ENVIRONMENTAL
CHEMICAL
CORPORATION

FINAL
SUPPLEMENTAL WORK PLAN

Fire Training Pit Removal Action
Iowa Army Ammunition Plant
Middletown, Iowa

Prepared for:

U.S. Army Corps of Engineers
Omaha District

Contract No. DACW45-95-D-0026
Delivery Order 5

Environmental Chemical Corporation
1240 Bayshore Highway
Burlingame, California 94010

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DQO	Data Quality Objective
ECC	Environmental Chemical Corporation
EPA	United States Environmental Protection Agency
ESD	Explanation of Significant Differences
FTP	Fire Training Pit
GAC	granular activated carbon
IAAAP	Iowa Army Ammunition Plant
IDA	Inert Disposal Area
LTTD	Low Temperature Thermal Desorption
NAPL	non-aqueous phase liquid
OE	Ordnance Explosive
PID	photo-ionization detector
ppm	parts per million
QA	quality assurance
QAPP	Quality Assurance Project Plan
QC	quality control
RBC	risk-based concentration
RCRA	Resource Conservation and Recovery Act
RDX	hexahydro-1,3,5-trinitro-1,3,5-triazine
ROD	Record of Decision
SAP	Sampling and Analysis Plan
SOP	Standard Operating Procedure
SSHP	Site Safety & and Health Plan
SVOC	semi-volatile organic compound
TCE	trichloroethylene
TCLP	Toxicity Characteristic Leaching Procedure
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
UXO	unexploded ordnance
VOC	volatile organic compound
WBPLF	West Burn Pads Landfill
WP	Work Plan

1.0 Objective

The objective of this work plan document is to describe the procedures proposed for removing contaminated soil, ash, and debris from two separate areas located near the former Fire Training Pit (FTP) site at the Iowa Army Ammunition Plant (IAAAP). The Army proposes to excavate, sample, treat, and dispose of these materials in accordance with applicable regulatory requirements and as necessary to permanently place the excavated materials in the Trench 6 "Soil Repository" (landfill cell) at the Inert Disposal Area (IDA) site. Verification samples will be collected from soil remaining at the excavation areas to ensure that residual contamination meets applicable excavation criteria. Verification samples will also be collected from treated soils to ensure that applicable treatment criteria are met. The excavation areas will be backfilled with clean compacted soil and topsoil and will be seeded to restore vegetation. A project location map and vicinity map are provided on Figure 1.

2.0 Background

Between August 1998 and September 1999, under U.S. Army Corps of Engineers (USACE) Contract No. DACA45-95-D-0026 (Delivery Order #5), Environmental Chemical Corporation (ECC) executed a non-time critical removal action at the Fire Training Pit (FTP) site for the Army. Approximately 4,300 cubic yards of contaminated soil was excavated from the FTP site and transported to the IDA for treatment and landfill disposal. Approximately 2,700 cubic yards of that excavated FTP soil was treated for VOCs/SVOCs contamination using a Low Temperature Thermal Desorption (LTTD) process and the remainder was treated using a land-farming process. The lower portion of the excavation (approximately 80 feet by 120 feet in plan view) was backfilled with clean sand and then covered with clean compacted clay and topsoil.

The Final Work Plan, Site Safety & Health Plan (SSHP), and Sampling & Analysis Plan (SAP) documents for the Fire Training Pit removal action project (ECC, July 1998), as approved by Army & EPA, provided the framework for execution of the 1998-1999 cleanup activities, which were subsequently documented in the Final Remedial Action Report for the Fire Training Pit site (ECC, October 2000).

Following the completion of the 1998-1999 cleanup activities at the Fire Training Pit site, as a result of an examination of historic aerial photographs and engineering drawings, two additional areas of potential contamination were identified near the former Fire Training Pit.

Based upon field observations (in May 2001 and November 2001), the first area appears to be a small landfill trench and/or secondary burn pit. It is approximately 10 feet by 40 feet in plan view, approximately 3-6 feet deep, and it is located immediately southeast of the smoke training vault (building 200-30) and north-northwest of the 1998-1999 FTP

excavation area. Reference Figures 2 & 3 for diagrams showing the location of this "landfill trench / secondary burn pit".

The second area appears to be an area of fuel-contaminated soil. It is approximately 40 feet by 50 feet in plan view, extending from approximately 4 feet to 13.5 feet below ground surface (bgs), and it is located directly east of the "landfill trench / secondary burn pit" area (discussed above), west of the north-south gravel access road which forms the eastern boundary of the FTP site, and north-northeast of the 1998-1999 FTP excavation area. Reference Figure 2 for a diagram showing the location of this "fuel-contaminated soil area".

This work plan document is intended to supplement the July 1998 Final Work Plan, SSHP, and SAP documents (used for the 1998-1999 Fire Training Pit removal action) for the purpose of supporting small-scale cleanup actions to address the "landfill trench / secondary burn pit" and "fuel-contaminated soil" areas near the former Fire Training Pit.

2.1 Landfill Trench / Secondary Burn Pit

A preliminary investigation of the "landfill trench / secondary burn pit" was conducted on 24 May 2001 by USACE & ECC personnel. Using historical aerial photographs to guide their placement, three exploratory trenches were excavated (using a backhoe) in the suspected area southeast of building 200-30. Visual evidence revealed the presence of ash and miscellaneous debris in two of the trenches. Field observations revealed no indications that the third trench (FTA-TR3) was contaminated. Field screening (i.e., PID instrument) readings did not indicate the presence of VOCs within the exploratory trenches. Results from three soil samples collected for chemical analysis (explosives and total metals) during this operation indicated the presence of high levels of metals (barium and silver) and low levels of explosives contamination. Reference Figures 2 & 3 for diagrams showing the locations of these three exploratory trenches (identified as FTA-TR1, FTA-TR2, and FTA-TR3). Detailed profiles of these trenches are provided on Figure 4. Photographs 1 & 2 are provided as visual indications of some of the ash and debris materials encountered during the 24 May 2001 field event.

To delineate the northern boundary of the "landfill trench / secondary burn pit" and to collect additional soil samples for TCLP (Toxicity Characteristic Leaching Procedure) analysis for metals, a second field investigation was conducted on 8 November 2001. Two additional exploratory trenches were excavated and three additional soil samples were collected for chemical analysis (explosives and TCLP metals or total metals). These sample results confirmed the presence of high levels of metals (including one barium result that exceeded TCLP regulatory limits) and low levels of explosives contamination. This sampling event, however, did not duplicate the high-concentration silver results from two 24 May 2001 samples. Reference Figure 2 for a diagram showing the locations of the two November 2001 exploratory trenches (identified as FTA-T4 and FTA-T5).

2.2 Fuel-Contaminated Soil Area

On 8 November 2001, in an effort to locate, delineate, and characterize the "fuel-contaminated soil" area, three exploratory trenches were excavated in the suspected area east-southeast of building 200-30 (using historical aerial photographs to guide their placement). Field observations noted during trenching operations included discolored (greenish) soil and degraded-diesel-fuel-like odors from two of the three trenches. The discolored soil and associated odors were reported to be very similar to that encountered during the 1998-1999 cleanup activities at the FTP site. Field observations revealed no indications that the third trench (FTA-T3) was contaminated. Results from two soil samples collected for chemical analysis (explosives, VOCs, SVOCs, and RCRA metals) indicated the presence of low levels of VOCs, SVOCs, and explosives contamination. Reference Figure 2 for a diagram showing the locations of these three exploratory trenches (identified as FTA-T1, FTA-T2, and FTA-T3). Photograph 3 is provided as visual indication of some of the discolored soil encountered during the 8 November 2001 field event.

3.0 Sampling Results (May 2001 and November 2001)

3.1 Landfill Trench / Secondary Burn Pit

From the 24 May 2001 field event, analytical results for soil sample FTA-TR2-01 included a total silver concentration of 22,000 mg/kg and a total barium concentration of 63,000 mg/kg. Analytical results from soil sample FTA-TR1-01 included a total silver concentration of 3,700 mg/kg and a total barium concentration of 3,600 mg/kg. TCLP analyses were not performed on those two soil samples; however, both sample results greatly exceeded "20-times-rule" threshold concentrations for silver (100 mg/kg) and barium (2,000 mg/kg), which indicates the possibility that both samples could have exceeded TCLP regulatory limits. In addition, both of these samples slightly exceeded previously established soil excavation criteria for RDX (1.3 mg/kg). Analytical results for explosives compounds included 1.9 mg/kg RDX in sample FTA-TR2-01 and 2.0 mg/kg RDX in sample FTA-TR1-01. Summarized analytical results from the 24 May 2001 sampling event are provided in Tables 1 and 2.

From the 8 November 2001 field event, analytical results for soil sample FTA-T5-03 included a TCLP barium concentration of 200 mg/L. This concentration exceeds the TCLP regulatory limit for barium (100 mg/L). Additionally, analytical results for soil sample FTA-T4-06 included an RDX concentration of 6.8 mg/kg, which exceeds the previously established soil excavation criteria for RDX (1.3 mg/kg). Summarized analytical results from the 8 November 2001 sampling event are provided in Tables 1, 2, and 3.

3.2 Fuel-Contaminated Soil Area

During the 8 November 2001 field event, two soil samples were collected from the discolored (greenish) soil encountered in exploratory trenches FTA-T1 and FTA-T2. Low levels of VOCs, SVOCs, explosives, and (total) metals were detected in both soil samples. Acetone, ethylbenzene, toluene, xylene, and methylene chloride were among the VOCs detected. A variety of semi-volatile compounds were detected at low concentrations. Summarized analytical results from the 8 November 2001 sampling event are provided in Tables 1, 2, 4, and 5.

4.0 Proposed Remedial Actions

To remediate the contaminated soils in the "landfill trench / secondary burn pit" area and in the "fuel-contaminated soil" area (as discovered in May/November 2001), the Army proposes the implementation of remedial measures as outlined below.

4.1 Landfill Trench / Secondary Burn Pit

- Excavate visibly contaminated soil, ash and debris;
- "Over-excavate" 1 foot (approx.) of soil, vertically and laterally, beyond the visible limits of the contaminated soil, ash, and debris;
- Collect representative "verification" soil samples for chemical laboratory analyses (explosives and RCRA metals) from the walls and floor of the excavation;
- Excavate additional soil, if required, based upon analytical results from verification samples;
- Repeat steps for verification sampling & additional excavation, as needed, until verification sample results demonstrate residual contamination is reduced to acceptable levels;
- Document the final excavation limits and associated verification sample locations via professional land survey methods;
- Backfill the excavation with clean compacted clay soil, cover with topsoil, grade to drain, and seed to restore vegetation;
- Transport excavated materials to the Inert Disposal Area (IDA) site at IAAAP;
- Stockpile the excavated materials within the Trench 6 Soil Repository landfill cell at the IDA;
- Collect representative samples from the stockpiled materials for chemical laboratory analyses (explosives and TCLP metals);
- Isolate and protect the stockpiled materials using synthetic covers/liners (as needed) while awaiting analytical results;
- If the stockpile sample results do not exceed TCLP regulatory limits (or previously established limits for explosives contamination), the stockpiled

materials will be relocated for permanent placement (without treatment) within the Trench 6 Soil Repository;

- If the stockpile sample results exceed TCLP regulatory limits, large debris items will be screened from the stockpiled materials (as needed to facilitate subsequent treatment operations), and the remaining stockpiled materials will be treated (as required to meet TCLP regulatory limits and associated Land Disposal Restrictions) within the Trench 6 Soil Repository using previously approved metals stabilization procedures. (Reference section 6 of this supplemental workplan document for metals treatment process details);
- If the stockpiled materials require treatment, representative post-treatment samples will be collected for analysis to verify successful completion of treatment operations (as defined by TCLP regulatory limits and Land Disposal Restrictions);
- If initial treatment is not fully successful, additional treatments will be applied to the excavated materials until TCLP regulatory limits and Land Disposal Restrictions are met;
- After verifying successful completion of soil treatment operations, the treated materials will remain permanently within the Trench 6 Soil Repository.

Approximately 90 cubic yards of soil, ash and debris are projected for removal from the "landfill trench / secondary burn pit" area. One composite sample will be collected from these excavated materials, using a minimum of five sub-samples, in a manner designed to create a sample that will be representative of the entire volume of excavated material. Composite soil "verification" samples will be collected from the excavation walls and floor in a manner designed to create samples that will be representative of the soils remaining at the perimeter of the final excavation.

Soil samples will be placed in a stainless steel bowl and homogenized, and representative sub-samples will be placed into glass jars with Teflon lined lids. Samples will be cooled to 4 degrees Celsius, placed in a cooler, and shipped to Data Chem Laboratory, where they will be analyzed for TCLP metals using USEPA SW846 Methods 1311/6010/7470 or for RCRA metals using USEPA SW846 Methods 6010/7471 (as applicable) and for explosives using USEPA SW846 Method 8330.

If the excavated materials exceed TCLP regulatory limits for metals, they will be treated in accordance with previously approved procedures, as outlined within the Final Work Plan Addendum for Metals Treatment for West Burn Pads Landfill (WBPLF) Soils (CAPE, December 2001). If metals treatment is required for materials removed from the FTP site, ECC proposes to use the Free Flow 100® metals treatment process, since it was previously proven to be successful (and cost-effective) for the treatment of IAAAP soils (from the WBPLF site) contaminated with high levels of metals. Reference section 6 of this supplemental workplan document for additional metals treatment process details.

Based upon sample results from the May 2001 and November 2001 field events, high concentrations of explosives are not expected to be found within the materials to be excavated from the "landfill trench / secondary burn pit" area. As a result, this supplemental workplan document assumes that excavated materials from this area will not require treatment for explosives contaminants prior to permanent placement in an engineered landfill environment at the IDA site. However, since low levels of explosives were found to exist in the May & November 2001 samples, excavated materials will be analyzed for explosives and final decisions regarding disposition of the excavated materials will take into account explosives concentrations.

4.2 Fuel-Contaminated Soil Area

- Remove visibly clean "overburden" soil from ground surface to (approx.) 1 foot above visibly contaminated (i.e., discolored) soil;
- Stockpile overburden soil in an on-site area near the excavation;
- Collect representative samples from the stockpiled overburden soils for chemical laboratory analyses (VOCs, SVOCs, RCRA metals, and explosives);
- Isolate and protect the stockpiled overburden soils using synthetic covers/liners (as needed) while awaiting analytical results;
- If the stockpiled overburden sample results indicate that the soil is not contaminated, the stockpiled overburden soils will be retained for use as backfill material for the excavation area;
- If the stockpiled overburden sample results indicate that the soil is contaminated, the stockpiled overburden soils will be relocated to the Trench 6 Soil Repository landfill cell at the IDA;
- Excavate visibly contaminated soil (below the fore-mentioned overburden soil);
- "Over-excavate" 1 foot (approx.) of soil, vertically and laterally, beyond the visible limits of the contaminated soil;
- Use visual & olfactory indications and instrument-based field screening methods (e.g., PID meter) to help determine whether residual contamination is reduced to acceptable levels;
- When visual & olfactory indications and field screening methods indicate that residual contamination has been reduced to acceptable levels, collect representative "verification" soil samples for chemical laboratory analyses (VOCs, SVOCs, RCRA metals, and explosives) from the walls and floor of the excavation;
- Excavate additional soil, if required, based upon analytical results from verification samples;
- Repeat steps for verification sampling & additional excavation, as needed, until verification sample results demonstrate residual contamination is reduced to acceptable levels;
- Document the final excavation limits and associated verification sample locations via professional land survey methods;

- Backfill the excavation with clean compacted clay soil, cover with topsoil, grade to drain, and seed to restore vegetation;
- Transport excavated soils to the Inert Disposal Area (IDA) site at IAAAP;
- Stockpile the excavated soils within the Trench 6 Soil Repository landfill cell at the IDA;
- Collect representative samples from the stockpiled soils for chemical laboratory analyses (VOCs, SVOCs, RCRA metals, and explosives);
- Isolate and protect the stockpiled soils using synthetic covers/liners (as needed) while awaiting analytical results;
- If the stockpile sample results are as expected and they indicate the soil to be contaminated with VOCs/SVOCs at levels that do not exceed LTTD action levels specified in the July 1998 Final FTP Work Plan (and the sample results do not exceed TCLP regulatory limits for metals, based upon "20-times-rule" threshold concentrations, or previously established treatment criteria for explosives contamination), the stockpiled soils will be redistributed for treatment within the Trench 6 Soil Repository;
- If the stockpiled soils require treatment for VOCs/SVOCs contamination, a previously approved "land-farming" soil treatment process (using tractor & disk equipment) will be employed. (Reference section 7 of this supplemental workplan document for land-farming process details);
- If the stockpiled soils are treated for VOCs/SVOCs, representative post-treatment samples will be collected for analysis to verify successful treatment (as defined by headspace readings from the soil samples);
- If initial treatment is not fully successful, additional land-farming treatments will be applied to the soils until treatment goals are achieved;
- After verifying successful completion of soil treatment operations, the treated soils will remain permanently within the Trench 6 Soil Repository.

Approximately 500 to 1,000 cubic yards of contaminated soil are projected for removal from the "fuel-contaminated soil" area. Representative soil samples will be collected from these excavated soils at a minimum frequency of one sample for every 300 cubic yards. Representative soil "verification" samples will be collected from the excavation walls and floor at a minimum frequency of one sample for every 600 square feet of excavation surface area.

Multi-point composite sampling methods will be used for the collection of explosives, metals, and SVOCs samples. These (non-VOCs) soil samples will be placed in a stainless steel bowl and homogenized, and representative sub-samples will be placed into glass jars with Teflon lined lids. VOCs samples will be collected and handled in a fashion designed to minimize the loss of volatile contaminants from the samples. VOCs soil samples will be placed into sample containers with no headspace. All samples will be cooled to 4 degrees Celsius, placed in a cooler, and shipped to Data Chem Laboratory, where they will be analyzed for VOCs using USEPA SW846 Method 8260B, SVOCs using USEPA SW846 Method 8270C, RCRA metals using USEPA SW846 Methods 6010/7471, and explosives using USEPA SW846 Method 8330.

If the excavated soils contain VOCs/SVOCs contamination at levels not exceeding LTTD treatment action levels (as specified in the July 1998 Final FTP Work Plan), they will be treated in accordance with previously approved "land-farming" procedures, as documented within the Final Remedial Action Report for the Fire Training Pit site (ECC, October 2000) and as outlined within section 7 of this supplemental workplan document.

Based upon sample results from the May 2001 and November 2001 field events, high concentrations of contaminants (VOCs, SVOCs, metals, explosives) are not expected to be found within the soils to be excavated from the "fuel-contaminated soil" area. As a result, this supplemental workplan document assumes that excavated soils from this area will not require treatment for explosives or metals contaminants prior to permanent placement in an engineered landfill environment at the IDA site. It also assumes that VOCs/SVOCs contamination will warrant no treatment beyond simple land-farming.

However, excavated soils will be analyzed for VOCs, SVOCs, metals, & explosives and final decisions regarding disposition of the excavated materials will take into account all contaminant concentrations.

5.0 Excavation Verification Samples

Representative soil "verification" samples will be collected from the walls and floors of both excavation areas after all visible signs of contamination have been removed and an additional foot of soil has been "over-excavated". Non-VOCs samples will consist of multi-point composites collected from the sidewalls and floors of the excavations. Verification samples will be collected at a minimum frequency of one sample for every 600 square feet of excavation area.

Verification samples from the "landfill trench / secondary burn pit" excavation will be analyzed for RCRA metals using USEPA SW846 Methods 6010/7471 and for explosives using USEPA SW846 Method 8330.

Verification samples from the "fuel-contaminated soil" excavation will be analyzed for VOCs using USEPA SW846 Method 8260B, SVOCs using USEPA SW846 Method 8270C, RCRA metals using USEPA SW846 Methods 6010/7471, and explosives using USEPA SW846 Method 8330.

Excavations will be left open until verification sample analytical data indicates that no contamination exceeding excavation criteria remains. However, the excavations will be backfilled as soon as possible (after receipt of acceptable verification sample results) with clean compacted clay soil and they will be covered with topsoil, graded to drain, and seeded to restore vegetation.

6.0 Soil Treatment for Metals Contamination

Analytical results from the May 2001 and November 2001 field events indicate a strong possibility that the materials to be excavated from the "landfill trench / secondary burn pit" area will contain metals contamination at levels exceeding TCLP regulatory limits and associated Land Disposal Restrictions. If this is proven to be the case by actual sample results from the excavated materials, the Army proposes to treat the soil in accordance with previously approved stabilization materials & procedures, as used at IAAAP (in December 2001 and January 2002) for the treatment of metals-contaminated soil removed from the West Burn Pads Landfill site. The following steps summarize this treatment process.

- Distribute the metals-contaminated materials within the Trench 6 Soil Repository (landfill cell) and spread the materials uniformly into a six-inch lift;
- Screen large debris items from the materials to be treated (as needed to accommodate the metals treatment process);
- Use the "Free Flow 100®" metals treatment process (as provided by Free Flow Technologies, Ltd.; Rockford, IL.) to chemically stabilize the metals contaminants within the excavated materials;
- Uniformly add "Free Flow 100®" amendment and moisture, per manufacturer specifications, to the materials requiring metals treatment;
- Use standard farm tractor and disk equipment to thoroughly mix materials, using a minimum of two passes north & south and two passes east & west.
- Allow the "Free Flow 100®" amendment, moisture, and soil to react per manufacturer's specifications;
- Collect one representative (5-point minimum) composite treatment verification sample from the treated materials and analyze the sample for TCLP metals using USEPA SW846 Methods 1311/6010/7470;
- Compare post-treatment TCLP sample results against the soil treatment goals listed within Table 3 of this supplemental workplan document;
- If initial treatment is not fully successful, additional treatments will be applied to the excavated materials until soil treatment goals (i.e., TCLP regulatory limits and Land Disposal Restrictions) are met;
- After verifying successful completion of soil treatment operations, the treated materials will remain permanently within the Trench 6 Soil Repository.

Additional details regarding the "Free Flow 100®" amendment materials and treatment process are documented within the Final Work Plan Addendum for Metals Treatment for West Burn Pads Landfill Soils (CAPE, December 2001).

7.0 Land-Farming Soil Treatment

During the 1998-1999 FTP removal action, ECC used a land-farming process to treat FTP soils that were mildly contaminated with VOCs/SVOCs (i.e., at levels not requiring more rigorous treatment via Low-Temperature Thermal Desorption). The Army proposes to use a similar land-farming process to treat soils that are to be removed from the "fuel-contaminated soil" area and that are contaminated with VOCs/SVOCs at levels not exceeding LTTD treatment action levels (as specified in the July 1998 Final FTP Work Plan). The following steps summarize this treatment process.

- Land-farming treatment will occur when ambient outdoor daily high temperatures reach approximately 80-85 degrees F;
- Distribute the VOCs/SVOCs-contaminated soil within the Trench 6 Soil Repository (landfill cell) and spread the materials uniformly into a six-inch lift;
- Use standard farm tractor and disk equipment to thoroughly mix the soil, using a minimum of two passes north & south and two passes east & west;
- Till the soil using tractor & disk (as indicated above) at least once per day for a minimum period of 3 days;
- Separate the land-farmed soil into 4 sections (of approximately equal-sized areas), collect representative treatment verification samples from each section, and measure & record headspace concentrations using a PID meter;
- If headspace PID readings are all less than 5 parts per million (ppm), then consider the land-farming treatment process to be complete;
- If headspace PID readings are greater than 5 ppm, repeat soil tilling & verification sampling steps until all soil treatment verification sample headspace concentrations are below the target PID concentration of 5 ppm.

8.0 Management of Liquids

The contractor will be required to implement appropriate measures to minimize transport of contaminants away from project remedial areas due to wind, erosion, and direct contact of precipitation/run-off with contaminated materials. The contractor will also be required to implement measures to minimize the collection of precipitation (especially due to surface run-off) in the excavations at the "landfill trench / secondary burn pit" and "fuel-contaminated soil" areas. However, due to direct precipitation and due to possible seepage from groundwater, it is possible that liquids may collect within the excavation areas to the extent that they need to be managed prior to backfilling operations. In the unlikely event that non-aqueous phase liquids (NAPL) are encountered, the contractor will be directed to capture as much NAPL as possible, store it in appropriate labeled containers, characterize it via chemical analysis, and dispose of it via appropriate means. The contractor will pump excess water from the excavations and, after completing laboratory chemical analysis to characterize it for potential contaminants, will either treat the water (via granular activated carbon or other appropriate means) and surface discharge the treated water on-site or, if appropriate, will transport the water to the IDA

where it may be used as process water for soil treatment operations that may occur for this project within the Trench 6 Soil Repository.

9.0 Remediation Goals

Remediation Goals for this project were previously determined using applicable regulatory limits (e.g., Land Disposal Restrictions) or risk-based concentrations (RBCs) for individual chemicals. Soil treatment goals for metals treatment operations are listed within Table 3 of this supplemental workplan document and additional information about metals treatment criteria are documented within the Final Work Plan Addendum for Metals Treatment for West Burn Pads Landfill Soils (CAPE, December 2001). Relevant soil excavation criteria and treatment goals for various VOC & SVOC compounds are documented within the Final Work Plan documents for the Fire Training Pit removal action project (ECC, July 1998) and in the Final Remedial Action Report for the Fire Training Pit site (ECC, October 2000). Soil treatment goals for land-farming operations are identified within section 7 of this supplemental workplan document. Also, relevant soil remediation criteria for various explosives and metals are documented within two IAAAP 1998 Soil Operable Unit Records of Decision (RODs) and within the associated 2003 Explanation of Significant Differences (ESD) document.

10.0 Field Quality Control (QC) and Quality Assurance (QA) Samples

A series of quality control samples will be collected in the field and submitted for analysis. QC samples will be collected at a rate of 10% of the field samples and sent to the same laboratory as the field samples. Two (2) QA samples will be collected, one from each excavation area, and sent to a second laboratory for analysis. The QC and QA samples shall be obtained from areas of most probable contamination. These samples will be analyzed for the purpose of assessing the quality of the sampling effort and the analytical data.

10.1 Quality Control Samples

QC samples are those samples collected in duplicate that will be submitted to the QC laboratory as blind samples. QC samples will be analyzed for the same parameters as the field samples. Results from these samples will be compared to data from the appropriate field sample to access the consistency and quality of data produced from the laboratory. The QC samples will be sent to a USACE certified laboratory. ECC proposes to use Data Chem Laboratory (a previously approved laboratory for environmental restoration project efforts at IAAAP) as the primary contract laboratory for this supplemental FTP project effort.

10.2 Quality Assurance Samples

QA samples are triplicate samples of the field sample collected. These samples are sent to a USACE certified laboratory other than the primary contract laboratory. These samples are analyzed to evaluate contractor laboratory performance. ECC proposes to send QA samples to Paragon Analytics Laboratory (a previously approved laboratory for environmental restoration project efforts at IAAAP) for this supplemental FTP project effort.

10.3 Project DQOs

Relevant Data Quality Objectives (DQOs) for this project are discussed in the Final Sampling & Analysis Plan for the Fire Training Pit removal action project (ECC, July 1998) and in the Final Work Plan Addendum for Metals Treatment for West Burn Pads Landfill Soils (CAPE, December 2001). Quality Assurance Project Plan (QAPP) documents were previously approved by Army & EPA (during Phase 2 of the IAAAP Focused FS Soil Removals project) for both laboratories proposed for this supplemental FTP project effort (i.e., Data Chem and Paragon Analytics). Laboratory quality control samples and sensitivity are discussed in those laboratory QAPP documents.

10.4 Sample Containers and Preservatives

All samples collected will be preserved according to Environmental Protection Agency (EPA) protocols established for the parameters of interest. Appropriate measures will be taken to ensure that requirements with respect to temperature are maintained during transport to the laboratory, and prior to login and storage at the laboratory. ECC will follow the procedures recommended by USACE in "Chemical Data Quality Management for hazardous Waste Remedial Activities, ER1110-263", for sampling handling and preservation.

Sample bottles and containers will be supplied to ECC by the analytical laboratory. Sample bottles and containers will be free of target analytes and of known quality (i.e., I-Chem 200 series or equivalent), as documented by the container manufacturer.

10.5 Equipment Decontamination

Equipment Decontamination will be performed before and after collection at each sampling location. All sampling equipment will be decontaminated as follows;

-Clean with non-phosphate surfactant using a brush if necessary to remove particulate matter and surface films, and rinse in distilled water;
-Rinse a final time with distilled water and allow to air dry;
-Clean disposable gloves will be worn while handling sampling equipment during the final stages of decontamination;

-Equipment or materials not used immediately after decontamination will be placed on a plastic sheet, covered with plastic, and secured to avoid potential contamination.

Decontamination water will be containerized in portable plastic tanks and transported to the IDA site, where the decon water may be used as process water for soil treatment operations that may occur within the Trench 6 Soil Repository or, if determined appropriate based upon analytical data, it will be treated via granular activated carbon (GAC) units prior to surface discharge.

11.0 Sampling Procedures

During sampling operations, a variety of sampling techniques may be utilized including hand sampling, hand auger sampling, and backhoe sampling. Field conditions and site accessibility will determine the sampling method selected. A description of each of these soil sampling techniques is presented below.

11.1 Hand Auger Soil Sampling

Shallow soil samples may be collected to a depth of approximately three feet using a hand auger system. With this system, borings are advanced, and samples collected by hand without the use of a drill rig. Brass sample liners are placed in a hand driven core sampler mounted on a drive rod that is advanced with a percussion slide hammer.

11.2 Backhoe Sampling

Backhoe samples may be collected from discrete vertical intervals. The depth of the trench will be measured prior to sampling to verify the sample depth. A small amount of soil will be removed from the center of the bucket making sure that it is not in direct contact with the bucket.

11.3 Soil Sample Handling

Soil samples collected for chemical analysis of constituents other than VOCs will be thoroughly mixed before being placed in the appropriate sample container. Samples collected for the analysis of VOCs or headspace screening will not be mixed, but will be transferred from the sampling device to the appropriate sample container as quickly as possible with minimal handling and agitation (to prevent/minimize loss of VOCs from the samples prior to analysis).

Soil samples, other than VOCs samples, will be removed from the sampling device and placed in a stainless steel bowl and thoroughly mixed using a stainless steel spoon. The soil in the bowl will be scraped from the sides, corners, and bottom of the bowl, rolled to the middle of the bowl, and mixed. The resulting sample will be quartered and moved to

the four corners of the bowl. Each quarter of the sample will be mixed individually. Each quarter is then recombined in the center of the bowl and entire sample mixed again. This procedure will be continued to ensure that all parts of the sample are mixed and the sample is as homogeneous as possible before being placed in the sample container.

11.4 Sampling Labeling and Numbering

Samples are anticipated to be grouped into layers corresponding to depth below cleared and grubbed ground surface from which they were collected (e.g., Layer 01 equals soil samples collected from the surface to 12 inches bgs). Sample identifications will use a sequential numbering system starting with number 1. The Fire Training Area will be identified as FTA. An example of the numbering system is show below.

FTA-SP1-01-V

In this example, FTA stands for Fire Training Area, "SP1" stands for Stockpile #1, "01" stands for 1 foot below ground surface, and "V" indicates a verification sample. The Letter "C" will indicate a characterization sample

12.0 Ordnance-Avoidance and Radiation-Avoidance Procedures

It is currently considered unlikely that unexploded ordnance items or man-made radioactive hazards will be encountered during the execution of this supplemental FTP project effort. However, due to the lack of historical information available about the two areas of remedial interest, previously approved Standard Operating Procedures (SOPs) for ordnance-avoidance and radiation-avoidance will be used during excavation activities for this supplemental FTP project effort. These SOPs were developed and approved for use during the year-2000 remediation of the West Burn Pads area project and the SOPs are documented within the final workplans for that project.

The ordnance-avoidance SOP requires the presence of a qualified UXO specialist during excavation and soil-sampling activities to monitor for any ordnance exposed by remedial activities. If any unexploded or inert ordnance is unexpectedly encountered during this project, ECC will provide Ordnance Explosive (OE) support as required to complete planned remedial activities.

The radiation-avoidance SOP is intended to detect radionuclides potentially present with sufficient sensitivity to assure protectiveness of personnel and to minimize the potential for inadvertent collection or dispersion of radiologically-contaminated materials. This SOP requires the on-site presence of a qualified radiation safety technician and appropriate radiation-detection equipment during excavation and soil-sampling activities to monitor for "unusual radiation" (compared to normal background levels). If any unusual radiation is unexpectedly encountered during this project, activities will be halted until appropriate radiation experts determine that it is safe/proper to continue.

13.0 Post-Action Report

Upon completion of the described work, a post-action report will be generated to document field activities, analytical results and other important information related to this supplemental cleanup project at the FTP site. This report will be submitted as an addendum to the Final Remedial Action Report for the Fire Training Pit site (ECC, October 2000).

14.0 Project Schedule

The Army is currently planning to execute this project effort using residual funding remaining under contract with ECC from the 1998-1999 remediation project at the FTP site. However, the ECC contract is due to expire on 30 September 2003. This means that all work associated with this project effort must be completed (and billed by ECC) by the contract expiration date. As a result, the proposed project schedule will be compressed as needed to allow the field work to be completed, the post-action report to be submitted, and all contract billings to be submitted by 9/30/03. If the work cannot be completed by 9/30/03, the project will be delayed until the Army can find alternative funding and contract mechanisms to complete the work. With this in mind, the following list of major project milestones is provided as a tentative schedule designed to complete the required tasks by 9/30/03.

Final Work Plan Approval received from EPA	Day 0
Mobilize to the FTP site to begin field work	Day 7
Excavation & Transportation activities complete	Day 12
Initial Laboratory Analytical Data received	Day 17
Land-Surveys of Final Excavations complete	Day 19
Backfilling operations complete	Day 20
Soil Treatment operations complete	Day 24
Final Laboratory Analytical Data received	Day 26
Draft Post-Action Report submitted to Army	Day 29
Draft Post-Action Report submitted to EPA	Day 34
Draft-Final Post-Action Report submitted to EPA	Day 41

Based upon applicable physical and contractual constraints, ECC is making tentative plans to begin field work on Monday-8/18/03 morning. This assumes that final workplan approval will be received from EPA by Friday-8/15/03. Delays in start of field work beyond 8/18/03 may result in an Army decision to not execute the planned field activities with ECC due to possibility that the necessary project tasks will not be completed by 9/30/03. The Army requests & appreciates the expedited assistance of all project participants to ensure that the project can be completed within the limited timeframe remaining before 30 September 2003.

TABLES

Table 1
Analytical Results - Explosives

Field Event (Date)	Sample Identification	Explosives Concentrations (mg/kg)													Sample Location
		RDX	**HMX**	**2,4,6-TNT**	**1,3,5-TNB**	1,3-DNB	2,4-DNT	2,6-DNT	2-Amino-4,6-DNT	**4-Amino-2,6-DNT**	**2-NT**	3-NT	4-NT	NB	**Tetryl**	
5/24/2001	FTA-TR1-01	**2.0**	**0.65**	**0.24**	**0.23**	<0.10	<0.10	<0.20	<0.20	**0.42**	<0.40	<0.40	<0.40	<0.20	**0.26**	landfill trench / secondary burn pit
	FTA-TR1-02	<0.20	<0.20	<0.20	<0.10	<0.10	<0.10	<0.20	<0.20	<0.20	<0.40	<0.40	<0.40	<0.20	<0.20	
	FTA-TR2-01	**1.9**	**0.80**	<0.20	**0.20**	<0.10	<0.10	<0.20	<0.20	**0.90**	<0.40	<0.40	<0.40	<0.20	**0.28**	
11/8/2001	FTA-T1-13	<0.20	<0.20	**4.4**	<0.10	<0.10	<0.10	<0.20	<0.20	<0.20	**0.35 (J)**	<0.40	<0.40	<0.20	<0.20	fuel-contaminated soil area
	FTA-T2-07	<0.20	<0.20	**0.19 (J)**	<0.10	<0.10	<0.10	<0.20	<0.20	<0.20	<0.40	<0.40	<0.40	<0.20	<0.20	
	FTA-T4-06	**6.8**	**2.4**	**1.0**	**0.22**	<0.10	<0.10	<0.20	<0.20	**0.29**	<0.40	<0.40	<0.40	<0.20	<0.20	landfill trench / secondary burn pit
	FTA-T5-03	**1.0**	**0.49**	**0.50**	**0.21**	<0.10	<0.10	<0.20	<0.20	**0.74**	<0.40	<0.40	<0.40	<0.20	<0.20	
	FTA-T5-04	<0.20	<0.20	**0.12 (J)**	<0.10	<0.10	<0.10	<0.20	<0.20	<0.20	<0.40	<0.40	<0.40	<0.20	<0.20	

Table 2
Analytical Results - Total Metals

Field Event (Date)	Sample Identification	Total Metals Concentrations (mg/kg)								Sample Location
		As	Ba	Cd	Cr	Pb	Se	Ag	Hg	
5/24/2001	FTA-TR1-01	<42	**3,600**	**3.4**	**120**	**280**	<42	**3,700**	**0.52**	landfill trench / secondary burn pit
	FTA-TR1-02	<39	**330**	**0.34 (B)**	**24**	**26**	<39	**78**	**0.051**	
	FTA-TR2-01	<42	**63,000**	**13**	**390**	**730**	<42	**22,000**	**0.087**	
11/8/2001	FTA-T1-13	<38	**180**	**0.27 (B)**	**20**	**8.8 (B)**	<38	<1.3	<0.064	fuel-contaminated soil area
	FTA-T2-07	<36	**130**	**0.19 (B)**	**19**	**9.5 (B)**	<36	<1.2	<0.060	
	FTA-T5-04	<39	**300**	**0.71**	**28**	**17**	<39	<1.3	<0.066	landfill trench / secondary burn pit
"20-times-rule" threshold *		100	**2,000**	20	**100**	**100**	20	**100**	4.0	

* The "20-times-rule" threshold is the concentration below which it is physically impossible for a sample to fail TCLP.
* TCLP failure is physically possible, but not a certainty, when concentrations exceed the "20-times-rule" threshold.

As = Arsenic
Ba = Barium
Cd = Cadmium
Cr = Chromium
Pb = Lead
Se = Selenium
Ag = Silver
Hg = Mercury

Table 3
Analytical Results - TCLP Metals

Field Event (Date)	Sample Identification	TCLP Metals Concentrations (mg/L)								Sample Location
		As	Ba	Cd	Cr	Pb	Se	Ag	Hg	
11/8/2001	FTA-T4-06	<0.50	**8.1**	**0.026**	<0.020	**0.18**	<0.30	**0.051**	<0.00020	landfill trench / secondary burn pit
	FTA-T5-03	<0.50	**200**	**0.094**	<0.020	**0.13**	<0.30	**0.066**	<0.00020	
TCLP Regulatory Limits		5.0	**100.0**	1.0	5.0	5.0	1.0	5.0	0.20	
UTS *		5.0	21.0	0.11	0.60	0.75	5.7	0.14	0.025	
10 x UTS		50.0	210.0	1.1	6.0	7.5	57.0	1.4	0.25	
Soil Treatment Goals **		**5.0**	**100.0**	**1.0**	**5.0**	**5.0**	**1.0**	**1.4**	**0.20**	

* UTS = "Universal Treatment Standards", as identified in Title 40 of the Code of Federal Regulations (40 CFR 268.48)
** The "Soil Treatment Goals" for this FTP project are set as the lesser of TCLP regulatory limits or 10xUTS for all applicable metals.

As = Arsenic
Ba = Barium
Cd = Cadmium
Cr = Chromium
Pb = Lead
Se = Selenium
Ag = Silver
Hg = Mercury

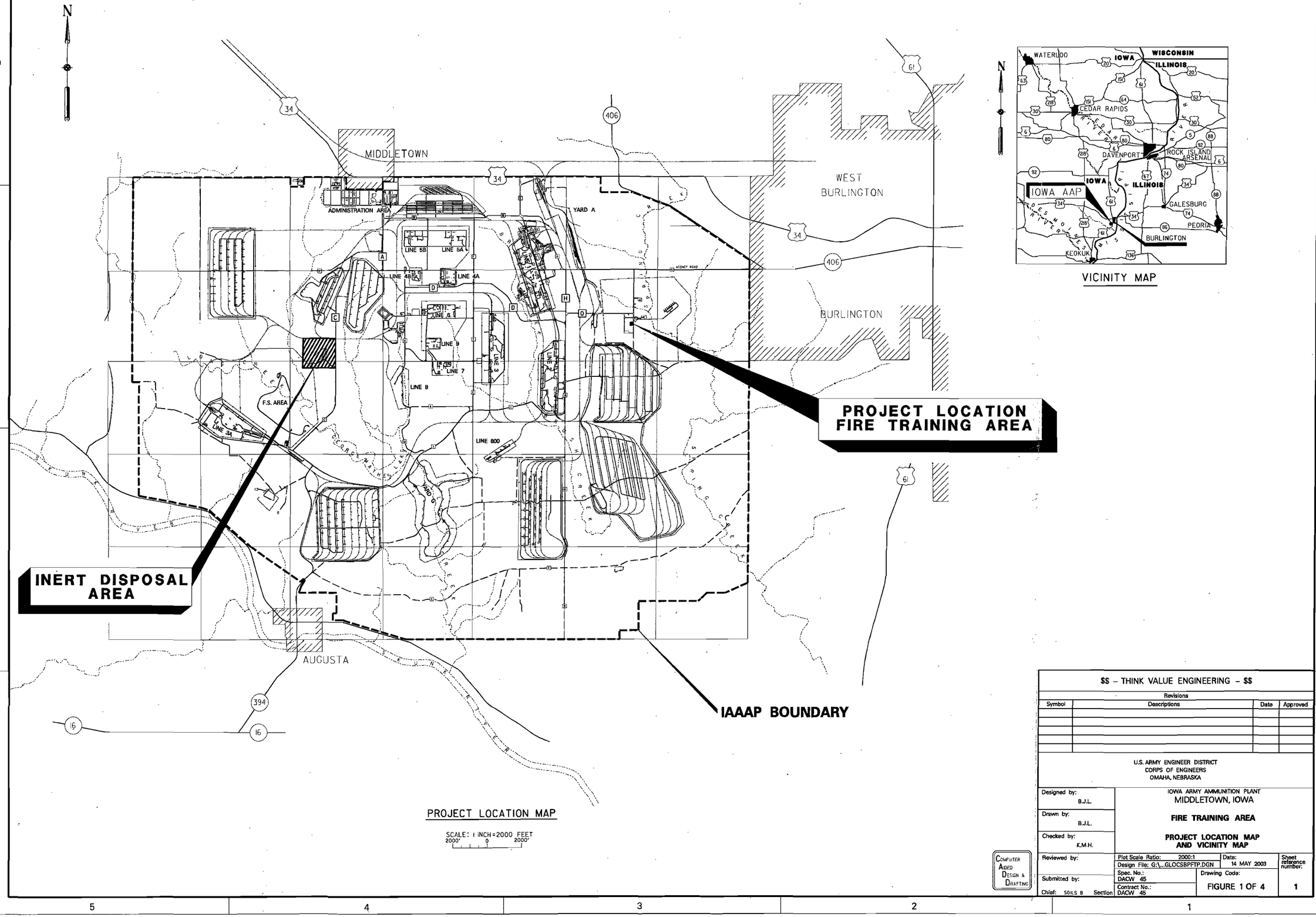
Table 4
Analytical Results - Detected Volatile Organic Compounds (VOCs)

Field Event (Date)	Sample Identification	Detected VOCs (ug/kg)						Sample Location
		Acetone	**Ethylbenzene**	**Toluene**	**o-Xylene**	**m,p-Xylene**	**Methylene Chloride**	
11/8/2001	FTA-T1-13	**81**	**340**	**3.5 (J)**	**42 (J)**	**240**	<64	fuel-contaminated soil area
	FTA-T2-07	**93**	<60	<60	<60	<120	**3.8 (J)**	

Table 5
Analytical Results - Detected Semi-Volatile Organic Compounds (SVOCs)

Field Event (Date)	Sample Identification	Detected SVOCs (ug/kg)								Sample Location
		2-Methylnaphthalene	Acenaphthene	Anthracene	Dibenzofuran	Fluorene	N-nitrosodiphenylamine	Naphthalene	Phenanthrene	
11/8/2001	FTA-T1-13	**1400**	**110 (J)**	**53 (J)**	**140 (J)**	**240**	**290**	**370**	**570**	fuel-contaminated soil area
	FTA-T2-07	**34 (J)**	**37 (J)**	**23 (J)**	**50 (J)**	**64 (J)**	**140 (J)**	<200	**170 (J)**	

FIGURES



PROJECT LOCATION MAP

SCALE: 1 INCH = 2000 FEET
2000' 0 2000'

VICINITY MAP

$$ – THINK VALUE ENGINEERING – $$

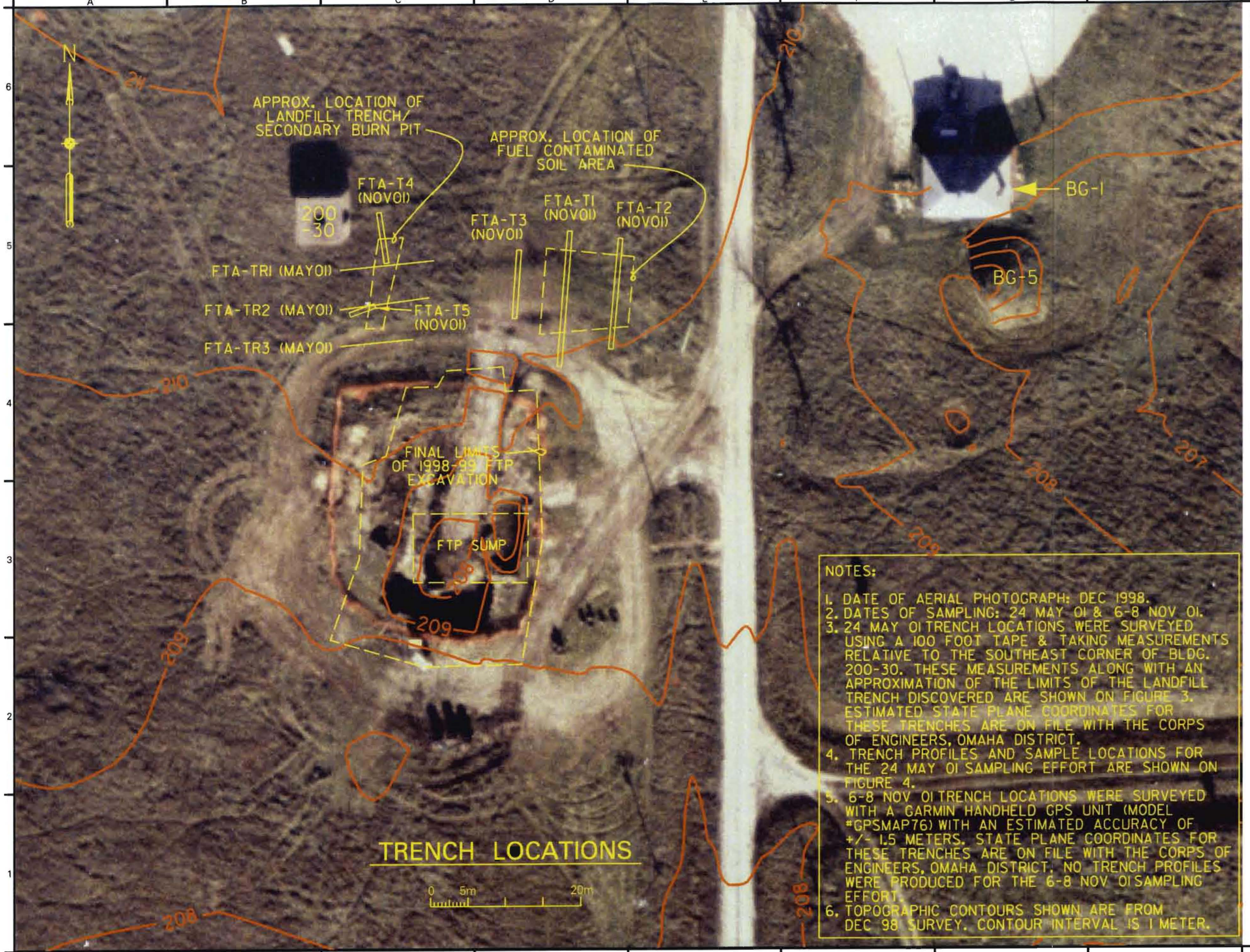
Revisions

Symbol	Descriptions	Date	Approved

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
OMAHA, NEBRASKA

Designed by: B.J.L.	IOWA ARMY AMMUNITION PLANT MIDDLETOWN, IOWA
Drawn by: B.J.L.	**FIRE TRAINING AREA**
Checked by: K.M.H.	**PROJECT LOCATION MAP AND VICINITY MAP**
Reviewed by:	Plot Scale Ratio: 2000:1 — Date: 14 MAY 2003 — Sheet reference number: 1
Submitted by:	Design File: G:\...GLOCSBPFTP.DGN — Spec. No.: DACW 45 — Drawing Code: FIGURE 1 OF 4
Chief: SOILS B Section	Contract No.: DACW 45

COMPUTER AIDED DESIGN & DRAFTING



NOTES:

1. DATE OF AERIAL PHOTOGRAPH: DEC 1998.
2. DATES OF SAMPLING: 24 MAY 01 & 6-8 NOV 01.
3. 24 MAY 01 TRENCH LOCATIONS WERE SURVEYED USING A 100 FOOT TAPE & TAKING MEASUREMENTS RELATIVE TO THE SOUTHEAST CORNER OF BLDG. 200-30. THESE MEASUREMENTS ALONG WITH AN APPROXIMATION OF THE LIMITS OF THE LANDFILL TRENCH DISCOVERED ARE SHOWN ON FIGURE 3. ESTIMATED STATE PLANE COORDINATES FOR THESE TRENCHES ARE ON FILE WITH THE CORPS OF ENGINEERS, OMAHA DISTRICT.
4. TRENCH PROFILES AND SAMPLE LOCATIONS FOR THE 24 MAY 01 SAMPLING EFFORT ARE SHOWN ON FIGURE 4.
5. 6-8 NOV 01 TRENCH LOCATIONS WERE SURVEYED WITH A GARMIN HANDHELD GPS UNIT (MODEL #GPSMAP76) WITH AN ESTIMATED ACCURACY OF +/- 1.5 METERS. STATE PLANE COORDINATES FOR THESE TRENCHES ARE ON FILE WITH THE CORPS OF ENGINEERS, OMAHA DISTRICT. NO TRENCH PROFILES WERE PRODUCED FOR THE 6-8 NOV 01 SAMPLING EFFORT.
6. TOPOGRAPHIC CONTOURS SHOWN ARE FROM DEC 98 SURVEY. CONTOUR INTERVAL IS 1 METER.

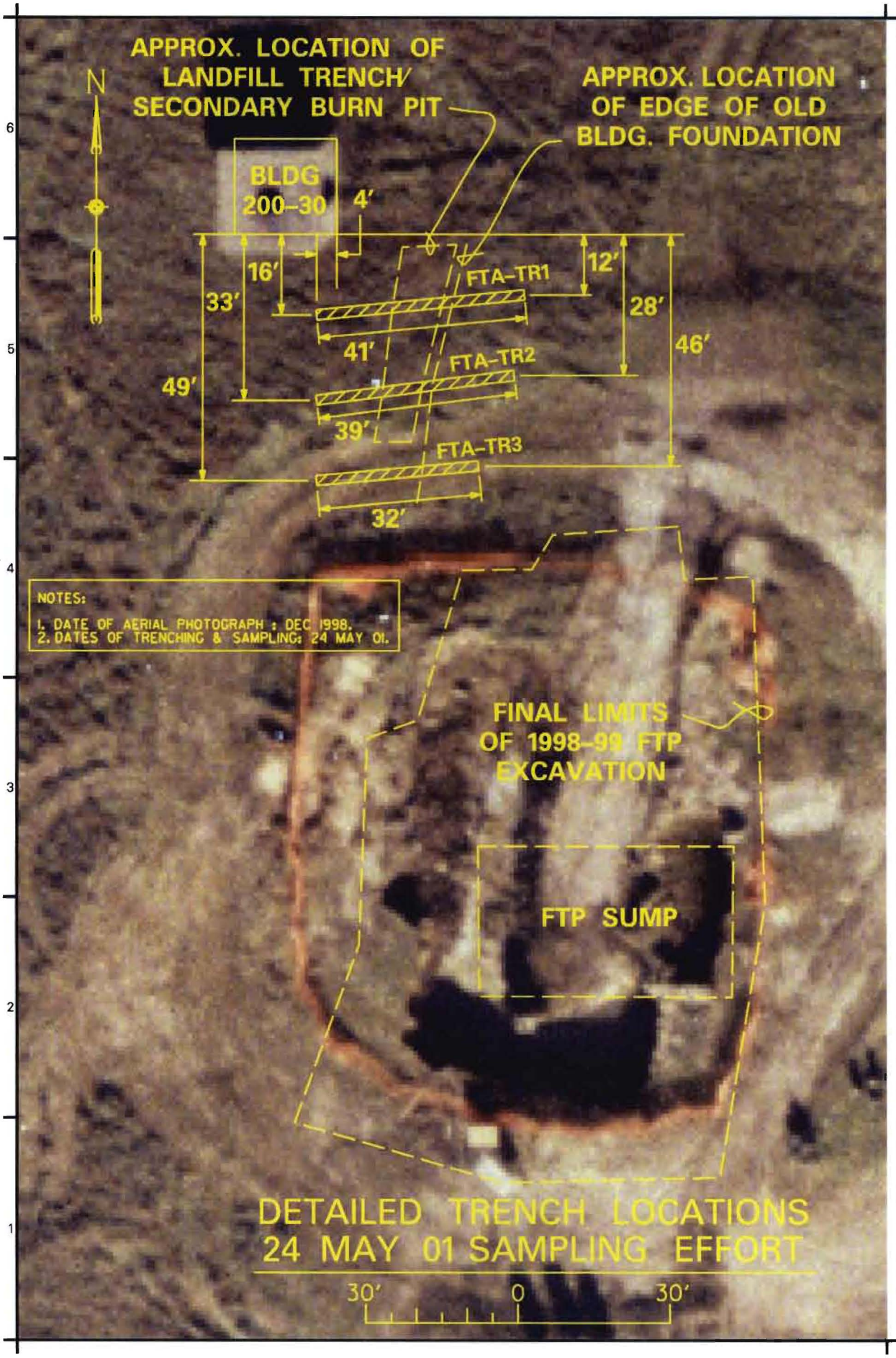
US Army Corps of Engineers
Omaha District

Designed by: B.J.L.
Drawn by: B.J.L.
Checked by: K.W.H.
Reviewed by:
Submitted by: Chief: JOHN J. BERTHO Unit B Section
Date: AUG 2002
Design file no.
REVISEDFTPTRENCH.DGN
Plot Scale Ratio: 1:1000
Drawing code:
Rev.
Scale No.
Contract No.

IOWA ARMY AMMUNITION PLANT
MIDDLETOWN, IOWA
FIRE TRAINING AREA

TRENCH LOCATIONS
MAY 2001 & NOV 2001 SAMPLING EFFORTS

Sheet reference number:
2
Figure 2 of 4



US Army Corps of Engineers
Omaha District

Designed by: B.J.L	Date: 16 MAY 2003	Rev.	
Drawn by: B.J.L	Ckd by: K.W.H.	Design file no. REVISED_FTP_SUP_INV.DGN	Spec. No.
	Reviewed by:	Plot Scale Ratio: FIT TO 8-1/2in	Contract No.
	Submitted by: Chief: JOHN J. BERTING Soils & Section	Drawing code:	

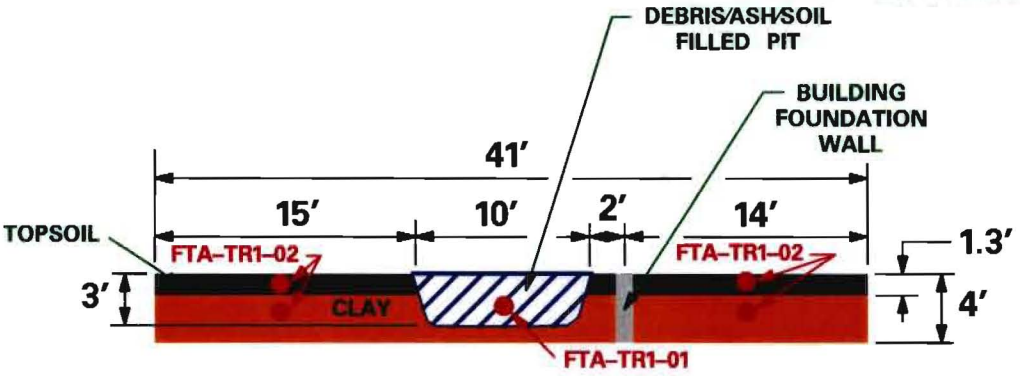
IOWA ARMY AMMUNITION PLANT
MIDDLETOWN, IOWA
FIRE TRAINING AREA

DETAILED TRENCH LOCATIONS
24 MAY 2001 SAMPLING EFFORT

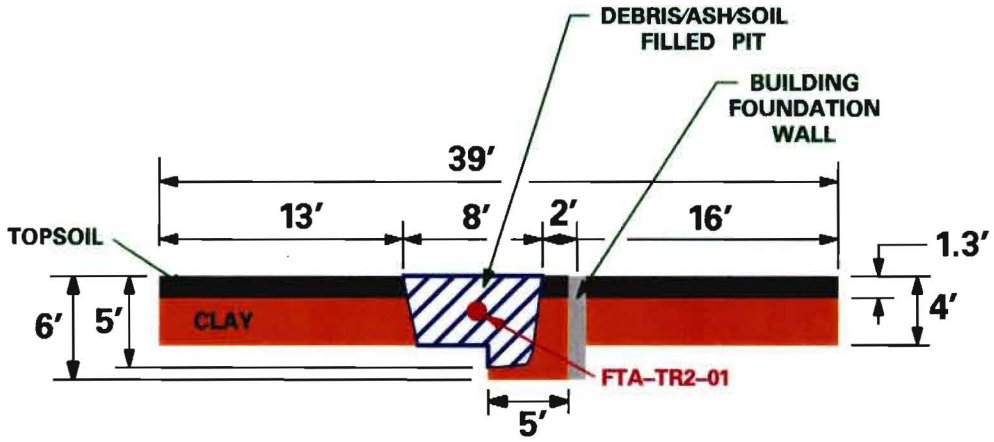
Sheet reference number:
3
Figure 3 of 4

WEST END OF TRENCH

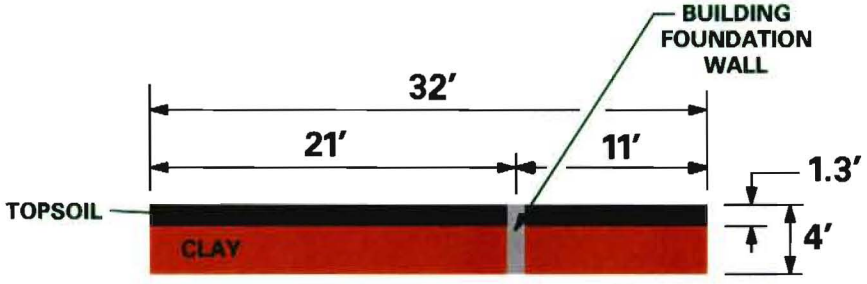
EAST END OF TRENCH



TRENCH 1 (FTA-TR1) - NORTH WALL*



TRENCH 2 (FTA-TR2) - NORTH WALL*



TRENCH 3 (FTA-TR3) - NORTH WALL*

* TYPICAL OF BOTH SIDES OF EXCAVATION

● SAMPLE LOCATIONS (FTA-TR1-02 IS A FOUR POINT COMPOSITE)

TRENCH PROFILES & SAMPLE LOCATIONS 24 MAY 01 SAMPLING EFFORT

US Army Corps of Engineers
Omaha District

Designed by: B.J.L.	Date: 16 MAY 2003	Rev.:
Drawn by: B.J.L.	Design file no.: REVISED_FTP_SUP_INV.DGN	Spec. No.
Cksd by: K.W.H.	Plot Scale Ratio: FIT TO 8-1/2X11	Contract No.
Reviewed by:	Drawing code:	
Submitted by: Chief, JOHN J. BERTING Site B Section		

IOWA ARMY AMMUNITION PLANT
MIDDLETOWN, IOWA
FIRE TRAINING AREA

TRENCH PROFILES & SAMPLE LOCATIONS
24 MAY 2001 SAMPLING EFFORT

Sheet reference number: 4
Figure 4 of 4

PHOTOGRAPHS

Photo #1: Fire Training Pit, Exploratory Trench FTA-TR1, 24 May 2001
"Landfill Trench / Secondary Burn Pit" Area
Miscellaneous Debris Visible in Excavated Soil

Photo #2: Fire Training Pit, Exploratory Trench FTA-TR2, 24 May 2001
"Landfill Trench / Secondary Burn Pit" Area
Ash Layer Visible in Trench Wall

Photo #3: Fire Training Pit, Exploratory Trench FTA-T1, 8 November 2001
"Fuel-Contaminated Soil" Area
Discolored (Greenish) Soil Visible in Excavated Soil

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION VII
901 NORTH 5TH STREET
KANSAS CITY, KANSAS 66101

August 21, 2003

Mr. Rodger Allison
ATTN: SMAIA-INE (Mr. Rodger Allison)
17571 State Highway 79
Middletown, IA 52638-5000

Dear Mr. Allison:

The Environmental Protection Agency hereby accepts as final the Draft Workplan for Supplemental Removal Action at the Fire Training Pit at the Iowa Army Ammunition Plant This action supplements a previous non-time critical removal at the Fire Training Pit.

Please contact me at (913) 551-7131 if you have any questions concerning this action.

Sincerely,

Scott Marquess
Project Manager
Federal Facilities/Special Emphasis Branch
Superfund Division