U.S. DEPARTMENT OF ENERGY
OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT
OFFICE OF QUALITY ASSURANCE

AUDIT REPORT

OF

U.S. GEOLOGICAL SURVEY

DENVER, COLORADO

AUDIT YMP-94-06

JUNE 20 THROUGH 24, 1994

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1.0 EXECUTIVE SUMMARY

As a result of Quality Assurance (QA) Audit YMP-94-06, the audit team determined that the U.S. Geological Survey (USGS) is satisfactorily implementing an effective QA program in accordance with the U.S. Department of Energy (DOE) Office of Civilian Radioactive Waste Management (OCRWM) Quality Assurance Requirements and Description (QARD), DOE/RW-0333P, Revision 0, for the Civilian Radioactive Waste Management Program and USGS's implementing procedures for QA Program Elements 1.0, 2.0, 3.0, 5.0, 6.0, 8.0, 12.0, 17.0, 18.0 and QARD Supplements I, II, and III. The audit team determined that implementation of QA Program Elements 4.0, 7.0, and 16.0 was unsatisfactory because of deficiencies identified in this report. These determinations were made by verifying that selected QARD requirements were satisfactorily implemented through USGS procedures utilizing the approved Requirements Traceability Network (RTN) and the audit process. In addition, the audit team determined that USGS is satisfactorily implementing all technical activities evaluated.

The audit team identified ten deficiencies during the audit that resulted in issuance of eight Corrective Action Requests (CAR). CAR YM-94-043 addressed performing scientific investigations without using a Scientific Notebook (SN) or technical implementing procedures. CAR YM-94-044 concerned not including all required information in Quality Surveillance Reports. CAR YM-94-045 addressed the lack of required software user documentation. CAR YM-94-046 concerned not documenting conditions adverse to quality on deficiency documents. CAR YM-94-047 addressed procedures not requiring technical review comment resolution to be performed by an independent reviewer and one independent review of data not being performed as required. CAR YM-94-048 concerned not reflecting requirements for identification and control of samples in Technical Procedures (TPs) and SNs. CAR YM-94-049 addressed the lack of criteria for what constitutes a trend in the USGS procedure for trending. CAR YM-94-050 addressed not translating QARD requirements into procurement procedures and implementation of procedures not resulting in acceptable products or services. There were seven deficiencies identified by the audit team and corrected prior to the postaudit meeting. These deficiencies are described in Section 5.5.2 of this report. Additionally, there were 18 recommendations resulting from the audit, which are detailed in Section 6.0 of this report.

The following strengths and/or improvements in the USGS QA Program were noted during the audit:

- The USGS personnel training and qualification program was extremely well implemented. Records of employee training and qualification were found to be detailed and well maintained.

- A review of USGS internal audit and surveillance reports indicated that these audits and surveillances were in depth, evaluated work in progress as well as completed work, and included detailed evaluations of program compliance.

- USGS has shown significant progress in completing corrective actions and closing old deficiency reports. Those that remain open show progress toward completion and closure.

- The technical work being performed by USGS and contractor personnel is of high quality. Significant effort has gone into performance of scientific investigations and integration between ongoing studies.

2.0 SCOPE

The audit was conducted to evaluate the adequacy of, compliance to, and the effectiveness of the USGS QA Program as described in the QARD and USGS implementing quality documents.

The QA program elements/requirements evaluated during the audit, in accordance with the published audit plan, are as follows:

QA PROGRAM ELEMENTS/REQUIREMENTS

1.0 Organization
2.0 Quality Assurance Program
3.0 Design Control
4.0 Procurement Document Control
5.0 Implementing Documents
6.0 Document Control
7.0 Control of Purchased Items and Services
8.0 Identification and Control of Items
12.0 Control of Measuring and Test Equipment
16.0 Corrective Action
17.0 Quality Assurance Records
18.0 Audits
Supplement I, Software
Supplement II, Sample Control
Supplement III, Scientific Investigation

The following QA program elements were considered during the development of the audit plan and found to be not applicable, since the current USGS QA Program has no activity for which these elements apply:

9.0 Control of Special Processes
10.0 Inspection
11.0 Test Control
13.0 Handling, Storage, and Shipping
14.0 Inspection, Test and Operating Status
15.0 Nonconformances
Supplement IV, Field Surveying

TECHNICAL AREAS

The following technical areas were evaluated during the audit:

Work Breakdown Structure (WBS) No.	Title
1.2.3.2.2	Rock Characteristics
1.2.3.2.8	Preclosure Tectonics
1.2.3.2.5	Postclosure Tectonics

The evaluation of technical areas included review of work performed under and/or development of the following Study Plans (SPs):

Study Plan No.	Title
8.3.1.4.2.2	Characterization of Structural Features Within the Site Area
8.3.1.8.2.1	Tectonic Effects
8.3.1.17.4.3	Quaternary Faulting Within 100km of Yucca Mountain, Including the Walker Lane
8.3.1.17.4.12	Tectonic Models and Synthesis
8.3.1.4.2.1	Characterization of the Vertical and Lateral Distribution of Stratigraphic Units Within the Site Area
8.3.1.17.4.5	Detachment Faults at or Proximal to Yucca Mountain
8.3.1.4.2.3	Three-Dimensional Geologic Model

3.0 AUDIT TEAM AND OBSERVERS

The following is a list of audit team members, their assigned areas of responsibility, and observers:

Name/Title	QA Program Elements/ Requirements or Technical Areas
Charles C. Warren, Audit Team Leader (ATL), Yucca Mountain Quality Assurance Division (YMQAD)	
Robert E. Harpster, Lead Technical Specialist, YMQAD	
James Blaylock, Auditor, YMQAD	3, 8, 16, Supplements II and III
Donald J. Harris, Auditor, YMQAD	4, 7, and 12
Stephen R. Maslar, Auditor, YMQAD	6 and 18
Richard L. Maudlin, Auditor, YMQAD	17 and Supplement I
Emily S. Reiter, Auditor, Headquarters Quality Assurance Division (HQAD)	1, 2, and 5
Thomas R. Swift, Auditor, HQAD	3, 5 and Supplement III
Jefferson R. McClearly, Technical Specialist, Management and Operating (M&O) contractor	SPs: 8.3.1.4.2.1; 8.3.1.4.2.2; 8.3.1.4.2.3; and 8.3.1.17.4.5

Ralph D. Rogers, Technical Specialist, M&O — SPs: 8.3.1.4.2.2; 8.3.1.8.2.1; 8.3.1.17.4.3; and 8.3.1.17.4.12

John W. Gilray, Observer, U.S. Nuclear Regulatory Commission (NRC)
John S. Trapp, Observer, NRC
Thomas C. Trbovich, Observer, NRC

4.0 AUDIT MEETINGS AND PERSONNEL CONTACTED

The preaudit meeting was held at USGS offices in Denver, Colorado on June 20, 1994. A daily debriefing and coordination meeting was held with USGS management and staff, and daily audit team meetings were held to discuss issues and potential deficiencies. The audit was concluded with a postaudit meeting held at USGS offices in Denver, Colorado on June 24, 1994. Personnel contacted during the audit are listed in Attachment 1. The list includes an indication of those who attended the preaudit and postaudit meetings.

5.0 SUMMARY OF AUDIT RESULTS

5.1 Program Effectiveness

The audit team concluded that, in general, the USGS QA Program is adequate and is being satisfactorily implemented for the scope of this audit.

Individually, QA Program Elements 1.0, 2.0, 3.0, 5.0, 6.0, 8.0, 12.0, 17.0, 18.0, and QARD Supplements I, II, and III are satisfactorily implemented. QA Program Elements 4.0, 7.0, and 16.0 were found unsatisfactory. In addition, technical activities were found to be satisfactorily implemented.

5.2 Stop Work or Immediate Corrective Actions Taken

There were no Stop Work Orders, immediate corrective actions or related additional items resulting from this audit.

5.3 QA Program Audit Activities

Details of the QA program audit activities are provided in Attachment 2. A list of objective evidence reviewed during the audit is provided in Attachment 3.

5.4 Technical Audit Activities

Details of technical activities audited are included in Attachment 2 and a list of objective evidence reviewed during the audit is provided in Attachment 3 of this report.

5.5 Summary of Deficiencies

The audit team identified ten deficiencies during the audit for which eight CARs have been issued. Seven additional deficiencies were identified and corrected prior to the postaudit meeting.

Synopses of deficiencies documented as CARs and those corrected during the audit are detailed below. Information copies of the CARs are included in Attachment 4.

5.5.1 Corrective Action Requests

As a result of the audit, the following CARs were issued:

CAR YM-94-043

Scientific investigations were performed without using a SN, technical implementing document or a combination of both as required by the QARD.

CAR YM-94-044

Quality Surveillance Reports were issued during Fiscal Year (FY) 1994 that did not contain a statement of acceptability and effectiveness in the report summary as required by USGS procedure.

CAR YM-94-045

Software user documentation was not on file as required by USGS procedure for one software application.

CAR YM-94-046

Quality Deficiency Reports (QDRs) were not issued as required by the QARD and USGS procedure for apparent conditions adverse to quality.

CAR YM-94-047

Contrary to QARD requirements, the USGS procedure for technical review of data does not require that technical review comment resolution be performed by the independent reviewer. In addition, independent data review was not completed for one set of data sampled.

CAR YM-94-048

QARD requirements for the identification and control of samples have not been incorporated into USGS TPs and SNs.

CAR YM-94-049

Contrary to QARD requirements, the USGS procedure for trending does not provide criteria as to what constitutes a trend. Therefore, the conclusions of trend reports are not substantiated by information in the reports.

CAR YM-94-050

USGS procedures for procurement fail to translate QARD requirements into the work process. In addition, implementation of procedures has not provided assurance that procurement activities resulted in acceptable products or services.

5.5.2 Deficiencies Corrected During the Audit

Deficiencies which are considered isolated in nature and only requiring remedial action can be corrected during the audit. The following deficiencies were identified and corrected during the audit:

1. Quality Management Procedure (QMP)-3.03, Revision 4, Paragraph 5.3.1.1 requires that, upon receipt of the software, the Yucca Mountain Project Branch (YMPB) shall assign a unique identifier to the software. Contrary to this requirement, released software GIBBS '90/1.0 and DIFFGIBBS are loaded on a technical contacts system; however, the physical software that is loaded on this machine does not contain the unique identifier that has been assigned through the configuration management system. This was resolved by the approval of Modification (M) 3 to QMP-3.03, Revision 4 which added requirements for unique identification to include file name and extension, file size, and the date of file creation. This information will be included on the Configuration Management Status Log.

2. QARD, Revision 0, Section 17.0, Paragraph 17.2.5 (A) (3) requires that approved implementing procedures provide a description of the filing system to be used. Paragraph 17.2.5 (B) (3) requires that special processed records be stored to preclude damage from stacking. Contrary to these requirements, QMP-17.03 does not provide a description of the filing system to be used and does not address requirements to preclude damage of special process records from stacking. This was resolved by the approval of M1 to QMP-17.03, Revision 1 which added information regarding the mechanism used to describe the filing system for QA Records and added requirements which prohibit the stacking of special processed records.

3. QARD, Revision 0, Section 17.0, Paragraph 17.2.2 (D) indicates that documents become QA Records when they are completed and no further action is required or when they have been authenticated. Contrary to this requirement, QMP-17.01, Revision 6, Paragraph 5.2.2, allows individual records to be authenticated, but indicates that the authenticated records are not QA Records in that they are a part of a records package. This was resolved by the approval of M1 to QMP-17.03, Revision 1 which deleted the provision that authenticated records, which were part of a QA Records Package, are not considered QA Records.

4. QMP-17.01, Revision 6, Paragraph 5.3.2.2 requires the records source to prepare a table of contents (Attachment 8) for completed records packages. Contrary to this requirement, the table of contents for records packages: ASCR-G12328410, Hydrologic Procedure (HP)-14, Revision 4, and Purchase Order (PO) 14PCLC00421, did not include a signature that identified the individual who compiled the records package as referenced by Attachment 8. This was resolved by the approval of M1 to QMP-17.03, Revision 1 which removed the requirements for identifying the individual who compiled the records package.

5. QMP-17.03, Revision 1, Paragraph 5.2.4 requires that records which meet acceptance requirements shall be stamped on the back as "accepted" and include the date of acceptance of the records package. Contrary to this requirement, there is no objective evidence in the records package of a stamp indicating acceptance and the date of acceptance for records packages: HP-14, Revision 2, HP-189, Revision 0, and G1232834-1. This was resolved by the approval of M1 to QMP-17.03, Revision 1 which removed the requirements for the use of a "stamp" in signifying records/records package approval.

6. The QA reviews required by QMP-5.05, Revision 4 and QMP-3.07, Revision 5 were not performed for the completed SN 0008. This condition was corrected by completing and documenting the reviews in accordance with procedural requirements.

7. Mandatory comment resolution for the review of USGS TP NWM-USGS-GCP-28, Revision 1 was not completed as required by QMP-3.07, Revision 5. During the audit, the review of mandatory comment resolution was properly documented to meet QMP-3.07 requirements.

5.5.3 Follow-up of Previously Identified CARS

CAR YM-93-053 was closed on April 27, 1994. This CAR documented that USGS POs did not include the appropriate QA program requirements for the scope of work or activity. The corrective action for this CAR was determined to be ineffective (reference CAR YM-94-050 for details).

CAR YM-93-054 was closed September 8, 1993. This CAR documented calibration data was not entered into a notebook or other organized documentation. The corrective action for this CAR was determined to be effective. The Principal Investigator (PI) for this activity retired in September 1993 (the activity related to the evaluation of past discharge area). Funding for this activity was terminated. The applicable instrument closure calibrations were performed and the instruments were withdrawn from service.

6.0 RECOMMENDATIONS

The following recommendations resulted from the audit and are presented for consideration by the USGS management.

1. QMP-6.01, Revision 6, Section 2, in the second paragraph refers to Administrative Procedure (AP)-1.5Q for requirements to be met by participants pertaining to controlled documents issued by Yucca Mountain Site Characterization Office (YMSCO) in Las Vegas, Nevada. It is unclear as to how AP-1.5Q applies or is to be used by USGS personnel who are on distribution for YMSCO controlled documents. It is recommended that this paragraph be clarified.

2. QMP-6.01, Revision 6, Section 5.1.3, identifies the prefix to be used for identifying specific categories of controlled documents. Categories of controlled documents not included on the list are Activity Controls Specification Reports and Grading Reports. It is recommended that these categories be included with the currently used prefix noted for completeness.

3. A detailed review of recently completed surveillances and internal and external audit reports showed that the surveillances and internal audit reports are very detailed, cover work in progress, evaluate completed work, and review compliance with procedures. The external audits, however, are less detailed regarding reviews and are based on interviews and a general review of procedures in place. External audit reports have also noted that in many cases no documented QA program exists making the audit process more difficult. Conditions adverse to quality related to weaknesses in the external audit program for evaluation of USGS suppliers, are documented in CAR YM-94-050.

4. During the next revision or modification of QMP-3.15, Revision 0, references to obsolete procedures such as AP-5.28 should be deleted.

5. QMP-12.01, Revision 6, M1, Instrument Calibration, Section 5.4, Reporting and Tracking of Calibration Status, Subsection 5.4.3, requires the QA Office to update the calibration tracking record. The calibration tracking record, dated May 25, 1994, contains many instruments that reflect the next scheduled calibration has been exceeded by a range of two to 20 months. The calibration tracking record is only published on a quarterly basis and the Calibration Status form only needs to be submitted to the QA Office within approximately 30 days from the date the calibration was performed. Although it was verified that instruments overdue for calibration had not been in use, both of these items contribute to the image that the calibration program is not well controlled. It is recommended that USGS reduce the quarterly issuance timeframe of the calibration tracking record to monthly and require transmittal of the Calibration Status form within 10 days of calibration. Also include a definition of "pending" to reflect the status of an instrument as being removed from use.

6. YMP-USGS-QMP-3.03, Revision 4, makes reference to the use of equivalent forms. In the review of some Software Identification Forms contained in the Software Documentation Packages, it was noted that some of the information as noted on the form in the procedure was missing from this documentation. It was pointed out by USGS personnel that the reason this information was not on the form, is that it was not applicable. It is recommended that if the implemented documentation is to be equivalent to that described in the procedure, as a minimum, all of the data required by the form in the procedure should be referenced in some fashion on the equivalent form.

7. Memorandums attesting to USGS personnel qualifications are being initiated prior to education and experience being verified by the USGS Servicing Personnel Office, although these memorandums imply that verifications have been completed. YMP-USGS Personnel Qualification Statement/Attestation Letter shown as Attachment 2 in QMP-2.02, Revision 6, should be reworded as follows: "Based on my evaluation of the education of (name of individual), this employee is qualified for the duties of the position."

8. YMP-USGS-QMP-16.04, Revision 0, should be revised to more clearly detail the sequence of QDR validation, assignment of a severity level, and assignment of a QDR number.

9. Conclusionary language should be avoided in planning documents. The purpose of a plan is to establish objectives for a study, describe methods to be used, and to define criteria that can be used to evaluate the features or phenomena being studied. When conclusions are stated or implied in a plan the investigators may be put in a position of having to refute the plan when they present their results, as in the case of the Detachment Faulting SP.

10. There should be greater consistency across the project in formats for basic geologic data collection, particularly rock descriptions. Perhaps the easiest way to accomplish this is to have several attachments to USGS Geologic Procedure (GP) NWM-USGS-GP-01, Revision 2, for Geologic Mapping and other procedures such as core logging that would provide standard formats for volcanic rocks, sedimentary rocks, and alluvial material for example. The formats would simply set a uniform order for certain minimum information such as rock type, color, grain size, etc. This will aid correlations between mapped areas, and between outcrop and core description for example.

11. Field notebooks should directly support the scientific effort rather than provide a personal diary that may be inappropriate for project records.

12. The use of standard scales would greatly increase the useability of the data being generated. If seismic and magnetic data were at the same scale as the geologic map for example, correlation of anomalies with structure would be much easier. Vertical as well as horizontal scales should be standardized.

13. Earlier integration of data from other studies would be beneficial. There appears to be a tendency for investigators to focus on an activity and carry it to completion and then integrate with other studies. While the end result may well be the same it could be more efficient to have earlier data integration.

14. Similar to the above recommendation, the timing of reviews is of concern. At present, reviews are generally conducted at the completion of an activity (for example, mapping of an area). It would be beneficial to schedule some preliminary reviews while work is in progress to help guide the project.

15. When work that is funded and filed under one activity would be directly applicable to a different activity, it should be cross referenced. For example, at present it is difficult to find mapping related to 8.3.1.17.4.5.2 because it is filed under 8.3.1.4.2.2.1.

16. A method needs to be developed for documenting the work that is done under modeling studies. Perhaps a technical implementing procedure or SN. The SN would offer the advantage of flexibility because of the complexity and serendipity of the various modeling studies.

17. For studies that are well underway and have progressed beyond the trial and error stage, TPs should be formalized. In several cases it is clear that the work being done is well thought out and very thorough (8.3.1.4.2.1). This is precisely the type of situation where procedures are of most benefit. To some extent this is being done (8.3.1.17.4.3) and in the long run, it would help the PIs and the project if it were done in more cases.

18. Technical data collected by USGS should be transmitted to the Local Records Center (LRC) in a more timely manner.

7.0 LIST OF ATTACHMENTS

Attachment 1: Personnel Contacted During the Audit
Attachment 2: Audit Details
Attachment 3: Objective Evidence Reviewed During the Audit
Attachment 4: Information Copies of CARs

ATTACHMENT 1

Personnel Contacted During the Audit

Name	Organization/Title	Preaudit Meeting	Contacted During Audit	Postaudit Meeting
Larry Anderson	USBR/PI		X	
Lawrence Anna	USGS/Acting UZ Sect. Chief			X
David Appel	USGS/Chief, HIP	X		X
Steven Beason	USBR/PI	X	X	
Michelle Boucher	USGS/QAIS	X	X	X
Art Braun	SAIC/PI		X	
Greg Brown	SAIC/QAIS	X	X	
Karen Burgess-Kohn	SAIC/Training Coordinator	X	X	X
David Buesch	USGS/GSP		X	
Thomas Chaney	USGS/QA Manager	X	X	X
Kristi Cloutier	SAIC/Records Specialist	X	X	
John Czarnecki	USGS/PI		X	
Robert Dickerson	SAIC/Geologist		X	
Louis Ducret	USGS/Associate Branch Chief			X
Mike Fahy	USBR/PI		X	
Janine Ferarese	USGS/Chemist		X	
Chris Fridrich	USGS/PI		X	
James Gemmel	USGS/Hydrolic Technician		X	
Daniel Gockel	USGS/QAS	X	X	X
Larry Hayes	USGS/TPO	X	X	
Gail Heitland	SAIC/Tech Data Management	X	X	X
Barbara Hersh	SAIC/Document Control	X	X	
Carol Hovenden	USBR/QAIS	X	X	X
Clay Hunter	USGS/Hydrologist	X	X	X
Nadine Karras	SAIC/QAS	X	X	X
William Keefer	USGS/GSP SP Coordinator		X	X
Ralph Klinger	USBR/Geologist		X	
James Krulick	USBR/Section Chief		X	
Bonnie Lankerd	SAIC/Records Specialist		X	
Judi Lindberg	SAIC/Admin Assistant		X	
Alice Lykins	USGS/QAS	X	X	X
Richard Luckey	USGS/SZ Section Chief	X		X
Patrick McKinley	USGS/Data Management	X	X	
Larry McInroy	SAIC/QA Oversite	X	X	X
Tracy Mendez-Vigo	SAIC/Lead QAIS	X	X	X
Martha Mustard	USGS/Hydrologist	X	X	X
James Nelson	SAIC/Geologist		X	
Dennis O'Leary	USGS/PI		X	
Heather Ortiz	SAIC/Training Assistant	X	X	X

Lucy Piety	USBR/Geologist		X	
Darrell Porter	SAIC/Manager		X	X
Wayne Rodman	USGS/QAS	X	X	X
Pete Rodriguez	SAIC/QA Auditor	X	X	X
Robert Scavuzzo	SAIC/QAS	X	X	X
Edward Schneider	USGS/QA Assistant		X	
Patricia Sheaffer	SAIC/QAIS	X	X	X
William Simonds	USGS/GSP		X	
Donna Sinks	SAIC/QA Auditor	X		
Richard Spengler	USGS/Section Chief	X	X	X
John Stuckless	USGS/Chief, GSP	X	X	X
M. J. Umari	USGS/Hydrologist		X	
Daniel Velega	SAIC/Auditor	X	X	X
Mark Wallendorf	SAIC/SCM Coordinator	X	X	X
James Watson	USGS/QAS	X	X	X
Lee Watt	SAIC/Records Coordinator	X	X	X
Ardell Whiteside	SAIC/QAIA	X	X	X
John Whitney	USGS/GSP		X	
Jon Woolverton	USGS/QAS	X		
Al Yang	USGS/Project Chief, UZ		X	
James Ziemba	SAIC/QA Auditor	X		X

Legend:

GSP-Geologic Studies Program
HIP-Hydrologic Investigations Program
QAIA-Quality Assurance Implementation Advisor
QAIS-Quality Assurance Implementation Specialist
QAS-Quality Assurance Specialist
SAIC-Science Applications International Corporation
SCM-Software Configuration Management
SZ-Saturated Zone
TPO-Technical Project Officer
USBR-U.S. Bureau of Reclamation
UZ-Unsaturated Zone

ATTACHMENT 2

Audit Details

The following is a summary of USGS QA Program activities covered during the audit. The list of objective evidence reviewed and specific procedures audited is provided in Attachment 3.

1.0 ORGANIZATION

The evaluation of this QA program element was based on selected requirements of the USGS implementing procedures reflecting QARD requirements as referenced by the RTN Matrix. Compliance with the QARD and USGS procedures was based upon personnel interviews, review of the procedural requirements for procedure QMP-1.01. The specific requirements selected for evaluation of compliance and effectiveness are listed below:

Organization (QMP-1.01)

- USGS YMP QA Manager: Functional responsibilities, level of authority and level of communication.
- Chief, YMPB (TPO): Planning and directing work, complying with quality requirements, approving, and implementing YMP-USGS QMPs.
- QAIA to the TPO: Assisting in integration of quality requirements into technical activities.
- Chief, Programs and Plans: Identification of person assigned.
- Chief, Nevada Operations Program: Identification of person assigned.
- Chief, GSP: Identification of person assigned.
- Chief, HIP: Identification of person assigned.
- Sections of procedure evaluated adequately reflect QARD requirements.

Results:

Assigned responsibilities as stated in QMP-1.01 were deemed satisfactory. Review discussions were conducted with the Chief, YMPB (TPO), USGS Yucca Mountain Project (YMP) QA Manager, and the QAIA to the Chief, YMPB. Questions asked included specified responsibilities, requirements, and methods of implementation. Each manager produced viable objective evidence to substantiate responsibilities and implementation of the QA program.

Based on interviews and objective evidence reviewed, implementation of QA Program Element 1.0 is considered satisfactory.

2.0 QUALITY ASSURANCE PROGRAM

The evaluation of this QA program element was based on selected requirements of USGS implementing procedures reflecting QARD requirements as referenced by the RTN Matrix. Compliance with the QARD and USGS procedures was based upon a review of requirements and an examination of objective evidence for procedures QMP-2.01, QMP-2.02, QMP-2.07 and QMP-2.08. The specific requirements selected for evaluation of compliance and effectiveness are listed below:

Requirements:

Management Assessment of the YMP-USGS Quality Assurance Program (QMP-2.01)

- Management Assessments are being performed annually.
- Management Assessments are performed by at least two representatives from YMPB and one of Water Resources Division (WRD) from outside the YMPB organization.
- Management Assessment Reports are in-depth and include adequacy and effectiveness statements of the QA program.
- Recommendations generated from Management Assessments are submitted to the Assistant Director for Engineering Geology and concurrence is indicated by signature.
- Management Assessment Reports are submitted through the Chief, to the Assistant Chief Hydrologist for Program Coordination and Technical Support approval.
- Management Assessment Reports are submitted to the LRC as QA Records.
- Sections of procedure evaluated adequately reflect QARD requirements.

Federal Personnel Qualification (QMP-2.02)

- Position Descriptions are established by supervisors.
- Minimum education and experience is based on the scope and complexity of work.

- Resumes are submitted to the USGS Servicing Personnel Office and a statement is signed certifying that education and experience has been verified and are included in each qualification folder.

- Memorandum to the Chief, YMPB from supervisors attesting that personnel qualifications are included in each folder for federal personnel.

- Qualification records are properly stored.

- Sections of procedure evaluated adequately reflect QARD requirements.

YMP-USGS Instruction (QMP-2.07)

- Supervisors/Managers notify the Training Coordinator of newly assigned, reassigned, or ongoing personnel instruction needs.

- YMP-USGS Orientation is completed by new employees.

- Supervisors of YMP-USGS activities select instruction methods for TPs.

- In-depth training courses have been documented.

- All YMP-USGS instruction is documented, provides a record of completion, and is forwarded to the Training Coordinator.

- Supervisors provide justification to the Training Coordinator when instruction assignments are unnecessary or not applicable.

- QA Record packages are prepared and submitted yearly to the LRC.

- Sections of procedure evaluated adequately reflect QARD requirements.

Non-Federal Contractor Personnel Qualification (QMP-2.08)

- Contractor's YMP-USGS Manager has evaluated positions to determine quality-affecting QARD requirements.

- Position Descriptions for contractor personnel have been established.

- Personnel have been trained to achieve and maintain proficiency.

- Supervisor documents personnel training prior to performing quality-affecting work.

- All personnel have received a copy of their Position Description.

- Waivers of qualifications are prepared for personnel who support YMP on a "limited scope effort."

- Sections of procedure evaluated adequately reflect QARD requirements.

Results:

Evaluation of Management Assessment activities for procedural compliance consisted of review of the most recent, approved Management Assessment Report in addition to the FY 1992 report. The results of the evaluation indicated satisfactory compliance with procedural requirements.

During the evaluation of procedure implementation for qualification of USGS and Non-Federal contractor personnel, objective evidence from a sample of qualification files was reviewed. Documentation was reviewed in each folder for verification of education and experience, Position Descriptions, and Memorandums of Attestation of employee qualifications. The results of the evaluation for both Federal and Non-Federal employees indicated satisfactory compliance to procedural requirements.

Training files containing completed Indoctrination Assignments, TP Instruction Assignments, Record of Instruction forms, and lesson plans were reviewed during the evaluation of procedure implementation for YMP-USGS personnel instruction. The results of the evaluation indicated satisfactory compliance to procedural requirements.

Based on the results of evaluations, implementation of QA Program Element 2.0 is considered satisfactory.

3.0 DESIGN CONTROL AND SUPPLEMENT III, SCIENTIFIC INVESTIGATION

The evaluation of this QA program element was based on selected requirements of USGS implementing procedures reflecting QARD requirements as referenced by the RTN Matrix. Compliance with the QARD and USGS procedures was based upon a review of requirements and an examination of objective evidence for procedures QMP-3.04, QMP-3.07, QMP-3.15 and Yucca Mountain Administrative Procedure (YAP)-SIII.3Q which USGS implements directly. The specific requirements selected for evaluation of compliance and effectiveness are listed below:

Requirements:

Technical Review and Approval of YMP-USGS Data and Publications (QMP-3.04)

- Independent technical review for data (one reviewer) and publications (two reviewers required).

- Proper documentation of mandatory and non-mandatory comments on the Data, Publications Review/Comment Resolution Form (DPR/CRF).

- Resolution of mandatory comments by author or PI.
- Satisfactory resolution verified and recorded by YMPB Program Chief.
- QA Manager reviews and signs DPR/CRF for publications.
- Sections of procedure evaluated adequately reflect QARD requirements.

YMP-USGS Review Procedure (QMP-3.07)

The scope of this procedure applies to technical and QA reviews of procedures and SNs.

- Independent technical and QA reviews are performed.
- Documentation of the type of review and indication mandatory versus non-mandatory comments.
- Mandatory comment resolution with reviewers.
- Review/Comment Resolution and Selection Forms processed as QA Records.
- Sections of procedure evaluated adequately reflect QARD requirements.

Application of Graded Quality Assurance (QMP-3.15)

- Membership of Grading Acceptance Committee includes: GSP, HIP, QA Chair, etc.
- Completion of the Activity Controls Specification (ACS) in accordance with QMP including: Indication of Importance and Characteristics, and Assignment of Controls.
- ACS approval by Grading Acceptance Committee.
- ACS distribution as a controlled document.
- Review guidance for evaluation of ACS Report per Attachment 293 of the QMP.
- Sections of procedure evaluated adequately reflect QARD requirements.

Control and Transfer of Technical Data on the Yucca Mountain Site Characterization Project (YAP-SIII.3Q) - formerly AP-5.1Q

- Candidate data is identified for submittal to the Technical Data Base.

- Is submitted with a Technical Data Information Forms (TDIF) with required information.
- Has a Data Transmittal Package for inclusion into the Central Records Facility
- Prepares a Data Package Segment for submitting acquired or developed data into the Project Data Archive.
- Submits the package to the Central Records Facility on an approved schedule.

Results:

For the technical review of data, CAR YM-94-047 was written to document a condition adverse to quality regarding QMP-3.04 not complying with QARD requirements, and that independent review of one set of data was not performed.

A condition adverse to quality regarding the proper indication of the resolution of a mandatory comment in accordance with QMP-3.07 requirements, was identified and corrected during the audit. Details of this condition are documented in Section 5.5.2, Item 7 of this report.

Results of the evaluations indicated that technical and quality reviews and grading were properly performed in accordance with the requirements of QMP-3.15. It was noted that QMP-3.15 contains some references to obsolete documents such as YMP AP-5.28 which should be corrected in the next revision of the procedure. This recommendation is documented in Section 6.0 of this report.

The USGS fulfills the requirements identified by directly implementing the YMSCO YAP-SIII.3Q, Control and Transfer of Technical Data on the Yucca Mountain Site Characterization Project. A sample of eight TDIFs were examined. Specifically, three of the TDIFs/Technical Data Package were submitted for the fracture mapping Activity 8.3.1.4.2.2 covered during the technical audit. All TDIF/Technical Data Base submittals had been coordinated with the YMP Administrator. The USGS establishes a schedule with the YMP Administrator for submittal of data in accordance with a schedule published in the PAC system. The latest schedule was transmitted in a letter to Claudia Newbury, DOE, on April 20, 1994. The TDIFs submitted to DOE for inclusion in the technical data specifically identified the data dictionary parameters.

The USGS does not maintain a single centralized Project Data Archive, but much of the initial data resides with the PI. The TDIF contains sufficient information to identify the Project Data Archive for the individual sources of data.

There were a limited number of data package segments being collected. For those being collected, the segments were being collected, handled, and processed in accordance with the procedural requirements.

Based on the results of the above evaluation, implementation of QA Program Element 3.0 and Supplement III are considered satisfactory.

4.0 PROCUREMENT DOCUMENT CONTROL AND 7.0 CONTROL OF PURCHASED ITEMS AND SERVICES

The evaluation of these QA program elements was based on selected requirements of USGS implementing procedures reflecting QARD requirements as referenced by the RTN Matrix. Compliance with the QARD and USGS procedures was based upon a review of requirements and an examination of objective evidence for procedures QMP-4.01, QMP-4.02, QMP-7.01 and QMP-7.04. The specific requirements evaluated for compliance and effectiveness are listed below:

Requirements:

Procurement Document Control (QMP-4.01)

- The requester incorporates the pertinent information into the Requisition Request, the Program Chief reviews the Requisition Request to ensure that the technical requirements were appropriate for the service or item being requested.

- The YMP QA Manager reviews the Requisition Request for the inclusion of the appropriate QA requirements and the determines that the supplier is either on the Approved Supplier's List (ASL), requires qualification, or will work to the YMP USGS QA Program.

- When a Requisition Request requires the use of a Vendor not on the ASL, a justification for the emergency use of the supplier is approved by the QA office and accompanies the Requisition Request to the YMP Branch Administrative Office or the participant support purchasing agent.

- When a contract requires a Request for Proposal (RFP) or an Invitation for Bid (IFB), the Contracting Officer prepares the RFP or IFB consistent with the importance, complexity and quantity of the items and services being procured and as appropriate, considers the following:

  - Technical Requirements
  - Statement of Work
  - QA Program Requirements
  - Supplier Personnel
  - Supplier Past Performance
  - Alternatives
  - Exceptions, and
  - Technical Evaluation Criteria

- The requester reviews the proposal and documentation to ensure the appropriate provisions as identified in the Requisition Request were included, then completes the Final Procurement Review form (or equivalent).

- The YMP USGS QA Manager reviews the proposal and Final Procurement Review form to determine that the requirements were met in the response to the RFP or IFB. If satisfactory, the QA Manager signs the Final Procurement Review form.

- For other than an RFP or IFB, the Contracting Officer prepares the final procurement document and the QA Manager verifies that the procurement document contained the Requisition Request requirements, and that the supplier was approved. The QA Manager then completes the Final Procurement Review form.

- When changes or corrections are necessary prior to release of the final procurement document, the QA Manager and requester completes an Acceptance of Change(s) to procurement documents.

- All modifications and changes to procurement documents are subjected to the same degree of control as the original document.

- Changes resulting from the proposal/bid evaluations or contract negotiations are incorporated into procurement documents. The evaluation of the changes and impacts shall be considered prior to contract award. This evaluation shall consider the following:

  - The appropriate requirements,
  - additional or modified criteria, and
  - analysis of exceptions and changes.

- Sections of procedure evaluated adequately reflect QARD requirements.

Control of Agreements (QMP-4.02)

- When USGS needs the services of a support participant, USGS shall develop an agreement considering the topics stated in Attachment 1 based on the level of importance, complexity and quantity of the service and the supplier quality performance.

- Agreements are reviewed for technical content and signed by the originating Program Chief.

- The QA Manager reviews the agreement, ensuring the appropriate QA provisions are included and correctly stated, and completes the QA Review of Agreement form.

- The participant (supplier) is qualified in accordance with QMP-7.04, as appropriate.

- Agreements are reviewed and approved by the support participant manager, the originating YMP USGS organization, QA Manager and the Chief, YMP Branch.

- Changes/modifications/addendums to agreements require the same review and approval of the originating organizations.

- Sections of procedure evaluated adequately reflect QARD requirements.

Receipt of Purchased Items and/or Services (QMP-7.01)

- Calibrated items received from approved suppliers shall comply with QMP-12.01.

- On receipt of an item or service, acceptability is determined by the requester or Contracting Officers Representative by a comparison of the item or service to the final procurement document requirements.

- If the item or service is acceptable, the requester/Contracting Officers Representative completes the "Acceptance Form" and forwards the form, certificates, and supporting documentation to the Administrative Officer (AO).

- When a discrepancy is noted, the requester/Contracting Officers Representative takes one of the following actions:

  - Reject the item or service.

  - Request resolution of the discrepancy.

  - Conditionally accepts the item or service.

  - Reject the item or service and notifies the requester/Contracting Officers Representative.

- The AO maintains the documents resulting from these procedures in the procurement files until acceptance (or rejection).

- Sections of procedure evaluated adequately reflect QARD requirements.

Supplier Evaluation (QMP-7.04)

- Evaluation of the suppliers is by audit, surveillance or desk-top evaluation and includes the applicable topics in Attachment 1, Supplier Evaluation Topics, as well as any technical requirements identified by the technical organization.

- The evaluation documentation includes the justification that the supplier is capable of meeting the QA and technical requirements or identifies any inadequacies.

- If the supplier is able to, or commits to, correcting the inadequacies. The USGS QA Manager documents the actions required to resolve inadequacies.

- The USGS QA Manager adds the supplier to the ASL and distributes the evaluation to the technical personnel requesting the evaluation.

- An Annual Performance Evaluation is performed no later than the anniversary date from the previous year and considers the following:

  - Suppliers performance.

  - Documentation (Certificate of Conformance, Nonconformance Reports [NCRs], CARs).

  - Source Verifications, Management Assessments, Receiving Inspections, and audits by others.

  - Experience with similar products from the same supplier.

  - Review of procurement documents for increased work since the initial procurement.

- If the Annual Performance Evaluation identifies inadequacies, the QA Manager and technical person determines one of the following actions:

  - Delete the supplier from the ASL, perform an impact analysis of supplied items or services.

  - Retain on ASL if inadequacies to be corrected do not impact future procurements.

  - Retain on ASL with restrictions (remove restrictions after documenting the justification for lifting).

- Documented evidence of acceptance or rejection of source verified items or services is furnished to the requester, supplier, and is included in the procurement records package.

- Triennial audits are performed to determine program effectiveness (compliance) and when necessary, a performance based audit is scheduled and performed.

- The ASL is distributed to the Chief HIP, Chief GSP and YMPB AO. The ASL contains the following:

  - Type of service
  - Suppliers name, address and phone numbers
  - List of items and/or services the supplier is qualified to provide
  - Condition to be included in purchasing documents

- The response to the RFP or IFB is evaluated for conformance to the procurement document and is performed by the QA and technical organizations, based on the following:

  - Technical considerations
  - QA program requirements
  - Suppliers personnel
  - Suppliers production capability
  - Suppliers past performance
  - Alternatives
  - Exceptions

- Any deficiencies to the suppliers QA program are corrected before starting work subject to QARD requirements and the Supplier Quality Program is accepted by USGS.

- If the initial audit (or pre-award survey) was used to set the initial triennial date, the same QA program for other contracts is proposed for the purchaser's contract.

- Sections of procedure evaluated adequately reflect QARD requirements.

Results:

During the evaluation of QA Program Elements 4.0 and 7.0, procedures, Requisition Requests, Requisitions, POs, Contracts, RFPs, Memorandums of Agreement, Acceptance Forms, Supplier Evaluations, Surveillances, Audits, Source Verification Plans, ASLs, USGS QDRs and YMP CAR-93-053 were reviewed. The results of the evaluation indicated the USGS procedures failed to provide the methodology of implementing the QARD requirements for accomplishing the activity or task. Consequently, the USGS procurement procedures have not provided assurance that the activity results in an acceptable product or service. (See CAR YM-94-050 for details.)

Based on the above results, implementation of QA Program Elements 4.0 and 7.0 is considered unsatisfactory.

5.0 IMPLEMENTING DOCUMENTS

The evaluation of this QA program element was based on selected requirements of USGS implementing procedures reflecting QARD requirements as referenced by the RTN Matrix. Compliance with the QARD and USGS procedures was based upon a review of requirements and an examination of objective evidence for procedures QMP-5.01, QMP-5.03 and QMP-5.05. The specific requirements selected for evaluation of compliance and effectiveness are listed below:

Requirements:

Preparation of Technical Procedures (QMP-5.01)

- Content meets the procedural requirements from introduction/scope through references and attachments.
- Independent technical reviews are performed and documented per QMP-3.07.
- QA reviews are performed and documented.
- After approval, an effective date is assigned by QA.
- Documentation for reason of revision is prepared by the PI.
- Less than three expedited changes are issued without a revision.
- Sections of procedure evaluated adequately reflect QARD requirements.

Development and Maintenance of Quality Management Procedures (QMP-5.03)

- All QMPs, modifications, revisions, and rescissions have been properly approved.
- YMP-USGS QA Manager provides documentation when work is performed directly to a YMSCO AP in lieu of developing a QMP.
- QMPs contain all required elements as required.
- QA reviews of "Final Drafts" are performed by an independent reviewer.
- QMPs are revised when they accumulate more than four modifications.
- Sections of procedure evaluated adequately reflect QARD requirements.
- Expedited modifications are reviewed within 30 days of the effective date.

Scientific Notebook (QMP-5.05)

- QA Manager maintains a log of notebook identification.
- Notebooks are pre-bound, numbered, and relevant loose material fastened or referenced.
- Initial entries contain: purpose/scope, identification of planning documents, methods/documents used, and dated signatures.
- Management Reviews of initial entries are within 30 working days.
- Review of in-progress entries are performed for compliance to procedures.
- Final reviews in accordance with QMP-3.07 are performed.
- Sections of procedure evaluated adequately reflect QARD requirements.

Results:

During the evaluation of QA Program Element 5.0, a total of five QMPs and revisions, three modifications, and four TPs were reviewed. The results of the evaluation indicated that implementing procedures, and changes thereto, contain all required elements, and are properly reviewed and approved before issuance.

Four SNs were also reviewed. SN No. 0008 was missing a QA review. This condition was corrected during the audit by completing the review (see Section 5.5.2, Item 6). The other items reviewed for the SN preparation, review and control, were acceptable and in compliance with procedural requirements.

Based on the results of the above evaluation, implementation of QA Program Element 5.0 is considered satisfactory.

6.0 DOCUMENT CONTROL

The evaluation of this QA program element was based on selected requirements of USGS implementing procedures reflecting QARD requirements referenced by the RTN Matrix. Compliance with the QARD and USGS procedures was based upon a review of requirements and an examination of objective evidence for procedure QMP-6.01. The specific requirements selected for evaluation of compliance and effectiveness are listed below:

Requirements:

Document Control (QMP-6.01)

- All YMP-USGS generated and controlled documents are assigned a unique control number.
- The QA Manager has identified documents which are to be controlled and that the QA Manager releases them for distribution.
- Each controlled document has a status indicator to identify it as a controlled document. It is also to contain an effective date.
- Sections of procedure evaluated adequately reflect QARD requirements.

Results:

Selected documents were chosen for review that were generated since the last USGS audit. Recent document packages and controlled document logs were also reviewed for compliance to the procedure. Based on the above, implementation of QA Program Element 6.0 was determined to be satisfactory.

8.0 IDENTIFICATION AND CONTROL OF ITEMS AND SUPPLEMENT II, SAMPLE CONTROL

The evaluation of this QA program element was based on selected requirements of USGS implementing procedures reflecting QARD requirements as referenced by the RTN Matrix. Compliance with the QARD and USGS procedures was based upon a review of requirements and an examination of objective evidence for procedure QMP-8.01. The specific requirements selected for evaluation of compliance and effectiveness are listed below:

Requirements:

Identification and Control of Samples (QMP-8.01)

- Each sample has a unique identifier on the sample or sample container; subsamples have their identification transferred to the component part, and markings shall be protected from damage or deterioration.
- The PI retains traceability of the original sample identifier to all documentation associated with the sample.
- The PI has established through TPs or SNs a sample tracking system and provisions for collection, handling, storage, cleaning, packaging, shipping, and preservation, from collection to final use.

- Samples are stored under conditions appropriate for their intended use and lifetime.

- Sections of procedure evaluated adequately reflect QARD requirements.

Results:

This verification was primarily a review of procedures. QMP-8.01, Revision 4 is not an implementing procedure but sets forth the QARD requirements that are to be implemented through TPs and SNs. This QMP states that PIs will implement the requirements through TPs and SNs. From an index of active USGS procedures, HP-249, Revision 0, was selected for review. This procedure is at the end of a sequence of procedures (HP-12, HP-252, HP-131, and HP-249). HP-12 identifies no special treatment whereas temperature of the sample is an important consideration in HP-252, HP-131, and HP-249 for samples including the refrigeration of the water extracted with implementation of HP-249. Procedurally, HP-249 does not flow into the analysis of the pore water samples to trace the special treatment of consumption of the samples during analysis. This condition adverse to quality is documented on CAR YM-94-048. Eight additional USGS TPs were reviewed for flowdown of requirements from QMP-8.01 and cross-referencing of procedures. These procedures are listed in Attachment 3.

Based on the above review, with exception of the documented condition adverse to quality, USGS implementing procedures for sample control provide the methodology to satisfactorily implement QA Program Element 8.0 and Supplement II.

12.0 CONTROL OF MEASURING AND TEST EQUIPMENT

The evaluation of this QA program element was based on selected requirements of USGS implementing procedures reflecting QARD requirements as referenced by the RTN Matrix. Compliance with the QARD and USGS procedures was based upon a review of requirements and an examination of objective evidence for procedure QMP-12.01. The specific requirements selected for evaluation of compliance and effectiveness are listed below:

Requirements:

Instrument Calibration (QMP-12.01)

- Specific calibration procedures for individual equipment are established as a separate and complete TP or included as a part of a TP or SN.

- If the procedure is a separate document, the procedure is referenced in and/or attached to the primary TP or SN for the activity.

- For equipment used only one time, a calibration is performed before and after use. Exception are specified in a TP or SN for equipment not retrievable after use or unserviceable after use and not calibrated.

- Software used with Measuring and Test Equipment (M&TE) is validated by calibration to accepted standards and/or are calibrated in accordance with the TP or SN.

- If a nationally recognized standard does not exist, the referenced standard used is supported by certificates, reports, data sheet that attest to the data accuracy and condition which the results were obtained. This information is reviewed and approved by the PI Supervisor.

- The PI shall review the calibration results and document a statement of acceptability and included it with the calibration documentation.

- For calibration performed by USGS/contractor personnel, the data is recorded and contains the following information:

  - Name of the organization performing the calibration.

  - Identification of equipment being calibrated (such as manufacturer, type, model, serial number, or other unique identifier).

  - Identification of calibration standard (such as manufacturer, type, model, serial number, or other unique identifier) and standard's range and accuracy, and National Institute of Standards and Technology (NIST) traceability when using other recognized standards. Alternatively, a notation may be made indicating the location of documentation containing the standard's identity, range, accuracy, and traceability.

  - Identification or control number of YMP-USGS TP (including revision) or SN that requires the calibration to be performed.

  - Date of calibration and due date for next calibration, when applicable (for example, a due date is not applicable to "calibration each use").

  - Records of actual calibration data values, when applicable, both before and after any adjustments, enabling the determination of whether the equipment was, and is, within required tolerance or accuracy. If adjustments are not performed, a second set of data is not required.

  - Identification of person performing each calibration.

- When calibrations are performed by a supplier (other than YMP-USGS), the supplier is on the ASL and documentation contains the following:

- Identification of the organization or vendor.

- Identification of equipment being calibrated (such as manufacturer, type, model, serial number, or other unique identifier).

- Identification of calibration standard (such as manufacturer, type, model, serial number, or other unique identifier) and standard's range and accuracy, and NIST traceability when using other recognized standards. Alternatively, a notation may be made indicating the location of documentation containing the standard's identity, range, accuracy, and traceability.

- Date of calibration.

- Records of actual calibration data values, when applicable, both before and after any adjustments, enabling the determination of whether the equipment was, and is, within required tolerance or accuracy. If adjustments are not performed, a second set of data is not required.

- Identification of person performing the calibration.

• All M&TE equipment is uniquely identified (model number, serial number and description).

• A calibration sticker is affixed to calibrated equipment or to its container.

• For each piece of equipment requiring calibration, a YMP-USGS Notification of Calibration Status form (Attachment 2) is completed by the PI, or delegate as follows:

  - Periodic Calibration - Attachment 2 is required for initial calibration and each subsequent calibration, and to report a closing calibration when equipment is no longer going to be used for quality-affecting work.

  - Calibration Each Use - Attachment 2 is required for initial calibration and use, and again to report a closing calibration when equipment is no longer used for quality-affecting activities.

• When equipment is no longer used for quality-affecting activities, a removal of equipment from service is performed in the following manner:

  - A closing calibration shall be performed on the equipment as soon as possible (generally on or before the next scheduled calibration) to validate previous YMP data.

- The calibration status sticker shall be removed and, if possible, the equipment should be segregated from equipment actively being used for YMP activities.

- The status of the equipment shall be documented on a YMP-USGS Notification of Calibration Status form (Attachment 2) that includes the closing calibration date when the equipment was last calibrated.

- A calibration tracking record is maintained by the QA Office for all qualify-affecting equipment calibrations and status, the QA Office provides the PIs with a quarterly listing of equipment in the calibration record and its status.

  On detection of a deficient condition, a QDR is prepared, and the equipment is controlled by tagging or segregation to prevent use when the following conditions occur:

  - Equipment used to collect data is not reported and tracked per Paragraph 5.4.1.

  - Calibration equipment used for qualify-affecting data collection does not display calibration status stickers.

  - Equipment being used for quality-affecting data collection does not meet required calibration due dates.

  - Equipment found to be or suspected to be out-of-calibration (that is, beyond accepted tolerance established in TPs or in SNs) is being used to collect data.

  - Equipment used while out-of-calibration is noted by tagging or other segregation.

  - No closing calibration is performed per Paragraph 5.4.2.

  - Calibrations are performed on equipment by a Vendor who is not approved per QMP-7.04.

- No repairs/adjustments are performed to out-of-calibration equipment prior to a complete documentation of the equipment's condition. Repair/adjustments performed to calibrate the equipment and the pre-calibration documentation is evaluated by the PI to determine the impact on accuracy, validity or acceptability of previously collected data. The evaluation is documented and referenced in the final calibration document.

- Sections of procedure evaluated adequately reflect QARD requirements.

Results:

During the evaluation of QA Program Element 12.0, the USGS Calibration Record for Calibration Status, vendor Certificates of Calibration, SN on USGS Calibration Notification of Calibration Status, YMP-USGS TPs containing calibration information, calibration stickers, QDRs, and M&TE, were reviewed. The results of the evaluation indicated satisfactory compliance to procedural requirements. One recommendation was made with regard to the calibration record which is contained in Section 6.0, Item 5 of this report.

Overall, the implementation of QA Program Element 12.0 is considered satisfactory.

16.0 CORRECTIVE ACTION

The evaluation of this QA program element was based on selected requirements of USGS implementing procedures reflecting QARD requirements as referenced by the RTN Matrix. Compliance with the QARD and USGS procedures was based upon a review of requirements and an examination of objective evidence for procedures QMP-16.03 and QMP-16.04. There has been no implementation of USGS procedure QMP-16.02 for control of Stop Work Orders. The specific requirements selected for evaluation of compliance and effectiveness are listed below:

Requirements:

Tracking, Trending, and QA Management Information (QMP-16.03)

- The QA Manager maintains a current tracking system for deficiency documents.
- Open deficiency documents are monitored and actions taken to expedite overdue actions.
- A trend analysis is performed on a quarterly basis and results reported to management.
- The report identifies trends and their resolution and current status of deficiency reports, audits, surveillances, and QMPs.
- Sections of procedure evaluated adequately reflect QARD requirements.

Control of Quality Deficiency Reports (QMP-16.04)

- The initiator completes Part I of the QDR form.
- The QDR is given a number, issued to the appropriate organization, and given a response due date.

- The response is evaluated and either accepted or rejected.
- Upon completion of action, QA personnel verify closure.
- Any extension requests are requested prior to the due date.
- The QDR is closed upon verification.
- Sections of procedure evaluated adequately reflect QARD requirements.

Results:

The USGS has initiated two quarterly trend reports in accordance with YMP-USGS-QMP-16.03. The two trend reports cover the timeframe of October 1 through December 31, 1993 and January 1 through March 31, 1994, respectively. Procedurally, QMP-16.03 defines adverse quality trends but there is no criteria as to what constitutes a trend. In the first report, dated October 1 through December 31, 1993, the report identified five deficiencies against YMP-USGS-QMP-4.01 with a single following statement that no trend existed. There were similar words used in three of the five deficiency descriptions such that the rationale in making the no trend decision was not apparent. Also, there was too much parroting of the QARD requirements in the procedure. An implementing procedure should have sufficient detail such that a knowledgeable individual can follow the process to understand the outcome of the implementation. This condition adverse to quality is documented on CAR YM-94-049.

Implementation of YMP-USGS-QMP-16.04 was also verified. The files for 23 open and seven closed QDRs were checked. The QDRs had been initiated, completed, verified, issued, evaluated, tracked, and closed at the various stages of processing. In tracing the process, the step in which a number is assigned to the QDR occurs at the time of initiation rather than after validation by the QA Manager and the assignment of a severity level. This is reasonable since a record exists of any QDRs that are invalidated, unissued, and the rationale for the action becomes part of the record. USGS personnel acknowledged that the procedure needs to be revised to more clearly detail the actual practice. This recommendation is documented in Section 6.0, Item 8 of this report.

As documented in QA Program Element 18.0 of this attachment, CAR YM-94-046 has been issued to identify that USGS audit and surveillance reports list numerous conditions that appear to meet the QARD definition for conditions adverse to quality without issuance of a QDR. This is a violation of USGS procedural requirements as well as requirements of the QARD. Because of the condition identified on CAR YM-94-046 and the results of the above review, implementation of QA Program Element 16.0 is considered unsatisfactory.

17.0 QA Records

The evaluation of QA Program Element 17.0 was based on selected requirements from the QARD and a review of the USGS implementing procedures as referenced by the RTN Matrix. Compliance with USGS procedures QMP-17.01 and QMP-17.03 were based upon personnel interviews, review of the procedural requirements, and evaluation of applicable documentation produced as a result of procedural implementation. The specific requirements selected for evaluation of adequacy and compliance are listed below.

Requirements:

Quality Assurance Records (OCRWM QARD, Section 17.0, Revision 0)

- QA Records are stored and preserved in predetermined storage facilities in accordance with approved documents which provide a description of the filing systems.
- Storage methods are developed to preclude deterioration of QA Records.
- Access to storage facilities is maintained designating personnel who are permitted access to QA Records.

YMP-USGS Records Management for Records Sources (QMP-17.01)

- Individual records are considered QA Records when they are authenticated. Individually authenticated records that are a part of the records package are not considered QA Records until the whole package is authenticated.
- Until submitted to the LRC, documents and completed QA records packages is protected from deterioration, loss, larceny, or damage through exposure to environmental extremes, and hazards such as fire, water damage, insects, mold, and rodents.
- Each individual record or records package is given a quality-affecting designation such as "QA: QA," "QA: NA," or "Information Copy."
- Records sources ensure that records submitted are legible as defined by this QMP.
- Unless extended, records are submitted no later than 15 working days following the date of completion of an individual record.
- On each individual QA Record, the records source either notes on the record that a copy is being sent to the LRC or lists those individual records on the submittal forms.

- Records that are identified by the governing procedure as part of a records package are submitted on a submittal form either as a completed package or package segment.

- For completed records packages, the records source prepares a table of contents.

- A copy of the first page of individual records are marked received by the LRC. Upon receipt of the records package the LRC shall perform a Quality Verification Check (QVC).

- Corrected records identify the correction, what record is being corrected, and include the initials or signature of the person authorized to make the change and the date the correction was made.

- Only authorized personnel are allowed access to the file cabinets and fireproof containers. Authorization is by the current "Authorized Access List."

YMP-USGS Local Records Center and General Records Management (QMP-17.03)

- Documents received by the LRC are dated and stamped as received by the LRC on either the submittal form or on the back of the first page of individual records.

- A QVC is conducted to check for acceptance requirements of correctness, legibility, and indexing items as required.

- Records which meet acceptance requirements are stamped on the back as accepted and the date of acceptance. Records which do not meet acceptance criteria shall be returned to the records source as rejected.

- The YMP-USGS indexing numbers are structured as required in QMP-17.03.

- Upon acceptance of records in the LRC, legible copies are transmitted to the Central Records Facility within 30 working days of acceptance.

- A list is posted in the LRC which designates those personnel who may have access to the files.

- When authenticated records are protected be either dual storage or in a two-hour fire rated container, temporary storage of those records is in a UL one-hour fire rated container.

Results:

The results of the review revealed that USGS has not, in all instances, adequately addressed the requirements of the QARD for those selected requirements listed above.

Three conditions adverse to quality were identified. Two of the conditions related QMP-17.03 not providing detail as to the filing system used and providing requirements which prohibit stacking of special process records. The third condition related to QMP-17.01 allowing records to be authenticated that were a part of the records package; however, these documents were not considered records. These three conditions adverse to quality were resolved during the course of the audit and are detailed in Section 5.5.2, Items 2 and 3. Implementation overall was found to be satisfactory based on the review of selected QA Records Packages and LRC File Access List, except for two minor deviations from the procedure. The two conditions adverse to quality related to the missing signatures for the person responsible for compiling the records package and records packages not containing an acceptance stamp. Prior to the post audit conference these conditions adverse to quality were corrected and are also detailed in Section 5.5.2, Items 4 and 5 of this report.

Based on the above, implementation of QA Program Element 17.0 was determined to be satisfactory.

18.0 AUDITS

The evaluation of this QA program element was based on selected requirements of USGS implementing procedures reflecting QARD requirements as referenced by the RTN Matrix. Compliance with the QARD and USGS procedures was based upon a review of requirements and an examination of objective evidence for procedures QMP-18.01, QMP-18.02 and QMP-2.05. The specific requirements selected for evaluation of compliance and effectiveness are listed below:

Requirements

Audits (QMP-18.01)

- The QA Manager performs the following functions:
  - Develops and maintains audit schedule
  - Approves audit plans
  - Approves notification letters
  - Approves audit reports
  - Certifies Lead Auditors
  - Coordinates audit activities through closeout
- The ATL performs the following functions:
  - Assembles audit team
  - Verifies qualifications of audit team
  - Conducts necessary training
  - Prepares audit report
  - Evaluates replies to QDRs

- QA Manager schedules annual external audits.
- QA Manager schedules internal audits during life of the activity as follows:
  - Annual audit of activity
  - During life of activity if life span is shorter than one year
- Internal audit schedule considers:
  - Function or end use of the data produced
  - Importance of the data
  - Complexity of the activity
  - Uniqueness of the activity
  - Necessity for special control or processes, and
  - Applicability of quality requirements to the activity
- External audits of organizations on the ASL are audited triennially as a minimum.
- Effectiveness audits are conducted on selected suppliers.
- Annual internal and external audit schedule is documented and updated as appropriate.
- ATL completes the audit preparation summary document (Attachment 1 to QMP-18.01) prior to each audit.
- An audit notification and plan are completed for each audit (Attachment 2 to QMP-18.01).
- An audit checklist is prepared for each audit (Attachment 3 to QMP-18.01).
- Completed audit checklists contain objective evidence reviewed to determine effective implementation of the item on the checklist.
- Preaudit meetings are conducted and documented for each audit.
- Postaudit meeting is conducted for each audit.
- Each audit report is prepared by the ATL and signed by the ATL and approved by the QA Manager.
- Audit Reports are properly distributed.
- QDRs are used to document conditions adverse to quality and that proper follow-up is performed.

- Records are submitted to the YMP-USGS LRC as follows:
  - Audit schedules
  - Audit record packages consisting of:

    Audit preparation summary
    Audit Plan
    Completed audit checklist
    Audit report

- Sections of procedure evaluated adequately reflect QARD requirements.

Surveillances (QMP-18.02)

- Surveillances are used to evaluate selected field activities for compliance with specific governing requirements.
- Surveillances are used to evaluate a supplier or potential supplier.
- Surveillance team is knowledgeable about the work and not directly responsible for the work.
- Any conditions adverse to quality are reported on a QDR.
- Surveillance reports are signed and dated by the Surveillance Team Leader and approved by the QA Manager.
- Surveillance reports are distributed to:
  - PI
  - Chief, HIP or GSP
  - Chief, YMPB
  - DOE YMQAD
- QDRs are used to document conditions adverse to quality and the follow-up.
- Surveillance reports are submitted by QA Office to YMP-USGS LRC.
- Section of procedure evaluated adequately reflect QARD requirements.

Qualification of Audit Personnel (QMP-2.05)

- One or more of the following items are used to develop competence of auditors:
  - Orientation

- Training programs
- On-the-job training

- Technical specialists receive the same training as stated above.

- Lead Auditors are qualified, trained and certified, meeting requirements summarized on Attachment 1 of QMP-2.05. Verify this for any Lead Auditors certified within the last year.

- Lead Auditors are recertified annually per Attachment 2 of QMP-2.05.

- Lead Auditors not recertified in a two-year period use Attachment 1 of QMP-2.05, not Attachment 2.

- The following records are submitted to the USGS LRC:

  - Verified auditor resume (if needed)
  - Lead Auditor recertifications
  - Lead Auditor certification
  - Lead Auditor examination

- Sections of procedure evaluated adequately reflect QARD requirements.

Selected audit and surveillance reports were reviewed for compliance to the required and pertinent procedure. These reports included internal and external audits, surveillances. Additionally, selected auditor qualifications were reviewed. All documents reviewed were generated since the last audit conducted of USGS. Status logs and completed record packages of the aforementioned documents were evaluated. Based on this review, two CARs and one recommendation regarding the quality of external audit reports were generated.

QMP-18.02 Surveillances, requires that surveillance reports provide a statement in the report summary on acceptability and effectiveness of the activity under surveillance. This requirement is not being complied with. See CAR YM-94-044.

The QARD and USGS implementing procedure for corrective action define requirements that a condition adverse to quality be identified when a QARD or implementing document requirement is not met. During a review of USGS audit and surveillance reports, it was noted that many concerns and the associated recommendation are used to document problems. Many of these problems are conditions adverse to quality as defined by the QARD and QMP-16.04. See CAR YM-94-046.

A detailed review of recently completed surveillances and internal and external audit reports showed that the internal and external audit reports are very detailed, cover work in progress, evaluate completed work, and review compliance with procedures. The external audits, however, appear to be less detailed regarding reviews based on

interviews and a general review of procedures in place. External audit reports have also noted that in many cases no documented QA program exists making the audit process more difficult. A recommendation detailing this matter is prescribed in Section 6.0, Item 3. Conditions adverse to quality related to weaknesses in the external audit program for evaluation of USGS suppliers, are documented in CAR YM-94-050.

Overall, based on the above reviews, QA Program Element 18.0 was determined to be satisfactory.

SUPPLEMENT I SOFTWARE CONTROL

The evaluation of QA Program Supplement I was based on selected requirements from the QARD and a review of the USGS implementing procedures as referenced by the RTN Matrix. Compliance with USGS procedure QMP-3.03 was based upon personnel interviews, review of the procedural requirements, and evaluation of applicable documentation produced as a result of procedural implementation. The specific requirements selected for evaluation of compliance and effectiveness are listed below.

Requirements:

OCRWM QARD, Supplement I, Revision 0, Software Control

- Software validation or modifications to released software items include regression testing.
- Qualification of acquired software not developed in accordance with this supplement is validated to an approved plan and the software shall be placed under configuration management.
- Qualification of acquired software that was developed or modified in accordance with this supplement includes regression testing, confirmation that documented information exists to support requirements were met and that the software is placed under configuration management.
- Cross-reference between baseline documents and associated software is maintained. Media containing a copy of the completed/released software shall be controlled to prevent damage and degradation.

Software (QMP-3.03)

- Software currently tracked in the SCM system that no longer falls within the scope of this QMP, requires the completion of an SCM from documenting withdrawal.
- Prior to use of the software for quality-affecting activities, the software is documented and entered into the SCM system and approved for release.

- The software baseline documents for the Software Life Cycle Plan are the Requirements Specification, Design Description, Software User Documentation, and the Software Validation Report.

- Required documentation includes: Software Identification Form, Requirements Specification, Design Description, Software User Documentation, Software Validation Report, and source or executable code. Software acquired outside the YMP-USGS or developed prior to the USGS QA Program may not have design documentation, but in all cases is validated.

- The Software Identification Form is completed by the Technical Contact. This identifier shall be used to identify all software documents. Each version of the software shall have a unique identifier.

- The Requirements Specification describes the overall nature and purpose of the software and identify the requirements for its intended use.

- Software verification of the Requirements Specification is performed by review.

- Software User Documentation includes basic information such as installation procedures, hardware and software operating environments, input and output options, file formats, default parameters etc.

- Software verification of User Documentation is by review.

- A Software Validation Report shall be included, listing each test to be run and any approved test procedures need to perform the test. For each test performed, acceptance criteria specified and the extent to which each test met these criteria is documented.

- Software verification of the Software Validation Report is performed by review.

- When all required documents are approved, the YMP-USGS QA Manager shall certify that all QMP requirements have been met and approves release of the software.

- The Software Configuration Status Accounting log records: a listing of all software baseline documents, software configuration documents, and associated unique identifiers; all documented software users; the status and brief description of all documented software problems; and the status and brief description of proposed or approved changes. The log shall be updated quarterly and a copy sent to the LRC.

Results:

The results of the review revealed that USGS has adequately addressed the requirements of the QARD for those selected requirements listed above. In the area of

implementation, procedural compliance was found to be satisfactory based on reviews of documentation contained in the specific Software Documentation Packages, Software Configuration Management Forms for software withdrawal, and Configuration Management Status Logs, except for two isolated instances. The conditions adverse to quality related to: (1) User Documentation for one software application not addressing all of the information required by the QMP, and (2) the unique identification which provides traceability through the configuration management system is not traceable to the software being used to perform quality-affecting activities. The condition adverse to quality relating to User Documentation was documented on CAR YM-94-045. The second condition adverse to quality relating to traceability of the software to software documentation was resolved prior to the post audit conference and is described in Section 5.5.2, Item 1 of this report.

Based on the above, implementation of Supplement I is determined to be satisfactory.

SUPPLEMENT II, SAMPLE CONTROL (See QA Program Element 8.0)

SUPPLEMENT III, SCIENTIFIC INVESTIGATION (See QA Program Element 3.0)

TECHNICAL ACTIVITIES

STUDY 8.3.1.4.2.1, Characterization of the Vertical and Lateral Distribution of Stratigraphic Units within the Site Area

This study includes five activities of which three are currently funded and active. The three funded activities include surface and subsurface stratigraphic studies, surface-based geophysical studies, and borehole geophysical surveys. Unfunded activities include petrophysical properties testing and magnetic properties and stratigraphic correlations. Rick Spengler of the USGS, gave the technical specialist an overview of the currently ongoing activities. The emphasis is on advancing the understanding of the site stratigraphy in order to support Exploratory Studies Facility (ESF) and repository design, and the development of the 3-D geologic model. The status of the activities is as follows:

Activity 8.3.1.4.2.1.1

This activity focuses on the acquisition of surface and subsurface stratigraphic information on the host rock and surrounding units. The primary effort currently is the logging of core from project boreholes including detailed rock descriptions, picking of formation and sub-formational contacts, and correlating between boreholes or from boreholes to surface outcrops. The SN that controls this activity was examined and the investigator, Dave Buesch, was interviewed at length. The SN does a good job of documenting the progressive increase is the understanding of the lithostratigraphy. Core logging formats have evolved and improved to the point that a procedure could now be developed from the notebook so that logging could be standardized for the rest of the project boreholes. Of some concern to the technical specialist was the lack of

any standard scales. Scales could vary between boreholes, or even within on borehole at the discretion of the logger. It would facilitate comparisons between holes and between holes and measured sections if scales and descriptions were standardized. A borehole log of North Repository Geologic (NRG)-7/7a, prepared by a staff member and reviewed by Dave Buesch, was examined by the technical specialist. Both the original work and the review demonstrated careful and detailed work of high quality.

Activity 8.3.1.4.2.1.2

This activity focuses on the collection and interpretation of surface based geophysical data such as seismic, magnetics, and gravity. Recent work has centered in or near the repository block and is being conducted in part to support the ESF. A seismic line run across the Ghost Dance Fault was viewed by the technical specialist and offset reflectors are evident on the line. This new data is being collected by Ernie Major and has been "calibrated" with vertical seismic profiling data collected in a borehole located on the reflection line.

Magnetic data was collected along the same line as the seismic data and the technical specialist asked if the magnetic anomalies occurred in the same location as the offset reflectors at the Ghost Dance Fault. Clay Hunter explained that, due to the dip of the fault and the possibly different depths being imaged by the different data sets, there may be apparent slight differences in location. However, he was confident that the different techniques were recognizing the same structural feature. The ability to see this relationship in the data sets was impaired because they were at different scales, so direct comparison over the full length of the lines could not be easily made. Gravity data collected along the same lines as the seismic and magnetic data was still being processed.

Activity 8.3.1.4.2.1.3

This activity focuses on the collection and interpretation of borehole geophysics. Downhole geophysical data is acquired in all types of project boreholes such as UZ, SZ, North Repository Geologic (NRG), etc. Approximately four months ago Phil Nelson completed a document that presented large format summary plots of geophysical logs and core data for 40 existing deep boreholes. It is intended that there will be six month updates as more boreholes are drilled and logged. Efforts to quantify rock characteristics with geophysical logs are ongoing (i.e., some of Alan Flint's work on rock properties is being factored in) but are somewhat hampered because the petrophysical activity is not funded.

Conclusions

Significant progress is being made in those activities where work is ongoing. The work is being performed by well qualified geologists and appears to be technically sound and of high quality. The borehole core logging effort in particular demonstrates a progressive increase in the understanding of the lithostratigraphy. The scope of the activities in progress appears adequate and their continuation and completion should

meet the objectives that were intended. At some point, in order to meet the total objectives of the study, at least some portions of the currently unfunded activities will need to be performed. The use of consistent scales would be of benefit to the study, as would a procedure for rock descriptions.

STUDY 8.3.1.4.2.2, Characterization of Structural Features within the Site Area

The technical specialist focused on the three activities within this study that are included in current work. These are Activity 1, "Geologic Mapping of Zonal Features in the Paintbrush Tuff;" Activity 2, "Surface-Fracture Network Studies," and Activity 4, "Geologic Mapping of the Exploratory Studies Facility."

8.3.1.4.2.2.1

For Activity 1, the technical specialist interviewed Richard Spengler USGS/PI and Art Braun SAIC, with input from SAIC QA specialists. The focus of the technical specialist's evaluation was the 1:240 scale mapping of the Ghost Dance and Sundance faults. The technical specialist reviewed portions of the mapping that has been completed to date, one of the field notebooks that was used during the mapping (CAB YGD3), one technical data package (Field Observations of Fractures and Field Measurements Collected FY 1992 for Attributes of Fractures, Maps at 1:240, southern part of Ghost Dance Fault, Yucca Mountain, Nevada), and the in process records for the technical review of Open File Report (OFR) 94-49, "The Sundance Fault: A Newly Recognized Shear Zone at Yucca Mountain, Nevada," as well as USGS GP-01, Revision 2, "Geologic Mapping."

Recent progress under this activity includes documentation of very detailed mapping of field relations in the vicinity of the Ghost Dance and Sundance faults. This work is being conducted under USGS GP-01 and an SN being maintained by the PI. Significant progress has been made in the collection of this data but the interpretation of the data has proven to be controversial. This controversy involves the interpretation of map relations and the data collection itself, in at least some instances. The controversy is being addressed by internal reviews within the YMPB of the USGS and by reviews from USGS professionals from outside of the branch. Several of the geometric relations depicted on the maps are puzzling and require careful analysis and explanation. There are also puzzling timing relations suggested by the map relations. For instance, the map relations suggest that the north striking structures, including the Ghost Dance Fault, are older than the northwest striking structures south of the main trace of the Sundance Fault, but are younger than the northwest striking structures north of the main trace of the Sundance Fault. The technical specialist reviewed the documentation of this review process that was available at the time of the audit; additional documentation will be generated as the review process continues. The PI suggested that resolution would be facilitated by extending the mapping into new areas, collecting data from seismic lines in the washes on the eastern side of Yucca Mountain and constructing more pavements similar to the one on the Ghost Dance fault of the south side of Antler Ridge.

The technical specialist also reviewed a Technical Data Package that was generated by this study. The data contained in the package was in a useable form and should meet the needs of the project. The data that was reviewed was collected in FY 1992. None of the data collected in FY 1993 or FY 1994 was available in the LRC. It would be very helpful if data could be submitted to the LRC in a more timely manner. This recommendation is documented in Section 6.0, Item 18 of this report.

Conclusions

This study is being conducted in a very careful and systematic way. The technical specialist believes that it would help the PI and the project if this careful procedure could be formalized in a USGS GP that is specific to this study. Additional data analysis and interpretation, and possibly additional data collection, will be required to resolve the controversy surrounding this activity. Several cross sections should be constructed at critical locations to aid in the data analysis and interpretation. Additional data on the orientations of foliations within the volcanic rocks would aid greatly in the interpretation of the data already collected. This data set will make a significant contribution to the project when this controversy is resolved.

8.3.1.4.2.2.2 and 8.3.1.4.2.2.4

Activities 2, Surface-Fracture Network Studies; and 4, Geologic Mapping of the Exploratory Studies Facility, were reviewed together by the technical specialist. The technical specialist interviewed Richard Spengler USGS/PI, Mike Fahy USBR/PI, and Steve Beason USBR/PI, with input from SAIC QA specialists. The focus of the technical specialist's review was the collection and interpretation of fracture data, especially in the starter tunnel of the ESF. The technical specialist reviewed USGS GP-12, Revision 1, "Mapping Fractures on Pavements, Outcrops and Along Traverses," SN 0041, "Underground Mapping of the North Ramp Starter Tunnel and Appurtenances," as well as Auxiliary Notebook No. 3 for SN 0041. The technical specialist also reviewed records packages for "Detailed Line survey Data for Exploratory Studies Facility North Ramp, Starter Tunnel, Right Slash," "Full-Periphery Maps, North Ramp of the Exploratory Studies Facility, through October, 1993," and the Technical Data Package for the "Full Periphery Map/Starter Tunnel."

Significant progress has been made in surface and underground fracture studies. In addition, mapping of the underground workings that constitute the "starter tunnel" has been completed and a report on these results should be available in the next couple of months. The data sets for the underground mapping are currently in the QMP-3.04 review process within the USGS. The SP identifies two procedures for underground mapping: NWM-USGS-GP-45, "Procedure for ESF Geologic Mapping" and NWM-USGS-GP-47, "Procedure for Photogrammetric Geologic Mapping." The PI (Beason) said that NWM-USGS-GP-45 was nearing completion and will be available soon. GP-47 is in an uncertain status because the PI has decided that preliminary studies are needed in the initial portions of the north ramp to determine the feasibility and cost-effectiveness of the photogrammetric technique. If DOE decides to make this technique a standard part of the ESF mapping then this procedure will be developed.

Surface fractures studies are conducted under NWM-USGS-GP-12, Revision 1. Initial field data is recorded on forms from that procedure. This data is subsequently analyzed with the help of summary statistics and stereonet plots. The data collection under this activity is closely coordinated with the data collection under Activity 4, Underground Mapping, to be sure that the same parameters are measured and characterized. This coordination will certainly facilitate subsequent interpretation and integration of these data sets.

The technical specialist reviewed a SN and auxiliary notebook used for these studies, as well as records packages for fracture and map data generated by these studies. The data contained in these packages was in a useable form and should meet the needs of the project.

Conclusions

The work being done under these activities is being conducted in a highly competent manner by qualified geologists. It will fulfill the needs of the DOE's site characterization program. In addition, the integration of data collection and analysis between these activities provides a model for technical integration that could be applied in many other areas of the project.

STUDY 8.3.1.4.2.3, Three-Dimensional Geologic Model

This study has not been funded and does not exist. Preliminary computer aided compilations of the lithostratigraphic framework of the site are underway and are funded under Study 8.3.1.4.2.1. A demonstration model called Revision 0 was developed based on multiple cross-sections. This approach has been superseded by Revision 1 which is a preliminary model that develops surfaces. In this case, a "master" structure contour map is developed (the base of the Tiva Canyon) and isopach maps of underlying units are progressively stacked or rather hung under the Tiva in order to create additional structural surfaces down section. The model recognizes faults and can grid in individual fault blocks. It can be expanded both in level of detail displayed and in geographic area covered. To date, only major faults and lithostratigraphic data are included.

The technical specialist questioned those most involved in model development (Jim Nelson and Bob Dickerson) on how the model used unqualified data. Older unqualified data, such as formation picks from OFRs on previous boreholes, is used in the model but can be flagged and printed in different symbols to identify it. Similarly, soft data such as interpreted surface geophysics, could be flagged but none has been used as yet. The model includes 20 foot digital topographic contours and has the capability of producing outcrop maps. This may be done after the Tiva is sub-divided in the model. The technical specialist questioned how process models such as hydrologic flow models will be run on the geologic framework being developed. It was stated that the geometry of the framework would be exported to the process model and then run on different hardware and software.

Currently the surfaces developed by the USGS model which uses LYNX software are given to EG&G where they are converted to surfaces in Earth Vision. EG&G then handles distribution to most users of the model (ESF design for example). USGS personnel indicated that the main reason for selecting the LYNX software was that it gave them maximum control over surface development. It is therefore easier to get the model to display the geologist's interpretation of a surface, based on the data and other factors. The model is being updated as additional data becomes available. For example, within 30 days of completing a new borehole new formation contacts are available and can be added to the model.

Conclusions

The technical approach to model development seems sound and the work is being conducted by well qualified geologists who have an understanding of the field relationships as well as the needed computer skills. It appears that the model can be expanded in both geographic area and level of detail as will be necessary to obtain a full framework model of the site area. Continued progress will effectively achieve project objectives at completion. A decision is needed soon regarding the as yet undeveloped study for this effort.

STUDY 8.3.1.8.2.1, Tectonic Effects

This study is at a very preliminary stage. An initial version of the SP for the study was approved by DOE in November 1992 and forwarded to the NRC in December 1992. The PI has proposed that this document be completely revised and that the original 8.3.1.8.2.1 study be combined with several other postclosure tectonics studies. A draft version of the study for this combined study is currently under review by DOE. This draft version of the study was the focus of the technical specialist's evaluation of this study.

The technical specialist interviewed Chris Fridrich USGS/PI and Dick Keefer USGS (study coordinator), with input from SAIC QA specialists. The technical specialist also reviewed the records package for the Journal Article: Hydrologic Analysis of the Saturated-Zone Ground-Water System under Yucca Mountain, Nevada. The development of tectonic scenarios will be a central part of this study. Several are presented in the Site Characterization Project (SCP). Additional scenarios have been developed by Sandia National Laboratories (SNL), Scenarios Constructed for Nominal Flow In the Presence of a Repository At Yucca Mountain and Vicinity (SAND 92-2186). The PI said he will work closely with SNL and use their development as a starting point for his study. He will attempt to simplify the event tree developed by SNL by eliminating scenarios that are improbable or result in effects of very small magnitude. The details of how this will be done have yet to be worked out. The PI plans to do some simple hydrologic modeling, but no complicated modeling or probability calculations. Sophisticated models and probability calculations will be drawn from other studies and incorporated in consequence analysis in this study.

Some preliminary work done under this study has been reported in a journal article that develops a conceptual model for the hydrologic system at Yucca Mountain. It is important that the PI maintain an objective view of this model and include a full range of alternative conceptual models in the analysis that is conducted under this study. The draft study that has been developed by the PI is weak in terms of presenting the details of how this analysis will be done.

The PI was questioned about the documentation that will be produced during the course of the study. The PI responded that no procedures or SNs would be used in conjunction with the study. This creates a problem because there will be no record that documents the development and execution of the study. The process of scenario development and evaluation will include many decisions about events to be included, models to be incorporated and parameter evaluation. Models and parameters will be drawn from many sources, including project participants and the open literature. It is not clear how these important steps in the process will be recorded and documented if no procedures or SNs are used in the study. The PI responded that this information would be in the final report and associated documentation. The technical specialist reviewed the records package for one publication that the PI has produced. This publication reported on the development of a conceptual model, but the records package did not include this type of documentation.

Conclusions

This study is at a very preliminary stage and more thought needs to be put into the formulation and execution of the study. A procedure or SN needs to be developed to document and record the evolution and execution of the study as it is conducted.

STUDY 8.3.1.17.4.3, Quaternary Faulting within 100 km of Yucca Mountain, including the Walker Lane

The technical specialist focused on two activities within this study, Activity 2, "Evaluate Quaternary Faults within 100 km of Yucca Mountain" and Activity 4, "Evaluate the Bare Mountain Fault Zone." The technical specialist interviewed Larry Anderson USBR/PI, Lucy Piety USBR and Ralph Klinger USBR, with input from SAIC QA specialists. The technical specialist reviewed the technical data records package for the "Bare Mountain Fault Scarp Profile Data" and the "Preliminary Map of Quaternary Faults within 100 km of Yucca Mountain." The technical specialist also reviewed procedures GP-50, Revision 0, "Identification of Geomorphic Features of Possible Tectonic Origin Using Conventional and Low-Sun-Angle Vertical Aerial Photographs" and GP-52, Revision 0, "Topographic Profiling of Geomorphic Features - Field Measurement."

Recent progress in this study includes the completion of a preliminary map that shows the locations of known and suspected quaternary faults within 100 km of Yucca Mountain. This map and accompanying documentation will soon be issued as an OFR by the USGS. The PI was questioned about the preparation of the map. The map is based on literature search only. A variety of sources were reviewed, including Nevada

State publications, theses and journal articles. The PI acknowledged that some information may have been missed but the OFR will contain a complete listing of all sources used and will provide a clear, well documented, basis for further work. Data sheets for each fault that were used to compile the information will be submitted to the LRC.

The SP for the study states that some air photo interpretation will be conducted. Initial work has concentrated on the area around Bare Mountain, the Amargosa Valley and Death Valley. The PI was questioned about additional areas that might potentially be investigated. The PI said that north and northeast of Yucca Mountain would be the best areas the study, but it might be difficult to get the coverage because the area is almost entirely within the Nellis Air Force Range and the Nevada Test Site. It should be noted that there are some photos available for entire area but not the low-sun-angle photos that are best for this type of study.

The SP for the study also states that some of the faults identified by the literature search will be checked in the field and additional work will be done to improve our understanding of these structures. The PI said that the decision on which structures will be checked in the field will be based on a seismic risk assessment. Field data to be collected will include topographic profiles, offsets of geomorphic features (especially strike separations) and trench logs as appropriate.

Initial work on the Bare Mountain Fault Zone, Activity 4, includes two trenches, three or four soil pits, a preliminary surface map, and several scarp profiles. The preliminary data suggest low slip rates with long recurrence intervals. Further work will provide better constraints on these parameters. Preliminary results suggest that the most recent faulting event occurred approximately 100,000 years ago. Samples have been collected for age dating that may provide better constraints on this age.

The technical specialist reviewed a records package for scarp profile data generated by these studies. The data contained in this package was in a useable form and should meet the needs of the project.

Conclusions

This study is being conducted in a highly competent manner by qualified geologists. It will fulfill the needs of DOE's site characterization program.

STUDY 8.3.1.17.4.5, Detachment Faults at or Proximal to Yucca Mountain

This study includes five activities, mapping and evaluation in four areas near Yucca Mountain where postulated detachments or unusual deposits are exposed, and dating studies. John Whitney of the USGS provided the technical specialist with an overview of the study. The emphasis of the study is on developing data that will be needed to support the seismic hazards analysis which is due in the spring of 1996. Data will also be used as input to tectonic models, and seismic design values for advanced conceptual design. The status of each of the five activities is as follows:

Activity 8.3.1.17.4.5.1

This activity focuses on the Miocene-Paleozoic contact in the Calico Hills area and its significance to detachment faulting. The map of this area was reviewed and the investigator (Bill Simonds) was interviewed at length. The technical specialist expressed a concern that it was important to determine whether the contact was depositional or tectonic but no criteria were provided in the SP on which to base that determination. Simonds response was that in mapping the contact in detail it was determined that there was usually a basal conglomerate present at the bottom of the Miocene section suggesting deposition on the Paleozoic surface. In addition, features common to tectonic contacts (shears, gouge, slikensides, etc.) were absent. Accordingly, the contact was classified as a depositional contact. The work in this area is nearly complete.

Activity 8.3.1.17.4.5.2

This activity focuses on an evaluation of postulated detachment faults in the Beatty-Bare Mountain area. The technical specialist examined maps and supporting field notebooks of the area being investigated and interviewed Chris Fridrich, who is responsible for mapping under this activity. The technical specialist questioned the consistency of mapping and criteria for classifying contacts (tectonic versus depositional) between different field areas. The response indicated that Simonds had participated in some mapping of this area and that Fridrich had visited some of the key outcrops with Simonds in the Calico Hills. This coordination should lead to some consistency of interpretation, and is commendable. However, it was also apparent that there were some differences in mapping style. All mapping is done under procedure NWM-USGS-GP-01, Revision 2, "Geologic Mapping." An examination of this procedure indicates that it allows tremendous latitude in how geologic mapping is conducted. For example, the procedure is silent on rock descriptions, so how a rock is described in terms of grain size, color, texture, etc. is at the discretion of individual investigators. Ordering these characteristics differently and/or using different standards or nomenclatures could make it difficult in the future to correlate the same rocks between different mapped areas. This would be particularly true if there was not recourse to the original investigators. The field notebooks examined were in general useful in supporting the maps though some entries were cryptic (personal or local names for topographic features for example) and several contained considerable personal information which is inappropriate for project records.

The postulated detachment faults addressed by this activity do appear to be significant tectonic features. The contacts in question exhibit shearing and in places rocks of the same age (Cambrian) but different metamorphic grade are juxtaposed. The mapping area for this activity has been expanded to include the area between Bare Mountain and Yucca Mountain in order to document the geology in this area. Results to date suggest that detachments are not present east of Bare Mountain. It appears that some of this mapping (i.e., East of Beatty Mountain Quad) was funded and filed under a different activity (8.3.1.4.2.2.1) which makes data retrieval less efficient.

Activity 8.3.1.17.4.5.3

This activity focuses on breccias occurring is the Crater Flat area and their possible relationship to detachment faulting. As described in the SP 8.3.1.17.4.5 section for this activity, the conclusion had been reached that these breccias were tectonically emplaced. The technical specialist questioned how this conclusion was reached. The investigator, Bill Simonds, responded that it was a previous, preliminary interpretation and that recent mapping and comparison of clast lithologies in the breccias with outcrops on Bare Mountain strongly suggests that the breccias are slide masses that originated on Bare Mountain and moved east and southeast onto Crater Flat. The technical specialist notes that the use of conclusionary language in planning documents is poor practice. The purpose of the activity is to evaluate the origin of the breccias. Whether or not they were tectonically emplaced should be a result of the investigation, not part of the planning. This activity is nearly complete and a draft open file report on the breccias is prepared and about to enter review.

Activity 8.3.1.17.4.5.4

This activity focuses on the nature of the Tertiary-Paleozoic contact in the Spector Range and Camp Desert Rock areas. The investigator, Bill Simonds, stated that detailed examination of the contact indicates that no shearing is present and that bedding relationships in the overlying Horse Springs sequence also indicate that the contact is depositional and not fault related. As a result of these observations, additional work may not be necessary in this area.

Activity 8.3.1.17.4.5.5

The focus of this activity is dating and evaluating the thermal and uplift histories of rocks juxtaposed by postulated detachment faults. The investigator for this activity, Tom Hoisch, was questioned by the technical specialist relative to the status of this activity. He indicated that samples had been sent out to be dated by both the Argon 39/40 and Fission Track methods but no results had yet been obtained. However, some results have been obtained from the thermo-barometric studies. It is this work that is supporting the preliminary conclusion that rocks of the same age but different metamorphic grades are juxtaposed by the postulated detachment faults in the Bare Mountain area. This would document significant displacement on these structures.

Conclusions

Significant progress is being made in all activities in this study. The work is being conducted by well qualified geologists and appears to be technically sound and of high quality. Examination of maps and notebooks and interviews with the various investigators has led the technical specialist to interpret the following: the Tertiary-Paleozoic contact where exposed in the vicinity of Yucca Mountain appears to be depositional. The Bare Mountain fault could be interpreted as a structural domain

boundary separating a highly extended terrain on the west (characterized by faults which juxtapose rocks of different metamorphic grade) from a less extended terrain to he east. Problematic breccias in Crater Flat appear to have been gravitationally emplaced as slide masses originating from Bare Mountain. Collectively, these interpretations suggest that the probability of a detachment fault underlying Yucca Mountain is low. These interpretations are based on a completion level for the study of 80 percent to 85 percent overall with the Calico Hills mapping activity being at a high of 95 percent and the dating activity at a low of about 50 percent completion.

The technical specialist feels that the work being performed will be effective in contributing to the seismic hazards analysis in specific and the overall understanding of the geology of Yucca Mountain and vicinity in general.

STUDY 8.3.1.17.4.12, Tectonic Models and Synthesis

This study is at a very preliminary stage. A draft version of the SP is currently under review by DOE. This draft version of the SP was the focus of the technical specialist's evaluation of the study. The records package for the USGS internal review of the SP was reviewed by the technical specialist.

Some preliminary work has been done under this study. Numerical analysis using a boundary element method of analysis has been initiated. This work is being conducted by an outside contractor. The draft SP states that boundary element modeling will be an integral part of this study. It will be important to have someone within the YMPB who understands the details of the formulation and development of the boundary element models that will be investigated during this study.

The draft SP states that a list of alternative conceptual models and model elements will be maintained by the PI. The PI said that this list has not yet been developed, but should be developed in the next few months. The PI was asked how the development and evolution of this list will be documented. The PI said that documentation will be provided in the final, and possibly intermediate, report(s) issued for the study. However, during the conduct of the study, no procedure or SN will be used to document the course of the study. This lack of documentation will lead to several problems. The process of model development will include many decisions on what elements will be included or excluded and why, what types of models will be investigated and many other things. Data that will be used in the development and testing of the models will include data generated by the YMSCO and data from the open literature. Without procedures or SNs, it is not clear how the QA status and pedigree of the data used in the study will be tracked. It is also important to record models and formulations that are developed to a certain point and then rejected and the reasons why they are rejected.

Conclusions

This study is at a very preliminary stage and more thought needs to be put into the formulation and evaluation of the tectonic models that will be included in the study. A procedure or SN needs to be developed to document and record the evolution of the study as it is conducted. This recommendation is documented in Section 6.0, Item 16 of this report.

ATTACHMENT 3

Objective Evidence Reviewed During the Audit

QA PROGRAM ELEMENT 1.0, "ORGANIZATION"

Procedures:

OCRWM QARD, Section 1.0, "Organization"
YMP-USGS-QMP-1.01, Revision 5, "Organization"

Objective Evidence:

Memorandum, USGS YMP QA Manager to Chief, YMPB, Subject: Authorizing Acting QA Manager, dated 5/31/94

Memorandum, USGS YMP QA Manager to Chief, Programs and Plans, Subject: Evaluation of Revised Response for Nonconformance Report USGS-NCR-93-11, QMP-4.01 Implementation Programs, dated 7/19/93

Memorandum, USGS YMP QA Manager to R. Spence (YMQAD), Subject: Quarterly Quality Assurance Management Information Report, dated 2/3/94

Memorandum, Chief, GSP to GSP Technical Staff, Subject: TP Preparation, dated 12/10/93

Memorandum, QA Implementation Advisor to Chief, YMPB, Subject: Supplemental Information for Corrective Action Report USGS-CAR-90-04, Revision 1, Untimely Corrective Actions, dated 6/4/93

Task Agreement between the USGS, Geologic Survey WRD and U.S. Bureau of Reclamation for Geologic Mapping of the Exploratory Studies Facility, dated 2/24/94

Memorandum of Agreement between Lawrence Berkeley Laboratory (LBL) and USGS for scientific work in support of USGS participation in the YMP, dated 5/23/94

QA PROGRAM ELEMENT 2.0, "QUALITY ASSURANCE PROGRAM"

Procedures:

OCRWM QARD, Section 2.0, "Quality Assurance Program"
YMP-USGS-QMP-2.01, Revision 3, M1, "Management Assessment of the YMP-USGS QA Program"
YMP-USGS-QMP-2.02, Revision 6, "Federal Personnel Qualification"
YMP-USGS-QMP-2.07, Revision 1, M1, "YMP-USGS Instruction"
YMP-USGS-QMP-2.08, Revision 2, "Non-Federal Contractor Personnel Qualification"

Objective Evidence:

YMP-USGS-QMP-2.01:

YMP-USGS Management Assessment Report for FY 1992, dated 6/17/93
YMP-USGS Management Assessment Report for FY 1993, dated 3/17/94

YMP-USGS-QMP-2.02:

Resumes for the following were reviewed:

K. Futa
W. Rodman
B. Parks
G. Cebula
M. Mustard
D. Gockel

Position Descriptions for USGS personnel:

G. Cebula, Physical Science Technician, dated 9/22/92
K. Futa, Research Chemist, dated 6/25/92
D. Gockel, Computer Specialist, dated 5/23/91
M. Mustard, Quality Assurance Specialist, 9/27/91
B. Parks, Supervisory Hydrologist, dated 4/9/92
W. Rodman, Quality Assurance Specialist, dated 5/25/89

Memorandums attesting to qualifications of the following USGS personnel:

K. Futa, dated 9/28/92
W. Rodman, dated 3/21/91
M. Mustard, dated 8/16/91
G. Cebula, dated 12/15/93
D. Gockel, dated 10/15/91
B. Parks, dated 7/13/92

YMP-USGS-QMP-2.08:

Position Descriptions for SAIC personnel:

A. Greengard, Technical System Specialist, dated 4/1/94
H. Ortiz, Training Assistant, dated 9/11/92
D. Porter, Contractor Project Manager, dated 3/22/94
R. Scavuzzo, Quality Assurance Specialist, dated 10/3/91

Resumes for the following were reviewed:

A. Greengard
D. Porter
H. Ortiz
R. Scavuzzo

Memorandums attesting to qualifications of the following SAIC personnel:

A. Greengard, dated 4/1/94
D. Porter, dated 3/23/94
H. Ortiz, dated 3/22/94
R. Scavuzzo, dated 6/15/94

YMP-USGS-QMP-2.07:

YMP-USGS Indoctrination Assignment Forms:

M. Olsten, dated 5/21/93
C. San Juan, dated 6/6/94

YMP-USGS-QMP Reading Assignments:

M. Olsten, dated 5/21/93
D. Buesch, dated 11/22/92
T. Hoisch, dated 4/17/94
C. San Juan, dated 6/7/94
N. King, dated 10/29/93
B. Parks, dated 11/18/93

Memorandum, Instruction Assessment for HP-242, R1, Procedure, dated 11/15/93

Memorandum, Reading Assignment for:

TPs NWM-USGS-SP-01, R5 and SP-04, R3, dated 11/23/93
QMP-5.05, R4, M1, Scientific Notebook, dated 5/4/94

Group Matrices dated 11/12/93 for HP-162, RO, M1, Method for Calibrating Thermistors for Measuring Absolute Temperature in Unsaturated Zone Boreholes

YMP USGS Instruction Assignment Baseline, dated 6/6/94

Lesson Plans reviewed:

YMP USGS Orientation Course No. 94C-06, dated 6/16/94
Software QA Implementation Course No. 92C-03, dated 1/27/92
YMP USGS Records Management Training QMP-17.01, R5, 2/10/92

Group Records for Instruction for:

YMP Orientation, dated 6/14/94
QMP-17.01, R5, dated 4/20/92, 1/9/92, and 3/20/92

Memorandum, Waiver of Training and Qualification Requirements for L. Murray, dated 3/18/94 and R. Wilson, dated 8/27/93

QA PROGRAM ELEMENT 3.0, "DESIGN CONTROL" (See Attachment 3, Supp. III)
QA PROGRAM ELEMENT 4.0, "PROCUREMENT DOCUMENT CONTROL"

Procedures:

OCRWM QARD, Section 4.0, "Procurement Document Control"
YMP-USGS-QMP-4.01, Revision 6, "Procurement Document Control"
YMP-USGS-QMP-4.02, Revision 5, "Control of Agreements"

Objective Evidence:

YMP-USGS-QMP-4.01:

Requisition Request, dated 8/23/93, approved 8/28/93, Requisition 3RQ4889-5790/PO 164388-93

Requisition Request, dated 4/21/92, Requisition 3RQ4889-5827/2RO4879-0098/PO 150482-92, -01-92, -02-92

Requisition Request, dated 9/30/93, Requisition 3RQ4889-5680/4RO4889-5373/PO 162578-93 and -01-93

Requisition Request, dated 11/1/93, Requisition 3RQ4889-5766/PO 164411-93

Requisition Request, dated 6/8/93, Requisition 93-4889-5558/PO 162482-93

Requisition Request, dated 6/16/93, Requisition 3RQ4889-5556/PO 162485-93

Requisition Request, dated 6/29/93, Requisition 3RQ4889-5602/PO 162548-93

Requisition Request, 4RQ4889-5738

Requisition Request, 4RQ4889-5695

Requisition Request, 4RQ4889-5696

YMP-USGS-QDR-94013 (12/17/94) USGS Procured Ph Standards from an unqualified supplier without a Technical Justification Statement

Requisition Request Desert Research Institute (DRI) 11/92

Contract 1434-93-C-40098, DRI

Contract Article I and QA Agreement between DRI and USGS, approved 3/94

YMP CAR-93-053 (Failure to pass QARD requirements to suppliers.)

Contract 1434-93-C-40098, Final Procurement Review, Bruce Parks (Tech) 8/6/93, Thomas Chaney (QA) 8/6/93

Requisition Request 4RO4889-5371 (MI - Money)/PO 162578-01-93

Requisition Request 3RQ4889-5827 (Delivery Dates)/PO 150482-01-92

Requisition Request R6028657 (USGS - Support Contractor's PO 45-930092)

RFP 1434-93-C-40098, DRI

YMP-USGS-QMP-4.02:

Memorandum of Agreement between LBL and WRD, approved 2/2/93

Memorandum of Agreement between the Geologic Division and WRD for Ground Motion from Regional Earthquakes, 2/17/94

Memorandum of Agreement between USGS QA Office and USGS Branch of QA for Qualification Surveys and Performance Evaluations of Suppliers Laboratories, 2/17/94

Memorandum of Agreement LBL, 2/2/93

Memorandum of Agreement WRD, 2/16/93

Memorandum of Agreement USGS YMP and USGS Branch of QA - Chief Branch of QA WRD - USGS, 2/18/93

Memorandum of Agreement LBL, 2/2/93

Memorandum of Agreement WRD, 2/16/93

Memorandum of Agreement QA, 2/17/94

QA PROGRAM ELEMENT 5.0, "IMPLEMENTING DOCUMENTS"

Procedures:

OCRWM QARD, Section 5.0, "Implementing Documents"
YMP-USGS-QMP-5.01, Revision 5, M1, "Preparation of Technical Procedures"
YMP-USGS-QMP-5.05, Revision 4, M1, "Scientific Notebook"
YMP-USGS-QMP-5.03, Revision 8, "Development and Maintenance of Quality Management Procedures"

Objective Evidence:

YMP-USGS-QMP-5.03:

YMP-USGS-MPM, "Management Procedures Manual," dated 5/31/94
RTN Requirements Matrix Report, dated 3/4/94
Memorandum, USGS YMP QA Manager to Chief, YMPB, Subject: Updated DOE/YMP Quality Administrative Procedures List Used by YMP-USGS
YMP-USGS-QMP-2.02, Revision 6, "Federal Personnel Qualification"
YMP-USGS-QMP-2.05, Revision 4, M1, "Qualification of Audit Personnel"
YMP-USGS-QMP-2.07, Revision 1, M6 (expedited change), "YMP USGS Instruction"
YMP-USGS-QMP-6.01, Revision 6, "Document Control"
YMP-USGS-QMP-16.03, Revision 2, M3, "Tracking, Trending, and QA Management Information Reporting"

YMP-USGS-QMP-5.01:

TPs Reviewed:

GCP-28, R1
GCP-34, R0
HP-162, R0, M1 Expedited
HP-137, R0

Independent Technical and QA Reviews of above procedures performed 3/24/94, 1/21/94, 2/27/94, and 3/2/94

Documentation of reasons for revisions, GCP-15, Revisions 3 and 4

YMP-USGS-QMP-5.05:

Scientific Notebooks Nuclear Waste Management:

USGS-SN-0001D, "Lithologic Logging Methodology"
USGS-SN-0064, "3D LithoStratigraphic Synthesis"
USGS-HP-233T, "Thermal Pulse Flowmeter Survey at the UE-25c Hole Complex"
USGS-SN-0008, "Channel Geometry Data Collection"

QA PROGRAM ELEMENT 6.0, "DOCUMENT CONTROL"

Procedures:

OCRWM QARD, Section 6.0, "Document Control"
YMP-USGS-QMP-6.01, Revision 6, "Document Control"

Objective Evidence:

The following document packages and their distribution:

HP-162, R0, M3	QMP-3.15, R0	QMP-4.02, R5, M1
QMP-5.01, R5, M1	GP-22-R2	QMP-1.01
GP-23-R0	HP-270, R2	QMP-5.03, R8
HP-273, R0	QMP-4.01, R6	HP-267, R0
HP-266, R0	GCP-12, R4	HP-14, R2, M1
GCP-28, R1	GCP-34, R1	

Controlled Document Logs:

TPs, dated 6/10/94
Activity Control Specifications, dated 4/26/94
Quality Procedures, dated 5/31/94
Grading Reports, dated 6/10/94

QA PROGRAM ELEMENT 7.0, "CONTROL OF PURCHASED ITEMS AND SERVICES"

Procedures:

OCRWM QARD, Section 7.0, "Control of Purchased Items and Services"
YMP-USGS-QMP-7.01, Revision 5, "Receipt of Purchased Items and/or Services"
YMP-USGS-QMP-7.04, Revision 1, "Supplier Evaluation"

Objective Evidence:

YMP-USGS-QMP-7.01:

Acceptance Forms:

PO 162578-93 Acceptance Form, B. Sekara, 3/31/94
PO 164411-93 Acceptance Form, O'Brien, 11/4/93
PO 162482-93 Acceptance Form, Oliver, 8/9/93
PO 162485-93 Acceptance Form, Oliver, 7/9/93
PO 162548-93 Acceptance Form, Parks, 1/13/94
PO 162578-93 Certificate of Calibration, Sekara, Memo to P. Reilly, Review of Calibration, dated 3/31/94
PO 164411-93 Calibration Acceptance Form, 11/4/93
PO 162482-93 Calibration Acceptance Form, Oliver, 8/9/93
PO 162485-93 Calibration Acceptance Form, Oliver, 7/9/93
PO 162548-93 Calibration Acceptance Form, Parks, 1/13/94

Purchase Orders:

PO 164388-93	PO 150482-92	PO 150482-01-92
PO 150482-02-92	PO 162578-93	PO 162578-01-93
PO 164411-93	PO 162482-93	PO 162485-93
PO 162548-93	PO 162404-93	PO 162414-93
PO 162375-93	PO 45-930090-76	PO 162548-93

YMP-USGS-QDR 93011-2, Deficient Procurement Documents

YMP-USGS-QDR 94-063, Annual evaluations not performed within the specified time period

YMP-USGS-QMP-7.04:

Ball Corporation Supplier Evaluations

89-S18 (Surveillance) 5/12/89
90-E06 (Annual Evaluation) 8/4/90
91-16 (Audit Triennial) 7/3/91
92-E19 (Annual Evaluation) 7/2/92
93-E-27 (Annual Evaluation) 7/8/93

DRI Supplier Evaluation:

94-SA-021 (Audit)

Druck Incorporated Supplier Evaluations:

89-S30 (Surveillance) 8/7/89
90-E12 (Annual Evaluation) 9/5/90
91-E13 (Annual Evaluation) 9/5/91
92-E26 (Annual Evaluation) 9/4/92
93-13 (Audit Triennial) 9/16/93

John Fluke, Incorporated Supplier Evaluations:

93-04 (Audit) 1/15/93
94-SE13 (Supplier Evaluation) 11/15/93

GEO/Kruger Supplier Evaluations:

BQA-91-03 (USGS - Branch Quality Assurance) 5/21/91
BQA-92-04 (USGS - Branch Quality Assurance) 5/21/92
BQA-93-07 (USGS - Branch Quality Assurance) 6/8/93

VIVI Metronics Supplier Evaluations:

93-03 (Audit) 2/18/93
94-026 (Supplier Evaluation) 2/8/94

Wavetek-Datron Supplier Evaluations:

92-S02 (Supplier Surveillance) 1/8/92
93-E05 (Annual Evaluation) 1/21/93
94-SE018 (Supplier Evaluations) 1/20/94

YMP-USGS-QDR 94-063 (Late Supplier Evaluations) 5/23/94

YMP-USGS ASL, dated 6/6/94

ASL Cover Letter, dated 6/6/94, Approved by Thomas Chaney (Distribution List contains 50 staff member's names)

Source Verification Form, Headway Industries, 6/14/94

Source Verification Plan, PO 151672-94

Source Verification Form, Northwest Welding, 6/15/94

QA PROGRAM ELEMENT 8.0, "IDENTIFICATION AND CONTROL OF ITEMS"

See Supplement II

QA PROGRAM ELEMENT 12.0, "CONTROL OF MEASURING AND TEST EQUIPMENT"

Procedures:

OCRWM QARD, Section 12.0, "Control of Measuring and Test Equipment"
YMP-USGS-QMP-12.01, Revision 6, "Instrument Calibration"

Objective Evidence:

USGS TPs:

MWM-USGS-GP-06 R4, NWM-USGS-GP-42T R0, NWM-USGS-GP-43 R0, NWM-USGS-GPP-01 R2, NWM-USGS-GPP-15 R1, NWM-USGS-HP-110 R0, NWM-USGS-HP-121 R0, NWM-USGS-HP-160 R2, NWM-USGS-HP-212 R0, NWM-USGS-HP-14 R2, NWM-USGS-HP-26 R1, NWM-USGS-HP-59 R1, NWM-USGS-HP-162 R0, NWM-USGS-HP-247 R0, NWM-USGS-HP-251 R0, NWM-USGS-HP-254 R0, NWM-USGS-HP-271 R0

NWM-USGS-GP-42T references attached Fluid Inc. 1988 Flow Heating/Freezing Systems Instruction Manual

NWM-USGS-GPP-15 references "Snodgrass 1976" Magnetic Susceptibility

NWM-USGS-HP-160 references "Packard Instrument 1986," Page 26, Section 2.13

NWM-USGS-HP-116 references NWM-USGS-HP-91 for the Ph Meter and Conductivity Meter

NWM-USGS-GCP-28, R0, Section 7.0, "Software"

Software Analyst CID GDD0070 is validated during calibration of the Mass Spectrometer using the secular equilibrium Standard HU 1

NWM-USGS-GCP-15, R3, Oxygen Isotope Analysis of Opal, Chalcedony and Quartz, Paragraph 6.0, Software (ISODT) is proprietary and is calibrated through calibration of the spectrometer with NIST traceable standards

NWM-USGS-GCP-17, R3, Determination of the Isotopic Ratio H/D in H20, Paragraph 6.0. The ISODT Software Package automatic samples handling and data collection for determination of SD values on the Finnagan Mat 252 isotope ratio mass spectrometer.

Letter to the Record from D. L. Campbell, Chief, Branch of Geophysics, USGS, dated 8/25/92

The PI, David L. Campbell reviewed the Calibration Models for Geophysical Borehole Logging Operation (Snodgrass 1976) on 8/25/92 and concurs with the use of the Three Denver Federal Center Magnetic Susceptibility Calibration Pits as the reference standards for the calibration for magnetic susceptibility

A list of standards used to calibrate the Electron Microprobe Manufacturing by CAL Taylor Corporation used standards from the Smithsonian Museum. The list of standards is included in NWM-USGS-GP-42T, R6, Appendix A

PI, Tom Hoisch - Douc Trendicator S/N358538 and ETEC Autoprobe S/N 0035

Calibration results in SN "Thermabarometric and Kinematic Studies of Metamorphic Rocks at Base Mountain and Proximal Site." All sample points are recorded on photographs and are in a notebook labeled "Base Mountain Photographs Calibration." Results were reviewed and determined to be acceptable by T. Hoisch on 9/8/93 and 9/9/93 respectively.

Pressure Transducers S/N442881, 442891, 482231, 482232, 482233, 482238, 571168, 482239, 482240, 519802 (Calibration by Druck) S/N 54331, 54334, 54588, 55182, 55189 (Calibration by Paroscientific). Certificate of Calibration reviewed and accepted by J. M. Gemmell.

Flow Meters DSC Voxter Model 1831-01-A3-2-116-6-3 S/N 1831-021 714092, Model 1831-02-A3-2-HL-6-3, S/N 1831-021704092.

Calibration Record for Calibration Status, dated 5/25/94 contains listing by PI or delegate, ID Number, Instrument Name, Last Calibration, Next Calibration and Calibrated By.

Memorandum, Subject quarterly calibration listing to individual PIs from W. Rodman, dated 3/7/94 and 6/2/94.

YMP-USGS Notification of Calibration Status (Forms):

Electronic Balance, S/N E 10807, Cal. Date 4/7/94, HP-204
Electronic Balance, S/N 3312097, Cal. Date 4/7/94, HP-204
Electronic Balance, S/N 3404009, Cal. Date 4/7/94, HP-204
Doric Trendicator, S/N 358538, Cal. Date 12/11/93, SN 0035
ETEC Aulaprobe, S/N A96256, Cal. Date 9/5/93, SN 0035
Gas Chromalgraph, S/N 945211, Cal. Date Pending, HP-160
Digital Multimeter, S/N 0567742, Cal. Date 5/2/94, HP-253T
Digital Multimeter, S/N 0552327, Cal. Date 12/20/93, HP-253T

Calibration Stickers/Instruments Evaluated:

Chrompack CP9001, S/N 945211, Sticker - Cal. Each Use
Mettler PE 160, S/N E 10807, due 10/94
Sartorius Blance 5500, S/N 3312097, Due 10/94
Sartorius Blance 110, S/N 3404009, Due 10/94
Packard Tri-Carb 4503, S/N 1067, Sticker - No Calibration Required
Liquid Scintillation Counter, S/N 484666, Sticker - Operator to Calibrate

YMP-USGS-QDRs Reviewed:

YMP-USGS-QDR-93-010-2, Temperature and Relative Humidity exceed 5% RII
YMP-USGS-QDR-93-013-2, Temperature and Relative Humidity exceed 5% RII
YMP-USGS-QDR-93-014-2, Seismic Station GMR not Calibrated
YMP-USGS-QDR-93-038-2, Temperature and Relative Sensors Malfunction

QA PROGRAM ELEMENT 16.0, "CORRECTIVE ACTION"

Procedures:

OCRWM QARD, Section 16.0, "Corrective Action"
YMP-USGS-QMP-16.02, Revision 0, "Control of Stop Work Orders"
YMP-USGS-QMP-16.03, Revision 3, "Tracking, Trending and Management Information Reporting"
YMP-USGS-QMP-16.04, Revision 0, M1, "Control of Quality Deficiency Reports"

Objective Evidence:

YMP-USGS-QMP-16.03:

Trend Report, 10/1/93 - 12/31/93
Trend Report, 1/1/94 - 3/31/94

YMP-USGS-QMP-16.04:

Quarterly Summary of Deficiency Document Closed 1/1/94 - 3/31/94

Status of Open Items dated 6/17/94

QDR Files:

OPEN

QDR-93002-1	QDR-93017-2	QDR-93003-1	QDR-93019-2
QDR-93011-2	QDR-94051-3	QDR-93014-2	QDR-94052-3
QDR-94053-3	QDR-94054-3	QDR-94055-3	QDR-94056-2
QDR-94057-2	QDR-94058-2	QDR-94059-2	QDR-94060-2
QDR-94061-2	QDR-94062-3	QDR-94063-3	QDR-94064-2
QDR-94065-3	QDR-94066-2	QDR-94070	QDR-94071-2

CLOSED

QDR-93006-2	QDR-93015-2	QDR-93018-2	QDR-94001-3
QDR-94016-2	QDR-94025-3		

QA PROGRAM ELEMENT 17.0, "QUALITY ASSURANCE RECORDS"

Procedures:

OCRWM QARD, Section 17.0, "Quality Assurance Records"
USGS-YMP-QMP-17.01, Revision 6, "YMP-USGS Records Management for Records Sources"
USGS-YMP-QMP-17.03, Revision 1, "YMP-USGS Local Records Center and General Records Management"

Objective Evidence:

YMP-USGS-QMP 17.01 and 17.03:

Records Packages:

93-9960-2248	93-4889-5025	ASCR-G12328410	HP-14, R2
PO 14PCLC00421	QDR 93007-2	HP-189, R0	G1232834-1

LRC Records Storage Access List dated 06/10/94

QA PROGRAM ELEMENT 18.0, "AUDITS"

Procedures:

OCRWM QARD, Section 18.0, "Audits"
YMP-USGS-QMP-2.05, Revision 4, M1, "Qualification of Audit Personnel"
YMP-USGS-QMP-18.01, Revision 7, M1, "Audits"
YMP-USGS-QMP-18.02, Revision 3, "Surveillances"

Objective Evidence:

YMP-USGS-QMP-2.05:

Qualification/certification for the following personnel:

R. Rodriguez, Lead Auditor Certification
D. Sinks, Auditor Qualification
A. Mullin, Technical Specialist Qualification
M. Peterman, Technical Specialist Qualification
J. Ziemba, Lead Auditor Recertification (1/27/94)
D. Valega, Lead Auditor Recertification (1/27/94)
A. Whiteside, Lead Auditor Recertification (1/27/94)

YMP-USGS-QMP-18.01:

Internal Audit Reports:

94058-IA and 94031-IA

External Audit Reports:

94052-SA, 94053-SA, 94045-SA, 94049-SA, and 94021-SA

QDRs:

94051-3, 94046-3, 94052-3, 94035-2, 94053-3, and 94063-3

Internal and External Audit Schedules, dated 10/26/93 and 5/3/94

Audit Notification Letter for Audits 94058-IA, dated 4/29/94 and 94031-IA, dated 3/3/94

Audit Plan, Preaudit Meeting, Postaudit Meeting, Audit Checklist for audit, and Audit Report Transmittal Letters for:

94058-IA, 94031-IA, 94052-SA, 94053-SA, 94045-SA, 94049-SA, and 94021-SA

YMP-USGS-QMP-18.02:

Surveillance Reports:

SR 94062-IS, SR 94050-IS, SR 94048-IS, SR 94041-IS, and SR 94030-IS

Qualifications of D. Sinks for knowledge about technical work under surveillance

SUPPLEMENT I, "SOFTWARE CONTROL"

Procedures:

OCRWM QARD, Supplement I, "Software Control"
YMP-USGS-QMP-3.03, Revision 4, Interim Change Notice 2, "Software"

Objective Evidence:

Reviewed Scientific and Engineering Software Documentation Packages for the following released software:

Software ID:	Program Name:	Version:
GSP0031.01	GIBBS '90	V1.0
GSP0032.01	DIFFGIBBS	V1.0
GSP0028.01	MAIN130	V1.0

Software Configuration Management forms for withdrawal of the following software:

Software ID:	Program Name:	Version:
GSP0005.01	X-ACQ	V1.0
HIP0026.01	PRED.PAS	V1.0
NHP0044.02	TCPCAL	V1.009
NHP0049.03	PTMREG	V1.002
GDM0018.01	GVHANDTC	V1.001
GSP0009.01	CUSP RT	V1.0

Software Configuration Status Accounting Logs for quarterly periods September 1993, December 1993, and March 1993.

Software Configuration Management Status Log dated 06/14/94

SUPPLEMENT II, "SAMPLE CONTROL"

Procedures:

OCRWM QARD, Section 8.0, "Identification and Control of Items" and Supplement II, "Sample Control"

NWM-USGS-HP-12, Revision 3, "Method for Collection, Processing, and Handling of Drill Cuttings and Core from Unsaturated-Zone Boreholes at the Well-Site, NTS"

NWM-USGS-HP-23, Revision 3, "Collection and Field Analysis of Ground-Water Samples from Saturated Zone"

NWM-USGS-HP-56, Revision 3, "Gas and Water Vapor Sampling from Unsaturated-Zone Test Holes"

NWM-USGS-HP-61, Revision 0, "Use of Hand-Held Steel Tapes (in Vertical Boreholes)"

NWM-USGS-HP-125, Revision 0, "Method for Extraction of Pore Water from Tuff Cores by Triaxial Compression"

NWM-USGS-HP-126, Revision 1, "Extraction of Residual Water from Tuff Samples by Vacuum Distillation"

NWM-USGS-HP-131, Revision 3, "Methods for Handling and Transporting Unsaturated Core and Rubble Samples for Hydrochemical Analysis"

NWM-USGS-HP-160, Revision 2, "Methods for Analysis of Samples for Gas Composition by Gas Chromatography"

NWM-USGS-HP-200, Revision 0, "Collection of Ground-Water Samples from Wells"

NWM-USGS-HP-223, Revision 0, "Method for Pore-Water Extraction Using One-Dimensional Compression"

NWM-USGS-HP-249, Revision 0, "Method for Pore-Water Extraction Using High-Pressure One-Dimensional Compression"

NWM-USGS-HP-252, Revision 1, "Method for Sealing Selected Core Samples During Drilling at Unsaturated Zone Boreholes"

Objective Evidence:

Samples:

JBC 921110.007 and 920923.014

SUPPLEMENT III, SCIENTIFIC INVESTIGATION AND QA PROGRAM ELEMENT 3.0, "DESIGN CONTROL"

Procedures:

OCRWM QARD, Section 3.0, "Design Control" and Supplement III, "Scientific Investigation"

YMP-USGS-QMP-3.04, Revision 5, M1, "Technical Review and Approval of YMP-USGS Data and Publications"

YMP-USGS-QMP-3.07, Revision 5, "YMP-USGS Review Procedure"

YMP-USGS-QMP-3.15, Revision 0, M1, "Application of Graded Quality Assurance"

YAP-SIII.3Q, Revision 0, "Control and Transfer of Technical Data On the Yucca Mountain Site Characterization Project" (Formerly AP-5.1Q)

Objective Evidence:

YMP-USGS-QMP-3.04:

Technical Data Packages/Data Sets

GS940208314224.001, Description and orientation for two faults identified at NRPM-150 to 157. TDIF, dated 2/3/94, WBS No. 1.2.3.2.1.2

Data Review, Drill Hole UZ-14, Duesch Lithologic Log, Borehole USW NRG-7/7A, reviewed by D. Buesch

GS940208312312.002, TDIF dated 2/8/94, WBS No. 1.2.3.3.1.3.1

DPR/CRFs:

DPR/CRF, Reviewer, D. C. Buesch, 2/7/94
DPR/CRF, J. Gemmell, 2/2/94
DRP/CRF, C. Fridrich, 11/23/93, Document Transmittal No. GS920708314221.003

YMP-USGS-QMP-3.07:

TPs/Technical and QA Reviews:

NWM-USGS-GCP-28, Revision 1, Drafts 1/18/94 and 3/10/94, effective date 4/8/94
NWM-USGS-GCP-34, Revision 0, Drafts 12/14/93 and 9/9/93, effective date 2/8/94
NWM-USGS-HP-162, Revision 0, Drafts 9/17/93 and 9/22/93
NWM-USGS-HP-137, Revision 0, Drafts 2/1/94 and 2/22/94

YMP-USGS-QMP-3.15:

ACS and Graded QA:

YMP-USGS-ACS-G12328412-2, Revision 0, SP 8.3.1.17.4.12, "Tectonic Models and Synthesis"

YMP-USGS-ACS-G1232845-1, Revision 0, SP 8.3.1.17.4.5, "Detachment Faults at or Proximal to Yucca Mountain"

YMP-USGS-ACS-G1232521-1, Revision 0, SP 8.3.1.8.21, "Analysis of Waste Package Rupture Due to Tectonic"

YMP-USGS-ACS-G1232212-1, Revision 0, SP 8.3.1.4.2.2, "Characterization of Structural Features Within the Site Area"

Memo, Grading, L. R. Hayes, 5/21/92, identified committee members

Memo, Grading, T. H. Chaney, 1/21/94, identified new QA Representative

ACS Document Control Lists, dated 6/20/94

YMP-SIII.3Q:

TDIFs:

GS940208314224.002	GS931008314224.006	GS94.A.100123
GS931008314224.007	GS94.A.100119	GS931108312132.019
GS94.A.100122	GS930808312332.003	GS94.A.100196
GS94.A.100197	GS930708314211.031	GS94.A.100299
GS940108312232.001	GS940408312232.011	

Letter, dated 4/20/94 to Claudia Newbury (DOE) from Patrick McKinley (USGS) Records Package 8.3.1.17.4.1.12

TDIF/Data Package for SCP No. 8.3.1.4.2.2.4:

GS940208314224.002	GS940208314224.006	GS940208314224.007

TECHNICAL ACTIVITIES

Study 8.3.1.4.2.2, Characterization of Structural Features Within the Site Area

Procedures:

NWM-USGS-GP-12, Revision 1, "Mapping Fractures on Pavements, Outcrops and Along Traverses"

NWM-USGS-GP-01, Revision 2, "Geologic Mapping"

Objective Evidence:

DOE, 1992, SP 8.3.1.4.2.2 (Characteristics of Structural Features Within the Site Area), Revision 2, Activity 1 (Geologic Mapping of Zonal Features in the Paintbrush Tuff), Activity 2 (Surface-Fracture Network Studies) and Activity 4 (Geologic Mapping of the Exploratory Studies Facility)

Several map sheets from the 1:240 scale mapping of the Ghost Dance and Sundance faults

One field notebook that was used during the mapping (CAB YGD3)

Technical Data Package: Field Observations of Fractures and Field Measurements Collected FY 92 for Attributes of Fractures, maps at 1:240, southern part of Ghost Dance Fault, Yucca Mountain, Nevada

In process records for the technical review of OFR 94-49, "The Sundance Fault: A newly Recognized Shear Zone at Yucca Mountain, Nevada"

SN 0041, "Underground Mapping of the North Ramp Starter Tunnel and Appurtenances"

Auxiliary Notebook No. 3 for SN 0041

Records Package for "Detailed Line Survey Data for Exploratory Studies Facility North Ramp, Starter Tunnel, Right Slash"

Records Package for "Full-Periphery Maps, North Ramp of the Exploratory Studies Facility, through October, 1993"

Technical Data Package for the "Full Periphery Map/Starter Tunnel"

STUDY 8.3.1.8.2.1, Tectonic Effects

Objective Evidence:

Draft version of SP 8.3.1.8.2.1, Revision 1, "Tectonic Effects"

Records Package for the Journal Article: Hydrologic Analysis of the Saturated-Zone Ground-Water System under Yucca Mountain, Nevada

STUDY 8.3.1.17.4.3, Quaternary Faulting within 100 km of Yucca Mountain, including the Walker Lane

Procedures:

NWM-USGS-GP-50, Revision 0, "Identification of Geomorphic Features of Possible Tectonic Origin Using Conventional and Low-Sun-Angle Vertical Aerial Photographs"

NWM-USGS-GP-52, Revision 0, "Topographic Profiling of Geomorphic Features - Field Measurement"

Objective Evidence:

DOE, 1993 SP 8.3.1.17.4.3 (Quaternary Faulting within 100 km of Yucca Mountain, including the Walker Lane), Revision 1

Draft version of OFR for "Compilation of Known or Suspected Quaternary Faults within 100 km of Yucca Mountain"

Preliminary Map of Quaternary Faults within 100 km of Yucca Mountain

Technical Data Records Package for the "Bare Mountain Fault Scarp Profile Data" and the "Preliminary Map of Quaternary Faults within 100 km of Yucca Mountain"

STUDY 8.3.1.17.4.12, Tectonic Models and Synthesis

Objective Evidence:

Draft version of SP 8.3.1.17.4.12, "Tectonic Models and Synthesis," dated 2/25/94
Review package for SP 8.3.1.17.4.12
Records Package 8.3.1.17.4.12

STUDY 8.3.1.4.2.1, Characterization of the Vertical and Lateral Distribution of Stratigraphic Units within the Site Area

Objective Evidence:

DOE, 1992, SP 8.3.1.4.2.1, Revision 0, "Characterization of the Vertical and Lateral Distribution of Stratigraphic Units within the Site Area"

SN by D. Buesch for Activity 8.3.1.4.2.1.1

Example of Graphical Lithologic Log for Borehole USW NRG-7/7A

Preliminary Seismic Line Section up WT-2 Wash, across the Ghost Dance Fault and a Magnetic Survey along the same line (R. Spengler)

Draft OFR on Breccia Deposits near Yucca Mountain (W. Simonds)

STUDY 8.3.1.17.4.5, Detachment Faults at or Proximal to Yucca Mountain

Procedures:

NWM-USGS-GP-01, Revision 2, "Geologic Mapping"

Objective Evidence:

DOE, 1994, SP 8.3.1.17.4.5, Revision 1, Draft, "Detachment Faults at or Proximal to Yucca Mountain"

Geologic Map (in process) for the Calico Hills Area

Data Package GS920708314221.003, Geologic Mapping of the East Beatty Mt. 7.5' Quad

STUDY 8.3.1.4.2.3, Three-Dimensional Geologic Model

Objective Evidence:

Isopatch and Structure Contour Maps (in process) that are input to and output from the 3-D Geologic Model (R. Dickerson)

Preliminary Block Diagram - Output from 3-D Geologic Model (R. Spengler)

Borehole Summaries with OFRs that are basic input to the 3-D Geologic Model (R. Dickerson)

ATTACHMENT 4

Information Copies

of

Corrective Action Requests

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8 CAR NO.: YM-94-043
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CORRECTIVE ACTION REQUEST

1 Controlling Document	2 Related Report No.
QARD, Revision 0	YMP-94-06

3 Responsible Organization	4 Discussed With
USGS	L. Hayes

5 Requirement:

QARD Supplement III 2.2.A states: "Scientific investigations shall be performed using scientific notebooks, technical implementing documents, or a combination of both."

6 Adverse Condition:

Contrary to the above, Tectonic Modeling and Synthesis Activity 8.3.1.17.4.12 does not use a scientific notebook or technical implementing documents. Furthermore, YMP-USGS-ACS-G12328412-2, Revision 0, graded the requirement as not applicable to the activity.

9 Does a Significant Condition Adverse to Quality exist?	10 Does a stop work condition exist?	3 Response Due Date:
Yes___ No X If Yes, Circle One: A B C D E	Yes___ No X ; If Yes - Attach copy of SWO If Yes, Circle One: A B C	20 Working Days From Issuance

11 Required Actions: [X] Remedial [X] Extent of Deficiency [X] Preclude Recurrence [X] Root Cause Determination

12 Recommended Actions:

1. Provide for the use of a Scientific Notebook for Activity 8.3.1.17.4.12.
2. Investigate to identify any other cases of inappropriate grading.

7 Initiator	14 Issuance Approved by:
James Blaylock C.C. Warner for 6-30-94	QADD [signature] for Date 7-4-94
15 Response Accepted	16 Response Accepted
QAR Date	QADD Date
17 Amended Response Accepted	18 Amended Response Accepted
QAR Date	QADD Date
19 Corrective Actions Verified	20 Closure Approved by:
QAR Date	QADD Date

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8 CAR NO.: YM-94-044
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CORRECTIVE ACTION REQUEST

1 Controlling Document	2 Related Report No.
YMP-USGS-QMP-16.02, Revision 3	YMP-94-06

3 Responsible Organization	4 Discussed With
USGS	T. Chaney/L. McInroy

5 Requirement:

Attachment I provides the surveillance report format. It requires a statement in the report summary on acceptability and effectiveness of the activity under surveillance.

6 Adverse Condition:

Contrary to the above, surveillance reports issued during FY 1994 do not contain a statement in the report summary on acceptability and effectiveness of the activity. The acceptability and effectiveness statement is contained in the surveillance report transmittal letter.

9 Does a Significant Condition Adverse to Quality exist? Yes___ No_X_ If Yes, Circle One: A B C D E	10 Does a stop work condition exist? Yes___ No_X_; If Yes - Attach copy of SWO If Yes, Circle One: A B C	3 Response Due Date: 20 Working Days From Issuance

11 Required Actions: [X] Remedial [X] Extent of Deficiency [X] Preclude Recurrence [ ] Root Cause Determination

12 Recommended Actions:
Comply with procedure requirements.

7 Initiator S. Maslar P.C. Latimer for 6-30-94	14 Issuance Approved by: QADD R.W. Nelson for Date 7-4-94
15 Response Accepted QAR Date	16 Response Accepted QADD Date
17 Amended Response Accepted QAR Date	18 Amended Response Accepted QADD Date
19 Corrective Actions Verified QAR Date	20 Closure Approved by: QADD Date

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8 CAR NO.: YM-94-045
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CORRECTIVE ACTION REQUEST

1 Controlling Document	2 Related Report No.
YMP-USGS-QMP-3.03, Revision 4	YMP-94-06

3 Responsible Organization	4 Discussed With
USGS	D. Gockel/M. Wallendorf

5 Requirement:

QMP-3.03, Paragraph 5.3.2.3 states in part; "Software user documentation.... It shall include basic information such a installation procedures, hardware and software operating environments, input and output options, file formats and default parameters."

6 Adverse Condition:

Contrary to the above, no objective evidence in the form of user documentation could be provided to reflect all of the information required to be addressed in the user documentation for MAIN 130/1.

9 Does a Significant Condition Adverse to Quality exist? Yes___ No X__ If Yes, Circle One: A B C D E	10 Does a stop work condition exist? Yes___ No X ; If Yes - Attach copy of SWO If Yes, Circle One: A B C	3 Response Due Date: 20 Working Days From Issuance

11 Required Actions: ☒ Remedial ☐ Extent of Deficiency ☐ Preclude Recurrence ☐ Root Cause Determination

12 Recommended Actions:
Either generate or obtain user documentation that addresses the information specified in QMP-3.03, Revision 4 for main 130/1.

7 Initiator	14 Issuance Approved by:
Richard L. Maudlin C.C. Warner for 6-30-94	QADD [signature] for Date 7-1-94
15 Response Accepted	16 Response Accepted
QAR Date	QADD Date
17 Amended Response Accepted	18 Amended Response Accepted
QAR Date	QADD Date
19 Corrective Actions Verified	20 Closure Approved by:
QAR Date	QADD Date

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8 CAR NO.: YM-94-046
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CORRECTIVE ACTION REQUEST

1 Controlling Document
QARD, Revision 0; YMP-USGS-QMP-16.04, Revision 0

2 Related Report No.
YMP-94-06

3 Responsible Organization
USGS

4 Discussed With
T. Chaney

5 Requirement:

QARD, Section 16.0 states: "A condition adverse to quality shall be identified when a QARD or implementing document requirement is not met." QMP-16.04, Section 5 states: "The identification of a condition adverse to quality shall be documented by the individual identifying the condition using a Quality Deficiency Report (QDR) or equivalent."

6 Adverse Condition:

Contrary to the above requirements, during a review of USGS internal audit reports 94058-IA and 94031-IA, it appears that of 13 concerns identified, more than half of these concerns met the criteria of the QARD and QMP-16.04 for a conditional adverse to quality without QDRs or equivalent being issued to document these conditions. USGS, per internal memo dated 6/17/94, has defined/interpreted a condition adverse to quality a "a clean or very clear violation of a QMP or technical procedure." This is not in compliance with the QARD or QMP-16.04 definition of a condition adverse to quality in that it does not include noncompliance with quality program requirements other than those specified in procedures.

9 Does a Significant Condition Adverse to Quality exist? Yes X No ___
If Yes, Circle One: A (B) C D E

10 Does a stop work condition exist? Yes ___ No X ; If Yes - Attach copy of SWO
If Yes, Circle One: A B C

3 Response Due Date:
20 Working Days From Issuance

11 Required Actions: [X] Remedial [X] Extent of Deficiency [X] Preclude Recurrence [X] Root Cause Determination

12 Recommended Actions:

1) USGS should use the wording in the QARD and QMP-16.04 as the basis for determining conditions adverse to quality.

2) Previously identified and future concerns with the associated recommendation need to be formally tracked to insure acceptable closure to USGS-QA.

7 Initiator: S. Maslar — C.C. [signature] for 6-30-94	14 Issuance Approved by: QADD [signature] Date 7/5/94
15 Response Accepted: QAR ___ Date ___	16 Response Accepted: QADD ___ Date ___
17 Amended Response Accepted: QAR ___ Date ___	18 Amended Response Accepted: QADD ___ Date ___
19 Corrective Actions Verified: QAR ___ Date ___	20 Closure Approved by: QADD ___ Date ___

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8 CAR NO.: YM-94-047
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CORRECTIVE ACTION REQUEST

1 Controlling Document	2 Related Report No.
QARD, Rev. 0	YMP-94-06
3 Responsible Organization	**4 Discussed With**
USGS	T. CHANEY

5 Requirement:

DOE/RW/0333P QARD, Section 2.2.9c, states for Document Review: "The review shall be performed by individuals other than the originator." QARD Section 2.2.9f states: "Mandatory comments resulting from the review shall be documented and resolved before approving the document." QARD Supplement III, Section III 2.2.4 states: "The reviewer shall be independent from the collector."

6 Adverse Condition:

1. Contrary to the QARD Requirements, QMP-3.04 does not require review comment resolution with the independent technical reviewer. QMP-3.04, para. 5.4.3.2 and 5.4.4.4 requires the YMPB Program Chief to resolve comments. The YMPB Program Chief responsibilities of directing the work defeats the independence of the review.
2. Contrary to QARD an independent data review was not performed for Geologic Data DTN #GS920708314221.003:
   - The reviewer changed data without an independent review.
   - The Acting Program Chief GSP approved the review.

9 Does a Significant Condition Adverse to Quality exist? Yes___ No X___ If Yes, Circle One: A B C D E	10 Does a stop work condition exist? Yes___ No X___; If Yes - Attach copy of SWO If Yes, Circle One: A B C	3 Response Due Date: 20 Working Days from Issuance

11 Required Actions: [X] Remedial [X] Extent of Deficiency [X] Preclude Recurrence [X] Root Cause Determination

12 Recommended Actions:

1. Revised QMP 3.04 to be consistent with QMP 3.07 and meet QARD requirements.
2. Perform the actions indicated in block 11.

7 Initiator T. SWIFT C.C Warner for 6-30-94	14 Issuance Approved by: QADD [signature] for Date 7.4.94
15 Response Accepted QAR Date	16 Response Accepted QADD Date
17 Amended Response Accepted QAR Date	18 Amended Response Accepted QADD Date
19 Corrective Actions Verified QAR Date	20 Closure Approved by: QADD Date

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8 CAR NO.: YM-94-048
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CORRECTIVE ACTION REQUEST

1 Controlling Document	2 Related Report No.
YMP-USGS-QMP-18.01, Rev. 4	YMP-94-06

3 Responsible Organization	4 Discussed With
USGS	T. CHANEY

5 Requirement:

YMP-USGS-QMP-8.01, R4 contains the QARD requirements for identification and control of samples.

6 Adverse Condition:

The QMP-8.01, R4 requirements have not been fully incorporated into many of the implementing technical procedures and scientific notebooks. Two examples of procedures not being updated to QMP-8.01, R4 are EP-200, R0 and HP-249, R0.

9 Does a Significant Condition Adverse to Quality exist? Yes___ No_X_ If Yes, Circle One: A B C D E	10 Does a stop work condition exist? Yes___ No_X_; If Yes - Attach copy of SWO If Yes, Circle One: A B C	3 Response Due Date: 20 WORKING DAYS FROM ISSUANCE

11 Required Actions: [X] Remedial [X] Extent of Deficiency [X] Preclude Recurrence [ ] Root Cause Determination

12 Recommended Actions:

1. Incorporate the QMP 8.01 requirements in the implementing documents.
2. Review the myriad of sample control procedures to identify interfaces and sequencing.
3. Remove what may be extraneous procedures.

7 Initiator	14 Issuance Approved by:
J. BLAYLOCK CC Warner for 6-30-94	QADD R Quintana for Date 7-4-94
15 Response Accepted	16 Response Accepted
QAR Date	QADD Date
17 Amended Response Accepted	18 Amended Response Accepted
QAR Date	QADD Date
19 Corrective Actions Verified	20 Closure Approved by:
QAR Date	QADD Date

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8 CAR NO.: YM-94-049
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CORRECTIVE ACTION REQUEST

1 Controlling Document	2 Related Report No.
QARD, Rev. 0	YMP-94-06

3 Responsible Organization	4 Discussed With
USGS	T. CHANEY

5 Requirement:

Section 5.2.2.D of the QARD states, in part: "Implementing documents shall include the following information as appropriate to the work to be performed: D. Quantitative or qualitative acceptance criteria sufficient for determining that activities were satisfactorily accomplished."

6 Adverse Condition:

QMP 16.03, R3, provides no criteria as to what constitutes a trend, hence the rationale and conclusions of the trend reports for the time periods 10/1/93 - 12/31/93 and 1/1/94 - 3/31/94 are not substantiated by the information provided.

9 Does a Significant Condition Adverse to Quality exist? Yes___ No_X_ If Yes, Circle One: A B C D E	10 Does a stop work condition exist? Yes___ No_X_; If Yes - Attach copy of SWO If Yes, Circle One: A B C	3 Response Due Date: 20 WORKING DAYS FROM 7/5/94

11 Required Actions: [X] Remedial [ ] Extent of Deficiency [X] Preclude Recurrence [ ] Root Cause Determination

12 Recommended Actions:
1. Provide qualitative criteria in QMP 16.03.
2. Change the definition of adverse condition to be consistent with the QARD glossary.
3. Substantiate the trend reports for the time frame identified above.

7 Initiator J. BLAYLOCK C.C. Blaylock 6-30-94	14 Issuance Approved by: QADD [signature] for Date 7-1-94
15 Response Accepted QAR Date	16 Response Accepted QADD Date
17 Amended Response Accepted QAR Date	18 Amended Response Accepted QADD Date
19 Corrective Actions Verified QAR Date	20 Closure Approved by: QADD Date

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8 CAR NO.: YM-94-050
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CORRECTIVE ACTION REQUEST

1 Controlling Document	2 Related Report No.
QARD DOE/RW/0333P and YMP-USGS QMPs	YMP-94-06

3 Responsible Organization	4 Discussed With
USGS	T. CHANEY

5 Requirement:

1. QARD, Section 4.0, PROCUREMENT DOCUMENT CONTROL, Para. 4.2.1 states: "Procurement documents issued by each affected organization shall include the following provisions, as applicable to the items being procured." Para. 4.2.1.C.1:ls states: "...A requirement for the supplier to have a documented QA program that implements the applicable QARD requirements prior to the

6 Adverse Condition:

Contrary to the above requirements:

(1) The USGS procurement procedures fail to translate the QARD requirements into the work process which describes the methodology for accomplishing the activity or task and,

(2) The implementation of the USGS procurement procedures have not provided assurance that the activity results in an acceptable product or service.

The above deficiencies are supported by the following observations:

Contrary to the QARD requirements, Section 5 Items 2,3,4,7,8 and 9:

a) The procurement procedure YMP-USGS-QMP-4.01, Rev. 6, fails to identify the methodology for determining what QARD requirements apply to any given scope of work identified in the purchase document. The procurement documents fail to be specific as to what QA program requirements pertain to the procurement or specifically identify those USGS QA program procedures that apply.

The Requisition Request and Purchase Orders reviewed, PO 164368-93, PO 162578-93, PO 164411-93, 4RQ4889-5738,

9 Does a Significant Condition Adverse to Quality exist?	10 Does a stop work condition exist?	3 Response Due Date:
Yes X No ___	Yes ___ No X ; If Yes - Attach copy of SWO	20 Working Days from Issuance
If Yes, Circle One: A (B) C D E	If Yes, Circle One: A B C	

11 Required Actions: [X] Remedial [X] Extent of Deficiency [X] Preclude Recurrence [X] Root Cause Determination

12 Recommended Actions:

1. Revise USGS procedures to facilitate translation of QARD requirements into work processes.
2. Implement procedures to assure procurement activities result in acceptable product or services.

7 Initiator	14 Issuance Approved by:
Donald Harris C.C. Warren for 6.1.94	QADD R Loux Date 7/5/94
15 Response Accepted	16 Response Accepted
QAR Date	QADD Date
17 Amended Response Accepted	18 Amended Response Accepted
QAR Date	QADD Date
19 Corrective Actions Verified	20 Closure Approved by:
QAR Date	QADD Date

REV. 2/14/94

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5 Requirements (continued)

initiation of the work."

2. Para. 4.2.1C.3: "When deemed appropriate, the purchaser shall permit some or all supplier work to be performed under the purchaser's quality assurance program provided the work is adequately addressed. In these cases, procurement documents shall specify that the purchaser's implementing documents are applicable to the supplier and that the purchaser shall provide these applicable documents to them."

3. Para. 4.2.2 (C) states in part: "Reviews shall assure that all applicable technical and quality program requirements are included."

4. QARD Section 7.0, CONTROL OF PURCHASED ITEMS AND SERVICES, Para. 7.2.1:

   Procurements shall be planned and documented to ensure a systematic approach to the procurement process. Procurement planning shall:

   A. Identify procurement methods and organizational responsibilities.

   B. Identify what is to be accomplished, who is to accomplish it, how it is to be accomplished, and when it is to be accomplished.

   C. Identify and document the sequence of actions and milestones needed to effectively complete the procurement.

5. Para. 7.2.3:

   A. The proposal/bid evaluation process shall include a determination of the extent of conformance to the procurement document requirements. This evaluation shall be performed by designated, technically qualified organizations including the quality assurance organization. The evaluation shall include the following subjects consistent with the importance, complexity, and quantity of items or services being procured:

      1. Technical considerations
      2. Quality assurance program requirements
      3. Supplier personnel
      4. Supplier production capability
      5. Supplier past performance
      6. Alternatives
      7. Exceptions

   B. Before the contract is awarded, the purchaser shall resolve, or obtain commitments to resolve, unacceptable quality conditions identified during the proposal/bid evaluation.

6. Para. 7.2.4 (A) states in part: "The purchaser of items and services shall establish measures to interface with the supplier and to verify supplier's performance." Para. 7.2.4.A3: "...Reviewing supplier documents that are prepared or processed during work performed to fulfill procurement requirements."

7. QARD, Section 5.0, IMPLEMENTING DOCUMENTS, Para. 5.2.2 states: "Content of implementing documents shall include the following information, as appropriate to the work to be performed: (A) Responsibilities of the organizations affected by the document, (B) Technical and regulatory requirements, (C) states in part: Sequential description of the work to be performed, (D) Quantitative and qualitative acceptance criteria sufficient for determining the activities were satisfactorily accomplished, (E) Prerequisites, limits, precautions, process

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5 Requirements (continued)

parameters, and environmental conditions, (F) Quality verification points and hold points, (G) Methods for demonstrating that the work was performed as required, (H) Identification of lifetime and nonpermanent QA records generated by the implementing document and (I) Identification of associated items and activities.'

8. QARD, Section 2.0, QUALITY ASSURANCE PROGRAM, Para. 6.2.3 states: 'REVIEWING DOCUMENTS. Documents that specify technical requirements, quality requirements or prescribe work shall be reviewed for adequacy, correctness and completeness, according the the requirements of Section 2.0, prior to approval of issuance.'

9. Para. 2.2.9 states: 'Documents shall be reviewed to the following requirements and for any additional requirements specified by the applicable section of the QARD. (A) Review criteria shall be established before performing the review. These criteria shall consider applicability, correctness, technical adequacy, completeness accuracy, and compliance with established requirements, (B) Pertinent background information shall be made available to the reviewers by the organization requesting the review if information is not readily available to the reviewer, (C) The review shall be performed by individuals other than the originator, (D) Reviewers shall be technically competent in the subject area being reviewed, (E) The scope of the review shall consider all aspects of the document....'

10. QARD Section 18.0, AUDITS

Para. 18.2.2C: 'External audits for compliance shall be performed triennially as a minimum. Pre-award surveys, if applicable, may serve as the first triennial audit if the affected organization is implementing the same quality assurance program for other contracts that is proposed for the purchaser's contract.'

11. QMP-7.04, Rev.1, CONTROL OF PURCHASED ITEMS AND SERVICES, Para. 5.2, states in part: 'Suppliers on the Approved Suppliers List (ASL) shall receive an annual evaluation any time prior to the scheduled anniversary date at the discretion of the YMP-USGS QA Manager.'

6 Adverse Condition (continued)

4RQ4889-5695, and 4RQ4889-5696 only identify that work is to be performed in accordance with either the supplier's QA program or in accordance with the USGS QA Program. (generally non-specific)

b) YMQAD Corrective Action Request, CAR YM-93-053 was closed on 4/26/94, based on QMP-4.01, Rev. 6. The effectiveness of implementation of the QMP in appropriately passing the QARD requirements down to the Suppliers was not performed at CAR closure. The effectiveness of correction performed during the Audit reflected the following in process Requisition Requests and Requisitions 4RQ4889-5738, 4RQ4889-5695 and 4RQ4889-5695 failed to identify the appropriate QARD requirements.

(Reference DOE Letter YMQAD:RBC-1155, dated December 17, 1993, to Larry R. Hayes, from Richard E. Spence, Subject: Verification of Corrective Action Request (CAR) YM-93-053 Resulting from YMQAD Review)

Contrary to QARD requirements Section 5 Items 2,3,4,5,7,8 and 9:

c) QMP-4.01, Rev. 6, PROCUREMENT DOCUMENT CONTROL, Paras. 5.4.1.2 and 5.4.1.3 in part states: 'When a proposal is selected and meets all the requested requirements the Contracting Officer

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6 Adverse Condition (continued)

(C.O.) shall forward the document to the Requester and QA Manager for review to ensure the procurement document include the appropriate provisions identified in Para. 5.4.1 (restatement of QARD requirements) and attachment 4. The procedure fails to provide the methodology for performing the reviews and attachment 4 is identified as 'Supplier Performance Evaluation' and does not contain information on Proposal evaluations.'

Contrary to QARD requirements, Section 5 Items 3,4,7,8 and 9:

d) QMP-7.04, Rev. 1, CONTROL OF PURCHASED ITEMS AND SERVICES, Para.5.3, Source Verification, states in part: 'YMP-USGS may accept an item or service by monitoring, witnessing, or observing activities performed by the supplier. This method of acceptance is called Source Verification. Attachment 2 (Source Verification Form) or equivalent shall be used. Para. 5.3.2 states: 'Documented evidence of acceptance or rejection of source verified items or services shall be furnished to the requester, the supplier and included in the procurement records package.' The procedure fails to contain any methodology for planning source inspections, determining what quantitative and qualitative acceptance criteria to include or on the actual performance of the source inspection. Currently two source inspections have been performed utilizing a Source Verification Plan which does at least provide a description of what was inspected and the results. Attachment 2, Source Verification Form provides very limited information. The Source Verification Form or Source Verification Plan are not sent to the supplier as required by the procedure.

Contrary to QARD requirements, Section 5 Items 1,2,3,4,7,8 and 9:

e) USGS QDR 93-011-2 was initiated against a series of procurement documents initiated by USGS Support Contractor. The QDR was dispositioned to require the QA implementation advisor to assure the deficiencies in the procurement documents are corrected by a change order. The inprocess Change Order R6028657, to PO 45-930092 generated only invokes that: 'Work performed under this contract shall meet all YMP-USGS QA Program Requirements in effect for the duration of this Contract.' This Change Order fails to identify specific requirements.

The existing contract fails to invoke any technical or quality requirement, therefore it would not stand the test of any judgement (law) against the supplier. Subsequently a letter was generated on 9/5/90, essentially specifying USGS QAPP-01, Rev. 5, Section 4, PROCUREMENT DOCUMENT CONTROL, Paras. 4.3.4. and 4.3.6 which were to be met, Right of Access Control and what constitutes a nonconformance. This letter failed to provide appropriate technical and quality assurance requirements or reference the Purchase Order.

f) YMQAD evaluation of Security Archives Storage Facility (SAIC/USGS contractor) during Audit YMP-94-06 two deficiencies of Security Archives were found (i.e.: Security Archives instruction was not referenced in the purchasing document with Security Archives). The first related to penetrations through the vault. It was observed that a Halon pipe penetration through the vault was not sealed to as required. Secondly, the temperature and humidity strip recorder indicated for a seven week period that the temperatures in the vault were below the minimum set forth in the Security Archive instruction which is based on the manufactures

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6 Adverse Condition (continued)

recommendations. No corrective action documents were generated by USGS to address this condition. USGS had just performed a requalification audit of Security Archives (USGS-94052-SA) on May 24, 1994 and failed to identify these conditions. As a result of the audit, Security Archives was maintained as a supplier of services on the USGS ASL.

Contrary to QARD requirements, Section 5 Items 6 and 11:

g) QDR 94-063, initiated 5/23/94, addressed the failure of USGS to perform their Annual Supplier Evaluations in accordance with QMP-7.04 which is the basis for retention on the ASL. These suppliers were not suspended from the ASL. They are retained on a managerial risk basis.

Contrary to QARD requirements, Section 5 Items 1,2,3,4,6,7,8,9 and 10:

h) YMP-USGS-QMP-7.04, Rev. 1, CONTROL OF PURCHASED ITEMS AND SERVICES, Para. 5.4, Triennial Audits in accordance with this paragraph is only three years after a supplier is placed on the ASL. The QMP fails to address the requirement or the methodology required by the QARD. The QARD requires that after qualification of a Supplier by History, Quality Records Review, or Survey when the supplier is using a QA program other than the QA program with requirements specifically required by USGS procurement document, an audit must be performed after commencement of USGS's work. This audit is used to set the triennial audit date and provides a degree of confidence the supplier is performing as required.

Contrary to QARD requirements, Section 5 Items 2,3,4,5,7,8 and 9:

i) The contract 1434-93-C-40098 Desert Research Institute (DRI) Quality Assurance Agreement between DRI Quarternary Science Cetner and USGS Geological Survey for Yucca Mountain Project Data Collection. (approved by USGS3/94) fails to address: 1) what YMp-USGS-QMPs DRI is responsible to implement; 2) allows DRI to generate written procedures for sample tracking and data collection without being performed in accordance to YMP-USGS-QMP-501; 3) fails to invoke a Document Control requirement, based on a statement of 'Employee Awareness'; 4) fails to invoke YMP-USGS procedures QMP-2.08 PERSONNEL QUALIFICATION, QMP 6.01 DOCUMENT CONTROL, QMP 8.01 IDENTIFICATION AND CONTROL OF SAMPLES or QMP 16.04 CONTROL OF DEFICIENCY REPORTS (Note: based on the Attachment I statement It appears that DRI is augmented staff to USGS.)