

**Per the Federal Facility Agreement for Iowa Army Ammunition Plant, Article X.B.1, the attached document is the final version of the submitted document.**

**WORK PLAN FOR SOIL SAMPLING  
LINE 7 DECONTAMINATION  
AND  
DECOMMISSIONING ACTIVITIES**

**Prepared For:**

**IOWA ARMY AMMUNITION PLANT  
17571 HIGHWAY 79  
MIDDLETOWN, IA 52638**

**Prepared By:**

**Tetra Tech, Inc.  
800 Oak Ridge Turnpike, Suite A-500  
Oak Ridge, TN 37830**

**JANUARY 2006**



## TABLE OF CONTENTS

1.0	INTRODUCTION .....	1-1
1.1	SITE DESCRIPTION .....	1-1
1.2	SITE BACKGROUND .....	1-1
1.3	ENVIRONMENTAL BACKGROUND.....	1-2
2.0	SOIL SAMPLING WORK PLAN.....	2-1
2.1	SAMPLE ANALYSIS PLAN.....	2-1
2.1.1	Selection of Sampling Locations .....	2-1
2.1.2	Field Activities.....	2-2
2.2	QUALITY ASSURANCE PROJECT PLAN.....	2-3
2.2.1	Field Quality Assurance/Quality Control Samples.....	2-3
2.2.2	Sampling and Field Procedures .....	2-3
2.2.3	Laboratory Analytical Procedures .....	2-3
2.2.4	Data Reduction, Validation, and Reporting.....	2-3
2.3	HEALTH AND SAFETY PLAN .....	2-4
2.4	IDW TRANSPORTATION AND DISPOSAL PLAN .....	2-5
2.5	REPORTING .....	2-5
3.0	REFERENCES .....	3-1



## **TABLES**

- 1-1 Buildings Summary
- 2-1 Preliminary Proposed Sampling Points
- 2-2 Sampling and Analysis Summary

## **FIGURES**

- 1-1 Site Layout and Historic Sampling Locations
- 2-1 Site Layout and Proposed Soil Sampling Points



## ACRONYMNS AND ABBREVIATIONS

amsl	above mean sea level
bgs	below ground surface
cy	cubic yards
FWWP	Facility-Wide Work Plan
GPS	global positioning system
HASP	Health and Safety Plan
HSO	health and safety officer
IAAAP	Iowa Army Ammunition Plant
IDA	Inert Disposal Area
IDW	investigation derived waste
JAYCOR	Jaycor, Inc.
mg/Kg	milligrams per kilogram
MWH	Montgomery Watson Harza
NELAP	National Environmental Laboratory Accreditation Program
OHM	OHM Remediation Services, Inc.
OU	Operable Unit
PCBs	polychlorinated biphenyls
Plexus	Plexus Scientific Corporation
PM	project manager
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	quality control
RDX	royal demolition explosive (cyclotrimethylenetrinitramine)
RG	remediation goal
RI	Remedial Investigation
ROD	Record of Decision
SAP	Sampling and Analysis Plan
SI	Site Investigation
SM	site manager
SOP	standard operating procedure
SSO	site safety officer
SVOC	semi-volatile organic compound
Tetra Tech	Tetra Tech, Inc.
TNT	trinitrotoluene
URS	URS Corporation
USACE	United States Army Corps of Engineers
USAEC	U.S. Army Environmental Center
USEPA	U.S. Environmental Protection Agency
VOC	volatile organic compound



## 1.0 INTRODUCTION

This Soil Sampling Work Plan for Line 7 has been prepared by Tetra Tech, Inc. (Tetra Tech) for the Iowa Army Ammunition Plant (IAAAP) to summarize and evaluate environmental information collected and identify the methods for collecting data needed to define soil contamination beneath former buildings and other areas of concern. This work plan was prepared in accordance with the requirements of Contract W911S0-04-F-0026.

Line 7 is currently in the process of being decontaminated and decommissioned (demolished) by Plexus Scientific Corporation (Plexus), under contract to Tetra Tech. As part of this effort and to ensure no impacts from past operations are present, sampling of soils beneath buildings and areas of concern is to be conducted by Tetra Tech.

### 1.1 SITE DESCRIPTION

Line 7, also known as the “primer line,” is located in the central portion of IAAAP and encompasses approximately nine acres. According to building inventories for IAAAP, the original buildings at Line 7 were constructed between 1941 and 1942 and included small caliber loading plants, storage magazines, and support structures such as change houses (USACE, 1944; IAAAP, 2001). An additional small caliber loading plant, vacuum house, and flammable materials storehouse were added in the late 1960s (IAAAP, 2001). A list of buildings, which includes the year built and documented uses, is provided in Table 1-1. A site layout is presented in Figure 1-1.

The ground surface at Line 7 generally slopes toward the southeast with ground surface elevations ranging from 213 to 210 meters above mean sea level (amsl). Based on other sites in the area, shallow till soils are assumed to consist of sandy silt/silty sand deposits, and the depth to shallow (water table) groundwater is assumed to be three to five feet below ground surface (bgs) with higher groundwater levels typically occurring in the spring.

### 1.2 SITE BACKGROUND

During the early 1940s, Line 7 produced blank ammunition used in ceremonies. After 1965 and during the Vietnam War, time fuzes for mortars were produced at this line (JAYCOR, 1996). According to Annual Supplements to Unit History, Line 7 ceased operations in the early 1970s. The equipment that remained in the buildings after the closure of Line 7 was disassembled and washed with hot water. The buildings of Line 7 received a 3X building certification after a thorough washdown with high pressure fire hoses (JAYCOR, 1996). A 3X building certification means that the level of contamination is enough to pose an explosive safety hazard, but the building or equipment is safe for its intended purpose (Plexus, 2005). The dates of these activities are unavailable.

The primary compounds used during Line 7 processes were trinitrotoluene (TNT), royal demolition explosive (RDX), and Composition B (a mix of TNT and RDX). Other chemicals



used as polishing agents in fuze production included acetone, toluene, xylenes, ethanol, and varnish. Gun powder also was used in munitions preparation. During production operations, wastes from building washdowns were discharged to gravel-lined sumps and allowed to leach into the ground. Overflow ran into the natural drainage-ways (JAYCOR, 1996).

### 1.3 ENVIRONMENTAL BACKGROUND

Soil samples were collected as part of the site investigation (SI) and remedial investigation (RI) activities from 1991-1992 and 1995 (JAYCOR, 1996), sump sampling activities in 1993 (JAYCOR, 1993), and sump removal activities in 1995 (OHM, 1996). Surface water samples were collected as part of the SI and RI activities. No groundwater samples have been collected at the site, though groundwater sampling has been proposed as part of the *Draft Final Comprehensive Watersheds Evaluation and Supplemental Data Collection Work Plan* (Tetra Tech, 2005).

During the SI in 1991 and the RI in 1992, soil samples (screening and fixed laboratory) were collected from depths generally ranging from the surface to one foot bgs (two samples were collected at greater depths), with several screening and fixed laboratory samples being collected in or adjacent to ditches. Samples were selectively analyzed for explosives, metals, pesticides, polychlorinated biphenyls (PCBs), semivolatile organic compounds (SVOCs), and volatile organic compounds (VOCs) depending on the uses of the buildings or previous sampling results (JAYCOR, 1996). No compounds were detected above remediation goals (RGs) set forth in the Interim Operable Unit 1 (OU-1) Record of Decision (ROD) (USAEC, 1997).

In surface soil screening samples collected during the RI, selenium and zinc exceeded the average background concentrations of 0.715 mg/Kg and 1670 mg/Kg, respectively, calculated in the Baseline Ecological Risk Assessment. Neither compound exceeded the maximum background concentrations of 1.65 mg/Kg and 8,000 mg/Kg, respectively (MWH, 2004). Selenium and zinc were determined not to be contaminants of potential concern in the Baseline Risk Assessment in the RI (JAYCOR, 1996), upon which the OU-1 ROD RG values were based (USAEC, 1997).

During the sump sampling activities in 1993, soil samples were collected by JAYCOR at the concrete sumps adjacent to Buildings 7-18 (Sump 34), 7-54-1 (Sump 35), and 7-67 (Sump 36) at depths ranging from the surface to approximately 2.5 feet bgs (six inches below the sump bottom). Samples were analyzed for explosives and metals (JAYCOR, 1993). No compounds were detected above comparison criteria.

Five concrete sumps (at Buildings 7-18, 7-54-1, 7-64, 7-66, and 7-67) were removed and the soils surrounding them excavated in April/May 1995 (a total of 5.5 cubic yards [cy] removed). Five steel sumps/tanks (at buildings 7-19-1, 7-19-2, 7-54-2, 7-64, and 7-36) were removed during the same time period. Soils at only two steel sumps/tanks (at Buildings 7-19-1 and 7-36) were excavated (a total of 35.5 cy removed). Samples were collected beneath the bottom of all sumps removed and screened for explosives and metals prior to sending for laboratory analysis (OHM, 1996). No detected compounds analyzed by the laboratory exceeded comparison criteria.



The sumps and their approximate locations are listed in Table 1-1. The estimated locations of excavations are presented on Figure 1-1.

Surface water samples were collected as part of SI/RI activities from standing water in a former sump excavation north of Building 7-212-1 and west of Building 7-19-2 (08SW0201 and R08SW0101) and analyzed for metals, explosives, SVOCs, VOCs, and pesticides (JAYCOR, 1996). No compounds exceeded applicable comparison criteria. Surface water is not considered a medium of concern at Line 7.

In 2005, Plexus performed a building assessment prior to initiating demolition activities at the site. Testing using explosive-detecting color change reagents (Expray and Dropex) was conducted at corners of rooms, cracks in concrete slabs, pass-throughs in walls, support beams, floor drains, and stained surfaces. All buildings except Building 7-36 received a 5X rating, meaning that no significant contamination is present, and the building does not pose a safety hazard. Building 7-36 retained its 3X rating because several of the storage bays contained explosives contamination (Plexus, 2005).





## 2.0 SOIL SAMPLING WORK PLAN

The Line 7 operational history, historical environmental data, and building assessment data have been reviewed to identify specific areas that have exhibited elevated concentrations of explosives, metals, SVOCs, VOCs, and/or PCBs or areas/buildings where past operations may have resulted in impacts to the environment.

### 2.1 SAMPLE ANALYSIS PLAN

This section addends the Sample and Analysis Plan (SAP) included in the *Final Facility-Wide Work Plan* (FWWP) prepared by URS Corporation (URS) (2002) and approved by the U.S. Environmental Protection Agency (USEPA) Region 7. All sections of the FWWP are incorporated by reference except as noted in the sections below. This addendum also provides quantities and locations for field activities to be completed as part of the Line 7 Soil Sampling Work Plan. Field activities will be completed in accordance with the procedures detailed in the appropriate Standard Operating Procedures (SOPs) of the approved FWWP (URS, 2002).

#### 2.1.1 Selection of Sampling Locations

Soil samples will be collected at the following buildings/areas, in which operations may have resulted in impacts to the environment:

- 7-36 (primer loading/small caliber loading);
- 7-63-1 (small caliber loading adjacent to 7-36);
- 7-57 (primer mixture preparation/small caliber loading), including sump on south side of building with no record of being removed;
- 7-67 (percussion element storage/explosives storage);
- 7-63 (motor house/small caliber loading);
- 7-198 (flammable materials storehouse/solvent storage);
- 7-169-1 (transformer pad).

Soil samples at these buildings/areas will be collected from zero to one foot, primarily beneath building slabs (and associated gravel bases) and at locations where evidence of potential contamination was observed during the Plexus building assessment. Other observations may be of cracks in the concrete slab, concrete staining, soil staining (especially beneath structures), cracks or leaks in floor drains/sewer lines, and any other indicators of the potential presence of contamination. Based on a review of drawings of the buildings, sampling may also be conducted at sump locations with no record of removal.

Samples will be analyzed for the compounds associated with each building. For the bulk of the buildings, samples will be analyzed for explosives and metals. At other buildings/areas, samples may be additionally analyzed for SVOCs, VOCs, and PCBs. The contaminants of concern at each building/area are provided in Table 1-1. Table 2-1 presents the preliminary proposed soil sampling locations, depths, and analytes.



Preliminary sampling locations based on historical building uses and the building assessment results are located based on the best available data, and a map of the proposed points has been created (Figure 2-1). Initially, Tetra Tech field personnel will locate the proposed sample locations by utilizing a hand held global positioning system (GPS) unit. During demolition activities, locations where evidence of contamination is observed as described above will be flagged, and the GPS unit will be used to survey the sampling point locations. Any relocation or addition of sampling locations will be conducted in the field at this time.

The data generated by the GPS unit will be downloaded into mapping software, and checked against pertinent features and structures. After the check, any revisions to the location data will be uploaded into the GPS unit.

If results of soil samples indicate that contaminant concentrations are above applicable comparison criteria (OU-1 RGs), and the area is not horizontally or vertically delineated, delineation will be conducted. For horizontal delineation, soil samples will be collected from surface soils and/or at depth at a maximum of 10 feet horizontal distance from the soil sample exceeding comparison criteria. For vertical delineation, soil samples will be collected a maximum of five feet below the soil sample exceeding comparison criteria (or immediately above the saturated zone, whichever is shallower). These procedures will be repeated until soil delineation sample results are below comparison criteria.

### **2.1.2 Field Activities**

The following field activities will be conducted during the Line 7 soil sampling:

- Surface soil sampling;
- Subsurface soil sampling;
- Equipment and personnel decontamination;
- Sample identification, handling, field documentation, and shipping; and
- Survey of sampling locations.

#### **Surface Soil Sampling**

Field procedures for surface soil sampling will be conducted in accordance with the FWWP and SOP No. 1 (URS, 2002).

#### **Shallow Subsurface Soil Sampling**

Shallow subsurface soil (less than eight feet bgs) sampling activities will be completed via hand augers. Field procedures for shallow subsurface soil sampling will be conducted in accordance with the FWWP and SOP No. 2 (URS, 2002).

#### **Equipment and Personnel Decontamination**

Decontamination will be conducted to prevent or reduce the amount of personnel exposure to chemicals. Decontamination activities will be conducted in accordance with the FWWP. Decontamination liquids will be containerized as investigative derived waste (IDW) and will be disposed of following the procedures discussed in the FWWP.



### **Sample Identification, Handling, Field Documentation, and Shipping**

Sample identification, handling, field documentation, and shipping procedures will be conducted as specified in the FWWP and SOP No. 7 (URS, 2002).

### **Location Surveying**

All soil sampling locations will be surveyed for horizontal coordinates utilizing a GPS unit. Coordinates will be uploaded into mapping software for production of sample location maps.

## **2.2 QUALITY ASSURANCE PROJECT PLAN**

This section addends the Quality Assurance Project Plan (QAPP), Section 4 of the FWWP (URS, 2002) as approved by the USACE and USEPA Region 7. All sections are incorporated by reference, except where noted below. Laboratory analysis of samples collected will comply with quantitative and qualitative requirements specified in the FWWP.

### **2.2.1 Field Quality Assurance/Quality Control Samples**

Samples will be collected during the field effort to meet the project objectives. Quality Assurance (QA) split, field duplicate and matrix spike samples will be collected and submitted for analysis in conjunction with the field samples. QA split, field duplicate, and matrix spike samples will be collected at a frequency of approximately 5 percent of all soil samples. Other field QA/quality control (QC) samples will include:

- One rinsate sample will be collected during each sampling event.
- One temperature blank will be placed in each cooler.

### **2.2.2 Sampling and Field Procedures**

All sampling and field procedures will be conducted in accordance with the FWWP, except where noted in Section 2.1.2. All personnel will be required to read this Work Plan and the FWWP. An NELAP certified laboratory (Accutest) has been contracted to support the fieldwork.

### **2.2.3 Laboratory Analytical Procedures**

Specific analytes and methods for soil are presented in Table 2-2.

### **2.2.4 Data Reduction, Validation, and Reporting**

As described in Section 4.7.2 of the QAPP, the contracted analytical laboratory will conduct the first level of data review. Tetra Tech will perform an independent review of 100 percent of the analytical data packages and a 10 percent validation of the analytical data. Independent review and data validation criteria are addressed in Sections 4.7.3 and 4.7.4 of the QAPP. If necessary, Tetra Tech will also conduct performance and system audits in accordance with Section 4.8 of the QAPP.



### 2.3 HEALTH AND SAFETY PLAN

This section provides a brief summary of the Health and Safety Plan (HASP) which has been provided as a supplement to Section 6 HASP of the FWWP (URS, 2002). All sections are incorporated by reference, except where noted below.

#### Emergency Telephone Numbers

- Ambulance: 911 (or 17 for on-post assistance)
- Police: 911 (or 17 for on-post assistance)
- Fire Department: 911 (or 17 for on-post assistance)
- Hospital: Great River Medical Center (319-768-1000)
- CHEMTREC: 1-800 424 9300
- Tetra Tech Project Manager (PM): Rick Arnseth (865-220-4721)
- Tetra Tech Health and Safety Officer (HSO): Matt Soltis (412-921-8912)
- Tetra Tech Site Manager (SM): Tonya Meeler (319-753-7029)
- Tetra Tech Site Safety Officer (SSO): Dean Johnson (319-753-7029)
- IAAAP PM/Point of Contact: Rodger Allison (319-753-7130)

If an emergency occurs at the facility, the following procedures are to be initiated:

- Initiate an emergency notification by hand signals, voice commands, air horn, two-way radios, or cell phones to the SM/SSO. Describe to the SSO (who will serve as the Incident Coordinator) what has occurred and provide as many details as possible.
- Evacuate nonessential persons from the incident scene; engage initial response measures given the emergency type (i.e., spill response, fire extinguisher, first aid).
- If site personnel cannot control the incident through offensive and defensive measures, the SM and/or SSO will enact the emergency notification procedures to secure additional outside assistance by calling that appropriate emergency contact identified above.
- Give the emergency operator the location of the emergency and a brief description of what has occurred.
- Stay on the phone and follow the instructions given by the operator. The appropriate agency will be notified and dispatched.
- Call the on-site representative, the PM, and the HSO.

#### Hospital Route

Name of facility: Great River Medical Center  
Telephone: 319-768-1000  
Address: 1221 S. Gear Avenue, West Burlington, IA 52655



### Specific Directions:

From Road A, travel through the front gate to Hwy 34. Turn right onto Hwy 34. Travel east of Hwy 34 for approximately 4 miles and exit at Gear Avenue. Turn right onto Gear Avenue and travel south less than 1 mile. The hospital is at the intersection of Gear Avenue and West Agency Road.

## **2.4 IDW TRANSPORTATION AND DISPOSAL PLAN**

Soil cuttings generated during sampling activities will be transported to the Inert Disposal Area (IDA) as specified in 7.3.1 of the Facility-Wide Work Plan (URS, 2002). Soil cuttings will be placed into one of three areas, depending on the level of risk presented by the contaminants in the soil, as specified in the OU-1 ROD (USAEC, 1997):

- Contaminated soils with risk levels above  $10^{-5}$  or that fail land disposal restriction criteria will be temporarily stored in the Corrective Action Management Unit (Trench 7) at the IDA for remediation, then, transported to the soil repository (Trench 6).
- Contaminated soils with risk levels between  $10^{-3}$  and  $10^{-1}$  will be permanently disposed in Trench 6.
- Contaminated soils with risk levels below  $10^{-6}$  and above the leaching RGs will be permanently disposed in Trench 6 or the Inert Landfill.

Decontamination fluids will be containerized as specified in Section 7.3.2 of the FWWP and transported to the IDA for discharge into the existing water treatment (granular activated carbon) system. There is no concentration limit on water placed in the treatment system.

Personal protective equipment and disposable items such as plastic will be containerized and disposed at Trench 6 of the IDA.

## **2.5 REPORTING**

A brief report will be prepared upon receipt of all laboratory analysis results, and after all sampling locations are delineated to below comparison criteria. The report will include a summary of the analytical data, figures and tables showing any exceedences of comparison criteria, and an evaluation of the potential for groundwater contamination based on the presence (or absence) of soil contamination.



### 3.0 REFERENCES

- JAYCOR, 1993, *Final Report Contamination Assessment of Concrete Sumps, Iowa Army Ammunition Plant*. June 1993.
- JAYCOR, 1996. *Revised Draft Final Remedial Investigation Report, Iowa Army Ammunition Plant*. May 1996.
- IAAAP, 2001. *Complete Building List*. February 5, 2001.
- MWH (Montgomery Watson Harza), 2004. *Draft Final Baseline Ecological Risk Assessment, Iowa Army Ammunition Plant*, October 2004.
- OHM (OHM Remediation Services, Inc.), 1996. *Draft Final Report Rapid Response IAAAP Removal Actions (Pesticide Pit and Explosive-Contaminated Sumps)*. January 1996.
- Plexus (Plexus Scientific Corporation), 2005. *Final Report, 3X Building Assessment and Waste Characterization, Iowa Army Ammunition Plant, Middletown, Iowa*. December 2005.
- Tetra Tech, 2005. *Draft Final Comprehensive Watersheds Evaluation and Supplemental Data Collection Work Plan, Iowa Ammunition Plant, Middletown, Iowa*. November 2005.
- URS (URS Corporation), 2002. *Final Facility-Wide Work Plan: Iowa Army Ammunition Plant*. February 2002.
- USAEC (U.S. Army Environmental Center), 1997. *Interim Action Record of Decision, Soils Operable Unit, Iowa Ammunition Plant, Middletown, Iowa*. October 1997.
- USACE (U.S. Army Corps of Engineers), 1944. *War Department Industrial Facilities Inventory Iowa Ordnance Plant, Burlington, Iowa*. March 1944.



## **TABLES**

**Table 1-1**  
**Buildings Summary--Line 7 Soil Sampling Work Plan**  
**Iowa Army Ammunition Plant**  
**Middletown, Iowa**

Building Number (7-xx)	Yr built	Use/Name 1 (USACE, 1944)	Use/Name 2 (IAAAP, 2001)	Sumps	Samples Collected	Potential COCs	Building Certification
18	1941	black powder service magazine	NL	SU34 (off NW corner of bldg): 2'x2' concrete sump removed/ 1cy excavated;	<b>RI:</b> laboratory analyzed samples collected around sump, <RGs. <b>Sump:</b> 1 beneath floor of sump, <RGs;	unlikely	5 X
19-1	1942	black powder dry house	gen purpose magazine	S of bldg: 5' diameter steel sump removed/20.5 cy excavated;	<b>RI:</b> screening and lab analyzed samples collected S of bldg, <RGs. <b>Sump:</b> samples collected beneath sump and off 4 walls of excavation, delineated to <RGs	unlikely	5 X
19-2	1971	NL	gen purpose magazine	W of bldg: 5' diameter steel sump removed; excavation not noted in removal report	<b>Sump:</b> samples collected beneath sump and off 4 walls of excavation, delineated to <RGs	unlikely	5 X
36	1942	primer loading	small cal loading plant	location unknown: 4'x10' steel sump removed/15 cy excavated	<b>RI:</b> screening samples collected in ditch ~20' W of truck dock, all <RGs; selenium and zinc exceed avg background concentrations but not maximum background; laboratory analyzed samples all <RGs; 1 sample to east <RGs; 1 sample at corner of 7-36 and 7-99-1 <RGs.	explosives, metals	3 X
54-1	1942	black powder rest house	ready magazine	SU36 (SW of bldg): 2'x2' concrete sump removed/ 1cy excavated	<b>Sump:</b> 1 sample collected beneath floor of sump, <RGs	unlikely	5 X
54-2	1942	black powder rest house	ready magazine	SW corner of bldg (W according to bldg plan): 5' diameter steel sump removed; RI says excavated, removal report says no excav	<b>RI:</b> screening samples collected W and S of bldg, <RGs; lab analyzed samples collected S of bldg, <RGs. <b>Sump:</b> 1 sample collected beneath sump, <RGs.	unlikely	5 X
57	1942	Primer mixture preparation building	small cal loading plant	located south central of bldg according to building plan; no indication of removal	<b>RI:</b> 1 sample collected on SW side of loading dock in ditch, all <RGs	explosives, metals	5 X
63	1942	motor house	small cal loading plant	between 63 and 64 according to building plan; possibly removed (see 64)	none collected	explosives, metals, SVOCs	5 X
63-1	1967	NL	small cal loading plant	none known	none collected	explosives	5 X
64	1942	black powder screening bldg	ready magazine	exact locations unknown: 2'x2' concrete sump (64C) removed/1.5 cy excavated; 5' diameter steel sump (64S) removed; RI says 1 sump removed prior.	<b>RI:</b> 1 sample collected in sump excav, <RGs. <b>Sump:</b> 1 beneath the floor of two sumps, <RGs	unlikely	5 X
65	1942	fan house	NL--incorporated into 19-1	none known	none collected	unlikely	5 X
66	1941	primer rest house	ready magazine	Off SW corner of bldg: 2'x2' concrete sump removed/1 cy excavated;	<b>RI:</b> screening samples collected W of bldg, <RGs; 1 lab analyzed sample S of bldg at sump outfall, <RGs. <b>Sump:</b> 1 beneath floor of sump, <RGs	unlikely	5 X
67	1941	percussion element storage magazine	explosives storage	SU35 (off SE corner of bldg): 2'x2' concrete sump removed/1 cy excav	<b>RI:</b> 1 composite sample collected in washdown area to S , <RGs. <b>Sump:</b> 1 beneath floor of sump, <RGs	explosives, metals	5 X
99-1	1969	NL	vacuum house	none known	<b>RI:</b> screening and laboratory analyzed samples collected N of bldg/W of 36; all <RGs except selenium at 1.41 mg/Kg, which was delineated to <RGs	unlikely	5 X
137-1	1942	change house "G" men	change house	none known	none collected	unlikely	5 X
137-2	1942	change house "G" women	incorporated into 137-1	none known	none collected	unlikely	5 X
169-1	1942	NL	substation	none known	<b>RI:</b> 4 samples collected around pad, PCBs <RG	PCBs	5 X
198	1967	NL	flammable materials storehouse	none known	<b>RI:</b> 1 collected off SE corner of loading dock, all <RGs	metals, SVOCs, VOCs	5 X
212-1	1971	NL	A/C plant	see Building 19-2	<b>RI:</b> 1 sample collected in previously excavated sump pit, <RGs	unlikely	5 X

**Notes:**

NL -- not listed

RI -- sampling conducted during SI/RI (JAYCOR, 1996)

Sump -- sampling conducted during sump removal (OHM, 1996)

building certification based on Plexus, 2005

highlighted -- building of concern



**Table 2-1  
Preliminary Proposed Sampling Points--Line 7 Soil Sampling Work Plan  
Iowa Army Ammunition Plant  
Middletown, Iowa**

Name	Rationale	Analytes and Depths					Coordinates			
		Explosives	Metals	VOCs	PCBs	SVOCs	X	Y	Longitude	Latitude
7-169-SS01	transformer pad				0-1		690353.4922	91025.47758	-91.24410476	40.7974636
7-169-SS02	transformer pad				0-1		690359.7496	91025.5633	-91.24403061	40.79746291
7-198-SS01	flammable/solvent storage			0-1		0-1	690350.4064	91004.90531	-91.24414763	40.79727912
7-198-SS02	loading dock pad flammable/solvent storage			0-1		0-1	690350.5778	91001.9909	-91.2441465	40.79725285
7-36-SS01	storage bay E/former charging room	0-1	0-1				690316.0406	91007.50913	-91.24455392	40.79731059
7-36-SS02	storeroom	0-1	0-1				690313.574	91007.45775	-91.24458315	40.7973107
7-36-SS03	storage bay D	0-1	0-1				690311.0561	91007.35498	-91.24461301	40.79731036
7-36-SS04	storage bay C	0-1	0-1				690308.2299	91007.40636	-91.24464647	40.79731148
7-36-SS05	storage bay B	0-1	0-1				690305.712	91007.35498	-91.24467632	40.79731161
7-36-SS06	storeroom; contamination detected during bldg assessment	0-1	0-1				690303.451	91007.30359	-91.24470312	40.79731167
7-36-SS07	storage bay A/former charging room; contamination detected during bldg	0-1	0-1				690300.8303	91007.30359	-91.24473416	40.79731229
7-36-SS08	storage bay J; contamination detected during bldg assessment	0-1	0-1				690321.1278	91031.09531	-91.24448641	40.79752172
7-36-SS09	storage bay W; contamination detected during bldg assessment	0-1	0-1				690320.9007	91033.45531	-91.24448838	40.79754302
7-36-SS10	storage bay I; contamination detected during bldg assessment	0-1	0-1				690320.9222	91035.87421	-91.24448738	40.79756479
7-57-SS01	storage bay A	0-1	0-1				690438.1814	91010.90555	-91.24310603	40.79731263
7-57-SS02	former supply and storage room location	0-1	0-1				690404.4086	91010.56268	-91.2435062	40.79731744
7-57-SS03	sump suspected to be present at primer mixing/loading plant	0-1	0-1				690417.0948	91007.39112	-91.24335689	40.79728592
		1-2	1-2				690417.0948	91007.39112	-91.24335689	40.79728592
		2-3	2-3				690417.0948	91007.39112	-91.24335689	40.79728592
7-57-SS04	doorway to former supply and storage room (seam in concrete if present)	0-1	0-1				690404.8372	91007.47684	-91.24350207	40.79728956
7-57-SS05	body assembly location	0-1	0-1				690394.6367	91017.07723	-91.24361995	40.79737837
7-57-SS06	drying room location	0-1	0-1				690400.2941	91023.59179	-91.24355093	40.79743569
7-57-SS07	fan and heater room location	0-1	0-1			0-1	690405.4372	91023.59179	-91.24349001	40.79743449
7-57-SS08	head assembly location	0-1	0-1				690435.267	91017.24867	-91.2431386	40.79737042
7-57-SS09	truck pad location	0-1	0-1			0-1	690453.4392	91014.5057	-91.24292418	40.79734148
7-57-SS10	drain pipe location	0-1	0-1			0-1	690431.9554	91009.31865	-91.24318027	40.7972998
7-63-1-SS01	loading plant	0-1	0-1				690322.1195	91018.27728	-91.2444786	40.7974061
7-63-1-SS02	potential sump location at loading plant	0-1	0-1				690325.4699	91020.58987	-91.2444382	40.79742614
		1-2	1-2							
		2-3	2-3							
7-63-SS01	motor house/loading plant	0-1	0-1		0-1	0-1	690236.4079	90938.83404	-91.24551832	40.79671095
7-67-SS01	explosives storage	0-1	0-1				690436.2956	90984.1616	-91.24313659	40.79707232
7-67-SS02	doorway to explosives storage (seam in concrete if present)	0-1	0-1				690433.3812	90984.1616	-91.24317111	40.797073

**Notes:**

Additional samples will be added as determined in the field

**Table 2-2**  
**Sampling and Analysis Summary--Line 7 Soil Sampling Work Plan**  
**Iowa Army Ammunition Plant**  
**Middletown, Iowa**

Parameter	Method	Container	Preservative	Regular Soil	QC Soil			Total Soil
					Field Dup	MS	MSD	
Explosives	8330	4oz glass	4° C	44	4	2	2	52
Metals	6010B	4oz glass	4° C	44	4	2	2	52
VOCs	8260B	4oz glass	4° C	3	1	1	1	6
SVOCs	8270C	4oz glass	4° C	9	1	0	0	11
PCBs	8082	4oz glass	4° C	6	1	0	0	7

**Notes:**

Target metals include arsenic, barium, beryllium, boron, cadmium, chromium, lead, mercury, and selenium.

Includes 50 percent additional samples to be located in the field

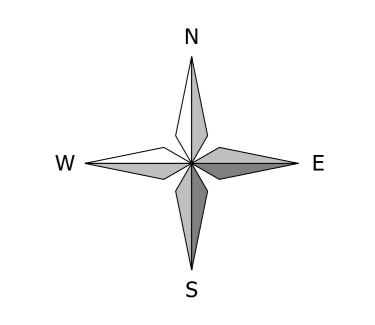


## **FIGURES**



### LEGEND

- Line 7 Proposed Samples
- Line 7 Historical Data
  - Non Detect
  - Detect
  - Above Screening Criteria
- Buildings
  - Building doors
  - Areas
  - Lines
- Surface Water
  - Bunkers
  - Excavations
- Process Lines
  - Building
  - Ruin
- Roads
  - Improved
  - Parking
  - Unimproved
- Railroads
  - Pipe Discharges
  - Possible Sumps
- Septic Systems and Drainfields
  - Tanks
- Topographic Contours
  - major contours
  - minor contours



0 25 m

LINE 7 DEMOLITION & DECOMMISSIONING  
SOIL SAMPLING WORK PLAN  
IOWA ARMY AMMUNITION PLANT  
MIDDLETOWN, IOWA

**Tetra Tech, Inc.**



OAK RIDGE, TENNESSEE

**Figure 2-1**  
**Site Layout and**  
**Proposed Soil Sampling Points**