FINAL

FOCUSED FEASIBILITY STUDY REPORT FOR

CONSTRUCTION DEBRIS SITES CC-IAAP-001 AND CC-IAAP-002

IOWA ARMY AMMUNITION PLANT

MIDDLETOWN, IOWA

August 2014

Prepared for:

ARMY CONTRACTING COMMAND - ROCK ISLAND
CCRC-IS
Rock Island, Illinois 61299-8000

Prepared by:

PIKA International, Inc.
12723 Capricorn Drive, Suite 500
Stafford, Texas 77477

TABLE OF CONTENTS

FIGURES

TABLES

APPENDICES

ACRONYM AND ABBREVIATIONS

ACM	Asbestos-Containing Material
AEC	Atomic Energy Commission
AO	American Ordnance, LLC
ARAR	Applicable or Relevant and Appropriate Requirements
BHHRA	Baseline Human Health Risk Assessment
CAA	Clean Air Act
CCRC-IS	Army Contracting Command - Rock Island
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COC	Contaminant of Concern
COPEC	Chemicals of Potential Ecological Concern
CWA	Clean Water Act
EO	Executive Order
FFA	Federal Facility Agreement
FFS	Focused Feasibility Study
FS	Feasibility Study
GRA	General Response Actions
HI	Hazard Index
HMTA	Hazardous Materials Transportation Act
IAAP	Iowa Army Ammunition Plant (used in site identifiers)
IAAAP	Iowa Army Ammunition Plant
ICs	Institutional Controls
IDNR	Iowa Department of Natural Resources
LAP	Load, Assemble, and Pack
LDR	Land Disposal Restriction
MFL	Million Fibers per Liter
MMRP	Military Munitions Response Program
NA	Not Applicable
NESHAP	National Emission Standards for Hazardous Air Pollutants
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
OSHA	Occupational Safety and Health Administration
OSR	Off-site Rule
PAH	Polynuclear Aromatic Hydrocarbons
PAL	Project Action Limit
PCBs	Polychlorinated Biphenyls
PIKA	PIKA International, Inc.
POTW	Publicly Owned Treatment Works
RAB	Restoration Advisory Board
RAGS	Risk Assessment Guidance for Superfund
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
RML	Removal Management Levels
SARA	Superfund Amendments and Reauthorization Act
SDWA	Safe Drinking Water Act
SLERA	Screening-Level Ecological Risk Assessment
SVOC	Semi-Volatile Organic Compound
TSCA	Toxic Substances Control Act of 1976

ACRONYM AND ABBREVIATIONS (CONTINUED)

µg/L	Micrograms per Liter
USC	Unites States Code
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound

1.0 EXECUTIVE SUMMARY

This Feasibility Study (FS) Report was prepared by PIKA International, Inc. (PIKA) on behalf of the Iowa Army Ammunition Plant (IAAAP) in Middletown, IA under Contract No. W52P1J-12-C-0025, Modification P00003, dated 3 April 2014, with the Army Contracting Command - Rock Island (CCRC-IS). This report was prepared in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the IAAAP Federal Facility Agreement (FFA).

This FS has been developed following the findings and recommendations in the Final Remedial Investigation (RI) Report (PIKA, 2014). The FS was conducted specifically to address the removal action at Site CC-IAAP-002 and to achieve site closure for Site CC-IAAP-001 and Site CC-IAAP-002 at the IAAAP. The purpose of this FS is to develop and evaluate remedial alternatives for the removal of asbestos containing material (ACM) debris piles located within Site CC-IAAP-002. This RI/FS was conducted in accordance with United States Environmental Protection Agency (USEPA) and Military Munitions Response Program (MMRP) guidelines.

During the RI conducted at Sites CC-IAAP-001 and CC-IAAP-002, samples were collected from surface soil, subsurface soil, sediment, groundwater and surface water. The samples were analyzed for explosives, metals, hexavalent chromium, semi-volatile organic compounds (SVOCs), polynuclear aromatic hydrocarbons (PAHs), volatile organic compounds (VOCs), pesticides, herbicides, polychlorinated biphenyls (PCBs), and asbestos. The RI findings indicate that concentrations of detected metals and SVOCs remaining at the two sites do not pose a risk to human health or the environment. However, the presence of ACM debris piles at Site CC-IAAP-002 does present a potential risk of future exposure to friable asbestos. Degradation of the ACM over time will create a pathway for potential exposure to friable asbestos, subsequently creating a risk to human health or the environment. The RI recommended the removal of the ACM debris pile to eliminate this future potential risk.

This FS evaluated several alternatives that could achieve the remedial goals. These included, the “No Action” alternative, security fencing with land use controls followed by long-term monitoring, encapsulation or capping with land use controls followed by long-term monitoring, and the removal and disposal of the ACM debris piles to an off-site facility. Following the evaluation of these alternatives, the removal and disposal alternative was selected based on its overall performance, its compliance with the established applicable or relevant and appropriate requirements (ARARs), and because it provides the best option to eliminate the risk of future exposure to friable asbestos which in turn offers the best protection of human health and the environment over the long term by eliminating the source of contamination.

2.0 INTRODUCTION

This Feasibility Study (FS) Report was prepared by PIKA International, Inc. (PIKA) on behalf of the Iowa Army Ammunition Plant (IAAAP) in Middletown, IA under Contract No. W52P1J-12-C-0025, Modification P00001, dated 16 July 2012 with the Army Contracting Command - Rock Island (CCRC-IS). This Report was prepared in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the IAAAP Federal Facility Agreement (FFA).

2.1 Purpose and Organization

The purpose of this FS report is to develop and assess potential remedial alternatives to address the unacceptable risks to human health and the environment due to the presence of the ACM debris piles at Site CC-IAAP-002 within the IAAAP. This study examines a limited number of alternatives selected based on their effectiveness at addressing the specific potential risk posed by the ACM debris pile and, therefore, is termed a Focused Feasibility Study (FFS).

This report is organized as follows:

- Section 1, Executive Summary, summarizes the FFS, discusses the evaluation of potential remedial alternatives, and discusses the recommended alternative selected.
- Section 2, Introduction, includes the purpose of the FFS report and the organization of this document. It also discusses the site background, summarizes the previous investigations, the nature and extent of the contamination, and the risk assessment for each site.
- Section 3, Project Remedial Action Objectives, identifies the remedial action objectives and lists the Applicable or Relevant and Appropriate Requirements (ARARs).
- Section 4, Development and Analysis of Alternatives, introduces the screening process for the selection of alternatives intended to address the potential exposure from the ACM debris piles. Each alternative is discussed in brief.
- Section 5, Detailed Analysis of Alternatives, evaluates each of the selected alternatives against the nine criteria listed in Section 300.430 (e)(9)(iii) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This section also recommends the best combination of screened alternatives.
- Section 6, References, lists the sources used in this document.
- Appendix A, Detailed Cost Estimates for Selected Alternatives, provides a breakdown of costs associated with each alternative.

2.2 Site Background

This section presents the available information for the installation and each of the two construction debris sites including observations regarding topography, physical features, and site drainage.

2.1.1 Installation Background

The IAAAP is located in the southeastern part of Iowa, near the town of Middletown, Des Moines County, approximately 10 miles west of the Mississippi River. Figure 2-1 shows the location of the IAAAP in southeastern Iowa and Figure 2-2 identifies the location of the two sites with respect to Line 2 and each other within the IAAAP. The IAAAP is a secured facility covering approximately 19,000 acres in a rural setting. Approximately 7,750 acres are currently leased for agricultural use, 7,500 acres are forested land, and the remaining area is used for administrative and industrial operations. The principal mission of IAAAP has been load, assemble, and pack (LAP) operations dealing with a variety of conventional ammunition and fusing systems.

IAAAP was initially developed in 1941 for the production of supplies for World War II and operated from September 1941 until August 1945. Production was resumed in 1949 and has continued to the present. Also, from 1946 to 1950, nitrogen fertilizer was produced at Line 8. From 1947 through mid-1975, the former Atomic Energy Commission (AEC) occupied facilities on the site, which then reverted to Army control in 1975 (Ecology and Environment, Inc., 1987 in JAYCOR, 1996). Currently, IAAAP is a government facility, owned by the United States Army and operated by a private contractor, American Ordnance, LLC (AO).

2.1.1.1 Construction Debris Site 001 (CC-IAAP-001)

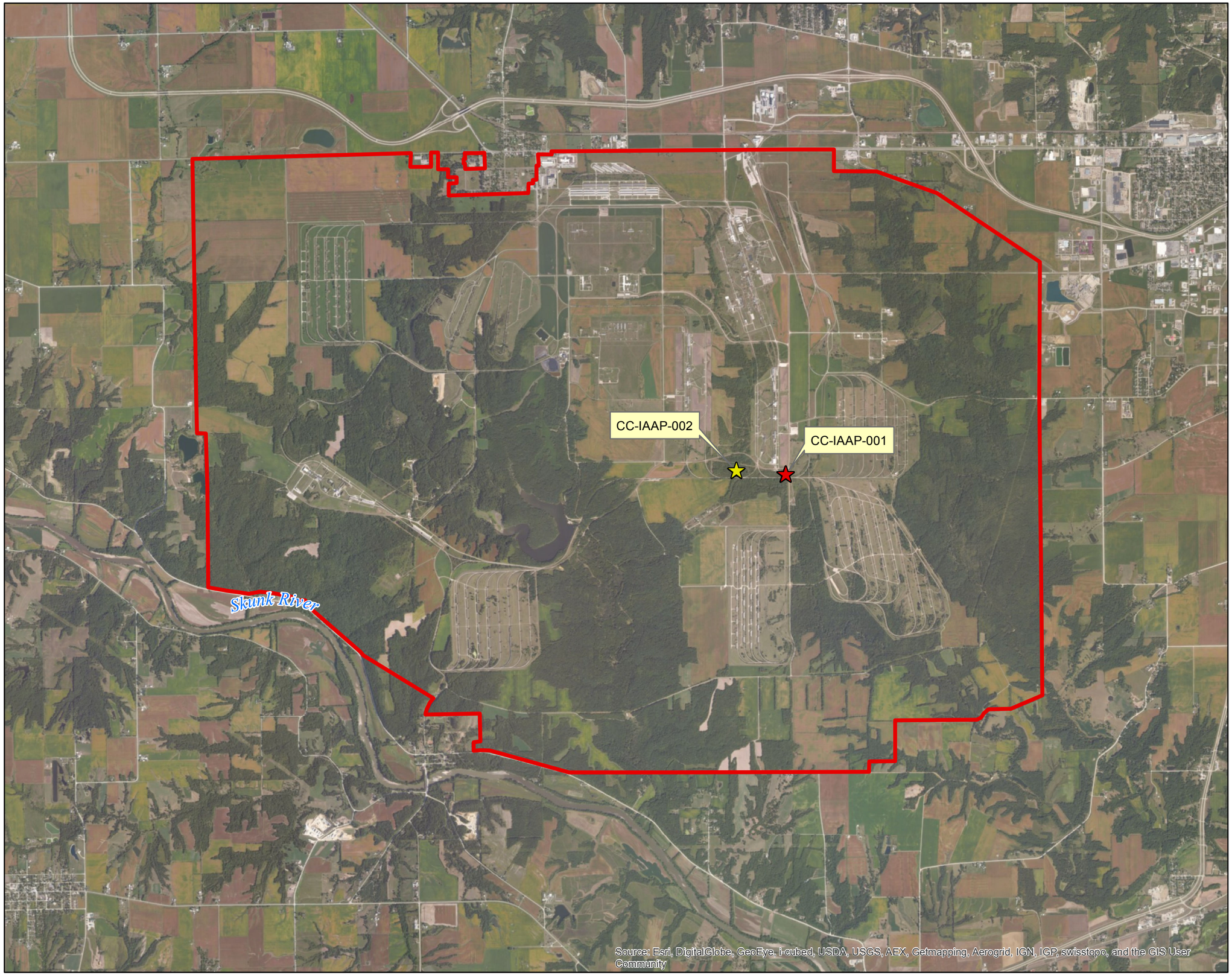
CC-IAAP-001 was discovered in October 2007 at the intersection of roads H and A during work on a water line along Road H (Figure 2-3). The site is bounded by a curving railroad spur that crosses Road H at the south end of the site and Road I at the northeast end of the site. The site slopes from north to south with steep embankments along Road H and the railroad spur. An unnamed drainage way bisects the site and flows from Road I, parallel to Road H, to the railroad spur at the south end of the site. The drainage exits the site through a culvert under the railroad spur approximately 50 feet west of Road H. The discharge from the intermittent drainage ditch eventually discharges into Brush Creek.

The site is moderately vegetated with small trees present in the western portion of the site. The site was used to discard construction and demolition debris. Debris is visible in several eroded areas along the steep embankment adjacent to Road H. Surface debris also exists along the drainage located at the base of the embankment along Road H. Visible debris includes scattered bricks, corrugated metal, metal parts, wire, and metal banding.

2.1.1.2 Construction Debris Site 002 (CC-IAAP-002)

CC-IAAP-002 was discovered by recreational users in March 2009 along a tributary to Brush Creek in a forested area south of Line 2 (Figure 2-4). The site was used to discard construction and demolition materials including sheets of metal, bricks, corrugated transite roofing/siding, wire, buckets, and wood. The debris was placed along the banks of an intermittent, unnamed drainage which discharges to Brush Creek. The end of the debris lies approximately 100-200 feet from the confluence with Brush Creek.

Surface water runoff follows the topography of the site and flows from the southwest to the northeast where it joins Brush Creek in the vicinity of a utility right-of-way. There is no vehicle access to the site. The area surrounding the site is heavily wooded with medium to large trees and an understory of moderately thick brush.

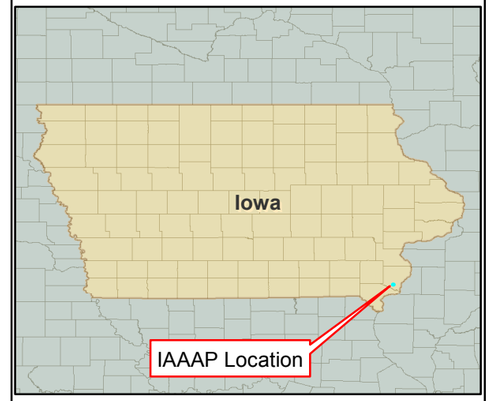


Iowa Army Ammunition Plant
Middletown, Iowa

LEGEND

- Site Boundary
- CC-IAAP-001 Construction Debris Site 1
- CC-IAAP-002 Construction Debris Site 2

LOCATION MAP



TITLE

Site Location Map

NOTES & SOURCES

Data Sources: ESRI

0 3,000 6,000 Feet

N

PIKA INTERNATIONAL, INC.

FIGURE 2-1

Path: S:\05-26-2011\IAAAP RI for CD Sites (OU-001 & 002)\GIS\Data For IAAAP RI for CD Sites (OU-001 & 002)\IAAAP_02_01_11X17.mxd

Iowa Army Ammunition Plant
Middletown, Iowa

LEGEND

- CC-IAAP-001, Construction Debris Site 1
- CC-IAAP-002, Construction Debris Site 2
- Creek
- Plant Roads
- RailRoad

LOCATION MAP

NOTES & SOURCES

Data Sources: ESRI

TITLE

Construction Debris
Site Location Map

0 800 Feet

N

PIKA INTERNATIONAL, INC.

FIGURE
2-2

Path: S:\05-26-2011\IAAAP RI for CD Sites (OU-001 & 002)\GIS\Data For IAAAP RI for CD Sites (OU-001 & 002)\Figure 2_2_Locationmap_22OCT13.mxd

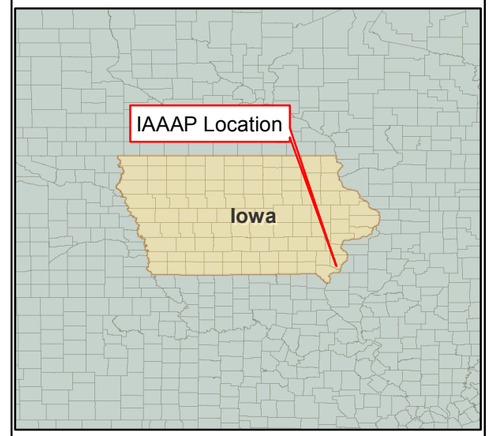
Iowa Army Ammunition Plant
Middletown, Iowa
Construction Debris Site 1

LEGEND

Legend

Site Boundary

LOCATION MAP



TITLE

CC-IAAP-001
Site Boundaries

NOTES & SOURCES

Data Sources: ESRI

Feet
0 10 20 40 60

1 in = 35 ft

N

PIKA INTERNATIONAL, INC.

FIGURE
2-3

Path: S:\05-26-2011\IAAAP RI for CD Sites (OU-001 & 002)\GIS\Data For IAAAP RI for CD Sites (OU-001 & 002)\IAAAP_01_11X17.mxd

ACM Debris Pile located centrally within CC-IAAP-002 (looking east from ACM3)

ACM Debris Pile located centrally within CC-IAAP-002 (looking west from ACM3)

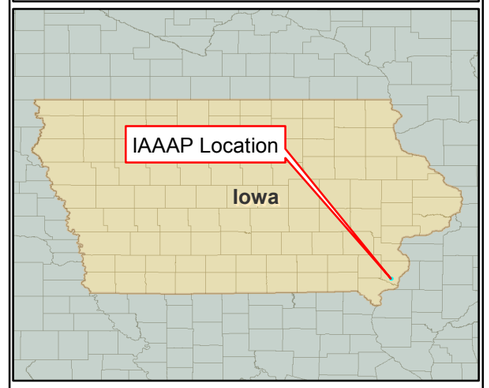
Iowa Army Ammunition Plant
Middletown, Iowa
Construction Debris Site 2

LEGEND

- Site Boundary
- Debris Pile
- Creek

* No surface water present on site

LOCATION MAP



TITLE

CC-IAAP-002
Site Boundaries and
Debris Pile Locations

NOTES & SOURCES

Data Sources: ESRI

0 10 20 40 60 Feet

1 in = 37 ft

N

PIKA INTERNATIONAL, INC.

FIGURE 2-4

Path: S:\05-26-2011\IAAAP RI for CD Sites (OU-001 & 002)\GIS\Data For IAAAP RI for CD Sites (OU-001 & 002)\IAAAP_02_11X17.mxd

2.3 Previous Investigations

A Remedial Investigation (RI) was conducted at the two construction debris sites by PIKA in 2013 to identify the areas of potential contamination at two construction debris sites, CC-IAAP-001 and CC-IAAP-002, at the IAAAP. Samples were collected from soil, surface water, sediments, and groundwater. Target analytes included explosives, metals, hexavalent chromium, semi-volatile organic compounds (SVOCs), polynuclear aromatic hydrocarbons (PAHs), volatile organic compounds (VOCs), pesticides, herbicides, polychlorinated biphenyls (PCBs), and asbestos. In addition, radiological; visual and instrument aided observations; and geological and analog geophysical investigations were also conducted at both sites to identify and delineate areas of potential contamination or debris.

RI activities at CC-IAAP-001 included five soil borings, seven site characterization borings, and four temporary well borings of which three yielded groundwater for sampling. The five soil borings and four temporary well borings were used to characterize the nature of chemicals of potential concern (COPC) at the sites. The seven site characterization boreholes were completed to identify and delineate the site boundary of extent of fill material (if present). The temporary borings were installed between June 11 and June 16, 2013. A total of seven surface soil samples, four sediment samples, 15 subsurface samples, three surface water samples, and three ground water samples were collected. The temporary groundwater wells were abandoned between June 16 and June 18, 2013 (following Iowa Administrative Code 7/2/08, Chapter 39, p.1). An analog geophysical investigation was performed using a Schonstedt magnetometer. The Schonstedt was scanned along linear tracks in the investigation area to identify areas of metal debris. The analog geophysical investigation identified three areas of metal debris along the southern edge of the site. The debris was attributed to scrap metal originating from maintenance the rail tracks and construction debris. No ordnance or radiological wastes were identified during the investigation of CC-IAAP-001.

Activities at CC-IAAP-002 included four soil borings, six site characterization borings, and three temporary well borings which all yielded groundwater for sampling. The four soil borings and three temporary well borings were used to characterize the nature of chemicals of potential concern (COPC) at the sites. The six site characterization boreholes were completed to identify and delineate the site boundary of extent of fill material (if present). The temporary borings were installed between June 14 and June 18, 2013. A total of six surface soil samples, three sediment samples, 12 subsurface samples, three ground water samples, and four ACM samples were collected at CC-IAAP-002. The temporary groundwater wells were abandoned between June 18 and June 20, 2013 (following Iowa Administrative Code 7/2/08, Chapter 39, p.1).

The investigation concluded that CC-IAAP-002 was used to discard construction and demolition materials including sheets of metal, bricks, corrugated transite roofing/siding, wire, buckets, and wood. The debris was placed along the banks of an intermittent, unnamed wash which discharges to Brush Creek. The end of the largest debris pile is approximately 100-200 feet from

the confluence of the wash with Brush Creek. No ordnance or radiological wastes were identified at CC-IAAP-002 during the RI.

2.4 Nature and Extent of Contamination

The nature and extent of contamination of four media were investigated at CC-IAAP-001: soil, sediment, surface water, and groundwater. Seven metals (arsenic, barium, cadmium, total chromium, hexavalent chromium, lead, and selenium) and one pesticide (endrin aldehyde) exceeded their respective project action limit (PALs) or background concentrations.

- Soil - metals (arsenic, barium, cadmium, total chromium, lead, and selenium) and one pesticide (endrin aldehyde) exceeded their respective PALs or background concentrations.
- Sediment - metals (arsenic, barium, total chromium, and selenium) exceeded their respective PALs.
- Surface Water - metals (total and dissolved arsenic; total and dissolved barium; total hexavalent chromium, and total selenium) exceeded their respective PALs.
- Groundwater - metals (total and dissolved arsenic, total chromium, total hexavalent chromium, and total lead) exceeded their respective PALs.

At CC-IAAP-002 seven metals (arsenic, barium, cadmium, total chromium, hexavalent chromium, lead, and selenium) and 13 SVOCs (acenaphthene, acenaphthylene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, chrysene, dibenzo(a,h)anthracene, fluoranthene, indeno(1,2,3-cd)pyrene, phenanthrene, and pyrene) exceeded their respective PALs or background concentrations.

- Soils - metals (arsenic, barium, total chromium, lead, and selenium) exceeded their respective PALs or background concentrations.
- Sediment - metals (arsenic, barium, total chromium, lead, and selenium) and 13 SVOCs (acenaphthene, acenaphthylene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, chrysene, dibenzo(a,h)anthracene, fluoranthene, indeno(1,2,3-cd)pyrene, phenanthrene, and pyrene) exceeded their respective PALs or background concentrations.
- Groundwater - metals (total and dissolved arsenic, total chromium, and total hexavalent chromium) exceeded their respective PALs.

Metals concentrations in surface and subsurface soils at both sites are within the range of background samples collected across the installation, with the exception of selenium. All soil, sediment, and water samples from both sites were scanned for radiation using a multi-spectrum detector (i.e. alpha/beta/gamma). The radiation measurements indicated all radiation levels were within normal background levels.

All soil and water samples collected from CC-IAAP-001 and CC-IAAP-002 were analyzed for asbestos. Asbestos was not detected in any of the samples from either site. A visual inspection of both sites was conducted by an Iowa licensed asbestos inspector. The visual inspection of CC-IAAP-001 identified no suspect ACM in the surface soil or in any of the soil boring cores. The visual inspection of CC-IAAP-002 identified three distinct areas of suspect ACM. Samples were collected of the cement panels and asbestos (chrysotile) was detected in all four samples. ACM was not identified in the surface soil or in any of the soil boring cores at CC-IAAP-002.

Following the above investigation and findings, no remedial actions were recommended at CC-IAAP-001. However, a recommendation to remove the ACM debris piles located at CC-IAAP-002 was made. The outline of the ACM debris piles is shown in Figure 2-4.

2.5 Risk Assessment

A Baseline Human Health Risk Assessments (BHHRAs) and Screening-Level Ecological Risk Assessments (SLERAs) were prepared for the two sites (CC-IAAP-001 and CC-IAAP-002). The BHHRA was consistent with the framework for risk assessment described in Risk Assessment Guidance for Superfund (*RAGS)* (United States Environmental Protection Agency [USEPA], 1989) and the SLERA was completed in accordance with The Superfund Guidance "*Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments"* (USEPA, 1997). The results of the risk assessments are included in the *Final Remedial Investigation Report for Construction Debris Sites CC-IAAP-001 AND CC-IAAP-002, Iowa Army Ammunition Plant, Middleton, Iowa* (PIKA, 2014).

The objective of the BHHRAs is to quantify the human health risks associated with potential exposures to site-related constituents under current and reasonably foreseeable future land use conditions, in the absence of any remedial actions. The objective of the SLERAs is to assess the potential for site-related chemicals of potential ecological concern (COPECs) in environmental media to adversely affect ecological receptors.

2.5.1 BHHRA at CC-IAAP-001

Consistent with the current and foreseeable future land use, the BHHRA has evaluated potential exposures to surface soil, subsurface soil, groundwater, and surface water for current and future hunters, future outdoor workers, and future construction workers. This evaluation was performed using conservative exposure assumptions, which represent very conservative estimates of potential site exposure. The conclusions of the BHHRA can be summarized as follows:

- The cancer risk estimates for the current adolescent hunter, current adult hunter, future adolescent hunter, future adult hunter, future commercial industrial worker, and future construction worker are within or below the Superfund acceptable risk range.
- The non-cancer Hazard Index (HI) estimates for the current adolescent hunter, current adult hunter, future adolescent hunter, future adult hunter, future commercial industrial

worker, and future construction worker are below a value of 1.
- Predicted blood lead level concentrations for the future commercial/industrial worker are below USEPA criteria.

Based on this evaluation, response actions are not recommended for CC-IAAP-001.

2.5.2 BHHRA at CC-IAAP-002

Consistent with the current and foreseeable future land use, the BHHRA has evaluated potential exposures to surface soil, subsurface soil, groundwater, and surface water for current and future hunters, future outdoor workers, and future construction workers.

This evaluation was performed using conservative exposure assumptions, which represent the very conservative estimates of potential site exposure. The conclusions of the BHHRA can be summarized as follows:

- The cancer risk estimates for the current adolescent hunter, current adult hunter, future adolescent hunter, future adult hunter, future commercial industrial worker, and future construction worker are within or below the Superfund acceptable risk range.
- The non-cancer HI estimates for the current adolescent hunter, current adult hunter, future adolescent hunter, future adult hunter, future commercial industrial worker, and future construction worker are below a value of 1.

Based on this evaluation, response actions are not recommended for CC-IAAP-002.

2.5.3 SLERA at CC-IAAP-001

This SLERA of construction debris site CC-IAAP-001 evaluated the potential for chemical constituents of concern detected in surface soil, surface water, and sediment to adversely affect ecological receptors. This SLERA followed the approach outlined in *Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments* (USEPA, 1997). In accordance with this Process Document, the SLERA identified complete exposure pathways and conducted a conservative assessment of all COPECs.

Based on the screening level risk estimate and considering the conservative nature of screening level ecological risk assessment tools:

- Risks to ecological receptors (including Indiana bat) from constituents in CC-IAAP-001 surface soil are likely negligible.
- Risks to ecological receptors (including Indiana bat) from constituents in CC-IAAP-001 surface water are likely negligible.
- Risks to ecological receptors (including Indiana bat) from constituents in CC-IAAP-001 sediment are likely negligible.

No further evaluation of risk to ecological receptors in CC-IAAP-001 is necessary.

2.5.4 SLERA at CC-IAAP-002

This SLERA of construction debris site CC-IAAP-002 evaluated the potential for chemical constituents of concern detected in surface soil and sediment to adversely affect ecological receptors. This SLERA followed the approach outlined in Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments (USEPA, 1997). In accordance with this Process Document, the SLERA identified complete exposure pathways and conducted a conservative assessment of all COPECs.

Based on the screening level risk estimate and considering the conservative nature of screening level ecological risk assessment tools:

- Risks to ecological receptors (including Indiana bat) from constituents in CC-IAAP-002 surface soil are likely negligible;
- Risks to ecological receptors (including Indiana bat) from constituents in CC-IAAP-002 sediment are likely negligible.

No further evaluation of risk to ecological receptors in CC-IAAP-002 is necessary.

2.5.5 Risk Assessment Conclusions

The results of the BHHRA indicate that cancer and non-cancer risks associated with surface soil sediment and groundwater at either site do not exceed USEPA risk management thresholds and, therefore, no response actions to mitigate cancer and non-cancer risks are required for these media. The results of the SLERA indicate that risks to ecological receptors are negligible. Therefore, no action for chemical contaminants is recommended at either site.

The extent of ACM is limited to the roofing material in debris piles located within CC-IAAP-002. However, there are several areas within the debris piles where the roofing material has disintegrated due to exposure to the elements. The ACM poses a threat of exposure to friable asbestos.

3.0 PROJECT REMEDIAL ACTION OBJECTIVES

This section discusses the remediation goals and identifies the ARARs.

3.1 Remediation Goals

The data obtained from the analysis of samples collected and visual observations made during the RI at Site CC-IAAP-001 and Site CC-IAAP-002 indicate that the contamination, as discussed in Section 2.4 above, does not pose a risk to human health or the environment. The presence of ACM debris piles at Site CC-IAAP-002, however, does present the potential for future exposure to friable asbestos.

Based on the findings of the RI, the following remediation goals specific to site CC-IAAP-002 were identified:

- Eliminate the potential for future exposure to the ACM debris piles in Site CC-IAAP-002; and

- Obtain closure certification – no further action (NFA) for both sites.

To achieve the remediation goals the following alternatives were selected for evaluation in this FS.

Alternative 1 - No Action

Under this alternative, the site would remain in its present condition with periodic inspections to document any changes in site conditions that might affect the condition of the ACM debris piles.

Alternative 2 – Security Fencing with Land Use Controls and Long-Term Monitoring

This alternative involves the placement of a barbed wire fence around the debris piles. Security fencing would limit access to the site and signs would be posted to warn of potential hazards.

Alternative 3 – Encapsulation/ Capping with Land Use Controls and Long-Term Monitoring

This alternative involves the placement of a two foot thick “cap” of clean fill material over the ACM debris piles with a suitable overlap around the edges to prevent future exposure to the buried debris.

Alternative 4 – Removal and Disposal of ACM Debris Piles

This alternative involves the removal of the ACM debris piles and disposing of the material at an approved off-site facility.

The selection and evaluation of alternatives is further discussed in Section 4.0 of this FS.

3.2 Identification of Applicable or Relevant and Appropriate Requirements

Section 121 of the CERCLA as part of the Superfund Amendments and Reauthorization Act (SARA) provides the statutory basis for including ARARs in the remedy selection process. The process of identification of ARARs for the debris sites consisted of investigating any federal, state, or regional standard, requirement, criterion, or limitation that might apply to proposed remedial actions.

The type, source, description, and applicability of each ARARs evaluated is presented in Table 3-1. ARARs that were evaluated and determined to not be applicable are also provided for completeness. The last two columns of the table specify the ARARs that apply to the recommended alternative. A detailed description of each alternative is provided in Section 4.

Table 3-1: Identification of Applicable or Relevant and Appropriate Requirements

No	Type	Scope	Citation	Description	Overview	Applicable to Alternatives?	Relevant or Appropriate to Alternatives?
1	Action	Federal	40 CFR Part 122 (CWA - 33 USC §§ 1251-1376)	National Pollutant Discharge Elimination System Requirements	Establishes requirements for permits to authorize the point source discharge of pollutants into waters of the United States, including stormwater discharges associated with construction activities equal to or greater than one acre [40 CFR 122.26(b)(15)].	2,3,4	None
2	Action	Federal	40 CFR Parts 131 (Water Quality Criteria)	Surface Water Quality Standards	Sets standards for surface water to protect aquatic organisms and human health	2,3,4	None
3	Action	Federal	40 CFR Parts 260-265, 268 (Solid Waste Disposal Act - 42 USC §§ 6901-6987)	Federal RCRA Hazardous Waste Management and Land Disposal Restrictions (LDRs)	Establishes federal rules for identifying, generating, transporting, treating, storing, and disposing of hazardous waste	4	None
4	Action	Federal	40 CFR Section 300.440 (42 USC 9601 et seq)	CERCLA Off-site Rule	The CERCLA off-site rule (OSR) provides requirements to avoid having CERCLA wastes generated from response actions contribute to present or future environmental problems by directing these wastes to management units determined to be environmentally sound.	4	None
5	Action	Federal	49 CFR Parts 170-180 (Hazardous Materials Transportation Act, 49 USC 1801 et seq)	Hazardous Materials Transportation	Transportation of wastes and materials which are hazardous materials (e.g., RCRA hazardous wastes, TSCA wastes, etc.) must be packaged, marked, placarded, and manifested in accordance with the HMTA regulations.	4	None
6	Action	Federal	40 CFR Part 61, Subpart M- Section 104 and 121 (Clean Air Act National Emission Standard for Asbestos)	Application of CAA Asbestos NESHAP at CERCLA sites	National work practice standard designed to limit the emissions of asbestos from a variety of activities, including demolition and renovation operations. Identifies prohibited activities and establishes training and health and safety requirements for protection of workers	2,3,4	None
7	Action	Federal	40 CFR Part 763,Subpart G (TSCA)	Worker Protection rule under the Toxic Substances Control Act	Creates a broad range of chemical control measures including information gathering, chemical testing, labeling, inspection, storage, and disposal requirements for ACM.	2,3,4	None
8	Action	State	Iowa Administrative Code 567, Chapter 61	Water Quality Standards	These regulations govern water discharges to surface water quality bodies. Of particular note are the numeric water quality criteria for aquatic and wildlife designated uses	None	None
9	Action	State	Iowa Code 455B.307A (also incorporates Iowa Administrative Code 567-100.5 (1) through (3).	Solid Waste Disposal	The Iowa Code 455B.307A lists the prohibitions and penalties that apply to discarding solid waste. The Iowa Administrative Code 567-100.5 lists the rules that apply to the disruption and excavation of sanitary landfills or closed dumps. documentation and disposal of solid waste generated during remedial actions. All solid waste disturbed or generated as part of the implemented remedial action will be properly disposed off at an appropriate off-site facility (landfill).	4	None
10	Action	Iowa Army Ammunition Plant (IAAAP)	Federal Facility Agreement (FFA), Section VI (Statutory Compliance/ CERCLA/RCRA Integration) of the Federal Facility Agreement (Administrative Docket Number: VII-F-90-0029)	Statutory Compliance/ RCRA-CERCLA Integration	The feasibility study document achieves the Statutory Compliance RCRA/CERCLA Integration of the Federal Facility Agreement. The recommended alternative is protective of human health and the environment and attains all ARARs.	4	None

Table 3-1: Identification of Applicable or Relevant and Appropriate Requirements

No	Type	Scope	Citation	Description	Overview	Applicable to Alternatives?	Relevant or Appropriate to Alternatives?
11	Chemical	Federal	29 CFR 1910.1001 (OSHA)	Asbestos General Standard	Specifies permissible exposure limits, engineering controls, worker training, labeling, respiratory protection, and disposal of asbestos waste.	3 and 4	None
12	Chemical	Federal	29 CFR 1926.1101 (OSHA)	Asbestos Construction Standard	Covers construction work involving asbestos, worker training, disposal of asbestos waste, and specifies permissible exposure limits.	3 and 4	None
13	Chemical	Federal	Office of Solid Waste and Emergency Response, USEPA, Directive#9200.0-68	Framework for Investigating Asbestos-Contaminated Superfund Sites	Guidance to develop removal action on a site-specific basis due to the lack of national or region specific RMLs	None	3
14	Chemical	Federal	Office of Solid Waste and Emergency Response, USEPA, Directive#9355.7-03B-P	Assessing Protectiveness for Asbestos Sites	Guidance providing recommendations for evaluating protectiveness of a remedy for asbestos contamination at Superfund sites during a five-year review	None	3
15	Chemical	State	Iowa Code 88B	State law governing Asbestos removal projects	Outlines Administrative Rule, Jurisdiction, Permits, Licensing, and Penalties for all asbestos related projects	3 and 4	None
16	Chemical	State	Iowa Division of Labor	Asbestos Statutes and Rules	Guidance for Asbestos Removal and Encapsulation, Asbestos Control Procedures, Permitting, and Licensing of Training Courses, and Worker Certification and Medical Monitoring	3 and 4	None
17	Chemical	Federal	40 CFR Part 141	USEPA Drinking Water Standards	National Primary Drinking Water Regulations. State defers to these regulations. Lists maximum contaminant levels for asbestos in MFL in drinking water	None	None
18	Location	Federal	36 CFR Part 800 (National Historic Preservation Act, Section 106 - 16 USC § 470 et seq)	Protection of Historic Properties	These regulations require federal agencies to take into account the effects of their undertakings on historic properties.	None	None
19	Location	Federal	36 CFR Part 65 (Archaeological and Historical Preservation Act – 16 USC § 461 et seq, 470 et seq)	National Historic Landmarks Program	These regulations set forth the criteria for establishing national significance and the procedures used by the Department of the Interior for conducting the National Historic Landmarks Program.	None	None
20	Location	Federal	40 CFR § 6.302(a) and Appendix A (Protection of Wetlands EO No. 11,990)	Actions Taken in a Wetland	This part requires that federal agencies avoid the destruction or loss of wetlands.	None	None
21	Location	Federal	50 CFR § 35.1 (Wilderness Act - 16 USC §§ 1311-1316)	Wilderness Area Impact	This section establishes the National Wilderness Preservation System in order to preserve wilderness areas.	None	None

Table 3-1: Identification of Applicable or Relevant and Appropriate Requirements

No	Type	Scope	Citation	Description	Overview	Applicable to Alternatives?	Relevant or Appropriate to Alternatives?
22	Location	Federal	50 CFR Part 17 50 CFR Part 222 50 CFR Part 402 (Endangered Species Act - 16 USC § 1531)	Endangered Species Conservation	These regulations require certain actions to protect endangered species within critical habitats; applicable if endangered species habitats are located in the area; relevant and appropriate if habitat is suitable for endangered species habitat.	None	None
23	Location	Federal	50 CFR Part 27 (National Wildlife Refuge System - 16 USC § 685)	Wildlife Refuges Impact	This regulation restricts activities within a National Wildlife Refuge area.	None	None

µg/L - Micrograms per liter
ARAR - Applicable or relevant and appropriate requirement
CAA - Clean Air Act
CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act
CFR - Code of Federal Regulations
COC - Contaminant of concern
CWA - Clean Water Act
EO - Executive Order
HMTA - Hazardous Materials Transportation Act
IDNR - Iowa Department of Natural Resources
LDR - Land disposal restriction
MFL - Million fibers per liter
NA - Not Applicable
NESHAP - National Emission Standards for Hazardous Air Pollutants
OSHA - Occupational Safety and Health Administration
OSR - Off-site rule
POTW - Publicly Owned Treatment Works
RCRA - Resource Conservation and Recovery Act
RML - Removal Management Levels
SDWA - Safe Drinking Water Act
TSCA - Toxic Substance Control Act of 1976
USC - United States Code
USEPA - United States Environmental Protection Agency

4.0 DEVELOPMENT AND ANALYSIS OF ALTERNATIVES

This FFS includes the development, screening, and detailed analysis of alternatives. The overall goal of the FFS is to propose an alternative best suited to achieve the project remediation goals. The alternative selected as part of this FFS will ensure the protection of human health and the environment and may involve either the complete elimination or destruction of hazardous substances at the site, the reduction of concentrations of hazardous substances to acceptable health-based levels, prevention of exposure to hazardous substances via engineering or institutional controls (IC), or a combination of these scenarios.

This section discusses the General Response Actions (GRAs), identifies alternatives that may be implemented at Site CC-IAAP-002 and then selects or recommends one of the identified alternatives for implementation at Site CC-IAAP-002.

4.1 General Response Actions

GRAs are generic types of remedial actions implemented to achieve the established remediation goals for the site. This section discusses the GRAs considered for the ACM debris piles at Site CC-IAAP-002 and determines the applicability of each GRA to achieve the remediation goal.

4.1.1 No Action

Description – The no-action consists of leaving the ACM debris piles in in place without any remediation activities.

Effectiveness - If the ACM piles are left in place, with time, the debris is likely to undergo degradation causing the potential of exposure to friable asbestos at a later date. This GRA does not meet the objective of eliminating the potential for future exposure to the ACM debris piles and is not protective of human health or the environment.

Implementability – No actions are required to implement this option, but it will not be selected because it is not protective of human health or the environment.

Cost – There is no cost associated with this option.

Recommendation - The NCP requires that the no action alternative be used as a baseline against which to compare other alternatives. Therefore, the No Action option was retained for further analysis.

4.1.2 Institutional or Land Use Controls

ICs are non-engineered instruments, such as administrative or legal controls, that help to minimize the potential for human exposure to contamination by ensuring appropriate land or resource use. ICs typically work by limiting land or resource use or by providing information that

helps modify or guide access to the site. ICs do not reduce contaminant toxicity, mobility, or mass. They do reduce or eliminate the potential for human exposure and can help protect existing and future remedial measures.

Two of the proposed remedial alternatives include ICs in combination with other containment methods. Therefore, the ICs were retained for further analysis. At Site CC-IAAP-002, it is expected that ICs will be used to achieve the following goals:

- Prevent residential or other incompatible land use – Eliminating the potential for residential land use will help reduce the potential exposure to site contaminants. This goal could be accomplished through the use of a proprietary control such as a restrictive covenant.
- Ensure that installed remedial measures remain in good working condition – It will be necessary to inspect, monitor, operate, and maintain remedial measures, make repairs, and conduct site monitoring activities. These goals would be achieved through the use of proprietary controls including restrictive covenants and access agreements.
- Prevent or restrict activities that would damage installed remedial measures or cause excessive exposure to site contaminants – Certain types of activities (including excavation of site soils) will have to be prevented or restricted to prevent damage to remedial measures and reduce the potential for worker exposure. These goals would be achieved through the use of proprietary controls including restrictive covenants.
- Inform the public about site hazards – Warning signs would ensure that the public was informed of the potential hazards posed by site contaminants.

4.1.3 Containment

Containment refers to a physical barrier that would restrict potential exposure to the ACM debris piles. This GRA does not change the concentration or potential for friable asbestos within the debris piles. However, this GRA does provide a barrier that reduces the potential of exposure.

4.1.3.1 Security Fencing

Description - A barbed wire security fence would be erected around the perimeter of the debris piles. Warning signs would be installed every 100 feet. This option would involve long-term maintenance of the fence and signs and periodic vegetation removal.

Effectiveness - Security fencing would limit access to the site, and signs would provide warning of the potential hazard. However, unauthorized entry (trespassers) could not be entirely eliminated and a fence would not prevent spread of friable asbestos via air-blown fibers or surface runoff. The security fence does not reduce environmental risks, contaminant mobility, or volume of the ACM debris.

Implementability – The security fencing could be installed quickly and maintenance of the fence would be conducted on a yearly basis.

Cost - The cost of security fencing at the site and annual maintenance would be low.

Recommendation – A security fence alone would not meet the objective of eliminating the potential for future exposure to the ACM debris piles because the fence would not prevent unauthorized entry or prevent transport of exposed friable asbestos via air-blown fibers or surface runoff. Friable material transported outside the fenced area would pose health risks to people working in other parts of the IAAAP property.

4.1.3.2 Soil and Clay-Based Caps

A cap (or surface horizontal barrier) of low permeability soil or clay would create a physical barrier to contain the ACM within the debris piles. This GRA, in conjunction with a security fence and ICs, would prevent future exposure to the ACM debris piles. The cap may restrict future land use and will require long-term monitoring and surveillance to maintain the integrity of the barrier.

Description - A single layer soil-based cap would be constructed over the debris piles using low permeability soil or clay. The cap would create a physical barrier to contain the ACM and reduce or stop infiltration of precipitation, and slow the degradation of the ACM material.

Effectiveness - Single layer soil cap in conjunction with a security fence and ICs, would prevent future exposure to the ACM debris piles. The cap may restrict future land use and will require long-term monitoring and surveillance to maintain the integrity of the barrier.

Implementability - A Single layer cap can be relatively easily constructed at CC-IAAP-002 using standard construction equipment and procedures. An access road would be constructed to the site to accommodate construction equipment and dump trucks. A soil cap requires yearly maintenance because it is more susceptible to erosion, damage from burrowing animals, and cracking from freezing and thawing. However, planting the cap with warm season grasses may reduce maintenance costs. In addition, the access road would be maintained to allow access to the cap for equipment maintenance.

Cost - The cost of this GRA would be moderate to high. Health risks associated with disturbing the ACM material were considered and incorporated into the unit costs for the cap.

Recommendation – Construction of the cap on the site would restrict potential exposure to the ACM debris piles and prevent spread of contaminants via air-blown particles or surface runoff. Therefore, it was retained for further consideration.

4.1.4 Removal and Disposal

Removal includes physically removing potentially hazardous materials as an initial step for treatment and/or disposal. Disposal involves methods to transport the potentially hazardous material to an off-site facility in accordance with all applicable regulations.

Description - The ACM debris piles would be excavated and disposed in an off-site landfill.

Effectiveness - Excavation of contaminated soil would remove the risk from the material, but the excavated materials would then have to be disposed of off-site.

Implementability - Excavation of the entire volume of ACM is practical. An access road for heavy equipment would be constructed to access the material. After removal of the material, the road would be removed and the site would be restored.

Cost - Moderate to High: Construction costs and health risks associated with the debris pile removal activities were considered as a part of this alternative involving removal of the ACM debris pile and were incorporated into the unit costs for removal and disposal.

Recommendation – Removal and disposal was retained for further consideration in conjunction with surface capping.

4.1.5 Treatment

Treatment may include any physical, chemical, or biological process that would lower or eliminate the effect of exposure to friable asbestos in the ACM debris piles by destruction or conversion into a less hazardous form. There is no known treatment process that would reduce the risk of exposure to friable asbestos. This GRA does not apply to ACM as it will not reduce the potential of future exposure to friable asbestos and will not achieve remediation goals. This GRA will not be selected for implementation.

4.1.6 Long-Term Monitoring

Long-term monitoring of site conditions provides useful information about the changing conditions at the site and the effectiveness of the selected alternative. If the alternative for capping with land use controls is selected, long-term monitoring will be implemented to ensure remedial actions continue to remain effective. If the alternative for removal and disposal is selected, long-term monitoring will not be required. Removal of the ACM debris piles eliminates risk of future exposure and the site will achieve a NFA required status.

4.2 Identification and Screening of Remedial Alternatives

The following alternatives were selected for evaluation:

Alternative 1 - No Action

This alternative is required and is provided as a baseline for comparison of other alternatives. Under this alternative, the site would remain in its present condition with periodic inspections to document any changes in site conditions that might affect the condition of the ACM debris piles. Although the No Action alternative is not recommended as a choice, it does provide value for comparing the other alternatives.

Alternative 2 – Security Fencing with Land Use Controls and Long-Term Monitoring

This alternative involves the placement of a barbed wire fence around the debris piles. This option would involve long-term maintenance of the fence and periodic vegetation removal. Security fencing would limit access to the site and signs would be posted to warn of potential hazards.

Alternative 3 – Encapsulation/ Capping with Land Use Controls and Long-Term Monitoring

This alternative involves the placement of a two foot thick "cap" of clean fill material over the ACM debris piles with a suitable overlap around the edges. Following placement, the material will be graded to ensure uniform application and compacted for stability. Suitable erosion control measures and revegetation will be implemented to ensure integrity of the cap material from potential run-off events within the unnamed drainage. Long-term monitoring will be required to ensure the integrity of the cap and the stability and effectiveness of the erosion control measures.

Alternative 4 – Removal and Disposal of ACM Debris Piles

This alternative involves the removal of the ACM debris piles and disposing of the material at an approved off-site facility. After the material is removed, the site would be restored and revegetated. No additional action would be required.

4.3 Evaluation Criteria

Each alternative defined above, with the exception of Alternatives 1 and 2 achieve the remediation goals for the project. These alternatives present a solution that eliminates the risk associated with potential exposure to the contents of the ACM debris piles. Although Alternative 2 provides a barrier that prevents exposure to the ACM debris piles, it does not eliminate the future potential for exposure.

The NCP (USEPA, 1990) suggests criteria to assist in the screening of each alternative and ensure that the alternative chosen will be the most viable solution. These criteria, described in Section 300.430 (e)(9)(iii) of the NCP are grouped into three categories:

Threshold Criteria: Each alternative must meet a threshold in order to be eligible for selection. Per the FFS scoping process the threshold to be met will be the ability to provide overall protection of human health and the environment and to comply with the project ARARs.

Primary Balancing Criteria: Each alternative will be evaluated for its long- and short-term effectiveness, its ease of implementation, its ability to reduce the toxicity and mobility of the contaminants of concern, and minimize the volume of hazardous material to be shipped off site.

Modifying Criteria: Each alternative will be evaluated based on the comments made during the review period by the representatives of the regulatory agencies (USEPA and Iowa Department of Natural Resources [IDNR]) and the community (Restoration Advisory Board [RAB] or public at large).

The nine criteria and three categories they fall within are listed in Table 4-1 and defined in the following subsections.

Table 4-1
NCP Evaluation Criteria for Selection of Remedial Action Alternatives

THRESHOLD CRITERIA	BALANCING CRITERIA	MODIFYING CRITERIA
1. Overall protection of human health and the environment 2. Compliance with ARARs	3. Long-term effectiveness and permanence 4. Reduction of toxicity, mobility, or volume 5. Short-term effectiveness 6. Implementability 7. Cost	8. Regulatory acceptance 9. Community acceptance

Overall Protection of Human Health and the Environment

All retained alternatives must achieve the overall protection of human health and the environment. This evaluation criterion provides an overall assessment of each alternative's ability to protect human health and the environment, focusing on how each alternative addresses site risks from each exposure pathway through treatment, engineering controls, or ICs.

Compliance with Applicable or Relevant and Appropriate Requirements

The remedial alternatives are evaluated to determine whether they attain the ARARs that were presented in Section 3.2. To be selected for implementation, an alternative must meet all project ARARs.

Long-Term Effectiveness and Permanence

This criterion evaluates the risk from hazardous materials remaining at the conclusion of remedial activities. The evaluation takes into account the volume, toxicity, mobility, and propensity of the residuals to bioaccumulate. This evaluation also includes assessment of the uncertainties associated with an alternative for providing long-term protection from the hazardous wastes and residuals, the potential need to maintain or replace technical components of the alternative, and the potential exposure pathways and risks posed should the remedial action need replacement.

Reduction of Toxicity, Mobility, or Volume

This criterion evaluates the anticipated performance of the alternative to include the extent to which total mass, volume, and/or mobility of contaminants are reduced; the toxicity of residuals resulting from the remedy; and to what extent the effects of treatment are irreversible.

Short-Term Effectiveness

This criterion measures the effects of the various alternatives on human health and the environment during implementation of the remedial action, as well as the effectiveness of the proposed measures to protect the community, workers, and the environment.

Implementability

Implementability refers to administrative and technical feasibility of applying a proposed alternative. Administrative factors that were investigated during the evaluation included construction permits, dust permits, and potential impacts on operations being conducted in areas adjoining the site. This evaluation was completed using input from IAAAP representatives, AO representatives, and discussion with project personnel.

Cost

The cost estimates in this report are order-of-magnitude level estimates, which are based on a variety of information including observations, quotes from suppliers, generic unit costs, vendor information, cost estimation guides, professional judgment, and expert judgment. These cost estimates are developed primarily for the purpose of comparing the remedial alternatives during the remedy selection process. Irrespective of the quality of data obtained during the RI, the accuracy of the estimates provided are expected to be in the range of -30 to +50 percent i.e., for an estimate of $100,000, the actual cost is expected to be between $70,000 (-30%) and $150,000 (+50%).

Regulatory Acceptance

This FS solicits input and acceptance from the regulatory agencies involved with the remedial action.

Community Acceptance

Community acceptance is evaluated based on issues and concerns the public or representatives of the public may have regarding each of the alternatives. The general public may use the RAB to address questions concerning these remedial actions. If there are questions concerning the selected alternatives from the public, the questions will be addressed during the proposed plan phase of this project.

5.0 DETAILED ANALYSIS OF ALTERNATIVES

This section provides a comparison of all alternatives listed in Section 4.0 and focuses on the relative performance of each alternative against each of the nine criteria. The recommended alternative for the remediation of the ACM debris piles are also provided in this section.

5.1 Comparative Evaluation of Selected Alternatives

The section provides a description of the process of estimating the costs expected during the implementation of each selected alternative and recommends the best alternatives to achieve the remediation goals for Site CC-IAAP-002. Additionally, detailed calculations for the individual costs anticipated during the implementation of each alternative are provided as Appendix A of this report.

Overall Protection of Human Health and the Environment

Because no action would be performed, Alternative 1 would not protect human health or the environment. Risks from exposure to ACM at the site would not be significantly different from those identified in the baseline risk assessment. Alternative 2 would deter access to the material but would not reduce environmental risks, contaminant mobility, or volume of the ACM debris. Alternatives 3 and 4 offer the best overall protection of human health and the environment by eliminating contaminant mobility and the potential for exposure.

Compliance with Applicable or Relevant and Appropriate Requirements

Under Alternative 1, since no action would be taken, the ARARs would not be met. Alternative 2 would not reduce environmental risks or contaminant mobility and, therefore, the ARARs would not be met. Compliance with the project ARARs identified in Section 3.3 is expected if either Alternative 3 or 4 are applied.

Long-Term Effectiveness and Performance

Alternative 1 includes no controls for exposure and no long-term management measures. Alternative 2 would not reduce environmental risks or contaminant mobility. Therefore, all current and potential future risks from asbestos exposure would remain under Alternatives 1 and 2. Application of Alternative 3 or 4 will address the exposure to asbestos by either encapsulation or removal and disposal. With Alternative 3, the encapsulation of the ACM debris piles provides a physical barrier that provides temporary reduction to the future exposure as long as the integrity of the cap, the erosion control features, and the land use controls are maintained. The regular maintenance of the erosion control measures and effective application of land use controls will determine the long-term effectiveness and performance of this Alternative. Alternative 4 provides the best long-term effect and performance of a remedial action.

Reduction of Toxicity, Mobility, or Volume

Alternatives 1 and 2 provide no significant reduction in toxicity, mobility, volume, or future potential exposure to the ACM debris piles. Alternative 3 does not reduce the volume of the ACM debris piles. However, the encapsulation or capping of the ACM debris pile provides a physical barrier that limits exposure. Alternative 4 provides maximum reduction in mobility and volume of the hazardous material by removing the ACM debris piles to an off-site facility.

Short-Term Effectiveness and Performance

There would be no additional risks posed to the community, the workers, or the environment if Alternative 1 and 2 were to be implemented. For Alternatives 3 and 4, there is moderate risk that personnel involved in field activities could be exposed to friable asbestos generated from during capping or removal activities. Risk to the operations at other active IAAAP sites, the surrounding community, or the adjoining ecosystem is not anticipated for either Alternative 3 or 4. All efforts will be taken to minimize the potential for these short-term risks through the use of dust control technologies, appropriate training, and use of personal protection equipment when applicable.

Implementability

Alternative 1, since it requires no action, is the most implementable since no action would be taken. Alternatives 2, 3, and 4 have varying levels of implementability. Alternative 2 would not require an access road or heavy equipment and would be relatively simple to implement. For Alternatives 3 and 4, conventional, commercially available heavy machinery and equipment would be used. As is typical with most mechanical equipment, certain wear and tear and maintenance is expected and might affect the implementability during the course of the remediation.

For Alternatives 2 and 3, long-term monitoring and effective implementation of land use controls is required which has a negative impact on implementability due to the long-term time and cost investments required. Alternative 4 has the best implementability, since no additional costs will be required after completion of the removal action. Alternatives 2 and 3 do not achieve the remediation goal of site closure, whereas Alternative 4 does.

Cost

There are no projected costs associated with Alternative 1. The costs for implementation of Alternatives 2, 3, and 4 vary, based on the level of effort and overall time estimated for each alternative to achieve the remediation goals. The estimated costs for each alternative are provided in Table 5-1 and a detailed cost breakdown for each alternative is provided in Appendix A.

Table 5-1
Estimated Costs for Remedial Action Alternatives

ALTERNATIVE	ESTIMATED COST
Alternative 1 – No Action	No Cost
Alternative 2 – Security Fencing with Land Use Controls/ One Year of Long-Term Monitoring	$119,577.24
Alternative 3 – Encapsulation or Capping with Land Use Controls/One Year of Long-Term Monitoring	$ 269,238.66
Alternative 4 – Removal and Disposal of ACM Debris Piles	$ 462,336.23

State Acceptance

The USEPA and IDNR have reviewed the findings of the RI conducted in 2013. This FS solicits input and acceptance from the regulatory agencies involved with the remedial action.

Community Acceptance

Two RAB meetings and presentations have been conducted to inform the public and members of the RAB of the findings of the RI conducted in 2013. During a RAB meeting conducted following the RI, the proposed remedial action for removal of the ACM debris piles was presented for public comment. To date no comments have been received from the public at large or the RAB members against implementation of the removal action (Alternative 4).

5.2 Recommended Alternatives

The remedial goal for Site CC-IAAP-002 is the removal of the ACM debris piles due to the potential of future exposure to friable asbestos. Alternative 3 prevents exposure to potential friable asbestos by installing a barrier. However, this alternative also requires the use of effective long-term monitoring which will result in additional costs and effort following the implementation of the alternative. This alternative also leaves the potential for future exposure in the event of degradation of the cap or erosion control measures, which would create future risk of exposure. Alternative 3 does not achieve site closure. Alternative 4 provides the best solution to eliminate the risk for future exposure and the costs incurred during remedial action could be offset by eliminating the need for incurring costs for long-term monitoring or future costs for maintenance that may be required for Alternative 3.

Following the detailed evaluation of Alternatives 3 and 4, Alternative 4 is recommended to achieve the remediation goal at Site CC-IAAP-002.

6.0 REFERENCES

PIKA International, Inc. (PIKA), 2010. Final Remedial Investigation/Feasibility Study Work Plan. May.

PIKA. 2013. Final Work Plan. *Remedial Investigation of Construction Debris Sites CC-IAAP-001 and CC-IAAP-002*. May.

PIKA. 2014. Final Report, Volume I and II. *Remedial Investigation Report for Construction Debris Sites CC-IAAP-001 and CC-IAAP-002*. March.

U.S. Environmental Protection Agency (USEPA). 1989. *Risk Assessment Guidance for Superfund, Vol. 1: Human Health Evaluation Manual (Part A)*. USEPA/540/1–89/002, Washington, D.C.

USEPA. 1997. *Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments – Interim Final*. EPA 540-R-97-006. June.

USEPA. 1990. *National Oil and Hazardous Substances Pollution Contingency Plan*. U.S. Environmental Protection Agency. Washington, D.C. Section 300.430 (e)(9)(iii).

USEPA. 2002c. *A Guide to Developing and Documenting Cost Estimates During the Feasibility Study*. U.S. Environmental Protection Agency. Washington, D.C. July.

APPENDIX A

Detailed Cost Estimates for Selected Alternatives

Alternative	Remedial Design	Remedial Action (Construction/ Operation)	Long Term Management	Total
Alternative 2 - Security Fencing with Land Use Controls and Long-Term Monitoring	$ 17,640.91	$ 77,526.75	$ 24,409.59	**$ 119,577.24**
Alternative 3 - Encapsulation with Land Use Controls and Long-Term Monitoring	$ 32,383.53	$ 215,177.94	$ 21,677.18	**$ 269,238.66**
Alternative 4 - Removal and Disposal of ACM Debris Piles	$ 41,862.83	$ 420,473.41	$ -	**$ 462,336.23**

Note: Highlighted cell is the recommended alternative

	Description	Quantity	Units	
Alternative 2 - Security Fencing with Land Use Controls and Long-Term Monitoring				**$ 119,577.24**
	Remedial Design			**$ 17,640.91**
	Personnel (Internal Draft/Draft)			$ 8,771.69
1	Sr. Project Manager	12.00	hour	
1	Project/Environmental Engineer	16.00	hour	
1	Technical Writer	24.00	hour	
1	CAD/GIS Specialist	16.00	hour	
1	Project Coordinator	8.00	hour	
	Reproduction and Photocopying	13.00	copy	
	Personnel (Draft Final)			$ 5,595.87
1	Sr. Project Manager	8.00	hour	
1	Project/Environmental Engineer	8.00	hour	
1	Technical Writer	16.00	hour	
1	CAD/GIS Specialist	8.00	hour	
1	Project Coordinator	8.00	hour	
	Reproduction and Photocopying	10.00	copy	
	Personnel (Final)			$ 3,273.35
1	Sr. Project Manager	4.00	hour	
1	Project/Environmental Engineer	4.00	hour	
1	Technical Writer	8.00	hour	
1	CAD/GIS Specialist	4.00	hour	
1	Project Coordinator	8.00	hour	
	Reproduction and Photocopying	10.00	copy	
	Total for Remedial Design			
	Remedial Action (Construction) / Remedial Action (Operation)			**$ 77,526.75**
	Mobilization/Site Setup,/Demobilization			**$ 9,794.86**
	Personnel			$ 5,690.86
1	Sr. Project Manager	10.00	hour	
1	Site Safety and Health Officer	24.00	hour	
0	General Technican (laborer)	0.00	hour	
	Travel			$ 1,923.75
	Airfare (Sacramento - Moline, IL)	0.00	roundtrip	
	Airfare (Houston - Moline, IL)	1.00	roundtrip	
	Per Diem	5.00	day	
1	Pickup Trucks	0.10	month	
	Fuel for Pickup Trucks	0.10	weeks	
	Equipment (Mob/Demob)			$ 42.75
1	Port-o-John	1.00	LS	

	Description	Quantity	Units	
Alternative 2 - Security Fencing with Land Use Controls and Long-Term Monitoring				**$ 119,577.24**
	Subcontractor			$ 2,137.50
	AllWorth Contracting	1.00	LS	
	Supplies and One-Time Costs			**$ 1,081.39**
	Tyvek Suits	0.00	each	
	Respirators	0.00	each	
	Respirator Cartridges	0.00	each	
	Decon Station	0.00	each	
	Eye Wash Station	0.00	each	
	Leather Gloves	5.00	each	
	Fire Extinguishers	1.00	each	
	First Aid Kits	1.00	each	
	MSDS Station	1.00	each	
	Spill Kits	1.00	each	
	Safety and Caution Signs	1.00	each	
	Trauma Bag	1.00	each	
	Shovels	0.00	each	
	Fire Blanket	1.00	each	
	Shipping Safety Supplies	1.00	LS	
	Site Work: Land Use Controls at CC-IAAAP-002			**$ 55,265.92**
	Personnel			$ 26,431.09
1	Sr. Project Manager	20.00	hour	
1	Site Safety and Health Officer	80.00	hour	
0	General Technican (laborer)	0.00	hour	
	AMEC - Biological Assessment	1.00	LS	
	Travel			$ 3,776.99
	Per Diem	14.00	days	
1	Pickup Trucks	0.50	month	
	Fuel for Pickup Trucks	2.00	week	
	Equipment			$ 205.84
1	Port-o-John	1.00	month	
	Subcontractor			$ 24,225.00
	AllWorth Contracting	1.00	LS	
	Vegetation Removal (for Fencing)	1.00	LS	
	Supplies			$ 627.00
	Misc. Operating & Safety Supplies	2.00	week	
	Signs	8.00	ea	
	Remedial Action Report			**$ 11,384.58**
	Personnel (Internal Draft/Draft)			$ 6,135.03
	Sr. Project Manager	8.00	hour	

	Description	Quantity	Units	
Alternative 2 - Security Fencing with Land Use Controls and Long-Term Monitoring				**$ 119,577.24**
	Corporate QA/QC Manager	4.00	hour	
	Project/Environmental Engineer	12.00	hour	
	Technical Writer	16.00	hour	
	CAD/GIS Specialist	4.00	hour	
	Project Coordinator	8.00	hour	
	Reproduction and Photocopying	13.00	copy	
	Personnel (Draft Final)			$ 3,195.41
	Sr. Project Manager	4.00	hour	
	Corporate QA/QC Manager	2.00	hour	
	Project/Environmental Engineer	4.00	hour	
	Technical Writer	6.00	hour	
	CAD/GIS Specialist	4.00	hour	
	Project Coordinator	8.00	hour	
	Reproduction and Photocopying	10.00	copy	
	Personnel (Final)			$ 2,054.14
	Sr. Project Manager	2.00	hour	
	Corporate QA/QC Manager	0.00	hour	
	Project/Environmental Engineer	4.00	hour	
	Technical Writer	2.00	hour	
	CAD/GIS Specialist	2.00	hour	
	Project Coordinator	8.00	hour	
	Reproduction and Photocopying	10.00	copy	
	Total for Remedial Action (Construction) / Remedial Action (Operation)			
	Long Term Management			**$ 24,409.59**
	Annual Inspection			**$ 24,409.59**
	Personnel			$ 9,972.52
1	Sr. Project Manager	8.00	hour	
1	Sr. Project Engineer	40.00	hour	
	Travel			$ 2,682.05
	Airfare (Houston - Moline, IL)	1.00	roundtrip	
	Per Diem	7.00	day	
1	Pickup Trucks	0.25	month	
	Fuel for Pickup Trucks	1.00	week	
	Subcontractor			$ 6,412.50
	AllWorth Contracting	1.00	LS	
	Vegetation Removal (for Fence Inspections)	1.00	LS	
	Letter Report			$ 5,342.51
1	Sr. Project Manager	4.00	hour	
1	Sr. Project Engineer	20.00	hour	
	Reproduction and Photocopying	10.00	copy	

	Description	Quantity	Units	
Alternative 3 - Encapsulation with Land Use Controls and Long-Term Monitoring				**$ 269,238.66**
	Remedial Design			**$ 32,383.53**
	Personnel (Internal Draft/Draft)			$ 22,701.85
1	Sr. Project Manager	16.00	hour	
1	Project/Environmental Engineer	16.00	hour	
1	Sr. Geologist	8.00	hour	
1	Technical Writer	40.00	hour	
1	CAD/GIS Specialist	8.00	hour	
1	Project Coordinator	8.00	hour	
	AMEC - Biological Assessment	1.00	LS	
	AMEC - Curtural Assessment	1.00	LS	
	Reproduction and Photocopying	13.00	copy	
	Personnel (Draft Final)			$ 6,002.10
1	Sr. Project Manager	8.00	hour	
1	Project/Environmental Engineer	12.00	hour	
1	Technical Writer	16.00	hour	
1	CAD/GIS Specialist	8.00	hour	
1	Project Coordinator	8.00	hour	
	Reproduction and Photocopying	10.00	copy	
	Personnel (Final)			$ 3,679.59
1	Sr. Project Manager	4.00	hour	
1	Project/Environmental Engineer	8.00	hour	
1	Technical Writer	8.00	hour	
1	CAD/GIS Specialist	4.00	hour	
1	Project Coordinator	8.00	hour	
	Reproduction and Photocopying	10.00	copy	
	Total for Remedial Design			
	Remedial Action (Construction) / Remedial Action (Operation)			**$ 215,177.94**
	Mobilization/Site Setup, Training, Installation of Access Roads/Demobiliza			**$ 77,854.47**
	Personnel			$ 13,361.29
1	Sr. Project Manager	20.00	hour	
1	Site Superintendent (Project Manager)	40.00	hour	
1	Site Safety & Health Officer	40.00	hour	
1	General Technician (laborer)	40.00	hour	
	Travel			$ 9,149.93
	Airfare (Sacramento - Burlington, IA)	3.00	roundtrip	
	Airfare (Houston - Burlington, IA)	0.00	roundtrip	
	Per Diem	24.00	day	
2	Pickup Trucks	0.25	month	
	Fuel for Pickup Trucks	1.00	week	

	Description	Quantity	Units	
Alternative 3 - Encapsulation with Land Use Controls and Long-Term Monitoring				**$ 269,238.66**
	Equipment (Mob/Demob)			$ 42.75
1	Port-o-John	1.00	LS	
	Equipment (Rental)			$ 51.46
1	Port-o-John	0.25	month	
	Subcontractor			$ 55,249.05
	Fye Exc. - Install Access Road for CC-IAAP-002	1.00	LS	
	META - Asbestos Inspector/Trainer (Mob/Demob)	1.00	LS	
	META - Asbestos Inspector/Trainer (Awareness Training)	1.00	LS	
	Supplies and One-Time Costs			**$ 11,318.03**
	Tyvek Suits	48.00	each	
	Respirators	3.00	each	
	Respirator Cartridges	48.00	each	
	Decon Station	1.00	each	
	Eye Wash Station	1.00	each	
	Leather Gloves	25.00	each	
	Fire Extinguishers	2.00	each	
	First Aid Kits	2.00	each	
	MSDS Station	1.00	each	
	Spill Kits	2.00	each	
	Safety and Caution Signs	10.00	each	
	Trauma Bag	2.00	each	
	Shovels	4.00	each	
	Fire Blanket	2.00	each	
	6-mil reinforced polysheeting	10.00	each	
	SWPPP Maintenance Materials - Estm	1.00	LS	
	Shipping Safety Supplies	1.00	LS	
	Site Work: Install Cap at CC-IAAAP-002			**$ 63,568.25**
	Personnel			$ 13,361.29
1	Sr. Project Manager	20.00	hour	
1	Site Superintendent (Project Manager)	40.00	hour	
1	Site Safety & Health Officer	40.00	hour	
1	General Technician (laborer)	40.00	hour	
	Travel			$ 4,964.70
	Per Diem	21.00	days	
2	Pickup Trucks	0.25	month	
	Fuel for Pickup Trucks	0.25	weeks	
	Equipment			$ 205.84
1	Port-o-John	1.00	month	

	Description	Quantity	Units	
Alternative 3 - Encapsulation with Land Use Controls and Long-Term Monitoring				**$ 269,238.66**
	Supplies			$ 427.50
	Misc. Operating & Safety Supplies	1.00	week	
	Subcontractors			$ 44,608.91
	META - Asbestos Inspector (Oversight)	40.00	hour	
	META - Asbestos Inspector (Per Diem)	7.00	day	
	Fye Exc. - Capping Debris Area	1.00	LS	
	Fye Exc. - Seeding	1.00	LS	
	AMEC - Biological Assessment	1.00	LS	
	AMEC - Curtural Assessment	1.00	LS	
	Site Restoration			**$ 32,948.08**
	Personnel			$ 13,361.29
1	Sr. Project Manager	20.00	hour	
1	Site Superintendent (Project Manager)	40.00	hour	
1	Site Safety & Health Officer	40.00	hour	
1	General Technician (Laborer)	40.00	hour	
	Travel			$ 4,929.08
	Per Diem	21.00	days	
2	Pickup Trucks	0.25	month	
	Fuel for Pickup Trucks	0.25	weeks	
	Equipment			$ 51.46
1	Port-o-John	0.25	month	
	Supplies			$ 285.00
	Misc. Operating & Safety Supplies	1.00	week	
	Subcontractor			$ 14,321.25
	Fye Exc. - Removal of Access Road	1.00	LS	
	Fye Exc. - Reseeding	1.00	LS	
	Remedial Action Report			**$ 29,489.11**
	Personnel (Internal Draft/Draft)			$ 20,415.71
	Sr. Project Manager	16.00	hour	
	Corporate QA/QC Manager	4.00	hour	
	Project/Environmental Engineer	16.00	hour	
	Technical Writer	24.00	hour	
	CAD/GIS Specialist	8.00	hour	
	Project Coordinator	8.00	hour	
	META - Asbestos Inspector	4.00	hour	
	AMEC - Biological Assessment	1.00	LS	
	AMEC - Curtural Assessment	1.00	LS	
	Reproduction and Photocopying	13.00	copy	

	Description	Quantity	Units	
Alternative 3 - Encapsulation with Land Use Controls and Long-Term Monitoring				**$ 269,238.66**
	Personnel (Draft Final)			$ 5,616.92
	Sr. Project Manager	8.00	hour	
	Corporate QA/QC Manager	2.00	hour	
	Project/Environmental Engineer	8.00	hour	
	Technical Writer	16.00	hour	
	CAD/GIS Specialist	4.00	hour	
	Project Coordinator	8.00	hour	
	META - Asbestos Inspector	2.00	hour	
	Reproduction and Photocopying	10.00	copy	
	Personnel (Final)			$ 3,456.48
	Sr. Project Manager	4.00	hour	
	Corporate QA/QC Manager	2.00	hour	
	Project/Environmental Engineer	4.00	hour	
	Technical Writer	8.00	hour	
	CAD/GIS Specialist	4.00	hour	
	Project Coordinator	8.00	hour	
	Reproduction and Photocopying	10.00	copy	
	Total for Remedial Action (Construction) / Remedial Action (Operation)			
	Long Term Management			**$ 21,677.18**
	Annual Inspection			
	Personnel			$ 15,957.17
1	Sr. Project Manager	8.00	hour	
1	Sr. Project Engineer	40.00	hour	
	AMEC - Biological Assessment	1.00	LS	
	Maintenance of Land Cap	1.00	LS	
	Vegetation Removal/Mowing	1.00	LS	
	Travel			$ 2,468.81
	Airfare (Houston - Burlington, IA)	1.00	roundtrip	
	Per Diem	5.00	days	
1	Pickup Trucks	0.25	month	
	Fuel for Pickup Trucks	1.00	week	
	Supplies			$ 142.50
	Misc. Operating & Safety Supplies	1.00	week	
	Letter Report			$ 3,108.70
1	Sr. Project Manager	4.00	hour	
1	Sr. Project Engineer	16.00	hour	
	Reproduction and Photocopying	10.00	copy	

	Description	Quantity	Units	
Alternative 4 - Removal and Disposal of ACM Debris Piles				**$ 462,336.23**
	Remedial Design			**$ 41,862.83**
	Personnel (Internal Draft/Draft)			$ 28,581.52
1	Sr. Project Manager	24.00	hour	
1	Project/Environmental Engineer	24.00	hour	
1	Sr. Geologist	8.00	hour	
1	Technical Writer	60.00	hour	
1	CAD/GIS Specialist	16.00	hour	
1	Project Coordinator	8.00	hour	
	AMEC - Biological Assessment	1.00	LS	
	AMEC - Cultural Assessment	1.00	LS	
	META - Asbestos Inspector	8.00	hour	
	Reproduction and Photocopying	13.00	copy	
	Personnel (Draft Final)			$ 8,359.99
1	Sr. Project Manager	20.00	hour	
1	Project/Environmental Engineer	16.00	hour	
1	Technical Writer	16.00	hour	
1	CAD/GIS Specialist	8.00	hour	
1	Project Coordinator	8.00	hour	
	META - Asbestos Inspector	4.00	hour	
	Reproduction and Photocopying	10.00	copy	
	Personnel (Final)			$ 4,921.31
1	Sr. Project Manager	12.00	hour	
1	Project/Environmental Engineer	8.00	hour	
1	Technical Writer	8.00	hour	
1	CAD/GIS Specialist	4.00	hour	
1	Project Coordinator	8.00	hour	
	META - Asbestos Inspector	2.00	hour	
	Reproduction and Photocopying	10.00	copy	
	Total for Remedial Design			
	Remedial Action (Construction) / Remedial Action (Operation)			**$ 420,473.41**
	Mobilization/Site Setup, Training, Installation of Access Roads/Demobiliz			**$ 79,846.03**
	Personnel			$ 12,550.84
1	Sr. Project Manager	20.00	hour	
1	Site Superintendent (Project Manager)	40.00	hour	
1	Site Safety & Health Officer	40.00	hour	
1	General Technicial (Laborer)	24.00	hour	

	Description	Quantity	Units	
Alternative 4 - Removal and Disposal of ACM Debris Piles				**$ 462,336.23**
	Travel			$ 7,945.80
	Airfare (Sacramento - Burlington, IA)	2.00	roundtrip	
	Airfare (Houston - Burlington, IA)	1.00	roundtrip	
	Per Diem	19.00	day	
2	Pickup Trucks	0.25	month	
	Fuel for Pickup Trucks	1.00	weeks	
	Equipment (Mob/Demob)			$ 42.75
1	Port-o-John	1.00	LS	
	Equipment (Rental)			$ 51.46
1	Port-o-John	0.25	month	
	Subcontractor			$ 59,255.18
	Fye Exc. - Install Access Road for CC-IAAP-002	1.00	LS	
	META - Asbestos Inspector/Trainer (Mob/Demob)	1.00	LS	
	Controlled Asbestos Inc. - (Mob/Demob)	1.00	LS	
	Supplies and One-Time Costs			**$ 12,180.72**
	Tyvek Suits	60.00	each	
	Respirators	3.00	each	
	Respirator Cartridges	60.00	each	
	Decon Station	1.00	each	
	Eye Wash Station	1.00	each	
	Leather Gloves	50.00	each	
	Nitrile Gloves	10.00	each	
	Fire Extinguishers	6.00	each	
	First Aid Kits	4.00	each	
	MSDS Station	1.00	each	
	Spill Kits	2.00	each	
	Safety and Caution Signs	10.00	each	
	Trauma Bag	2.00	each	
	Shovels	5.00	each	
	Fire Blanket	4.00	each	
	6-mil reinforced polysheeting	10.00	each	
	SWPPP Maintenance Materials - Estm	1.00	LS	
	Shipping Safety Supplies	1.00	LS	
	Site Work: Asbestos Removal at CC-IAAAP-002			**$ 257,403.92**
	Personnel			$ 63,482.70
1	Sr. Project Manager	75.00	hour	
1	Site Superintendent (Project Manager)	200.00	hour	
1	Site Safety & Health Officer	200.00	hour	
1	General Technicial (Laborer)	200.00	hour	

	Description	Quantity	Units	
Alternative 4 - Removal and Disposal of ACM Debris Piles				**$ 462,336.23**
	Travel			$ 26,961.00
	Per Diem	105.00	days	
2	Pickup Trucks	1.25	month	
	Fuel for Pickup Trucks	5.00	weeks	
	Equipment			$ 257.30
1	Port-o-John	1.25	month	
	Supplies			$ 2,137.50
	Misc. Operating & Safety Supplies	5.00	week	
	Subcontractors			$ 133,272.41
	META - Asbestos Oversight	200.00	hour	
	META - Per Diem	35.00	day	
	Controlled Asbestos Inc. - Removal	1.00	LS	
	AMEC - Biological Assessment	1.00	LS	
	AMEC - Cultural Assessment	1.00	LS	
	Sampling (MI Sampling)			$ 3,933.00
	Surface SamPling	4.00	sample	
	Controlled Asbestos Inc. - Air Monitoring	1.00	LS	
	Shipping of Samples	1.00	LS	
	Transportation and Disposal of Soils			$ 27,360.00
	Controlled Asbestos, Inc. - T&D	1.00	LS	
	Site Restoration			**$ 37,698.33**
	Personnel			$ 12,696.54
1	Sr. Project Manager	15.00	hour	
1	Site Superintendent (Project Manager)	40.00	hour	
1	Site Safety & Health Officer	40.00	hour	
1	General Technicial (Laborer)	40.00	hour	
	Travel			$ 5,392.20
	Per Diem	21.00	days	
2	Pickup Trucks	0.25	month	
	Fuel for Pickup Trucks	1.00	weeks	
	Equipment			$ 51.46
1	Port-o-John	0.25	month	
	Supplies			$ 427.50
	Misc. Operating & Safety Supplies	1.00	week	
	Subcontractor			$ 19,130.63

	Description	Quantity	Units	
Alternative 4 - Removal and Disposal of ACM Debris Piles				**$ 462,336.23**
	Fye Exc. - Removal of Access Road	1.00	LS	
	Fye Exc. - Reseeding of Access Road Areas	1.00	LS	
	Fye Exc. - Reseeding of Pile Removal Areas	1.00	LS	
	Remedial Action Report			**$ 28,905.36**
	Personnel (Internal Draft/Draft)			$ 19,190.04
	Sr. Project Manager	8.00	hour	
	Corporate QA/QC Manager	4.00	hour	
	Project/Environmental Engineer	16.00	hour	
	Technical Writer	24.00	hour	
	CAD/GIS Specialist	4.00	hour	
	Project Coordinator	8.00	hour	
	AMEC - Biological Assessment	1.00	LS	
	AMEC - Cultural Assessment	1.00	LS	
	META - Asbestos Inspector	6.00	hour	
	Reproduction and Photocopying	13.00	copy	
	Personnel (Draft Final)			$ 5,446.37
	Sr. Project Manager	4.00	hour	
	Corporate QA/QC Manager	4.00	hour	
	Project/Environmental Engineer	8.00	hour	
	Technical Writer	16.00	hour	
	CAD/GIS Specialist	4.00	hour	
	Project Coordinator	8.00	hour	
	Asbestos Inspector	4.00	hour	
	Reproduction and Photocopying	10.00	copy	
	Personnel (Final)			$ 4,268.95
	Sr. Project Manager	4.00	hour	
	Corporate QA/QC Manager	2.00	hour	
	Project/Environmental Engineer	12.00	hour	
	Technical Writer	8.00	hour	
	CAD/GIS Specialist	4.00	hour	
	Project Coordinator	8.00	hour	
	Reproduction and Photocopying	10.00	copy	
	Closure Report			**$ 4,439.05**
	Personnel			$ 4,439.05
	Sr. Project Manager	12.00	hour	
	Project Engineer	28.00	hour	