

LLNL Environmental Restoration Division (ERD)
Standard Operating Procedure (SOP)

ERD SOP 4.9: Collection of Field QC Samples—Revision: 5

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1.0 PURPOSE

The purpose of this SOP is to obtain various types of Quality Control (QC) samples that provide quality control information necessary for interpretation of data.

2.0 APPLICABILITY

This procedure is applicable to the collection of QC samples during routine ground water monitoring, environmental investigations and remediation processes.

3.0 REFERENCES

- 3.1 U.S. Environmental Protection Agency (1981), *Manual of Groundwater Quality Sampling Procedures*, EPA-600/22-81-160, Washington, D.C.
- 3.2 U.S. Environmental Protection Agency (1982), *Handbook for Sampling and Preservation of Water and Wastewater*, EPA-600/4-82-029, Washington, D.C.
- 3.3 Weston Managers Designers/Consultants (1988), *Field Sampling Procedures Manual*, Prepared for Lawrence Livermore Laboratory.

- 3.4 U.S. EPA (1987), *Data Quality Objectives For Remedial Response Activities*, Office of Emergency Response and Office of Waste Programs Enforcement, Washington, DC, 20460.
- 3.5 Test Methods for Evaluating Solid Waste, SW-846, November 1986, Third Edition.

4.0 DEFINITIONS

See SOP Glossary.

5.0 RESPONSIBILITIES

5.1 Data Management Team (DMT)

The DMT's responsibilities are to decode the blind QC sample identification names on the printed analytical results using decoding QC sample list provided by the SC, and properly identifying the sample type and matrix in electronic storage.

5.2 Division Leader

The Division Leader's responsibility is to ensure that all activities performed by ERD at the Livermore Site and Site 300 are performed safely and comply with all pertinent regulations and procedures, and provide the necessary equipment and resources to accomplish the tasks described in this procedure.

5.3 QC Chemist

The QC chemist is responsible for determining the type(s) of analyses to be run on the various QC samples and partially responsible for determining the frequency of QC samples (i.e., field, equipment, and trip blanks).

5.4 Hydrogeology Group Leader (HGL)/ Drilling Coordinator (DC)

The HGL and DC are responsible for determining the frequency of drilling QC samples, such as equipment blanks and collocated samples in consultation with the QC chemist.

5.5 Subproject Leader (SL)

The SL is responsible for the overall investigation, planning, and assessment and remediation within a study or treatment facility area.

5.6 Sampling Coordinator (SC)

The SC's responsibilities are to generate the QC sample list and distribute the list to key individuals, including the QC Chemist, SLs, DMT, Operations and Regulatory Affairs Division/Water Guidance and Monitoring Group (WGMG) analysts and sampling technicians.

5.6 Field Personnel

The field personnel are responsible for collecting the Field QC samples as scheduled by the SC, DC, or SL.

6.0 PROCEDURE

6.1 Generation of the Quality Control Sampling List

- 6.1.1 The SC shall generate the QC sampling list by calculating the number of samples that need to be collected as collocated samples to meet the ERD Data Quality Objective (DQO) of 10% for all ground water sampling. The 10% is divided into 5% interlaboratory and 5% intralaboratory collocated samples. The SC chooses the installations to be used for collocated samples and field blanks at random within each geographic area. However, this list may be modified based upon past history, data anomalies, or logistical problems.
- 6.1.2 The SC shall distribute the QC Sampling List to key individuals listed in Section 4.4. The field personnel must compare the QC list to the sampling plan to determine when to collect the QC samples.
- 6.1.3 The DC shall determine the number and location of QC samples for drilling activities. As a general rule, 10% of all soil samples will be collocated as described above.

6.2 Intralaboratory Collocated Samples

Intralaboratory collocated samples are sent to the same laboratory and have the same requested analyses.

6.2.1 ERD Routine Water Samples

- A. The SC selects 5% of the well locations to be sampled as Intralaboratory collocated QC samples from those wells with a history of contamination.
- B. Samples are collected, one right after the other. Samples are collected as prescribed in the appropriate sampling SOP.
- C. Samples are assigned a fictitious well identifier (and a different collection time from the primary sample) to blind the samples true identity to the laboratory performing the analysis, and the other is labeled with a true well identifier. The fictitious well identifiers of the QC samples usually end with "Y" or represent an unused legitimate name from a sequential series (i.e., W-181). Other fictitious well identifiers are generated as needed.

6.2.2 WGMG Water Samples

For WGMG samples, one sampling location is randomly selected quarterly by the SC or environmental analyst in each sampling network and assigned the fictitious name as shown in Table 4.4 for a total of 8 "blind" intralaboratory collocated QC samples. All wells, including historically clean wells, are used for the selection.

Table 1.

Intralaboratory collocated fictitious well identifier sample	Sampling network
K1-11Y	Pit 1
K7-11Y	Pit 7
W-817-11Y	Building 817 wells (HE Process Area)
K1-21Y	Pit 2
K2-11Y	Elk Ravine (Eastern and Western Firing Area)
NC5-11Y	Off-site water-supply wells
K6-11Y	Pit 6
K8-11Y	Pit 8

6.2.3 ERD Soil Samples

Intralaboratory collocated soil samples may be assigned fictitious names as described in Section 6.2.1, or they may have “DUP” at the end of the real sample identifier. When a collocated soil sample is taken from a different depth than the original sample, the original sample’s depth as well as the collocated sample’s depth become part of the collocated sample’s ID. For example, 830-23-(26.8F)-26.3FDUP, where 26.8F is the actual depth and 26.3F is the depth of the adjoining sample for which it is collocated.

6.3 Interlaboratory Collocated Water and Soil Samples

6.3.1 For routine ground water sampling, the SC selects 5% of the well locations to be sampled as interlaboratory collocated QC samples from those wells with a history of contamination. Interlaboratory collocated samples are collected one right after the other as prescribed in the appropriate sampling SOP.

6.3.2 The samples are labeled with the true well identification and sent to two separate analytical laboratories.

6.3.3 The collocated samples are to have the same requested analyses.

6.4 Critical Wells

At Site 300, water-supply wells may be sampled as interlaboratory collocated samples in addition to the 5% interlaboratory collocated samples for QC purposes, when necessary.

6.5 Trip Blanks

6.5.1 Trip blanks are only necessary if samples are to be collected and analyzed for VOCs (volatile organic compounds). Trip blanks should be submitted for the same VOC analysis as the samples in the same ice chest. If several VOC analyses are requested, the trip blanks should be analyzed per the SC, HGL, DC, or SL. Trip blanks may also be submitted with soil samples.

- 6.5.2 Trip blanks (one 40 mL volatile organic analysis [VOA] per day) remain within the ice chest throughout the day's sampling activities and should be preserved to 4°C in the same manner as the samples. Each laboratory receiving samples requires a separate trip blank.
- 6.5.3 Write date of trip blank preparation on CoC as part of the Sample ID (i.e., Trip Blank 8-29-03). The sample date is the date the samples were collected.
- 6.5.4 Trip blanks should not be analyzed unless there are VOCs detected in the associated samples. This request should be written in the instructions to the lab on the CoC accompanying the samples.

Note: Inspect trip blanks for air bubbles upon receipt from the contract analytical laboratory (CAL). Trip blanks containing air bubbles should be returned to the CAL and new ones requested. Also unused trip blanks should be discarded and replaced monthly.

6.6 Field Blanks

- 6.6.1 Collect field blanks as indicated in the Sampling Plan. Additional field blanks should be taken if there is any reason to suspect air-borne contaminants (i.e., odors, dust, work being performed near by such as painting, fumigating, etc.). Field blanks are to be collected as described below:
 - A. For ERD and WGMG samples, pour the analyte-free water, provided by the analytical laboratory directly into the appropriate sample container at the sampling location and submit for the appropriate requested analyses.

Note: WGMG field blank water may be obtained from Building 151 or from the CAL.
 - B. Label the bottle as indicated on the QC Sample list, and place in an ice chest with the samples.
 - C. During quarterly sampling activities, field blanks are poured at least one time per study area or sampling network at Site 300.
 - D. Some projects will require field blanks for all analytes listed in the sampling plan for a specific location. The sampling plan will specify the analytes the field blanks should be collected and analyzed for.

6.7 Equipment Blanks

This includes equipment used for soil and ground water sample collection, as well as pressure transducers used for hydraulic testing.

- 6.7.1 An equipment blank will be collected from all portable pumps used for ground water purging and sampling after decontamination.
 - A. Decontaminate the equipment as per SOP 4.5, "General Equipment Decontamination."
 - B. Place pump into a clean bucket or barrel containing DI water (source must be approved by the SC or QC Chemist), and operate pump as described in SOP 4.1, and the appropriate equipment manuals.

- C. Submit the equipment blanks collected for the same analyses as the well samples, or at a minimum for the constituents of concern (COCs).
 - D. Collect samples from the pump in the same manner as described in SOP 2.3, "Sampling Monitor Wells with Bladder and Electric Submersible Pumps," and SOP 2.6, "Sampling for Volatile Organic Compounds."
 - E. Label the equipment blank collected from the portable pumping system according to the study area, type (PR for pump rinsate), and well in which the pump was used for purging and sampling (i.e., GSA-PR-W-25N-25).
- 6.7.2 Equipment blanks, also known as rinsate samples, are used to ensure that nondedicated equipment involved with sample collection has been adequately decontaminated.
- 6.7.3 Drilling equipment blanks are collected from soil sampling devices (i.e., split spoon samplers and core barrels). Auger flights will be visually inspected once they have been cleaned to verify they are free from soil particles. The frequency of these equipment blanks depends upon the past and future drilling locations, and the contaminant type and concentration in these locations. The DC and/or HGL shall determine the necessity and frequency during drilling activities. If equipment blanks are deemed necessary, follow steps A through D.
- A. Decontaminate the equipment per SOP 4.5.
 - B. Pour enough analyte-free water (obtained from the analytical laboratory) or water approved by the DC and/or QC Chemist through or over the surface of equipment, and collect rinsate directly into appropriate containers.
 - C. Label the equipment blank collected from the drilling apparatus as follows:
 - RINSEATE-A-borehole name
 - RINSEATE-CB-borehole name
 - RINSEATE-B-borehole name
 - where
 - A = auger
 - CB = core barrel
 - B = bailer
 - D. Submit the equipment blanks collected for the same analyses as the soil sample.

6.8 Treatment Facility QC Samples.

Facility QC samples will be collected when specified by the SL and/or facility permits.

- 6.8.1 The San Joaquin RWQCB requires one field blank and one collocated sample for every 10 samples collected and analyzed. The QC samples are to be analyzed for the same parameters as the other samples collected. The collocated sample should be sent to the laboratory as the other samples (intralaboratory). Label samples as follows:

facility name - FB

facility name - dup

Other naming schemes may be used to blind the sample as approved by the DMT.

6.9 Drilling Water

Collect a sample of any water used during drilling activities and analyze for VOCs.

6.10 Drilling Mud

Collect drilling mud samples every 10 to 20 ft if high VOCs are expected.

6.11 Temperature Blanks

Temperature blanks are used to accompany all samples that require temperature preservation. They should consist of a 125-mL poly container, or equivalent, filled with water placed in the ice-chest at the beginning of the sampling event day. The receiving analytical laboratory should measure these blanks and notify the SC if the temperature exceeds $4^{\circ}\text{C} \pm 2^{\circ}\text{C}$. The temperature blank should be documented in the "Remarks" section on the CoC form.

6.12 Supplies

6.12.1 To meet ERD sampling requirements, 1-liter polyethylene or glass containers of analyte-free water used for field blanks and equipment blanks and VOA vials containing analyte-free water used for trip blanks, should be ordered from analytical laboratory.

6.12.2 Visually inspect ice chests used to refrigerate the samples. Use clean ice-chests only.

6.12.3 Load ice chests with enough bagged ice cubes or bagged Blue Ice to keep samples at 4°C .

6.13 Documentation

All sampling information should be recorded as required by the appropriate sampling or drilling SOP.

6.14 Shipping and Handling

QC samples should be handled and shipped as described in SOP 4.4.

7.0 QA RECORDS

7.1 Chain-of-Custody Forms

7.2 Document Control Logbooks

7.3 Sampling and Analysis Plans

7.4 Field Sheets

8.0 ATTACHMENTS

Not applicable.