



**Department of Energy**

Washington, DC 20585

JAN 17 1997

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for Yucca Mountain Site  
Characterization Project  
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**ISSUANCE OF SURVEILLANCE RECORD YMP-SR-97-002 RESULTING FROM THE OFFICE OF QUALITY ASSURANCE (OQA) SURVEILLANCE OF THE CIVILIAN RADIOACTIVE WASTE MANAGEMENT SYSTEM MANAGEMENT AND OPERATING CONTRACTOR (CRWMS M&O)**

Enclosed is the record of Surveillance YMP-SR-97-002 conducted by the OQA at the CRWMS M&O facility in Las Vegas, Nevada, and at the Exploratory Studies Facility.

The purpose of the surveillance was to verify that the measuring and test equipment utilized for the Single Heater Test was properly controlled, calibrated and maintained.

Deficiency Report (DR) YM-97-D-025 was issued as a result of this surveillance. Response to the DR, which was submitted 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 DR 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 John S. Martin at (702) 794-5591.

*R.W. Clap*  
For Donald G. Horton, Director  
Office of Quality Assurance

OQA:JB-0732

Enclosure:  
Surveillance Record YMP-SR-97-002

9701280037 970117  
PDR WASTE  
WM-11 PDR

Recip: NMSS/HLUR



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Records Processing Center = "12"

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

As background the single heater test is intended to generate site-specific data to be used in understanding the Thermal Hydrological/Mechanical /Chemical processes at a repository scale and to make site-specific measurements of heat driven rock mass properties. Specific objectives of the test are intended to provide:

- Measurement of rock-mass thermal properties at several locations representative of the repository host rock conditions,
- Measure the thermal expansion of the rock mass,
- Examine the validity of conductive thermal models,
- Measure changes in rock-mass and fracture permeability,
- Measure rock-mass modules under thermal conditions using the Goodman Jack method,
- Develop an in site test experience base using the simplest test, and
- Evaluate rock-mass strength and ground support interactions.

The single heater test is further described within Study Plan 8.3.1.15.1.6, In Site Thermomechanical Properties and within Field Work Package (FWP-ESF-96-003), Thermal Testing In The Exploratory Studies Facility - Phase I.

In order to perform these tests, numerous boreholes were drilled to allow the installation of a single heater element and M&TE for the purpose of measuring the response of the rock-mass when heated. Visual observation was made of the boreholes and it was found that each borehole is identified by a placard associated with the type and function of the instrument(s) installed, such as:

9 ESF-TMA-TC-2  
TEMPERATURE MEASUREMENT  
(MULTI-POINT THERMOCOUPLE PROBE)  
4.8 CM DIAMETER (AQ DIAMOND BIT) 8.0 M LONG, HORIZONTAL  
DATE CORED, MAY 1, 1996

However, other than the identification of the borehole and the type of instrument contained within; the unique identification of the installed instruments could not be located.

A randomly selected sample of approximately fifteen borehole numbers was obtained from the borehole placards. This sample was intended to be utilized to obtain the serial numbers and access to the calibration records for the M&TE selected.

The Test Coordination Office (TCO) was contacted to determine who held overall responsibility for the single heater test and the Test Lead for Thermal Testing was identified as the point of

contact. The list of the boreholes was electronically transmitted on at least three occasions to the Test Lead in order to obtain a listing of the installed M&TE and to access the associated calibration documentation. On each occasion the Test Lead was unable to produce the necessary information identifying other sources of contact who were also unable to produce the information.

A meeting was held on October 2, 1996 concerning the identification and control of M&TE utilized for the single heater test. Present at the meeting were the Test Lead and representatives from the M&O TCO, QA and the DOE Office of Quality Assurance. During the meeting it was stated that each borehole may contain numerous instruments and the Test Lead did not have immediate access to the measuring and test equipment and calibration records. When queried as to when this information could be made available or who was more appropriate to contact, it was indicated that the Test Lead was the primary contact. It was also indicated by the Test Lead that it would take approximately two months to assemble the information sought by the surveillance. Based upon instigation by M&O QA, it was determined that the Test Lead and the TCO would assemble a matrix listing borehole identification, measuring and test equipment installed and serial numbers, purchase requisition numbers, the affected organization who had responsibility for the M&TE, and calibration records. With M&O QA input, it was agreed that the matrix was to be supplied within the following week. A proposed matrix containing headings for the above attributes was supplied the following day for comment. The matrix was found to be acceptable and the TCO proceeded with attempting to assemble the information.

During the meeting it was also found that the M&O had purchased a large portion of the installed M&TE and had also arranged for the calibrations to be performed. M&O QA had issued a Deficiency Report LVMO-96-D-058 addressing the fact that the Test Lead had procured calibration services without acquiring the appropriate reviews of the purchase documents. Specifically, the purchase documents were not reviewed by M&O QA to assure that appropriate quality and technical requirements were incorporated into the Purchase Orders.

Three weeks later an incomplete matrix was presented and updated as to when a completed matrix was expected to be given. A review of the matrix, as supplied, was performed in order to determine the affected organization and Principal Investigator who held overall responsibility for each borehole.

Based upon the difficulty the TCO was having acquiring the data needed for the matrix, it was decided to limit the scope of the surveillance from the original fifteen boreholes to just three boreholes.

In discussion with the TCO, they agreed to supply an individual to accompany the surveillance team to the TMAE where three boreholes would be selected. Subsequent to selection, it was agreed that they would put the team in contact with the appropriate Affected Organization and PI or their representative. The three boreholes selected were; #3 ESF-TMA-MPBX-2, #9 ESF-

TMA-TC-2, and #30 ESF-TMA-RB-3. It was found that these boreholes were instrumented by Sandia National Laboratories (SNL) and a representative of the PI was contacted. A meeting was set up and the Scientific Notebook and associated calibration documentation for these boreholes was reviewed to assure that the minimum requirements from the Quality Assurance Requirements and Description Document (QARD) DOE/RW-0333P, Revision 5, Section 12.0 Control Of Measuring And Test Equipment were met. The information provided by the Scientific Notebooks and calibration documentation is summarized as follows:

#3 ESF-TMA-MPBX-2 was instrumented with 6 High Temperature Linear Variable Differential Transformers which were procured by the M&O with the calibrations accomplished when supplied to SNL. The calibrations were performed by a company called Roctest. In review of the calibration documentation, it was found that it did not contain the minimum information required by the QARD. Specifically, the information missing from the calibration documentation was the identification of the implementing document used to perform the calibration, and the recalibration due date or interval. In addition, it was found that Roctest had utilized a supplier (RDP) to perform a calibration of a module that was added to their instrumentation package. In accordance with the Qualified Suppliers List (QSL) Roctest has not been qualified to utilize sub-tier suppliers. A synopsis of the requirements violated and details of each deficiency are described within Section 10 of this report and further documented on Deficiency Report (DR) #YM-97-D-025.

#9-ESF-TMA-TC-2 was instrumented with two Multi-Point Thermocouple Probes which were procured by the M&O. Review of the Scientific Notebook for the calibration documentation for these probes indicates that they were not calibrated/checked throughout the expected range of usage. However, there was a user check performed by applying the probes to an ice bath prior to insertion into the borehole. In discussions with the SNL representative it was indicated that these probes should have been checked throughout their expected range of use. It was also indicated that if the probes were procured and totally controlled under SNL quality program that the check would have been performed by SNL. In addition, no recalibration/check due date has been documented for these probes. A synopsis of the requirements violated and details of each deficiency are described within Section 10 of this report and further documented on Deficiency Report (DR) #YM-97-D-025

#30 ESF-TMA-RB-3 was instrumented with a Vibrating Wire Load Cell. The Load Cells were procured by SNL and calibrations were performed by a company called Geokon. Review of the calibration documentation and associated entries within the Scientific Notebook found the control, and calibration of the Vibrating Load Cells to be acceptable.

In addition to the documentation reviews performed above, personnel interviews were also conducted during the course of the surveillance. Interviews with the Test Lead for Thermal Testing were conducted to determine his overall knowledge and cognizance of quality requirements for the control of M&TE. Based on these interviews it was determined that the Test Lead for Thermal Testing had a fundamental understanding of QARD requirements. In interviews with SNL personnel it was perceived that they had a thorough knowledge and understanding of the QA program requirements for the control M&TE. However, SNL had relied on the Test Lead for Thermal Testing to accomplish the tasks that were found to be deficient..

Section 10 provides the overall evaluation of the control of M&TE for the single heater test, a synopsis of the deficiencies identified, and recommendations generated as a result of the surveillance.

**PERSONNEL CONTACTED:**

NAME:	ORGANIZATION:
Gail Abend	CRWMS M&O/QA
Andrew Burningham	CRWMS M&O/TCO
Robin Datta	CRWMS M&O/TCO
Ned Elkins	CRWMS M&O/TCO
Tim George	Sandia National Laboratory (SNL)
Robert Justice	CRWMS M&O/QA
Doug Weaver	CRWMS M&O/TCO
Albert Williams	DOE/OQA

**Block 10 (continued) SURVEILLANCE CONCLUSIONS:**

As noted, the deficiency report consists of four separate deficiencies. The four deficiencies were grouped under the control of one deficiency report due to their relationship and so that all aspects relative to the control and handling of M&TE would be considered during resolution. A synopsis of each deficiency found as a result of the surveillance is as follows:

- Roctest was evaluated and selected to supply calibration of rock mechanics instrumentation for which Roctest manufactures specifically high temperature BOF-EX measurement modules. Based on this, the Supplier Evaluation Report (SER) only identified QA program elements 1.0, 2.0, 5.0, 6.0, 12.0, 13.0, 15.0, 16.0, 17.0 and 18.0 as applicable.

However, Roctest procured items (a module to be added to their instrumentation package) and calibration services from a company called RDP which would involve QA program elements 4.0 and 7.0.

The evaluation of Roctest has failed to identify the need for Roctest to go outside their company for the acquisition of items and services not directly supplied by them. No evidence exists to indicate that Roctest has performed an evaluation of RDP to provide calibration services. As such, the modules calibrated by RDP are in question.

- Two thermocouple probes designated TMA-TC-2A and 2B located in the single heater test borehole designated ESF-TMA-TC-2 were installed prior to being calibrated or checked throughout the expected range of use.
- The calibration certificate supplied by Roctest for seven high temperature BOF-EX measurement modules dated July 10, 1996 does not contain:
  - 1) Recalibration due date or interval, or
  - 2) Identification of the implementing document used in performing the calibration.

The serial numbers for the seven high temperature BOF-EX measurement modules are 055D-9622 through 055D-9628.

- The following instruments have not been labeled, tagged, marked, or indicated on documentation as to the due date of the next calibration/check:

High temperature BOF-EX measurement modules 055D-9622 through 055D-9628

Thermocouple probes TMA-TC-2A and TMA-TC-2B

The following recommendations are provided.

- It is recommended that the M&O provide additional control and interface when procuring M&TE and calibration services for other affected organizations. During the course of the surveillance, it was found that confusion existed as to who held overall responsibility for the control of M&TE utilized for the single heater test. For example, confusion existed as to who controls the instrumentation and is responsible for assuring that all quality requirements are met when the M&O procures instrumentation and calibration services and then has SNL perform installation.

- During the course of the surveillance, it came to light that the M&O Quality Assurance Organization has taken a hands-off approach to overview of site quality affecting testing activities for which they are ultimately responsible.

It is recommended that the M&O quality organization take a more proactive involvement in the day-to-day testing activities being performed at the Yucca Mountain Site.