subject property is within a mixed-use industrial and residential area of the City of Waterloo. This discussion of the subject property history is derived from Phase I ESAs conducted by HR Green (HRG) in 2021 and 2022 (HRG 2021, 2022). The nearest residence is approximately 0.17 mile east-northeast of the subject property. Properties surrounding the subject property have been predominantly commercial or industrial since the early 1900s. Some development of residential housing north of the subject property began in approximately 1906; however, from the 1960s to present day, developments north of the subject property became predominantly commercial. From at least as early 1900 until 1984, a meat-packing operation with cold storage warehousing operated on the subject property. Previous occupants of the subject property also included Talleday Steel Pipe and Tank Company in 1900, Kelly Manufacturing Company in 1906, and Waterloo Canning Company from 1900 to 1918.

Currently, the subject property is bounded to the north by Sycamore Street, with Rath Packing Company Administration Building, an abandoned historical building, and other commercial properties beyond; to the east by Vinton Street, with General Sheet Metal Works and Allstate Rental beyond; to the south by an area of trees, a rail spur, and a flood wall, with the Cedar River and commercial and residential properties beyond; and to the west by Powers Manufacturing Company, with East 11th Street and commercial and retail buildings beyond.

3.0 PREVIOUS INVESTIGATIONS

HRG identified the following recognized environmental conditions (RECs) during a Phase I ESA at the subject property in July 2021 and a Phase I ESA Update in February 2022 (HRG 2021, 2022):

- **The historical use of the subject property.** Historical Sanborn maps depict the “Waterloo Canning Co.” on the western portion of the subject property in 1900, 1906, 1910, and 1918. The maps depict a gasoline house, tank, and railroad spur associated with the operation. Historical Sanborn maps also indicate the western portion of the subject property operated as part of “Talleday Steel Pipe and Tank Co.” in 1900 and the “Kelly Manufacturing Co.” in 1906. Both uses included tin and sheet iron working space.

- **The current and historical use of the subject property.** Available documents list the subject property as part of a meat packing operation from at least 1900 until 1984. It has operated as cold storage warehousing since 1984.

- **The historical use of the adjoining parcel northwest of the subject property.** Available documents depict railroad tracks traversing the parcel from at least 1900-2002.

- **The historical use of the adjoining parcels south and west-southwest of the subject property**. Available documents indicate the Citizens Gas and Electric facility manufactured gas from coal for lighting and heating purposes from 1901 to 1956. Historical Sanborn maps depict tar separators, condensers, coal bins, gas holders and tanks, and oil rooms associated with the operation. The facility has been under investigation since 1988 and was proposed to the National Priority List (NPL) in 1992 as the “Waterloo Coal Gasification Plant.” Contaminants of concern include coal tar, metals, and cyanide residues. Site monitoring of groundwater conditions and reporting are ongoing and the monitoring well network extends onto the subject property. A map from the 2019 Remedial Action Annual Progress Report identifies groundwater impact from this facility on the subject property. The same report depicts a portion of the subject property within its technical impracticability zone meaning compliance with applicable standards cannot be met for an extended period of time as a result of technical and financial limitations. HRG observed approximately fourteen 55-gallon drums and two poly vertical aboveground storage tanks (ASTs) associated with remediation and investigation activities within a fenced area on these adjoining parcels during the site reconnaissance.

- **Site reconnaissance.** HRG observed instances of staining on the interior of the structure in areas where material is used and/or stored including the forklift charging area, maintenance shop, and engine room. HRG observed staining in the truck cleanout area on the exterior of the structure.

HRG identified the following controlled recognized environmental conditions (CRECs) during a Phase I ESA at the subject property in July 2021 and a Phase I ESA Update in February 2022 (HRG 2021, 2022):

- The Rath Administration Building is adjacent to and north of the subject property. IDNR completed an initial site screening (ISS) on April 21, 2008, that stated a Phase II ESA conducted at the facility identified the following exceedances of Iowa Statewide Standards (SWSs): arsenic, barium, cadmium, chromium, lead, and benzo(a)pyrene in unfiltered groundwater samples and arsenic in soil. The concentrations of arsenic in soil were within background levels commonly observed in Iowa. IDNR determined that it did not require any further investigation although residual impact remained.

- The 93-97 Vinton Street facility is adjacent to and southeast-south of the subject property. Available documents depicted a maintenance shop that operated as part of the larger Rath campus. IDNR completed an ISS on May 5, 2006, that stated a Phase II ESA conducted at the facility identified the following exceedances: arsenic, lead, and benzo(a)pyrene above SWSs in soils, and benzo(a)anthracene, benzo(a)fluoranthene, benzo(a)pyrene, dibenz(a,h)anthracene, and indeno(1,2,3-c,d)pyrene above SWSs for protected groundwater. IDNR determined that it did not require any further investigation although residual impact remained.

The HRG Phase I ESA reports recommended an additional investigation to evaluate subsurface conditions at the subject property.

A Phase II ESA and HMS was conducted by the Toeroek Team in 2022. The results of that investigation are discussed in Section 5.1.

4.0 PLANS FOR FUTURE USE

Future use of the subject property is unknown; however, the current property owner has expressed a preference for demolishing the building to allow redevelopment of the property. The subject property is currently in use by Crystal Distribution Services, LLC. It is improved with an approximately 150,000-SF footprint, 5- to 7-story building with a basement. Groundwater is not currently used for drinking water at the subject property. The City of Waterloo public utility (Waterloo Water Works) derives its drinking water from the Alluvial and Silurian-Devonian Aquifers (Waterloo Water Works 2021). City of Waterloo ordinance (Chapter 2, Section 8-2-1) requires a connection to city water utilities.

Based on analytical results from soil-gas samples and indoor air samples, further investigation and/or remediation appears warranted, including sampling of soil and groundwater under the building. In addition, asbestos and LBP should be appropriately addressed prior to building renovation or demolition. No remedial activities have occurred at the subject property to date.

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 subject property redevelopment, and to do so in a manner protective of human health and the environment. This ABCA considers cleanup alternatives for environmental media that would conform to IDNR SWSs for soil and groundwater, EPA VISLs for soil gas and sub-slab soil vapor; and EPA RSLs for indoor air (IDNR 2022a; EPA 2022a, b). For ACM and LBP, the ABCA uses AHERA and HUD definitions, respectively, and considers the IDNR requirements for ACM and LBP inspection, reporting, and disposal for demolition or renovation of commercial buildings.

The Toeroek Team evaluated brownfields cleanup alternatives to address environmental impacts identified during the Phase II ESA (Toeroek Team 2022a) and HMS (Toeroek Team 2022b). The purpose of the 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 contaminated environmental media, ACM, and LBP, 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 tradeoffs 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 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:

- 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 control (IC) 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 tradeoffs that would affect selection of the preferred alternative.

5.1 EVALUATED CONTAMINATION

This ABCA evaluates the following at the subject property: contaminants in subsurface soil, and groundwater; vapor intrusion; ACM; and LBP. The sections below discuss contaminants/materials identified during the Phase II ESA and HMS at the subject property. Additional details about sampling methodology and detected constituents are in the Phase II ESA (Toeroek Team 2022a) and HMS (Toeroek Team 2022b) reports. Figure 2 in Appendix A shows sample locations for environmental media.

5.1.1 Subsurface Soil

As part of the 2022 Phase II ESA, the Toeroek Team collected ten subsurface soil samples, as well as one field duplicate, at ten locations (B1 through B10) across the subject property. Subsurface soil samples were collected within select intervals based on visual staining, detected odor, or elevated photoionization detector (PID) readings. If no staining/odor or elevated PID reading was noted, a sample was collected from directly above the water table or from the bottom of the soil core if the water table was not encountered. Samples were analyzed for volatile organic compounds (VOCs); semivolatile organic compounds (SVOCs); polychlorinated biphenyls (PCBs); total petroleum hydrocarbons (TPH) in the gasoline range (TPH-GRO), diesel range (TPH-DRO), and oil range (TPH-ORO); and the eight Resource Conservation and Recovery Act (RCRA) metals.

The Phase II ESA screened analytical data against the IDNR SWS for soil (IDNR 2022a). For metals, concentrations were also compared to background concentrations plus one standard deviation for Black Hawk County, Iowa (USGS 2022). The following exceedances of SWSs were observed in soil in least one sample:

- **SVOCs:**
    - Benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, and indeno(1,2,3-cd)pyrene were reported above the IDNR SWS for soils at two locations (B2 and B5) at samples collected from 14 to 16 feet below ground surface (ft bgs) and 13 to 15 ft bgs, respectively.

Given the depth of detections of SVOCs and the presence of these SVOCs in groundwater, as described in Section 5.1.2, it is likely that contamination in soil at the subject property is from the "smear zone" created by contaminated groundwater. According to the 2018 five-year review conducted for the Waterloo Coal Gasification Plant (EPA 2018), high river stages in the Cedar River had moved groundwater north, toward the subject property from the former coal gas plant, in March 2013, September 2015 and 2016. Given the depth that these contaminants were observed and their limited detections above IDNR SWSs, these subsurface contaminants are not considered further in the ABCA.

5.1.2 Groundwater

As part of the completed Phase II ESA, the Toeroek Team was to collect ten groundwater samples, as well as a field duplicate, each at a location collocated with one of the ten soil samples. Groundwater was encountered between 10 and 16 feet bgs. Samples were analyzed for VOCs, SVOCs, PCBs, TPH-GRO, TPH-DRO, TPH-ORO, and total metals. Although groundwater is not currently used for drinking water, as described in Section 4.0, results from groundwater samples were compared with IDNR SWS for Unprotected Groundwater.

The following exceedances of IDNR SWSs (IDNR 2022a) were observed in groundwater in least one sample:

- **VOCs**
    - 1,2,4-Trimethylbenzene (TMB) was reported above the IDNR SWS for Unprotected Groundwater.
    - Exceedance of 1,2,4-TMB SWS was only observed in the sample from B3.
- **SVOCs:**
    - Benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, dibenzofuran, indeno(1,2,3-cd)pyrene, and naphthalene were reported above the IDNR SWS for Unprotected Groundwater.
    - Exceedances of SVOCs SWSs were observed in all groundwater samples.
- **TPH**
    - TPH-DRO and TPH-GRO were reported above the IDNR SWS for Unprotected Groundwater.
    - Exceedances of TPH SWSs were only observed in the sample from B3.

- **Metals**
  - Concentrations of total arsenic, barium, cadmium, chromium, cobalt, lead, manganese, nickel, and vanadium in groundwater samples were reported above the IDNR SWS for Unprotected Groundwater.
  - Exceedances of metals SWSs were observed in all groundwater samples.
  - Groundwater samples for metals analysis were not filtered in the field. As a result, some component of the detected metals is likely from suspended sediment.

For this ABCA, the presence of metals in groundwater is not considered further. The City of Waterloo currently provides drinking water to the subject property and the rest of the city; therefore, presence of metals in groundwater at the subject property does not pose a risk for ingestion or dermal contact. Metals in groundwater also do not pose a risk for vapor intrusion to overlying buildings.

SVOCs in groundwater also are not considered further. The 2018 five-year review conducted for the Waterloo Coal Gasification Plant (EPA 2018) established that groundwater at the former manufactured gas plant continues to be contaminated with SVOCs and that the plume of SVOC-contaminated groundwater from the former manufactured gas plant extends onto the southern and southwestern parts of the subject property. The remedy for groundwater at the former manufactured gas plant is ICs with monitoring.

VOCs and TPH in groundwater, by contrast, are sources of potential vapor intrusion, unlike metals and SVOCs, where the primary risk is from ingestion or dermal contact.

5.1.3 Vapor Intrusion

As part of the completed Phase II ESA, the Toeroek Team collected nine soil-gas samples at locations collocated with nine of the ten soil samples (SG-B1 through SG-B9) at depths of 4 to 7 feet below ground surface (bgs) and ten sub-slab soil-gas samples collocated with ten indoor air samples. Samples were analyzed for VOCs. Additionally, an ambient air sample was collected to assess background air concentrations of VOCs. Results from soil-gas samples were compared to EPA VISLs and indoor air samples were compared to EPA RSLs (EPA 2022a, b). For both, a target hazard quotient of 0.1 and a target cancer risk of $1x10^{-6}$ were used.

Concentrations of naphthalene in soil-gas samples exceeded the EPA residential VISL in samples from B1, B2, and B3 in the western portion of the property.

In sub-slab soil-gas, no constituents exceeded the EPA industrial VISLs. The following constituents exceeded their respective EPA residential VISLs:

- **Benzene** at SS1, SS2, SS3 and SS7. SS1 through SS3 are under the western portion of the building in the historical Waterloo Canning area.
- **Naphthalene** at SS1.
- **Chloroform** at SS4.

Because Iowa has not established SWSs for indoor air, concentrations of VOCs in indoor air were compared to the EPA RSLs. Of the constituents detected in sub-slab soil vapor and nearby soil gas (that is, constituents likely to be derived from subsurface contamination in soil), benzene and naphthalene were detected in indoor air at concentrations exceeding industrial RSLs. Other VOCs were detected in indoor air at concentrations above residential RSLs (ethylbenzene, 2-propanol, and tetrachloroethene), but the lack of these constituents in concentrations that exceed VISLs in sub-slab soil vapor suggests a source from industrial chemicals inside the building.

Concentrations of benzene exceeded industrial RSLs in all indoor air samples. Concentrations of naphthalene exceeded industrial RSLs in samples from AI2, A13, AI4, AI5, and AI10. However, these concentrations were nearly identical to the concentration of naphthalene detected in outdoor air. As a result, benzene is the primary constituent of concern in ambient indoor air. The highest concentrations of benzene, by an order of magnitude, were detected in indoor air from AI1, AI2, AI3, and AI10, all located in the historical Waterloo Canning area. As described in Section 3, the Waterloo Canning area was the location of a gasoline house and tank in the early 20th century.

Benzene was not detected in groundwater collected during the 2022 Phase II ESA. Based on this pattern, it is likely that benzene in indoor air is derived largely from a source area, likely contaminated soil, under the former Waterloo Canning portion of building.

5.1.4 Asbestos-Containing Materials

During the ACM survey, the Toeroek Team collected 58 bulk samples of suspect ACM. The HMS report includes figures showing sample locations (Toeroek Team 2022b). Collections 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 by polarized light microscopy (PLM), and in some cases, 400 point count. AHERA defines ACM as any material or product that contains more than 1% asbestos.

The ACM survey identified the following regulated ACM:

- White pipe insulation (approximately 4,700 linear feet [LF])
- Green pipe insulation (approximately 300 LF)
- Heater insulation (approximately 1,700 SF)
- Black felt-wrapped (foam) pipe insulation (approximately 1,100 LF)
- Black door caulk on elevator doors (approximately 280 LF)
- Boiler insulation and scattered pipe debris (approximately 1,500 SF)
- Transite wall panels (approximately 4,450 SF)
- Black duct sealant (approximately 300 SF)
- Aircell pipe insulation (approximately 550 LF)
- Asphalt shingles (approximately 11,500 SF)
- White tank insulation (approximately 100 SF)
- Green 9- by 9-inch vinyl floor tile and black mastic (approximately 4,500 SF)
- Brown 12- by 12-inch vinyl floor tile and black mastic (approximately 120 SF)
- Silver-painted pipe insulation (approximately 200 LF)
- White door caulk on the west exterior loading dock door (approximately 8 LF)
- Corrugated transite roof and wall panels (approximately 2,500 SF)
- Old grey window caulk (approximately 30 LF)
- Grey/silver roofing tar (approximately 6,000 SF)
- White roofing caulk (approximately 60 LF)
- Roofing material (approximately 12,200 SF)
- White expansion joint on vertical seams (approximately 400 LF)

In addition, fire doors and elevator equipment observed throughout the building are assumed to be ACM. These locations were not sampled because of concerns with structural damage.

5.1.5 Lead-Based Paint

During the LBP survey, the Toeroek Team tested 696 surfaces in the subject property buildings using a handheld x-ray fluorescence (XRF) device. The HMS report includes figures showing LBP screening locations (Toeroek Team 2022b). The LBP survey accorded with protocols similar to the single-family housing inspection procedures in *Guidelines for the Evaluation and Control of LBP in Housing* (HUD Guidelines) (HUD 2012). HUD guidelines suggest that paint applied before 1978 may contain lead. HUD considers LBP as paint with lead levels above 1.0 milligram per square centimeter (mg/cm^2).

Approximately 2,194 SF of various colors of LBP on a variety of substrates and approximately 17,804 LF of various colors of LBP on piping were identified throughout the building.

5.1.6 Polychlorinated Biphenyls

During the hazardous materials survey, the Toeroek Team collected ten samples of suspected PCB-containing caulk material. The HMS report includes figures showing PCB sample locations (Toeroek Team 2022b). Collection of the samples accorded with EPA guidance. Upon completion of sampling activities, the bulk samples were sent for analysis for PCBs. EPA has set an action level of 50 parts per million (ppm) for PCBs in materials, and that was the benchmark used for the HMS. Laboratory results indicated that the sampled building materials did not contain a concentration of PCBs above 50 ppm. Therefore, PCBs are not addressed in this ABCA.

5.2 EVALUATION OF CLEANUP ALTERNATIVES FOR ENVIRONMENTAL MEDIA

Future use of the subject property is unknown; however, the current property owner has expressed preference for demolishing the building to allow redevelopment of the property. Evaluations of cleanup alternatives are based on the potential future use scenario at the subject property—residential and/or commercial development.

The Toeroek Team considered three alternatives for the site as a whole. As required by ABCA guidance, one of the alternatives considered is No Action. Because the current property owner is expected to enroll the subject property in Iowa LRP, evaluations took into account Iowa LRP procedural requirements.

Three cleanup alternatives options were evaluated for residential and/or commercial reuse: (1) no action; (2) soil management plan (SMP), vapor mitigation system, and ICs with O&M; and (3) soil excavation with off-site disposal, confirmation sampling, backfill, O&M, and ICs. Alternatives 2 and 3 can achieve clearance criteria under the Iowa LRP.

Costs that are common for all cleanup alternatives (not including no action alternatives) are not included in the evaluation cost estimates. For reference, fees associated with enrollment in the Iowa LRP include a $750 nonrefundable application fee and reimbursement of IDNR oversight, up to a maximum of $25,000. Because the application fee is identical for all cleanup alternatives and because the oversight costs are unknown, the costs for application to the LRP and oversight by IDNR are not included in any of the cost estimates when evaluating alternatives. These costs are included in the total costs for the recommended alternatives shown in Section 5.5. In addition, cost for actual building demolition and disposal of nonhazardous construction and demolition debris (C&D) is not included in any of the estimates. These costs are presumed to be addressed as part of the redevelopment cost estimate.

5.2.1 Alternative 1: No Action

Alternative 1 (No Action) is presented for baseline comparison, as required by ABCA guidance. This alternative would provide no containment, treatment, removal, or monitoring of contaminants.

Effectiveness

Because the no action alternative would not be protective of human health and the environment, it is not considered effective. Currently, concentrations of benzene in sub-slab vapor and indoor air suggest that volatile compounds in soil (more likely) or groundwater (less likely) may be entering the building. Concentrations of benzene in indoor air exceed EPA industrial RSLs, particularly in the western portions of the building (former Waterloo Canning area). If contaminated media (soil or groundwater) are not removed and if no vapor mitigation system is installed, indoor air in the current building or in future construction on the current building footprint likely will continue to be contaminated with benzene at concentrations above EPA industrial RSLs.

Implementation

Implementation of this alternative 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

This alternative would not involve any direct costs.

5.2.2 Alternative 2: Soil Management Plan, Vapor Mitigation, and Institutional Controls with Operations and Maintenance

This alternative would leave in place the contaminated soil or groundwater presumed to be under the current building, assuming that either the current building remains, or the new building is primarily slab-on-grade construction. Potential site receptors would protected from exposure to contaminated soil via dermal contact and incidental ingestion by the construction of the building itself. However, an SMP would be necessary to guide proper handling of soil at the subject property 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 to minimize administrative requirements.

A passive vapor mitigation system would be installed, consisting primarily of a vapor barrier. The barrier would prevent volatilization of VOCs from contaminated soil or groundwater in the current footprint of the building. This would either be installed in the current building or put in place during construction of the new building. For this ABCA, construction of a new building with the same building footprint of the old building is assumed, with an area of approximately 150,000 SF.

The vapor mitigation system would include a Terrashield barrier, which includes a dual metallized film, nitrile spray-applied core, and reinforced geotextile (Land Science 2022). Regular inspections, monitoring, and potential repairs or maintenance of the vapor mitigation system would be necessary as long as any overlying structure is occupied on the subject property and VOC contamination remains below the slab. ICs would be necessary to ensure (1) inclusion of a vapor intrusion mitigation system in design of any new structure to be built on the subject property and (2) continued integrity of that vapor intrusion mitigation system.

ICs also would be necessary to ensure that an SMP is in place to manage contaminated soils and maintain the existing pavement/building cover. ICs would be implemented in the form of a deed restriction/environmental covenant disallowing excavation in the current building footprint, where soil contaminated with VOCs may be present. ICs will also be required to ensure that contaminated groundwater at the subject property cannot be used as a drinking water source or for other uses such as landscape irrigation. These ICs would address the known contamination of groundwater at the subject property with VOCs, TPH, metals, and SVOCs and the possible contamination of groundwater with VOCs as seen in the sub-slab vapor.

O&M would be needed for routine inspections to ensure the ICs remain protective. These inspections would include indoor air sampling to confirm that the vapor barrier is preventing migration of organic vapors into the building and would be accompanied by an annual report.

Alternative 2 would allow redevelopment of the subject property as planned; however, ICs would be required in perpetuity as long as any VOC-contaminated soil or groundwater remains in place under the building footprint. Groundwater ICs would be required in perpetuity as long as groundwater contaminated metals, VOCs, SVOCs, and TPH remains at the subject property.

Effectiveness

Alternative 2 would be effective in limiting exposure of occupants to contamination in soil and groundwater and would allow residential and/or commercial redevelopment of the subject property. However, this alternative would leave impacted soil or groundwater in place. It would require long-term stewardship to ensure continuation of all restrictive measures over the life of the ICs and to assess O&M of the vapor barrier.

Implementation

An SMP and ICs would be easy to install. However, ICs would require long-term O&M; this ABCA assumes a 30-year life of the O&M. 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 and to prohibit use of groundwater at the subject property. In addition, a long-term stewardship plan would necessitate IDNR approval. This alternative would mandate annual inspections to ensure that site occupants comply with restrictive covenants.

A vapor intrusion mitigation system is a common remediation practice, and the materials, services, and equipment necessary for implementation are readily available; however, the vapor intrusion mitigation system would require routine inspections and potential repairs or maintenance until sub-slab and indoor air concentrations are below cleanup levels. In addition, air monitoring would be required to verify performance of the vapor mitigation system as intended. Any structure to be built on the subject property would be designed with a vapor mitigation system consisting of a Terrashield vapor barrier.

Cost

Table 1 provides a breakdown of the cost for Alternative 2. Development of the SMP is estimated at $20,000. Costs associated with the construction of a vapor barrier are estimated at $1,818,842.

Development of ICs is estimated at $32,084. Routine O&M sampling and inspections are estimated at $10,795 per year (in 2022 dollars) over a 30-year time period. A 30% contingency has also been applied to allow for unforeseen circumstances during the 30-year operating period. Estimated total cost of Alternative 2 in 2022 dollars is $2,594,000. Costs were estimated by applications of selected functions of Remedial Action Cost Engineering and Requirements System (RACER) Version 11.2.16.0 and professional judgment. Details of costs are in Appendix B.

TABLE 1

ENVIRONMENTAL MEDIA ALTERNATIVE 2 – TOTAL COSTS

Line Item	**Cost**	
Development of Soil Management Plan		$20,000
Installation of Terrashield vapor barrier		$1,818,842
Installation of Terrashield vapor barrier (150,000 SF at $9.49/SF)	$1,423,525	
Construction management and design	$288,705	
Project management	$86,612	
Development of Institutional Controls		$32,084
Prepare Land Use Controls Implementation Plan	$26,354	
Meetings with Agencies	$4,207	
Restrictive Covenant	$1,523	
On-going Operations and Maintenance (30 years at $10,795/year), with present value analysis		$188,000
Subtotal		**$1,995,676**
Contingency (30%)		$598,703
Total Alternative 2 Cost		**$2,594,000**

Notes:

SF Square feet

5.2.3 Alternative 3: Excavation with Off-site Disposal, Soil Management Plan, and Institutional Controls

The alternative would remove soil under the footprint of the current building that is likely contaminated with VOCs. The most likely source of benzene in sub-slab vapor under the building is an underground storage tank of petroleum products; as described in Section 3, the former Waterloo Canning building had a gasoline house and tank. Because of the lack of detections of benzene in groundwater from the property, this alternative focuses on the likelihood of contaminated soil as the likely source of contamination of indoor air. The highest exceedances of VISLs in sub-slab vapor and RSLs in indoor air are in the location of the former Waterloo Canning building, now the western portion of the greater Rath Building. The area of this portion of the building, based on historical fire insurance maps, roughly coincides with the area bounded by SS1, SS2, SS3, and SS10 and covers approximately 29,500 SF.

For this alternative, soil under the former Waterloo Canning portion of the building will be excavated to remove contaminated soil. This ABCA assumes excavation to a depth of 8 feet over the entire Waterloo Canning footprint (29,500 SF), after the building has been demolished. This is considered a conservative estimate, and the actual amount of soil that will be excavated to remove contaminated soil may be less than this volume. Additional investigation using geophysical methods such as ground penetrating radar may be able to narrow the focus of excavation by locating a buried tank. Confirmation samples will be collected to determine the actual excavation boundaries. For this ABCA, 15 samples for VOCs and TPH are assumed. Excavation will be extended until concentrations of VOCs in soil are below the IDNR SWSs for soil.

Soil will be excavated and sent offsite for disposal. The excavated soil will be contained in roll off containers on site pending waste characterization. Waste profiling for disposal will require sampling and analysis for toxicity characteristic leaching procedure (TCLP) VOCs. For the purposes of this estimate, excavated soil is expected to be characterized as nonhazardous waste and disposed of in a Subtitle D landfill. The excavation will be backfilled with clean fill. This ABCA assumes that 20% of the backfill will be derived from clean soil excavated onsite and the remainder from offsite. No site restoration or capping is estimated, as this will be part of the site redevelopment.

Potential site receptors would be protected from exposure to other contaminated soil (such as the subsurface soil at B2 and B5) by the overlying surface soil and pavement. However, an SMP would be necessary to guide proper handling of soil at the subject property 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 to minimize administrative requirements.

ICs will also be required to ensure that contaminated groundwater at the subject property cannot be used as a drinking water source or for other uses such as landscape irrigation. These ICs would address the known contamination of groundwater at the subject property with VOCs, TPH, metals, and SVOCs. Given the relatively simple nature of these ICs and the current source of drinking water, no O&M is estimate for these ICs.

Alternative 3 would allow redevelopment of the subject property as planned. Groundwater ICs would be required in perpetuity as long as contaminated groundwater remains at the subject property. However, no ongoing costs are associated with these ICs.

Effectiveness

Alternative 3 would be effective in limiting exposure of occupants to contamination in soil and groundwater, would remove the source of VOC contamination in indoor air, and would allow residential and/or commercial redevelopment of the subject property. It would require ICs to limit use of groundwater at the subject property, but with no ongoing O&M associated with these ICs.

Implementation

Alternative 3 would be moderately difficult to implement based on the depths of excavations required although not technically complex. Excavation of soil from the Waterloo Canning building footprint to a depth of 8 feet would generate approximately 8,740 cubic yards (CY) of waste soil for offsite disposal. However, the actual volume of soil may be less if a better estimate of the location of the source of contamination can be made following demolition of the building. Soil excavation by qualified equipment operators would accord with applicable state and federal regulations. The actual area of contamination is not expected to encompass the entire footprint of the former Waterloo Canning building, so some reuse of excavated soil as backfill is anticipated. This ABCA assumes that waste soil excavated during this process would either be used as backfill (20%) or disposed of off-site (80%) as nonhazardous waste. In addition, planning this process would require careful consideration of precautions concerning worker health and safety.

An SMP and ICs would be easy to implement. Implementation of ICs would include a restrictive covenant filed with the Register of Deeds to prohibit use of groundwater at the subject property.

Cost

Table 2 provides a breakdown of the cost for Alternative 3. Development of the SMP is estimated at $20,000. Costs associated with excavation, transportation, and disposal of soil are estimated at $1,328,371. Development of ICs is estimated at $32,084. A 30% contingency has also been applied to allow for unforeseen circumstances such as usability of excavated soil as backfill. Estimated total cost of Alternative 3 dollars is $1,795,000. Costs were estimated by applications of selected functions of Remedial Action Cost Engineering and Requirements System (RACER) Version 11.2.16.0 and professional judgment. Details of costs are in Appendix C.

TABLE 2

ENVIRONMENTAL MEDIA ALTERNATIVE 3 – TOTAL COSTS

Line Item	Cost	
Development of Soil Management Plan		$20,000
Excavation of soil		$1,328,371
Excavation of soil (29,500 SF to a depth of 8 feet)	$545,898	
Waste characterization	$13,710	
Off-site transportation and disposal of nonhazardous soil	$490,528	
Construction management and design	$214,027	
Project management	$64,208	
Development of Institutional Controls		$32,084
Prepare Land Use Controls Implementation Plan	$26,354	
Meetings with Agencies	$4,207	
Restrictive Covenant	$1,523	
Subtotal		**$1,380,455**
Contingency (30%)		$414,137
Total Alternative 3 Cost		**$1,795,000**

Notes:

SF Square feet

5.3 EVALUATION OF CLEANUP ALTERNATIVES FOR ASBESTOS-CONTAINING MATERIAL

The Toeroek Team has also developed three cleanup alternatives for ACM. Although demolition of the building is presumed for the site, the cleanup alternatives for ACM are developed to show alternatives for limited abatement of damaged ACM as well as demolition or removal of all hazardous materials. Three cleanup alternatives are required by ABCA guidance.

Regarding ACM, three options were evaluated: (1) no action; (2) abatement of friable and damaged asbestos and retention in place of all non-friable ACM under management specified in an O&M plan; and (3) abatement of all ACM wastes. Alternatives 2 and 3 are expected to achieve clearance criteria under IDNR requirements.

5.3.1 Alternative 1: No Action

Alternative 1 (No Action) would leave ACM in place at the subject property.

<u>Effectiveness</u>

This alternative would not be effective if the subject property building is 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 subject property building cannot proceed before proper abatement; therefore, demolition could not occur if this alternative would be selected. This alternative would also be ineffective in achieving the goal of reducing health risks.

Implementation

Implementation of this alternative 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

This alternative would not involve any direct costs.

5.3.2 Alternative 2: Abatement of Friable and Damaged Asbestos-Containing Material and Operations and Maintenance Plan

Alternative 2 would involve, prior to demolition or renovations, proper abatement of friable and damaged ACM identified in the subject property building. This alternative would leave non-friable and undamaged ACM in place at the subject property. The friable damaged ACM would require proper abatement by a licensed State of Iowa asbestos abatement contractor in accordance 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. However, prior to implementation of this alternative, all ACM would need to be reassessed for damage.

Effectiveness

This alternative would be effective regarding rehabilitation of the subject property building containing ACM. This alternative would also be effective in achieving the goal of reducing health risks and would allow for 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 this alternative would include leaving non-friable ACM in place and properly abating the other 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.

Abatement of friable and damaged ACM by a licensed State of Iowa asbestos abatement contractor 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 ACM and during demolition because of presence of co-located LBP. A RAP and Health and Safety Plan would address these regulations.

Cost

Table 3 provides a breakdown of abatement costs for ACM that was observed to be damaged or friable, and Table 4 provides total costs. Estimated cost of completing an O&M Plan described above would be $4,500. Estimated abatement costs for damaged ACM were gathered from local vendors. Costs per SF or LF are provided and include removal and disposal costs. Estimated cost for abatement of damaged ACM associated with the subject property building is $221,550. This estimate does not include restoration costs. Additional costs to be considered, particularly if the subject property would be enrolled in the Iowa LRP, 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. 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 $4,000. Estimated total cost of Alternative 2 is $240,550. This cost does not include re-inspections of ACM or any oversight fees for IDNR.

TABLE 3

ACM ALTERNATIVE 2 – ABATEMENT COSTS FOR FRIABLE AND DAMAGED MATERIALS

Material Description	Material Locations	Total Quantity	Cost/Unit ($/SF or $/LF)	Total Cost
White Pipe Insulation (Various Sizes)	Throughout	4,700 LF	$15	$70,500
Green Pipe Insulation	7th Floor – C71, C72	300 LF	$15	$4,500
Heater Insulation	5th and 7th Floors	1,700 SF	$15	$25,500
Black Felt-Wrapped (Foam) Pipe Insulation	Roofs, 7th Floor, and C51	1,100 LF	$15	$16,500
Boiler Insulation (Scattered Pipe Insulation Debris)	6th Floor – C64 Metal Boiler, C71, C72, B56, C51, G51	1,500 SF	$15	$22,500
Aircell Pipe Insulation	C51, E51, G22, Basement Boiler Room, East Abandoned Basement Bathroom	550 LF	$15	$8,250
White Tank Insulation	G22, CB1	100 SF	$15	$1,500
Green 9” x 9” Vinyl Floor Tile and Mastic	C22 – Lab Area	4,500 SF	$15	$67,500
Brown 12” x 12” Vinyl Floor Tile and Mastic	C22 – Lab Hallway	120 SF	$15	$1,800
Silver-Painted Pipe Insulation	C22 – Lab Area	200 LF	$15	$3,000
Total Damaged and Friable ACM Abatement Cost				**$221,550**

Notes:

ACM Asbestos-containing material
LF Linear feet
SF Square feet

TABLE 4

ACM ALTERNATIVE 2 – TOTAL COSTS

Line Item	Cost
Development of Operations and Maintenance Plan	$4,500
Abatement of damaged asbestos-containing material (ACM)	$221,550
Development of Remedial Action Plan	$3,500
Development of Quality Assurance Project Plan	$3,500
Final Abatement Report	$3,500
Oversight and clearance sampling	$4,000
Total Alternative 2 Cost	**$240,550**

5.3.3 Alternative 3: Abatement of all Asbestos-Containing Material

Alternative 3 would involve, prior to demolition or renovations, proper abatement of all ACM identified in the subject property building. Abatement by a licensed State of Iowa asbestos abatement contractor would 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 may conduct pre/post-abatement inspections (if required).

<u>Effectiveness</u>

Removal of all identified ACM under Alternative 3 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 subject property without restrictions pertaining to disturbance of ACM.

<u>Implementation</u>

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 because of presence of co-located LBP. A RAP and Health and Safety Plan would address these regulations.

<u>Cost</u>

Table 5 provides a breakdown of abatement costs for this alternative, and Table 6 provides total costs. Estimated abatement costs were gathered from local vendors. Costs per SF or LF are provided and include removal and disposal costs. Estimated cost for abatement of the ACM associated with the subject property building is $228,014. This estimate does not include restoration costs. Additional costs to be considered, particularly if the subject property would be enrolled in the Iowa LRP, 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. Estimated total cost of Alternative 3 is $243,514.

TABLE 5

ACM ALTERNATIVE 3 – ABATEMENT COSTS FOR ALL MATERIALS

Material Description	Material Locations	Estimated Quantity	Cost/Unit ($/SF or $/LF)	Total Cost
White Pipe Insulation (Various Sizes)	Throughout	4,700 LF	$15	$70,500
Green Pipe Insulation	7th Floor – C71, C72	300 LF	$15	$4,500
Heater Insulation	5th and 7th Floors	1,700 SF	$15	$25,500
Black Felt-Wrapped (Foam) Pipe Insulation	Roofs, 7th Floor, and C51	1,100 LF	$15	$16,500
Black Door Caulk	Elevator Door – All Floors	280 LF	$8	$2,240
Boiler Insulation (Scattered Pipe Insulation Debris)	6th Floor – C64 Metal Boiler, C71, C72, B56, C51, G51	1,500 SF	$15	$22,500
Transite Wall Panels	6th Floor – H Area Walls, E61	4,450 SF	$8	$35,600
Black Duct Sealant	6th Floor – G Area, A3, C64	300 SF	$10	$3,000
Aircell Pipe Insulation	C51, E51, G22, Basement Boiler Room, East Abandoned Basement Bathroom	550 LF	$15	$8,250
Asphalt Shingles	Upper Columns and Ceiling (B55), B53, C11	11,500 SF	$3	$34,500
White Tank Insulation	G22, CB1	100 SF	$15	$1,500
Green 9” x 9” Vinyl Floor Tile and Mastic	C22 – Lab Area	4,500 SF	$4	$18,000
Brown 12” x 12” Vinyl Floor Tile and Mastic	C22 – Lab Hallway	120 SF	$4	$480
Silver-Painted Pipe Insulation	C22 – Lab Area	200 LF	$15	$3,000
White Door Caulk	West Exterior Loading Dock Door	8 LF	$8	$64
Corrugated Transite Panels	Northwest Office Roof, Southwest Rail Dock Wall	2,500 SF	$8	$20,000
Old Grey Caulk	Exterior – North Street Level Windows	30 LF	$8	$240
Grey/Silver Roofing Tar	All Roofs	6,000 SF	$5	$30,000
White Roofing Caulk	Roof – A	60 LF	$8	$480
Roofing Material	Roof – E	12,200 SF	$4	$48,800
White Expansion Joint	Exterior – North A12 (Behind Metal Vertical Seams)	200 LF	$8	$1,600
Total ACM Abatement Cost				**$228,014**

Notes:

ACM Asbestos-containing material
LF Linear feet
SF Square feet

TABLE 6

ACM ALTERNATIVE 3 – TOTAL COSTS

Line Item	Cost
Abatement of asbestos-containing material (ACM)	$228,014
Development of Remedial Action Plan	$3,500
Development of Quality Assurance Project Plan	$3,500
Final Abatement Report	$3,500
Oversight and clearance sampling	$5,000
Total Alternative 3 Cost	**$243,514**

5.4 EVALUATION OF CLEANUP ALTERNATIVES FOR LEAD-BASED PAINT

The Toeroek Team has also developed three cleanup alternatives for LBP. Although demolition of the building is presumed for the site as a whole, the cleanup alternatives for LBP are developed to show alternatives for encapsulation as well as demolition or removal of all hazardous materials. Three cleanup alternatives are required by ABCA guidance.

Three cleanup alternatives were evaluated to address LBP found on structures associated with the subject property. These alternatives include: (1) no action, (2) removal through demolition, and (3) stabilization and encapsulation. Alternatives 2 and 3 are expected to achieve clearance criteria under the LRP. According to IDNR guidance, whole-building demolition debris is presumed a nonhazardous waste with regard to lead due to the relative bulk of other building material (IDNR 2022c). However, if only selected areas or structures are demolished, some disposal characterization testing is assumed before disposal of demolition waste to determine the appropriate landfill type to receive that waste. This would involve TCLP analysis of the demolition waste.

5.4.1 Alternative 1: No Action

Alternative 1 (No Action) would leave LBP in place at the subject property.

Effectiveness

This alternative would not be effective if the subject property building is demolished. Restrictions on proposed demolition of materials containing LBP (depending on condition of the LBP) would be necessary to ensure those materials remain undisturbed. This alternative would also be ineffective in achieving the goal of reducing health risks.

Implementation

Implementation of this alternative would be straightforward—leaving the LBP in place.

Cost

This alternative would not involve any direct costs.

5.4.2 Alternative 2: Lead-based Paint Removal by Demolition

Alternative 2 (LBP Removal by Demolition) includes removal (by demolition) for proper disposal. All surfaces/components that contain LBP determined to be in good condition can be removed/demolished and disposed of as demolition waste—assuming satisfactory results of a disposal characterization test via TCLP analysis prior to disposal of the demolition debris. For worker safety, application of removal/demolition techniques would be necessary in a manner that does not chip, shred, mulch, or mill the LBP. Under the future site use scenario for the subject property building (that is, demolition), this alternative is likely the most appropriate and economically feasible. Regulatory clearance would be obtained through successful implementation of a pre-approved RAP. Disposal of any materials not passing the TCLP analysis would have to occur as hazardous waste. Costs specified below assume previous removal of materials containing ACM.

This alternative is a direct approach because of removal of LBP without need for controls to manage LBP left in place prior to building demolition. Removal and off-site disposal of LBP-containing material as special (demolition) waste would occur.

Effectiveness

Removal of all identified LBP under Alternative 2 would effectively address the risk to human health posed by the LBP. This alternative would allow demolition of the subject property building without restrictions pertaining to disturbance and management of LBP.

Implementation

Abatement would accord with applicable state and federal regulations. Prior to disposal, characterization of selected demolition debris via TCLP analysis may be performed. Disposal of surfaces coated with LBP would occur with disposal of general building demolition debris as part of a whole-building demolition.

EPA, state, and OSHA requirements must be met during removal of ACM as described in Section 5.3. The Iowa RAP and Health and Safety Plan will address these regulations.

Cost

Table 7 provides total costs for this alternative. Estimated costs of this alternative were gathered from local vendors. Prior to disposal, characterization of selected demolition debris via TCLP analysis may be performed if demolition does not include the whole building. Assuming collection of five samples for TCLP analysis, estimated cost is $2,500. Additional costs to be considered, particularly if the subject property would be enrolled in the Iowa LRP, include those for three technical reports (RAP, QAPP, and Final Abatement Report). 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). Total cost of Alternative 2 is estimated at $13,000, which does not include costs of demolition and disposal. If the material is characterized to be hazardous waste, then additional disposal costs will be incurred.

TABLE 7

LBP ALTERNATIVE 2 – TOTAL COSTS

Line Item	**Cost**
Characterization of selected demolition materials (five samples at $500/sample)	$2,500
Development of Remedial Action Plan	$3,500
Development of Quality Assurance Project Plan	$3,500
Final Abatement Report	$3,500
Total Alternative 2 Cost	**$13,000**

5.4.3 Alternative 3: Lead-based Paint Stabilization and Application of Encapsulation

Alternative 3 includes stabilization of LBP in poor condition (chipping, flaking, etc.) and application of an encapsulant to all LBP surfaces. The encapsulant would be a durable, air- and dust-tight, surface coating material. Application of the encapsulant would ensure that LBP remaining could not leach to the surface and pose a threat to future occupants. In accordance with state regulations, the condition of LBP-containing surfaces should be inspected, and removal of loose (that is, chipping or flaking) LBP would be required. The removed LBP residue should be segregated for proper disposal. Based on findings of the subject property reconnaissance by the Toeroek Team, numerous surfaces would require stabilization to remove loose LBP.

Waste generation and amount of material sent for disposal would be less than under Alternative 2. Regulatory clearance would be obtained through successful implementation of a pre-approved RAP, a pre-approved QAPP, and pre-/post-encapsulation inspections by an Iowa-licensed LBP inspector or risk assessor. In addition, collection of dust-wipe samples in accordance with IDNR clearance regulations would be necessary after completion of all interior renovations to verify that all lead dust levels are below IDNR clearance levels.

Effectiveness

Encapsulation is a relatively simple process that does not significantly alter structural conditions. This alternative would allow redevelopment of the subject property; however, restrictions (ICs) would apply concerning future disturbance of LBP. In addition, filing an O&M Plan on the property's chain-of-title as an IC would be recommended.

Implementation

Stabilization and encapsulation by a licensed State of Iowa lead abatement contractor would accord with applicable state and federal regulations. Encapsulation is not a viable alternative for surfaces subject to impact or friction. Encapsulation requires follow-up inspections, maintenance, and possible building restrictions. Abatement by a registered lead abatement contractor would accord with applicable state and federal regulations. Segregation and proper disposal of LBP residue removed during stabilization activities (likely as hazardous waste) would be required. Because this technique can generate a hazardous waste stream, careful consideration of precautions concerning worker health and safety would be necessary.

Cost

Table 8 provides total costs for this alternative. Estimated costs were gathered from local vendors. Estimated cost of stabilization and encapsulating is $6.00 per SF or LF. Assuming all surfaces containing LBP would require stabilization/encapsulation, the cost of Alternative 3 is estimated at $120,000. Additional costs to be considered, particularly if the subject property would be enrolled in the Iowa LRP, include three technical reports (RAP, QAPP, and Final Abatement Report) and 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, estimated at $5,000, may vary depending on the abatement techniques applied. Estimated total cost for Alternative 3 is $135,500. It includes no restoration costs.

TABLE 8

LBP ALTERNATIVE 3 – TOTAL COSTS

Line Item	Cost
Stabilization and encapsulation of lead-based paint	$120,000
Development of Remedial Action Plan	$3,500
Development of Quality Assurance Project Plan	$3,500
Final Abatement Report	$3,500
Oversight and clearance sampling	$5,000
Total Alternative 3 Cost	**$135,500**

5.5 RECOMMENDED CLEANUP ALTERNATIVES

This section recommends cleanup alternatives for contaminated soil and groundwater, vapor intrusion, ACM, and LBP at the subject property.

5.5.1 Environmental Media

Alternative 3 (Excavation with Off-site Disposal and ICs) is the recommended cleanup alternative for environmental media, particularly if the building is demolished as anticipated. This alternative would remove the source of potential vapors to receptors at the subject property, and would allow redevelopment of the subject property as proposed without ongoing O&M requirements that would be associated with a vapor barrier. This alternative would achieve regulatory compliance and would allow residential and/or commercial redevelopment of the subject property. This alternative also would be the most cost-effective option to address vapor intrusion. The estimated costs assume that the entire footprint of the former Waterloo Canning building would be excavated to a depth of 8 feet. However, this volume might be reduced if the source area could be better isolated after the building is demolished. A restrictive covenant would be filed with the Register of Deeds to ensure that groundwater from the subject property continues not to be used for drinking or irrigation.

5.5.2 Asbestos-Containing Material

Alternative 3 (Abatement of ACM) is the recommended cleanup alternative for ACM. Future plans at the subject property include either substantial rehabilitation/renovation or demolition; therefore, removal of the identified ACM would be required prior to initiation of those activities.

5.5.3 Lead-Based Paint

Alternative 2 (LBP Removal by Demolition) is the recommended cleanup alternative for LBP identified at the subject property. Building materials containing LBP would be demolished and sent for disposal as demolition waste. This alternative could be implemented by general construction/demolition workers. Based on presence of lead, construction/demolition work must accord with OSHA guidelines for protection of workers.

5.5.4 Total Cleanup Cost

Table 9 summarizes total cleanup costs for the three recommended alternatives. Based on the recommended cleanup alternatives, estimated total cleanup cost is $2,077,264, or approximately $2,100,000, which includes site enrollment in the LRP and technical consulting fees. As stated above, costs for demolition of the building, site restoration, and any associated disposal costs for C&D wastes (including ACM and LBP) materials have not been included in this ABCA.

TABLE 9

SUMMARY OF COSTS FOR RECOMMENDED ALTERNATIVES

Contaminant / Material	Recommended Alternative	Action - Cost	Total Cost
Environmental Media	Alternative 3 – Excavation with Off-site Disposal and Institutional Controls (ICs)	Capital Cost – $1,528,371	$1,795,000
		ICs – $32,084	
		Contingency – $414,137	
Asbestos-containing Material (ACM)	Alternative 3 – Abatement of all ACM	Abatement – $228,014	$243,514
		Oversight and Clearance Sampling – $5,000	
		Technical Reporting – $10,500	
Lead-based Paint (LBP)	Alternative 2 – LBP Removal by Demolition	Waste Characterization Sampling and Analysis - $2,500	$13,000
		Technical Reporting – $10,500	
Iowa Land Recycling Application and Oversight			$25,750
Total Cost			**$2,077,264**
Total Cost Rounded to 2 Significant Figures			**$2,100,000**

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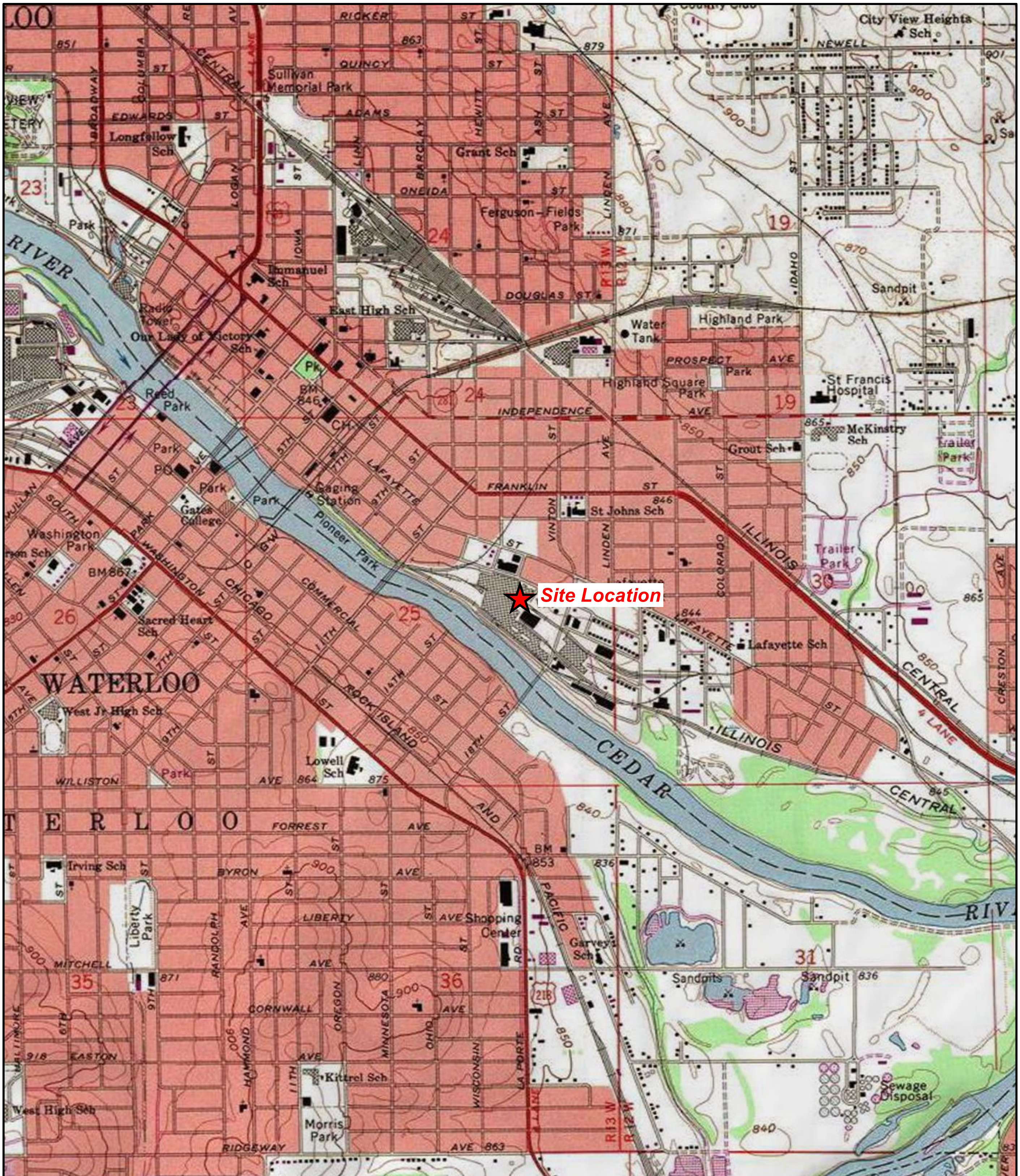
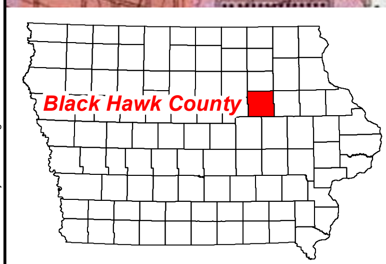
APPENDIX A

FIGURES





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0 1,000 2,000

Feet

Former Rath Buildings
1442, 1508, 1620, and 1656 Sycamore Street
Waterloo, Iowa

Figure 1
Site Location Map

TETRA TECH

TOEROEK ASSOCIATES, INC.

Source: USGS Waterloo North, IA 7.5 Minute Topo Quad, 1972; USGS Waterloo South, IA 7.5 Minute Topo Quad, 1972

Date: 8/26/2022 | Drawn By: Nick Wiederholt | Project No: 103Z65210190.010.02

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Legend

- DPT soil/groundwater/ soil-gas sample location
- Outdoor ambient air sample location
- Sub-slab soil gas/ indoor air sample location
- Approximate site boundary
- DPT Direct-push technology

Source: Esri, ArcGIS Online, World Imagery (Clarity)

Former Rath Buildings
1442, 1508, 1620, and 1656 Sycamore Street
Waterloo, Iowa

Figure 2
Sample Location Map

TETRA TECH
TOEROEK ASSOCIATES, INC.

Date: 8/26/2022 Drawn By: Nick Wiederholt Project No: 103Z65210190.010.02

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APPENDIX B

ENVIRONMENTAL MEDIA ALTERNATIVE 2 COST ESTIMATES

Appendix B
Remedial Alternatives Cost Estimates for Soil
Site 10 - Rath Buildings Site
Waterloo, Black Hawk County, Iowa

ALTERNATIVE 2
SOIL MANAGEMENT PLAN, PASSIVE VAPOR MITIGATION, O&M, AND ICs

Table B-2
Cost Summary
Alternative 2 - Soil Management Plan, Passive Vapor Mitigation, O&M, and ICs

Source	Description	Subtotal	Contingency	Total (Rounded)
Table B-3	Capital Cost	$ 1,818,842	$ 545,652	$ 2,364,000
Table B-4	Institutional Controls	$ 32,084	$ 9,625	$ 42,000
Tables B-5, B-9	Operation and Maintenance	$ 144,751	$ 43,425	$ 188,000

Contingency	30%		$ 598,702.83
Total			**$ 2,594,000**

Appendix B
Remedial Alternatives Cost Estimates for Soil
Site 10 - Rath Buildings Site
Waterloo, Black Hawk County, Iowa

Overhead and Profit (O&P)		
Means	15%	
RACER	35%	Assumed markup for costing purposes
Contractor quote	15%	Assumed prime contractor markup for costing purposes
Professional judgment	0%	
Inflation	3.15%	Avg. annual inflation from 2015 to 2022

Table B-3
Capital Cost
Alternative 2 - Soil Management Plan, Passive Vapor Mitigation, O&M, and ICs

Item	Description	Quantity	Unit	Source	Year	Unit Price	Unit Price (Incl. O&P and Inflation)	Total Cost
	Construction Subtotal							**$ 1,443,525**
	Soil Management Plan							**$ 20,000**
1	Soil Management Plan	1	ls	Professional judgment	2022	$ 20,000.00	$ 20,000.00	$ 20,000
	Passive Vapor Mitigation							**$ 1,423,525**
2	Vapor Mitigation Subcontractor (TerraShield)	150,000	sf	Contractor quote	2021	$ 8.00	$ 9.49	$ 1,423,525

Construction subtotal		$ 1,443,525
Construction management[1]	8%	$ 115,482
Remedial design[1,2]	12%	$ 173,223
Project management[1]	6%	$ 86,612
Capital Cost Subtotal		**$ 1,818,842**

Appendix B
Remedial Alternatives Cost Estimates for Soil
Site 10 - Rath Buildings Site
Waterloo, Black Hawk County, Iowa

Table B-4								
Institutional Controls								
Alternative 2 - Soil Management Plan, Passive Vapor Mitigation, O&M, and ICs								
Item	**Description**	**Quantity**	**Unit**	**Source**	**Year**	**Unit Price**	**Unit Price (Incl. O&P and Inflation)**	**Periodic Cost**
	Institutional Controls Subtotal							**$ 32,084**
	Prepare LUC Implementation Plan							**$ 26,354**
3	Project manager	22	hrs	RACER	2015	$ 74.72	$ 125.36	$ 2,758
4	Project engineer	30	hrs	RACER	2015	$ 54.69	$ 91.76	$ 2,753
5	Staff engineer	45	hrs	RACER	2015	$ 66.28	$ 111.20	$ 5,004
6	QA/QC officer	11	hrs	RACER	2015	$ 62.31	$ 104.54	$ 1,150
7	Word processing/clerical	60	hrs	RACER	2015	$ 33.64	$ 56.44	$ 3,386
8	Draftsman/CADD	30	hrs	RACER	2015	$ 36.07	$ 60.52	$ 1,816
9	Attorney, partner, real estate	22	hrs	RACER	2015	$ 239.59	$ 401.98	$ 8,844
10	Other direct costs	1	ls	RACER	2015	$ 383.09	$ 642.74	$ 643
	Meetings with Agencies							**$ 4,207**
11	Per diem (per person)	1	day	RACER	2015	$ 129.00	$ 216.43	$ 216
12	Project manager	20	hrs	RACER	2015	$ 74.72	$ 125.36	$ 2,507
13	Word processing/clerical	16	hrs	RACER	2015	$ 33.64	$ 56.44	$ 903
14	Draftsman/CADD	8	hrs	RACER	2015	$ 36.07	$ 60.52	$ 484
15	Other direct costs	1	ls	RACER	2015	$ 58.03	$ 97.36	$ 97
	Restrictive Covenant							**$ 1,523**
16	Overnight deliver, 8 oz letter	3	ea	RACER	2015	$ 18.85	$ 31.63	$ 95
17	Project manager	1	hrs	RACER	2015	$ 74.72	$ 125.36	$ 125
18	Word processing/clerical	3	hrs	RACER	2015	$ 33.64	$ 56.44	$ 169
19	Attorney, associate, real estate	3	hrs	RACER	2015	$ 169.05	$ 283.63	$ 851
20	Paralegal, real estate	3	hrs	RACER	2015	$ 49.18	$ 82.51	$ 248
21	Other direct costs	1	ls	RACER	2015	$ 20.76	$ 34.83	$ 35

Appendix B
Remedial Alternatives Cost Estimates for Soil
Site 10 - Rath Buildings Site
Waterloo, Black Hawk County, Iowa

Table B-5								
Operation and Maintenance								
Alternative 2 - Soil Management Plan, Passive Vapor Mitigation, O&M, and ICs								
Item	**Description**	**Quantity**	**Unit**	**Source**	**Year**	**Unit Price**	**Unit Price (Incl. O&P and Inflation)**	**Periodic Cost**
	O&M (cost per year)							**$ 10,795**
22	Sampling (indoor air)	1	ls	RACER	2015	$ 4,944.00	$ 8,294.94	$ 8,295
23	Reporting	1	ls	Professional Judgment	2022	$ 2,500.00	$ 2,500.00	$ 2,500

Notes:

Labor rates will be required to conform to the Davis-Bacon Act.

1	Based on "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study" (EPA 2000).
2	Remedial design includes developing plans and specifications, such as a remedial action work plan, design analysis, and construction cost estimating.
CADD	Computer-aided design
ea	Each
EPA	U.S. Environmental Protection Agency
hrs	Hours
IC	Institutional control
ls	Lump sum
LUC	Land use control
O&M	Operation and maintenance
O&P	Overhead and profit
QA/QC	Quality assurance/quality control
RACER	Remedial Action Cost Engineering and Requirements System
sf	Square foot

Reference:

EPA. 2000. "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study." EPA 540-R-00-002, Office of Solid Waste and Emergency Response 9355.0-75. July.

APPENDIX C

ENVIRONMENTAL MEDIA ALTERNATIVE 3 COST ESTIMATES

Appendix B
Remedial Alternatives Cost Estimates for Soil
Site 10 - Rath Buildings Site
Waterloo, Black Hawk County, Iowa

ALTERNATIVE 3
EXCAVATION WITH OFF-SITE DISPOSAL, SOIL MANAGEMENT PLAN, AND ICs

Table B-6
Cost Summary
Alternative 3 - Excavation with Off-Site Disposal, Soil Management Plan, and ICs

Source	Description	Subtotal	Contingency	Total (Rounded)
Table B-7	Capital Cost	$ 1,348,371	$ 404,511	$ 1,753,000
Table B-8	Institutional Controls	$ 32,084	$ 9,625	$ 42,000
--	Operation and Maintenance	$ -	$ -	$ -
	Contingency 30%	$ 1,380,455		$ 414,136.61
	Total			**$ 1,795,000**

Appendix B
Remedial Alternatives Cost Estimates for Soil
Site 10 - Rath Buildings Site
Waterloo, Black Hawk County, Iowa

Overhead and Profit (O&P)		
Means	15%	
RACER	35%	Assumed markup for costing purposes
Contractor quote	15%	Assumed prime contractor markup for costing purposes
Professional judgment	0%	
Inflation	3.15%	Avg. annual inflation from 2015 to 2022

Table B-7
Capital Cost
Alternative 3 - Excavation with Off-Site Disposal, Soil Management Plan, and ICs

Item	Description	Quantity	Unit	Source	Year	Unit Price	Unit Price (Incl. O&P and Inflation)	Total Cost
	Construction Subtotal							**$ 1,070,136**
	Soil Management Plan							**$ 20,000**
1	Soil Management Plan	1	ls	Professional judgment	2022	$ 20,000.00	$ 20,000.00	$ 20,000
	Excavation to 8 ft bgs (~8,740 CY)							**$ 545,898**
2	12 CY dump truck haul/hour	527	hrs	RACER	2015	$ 108.96	$ 182.81	$ 96,341
3	Excavate and load, bank measure, medium material, 3-1/2 CY bucket, hydraulic excavator	9,602	bcy	RACER	2015	$ 1.55	$ 2.60	$ 24,971
4	Unclassified fill, 6-inch lifts, off-site (includes delivery, spreading, and compaction)	8,834	cy	RACER	2015	$ 27.91	$ 46.83	$ 413,650
5	Disposable material per sample	75	ea	RACER	2015	$ 10.34	$ 17.35	$ 1,301
6	Testing, purgeable organics (624, 8260)	15	ea	RACER	2015	$ 163.35	$ 274.07	$ 4,111
7	Testing, total petroleum hydrocarbons (8015B)	15	ea	RACER	2015	$ 80.49	$ 135.04	$ 2,026
8	Project Manager	6	hrs	RACER	2015	$ 91.12	$ 152.88	$ 917
9	Project Scientist	15	hrs	RACER	2015	$ 75.99	$ 127.49	$ 1,912
10	QA/QC Officer	2	hrs	RACER	2015	$ 75.99	$ 127.49	$ 255
11	Field Technician	2	hrs	RACER	2015	$ 38.20	$ 64.09	$ 128
12	Word Processing/Clerical	2	hrs	RACER	2015	$ 41.02	$ 68.82	$ 138
13	Draftsman/CADD	2	hrs	RACER	2015	$ 43.99	$ 73.81	$ 148
	Waste Characterization							**$ 13,710**
14	Disposable material per sample	35	ea	RACER	2015	$ 10.34	$ 17.35	$ 607
15	Decontamination materials per sample	35	ea	RACER	2015	$ 14.35	$ 24.08	$ 843
16	TCLP, soil analysis	35	ea	RACER	2015	$ 89.10	$ 149.49	$ 5,232
17	Project Manager	3	hrs	RACER	2015	$ 91.12	$ 152.88	$ 459
18	Field Technician	46	hrs	RACER	2015	$ 38.20	$ 64.09	$ 2,948
19	Project Scientist	14	hrs	RACER	2015	$ 75.99	$ 127.49	$ 1,785
20	Overnight delivery service, 51 to 70 lb packages	180	lb	RACER	2015	$ 6.08	$ 10.20	$ 1,836
	Off-Site Transportation and Disposal (Non-Hazardous)							**$ 490,528**
21	Bulk solid waste loading into disposal vehicle or bulk disposal container	8,833	bcy	RACER	2015	$ 2.57	$ 4.31	$ 38,087
22	Transport bulk solid hazardous waste, maximum 20 CY (per mile)	3,536	mile	RACER	2015	$ 2.57	$ 4.31	$ 15,247
23	Waste stream evaluation fee, not including 50% rebate on 1st shipment	1	ea	RACER	2015	$ 49.50	$ 83.05	$ 83
24	32 ft dump truck, 6 mil liner, disposable	442	ea	RACER	2015	$ 25.48	$ 42.75	$ 18,895
25	Landfill non-hazardous solid bulk waste by CY	8,833	cy	RACER	2015	$ 28.22	$ 47.35	$ 418,216

Construction subtotal		$ 1,070,136
Construction management[1]	8%	$ 85,611
Remedial design[1,2]	12%	$ 128,416
Project management[1]	6%	$ 64,208
Capital Cost Subtotal		**$ 1,348,371**

Appendix B
Remedial Alternatives Cost Estimates for Soil
Site 10 - Rath Buildings Site
Waterloo, Black Hawk County, Iowa

Table B-8								
Institutional Controls								
Alternative 3 - Excavation with Off-Site Disposal, Soil Management Plan, and ICs								
Item	**Description**	**Quantity**	**Unit**	**Source**	**Year**	**Unit Price**	**Unit Price (Incl. O&P and Inflation)**	**Periodic Cost**
	Institutional Controls Subtotal							**$ 32,084**
	Prepare LUC Implementation Plan							**$ 26,354**
26	Project manager	22	hrs	RACER	2015	$ 74.72	$ 125.36	$ 2,758
27	Project engineer	30	hrs	RACER	2015	$ 54.69	$ 91.76	$ 2,753
28	Staff engineer	45	hrs	RACER	2015	$ 66.28	$ 111.20	$ 5,004
29	QA/QC officer	11	hrs	RACER	2015	$ 62.31	$ 104.54	$ 1,150
30	Word processing/clerical	60	hrs	RACER	2015	$ 33.64	$ 56.44	$ 3,386
31	Draftsman/CADD	30	hrs	RACER	2015	$ 36.07	$ 60.52	$ 1,816
32	Attorney, partner, real estate	22	hrs	RACER	2015	$ 239.59	$ 401.98	$ 8,844
33	Other direct costs	1	ls	RACER	2015	$ 383.09	$ 642.74	$ 643
	Meetings with Agencies							**$ 4,207**
34	Per diem (per person)	1	day	RACER	2015	$ 129.00	$ 216.43	$ 216
35	Project manager	20	hrs	RACER	2015	$ 74.72	$ 125.36	$ 2,507
36	Word processing/clerical	16	hrs	RACER	2015	$ 33.64	$ 56.44	$ 903
37	Draftsman/CADD	8	hrs	RACER	2015	$ 36.07	$ 60.52	$ 484
38	Other direct costs	1	ls	RACER	2015	$ 58.03	$ 97.36	$ 97
	Restrictive Covenant							**$ 1,523**
39	Overnight deliver, 8 oz letter	3	ea	RACER	2015	$ 18.85	$ 31.63	$ 95
40	Project manager	1	hrs	RACER	2015	$ 74.72	$ 125.36	$ 125
41	Word processing/clerical	3	hrs	RACER	2015	$ 33.64	$ 56.44	$ 169
42	Attorney, associate, real estate	3	hrs	RACER	2015	$ 169.05	$ 283.63	$ 851
43	Paralegal, real estate	3	hrs	RACER	2015	$ 49.18	$ 82.51	$ 248
44	Other direct costs	1	ls	RACER	2015	$ 20.76	$ 34.83	$ 35

bcy	Bank cubic yard
cy	Cubic yard
ea	Each
EPA	U.S. Environmental Protection Agency
hrs	Hours
ls	Lump sum
NA	Not applicable
O&P	Overhead and profit
RACER	Remedial Action Cost Engineering and Requirements System

Reference:

EPA. 2000. "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study." EPA 540-R-00-002, Office of Solid Waste and Emergency Response 9355.0-75. July.