

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

ERD SOP 2.13: Barcad Sampling—Revision: 2

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	<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left; width: 70%;">APPROVALS:</th> <th style="text-align: left;">Date</th> </tr> </thead> <tbody> <tr> <td><u>Albert J Samane</u> Division Leader</td> <td><u>9/5/03</u></td> </tr> <tr> <td><u>[Signature]</u> Environmental Chemistry and Biology Group Leader</td> <td><u>9/3/03</u></td> </tr> </tbody> </table>	APPROVALS:	Date	<u>Albert J Samane</u> Division Leader	<u>9/5/03</u>	<u>[Signature]</u> Environmental Chemistry and Biology Group Leader	<u>9/3/03</u>
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1.0 PURPOSE

The purpose of this SOP is to define barcad sampling procedures that will ensure collection of a representative ground water sample.

2.0 APPLICABILITY

This SOP procedure applies to the use of barcads for ground water sample collection. Barcads are generally used where it is desirable to install more than one discrete sampling device in multiple water bearing zones within a single borehole.

3.0 REFERENCES

- 3.1 Raber, E. and D. Carpenter (1983), *An Evaluation of the Hydrogeology and Ground Water Chemistry Associated with Landfills at LLNL's Site 300* (UCRL-53416).
- 3.2 Christofferson, E. and D. Ramsey (1992), "Procedures Manual for the Environmental Monitoring Section—EMP-GW-S, Ground Water Sampling."

Procedure No. ERD SOP-2.13	Revision Number 2	Page 2 of 8
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4.0 DEFINITIONS

See SOP Glossary.

5.0 RESPONSIBILITIES

5.1 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, comply with all pertinent regulations and procedures, and provide the necessary equipment and resources to accomplish the tasks described in this procedure.

5.2 Field Personnel

The field personnel are responsible for properly performing Barcad Sampling in compliance with all applicable regulations and procedures to insure the samples and data provided are representative of the actual conditions.

5.3 Sampling Coordinator (SC)

The SC's responsibilities are to ensure that the field personnel have been properly trained, they comply with all applicable regulations and procedures, and supply a quarterly Barcad Sampling Schedule.

6.0 PROCEDURES

6.1 Discussion

Barcads are ordinarily set up as multiple completions, but usually there are no more than two per borehole. They are used for sampling discrete water-bearing zones within the same or separate hydrologic unit(s) to determine the presence of contaminants. Technicians operating Barcads should have completed a lab course on pressure safety orientation (HS5030-W) prior to using compressed nitrogen gas.

Barcads exist at Site 300 and are located in the East Firing Area (EFA). No equipment decontamination is necessary for Barcads. All equipment that comes in contact with the ground water is dedicated to each installation. Because the nitrogen gas comes in direct contact with the ground water, Barcads are not appropriate for the collection of VOC samples.

6.2 Preparation

- 6.2.1 Perform preparation activities per SOP 4.1, "General Instructions for Field Personnel."
- 6.2.2 Determine the number and type of sample bottles that will be needed per SOP 4.3, "Sample Container and Preservation."
- 6.2.3 Assemble and load appropriate sampling containers and equipment into the sampling vehicle. See Attachment A for equipment checklist.

Procedure No. ERD SOP-2.13	Revision Number 2	Page 3 of 8
-------------------------------	----------------------	-------------

- 6.2.4 Locate Barcads to be sampled and choose the most efficient sampling order.
- 6.2.5 Fill out initial information in Document Control Logbook per instructions in SOP 2.2, “Sample Control and Documentation.”

6.3 Operation

- 6.3.1 Unlock the protective casing, and remove any dirt or debris from the lines and fittings with a clean disposable towel.
- 6.3.2 Inspect the dedicated sample lines, gauges and the nitrogen cylinder for damage. Perform minor repairs whenever possible and document them in the logbook.
- 6.3.3 Check the pressure gauge on the nitrogen cylinder. If the gauge reads under 500 PSI, then it is considered insufficient pressure for sampling and the cylinder must be replaced. The nitrogen cylinder must be in an upright position and fixed to a stationary location.
- 6.3.4 Turn the cylinder valve that opens the nitrogen cylinder to the gas line (refer to Attachment B of this SOP). Open the corresponding discharge valve to purge the line of the Barcad you are sampling, then close the discharge valve of the Barcad you are not sampling. Close the vent valve and open the pressure valve to pressurize the system. Water will soon begin to flow from the discharge line. When the water stops flowing, close the pressure valve and open the vent valve to depressurize the lines. The first purge cycle is now completed. Each discharge line must go through three complete purge cycles. Allow approximately 20 min between purges, although true recovery time may vary 2–20 min between locations. Note the date and times of purge cycles in the Document Control Logbook. Once this has been completed, sampling can be performed on the fourth purge cycle. If bottles were partially filled during sampling, note the time and approximate amount in the Ground Water Sampling Data Sheets (refer to SOP 2.1, Attachment C, “Pre-sample Purging of Wells,”) and repeat the purging process as often as necessary. If samples must be filtered, connect a disposable filter to the appropriate discharge line being purged. Follow the same sequence for sampling the second Barcad of the installation.
- 6.3.5 When sampling is complete, turn the nitrogen cylinder valve to the “close” position. Depressurize the lines by turning all other valves to the “open” position. Close and lock the protective box.

6.5 Post Operation

- 6.5.1 Perform post operation activities per SOP 4.1.
- 6.5.2 Review field forms for completeness and distribute per SOP 4.2.
- 6.5.3 Cross-check the sample bottles with those recorded on the Ground Water Sampling Data Sheets before leaving the sampling site. Store and ship samples per SOP 4.4, “Guide to the Handling, Packaging, and Shipping of Samples.”

Procedure No. ERD SOP-2.13	Revision Number 2	Page 4 of 8
-------------------------------	----------------------	-------------

6.5.4 Inventory sampling supplies and replace expendable items.

7.0 QUALITY ASSURANCE RECORDS

- 7.1 Chain-of-Custody Forms
- 7.2 Document Control Logbooks
- 7.3 Ground Water Sampling Data Sheets

8.0 ATTACHMENTS

Attachment A—Equipment Checklist

Attachment B—Barcad Completion

Procedure No. ERD SOP-2.13	Revision Number 2	Page 5 of 8
--------------------------------------	-----------------------------	--------------------

Attachment A

Equipment Checklist

Procedure No. ERD SOP-2.13	Revision Number 2	Page 6 of 8
--------------------------------------	-----------------------------	--------------------

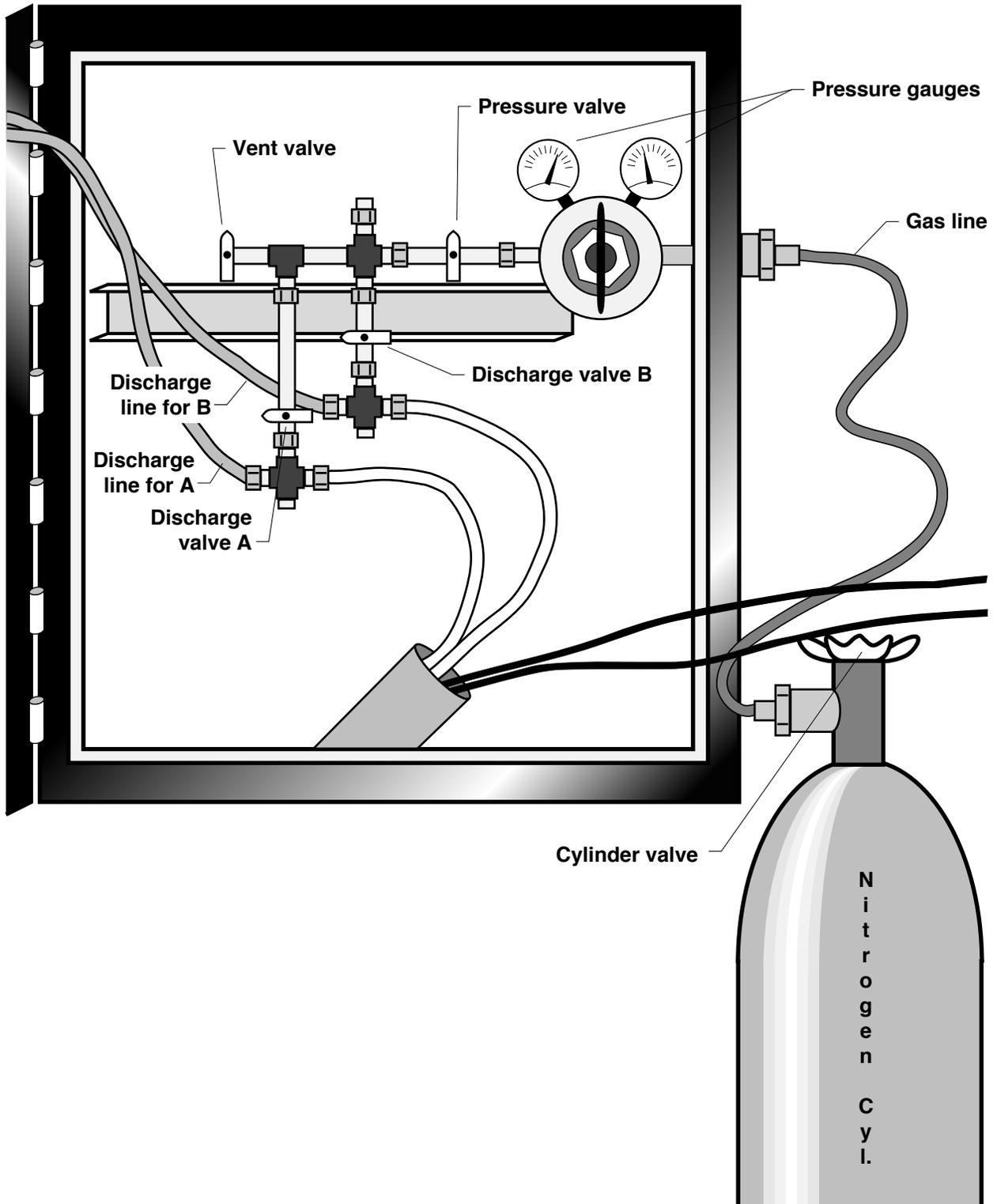
Equipment Checklist

- ___ Two-way radio
- ___ Sample labels
- ___ Sample containers
- ___ Ice chests and blue ice
- ___ Document control logbook
- ___ CoC form
- ___ Ground Water Sampling Data Sheet
- ___ Disposable towels
- ___ Tool kit
- ___ Snake chaps (when necessary)
- ___ Vinyl gloves
- ___ Appropriate maps
- ___ Pencils/pens

Procedure No. ERD SOP-2.13	Revision Number 2	Page 7 of 8
--------------------------------------	-----------------------------	--------------------

Attachment B

Barcad Completion



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Attachment B. Barcad completion showing details inside wellhead box.