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MEMORANDUM FOR: John J. Linehan, Acting Chief
Operations Branch, HLWM

FROM: Ronald L. Ballard, Chief
Technical Review Branch, HLWM

SUBJECT: HLTR STAFF QA OBSERVATION AUDIT REPORT

Transmitted with this memorandum is the QA Observation Audit Report on the observation audit of the USGS Denver office in the technical areas of hydrology, geochemistry, and seismology. The report was prepared by Fred Ross, hydrologist and observation team technical coordinator, with assistance from John Bradbury in geochemistry and Buck Ibrahim in seismology. This report fulfills HLTR Branch obligations under the TA task control request from the Operations Branch dated 6/2/88.

Please contact Fred Ross, Ext 20527, if you have any questions regarding this transmittal.

[Signature]
for Ronald L. Ballard, Chief
Technical Review Branch, HLWM

Enclosure:
As stated

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The technical staff's participation in the QA audit of the USGS included the observation and evaluation of technical audits of five (5) USGS Scientific Investigation Plans (SIP's) and associated technical procedures. The five SIP's were on regional surface water hydrology (3310G-01), percolation in the unsaturated zone from surface borehole investigations (3343G-01), boundary conditions and hydraulic gradients within the saturated zone (3331G-01), hydrogenic deposits (3370G-02), and regional studies of seismicity (3233G-03). Major aspects of the technical audit that were observed and evaluated were:

- (1) technical auditor qualifications
- (2) utilization of technical check list questions
- (3) technical auditor team preparation
- (4) conduct of technical audits

Based on its review of the technical auditor's qualifications, the staff concluded that each technical auditor appeared to have sufficient educational and/or technical experience to be knowledgeable in the technical areas relevant to the SIP(s) and technical procedures they were responsible for examining during the audit. This was further demonstrated by the nature and quality of the questions asked by the technical specialists during the audit. The technical auditor's qualifications ranged from a B.S. degree with more than twenty years relevant experience, to a Ph.D degree in an appropriate field with about three years related experience.

Prior to the audit, each technical auditor prepared a technical check list related to the technical products (SIP's and procedures) that served as the initial basis for conducting the audit. The auditors followed their check lists and amended them as the audits expanded into more detailed areas not thoroughly described in the SIPs or procedures. Through detailed questioning and investigation, the technical specialists were able to ascertain circumstances where the technical program was evolving away from the older SIP's and procedures. For the surface borehole investigation of the unsaturated zone, the technical specialist in hydrology discovered that the

experimental nature of the testing technology, particularly regarding equipment calibration, reliability and placement methods, makes strict adherence to the current SIP highly impractical and projections of future work somewhat uncertain. Partly as a result, past and currently collected unsaturated zone hydrologic data has been down graded to QA level III. In the case of the technical audits on regional seismology and saturated zone hydrology, it was discovered that some of the seismology and the hydrology procedures were revised or new procedures added to cover work already performed. In one case the auditor's questioning concentrated too much on the SIPs and the auditor did not address procedure limitations or occasional inconsistencies, omissions, or errors that were discovered by the observers. For example, Ms Jenny Chapman, the technical observer representing the State of Nevada questioned the procedure for calibrating the steel measuring tape by noting that the procedure called for paste or chalk for marking the tape when salt was actually used. In another case, the audit was too programatical and the auditor needed to include more technical questions in the check list to ensure adequate technical coverage of the SIP's and procedures. The staff suggests that future efforts include more check list questions covering technical procedures.

The staff found the technical audit of the USGS to be acceptable overall. The technical audit team was persistent and thorough in questioning the activities described under the SIPs. Generally, the technical specialists integrated their review activities with other members of the QA audit team. When a potential programatical problem was uncovered, the lead technical auditor and the audit team leader were notified. The questioning of USGS personnel on data management and control was one of several cases in which members of the QA audit team assisted in the technical investigation. The technical discussions were frank and open, and mostly within the scope of the audit. The questioning resulted in findings or observations related to work performed without procedures, management of data including the need for backup files should data be lost or destroyed, clarification of tentative procedures, and auxiliary software and how its output will be treated.

Based on its activities as technical observers, the staff concludes, in terms of the five SIP's audited, the following about the USGS program:

- ° The SIP's contain substantially no more information about the USGS site characterization testing program than what is generally presented in the CDSCP. To thoroughly understand the USGS scientific program, more detailed descriptions of the SIP activities are needed.
- ° Many of the technical procedures covering SIP activities were written in the early 1980's, and do not reflect current thinking. Some data collection was conducted without written procedures.
- ° Some of the principal investigators appear to have limited awareness of work ongoing or planned under other related SIP's.
- ° In most instances no procedures are in place for data management and control. Records reside with the Principal Investigators until investigations are completed and reports published. No backup files nor master indexes of data are maintained. The USGS system of data management may not lend itself readily to the "timely" release of data.