



Department of Energy

Washington, DC 20585

MAR 27 1997

QA: L

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for Yucca Mountain Site
Characterization Project
U.S. Geological Survey
1261 Town Center Drive
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**ISSUANCE OF SURVEILLANCE RECORD YM-SR-97-019 RESULTING FROM
THE OFFICE OF QUALITY ASSURANCE (OQA) SURVEILLANCE OF THE
U.S. GEOLOGICAL SURVEY (USGS)**

Enclosed is the record of Surveillance YM-SR-97-019 conducted by the OQA at the Hydrologic Research Facility and USW H-1 facilities at the Yucca Mountain Site, Nevada.

The purpose of the surveillance was to verify compliance with USGS procedures governing water level measurement.

One Performance Report (PR) was issued as a result of this surveillance. A response to the PR, which was transmitted via separate letter, is due by the date indicated in Block 12 of the PR.

This surveillance is considered completed and closed as of the date of this letter. A response to this surveillance record is not required; however, the open PR will continue to be tracked until it is closed to the satisfaction of the quality assurance representative and the Director, OQA.

If you have any questions, please contact either James Blaylock at (702) 794-1420 or Kenneth T. McFall at (702) 794-5470.


Donald G. Horton, Director
Office of Quality Assurance

WM-11
102.7

OQA:JB-1270

Enclosure:
Surveillance Record YM-SR-97-019

NH33

Recip: [unclear] HLUR

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PDR WASTE
WM-11 PDR

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MAR 27 1997

R. W. Craig

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cc w/encl:

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

Water level measurement collection activities at USW H-1 are an on-going activity and are accomplished on a monthly basis. USW H-1 is one of a number of boreholes making up the periodic network boreholes. These boreholes are used for water level measurements across the affected area at Yucca Mountain. The depth to water is measured manually with a rolled steel tape and by electronic instruments such as transducers. USW H-1 is used to monitor 4 discrete hydrologic intervals in the saturated zone. Each interval is isolated from the rest of the well by packers and accessed by tubes running from the surface to the particular interval for a total of 4 tubes. The surveillance witnessed the 8 water level measurements taken on the 4 tubes in borehole USW H-1. USW H-1 measurements are taken manually with a steel tape which is coated with salt on the bottom 8 to 10 feet.

The 2600 foot steel tape is mounted in a spool on an electrically powered lowering and raising assembly. A weight of approximately one pound is attached to the end of the tape to provide mass in lowering the tape into the borehole. The lowest 8 to 10 feet of the steel tape are covered in clear double stick tape, coated with salt, and are enclosed in clear vinyl tubing. When the steel tape is lowered to about 2 feet below the anticipated water level and anchored to prevent any creep, the tape is held motionless for 3 minutes to allow the salt on the tape to dissolve. The tape is then removed from the borehole and examined to determine the location of the dissolved salt which indicates the water level. Data is recorded on field sheets in a looseleaf logbook, transported back to the HRF, and entered onto a software spread sheet in Microsoft Works which produces Water-Level Measurement Work Sheets. The Water-Level Measurement Work Sheets are then transmitted electronically to the Principal Investigator in Denver, Colorado.

The following requirements from NWM-USGS-HP-75, Revision 2, "Method for Measuring Depth-to-water in Wells Using Reeled Steel Tapes Longer than 1,000 feet" were reviewed:

- Para. 2.1.4* Lower the tape carefully into the well to slightly below the estimated water level, until a convenient foot mark value on the tape is reached. This tick mark is held against a measuring point (MP) of known altitude, such as the top of the well casing. This point is the hold-point. Record this number in the log book or other organized document. Hold the tape at the hold-point for a few minutes to allow the water to mark the tape.
- Para. 2.1.6* Identify the water cut-mark and read its distance from zero on the tape. Record this cut-point to the nearest 0.01 foot in the logbook or other organized document.
- Para. 2.1.7* Repeat the above steps until the difference between any two measurements is no more than one part in 10,000 for measurements of more than 1,000 feet; or 0.1 feet for measurements less than 1,000 feet.
- Para. 2.3* Data Tracking. The serial number of the tape used to make the depth-to-water measurement will be noted in the logbook or other organized document to provide traceability between the data and the equipment.

Para. 4.2 **Assumptions:** The steel tape has not been stretched, spliced or damaged, causing a change in length, since its last calibration

Para. 8.0 **CALIBRATION** - Calibration is required. All calibrations will be performed and documented per QMP-12.01. ...Calibrations will be performed at least every three years...

Para. 11.1 Data produced by this procedure will be depth-to-water below land surface measurements, usually reported in feet and hundredths of feet, but they may also be reported in meters and decimal fractions. The data will be documented in logbooks or other organized documents.

Para. 11.2 Individual records generated by this work are logbooks containing data and information related to the collection of the depth-to-water data.

The activities witnessed complied with the above requirements. Details of the water level measurements provided below were taken from the field notes.

USW H-1 Tube #1 Run #1

Chain: #3
Time: 0850
Temp.: 8.8C
Barometric
Pressure: 663 mm Hg
Hold: 1699.00'
Cut: 1.11'
Sum: 1697.89'
M.P.: 1.02'
D.T.W.: 1696.87'

USW H-1 Tube #1 Run #2

Chain: #3
Time: 0900
Temp.: 9.6C
Barometric
Pressure: 663 mm Hg
Hold: 1700.00'
Cut: 2.1'
Sum: 1697.90'
M.P.: 1.02'
D.T.W.: 1696.88'

USW H-1 Tube #2 Run #1

Chain: #3
Time: 0913
Temp.: 10.3C
Barometric
Pressure: 663 mm Hg
Hold: 1867.00'
Cut: 2.86'
Sum: 1864.14'
M.P.: 1.02'
D.T.W.: 1863.12'

USW H-1 Tube #2 Run #2

Chain: #3
Time: 0925
Temp.: 9.4C
Barometric
Pressure: 663 mm Hg
Hold: 1868.00'
Cut: 3.90'
Sum: 1864.10'
M.P.: 1.02'
D.T.W.: 1863.08'

USW H-1 Tube #3 Run #1

Chain: #3
Time: 0938
Temp.: 11.1C
Barometric
Pressure: 663 mm Hg
Hold: 1885.00'
Cut: 4.43'
Sum: 1880.57'
M.P.: 1.02'
D.T.W.: 1879.55'

USW H-1 Tube #3 Run #2

CHAIN: #3
Time: 0950
Temp.: 10.9C
Barometric
Pressure: 663 mm Hg
Hold: 1886.00'
Cut: 5.43'
Sum: 1880.57'
M.P.: 1.02'
D.T.W.: 1879.55'

USW H-1 Tube #4 Run#1

Chain: #3
Time: 1002
Temp.: 11.0C
Barometric
Pressure: 663 mm Hg
Hold: 1886.00'
Cut: 5.97'
Sum: 1880.03'
M.P.: 1.02'
D.T.W.: 1879.01'

USW H-1 Tube #4 Run#2

Chain: #3
Time: 1014
Temp.: 10.8C
Barometric
Pressure: 663 mm Hg
Hold: 1887.00'
Cut: 7.00'
Sum: 1880.00'
M.P.: 1.02'
D.T.W.: 1878.98'

Chain: The unique identifier for the 2600' steel tape
Hold: Footage mark on the tape at which the tape is secured against creep
Cut: The mark on the tape where the water has dissolved the salt
Sum: The Hold minus the Cut
M.P.: Measuring point of known altitude, in this case the top of the borehole casing
D.T.W.: Depth to Water

Temperature and barometric pressure are not required by the procedure but are taken for reference purposes. The temperature measurements are recorded because water level measurements taken when the ambient air temperature is over 110 degrees Fahrenheit require the inclusion of a steel tape stretch factor to be included in the depth calculations. Temperature values are surface air ambient. This temperature does not affect the steel tape in the well because it is exposed to the borehole ambient air temperature, which is noticeably less. The barometric pressure readings are taken to provide explanation in case of water level fluctuation up or down due to unusually low or high atmospheric pressure. Unusually high or low barometric pressure can cause a fluctuation of 1/10th of a foot or slightly more. The thermometer and barometer are not calibrated but they are checked against calibrated instruments at the HRF prior to taking water level measurements.

The 2600' steel tape is required to be calibrated once every three years. The calibration information is recorded below:

Chain #3 2600' steel tape

Manufacturer: USGS

Last Calibration: 10/25/95

Next calibration due: 10/25/98

Procedure: USGS Technical Procedure NWM-USGS-HP-26, Revision 2, "Method for Calibrating Water-Level Measurement Equipment Using the Reference Steel Tape"

Calibrator: Goemaat/Graves

Personnel contacted during the surveillance:

Robert Goemaat, USGS, Hydrologic Technician

Robert Graves, USGS, Principal Investigator