Jacobs

Sampling of Excavated Soil from White House Modernization Project

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1. Background

The White House Modernization Project involves the demolition of the East Wing of the White House, which was originally built in 1902 and further expanded and rebuilt in 1942. The demolition is expected to produce approximately 30,000 cubic yards of excavated soil over the course of 30 days. The excavated soil will be transported to the East Potomac Golf Links located at 972 Ohio Drive SW, Washington, D.C. 20024 for stockpiling. A 2-acre area has been cleared of topsoil to prepare the stockpile site for placement of the incoming excavated material.

2. Objectives

In support of the National Park Service (NPS), the primary objectives of this technical memorandum are as follows:

- Evaluate Current Soil Conditions – Collect background samples from the native material at the stockpile site.
- Characterize Excavated Soil – Collect representative samples from the stockpile material.
- Track Soil Transport Operations – Count and document trucks delivering soil to the stockpile site.

3. Contaminant of Concern/Parameters

The composition of the excavated soil is currently unknown, and the East Wing's historical construction raises concerns about potential hazardous materials. To address these uncertainties, a comprehensive analytical program will be implemented. Soil samples will be analyzed for the following:

- VOCs (U.S. Environmental Protection Agency [EPA] Method 8260)
- SVOCs, including polynuclear aromatic hydrocarbons (EPA Method 8270)
- PCBs (EPA Method 8082)
- Pesticides (EPA Method 8081)
- TPH (Gasoline/Diesel ranges, EPA Method 8015B)
- Priority Pollutant Metals (EPA Method 6010/7471)
- Herbicides (EPA Method 8321)
- Asbestos (EPA Method 600/R-93/116)

This approach will provide data for environmental or health risks to be identified and managed effectively throughout excavation and stockpiling activities.

4. Methodology

The following activities will be conducted in accordance with the approved Standard Operation Procedures (SOPs) (Attachment 1):

4.1 Background Soil Sampling

Background sampling within the 2-acre stockpile area should be completed before placement of excavation soils. A total of **10 soil samples** will be collected from native material evenly distributed across the available area. Each sample location will be recorded using a Global Positioning System (GPS) unit, and detailed soil descriptions will be documented in field notes. Samples will be placed in appropriate containers, labeled, and preserved following chain-of-custody requirements. Sampling equipment will be disposable to minimize cross-contamination risk.

4.2 Stockpile Soil Sampling

Representative sampling of the excavated material will be collected during active delivery operations. One sample will be collected per day of hauling operations from the stockpile material, for an estimated total of **40 samples**. If soil transport activities have begun before mobilization, the sampling team will implement a catch-up protocol by collecting multiple samples on the initial day to align with the cumulative number of hauling days. GPS coordinates and soil descriptions will be documented for each sample collected. Samples will be handled and preserved in accordance with SOP 077 requirements.

4.3 Haul Road Sampling

The haul road, approximately 0.25 mile (1,320 feet) in length, was constructed using excavated material from the East Wing project. To evaluate potential contaminant migration associated with this material, **three discrete soil samples** will be collected at three equidistant intervals along the road alignment. Sampling will begin at the road entrance (Sample 1) and proceed sequentially toward the terminus (Sample 3) for spatial representativeness. Each sampling point will be georeferenced using a calibrated GPS unit. Samples will be containerized, labeled, and preserved under strict chain-of-custody procedures. Sampling activities will conform to the applicable SOPs for discrete soil sampling and quality assurance/quality control requirements to maintain data integrity.

4.4 Truck Counting

Truck counting will be performed at the stockpile site to document the volume of soil transported from the excavation area. Field personnel will record each truck arrival and departure in a dedicated logbook, noting the time and any observable characteristics such as truck type or size. Because truck sizes and capacities are currently unknown and may vary, the count will focus on the number of trips rather than estimating tonnage. GPS units will be used to confirm the location and timing of observations.

In accordance with **Washington, D.C., regulations**, commercial trucks hauling soil must comply with the following designated truck routes and legal size and weight limits:

- Maximum gross vehicle weight: 80,000 pounds
- Width: 8 feet (8 feet 6 inches on freeways)
- Height: 13 feet 6 inches
- Length: 40 feet for single-unit vehicles; 55 feet for combinations
  Oversize or overweight vehicles require a District Department of Transportation permit and must follow restricted routing near federal landmarks. [rhllaw.com], [freight.ddot.dc.gov]

Based on an excavation volume of **30,000 cubic yards** and an average dump truck capacity of **10 to 14 cubic yards per load**, the project will require approximately **2,150 to 3,000 truckloads** to transport the material.

5. Health and Safety

A site-specific Health and Safety Plan details the health and safety requirements for soil sampling related tasks, the potential hazards associated with each task, and the control measures and/or personal protective equipment implemented to prevent or mitigate potential hazards. The sampling team will meet and review the site-specific Health and Safety Plan before beginning field activities. In addition, daily tailgate safety meetings will be conducted before each work shift to discuss safety hazards and changing conditions and/or work tasks. A site-specific Health and Safety Plan will be provided to NPS as a separate document in support of this project.

6. Team Communications and Contact Information

Table 6-1 summarizes team communications and contact information.

Table 6-1. Team Communications and Contact Information

Role/Position	Contact Information
Jacobs Program Manager	Scott Pratt, P.G. [redacted] Mobile: [redacted]
Jacobs Project Manager	Rick McCormick, P.E. [redacted] Mobile: [redacted]
Jacobs Project Chemist	Kaye Walker [redacted] Mobile: [redacted]
National Park Services PM	Jenny Phillippe, LPG [redacted] Mobile: [redacted]
NPS Onsite primary Point of Contact with Clark	Dan Copenhaven
East Potomac Golf Course Point of Contact	Michael Stachowicz

The field team will coordinate with the East Potomac Golf Course POC or NPS Onsite representative daily.

7. Pricing

Table 7-1 provides the following pricing options.

Table 7-1. Pricing Information

The pricing options presented in this technical memorandum are estimated based on Jacobs' current understanding of the scope of work as communicated in teleconferences conducted between Jacobs and NPS on October 22 and October 23, 2025. Actual costs may vary as the project scope evolves. Given the fast-paced nature of this project, the Jacobs project manager will communicate with the NPS project manager multiple times per week to communicate project status and will discuss changes that impact costs as they occur.

Attachment 1
Standard Operating Procedures

Preparing Field Logbooks

I. Purpose

This SOP provides general guidelines for entering field data into logbooks (hard copy and electronic) during site investigation and remediation activities.

II. Scope

This is a general description of data requirements and format for field logbooks. Logbooks are needed to properly document all field activities in support of data evaluation and possible legal activities. Field notes may be recorded in field logbooks or electronically on computer tablets.

III. Equipment and Materials

- Logbook
- Indelible pen
- Jacobs supplied electronic tablet or laptop with notebook software

IV. Procedures and Guidelines

Properly completed field logbooks are a requirement for all the work we perform under the Navy CLEAN contract. Logbooks are legal documents and, as such, must be prepared following specific procedures and must contain required information to ensure their integrity and legitimacy. This SOP describes the basic requirements for field logbook entries.

A. Procedures for Completing Field Logbooks

1. Field notes commonly are kept in bound, hard-cover logbooks used by surveyors and produced, for example, by Peninsular Publishing Company and Sesco, Inc. Pages should be water resistant, and notes should be taken only with waterproof, non-erasable permanent ink, such as that provided in Rite in the Rain or Sanford Sharpie permanent markers.

   Note: For sites where PFAS is being analyzed for, Rite-in-the-Rain, Sanford Sharpie, or anything water-resistant or with Teflon cannot be used in the field. All field book materials must be “fluorine free”. Acceptable substitutes would be a sewn notebook without a plastic cover, or loose-leaf notebook paper.

2. Alternatively, field notes may be recorded electronically in Jacobs provided field tablets or laptop computers. Notes are recorded in appropriate note collection software (such as, Microsoft OneNote). At the end of each day, the electronic notes must be digitally signed by the author and downloaded for electronic file storage. The notes may be converted to an Adobe pdf file prior to storage. It is important that the field notes be downloaded daily to

ensure the electronic time stamp of the notes is the same as the day the notes were recorded.

3. On the inside cover of the logbook the following information should be included:
   - Company name and address
   - Log-holders name if logbook was assigned specifically to that person
   - Activity or location
   - Project name
   - Project manager's name
   - Phone numbers (such as for the company, supervisors, emergency response)
4. All lines of all pages should be used to prevent later additions of text, which could later be questioned. Any line not used should be marked through with a line and initialed and dated. Any pages not used should be marked through with a line, the author's initials, the date, and the note "Intentionally Left Blank."
5. If field notes are recorded electronically, the author will not have any spaces between entries.
6. If errors are made in the logbook, cross a single line through the error and enter the correct information. All corrections shall be initialed and dated by the personnel performing the correction. If possible, all corrections should be made by the individual who made the error.
7. Daily entries will be made chronologically.
8. Information will be recorded directly in the field logbook during the work activity. Information will not be written on a separate sheet and then later transcribed into the logbook.
9. Each page of the logbook will have the date of the work and the note takers initials.
10. The final page of each day's notes will include the note-takers signature as well as the date.
11. Only information relevant to the subject project will be added to the logbook.
12. The field notes will be copied, and the copies sent to the Project Manager or designee in a timely manner (at least by the end of each week of work being performed).

B. Information to be Included in Field Logbooks

1. Entries into the logbook should be as detailed and descriptive as possible so that a particular situation can be recalled without reliance on the collector's memory. Entries must be legible and complete.
2. General project information will be recorded at the beginning of each field project. This will include the project title, the project number, and project staff.
3. **Scope:** Describe the general scope of work to be performed each day.

4. **Weather:** Record the weather conditions and any significant changes in the weather during the day.
5. **Tail Gate Safety Meetings:** Record time and location of meeting, who was present, topics discussed, issues/problems/concerns identified, and corrective actions or adjustments made to address concerns/ problems, and other pertinent information.
6. **Standard Health and Safety Procedures:** Record level of personal protection being used (e.g., level D PPE), record air monitoring data on a regular basis and note where data were recording (such as, reading in borehole, reading in breathing zone). Also record other required health and safety procedures as specified in the project specific health and safety plan.
7. **Instrument Calibration:** Record calibration information for each piece of health and safety and field equipment.
8. **Personnel:** Record names of all personnel present during field activities and list their roles and their affiliation. Record when personnel and visitors enter and leave a project site and their level of personal protection.
9. **Communications:** Record communications with project manager, subcontractors, regulators, facility personnel, and others that impact performance of the project.
10. **Time:** Keep a running time log explaining field activities as they occur chronologically throughout the day.
11. **Deviations from the Work Plan:** Record any deviations from the work plan and document why these were required and any communications authorizing these deviations.
12. **Health and Safety Incidents:** Record any health and safety incidents and immediately report any incidents to the Project Manager.
13. **Subcontractor Information:** Record name of company, record names and roles of subcontractor personnel, list type of equipment being used and general scope of work. List times of starting and stopping work and quantities of consumable equipment used if it is to be billed to the project.
14. **Problems and Corrective Actions:** Clearly describe any problems encountered during the field work and the corrective actions taken to address these problems.
15. **Technical and Project Information:** Describe the details of the work being performed. The technical information recorded will vary significantly between projects. The project work plan will describe the specific activities to be performed and may also list requirements for note taking. Discuss note-taking expectations with the Project Manager prior to beginning the field work.
16. Any conditions that might adversely affect the work or any data obtained (such as, nearby construction that might have introduced excessive amounts of dust into the air).
17. **Sampling Information:** Specific information that will be relevant to most sampling jobs includes the following:

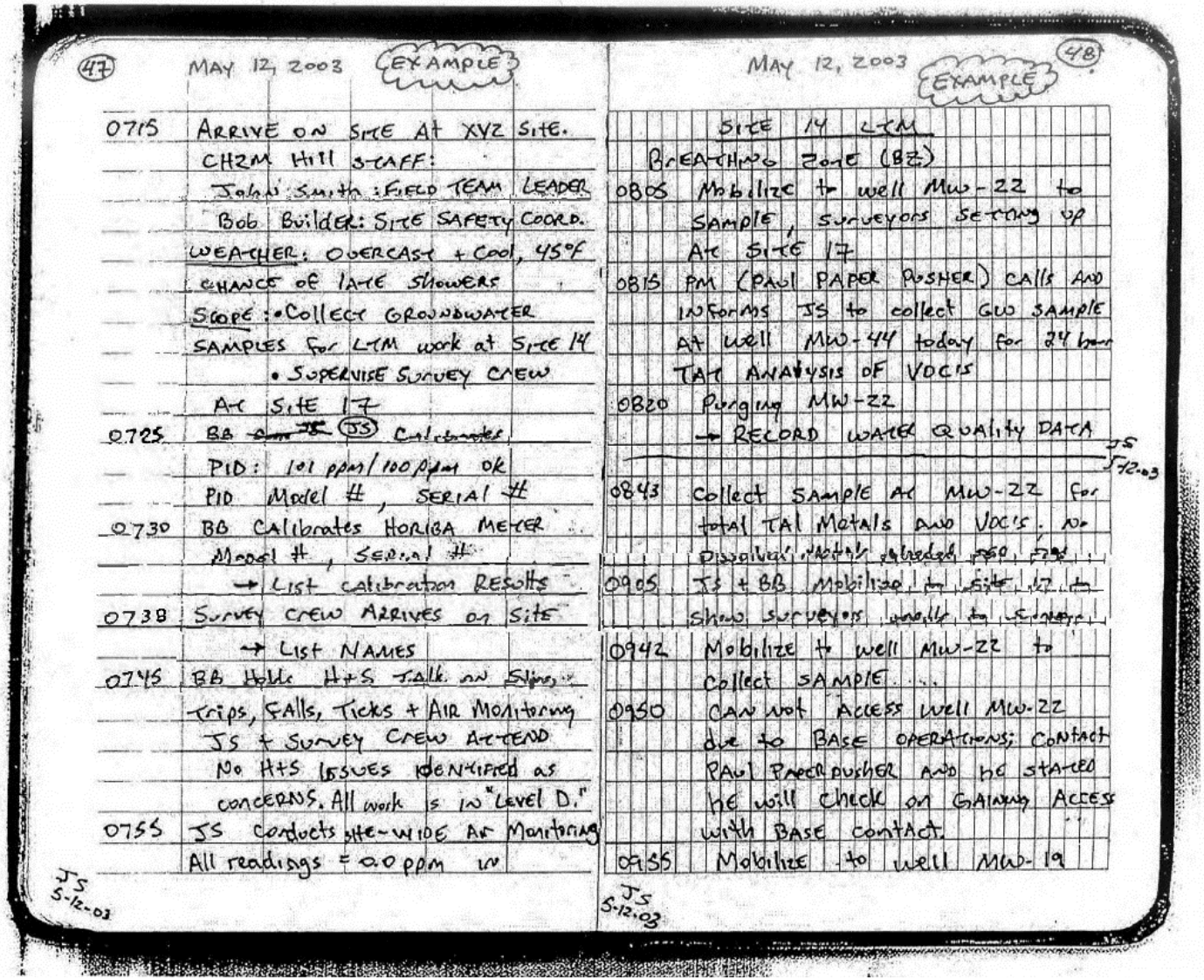
- Description of the general sampling area – site name, buildings and streets in the area, etc.
- Station/Location identifier
- Description of the sample location – estimate location in comparison to two fixed points – draw a diagram in the field logbook indicating sample location relative to these fixed points – include distances in feet.
- Sample matrix and type
- Sample date and time
- Sample identifier
- Draw a box around the sample ID so that it stands out in the field notes
- Information on how the sample was collected – distinguish between "grab," "composite," and "discrete" samples
- Number and type of sample containers collected
- Record of any field measurements taken (i.e., pH, turbidity, dissolved oxygen, and temperature, and conductivity)
- Parameters to be analyzed for, if appropriate
- Descriptions of soil samples and drilling cuttings can be entered in depth sequence, along with PID readings and other observations. Include any unusual appearances of the samples.

C. Suggested Format for Recording Field Data

1. Use the left side border to record times and the remainder of the page to record information (see attached example).
2. Use tables to record sampling information and field data from multiple samples.
3. Sketch sampling locations and other pertinent information.
4. Sketch well construction diagrams.

V. Attachments

- Example field notes.



(47) MAY 12, 2003 EXAMPLE

0715 ARRIVE ON SITE AT XYZ SITE.
CH2M HILL STAFF:
John Smith: FIELD TEAM LEADER
Bob Builder: SITE SAFETY COORD.
WEATHER: OVERCAST + COOL, 45°F
CHANCE OF LATE SHOWERS
SCOPE: • COLLECT GROUNDWATER SAMPLES FOR LTM WORK AT SITE 14
• SUPERVISE SURVEY CREW AT SITE 17
0725 BB ~~CM~~ (JS) CALIBRATES
PID: 101 ppm/100 ppm OK
PID Model #, SERIAL #
0730 BB CALIBRATES HORIBA METER
Model #, SERIAL #
→ LIST CALIBRATION RESULTS
0738 SURVEY CREW ARRIVES ON SITE
→ LIST NAMES
0745 BB HOLDS H+S TALK ON SLIPS, TRIPS, FALLS, TICKS + AIR MONITORING
JS + SURVEY CREW ATTEND
NO H+S ISSUES IDENTIFIED AS CONCERNS. ALL WORK IS IN "LEVEL D."
0755 JS CONDUCTS SITE-WIDE AIR MONITORING
ALL READINGS = 0.0 ppm IN

JS 5-12-03

MAY 12, 2003 EXAMPLE (48)

SITE 14 LTM
BREATHING ZONE (BZ)
0805 MOBILIZE TO WELL MW-22 TO SAMPLE, SURVEYORS SETTING UP AT SITE 17
0815 PM (PAUL PAPER PUSHER) CALLS AND INFORMS JS TO COLLECT GW SAMPLE AT WELL MW-44 today for 24 hour TAT ANALYSIS OF VOC'S
0820 Purging MW-22
→ RECORD WATER QUALITY DATA
JS 5-12-03
0843 COLLECT SAMPLE AT MW-22 FOR total TAL Metals AND VOC'S. NO Dissolved metals collected this time.
0905 JS + BB MOBILIZE to site 17 to show surveyors where to survey.
0942 MOBILIZE TO WELL MW-22 TO COLLECT SAMPLE
0950 CAN NOT ACCESS WELL MW-22 due to BASE OPERATIONS; CONTACT PAUL PAPERPUSHER AND BE STATED HE will CHECK ON GAINING ACCESS WITH BASE CONTACT.
0955 MOBILIZE TO WELL MW-19

JS 5-12-03

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Disposal of Waste Fluids and Solids

I. Purpose and Scope

This Standard Operating Procedure (SOP) describes the procedures used to dispose of hazardous fluid and solid materials generated as a result of the site operations. This SOP does not provide guidance on the details of Department of Transportation regulations pertaining to the transport of hazardous wastes; the appropriate Code of Federal Regulations (49 CFR 171 through 177) should be referenced. Also, the site investigation-derived waste management plan should be consulted for additional information and should take precedence over this SOP.

II. Equipment and Materials

A. Fluids

- UN-rated 55-gallon steel drums or frac tanks
- Tools for securing drum lids
- Funnel for transferring liquid into drum
- Labels
- Paint pens
- Marking pen for appropriate labels
- Seals for 55-gallon steel drums

B. Solids

- UN-rated 55-gallon steel drums or rolloffs
- Tools for securing drum lids
- Paint pens
- Plastic sheets
- Labels
- Marking pen for appropriate labels

III. Procedures and Guidelines

A. Methodology

Clean, empty drums or rolloffs or frac tanks will be brought to the site by the drilling subcontractor for soil and groundwater collection and storage. The empty drums will be located

at the field staging area and moved to drilling locations as required. The drums will be filled with the drilling and well installation wastes (fill drum three-fourths, not to top), capped, sealed, and moved to the onsite drum storage area by the drilling subcontractor. The full drums will separate types of wastes by media. The drums will be labeled as they are filled in the field and labels indicating that the contents are pending analysis affixed.

The drum contents will be sampled to determine the disposal requirements of the drilling wastes. Check with the Environmental Manager (EM) assigned to the project prior to sample collection for frequency and analysis. Unless otherwise specified by the EM, the drum sampling will be accomplished through the collection and submittal of composite samples, one sample per 10 drums (check with disposal facility to determine sample frequency) containing the same media. Similar compositing will be performed in each rolloff to obtain a representative sample. The compositing of the sample will be accomplished by collecting a specific volume of the material in each drum into a large sample container. When samples from each of the drums being sampled in a single compositing are collected, the sample will be submitted for Toxicity Characteristic Leaching Procedure, ignitability, corrosivity, and reactivity analysis. Additional analysis may be required by your EM.

If rolloffs are used, compositing and sampling of soil will comply with applicable state and federal regulations.

B. Labels

Drums and other containers used for storing wastes from drilling operations will be labeled when accumulation in the container begins. Analysis pending labels should be used initially. Labels will include the following minimum information:

- Container number
- Container contents
- Origin (source area including individuals wells, piezometers, and soil borings)
- Date that accumulation began
- Date that accumulation ended
- Generator Contact Information
- When laboratory results are received, drum labels will be completed or revised to indicate the hazardous waste constituents in compliance with Title 40 of the Code of Federal Regulations, Part 262, Subpart C if the results indicate hazardous waste or labeled as non-hazardous if applicable.

C. Fluids

Drilling fluids generated during soil boring and groundwater discharged during development and purging of the monitoring wells will be collected in 55-gallon, closed-top drums. When a drum is filled, the bung will be secured tightly. Fluids may also be transferred to frac tanks after being temporarily contained in drums to minimize the amount of drums used.

When development and purging is completed, the water will be tested for appropriate hazardous waste constituents as per instruction from the project EM. Compositing and sampling of fluids will comply with applicable state and federal regulations.

D. Solids

The soil cuttings from well and boring drilling will constitute a large portion of the solids to be disposed of.

The solid waste stream also will include plastic sheeting used for decontamination pads, Tyveks, disposable sampling materials, and any other disposable material used during the field operations that appears to be contaminated. These materials will be placed in designated drums.

E. Storage and Disposal

The wastes generated at the site at individual locations will be transported to the drum storage area by the drilling services subcontractor. Drums should be stored on plastic sheeting with a short berm wall (hay bales or 2 x 4 planks or equivalent) to capture small spills. The drums should be staged such that the labels are all visible and there should be enough room to walk between rows of drums if applicable.

Waste solid materials that contain hazardous constituents will be disposed of at an offsite location in a manner consistent with applicable solid waste, hazardous waste, and water quality regulations. Transport and disposal will be performed by a commercial firm under subcontract.

The liquid wastes meeting acceptable levels of discharge contamination may be disposed of through the sanitary sewer system at the site. However, prior to disposal to the sanitary sewer system, approval and contract arrangements will be made with the appropriate authorities. Wastes exceeding acceptable levels for disposal through the sanitary sewer system will be disposed of through contract with a commercial transport and disposal firm.

IV. Attachments

None.

V. Key Checks and Preventative Maintenance

- Contact the project EM prior to containerizing waste to determine containerization method and sampling frequency and analysis.
- Check that representative samples of the containerized materials are obtained.
- Be sure that all state and federal regulations are considered when classifying waste for disposal.

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Global Positioning System

I. Purpose

The procedure describes the calibration, operation, and functions associated with a Trimble GeoExplorer 6000 series. The GeoExplorer 6000 series includes the GeoXH and GeoXT handhelds. These handhelds combine a Trimble Global Navigation Satellite Systems (GNSS) receiver with a field computer powered by Microsoft Windows Mobile version 6.5 operating system. If using a different instrument, the operation manual supplied by the manufacturer should be consulted for instructions.

II. Scope

This procedure provides information regarding the field operation and general maintenance of a Trimble GeoExplorer 6000 series. The information contained herein presents the operation procedures for this equipment. Review of the equipment's instruction manual is a necessity for more detailed descriptions pertaining to the operation and maintenance of the equipment.

III. Definitions

GPS: Global Positioning System - A system of satellites developed and operated by the Department of Defense. Continuous 3D coordinate information is broadcast free of charge on a worldwide basis enabling precise positional location. The GeoExplorer 6000 series handheld includes an integrated GNSS receiver that enables the collection of Global Positioning System (GPS) and Global Navigation Satellite System (GLONASS) data for incorporating into a GIS or for managing assets.

GPS and GLONASS are GNSS. Each system consists of a constellation of satellites that orbit the earth. GNSS provides worldwide, all-weather, 24-hour time and position information.

IV. Procedures and Guidelines

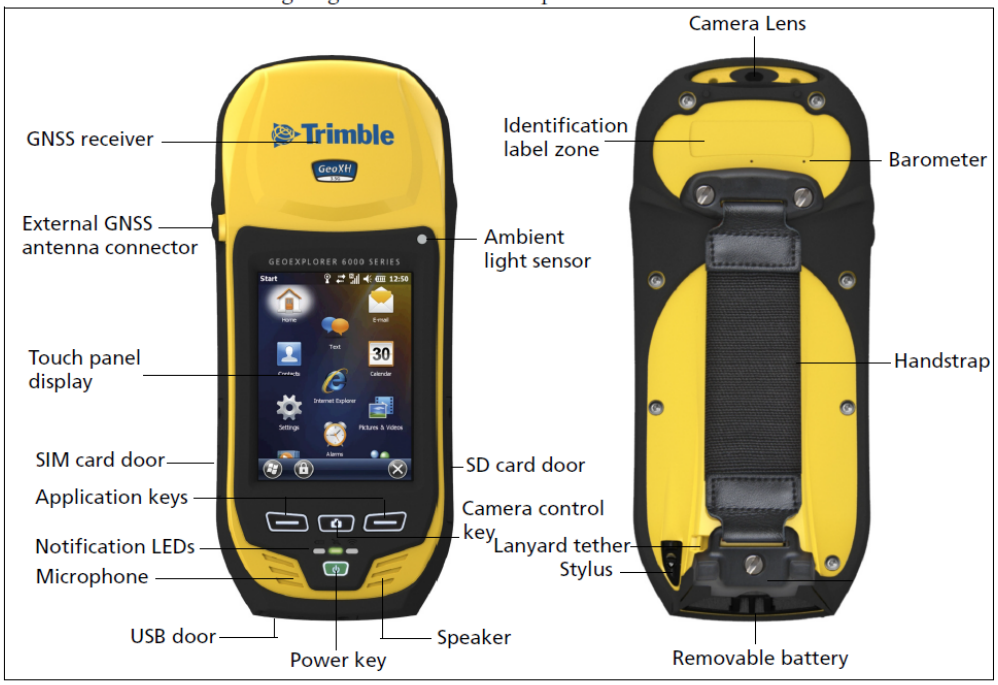
The procedure for calibration, operation, and maintenance of the GPS unit is outlined below. Daily calibration and battery recharging is typical operating procedure; frequencies other than daily shall be noted in the logbook and reason for increased frequency recorded. If using a different instrument, the operation manual supplied by the manufacturer should be consulted for instructions.

The procedures described include additional features pre-programmed into the GPS datalogger to aid the data collection process.

A. GeoExplorer 6000 Unit

Parts of the GeoExplorer 6000 series handheld

The following diagrams show the main parts of the handheld.



Keypad buttons

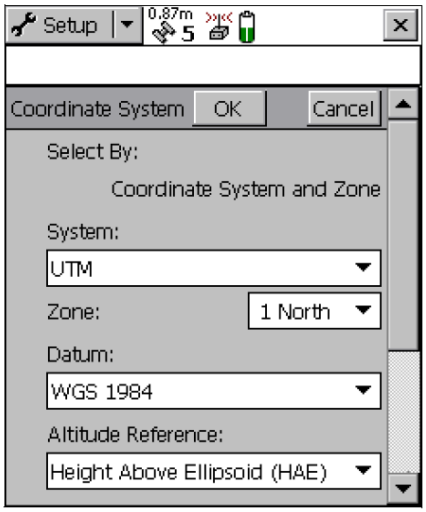
The GeoExplorer 6000 series handheld has a keypad for fast, easy access to common actions. LEDs provide visual notifications of system events.

B. Operations for Surveying Coordinates of a Location

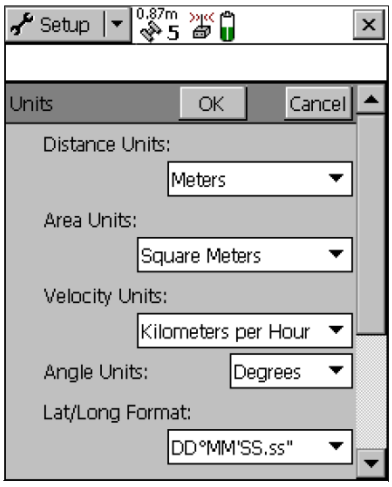
The TerraSync software consists of five sections as described as follows:

Use this section ...	to ...
Map	view features, background files, and the GPS trail graphically
Data	work with data files: • create a new data file or open an existing data file • log base station data to file or broadcast real-time corrections • collect new features or maintain existing features • move, copy, delete, or rename data and background files
Navigation	navigate to features using the *Direction Dial* and *Close-up* screens, or the graphical lightbar
Status	view information about: • the satellites the TerraSync software is tracking, their relative positions in the sky, and your current position • the predicted satellite constellation and position quality over the next 12 hours • communication ports that the TerraSync software is using • your GPS receiver and real-time correction source • the current UTC time • the TerraSync software version and trademark information
Setup	configure the TerraSync software

1. **Configure coordinate settings:** To open the **Coordinate System** form, tap Coordinate System in the Setup screen. Use this form to specify the coordinate system you want the TerraSync software to display foreground and background files.



2. **Configure unit settings:** To open Units form, tap Units in the Setup screen. Use this form to specify the units used for measurements and display.



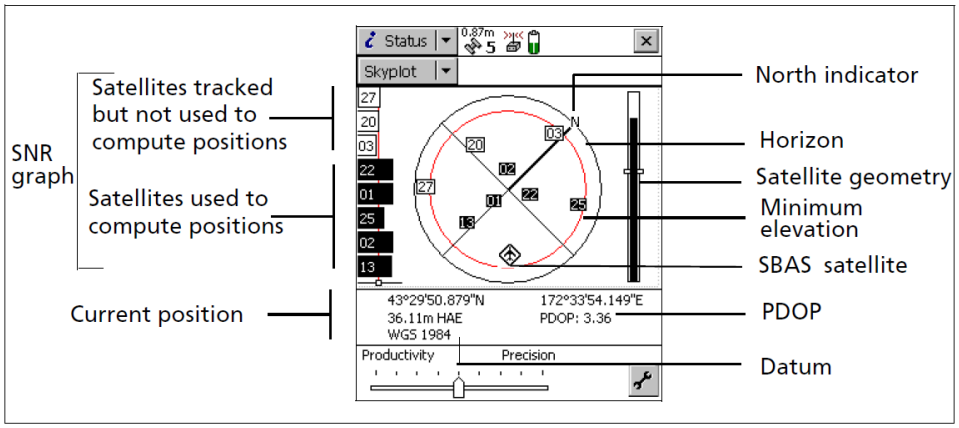
3. Starting the TerraSync Software:

- When you are outside and ready to begin, switch on your data collector and start the TerraSync software. The GPS receiver should activate automatically.
- On the Microsoft Windows or Windows Mobile taskbar, tap the windows icon and the select Programs/TerraSync. While the software is loading, a Trimble identification screen appears.

4. **Getting a clear view of the sky.** Move to a location where the receiver has a clear view of the sky. Signals can be received from any direction. Satellite signals can be blocked by people, buildings, heavy tree cover, large vehicles, or powerful transmitters. GPS signals can go through leaves, plastic, and glass, but they will weaken the signal.

5. **Checking the GPS status.** When you start the TerraSync software, it automatically connects to the GPS receiver and begins to track visible satellites to calculate its current position. Use the satellite icon on the status bar to check whether the receiver is computing GPS positions.

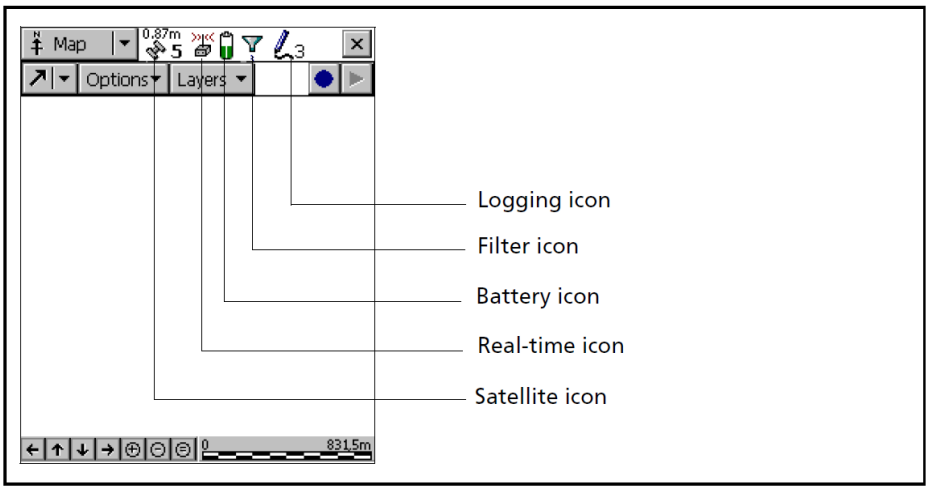
6. **To view the GPS status:** The Skyplot screen appears when you first run the TerraSync software. If this screen is not visible, tap the Section button, select Status, tap the Subsection list button, and then select Skyplot.



- Filled black boxes represent satellites that the receiver is using to compute its current GPS position.
- White boxes represent satellites that the receiver is getting signals from but is not using because the signals are too weak.

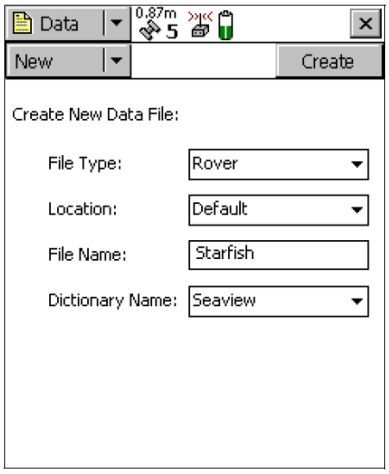
7. You need a minimum of four satellites with good geometry to computer a 3D GPS position.

8. **Status Bar:** The status bar appears in the top row of the TerraSync screen. It is always visible, but the icons displayed depend on the current status of the TerraSync software.



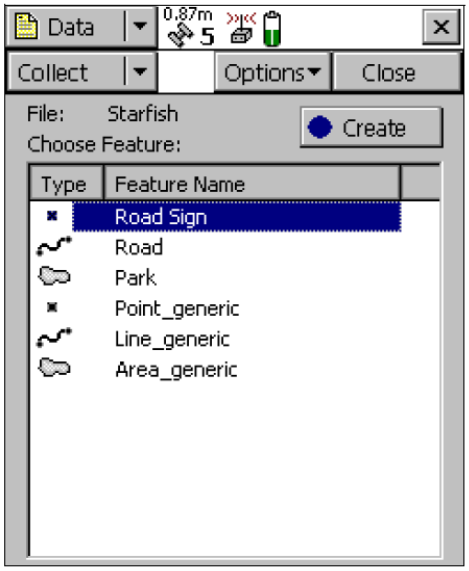
9. **Creating a New Data File:** Before starting the data collection session, you need to create a new data file to store the new features and attributes you collect. Use the Data section to do this.

- Tap the Section list button and then select Data.
- Tap the Subsection list button and then select New.



- In the Dictionary Name field, select a data dictionary.
- Tap **Create**. The Collect Features screen appears:

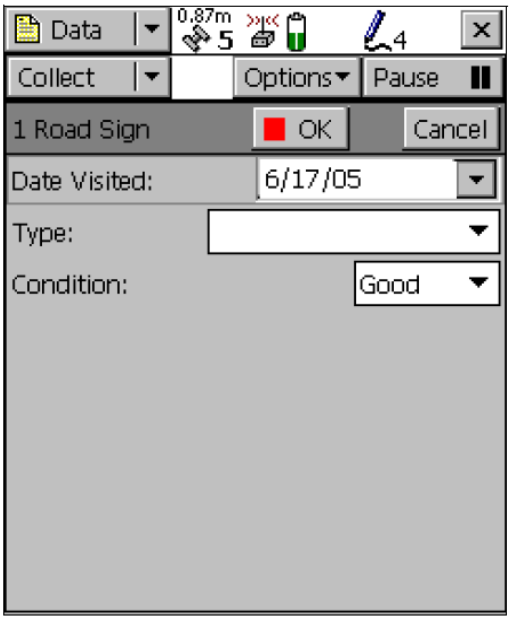
10. **Collecting a Point Feature:** When you record a point feature, you remain stationary for some time. The TerraSync software logs a number of GPS positions during this time. These positions are averaged together to compute the final GPS position of the point feature.



When the TerraSync software is logging GPS positions, the logging icon appears in the status bar. The number beside the icon indicates how many positions have been logged for the selected feature. It is recommended that a minimum of 20 positions are logged prior to recording the feature.

To record a Point Feature:

- Make sure the Collect Features screen is open.
- In the Choose Feature list, highlight an appropriate point feature and then tap **Create**. The attribute entry form for the feature type appears:



- Fill in the attribute field with appropriate values.
- Once you have reached the desired number of positions, tap OK to close the road sign feature. The attribute entry form closes and you are returned to the Collect Features screen.
- Refer to the TerraSync Orientation Guide for steps on how to collect other features.

11. Ending the data collection session: When the data collection session is complete, close the data file and then exit the Terra Sync software.

- In the Collect Features screen, tap **Close**.
- A message appears asking you to confirm that you want to close the open file. Tap **Yes** to close.
- Tap the X button in the top right corner of the screen.
- A message appears asking you to confirm that you want to close the TerraSync software. Tap **Yes** to close.

C. Preventive Maintenance

Data should be downloaded from the datalogger a minimum of once daily, twice daily is preferred. At the end of each day the receiver batteries should be recharged. For technical assistance call the rental company through which you acquired the Trimble unit. Guidance is also provided in the manual and at http://www.trimble.com.

V. References

GeoExplorer 6000 series, Trimble, February 2011.

TerraSync and GPS Pathfinder Office Software Guide, December 2006

Chain-of-Custody

I. Purpose

The purpose of this standard operating procedure is to provide information on chain-of-custody procedures to be used under the Comprehensive Long-Term Environmental Action--Navy Program.

II. Scope

This procedure describes the steps necessary for transferring samples using Chain-of-Custody Records. A Chain-of-Custody Record is required, without exception, for the tracking and recording of samples collected for on-site or off-site analysis (chemical or geotechnical) during program activities (except wellhead samples taken for measurement of field parameters). Use of the Chain-of-Custody Record Form creates an accurate written record that can be used to trace the possession and handling of the sample from the moment of its collection through analysis. This procedure identifies the necessary custody records and describes their completion. This procedure does not take precedence over region specific or site-specific requirements for chain-of-custody.

III. Definitions

Chain-of-Custody Record Form - A Chain-of-Custody Record Form is a printed two-part form that accompanies a sample or group of samples as custody of the sample(s) is transferred from one custodian to another custodian. One copy of the form must be retained in the project file.

Custodian - The person responsible for the custody of samples at a particular time, until custody is transferred to another person (and so documented), who then becomes custodian. A sample is under one's custody if:

- It is in one's actual possession
- It is in one's view, after being in one's physical possession
- It was in one's physical possession and then they locked it up to prevent tampering
- It is in a designated and identified secure area

Sample - A sample is physical evidence collected from a facility or the environment, which is representative of conditions at the point and time that it was collected.

IV. Procedures

The term "chain-of-custody" refers to procedures which ensure that evidence presented in a court of law is valid. The chain-of-custody procedures track the evidence from the time and place it is first obtained to the courtroom, as well as providing security for the evidence as it is moved and/or passed from the custody of one individual to another.

Chain-of-custody procedures, recordkeeping, and documentation are an important part of the management control of samples. Regulatory agencies must be able to provide the chain-of-possession and custody of any samples that are offered for evidence, or that form the basis of analytical test results introduced as evidence. Written procedures must be available and followed whenever evidence samples are collected, transferred, stored, analyzed, or destroyed.

A. Sample Identification

The method of identification of a sample depends on the type of measurement or analysis performed. When in situ measurements are made, the data are recorded directly in bound logbooks or other field data records with identifying information.

Information which shall be recorded in the field logbook, when in situ measurements or samples for laboratory analysis are collected, includes:

- Field sampler(s)
- Contract task order number
- Project sample number
- Sample location or sampling station number
- Date and time of sample collection and/or measurement
- Field observations
- Equipment used to collect samples and measurements
- Calibration data for equipment used

Measurements and observations shall be recorded using waterproof ink.

B. Sample Label

Samples, other than for in situ measurements, are removed and transported from the sample location to a laboratory or other location for analysis. Before removal, however, a sample is often divided into portions, depending upon the analyses to be performed. Each portion is preserved in accordance with the Sampling and Analysis Plan. Each sample container is identified by a sample label (**Attachment 1**). Sample labels are provided, along with sample containers, by the analytical laboratory. The information recorded on the sample label includes:

- **Project:** Name of project site.
- **Sample Identification:** The unique sample number identifying this sample.
- **Date:** A six-digit number indicating the day, month, and year of sample collection (for example, 05/21/17).
- **Time:** A four-digit number indicating the 24-hour time of collection (for example: 0954 is 9:54 a.m., and 1629 is 4:29 p.m.).
- **Medium:** Water, soil, sediment, sludge, waste, etc.
- **Sample Type:** Grab or composite.
- **Preservation:** Type and quantity of preservation added.

- **Analysis:** Volatile organic analysis, bridged nucleic acids, polychlorinated biphenyls, pesticides, metals, cyanide, other.
- **Sampled By:** Printed name or initials of the sampler.
- **Remarks:** Any pertinent additional information.

The field team should always follow the sample ID system prepared by the Project Chemist and reviewed by the Project Manager.

C. Chain-of-Custody Procedures

After collection, separation, identification, and preservation, the sample is maintained under chain-of-custody procedures until it is in the custody of the analytical laboratory and has been stored or disposed.

D. Field Custody Procedures

- Samples are collected as described in the site Sampling and Analysis Plan. Care must be taken to precisely record the sample location and to ensure that the sample number on the label matches the Chain-of-Custody Record exactly.
- A Chain-of-Custody Record will be prepared for each individual cooler shipped and will include only the samples contained within that cooler. The Chain-of-Custody Record for that cooler will then be sealed in a plastic zipper-type bag and placed in the cooler prior to sealing. This ensures that the laboratory properly attributes trip blanks with the correct cooler and allows for easier tracking should a cooler become lost during transit.
- The person undertaking the actual sampling in the field is responsible for the care and custody of the samples collected until they are properly transferred or dispatched.
- When photographs are taken of the sampling as part of the documentation procedure, the name of the photographer, date, time, site location, and site description are entered sequentially in the site logbook as photos are taken. Once downloaded to the server or developed, the electronic files or photographic prints shall be serially numbered, corresponding to the logbook descriptions; photographic prints will be stored in the project files. To identify sample locations in photographs, an easily read sign with the appropriate sample location number should be included.
- Sample labels shall be completed for each sample, using waterproof ink unless prohibited by weather conditions (for example, a logbook notation would explain that a pencil was used to fill out the sample label if the pen would not function in freezing weather).

E. Transfer of Custody and Shipment

Samples are accompanied by a Chain-of-Custody Record Form. A Chain-of-Custody Record Form must be completed for each cooler and should include only the samples contained within that cooler. A Chain-of-Custody Record Form example is shown in **Attachment 2**. When transferring the possession of samples, the individuals relinquishing and receiving will sign, date, and note the time on the record. This record documents sample custody transfer from the sampler, often through another person, to the analyst in the laboratory. The Chain-of-Custody Record is filled out as given below:

- Enter header information (contract task order number, samplers, and project name).

- Enter sample specific information (sample number, media, sample analysis required and analytical method grab or composite, number and type of sample containers, and date/time sample was collected).
- Sign, date, and enter the time under “Relinquished by” entry.
- Have the person receiving the sample sign the “Received by” entry. If shipping samples by a common carrier, print the carrier to be used and enter the airbill number under “Remarks,” in the bottom right corner.
- Place the original (top, signed copy) of the Chain-of-Custody Record Form in a plastic zipper-type bag or other appropriate sample-shipping package. Retain the copy with field records.
- Sign and date the custody seal, a 1-inch by 3-inch white paper label with black lettering and an adhesive backing. **Attachment 3** is an example of a custody seal. The custody seal is part of the chain-of-custody process and is used to prevent tampering with samples after they have been collected in the field. Custody seals shall be provided by the analytical laboratory.
- Place the seal across the shipping container opening (front and back) so that it would be broken if the container were to be opened.
- Complete other carrier-required shipping papers.

The custody record is completed using waterproof ink. Any corrections are made by drawing a line through and initialing and dating the change, then entering the correct information. Erasures are not permitted.

Common carriers will usually not accept responsibility for handling Chain-of-Custody Record Forms; this necessitates packing the record in the shipping container (enclosed with other documentation in a plastic zipper-type bag). If custody forms are sealed inside the shipping container and the custody seals are intact, commercial carriers are not required to sign the custody form.

The laboratory representative who accepts the incoming sample shipment signs and dates the Chain-of-Custody Record, completing the sample transfer process. It is then the laboratory’s responsibility to maintain internal logbooks and custody records throughout sample preparation and analysis.

V. Quality Assurance Records

Once samples have been packaged and shipped, the chain-of-custody copy and airbill receipt become part of the quality assurance record.

VI. Attachments

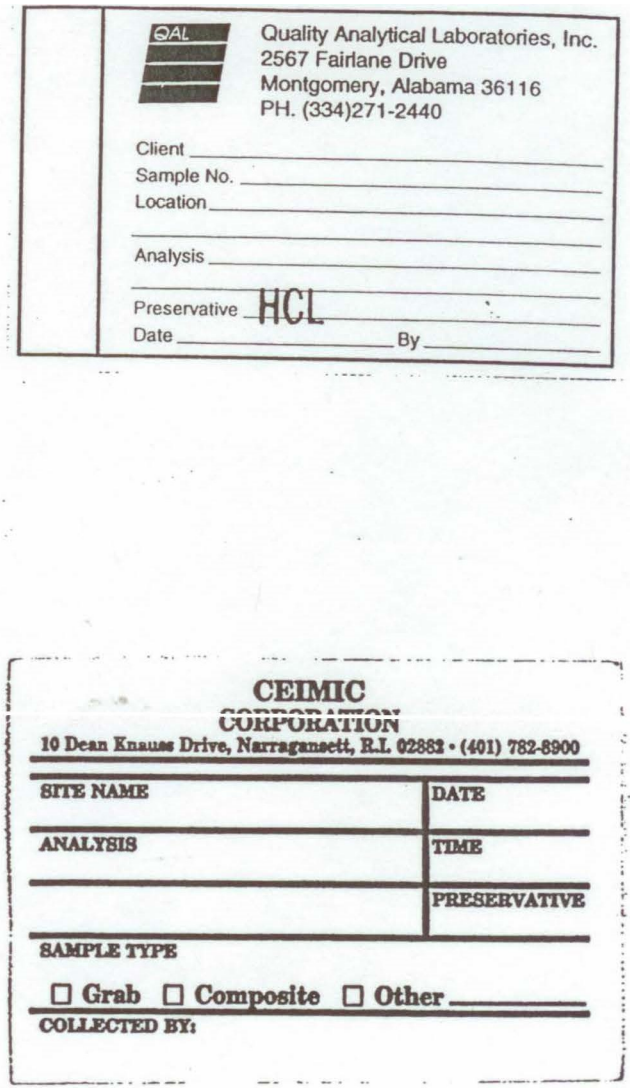
1 Sample Label
2 Chain-of-Custody Form
3 Custody Seal

VII. References

USEPA. User’s Guide to the Contract Laboratory Program. Office of Emergency and Remedial Response, Washington, D.C. (EPA/540/P-91/002), January 1991.

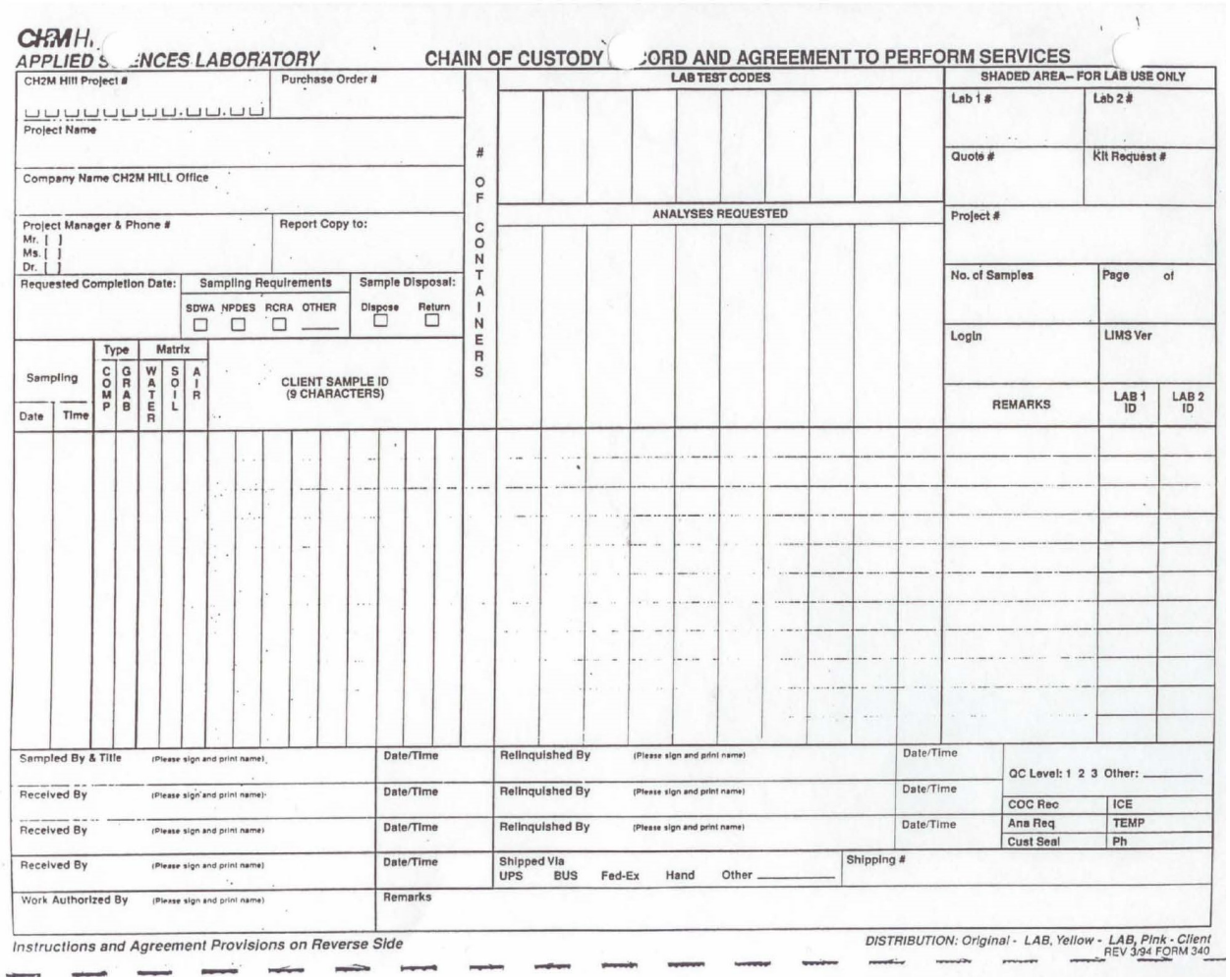
ATTACHMENT 1

Sample Label



ATTACHMENT 2

Chain-of-Custody Form



CH2M HILL
APPLIED SCIENCES LABORATORY

CHAIN OF CUSTODY RECORD AND AGREEMENT TO PERFORM SERVICES

CH2M Hill Project #
Purchase Order #
Project Name
Company Name CH2M HILL Office
Project Manager & Phone #
Mr. [ ]
Ms. [ ]
Dr. [ ]
Report Copy to:
Requested Completion Date:
Sampling Requirements: SDWA NPDES RCRA OTHER
Sample Disposal: Dispose Return

Sampling: Date | Time
Type: COMP GRAB
Matrix: WATER SOIL AIR
CLIENT SAMPLE ID (9 CHARACTERS)
OF CONTAINERS
LAB TEST CODES
ANALYSES REQUESTED

SHADED AREA– FOR LAB USE ONLY
Lab 1 # | Lab 2 #
Quote # | Kit Request #
Project #
No. of Samples | Page of
Login | LIMS Ver
REMARKS | LAB 1 ID | LAB 2 ID

Sampled By & Title (Please sign and print name) | Date/Time | Relinquished By (Please sign and print name) | Date/Time
Received By (Please sign and print name) | Date/Time | Relinquished By (Please sign and print name) | Date/Time
Received By (Please sign and print name) | Date/Time | Relinquished By (Please sign and print name) | Date/Time
Received By (Please sign and print name) | Date/Time | Shipped Via UPS BUS Fed-Ex Hand Other _____ | Shipping #
Work Authorized By (Please sign and print name) | Remarks

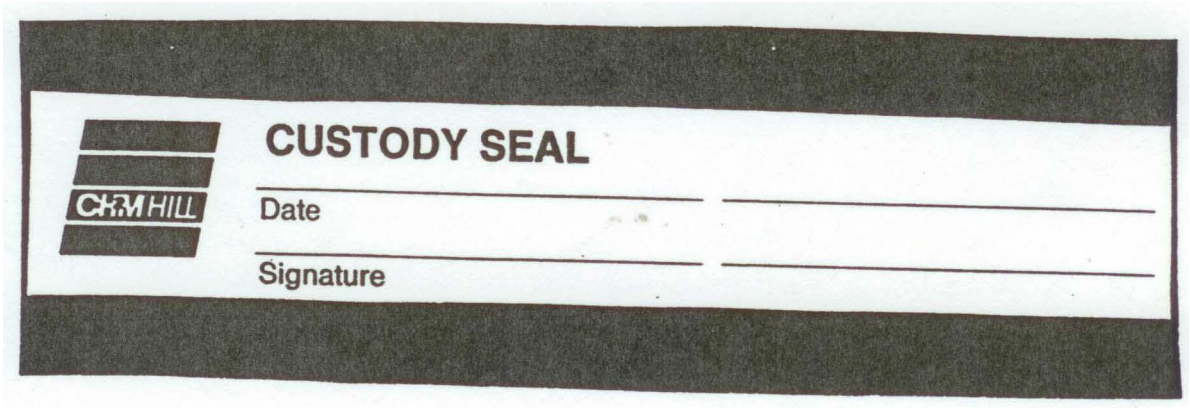
QC Level: 1 2 3 Other: _____
COC Rec | ICE
Ana Req | TEMP
Cust Seal | Ph

Instructions and Agreement Provisions on Reverse Side

DISTRIBUTION: Original - LAB, Yellow - LAB, Pink - Client
REV 3/94 FORM 340

ATTACHMENT 3

Custody Seal



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Homogenization of Soil and Sediment Samples

I. Purpose

The homogenization of soil and sediment samples is performed to minimize any bias of sample representativeness introduced by the natural stratification of constituents within the sample.

II. Scope

Standard techniques for soil and sediment homogenization and equipment are provided in this standard operating procedure. These procedures do not apply to aliquots collected for volatile organic compounds (VOCs) or field GC screening; samples for these analyses should NOT be homogenized.

III. Equipment and Materials

Sample containers, stainless steel spoons or spatulas, stainless steel pans, disposable scoop/trowel, and dedicated sealable bag.

IV. Procedures and Guidelines

Soil and sediment samples to be analyzed for semivolatiles, pesticides, polychlorinated biphenyls , metals, cyanide, or field XRF screening should be homogenized in the field. After a sample is taken, a stainless steel spatula or disposable plastic scoop should be used to remove the sample from the split spoon or other sampling device. The sampler should not use fingers to do this, as gloves may introduce organic interferences into the sample.

Samples for VOCs should be taken immediately upon collection and should not be homogenized.

Prior to homogenizing the soil or sediment sample, any rocks, twigs, leaves, or other debris should be removed from the sample. The sample should be placed in a decontaminated stainless steel pan and thoroughly mixed using a stainless steel spoon or disposable plastic scoop. The soil or sediment material in the pan should be scraped from the sides, corners, and bottom, rolled into the middle of the pan, and initially mixed. The sample should then be quartered and moved to the four corners of the pan. Each quarter of the sample should be mixed individually, and then rolled to the center of the pan and mixed with the entire sample again.

Alternatively, the contents of the scoop/trowel can be placed into dedicated sealable bag. The contents should then be thoroughly mixed by kneading the bag, breaking up any clods.

All stainless steel spoons, spatulas, and pans must be decontaminated following procedures specified in standard operating procedure *Decontamination of Personnel and Equipment* prior to homogenizing the sample. A composite equipment rinse blank of homogenization equipment should be taken each day it is used.

Shallow Soil Sampling

I. Purpose

To provide general guidelines for the collection and handling of surface soil samples during field operations.

II. Scope

The method described for surface soil sampling is applicable for loosely packed earth and is used to collect disturbed-soil samples.

III. Equipment and Materials

- Sample jars
- A hand auger or other device that can be used to remove the soil from the ground. Stainless steel is preferred. However, split spoons, which are most commonly available in carbon steel are acceptable for use only if they are not rusty.
- A stainless steel spatula or disposable plastic scoop should be used to remove material from the sampling device.
- Unpainted wooden stakes or pin flags
- Fiberglass measuring tape (at least 200 feet in length)
- GPS Unit (if available)

IV. Procedures and Guidelines

Wear protective gear, as specified in the Health and Safety Plan.

To locate samples, identify the correct location using the pin flags or stakes. Proceed to collect a sample from the undisturbed soil adjacent to the marker If markers are not present, the following procedures will be used.

For samples on a grid:

- Use measuring tape to locate each sampling point on the first grid line as prescribed in the sampling plan. As each point is located, drive a numbered stake in the ground and record its location on the site map and in the logbook.
- Proceed to sample the points on the grid line, as described below.
- Measure to location where next grid line is to start and stake first sample. For subsequent samples on the line take two orthogonal measurements: one to the previous grid line, and one to the previous sample on the same grid line.

- Proceed to sample the points on the grid line as described below. Repeat until all samples are collected from the area.
- Or, a GPS unit can be used to identify each location based on map coordinated, if available.

For non-grid samples:

- Use steel measuring tape to position sampling point at location described in the sampling plan by taking two measurements from fixed landmarks (for example, corner of house and fence post).
- Note measurements, landmarks, and sampling point on a sketch in the field notebook, and on a site location map.
- Proceed to sample as described below. Repeat until all samples are collected from the area.
- Or, a GPS unit can be used to identify each location based on map coordinated, if available.

To the extent possible, differentiate between fill and natural soil. If both are encountered at a boring location, sample both as prescribed in the field sampling plan. Do not locate samples in debris, tree roots, or standing water. In residential areas, do not sample in areas where residents' activities may impact the sample (for example, barbecue areas, beneath eaves of roofs, driveways, garbage areas). If an obstacle prevents sampling at a measured grid point, move as close as possible, but up to a distance of one half the grid spacing in any direction to locate an appropriate sample. If an appropriate location cannot be found, consult with the Field Team Leader (FTL). If the FTL concurs, the sampling point will be deleted from the program. The FTL will contact the project manager (PM) immediately. The PM and Navy Technical Representative will discuss whether the point should be deleted from the program. If it is deleted, the PM will follow-up with the Navy Technical Representative in writing.

To collect samples:

- Use a decontaminated stainless steel scoop/trowel or disposable plastic scoop to scrape away surficial organic material (grass, leaves, etc.) adjacent to the stake. New disposable scoops or trowels may also be used to reduce the need for equipment blanks.
- If sampling:
  - Surface soil: Obtain soil sample by scooping soil using the augering scoop/trowel, starting from the surface and digging down to a depth of about 6 inches, or the depth specified in the workplan.
  - Subsurface soil: Obtain the subsurface soil sample using an auger down to the depths prescribed in the field sampling plan.
- Take a photo ionization detector reading of the sampled soil if organics are anticipated to be present and record the response in the field notebook. Also record lithologic description and any pertinent observations (such as discoloration) in the logbook.
- Empty the contents of the scoop/trowel into a decontaminated stainless steel pan or dedicated sealable bag.
- Repeat this procedure until sufficient soil is collected to meet volume requirements.

- For target compound list (TCL) volatile organic compound and field GC aliquots, fill sample jars directly with the trowel or scoop or specialized sampling equipment (that is, Encore or Terra Core sampler) and cap immediately upon filling. DO NOT HOMOGENIZE.
- For TCL pesticides/polychlorinated biphenyls and semi-volatile organic compounds, target analyte list metals, and field X-ray fluorescence aliquots, homogenize cuttings in the pan using a decontaminated stainless steel utensil in accordance with standard of procedure *Decontamination of Drilling Rigs and Equipment*.
- For TCL polychlorinated biphenyls, soil samples should include rocks and hard chunks encountered. The extraction procedure may require that the lab screen the soil to eliminate rocks larger than 3/8 inch in diameter, but the criteria are too complicated to allow a decision to be made in the field.
- Transfer sample for analysis into appropriate containers with a decontaminated utensil.
- Immediately upon collection, all samples for chemical analysis are to be placed in a closed container on ice unless it is not possible to do so. Although unusual and uncommon, there may be instances where it is not possible to have containers with ice at the sample location. In these instances, the samples should be placed on ice as soon as practical and during the time between collection and placing the samples on ice, the samples should be kept as cool as possible.
- Backfill the hole with soil removed from the borehole. To the extent possible, replace topsoil and grass and attempt to return appearance of sampling area to its pre-sampled condition. For samples in non-residential, unmowed areas, mark the sample number on the stake and leave stake in place. In mowed areas, remove stake.

V. Attachments

None.

VI. Key Checks and Items

- Use phthalate-free latex or surgical gloves and other personal protective equipment
- Transfer volatiles first, avoid mixing
- Decontaminate utensils before reuse, or use dedicated, disposable utensils

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V. Attachments

None.

VI. Key Checks and Items

- Take VOC samples immediately and do not homogenize the soil.
- Homogenize soil for analyses other than VOCs in a clean, stainless steel bowl or dedicated sealable bag.

Soil Sampling During Excavations

I. Purpose and Scope

The purpose of this procedure is to provide guidelines for obtaining samples of subsurface soils during excavations, soil stockpiles, and import fill sources using hand tools or heavy equipment.

II. Equipment and Materials

- Stainless steel trowel, shovel, disposable plastic scoop, coring device, hand auger, or other appropriate hand tool
- Excavator with bucket
- Stainless steel pan or bowl or disposable sealable bags
- Sample bottles

III. Procedures and Guidelines

Wear protective gear, as specified in the Health and Safety Plan.

Before sampling begins, equipment will be decontaminated using the procedures described in standard of procedure (SOP) *Decontamination of Drilling Rigs and Equipment*. The sampling point is located and recorded in the field logbook. Debris should be cleared from the sampling location.

A. Surface and Shallow Subsurface Sampling by Hand Methods

Either a shovel, post-hole digger, or trowel, will be used to remove soil immediately above the interval to be sampled. Once the desired sample interval is exposed, a decontaminated sampling tool (shovel, post-hole digger, trowel, disposable plastic scoop, etc.) will be used to collect the sample. Soil that will be analyzed for semi-volatile organic compounds and inorganic analyses will be placed in a stainless steel sample bowl or disposable plastic scoop and will be homogenized using a stainless steel spoon or plastic disposable scoop. Procedures detailing the homogenization process are provided in SOP *Homogenization of Soil and Sediment Samples*. Note that during homogenization, pieces of gravel, asphalt, and metal should be removed as they do not make up the soil fraction of the sample and may produce erroneous results following chemical analysis. The homogenized sample will then be placed in the sample containers for chemical analysis. Soil samples that will be analyzed for volatile organic compounds will not be composited but will be placed directly into the sample containers for chemical analysis.

During sample collection, sampling personnel will also record the following information in a bound field notebook:

- Lithology of the material encountered including soil type, color, grain-size, moisture content, and a record of any foreign material encountered (concrete, asphalt, metal, plastic, etc.)

- Sampling interval
- Date and time the sample was collected
- Results of screening measurements (that is, photo ionization detector, etc.)
- Presence of odors or staining

Logbook entry procedures are described in detail in SOP *Preparing Field Log Books.*

B. Sampling Using Excavator Bucket

The following procedures will be used when collecting soil samples from the bucket of an excavator:

- Using an excavator bucket, scoop a volume of soil from the sampling location which is large enough to collect sample soil that did not come into direct contact with the surfaces of the bucket.
- Once the soil is removed, use a decontaminated trowel or shovel to remove the upper few inches of soil in the center of the bucket to expose a "fresh" sample. Once exposed use a decontaminated trowel, spoon, disposable plastic scoop, or shovel to collect a soil sample for chemical analysis. Samples collected for volatiles analysis should be placed directly into the sample containers. Material for samples for all other parameters should be removed to a decontaminated stainless steel bowl, tray, or disposable sealable bag. Samples that will be analyzed for semi-volatile organic compounds and inorganic will be homogenized as previously described in Section A, and follow the procedures provided in SOP *Homogenization of Soil and Sediment Samples*.

Additionally, the logbook entry procedures summarized in Section A and detailed in SOP *Preparing Field Log Books* will be followed during sample collection.

C. Stockpile and Import Fill Sampling

1. Procedure for Collecting Volatile Fractions

   Using an auger, split spoon, or other device, retrieve a core from the stockpile or borrow source area to be sampled. Remove the core from the auger, split spoon, or other device and place the sample into a pre-preserved volatile organic analysis vial using a **Terra Core®** sampler or direct sample container such as an **En Core®** sampler and seal the cap tightly. Ideally, the operation should be completed in one minute. After filling the required volatile organic analysis vials, fill a 4-ounce jar with the remaining core sample. (This will be used by the laboratory to determine percent moisture.) Label the vials and place on ice for shipment to the laboratory.

2. Procedure for Collecting Non-Volatile Samples

   From five randomly selected sample locations, use a stainless steel spoon to collect equal amounts of soil for the required samples and place the soils into a stainless steel bowl or tray. The volume of soil collected should be sufficient to completely fill all sample containers requested by the laboratory. Homogenize the five samples by following the procedures

provided in SOP *Homogenization of Soil and Sediment Samples*. Fill each required sample container with the required volume of homogenized soils. Complete the sample labels and place the sample containers on ice for shipment to the laboratory.

IV. Attachments

None.

V. Key Checks and Preventative Maintenance

- Check that decontamination of equipment is thorough.

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Soil Sampling for Volatile Organic Compounds

I. Purpose and Scope

The purpose of this procedure is to provide guidelines for obtaining samples of surface and subsurface soils using a low-concentration volatile organic compound sampling device.

II. Equipment and Materials

- The EnCore Sampler 5g or 25g versions, Terra Core Sampler, or equivalent
- T-handle with a plunger
- 40 milliliters (mL) VOA vials
- Laboratory approved wide mouth jar
- Field logbook
- Shovel, post-hole digger or other tool

III. Procedures and Guidelines

Wear protective gear, as specified in the Health and Safety Plan.

The sampling point is located and recorded in the field logbook. Debris should be cleared from the sampling location. The soil sample is collected, stored, and delivered in a sealed, headspace-free state when using the EnCore Sampler. The Terra Core Sampler collects a plug of soil that is then immediately preserved in the field in a 40-mL vial.

A. Surface and Shallow Subsurface Sampling

A shovel, post-hole digger, or other tool can be used to remove soil to a point just above the interval to be sampled. Quickly collect a soil sample using the sampling device by pushing the T-handle with the sampler attached directly straight down into the soil. As the soil is collected in the sampler, the plunger on the sampler will be pushed up. Refer to the individual sampling device documentation to determine the appropriate sample level in the sampling device. When using any low-concentration sampling device, make sure that the area to be sampled is free of stones or other objects that may hinder the advancement of the sampler. Immediately cap or transfer the sample to the 40-mL vial as soon as it is collected. Fill out a label and attach to sampler or vial. Immediately upon collection, all samples for chemical analysis are to be placed in a closed container on ice unless it is not possible to do so. Although unusual and uncommon, there may be instances where it is not possible to have containers with ice at the sample location. In these instances, the samples should be placed on ice as soon as practical and during the time between collection and placing the samples on ice, the samples should be kept as cool as possible.

The soils removed from the borehole should be logged using the Unified Soil Classification System or other acceptable method including visual descriptions such as depth, odor, staining, etc. in the field logbook.

When sampling is completed, photo ionization device readings should be taken directly above the hole and recorded in the logbook, and the hole is then backfilled.

B. Split Spoon Sampling

Using a drilling rig, augers will be advanced in the borehole to the desired depth. For split spoon sampling, the samples are then collected following the ASTM D 1586 standard (refer to standard operating procedure for *Soil Boring Drilling and Abandonment* or *Logging of Soil Borings* for this ASTM). The split spoon sampler is lowered into the hole and driven to a depth equal to the total length of the sampler; typically, this is 24 inches. The sampler is driven in 6-inch increments using a 140-pound weight ("hammer") dropped from a height of 30 inches. The number of hammer blows for each 6-inch interval is counted and recorded in the field logbook. To obtain enough volume of sample for subsequent laboratory analysis, use of a 3-inch ID sampler may be required. Blow counts obtained with a 3-inch ID spoon would not conform to ASTM D 1586 and would, therefore, not be used for geotechnical evaluations.

Once retrieved from the hole, the sampler is carefully split open. Care should be taken not to allow material in the sampler to fall out of the open end of the sampler. To collect the sample, the surface of the sample should be removed with a disposable or decontaminated spoon or equivalent in order to avoid the possibility of cross contamination from the split spoon sampler. Samples collected for volatiles analysis should be collected directly from the desired depth in the split spoon. Immediately upon collection, all samples for chemical analysis are to be placed in a closed container on ice unless it is not possible to do so. Although unusual and uncommon, there may be instances where it is not possible to have containers with ice at the sample location. In these instances, the samples should be placed on ice as soon as practical and during the time between collection and placing the samples on ice, the samples should be kept as cool as possible.

Split spoon samples also will be collected using a tripod rig. When using a tripod rig the soil samples are collected using an assembly similar to that used by the drilling rig.

C. Direct Push Soil Sampling

Drive sampling tube to the desired sampling depth using the truck-mounted hydraulic percussion hammer. If soil above the desired depth is not to be sampled, first drive the lead rod, without a sampling tube, to the top of the desired depth. Once the desired depth is reached, remove the rods, attach the sampling tube, and drive down into the desired sampling interval. Remove the rods and sampling tube from the borehole and remove the sampling tube from the lead rod.

Cut open the acetate liner using a specific knife provided by the drilling subcontractor designed to slice the acetate liners. To collect the sample, the surface of the sample should be removed with a disposable or decontaminated spoon or equivalent in order to avoid the possibility of cross contamination from the direct push sampling device. Samples collected for volatiles analysis should be placed directly into the sample containers from the desired depth in the acetate liner. Immediately upon collection, all samples for chemical analysis are to be placed in a closed container on ice unless it is not possible to do so. Although unusual and uncommon, there may be instances where it is not possible to have containers with ice at the sample location. In these instances, the samples should be placed on ice as soon as practical and during the time between collection and placing the samples on ice, the samples should be kept as cool as possible.

IV. Attachments

- EnCore Sampler User's Manual
- TerraCore Sampler User's Manual

V. Key Checks and Preventative Maintenance

- Check that sample collection is swift to avoid loss of volatile organics during sampling.

VI. References

ASTM D1586 / D1586M-18, Standard Test Method for Standard Penetration Test (SPT) and Split-Barrel Sampling of Soils, ASTM International, West Conshohocken, PA, 2018, www.astm.org

Attachment 1

EnCore Sampler User's Manual

Disposable En Core® Sampler

Sampling Procedures

Using The En Core® T-Handle

En Novative Technologies, Inc.
1795 Industrial Drive
Green Bay, WI 54302
Phone: 920-465-3960 • Fax: 920-465-3963
Toll Free: 888-411-0757
www.ennovativetech.com

NOTE:

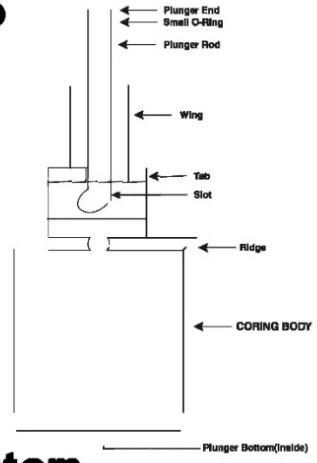
1. En Core® Sampler is a SINGLE USE device. It cannot be cleaned and/or reused.

2. En Core® Sampler is designed to store soil. Do not use En Core Sampler to store solvent or free product!

3. En Core® Sampler must be used with En Core® T-Handle and/or En Core® Extrusion Tool exclusively. (These items are sold separately.)

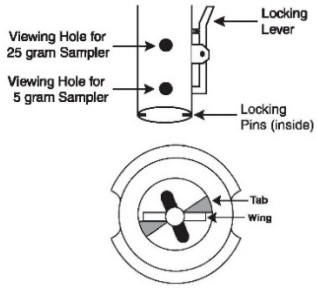
En Core®

Top



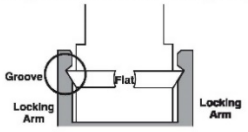
Bottom

En Core® T-Handle



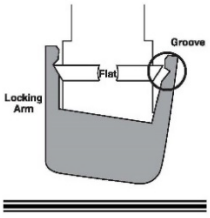
Sampler Correctly Capped

(Locking arm grooves seated over coring body ridge.)



Sampler Incorrectly Capped

(Cap appears crooked; locking arm grooves not fully seated over coring body ridge.)



BEFORE TAKING SAMPLE:

1. Hold **coring body** and push **plunger rod** down until **small o-ring** rests against **tabs**. This will assure that plunger moves freely.

2. Depress **locking lever** on En Core T-Handle. Place coring body, **plunger end first**, into open end of T-Handle, *aligning the (2)* ***slots*** *on the coring body with the (2)* ***locking pins*** *in the T-Handle*. Twist coring body clockwise to lock pins in slots. Check to ensure Sampler is locked in place. Sampler is ready for use.

TAKING SAMPLE:

3. Turn T-Handle with T-up and coring body down. This positions plunger bottom flush with bottom of coring body (ensure that plunger bottom is in position). Using T-Handle, push Sampler into soil until coring body is completely full. When full, small o-ring will be centered in T-Handle **viewing hole**. Remove Sampler from soil. Wipe excess soil from coring body exterior.

4. Cap coring body while it is still on T-handle. *Push* **cap** over **flat** area of **ridge** *and twist* to lock **cap** in place. **CAP MUST BE SEATED TO SEAL SAMPLER (see diagram)**.

PREPARING SAMPLER FOR SHIPMENT:

5. Remove the capped Sampler by depressing locking lever on T-Handle while twisting and pulling Sampler from T-Handle.

6. Lock plunger by rotating extended plunger rod fully counter-clockwise until **wings** rest firmly against tabs (see plunger diagram).

7. Attach completed tear-off label (from En Core Sampler bag) to cap on coring body.

8. Return full En Core Sampler to zipper bag. Seal bag and put on ice.

Disposable En Core® Sampler

EXTRUSION PROCEDURES

USING THE En Core® EXTRUSION TOOL

CAUTION! Always use the Extrusion Tool to extrude soil from the En Core Sampler. If the Extrusion Tool is not used, the Sampler may fragment, causing injury.

1. To attach En Core Sampler to En Core Extrusion Tool: Depress locking lever on Extrusion Tool and place Sampler, plunger end first, into open end of Extrusion Tool, aligning slots on coring body with pins in Extrusion Tool. Turn coring body clockwise until it locks into place. Release locking lever.

2. Rotate and gently push Extrusion Tool plunger knob clockwise until plunger slides over wings of coring body. (When properly positioned plunger will not rotate further.)

3. Hold Extrusion Tool with capped Sampler pointed upward so soil does not fall out when cap is removed. Remove cap from Sampler by rotating cap until locking arms are aligned with the flat area of ridge and pull cap off. To release soil core push down on plunger knob of En Core Extrusion Tool. Remove and properly dispose of En Core Sampler.

Warranty and Disclaimers

IMPORTANT: FAILURE TO USE THE EN CORE* SAMPLER IN COMPLIANCE WITH THE WRITTEN INSTRUCTIONS PROVIDED HEREIN VOIDS ALL EXPRESS AND IMPLIED WARRANTIES, INCLUDING WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

PRINCIPLE OF USE. The En Core Sampler Cartridge System is a volumetric sampling system designed to collect, store and deliver a soil sample. The En Core Sampler comes in two sizes for sample volumes of approximately 25 or 5 grams. There are four components: the cartridge with a movable plunger; a cap with two locking arms; a T-handle (purchased separately); and an extrusion handle (purchased separately). NOTE: The En Core Sampler is designed to store soil. It is not designed to store solvent or free product.

The soil is stored in a sealed headspace-free state. The seals are achieved by three special Viton® * o-rings, two located on the plunger and one on the cap of the Sampler. At no time and under no condition should these o-rings be removed or disturbed.

QUALITY CONTROL. The cartridge is sealed in an airtight package to prevent contamination prior to use. Due to the stringent quality control requirements associated with the use of this system, the disposable cartridge is designed to be used only once.

WARRANTY. En Novative Technologies, Inc. ("En Novative Technologies") warrants that the En Core Sampler shall perform consistent with the research conducted under En Novative Technologies' approval, within thirty (30) days from the date of delivery, provided that the Customer gives En Novative Technologies prompt notice of any defect or failure to perform and satisfactory proof thereof. THIS WARRANTY DOES NOT APPLY TO THE FOLLOWING, AS SOLELY DETERMINED BY EN NOVATIVE TECHNOLOGIES: (a) Damage caused by accident, abuse, mishandling or dropping; (b)Samplers that have been opened, taken apart or mishandled; (c)Samplers not used in accordance with the directions; and (d)Damages exceeding the cost of the sampler. Seller warrants that all En Core Samplers shall be free from defects in title. THE FOREGOING WARRANTIES ARE IN LIEU OF ALL OTHER WARRANTIES, WHETHER ORAL, WRITTEN, EXPRESSED, IMPLIED OR STATUTORY, INCLUDING ANY INFORMATION PROVIDED BY SALES REPRESENTATIVES OR IN MARKETING LITERATURE. IMPLIED WARRANTIES OF FITNESS AND MERCHANTABILITY SHALL NOT APPLY. En Novative Technologies' warranty obligations and Customer's remedies, except as to title, are solely and exclusively as stated herein.

LIMITATION OF LIABILITY. IN NO EVENT SHALL EN NOVATIVE TECHNOLOGIES BE LIABLE FOR ANTICIPATED PROFITS, INCIDENTAL, SPECIAL OR CONSEQUENTIAL DAMAGES, INCLUDING, BUT NOT LIMITED TO, DAMAGES FOR LOSS OF REVENUE, DOWN TIME, REMEDIATION ACTIVITIES, REMOBILIZATION OR RESAMPLING, COST OF CAPITAL, SERVICE INTERRUPTION OR FAILURE OF SUPPLY, LIABILITY OF CUSTOMER TO A THIRD PARTY, OR FOR LABOR, OVERHEAD, TRANSPORTATION, SUBSTITUTE SUPPLY SOURCES OR ANY OTHER EXPENSE, DAMAGE OR LOSS, INCLUDING PERSONAL INJURY OR PROPERTY DAMAGE. En Novative Technologies' liability on any claim of any kind shall be replacement of the En Core Sampler or refund of the purchase price. En Novative Technologies shall not be liable for penalties of any description whatsoever. In the event the En Core Sampler will be utilized by Customer on behalf of a third party, such third party shall not occupy the position of a third-party beneficiary of the obligation or warranty provided by En Novative Technologies, and no such third party shall have the right to enforce same. All claims must be brought within one (1) year of shipment, regardless of their nature.

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* Viton® is a registered trademark of DuPont Dow Elastomers.

TerraCore Sampler User's Manual

En Novative Technologies, Inc.

Recommended Use Of The Terra Core®

NOTE: The Terra Core® Sampler is a single use device. It cannot be cleaned and/or reused.

Step 1

Have ready a 40ml glass VOA vial containing the appropriate preservative. With the plunger seated in the handle, push the Terra Core® into freshly exposed soil until the sample chamber is filled. A filled chamber will deliver approximately 5 or 10 grams of soil.

Step 2

Wipe all soil or debris from the outside of the Terra Core® sampler. The soil plug should be flush with the mouth of the sampler. Remove any excess soil that extends beyond the mouth of the sampler.

Step 3

Rotate the plunger that was seated in the handle top 90° until it is aligned with the slots in the body. Place the mouth of the sampler into the 40ml VOA vial containing the appropriate preservative and extrude the sample by pushing the plunger down. Quickly place the lid back on the 40ml VOA vial. **Note:** When capping the 40ml VOA vial, be sure to remove any soil or debris from the top and/or threads of the vial.

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En Novative Technologies, Inc.

Terms and Conditions of Sale

1. Acceptance ALL SALES ARE SUBJECT TO AND EXPRESSLY CONDITIONED UPON THE TERMS AND CONDITIONS CONTAINED HEREIN. NO VARIATION OF THESE TERMS AND CONDITIONS WILL BE BINDING UPON SELLER, UNLESS AGREED TO IN WRITING AND SIGNED BY AN OFFICER OR OTHER AUTHORIZED REPRESENTATIVE OF SELLER. IF THESE TERMS AND CONDITIONS ARE NOT ACCEPTABLE TO BUYER, BUYER MUST SO NOTIFY SELLER IMMEDIATELY IN WRITING.
2. Terms Delivery, Delays. Unless otherwise specified, terms are net 30 days from the date of invoice, F.O.B. shipping point, freight prepaid and added. All prices are subject to change without notice. Stenographic, clerical and computer errors are subject to correction. If financial condition of Buyer results in the insecurity of Seller, in Seller's sole discretion, as to the ultimate collectibility of the purchase price, Seller may, without notice to Buyer, delay or postpone the delivery of goods, and Seller at its option, is authorized to change the terms of payment to payment in full or in part in advance of shipment of the entire undelivered balance of said goods. Buyer agrees to pay all costs, including but not limited to, reasonable attorney and accounting fees and other expenses of collection resulting from any default by Buyer in any of the terms hereof. All risk of loss or damage during shipping shall be borne by Buyer. Seller reserves the right, in its discretion, to determine the exact method of shipment. Seller reserves the right to make delivery in installments, all such installments to be separately invoiced and paid for when due per invoice, without regard to subsequent deliveries. Delay in delivery of any installment shall not relieve Buyer or Buyer's obligation to accept remaining deliveries. Immediately upon Buyer's receipt of any goods shipped hereunder, Buyer shall inspect the same and shall notify Seller in writing of any claims for shortages, defects or damages and shall hold the goods for Seller's written instructions concerning disposition. Seller shall not be liable for any loss, damage or penalty as a result of any delay in or failure to manufacture, deliver or otherwise perform hereunder due to any cause beyond Seller's reasonable control, including, without limitation, strikes or labor difficulties, acts or omissions of any governmental authority or Buyer, accident, insurrection or riot, fires, floods or other acts of God, breakdowns of essential equipment, priorities or embargoes, shortages, delays in transporta tion, or inability to obtain necessary labor, fuel, materials, supplies or power at current prices or from usual sources.
3. Allocation of Goods. If Seller is unable for any reason to supply the total demands for goods specified in Buyer's order, Seller may allocate its avail able supply among any or all buyers on such basis as Seller may deem fair and practical, without liability for any failure of performance which may result therefrom.
4. Taxes and Other Charges. Any use tax, sales tax, excise tax, or any other tax, fee or charge of any nature whatsoever imposed by any governmental authority, on or measured by the transaction between Seller and Buyer, shall be paid by Buyer in addition to the prices quoted or invoiced.
5. Warranty. SELLER MAKES NO WARRANTIES REGARDING THE TERRA CORE™ SAMPLER, WHETHER ORAL, WRITTEN, EXPRESS, IMPLIED OR STATUTORY, INCLUDING ANY INFORMATION PROVIDED BY SALES REPRESENTATIVES IN MARKETING LITERATURE, DIRECTIONS FOR USE, OR ANY OTHER INFORMATION SUPPLIED WITH THE SAMPLER. IMPLIED WARRANTIES OF FITNESS AND MERCHANTABILITY SHALL NOT APPLY. Seller's warranty obligations and Buyer's remedies are solely and exclusively as stated herein. FURTHERMORE, SELLER SPECIFICALLY DISCLAIMS ANY WARRANTIES RELATING TO SAMPLE QUALI TY OR SAMPLE PRESERVATION. SELLER DOES NOT WARRANT THAT THE USE OF THE TERRA CORE™ SAMPLER WILL RESULT IN COMPLIANCE WITH ANY SAMPLING METHODS OUTLINED BY ANY REGULATORY BODY. SELLER DOES NOT WARRANTY OR GUARANTEE SAMPLING RESULTS.
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7. Returns. Written authorization must be obtained from Seller prior to returning any goods. Buyer shall strictly comply with Seller's return shipment instructions. Returned goods will be subject to a restocking charge.
8. Technical Assistance. At Buyer's request, Seller may, at Seller's discretion, furnish technical assistance and information with respect to Seller's products. SELLER MAKES NO WARRANTIES OF ANY KIND OR NATURE, EXPRESS OR IMPLIED, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, WITH RESPECT TO TECHNICAL ASSISTANCE OR INFORMATION PROVIDED BY SELLER OR SELLER'S REPRESENTA TIVES. ANY SUGGESTIONS BY SELLER REGARDING USE, SELECTION, APPLICATION OR SUITABILITY OF THE SAMPLER SHALL NOT BE CONSTRUED AS AN EXPRESS WARRANTY OF ANY KIND, INCLUDING COMPLIANCE WITH ANY SAMPLING METHODS OUTLINED BY ANY REGULATORY BODY, UNLESS SPECIFICAL LY DESIGNATED AS SUCH IN A WRITING SIGNED BY AN OFFICER OF SELLER.
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10. Governing Law. All disputes relating to the terms hereof, performance of this order or any other claim related to Seller's goods shall be governed by the laws of the State of Wisconsin; provided, however, construction shall be without regard to any rule or presumption requiring construction against the party causing this agreement to be drafted. Buyer and Seller agree that any dispute arising between them which results in either party institut ing court proceedings that such action will be maintained in the Circuit Court for Brown County, Wisconsin.

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