SEP 0 5 1990

Mr. Ralph Stein, Associate Director
for Systems Integration and Regulations
Office of Civilian Radioactive Waste Management
U.S. Department of Energy, RW 30
Washington, DC 20585

Dear Mr. Stein:

SUBJECT: OBSERVATION AUDIT OF U.S. GEOLOGICAL SURVEY QUALITY ASSURANCE PROGRAM

I am transmitting the U.S. Nuclear Regulatory Commission (NRC) Observation Audit Report No. 90-05 for the U.S. Department of Energy (DOE)/Yucca Mountain Project Office (YMPO) Quality Assurance (QA) Audit No. 90-03 of the U.S. Geological Survey (USGS) conducted at Denver, Colorado, Las Vegas, Nevada, and the Nevada Test Site, on June 25 through 29, 1990, and July 2 and 3, 1990. The NRC staff observed and evaluated the DOE/YMPO QA audit to gain confidence that DOE and USGS are effectively implementing the requirements of their QA programs. The NRC staff based its evaluation of the audit process and the USGS QA program on direct observations of the auditors, discussions with the audit team, and reviews of the pertinent audit information (e.g., audit plan, checklists, and USGS documents).

The NRC staff has determined that overall, DOE/YMPO QA Audit No. 90-03 of USGS was useful and effective. The audit was conducted in a professional manner, and the programmatic and technical portions of the audit were well integrated to assess the adequacy and effectiveness of implementation of the USGS QA program. The audit team was well qualified in the QA and technical disciplines, and their assignments and checklist items were adequately described in the audit plan.

The NRC staff noted that certain changes in the technical scope of the audit were made by the DOE/YMPO audit team, and the NRC staff was not informed of these changes prior to the start of the audit on the morning of June 25, 1990. These changes in the technical scope of the audit affected the preparedness of certain NRC technical staff, and to some extent, adversely impacted their participation as observers on this audit.

In general, the NRC staff agrees with the DOE/YMPO audit team's preliminary findings that the USGS QA program has improved considerably since the last audit (August 1989), and has satisfactory procedure implementation, but still suffers from weaknesses in the area of records and effectiveness of training. The audit team recommended that the USGS management attention is needed to correct these weaknesses. The audit team also recommended more effective use of USGS internal audits and surveillances. The NRC staff agrees with these recommendations. The restrictions due to the Privacy Act prevented the auditors from reviewing and obtaining any objective evidence of USGS QA and technical personnel qualifications and training.

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The DOE needs to continue an aggressive schedule of audits and surveillance of the USGS QA program to ensure that future implementation is carried out in an adequate manner. DOE must also have a more focused monitoring to ensure that all the corrective actions for the deficiencies identified from this audit are completed in a timely manner. The NRC staff expects to observe these audits and surveillances, and may perform its own independent audit at a later date to assess the adequacy and effectiveness of implementation of the USGS QA program.

A written response to this letter or the enclosed report is not required. If you have any questions, please call Tilak Verma of my staff on (301) 492-3465 or FTS 492-3465.

Sincerely,

John J. Linehan, Director
Repository Licensing and Quality
Assurance Project Directorate
Division of High-Level Waste Management

Enclosure: As stated

cc: C. Gertz, DOE/NV
S. Bradhurst, Nye County, NV
M. Baughman, Lincoln County, NV
D. Bechtel, Clark County, NV
D. Weigel, GAO
P. Niedzielski-Echner, NV

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NAME:	RBallard	KHooks	JLinehan	:	:	:
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1.0 INTRODUCTION

From June 25 through 29, 1990, and July 2 through 3, 1990, the U.S. Nuclear Regulatory Commission (NRC) staff observed the U.S. Department of Energy (DOE)/Yucca Mountain Project Office (YMPO) Quality Assurance (QA) Audit No. 90-03 of the U.S. Geological Survey (USGS) which was conducted in Denver, Colorado; Las Vegas, Nevada; and the Nevada Test Site (NTS). The USGS, a participant in the Yucca Mountain Project (YMP), is responsible for the site characterization activities in the areas of hydrology, geophysics, seismology, and some of the geology and geochemistry investigations. Work in these areas is ongoing at the NTS and the USGS offices in Denver, Colorado; Menlo Park, California; and Las Vegas, Nevada.

The NRC staff, in this report, addresses the effectiveness of the DOE/YMPO audit, and to a lesser extent, the adequacy and effectiveness of implementation of the USGS QA program.

2.0 OBJECTIVES

The objective of the DOE/YMPO audit was to determine the adequacy and effectiveness of implementation of the USGS QA program in meeting the applicable requirements of the Nevada Nuclear Waste Storage Investigations (NNWSI) Project Quality Assurance Plan NNWSI/88-9, Revision 4 (88-9 QA Plan) for the YMP. The NRC staff's objective was to gain confidence that DOE and USGS are properly implementing the requirements of their QA programs by evaluating the effectiveness of the DOE/YMPO audit, and by determining whether the USGS QA program is in accordance with the requirements of the 88-9 QA Plan, the USGS Quality Assurance Program Plan (QAPP) and 10 CFR Part 50, Appendix B.

3.0 SUMMARY AND CONCLUSIONS

The NRC staff based its evaluation of the DOE/YMPO audit process and the USGS QA program on direct observation of and discussions with the audit team and reviews of the pertinent audit information (e.g., audit plan, checklists and USGS documents).

The NRC staff found that, overall, DOE/YMPO Audit No. 90-03 of USGS was useful and effective. The programmatic and technical portions of the audit, including their subsequent integration, were effective. The audit team was well qualified in the QA and technical disciplines, and conducted the audit in a professional manner. The audit team's assignment and checklist items were adequately described in the audit plan. The audit team, in general, made an effective use of its checklists in determining the adequacy and effectiveness of implementation of the USGS QA program.

The audit was well organized with minimal logistic delays. The daily caucuses provided a good exchange of information between the programmatic and technical concerns of the auditors and observers. Concerns raised during the caucuses were adequately addressed during the following day. The Audit Team Leader was thorough in assuring complete understanding of any identified discrepancies to be able to adequately advise USGS management personnel during daily meetings. The audit process, including organization, performance, and reporting provided

appropriate information to adequately assess implementation of the USGS QAPP and associated procedures during USGS performance of YMP activities.

The NRC staff agrees with the DOE/YMPO audit team's preliminary findings that the USGS QA program, in general, has adequate implementation and, with the exception of one or two isolated cases, seems to be effective. The audit team concluded that the USGS QA program has improved considerably since the last audit, but still suffers from weaknesses in the area of records and the effectiveness of training. The NRC staff also agrees with the audit team's recommendations that the USGS management attention is needed to correct these program weaknesses, and that the USGS QA program should make more effective use of USGS internal audits and surveillances. The USGS personnel qualifications could not be evaluated due to the Privacy Act restrictions, which the USGS is attempting to resolve.

DOE must closely monitor the USGS QA program to ensure that future implementation is carried out in an acceptable manner. The NRC staff expects to observe this monitoring and may perform its own independent audit at a later date to determine the adequacy and effectiveness of the USGS QA program.

4.0 AUDIT PARTICIPANTS

4.1 NRC

Tilak Verma	Observer (Lead)
Kenneth Hooks	Observer
John Bradbury	Observer
Neil Coleman	Observer
Philip Justus	Observer
Keith McConnell	Observer
Thomas Trbovich	Observer (Center for Nuclear Waste Regulatory Analyses)

4.2 DOE

James Blaylock	Audit Manager	DOE/YMPO
Richard L. Maudlin	Audit Team Leader	MACTEC
D. Brown	Auditor-In-Training	CER
James E. Clark	Auditor	SAIC
Ed Cocoros	Auditor	MACTEC
Neil Cox	Auditor	SAIC
Kenneth Gilkerson	Auditor-In-Training	SAIC
Donald Harris	Auditor-In-Training	HARZA
Kenneth McFall	Auditor	SAIC
Mark Myer	Auditor-In-Training	CER
Charles Warren	Auditor	MACTEC
Richard Weeks	Auditor	SAIC
Thomas Higgins	Lead Tech. Specialist	SAIC
Paul Cloke	Technical Specialist	SAIC
April Gil	Technical Specialist-In-Training	SAIC

DOE

Bruce Hurley	Technical Specialist	SAIC
Keith Kersch	Technical Specialist	SAIC

4.3 State of Nevada

Susan Zimmerman	Observer

4.4 Clark County

E. Von Tiesenhausen	Observer

5.0 REVIEW OF THE AUDIT AND AUDITED ORGANIZATION

The DOE audit was conducted in accordance with procedures WMPO Quality Management Procedure (QMP) 18-01, "Audit System for the Waste Management Project Office," Revision 3, and WMPO QMP 16-03, "Standard Deficiency Reporting System," Revision 1. The NRC staff observation of the DOE/YMPO audit was based on the NRC procedure "Conduct of Observation Audits" issued October 6, 1989.

NRC staff observations are classified in accordance with the following guidelines:

(a) Level 1

Failure of the audit team to independently identify either:

- Flaws in completed and accepted work important to safety or waste isolation which renders the work unusable for its intended purpose. Denotes failure of the QA program to verify quality, or
- A breakdown in the QA program resulting in multiple examples of the same or similar significant deficiencies over an extended period of time in more than one work activity (technical area), or
- Multiple deficiencies of the same or similar significant deficiencies in a single work activity (technical area). Failure of the audit team to adequately assess a significant area of the QA program or its implementation, such as technical products, applicable 10 CFR Part 50, Appendix B criteria, or quality level classifications, without prior justification, such that the overall effectiveness of the QA program being audited is made indeterminate.

(b) Level 2

Failure of the audit team to independently identify an isolated significant deficiency.

(c) Level 3

Failure of the audit team to independently identify deficiencies that have minor significance, or failure of the audit team to follow applicable audit procedures.

Levels 1, 2, and 3 of NRC staff observations require a written response from DOE to be resolved.

The NRC staff findings may also include weaknesses (actions or items which are not deficiencies but could be improved), good practices (actions or items which enhance the QA program) and requests for information required to determine if an action or item is deficient. Written responses to weaknesses identified by the NRC staff will be requested when appropriate. In general, weaknesses and items related to requests for information will be examined by the NRC staff in future audits or surveillances.

5.1 Scope of Audit

The Audit Plan for Audit 90-03 stated that the scope of the audit was to verify the adequacy and effectiveness of implementation of the USGS QA program implementing procedures. In addition, implementation of corrective actions as provided in the responses to open YMPO Standard Deficiency Reports (SDRs) and Observations were evaluated and, if found satisfactory, were closed.

(a) Programmatic Elements

The programmatic portions of the audit utilized checklists based on the requirements in the 88-9 QA Plan and the USGS QAPP, YMP-USGS-QAPP-01, Revision 5. The checklists cover the QA program controls for fourteen of the eighteen 10 CFR Part 50, Appendix B criteria listed below:

1.0 Organization
2.0 Quality Assurance Program
3.0 Scientific Investigation and Design Control
4.0 Procurement Document Control
5.0 Instructions, Procedures, Plans, and Drawings
6.0 Document Control
7.0 Control of Purchased Items and Services
8.0 Identification and Control of Items, Samples, and Data
12.0 Control of Measuring and Test Equipment
13.0 Handling, Shipping, and Storage
15.0 Control of Nonconforming Items
16.0 Corrective Action
17.0 Quality Assurance Records
18.0 Audits

In addition, the programmatic controls for the USGS Software Configuration Management System (SCM) were reviewed as a part of the programmatic audit.

The following 10 CFR Part 50, Appendix B, criteria were not included in the scope of the USGS audit since they apply to engineered items which are outside the scope of the work done by USGS:

9.0 Control of Processes
10.0 Inspection
11.0 Test Control
14.0 Inspection, Test, and Operating Status

The NRC staff finds the programmatic scope of the audit acceptable in that it covered the applicable 10 CFR Part 50, Appendix B, criteria for which USGS has responsibility. These programmatic elements addressing the Appendix B criteria were found acceptable by the NRC staff in their review of the USGS QAPP (ref. Linehan/Stein letter dated June 20, 1989).

(b) Technical Areas

The DOE/YMPO technical team selected the following four technical activities for review and evaluation during the audit:

SITE CHARACTERIZATION PLAN (SCP) REFERENCE	TITLE
8.3.1.5.2.1	Characterization of Quaternary Regional Hydrology
Sub-activity (.3)	Evaluation of Past Discharge Areas
Sub-activity (.4)	Analog Recharge Studies
Sub-activity (.5)	Calcite and Opaline Silica Vein Deposits
8.3.1.2.2.7	Hydrochemical Characterization of the Unsaturated Zone
Sub-activity (.1)	Gaseous-Phase Chemical Investigations
Sub-activity (.2)	Aqueous-Phase Chemical Investigations
8.3.1.4.2.2	Characterization of Structural Features Within the Site Area
Sub-activity (.1)	Geologic Mapping of Zonal Features in the Paintbrush Tuff
Sub-activity (.2)	Surface-Fracture Network Studies
8.3.1.2.1.3	Characterization of the Regional Ground-Water Flow System
Sub-activity (.2)	Regional Potentiometric Level Distribution and Hydrologic Framework Studies
Sub-activity (.3)	Forty Mile Wash Recharge Study

These technical activities were selected by the audit team from a large number (185) of technical activities the USGS is conducting or planning to conduct for the YMP. The selection was based on a number of factors, such as ongoing work for the activity, availability of study plans and technical procedures, priority and importance of the activity, and whether the activity was included in DOE/YMPO Audit 89-04. NRC staff recommends that future DOE/YMPO audits of technical activities should include remote sites that are instrumented and have not been a subject of previous audits.

The technical checklists were developed from information contained in the USGS Study Plans (SPs), associated technical procedures, and the USGS monthly Project Status Reports.

The audit team technical specialists were instructed to review the following personnel and procedural-type elements common to all the technical (subject) areas:

- Technical qualifications of USGS Scientific Investigation Personnel (technical staff);
- USGS technical staff's understanding of technical and QA procedural requirements as they pertain to scientific investigation activities;
- Adequacy of technical procedures; and
- Development of SPs, work supporting the SCP, and any related work products.

The NRC staff finds the scope of the technical portion of this audit acceptable as it included a reasonable sample of important technical activities that are being conducted or being planned by the USGS for the YMP. However, the NRC staff noted that certain changes in the technical scope of the audit were made by the DOE/YMPO audit team, and the NRC staff was not informed of these changes until the start of the audit on the morning of June 25, 1990. The changes included the deletion of a technical activity, 8.3.1.2.2.7, "Hydrochemical Characterization of the Unsaturated Zone", and addition of another technical activity, 8.3.1.2.2.8, "Fluid Flow in Unsaturated, Fractured Rock", to the technical scope of the audit. These changes in the technical scope of the audit affected the preparedness of certain NRC technical staff, and to some extent, adversely impacted their participation as observers on this audit.

5.2 Timing of the Audit

The NRC staff believes the timing of the QA audit was reasonable. USGS has made a number of improvements in its QA program since the

last DOE/YMPO audit during August 1989. There was sufficient implementation of the programmatic and technical procedures for assessing the adequacy and effectiveness of the USGS QA program implementation under their QAPP-01, Revision 5.

5.3 Examination of Programmatic Elements

The NRC staff observed the audit team's evaluation of selected programmatic elements of the USGS QAPP. Only portions of some elements were observed; the details of program deficiencies identified by the DOE/YMPO audit team members which were not part of the portion observed will not be discussed in this report.

(a) Quality Assurance Program (Criterion 2)

The DOE/YMPO auditors attempted to review and evaluate the adequacy and effectiveness of the USGS YMP personnel qualification, experience, indoctrination, and training from the available records and from the interviews with the personnel and management. In general, it was not possible to review and evaluate USGS personnel qualifications due to limitations imposed by the Privacy Act. The USGS personnel stated that they are working to resolve these limitations, and hope to have a satisfactory system in place prior to 1991.

The qualification and training records of SAIC-Golden personnel acting as lead auditors or programmatic members of the audit and surveillance teams for both internal and external USGS audits were available, and were reviewed by the DOE/YMPO auditors and NRC observers. The records of USGS personnel who acted as technical specialists on these audits were not available for review, due to the Privacy Act, except for records of training given by SAIC-Golden personnel on USGS YMP procedures. The records of the SAIC-Golden personnel appeared to satisfy procedural requirements for experience and training and verification of qualifications.

The USGS YMP-specific training, on project procedures, is handled by SAIC-Golden personnel. This training has generally been classified as either orientation or indoctrination, and no lesson plans or examinations are required by the procedure. The records of all SAIC-Golden and USGS personnel who have taken this training are available in the SAIC-Golden files. Much of this training has consisted of requiring personnel to read procedures and attest that they have done so. While this system meets procedural requirements, its efficacy in training personnel to implement procedures is doubtful based on the findings of some other portions of this audit.

The USGS YMP management assessment for 1989 was not completed in February 1990 as required by YMP-USGS-QMP 2.01, Rev. 3, and this

deficiency was documented by the USGS in Nonconformance Report (NCR) 90-19 dated March 9, 1990. The draft management assessment for 1989 was being reviewed by USGS Headquarters at the time of the audit, and was not available for review by the DOE/YMPO auditors. The development and conclusions of the assessment were briefly discussed by the USGS manager who led the assessment team; it appears to the NRC observers that some of the conclusions (i.e., adequacy of the training program) in the draft assessment were not supported by the results of this audit.

The DOE/YMPO auditors were knowledgeable of the procedural requirements in this area, had prepared the checklists appropriately, and used the checklists to the extent possible.

In general, the adequacy of the USGS QA program for portions of this element and the effectiveness of its implementation could not be determined due to limitations imposed by the Privacy Act. Training on USGS YMP procedures appeared to be in compliance with procedural requirements, but its effectiveness was questionable due to problems identified on NCRs and Corrective Action Reports (CARs).

(b) Procurement Document Control, and Control of Purchased Items and Services (Criteria 4 and 7)

The DOE/YMPO auditors reviewing these areas used their checklist questions effectively in evaluating the adequacy and effectiveness of implementing YMP-USGS-QMP 4.01 and YMP-USGS-QMP 7.01. The auditors had an excellent knowledge of the USGS QAPP requirements and both of these procedures.

A selected sample of procurement documents was reviewed to check if the procedural requirements for appropriate reviews and signatures had been met. A potential problem with the acceptance of procured items, other than those requiring calibration, was identified by the auditors. A recent revision to YMP-USGS-QMP 7.01 (June 15, 1990) deleted the QA review requirements and incoming QA acceptance for commercial grade items. Since the revised procedure was somewhat vague on how these items are controlled, an Observation was initiated to cover this discrepancy.

The auditors were thorough in interviewing and evaluating the available information and concluded that the implementation of procedures under these two criteria was adequate and effective.

(c) Control of Measuring and Test Equipment (Criterion 12)

The DOE/YMPO auditors conducting the evaluation of this area were very knowledgeable of calibration requirements. The checklist was very thorough and covered USGS procedural requirements adequately.

The review began with a check of the Calibration Record List, where instruments were selected for later review in the various laboratories to assure proper application of calibration stickers. The Approved Vendors List and USGS Audit Reports were reviewed to assure proper qualification of calibration vendors. Calibration certifications were reviewed to assure compliance with procedure YMP-USGS-QMP-12.01, Revision 4 requirements.

An Observation was issued due to data required by procedure not being supplied by some calibration vendors. Also, Seismic Telemetry Stations at the NTS were noted as being overdue for calibration for two months. This was apparently due to the desert tortoise problem, and though calibration had been completed at the time of the audit, the NCRs were not available in Denver as required by the procedure. These NCRs were checked at the Yucca Mountain Site and were satisfactory.

A review of equipment in the USGS laboratories in Denver found the equipment to have current calibration stickers. In one lab, a balance was noted as having an NCR sticker attached even though the NCR had been closed one month earlier.

A review of equipment was also conducted at the USGS Geologic Division at Golden, Colorado, and no discrepancies were noted. The auditors also reviewed a number of pieces of equipments at the NTS on July 2 and 3, 1990 and found no discrepancies.

Based on the above, the DOE/YMPO audit team found that the Measuring and Test Equipment Program is adequate and being implemented effectively. The audit under this criterion was effective.

(d) Control of Nonconformance (Criterion 15)

The DOE/YMPO auditors used their audit checklist questions and reviewed NCRs to determine the adequacy and effectiveness of implementing the requirements under this criterion. The auditors reviewed YMP-USGS-QMP 15.01 to determine the adequacy of controls of non-conforming items. The USGS QA and technical personnel were interviewed to assess their knowledge of requirements under this criterion.

A potential problem was identified by the auditors in that the application of the YMP-USGS-QMP 15.01 is more suited to the hardware type of discrepancy rather than the process or programmatic type. The auditors discussed this further with the USGS personnel and decided that the problem was with the procedure and initiated an Observation. The audit, under this criterion, was effective.

(e) Corrective Action (Criterion 16)

The DOE/YMPO auditors reviewed selected CARs and used their audit checklist questions to assess the adequacy and effectveness of controls under this criterion. Their review was quite thorough and effective, and resulted in identification of some procedural deficiencies.

The DOE auditors also performed a review of SDRs and Observations which had been recently completed by the USGS to determine whether they could be closed. Some of the statements in the SDRs of the cause of the deficient condition and the corrective actions to be taken to prevent recurrence were determined by the auditors to be unclear, requiring further explanation and/or rewrite.

The auditors reviewed supporting documents related to the SDRs and Observations, and questioned the QA staff personnel when the documentation was unclear or incomplete. The DOE/YMPO auditor was knowledgeable in the requirements of the applicable YMPO procedures and performed a thorough review.

The implementation of the procedures under this criterion by the USGS was adequate and generally effective; however, more training on preparing clear statement of the deficient condition and the corrective action appears necessary to the NRC observers. The audit under this criterion was effective.

(f) Quality Assurance Records (Criterion 17)

The auditors randomly selected several record packages for activities affecting quality and reviewed these selected packages for compliance with the requirements under this criterion. The audit team identified procedural deficiencies in several of the record packages reviewed. At the request of other auditors, an extensive review of other record packages was conducted. Some of these packages also showed similar types of procedural deficiencies.

The auditors made effective use of their checklists in questioning the USGS personnel. The auditors concluded that the records area seemed to have adequate procedures, but they were not effectively implemented.

(g) Audits (Criterion 18)

USGS Audit Reports for both internal and external audits were reviewed by the DOE/YMPO auditors for evidence of implementation of USGS YMP audit procedures. The audit files contained the required audit plans, notification letters, checklists, and evidence of resolution of audit findings. In general, the audits appeared to be adequate and meet procedural requirements. Some question as to the effectiveness of the audits exists since the DOE/YMPO audit found pervasive problems in the areas of records and training which had not been identified through the USGS internal audits.

The audit team noted that USGS's internal audit 90-02, conducted January 8-22, 1990, did uncover similar discrepancies under Criteria 4, 7, and 12 that were discovered during the current DOE evaluation.

The DOE/YMPO auditors were well prepared and knowledgeable, and made good use of their checklists. An adequate evaluation was conducted in this area with minor discrepancies being noted and appropriate SDRs and Observations initiated. The USGS program appeared to comply with procedure requirements, but its effectiveness in identifying deficiencies in some areas was not demonstrated.

(h) Software Configuration Management System (SCM)

The DOE/YMPO auditors reviewed and evaluated the adequacy and effectiveness of the programmatic controls for the USGS SCM. The audit process and the evaluation were quite thorough. The auditors were effective and professional in using their checklists and questioning the USGS personnel.

The USGS personnel in this area seemed well qualified and knowledgeable about the requirements of the SCM. The auditors concluded that the implementation of procedures (YMP-USGS-QMP-3.03 and YMP-USGS-QMP-3.14) in this area is adequate and effective. No deficiencies were identified.

(i) Conclusions

(1) Audit Effectiveness

The programmatic portion of the audit of USGS was

conducted in an effective and professional manner. The DOE/YMPO audit team members had detailed and complete checklists covering their assigned areas and were able to complete all items. The auditors asked questions to ascertain complete understanding of the QA Program by USGS personnel, and when discrepancies were noted, recommendations were offered on ways to improve compliance.

(2) USGS QA Program

Major improvements were noted in the USGS QA Program as compared to earlier audit results. It was obvious that much effort had been applied to correcting previously noted DOE audit and surveillance concerns. However, concerns were noted on the effectiveness of the USGS training program for project personnel. It was apparent during the audit that USGS QA personnel had a complete understanding of their assigned implementation elements, but were somewhat unfamiliar with the requirements of the total QA Program. A discussion with the USGS QA Manager indicated he recognized the problem, and felt it was due to the loss, addition, and reassignment of QA personnel within a relatively short period of time. His reply indicated appropriate measures will be taken to correct this in the future.

Overall, USGS has developed and procedurally implemented a QA Program in compliance with the 88.9 QA Plan and the YMP-USGS-QAPP-01.

5.4 Examination of Technical Activities

The DOE/YMPO audit team technical specialists reviewed, to varying degrees, the technical areas listed below:

SCP REFERENCE	SUB-ACTIVITY	TITLE
8.3.1.4.2.2.		Characterization of Structural Features within the Site Area
	.1	Geologic Mapping of Zonal Features in the Paintbrush Tuff
	.2	Surface-Fracture Network Studies
8.3.1.2.1.3		Characterization of Regional Groundwater Flow System

SCP REFERENCE	SUB-ACTIVITY	TITLE
	.2	Regional Potentiometric Level Distribution and Hydrologic Framework Studies
	.3	Fortymile Wash Recharge Studies
8.3.1.5.2.1		Characterization of Quaternary Regional Hydrology
	.3	Evaluation of Past Discharge Areas
	.4	Analog Recharge Studies
	.5	Calcite and Opaline Silica Vein Deposits
8.3.1.2.2.8		Fluid Flow in Unsaturated, Fractured Rock
	.1	Development of Conceptual and Numerical Models of Fluid Flow in Unsaturated, Fractured Rock

The NRC staff reviewed copies of the first three SPs prior to the start of the audit. The fourth area "Fluid Flow in Unsaturated, Fractured Rock" was added to the list of technical activities reviewed during the audit. This activity was added in place of another activity; the NRC staff was not informed about the change prior to the start of the audit and did not receive any information about this activity for their review. A SP has not yet been developed for this activity.

The NRC staff observed the audit team's evaluation of selected areas. The DOE/YMPO technical specialists and auditors working together as a team were involved in most of the reviews observed by the NRC staff. Only portions of the examination of some technical activities were observed; the details of program deficiencies identified by the audit team members which were not part of the portion observed will not be discussed in this report.

(a) Characterization of Structural Features Within the Site Area (8.3.1.4.2.2)

The auditors and technical specialists made effective use of their technical checklists in interviewing the USGS technical and QA personnel associated with this activity. The team asked questions to assess the USGS personnel qualifications, experience and knowledge of the technical and QA requirements for these studies. The auditors and technical specialists appeared knowledgeable and well trained.

The team conducted an effective audit of this technical activity. The USGS technical personnel appeared well qualified to perform the work described in this SP; however, the implementation of QA and technical procedures within the context of this activity appeared inadequate. Specifically, QA procedures related to the control of one-of-a-kind documents and submission of data to the records center were not being implemented. In addition, the requirements in YMPO Administrative Procedure, AP-1.10 Q for "Interim Change Notices" to the SP are apparently not being implemented with respect to this activity. These procedural deficiencies were referred to the programmatic auditors for their evaluation and consideration for initiating SDRs and Observations as appropriate.

(b) Characterization of Regional Groundwater Flow System (8.3.1.2.1.3)

The technical specialists and auditors used their checklist effectively and interviewed USGS technical and QA personnel to determine the status of the work. The team was thorough in examining the reviews that had been performed on the draft of the SP for these activities. The whole process of comment resolution was examined, including file copies of the YMP-USGS Review/Comment Resolution Forms.

The auditors and technical specialists were well qualified and conducted an effective examination of this technical activity. The USGS technical personnel seemed well qualified and appeared knowledgeable about the QA requirements for this activity. The DOE/YMPO audit team concluded that the implementation of technical and QA procedures in this area appeared adequate and effective.

(c) Characterization of Quaternary Regional Hydrology (8.3.1.5.2.1)

The technical specialists and auditors utilized the SP, published reports and monthly status reports in their interviews. The audit team was knowledgeable and thorough, tracking data from conclusions back to inception and actual samples. They did not ask about the personal qualifications of the USGS staff specifically, but asked questions that enabled the audit team to conclude that the USGS investigators were competent.

The USGS reviewer comments and resolution were checked by the audit team. The comments were technical in nature, and were satisfactorily resolved and documented. The audit team concluded that the implementation of procedures for this activity was adequate and effective.

(d) Fluid Flow in Unsaturated, Fractured Rock (8.3.1.2.2.8)

The technical specialists discussed the scope and status of the work for this activity and questioned the Principal Investigator (PI) and other technical staff for their knowledge of the QA requirements and technical methodology for this type of work. A SP has not yet been prepared for this study. The DOE/YMPO technical specialists did not review any technical procedures or appear that well prepared and knowledgeable about the technical aspects of the work in this area. NRC staff noted that although the Scientific Investigation Procedures (SIPs) had been sent to the technical specialists, one of the team members had not had a chance to read them, and therefore, was not familiar with the work. Some of the questions by the technical specialists seemed unrelated to this portion of the audit.

The NRC staff found the technical audit for this activity to be less than effective, perhaps due to the late addition of this technical area to the scope of the audit and the degree of completion of the USGS efforts in this area.

(e) Conclusion

(1) Audit Effectiveness

In general, The technical portion of the audit was effective. The technical checklists (except for 5.4 (d)) were of sufficient detail and were completed during the audit. The audit team conducted the audit in a professional manner and generally asked questions to ascertain complete understanding of the technical program and applicable QA requirements by the USGS PIs and their staff. When discrepancies were noted, recommendations were offered on ways to improve compliance. The technical portion of the audit was less effective in the area of technical activities under 5.4 (d).

(2) USGS Technical Program

The USGS technical personnel appeared well qualified, and in general, had a good understanding of QA requirements in their areas of technical work.

5.5 Conduct of Audit

The audit team members were generally well prepared and demonstrated a sound knowledge of the QA and technical aspects of the USGS program.

The audit checklists included the important QA controls addressed in the 88-9 QA Plan that are applicable to USGS. In general, the audit

team used the checklists effectively in their interviews with USGS personnel and review of documents. The technical and programmatic portions of the audit were generally effective, and integration of the technical and programmatic portions of the audit was effective.

5.6 Qualification of Auditors

The qualifications of the QA auditors on the team were previously accepted by the NRC staff (ref. NRC Observation Audit Report for USGS dated August 22, 1988) or were acceptable based on QMP-02-02, the DOE procedure for qualifying auditors. In general, the technical specialists appeared knowledgeable in the technical areas which they reviewed and of the USGS QA Program requirements.

5.7 Audit Team Preparation

The QA auditors were generally well prepared in the areas they were assigned to audit and knowledgeable in the USGS QAPP and implementing procedures. The technical specialists, except in one area (5.4(d)), were familiar with the technical activities of the USGS as described in the SPs and monthly Project Status Reports. Audit Plan 90-03 overall was complete and included: (1) the audit scope; (2) a list of audit team personnel and observers; (3) a list of all the audit activities; (4) the audit notification letter; (5) the USGS QAPP and past audit report; and (6) the programmatic and technical checklists.

5.8 Audit Team Independence

The audit team members did not have prior responsibility for performing the activities they investigated. Members of the team had sufficient independence to carry out their assigned functions in a correct manner without adverse pressure or influence from the USGS personnel.

5.9 Review of Previous Audit Findings

(a) The previous audit identified four SDRs (415, 416, 417 and 418). All these SDRs have been closed as a result of implementation of USGS corrective actions.

(b) The NRC had no observations resulting from the August 1989 audit, and all NRC observations from previous audits were effectively resolved prior to the August 1989 audit.

(c) Based on discussions between the State of Nevada and NRC observers, the State of Nevada observations from previous audits appeared to have been resolved prior to this audit.

5.10 Summary of NRC Staff Findings

(a) Observations

The NRC staff did not identify any observations relating to deficiencies in either the DOE/YMPO audit process or the USGS QA program.

(b) Weaknesses

- Due to the "Privacy Act," the audit team was not able to review the personnel files of the technical and QA personnel to verify they were trained and qualified to perform quality-affecting activities.
- It appears to the NRC observers that some of the conclusions in the draft management assessment are not supported by the results of this audit.
- The USGS internal audit 90-02, conducted January 8 through 22, 1990, identified similar discrepancies under programmatic elements 4, 7 and 12 that were identified during this audit. This indicates possible weaknesses in corrective actions.
- One technical specialist did not seem to have reviewed the SIPs for one technical activity prior to the start of the audit.
- Technical procedures were not evaluated for their adequacy for one of the technical activities reviewed during this audit.

(c) Good Practices

- The USGS has assigned personnel experienced in QA to various technical groups to assist in the implementation of the QA program.
- Programmatic and technical portions of the audit were well integrated.
- SCM and implementing procedures are an excellent example of an effective implementation of the software QA program.

5.11 Summary - DOE/YMPO Audit Team Findings

During the course of the audit, the audit team identified approximately nine deficiencies in the USGS QA program and prepared draft SDRs for these deficiencies; some of these SDRs had multiple examples. The audit team concluded that the QA program implementation was adequate and

effective under Criteria 1, 3, 4, 5, 6, 7, 8, 12, 13, and 16, and was marginally effective under Criterion 18. Implementation is also adequate and effective for the software QA program. The three areas, where the implementation is adequate procedurally but not effective, are personnel training and their knowledge of the QA program (Criterion 2), control of nonconformances (Criterion 15), and QA records (Criterion 17).

A summary statement for the nine SDRs follows:

(a) Criteria letter was incomplete and did not provide applicable criteria, requirements, or applicable procedures for the field work to be performed by the NTS Contractors. This Criteria Letter was not submitted to the USGS QA Manager for review and signature prior to its being sent to the contractors.

(b) Record package GS.89.M.00025 contained illegible copies of aerial photos and field notebooks with illegible information.

(c) USGS QMP-17.01, Revision 3 fails to implement the 45 day transmittal requirement of data to the Local Records Center (LRC) as required by AP1.7Q.

(d) Audits are not being consistently implemented in accordance with USGS QMP-18.01, Revision 4.

(e) Conflicts in the content of a SP related to QA Level Assignment and procedure revisions were not corrected prior to sending it to the Project Office. A SP was sent to Project Office with reference to obsolete Technical Procedure.

(f) NCRs are not being processed in accordance with procedural requirements.

(g) CARs are not initiated to document recurring conditions.

(h) Discrepancies found in several records packages related to: eligibility, completeness, use of white out, lack of indexing parameters, table of contents did not list all records, and packages not forwarded to LRC within 10 days.

(i) LRC not adequately performing quality verification of records packages.

In addition to these deficiencies, the DOE/YMPO audit team also identified 11 Observations pretaining to the USGS program.

These are preliminary findings which will be further evaluated by the audit team and YMPO management prior to becoming final. These deficiencies and observations are not considered serious by the DOE/YMPO audit team, and if corrected in a timely manner, they should not adversely impact the quality of the USGS work for YMP.