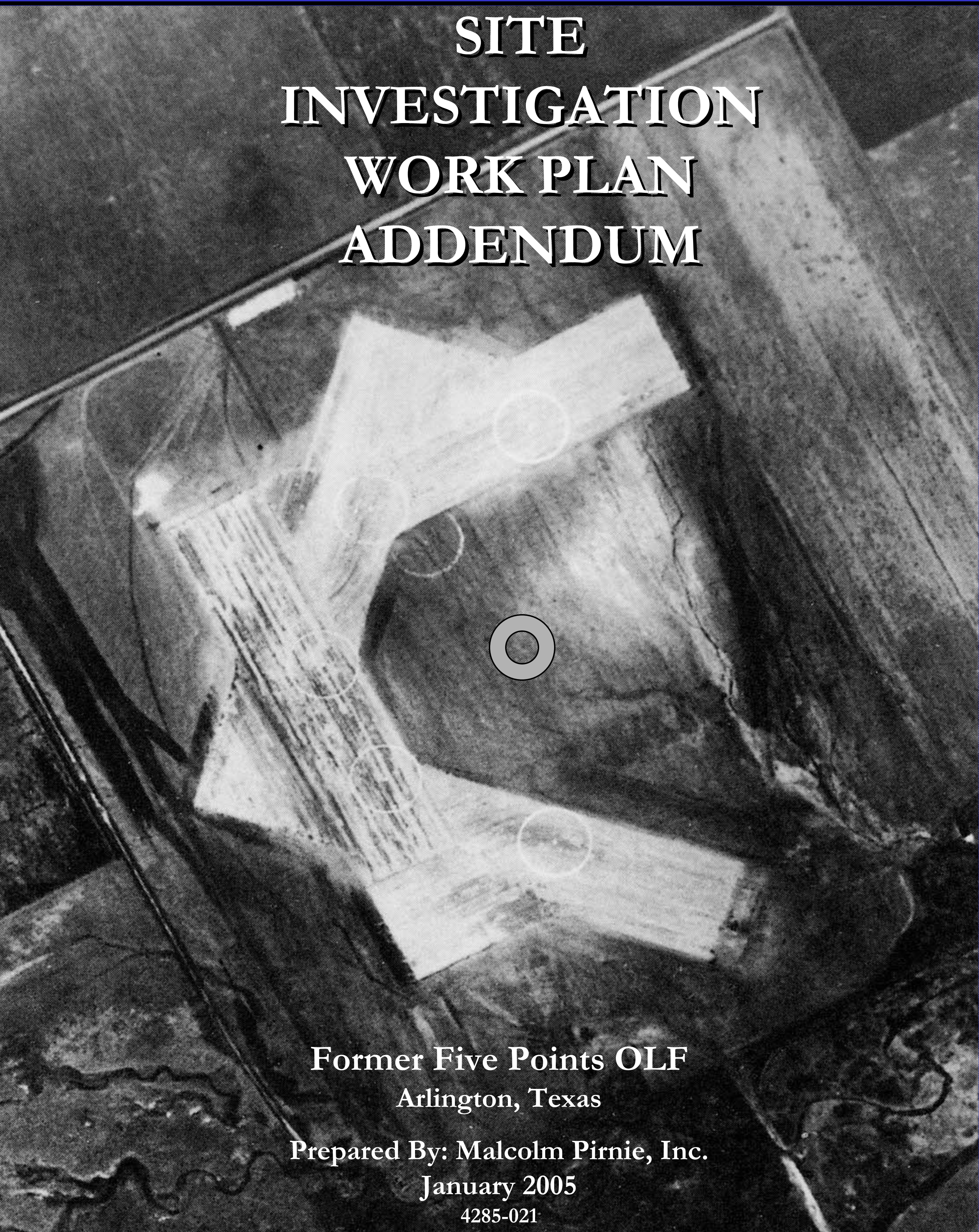
SITE INVESTIGATION WORK PLAN ADDENDUM



Former Five Points OLF

Arlington, Texas

Prepared By: Malcolm Pirnie, Inc.

January 2005

4285-021

SOIL INVESTIGATION

WORK PLAN ADDENDUM

FIELD SAMPLING PLAN

QUALITY ASSURANCE PROJECT PLAN

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Five Points Outlying Field

Work Plan Addendum

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1.0 INTRODUCTION

1.1 PURPOSE AND OBJECTIVE

The purpose of this work plan is to collect confirmation soil samples from each excavation site following the removal of practice bombs from the Five Points Field Site in Arlington, Texas. The objective of the site investigation is to determine whether Munitions Constituents (MC) such as lead, zinc, explosives, and white phosphorous are present and contributing to environmental impacts of surface soils as a result of the activities at the formerly used defense site (FUDS). This follow-up investigation will provide data for a Final Confirmation Soil Sampling Report and a Corrected Final Report.

1.2 PROJECT SCOPE

The scope of the project will include the following:

- Collect confirmation soil samples from excavation sites in accordance with the sampling and analysis plan (SAP) discussed in this work plan.
- Establish protocol for holding soil samples until statistically selected samples are identified for analysis.
- Perform laboratory analysis of the collected samples, utilizing quality assurance/control measures.
- Prepare a final confirmation soil sampling report that presents the constituent concentrations and a corrected final report.

1.3 DOCUMENT ORGANIZATION

This work plan is organized as follows:

- Section 2.0 describes the site background and geologic setting
- Section 3.0 presents the Sampling and Analysis Plan (SAP), including site entry, sampling locations and procedures, decontamination procedures, and investigation derived waste (IDW) protocols as well as sample management procedures for holding and selecting samples for analysis

- Section 4.0 presents the Quality Assurance Project Plan (QAPP), including descriptions of the laboratory analysis and quality assurance/quality control (QA/QC) procedures
- Section 5.0 discusses the content and format of the Site Investigation Report

In addition, Appendix A will detail the Site Specific Health and Safety Plan (SSHP), to include procedures for munitions and explosives of concern (MEC) avoidance.

2.0 BACKGROUND

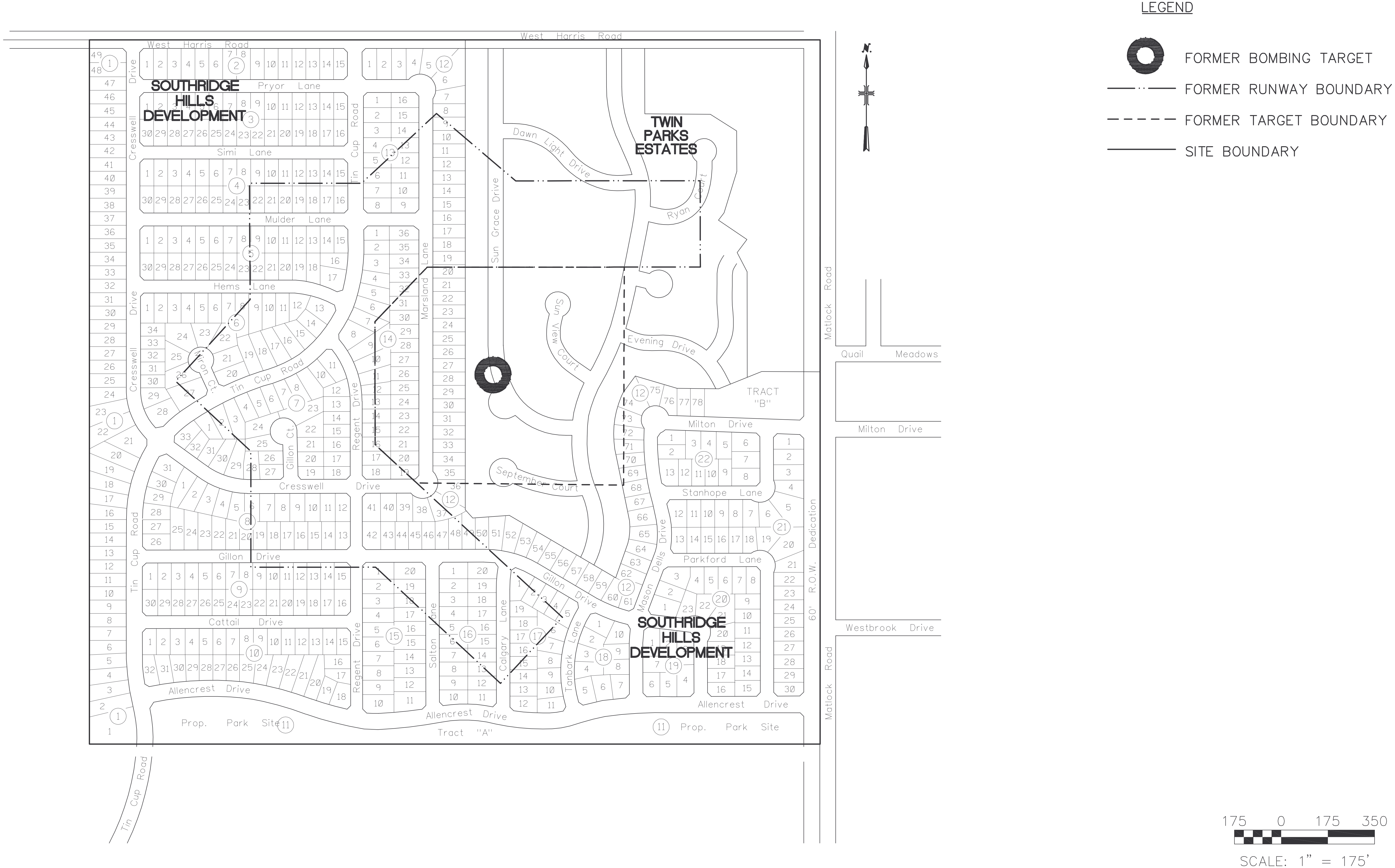
2.1 SITE HISTORY[1]

The Five Points OLF was established in 1940 when the Department of Defense (DoD) acquired the land to be used as an outlying field for the Dallas Naval Air Station. The site occupied approximately 162 acres. Four runways were constructed at the site for naval air operations and were utilized for practice landings and takeoffs for several years. At an unknown date, the site was switched to a practice bombing range. Ordnance used at this site was restricted to three types: M-47 chemical bombs, MK 23 Mod 1 practice bombs and M38A2 practice bombs. The M-47 chemical bomb casings used on this range had failed stress tests during manufacture, were rejected for chemical bomb use, and subsequently were filled with inert material and used as practice bombs. The practice bombs were fitted with spotting charges that indicated the location of the practice bomb impact. The material that comprised the spotting charges included white phosphorus, red phosphorus, rust, and flour.

The bombing range was surface swept for ordnance in 1954. Clearance certificates were issued for the site in 1954 and 1956. The 1954 clearance report indicated that 75 M-47 chemical bombs, 27 MK 23 Mod 1 practice bombs and 23 M38 practice bombs had been removed.

At an unknown date, the Navy declared the entire 162-acre site as excess and transferred the property to the General Services Administration (GSA) for disposal. Gordon and Pope Supply Company obtained the property from the GSA in July 1956 with the recommendation from the GSA that 17.5 acres of the former range be restricted to surface use only and stated that ordnance may be present anywhere on the property.

In 1983, 35 acres of the former practice range were sold and developed into the Twin Parks Estates Mobile Home Park (Figure 1). Development was halted in November



MALCOLM PIRNIE

FORMER FIVE POINTS OUTLYING FIELD
ARLINGTON, TX

SOIL INVESTIGATION

FORMER FIVE POINTS OUTLYING FIELD

SITE MAP

SCALE: 1"=175'-0"

MALCOLM PIRNIE, INC.

JANUARY 2005

FIGURE 1

1983 upon the discovery of a practice bomb in the subsurface. The developer contracted the removal of any remaining ordnance, leading to the removal of approximately 3,000 MK 23 practice bombs from the site. Some of these bombs were found to depths of six feet, suggesting that the leftover practice bombs had been buried on-site.

In February 1998, a site survey of the remaining 127 undeveloped acres of the site was performed by personnel from the Corps of Engineers Huntsville Engineering and Support Center (CEHNC). A visual survey revealed no unexploded ordnance (UXO) on the surface; however, a magnetometer survey revealed numerous subsurface anomalies focused primarily in the area of the former target center. The subsurface detections decreased as the survey moved away from the target center. Due to this finding, it was concluded that the potential still exists for subsurface practice bombs to be located in this region.

The remaining 127 acres of the site has been under development as a subdivision by KBHomes since 1998 (Southridge Hills), with approximately 700 homes projected for construction. In January 2000, the Corps of Engineers St. Louis District (CEMVS) conducted an ordnance site visit. Open areas of the site were walked and no additional bombs were found. Construction workers at the site, however, indicated that practice bombs had been uncovered while digging in the area.

Based upon the conclusion that much of the ordnance had been buried in-place and that the potential exists for additional practice bombs to be located in the subsurface, the Army Corps of Engineers Fort Worth District (CESWF) proposed to sample soil at this site to determine if MC could be detected, and whether the presence of MC could be attributed to the activity at the Former Five Points OLF.

In November 2002, field work was conducted at the former Five Points OLF by Malcolm Pirnie. Prior to the start of field activities, soils in two major regions within the former Five Points OLF were identified as being affected from prior practice bombing operations, and therefore had the highest probability of containing the MCs (lead, zinc, white phosphorus, tetryl, and TNT and its associated degradation products). These regions, the center of the former bombing target area and the original surface water drainage areas, were the focus of the sampling effort. Sampling sites were selected based on these highest probability regions. Additionally, some residents within the South Ridge Hills development requested that sampling be performed on their property, either due to suspected health problems, or from a desire to have the property tested in the event it was not initially selected as a sampling site.

The majority of the sampling sites were marked as "blue" sites. The so-called "blue" sites were those locations chosen for being in either the central target area or the drainage area (or both), or were requested by a resident who did not have a specific health concern. These sites were sampled at a single location on the residential property. The remaining sampling sites were marked as "red" sites, which were selected based upon resident requests due to suspected health concerns. Each red site had four shallow sampling locations within the property boundary, and had an additional deeper sampling location at one of the four sample locations.

In total, 84 blue and 12 red sites (total of 96 sampling sites and 144 sampling locations) within the Five Points OLF boundaries were selected for soil sample collection. Of the 96 sampling sites, 59 were located within the boundaries of the former bombing center (55 blue and 4 red sites), 39 were located within the drainage area (31 blue and 8 red sites) and two were located in other locations outside of the high probability areas (both blue sites).

The comprehensive sampling procedures for the Five Points OLF site investigation are outlined in Sampling and Analysis Plan (SAP) presented in the Site Investigation Work Plan (Malcolm Pirnie, 2002). Results of the investigation are detailed in the Site Investigation Report (Malcolm Pirnie, 2003)

[1]This information was extracted from the "Five Points Outlying Field, *Archives Search Report*" as prepared by the US Army Corps of Engineers, St. Louis District (CEMVS), February 2002.

2.2 SITE LOCATION AND PROPERTY BOUNDARIES

The approximately 162-acre site known as the former Five Points OLF is located at the corner of Harris Road and Matlock Road, Arlington, Tarrant County, Texas, at 32° 37’ 26” latitude and 97° 07’ 25” longitude (see Figure 2). A 35-acre portion of the former Five Points OLF was developed in the 1980s as a mobile home park under the name of Twin Parks Estates. The remaining 127 acres of the original tract used by the DoD is currently being developed as a new home subdivision known as Southridge Hills.

2.3 GEOLOGIC SETTING

The Five Points OLF site is located in the Osage Plains section of the Central Lowland province. Geologic formations of this section range from Cretaceous to Recent. The oldest strata are exposed in the western part of Tarrant County. Younger bedrock units are exposed in sequence toward the east. Alluvium and terrace deposits overlap the bedrock along streams and rivers.

The outstanding geologic event in the region was the encroachment of the Comanchean Sea. This early Cretaceous sea moved slowly from the Gulf of Mexico to cover all of Texas. It extended northward to cover the Arbuckle Uplift (in Oklahoma) and then receded. After a period of exposure and erosion, sediments from this period were covered by the less extensive sea of the Gulfian Epoch.

Comanchean series sediments of the Cretaceous System are divided into three major divisions: the Trinity, the Fredericksburg, and the Washita Group. The Cretaceous System forms a southeastward-thickening wedge extending across the area into a structural feature known as the East Texas basin. Regional dip is east and southeast at rates of about 15 to 40 feet/mile (Nordstrom 1982).

Along the contacts between geologic formations, a mixing of sediments by erosion has occurred. It is most evident where the formations have widely different

Figure 2 Aera Location Map - Five Points OLF

characteristics. In the area between formations of the Fredericksburg and Trinity Groups, strongly calcareous materials of the higher lying Fredericksburg Group have moved down slope so as to cover the noncalcareous Trinity Group. Further movement down slope has mixed these sediments into material that differs from that in the original formations. In these areas of mixed parent materials, unlike soils occur in close association. Small areas of calcareous soils with grass cover occur in intricate patterns with acid soils and oak forest cover.

2.4 SOILS

The soils of the Five Points OLF site are a combination of clays and silty clays. [The Tarrant County site soils are primarily characterized as Heiden clay (Ressel, et al 1981).] The soils range from very shallow to deep in very short distances. The slope ranges from level to 30%. Since the site covers a large area and the soil series are relatively small and jumbled, there are a number of different soil types present in the site. For all the soils present, the risk of corrosion to uncoated steel is high and to concrete is low.

The shallow soils have a surface layer that can range from 5 to 12 inches deep. It consists of grayish-brown gravelly clay. Underlying this layer is platy or coarsely fractured limestone. These soils are well drained. The available water capacity is very low, permeability is moderately slow, and runoff is medium to rapid depending on the slope. The hazard of erosion due to water is slight to moderate. During the November 2002 sampling event, fill material was encountered at some locations. The fill material was easily identified; the material was composed of a fine, loose, light brown to beige sand, as compared to the native soil, which was a firm, dark-brown to black silty clay. See boring logs Site Investigation Report for complete descriptions of borings.

The deep soils have profiles that differ greatly within small areas. The surface layer is generally about 12 inches thick. It is composed of dark grayish-brown stony clay or clay. The subsurface layer, to a depth of 25 inches, is very dark gray clay. The subsoil, to a depth of 40 inches, is dark gray, light olive brown or yellowish-brown clay and silty clay. The stratum and substratum, to 70 inches, is composed of brownish yellow silty clay, or grayish-brown clay that may be mottled with olive yellow in some small areas. The deep soils are well drained. The available water capacity is medium to high, permeability is very slow, surface runoff is medium, and the hazard of water erosion is moderate.

2.5 HYDROLOGY

2.5.1 Groundwater

The Trinity Group of Cretaceous age is the largest and most prolific aquifer in study area. The aquifer consists of the Antlers, Paluxy, and Twin Mountains Formations. The Antlers is a coalescence of the Paluxy and Twin Mountains. The Trinity Group aquifer ranges in thickness from 100 feet in the outcrop area to about 1200 feet near the down dip limit of fresh to slightly saline water. Artesian storage coefficients range from 0.0001 to 0.00025 and specific yields range from 15 to 25 percent in the outcrop (Nordstrom 1982).

2.5.2 Surface Water

There are no major rivers or streams at this site. Runoff from this location drains to the southeast portion of the site into an intermittent section of Bowman Branch. This branch flows easterly, becoming perennial, and eventually empties into Walnut Creek approximately 3.5 miles east southeast of the site. From this point, the flow heads to the east-northeast for approximately three miles until draining into Mountain Creek, 1800 feet downstream of the John Penn Branch confluence. The flow then travels approximately five miles to the north-northeast before draining into Mountain Creek Lake.

3.0 SAMPLING AND ANALYSIS PLAN (SAP)

This section describes the sampling design and collection methodologies. Confirmation data will be collected from excavations to show COC concentrations are below protective concentration levels (PCLs).

The current density of subsurface ordnance items is unknown. Malcolm Pirnie, therefore, has assumed that 80 ordnance items will be found, removed, and require collection of a soil sample from beneath the item. ATI, the unexploded ordnance contractor, is preparing a survey of subsurface anomalies in the residential neighborhood and the trailer park at the Former Five Points Outlying Field. Results of the survey will be presented in the form of mapping and dig sheets identifying locations of potential MEC items. When the mapping and dig sheets are made available, Malcolm Pirnie will make an assessment whether the assumed 80 ordnance items is representative of the actual conditions in the field.

Malcolm Pirnie will coordinate with the project manager for ATI regarding a schedule for Malcolm Pirnie personnel mobilizing to the site. During sampling activities, Malcolm Pirnie field personnel will not interfere with ATI's removal activities.

Two grab samples will be collected from the soil directly beneath each ordnance item excavated and removed by ATI personnel. Samples will be collected in brass sleeves using a slide hammer, and end caps will be fitted to the sleeves to ensure samples are undisturbed for analysis of white phosphorus. In the event that multiple ordnance items are found within 50 feet of one another, additional soil samples will be collected at a rate of one sample per four ordnance items, following consultation with the USACE Project Manager.

Samples collected for lead/zinc (EPA SW-846 method 6010) and explosives analyses will be submitted to the primary laboratory for analysis. QA samples will be shipped directly to the QA analytical laboratory for analysis. Samples collected for white phosphorus analysis (EPA SW-846 Method 7580) will be submitted to the USACE Waterways Experimentation Station (WES) in Vicksburg, Mississippi. Chemical analyses, QA/QC procedures, and data validation will be conducted as described in Section 4.0 of the original Scope of Work.

The presence of MEC hazards presents risks different from the risks associated with environmental contaminants. Environmental contaminants generally present a threat to human health and the environment through repeated and accumulated exposures to contaminants above acceptable exposure limits. MEC hazards present a "hazard" of physical injury from explosion resulting from accidental or unintentional detonation (Engineer Pamphlet Draft – *Development of Integrated Conceptual Site Models for Environmental and Ordnance and Explosives Sites,* February 2002). Field personnel will only enter the removal area once the MEC or other related items has been identified and removed. It is assumed that MEC items are between one and three feet below ground surface (bgs). Excavations will generally be performed manually by the removal contractor. Should the survey indicate that a MEC item is four or more feet bgs, then more extensive excavation may be required. Field personnel will only enter the excavated areas if the area has appropriate shoring or slopes as required for Type C Soil (OSHA 29 CFR 1926 Subpart P). Malcolm Pirnie's Site Health and Safety Plan addresses potential safety concerns (to include ordnance avoidance) for this investigation and is presented in Appendix A.

This SAP has been adapted from the USACE Tulsa District's field sampling plan (FSP), provided as Appendix B. The FSP provides greater detail in regard to the activities at the sampling locations and implementation of the sampling procedures and techniques.

3.1 SITE VISIT

Malcolm Pirnie met with the USACE Program Manager and MEC removal contractor, ATI, at the site prior to the start of field activities on July 28, 2004. The parties discussed modifications needed to this plan by ATI at the site to accommodate removal activities. Coordination methods between Malcolm Pirnie and ATI were discussed and protocols established for contacting Malcolm Pirnie and collecting of soil samples following ordnance removal.

3.2 FIELD WORKER PROCEDURES

Upon notification by ATI following the morning excavations, Malcolm Pirnie will mobilize to the site for collection of soil samples. All Malcolm Pirnie personnel operating in the field will be required to display company badges and/or company logos while performing any field work. Homeowners will not be present during the removal of the MEC. ATI will be responsible for notifying the USACE Fort Worth District if homeowners will not vacate the area. Any inquiries as to the nature of the field investigation made by the public or the media will be referred to the USACE, Fort Worth District.

3.3 INITIAL SITE ACTIVITIES

3.3.1 Utility Location

ATI will be responsible for marking utilities in the vicinity of the excavation areas. Details of this are in the ATI work plan.

3.3.2 Excavation Layout

Prior to mobilization to the field, ATI will provide to Malcolm Pirnie geophysical maps, GIS/GPS coordinate data, and “dig sheets” indicating the locations of subsurface MEC items targeted for excavation and removal. Malcolm Pirnie will use the sample identifiers for locations developed by ATI and presented in the dig sheets. Malcolm Pirnie will review the dig sheets and survey maps to randomly select QA/QC sampling locations. QA/QC sampling locations will have soil samples collected in triplicate for a total of six brass sleeves.

The intent of the SAP is to collect confirmation soil samples in excavations with MEC item removal completed by ATI. No excavation location will be located on impervious surfaces such as roads or driveways. Other obstacles to be avoided are swimming pools, residential deck areas, storage sheds, and other fixed residential structures.

3.4 SURFACE SOIL SAMPLING DESIGN

3.4.1 Excavation and Sampling Locations

It is assumed that up to 80 ordnance items will be found, removed, and require soil sampling from directly beneath the item. ATI will use a magnetometer to reacquire geophysical targets and remove the MEC. These locations will be provided to Malcolm Pirnie through geophysical maps, GIS/GPS coordinate data, and "dig sheets" prior to the field mobilization of the UXO removal contractor.

3.4.2 Slid Hammer Sampling Procedures

Two grab samples will be collected from the soil directly beneath the ordnance item. Samples will be collected in brass sleeves using a slide hammer, and end caps will fitted to the sleeves to ensure samples are undisturbed for analysis of white phosphorus. In the event that multiple ordnance items are found within 50 feet of one another, additional soil samples will be collected at a rate of one sample per four ordnance items, following consultation with the USACE Project Manager.

The soil core sample on the end of the slide hammer will be washed with a phosphate-free detergent (Alconox) and ASTM Type II grade Water and allowed to air dry between sampling locations. It is anticipated that at least one sampling location will be available to Malcolm Pirnie personnel upon arrival to the site. Paper work, labeling, and packing will be performed on-site, while additional location(s) are being prepared. Coolers will be sent to the laboratory once per week unless sample collection occurs at a higher rate.

A new, clean pair of disposable nitrile gloves will be worn each time a different location is sampled and will be donned immediately prior to sampling. Field personnel will take precautions to prevent contamination from sampling equipment. Presterilized disposable plastic scoops will be used when possible. Any sampling equipment that will be reused will be properly decontaminated and inspected for visible signs of deterioration.

3.5 SOIL SAMPLE HOLDING AND COORDINATION

Samples collected at the Five Points Site will be shipped to the analytical laboratory within 48 hours of collection. There will be two sleeves for each sampling location. One soil sample sleeve from each location will be sent the primary analytical laboratory for analysis of metals and explosives and one sleeve will be sent to USACE Waterways Experimentation Station (WES) for analysis of white phosphorus. All sample locations will have two sleeves collected and soils analyzed for lead, zinc, tetryl, TNT, and white phosphorus.

3.6 LABORATORY ANALYSIS

Samples will be analyzed at appropriate USACE certified off-site laboratories. Field and Quality Control (QC) lead, zinc and explosives samples will be analyzed at a primary laboratory (E-Labs). The white phosphorus field and QC samples contained within the sealed sample tubes will be sent to the USACE WES for analysis. Malcolm Pirnie will send the QA sample to a separate USACE lab for white phosphorus analyses (Cold Regions Research and Engineering Lab, CRREL). STL Laboratories will provide the analysis of the QA samples for lead, zinc and explosives. The QA/QC Program Plan (QAPP) is described in Section 4.0 and in complete form in Appendix C.

These environmental samples will be analyzed in accordance with the most recently promulgated methods from the EPA publication, SW-846, "Test methods for Evaluating Solid Waste", American Society for Testing and Materials (ASTM), Standard Methods, and/or any other equivalent method accepted by Texas or Federal Regulations. The laboratory analyses for this site will include tests for total lead and zinc by EPA SW-846 method 6010; White Phosphorus by EPA SW-846 method 7580; and Tetryl, TNT and its transformation products by EPA SW-846 method 8330.

QA/QC split samples and equipment rinsate blanks will be analyzed to help determine analytical precision, comparability, and potential sample cross contamination. QA/QC and blank samples will be analyzed using the same tests as listed for samples in the above section. For all soil samples listed above, field, QA, and QC (triplicate split) sample aliquots will be analyzed at a frequency of one for every ten samples (10%). Equipment rinsate blanks will be analyzed at a frequency of one per batch of twenty samples (5%).

3.7 SAMPLE CONTAINERS AND PRESERVATION TECHNIQUES

All soil samples will be extracted using clean sample-specific brass sleeves and clean, dry soil core sampler mounted on the slide hammer. Sample container and preservation information is shown in Table 3.1.

TABLE 3.1
METHODS, SAMPLE CONTAINERS, PRESERVATIVES AND HOLDING TIMES FOR SOIL SAMPLE CHEMICAL ANALYSIS

Analyte	Analytical Method	Sample Container	Sample Preservation	Holding Time
White Phosphorus* (WP)	SW 7580	6" sample sleeve sealed at both ends with plastic end caps	Cool to 4°C Kept in dark	6 months
Lead/Zinc	SW 6010	6" Brass sleeve sealed at both ends with plastic end caps	Cool to 4°C	6 months
Explosives**	SW 8330		Cool to 4°C	14 days for extraction and analysis

* Because white phosphorus will oxidize on contact with oxygen, care must be taken to limit contact of the sample with the atmosphere and to minimize any introduction of air into to the collected samples. Therefore, aqueous (i.e. equipment/rinsate blanks) samples should be poured gently into sample containers to minimize agitation that might drive off the volatile compound. If bubbling occurs while transferring the sample into the container, the sample should be discarded and another sample collected. If any air bubbles are present in the one-liter amber bottle, a new sample must be collected. Containers for soil samples should be filled as completely as possible to eliminate as much free space as practical.

** Includes the TNT transformation products and co-contaminants as listed on the standard analytes list for Method SW 8330.

3.8 EQUIPMENT DECONTAMINATION

All presterilized brass sleeves will be used at each new sampling location. Any non-dedicated or non-disposable sampling equipment used will be decontaminated prior to use and between each (different) sample location. Sampling equipment requiring decontamination include the soil core sampler. Equipment will be decontaminated by scrubbing with a solution of potable water and Alconox or equivalent, rinsing with potable water, followed by rinsing with ASTM Type II grade water. All equipment will be allowed to air dry prior to reuse.

3.9 FIELD OPERATIONS DOCUMENTATION

During execution of field activities, the field teams will maintain various field book, reports, and logs. Additional details for these components are described below. Survey records of sample locations including the documentation of prominent site features will also be maintained. A log describing the soil encountered at the various sample locations throughout the site will be maintained.

3.9.1 Daily Quality Control Reports (DQCRs)

Daily quality control reports will be completed by the Field Team Leader, which Malcolm Pirnie is called to mobilize. The DQCR will list all of the personnel onsite that day, as well as summarize all activities that took place. The DQCRs are generated by Malcolm Pirnie and will be submitted to the USACE Field Team Leader or designated representative.

3.9.2 Field Logbook and/or Sample Field Sheets

The Field Team Leader will maintain a daily field log in a bound notebook or personal digital assistant (PDA) that can be downloaded and bound into a notebook. In this log, the Field Team Leader will record the onsite activities in real time, including names of individuals’ onsite and sampling information, such as: sample locations, sample numbers, number of sample containers collected, soil description, etc. The recorded information should also include sample collection dates and times, sample collection depth, total depth of excavation, and any other applicable information. Notes will be written on sequentially numbered pages with indelible ink. Corrections to log entries will be made by lining through incorrect entries with a single line and initialing and dating the strikeout. At the end of each day, any unused space at the bottom of the last page will be "crossed" out, initialed, and dated by the Field Team Leader. The log description will be in accordance with EM 1110-1-4000.

3.9.3 Photographic Records

A photographic record of pertinent field activities will be maintained by the Field Team Leader to document the progress of the project and to provide a record of excavation locations and MEC locations.

3.9.4 Sample Documentation

All sample information will be documented to allow for tracking of sampling and analytical activities. All sample documentation will be consistent with the procedures outlined in this section.

All samples will be identified by nomenclature presented by ATI on dig sheets, survey mapping, or in the field.

All sample labels used on sample containers will include, at a minimum, a sample identification number, the date of the sample, time it was collected, site name, analysis to be performed, analytical method, and preservation technique (if applicable). The label will adhere to the container and the writing on it will be indelible ink. The label will be secondarily affixed to the container with clear adhesive tape completely covering the label.

Each sample will be identified on a Chain-of-Custody (C-O-C) record. Information recorded will include, at a minimum, sampler name(s), date and time of sample collection, identification code unique to each sample, number of containers with the same sample code, analyses requested for each sample and signature blocks for each individual who has custody for the samples. The method numbers for all requested analyses, the USACE contract number, project number, and the sample ID number will be included on the C-O-C.

3.10 SAMPLE SHIPPING REQUIREMENTS

Field and QC samples for zinc, lead, and explosives collected during the field activities will be shipped via appropriate courier to E-Labs. Field and QC samples for white phosphorus analyses will be shipped directly to the USACE WES laboratory. Coolers of suitable strength for packaging and shipping of samples will be used and will be manifested to meet USDOT regulations. The bottom and sides of each cooler will be lined with bubble wrap or other cushioning material. Each sample sleeve will be individually wrapped in a zip-lock type bag to prevent cross-contamination. Once samples are in the cooler, any voids will be filled with additional packaging material. Ice will be double-bagged in re-sealable bags and placed in cooler with the samples. A sufficient amount of ice will be added to coolers to ensure they arrive at the laboratory at a temperature of 4° Celsius or lower. The C-O-C record will be placed in a watertight bag and taped to the inside lid of the cooler. The cooler will be secured with strapping tape and custody seals will be affixed to the front and back seams (one in each area) of the cooler to prevent tampering. The custody seals will be covered with wide, clear adhesive tape.

QA samples for zinc, lead and explosives will be shipped to ECB for analysis from the site following random sample selection from analytical work. The white phosphorus QA samples will be directly sent to CRREL for analysis. The packaging and shipping procedures outlined above will be followed.

4.0 QUALITY ASSURANCE PROGRAM PLAN (QAPP)

4.1 INTRODUCTION

The QAPP addresses quality assurance objectives for analytical laboratory data such as precision, accuracy, bias, completeness, representativeness, comparability, sensitivity, and appropriateness for the intended uses. These quality assurance objectives are evaluated based on laboratory quality control procedures performed during analyses. The purpose of this QAPP is to document the environmental laboratory data quality assurance requirements applicable to field and related activities outlined in this workplan. The overall objective is to obtain technically valid and legally defensible environmental data that meets or exceeds the project's data quality objectives (DQOs).

4.2 QUALITY ASSURANCE OBJECTIVES FOR DATA ASSESSMENT

Quality Assurance (QA) involves those planned and systematic actions necessary to provide adequate confidence that project activities will be performed satisfactorily and safely. The goal of QA is to assure that activities are planned and performed according to accepted standards and practices to ensure that resulting data are valid and retrievable. Quality Control (QC) is an integral part of the overall QA functions and is comprised of those actions necessary to control and verify that activities as well as resulting data meet established requirements. The objective of QA/QC is to assure that the uncertainty of the generated data is within an acceptable range that will allow proper evaluation of the former Five Points OLF site through the collected data. The overall objective is to obtain technically valid and legally defensible environmental data that meets or exceeds the project's data quality objectives (DQOs).

The data collected will meet specific quality control (QC) Data Quality Indicators (DQIs) with respect to accuracy, precision, completeness, sensitivity, representatives, and comparability. The DQIs are presented below. Further description and detail of the DQIs is contained in the attached QAPP (Appendix C).

4.2.1 Accuracy

Accuracy is the degree of agreement between an observed value and an accepted reference value. For a set of observed values, accuracy is dependent upon a combination of random error and systematic error.

4.2.2 Bias

Bias refers to the systematic or persistent distortion of a measurement process that causes errors in one direction. Bias is a term that is related to, but not interchangeable with, accuracy. The bias of an analytical procedure can be determined by the addition of a known amount of material to a field sample matrix or a standard matrix. The percent recovery (% R) of the spiked material is a measure of bias; a description of this calculation is described in the QAPP (Appendix C).

4.2.3 Precision

Precision is the agreement among a set of replicate measurements. Precision values can show the degree of reproducibility in an analytical method and in sampling. Precision can be calculated as a relative percent difference (RPD). RPD calculation is described in the QAPP. Precision will be measured for the analyses performed using one or more of the following sample sub-sets to obtain an RPD: MS/MSDs, LCS/LCSDs, field duplicates, and/or laboratory duplicates. A field duplicate is a field sample split that is generated in the field. A laboratory duplicate is a laboratory split of a field sample.

4.2.4 Representativeness

Representativeness expresses the degree to which sample data accurately and precisely represent actual site conditions. Representativeness is a qualitative parameter concerned with the proper design of the sampling program. The representativeness objective is to eliminate all non-representative data by examining field and laboratory documentation.

4.2.5 Comparability

Comparability is a qualitative measure of the confidence with which one data set can be compared to another. Sample data should be comparable to other sample data for similar locations and conditions. The comparability objective is for samples to be collected by the techniques specified, samples to be analyzed by the methods specified, and analytical results to be reported in units consistent with the method.

4.2.6 Completeness

Field completeness will be assessed by comparing the number of samples collected to the number of samples planned. Analytical completeness will be assessed by comparing the total number of analytes with valid results to the number of analyses requested. The overall project completeness is, therefore, a comparison between the total number of valid analytical results to the number of analytical results planned.

4.2.7 Sensitivity

Sensitivity is defined as the ability of the analytical method to achieve a required limit, such as a detection limit (DL), reporting limit (RL), method detection limit (MDL), etc. If project critical limits are needed, laboratories will be made aware of the required limits before samples are sent for analysis to insure that the limits will be met.

4.2.8 Laboratory Quantitation Objectives

Laboratory quantitation limits for all analytes are given in Table 4.1. These laboratory quantitation limits were set to meet the project DQOs. The laboratory quantitation limits were set as low as possible to obtain an accurate comparison with the established criteria for the project. The laboratory may report results that are below the laboratory quantitation limit, but above the method detection limit (MDL), as estimated or “J” flagged values.

TABLE 4.1

LABORATORY QUANTITATION LIMITS FOR ANALYTES

Analyte	Quantitation Limits[1]	
	Soil[2] (mg/kg)	Water (µg/L) (Equipment Blanks)
Tetryl	10	50
TNT	1	5
White Phosphorus	0.2	0.1
Lead	10	5
Zinc	10	100

Notes: [1]Quantitation limits may be adjusted if dilution is necessary.
[2]The moisture content of the samples must be used to adjust the quantitation limits appropriately.

4.3 DATA QUALITY OBJECTIVES

Data quality objectives (DQOs) are qualitative and/or quantitative statements regarding the quality of data needed to support project activities. They clarify study objectives, define the appropriate types of data, specify decision rules, specify the tolerable levels of potential decision errors, and define a defensible sample design that support the decision-making process. In order to develop site-specific DQOs, the intended use of the data must be defined. Different intended uses of data require different levels of analytical and sampling certainty. This use must be balanced between data quality needs and time, as well as cost constraints.

The Technical Project Planning (TPP) process is a USACE tool used to produce DQOs that help manage the uncertainty associated with the project. The TPP process supported efforts to prepare project specific DQO statements that meet the definition of a DQO as provided in EPA's 7-Step DQO process.

All acceptable laboratory analysis data will meet the established criteria for the project in order to identify and determine if potential hazardous constituents are above the established action levels. These data will help decide and recommend further actions plans for the site.

4.3.1 Project Objectives

The objective of this investigation is to remove MEC and to determine if the soils surrounding the MECs contributed to environmental impacts of surface soils at the former Five Points OLF. The confirmation soil sampling will be used to demonstrate the removal of site-specific COCs from the surface soil at the site. The evaluation of confirmation sample results will be assessed by comparison of analytical data to TCEQ Tier 1 Residential Soil PCLs.

All analytical chemistry data will be validated as outlined in Section 7.2 of the QAPP (Appendix C). As part of efforts to manage/minimize potential analytical measurement errors, USACE validated laboratories will be used. USACE validated laboratories ensure standard operating procedures are in place, State and EPA QA/QC protocols are followed, and current method technologies are used. All soil samples collected will be submitted to the primary analytical laboratory for proper refrigerated storage. Soil samples that will be analyzed for explosives (EPA Method 8330) will be extracted and analyzed within the 14-day holding time. Chemical analysis of lead and zinc (EPA Method 6010) and analyses of white phosphorus (EPA Method 7580) will be performed on three randomly selected samples. Pending analytical results, Malcolm Pirnie will assume that no detections of chemicals of concern (COCs) will exceed Texas Risk Reduction Program (TRRP) Tier 1 Residential Soil Protective Concentration Levels (PCLs). Once analytical results are verified, an additional eight samples will be randomly selected for analysis. Samples collected for lead/zinc and explosives analyses will be submitted to the primary laboratory for storage; a randomly selected QA sample, selected from the eight locations identified prior to sample collection, will shipped from the primary laboratory to the QA analytical laboratory for analysis. Samples collected for white phosphorus analysis and selected will be submitted to the USACE WES in Vicksburg, Mississippi.

4.4 SAMPLING REQUIREMENTS

The following protocol will be followed for all laboratory activities involving sample receipt, handling, custody and holding times to ensure proper QA/QC is met.

4.4.1 Sample Receipt

Upon receipt of the sample coolers at the appropriate laboratory, the laboratory will check all coolers and sample containers to verify their integrity. A list of checks to be performed upon laboratory receipt is contained in the QAPP (Appendix C).

4.4.2 Sample Handling

All sample containers for chemical analysis will be placed in ice-filled coolers immediately following collection, and kept at four degrees Celsius prior to and during shipment. All samples collected will remain in the possession of the sampling crew until shipment. Locked vehicles or trailers will be used for interim storage as necessary. If coolers (used for sample storage) must be left unattended for extended periods of time, signed custody seals will be placed on the coolers. To provide adequate protection and temperature control during shipment, sample sleeves will be prepared and packaged according to procedures specified in the SAP (Section 3.0).

4.4.3 Sample Custody

C-O-C forms are used to record the possession and handling of samples from the time of collection through analysis. For each transfer of the sample custody, the sample custodian will record the date and time and sign the C-O-C form. The field sample custodian will retain a copy (either carbon or photocopy) of the C-O-C form. For sample packages sent by common carrier to the laboratory, the bill of lading will be retained as a part of the permanent C-O-C documentation. Description of all C-O-C documentation and information is contained in the QAPP (Appendix C).

4.4.4 Sample Holding Time Requirements

See the SAP (Section 3.0) and the QAPP (Appendix C) for all sample holding time and container requirements.

4.5 DATA REDUCTION, REVIEW AND ASSESSMENT

4.5.1 Data Reduction

Data reduction procedures are specified in the USACE EM 200-1-3, Appendix I, “Shell for Analytical Chemistry Requirements” and the EPA SW-846 method for each analysis.

4.5.2 Data Review and Assessment

Malcolm Pirnie will perform a data review on all field, QA, and QC sample analytical data generated. Review will be performed according to standard USACE protocols (ER 1110-1-263, EM 200-1-6, EM 200-1-1, etc.) and guidance contained in the US EPA’s “National Functional Guidelines for Organic Data Review” and “National Functional Guidelines for Inorganic Data Review”.

4.6 LABORATORY OPERATIONS DOCUMENTATION

4.6.1 Laboratory Reports

The laboratory reports will include, at a minimum, information for a definitive data package. The definitive data package format allows for the review of the data by an independent organization. However, these data packages do not allow for complete independent reconstruction of the analytical data. The information in the following sub-sections is representative of, but not limited to, information required in a definitive data package. All of the laboratory data should also be retained in project files by the laboratories and made available upon request.

4.6.1.1 Sample Identification (ID)

A table that matches field, QC, and QA Ids to the laboratory Ids will be prepared. It will identify all field duplicates and blanks.

4.6.1.2 Sample Receipt and Chain of Custody (C-O-C)

C-O-C forms and cooler receipt forms will be included in all laboratory reports. A cooler receipt form notes problems encountered in sample packaging, C-O-C, and sample preservation.

4.6.1.3 Case Narrative

A case narrative will be written which identifies any problems encountered during sample analysis, including sample preservation, holding times, calibrations, and QA/QC results outside of criteria, etc. Deviations of any calibration standards or QC sample results from appropriate acceptance limits should be noted and associated corrective actions taken by the laboratory should be discussed.

4.6.1.4 General Organic and Inorganic Reporting

Reported concentrations below the quantitation limit, % recovery control limit exceedances, percent moisture for soil samples, dilution factors, extraction dates, and analysis dates will all be reported for each analysis method performed.

4.6.1.5 Internal Quality Control Reporting

Internal quality control samples will be reported for each analytical batch or sample delivery group. All data gathered on method and instrument blanks, surrogate spikes, Laboratory Control Spikes and Duplicates, and Matrix Spikes and Duplicates will be reported as specified in the QAPP.

4.6.1.6 Field Duplicates and Blanks

- Field duplicates – Field duplicate pairs will be identified. RPDs will be reported for all field duplicate pairs
- Equipment blanks – Results will be reported for all equipment blanks

4.6.1.7 Electronic Deliverables

All data will be submitted on floppy or compact disk to the USACE, Fort Worth District, in Excel or other specified format.

4.6.2 Data Assessment or Validation Report

A data assessment/validation report will be prepared and will include the following sections:

- Introduction
- Chain of custody synopsis
- Detailed discussions
- Technical summary
- Completeness
- Conclusion

A complete description of these sections and contents of the Data Validation Report are contained in the QAPP (Appendix C).

4.7 CORRECTIVE ACTION MEASURES

When non-conformance with QA procedures is discovered, corrective action will be taken. Procedures for corrective action are described in "A Compendium of Superfund Field Operations Methods" (USEPA, 1987).

4.7.1 Field Activities

Field activities that are in error will be corrected as quickly as possible. The Field QA/QC officer will be responsible for initiation and documentation of corrective action whenever an error has the potential to compromise the quality of data generated or there is a possibility the error might be repeated.

4.7.2 Laboratory

Laboratory corrective actions are required when errors, deficiencies, or QC out of criteria exist. All corrective actions will be thoroughly documented. Corrective actions are required in certain circumstances for each of the following and are described in detail in the QAPP (Appendix C).

- Incoming Samples
- Sample Holding Times
- Calibrations
- Laboratory Quantitation Limits
- Method Blanks
- Laboratory Control Samples (LCS)
- Matrix Spikes/Matrix Spike Duplicates (MS/MSDs)
- Laboratory Duplicates
- Calculation Errors
- On-Site Audits

4.7.3 Implementation and Reporting

Following corrective action problem identification, the responsible individual, as assigned, will identify the root cause(s) of the problem and analyze the problems (root cause analysis). The responsible individual will work with field and laboratory personnel to develop a corrective action from the root cause analysis. For each problem, a corrective action report will be prepared to document that action was taken. The report will describe the problem, potential ramifications, corrective action, implementation, results of implementation, and effectiveness of the corrective action.

5.0 DOCUMENTATION

5.1 CONFIRMATION SOIL SAMPLING REPORT

Following the completion of field activities and receipt of all analytical data, a Confirmation Soil Sampling Report will be prepared and submitted to the USACE for review. Malcolm Pirnie will submit this document within 60 days following the completion of the removal of MEC and laboratory analysis. The site investigation report will include the following information:

- Detailed descriptions of all completed field investigations, including the methods and locations of all sampling performed. Any deviances from the sampling protocol listed in this workplan will also be discussed.
- The results of all data collected in summarized form presented on tables, graphs, and maps.
- Field notes.
- Laboratory data including the original C-O-C forms, laboratory traffic reports, and cooler receipt forms.
- Photographs fully documenting site conditions and soils during the investigation.
- A discussion of the investigation results, including any interpretations of the chemical and physical site conditions.
- Summary and conclusions. The conclusion section will include a description of site conditions, sample chemical analyses results, and locations of ordnances found.

Following receipt of comments from the USACE document review, a corrected Final Confirmation Soil Sampling Report will be compiled. Malcolm Pirnie will address each comment received from the draft report, and incorporate the necessary corrections into the final document. The completed final report will be submitted to the USACE and then TCEQ for final approval.

6.0 REFERENCES

Listed USACE Engineer (Manual or Regulation) publications meet or exceed standard industry practices and generally are consistent with the other national documents referenced. These USACE documents can be accessed at the following website address, http://www.usace.army.mil/inet/usace-docs.

Engineer Manual (EM) 200-1-3, Environmental Quality – *Requirements for the Preparation of Sampling and Analysis Plans, February 2001.*

EM 200-1-2, *Technical Project Planning (TPP) Process, August 1998.*

EM 200-1-6, Environmental Quality – *Chemical Quality Assurance for HTRW Projects, October 1997.*

Huntsville Engineering and Support Center, Defense Environmental Restoration Program for FUDS Ordnance and Explosives, *Archives Search Report for Five Points Outlying Field, Project No. KO6TX002801, February 2002*.

Texas Department of Water Resources, Report 269, *Occurrence, Availability, and Chemical Quality of Ground Water in the Cretaceous Aquifers of North-Central,* Nordstrom, Phillip L. (1982).

U.S. Department of Agriculture, Soil Conservation Service, *Soil Survey of Tarrant County, Texas.* Ressel, Dennis D.; Allen, Milton; Coffee, Daniel R.; Hill, Ralph H.; Holt, Thomas H.; Pauls, Edward W.; and Steptoe, Levi, Jr. (1981).

EPA/SW-846, *Test Methods for Evaluating Solid Waste – Physical/Chemical Methods, Update III, December 1996.*

Engineer Regulation (ER) 1110-1-263, *Chemical Data Quality Management for Hazardous, Toxic, Radioactive Waste (HTRW) Remedial Activities, April 1998.*

USACE, *Quality Management Plan for Environmental Projects for EPA Region 6, August 2001.*

EM 385-1-1, *Safety and Health Requirements Manual ENG Form 5044-R, September 1996.*

EM 1110-1-4000, Engineering and Design – *Monitoring Well Design, Installation, and Documentation at HTRW Sites, November 1998.*

APPENDIX A

SITE SPECIFIC HEALTH AND SAFETY PLAN

SITE SPECIFIC HEALTH AND SAFETY PLAN

MALCOLM PIRNIE

SECTION 1: GENERAL INFORMATION AND DISCLAIMER		**PROJECT NUMBER:**	4285-021
PROJECT NAME:	Former Five Points OLF	CLIENT NAME:	USACE - Ft. Worth
PROJECT MANAGER:	Glenn Hoeger	PROJECT LEADER:	Garett Ferguson
PREPARED BY:	Tiffany Rogers Bright	DATE:	02/23/2005

NOTE: This site specific Health and Safety Plan - Short Form (HASP-SF) has been prepared for use by **Malcolm Pirnie, Inc.** employees for work at this site / facility. **The plan is written for the specific site / facility conditions, purposes, tasks, dates and personnel specified, and must be amended and reviewed by those personnel named in Section 4 if these conditions change.** Malcolm Pirnie, Inc. is not responsible for its use by others.

Subcontractors shall be solely responsible for the health and safety of their employees and shall comply with all applicable laws and regulations. In accordance with 1910.120(b)(1)(iv) and (v), Malcolm Pirnie, Inc. will inform subcontractors of the site / facility emergency response procedures, and any potential fire, explosion, health, safety or other hazards by making this Site Specific Health and Safety Plan and site information obtained by others available during regular business hours. All contractors and subcontractors are responsible for: (1) developing their own Health and Safety Plan, including a written Hazard Communication Program and any other written hazard specific or safety programs required by federal, state and local laws and regulations, that details subcontractor tasks, potential or actual hazards identified as a result of a risk analysis of those tasks, and the engineering controls, work practices and personal protective equipment to be utilized to minimize or eliminate employee exposure to the hazard; (2) providing their own personal protective equipment; (3) providing documentation that their employees have been health and safety trained in accordance with applicable federal, state and local laws and regulations; (4) providing evidence of medical surveillance and medical approvals for their employees; and (5) designating their own site safety officer responsible for ensuring that their employees comply with their own Health and Safety plan and taking any other additional measures required by their site activities.

Providing a copy of this Malcolm Pirnie plan to subcontractors, does not establish, nor is it intended to establish a "joint employer" relationship between the Contractor and Malcolm Pirnie. This allowance does not establish, nor is it intended to establish, a direct or indirect employer/employee relationship with subcontractor's employees.

THIS SITE SPECIFIC HASP MUST BE REVIEWED AND APPROVED BY CORPORATE HEALTH AND SAFETY FOR ONE OR MORE OF THE FOLLOWING CONDITIONS: IF AN UPGRADE TO "LEVEL C" OR ABOVE IS ANTICIPATED; A PERMIT REQUIRED CONFINED SPACE ENTRY OR ENTRY INTO AN EXCAVATION IS ANTICIPATED; SAMPLING OF UNKNOWN DRUMS AND/OR IN UNKNOWN CONDITIONS IS ANTICIPATED, OR IF THERE MAY BE RADIATION LEVELS GREATER THAN 0.5 mR (500µR)/HOUR.

SECTION 2: EMERGENCY INFORMATION

(A) LOCAL RESOURCES	**SERVICE NAME**	**TELEPHONE NUMBER**
EMERGENCY MEDICAL SERVICES	American Medical Response, Inc.	817-640-9911 or 911
HOSPITAL (Map attached)	Arlington Memorial Hospital	817-548-6100
FIRE DEPARTMENT	Arlington Police Department	817-459-5700 or 911
POLICE / SECURITY	Arlington Fire Department	817-459-5500 or 911
HAZMAT/ SPILL / OTHER RESPONSE	Garner Environmental Service, Inc.	817-535-7222

(B) CORPORATE RESOURCES

MALCOLM PIRNIE 24 / 7 EMERGENCY / INCIDENT TELEPHONE NUMBERS		**(800) 478-6870 (24 HOURS)**
CORPORATE HEALTH AND SAFETY **	MARK MCGOWAN, CIH, CSP	(914) 641-2484 WHI
	JOSEPH GOLDEN, EMT-P, CET, CHMM	(914) 641-2978 WHI
CORPORATE HEALTH PHYSICIST	LES SKOSKI	(201) 398-4377 NNJ
CORPORATE HUMAN RESOURCES **	PATRICIA OLSIEWICZ (WORKERS COMP / OSHA LOG)	(914) 641-2913 WHI
LEGAL DEPARTMENT **	JERRY CAVALUZZI	(914) 641-2950 WHI

**** TO BE NOTIFIED IN CASE OF ACCIDENT**

SECTION 3: PROJECT INFORMATION

(A) SITE / FACILITY INFORMATION:

SITE NAME: Former Five Points OLF	SITE CLIENT CONTACT: Eric Kirwan
	PHONE NUMBER: 817-886-1673
ADDRESS: Corner of Allencrest Drive and Matlock Road	SITE SAFETY CONTACT:
TOWNSHIP/ COUNTY: Arlington, Texas	
☒ FEDERAL ☐ STATE	☐ MUNICIPAL / REGIONAL ☒ PRIVATE

☐ HAZARDOUS (RCRA) ☐ UST / LUST ☐ REFINERY
☐ HAZARDOUS (CERCLA / STATE) ☐ BROWNFIELD ☐ WTP / WWTP
☐ CONSTRUCTION ☐ CHEMICAL PLANT ☒ OTHER:
☐ LANDFILL (NON-HAZARDOUS) ☐ CHEMICAL PLANT Possible MEC

☐ ACTIVE ☒ INACTIVE

☐ HAZARDOUS WASTE	☐ SOLID WASTE	☐ CONSTRUCTION	
☐ HYDROGEOLOGY	☐ ENVIRONMENTAL	☐ AIR / ODOR	
☐ WASTE WATER	☐ WATER	☐ OTHER:	
☐ PRE-JOB VISIT	☐ AUDIT	☐ AIR	☐ SEDIMENT
☐ (SUB) CONTRACTOR OVERSIGHT	☒ OTHER:	☐ SURFACE WATER	☒ SURFACE SOIL
☐ CONSTRUCTION MGMT	Site investigation of FUDS in residential neighborhood	☐ GROUND WATER	☐ LANDFILL
☒ INSPECTION		☐ WASTE WATER	☐ OTHER
☐ INVESTIGATION SURVEY		☐ WASTE STREAM	

DATE(S) OF FIELD ACTIVITIES:

(E) **FIELD TASKS**

MALCOLM PIRNIE TASKS (List field tasks to be performed by Malcolm Pirnie staff)

M1. Confirmation soil sampling - to be conducted only after MEC removal by subcontractor and sample site checked for additional items. MPI personnel will remain outside the exclusion zone until cleared by the USO technician.

M2.

M3.

TASKS PERFORMED BY OTHERS (List field tasks to be performed by client, subcontractors, or contractors)

01. Excavation of possible MEC locations

02.

03.

04.

SECTION 4: PROJECT SAFETY ORGANIZATION, HEALTH AND SAFETY TRAINING, AND MEDICAL MONITORING (A) PROJECT HEALTH AND SAFETY ROLES, RESPONSIBILITIES AND COORDINATION	
PROJECT OFFICER	The Project Officer (PO) is ultimately responsible for project performance. The PO seeks and gets appropriate approvals for risk management decisions (e.g. from Regional/Practice Director(s), Legal Council, Corporate Health and Safety), and selects and effective and qualified project team. The PO supports the Project Manager or Deputy Project Manager with appropriate resources.
PROJECT MANAGER DEPUTY PROJECT MANAGER	The Project Manager (PM) has the responsibility for executing the project in accordance with the scope of work and good engineering practice. The PM will supervise the allocation of resources and staff to implement specific aspects of this HASP and may delegate authority to expedite and facilitate any application of the program. The PM implements and executes an effective program of site-specific personnel protection and accident prevention. The Project Manager reports to the Project Officer. Deputy Project Managers (DPM) are assigned all duties and responsibilities of the Site Safety Officer in his/her absence.
CORPORATE HEALTH & SAFETY	Corporate Health and Safety is responsible for Malcolm Pirnie's overall Health and Safety Program and provides project guidance on air monitoring methodology, data interpretation and assistance in determining appropriate project engineering controls, work practices, and personal protective equipment. Corporate Health and Safety also reviews and approve HASPs in accordance with Section 1.
SITE SAFETY OFFICER ALTERNATE SITE SAFETY OFFICER (S)	The Site Safety Officer (SSO) is responsible for interpreting and implementing the site health and safety provisions set out in this HASP, and will guide the efforts of field team personnel in their day-to-day compliance with this HASP. The SSO has the ability and authority to make necessary changes or additions to this HASP and provide technical assistance to field team personnel on problems relating to worksite safety. The SSO has the authority to correct safety-related deficiencies in materials or practice and to call a Project STOP in the most serious cases. Alternate Site Safety Officer (ASSO) is assigned all duties and responsibilities of the Site Safety Officer in his/her absence.
PUBLIC INFORMATION OFFICER:	The Public Information Officer (PIO) is responsible for all public, press and other news media request for information, and is the only person authorized to provide such information
SITE RECORDKEEPER:	The Site Recordkeeper is responsible for the documentation of all related heath and safety data documentation, including but not limited to metrological data, instrument calibration, accident and injury reports, and air monitoring data.
FIELD TEAM LEADER:	The Field Team Leader (FTL) is responsible for leading "on-site" activities of field team personnel, and to ensure field team personnel perform only those tasks that have been identified in this HASP.
FIELD TEAM PERSONNEL	Field personnel have the following health and safety responsibilities: • Implement the procedures set forth in the HASP; • Take all reasonable precautions to prevent injury to themselves and their fellow employees; and • Perform only those tasks that they believe they can do safely, and immediately report any accidents and/or unsafe conditions in accordance with Section 1.

(B) PROJECT TEAM - The following Malcolm Pirnie personnel are designated to carry out the stated project job functions on site. THE SITE SAFETY OFFICER, OR A DESIGNATED ALTERNATE WILL BE ON-SITE DURING **ALL** SITE ACTIVITIES. (NOTE: One person may carry out more than one job function.)

PROJECT MANAGER:	Glenn Hoeger
PROJECT OFFICER:	John Sparks
SITE SAFETY OFFICER:	Garett Ferguson, Tiffany Bright
ALTERNATE SAFETY OFFICER(S):	Joe Anzaldua
PUBLIC INFORMATION OFFICER:	Randy Niebuhr, USACE - Fort Worth
SITE RECORDKEEPER:	Garett Ferguson
FIELD TEAM LEADER:	Garett Ferguson
FIELD TEAM PERSONNEL:	Tiffany Bright
	Garett Ferguson
	Joe Anzaldua

The following subcontractors and governmental agencies have been informed by Malcolm Pirnie of emergency response procedures, and any potential fire, explosion, health, safety or other hazards of the site / facility by making this Site Specific Health and Safety Plan and site information obtained by others available during regular business hours. Subcontractors and governmental agencies shall be solely responsible for the health and safety of their employees and shall comply with all applicable laws and regulations as described in **Section 1** of this plan.

SUBCONTRACTOR(S):	
FEDERAL AND STATE AGENCY REPS:	Dewayne Ford, USACE - Fort Worth
	Wayne Elliot, USACE - Fort Worth
OTHER AGENCY REPS:	

(C) HEALTH AND SAFETY TRAINING, MEDICAL MONITORING, AND FIT TESTING PROGRAM

The following project staff is included in the Malcolm Pirnie Health and Safety Training and Medical Monitoring programs. The details of these programs can be found in the Health and Safety Policies and Written Programs. (NOTE: At least one CPR/First Aid Trained person must be on-site during HAZWOPER and confined space entry activities.)

	HAZWOPER TRAINING			OTHER TRAINING						FIT TEST			
NAME	INITIAL (DATE)	8HR (DATE)	MGR (DATE)	DOT (DATE)	CSE (DATE)	CPR (DATE)	First Aid (DATE)	BBP (DATE)	MEDICAL (DATE)	MAKE	SIZE	TYPE	(DATE)
Garrett Ferguson	11/00	12/04	06/04		1/01	4/04	4/04		7/04	MSA	MED	FF	1/04
Tiffany Bright	12/99	5/05				7/05			9/04				
Joe Anzaldua	11/98	7/04				3/05	3/07		6/05				

SECTION 5: HAZARD ANALYSIS

(A) **ACTUAL OR POTENTIAL PHYSICAL HAZARDS** – (Check all that apply to Malcolm Pirnie activities)

- ☐ ANIMALS / PLANTS
- ☐ ASBESTOS / LEAD
- ☒ CHEMICAL EXPOSURE (See Section 5B/5C)
- ☐ CONFINED SPACE (See Section 12)
- ☐ DEMOLITION
- ☐ DRILLING
- ☒ DRUM HANDLING
- ☐ DUST, HARMFUL
- ☐ DUST, NUISANCE
- ☐ ELECTRICAL
- ☒ EXCAVATIONS (See Section 13)
- ☐ EXTREME COLD (See Section 10)
- ☐ FALL, >6' VERTICAL
- ☐ FALLING OBJECTS
- ☒ HEAT STRESS
- ☒ HEAVY EQUIPMT
- ☐ HEAVY LIFTING
- ☐ HOT WORK
- ☐ HUNTING SEASON
- ☐ IMMERSION
- ☐ IONIZING RADIATION
- ☐ LIGHT RADIATION (i.e., Welding, High Intensity)
- ☐ LIMITED CONTACT
- ☐ MOVING PARTS (LO / TO)
- ☐ NOISE (> 85 dB)
- ☐ NON-IONIZING RADIATION
- ☐ OVERHEAD OBJECTS
- ☐ POWERED PLATFORMS
- ☐ POOR VISIBILITY
- ☐ ROLLING OBJECTS
- ☐ SCAFFOLDING
- ☐ SHARP OBJECTS
- ☐ STEEP / UNEVEN
- ☐ TERRAIN
- ☒ TRAFFIC (STRUCK BY)
- ☒ OTHER: Unexploded MEC

(B) **PRESENCE OF HAZARDOUS MATERIALS STORED OR USED ON SITE** ☐ YES By Client / Owner ☐ YES By Malcolm Pirnie (See Section 11) ☒ NO

(CHECK ALL THAT APPLY)

TYPE

- ☐ EXPLOSIVES
- ☐ COMPRESSED GASES
- ☐ FLAMMABLE / COMBUSTIBLE LIQUIDS
- ☐ FLAMMABLE / REACTIVE SOLIDS
- ☐ OXIDIZERS
- ☐ TOXIC / INFECTIOUS
- ☐ RADIOACTIVE
- ☐ CORROSIVE
- ☐ MISCELLANEOUS
- ☐ HAZARDOUS WASTE (Stored)

(C) **CHEMICAL HAZARDS OF CONTAMINANTS INFORMATION**

(1) IDENTIFIED CONTAMINANTS - Known or suspected hazardous/toxic materials (attach historical information, physical description, map of contamination and tabulated data, if available)

SUBSTANCES INVOLVED	CHARACTERISTICS	MEDIA	ESTIMATED CONCENTRATIONS	LOWEST PEL, or TLV
Lead, Zinc	TO	SL	<100	☒ PPM ☐ mg/m^3
Explosives (TNT/Tetryl)	RE	SL	<1	☒ PPM ☐ mg/m^3
White Phosphorus	RE	SL	<1	☒ PPM ☐ mg/m^3

Media types: GW (ground water), SW (surface water), WW (wastewater), AIR (air), SL (soil), SD (sediment), WL (waste, liquid), WS (waste, solid), WD (waste, sludge), WG (waste, gas), OT (other).

Characteristics: CA (corrosive, acid), CC (corrosive, caustic), IG (ignitable), RA (radioactive), VO (volatile), TO (toxic), RE (reactive), BIO (infectious), UN (unknown), OT (other, describe

(2) DESCRIBE POTENTIAL FOR CONTACT WITH EACH MEDIA TYPE FOR EACH OF THE MPI TASKS LISTED IN SEC 3 (E):

MPI TASK	ROUTE OF EXPOSURE (INHAL/INGEST/CONTACT/ABSORB)	POTENTIAL FOR CONTACT (HIGH / MEDIUM / LOW)	METHOD OF CONTROL
M1	Inhalation	Low	None
M1	Ingestion	Low	Gloves
M1	Contact	Low	Gloves

The Site Safety Officer will brief the MPI field team on symptoms and signs of overexposure to chemical hazards

SECTION 6: SITE CONTROL MEASURES

(A) WORK ZONES - EXCAVATIONS, DRILLING OPERATIONS, AND HEAVY EQUIPMENT

USACE - Forth Worth has been designated to coordinate access control and security for Malcolm Pirnie operations on site. It is a Malcolm Pirnie policy that Malcolm Pirnie personnel will not enter trench or excavated areas without approval of Corporate Health and Safety. A safe perimeter has been established at the boundary of any excavation and/or a safe distance from excavators, drill rigs and other heavy equipment.

These boundaries are identified by: Boundaries will be established at each sampling location

No unauthorized person should be within this area.

(B) WORK ZONES - CONTAMINATION

The prevailing wind conditions are variable A wind direction indicator is used to determine daily wind direction. The Command Post is located upwind from the Exclusion Zone or at a sufficient distance to prevent exposure should a release occur.

Control boundaries have been established and Exclusion Zone(s) (the contaminated area) have been identified. (Attach site map)

These boundaries are identified by: An exclusion zone surrounding the area of excavation

No unauthorized person should be within this area.

SECTION 7: SAFETY PROCEDURES / EQUIPMENT REQUIRED

Identify all procedures and equipment needed to eliminate or minimize exposure to hazards identified in Section 5.

- ☐ AIR MONITORING EQUIPMENT (See Section 9)
- ☐ BARRIER TAPE
- ☐ COMMUNICATIONS - ONSITE
- ☒ COMMUNICATIONS - OFFSITE (i.e., cell/digital phones if no other means)
- ☐ CONFINED SPACE PROGRAM & EQUIPMENT (See Section 12)
- ☒ EYE WASH
- ☐ EMERGENCY SHOWERS
- ☐ EMERGENCY AIR HORN
- ☐ FALL PROTECTION PROGRAM & EQUIPMENT
- ☐ FIRE EXTINGUISHER(S) - ABC
- ☒ FIRST AID KIT / BBP KIT
- ☐ FLOTATION DEVICE (USCG)
- ☐ GFCI EXTENSION CORDS
- ☐ HARNESS(S) / LIFELINE(S)
- ☒ INSECT / TICK REPELLANT
- ☐ HUNTING SEASON
- ☐ LADDER(S)
- ☐ LIGHTING - HAND HELD
- ☐ LIGHTING - FIXED / EMERGENCY
- ☐ LOCKOUT/TAGOUT PROGRAM & EQUIPMENT
- ☐ MSDSs – ATTACHED (See Section 11)
- ☐ MSDSs - FACILITY / OTHERS
- ☐ PPE - PHYSICAL HAZARDS (See Section 15)
- ☒ PPE - CHEMICAL HAZARDS (See Section 15)
- ☐ RESPIRATORY PROTECTION PROGRAM & EQUIPMENT (APR) (See Section 15)
- ☐ RESPIRATORY PROTECTION PROGRAM & EQUIPMENT (SAR) (See Section 15)
- ☒ TRAFFIC CONES
- ☐ VENTILATION EQUIPMENT
- ☐ OTHER:

SECTION 8: COMMUNICATIONS AND SAFE WORK PRACTICES

(A) COMMUNICATIONS - ONSITE

Whenever possible, communications between site personnel should be face-to-face. When verbal communications is not possible, radio communications shall be established.

In case of radio communications failure, or when respiratory protection is in use, the following hand signals will be used:

OK; I AM ALL RIGHT; I UNDERSTAND	THUMBS UP
NO; NEGATIVE	THUMBS DOWN
NEED ASSISTANCE	BOTH HANDS ON TOP OF HEAD
DANGER - NEED TO LEAVE AREA, NO QUESTIONS	GRIP PARTNERS WRIST WITH BOTH HANDS
HAVING DIFFICULTY BREATHING	HANDS TO THROAT

(B) COMMUNICATIONS - OFF SITE

If applicable, telephone communication to the Command Post should be established as soon as practical.

Telephone numbers that can be used to reach the command post are: 214-542-6257 (Dallas Field Phone) and ______________________

(C) SAFE WORK PRACTICES

1. A "BUDDY SYSTEM" IN WHICH ANOTHER WORKER IS CLOSE ENOUGH TO RENDER IMMEDIATE AID WILL BE IN EFFECT. CLIENTS AND/OR CONTRACTORS MAY SERVE AS A "DESIGNATED BUDDY."
2. WHERE THE EYES OR BODY MAY BE EXPOSED TO CORROSIVE MATERIALS, SUITABLE FACILITIES FOR QUICK DRENCHING OR FLUSHING SHALL BE AVAILABLE FOR IMMEDIATE USE (SEE SECTION 7).
3. DO NOT KNEEL ON THE GROUND WHEN CHEMICAL PROTECTIVE CLOTHING IS BEING USE.
4. IF DRILLING EQUIPMENT IS INVOLVED, HAVE A CURRENT UTILITY SURVEY, AND KNOW WHERE THE 'KILL SWITCH' IS.
5. CONTACT WITH SAMPLES, EXCAVATED MATERIALS, OR OTHER CONTAMINATED MATERIALS MUST BE MINIMIZED.
6. ALL ELECTRICAL EQUIPMENT USED IN OUTSIDE LOCATIONS, WET AREAS OR NEAR WATER MUST BE PLUGGED INTO GROUND FAULT CIRCUIT INTERRUPTER (GFCI) PROTECTED OUTLETS (SEE SECTION 7).
7. IN THE EVENT OF TREACHEROUS WEATHER-RELATED WORKING CONDITIONS (I.E., THUNDERSTORM, LIMITED VISIBILITY, EXTREME COLD OR HEAT) FIELD TASKS WILL BE SUSPENDED UNTIL CONDITIONS IMPROVE OR APPROPRIATE PROTECTION FROM THE ELEMENTS IS PROVIDED.
8. SMOKING, EATING, CHEWING GUM OR TOBACCO, OR DRINKING ARE FORBIDDEN EXCEPT IN CLEAN OR DESIGNATED AREAS.
9. USE OF CONTACT LENSES NEAR CHEMICALS OR DURING USE OF RESPIRATORY PROTECTION IS PROHIBITED AT ALL TIMES.
10. GOOD HOUSEKEEPING PRACTICES ARE TO BE MAINTAINED.
11. SITE / FACILITY SPECIFIC SAFE WORK PRACTICES:

____

____

____

SECTION 9: ENVIRONMENTAL MONITORING ☒ THIS SECTION NOT APPLICABLE TO SITE ACTIVITIES

(A) The following environmental monitoring instruments shall be used on site at the specified intervals and recorded in the site logbook. (NOTE: If monitoring period is "OTHER", monitoring schedule will be attached to this plan.)

EQUIPMENT	MONITORING PERIOD				ACTION LEVEL
☐ Combustible Gas Indicator	☐ Continuous	☐ Hourly	☐ x Day	☐ Other	________
☐ O_2 Meter	☐ Continuous	☐ Hourly	☐ x Day	☐ Other	________
☐ Toxics: ☐ CO ☐ H_2S	☐ Continuous	☐ Hourly	☐ x Day	☐ Other	________
☐ Other: ____________	☐ Continuous	☐ Hourly	☐ x Day	☐ Other	________
☐ PID (Lamp______eV)	☐ Continuous	☐ Hourly	☐ x Day	☐ Other	________
☐ FID					
☐ Colorimetric tubes:					
____________	☐ Continuous	☐ Hourly	☐ x Day	☐ Other	________
____________	☐ Continuous	☐ Hourly	☐ x Day	☐ Other	________
☐ Radiation: ☐ α ☐ β ☐ gamma	☐ Continuous	☐ Hourly	☐ x Day	☐ Other	________
☐ Respirable Dust Meter	☐ Continuous	☐ Hourly	☐ x Day	☐ Other	________
☐ Noise Meter	☐ Continuous	☐ Hourly	☐ x Day	☐ Other	________
☐ Other:	☐ Continuous	☐ Hourly	☐ x Day	☐ Other	________
____________	☐ Continuous	☐ Hourly	☐ x Day	☐ Other	________
____________	☐ Continuous	☐ Hourly	☐ x Day	☐ Other	________

(B) Monitoring equipment is to calibrated according to manufacturers' instructions. Record calibration data and air concentrations in the Health and Safety on-site log book.

(C) Recommended Action Levels for Upgrade or Downgrade of Respiratory Protection, or Site Shutdown and Evacuation. These are average values. Consideration should be given to the potential for release of highly toxic compounds from the waste or from reaction by-products. Levels are for persistent (> 10 min) breathing zone measurements in non-confined spaces. **For unexpected conditions, stop all work and contact Corporate Health and Safety.**

Oxygen Levels	
Less than 19.5%	Level B necessary for work to start / continue. Consider toxicity potential.
19.5% to 23.5%	Work may start / continue. Investigate changes. Continuous monitoring.
Greater than 23.5%	PROHIBITED WORK CONDITION
Flammability / Explosive Hazards	
Less than 10% of LEL	Work may start / continue. Consider toxicity potential.
10% to 25% of LEL	Work may start / continue. Continuous monitoring.
Greater than 25% of LEL	PROHIBITED WORK CONDITION.
Uncharacterized Airborne Organic Vapors or Gases	
Background*	Work may start / continue. Continue to monitor conditions.
Up to 5 meter units (m.u. or "ppm") above background	Level C necessary for work to start / continue. Continuous monitoring. Use Colorimetric tubes to characterize vapors.
Up to 50 m.u. above background	Level B necessary for work to start / continue. Continuous monitoring.
Greater than 50 m.u.	PROHIBITED WORK CONDITION.
*** Off-site clean air measurement**	
Characterized Airborne Organic Vapors or Gases**	
Up to 50% of TLV, or PEL or REL	Work may start / continue. Continue to monitor conditions.
Up to 25 times the TLV, or PEL or REL	Level C necessary for work to start / continue. Continuous monitoring.
Up to 500 times the TLV, or PEL or REL	Level B necessary for work to start / continue. Continuous monitoring.
Greater than 500 times the TLV, or PEL or REL	PROHIBITED WORK CONDITION.
** **Use mixture calculations (% allowed = □$C_N EL_N$) if more than one contaminant is present.**	
Radiation	
Less than 0.5 mR/Hour (500 μR)	Work may start / continue. Continue to monitor conditions.
Up to 1 mR/Hour above background	Work may start / continue with Radiation Safety Officer present on site.
Greater than 1 mR/Hour above background	PROHIBITED WORK CONDITION.

SECTION 10: PERSONAL MONITORING ☒ THIS SECTION NOT APPLICABLE TO SITE ACTIVITIES

(A) PERSONAL EXPOSURE SAMPLING (Consider if high levels of noise or high concentrations of lead, mercury or arsenic are present)

The following personal monitoring will be in effect on site: ______

A copy of personal monitoring results is to be sent to Corporate Health and Safety for inclusion in the Employee's Confidential Exposure Record File.

(B) HEAT / COLD STRESS MONITORING

The expected air temperature will be 75-90 ºF. If it is determined that heat stress or cold stress monitoring is required (mandatory for heavy exertion in PPE at temperatures over 70ºF, or at temperatures under 40ºF or wind chill equivalent), the following procedures shall be followed (describe procedures in effect, for heat stress i.e., monitoring body temperature, body weight, pulse rate; for cold stress i.e., appropriate clothing, shelter breaks):

Heart rate may be measured by pulse (measured heart rate should not exceed 2x resting heart rate)

Body temperature may be measured orally with a clinical thermometer (oral temperature should not exceed 99.6 F)

SECTION 11: HAZARD COMMUNICATION PROGRAM ☐ THIS SECTION NOT APPLICABLE TO SITE ACTIVITIES

If chemicals are introduced to the site by Malcolm Pirnie (e.g., decontamination liquids, preservatives, etc.), a copy of the Malcolm Pirnie Hazard Communication Program and Material Safety Data Sheets (MSDSs) of chemicals introduced by Malcolm Pirnie to the site is attached to this plan. The Site Safety Officer will review this information with all field personnel prior to the start of the project, and will inform other employers (e.g., Owner, Contractor and Subcontractors) the availability and location of this information. The Comprehensive List of Chemicals introduced by Malcolm Pirnie to this site is:

non-phosphate detergent

All chemicals being introduced to the site, hazardous/potentially hazardous samples prepared at the site, and/or any hazardous materials previously sent to the site, **that will be stored at the site or will be transported from the site by common carrier**, will be packaged, labeled and identified as hazardous materials in accordance with U.S. Department of Transportation (DOT) and/or International Air Transport Association (IATA) regulations by a trained HazMat employee.

(NOTE: At multi-employer sites, the Site Safety Officer will obtain information, if applicable, on hazardous chemicals other employers may produce or introduce to the job site to which Malcolm Pirnie employees may be exposed, including the location of their written hazard communication program(s), labeling program(s), and Material Safety Data Sheet(s).

SECTION 12: CONFINED SPACE ENTRY ☒ THIS SECTION NOT APPLICABLE TO SITE ACTIVITIES

If a permit-required confined space entry will be made on site, a copy of the Malcolm Pirnie Confined Space Entry Program, and a completed Malcolm Pirnie Confined Space Pre-Entry Inspection Check List will be attached to this plan. A Confined Space Entry Permit must be completed and posted outside the confined space prior to entry, and the entry will follow the Malcolm Pirnie Confined Space Entry written program. Permits are to be saved and logged with project documentation.

SECTION 13: EXCAVATION SAFETY ☐ THIS SECTION NOT APPLICABLE TO SITE ACTIVITIES

Excavations being created in order to accomplish Malcolm Pirnie tasks or in progress during Malcolm Pirnie inspection of other activities or tasks, shall be shored or slopped or otherwise protected to prevent accidental collapse prior to entry, in accordance with Subpart F of 29 CFR 1926. It is Malcolm Pirnie policy that Malcolm Pirnie personnel will not enter trench or excavated areas without approval of Corporate Health and Safety. If an entry into an excavation by Malcolm Pirnie personnel is necessary, a Excavation Plan identifying the Competent Person and the protective measure to be used (i.e., sloping, shoring, trench box) will be attached to this plan.

SECTION 14: DECONTAMINATION PROCEDURES ☐ THIS SECTION NOT APPLICABLE TO SITE ACTIVITIES

Personnel and equipment leaving the Exclusion Zone shall be thoroughly decontaminated. The Site Safety Officer is responsible for monitoring adherence with this decontamination plan.

A ______________ decontamination protocol shall be used with the following decontamination stations:

(1) Wash and scrub sampling equipment with non-phosphate detergent and a stiff brush

(2) Rinse with distilled water and then with deionized water

(3) Allow equipment to air dry

(4) ______________

(5) ______________

(6) ______________

(7) ______________

(Other) ______________

The following decontamination equipment is required: ______________

- ☐ Decon Pad (Plastic Sheet)
- ☒ Trash Cans/Bags
- ☒ Dry Brushes
- ☐ Wet Brushes
- ☒ Buckets
- ☐ Hose / Spray
- Other: Buckets, brushes, distilled water, DI water, detergent (non-phosphate)

______________ Will be used as the decontamination solution

SECTION 15: PERSONAL PROTECTIVE EQUIPMENT

TASK *	RESPIRATORS & CARTRIDGE[1]	USE ** (See Section 16)	CLOTHING	GLOVES	BOOTS	OTHER
M1			T	N	SL	HH, G

* Same as Section 3E

**UP = Upgrade
CONT = Continuous

NOTE: PPE use will be in accordance with Malcolm Pirnie's Health and Safety Policy and Written Programs

CODES:

RESPIRATORS[1]	CARTRIDGES[1]	CLOTHING	GLOVES[2]	BOOTS	OTHER
HF = Half Face APR	P = Particulate	N/S = No Special	Co = Cotton	SL = Leather Safety	HH = Hard Hat
FF = Full Face APR	OV = Organic Vapors	C = Coveralls	Le = Leather	H = Hip (Fireman)	G = Safety Glasses
ESCBA = Escape Bottle	AG = Acid Gas	T = Tyvek	L = Latex	O = Latex overboots	GP = Glare Protection
SAR = Airline	Mult = Multi-Gas/Vapor	Sx = Saranex	N = Nitrile		GI = Goggles - Impact
SCBA = SCBA	Other	PT = PE Tyvek	B = Butyl		GS = Goggles - Splash
			Neo = Neoprene		FS = Face Shield
			V = Viton		HP = Hearing Protection
			PVC = Polyvinyl Chloride		
			PVA = Polyvinyl Alcohol		
			Other:		

1 - List all that apply, i.e., FF w/ OV/AG/P

2 - Use same codes for clothing and boots of same material

Respiratory protection will be upgraded under the following conditions: ______________

The following cartridge change out schedule is to be followed onsite (attach any calculations to plan): ______________

SECTION 16: EMERGENCY ACTION PLAN

The following standard emergency response procedures will be used by onsite personnel. The Site Safety Officer shall be notified of any onsite emergencies and be responsible for ensuring that the appropriate procedure are followed.

(A) EVACUATION

All work activities are suspended and the site is to be EVACUATED IMMEDIATELY, when there is a threat to life or health as determined by individual good judgement, i.e. fire, hazardous chemical spill, dangerous gas leak, severe weather (i.e., tornado); or when notified by other site / facility staff and local fire or police officials.

If an evacuation is called for, the emergency alarm system for weather-related, medical, fire and other evacuation emergencies is:

Evacuation from the Exclusion Zone should whenever possible occur through the decontamination line. In those situations where egress in this manner cannot occur, the following emergency escape routes have been designated (document on map if possible):

____

____

Once evacuated off site, all staff should gather at mobile field office which is a minimum of 250 feet away from the incident

(B) FIRE OR EXPLOSION

Upon discovery of a fire or an explosion, the above-designated emergency signal shall be sounded and all personnel shall assemble at the decontamination line. The fire department is to be notified and all personnel moved to a safe distance (minimum 250') from the involved area.

If a person's clothing should catch fire, burning clothing may be extinguished by having the individual drop to the floor and roll. If necessary, physically restrain the person and roll them around on the floor to smother the flames. Use a fire blanket or extinguisher if one is readily available and you have been trained in its use. Call emergency medical services if not already done so.

If a person's clothing should become saturated with a chemical, douse the individual with water from the nearest safety shower if available. Consult the chemical Material Safety Data Sheets (MSDSs) for further information. Call emergency medical services if indicated by the MSDSs.

NEVER RE-ENTER THE SITE / FACILITY until the emergency has been declared over and permission to re-enter has been given by site / facility health and safety staff or local fire or police officials. If any staff is unaccounted for, notify an individual in charge.

(C) MEDICAL EMERGENCY

If you discover a medical emergency and are by yourself, CALL OUT FOR HELP. When someone arrives, tell them to call for help. If no one comes or you know you are alone, provide whatever care you can for 1 minute, then make the call yourself. (See Section 2)

Upon notification of an injury in the Exclusion Zone, the designated emergency signal shall be sounded. All site personnel shall assemble at the decontamination line. The SSO or alternate should evaluate the nature of the injury, and the affected person should be decontaminated to the extent possible prior to movement to the Support Zone. The onsite CPR/FA personnel shall initiate the appropriate first aid, and contact should be made for an ambulance (and other emergency services as needed) and with the designated medical facility (if required). No persons shall reenter the Exclusion Zone until the cause of the injury or symptoms is determined.

The hospital is 20 minutes from the site. Ambulance response time is 5 minutes. ________________ of ____________________ was contacted on ____________ and briefed on the situation, the potential hazards, and the substances involved. When IDLH conditions exist, arrangements should be made for onsite standby of emergency services.

A map for directions to the nearest hospital is attached to this plan. If not, the directions are: ________________

____

(D) SAFETY EQUIPMENT FAILURE

If any other equipment (i.e., air monitoring) on site fails to operate properly, the FTL and/or SSO shall be notified to determine the effect of this failure on continuing operations on site. If the failure affects the safety of personnel or prevents completion of the Work Plan tasks, all personnel shall leave the work area until the situation is evaluated and appropriate actions taken.

(E) FOLLOW UP

In all situations, when an on site / facility emergency results in evacuation of the work area, or a "large spill" has occurred, staff shall not resume work until:

- The conditions resulting in the emergency have been corrected;
- The hazards reassessed by the SSO and Corporate Health and Safety;
- The HASP has been reviewed by the SSO and Corporate Health and Safety; and
- Site personnel have been briefed on any changes in the HASP by the SSO.

SECTION 17: SPILL CONTAINMENT / CONTROL ☒ THIS SECTION NOT APPLICABLE TO SITE ACTIVITIES

For most chemicals introduced to the worksite, or under control of Malcolm Pirnie employees, spills of chemicals would be considered incidental and would be controlled in the immediate area of the spill. Such spills shall be handled utilizing precautions appropriate for the chemical characteristics specified in the MSDS for the chemical including spill control methods and selection and use of minimum personal protective equipment.

For chemicals introduced to the worksite, or under control of Malcolm Pirnie employees, that would cause a ″large spill″ (greater than 55 gallons), a copy of the appropriate Emergency Response Guidebook (ERG) guide shall be attached to this plan, and a spill response contractor shall be identified in Section 2.

SECTION 18: EMPLOYEE ACKNOWLEDGEMENTS

PLAN REVIEWED BY:		DATE
Project Manager:	Glenn Hoeger	
Project Leader:	Garett Ferguson	
Local H&S Coordinator:	Allen Nash	
Corporate H & S	Mark McGowan	

I acknowledge that I have read the information on this HASP, attached Material Safety Data Sheets (MSDSs), DOT Emergency Response Guides, and Health and Safety Programs.
I understand the site / facility hazards as described and agree to comply with the contents of the plan.

EMPLOYEE (Print Name)

VISITOR (Print Name)

ATTACHED DOCUMENTS

- ☐ MSDS(s)
- ☐ Hazard Communication Written Program
- ☐ Confined Space Entry Written Program
- ☐ DOT ERG Guides
- ☒ Site Map
- ☐ Personal Protective Equipment Written Program
- ☐ Excavation Safety Plan
- ☐ Respiratory Protection Program
- ☒ Hospital Directions
- ☐ Emergency Action Plan
- ☐ Evacuation Routes
- ☐ Cartridge Change Out Calculations
- ☒ Other

Appendix B

Field Sampling Plan

U.S. ARMY CORPS OF ENGINEERS
FORT WORTH DISTRICT

DRAFT FIELD SAMPLING PLAN

FIVE POINTS OUTLYING FIELD
TARRANT COUNTY, TEXAS

November 2004

Five Points Outlying Field

Sampling and Analysis Plan

Table of Contents

TABLES

ACRONYMS LIST

ASTM	American Society for Testing and Materials
BGS (bgs)	Below Ground Surface
CEHNC	Corps of Engineers Huntsville Engineering and Support Center
CEMVS	Corps of Engineers St. Louis District
CERCLA	Comprehensive Environmental Response Compensation & Liability Act
CESWF	Corps of Engineers Fort Worth District
CESWT	Corps of Engineers Tulsa District
COC	Chain of Custody
DoD	(United States) Department of Defense
DOE	(United States) Department of Energy
DOT	(United States) Department of Transportation
DQCR	Daily Quality Control Report
DQOs	Data Quality Objectives
EE/CA	Engineering Evaluation/Cost Analysis
EM	Engineer Manual
EP	Engineer Pamphlet
EPA	(United States) Environmental Protection Agency
ER	Engineer Regulation
FSP	Field Sampling Plan
FT. (ft.)	Feet
FUDS	Formerly Used Defense Sites
GSA	General Services Administration
GPS	Global Positioning System
HTRW	Hazardous, Toxic, and Radiological Waste
HTW	Hazardous and Toxic Waste
IDM	Investigative Derived Material
MC	Munitions Constituents
MEC	Munitions and Explosives of Concern
NAS	Naval Air Station
NPL	National Priorities List

NWS	National Weather Service
PCLs	Protective Concentration Levels
PDA	Personal Digital Assistant
PPE	Personal Protective Equipment
QA	Quality Assurance
QC	Quality Control
RCRA	Resource Conservation and Recovery Act
SAP	Sampling and Analysis Plan
SARA	Superfund Amendments and Reauthorization Act
SQ. FT. (sq. ft.)	Square Feet
TCEQ	Texas Commission on Environmental Quality
TNRCC	Texas Natural Resources Conservation Commission (now TCEQ)
TNT	Trinitrotoluene
TPP	Technical Project Planning
USACE	United States Army Corps of Engineers
USFWS	United States Fish and Wildlife Service
UXO	Unexploded Ordnance
WP	White Phosphorus

1.0 INTRODUCTION

The purpose of this field activity is to remove all remaining Munitions and Explosives of Concern (MEC) from the originating from prior Department of Defense (DoD) activities contributing to potential environmental contamination of surface and/or subsurface soils at the site. In order to help make this determination, data regarding presence, absence, and/or concentration levels of chemicals of concern [namely, Lead (Pb), Zinc (Zn), White Phosphorus (WP), Tetryl, and Trinitrotoluene (TNT) along with its related transformation compounds] are needed. This document describes the approach for soil sampling and analytical testing strategy that will be used to gather the required data.

1.1 PROJECT BACKGROUND

The former Five Points Outlying Field (Five Points OLF) is a Formerly Used Defense Site (FUDS) and since the FUDS program was created under the Superfund Amendments and Reauthorization Act (SARA) Act, this project is undertaken as a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) action. [The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended by the Superfund Amendments and Reauthorization Act (SARA), incorporates into the law the CERCLA compliance policy. Although the site during this investigation is not a CERCLA Superfund project or on the National Priority List (NPL), all investigation and reporting will meet CERCLA standards.]

The 162.06-acre site known as the former Five Points OLF is located at the corner of Harris Road and Matlock Road, Arlington, Tarrant County, Texas, at 32 ° 37’ 26” latitude and 97 °07’ 25” longitude. A 35-acre portion of the former Five Points OLF was developed in the 1980s as a mobile home park under the name of Twin Parks Estates. The remainder of the original 162.06-acre tract used by the Department of Defense (DoD) is currently being developed as a new home subdivision known as Southridge or South Ridge Hills.

1.2 SITE HISTORY[1]

The U.S. Government acquired 162.06 fee acres in 1940 as an outlying field for the Dallas Naval Air Station (Dallas NAS) at Grand Prairie, Texas. The property was developed and designated Five Points Outlying Field. Personnel from the Dallas NAS used Five Points OLF for practice landings and takeoffs. The site was later used as a practice bombing range. Improvements constructed at the site included a practice landing field, a target bulls-eye consisting of two concentric rings, and a boundary fence. Explosive ordnance use on this site was limited to MK 23 miniature Navy practice bombs, M38A2 Practice Bombs, and an unknown version of the M47 series bomb. During World War II, M47 bomb casings filled only with sand or water were used as practice bombs when M38A2 Practice Bombs were not available. In addition, M47 series chemical bombs could have been filled with white phosphorus (a smoke producing agent), or powdered rust (a staining agent) to visually mark where bombs struck the ground. The Navy declared the 162.06 acres of Five Points OLF to be excess at an undetermined date and transferred the property to the General Services Administration (GSA) for disposal. The GSA conveyed all 162.06 acres of the former range to Gordon and Pope Supply Company in July 1956. The GSA deed recommended that 17.5 acres of the former range be restricted to surface use only and stated that ordnance may be present anywhere on the property.

[1]This information was extracted from the "Five Points Outlying Field, *Archives Search Report*" as prepared by the US Army Corps of Engineers, St. Louis District (CEMVS), February 2002.

1.3 PRIOR ACTIVITIES[1]

Twin Parks Estates mobile home park construction commenced on a thirty-five acre portion of the former Five Points OLF on 1 September 1983. In November 1983, construction was halted when a subsurface bomb was discovered during a city inspection. The Twin Parks Estates partnership hired a contractor to clear the site of ordnance. Approximately three thousand bombs were removed from the thirty-five acre site. Ordnance was found as deep as six feet, which may indicate that ordnance found during previous sweeps may have been buried in place.

Personnel from the Corps of Engineers Huntsville Engineering and Support Center (CEHNC) visited the area in February 1998 to address some concern that pertained to the remaining 127 acres of the former practice bombing range. The acreage at that time was undeveloped, but contained Mesquite trees, tall weeds, and grass. The CEHNC conducted a visual and magnetometer survey of the area without any intrusive investigations. Personnel located metal scrap on the surface, but none relating to any unexploded ordnance. Numerous subsurface metallic anomalies were detected, with the majority of them near the former target center (with decreasing detection as the team moved away from the center). It was concluded that potential still exists for subsurface practice bombs (USACE 1998).

In January 2000, the St. Louis District (CEMVS) conducted an ordnance site visit to the former Five Points Outlying Field. Construction workers at the site were able to identify areas where practice bombs had previously been found. Two miniature Navy practice bombs were inspected and were found to have been expended. Open areas of the site were walked and no additional bombs were found. Construction workers indicated that practice bombs would be uncovered occasionally when they were digging. Much of the area had been re-graded for a new housing subdivision, Southridge/South Ridge Hills, which was/is being developed at the site. No surface indications of ordnance burials were found.

In November 2002, field work was conducted at the former Five Points OLF by Malcolm Pirnie. Prior to the start of field activities, soils in two major regions within the former Five Points OLF were identified as being affected from prior practice bombing operations, and therefore had the highest probability of containing the MC (lead, zinc, white phosphorus, tetryl, and TNT and its associated degradation products). These regions, the center of the former bombing target area and the original surface water drainage areas, were the focus of the sampling effort. Sampling sites were selected based on these highest probability regions. Additionally, some residents within the South Ridge Hills development requested that sampling be performed on their property, either due to suspected health problems, or from a desire to have the property tested in the event it was not initially selected as a sampling site.

In total, 96 sampling sites and 144 sampling locations within the Five Points OLF boundaries were selected for soil sample collection. Of the 96 sampling sites, 59 were located within the boundaries of the former bombing center, 39 were located within the drainage area and two were located in other locations outside of the high probability areas. The comprehensive sampling procedures for the Five Points OLF site investigation are outlined in Sampling and Analysis Plan (SAP) presented in the Site Investigation Work Plan (Malcolm Pirnie, 2002). Results of the investigation are detailed in the Site Investigation Report (Malcolm Pirnie, 2003).

1.4 DEFINITIONS OF PROBLEMS

The USACE has contracted the removal of MEC items at the former Five Points OLF. The purpose of this project is to collect confirmation samples to provide analytical data supporting successful removal of MEC items and associated MC in surrounding soil.

2.0 PROJECT ORGANIZATION AND RESPONSIBLITIES

The USACE regional team resources that are primarily involved with this proposed preliminary investigation and their respective responsibilities are listed below:

Organization	Responsibility
U.S. Army Corps of Engineers, Fort Worth District (CESWF)	* Overall project management * Right-of-entry permits * Point-of-contact for public and regulatory communications * Conducts all field activities * Analytical services laboratories * Data analyses and interpretation * Develop all reports

U.S. Army Corps of Engineers, Huntsville (AL) District (CEHNC)	* Munitions and Explosives of Concern (MEC) support
U.S. Army Corps of Engineers, Tulsa District (CESWT)	* Develop Sampling and Analysis Plan (SAP)

Key personnel for the former Five Points OLF preliminary investigation are summarized below:

Organization	**Key Personnel**	**Responsibility**
CESWF	Dewayne Ford	Project Manager
	Eric Kirwan	Field Investigations
CEHNC	Bill Sargent	Technical Assistance (MEC)

The organizational structure and responsibility of project personnel are designed to provide project control and quality assurance for the field activities at the site. CESWF will oversee contractors used for field activities.

3.0 SCOPE AND OBJECTIVES

As part of the Engineering Evaluation/Cost Analysis (EE/CA) for this project, a UXO removal contractor for the U. S. Army Corps of Engineers (USACE), Fort Worth District (CESWF) will identify and remove ordnance and explosives hazards that may be related to earlier Department of Defense (DoD) activities at the site. Malcolm Pirnie will collect and manage confirmation soil samples following excavation and removal of MEC items. Malcolm Pirnie will send confirmation soil samples will be sent to E-Labs in Houston, Texas for analysis of metals and explosives, while soil samples collected for analysis of white phosphorus will be sent to the USACE Waterways Experimentation Station (WES) in Vicksburg, Mississippi.

3.1 TASK DESCRIPTION

This document describes how the USACE will perform confirmation sampling and analysis activities to document successful removal of MEC from environmental media on properties at the site. These activities include identification of subsurface abnormalities, excavation and identification of MEC items, and removal of any MEC item identified and confirmation sample collection. The surface exposure-route scenario is the primary area of consideration for this phase of the project since it is the most likely area for contamination to have occurred. Analytical results will be compared to Texas Commission on Environmental Quality (TCEQ) Tier 1 Residential Soil Protective Concentration Levels (PCLs). Also, analytical results for white phosphorus, TNT (and its related transformation products), and Tetryl will be compared to detection limits to evaluate sample location with regards to presence or absence criteria. Any results that exceed PCLs may result in analysis of all samples collected.

3.2 PROJECT SCHEDULE

Field surveys by the UXO removal contractor should be completed during the Second week of November 2004. MEC removal is scheduled to begin approximately the third week of November 2004 and conclude in approximately 6 months.

4.0 NONMEASURMENT DATA AQUISITION

4.1 CLIMATIC DATA[1]

The nearest source of long-record climatological data for this site is the Dallas-Fort Worth National Weather Service (NWS) office. This office is located approximately 15 miles north - northeast of Five Points OLF. Climatological data recorded at this office during the period 1948 – 1995 is given in Table 4.1. The Dallas-Fort Worth climate is humid subtropical with hot summers. It is also continental, characterized by a wide annual temperature range. Precipitation also varies considerably, ranging from less than 20 inches to more than 50 inches annually.

Throughout the year, rainfall occurs more frequently during the night. Usually, periods of rainy weather last for only a day or two, followed by several days with fair skies. A large part of the annual precipitation results from thunderstorm activity, with occasional heavy rainfall over brief periods of time. Thunderstorms occur throughout the year, but are most frequent in the spring. Hail falls on about two or three days a year, ordinarily with only slight and scattered damage. Windstorms occurring during thunderstorm activity are sometimes destructive. Wind gusts for the area have reached a maximum of 72 knots, whereas the average maximum wind speed is 61 knots.

The highest temperatures of summer are associated with fair skies, westerly winds and low humidities. Characteristically, hot spells in summer are broken into three-to-five day periods by thunderstorm activity. There are only a few nights each summer when the low temperature exceeds 80 degrees Fahrenheit. Summer daytime temperatures frequently exceed 100 degrees Fahrenheit. Winters are mild, but northers occur about three times each month and often are accompanied by sudden drops in temperature. Periods of extreme cold that occasionally occur are short-lived, so that even in January, mild weather occurs frequently. Snowfall is rare, with an average annual precipitation of 18 inches occurring mainly during the months of January and February. The average length of the warm season (freeze-free period) in the Dallas-Fort Worth Metroplex is about 249 days. The average last occurrence of 32 degrees Fahrenheit or below is in mid-March and the average first occurrence of 32 degrees Fahrenheit or below is in late November. During the period 1948 – 1995 at the Dallas-Fort Worth NWS office, the daily temperature extremes include a minimum of -1 degree Fahrenheit (in December 1989) and a maximum of 113 degrees Fahrenheit (in June 1980).

TABLE 4-1
CLIMATOLOGICAL DATA RECORDED AT THE
DALLAS-FT. WORTH, TEXAS, NATIONAL WEATHER SERVICE OFFICE

Month	Temperature		Precipitation	Wind	
	Average Minimum (°F)	Average Maximum (°F)	Average (Inches)	Average Speed (Knots)	Average Direction
January	34	54	1.9	11	S
February	38	60	2.2	11	S
March	45	68	2.6	13	S
April	55	76	3.8	13	S
May	63	83	5.0	12	S
June	71	92	2.9	11	S
July	75	96	2.2	10	S
August	74	96	2.0	9	S
September	67	88	3.0	10	S
October	56	79	3.5	10	S
November	45	66	2.2	11	S
December	37	58	1.9	10	S
Average	55	76	33.3	11	S

Source: International Station Meteorological Climate Summary, September 1996. Jointly produced by: Fleet Numerical Meteorology and Oceanography Detachment, National Climatic Data Center, and USAFETAC OL-A.

4.2 GEOLOGY AND SOILS[1]

4.2.1. Geology and Physiology

The Five Points OLF site is located in the Osage Plains section of the Central Lowland province. Rocks of this section range from Cretaceous to Recent. The oldest strata are exposed in the western part of Tarrant County. Younger bedrock units are exposed in sequence toward the east. Alluvium and terrace deposits overlap the bedrock along streams and rivers.

The outstanding geologic event in the region was the encroachment of the Comanchean Sea. This early Cretaceous sea moved slowly from the Gulf of Mexico to cover all of

Texas. It extended northward to cover the Arbuckle Uplift (in Oklahoma) and then receded. After a period of exposure and erosion, sediments from this period were covered by the less extensive sea of the Gulfian Epoch.

Comanchean series rocks of the Cretaceous System are divided into three major divisions: the Trinity, the Fredericksburg, and the Washita Group. The Cretaceous System forms a southeastward-thickening wedge extending across the area into a structural feature known as the East Texas basin. Regional dip is east and southeast at rates of about 15 to 40 feet/mile (Nordstrom 1982).

4.2.2 Soils

The soils of the Five Points OLF site are a combination of clays and silty clays. [The Tarrant County site soils are primarily characterized as Heiden clay (Ressel, et al 1981).] The soils range from very shallow to deep in very short distances. The slope ranges from level to 30%. Since the site covers a large area and the soil series are relatively small and jumbled, there are a number of different soil types present in the site. For all the soils present, the risk of corrosion to uncoated steel is high and to concrete is low.

The shallow soils have a surface layer that can range from 5 to 12 inches deep. It consists of grayish-brown gravelly clay. Underlying this layer is platy or coarsely fractured limestone. These soils are well drained. The available water capacity is very low, permeability is moderately slow, and runoff is medium to rapid depending on the slope. The hazard of erosion due to water is slight to moderate.

The deep soils have profiles that differ greatly within small areas. The surface layer is generally about 12 inches thick. It is composed of dark grayish-brown stony clay or clay. The subsurface layer, to a depth of 25 inches, is very dark gray clay. The subsoil, to a depth of 40 inches, is dark gray, light olive brown or yellowish-brown clay and silty clay. The stratum and substratum, to 70 inches, is composed of brownish yellow silty clay, or grayish-brown clay that may be mottled with olive yellow in some small areas. The deep soils are well drained. The available water capacity is medium to high, permeability is very slow, surface runoff is medium, and the hazard of water erosion is moderate.

4.3 HYDROLOGY[1]

4.3.1 Ground Water

The Trinity Group of Cretaceous age is the largest and most prolific aquifer in study area. The aquifer consists of the Antlers, Paluxy, and Twin Mountains Formations. The Antlers is a coalescence of the Paluxy and Twin Mountains. The Trinity Group aquifer ranges in thickness from 100 feet in the outcrop area to about 1200 feet near the down dip limit of fresh to slightly saline water. Artesian storage coefficients range from 0.0001 to 0.00025 and specific yields range from 15 to 25 percent in the outcrop (Nordstrom 1982).

4.3.2 Surface Water

There are no major rivers or streams at this site. Runoff from this location drains to the southeast portion of the site into an intermittent section of Bowman Branch. This branch flows easterly, becoming perennial, and eventually empties into Walnut Creek approximately 3.5 miles east southeast of the site. From this point, the flow heads to the east-northeast for approximately three miles until draining into Mountain Creek, 1800 feet downstream of the John Penn Branch confluence. The flow then travels approximately five miles to the north-northeast before draining into Mountain Creek Lake.

4.4 ECOLOGY[1]

The information on the endangered and threatened species for this site has been provided by the U.S. Fish and Wildlife Service (USFWS) and the Texas Parks and Wildlife Department.

The USFWS reported that the following federally listed species occur in Tarrant County, Texas: whooping crane (Grus americana), endangered; bald eagle (Haliaeetus leucocephalus), threatened; least tern (Sterna antillarum), endangered.

The Texas Parks and Wildlife Department provided the inventory of state-listed species that are known to occur in Tarrant County; no additional information on the occurrence of rare or endangered species or natural communities is known at this time. This does not mean that other state or federally listed species may not be present within the areas of interest.

5.0 FIELD ACTIVITIES

The field activities discussed in this plan are part of efforts to determine the presence or absence of potential DoD associated environmental contamination at the site. This section of the SAP will detail the procedures for the performance of the related field tasks to be conducted at the site during this MEC removal procedure and soil sampling. Field activities can be modified in the field (as needed) to accommodate site conditions to facilitate implementation of SAP with approval from the Field Team Leader. This effort, as stated in Section 3.0, will primarily be to remove MEC hazards present due to the historical use of the site. Removal of MEC will be performed by a UXO removal contractor. Risk from MEC hazards is different from risk associated with environmental contaminants. Environmental contaminants generally present a threat to human health and the environment through repeated and accumulated exposures to contaminants above acceptable exposure limits. MEC hazards present a “hazard” of physical injury from explosion resulting from accidental or unintentional detonation.

5.1 SOIL SAMPLING

5.1.1 Rationale/Design

The approach for this phase of the project is to conduct sampling at the site to collect two grab samples from locations where MEC were removed. This sampling approach is designed to examine areas most likely to be potentially contaminated with MEC related to past DoD activities at the site. Up to 80 soil sample locations are anticipated. The sample locations will be determined by the location of the buried MEC, which will be established by the UXO removal contractor prior to mobilization to the field. Sample locations will be provided to the USACE and Malcolm Pirnie. All sample locations will be surveyed using appropriate technology (GPS and/or conventional methods) with prominent features also documented for future reference. Sample location will be provided with a specific identifier provided by the UXO removal contractor.

5.1.1.1 Laboratory Analysis

Samples will be analyzed at appropriate government approved off-site laboratories. Field and Quality Control (QC) samples will be analyzed at a primary laboratory and the Quality Assurance (QA) samples will be analyzed at a separate, independent QA laboratory selected by the USACE project chemist.

These environmental samples will be analyzed in accordance with the most recently promulgated methods from the EPA publication, SW-846, "Test methods for Evaluating Solid Waste", American Society for Testing and Materials (ASTM), Standard Methods, and/or any other equivalent method accepted by Texas or Federal Regulations. The laboratory analyses for this site will include tests for total lead and zinc by EPA SW-846 method 6010; White Phosphorus by EPA SW-846 method 7580; and Tetryl and TNT (includes transformation products) by EPA SW-846 method 8330. Equivalent methods may be used.

5.1.1.2 QA/QC and Equipment Rinseate Blank Samples

QA/QC split samples and equipment rinseate blanks will be analyzed to help determine analytical precision, comparability, and potential sample cross contamination. QA/QC and blank samples will be analyzed for the same tests as listed for samples in the above section.

Field, QA, and QC (triplicate split) sample aliquots will be analyzed at a frequency of one for every ten samples (10%). Equipment rinseate blanks will be analyzed at a frequency of one per batch of twenty samples (5%).

5.1.2 Field Procedures

Two grab samples will be collected from the soil directly beneath the ordnance item. Samples will be collected from up to 80 sample locations. This number could increase or decrease depending on the number of MEC excavated. Prior to sampling, the MEC will be removed by the UXO removal contractor. Samples will be collected in brass sleeves using a slide hammer, and end caps will fitted to the sleeves to ensure samples are undisturbed for analysis of white phosphorus. In the event that multiple ordnance items are found within 50 feet of one another, additional soil samples shall be collected at a rate of one sample per four ordnance items, following consultation with the USACE Project Manager. A clean pair of new, disposable gloves should be worn each time a different location is sampled and gloves should be donned immediately prior to sampling. Field personnel should take precautions to prevent cross contamination from sampling equipment. The sampling equipment should be properly decontaminated and inspected for visible sign of deterioration before each use. Vegetation/organic matter should be removed (when needed) to allow the soil locations to be sampled.

CESWF contractor, ATI, will execute the excavation activities.

5.2 SAMPLE CONTAINERS AND PRESREVATION TECHNIQUES

TABLE 5-3

METHODS, SAMPLE CONTAINERS, PRESERVATIVES, AND HOLDING TIMES FOR SOIL SAMPLES CHEMICAL ANALYSES

Analyte	Analytical Method	Sample Container[2]	Sample Preservation	Holding Time
White Phosphorus* (WP)	SW 7580	Sample sleeve sealed at both ends plastic end caps	Cool to 4°C Kept in dark	6 months
Lead/Zinc	SW 6010	Sample sleeve sealed at both ends plastic end caps	Cool to 4°C	6 months
Tetryl/TNT**	SW 8330		Cool to 4°C	14 days for extraction, 40 days for analysis

* Because white phosphorus will oxidize on contact with oxygen, care must be taken to limit contact of the sample with the atmosphere and to minimize any introduction of air into to the collected samples. Therefore, aqueous (i.e. equipment/rinseate blanks) samples should be poured gently into sample containers to minimize agitation that might drive off the volatile compound. If bubbling occurs while transferring the sample into the container, the sample should be discarded and another sample collected. If any air bubbles are present in the one-liter amber bottle, a new sample must be collected. Containers for soil samples should be filled as completely as possible to eliminate as much free space as practical. [2]Teflon

liners, in conjunction with sampling equipment, will be used to collect soil/sediment samples when practical.

**Includes the TNT transformation products and co-contaminants as listed on the standard analytes list for Method SW 8330.

5.3 EQUIPMENT DECONTAMINATION

All presterilized brass sleeves will be used at each new sampling location. Any non-dedicated or non-disposable sampling equipment used shall be decontaminated prior to use and between each (different) sample location. Sampling equipment requiring decontamination include the soil core sampler. Equipment will be decontaminated by scrubbing with a solution of potable water and Alconox or equivalent, rinsing with potable water, followed by rinsing with ASTM Type II grade water. All equipment will be allowed to air dry prior to reuse.

6.0 FIELD OPERATIONS DOCUMENTATIONS

During execution of field activities, the field teams will maintain various field book, reports, and logs. Additional details for these components are described below. Survey records of sample locations including the documentation of prominent site features will also be maintained. A log describing the soil encountered at the various sample locations throughout the site shall be maintained.

6.1 DAILY QUALITY CONTROL RREPORTS (DQCRs)

Daily quality control reports will be completed by the Field Team Leader, which Malcolm Pirnie is called to mobilize. The DQCR will list all of the personnel onsite that day, as well as summarize all activities that took place. The DQCRs are generated by Malcolm Pirnie and will be submitted to the USACE Field Team Leader or designated representative.

6.2 FIELD LOGBOOK AND/OR SAMPLE FIELD SHEETS

Field Team Leader will maintain daily field log in a bound notebook or personal digital assistant (PDA) that can be downloaded and bound into a notebook. In this log, the Field Team Leader will record the onsite activities in real time, including names of individuals onsite and sampling information, such as; sample locations, sample numbers, number of sample containers collected, soil description, etc. The recorded information should also include sample collection dates and times, sample collection depth, and any other applicable information. Soil samples shall be described according to the Unified Soil Classification System. Notes will be written on sequentially numbered pages with indelible ink. Corrections to log entries will be made by lining through incorrect entries with a single line and initialing and dating the strikeout. At the end of each day, any unused space at the bottom of the last page will be “crossed” out, initialed, and dated by the Field Team Leader. The log description shall be in accordance with EM 1110-1-4000.

6.3 PHOTOGRAPHIC RECORDS

A photographic record of pertinent field activities will be maintained by Field Team Leader to document the progress of project and to provide a record of it.

6.4 SAMPLE DOCUMENTATION

All sample information will be documented to allow for tracking of sampling and analytical activities. All sample documentation will be consistent with the procedures outlined in this section.

6.4.1 Sample Numbering System

All samples will be identified by nomenclature presented by UXO removal contractor on dig sheets and survey mapping.

6.4.2 Sample Labels

All sample labels used on sample containers will include, at a minimum, a sample identification number, the date of the sample, time it was collected, site name, analysis to be performed, analytical method, and preservation technique (if applicable). The label will adhere to the container and the writing on it will be indelible ink. The label will be secondarily affixed to the container with clear adhesive tape completely covering the label.

6.4.3 Chain-of-Custody Records

Each sample will be identified on a Chain-of-Custody (COC) record. Information recorded will include, at a minimum, sampler name(s), date and time of sample collection, identification code unique to each sample, number of containers with the same sample code, analyses requested for each sample, signature blocks for each individual who has custody for the samples. The method numbers for all requested analyses, the USACE contract number, project number, and the sample ID number will be included on the COC.

7.0 SAMPLE PACKING AND SHIPPING REQUIREMTENTS

Field and QC samples for zinc, lead, and explosives analyses collected during the field activities will be shipped via appropriate courier to the primary analytical laboratory (E-Labs). Field and QC samples for white phosphorus analysis will be shipped to the USACE WES in Vicksburg, Mississippi. Coolers of suitable strength for packaging and shipping of samples will be used and will be manifested to meet USDOT regulations. The bottom and sides of each cooler will be lined with bubble wrap or other cushioning material. Each sample sleeve will also be individually wrapped in a zip-lock type bag to prevent cross-contamination. Once samples are in the cooler, any voids will be filled with additional packaging material. Ice will be double-bagged in re-sealable bags and placed in cooler with the samples. A sufficient amount of ice will be added to coolers to ensure they arrive at the laboratory at a temperature of 4° Celsius or lower. The C-O-C record shall be placed in a watertight bag and taped to the inside lid of the cooler. The cooler shall be secured with strapping tape and custody seals will be affixed to the front and back seams (one in each area) of the cooler to prevent tampering. The custody seals will be covered with wide, clear adhesive tape.

QA samples for zinc, lead and explosives will be shipped to STL for analysis from random field sample selection for analytical work.

The white phosphorus QA samples contained within the sealed sample sleeves will be sent to the CRREL for analysis. The packaging and shipping procedures outlined above will be followed.

8.0 REFERENCES

Listed USACE Engineer (Manual or Regulation) publications meet or exceed standard industry practices and generally are consistent with the other national documents referenced. These USACE documents can be accessed at the following website address, http://www.usace.army.mil/inet/usace-docs.

Engineer Manual (EM) 200-1-3, Environmental Quality – *Requirements for the Preparation of Sampling and Analysis Plans, February 2001.*

EM 200-1-2, *Technical Project Planning (TPP) Process, August 1998.*

EM 200-1-6, Environmental Quality – *Chemical Quality Assurance for HTRW Projects, October 1997.*

Huntsville Engineering and Support Center, Defense Environmental Restoration Program for FUDS Ordnance and Explosives, *Archives Search Report for Five Points Outlying Field, Project No. KO6TX002801, February 2002.*

Texas Department of Water Resources, Report 269, *Occurrence, Availability, and Chemical Quality of Ground Water in the Cretaceous Aquifers of North-Central,* Nordstrom, Phillip L. (1982).

U.S. Department of Agriculture, Soil Conservation Service, *Soil Survey of Tarrant County, Texas.* Ressel, Dennis D.; Allen, Milton; Coffee, Daniel R.; Hill, Ralph H.; Holt, Thomas H.; Pauls, Edward W.; and Steptoe, Levi, Jr. (1981).

EPA/SW-846, *Test Methods for Evaluating Solid Waste – Physical/Chemical Methods, Update III, December 1996.*

Engineer Regulation (ER) 1110-1-263, *Chemical Data Quality Management for Hazardous, Toxic, Radioactive Waste (HTRW) Remedial Activities, April 1998.*

USACE, *Quality Management Plan for Environmental Projects for EPA Region 6, August 2001.*

EM 385-1-1, *Safety and Health Requirements Manual ENG Form 5044-R, September 1996.*

EM 1110-1-4000, *Engineering and Design – Monitoring Well Design, Installation, and Documentation at HTRW Sites, November 1998.*

Appendix C

Quality Assurance Project Plan

U.S. ARMY CORPS OF ENGINEERS
FORT WORTH DISTRICT

QUALITY ASSURANCE PROJECT PLAN

FIVE POINTS OUTLYING FIELD
TARRANT COUNTY, TEXAS

Prepared by: U. S. Army Corps of Engineers – Tulsa District
July 2002

Five Points Outlying Field

Quality Assurance Project Plan

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TABLES

ACRONYMS LIST

ASTM	American Society for Testing and Materials
BGS (bgs)	Below Ground Surface
CERCLA	Comprehensive Environmental Response Compensation & Liability Act
COC	Chain of Custody
COE	Corps of Engineers
DoD	(United States) Department of Defense
DOE	(United States) Department of Energy
DOT	(United States) Department of Transportation
DQCRs	Daily Quality Control Reports
DQIs	Data Quality Indicators
DQOs	Data Quality Objectives
EE/CA	Engineering Evaluation/Cost Analysis
EM	Engineer Manual
EPA	(United States) Environmental Protection Agency
ER	Engineer Regulation
FSP	Field Sampling Plan
FUDS	Formerly Used Defense Sites
GPS	Global Positioning System
HTRW	Hazardous, Toxic, and Radiological Waste
HTW	Hazardous and Toxic Waste
IDM	Investigative Derived Material
LCS	Laboratory Control Spike
LCSD	Laboratory Control Spike Duplicate
MC	Munitions Constituents
MDL	Method Detection Limit
MEC	Munitions and Explosives of Concern
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PDT	Project Delivery Team

PM	Project Manager
PPE	Personal Protective Equipment
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QA/QC	Quality Assurance/Quality Control
QC	Quality Control
RCRA	Resource Conservation and Recovery Act
RPD	Relative Percent Difference
SAP	Sampling and Analysis Plan
TBD	To Be Determined
TCEQ	Texas Commission on Environmental Quality
TNRCC	Texas Natural Resources Conservation Commission (now TCEQ)
TNT	Trinitrotoluene
TPP	Technical Project Planning
USACE	United States Army Corps of Engineers
UXO	Unexploded Ordnance
WP	White Phosphorus

1.0 INTRODUCTION

This Quality Assurance Project Plan (QAPP) has been prepared as part of the Sampling and Analysis Plan (SAP) in support of the subsurface soil sampling during UXO (Unexploded Ordnance) removal at the former Five Points Outlying Field OLF) site in Arlington, Tarrant County, Texas. The QAPP addresses quality assurance objectives for analytical laboratory data such as precision, accuracy, bias, completeness, representativeness, comparability, sensitivity, and appropriateness for the intended uses. The purpose of this QAPP is to document the environmental laboratory data quality assurance requirements applicable to field and related activities outlined in the Field Sampling Plan (FSP) for the project. The overall objective is to obtain technically valid and legally defensible environmental data that meets or exceeds the project's DQOs. This QAPP supplements the site specific Field Sampling Plan and provides guidance for field activities.

2.0 PROJECT ORGANIZATION AND RESPONSIBILITES

Overall project quality and consistency is the responsibility of all parties associated with the work. Project coordination will be via the collective efforts of the Project Delivery Team (PDT). The duties and responsibilities of key PDT personnel (reference FSP, Section 2.0) concerned with quality assurance for the project are described below:

Project Manager (Dewayne Ford, Wayne Elliot) – The Project Manager (PM) has primary responsibility for all activities on the project. He is responsible for planning, scheduling, cost control, overall quality parameters, implementation of the project Work Plan, etc. The PM provides leadership to the multidisciplined PDT and is responsible for assuring that the customer's interests are properly represented and serves as the primary contact between the customer and the USACE.

Field Team Leader (Tim Bohanan) – The Field Team Leader assists the PM and is responsible for implementation of field investigation activities and may include contractor selection and oversight (as applicable), coordination of analytical services, data review, associated documentation, etc.

Technical Team Leader (Greg Williams) – The Technical Team Leader assists the PM and Field Team Leader in all of the technical aspects of the project and is responsible for the preparation of the SAP.

Project Chemist (Roxanne Welch) – The Project Chemist has a responsibility to assure analytical data quality meets the project's data quality objectives (DQOs). She will determine the frequency of quality control/quality assurance duplicate sample sets for collection and analysis. She will work with Field Team Leader, Technical Team Leader, and/or Project Manager to ensure that DQOs have been established for the project, that they are met, and that they provide valid, useable data for the intended purpose.

Field QA/QC Officer (TBD) – The Field Quality Assurance/Quality Control (QA/QC) Officer works with the Project Manager and other project personnel. The Field QA/QC officer will be independent of the team that is generating the data. The Field QA/QC Officer is responsible for monitoring and verifying that the work is performed in accordance with the project's Sampling and Analysis Plan and other applicable procedures.

3.0 QUALITY ASSURANCE OBJECTIVES FOR DATA ASSESSMENT

Quality Assurance (QA) involves those planned and systematic actions necessary to provide adequate confidence that project activities will be performed satisfactorily and safely. The goal of QA is to assure that activities are planned and performed according to accepted standards and practices to ensure that resulting data are valid and retrievable. Quality Control (QC) is an integral part of the overall QA functions and is comprised of those actions necessary to control and verify that activities as well as resulting data meet established requirements. The objective of QA/QC is to assure that the uncertainty of the generated data is within an acceptable range that will allow proper evaluation of the Five Points OLF site through the collected data.

The data collected shall meet specific quality control (QC) Data Quality Indicators (DQIs) with respect to accuracy, precision, completeness, sensitivity, representatives, and comparability. The DQIs are presented below.

3.1 ACCURACY

Accuracy is the degree of agreement between an observed value and an accepted reference value. For a set of observed values, accuracy is dependent upon a combination of random error and systematic error.

3.2 BIAS

Bias refers to the systematic or persistent distortion of a measurement process that causes errors in one direction. Bias is a term that is related to, but not interchangeable with, accuracy.

The bias of an analytical procedure can be determined by the addition of a known amount of material to a field sample matrix or a standard matrix. The percent recovery (% R) of the spiked material is a measure of bias. %R is calculated as follows:

$$\% R = \frac{C_2 - C_1}{C_0} \times 100\%$$

where:

C_0 = amount of analyte added to the sample or standard matrix,
C_1 = amount of analyte present in the unspiked sample or standard matrix, and
C_2 = amount of analyte recovered from the spiked sample.

Bias will be measured for the chemical analyses by analyzing Matrix Spikes and Matrix Spike Duplicates (MS/MSDs), surrogate spikes, and Laboratory Control Spikes and Laboratory Spike Duplicates (LCS/LCSDs).

A Matrix Spike (MS) is an aliquot of a field sample spiked with a known concentration of target analytes. The sample is spiked during sample preparation and prior to analysis. A MS is performed to evaluate the accuracy and/or bias of a particular method on a specified matrix. A Matrix Spike Duplicate (MSD) is a duplicate split of the same field sample aliquot used for the MS and is spiked at the same concentration as the MS.

Surrogates are organic compounds similar in structure to the method target compounds but would not normally be found in environmental samples. Surrogates are analyzed to assess the ability of the method to successfully recover the specific non-target analytes from and actual matrix. All field samples and QC samples for organic analyses will be spiked with surrogates.

A Laboratory Control Spike (LCS) is a known matrix, such as laboratory-grade water or clean soil, spiked with representative target analytes. LCS measures accuracy and/or bias in performing a method without the variable of the sample matrix.

Acceptable ranges for percent recoveries (%R) for MS/MSDs, surrogate spikes, and LCS are given in Table 3-1.

3.3 PRESICION

Precision is the agreement among a set of replicate measurements. Precision values can show the degree of reproducibility in an analytical method and in sampling. Precision can be calculated as a relative percent difference (RPD). RPD is calculated as follows:

$$RPD = \frac{|C_2 - C_1|}{(C2 + C1)/2} \times 100\%$$

where:
C_1 = analyte concentration in the sample,
C_2 = analyte concentration in the sample replicate,
| | = absolute value (It is customary to express RPD as a positive number.)

Precision will be measured for the analyses performed using one or more of the following sample sub-sets to obtain an RPD: MS/MSDs, LCS/LCSDs, field duplicates, and/or laboratory duplicates.

The RPD between all target analytes in MS/MSD will be calculated to measure precision of a method in a given sample matrix.

A field duplicate is a field sample split that is generated in the field. A laboratory duplicate is a laboratory split of a field sample. Both field duplicate samples and/or laboratory duplicate samples can be utilized to measure precision. RPDs will be calculated to assess the precision of a method in a given sample matrix. Maximum acceptable RPDs for MS/MSDs, laboratory QC, and field duplicates are given in Table 3-1.

TABLE 3-1
QUALITY CONTROL LIMITS FOR ANALYSES

QC Check	Analyte	Percent Recovery (%R)		Relative Percent Difference (RPD)	
		Water	Soil	Water	Soil
MS/MSDs	Tetryl/TNT	50 – 140[2]	50 – 140[2]	50	50
	White Phosphorus	75 – 125	75 – 125	25	25
MS Surrogates	Lead/Zinc	75 – 125	75 – 125	--	--
	Tetryl/TNT	60 – 140[2]	50 – 150[2]	--	--
Laboratory Duplicates	Lead/Zinc	--	--	20[1]	20
LCS	White Phosphorus	75 – 125	75 – 125	--	--
	Tetryl/TNT	60 – 140[2]	50 – 150[2]	--	--
	Lead/Zinc	80 – 120	--	--	--
QC Duplicates (Field Duplicates)	White Phosphorus	--	--	25	25
	Tetryl/TNT	--	--	50	50
	Lead/Zinc	--	--	25	30

Notes: [1]Or ± quantitation limit if concentration <5x quantitation limit
[2]Due to tendency for Tetryl to decompose, an expanded criteria may be applied at 45% - 140% for both water and soil matrices.

3.4 REPRESENTATIVENESS

Representativeness expresses the degree to which sample data accurately and precisely represent actual site conditions. Representativeness is a qualitative parameter concerned with the proper design of the sampling program. The determination of the representativeness of the data will be performed by:

- Comparing actual sampling procedures and chain of custody (COC) forms to those described in the SAP.
- Identifying and eliminating non-representative data in site characterization activities.
- Evaluating holding times and condition of samples on arrival at the laboratory.
- Examining method blanks, calibration blanks, and equipment blanks for cross contamination.
- Calculating RPDs for QC duplicates (field duplicates).

The representativeness objective is to eliminate all non-representative data.

Maximum allowable values for blank contamination are given in Table 3-2.

A method blank is an analyte-free matrix to which all reagents are added in the same amounts as for sample processing. The method blank is carried through the complete sample preparation and analysis procedure. The method blank is used to assess contamination resulting from analysis.

A calibration blank is assessed for all analyses. In the metal analysis, for instance, a volume of reagent water is acidified with the same amount of acids as the standards and samples. The calibration blank is used to assess contamination resulting from analysis minus the sample preparation procedure (except for potential contamination in the acids).

TABLE 3-2
MAXIMUM ALLOWABLE BLANK CONTAMINATION (μg/L)

Analysis	Method Blanks	Instrument Blanks	Equipment/Rinseate Blanks
Tetryl/TNT	< 0.5 RL*	--	--
WP	< 0.5 RL*	--	--
Lead/Zinc	3	2	5

*RL is the Reporting Limit.

An equipment/rinseate blank is a field QC sample that is generated by passing analyte-free reagent water through soil or water sampling equipment (such as trowels, scoops, bailers, etc.) after it has been decontaminated between uses. An equipment blank is a QC check for contamination due to sampling and decontamination procedures.

3.5 COMPARABILITY

Comparability is a qualitative measure of the confidence with which one data set can be compared to another. Sample data should be comparable to other sample data for similar locations and conditions.

The comparability objective is for samples to be collected by the techniques specified, samples to be analyzed by the methods specified, and analytical results to be reported in units consistent with the method.

3.6 COMPLETENESS

Completeness is a measure of the amount of valid data obtained compared to the total number of measurements planned. Completeness shall be evaluated qualitatively and quantitatively. The qualitative evaluation of completeness shall be determined as a function of all events contributing to the sampling event. This includes items such as samples arriving at the laboratory intact, properly preserved, and in sufficient quantity to perform the requested analyses.

The quantitative description of completeness shall be defined as the percentage of QC parameters that are acceptable. QC parameters that shall be assessed for quantitative determinations of completeness shall include initial calibrations, continuing calibrations, surrogate percent recoveries (of organic analyses), field sample and laboratory duplicate RPDs, MS/MSD percent recoveries and RPDs, LCS percent recoveries, and holding times. The quantitative assessment of completeness shall be calculated for each analytical method as:

$$\text{Completeness} = (S/R) * 100$$

where:

S = Number of acceptable sample results.
R = Number of requested sample results.

The completeness goal for sample holding times is 100 percent; for all other QC parameter, the goal is 90 percent. If completeness is less than 90 percent, problems in the sampling or analytical procedures should be examined and possible solutions explored.

3.7 SENSITIVITY

Sensitivity is defined as the ability of the analytical method to achieve a required limit, such as a detection limit (DL), reporting limit (RL), method detection limit (MDL), etc. If project critical limits are needed, laboratories should be made aware of the required limits before samples are sent for analysis to insure that the limits will be met.

3.8 LABORATORY QUANTITATION OBJECTIVES

Laboratory quantitation limits for all analytes are given in Tables 3-3. These laboratory quantitation limits were set to meet the project DQOs. The laboratory quantitation limits were set as low as possible to obtain an accurate comparison with the established criteria for the project. The laboratory may report results that are below the laboratory quantitation limit, but above the method detection limit (MDL), as estimated or "J" flagged values.

TABLE 3-3

LABORATORY QUANTITATION LIMITS FOR OTHER ANALYTES

Analyte	Quantitation Limits[1]	
	Soil[2] (mg/kg)	Water (µg/L)
Tetryl	10	50
TNT	1	5
White Phosphorus	0.2	0.1
Lead	10	5
Zinc	10	100

Notes: [1]Quantitation limits may be adjusted if dilution is necessary.
[2]The moisture content of the samples must be used to adjust the quantitation limits appropriately.

4.0 DATA QUALITY OBJECTIVES

Data quality objectives (DQOs) are qualitative and/or quantitative statements regarding the quality of data needed to support project activities. They clarify study objectives, define the appropriate types of data, specify decision rules, specify the tolerable levels of potential decision errors, and define a defensible sample design that support the decision-making process. In order to develop site-specific DQOs, the intended use of the data must be defined. Different intended uses of data require different levels of analytical and sampling certainty. This use must be balanced between data quality needs and time, as well as cost constraints.

The Technical Project Planning (TPP) process is a USACE tool used to produce DQOs that help manage the uncertainty associated with the project. The TPP process supported efforts to prepare project specific DQO statements that meet the definition of a DQO as provided in EPA's 7-Step DQO process.

All acceptable laboratory analysis data will meet the established criteria for the project in order to identify and determine if potential hazardous constituents are above the established action levels. These data will help decide and recommend further actions plans for the site.

4.1 PROBLEM STATEMENT

The scope of this project is to perform a preliminary investigation, under the CERCLA regulatory framework, to determine the presence or absence of environmental contamination from previous DoD activities at the site.

Historically, the Five Points OLF site was used as a practice bombing range. Potential munitions constituents (MC) based on earlier DoD activities include lead, zinc, white phosphorus, tetryl, and TNT (and associated transformation products). Sampling performed in November 2002 indicated that these compounds were not present in amounts exceeding TRRP Tier 1 residential Soil Protective Concentration Levels. Data from sampling points located in the excavation areas of munitions and explosives of concern (MEC) are needed to determine whether concentration levels of these compounds are contributors to potential environmental contamination at the site.

4.2 PROJECT OBJECTIVES

The objective of this preliminary investigation is to determine whether there has been a release of MC to the environment at the site. The investigation will characterize the subsurface surface soil beneath the excavated MEC to accomplish this. The evaluation of current site conditions will be assessed by comparison of analytical data to Texas Commission on Environmental Quality (TCEQ) Tier 1 Residential Soil Protective Concentration Levels (PCLs). Also, analytical results for WP, TNT (and its related transformation products), and Tetryl will be compared to detection limits to facilitate presence or absence determinations. The analytes of concern are limited to those that might be a result of this site's historical use as a practice bombing target and a practice landing field. Which, as stated in above section, includes:

- White Phosphorus (WP)
- Tetryl and Trinitrotoluene (TNT)
- Lead and Zinc

Implementation of field sampling activities will include:

- Two grab samples from the soil directly beneath the ordnance item at up to an estimated 80 locations.

All analytical chemistry data will be validated as outlined in Section 7.2. As part of efforts to manage/minimize potential analytical measurement errors, USACE validated laboratories will be used. USACE validated laboratories ensure standard operating procedures are in place, State and EPA QA/QC protocols are followed, and current method technologies are used. Soil samples that will be analyzed for explosives (EPA

Method 8330) will be extracted and analyzed within the 14-day holding time. Chemical analysis of lead and zinc (EPA Method 6010) and analyses of white phosphorus (EPA Method 7580) will be performed on three randomly selected samples. Malcolm Pirnie shall assume that no detections of MC will exceed Texas Risk Reduction Program (TRRP) Tier 1 Residential Soil Protective Concentration Levels (PCLs). Once analytical results are verified, an additional eight samples will be randomly selected for analysis. Samples collected for lead/zinc and explosives analyses shall be submitted to the primary laboratory for storage; a randomly selected QA sample, selected from the eight locations identified prior to sample collection, will shipped from the primary laboratory to the QA analytical laboratory for analysis. Samples collected for white phosphorus analysis and selected will be submitted to the USACE Waterways Experimentation Station (WES) in Vicksburg, Mississippi.

5.0 SAMPLE RECEIPT, HANDLING, CUSTODY, AND HOLDING TIME REQUIREMENTS

5.1 SAMPLE RECEIPT

Upon receipt of the sample coolers at the appropriate laboratory, the laboratory will check the following items:

- The cooler will be checked for damage or leakage and the custody seals will be verified to be intact.
- Contents of cooler will be compared with COC to verify that all sample IDs and requested analyses match and that no samples are missing.
- Bottles will be inspected for breakage or leakage, and the field personnel will be notified immediately if breakage or leakage occurs.
- The temperature of the sample will be measured and recorded on the COC form.
- The pH of water samples for metals analysis will be measured (to verify pH is less than 2) and recorded.
- Any problems (i.e., discrepancies between cooler contents and COC forms, damaged samples, etc.) will be noted in the "Remarks" section of the COC and/or on the cooler receipt form..
- The date, time, and signature should be recorded on the COC form acknowledging the condition and receipt of samples.

5.2 SAMPLE HANDLING

All sample containers for chemical analysis will be placed in ice-filled coolers immediately following collection, and kept at 4 degrees Celsius prior to and during shipment. All samples collected will remain in the possession of the sampling crew until shipment. Locked vehicles or trailers will be used for interim storage as necessary. If coolers (used for sample storage) must be left unattended for extended periods of time, signed custody seals will be placed on the coolers.

To minimize bottle breakage and provide adequate temperature during shipment, sample bottles will be prepared and packaged according to the following procedures:

- Waterproof metal or rigid plastic ice chests or coolers will be used as vehicles of sample shipment.
- Bubble-wrap foam, or other inert packing material will be placed on the floor of the cooler.
- Bottles will be enclosed in a sealed plastic bag.
- Bottles will be placed upright in the cooler so that they do not touch and will not touch during shipment.
- Bags of ice will be placed around, among, and on top of the sample bottles.
- The cooler will be filled with packing material to minimize potential bottle breakage during shipment, but not thermally insulate the bottles from the ice.
- The ice in the cooler will be contained in sealed polyethylene bags to prevent leakage.

The following steps will be followed on the shipment of all environmental samples:

- The completed COC form will be placed into a Ziploc bag, sealed, and taped to the inside cover of the corresponding cooler.
- The drain of the cooler will be taped shut.
- The cooler lid will be secured by wrapping the cooler with strapping tape at a minimum of two different locations without covering labels.
- The completed shipping label will be attached to the top of the cooler.
- The signed custody seal will be affixed upon the front right and back left of each cooler/lid interface and covered with clear packing tape.
- No precautionary notices are required on the package exterior since samples to be collected during this project are "environmental samples."

Refer to Section 7.0 of FSP for consistency.

5.3 SAMPLE CUSTODY

COC forms are used to record the possession and handling of samples from the time of collection through analysis. For each transfer of the sample custody, the sample custodian will record the date and time and sign the COC form. The field sample custodian will retain a copy (either carbon or photocopy) of the COC form. For sample packages sent by common carrier to the laboratory, the bill of lading will be retained as a part of the permanent COC documentation.

The COC form will include the following information:

- Project description (e.g., project name, project number, project location, etc.)
- Laboratory name

- Sample identification number
- Sample type (i.e., soil, water, etc.)
- Sample collection date
- Analysis requested
- Type and number of sample containers
- Preservative method
- Signature of sample custodian and date and time for each transfer of sample custody

Refer to FSP, Section 6.4.3 for consistency.

5.4 SAMPLE HOLDING TIME REQUIREMENTS

METHODS, SAMPLE CONTAINERS, PRESERVATIVES, AND HOLDING TIMES FOR CHEMICAL ANALYSES – SOILS

Analyte	Analytical Method	Sample Container[2]	Sample Preservation	Holding Time
White Phosphorus* (WP)	SW 7580	Sample tube sealed at both ends with wax and wrapped in black plastic	Cool to 4°C Kept in dark	6 months
Lead/Zinc	SW 6010	One 16-ounce jar for lead, zinc and TNT/Tetryl	Cool to 4°C	6 months
Tetryl/TNT**	SW 8330		Cool to 4°C	14 days for extraction, 40 days for analysis

* Because white phosphorus will oxidize on contact with oxygen, care must be taken to limit contact of the sample with the atmosphere and to minimize any introduction of air into to the collected samples. Therefore, aqueous (i.e. equipment/rinseate blanks) samples should be poured gently into sample containers to minimize agitation that might drive off the volatile compound. If bubbling occurs while transferring the sample into the container, the sample should be discarded and another sample collected. If any air bubbles are present in the one-liter amber bottle, a new sample must be collected. Containers for soil samples should be filled as completely as possible to eliminate as much free space as practical. [2]Teflon liners, in conjunction with sampling equipment, will be used to collect soil/sediment samples when practical.

**Includes the TNT transformation products and co-contaminants as listed on the standard analytes list for Method SW 8330.

6.0 DATA REDUCTION, REVIEW AND ASSESSMENT

6.1 DATA REDUCTION

Data reduction procedures are specified in the USACE EM 200-1-3, Appendix I, "Shell for Analytical Chemistry Requirements" and the EPA SW-846 method for each analysis.

6.2 DATA REVIEW AND ASSESSMENT

Malcolm Pirnie will perform a data review on all field, QA, and QC sample analytical data generated. Review will be performed according to standard USACE protocols (ER 1110-1-263, EM 200-1-6, EM 200-1-1, etc.) and guidance contained in the US EPA's National Functional Guidelines for Organic Data Review and National Functional Guidelines for Inorganic Data Review.

7.0 LABORATORY OPERATIONS DOCUMENTATION

7.1 LABORATORY REPORTS

The laboratory reports will include, at a minimum, information for a definitive data package. The definitive data package format allows for the review of the data by an independent organization. However, these data package does not allow for complete independent reconstruction of the analytical data. The information in the following sub-sections is representative of but not limited to, information required in a definitive data package. All of the laboratory data should also be retained in project files by the laboratories and made available upon request.

7.1.1 Sample Identification (ID)

A table that matches field, QC, and QA IDs to the laboratory IDs will be prepared. It will identify all field duplicates and blanks.

7.1.2 Sample Receipt and Chain of Custody (COC)

COC forms and cooler receipt forms will be included in all laboratory reports. A cooler receipt form notes problems encountered in sample packaging, COC, and sample preservation.

7.1.3 Case Narrative

A case narrative will be written which identifies any problems encountered during sample analysis, including sample preservation, holding times, calibrations, and QA/QC results outside of criteria, etc. Deviations of any calibration standards or QC sample results from appropriate acceptance limits should be noted and associated corrective actions taken by the laboratory should be discussed.

7.1.4 General Organic and Inorganic Reporting

The following information will be provided for field sample results for a particular method:

- All analytes for each sample reported as a detected concentration or less than the limit of quantitation.
- All samples with spike %Rs outside of control limits due to matrix interference will be noted.
- All soil sample results will be reported on a dry weight basis. Percent moisture will also be reported.
- All dilution factors.
- All extraction dates.
- All analysis dates.

7.1.5 Internal Quality Control Reporting

Internal quality control samples will be reported for each analytical batch or sample delivery group. Internal quality control samples will be reported as described below:

- Laboratory blanks (method blanks and instrument blanks) – Results for all analytes tested will be reported for each blank. All non-blank sample results will be designated as corresponding to a particular laboratory blank.
- Surrogate spikes – Surrogate spike %Rs will be reported for all organic methods that require surrogate spiking. The spike control limits and the spiking concentration will be specified. If surrogate %Rs are out of control limits, the sample will be reanalyzed, and both sets of results will be reported. The data will be flagged if the reanalysis was not performed.
- MS – MS %Rs will be reported for all analyses. All field sample results will be designated as corresponding to a particular MS sample. The sample that was spiked will be indicated. MS %R control limits will also be specified.
- Laboratory duplicates or MSDs - %Rs and RPDs will be reported for all spiked samples and duplicate pairs. Control limits for %Rs and RPDs will also be reported.
- LCS – LCS results and specified control limits will be reported.

7.1.6 Field Duplicates and Blanks

- Field duplicates – Field duplicate pairs will be identified. RPDs will be reported for all field duplicate pairs.
- Equipment blanks – Results will be reported for all equipment blanks.

7.1.7 Electronic Deliverables

All data will be submitted on floppy or compact disk to the USACE, Fort Worth District, in Excel or other specified format.

7.2 DATA QUALITY ASSESSMENT OR VALIDATION REPORT

A data assessment/validation report will be prepared and will include the following sections:

- Introduction
- Chain of custody synopsis
- Detailed discussions
- Technical summary
- Completeness
- Conclusion

The introduction and chain-of-custody synopsis sections will describe the analyzing laboratories, number of field samples tested by medium, number of QA and QC samples by medium, and the laboratory ID numbers which correspond to each sample ID number, and the parameters tested.

The detailed discussion section will be arranged by parameter tested. The following topics will be discussed under each subsection:

- Accuracy and/or Bias (including MS/MSD, LCS, and surrogate %Rs)
- Precision (including MS/MSD and laboratory duplicate RPDs)
- Representativeness (including holding times, MC, laboratory and field blanks, and RPD for field duplicates)
- Comparability
- Sensitivity

The technical summary section will discuss any significant problems that were noted during the assessment of analytical data and field activities.

The completeness section will state whether the goal of 90%, as stated in section 3.5 of this QAPP, was met.

The conclusion section will state the usability/suitability of the data for its intended purpose and whether DQOs discussed in Section 3.0 were met.

8.0 CORRECTIVE ACTION MEASURES

When non-conformance with QA procedures is discovered, corrective action will be taken. Procedures for corrective action are described in A Compendium of Superfund Field Operations Methods (USEPA, 1987).

8.1 FIELD ACTIVITIES

Field activities that are in error will be corrected as quickly as possible. The Field QA/QC officer will be responsible for initiation and documentation of corrective action whenever an error has the potential to compromise the quality of data generated or there is a possibility the error might be repeated.

8.2 LABORATORY

Laboratory corrective actions are required when errors, deficiencies, or QC out of criteria exist. The following sections list some circumstances that require corrective action, and what the corrective action is. All corrective actions will be thoroughly documented.

8.2.1 Incoming Samples

Problems noted during sample receipt will be documented on a cooler receipt form. The Fort Worth District, USACE project chemist will be contacted immediately by the laboratory to resolve the problem.

8.2.2 Sample Holding Times

If samples cannot be extracted or analyzed within the method holding times, the Fort Worth District, USACE project chemist will be notified immediately, so that an appropriate corrective action can be generated.

8.2.3 Calibrations

Instrument performance checks and initial calibrations must meet the requirements before samples can be analyzed. If calibration verification standard does not meet the requirements, the calibration will be reviewed, and the calibration verification standard will be reanalyzed. If the calibration verification standard still does not meet the requirements, all samples that were analyzed after the last acceptable calibration verification will be reanalyzed.

8.2.4 Laboratory Quantitation Limits

If sample matrix interference is encountered which cause the laboratory quantitation limits to be elevated above those given in Table 3-3, appropriate laboratory analysis procedures will be employed. Samples will be diluted if analyte concentrations exceed the calibration range. Dilution factors, their rationale, and revised quantitation limits will be documented.

8.2.5 Method Blanks

If method blank concentrations exceed the limits in Table 3-2, it will be assessed whether the method blank contamination was also detected in any associate samples. If not, no corrective action will be necessary, except trying to find the source of the contamination and reduce or eliminate it. Also, the method blank contamination will be reported in the case narrative. If the method blank contamination is also found in the associated samples, the method blank and associated samples containing the contaminant will be reanalyzed. If the contamination remains, the contaminated samples will be re-extracted and reanalyzed with a new method blank and batch specific QC samples within the method holding times.

8.2.6 Laboratory Control Samples (LCS)

If LCS %Rs are not within the criteria specified in Table 3-1, corrective action is needed. If an analyte in the LCS has a %R higher than the criteria, the other related QC criteria are acceptable, no corrective action is necessary, except to try to find the source of the problem and note the problem in the case narrative.

If LCS %Rs are below the criteria for any analytes, the LCS will be reanalyzed for the failed analytes only. If the reanalysis also has low %Rs, the LCS, method blank, and associated samples will be re-extracted and reanalyzed for the failed analytes only.

8.2.7 Matrix Spikes/Matrix Spike Duplicates (MS/MSDs)

If %Rs for the same analyte in both a MS and MSD do not meet the acceptance criteria and the failure is not in the same direction or order of magnitude, then the MS/MSD will be reanalyzed for the failed analytes only. If the reanalysis also failed the %R criteria, the cause of the failure will be investigated.

If an analyte concentration in a sample is at least four times the spiked concentration, no corrective action is necessary.

8.2.8 Laboratory Duplicates

If significant non-target interference exists, the Fort Worth District, USACE project chemist will be notified immediately to discuss possible courses of corrective action such as implementing additional laboratory analytical procedures.

8.2.9 Calculation Errors

The laboratory will reissue a data package if calculation and/or reporting errors are noted. The case narrative will clearly state the reason(s) for the re-issuance of the report.

8.2.10 On-Site Audits

A corrective actions report will be written to address any deficiencies noted during an audit.

8.3 IMPLEMENTATION AND REPORTING

Following corrective action problem identification, the responsible individual, as assigned, will identify the root cause(s) of the problem and analyze the problems (root cause analysis). The responsible individual will work with field and laboratory personnel to develop a corrective action from the root cause analysis. For each problem, a corrective action report will be prepared to document that action was taken. The report will describe the problem, potential ramifications, corrective action, implementation, results of implementation, and effectiveness of the corrective action.

9.0 REFERENCES

Listed USACE Engineer (Manual or Regulation) publications meet or exceed standard industry practices and generally are consistent with the other national documents referenced. These USACE documents can be accessed at the following website address, http://www.usace.army.mil/inet/usace-docs.

U.S. EPA, October 1998, *EPA Requirements for Quality Assurance Project Plans, External Review Draft Final (EPA QA/R-5).*

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USACE, August 2001, *Quality Management Plan for Environmental Projects EPA Region 6.*

USACE, August 1998, *Technical Project Planning (TPP) Process (EM 200-1-2).*

USACE, July 1994, *Validation of Analytical Chemistry Laboratories (EM 200-1-1).*

U.S. EPA, February 1994, *Contract Laboratory Program National Functional Guidelines For Inorganic Data Review.*

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USACE, September 1996, *Safety and Health Requirements Manual ENG Form 5044-R (ER 385-1-1).*

USACE, February 2001, *Requirements for the Preparation of Sampling and Analysis Plans, Appendix I, Shell for Analytical Chemistry Requirements (EM 200-1-3).*

U.S. EPA, 1987, *A Compendium of Superfund Field Operations Methods.*