

**FINAL**

**EXPLANATION OF SIGNIFICANT DIFFERENCES  
FOR THE INTERIM ACTION  
RECORD OF DECISION (IROD)  
SOILS OPERABLE UNIT (OU-1)**

**ADDITION OF ENVIRONMENTAL  
PROTECTIVENESS  
TO THE REMEDY AND TRANSFER OF SITES  
FROM OU-4 TO OU-1**

**for  
IOWA ARMY AMMUNITION PLANT  
MIDDLETOWN, IA**

**Prepared by:**

**Tetra Tech, Inc.  
800 Oak Ridge Turnpike, A-600  
Oak Ridge, TN 37830**

**JUNE 2008**

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**June 2008**

## LIST OF ACRONYMS

AEC	Atomic Energy Commission
Army	U.S. Army
BERA	Baseline Ecological Risk Assessment
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
COC	Constituent of Concern
CTA	Central Test Area
ESD	Explanation of Significant Differences
EPA	U.S. Environmental Protection Agency
FFA	Federal Facilities Agreement
FUSRAP	Formerly Utilized Sites Remedial Action Program
HQ	Hazard Quotient
IAAAP	Iowa Army Ammunition Plant
InDA	Incendiary Disposal Area
IROD	Interim Record of Decision
LAP	load, assemble, and pack
LDR	Land Disposal Restriction
LOAEL	Lowest Observed Adverse Effects Level
NCP	National Contingency Plan
NPDES	National Pollutant Discharge Elimination System
NOAEL	No Observed Adverse Effects Level
OU	Operable Unit
PDS	Possible Demolition Site
RCRA	Resource Conservation and Recovery Act
RG	Remedial Goal
ROD	Record of Decision
SARA	Superfund Amendments and Reauthorization Act of 1986
SVOC	Semi-Volatile Organic Compound
TCLP	Toxicity Characteristic Leaching Procedure
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service

## **1.0 INTRODUCTION TO THE SITE AND STATEMENT OF PURPOSE**

The Iowa Army Ammunition Plant (IAAAP) is a load, assemble, and pack (LAP) munitions facility located in Middletown, a rural area of eastern Iowa, 8 miles west of Burlington in Des Moines County, and approximately nine miles northwest of the Skunk and Mississippi Rivers.

The U.S. Environmental Protection Agency (EPA) added the IAAAP to the National Priorities List (NPL) in 1990. The NPL is the EPA's list of sites that appear to pose the greatest threat to human health and the environment, based on the site assessment process. The Department of Defense (DOD) has established the Defense Environmental Restoration Program to address sites under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA).

The Army, as an agency within the DOD, is the lead DOD agency for implementing environmental restoration activities at the IAAAP. The EPA and the Army signed a Federal Facilities Agreement (FFA) for site cleanup, which became effective December 10, 1990. The FFA provides a framework for CERCLA response actions to be performed at the IAAAP, including the investigation and cleanup of contamination. EPA is the support agency and ensures that cleanup activities conducted by the Army meet the requirements of CERCLA/ SARA, the NCP, and the FFA.

A remedy consisting of excavation/stabilization/solidification/disposal was selected for contaminated soils at 15 areas throughout the IAAAP designated as the Soils Operable Unit #1 (OU-1). An Interim Record of Decision (IROD) dated March 4, 1998 (informally known as the "excavation ROD") presented the selected interim remedial action for OU-1 soils. A ROD dated September 29, 1998, (informally known as the "treatment ROD") was issued for OU-1 to address the treatment and placement aspects of the contaminated soils at IAAAP.

This Explanation of Significant Differences (ESD) documents significant changes to the March 1998 IROD. The ROD changes are the result of new scope added to OU-1 associated with ecological risks and additional areas of soil excavation previously included in OU-4. Specifically, the additional soils excavated to address ecological risks at the following sites will be addressed within OU-1:

- Line 3 (IAAP-003),
- Line 3A (IAAP-004), and
- Line 800 (IAAP-044).

Also, areas that have been previously remediated to manage potential human health and groundwater protection risks will be reevaluated to assess the potential ecological risks and potential additional corrective action.

In addition, three areas previously included in the Installation-Wide OU (OU-4) will be added to OU-1. The three areas that will be added to OU-1 are the

- Incendiary Disposal Area (IAAP-013) - (InDA),



- Possible Demolition Site (IAAP-018) - (PDS), and
- Central Test Area (IAAP-047) - (CTA).

## **2.0 SITE HISTORY, GENERAL CONTAMINATION SOURCES AND SELECTED REMEDY**

### **2.1 Site History**

The IAAAP produced munitions for World War II from the plant's inception in September 1941. Activities at the IAAAP continued at a reduced level during peacetime. The plant was operated from 1941 - 1946 by Day & Zimmerman Corporation. The IAAAP was Government owned/Government operated between 1946 and 1951.

The former U.S. Atomic Energy Commission (AEC) operated on portions of IAAAP from 1947 through mid-1975, at which time operation reverted to Army control. The IAAAP was operated by the private contractor Mason & Hanger Corporation between 1951 and 1998. American Ordnance has been the operating contractor of the IAAAP from 1998 to the present. The IAAAP currently has the capability to LAP munitions, including projectiles; mortar rounds; warheads; demolition charges; antitank mines; anti-personnel mines; and the components of these munitions, including primers, detonators, fuses, and boosters.

### **2.2 Summary of General Contamination Sources**

The primary source of contamination at the facility is attributable to past operating practices in which explosives-contaminated wastewaters and sludges were discharged to uncontrolled on-site lagoons and impoundments. Additional sources of contamination included open burning of explosives materials and munitions and landfilling of waste material. Process wastewaters currently are treated and recycled, while only a small portion of the treated wastewater, containing residual explosives and other contaminants regulated under the plant's National Pollutant Discharge Elimination System (NPDES) permit, is discharged to surface water bodies. Pink/red wastewaters from trinitrotoluene (TNT) operations are a listed hazardous waste (K047) according to the Resource Conservation and Recovery Act (RCRA). Some areas of IAAAP are known to contain contamination (e.g., depleted uranium, explosives, and metals) resulting from AEC operations. The U.S. Army Corps of Engineers (USACE), is responsible for addressing contamination resulting from AEC operations at IAAAP, and will take actions to ensure that the environmental impacts associated with past AEC activities at the site are thoroughly investigated and appropriate remedial actions are taken to protect public health, welfare, and the environment. This will be accomplished under the Formerly Utilized Sites Remedial Action Program (FUSRAP) subject to a separate Federal Facility Agreement with EPA and the State of Iowa.

### **2.3 Selected Remedy**

Due to the complexity of the problems associated with the IAAAP, the facility has been divided into three OUs to facilitate project management. The three OUs are:

- Soils OU (OU-1) , to address contamination in the soils,
- Groundwater OU (OU-3), to address contamination of the groundwater, and
- Installation-Wide OU (OU-4), to address other unacceptable risks not addressed in either OU-1 or OU-3.

The IROD describes the interim remedial action for contaminated soils within OU-1. The 15 sites addressed in the OU-1 IROD include:

1. Line 1
2. Line 2
3. Line 3
4. Line 3A
5. Lines 4A/4B
6. Lines 5A/5B
7. Line 6
8. Line 8
9. Line 9
10. Line 800
11. East Burn Pads Area
12. Demolition Area/Deactivation Furnace
13. Burn Cages/West Burn Pads Area
14. North Burn Pads Area, and
15. Roundhouse Transformer Storage Area

The future land use scenario at IAAAP is commercial/industrial. The general Remedial Action Objectives (RAOs) for the soil medium at IAAAP include the prevention of onsite workers and visitors from ingestion of site-specific constituents of concern (COCs) present in the soil medium. The general RAOs also include the protection of onsite workers from ingesting groundwater that contains COCs that have migrated from the soil medium to the shallow aquifers. The IROD does not address ecological risks.

The major components of the selected remedy under the OU-1 IROD are:

- Excavation of soils contaminated at levels exceeding the soil remediation goals (RGs) for the remediation areas.
- Verification sampling to ensure that RGs are met in the remediation areas.
- Segregation of excavated soils according to contaminant type and concentration.
- Temporary storage of the most highly contaminated soils in the on-site Corrective Action Management Unit and treatment of those soils in accordance with the specification of the final ROD for the soils.
- Permanent disposal of soil contaminated at lesser levels in the on-site Soil Repository or in the on-site Inert Landfill.

- Solidification/stabilization of metals-contaminated soils containing metals at levels exceeding LDR criteria, and permanent disposal in the on-site Soil Repository.

The Final ROD dated September 29, 1998, was issued for OU-1 to address the treatment and placement aspects of the contaminated soils at IAAAP.

The ROD presented an estimate of the volume of contaminated soils in OU-1 as 124,573 cubic yards. In January 2003, an ESD for the OU-1 ROD presented a revised estimate of soil volumes to be treated and a contingent remedy for the biological treatment of explosives in contaminated soils. The ESD revised the volume estimate of contaminated soils at IAAAP to 168,122 cubic yards. An ESD for the IROD to delete specific radiological RGs (which were below background values) from the scope of OU-1 was signed by the Army on June 13, 2006.

The IROD, ROD and the 2003 ESD present the final remedy for contaminated OU-1 soils, which is to excavate and manage the soils based on the nature of contamination. Four different types of soil contamination were established:

- Explosives-contaminated soils
- Explosives-plus-metals-contaminated soils
- Metals-contaminated soils
- Semi-volatile organic compound (SVOC)-contaminated soils

The major components of the selected remedy for the four types of soil contamination requiring treatment are summarized below.

#### Explosives-Contaminated Soils

- Excavate explosives-contaminated soil and transport to a temporary treatment facility onsite.
- Process the soil through a biological treatment unit.
- Following confirmation sampling, dispose of treated soil according to the following criteria:
  - A. For soils with cumulative risks less than  $10^{-6}$ , which are in compliance with land disposal restrictions (LDRs), and which exceed Summers model remediation goals, dispose the soil in an onsite engineered landfill cell such as the “Trench 6” Soil Repository, located at the Inert Disposal Area, or another EPA-approved onsite landfill.
  - B. For soils with cumulative risks less than  $10^{-6}$ , which are in compliance with LDRs, and which satisfy Summers model remediation goals, dispose on IAAAP property in an appropriate manner protective of human health and the environment. The treatment residuals must also be shown to be non-toxic or not bio-available at levels posing a threat to human health or the environment.

#### Explosives-Plus-Metals-Contaminated Soils

- Excavate explosives-plus-metals-contaminated soil and transport to a temporary treatment facility onsite.

- Process the soil through a two-step treatment process: biological treatment for explosives contaminants and solidification/stabilization for metals contaminants.
- Sample to confirm successful treatment for both explosives and metals.
- Following sampling to confirm compliance with Toxicity Characteristic Leaching Procedure (TCLP) based remediation goals, dispose the soil in an onsite engineered landfill cell such as the “Trench 6” Soil Repository, located at the Inert Disposal Area, or another EPA-approved onsite landfill.

#### Metals-Contaminated Soils

- Excavate metals-contaminated soil and transport to a temporary treatment facility onsite.
- Process the soil through solidification/stabilization step for metals contaminants.
- Following sampling to confirm compliance with TCLP-based remediation goals, dispose the soil in an onsite engineered landfill cell such as the “Trench 6” Soil Repository, located at the Inert Disposal Area, or another EPA-approved onsite landfill.

#### SVOC-Contaminated Soils

- Excavate SVOC-contaminated soil.
- Transport the soil to a commercial waste treatment and disposal facility off-site.
- This ESD modifies only the excavation criteria described in the OU-1 IROD. Upon excavation, soils addressed in the ESD are managed as originally described in the ROD and 2003 ESD.

### **3.0 BASIS FOR THE ESD**

This ESD is necessary for two general reasons. Section 3.0 describes the background and rationale for the changes proposed in this ESD. Section 4.0 discusses the resulting changes in performance standards, scope of work and costs.

#### **3.1 Addition of Environmental Protectiveness to the Remedy**

The IROD, ROD and previous associated ESDs did not address ecological risks, although the IROD indicated that further evaluation of potential ecological risks would be conducted as part of future investigations. The Baseline Ecological Risk Assessment (BERA) was conducted using data collected during facility-wide Site Investigations and the Remedial Investigation and supplemental investigations conducted specifically for the BERA. The risk to the Indiana bat was evaluated in the BERA because it is known to be present at the IAAAP, and is listed as a threatened and endangered species. Therefore, it is considered important to protect even individual bats within the population. Using a risk analysis that utilized insects exposed to

surface soil as prey for the Indiana bat, the BERA indicated that the potential for unacceptable risks exist to the Indiana bat based on food chain uptake model as described in the BERA and BERA Supplement.

Ecological issues contained in the BERA were addressed in a series of discussions involving the Army, EPA and the U.S. Fish and Wildlife Service (USFWS). During these discussions a procedure was developed to calculate and, if necessary, address potential ecological risks using conservative literature values for bioaccumulation factors. The Army, EPA and USFWS reached agreement on a procedure for determining which OU-1 areas, and which chemicals at those areas, pose potential unacceptable risks to the Indiana bat. This process is documented in the BERA Response to Comments and in Appendix M of the BERA.

As described in additional detail in Section 4.1 the ecological evaluation procedure has resulted in the determination that ecological risk criteria are exceeded at the following OU-1 sites:

- Line 3,
- Line 3A, and
- Line 800.

This results in the need to excavate additional soil (i.e., soil in addition to the soil that will need to be excavated to address human health risks) at these three sites. This ESD describes the performance criteria for the ecological risk-driven excavations and administratively adds additional soils to OU-1 so that other management activities (transportation, treatment, disposal, etc.) can be accomplished according to the OU-1 decision documents.

Several IAAAP sites have already been remediated in order to meet performance criteria related to human health and protection of groundwater. The potential ecological risks that may still exist at these previously-remediated sites will be evaluated as described in the BERA and this ESD.

As a result of the new approach for addressing the ecological risk resulting in additional excavations, the Army and EPA have concluded that it is appropriate to revise the IROD to address applicable changes. In accordance with EPA guidance, it has been determined that the subject ROD changes fall within the range of “significant” (i.e., greater than “minor” but less than “fundamental”), thereby dictating the need to document the IROD changes with an ESD.

### **3.2 Transfer of Three Sites from OU-4 to OU-1**

OU-1 addresses the contaminated soils across the IAAAP installation. However, at the time that OU-1 was first defined, not all IAAAP sites had been fully investigated. Sites that were not fully investigated were included with OU-4. Subsequent investigation has revealed that three current OU-4 sites have contaminated soil that will require remediation. The three sites are:

- InDA,
- PDS, and
- CTA.

Descriptions of these areas are presented in Attachment 1. A total of approximately 2064 cubic yards of soils contaminated above RGs for human health and protection of groundwater defined in the OU-1 IROD were identified at the three areas. The type of contamination at the three transferred sites is similar to that at the sites already covered under OU-1 (Table 1). Specifically, a single metal, lead, was detected above RGs at the InDA. Two metals (i.e., lead and mercury) and 2,4,6-TNT were detected above RGs at the PDS. At the CTA, three metals (i.e. cadmium, iron, and arsenic) and 2,4,6-TNT were detected above their respective RGs.

This ESD will add these three sites to OU-1 which will consolidate all soil contamination under one OU. The OU-1 IROD, OU-1 ROD and the 2003 ESD contain the criteria for the remediation of soils within OU-1 at IAAAP.

#### **4.0 DESCRIPTION OF SIGNIFICANT DIFFERENCES**

The basis for this ESD is presented in Section 3.0. Section 4.0 provides details regarding the changes to performance standards, scope of work and costs.

##### **4.1 Addition of Environmental Protectiveness to the Remedy**

Screening level estimates of potential adverse ecological effects will be used to guide additional excavation activities at individual units as described in the BERA and BERA Supplement. These potential risks will be calculated at each site using a previously approved procedure (a food chain model) which includes the use of soil to insect bioaccumulation factors (BAFs) along with the soil to insect data from a study conducted at the Savannah Army Depot. The 95% Upper Confidence Limit (UCL) will be used as the exposure point concentration. The size of each site will also be quantitatively considered during the development of screening criteria. Specifically, the size of each unit will be compared to the 70-acre forage area of the juvenile Indiana bat in order to calculate an “area use” factor.

Two hazard quotients will be calculated; one based on the Lowest Observed Adverse Effect Level (LOAEL) and another based on the No Observed Adverse Effect Level (NOAEL). The performance standard for ecological soil remediation requires that soil be excavated to achieve the more conservative of the following two standards:

- HQ less than 10 for HQ based on NOAEL
- HQ of less than 1 for HQ based on LOAEL

The evaluation of ecological risk will take into account the risk-reducing effect of separate actions (i.e., excavation for the purpose of addressing risks associated with human health and protection of groundwater). For those sites where excavation is needed to address human health risks, 95% UCLs will be calculated using a data set containing (1) shallow soil data from locations that will remain after the human health excavation has been conducted and (2) concentrations equal to site background in those areas where clean soil will be used to backfill excavations.

Based on the current data, a total of approximately 1350 cubic yards of soils require remediation to address potential ecological risk at Line 3, Line 3A, and Line 800. The approximate breakdown by site is 1043 cubic yards, 291 cubic yards and 15 cubic yards at Line 3, Line 3A, and Line 800, respectively. At each of the three sites, copper concentrations exceed the performance standard, resulting in excavation areas and volumes that will be determined based on the copper distribution in shallow soil.

The estimated increase in cost is approximately \$405,000. This amount includes excavation costs as well as transportation, treatment, and disposal costs for the additional 1350 cubic yards. Estimated costs are based on the unit costs for soil excavation, transportation, treatment, and disposal at the Inert Disposal Area. In addition, previously-remediated sites will be evaluated for potential ecological risks and this evaluation may result in a determination that additional excavation is necessary.

#### **4.2 Transfer of Three Sites from OU-4 to OU-1**

The performance criteria are described in the OU-1 IROD, OU-1 ROD and the 2003 ESD and are not altered by this ESD. Based on the current data for the InDA, PDS, and CTA a total of approximately 2064 cubic yards of soils will require remediation. The approximate breakdown is 48 cubic yards, 1858 cubic yards, and 158 cubic yards at the InDA, PDS, and CTA, respectively (Table 1). The estimated additional cost for excavation, transportation, treatment, and disposal is \$619,000, based on the unit costs for soils at the Inert Disposal Area.

For the six sites specifically addressed by this ESD, an estimated total of 3,414 cubic yards of soils will be excavated, resulting in additional costs (i.e., excavation, transportation treatment, and disposal) of approximately \$1,024,000.

### **5.0 STATUTORY DETERMINATIONS**

Considering the new information that has been developed and the changes that have been made to the selected remedy, the Army and EPA believe that the remedy remains protective of human health and the environment, complies with Federal and State of Iowa requirements that are legally applicable or relevant and appropriate to this remedial action, and is cost-effective. Therefore, the revised remedy satisfies the statutory requirements of Section 121 of CERCLA.

### **6.0 PUBLIC PARTICIPATION COMPLIANCE**

The Army provided informational briefings regarding soil treatment plans and related project activities to the Restoration Advisory Board during multiple public meetings held during calendar years 2004 – 2006. In accordance with the requirements of Section 300.435(c)(2)(i) of the NCP, the Army will publish a notice of availability and a brief description of the ESD in The Burlington Hawk Eye newspaper. This ESD will also be made available to the public by placing it in the Administrative Record file and information repositories.

Copies of the Administrative Record file for the IAAAP site are located in the following information repositories:

Burlington Public Library  
501 North 4<sup>th</sup> Street  
Burlington, Iowa 52601  
(319) 753-1647

Danville City Hall  
105 West Shepard  
Danville, Iowa 52623  
(319) 392-4685

Lee County Health Department  
2218 Avenue H  
Fort Madison, Iowa 52627  
(319) 372-5225

A public meeting to address this change is not currently planned. However, a meeting will be scheduled upon public request.




The point of contact for public inquiries is:

Scott Marquess  
USEPA – Region VII  
901 North 5<sup>th</sup> Street  
Kansas City, KS 66101  
913-551-7131

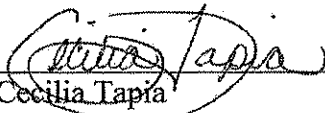
Rodger Allison  
SJMIA-INE  
Iowa Army Ammunition Plant  
17571 State Highway 79  
Middletown, IA 52638-5000  
319-753-7130

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Lt. Col. Benjamin Nutt  
Commander  
Iowa Army Ammunition Plant

12 Feb 2008  
Date



Cecilia Tapia  
Director  
Superfund Division  
USEPA, Region VII

5/15/08  
Date

**Table 1 – Details of OU-4 Sites to be Transferred to OU-1**

<b>Site</b>	<b>Chemicals detected above the RG</b>	<b>Number of detections</b>	<b>Number of non-detections</b>	<b>Minimum detected concentration (mg/kg)</b>	<b>Maximum detected concentration (mg/kg)</b>	<b>RG (mg/kg)</b>	<b>Volume of contaminated Soil (cubic yards)</b>
Incendiary Disposal Area (East Yard D)	Lead	52	0	6.9	3000	1000	48
Possible Demolition Site (South Yard G)	2,4,6-TNT	27	34	0.04	78	47.6	1858
	Lead	61	0	7.9	1700	1000	
	Mercury	57	3	0.05	409	310	
Central Test Area	2,4,6-TNT	15	75	0.1	110	47.6	158
	Cadmium	11	69	0.044	1100	1000	
	Iron	74	0	6530	220,000	100,000	
	Arsenic	80	0	1.8	54.5	30	
						Total	<b>2064</b>

**ATTACHMENT 1**

**DESCRIPTIONS OF SITES TO BE TRANSFERRED FROM OU-4 TO OU-1**

#### IAAP-013 - Incendiary Disposal Area (East of Yard D)

The Incendiary Disposal Area (InDA) is located near the east plant boundary, east of Yard D and Spring Creek and north of K Road as shown in Figure 1. The aerial extent of the InDA is shown in Figure 2. The area slopes toward a tributary of Spring Creek to the west. Although details are not known, the area was rumored to have been used for incendiary material burial during the mid-1940s. The exact size, location, and materials buried here could not be determined because there was no documented waste disposal in this area. Magnesium fuses may have been buried at this location during the mid-1940s. The InDA was believed to be small (approximately 40 by 60 feet) and surrounded by a barbed wire fence. Interviews indicated that any items that were not burned on the burning pads were detonated, and that this area was not used often or after World War II, giving it a short period of use. Contaminants investigated at the InDA include explosives and metals. Lead is the only constituent that was detected at concentrations above RGs for human health and protection of groundwater. Approximately 48 cubic yards of contaminated soils were delineated at InDA. The proposed areas of excavation are shown in Figure 2. Contaminated soils identified at this area will be excavated, treated, and disposed of in accordance with criteria established in the OU-1 RODs (1998a, b) and the ESD (2003).

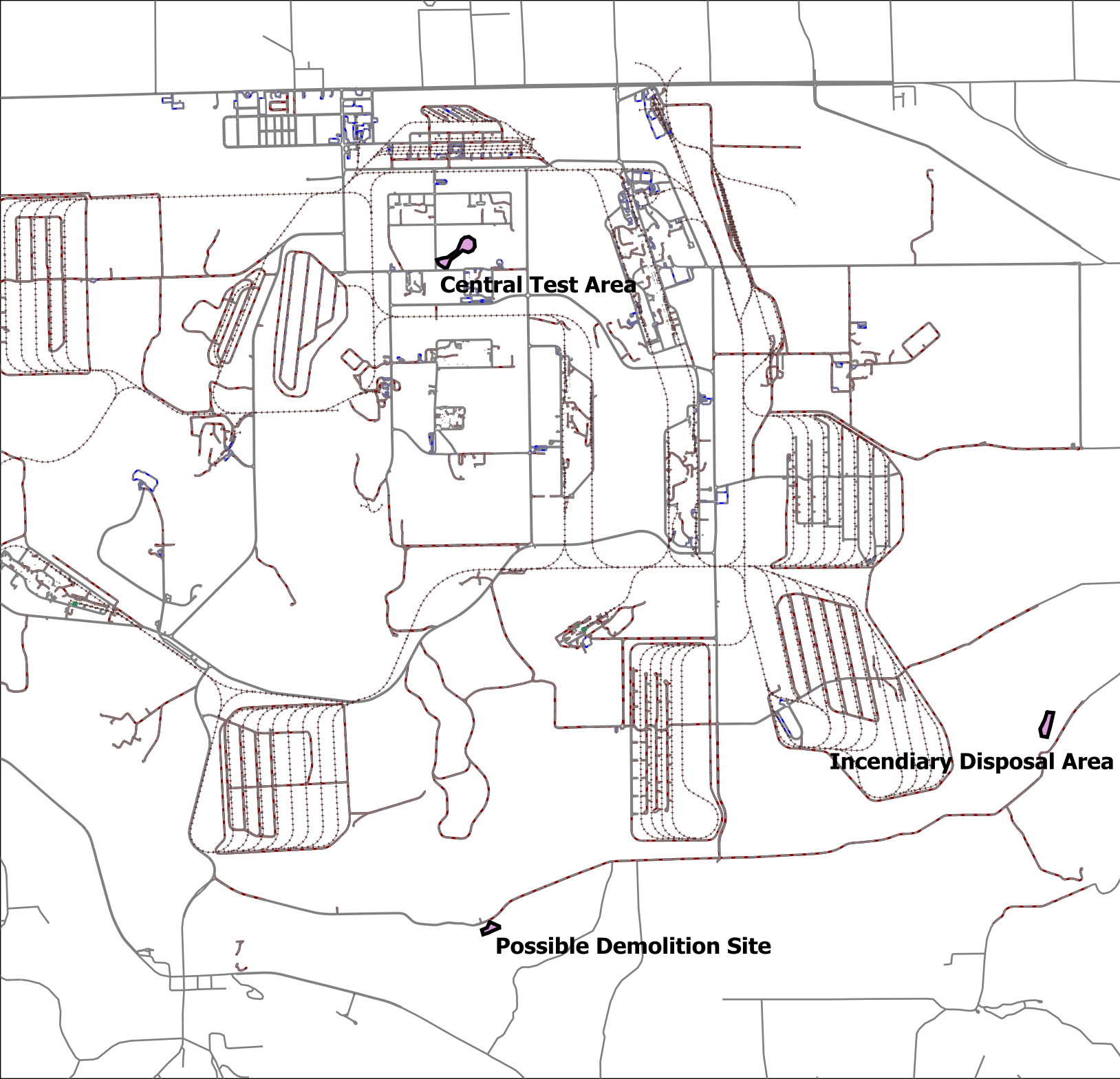
#### IAAP-018 – Possible Demolition Site (South of Yard G)

The Possible Demolition Site (PDS) is located south of Plant Road K near Yard G and across the road from the pistol range, as shown in Figure 1. The areal extent of the PDS is shown in Figure 3. The site is relatively flat, sloping gently toward Long Creek to the west. The PDS was used during the 1940s and possibly into the early 1950s as a demolition area for ammunition items. There are no site records to substantiate demolition activities or the kind of ammunition items disposed at the site. The specific wastes that may be present at this site are unknown; however, the contaminants likely to be present are explosives commonly used at IAAAP and metals. The exact size of the area is unknown, but it is thought to be as much as 15 acres. Contaminants investigated at the PDS include explosives and metals. Lead, mercury, and 2,4,6-TNT were detected in soil samples at concentrations exceeding the RGs for human health and protection of groundwater. Approximately 1858 cubic yards of contaminated soils were delineated at the PDS. The proposed areas of excavation are shown in Figure 3. Contaminated soils identified at this area will be excavated, treated, and disposed of in accordance with criteria established in the OU-1 RODs (1998a, b) and the ESD (2003).

#### IAAP- 047 – Central Test Area

The Central Test Area (CTA) is located between Line 4A and Line 5A as shown in Figure 1. The aerial extent of the CTA is depicted in Figure 4. The area includes Building 600-84; the walled-in area south of the building; and the field to the north and east of the building, which was known as the test-fire area. Building 600-84 was constructed in 1941 as the Central Testing Laboratory, and many of the components tested inside the building were fuses, primers, and detonators. The walled-in area south of Building 600-84 was used as a test site for the inside charge of grenades. The test-fire area was used to test-fire hand grenades, adaptor boosters, and aerial mines. Actual operational details at this area are unclear. Contaminants investigated at the CTA include explosives and metals. Cadmium, iron, arsenic, and 2,4,6-TNT were detected in soil samples

exceeding the RGs for human health and the protection of groundwater. Approximately 158 cubic yards of contaminated soils were delineated at the CTA. The proposed areas of excavation are shown in Figure 4. Contaminated soils identified at this area will be excavated, treated, and disposed of in accordance with criteria established in OU-1 RODs (1998a, b) and the ESD (2003).



GIS FILENAME: IAAAP.map

DATE: 6/19/2007

SOURCE:

OPERATOR: jeff.dahoda

COORDINATE SYSTEM:

State Plane - Iowa South

(NAD 83, meters)

VERTICAL REFERENCE DATUM:

NAVD88

#### LEGEND



**Sites**



**Buildings**



**Railroads**



**Roads**



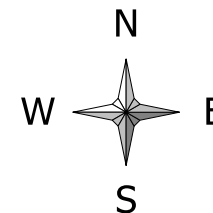
Improved



Parking



Unimproved



0

4000 ft US

Draft ESD for OU-1 Soils IROD  
IOWA ARMY AMMUNITION PLANT  
MIDDLETOWN, IOWA

**Tetra Tech, Inc.**



OAK RIDGE, TENNESSEE

Figure 1

Location of Sites

Transferred from

OU-4 to OU-1








GIS FILENAME: IAAAP.map  
DATE: 6/20/2007  
SOURCE:  
OPERATOR: jeff.dahoda


COORDINATE SYSTEM:  
State Plane - Iowa South  
(NAD 83, meters)  
VERTICAL REFERENCE DATUM:  
NAVD88


LEGEND


**Sites**

**Planned Excavation**

**Railroads**

**Roads**  
Improved

**Parking**

**Unimproved**

N

W


S

E

0200 ft US

Draft ESD for OU-1 Soils IROD  
IOWA ARMY AMMUNITION PLANT  
MIDDLETOWN, IOWA

**Tetra Tech, Inc.**



OAK RIDGE, TENNESSEE

Figure 2  
Planned Excavations at the  
Incendiary Disposal Area





GIS FILENAME: IAAAP.map

DATE: 6/20/2007

SOURCE:

OPERATOR: jeff.dahoda

COORDINATE SYSTEM:

State Plane - Iowa South

(NAD 83, meters)

VERTICAL REFERENCE DATUM:

NAVD88

#### LEGEND



**Sites**



**Planned Excavation**



**Buildings**



**Railroads**



**Roads**



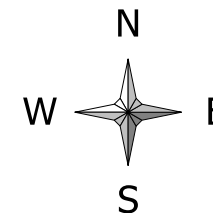
Improved



Parking

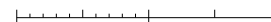


Unimproved



0

200 ft US



Draft ESD for OU-1 Soils IROD  
IOWA ARMY AMMUNITION PLANT  
MIDDLETOWN, IOWA

**Tetra Tech, Inc.**



OAK RIDGE, TENNESSEE

Figure 3  
Planned Excavations at the  
Possible Demolition Site



GIS FILENAME: IAAAP.map

DATE: 6/20/2007

SOURCE:

OPERATOR: jeff.dahoda

COORDINATE SYSTEM:

State Plane - Iowa South

(NAD 83, meters)

VERTICAL REFERENCE DATUM:

NAVD88

## LEGEND



**Sites**



**Planned Excavation**



**Buildings**



**Railroads**



**Roads**



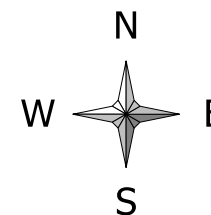
Improved



Parking



Unimproved



0

200 ft US



Draft ESD for OU-1 Soils IROD  
IOWA ARMY AMMUNITION PLANT  
MIDDLETOWN, IOWA

**Tetra Tech, Inc.**



OAK RIDGE, TENNESSEE

Figure 4  
Planned Excavations at the  
Central Test Area

