



Department of Energy

Washington, DC 20585

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U.S. Geological Survey
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ISSUANCE OF SURVEILLANCE RECORD YMP-SR-97-006 RESULTING FROM THE OFFICE OF QUALITY ASSURANCE (OQA) SURVEILLANCE OF U.S. GEOLOGICAL SURVEY (USGS)

Enclosed is the record of Surveillance YMP-SR-97-006 conducted by the OQA at the USGS facilities, Yucca Mountain Site, and Exploratory Studies Facility.

The purpose of the surveillance was to observe gas sampling activities in Alcove 6 of the Exploratory Studies Facility and to verify implementation of the USGS Technical Procedure HP-56.

Performance Report (PR) YM-97-P-003 and Deficiency Report (DR) YM-97-D-023 were issued as a result of this surveillance. Response to the PR is due by the date indicated in Block 12. Response to the DR, which was transmitted via separate letter, is due by the date indicated in Block 12.

This surveillance is considered completed and closed as of the date of this letter. A response to this surveillance record and any documented recommendations is not required; however, the open PR and DR will continue to be tracked until they are closed to the satisfaction of the quality assurance representative and the Director, Office of Quality Assurance.

If you have any questions, please contact either James Blaylock at (702) 794-1420 or John R. Doyle at (702) 794-1465.

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OQA:JB-0733

Enclosure:
Surveillance Record YMP-SR-97-006

R.W. Craig
for Donald G. Horton, Director
Office of Quality Assurance

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Recip: NMSS/HLUR

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**OFFICE OF CIVILIAN
RADIOACTIVE WASTE MANAGEMENT
U.S. DEPARTMENT OF ENERGY
WASHINGTON, D.C.**

Surveillance No. YMP-SR-97-006

QUALITY ASSURANCE SURVEILLANCE RECORD

SURVEILLANCE DATA

1. ORGANIZATION/LOCATION: <u>U.S. Geological Survey (USGS)</u>	2. SUBJECT: <u>Hydro Chemistry Gas Collection</u>	3. DATE: <u>December 10, 1996</u>
4. SURVEILLANCE OBJECTIVE: <u>Assess the collection of gas samples in accordance with YMP-USGS-HP-56 "Gas and Water Vapor Sampling From Unsaturated Boreholes," Revision 4</u>		
5. SURVEILLANCE SCOPE: <u>Observe gas sampling activities in Alcove 6 of the Exploratory Studies Facility to verify implementation of the USGS Technical Procedure HP-56.</u>		6. SURVEILLANCE TEAM: Team Leader: <u>John R. Doyle</u> Additional Team Members: <u>N/A</u>
7. PREPARED BY: <u>John R. Doyle</u> <i>JRD</i> ^{FOR} Surveillance Team Leader <u>1-15-97</u> Date	8. CONCURRENCE: <u>N/A</u> QA Division Director Date	

SURVEILLANCE RESULTS

9. BASIS OF EVALUATION/DESCRIPTION OF OBSERVATIONS: <u>On December 16 through 20, a surveillance was conducted at North Ghost Dance Fault Alcove (Alcove #6) of the Exploratory Studies Facility (ESF) and the Hydrologic Research Facility (HRF) to assess gas sampling and the effectiveness of implementation of Hydrologic Procedure (HP) 56 Revision 4, M1 "Gas and Water Vapor Sampling from Unsaturated-Zone Boreholes".</u> <u>(page 2 continued)</u>	
10. SURVEILLANCE CONCLUSIONS: <u>Based on document reviews, instrument and standard verifications, and personnel interviews it has been determined that except for the deficiencies sited during the course of the surveillance the overall effectiveness and adequacy of the gas and water sampling for gas and water vapor from unsaturated boreholes is in accordance with HP-56 and is considered satisfactory. One Deficiency Report, One Performance Report and One Recommendation were generated as a result of this surveillance. A summary of these documents are as follows:</u> <u>(See page 4 continued)</u>	
11. COMPLETED BY: <u>John R. Doyle</u> <i>JRD</i> ^{FOR} Surveillance Team Leader <u>1-15-97</u> Date	12. APPROVED BY: <u>Donald G. Horton</u> <i>R.W. Horton</i> ^{FOR} QA Division Director <u>1/17/97</u> Date

Block 9 (continued) BASIS FOR EVALUATION/DESCRIPTION OF OBSERVATIONS:

Aspects of Study Plan 8.3.1.2.2.4 "Characterization of the Yucca Mountain Unsaturated Zone in the ESF" provide information on flow paths of gases through the unsaturated zone as well as interactions with other minerals and their transport properties. Gas samples are collected in accordance with HP-56 from selected boreholes in the ESF. Samples are then either analyzed at the HRF or sent to offsite laboratories located at the USGS facilities in Denver, Colorado.

A seamist pressure monitoring system has been inserted into Exploratory Studies Facility-Northern Access Drift-Geothermal Test Borehole #1A (ESF-NAD-GTB#1A) located in North Ghost Dance Fault Alcove (Alcove #6). The seamist system consists of a bladder membrane with ports selected at predetermined locations down hole. Gas induced during drilling operations is evacuated from each zone, utilizing a noreprene tube connected to a peristaltic pump and when the [CO₂] reaches approximately 200 parts/million, gas sampling can commence. [CO₂] determination is accomplished using a calibrated Infra-Red Gas Analyzer (IRGA) (Model EGM-1, SN 155). The IRGA is calibrated by the operator and utilized to determine when all contaminants have been evacuated. Calibration is done using a known concentration standard of 2006 PPM [CO₂] injected into the IRGA prior to use. The standard (Scott Speciality Gas Standard, Certification of Analysis Number 165355-93, for Cylinder Number 157089) was verified in the Gas Hydro Chemistry Mobile Laboratory located at the HRF. It was also verified that this vendor was listed on the Yucca Mountain Project Qualified Supplier's List and that the IRGA was listed on the USGS Calibration Records List.

The cylinder itself was not observed on location in Alcove #6 of the ESF. However, the calibrated standard was transported to Alcove #6 via a Mylar balloon. (See Deficiency Report (DR) YM-97-D-023) The standard is required to be transported by glass containers, aluminum cylinders or Tedlar Bags in accordance with Study Plan 8.3.1.2.2.4 Paragraph 3.8.3.1.

In addition to the above, the following selected attributes of HP-56 were reviewed:

- Paragraph 2.2.1.2 Verified Method 2 for borehole sampling:

Satisfactorily verified that noreprene tubing is connected to a peristaltic pump, (Portable Masterflex Number 1314670) with 12 Volt Power supply, labeled with Test IDs (1 through 10) traced to Field Notebook located on site Alcove 6 for sampled intervals.

- Paragraph 2.2.2.2

Sampling Method 2 utilizes flow meters for estimation purposes only, HP-56 is in conflict with Study Plan 8.3.1.2.2.4 which requires gas evacuation at known rate of 500 ml/min. (See DR YM-97-D-023)

- Paragraph 2.2.3

Verified for Carbon 14 sampling the following equipment:

Stainless Steel 500 ML Gas sample cylinder DOT 3-1800 Wiley 2 E K089 304
LHDF-4-500cc 1687-1 and 700 ml Silica Gel Towers that were utilized.

- Paragraph 9.1

Sampling was started during the course of the surveillance and at that time no Sample Collection Reports were submitted to the Sample Management Facility (SMF) for sample tracking purposes. However, it was verified that Sample Collection Reports from Alcove #3 for CO2 and Whole Gas Samples had been submitted to the SMF for previous Borehole Samples:

ESF/AC#3/Zone 20-CD SMF # 508643

ESF/AC#3/Zone 18-CD SMF # 508642

ESF/AC#3/Zone 16-CD SMF # 508641

- Paragraph 9.4.1

Satisfactorily verified CO2 Gas collection stainless steel gas cylinder valves are tightened and taped, wrapped with protective cushioning, and placed in wooden boxes filled with Styrofoam for samples 1 through 10.

- Paragraph 9.4.2

Whole Gas samples are collected in a Mylar balloon from each of the 10 sampling ports, then sealed using duct tape attaching a tube with a stopcock to the end of the balloon. The sample is then transported to offsite laboratories for analyses. Utilization of a Mylar balloon is in conflict with Study Plan 8.3.1.2.2.7 sample container requirements. (See DR YM-97-D-023).

• Paragraph 10

States in part "Documents generated by implementing this procedure are non-record materials". This statement is in conflict with committed remedial action to Performance Report (PR) USGS-96-P008 Block 12 Item 1, which states in part: "... Field Notebooks will be official records in the future. (See HP-56, Revision 4-M1, approved April 15, 1996) " (See PR YM-97-P-003)."

Personnel Contacted during the Course of the Surveillance:

Pete Striffler, Technical Field Representative, USGS
Gary Patterson, Principal Investigator, USGS
Wayne Rodman, Quality Assurance Specialist, USGS
Debra Edwards, Hydro Geologist, USGS
Chris Lewis, SMF Curator, M&O/SAIC
Martha Mustard, Quality Assurance Specialist, USGS
Jon Woolverton, Quality Assurance Specialist, USGS

Documents Reviewed during the course of the Surveillance:

HP-56 "Gas and Water Sampling from Unsaturated-Zone Boreholes" Revision 4-M1
Field Work Package FWP-ESF-96-006 "Hydrologic Properties of Major Faults
Encountered in the ESF" Revision 1
Study Plan 8.3.1.2.2.7 "Hydro Chemical Characterization of the Unsaturated-Zone"
Revision 1
Study Plan 8.3.1.2.2.4 "Characterization of the Yucca Mountain Unsaturated Zone in the
ESF" Revision 1
Quality Management Procedure (QMP) 12.01 "Control of Measuring and Test
Equipment" Revision 7
Performance Report USGS-96-P008 dtd.. April 15, 1996
Field Notebook for Alcove #6

Block 10 (continued) Surveillance Conclusions:

DR YM-97-D-023

Study Plan 8.3.1.2.2.4, Paragraph 3.8.3.1 "Collection and Transportation of Bag Samples from Boreholes" requires that during sample collection the sample gas will be pumped at a flow rate of 500 ml/minute. Sample collection was observed utilizing equipment, as specified in HP-56, for approximation only. HP-56 conflicts with the requirements of the Study Plan.

In addition, Study Plan 8.3.1.2.2.4, Paragraph 3.8.3.1 (#2) states: "The second method involves allowing the CO₂ gas to flow into 250-ml or 500-ml flow-through glass containers, 3- or 10-liter Tedlar bags, or 2.1-liter aluminum cylinders." Samples, both for calibration standards and CO₂, are collected/transported in manufacturer rejected Mylar party balloons.

PR YM-97-P-003

QARD Subsection 16.2.5 requires that all corrective actions to any condition adverse to quality be verified prior to closure. Contrary to this, remedial actions to PR-USGS-97-P008 commit to revise HP-56 to require Field Notebooks as "official records" from the implementation of the procedure. A review of HP-56 reveals that all documents generated by implementing this procedure are considered as non-record material. Conversations with cognizant USGS personnel reveals that the Field Notebooks are captured as records in the final records package. HP56 needs to be revised to formally address the capture of Field Notebooks as QA Records.

The following recommendation is for management consideration and does not require any formal response:

Recommendation 1

Gas evacuation appears to take an significant amount of time for this borehole, up to eleven days. Suggest that commercial grade pumps of a larger volume be used to decrease the evacuation time required for these boreholes and thus samples can be collected with minimal downtime and the resulting data readily available for Site Characterization Activities.