

START

RELEASE INSTRUCTIONS (RI)

DOCUMENT NO.:

WHC-CM-7-7

PAGE 1 OF 2

TO: DEBRA A ISOM
H6-08

0176

TITLE: Environmental Investigations and
Site Characterization

RELEASE NO.: 97

DATE PREPARED: 07/31/95

I have entered this release into the document per instructions.

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DA Isom

8/9/95

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INSTRUCTIONS

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	PAGES	REV	DATE	PAGES	REV	DATE
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RELEASE INSTRUCTIONS (RI)

DOCUMENT NO.:

WHC-CM-7-7

PAGE 2 OF 2

IMPLEMENTATION NOTICE

(ROUTE A COPY OF THE IMPLEMENTATION NOTICE TO ALL USERS OF THIS COPY OF THE MANUAL)

EII 1.5, Field Logbooks, Rev 6:

EII reformatted to current controlled manual (CM) standards. The EII has been modified to accommodate several organization's needs. Major changes:

1. The requirement that field logbooks must be used only for the project/activity identified by the field logbook title has been removed at the request of S&ML. Even though this may not be stated in the procedure, logbooks are always given a title when issued from WHC Unclassified Document Control or, if issued from the HTS logbook custodian located at 2440 Stevens, they are given a subject/activity/title.
2. The requirement for weekly copying has been modified to state that logbooks (based on value of the data or designated as QA records) may either be copied weekly or copied at the end of a project. Depending on organization needs and value of the logbook, weekly copying works well for some organizations. The weekly copies (when the logbook is in use) are given to the HTS logbook custodian. For other organizations, like S&ML, copying at the end of the project seems to be more practical. See Section 5.1 item 10, 11 and Note.
3. The step for assignee entering signature, initials and printed name in the front of a newly issued logbooks has been modified to accommodate needs of S&ML. See Section 5.1, item 3.
4. The records table in Section 6 was modified to accommodate field logbooks that are considered "records" not "QA records."

Impact: Updated procedure reflects current operating practices.

Page Count: From 7 to 6 pages.

EII 5.5, Laboratory Cleaning of RCRA/CERCLA Sampling Equipment, Rev 3, Change 1:

No technical changes made, procedure reformatted, designated reviewing organization section added.

Page Count: From 4 to 3 pages.

EII 5.8, Groundwater Sampling, Rev 4, Change 1:

Changes needed to clarify wording and describe new sampling practice of checking calibration at each well.

EII 10.2, Measurement of Groundwater Levels, Rev 3, Change 2:

Procedure revised to meet current operating practices and reformat to current CM standards.

Page count: From 10 to 8 pages.

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ICA = INSTRUCTION CHANGE AUTHORIZATION, (P) = PERMANENT (BLUE SHEET), (T) = ONE TIME (GOLDENROD SHEET)

Field Logbooks**1.0 PURPOSE**

This Environmental Investigations Instruction (EII) establishes the methods for acquisition, control, entry and disposition of field logbooks.

2.0 SCOPE

This EII applies to field logbooks maintained to provide a narrative sequence of events, observations and measurements (not required to be recorded elsewhere) during field sampling, environmental site characterization, investigations, or related events.

3.0 REQUIREMENTS**Field Logbook(s):**

1. Must be bound and uniquely numbered with sequentially numbered pages.
2. Custody requirements must be maintained by anyone who has possession of the field logbook(s), (i.e., user, File Custodian (FC), auditor.)
3. Entries and corrections shall be legibly written using permanent, reproducible black ink and be complete, factual, detailed and objective.
4. Entries should be recorded as the event progresses. All entries shall be recorded within five (5) working days from the end of each sampling event.

NOTE: Field logbook entries should not take precedence over performing and controlling the activities.

5. Changes and/or corrections shall be made by user or cognizant scientist/field team leader by lining through the entry (e.g., errors) and when required adding corrected information. The change and/or correction and any added information shall include the date and identification of the person making the change/correction.

NOTE: Erroneous information is not to be obliterated. The controlled field logbook (or any portion thereof) is not to be destroyed or thrown away, even if it is illegible or contains inaccuracies that require annotation.

6. Changes and/or corrections required after a completed logbook has been transmitted to IRM for permanent storage require transmittal of a changed/corrected copy of the originally transmitted page(s) as a "supplemental" record in accordance with WHC-CM-3-5, *Document Control and Records Management*, Section 9.

* Various changes were made throughout the procedure, therefore, revision bars were not used.

Field Logbooks

7. Must provide sufficient data and observations to enable participants to reconstruct events and to refresh the memory of field personnel if called upon to give testimony during legal proceedings.
8. Attachments (photos, forms) must be securely attached, initialed and dated to show if tampering has taken place, the number of attachments on a page must be indicated, be maintainable a minimum of 25 years, and provide acceptable copies.
9. Unused portions of pages and the page following the last page used (when applicable) at the end of the project must be lined through, initialed and dated to provide objective evidence that further entries were not required.
10. Identify by number (on page 1 or on the last page or back inside spine) previous and subsequent field logbooks used for a continuing project (when applicable and known).
11. Must be returned to the File Custodian when no further entries are needed at project completion to meet record retention requirements.
12. Retention requirements are specified in Section 6.0.

5.0 PROCEDURE

Obtaining Field Logbooks

NOTE: Purchases other than store stock logbook(s) or controlled logbooks from Document Control will be submitted to the File Custodian for assignment.

- | | |
|----------------|--|
| Assignee | 1. Contact the File Custodian to request a field logbook when needed and furnish the following information: <ol style="list-style-type: none">a. Full name of the assignee who will be responsible for maintenance and control of the field logbook.b. The field logbook number and project the logbook will be used for. |
| File Custodian | 2. Assign the field logbook by ensuring the information requested in a & b from item 1 above is entered on the field logbook and on the sign-in/out sheet. |

Maintenance and Control of Field Logbooks

- | | |
|----------|--|
| Assignee | 3. Upon receipt of the field logbook, affix signature and initials adjacent to the printed name (for traceability) before beginning entries. |
|----------|--|

NOTE: If the organization maintains a signature/initial log, step 3 above may be skipped.

- | | |
|---------------------|---|
| Field Team/Assignee | 4. All members of the field team may use the field logbook at the discretion of the assignee. |
|---------------------|---|

Field Logbooks

Assignee/Cog Manager 5. Return the field logbook to the File Custodian at the end of the project or if the assignee leaves the project.

Assignee/FC/Auditor/User 6. Maintain custody by having the field logbook:

- a. In their physical possession.
- b. Under direct observation
- c. Secured so that no tampering can occur.
- d. Secured in an area where access is restricted to authorized personnel only.

NOTE: The term secured refers to such things as locked in a file cabinet, locked in the individual's desk, locked in the field vehicle during working hours, out of sight in the individual's office, when in a limited access building.

Assignee/User 7. Ensure that sufficient information for the field activity is provided in the field logbook to refresh the memory of field personnel if called upon to give testimony during legal proceedings.

8. Refer to Appendix A for additional entry considerations.

9. Field logbooks require signature or initial and date

a. At the beginning and end of each entry by each user.

b. At the bottom of each page written on by the user.

NOTE: The printed name, signature, and initials of the assignee and users must appear in a signature logbook and/or in the logbook for verification purposes.

NOTE: If the field logbook is designated as a Quality Assurance record, items 10 and 11 apply, if it is not, skip to item 12.

10. Each week the logbook is in use, provide copies of sheets used to the file custodian. Or, upon project or activity completion, copy the used sheets and file in the project file (i.e., SAF file).

11. When the project is completed or the logbook is no longer needed, return it to the File Custodian.

NOTE: Making frequent copies of used pages in field logbooks is considered a prudent task commensurate to the value of the logbook data. If the logbook were lost, destroyed, received water damage, the data would be retrievable on the copied pages.

Field Logbooks

- File Custodian 12. The File Custodian acknowledges receipt of the returned logbook by signing and dating the sign-in/out sheet.
- Assignee 13. When all pages have been used or no further entries will be made, the assignee transmits completed field logbook(s) to the File Custodian for transmittal to the IRM in accordance with approved RIDS.
- File Custodian 14. Provide receipt acknowledgement to the assignee.
- 15. Transmit field logbook(s) to IRM in accordance with WHC-CM-3-5, Section 5, for storage.
- 16. A copy of the logbook pages pertaining to the specific project shall be kept in the appropriate field file.
- Assignee/Cog Scientist/Engineer 17. Review logbooks and identify or notify the user of changes and/or corrections required to complete field logbook(s).
- 18. Make necessary changes/corrections in accordance with Section 4.0, item 6 of this EII.

6.0 RECORDS

Record processing and disposition is in accordance with the following table.

Name, Filing Unit Title or Description	Record Type*	Retention Period	Disposal Authority	Cut-off and Retirement Instructions
Field Logbooks	R	TBD (depending on assignees RIDS)	TBD	Retain copy in project/activity file. File custodian will transmit logbook to Document Control for retention per the RIDS.
Field Logbooks	QA	TPA + 10 years	DRS 1.8.c (Force Fit) TBD	Submit copies of used pages to FC on a weekly basis or at project completion. When no further entries are required or when no longer needed, submit logbook to FC for transmittal to permanent storage. A copy should be placed copy in project file.

* QA = Quality Assurance R = Record Material

7.0 DESIGNATED REVIEWING ORGANIZATION

The organization designated to review changes to this document is Hanford Technical Services, process owner. Comments from other organizations are welcome; however, are dispositioned at the option of HTS.

8.0 REFERENCES

WHC-CM-3-5, *Document Control and Records Management.*

Section 5, "Records Storage, Retrieval, and Destruction."

Section 9, "Quality Assurance Records."

Section 12.8, "Controlling Field, Laboratory, and Facility Notebooks/Logbooks."

APPENDIX A
FIELD LOGBOOK ENTRY CONSIDERATIONS

This list is intended to provide the field logbook user with a means of identifying information that may be necessary to include in the logbook without relying strictly on the field logbook user's memory. It is the responsibility of the user to provide sufficient information in the field logbook to reconstruct events that are applicable to the activities performed. Therefore the information needed in the field logbook should be factual, detailed and objective to allow this reconstruction of events. Any one logbook might not contain all these items.

Many of the general topics are discussed further in EIIs that specify the required information to be recorded in the field logbook. These EIIs also identify controlled forms to be used for recording specific items. The controlled forms completed during the field activities (e.g., field activity report numbers) may be referenced.

1. Names, titles, and responsibilities of individuals involved in the field activity.
2. Type and purpose of field activity.
3. Title and identification number (including revision number) of the controlling document(s) to which the work is being performed.
4. Site map, sketch, or other definitive site description.
5. Documentation of safety meetings and field meetings.
6. Field decontamination of equipment and personnel.
7. Decontamination of equipment prior to arrival onsite.
8. Field observations such as weather conditions.
9. Equipment identification numbers.
10. Condition of equipment (if notably poor).
11. Instrument calibration information.
12. Field problems, solutions, corrective actions and reference to Instruction Change Authorizations (ICAs) approved, if any.
13. Attachments such as photographs.
14. Visitors to the site and/or tours of the site.
15. Documentation of safety surveys (i.e., radiological, metal detector, underground utilities, etc.).

Laboratory Cleaning of RCRA/CERCLA Sampling Equipment**1.0 PURPOSE**

This Environmental Investigations Instruction (EII) establishes the method of cleaning sampling equipment used for RCRA and CERCLA sampling. The steps provided in this EII are intended to prevent cross-contamination of samples by contaminated sampling equipment.

2.0 SCOPE

This EII applies to the cleaning of sampling equipment used for RCRA/CERCLA sampling before the equipment is taken into the field and to equipment used to collect samples for both physical and analytical testing.

This EII does not apply to cleaning equipment that is used to collect samples for physical testing (e.g., sieve or permeability analyses); such equipment is cleaned in accordance with EII 5.4.

3.0 REQUIREMENTS**3.1 Safety**

1. Equipment cleaning presents the following hazards.
 - a. Nitric acid (although diluted) may react with metallic objects and could produce toxic fumes.
 - b. Hexane is a flammable liquid and could produce serious physical effects if inhaled or spilled on the skin.
 - c. A burn hazard is encountered if hot drying ovens are used.
2. Use personal protective equipment (PPE) in accordance with WHC-CM-4-3, safety requirements, and laboratory-specific procedures.
3. When handling dangerous chemicals, wear proper PPE, such as appropriate gloves, and safety glasses or face shields to protect your skin from burns.
4. Clean with dangerous chemicals only under a laboratory hood or in a properly ventilated area to prevent inhalation of dangerous fumes.
5. Exercise caution and wear proper PPE when working with equipment in a drying oven.

*Editorial and reformatting are the only changes to Rev 3, Change 1.

Laboratory Cleaning of RCRA/CERCLA Sampling Equipment

3.2 Equipment

1. At a minimum, the laboratory facility must have the following:
 - a. Exhaust hoods to eliminate inhalation hazards.
 - b. Drying ovens of sufficient size to accept a 24-inch-long drive barrel.
 - c. A lockable storage area with controlled access to store cleaned equipment.
 - d. Drains or containment facilities for hazardous chemical waste.

NOTE: Do not dispose of potentially hazardous liquids in sink drains.

3.3 Transport

Equipment must be surveyed and unconditionally released before being transported to the 1706 KE laboratory.

4.0 PROCEDURE

4.1 Cleaning

The site-specific sampling and analysis plan may require that rinsate samples be collected to monitor the adequacy of cleaning.

Cleaning
Facility
Supervisor

1. Oversee cleaning activities and assign personnel to perform those activities.
2. Based on field conditions, equipment, material, and manpower availability, assign personnel to transport contaminated equipment.

Assigned
Cleaning
Personnel

3. Wash equipment in potable water and nonphosphate detergent to remove visible dirt and grease.
4. Rinse three times with potable water.

CAUTION: When using nitric acid or hexane to clean equipment other than stainless steel and glass, consult the Field Team Leader (FTL) for special instructions. If drying ovens are used, do not use equipment that may melt when subjected to temperatures of 100°C.

5. Rinse with 1M or 10% solution nitric acid under an exhaust hood when cleaning stainless steel or glass.

Laboratory Cleaning of RCRA/CERCLA Sampling Equipment

6. Rinse three times with deionized water. Makeup rinse water will be in accordance with ASTM D 1193, "Standard Specification for Reagent Water," Type I, II, or III.

CAUTION: Hexane is a flammable material.

7. Rinse with chromatograph-grade hexane under an exhaust hood.
8. Collect wash and rinse fluids for proper disposal in accordance with requirements for hazardous waste disposal.
9. Wear appropriate gloves at all times when handling cleaned equipment to protect equipment from contamination from skin oils and perspiration.
10. Dry equipment in oven set at 100°C for at least 15 minutes, or until dry. Allow equipment to cool before handling.
11. Enclose cool/dry equipment in aluminum foil (shiny side out) or another clean, air-tight container that will not contaminate the equipment.

NOTE: The protective material or container must be previously unused or cleaned according to this EII. Do not re-use aluminum foil.

12. Seal the protective wrapping as needed with tape or similar sealant to maintain cleanliness.
13. Store wrapped equipment in locked, controlled access facility until needed.

5.0 DESIGNATED REVIEWING ORGANIZATION

The organization designated to review changes to this document is Hanford Technical Services. Comments from other organizations are welcome; however, are dispositioned at the option of HTS.

6.0 REFERENCES

ASTM D 1193, "Standard Specification for Reagent Water."

Job Safety Analysis-3, "RCRA Sampler Decontamination."

WHC-CM-4-3, *Industrial Safety Manual*.

WHC-SD-CP-HSP-001, Westinghouse Hanford Company Chemical Hygiene Plan.

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Groundwater Sampling

- Sampler**
1. Preserve water samples by placing the sample container on ice to retard degradation/alteration of the sample.
 2. Immediately seal and label the sampling container (store the sample in the required cooler, shipping container, or shielded container).
 3. As directed by the FTL/CE, prepare a Chain of Custody/Sample Analysis Request (COC/SAR) (BC-6000-828, Siteforms) or Chain of Custody (A-6000-407, macro WEF061) and Sample Analysis Request (A-6000-406, WEF060), and appropriate shipping documentation.
- NOTE:** In accordance with EII 5.1, a COC/SAR accompanies the samples to the laboratory.
- Sampler**
4. Transmit copies of the chain of custody, shipping, and radiation documentation to Analytical Services (AS) *and/or* PNL by close of business the working day after sample shipment.
 5. Make a copy available to all other data users within ten working days of the sample date.
- FTL/CE**
6. Ensure that sample identification numbers are in accordance with EII 5.10 of this manual.
 7. Record sample identification numbers in the field logbook; detail included on the chain of custody documentation need not be repeated in the field logbook.
 8. Coordinate sample shipment.
- NOTE:** When groundwater samples are shipped offsite, they are packaged and shipped in accordance with EII 5.11 of this manual. Coordinate shipping with the WHC Transportation Logistics and Shipping/Receiving organizations and Analytical Services.

Groundwater Sampling

4.4 Records

Records generated during field sampling activities are processed and dispositioned in accordance with the following table.

Name Filing Unit Title or Description	Record Type*	Retention Period	Disposal Authority	Cut-off and Retirement Instructions
Field Logbook(s)	QA	TPA + 10 years	DRS 1.8c (force fit)	Submit weekly copies to FC; submit completed logbook to FC upon project completion or when no longer needed, for transmittal to IRM permanent storage
Groundwater Sample Report(s)	QA	TPA + 10 years	DRS 1.8f (force fit)	Upon completion submit to FC for transmittal to IRM permanent storage
Chain of Custody/Samp le Analysis Request	QA	TPA + 10 years	TBD	Transmit field completed chain of custody documentation to AS in accordance with EII 5.1. AS ensures that a copy of the completed form(s) accompany the sample analytical data package(s) received from the laboratory.

* QA = Quality Assurance; TPA = Tri-Party Agreement; TBD = To be determined

5.0 FORMS

Chain of Custody/Sample Analysis Request, form BD-6000-828, Siteforms
Groundwater Sample Report(s), form A-6000-408, macro GEF075
Chain of Custody, form A-6000-407, macro WEF061
Sample Analysis Request, form A-6000-407, macro WEF060.

6.0 DESIGNATED REVIEWING ORGANIZATION

The organization designated to review changes to this document is listed below. Comments from other reviewers are welcome, but are resolved at the originating organization's option.

Designated Reviewing Organization

CMPOC

Hanford Technical Services, process owner

PSS/HTS

Groundwater Sampling

35. Box of extra bottles
36. Groundwater Sample Report (A-6000-480)
37. Field logbook
38. Chain of Custody forms
39. Rubber gauntlet gloves
40. Radiation work protection clothes
41. Radiation detection instruments
42. Pencils and waterproof markers
43. Masking tape.

3.0 GENERAL PREPARATION AND SAMPLING PRECAUTIONS

- | | |
|---------------|---|
| FTL/CE | <ol style="list-style-type: none">1. Before leaving for the field, calibrate field equipment (pH/conductivity meter and turbidity meter) using the manufacturer's recommended procedures and in accordance with Section 5.1 of WHC-CM-7-8, Vol 4.2. Load the truck in a secure and safe manner with the necessary supplies. Test start generators, compressors, and other equipment before entering a zone. |
| All Personnel | <ol style="list-style-type: none">3. Do not sample downwind from sources of volatile organics (e.g., car or generator exhausts, open fuel tanks). These could contaminate the sample. If any such sources are unavoidable, note them on the Groundwater Sample Report (A-6000-480). |
| Sampler | <ol style="list-style-type: none">4. Leave caps on the sample containers until just before filling. Complete and apply sample labels to the sample containers. Figure A-1 illustrates a typical sample label and provides an explanation key. |
| All Personnel | <ol style="list-style-type: none">5. Avoid handling the Teflon bottle cap liners. Do not use any liner that falls out of the cap and onto the ground.6. Never allow the sampling flow rate to exceed the flow rate used while purging a well.<ol style="list-style-type: none">a. A purge volume equivalent to three casing volumes is precalculated for each well and is entered on the Groundwater Sample Report. Some wells are low-yielding and will purge dry before three casing volumes are removed. Specific directions on how to collect a sample from these wells are in the appropriate sampling methods in Appendix B through H. If, during a well purge, the sampler detects the sound of cascading water (formation water vigorously reentering the well), turn off the pump and contact the FTL to determine the best method of collecting the sample without causing potential loss of volatile organics. Some wells require special pumping rates and will be noted on the Groundwater Sample Report. |

Groundwater Sampling

- b. Take necessary steps to prevent sampling equipment that will be handled immediately above the well head from coming into contact with the ground. Spread clean plastic on the ground, and place the sampling equipment on it, if necessary, during sampling setup operations and actual sampling.
- c. Never leave measurement probes (such as pH, conductivity, and temperature), in contact with sample water upstream from the sample manifold when sample bottles are being collected. In addition, never place measurement probes in shipping containers containing groundwater samples for laboratory analysis.

4.0 GENERAL WORK PROCEDURES FOR GROUNDWATER SAMPLING

- All Personnel
1. Read and become familiar with any and all applicable site safety documents (HWOP or JHA).
 2. Attend all scheduled safety briefings. Document any necessary changes in safety procedures using EII 2.1 of this manual.
 3. Park the vehicle near the well for convenience and safe operation of sampling equipment.

NOTE: Park downwind of the well being sampled to prevent vehicle exhaust gases from affecting sample integrity.

- FTL/CE
4. Immediately establish a temporary control zone around the well during purging and sampling activities, as necessary, to control visitor or unauthorized personnel access. Use visual references or (preferably) cones.

NOTE: No eating, smoking or drinking is allowed in the control zone. All visitors must be kept out of the control zone and challenged for their legitimate need for access, level of hazardous waste training, level of protective clothing, and purpose for being there.

- All Personnel
5. Wear personal protective clothing as defined in the site-specific safety document(s) to enter the control zone.
 6. Avoid direct contact with the water except with gloved hands.
 7. If splashed, wipe coveralls off with paper towels and discard the towel into the appropriate waste container.
 8. If necessary, decontaminate using an eyewash station, and/or remove and discard coveralls and other protective apparel.
 9. Avoid handling any objects not necessary for performing sampling procedures.

Groundwater Sampling

10. Remove gloves and discard into waste container or decontaminate (when appropriate) when sampling is complete and the chance of being splashed has ceased.
11. If required by WHC-IP-0718, monitor each sample for radioactivity and handle it as if it were contaminated (avoid excessive contact).
12. Wash hands after leaving the control zone and before eating, smoking, or drinking.
13. After the chance of being splashed has ceased, and when appropriate, remove the control zone.
14. When leaving the well site, avoid driving through the purge water puddles, if possible.

5.0 INSTRUCTIONS FOR COLLECTING ANY GROUNDWATER SAMPLE

FTL/CE

1. Select the appropriate sampling method by:
 - a. Determining whether the borehole to be sampled is a well or a piezometer (by comparing diameter).
 - b. Determining which pump is in the well, if any (submersible pump, bladder pump, Hydrostar pump, or no pump [requires use of a bailer]).

NOTE: This information can be found on the Groundwater Sample Report. The appropriate method can be found in Appendices B through H. Follow the appropriate method first; then continue with section 5.0, step 2 of this appendix.

NOTE: Operate pumps in a continuous manner so that they do not produce pulsating samples.

Sampler

2. Check for HPT coverage, total activity requirements, purgewater and purge truck requirements.
3. Measure depth to water.
4. *Recheck calibration of pH and conductivity using Section 5.1, "User Calibration of Groundwater M&TE," of WHC-CM-7-8, Volume 4.*

Groundwater Sampling

5. Take field readings:
 - a. Ph, conductivity, and temperature are taken at the start, middle, and end of recommended purge and/or until stable.
 - b. Two turbidity readings are measured before sampling.
 6. Take other measurements *specified by the project scientist or cognizant engineer.*
 7. Fill sample containers in the following order unless otherwise specified:
 1. Volatile organics
 2. Total organic halogens (TOX)
 3. Total organic carbon (TOC)
 4. Semivolatile organics
 5. Other unfiltered samples
 6. Filtered samples.
- NOTE: If the sampling order is different than that specified above, record the sampling order and justification for the order in the field logbook or on the Groundwater Sample Report.
8. Unscrew the cap from the sample container, being careful not to touch the lip of the bottle or the inside of the Teflon liner.
 9. Fill the sample bottle slowly by placing the inner side of the sample bottle near the sampling manifold drop leg to prevent trapping any air bubbles. Avoid splashing or agitating the water while the bottle is being filled.
 10. For those bottles requiring zero headspace (those having a septum lid), reduce the pumping rate to 100 mL/min (when possible). Check this rate in the field by timing the filling of a graduated cylinder/bottle.
 - a. Fill each sample bottle completely so that a meniscus forms over the mouth.
 - b. Cap the bottle immediately, turn it upside down, tap it a few times, and check for air bubbles in the sample.
 - c. If a bubble exists, discard the sample and repeat the sampling procedures until a bubble-free sample is obtained.
 - d. If the bottle to be filled contains a preservative, only make one attempt to obtain a bubble-free sample with that bottle.
 11. On all other sample containers, fill the bottles as much as possible, and do not be concerned about bubbles.

Measurement of Groundwater Levels

1.0 PURPOSE

This Environmental Investigations Instruction (EII) establishes methods for performing and documenting measurements of groundwater levels in monitoring wells.

2.0 SCOPE

This EII applies to measurements of groundwater levels in wells for water level monitoring.

3.0 DEFINITIONS

See the Glossary/Acronyms section of this manual.

4.0 REQUIREMENTS

4.1 Safety Requirements

All groundwater level measurement activities shall be performed in accordance with WHC-CM-4-3 requirements during routine activities or the applicable site health and safety document when groundwater level measurements are performed during hazardous waste site investigations and characterizations.

The Site Safety Officer must monitor health and safety hazards as required by the applicable health and safety documents for hazardous waste site characterization activities.

The *Radiation Control Technician (RCT)* must monitor for radiological contamination as required for work in radiation zones.

4.2 Documentation of Measurements

Groundwater level measurements taken as part of a routine monitoring program shall be documented on an appropriate Groundwater Measurement form. Two Groundwater Measurement forms exist for documenting water level measurements. Routine measurements are to be documented using the Groundwater Monitoring System (GWMS), which automatically generates a Groundwater Measurement report. Data is electronically transmitted to this form. During measurements, if the GWMS fails, data are to be manually documented using the Groundwater Measurement form.

Recording charts from continuous recorders shall identify the well number, the date and time period of record, the device type and serial number, and the names of the persons installing and removing the chart. The chart must also show the water level as measured by a steel tape when the continuous recorder is installed and again when the continuous recorder is removed from the recording device. Charts shall be signed by the field technician and maintained as quality records.

For continuous recorders with memory systems, data shall be transferred to a magnetic disk. The disk shall be printed and labeled with the information required for charts. The disk and hard copy shall be maintained as quality records.

Measurement of Groundwater Levels

All records shall be processed in accordance with EII 1.6, as specified in Section 6.0 of this EII.

5.0 PROCEDURE

5.1 Preliminary Requirements

5.1.1 Tape calibration

- | | |
|--------------------|---|
| Cognizant Engineer | 1. Direct groundwater level measurement activities. |
| | 2. Establish the accuracy to which equipment will be calibrated. |
| Field Technician | 3. Ensure that at least one steel tape is calibrated in accordance with manufacturer's instruction and WHC calibration program standards. |

NOTE: Calibrated tapes should only be used to standardize other tapes.

- | | |
|------------------|---|
| Field Technician | a. Ensure that a valid calibration sticker and tape identification barcode label are affixed in a visible location. |
| | b. Return to the standards laboratory any equipment having expired calibration. |
| Field Technician | c. Transmit tape calibration records to the File Custodian (FC) in accordance with EII 3.2. |
| | 4. Ensure that the tape to be used has been standardized within the last six months. |
| | a. If not, do not use the tape. |
| | b. Ensure that a valid standardization sticker and tape identification barcode label are affixed in a visible location. |

5.1.2 Tape standardization

- | | |
|------------------|---|
| Field Technician | 1. Use the GWMS to collect tape standardization data. |
| | 2. Affix a sticker to the tape, identifying the status and the tape identification number barcode. |
| | 3. Perform a comparison in the following manner: |
| | a. Affix weights having approximately the same weight and volume to both the calibrated tape and the tape(s) to be standardized (the field tapes[s]). |
| | b. Measure depth to water in a well <i>that is approximately</i> the maximum length of the <i>standardization tape</i> . |

Measurement of Groundwater Levels

- c. If the field tape deviates in length from the calibrated tape by $\leq .10$ ft, use it to perform water level measurements. Indicate the following by attaching a sticker to the tape.
 - 1) Tape identification number barcode label
 - 2) The word "standardized"
 - 3) Date of standardization
 - 4) Signature of the person(s) performing the standardization
 - 5) The amount of deviation between the calibrated tape and the field tape.

- d. If the field tape deviates in length by $> .10$ ft. and $< .25$ ft., use it for indication only (e.g., tagging bottom, locating top of water). Indicate the following by attaching a sticker to the tape:
 - 1) "For tagging only"
 - 2) Tape identification number barcode label
 - 3) The signature of the person(s) performing the standardization
 - 4) Date of standardization
 - 5) The amount of deviation between the calibrated tape and the field tape.

- e. If the field tape deviates in length by ≥ 0.25 ft, it is not acceptable for conducting any measurements. Discard the tape.

Field
 Technician

4. *Maintain a copy of all tape calibrations and standardization records.*

5.1.3 Cleaning

Field
 Technician

- 1. For personnel safety and to prevent cross contamination of wells, clean all measuring devices before each series of measurements and after each well measurement.
 - a. As a minimum, use potable water, deionized water or Columbia River raw water and a clean towel or clean as directed by the RCT and/or the Field Team Leader (FTL).
 - b. Clean the portion of the measuring device(s) which come in contact with the water plus approximately 3 feet.

Measurement of Groundwater Levels

- c. Indicate on the Groundwater Measurement form whether or not cleaning was performed using potable water.
- d. If an alternative method was used, indicate which method in the space provided on the Groundwater Measurement form.

5.1.4 Reference point

Field
 Technician

1. Establish a reference point at the top of the well casing.
 - a. Measure to the nearest 0.01 ft.
 - b. *Ensure* that the reference point is clearly and permanently marked.
 - c. Survey to establish the elevation with reference to a Vertical Control point in use at the Hanford Site.
 - d. *Ensure* that the current elevation is recorded on the Groundwater Measurement form.

5.1.5 Measurement point

Field
 Technician

1. Establish a measurement point near the top of the well head. This point could be on a well seal, *the top rim of a casing*, pump plate or similar device.
2. *Consistently* measure depth to water from this point.
3. Describe the measurement point in the space provided on the Groundwater Measurement form.

5.2 Groundwater Level Measurement Methods

5.2.1 Weighted measuring tape

Field
 Technician

1. Collect and document data obtained using a weighted steel measuring tape and either using the GWMS or manually as required. If a well is unable to be measured due to extenuating circumstances, record a description of the problem in the comment section of the handheld computer unit (HCU) or Groundwater Measurement form.
 - a. The GWMS is the primary method for collecting water-level data. This system partially automates the collection of groundwater levels using barcode technology, HCUs, and a qualified database to import the field data from the HCUs. To facilitate this process, a barcode label with a unique identifier is attached to each well being measured on a periodic basis. Data collected by the GWMS is electronically transmitted to the *Data Management organization* for input into the HEIS for access. For detailed instructions pertaining to the use of the GWMS, refer to WHC-SD-EN-UM-004.

Measurement of Groundwater Levels

Field
 Technician

- b. If the GWMS cannot be used, collected data can be manually recorded on the Groundwater Measurement form. This form serves as a backup system to the GWMS and is used for making nonroutine water level measurements.
2. Use the weighted tape as follows (all references to a form pertain to the Groundwater Measurement form used for manually recording water level data).
- a. Determine the difference between the reference point (RP) and measurement point (MP) using a carpenter's level and steel scale capable of measuring 0.01 ft gradations, or using measured documented dimensions of the well appurtenances (e.g., well seal, pump plate). If survey data exist for both the MP and the RP, these values can be subtracted to obtain the "MP-RP" value. Record the difference in the "MP-RP" column of the form or input the value when prompted by the HCU (select default if appropriate).
 - b. Chalk the lower 1 ft segment of the tape that extends below the zero point of the tape by drawing it across carpenter's chalk.
 - c. Lower the tape into the well until the water surface is penetrated and a marked increment on the tape coincides with the MP.
 - d. Note the tape reading at the measurement point.
 - e. Withdraw the tape without letting the tape go deeper into the well than the hold point. Note the reading at the demarcation between the dry and wetted portions of the tape. This reading indicates the length of the remaining dry portion of the chalked portion.
 - f. Add the length of the dry portion below the zero mark to the tape reading taken at the measurement point (step d, above). This quantity is the depth from the measurement point to the groundwater level and is either input into the HCU barcode reader or manually recorded on the form under the column headed "Depth to Water From MP."

Field
 Technician

- g. The time is automatically input into the GWMS HCU. If manually performing measurement, record the time the measurement is made on the form under the column headed "Time."
- h. During manual data collection, obtain the adjusted depth to water by subtracting the MP-RP reading (step a, above) from the depth to water from MP reading (step f, above). This quantity is the depth from the reference point to the groundwater level and is recorded on the form under the column headed "Adjusted Depth to Water From RP." This step is done automatically if the GWMS is used and no action is required from the field technician performing measurements.

Measurement of Groundwater Levels

- i. When performing routine groundwater level monitoring, take at least two consistent measurements to ensure the adequacy and accuracy of the measurement. The measurements shall be within .02 ft. of each other.
- j. Transfer of data collected by the HCU to the GWMS supervisor station shall be completed at the end of each shift.

5.2.2 Electric sounder

The electric sounder will be used for indication purposes only, and measurements will not be acceptable as quality data.

- Field Technician
1. Use the electric sounder following the steps given in section 5.2.1, except that steps a through d below replace steps b through f in Section 5.2.1.
 - a. Check the operation of the equipment by inserting the probe or contact ends in water to ensure that contact is clearly indicated on the meter.
 - b. Lower the probe or exposed contact ends of the tape into the well.
 - c. When the meter registers contact with water, record the tape graduation reading at the measurement point. This reading is the depth from the measurement point to the water level.
 - d. Take at least two consecutive, consistent measurements to ensure the adequacy and accuracy of the measurement when performing groundwater level monitoring unless conditions warrant rapid measurement of changing water levels or as indicated by the Cognizant Engineer.

5.2.3 Continuous recording device

The continuous recording device is used to record changes in the water level over a continuous period of time.

- Field Technician
1. Check operation of the equipment in accordance with manufacturer's instructions.
 2. For float-balance type devices, set the float in accordance with the manufacturer's instructions. The float should be of a diameter large enough to minimize friction between the float cable and the well walls. For pressure-transducer type devices, set the transducer as required by the manufacturer's instructions.
 3. Fit the recorder with a locking weatherproof casing to protect the equipment from damage and weather.
 4. Set the recorder in accordance with the manufacturer's instructions and secure the protective casing.

Measurement of Groundwater Levels

5. Check the recorder periodically to ensure that a malfunction has not occurred.
 - a. Perform operational checks, as a minimum, each time the recording chart is changed, or as recommended by the cognizant engineer.
 - b. Checks shall include a comparison of the recorded depth with a measurement made with a weighted, steel tape.
 - c. Record the measured depth, the date, time of measurement and the name of the person making the measurement on the recorder chart; each chart should indicate, as a minimum, when the chart is emplaced and when it is removed.
 - d. Also record the measured depth on the Groundwater Measurement form.
 - e. Check pressure-transducer recording at a frequency indicated by the Cognizant Engineer.

5.3 Documentation

Identify recording charts, magnetic disks and hard copies of the data from continuous recording devices with the well number, date and time of chart emplacement and removal (or data removal in the case of a pressure-transducer), and the device type and serial number.

5.3.1 Recording data manually

- | | |
|-------------------------|--|
| <i>Field Technician</i> | <ol style="list-style-type: none"> 1. <i>When manually recording measurement data, enter the following on the Groundwater Measurement form:</i> <ul style="list-style-type: none"> ● <i>measuring device type</i> ● <i>device ID number</i> ● <i>time of measurement</i> ● <i>depth to water from measuring point (feet)</i> ● <i>adjusted depth to water from reference point (feet)</i> ● <i>cleaning method and comments.</i> 2. <i>Sign the form, then forward on to the individual authorized to review, sign and transmit the form to Groundwater Management.</i> |
|-------------------------|--|

5.3.2 GWMS data recording

Documentation of data by the GWMS is recorded automatically on a Groundwater Measurement Report. Data collected using an HCU is electronically transmitted to this form. The form must be signed by the individual collecting the data. An authorized person must review and sign the form prior to transmittal to Groundwater Management.

Measurement of Groundwater Levels

6.0 RECORDS

Records are processed and dispositioned in accordance with the following table:

Name, Filing Unit Title or Description	Record Type*	Retention Period	Disposal Authority	Cut-off and Retirement Instructions
Groundwater Measurement form/ Groundwater Measurement Report	QA	TBD	DRS 1.8f	Transmit completed form(s) to the FC for review. The FC then transmits the form(s) to Groundwater Management (GM) within five working days. GM retains a reference copy, sends a copy to Well Services, and the transmits the original to storage in accordance with WHC-CM-3-5, Section 5. The FC includes a copy in the water level measurement files.
<i>Calibration and Standardization Records</i>	<i>QA</i>	<i>TBD</i>	<i>TBD</i>	<i>Upon completion, transmit to FC. FC makes a copy and forwards the record to storage.</i>
Charts and magnetic disks	QA	TBD	TBD	GM transmits to IRM permanent storage in accordance with approved RIDS.

* QA = Quality Assurance; TBD = To be determined

7.0 DESIGNATED REVIEWING ORGANIZATION

The organization designated to review changes to this document is listed below. Comments from other organizations are welcome; however, such courtesy comments are dispositioned at the option of the originating organization.

Designated Reviewers

CMPOC

Hanford Technical Services, process owner

PSS/HTS

8.0 FORM

Groundwater Measurement Form (A-6000-458)

9.0 BIBLIOGRAPHY

WHC-CM-4-3, *Industrial Safety Manual*.

WHC-SD-EN-UM-004, *User Manual for the Groundwater Monitoring System*.