QUALITY ASSURANCE SAMPLING PLAN
AND
RESPONSE PLAN

FOR

EL PASO COUNTY METALS SURVEY SITE

EL PASO, EL PASO COUNTY, TEXAS

Prepared for

U.S. Environmental Protection Agency Region 6
1445 Ross Avenue
Dallas, Texas 75202

U.S. Army Corps of Engineers
Fort Crook Area, Rapid Response Resident Office

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Submitted by

Weston Solutions, Inc.
70 N.E. Loop 410, Suite 460
San Antonio, Texas 78216
(210) 308-4300
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APPROVALS

Weston Solutions, Inc.

Chad Conway
Project Team Leader

for Robert Beck
Project Manager

U.S. EPA

Jon Rinehart (EPA)
Site Assessment Manager

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1. INTRODUCTION

Weston Solutions, Inc. (WESTON®) has been tasked by the U.S. Environmental Protection Agency (EPA) Region 6 under U.S. Army Corps of Engineers Rapid Response Contract Number DACA-45-98-D-0004, Task Order 0028 to perform sampling activities at the El Paso County Metals Survey Site, centered in El Paso, El Paso County, Texas (Figure 1-1). Weston has prepared this Quality Assurance Sampling Plan (QASP) and Response Plan to describe the technical scope of work to be completed.

1.1 PROJECT OBJECTIVES

The primary objectives for Weston regarding this site are to conduct soil sampling to document the levels of potential contaminants in the surficial and near-surficial soils at the site. Samples are to be used to ascertain contaminant concentrations for comparison to EPA Region 6/Texas Natural Resource Conservation Commission (TNRCC) Risk-Based screening values for metals (arsenic and lead based on currently available data).

1.2 PROJECT TEAM

The Project Team will consist of Robert Beck--Project Manager (PM), Chad Conway--Project Team Leader (PTL), and Jason Wilder--Data Manager (DM), and other Weston personnel as necessary. Weston has available resources in its Houston, Austin, Dallas, San Antonio, and Albuquerque offices as necessary.

Weston personnel will be responsible for performing the sampling activities, and will serve as the liaison to EPA Region 6 personnel and the community in the field during the site activities. For all sample collections, the PTL will coordinate determination of the sample location in the field, collection of samples as necessary, logging of the activities at each sample location in the field logbook, and verification of the sample documentation. Sample documentation and preparation is the responsibility of Weston. If sample locations identified in this document need to be modified due to physical constraints, access issues, or other conditions, the EPA Site Assessment Manager (SAM)/On Scene Coordinator (OSC) or his designee will be notified.

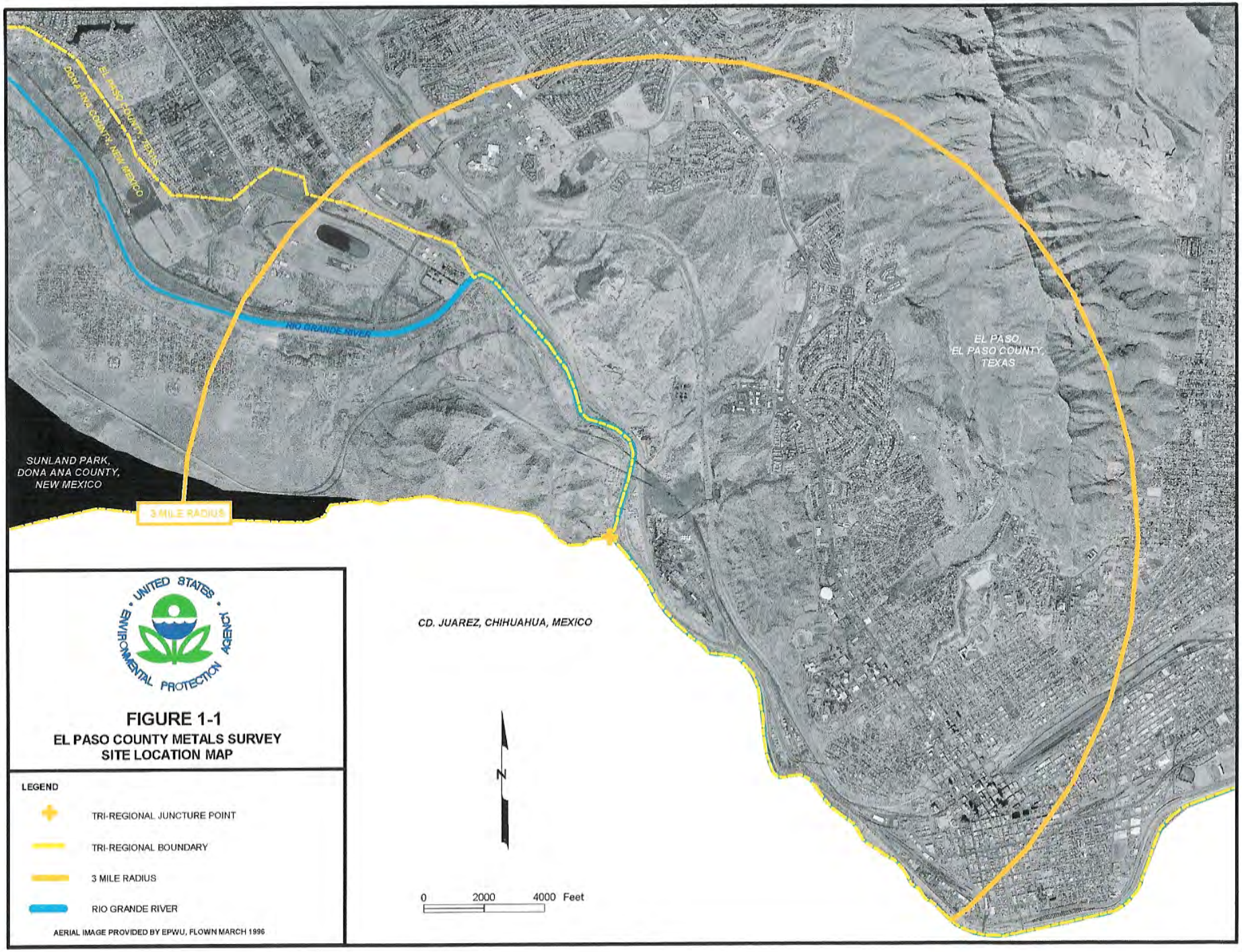
1.3 QASP FORMAT

This QASP has been organized in a format that is intended to facilitate and effectively meet the objectives of the removal oversight. The QASP is organized in the following sections:

- Section 1 - Introduction
- Section 2 - Site Background
- Section 3 - Sampling Approach and Procedures
- Section 4 - Quality Assurance

All figures and tables are included at the end of each respective section. Appendices are attached with the following information:

- Appendix A - Referenced Standard Operating Procedures
- Appendix B - Example Property Location Maps


EL PASO COUNTY, TEXAS
DONA ANA COUNTY, NEW MEXICO
RIO GRANDE RIVER
SUNLAND PARK, DONA ANA COUNTY, NEW MEXICO
3 MILE RADIUS
EL PASO, EL PASO COUNTY, TEXAS
CD. JUAREZ, CHIHUAHUA, MEXICO
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
FIGURE 1-1
EL PASO COUNTY METALS SURVEY
SITE LOCATION MAP
LEGEND
TRI-REGIONAL JUNCTURE POINT
TRI-REGIONAL BOUNDARY
3 MILE RADIUS
RIO GRANDE RIVER
AERIAL IMAGE PROVIDED BY EPWU, FLOWN MARCH 1996
N
0
2000
4000 Feet

2. SITE BACKGROUND

Information about the site location and description, site history and features, and a summary of previous investigations is included in the following subsections.

2.1 SITE LOCATION AND DESCRIPTION

The El Paso County Metals Survey Site is located over approximately a six-mile area centered in the southern portion of El Paso, Texas. The area of concern extends into New Mexico but excludes areas south of the Rio Grande River into Mexico. Properties to be sampled have been identified based on previous sampling results. These properties are generally located in an area located north of Interstate 10, east of Mesa Drive, and south of Executive Drive. Additional properties may be identified by EPA based on results of this investigation or other factors. If additional sample locations are to be added, the SAM/OSC, or his designee will coordinate with the Weston PTL or his designee.

2.2 SITE HISTORY AND FEATURES

Previous independent investigations of the area of concern have been conducted by students of the University of Texas at El Paso (UTEP). As part of several theses efforts, extensive sampling of surface soils within the site has been completed, and elevated levels of metals, namely arsenic and lead, have been detected. As part of the present project activities, sampling activities primarily aimed at identifying the level and extent of current levels of contamination may in essence duplicate some of these previous sampling efforts.

In July 2001, Ecology and Environment collected samples from approximately 100 locations within the area of concern. Facilities sampled during this investigation include:

- San Jacinto Plaza Park
- Mundy Park
- Houston Square Park

- Tula Irrobali Park
- Chihuahuita Park
- Marcos B. Armijo Park
- Paseo de los Heroes Park
- Dunn Park
- Roger Brown Ballfield
- Tom Lea Upper Park
- Arroyo Park
- Madeline Park
- Althea Park
- Mission Hills Park
- Doniphan Park
- El Paso Library
- Cleveland Park
- Galatzan Park and Recreation Center
- Crestmont Park
- Pacific Park
- Buena Vista Park
- City of Sunland Park City Hall
- Ileana Park Meadow

- Mt. Cristo Rey Park
- Red Mender Park
- Meadow Vista Water Tank
- Levee Park
- Riverside Park
- McNutt @ Racetrack Water Tank
- Mesita Elementary
- Vilas Elementary
- El Paso High
- Lamar Elementary
- Wiggs Middle
- Alamo Elementary
- Roosevelt Elementary
- Hart Elementary
- Guillen Middle
- Carlos Cordova Middle
- Highland Annex Elementary
- Moreno Elementary
- Highland Elementary
- Houston Elementary

- Beall Elementary
- Douglas Elementary
- Dr. Green Elementary
- Morehead Middle
- Johnson Elementary
- Sunland Park Elementary
- Desert View Elementary
- Riverside Elementary
- Olga Kohlberg Elementary
- University of Texas at El Paso

Additionally, in July 2001, Weston collected approximately 1200 samples from locations within the area of concern. This sampling investigation included more extensive sampling at fewer locations. Facilities sampled during this investigation included:

- Althea Park
- Arroyo Park
- Doniphan Park
- Alamo Elementary
- El Paso High School
- El Paso Library

- Mesita Elementary
- Roosevelt Elementary
- San Marcos Street (residential area)

Results of these two investigations indicated lower than expected values of lead and arsenic, as compared to the previously mentioned UTEP studies.

Lastly, Weston collected approximately 1700 samples from 432 additional locations during a study conducted in February 2002. Results of this more recent investigation indicate 35 residential areas had arsenic and/or lead concentrations exceeding EPA/TNRCC established screening levels.

2.3 SUMMARY OF PREVIOUS INVESTIGATIONS

As previously mentioned, the site has been the source of several previous studies conducted by students from the University of Texas at El Paso. In addition, a study was conducted by the Texas Air Control Board (TACB).

The Sampling and Analysis Division of the TACB conducted soil sampling within the area of concern on 12 and 13 July 1989. The primary objective of the project was to document levels of arsenic in the top one-half inch of soils. The highest value of arsenic detected was 1100 micrograms per gram (parts per million (ppm)) of arsenic in soil. It should be noted that this result was from a sample located at the International Boundary and Water Commission which was also located directly across from a brick manufacturing company in Mexico. The TACB study emphasized collection of soils in the vicinity of schools and recreational parks. At each sampling location, twelve samples were taken from evenly spaced locations, on the circumference of a two-foot diameter circle. At each location, an aliquot of soil was obtained by removing an approximately 1-inch by one-half-inch depth core.

In May 1993, Brenda E. Barnes (UTEP graduate student) presented a Master's Thesis titled An Evaluation of Metals Concentrations in Surficial Soils, El Paso County, Texas. The study

involved the collection of soil samples from areas surrounding various facilities in El Paso which were potential sources of metals contamination. Potential sources of contamination which were studied included the ASARCO Smelter, Memorial Park in central El Paso where a former smelter was located, and Phelps Dodge Copper Refinery. Soil samples were collected from outlying areas north and east of El Paso in an effort to observe affects of distance from the potential contaminant sources. Concentrations of arsenic, cadmium, copper, lead, and zinc were found at highest concentrations in the area around the ASARCO smelter. Higher concentrations were found in the surface samples (2.5-centimeter depth) than in those samples taken from deeper locations. The metals concentrations did not appear to be affected by sample lithology or soil type.

In December 1993, Emmanuel Chukwuka Ndame (UTEP graduate student) presented a Master's Thesis titled Heavy Metals in Soils in the Vicinity of the University of Texas at El Paso Campus (El Paso County, Texas). The study involved the collection and analysis of seventy-eight soil samples. Areas of interest for the study included the campus of UTEP and parks and public school playgrounds within a 2-kilometer radius of the campus. The samples were analyzed for several metals including arsenic, barium, cadmium, chromium, lead, and selenium. The Ndame thesis concluded that there was no point source or large-scale contamination. Further, it concluded that lead concentrations increased from the west part of the campus to the ASARCO smelter. Sample results indicated the presence of arsenic in soils ranging from below the instrument detection limit of 51 ppm to 92 ppm. Surface soil concentrations of lead were reported as high as 1500 ppm. Significant concentrations of arsenic and lead were not detected in any of the off-campus public schools or parks with the exception of a surface soil sample collected from Althea Park which had a lead concentration of 840 ppm.

In May 1994, Dilip Kumar Devanahalli (UTEP graduate student) presented a Master's Thesis titled Survey of Heavy Metal Concentrations of Soils in Downtown El Paso, Texas. The thesis study involved the collection of soil samples from a downtown area of El Paso, Texas bounded by Interstate 10 to the north, Rio Grande River to the south, Sun Metro Terminal to the west, and Phelps Dodge Copper Refinery to the east. Fifty-four soil samples were collected from the

surface and at a depth of 6 inches in public parks and playgrounds including schools. Arsenic concentrations in samples collected ranged from below the instrument detection limit of 13 ppm to 33 ppm. Lead concentrations ranged from the instrument detection limit of 17 ppm to 560 ppm.

Also in May 1994, Shyam Srinivas (UTEP graduate student) presented a Master's Thesis titled Heavy Metal Contamination of Soils in Public Parks, El Paso, Texas. As part of this study, seventy-two surface and subsurface (6-inch depth) samples were collected from public parks in El Paso. The results of the sample analyses indicated that concentrations of metals were higher in surface soils than in subsurface soils. Arsenic was detected in only one sample, at the instrument detection limit of 55 ppm. Lead concentrations ranged from below the instrument detection limit of 30 ppm to 130 ppm.

Numerous other studies have been conducted, or are in the process of being conducted, by other university and environmental research centers.

Ecology and Environment (E&E) collected samples from approximately 100 locations within the site in July 2001, and Weston collected over 1200 samples in July 2001. Results of these two investigations indicated lower than expected levels of arsenic and lead as compared to the previously mentioned UTEP studies.

Lastly, Weston collected approximately 1700 samples from 432 locations in February 2002. Results of this more recent investigation indicated 35 residential areas had arsenic and/or lead concentrations exceeding EPA/TNRCC established screening levels.

2.4 SITE CONCERNS

The primary concerns associated with the El Paso County Metals Survey Site are the presence of metals, namely lead and arsenic, above the EPA Region 6/Texas Natural Resource Conservation Commission (TNRCC) health based screening levels of 500 ppm (for lead) and 24 ppm (for arsenic). The goal of the sampling and analysis for level and extent of contamination, which will

be conducted at various properties, will be to evaluate surficial and near surficial soils for the presence of these metals at levels above the established screening levels.

3. SAMPLING APPROACH AND PROCEDURES

Samples collected will be used to evaluate the characteristics and to define the extent of affected soils at the site. Additional sampling may be conducted to confirm historical results and potentially the source(s) of contaminants.

3.1 OVERVIEW OF SAMPLING ACTIVITIES

Properties to be sampled have been identified based on the previous studies referenced above and are generally located in an area north of Interstate 10, east of Mesa Drive, and south of Executive Drive. Sample data management will be done using Forms II Lite software.

3.1.1 Health and Safety Plan Implementation

The Weston field activities will be conducted in accordance with the site-specific health and safety plan (HASP). In general, the HASP specifies that work will proceed in Level D (coveralls and steel-toed boots) in selected sampling areas based on appropriate air monitoring results. The Weston PTL will act as the Site Health and Safety Coordinator (SHSC) and will be responsible for implementation of the HASP during all field investigation activities. In accordance with WESTON's general health and safety operating procedures, the field team will drive the route to the hospital specified in the HASP prior to initiating sampling activities.

3.1.2 Site Reconnaissance

Weston has conducted an initial survey of the properties to be sampled. However, due to the large number of samples to be collected, actual sampling points have not been specifically identified on the ground. Weston, with the consultation of the SAM/OSC, will establish sampling points at each property identified that meet the objectives of the investigation.

3.1.3 Community Relations

Community relations may be a relatively large issue due to the general nature of the site. It is anticipated that the SAM/OSC will be on site at all times. If so, community relations issues will be directed to him. If not, the Weston PTL, under the guidance of WESTON's Project Manager, will manage community relations in the field as directed by the SAM/OSC. It is unclear at the present time, if a community relations plan and program will be necessary for this site, although it is likely. If requested, Weston will establish each.

Site access is likely also to be a significant issue. Weston will work as directed by EPA to obtain access to all of the sites designated. A large percentage of the sample locations are associated with residential areas. Therefore, a program for obtaining access will need to be worked out. At the present time, it is anticipated that a mass-mailing of access agreements along with a door-to-door effort will be made to obtain site access. Weston will work with EPA to attempt to gain access using this mean or other as directed by the SAM.

3.2 SAMPLING/MONITORING APPROACH

All soil samples will be collected in general accordance with the EPA Compendium of Emergency Response Team (ERT) Soil Sampling and Surface Geophysics Procedures and the WESTON standard operating procedures (SOPs) (Appendix A). The specific sampling procedures are described below.

3.2.1 Soil

Soil samples will be collected from all identified properties in a consistent manner. Sampling from residential areas will be composed of surficial five-point composites, as well as individual subsurface grab samples. The number of samples collected per yard will be dependent on the size of the yard. Composite samples will be composed of five-point surficial "sub"-samples of approximate equal volume. The "sub"-samples will be placed into plastic bags, homogenized, and then placed into pre-cleaned, 4-ounce glass containers with Teflon-lined lids. Grab samples will be collected and placed immediately into a pre-cleaned, 4-ounce glass container with a Teflon-lined lid. Foreign material such as vegetation, large rocks and pebbles, etc. will be

removed from the sample and discarded. For planning purposes, it has been assumed that six to twelve samples will be collected from each property for subsequent laboratory analysis.

Deviations from the properties to be sampled, either additions or deletions, may be made due to analytical results of samples collected previously during this investigation, new observations made in the field, difficulty in sample collection, limited access, or other conditions. The SAM/OSC will be notified, and concurrence will be obtained should significant deviations from the plan will be implemented.

Both surface and subsurface samples will be collected from each property. Appendix B presents example site sketches of typical sample points for a given property. Surface samples from 0 to 1 inch depth will be collected from five sample points within the sample area, and composited into one sample for analysis. Grab samples will also be collected from the center sample point within the sample area from depths of 6 inches and 12 inches. Samples from depths of 12 inches will be held pending the results from the 0- to 1-inch and 6-inch samples.

Surface samples (0 to 1 inch in depth) will be collected utilizing dedicated plastic scoops or stainless steel spoons. Subsurface samples will be collected primarily using slam bars. Geoprobe, conventional drilling, or grab sample methods may also be employed, in the event that difficulties are encountered with the slam bar sampling method. In general, if sample cores are collected, the outside will be shaved, if possible, to remove exterior surfaces and to reduce the possibility of cross-contamination between sampling depths. In addition, dedicated plastic scoops will be used to collect the samples to reduce the potential for cross-contamination between intervals and locations.

Sample analysis will be conducted at a fixed laboratory utilizing EPA Method 6010B.

3.2.2 Surface Water

No surface water sample activities are planned at this time.

3.2.3 Indoor Dust

No indoor dust sample activities are planned at this time.

3.2.4 Investigation-Derived Waste (IDW)

Attempts will be made to eliminate, or minimize investigation derived waste (IDW) during this investigation. IDW will be handled in accordance with EPA Guidance Document EPA/540/G-91/009, OERR Directive 9345.3-02, "Management of Investigation-Derived Wastes During Site Inspections."

All non-dedicated equipment will be decontaminated using soap and water wash and water rinse. Rinse water, along with excess soils, will be returned as near as possible to the sample location within the property sampled. It is anticipated that minimal amounts of IDW will be generated during this activity.

3.2.5 Sampling and Sample Handling Procedures

Samples will be collected using equipment and procedures appropriate to the matrix, parameters, and sampling objective. The volume of the sample collected must be sufficient to perform the analysis requested. Samples must be stored in the proper types of containers and preserved in a manner appropriate to the analysis to be performed.

All clean, decontaminated sampling equipment and sample containers will be maintained in a clean, segregated area. All soil and samples will be collected with clean decontaminated equipment (SOP 1201.01). All samples collected for laboratory analysis will be placed directly into precleaned, unused glass or plastic containers. Sampling personnel will change gloves between each sample collection/handling. All samples will be assembled and catalogued prior to shipping (refer to SOPs 1101.01 and 1102.01) to the designated laboratory.

Sampling preservation, containers and hold times for analytical methods associated with this site are presented in Subsection 3.5.

3.2.6 Field Quality Control Samples

Field Quality Assurance/Quality Control (QA/QC) samples will be collected so that ten percent of samples per matrix will be collected as blind duplicate sample analysis. If non-dedicated sample equipment is used, then one equipment rinsate blank per day will be submitted for analysis for arsenic and lead.

3.3 SAMPLE MANAGEMENT

Specific nomenclature that will be used by Weston will provide a consistent means of facilitating the sampling and overall data management for the project (SOP 0110.04). Any deviations from the sample nomenclature proposed below must be approved by Weston's Data Manager.

As stated in SOP 0110.04, sample nomenclature will follow a general format regardless of the type or location of the sample collected. The general nomenclature consists of the following components:

- Geographic location (e.g. location within a property).
- Collection type (composite, grab, etc.).
- QA/QC type (normal, duplicate, etc.).
- Sequence - An additional parameter used to further differentiate samples (e.g., if two samples were taken from the same sample area on the same day).

Sample data management will be completed utilizing the EPA-provided Forms II Lite software.

3.4 DECONTAMINATION

The nondisposable sampling equipment (soil samplers, hand trowels, etc.) used during the sample collection process will be thoroughly decontaminated before initial use, between use, and at the end of the field investigation. Equipment decontamination will be completed in the following steps:

- Water spray or brush, if needed, to remove soil/sediment from the equipment.
- Non phosphate detergent and potable water wash to clean the equipment.
- Final potable water rinse.
- Equipment air-dried.

Personnel decontamination procedures will be described in the site-specific HASP that will be prepared by Weston prior to implementation of activities at the site.

3.5 SAMPLE PRESERVATION, CONTAINERS, AND HOLD TIMES

Once collected, samples will be securely stored on site until they are submitted for analysis. The samples will be sent to the designated laboratory by a common carrier, typically on a daily basis.

It is currently anticipated that Weston will require a one-week turnaround for analytical results. This could be revised based on discussions with the SAM/OSC. This turnaround time is initiated when the samples are received at the laboratory and continues until the analytical results are made available to Weston (either verbally or by providing facsimile copies of the results) for review. Samples that have been analyzed will be disposed of by the designated laboratory in accordance with the laboratory's SOPs.

4. QUALITY ASSURANCE

Quality assurance will be conducted in accordance with Weston's Quality Assurance Project Plan (QAPP), dated 5 December 2000.

4.1 SAMPLE CUSTODY PROCEDURES

Because of the evidentiary nature of sample collection, the possession of samples must be traceable from the time the samples are collected until they are introduced as evidence in legal proceedings. After sample collection and identification, the samples will be maintained under the chain-of-custody procedures. If the sample collected is to be split (such as with the EPA, COE, or laboratory QC), the sample will be allocated into similar sample containers. Sample labels completed with the same information as that on the original sample container will be attached to each of the split samples. All personnel required to package and ship coolers containing potentially hazardous material will be trained accordingly.

The chain-of-custody (COC) procedures are documented in SOP 1101.01, Appendix A, and will be made available to all personnel involved with the sampling. A typical chain-of-custody record included in SOP 1101.01 will be completed each time a sample or group of samples is prepared for shipment to the laboratory. The record will repeat the information on each of the sample labels and will serve as documentation of handling during shipment. A copy of this record will remain with the shipped samples at all times, and another copy will be retained by the member of the sampling team who originally relinquished the samples. Weston personnel will complete a COC form for all samples sent to a Weston designated off-site laboratory.

Samples relinquished to the participating laboratories will be subject to the following procedures for transfer of custody and shipment:

- Samples will be accompanied by the chain-of-custody record. When transferring possession of samples, the individuals relinquishing and receiving the samples will sign, date, and note the time of the sample transfer on the record. This custody record documents transfer of sample custody from the sampler to another person or to the laboratory.

- Samples will be properly packed for shipment and dispatched to the appropriate laboratory for analysis with separate, signed custody records enclosed in each sample box or cooler. Sample shipping containers will be padlocked or custody-sealed for shipment to the laboratory. The preferred procedure includes use of a custody seal wrapped across filament tape that is wrapped around the package at least twice. The custody seal will then be folded over and stuck to itself to ensure that the only access to the package is by cutting the filament tape or breaking the seal to unwrap the tape.

- If sent by common carrier, a bill of lading or air bill will be used. Bill of lading and air bill receipts will be retained in the project file as part of the permanent documentation of sample shipping and transfer.

SOPs 1101.01 and 1102.01 describe these procedures in more detail.

4.2 PROJECT DOCUMENTATION

Field Documentation

Weston will perform field documentation of site activities during all field work. The primary methods of documentation will be completion of a field logbook and photo documentation. All documents will be completed legibly and in ink. Any corrections or revisions will be made by lining through the original entry and initialing the change. The following field documentation will be maintained:

Field Logbook (SOP 1501.01)

The field logbook is a descriptive notebook detailing site activities and observations so that an accurate, factual account of field procedures may be reconstructed. All entries will be signed by the individuals making them. Entries should include, at a minimum, the following:

- Site name and project number.
- Names of personnel on-site.
- Dates and times of all entries.
- Descriptions of all site activities, including site entry and exit times.
- Noteworthy events and discussions.
- Weather conditions.
- Site observations.
- Identification and description of samples and locations.
- Subcontractor information and names of on-site personnel.
- Dates and times of sample collections and chain-of-custody information.
- Records of photographs.

- Site sketches.

Sample Labels

Sample labels will be securely affixed to the sample container. They will clearly identify the particular sample and should include the following information:

- Site name and project number.
- Date and time the sample was collected.
- Sample preservation method.
- Analysis requested.
- Sampling location.

Chain-of-Custody Record (SOP 1101.01)

A chain-of-custody record will be maintained from the time of sample collection until final deposition. Every transfer of custody will be noted and signed, and a copy of the record will be kept by each individual who has signed it. The chain-of-custody is discussed in Subsection 4.1 Sample Custody Procedures.

Custody Seal

Custody seals demonstrate that a sample container has not been opened or tampered with. The individual who has custody of the samples will sign and date the seal and affix it to the container in such a manner that it cannot be opened without breaking the seal.

Photo Documentation

Weston will take photographs to document site conditions and activities as site work progresses. Initial conditions should be well documented by photographing features that define the site-related contamination or special working conditions. Representative photographs should be taken of each type of site activity. The photographs should show typical operations and operating conditions as well as special situations and conditions that may arise during site activities. Site final conditions should also be documented by photograph as a record of how the site appeared at completion of the work.

All photographs should be taken with either a film camera, a digital camera, or a video camera

capable of recording the date on the image. Each photograph should be recorded in the logbook with the location of the photographer, direction the photograph was taken, the subject of the photograph, and its significance (i.e., why the picture was taken). Where appropriate, the photograph location, direction, and subject should also be shown on a site sketch. SOPs 1502.01 and 1502.02 discuss photo documentation in more detail.

APPENDIX A

REFERENCED STANDARD OPERATING PROCEDURES

INTRODUCTION

The following Standard Operating Procedure (SOP) is to describe the procedures for collecting representative soil samples. Analysis of soil samples may determine whether concentrations of specific soil pollutants exceed established action levels, or if the concentrations of soil pollutants present a risk to public health, welfare, or the environment. This SOP is similar to SOP Number 1001.03 for collecting near surface soil samples with a hand auger.

PROCEDURE

Surface soil samples may be collected using a variety of methods and equipment. The methods and equipment used are dependent on the depth of the desired sample, the type of sample required (disturbed versus undisturbed), and the type of soil. Near-surface soils may be easily sampled using a spade, trowel, or hand scoop.

Sample Preservation

Cooling to 4°C ± 2°C, supplemented by a minimal holding time, is suggested.

Interferences and Potential Problems

There are two primary interferences or potential problems associated with soil sampling: cross-contamination of samples and improper sample collection. Cross-contamination problems can be eliminated or minimized through the use of dedicated (disposable) sampling equipment. If this is not possible or practical, then decontamination of sampling equipment is necessary. Improper sample collection can involve using contaminated equipment, disturbance of the matrix resulting in compaction of the sample, or inadequate homogenization of the samples where required, resulting in variable, non-representative results. Homogenization may also affect sample representativeness where the analytical requirements include volatile organic compounds.

Equipment or Apparatus

The equipment used for sampling may be selected from the following list, as appropriate:

- Tape measure
- Survey stakes or flags
- Stainless steel, plastic, or other appropriate homogenization bucket or bowl
- Ziploc plastic bags
- Logbook
- Labels
- Chain-of-custody forms and seals
- Coolers
- Ice
- Decontamination supplies and equipment
- Canvas or plastic sheet
- Spatulas/spades/shovels
- Scoops

- Plastic or stainless steel spoons
- Trowel

Preparation

1. Determine the extent of the sampling effort, the sampling methods to be employed, and what equipment and supplies are required.
2. Obtain necessary sampling and monitoring equipment from the list above.
3. Prepare schedules, and coordinate with staff, client, and regulatory agencies, if appropriate.
4. Perform a general site survey prior to site entry in accordance with the site-specific health and safety plan.
5. Decontaminate or preclean equipment, and ensure that it is in working order.
6. Use stakes, buoys, or flagging to identify and mark all sampling locations. Consider specific site factors, including extent and nature of contaminant, when selecting sample locations. If required, the proposed locations may be adjusted based on site access, property boundaries, and surface obstructions. All staked locations will be utility-cleared by the property owner or other responsible party prior to soil sampling.
7. Evaluate safety concerns associated with sampling that may require use of personal protective equipment and/or air monitoring.

Surface Soil Sample Collection

Collect samples from the near-surface soil with tools such as spades, shovels, and scoops. Surface material can be removed to the required depth with this equipment, then a stainless steel or plastic scoop can be used to collect the sample. The use of a flat, pointed mason trowel to cut a block of the desired soil can be helpful when undisturbed profiles are required. A stainless steel scoop, lab spoon, or plastic spoon will suffice in most other applications. Avoid the use of devices plated with chrome or other target analyte materials.

The following procedures should be followed when collecting surface soil samples:

1. Carefully remove the top layer of soil or debris to the desired sample depth with a pre-cleaned spade.
2. Using a pre-cleaned, stainless steel scoop, plastic spoon, or trowel, remove and discard a thin layer of soil from the area which came in contact with the spade.
3. If volatile organic analysis is to be performed, transfer a portion of the sample directly into an appropriate, labeled sample container(s) with a stainless steel lab spoon, plastic lab spoon, or equivalent and secure the cap(s) tightly. Place the remainder of the sample into a stainless steel, plastic, or other appropriate homogenization container, and mix thoroughly to obtain a homogenous sample representative of the entire sampling interval. Then, either place the sample into an appropriate, labeled container(s) and secure the cap(s) tightly; or if composite samples are to be collected, place a sample from another sampling interval into the

homogenization container and mix thoroughly. When compositing is complete, place the sample into appropriate, labeled container(s) and secure the cap(s) tightly.

4. Fill hole created through sampling with unused material or other appropriate backfill material (sand).
5. Record applicable information into field log book or appropriate forms as documentation of sampling.

SOP	**1001.04**				
GROUP	Sampling Procedures				
SUB-GROUP	Soil Sampling Prodedures				
TITLE	Sampling of Stockpiled Soil				
DATE	8/21/2002	**FILE**	1001-04.DOC	**PAGE**	1 of 1

INTRODUCTION

The following Standard Operating Procedure (SOP) describes the procedure for collecting representative samples of stockpiled soil. Representative soil samples may be collected for analysis to determine whether concentrations of specific soil pollutants exceed established action levels, or if the concentrations of soil pollutants present a risk to public health and welfare, or the environment. Soil samples are also typically collected from stockpiles for classification prior to entry into a soil treatment process or offsite disposal, or after treatment to verify the effectiveness of the treatment system. This soil sampling procedure is closely related to SOP Nos. 1001.01, 1001.03, and 1001.10 regarding soil sampling procedures.

PROCEDURE

Stockpiles will be sampled as follows:

- Soil may be collected from the surface of a stockpile using the surface soil sampling procedure (SOP 1001.01) or from deeper within the stockpile according to the hand augering procedure (SOP 1001.03) as appropriate to obtain the required soil material. The procedure to be used to physically collect soil samples from stockpiles are described in SOP Nos. 1001.01, 1001.03, and 1001.10 (soil compositing). Reference should be made to these SOPs for specific sampling equipment, procedures, and other general guidelines. Equipment that may be used as part of the soil compositing procedure is identified under SOP Nos. 1001.01 and 1001.03 where general soil sampling methods are described.

- Each project may have different stockpile sampling objectives and requirements. Therefore, the sampling of stockpiles should be addressed in a site-specific Sampling and Analysis Plan and the soil sampling implemented in accordance with this plan.

- Samples may be collected from discrete locations in a pile and submitted for laboratory analysis, as described in SOP Nos. 1001.01 and 1001.03. More typical is that several samples from a single stockpile will be collected and composited to prepare a single sample for laboratory analysis. Collecting composite samples from a stockpile is recommended and will generally be performed to better characterize the soil in the pile. The number of samples to collected from a stockpile and composite will depend on the size of the stockpile and the particular requirements of the project. Typically compositing for characterization purposes is on the order of 1 composite soil sample for every 50 cubic yards. Compositing will be performed in accordance with SOP 1001.10.

REFERENCES

SOP No. 1001.01 - Standard Operating Procedure, Surface Soil Sampling
SOP No. 1001.03 - Standard Operating Procedure, Shallow Subsurface and Near Surface Soil Sampling
SOP No. 1001.10 - Standard Operating Procedure, Soil Compositing

INTRODUCTION

The following Standard Operating Procedure (SOP) is to describe the procedures for collecting representative surface water samples. Analysis of surface samples may determine whether concentrations of specific soil pollutants exceed established action levels, or if the concentrations of pollutants present a risk to public health, welfare, or the environment.

PROCEDURE

Surface water samples may be collected using a variety of methods and equipment. The methods and equipment used are usually dependent on the location of the body of water being sampled. Sampling can be performed by merely submerging the sample container, a weighted-bottle sampler with stopper, a bailer, or by pump assisted methods. Several types of pumps can be used for sampling depending on the objectives of sampling and the site conditions.

Sample Preservation

Samples are to be preserved in conformance with the site-specific Quality Assurance Project Plan, Sampling and Analysis Plan or work plan. In general these requirements include refrigeration to 4°C, addition of appropriate additives (HCl, H_2SO_4, NaOH) to adjust and fix pH, and a defined maximum holding time. If a site-specific plan is not available, the analytical laboratory should be consulted for the appropriate preservation procedures.

Interferences and Potential Problems

There are two primary interferences or potential problems associated with surface water sampling: cross-contamination of samples and improper sample collection. Cross-contamination problems can be eliminated or minimized through the use of dedicated sampling equipment. If this is not possible or practical, then decontamination of sampling equipment is necessary. Improper sample collection can involve using contaminated equipment, undue disturbance of the sample matrix, or improper sample location.

Equipment or Apparatus

- Ziploc plastic bags
- Logbook
- Labels
- Chain-of-custody forms and seals
- Coolers
- Ice
- Decontamination supplies and equipment
- Discharge tubing
- Sample containers
- Sampling devices

Preparation

1. Determine the extent of the sampling effort, the sampling methods to be employed, and which equipment and supplies are required.
2. Obtain necessary sampling and monitoring equipment.
3. Decontaminate or preclean equipment, and ensure that it is in working order.
4. Prepare schedules, and coordinate with staff, client, and regulatory agencies, if appropriate.
5. Perform a general site survey prior to site entry in accordance with the site-specific health and safety plan.

Surface Water Sampling

Samples from shallow depths can be readily collected by merely submerging the sample container. In flowing surface water bodies, the container's mouth should be positioned so that it faces upstream, while the sampling personnel stand downstream so as not to stir up sediment that could potentially contaminate the sample.

Collecting a representative sample from a larger body of surface water requires that samples be collected near the shore unless boats are feasible and permitted. If boats are used, the body of water should be cross sectioned, and samples should be collected at various depths across the body of water in accordance with the specified sampling plan. For this type of sampling, a weighted-bottle sampler is used to collect samples at a predetermined depth. The sampler consists of a glass bottle, a weighted sinker, a bottle stopper, and a line that is used to open the bottle and to lower and raise the sampler during sampling. The procedure for use is as follows:

- Assemble the weighted bottle sampler.
- Gently lower the sampler to the desired depth so as not to remove the stopper prematurely.
- Pull out the stopper with a sharp jerk of the sampler line.
- Allow the bottle to fill completely, as evidenced by the cessation of air bubbles.
- Raise the sampler and cap the bottle.
- Wipe the bottle clean. The sampling bottle can be also be used as the sample container for shipping.

Teflon bailers have also been used where feasible for collecting samples in deep bodies of water.

Another method of extending the reach of sampling efforts is the use of a small peristaltic pump. In this method the sample is drawn through heavy-wall Teflon tubing and pumped directly into the sample container. This system allows the operator to reach into the liquid body, sample from depth, or sweep the width of narrow streams.

The general sampling procedures are listed below:

1. Collect the sample using whichever technique, submerged bottle, bottle sampler with stopper, pump & tubing, or bailer.

2. The collected sample may be collected in the sample containers or may be transferred to the appropriate sample containers in order of the volatile organics first and inorganics last.

3. Label sample containers, place on ice in a cooler, remove, and decontaminate equipment as necessary.

REFERENCES

SOP 0110.01 Sample Nomenclature
SOP 1005.01 Field Duplicate Collection
SOP 1005.02 Rinse Blank Preparation
SOP 1005.03 Field Blank Preparation
SOP 1101.01 Sample Custody - Field
SOP 1102.01 Sample Shipping
SOP 1201.01 Sampling Equipment Decontamination
SOP 1501.01 Field Logbook

SOP	**1101.01**				
GROUP	Sampling Handling				
SUB-GROUP	Sample Custody				
TITLE	Sample Custody in the Field				
DATE	**7/24/2002**	**FILE**	1101-01.DOC	**PAGE**	1 of 4

INTRODUCTION

The following Standard Operating Procedure (SOP) presents procedures for maintaining sample chain of custody (COC) during activities where samples are collected.

PROCEDURE

Sample custody is defined as being under a person's custody if any of the following conditions exist:

- it is in their possession,
- it is in their view, after being in their possession,
- it was in their possession and they locked it up, or
- it is in a designated secure area.

A designated field sampler will be personally responsible for the care and custody of collected samples until they are transferred to another person or properly dispatched to the laboratory. To the extent practicable, as few people as possible will handle the samples.

Sample tags or labels will be completed and applied to the container of each sample. When the tags or labels are being completed, waterproof ink will be used. If waterproof ink is not used, the tags or labels will be covered by transparent waterproof tape. Sample containers may also be placed in Ziploc-type storage bags to help keep them clean in the cooler. Information typically included on the sample tags or labels will include the following:

- Project Code
- Station Number and Location
- Sample Identification Number
- Date and Time of Sample Collection
- Type of Laboratory Analysis Required
- Preservation Required, if applicable
- Collector's Signature
- Priority (optional)
- Other Remarks

Additonal information may include:

- Anticipated Range of Results (Low, Medium, or High)
- Sample Analysis Priority

A COC form will be completed each time a sample or group of samples is prepared for transfer to the laboratory. The form will repeat the information on each of the sample labels and will serve as documentation of handling during shipment. The minimum information requirements of the COC form are listed in Table 1101.01-A. An example COC form is shown in Figure 1101.01-A. The completed COC must be reviewed by the Field Team Leader or Site Manager prior to sample shipment. The COC form will remain each sample shipping container at all times, and another copy will be retained by the member of the sampling team who originally relinquished the samples or in a project file.

TABLE 1101.01-A CHAIN OF CUSTODY FORM

INFORMATION	COMPLETED BY	DESCRIPTION
COC	Laboratory	enter a unique number for each chain of custody form
SHIP TO	Field Team	enter the laboratory name and address
CARRIER	Field Team	enter the name of the transporter (e.g., FedEx) or handcarried
AIRBILL	Field Team	enter the airbill number or transporter tracking number (if applicable)
PROJECT NAME	Field Team	enter the project name
SAMPLER NAME	Field Team	enter the name of the person collecting the samples
SAMPLER SIGNATURE	Field Team	signature of the person collecting the samples
SEND RESULTS TO	Field Team	enter the name and address of the prime contractor
FIELD SAMPLE ID	Field Team	enter the unique identifying number given to the field sample (includes MS, MSD, field duplicate and field blanks)
DATE	Field Team	enter the year and date the sample was collected in the format M/D (e.g., 6/3)
TIME	Field Team	enter the time the sample was collected in 24 hour format (e.g., 0900)
MATRIX	Field Team	enter the sample matrix (e.g., water, soil)
PRESERVATIVE	Field Team	enter the preservative used (e.g., HNO3) or "none"
FILTERED/ UNFILTERED	Field Team	enter "F" if the sample was filtered or "U" if the sample was not filtered
CONTAINERS	Field Team	enter the number of containers associated with the sample
MS/MSD	Field Team or Laboratory	enter "X" if the sample is designated for the MS/MSD
ANALYSES REQUESTED	Field Team	enter the method name of the analysis requested (e.g., SW6010A)
COMMENTS	Field Team	enter comments
SAMPLE CONDITION UPON RECEIPT AT LABORATORY	Laboratory	enter any problems with the condition of any sample(s)
COOLER TEMPERATURE	Laboratory	enter the internal temperature of the cooler, in degrees C, upon opening
SPECIAL INSTRUCTIONS/COMMENTS	Laboratory	enter any special instructions or comments
RELEASED BY (SIG)	Field Team and Laboratory	enter the signature of the person releasing custody of the samples
COMPANY NAME	Field Team and Laboratory	enter the company name employing the person releasing/receiving custody
RECEIVED BY (SIG)	Field Team and Laboratory	enter the signature of the person receiving custody of the samples
DATE	Field Team and Laboratory	enter the date in the format M/D/YY (e.g., 6/3/96) when the samples were released/received
TIME	Field Team and Laboratory	enter the date in 24 hour format (e.g., 0900) when the samples were released/received

FIGURE 1101.01-A CHAIN OF CUSTODY FORM

SOP	**1102.01**				
GROUP	Sample Handling				
SUB-GROUP	Sample Shipping				
TITLE	Sample Shipping				
DATE	7/24/2002	**FILE**	1102-01.DOC	**PAGE**	1 of 1

INTRODUCTION

The following Standard Operating Procedure (SOP) presents the procedures for sample shipping that will be implemented during field work involving sampling activities.

TERMS

COC - Chain-of-Custody

PROCEDURE

Prior to shipping or transferring custody of samples, they will be packed according to D.O.T. requirements with sufficient ice to maintain an internal temperature of 4°C ± 2°C during transport to the laboratory. Samples relinquished to the participating laboratories will be subject to the following procedures for transfer of custody and shipment:

1. Samples will be accompanied by a COC record. When transferring possession of samples, the individuals relinquishing and receiving the samples will sign, date, and note the time of the sample transfer on the record. If sent by common carrier, a bill of lading or airbill should be used. Bill of lading and airbill receipts will be retained in the project file as part of the permanent documentation of sample shipping and transfer. This custody record documents transfer of sample custody from the sampler to another person or to the laboratory. The designated laboratory will accept custody in the field upon sample pick-up or at the laboratory if the samples are delivered via field personnel or a courier service.
2. Samples will be properly packed in approved shipping containers for laboratory pick-up by the appropriate laboratory for analysis, with separate, signed custody records enclosed in each sample box or cooler. Sample shipping containers will be padlocked or custody-sealed for transfer to the laboratory. The preferred procedure includes use of a custody seal wrapped across filament tape that is wrapped around the package at least twice. The custody seal will then be folded over and stuck to itself so that the only access to the package is by cutting the filament tape or breaking the seal to unwrap the tape. The seal will then be signed. The designated laboratory will accept custody of the samples upon receipt.
3. Whenever samples are split with state representatives or other parties, the COC record will be marked to indicate with whom the samples were split.
4. The field sampler will call the designated laboratory to inform them of sample shipment and verify sample receipt as necessary.

INTRODUCTION

The following Standard Operating Procedure (SOP) presents the procedures for documenting activities observed or completed in the field in a field logbook. The documentation should represent all activities of WESTON personnel and entities under WESTON's supervision.

TERMS

FSP - Field Sampling Plan

SAP - Sampling and Analysis Plan

QAPP - Quality Assurance Project Plan

HASP - Health and Safety Plan

PROCEDURE

Field logbooks will be used and maintained during field activities to document pertinent information observed or completed by WESTON personnel or entities that WESTON is responsible for providing oversight. Field logbooks are legal documents that form the basis for later written reports and may serve as evidence in legal proceedings. The Site Manager or Field Team Leader will review field log entries daily and initial each page of entries. Field logbooks will be maintained by the Site Manager or Field Team Leader during field activities and transferred to the project files for a record of activities at the conclusion of the project. General logbook entry procedures are listed below.

- Logbooks must be permanently bound with all pages numbered to the end of the book. Entries should begin on page 1.
- Only use blue or black ink (waterproof) for logbook entries.
- Sign entries at the end of the day, or before someone else writes in the logbook.
- If a complete page is not used, draw a line diagonally across the blank portion of the page and initial and date the bottom line.
- If a line on the page is not completely filled, draw a horizontal line through the blank portion.
- Ensure that the logbook clearly shows the sequence of the day's events.
- Do not write in the margins or between written lines, and do not leave blank pages to fill in later.
- If an error is made, make corrections by drawing a single line through the error and initialing it.

- Maintain control of the logbook and keep in a secure location.

Field logbooks will contain, at a minimum, the following information, if applicable:

General Information

- Name, location of site, and work order number
- Name of the Site Manager or Field Team Leader
- Names and responsibilities of all field team members using the logbook (or involved with activities for which entries are being made)
- Weather conditions
- Field observations
- Names of any site visitors including entities that they represent

Sample Collection Activities

- Date(s) and times of the sample collection or event.
- Number and types of collected samples.
- Sample location with an emphasis on any changes to documentation in governing documents (i.e., SAP, FSP). This may include measurements from reference points or sketches of sample locations with respect to local features.
- Sample identification numbers, including any applicable cross-references to split samples or samples collected by another entity.
- A description of sampling methodology, or reference to any governing document (i.e., FSP, SAP, QAPP).
- Summary of equipment preparation and decontamination procedures.
- Sample description including depth, color, texture, moisture content, and evidence of waste material or staining.
- Air monitoring (field screening) results.
- Types of laboratory analyses requested.

Site Health and Safety Activities

- All safety, accident, and/or incident reports.
- Real-time personnel air monitoring results, if applicable, or if not documented in the HASP.
- Heat/cold stress monitoring data, if applicable.
- Reasons for upgrades or downgrades in personal protective equipment.
- Health and safety inspections, checklists (drilling safety guide), meetings/briefings.
- Calibration records for field instruments.

Oversight Activities

- Progress and activities performed by contractors including operating times.
- Deviations of contractor activities with respect to project governing documents (i.e., specifications).
- Contractor sampling results and disposition of contingent soil materials/stockpiles.
- Excavation specifications and locations of contractor confirmation samples.
- General site housekeeping and safety issues by site contractors.

SOP	**1502.01**				
GROUP	Field Documentation				
SUB-GROUP					
TITLE	Photograph Logs				
DATE	7/24/2002	**FILE**	1502-01.DOC	**PAGE**	1 of 1

INTRODUCTION

The following Standard Operating Procedure (SOP) presents the requirements for collecting information related to photodocumentation of site activities.

PROCEDURE

- Uniquely number each roll of film obtained for use.
- Record the following information for each negative exposed:
    1. Date and Time
    2. Photographer Name
    3. Witness Name
    4. Orientation (Landscape, Portrait, or Panaoramic)
    5. Description (including activity being performed, specific equipment of interest, sample location(s), compass direction photographer is facing)
- Record "NA" for the negatives not used if the roll is not completely used prior to development.
- Record unique roll number on receipt when film is submitted for development.
- Verify descriptions on log with negative numbers when photographs are received from processing.

FORMS

Blank Photograph Logs can be printed from WESTON On-Line from the *Records Management Application.* Selecting the *Reports/Project Planning/Blank Photo Logs* menu option will generate a project specific log with 36 entries.

SOP	**1502.02**				
GROUP	Field Documentation				
SUB-GROUP					
TITLE	Photograph Management and Reporting				
DATE	8/21/2002	**FILE**	1502-02.DOC	**PAGE**	1 of 1

INTRODUCTION

The following Standard Operating Procedure (SOP) presents the requirements for managing and reporting information related to photodocumentation of site activities.

PROCEDURE

Enter the Photograph Log information specified in SOP 1502.01 into WESTON On-Line *Records Management Application*. The data entry screen can be accessed by selecting the *Data/Photograph Log* menu option.

REPORTS

Complete Photograph Logs can be printed from WESTON On-Line from the *Records Management Application.* Selecting the *Reports/Summary Tables/Photographs/Logs* menu option will generate a specific log for a selected roll of film.

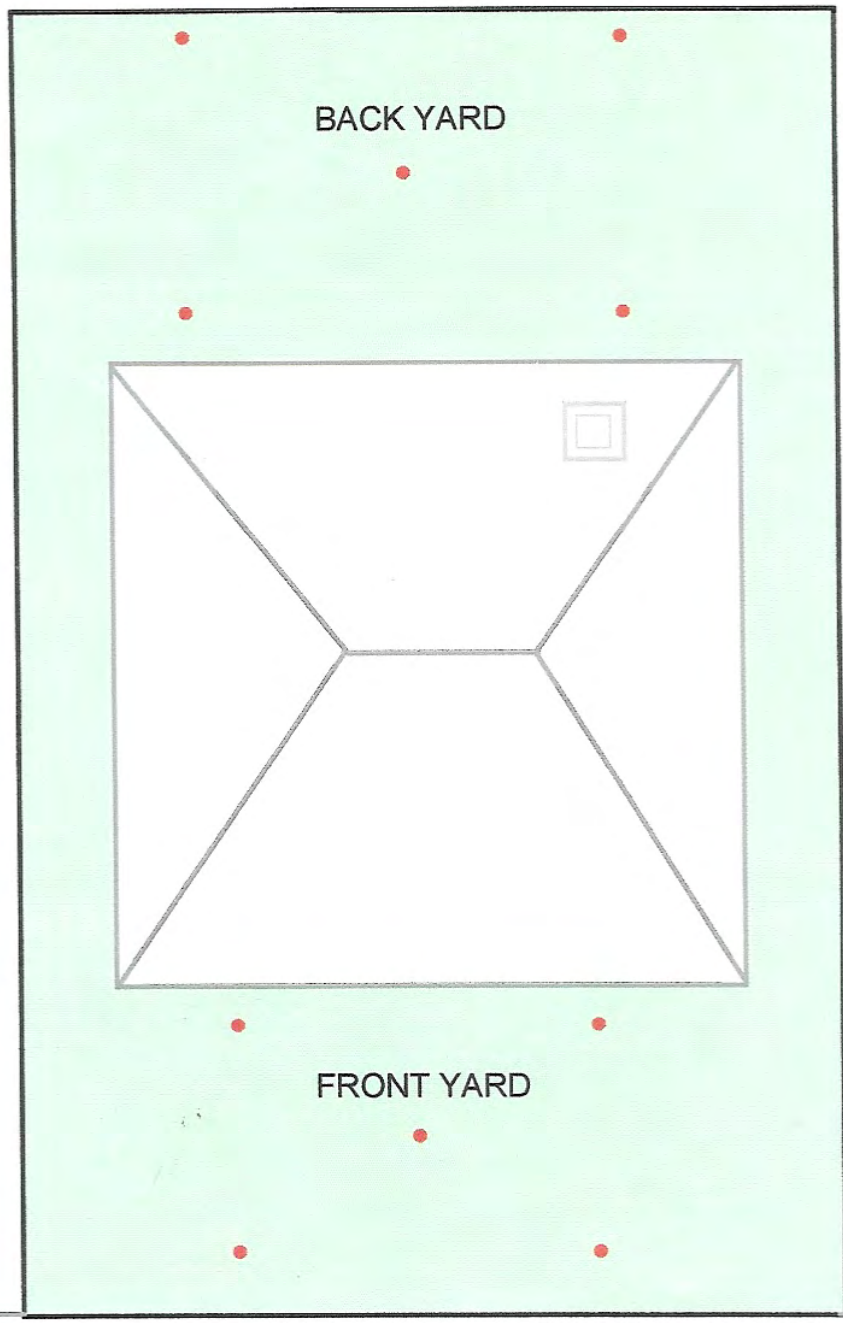
Photograph Templates can be printed from WESTON On-Line from the *Records Management Application.* Selecting the *Reports/Summary Tables/Photographs/Templates* menu option will generate templates for mounting the photographs for a selected roll of film.

APPENDIX B

EXAMPLE PROPERTY SAMPLE LOCATION MAPS

FIGURE B-1

EXAMPLE SURFICIAL SAMPLE LOCATION MAP



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

EL PASO COUNTY METAL SOIL SURVEY

ANYSTREET DR.

FIGURE B-1

EXAMPLE SURFACE SAMPLE LOCATION MAP

FIGURE B-2

EXAMPLE SUBSURFACE SAMPLE LOCATION MAP

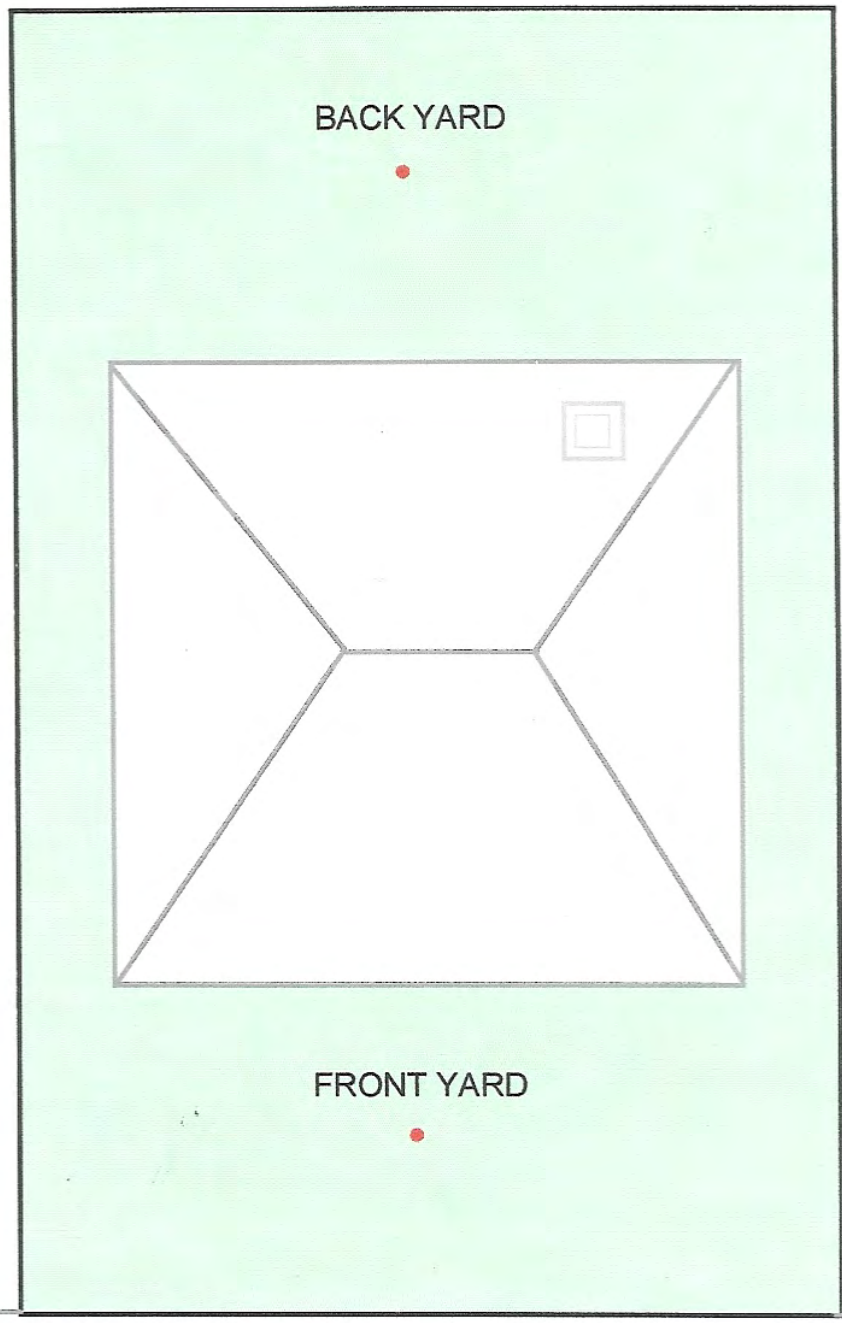


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FIGURE B-2

EXAMPLE SUBSURFACE SAMPLE LOCATION MAP