SPRING AND SURFACE WATER SAMPLING

Purpose

This procedure describes the responsibilities and process for collecting, documenting, and submitting samples from surface water (baseflow and snowmelt) and springs collected as required by the Environmental Surveillance Program and other ENV sampling programs.

Scope

This procedure applies to the ENV and contractor personnel assigned to collect samples from surface water (baseflow and snowmelt) and springs for the Environmental Surveillance Program and other ENV sampling programs.

In this procedure

This procedure addresses the following major topics:

Integrated Work Management

The work specified in this procedure shall be conducted in accordance with applicable Integrated Work Documents, in accordance with LANL IMP 300, Integrated Work Management for Work Activities.

Signatures

First authorization review date is one year from division leader signature below.

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General Information about this Procedure

Attachments

This procedure has the following attachments:

Number	Attachment Title	No. of pages
1	Equipment and Supplies Checklist	1
2	Spring and Surface Water Sampling Field Data Sheet	1

History of revisions

This table lists the revision history and effective dates of this procedure.

Revision	Date	Description Of Changes
0	7/05	New document. Supersedes RRES-WQH-SOP-047.1 and ER SOP 6.13
1	3/06	Removed specific references to ENV-WQH and ENV-ECR procedures. Incorporated ECR QA review comments.

Who requires training to this procedure

Personnel assigned to collect samples from surface water and springs require training before implementing this procedure.

Training method

The training method for this procedure is read-training. Training is in accordance with group specific procedures for training. Retraining to this procedure is "self-study" (reading).

Personnel who have not previously collected spring or surface water samples at LANL should be mentored before performing this procedure.

General Information about this Procedure, continued

Prerequisites

In addition to training to this procedure, the following training is also required prior to performing this procedure:

- Training as specified in RRES-ES-Field, General Field Work for All
- ENV-DO-207, *Handling, Packaging, and Transporting Field Samples*
- ENV-DO-203, *Field Water Quality Analyses*
- ENV-DO-206, *Sample Containers and Preservation*

Knowledge of the applicable ENV sampling programs is important in fulfilling the procedure.

Definitions to this procedure

Confluence: A flowing together of two or more streams.

Groundwater: Subsurface water in the saturated zone from which wells and springs are supplied

Participant – Personnel trained to this procedure and authorized to conduct the work prescribed in this procedure.

Requester: Team leader, project leader, or other individual who requests that spring or surface water sampling be conducted.

Spring: A place where groundwater flows from the ground onto the surface.

Stagnant water: Surface water where there is no detectable flow either upstream or downstream of the water.

Surface water: Water on the earth's surface including ponds, lakes, and streams.

To aid in water quality interpretation, we divide stream flow into three types or matrices. Each of the three flow types might be collected at a single location within a time span of as little as a week, depending on weather conditions. At times, the flow might represent a combination of several of these components. This procedure discusses sampling for the first two of the three types:

Baseflow: Persistent stream flow, but not necessarily perennial water. This stream flow is present for periods of weeks or longer. The water source may be effluent discharge or shallow groundwater that discharges in canyons.

Snowmelt: Flowing water that is present as a result of melting snow. This type of water often may be present for a week or more and in some years may not be present at all.

Storm runoff: Flowing water that is present in response to rainfall. These flow events are generally very short lived, with flows lasting from less than an hour to several days.

General Information about this Procedure, continued

Note

All directives in RRES-ES-Field, *General Field Work for All*, and its addendums are explicitly included in this procedure.

Actions specified within this procedure, unless preceded with “should” or “may,” are to be considered mandatory guidance (i.e., “shall”, “must”).

Preparations for Sampling

Check the COC and sampling plans

Prior to sampling, **participant** shall meet with the requester or designee to:

- Review sampling plans and Analytical Requests.
- Ensure that proper samples will be collected according to the sampling plan.
- Discuss any issues related to sample collection or the sampling site.
- Initiate an Analytical Request/chain of custody form.

If any unexpected issues arise in the field that cause a significant variation in sample collection protocol, **participant** shall contact the requester or designee to resolve these issues prior to continuing with sampling.

If unusual conditions at the sampling site might affect the sampling, **participant** shall meet with the requester or designee after sampling to pass on this information.

Equipment needed

The equipment that may be needed for a sampling activity is given in Attachment 1, "Equipment and Supplies Checklist."

Equipment calibration

Equipment shall be calibrated before leaving for the field. Reference ENV-DO-203, *Field Water Quality Analysis*.

Spring Sampling

Locating sampling sites

Sampling sites may include posts with bar code labels used to identify the station name. Prior to going to the field, **participant** may need to obtain maps or a GPS programmed with spring coordinates.

Check that station is marked

Locations for all stations shall be marked in the field with stakes. Bring extra stakes to the field in case replacement is needed. The locations for stations along the Rio Grande (such as Rio Grande at Pajarito) may not be marked as the location is too close to the stream bank to retain a stake.

Stakes shall be removed from sampling locations when stations are moved or sampling at a location is discontinued.

Selection of spring sampling location

The **participant** must choose where (or even whether) to sample springs, in order to obtain a representative water sample.

Step	Action
1	Upon arrival at the site, locate the spring.
2	Determine where/whether the spring should be sampled in accordance with the guidance provided in section below (Sampling Site Approach and Considerations) . Note: If there is any question about whether a representative sample can be collected, contact the requester before proceeding.
3	Document in the field notes the rationale for choosing the sample location or for choosing not to sample.
4	Photograph the sampling location (or spring area not to be sampled).
5	If a sample will be collected, continue with the next section.

Spring Sampling, continued

Sampling site approach and considerations

Sampling site characteristic	Approach	Considerations
Spring with clearly established sampling locations.	Sample at the established location.	None.
Spring with clear discharge points and large flow of water.	Select a sampling location that will provide a representative sample.	Ensure that the sampling location is not contaminated by surface materials or nearby surface water.
Spring with low-flow rate that issue along the Rio Grande (or other water source)	Select a sampling location that is NOT influenced by the other water source.	Ensure that the sampling location is not contaminated by nearby surface water. Typically this means that a relatively strong flow is present at least one foot above the level of the other water source.
Spring with low-flow rate that discharge over a large area but water is not more than an inch or so deep.	Select a location where the water is at its deepest and where a low-turbidity sample can be collected.	Ensure that the sampling location is not contaminated by surface materials or nearby surface water. Do not sample from a newly-dug hole.

Spring Sampling, continued

Selection of spring sampling location, con't

Several springs discharge over a large area. Some, like Spring 8A, discharge on a large grassy hillside with no one large source of flow and no significant depth of water. Others, like Sandia Spring and Ancho Spring, discharge over some length in a gully or steam drainage (and also over a hill side in the case of Sandia Spring). One school of thought advocates collecting a sample at the discharge point farthest upstream based on the idea that this would represent the spring source.

These springs do not issue from a point, but over a large area where surface flow is found. To obtain a representative sample, collect it at a point where a strong flow occurs and a sample most clear of soil influence can be collected.

At Sandia Spring this sample collection point might be in the drainage downstream from the grassy slope where past samples were collected. This collection point is where a large pool forms in the drainage due to adjacent spring discharge.

Spring Sampling, continued

Steps for sampling springs

To collect a sample at each sample site, **participant** shall perform the following steps:

Step	Action
1	Where flow conditions allow, make a discharge measurement using a Parshall flume. For use of the flume, see Geological Survey Water-Supply Paper 2175, "Measurement and Computation of Stream Flow: Volume 1," Measurement of Stage and Discharge, Chapter 8. If flow is spread over too large an area, a quantitative discharge measurement may not be possible. When quantitative measurements are not possible, a qualitative description of flow should be made (e.g., no visible flow). Photos may be used to help document the qualitative description.
2	Use deionized water to decontaminate all analytical instruments before taking first sample and between samples (pH meters, etc.).
3	Collect sample. • Use a pre-cleaned, new polyethylene bottle or other transfer device (for example a Parastaltic pump and clean tubing) and nitrile gloves to retrieve samples. • Filter sample, if required, by attaching a 0.45mm filter to the Parastaltic pump tubing. • Collect organic samples using a glass bottle rather than a polyethylene bottle. • The water sample can also be collected directly by dipping the collection bottle into the water.
4	Take parameters of collected samples and document on field data sheet (Attachment 2).
5	Preserve samples as specified on the Analytical Request forms. Use assigned (based on Analytical Request Forms) bottle/preservative for proper analysis. Reference ENV-DO-206, Sample Containers and Presevation, for guidance. Take precaution when handling bottles with preservatives
6	Apply chain of custody tape.
7	Complete field data sheet (Attachment 2).
8	Store sample in cooler with blue ice or equivalent and transfer to SMO Reference ENV-DO-207, Handling, Packaging, and Transporting Field Samples, for guidance.

Surface Water Sampling

Locating sampling sites

Permanent surface water sampling sites may be identified by posts with labels identifying the station name; however, this may not be possible at some sites due to potential for public access, vandalism, physical location (e.g., near a road), or short-term nature of sampling campaign. Bring extra stakes to the field in case replacement is needed Stakes shall be removed from sampling locations when stations are moved or sampling at a location is discontinued.

Baseflow and snowmelt samples shall be collected from running water. In some cases, a project may require sampling pooled or ponded water. Consult with the requester or designee if any questions about where or how to collect the water samples.

Samples shall be collected far enough upstream of a confluence so that the sample is not influenced by water from another stream. Document on field data sheet (Attachment 2) the flow conditions of each stream and the distance upstream from the confluence at which the sample was collected.

Surface Water Sampling, continued

Steps for sampling surface waters

To collect a sample at each sample site, **participant** shall perform the following steps:

Step	Action
1	Where flow conditions allow, make a discharge measurement using a current meter or Parshall flume For use of the flume, see Geological Survey Water-Supply Paper 2175, "Measurement and Computation of Stream Flow: Volume 1," Measurement of Stage and Discharge, Chapter 8.
2	Use deionized water to decontaminate all analytical instruments before taking first sample and between samples (pH meters, conductivity meters, etc.).
3	Collect sample. • Use a pre-cleaned, new polyethylene bottle or other transfer device (for example a Parastaltic pump and clean tubing) and nitrile gloves to retrieve samples. • Filter sample, if required, by attaching a 0.45mm filter to the Parastaltic pump tubing. If approved by the requester, sample may be filtered at the laboratory rather than in the field. • Collect organic samples using a glass bottle rather than a polyethylene bottle. • For samples collected from the bank, the water sample can also be collected directly by dipping the collection bottle into the water. • Use proper size bottle/preservative for proper analysis.
4	Take parameters of surface water and document on field data sheet (Attachment 2).
5	Preserve samples as specified on the Analytical Request forms. Use assigned (based on Analytical Request Forms) bottle/preservative for proper analysis. Reference ENV-DO-206, Sample Containers and Presevation, for guidance. Take precaution when handling bottles with preservatives
6	Apply chain of custody tape.
7	Complete field data sheet (Attachment 2).
8	Store sample in cooler with blue ice or equivalent and transfer to SMO. Reference ENV-DO-207, Handling, Packaging, and Transporting Field Samples, for guidance.

Surface Water Sampling, continued

Disposing of wastes

For all wastes generated, contact the Waste Management Coordinator (667-9415). To salvage or recycle components or materials, contact the ENV Division property representative (667-2303).

Work plans or sampling plans should provide specific guidance on waste disposal requirements. If additional guidance is needed, contact the sampling lead.

Surface water sampling performed in accordance with work plans required by the NMED Consent Order must be managed in accordance with the investigation-derived waste management requirements specified in the approved work plan. Dispose of waste in accordance with the work plan. The work plan can be obtained from the sample requester.

Records Resulting from this Procedure

Records

The **participant** shall ensure that the following records, generated as a result of this procedure, shall be permanently stored with participant's Group within ENV Division in accordance with group-specific procedures:

- Analytical Request/chain of custody forms
- Field Data Sheets

Copies of records will be made available to requesters upon their request.

Click here to record "self-study" training to this procedure.

EQUIPMENT AND SUPPLIES CHECKLIST

For sampling, the following equipment may be needed:

- Analytical Request form
- GPS unit
- Parastaltic pump and tubing/or equivalent
- filters
- meters for measuring pH, temperature, electrical conductance, and turbidity
- properly labeled sample containers
- clean 250 - ml bottle
- ball-point pen (indelible dark ink)
- felt-tip marker pen (indelible dark ink)
- 1-14 pH indicator paper
- disposable gloves (latex, PVC, other suitable plastic, or rubber)
- disposable wipes
- safety glasses
- clipboards
- deionized water
- duct tape
- blue ice or equivalent
- insulated coolers
- trash bags
- custody seals or custody tape
- other equipment specified in EPA Methods, as needed (pH measurements, conductivity, etc.)
- fire extinguisher
- preservatives
- Surface Water Sampling Field Data Sheet
- battery for pump
- backpack (if needed)
- camera
- stakes (if needed)

Los Alamos National Laboratory
Surface Water Sampling Field Sheet

(ENV-D0-204 R1, Attachment 2)

Location:	
Sample Retrieval **Time:**	**Date:**
Analytical Request Record No.:	
Sampled By:	

FIELD PARAMETERS	
pH:	**Temperature:**
Specific conductance:	**DO:**
Turbidity:	**Other: (specify)**

STREAMS (circle all that apply)						
Location:	Wading Bridge: upstream Other (specify):	Bank downstream	Station gage: at / above / below Side bridge _____ ft mile		Boat	Ice
Sampling Site:	Pool Sampler type:	Riffle	Open channel	Braided	Backwater	
Bottom:	Bedrock Concrete	Rock	Cobble	Gravel Other (specify):	Sand	Mud
Stage Conditions:	Not determined Falling	Stable: normal Rising	low high Peak	Other (specify):		
Hydraulic Event:	Routine Sampling Snowmelt Ice cover: thickness _____	Flood	Regular Flow Drought inches_____	Spill	Other (specify):	
Stream Color(s):	Brown Other (specify):	Clear	Green	Blue	Gray	
Stream Mixing:	Excellent	Good	Fair	Poor		
SPRINGS (circle all that apply)						
Sampling Site:	Pool	Riffle	Braided	Backwater		
Bottom:	Bedrock	Rock	Cobble	Gravel	Sand	Mud
Stage Conditions:	Not determined Falling	Stable: normal Rising	low high Peak	Other (specify):		
Stream Color(s):	Brown Other (specify):	Clear	Green	Blue	Gray	
Stream Mixing:	Excellent	Good	Fair	Poor		

Other Observations: _____