

WP 02-EM1006

Revision 6

Final Sample and Serial Sample Collection

Technical Procedure

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APPROVED FOR USE

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INTRODUCTION ¹

This procedure describes the steps to collect ground-water samples from the water quality sampling program (WQSP) wells and from privately-owned wells, in the vicinity of the Waste Isolation Pilot Plant (WIPP). Serial samples will be collected and analyzed until field indicator parameters stabilize, after which the final samples for complete analysis will be collected. Final samples will then be analyzed in accordance with WP 02-1, WIPP Groundwater Monitoring Program Plan.

The following records are generated by this procedure. Records are managed in accordance with WP 15-PR, WIPP Records Management Program.

- Final Sample Checklist (Attachment 2 of this procedure)
- Uniquely numbered Chain of Custody (COC) (Example in WP 02-EM3001, Attachment 2)
- Uniquely numbered Request for Analysis (Example in WP 02-EM3001, Attachment 3)
- Shipping Authorization
- Carrier Waybill
- Field Logbook

REFERENCES

BASELINE DOCUMENTS

- DOE/EH-0173T, *Environmental Regulatory Guide for Radiological Effluent Monitoring and Environmental Surveillance*
- DOE/EP-0023, *A Guide for Environmental Radiological Surveillance at U.S. Department of Energy Installations*
- WP 12-IH.01, WIPP Chemical Hygiene Plan
- WP 13-1, Washington TRU Solutions LLC Quality Assurance Program Description
- DOE/WIPP 96-2162, *Groundwater Protection Management Program Plan*
- DOE/WIPP 99-2194, *WIPP Environmental Monitoring Plan*
- WP 02-1, WIPP Groundwater Monitoring Program Plan

REFERENCED DOCUMENTS

- WP 15-PR, WIPP Records Management Program
- WP 02-EM1005, Groundwater Serial Sample Analysis
- WP 03-EM3001, Administrative Processes for Environmental Monitoring
- Hazardous Waste Facility Permit issued to the Waste Isolation Pilot Plant, Permit # NM4890139088-TSDF, Issued by New Mexico Environment Department

EQUIPMENT

CONSUMABLE MATERIALS

- Industry standard 0.45- μ m filters
- Deionized water
- Packing material
- Paper towels

TEST EQUIPMENT AND SUPPLIES

- New, certified-clean 1-liter amber glass bottles
- New, certified-clean 2-liter polyethylene jugs
- New, certified-clean 1-liter polyethylene bottles
- New, certified-clean 1-liter amber glass bottles with Teflon septa
- New, certified-clean 250-mL (milliliter) amber glass bottles with Teflon septa
- New, certified-clean 40-mL VOA (volatile organic analyte) vials with Teflon septa
- 47-mm (millimeter) filter holder
- Clear packing tape
- Electrical tape
- Indelible pens
- Labels or waterproof marker

- Portable water pump
- Timepiece
- Tweezers
- Waterproof coolers and crushed ice and/or ice packs
- Custody seals
- Plastic bags
- Portable eyewash
- Chemical safety goggles
- Neoprene or polyvinyl chloride gloves

REAGENTS

- Hydrochloric acid (HCl Ultrex II [36% by Wt.] or equivalent)
- Nitric acid (HNO₃ Ultrex II [70.6% by Wt.] or equivalent)
- Sulfuric acid (H₂SO₄ Ultrex II [89.4% by Wt.] or equivalent)

PRECAUTIONS AND LIMITATIONS

- Only personnel with a current EM09, Final Sampling, qualification card or trainees operating under the direct supervision of a qualified sampling staff are authorized to perform the sample collection activities specified in this procedure.
- If this procedure cannot be performed as written, Environmental Monitoring and Hydrology (EM&H) Manager shall be contacted.
- EM&H Manager shall be contacted if abnormal conditions are found during the performance of this procedure.
- The Material Safety Data Sheet (MSDS) book shall be up to date and readily available.
- The wearing of chemical safety goggles and neoprene or polyvinyl chloride gloves is required when handling acids. Concentrated acids are to be handled inside the fume hood.

- Sample containers shall be new, certified-clean containers that will be discarded after one use. No sample bottles will be reused for sampling purposes of any sort. Rinsing is not required, if sample containers are received as pre-preserved.

PREREQUISITE ACTIONS

- Notify the well owner 10 days prior to the actual sampling activity.
- Notify shipper and laboratory of planned sample collection dates no less than five (5) working days in advance.
- Record manufacturer, lot #, and date opened for each of the acids used for sample preservation. (Attachment 2, Final Sample Checklist, entries 19, 20, and 21) If contamination is suspected or known, DO NOT use. Obtain acceptable container of acid.
- Prepare or acquire trip blanks to satisfy the frequency criteria of one sample per sample shipment. Trip blanks shall be prepared in accordance with U.S. Environmental Protection Agency (EPA) guidelines, which require preparation in field office (for example 918B) or at the contract lab. Prepare within 48-hours of final sampling event and store at ambient temperature. Trip blanks apply only to collection of samples which are designated for volatile organic compound(s) (VOC) and total organic halogen(s) (TOX) analyses. Trip blanks are not required for other analyses, including total organic carbon (TOC), semi-volatiles, general chemistry parameters or radionuclides.
- Before collecting the final sample, verify that well purging criterion has been met and that the analysis results of the last serial sample meets the acceptance criteria as defined in WP 02-EM1005. The well purging criterion is that a minimum of three (3) well bore volumes have been pumped at a rate that will minimize the agitation of recharge water.
- Record information about any final samples that were collected when field indicator parameters were NOT stabilized in the field logbook and provide a discussion of which parameter(s) did not stabilize.

PERFORMANCE

1.0 COLLECTION OF WATER SAMPLES FROM PRIVATE WELLS

1.1 Filtered Sample Collection

- 1.1.1 Prepare the applicable Final Sample Checklist (Attachment 2) by recording the appropriate data for items 1 through 9.
- 1.1.2 Connect a Teflon sample line from the portable pump to the well-pumping apparatus.

- 1.1.3 Prior to sampling, perform the following:
- Inspect filter holder for contaminants and damage.
 - Rinse the filter holder with deionized water.
- 1.1.4 Use tweezers to place a clean 0.45- μ m filter on bottom portion of filter holder.
- 1.1.5 Wet filter thoroughly with deionized water to prevent air locks.
- 1.1.6 Assemble filter holder.
- 1.1.7 Connect filter holder to output line from pump.
- 1.1.8 Direct water through filtered sample line.
- 1.1.9 Rinse sample bottle(s) three times with filtered water.
- 1.1.10 Collect one liter of filtered water for field laboratory analysis.

NOTE

The sample bottle for samples requiring preservation should only be filled approximately $\frac{1}{2}$ full.

- 1.1.11 Collect filtered water sample(s) to be sent off-site for analysis and for WIPP archive and WIPP Laboratories.
- 1.1.12 Collect duplicate sample by alternating sampling stream between primary and duplicate sample bottles.
- 1.1.13 Record, using 24-hour format, the time each individual sample collection began and ended on the Final Sample Checklist (Attachment 2, Item 18).
- 1.1.14 **IF** sample requires preservative,
GO TO Section 1.3, perform water sample preservation steps,
RETURN TO Step 1.1.16.

NOTE

The Final Sample Checklist indicates which samples should be preserved and the type of preservative to be used.

- 1.1.15 **IF** sample does not require preservative,
THEN secure lid to bottle and seal with electrical tape.

1.1.16 Label filtered sample(s) with the following:

- Project name
- Sample number
- Sample location (zone sampled)
- Well number
- Collector's name
- Date
- Time of collection
- Type of sample (deionized water or groundwater)
- Acid wash (yes or no)
- Parameter
- Type of preservative
- Bottle number
- Method of collection (filter or unfiltered)
- Temperature requirements

1.1.17 Affix label securely to bottle and cover with clear packing tape.

1.1.18 Disassemble filter holder.

1.1.19 Remove used 0.45- μ m filter.

1.1.20 Rinse filter holder with deionized water.

1.2 Unfiltered Sample Collection

1.2.1 Direct water flow through an unfiltered sample line.

1.2.2 Rinse sample bottle(s) three times with unfiltered water.

NOTE

The sample bottle for samples requiring preservation should only be filled approximately $\frac{1}{2}$ full.

1.2.3 Collect one liter of unfiltered water for field laboratory analysis.

- 1.2.4 Collect unfiltered water sample(s) to be sent off-site for analysis.
- 1.2.5 Record, using 24-hour format, time each individual sample collection began and ended on the Final Sample Checklist (Attachment 2, Item 18).

NOTE

The Final Sample Checklist indicates which samples should be preserved and the type of preservative to used.

- 1.2.6 **IF** sample requires preservative,
GO TO Section 1.3, perform water sample preservation steps,
RETURN TO Step 1.2.8.
- 1.2.7 **IF** sample does not require preservative,
THEN secure lid to bottle and seal with electrical tape.
- 1.2.8 Label unfiltered sample(s) with the following data:
- Project name
 - Sample number
 - Sample location (zone sampled)
 - Well number
 - Collector's name
 - Date
 - Time of collection
 - Type of sample (deionized water or groundwater)
 - Acid wash (yes or no)
 - Parameter or destination
 - Type of preservative
 - Bottle number
 - Method of collection (filter or unfiltered)
 - Temperature requirements

- 1.2.9 Affix label securely to sample bottle(s) and cover with clear packing tape.

1.3 Water Sample Preservation

WARNING

To prevent injury to personnel, use of chemical safety goggles and neoprene or polyvinyl chloride gloves is required when using acids.

NOTE

Samples and blanks requiring preservation should be preserved immediately following collection.

- 1.3.1 Reference the Final Sample Checklist (Attachment 2, Item 17) to determine type of preservative to add to water sample(s).
- 1.3.2 For samples requiring acid preservation, add 2 ml selected high purity preservative (sulfuric acid [H₂SO₄], nitric acid [HNO₃], or hydrochloric acid [HCl]) per liter of sample.
- 1.3.3 Fill bottle to shoulder.
- 1.3.4 Agitate preserved water sample.
- 1.3.5 Check the pH.
- 1.3.6 **IF** pH is above 2.0 standard units,
THEN add one mL of selected preservative to lower pH.
- 1.3.7 Agitate preserved water sample again.
- 1.3.8 Repeat Step 1.3.5 through Step 1.3.7 until pH drops below 2.0 standard units.
- 1.3.9 Add the same relative amount of preservative to each remaining sample requiring acid preservative as indicated by the Final Sample Checklist (Attachment 2, Item 17).
- 1.3.10 Secure lid with electrical tape.

2.0 COLLECTION OF SERIAL GROUNDWATER SAMPLES

2.1 Serial Sample Collection of Filtered Groundwater

2.1.1 Prior to sampling, perform the following:

- Inspect filter holder for contaminants and damage.

- Rinse the filter holder with deionized water.
- 2.1.2 Use tweezers to place one 0.45- μ m filter on bottom portion of filter holder.
 - 2.1.3 To prevent air locks, wet filter thoroughly with deionized water.
 - 2.1.4 Assemble filter holder.
 - 2.1.5 Place assembled filter holder on laboratory rack.
 - 2.1.6 Divert water flow through sample line and filter.
 - 2.1.7 Rinse three sample bottles, three times each, with filtered water.
 - 2.1.8 Fill three bottles with filtered water. Collect duplicate samples by alternating sampling stream between primary and duplicate sample bottles.
 - 2.1.9 Label bottles with the following:
 - Well name
 - Round number
 - Formation
 - Serial sample number
 - 2.1.10 Place one bottle in temperature bath at 25°C for measurement of specific conductance.
 - 2.1.11 Analyze the other two filtered water samples, according to WP 02-EM1005, at a later time, but on same day.
 - 2.1.12 Disassemble filter holder.
 - 2.1.13 Remove used 0.45- μ m filter.
 - 2.1.14 Rinse filter holder thoroughly with deionized water.
- 2.2 Serial Sample Collection of Unfiltered Groundwater
 - 2.2.1 Prior to sampling, inspect sample line and filter holder.
 - 2.2.2 Rinse filter holder with deionized water.
 - 2.2.3 Assemble filter holder without filter and secure to laboratory rack.
 - 2.2.4 Divert water flow through filter holder.

2.2.5 Collect duplicate samples by alternating sampling stream between primary and duplicate sample bottles.

2.2.6 Analyze unfiltered samples according to WP 02-EM1005.

3.0 COLLECTION OF FINAL SAMPLES

NOTE

A final sample will be collected semiannually from each well in the Resource Conservation and Recovery Act (RCRA) detection monitoring network. These wells are identified in the Hazardous Waste Facility Permit (HWFP), Attachment L. A split of the final sample will be provided to WIPP oversight agencies as requested by the Carlsbad Field Office (CBFO), or the New Mexico Environment Department (NMED).

NOTE

Samples for VOC and TOX should be filled in such a manner that no air remains in the sample bottle, e.g., zero headspace.

3.1 Unfiltered Final Sample Collection

3.1.1 Direct water flow through an unfiltered sample line.

3.1.2 Rinse sample collection bottle three times.

NOTE

The sample bottle for samples requiring preservation should only be filled approximately $\frac{1}{2}$ full.

3.1.3 Fill bottle with final sample. Collect duplicate samples by alternating sampling stream between primary and duplicate sample bottles.

3.1.4 Record, using 24-hour format, the time each individual sample collection began and ended on Final Sample Checklist (Attachment 2, Item 18).

NOTE

The Final Sample Checklist indicates which samples should be preserved and the type of preservation to be used.

3.1.5 **IF** sample requires a preservative, **GO TO** Section 1.3, perform water sample preservation steps, **RETURN TO** Step 3.1.7.

3.1.6 **IF** sample does not require a preservative, **THEN** secure lid of sample bottle and seal with electrical tape.

3.1.7 Label sample with the following:

- Project name
- Sample number
- Sample location (zone sampled)
- Well number
- Collector's name
- Date
- Time of collection
- Type of sample (deionized water or groundwater)
- Acid wash (yes or no)
- Parameter or destination
- Type of preservative
- Bottle number
- Method of collection (filter or unfiltered)
- Temperature requirements

3.1.8 Affix label securely to sample bottle, and cover with clear packing tape for moisture protection.

NOTE

Deionized (DI) water is prepared for field blanks.

3.2 Filtered Final, Hold, and Field Blank Sample Collection

- 3.2.1 Rinse filter holder with deionized water.
- 3.2.2 Use tweezers to place one 0.45- μ m filter on bottom portion of filter holder.
- 3.2.3 Wet 0.45- μ m filter thoroughly with deionized water to prevent air locks.
- 3.2.4 Assemble and secure filter holder.
- 3.2.5 Divert water into filter assembly.

- 3.2.6 Use the filtered sample water to rinse out the sample bottles three times.

NOTE

The sample bottle for samples requiring preservation should only be filled approximately ½ full.

- 3.2.7 Fill bottles with final sample. Collect duplicate samples by alternating sampling stream between primary and duplicate sample bottles.
- 3.2.8 Fill bottle with "Hold" sample.
- 3.2.9 Prepare field blanks to satisfy the frequency criteria of one field blank sample per 20 samples (5 percent of samples collected). Field blanks shall be prepared in accordance with EPA guidelines. Prepare field blanks for VOC and radionuclide analyses associated with each well. Prepare field blanks for metals analysis at the first and last well in the round or as otherwise directed by the team lead.
- 3.2.10 Record, using 24-hour format, the time each individual final sample collection began and ended on the Final Sample Checklist (Attachment 2, Item 18).

NOTE

The Final Sample Checklist indicates which samples should be preserved and the type of preservative to be used.

- 3.2.11 **IF** sample requires a preservative,
GO TO Section 1.3, perform water sample preservation steps,
RETURN TO Step 3.2.13.
- 3.2.12 **IF** sample does not require a preservative,
THEN secure lid of sample bottle and seal with electrical tape.
- 3.2.13 Label final sample with the following:
- Project name
 - Sample number
 - Sample location (zone sampled)
 - Well number
 - Collector's name

- Date
- Time of collection
- Type of sample (deionized water or groundwater)
- Acid wash (yes or no)
- Parameters or destination
- Type of preservative
- Bottle number
- Method of collection (filter or unfiltered)
- Temperature requirements

3.2.14 Affix label securely to bottle and cover with clear packing tape for moisture protection.

3.2.15 Disassemble filter assembly.

3.2.16 Discard filter.

3.2.17 Rinse filter holder with deionized water.

4.0 SHIPPING AND STORAGE OF FINAL SAMPLES

NOTE

Custody seals shall be adhesive backed strips that are destroyed when they are removed or the container is opened.

4.1 Sign and date custody seals.

4.2 Affix custody seal to cap of each sample bottle.

4.3 Place sample bottles in appropriate size of closable plastic bags.

4.4 Wrap glass bottles with bubble wrap or other cushioning materials.

4.5 Place sample bottles in shipping cooler with bags of crushed ice, freezer packs, or both.

Samples should be packed such that they are cooled to as near 4°C (+/-2°C) as possible, and this temperature is maintained until arrival at the laboratory for analysis.

- 4.6 Verify that the sample identification (ID) number on each bottle corresponds to the sample ID number listed on the Chain-of-Custody form.
- 4.7 Enter signature, date, and time on the Chain-of-Custody form to relinquish custody of samples to person receiving samples.

NOTE

If samples are taken to the contract laboratory, the Chain-of-Custody form and Request for Analysis will be left out of cooler, and person transporting samples will sign the Chain-of-Custody form to receive custody of samples while in transit. A copy of the Chain-of-Custody form is not required to be affixed to the exterior of the cooler.

- 4.8 Place completed and signed Chain-of-Custody form and Request for Analysis form, in moisture-proof envelope and place in cooler if cooler is shipped to contract laboratory.
- 4.9 Seal cooler with tape.
- 4.10 Affix copy of Chain-of-Custody form to outside of cooler, and note requirement to maintain sample temperature at 4°C (+/-2°C) if cooler is shipped to contract laboratory.
- 4.11 Write Chain-of-Custody numbers and sample ID numbers on the shipping authorization and waybill.

NOTE

Samples must be shipped "express air freight," or equivalent, in order to ensure samples remain iced and to facilitate analysis before hold times are exceeded.

- 4.12 Take samples and properly completed Shipping Authorization to shipment site for shipment or transport to contract laboratory.
- 4.13 Place "Hold" sample in lockable storage cabinet and enter date, time, sample number, and name of person placing samples in storage in sample storage logbook.
- 4.14 Examine "Hold" samples periodically for damage or deterioration of labels and custody seals. Samples with damaged custody seals or that cannot be identified because of deteriorated labels shall be segregated and marked "nonconforming/do not use." Labels that are deteriorating, but are still legible, shall be replaced with new labels containing the identical information as a the original.
- 4.15 Record final sample disposition in sample storage logbook.

- 4.16 Transport radiological samples to WIPP Laboratories for analysis.
- 4.17 Persons relinquishing and receiving custody of samples, should verify that the sample ID numbers on bottle labels match the sample ID numbers on the Chain-of-Custody form.
- 4.18 Persons relinquishing and receiving custody of samples, must sign Chain-of-Custody form.
- 4.19 Retain copies of signed Chain-of-Custody form, Request for Analysis, Shipping Authorization, and carrier waybill.

5.0 FIELD TEAM LEADER REVIEW

- 5.1 Verify that the Final Sample Checklist is filled out properly and is complete.
- 5.2 Verify that project records are complete and appropriately dispositioned in the project files.

Attachment 1 - Definitions

Analytical Task Leader (ATL) - Person responsible for performing physical and chemical analyses of groundwater in accordance with applicable plans, procedures, and directions.

Final Sample - A sample of groundwater collected after it has been determined that the chemical and physical parameters of the water being sampled have stabilized.

Private Well - A well that provides water that is currently being used for human and/or livestock consumption.

Serial Sample - A serial sample is a sample of groundwater taken at periodic intervals to establish stabilization of chemical and physical parameters, based on consistency of analysis results prior to final sampling.

Team Leader (TL) - Person responsible for assuring that the WIPP Groundwater Monitoring Program is being conducted in accordance with applicable plans and procedures.

Attachment 2 - Example of Final Sample Checklist

FINAL SAMPLES CHECKLIST

(1) PROJECT NAME: WIPP - DMP	(2) WELL NUMBER: WQSP -1	FILTER TYPE: WHATMAN	(4) COLLECTED BY:
(5) ZONE: CULEBRA	(6) ROUND: 26	PORE SIZE: 0.45UM	
	(3) LOT#		
	FILTER TYPE: BARNSTEAD	(8) CHECKED BY/DATE:	
	(7) LOT #		

(9) SAMPLE NUMBER	(10) PARAMETERS	(11) SAMPLE MEDIA	(12) DESTINATION	(13) NO. OF BOTTLES	(14) VOLUME	(15) TYPE (w/sep = w/septom)	(16) SAMPLE FILTER	(17) PRESERVATIVE	(18) COLLECTION TIME/DATE
WQ1C R26N 1	Volatiles	W	CONTRACT LAB	4	40 mL	AMBER GLASS w/sep	NO	HCl pH<2	
WQ1C R26N 1D	Volatiles	W	CONTRACT LAB	4	40 mL	AMBER GLASS w/sep	NO	HCl pH<2	
WQ1C R26N 2	VOC TRIP BLANK (w/DI WATER)	W	CONTRACT LAB	4	40 mL	AMBER GLASS w/sep	NO	HCl pH<2	
WQ1C R26N 3	VOC FIELD BLANK (w/DI WATER)	W	CONTRACT LAB	4	40 mL	AMBER GLASS w/sep	NO	HCl pH<2	
WQ1C R26N 4	TOX	W	CONTRACT LAB	1	1 LITER	AMBER GLASS w/sep	NO	H2SO4 pH<2	
WQ1C R26N 4D	TOX	W	CONTRACT LAB	1	1 LITER	AMBER GLASS w/sep	NO	H2SO4 pH<2	
WQ1C R26N 5	TOC	W	CONTRACT LAB	1	250 mL	AMBER GLASS w/sep	NO	HCl pH<2	
WQ1C R26N 5D	TOC	W	CONTRACT LAB	1	250 mL	AMBER GLASS w/sep	NO	HCl pH<2	
WQ1C R26N 6	SEMI-VOLATILES	W	CONTRACT LAB	6	1 LITER	AMBER GLASS	NO	NONE	
WQ1C R26N 6D	SEMI-VOLATILES	W	CONTRACT LAB	2	1 LITER	AMBER GLASS	NO	NONE	
WQ1C R26N 7	METALS	W	CONTRACT LAB	1	1 LITER	PLASTIC	NO	HNO3 pH<2	
WQ1C R26N 7D	METALS	W	CONTRACT LAB	1	1 LITER	PLASTIC	NO	HNO3 pH<2	
WQ1C R26N 8	GENERAL CHEMISTRY	W	CONTRACT LAB	1	1 LITER	PLASTIC	NO	NONE	

Attachment 2 - Example of Final Sample Checklist

(9) SAMPLE NUMBER	(10) PARAMETERS	(11) SAMPLE MEDIA	(12) DESTINATION	(13) NO. OF BOTTLES	(14) VOLUME	(15) TYPE (w/sep = w/septum)	(16) SAMPLE FILTER	(17) PRESERVATIVE	(18) COLLECTION TIME/DATE
WQ1C R26N 8D	GENERAL CHEMISTRY	W	CONTRACT LAB	1	1 LITER	PLASTIC	NO	NONE	
WQ1C R26N 9	RADIONUCLIDES	W	CONTRACT LAB	2	2 LITERS	PLASTIC	YES	HN03 pH<2	
WQ1C R26N 9D	RADIONUCLIDES	W	CONTRACT LAB	2	2 LITERS	PLASTIC	YES	HN03 pH<2	
BU1C R26N 10	RADIONUCLIDES (w/DI WATER)	W	CONTRACT LAB	2	2 LITERS	PLASTIC	YES	HN03 pH<2	
WQ1C R26N 11	HOLD	W	CONTRACT LAB	1	2 LITERS	PLASTIC	YES	HN03 pH<2	
ACID /REAGENT BLANKS									
WQ1C R26N 12	METALS (w/DI WATER)	W	CONTRACT LAB	1	1 LITER	PLASTIC	NO	HN03 pH<2	
WQ1C R26N 13	METALS (w/DI WATER)	W	CONTRACT LAB	1	1 LITER	PLASTIC	NO	NONE	

PRESERVATIVES

(19) NITRIC ACID: MANUFACTURER: _____ LOT # _____ DATE OPENED: _____

(20) SULFURIC ACID: MANUFACTURER: _____ LOT # _____ DATE OPENED: _____

(21) HYDROCHLORIC ACID: MANUFACTURER: _____ LOT # _____ DATE OPENED: _____