

PROJECT OFFICE QUALITY ASSURANCE AUDIT REPORT FOR

THE YUCCA MOUNTAIN PROJECT OFFICE AUDIT OF

SANDIA NATIONAL LABORATORIES

AUDIT NO. 89-3

CONDUCTED: SEPTEMBER 11-20, 1989

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Audit Team Leader

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10/9/89

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Verification Department

Date:

10-9-89

Approved By:

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Edwin L. Wilmot, Acting Director  
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Yucca Mountain Project Office

Date:

10/10/89

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ENCLOSURE

## EXECUTIVE SUMMARY

PROJECT OFFICE AUDIT REPORT NO. 89-3

SANDIA NATIONAL LABORATORIES

ALBUQUERQUE, NEW MEXICO

SEPTEMBER 11 - 20, 1989

In the opinion of the Yucca Mountain Project Office (Project Office) audit team, the Sandia National Laboratories (SNL) Quality Assurance Program Plan (QAPP), Revision E, is adequate for the overall control of quality-related activities. SNL is permitted to proceed with these activities as applicable implementing procedures (i.e., Department Operating Procedures, Quality Assurance Procedures, Experiment Procedures, and Technical Procedures) are prepared and are approved as adequate for the control of SNL activities.

It should be noted that the SNL Software Quality Assurance Plan (SQAP) has not been approved by the Project Office. Therefore, the audit team was unable to verify that the SNL QA program, for software QA, meets the provisions of the Yucca Mountain Project QA plan (QAP), NNWSI/88-9, Revision 2.

The effectiveness of the SNL QA program cannot be determined at this time due to incomplete/unapproved implementing study plans and the limited quantity of technical products issued since the approval of SNL QAPP, Revision E.

As a result of this audit, sixteen Standard Deficiency Reports (SDRs) were issued: fourteen to SNL and two to the Project Office. A total of eight observations were issued to SNL during the course of the audit. It should be noted that during the course of the audit, SNL was able to correct nine concerns identified by the auditors. The nine concerns and the actions taken to correct them are described in this report.

It was apparent to the audit team that a great deal of time and effort had been expended by SNL to bring their QA program in compliance with Yucca Mountain Project requirements. SNL is to be commended for the effort that was put forth during the audit to accommodate the audit team. Of particular note is the amount of time and effort expended by SNL personnel to correct potential deficiencies and observations identified during the audit.

## 1.0 INTRODUCTION

This report contains the results of a QA audit of SNL Yucca Mountain Project activities. The audit was conducted at the SNL facilities in Albuquerque, New Mexico, September 11-20, 1989. The audit was conducted in accordance with the requirements of QMP-18-01, Revision 3, Audit System for the Waste Management Project Office. The QA program requirements to be verified were taken from the QAP NNWSI/88-9, Revision 2.

## 2.0 AUDIT SCOPE

The following program elements were audited to assess compliance with NNWSI/88-9, Revision 2, and SNL QAPP, Revision E.

- 1.0 Organization
- 2.0 Quality Assurance Program
- 3.0 Scientific Investigation Control 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
- 10.0 Inspection
- 11.0 Test Control
- 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

The following programmatic elements described in the SNL QAPP were reviewed prior to the audit and found to be not applicable to the activities assigned to SNL at this time:

- 9.0 Control of Processes
- 14.0 Inspection, Test and Operating Status

## 2.0 AUDIT SCOPE (CONTINUED)

The scope of this audit also included a review of the following technical activities:

| <u>WBS Element</u> | <u>Title</u>  |
|--------------------|---|
| 1.2.1.3.1          | Site & Engineering Properties Database                |
| 1.2.1.3.2          | Interactive Graphics Information System               |
| 1.2.1.3.3          | Reference Information Base                            |
| 1.2.1.4.2          | Radionuclide Source Term                              |
| 1.2.3.2.1.2.2      | Site Faulting Potential (Midway Valley)               |
| 1.2.4.1.2          | Basis for Design                                      |
| 1.2.4.2.1.1        | Rock Mass Analysis                                    |
| 1.2.4.2.1.3        | Laboratory Properties                                 |
| 1.2.4.2.1.5.2      | ESF Geomechanical Test                                |
| 1.2.4.2.2.1        | Equipment Engineering (SAND88-3073)                   |
| 1.2.4.3.3          | Shafts/Ramps  |
| 1.2.4.6.1          | Repository Performance Code Development/Certification |
| 1.2.6.1.1          | ESF Management, Planning, and Design                  |

The following technical activity was added to the audit scope during the audit:

|           |                             |
|-----------|-----------------------------|
| 1.2.4.3.7 | Seismic UNE Design Analysis |
|-----------|-----------------------------|

## 3.0 AUDIT TEAM PERSONNEL

|                    |                           |
|--------------------|---------------------------|
| Stephen R. Dana    | Audit Team Leader         |
| John Friend        | Auditor                   |
| Stephen Hans       | Auditor                   |
| Amelia Arceo       | Auditor                   |
| Sidney L. Crawford | Auditor                   |
| Jerry Heaney       | Auditor                   |
| James Blaylock     | Auditor/Audit Manager     |
| Robert Nilsson     | Auditor-In-Training       |
| Dwayne Chesnut     | Lead Technical Specialist |

3.0 AUDIT TEAM PERSONNEL (CONTINUED)

|                  |   |
|------------------|---|
| Forrest Peters   | Technical Specialist                    |
| Martha Mitchell  | Technical Specialist                    |
| Russ Dwyer       | Technical Specialist                    |
| Paul Cloke       | Technical Specialist                    |
| William Sublette | Technical Specialist                    |
| Larry Lamonica   | Technical Specialist                    |
| Barry Dial       | Technical Specialist                    |
| Bob Saunders     | Technical Specialist                    |
| Gary Faust       | Observer, DOE/HQ                        |
| Gregory Rolbin   | Observer, DOE/HQ                        |
| Kenneth Hooks    | Observer, (Lead) NRC                    |
| John Peshel      | Observer, NRC                           |
| Keith McConnell  | Observer, NRC                           |
| James Conway     | Observer, NRC                           |
| John Gilray      | Observer, NRC                           |
| Bob Engelhardt   | Observer, NRC                           |
| Susan Zimmerman  | Observer, State of Nevada               |
| Edwin Wilmot     | Observer, YMP                           |
| Gene Rodriguez   | Observer, YMP                           |
| Joe Caldwell     | Observer, YMP                           |
| Tom Bosworth     | Observer, Albuquerque Operations Office |
| Dale Hedges      | Observer, SAIC                          |
| Bruce Hurley     | Observer, SAIC                          |

#### 4.0 SUMMARY OF AUDIT RESULTS

##### 4.1 STATEMENT OF PROGRAM EFFECTIVENESS

In the opinion of the Project Office audit team, the effectiveness of the QA program at SNL cannot be determined at this time. Until sufficient objective evidence has been generated to demonstrate technical adequacy and program implementation, the effectiveness will remain indeterminate.

Based on the results of the audit, the SNL QA program is judged to be adequate to support the initiation of QA Level I and II activities. This is based upon the fact that staffing appears to be adequate (except as noted below), training is satisfactory, most required upper tier procedures currently required are in place, there are no major outstanding deficiencies, and the SNL QAPP, Revision E, is adequate for the overall control of quality related activities. However, specific areas of the SNL QA program were identified by the audit team as weak and require actions by SNL to assure effective program implementation. These areas are:

1. Position descriptions.
2. QA review of technical procedures.
3. Surveillances. The number of personnel dedicated to this area should be increased to assure coverage of all required activities. In addition, technical input on surveillances appeared to be limited and should be increased.
4. Organization. In order for the QA Coordinator to effectively manage the overall SNL QA organization, those individuals (QA personnel) responsible for verifying the adequacy of the SNL QA program should report directly to the QA Coordinator.

##### 4.2 SUMMARY OF TECHNICAL ACTIVITIES

The technical specialists interviewed principal investigators and members of the SNL scientific and engineering staff, and examined samples of various documents to assess the technical adequacy of the implementing plans and procedures for meeting the requirements of the Yucca Mountain Project QAP NWSI/88-9, Revision 2. Because SNL QAPP, Revision E, was approved only a short time before the audit, little actual technical work has been conducted under this plan. Accordingly, the specialists relied upon examination of work conducted earlier (including some QA Level III as well as ongoing activities intended to be used in licensing) to determine how the SNL staff approach the definition and solution of technical problems, how commensurate their qualifications are with their responsibilities, and how well their normal practices (such as traceable documentation of daily work) provide the basis for a good QA program.

#### 4.2 SUMMARY OF TECHNICAL ACTIVITIES (CONTINUED)

In summary, the SNL staff (interviewed during the audit) is competent and appears to be highly motivated to produce good quality technical work. The staff appears to be adequately trained in and cognizant of the QA process and the relevant procedural requirements which govern their activities. All the necessary elements appear to be in place to provide effective QA, but actual effectiveness must be verified after a few months of working under SNL QAPP, Revision E.

#### 4.3 SUMMARY OF FINDINGS

A total of sixteen Standard Deficiency Reports (SDRs) were generated as a result of this audit. Information copies of these SDRs are included in Enclosure 3. Fourteen SDRs were issued to SNL and two (SDRs 442 and 443) to the Project Office. Eight Observations were also issued to SNL. A synopsis of SDRs and Observations is discussed in Section 6 of this report. This synopsis also includes nine concerns that were corrected during the course of the audit.

#### 5.0 AUDIT MEETINGS

##### 5.1 PRE-AUDIT CONFERENCE

A pre-audit conference was held with the SNL Technical Project Officer (TPO) and his staff at 10:00 a.m. on September 11, 1989. The purpose, scope, and proposed agenda for the audit were presented and the audit team was introduced. A list of attendees is provided in Enclosure 1.

##### 5.2 PERSONS CONTACTED DURING THE AUDIT

See Enclosure 1.

##### 5.3 POST-AUDIT CONFERENCE

The post-audit conference was held at 2:00 p.m. on September 15, 1989 at SNL in Albuquerque, New Mexico. A synopsis of the preliminary SDRs and observations identified during the course of the audit was presented to the TPO and his staff. Audit of Work Breakdown Structure (WBS) element 1.2.1.3.2 was not completed prior to the post-audit conference; therefore, a separate post-audit conference was held at 2:00 p.m. on September 20, 1989 to discuss results of this technical element. A list of those attending both post-audit conferences is provided in Enclosure 1.

#### 5.4 AUDIT STATUS MEETINGS

Audit status meetings were held with the SNL TPO and his key staff at 9:00 a.m. each day of the audit. A status of how the audit was progressing and identification of deficiencies and observations were discussed.

#### 6.0 SYNOPSIS OF SDRs, OBSERVATIONS, AND CONCERNS CORRECTED DURING THE AUDIT

##### 6.1 STANDARD DEFICIENCY REPORTS

- |             |   |
|-------------|---|
| SDR No. 430 | SNL has not forwarded to the T&MSS Project QA Department (QA Verification Division Manager) copies of 1989 purchase order documents (e.g., Geomatrix - P.O. 75-4350, JFT AGAPITO - P.O. 420096).  |
| SDR No. 431 | SNL procedure DOP 2-6, Revision C, does not adequately establish minimum education and minimum experience requirements. Therefore, a determination cannot be made on whether SNL certification of personnel qualifications are correct.   |
| SDR No. 432 | The QA Coordinator's current basis for scheduling Audits and Surveillances is not based on the schedule of performance of activities as required by SNL procedure QAP 10-1. Additionally, the QA Coordinator does not have access to schedules of project activities in order to schedule surveillance activities in a timely manner.   |
| SDR No. 433 | Fifteen of the thirty-nine SDRs reviewed disclosed that the determination as to whether the SDR should be elevated to a Corrective Action Report (CAR) was made prior to obtaining enough information to make a proper decision.  |
| SDR No. 434 | A partial review of SNL procedures disclosed that several procedures did not contain adequate QA record sections.   |
| SDR No. 435 | Calibration certifications of equipment or devices used on work performed by SNL 7111 Division do not contain the requirements stated in SNL DOP 12-1. Additionally, these records are QA records as stated by SNL personnel; however, they have neither been filed in the SNL Records Management System nor authenticated as required. |



6.1 STANDARD DEFICIENCY REPORTS (CONTINUED)

- SDR No. 436 SNL could not provide objective evidence to demonstrate that technical procedures (TPs) have been reviewed and approved by QA to assure that they implement the requirements stated in the SNL QAPP, Revision E, and DOP 5-2.
- SDR No. 437 DOP 8-2 required a semiannual check of the samples in the Samples Library by the Samples Library Manager or his assistant. The procedure also required an inventory of samples during the semiannual check. The semiannual check of the Samples Library by the Samples Library Manager was not conducted nor was an inventory list of the Samples Library performed.
- SDR No. 438 The cross references in the Interactive Graphics Information System (IGIS) Reference and Product Logs are not accurate. Many cross references are questionable based on descriptive titles. The discrepancies occur principally in the 1985-1987 time frame, but current work (Product Log) is accessing Reference Log files in that time interval. As a result, some Level I IGIS products cannot be fully traced to the original source data.
- SDR No. 439 Design Investigation Memo (DIM) 205, Revision B, dated 3/15/89, Waste Emplacement Orientation Review (QL II), was not approved by the QA Coordinator. No additional examples of the discrepancy were noted in the review of eleven other DIMs.
- SDR No. 440 Some records were not transmitted to the Local Records Center (LRC) and the Central Records Facility (CRF) within 10 working days as required by AP-1.7Q.
- SDR No. 441 A review of SNL QA Level I procurement documents disclosed that the "Right of Access" clause has not been a part of the documentation. SNL uses a "Standard Lab Terms and Conditions Attachment" for all Purchase Requisition/Change Requisitions (PR/CRs) which addresses audits of financial records. Additionally, none of the PR/CRs reviewed contained a nonconformance requirements section. However, supplier audits have been performed and there is no apparent effect on quality involving Purchase Orders (POs).

6.1 STANDARD DEFICIENCY REPORTS (CONTINUED)

SDR No. 442 SNL work plans were submitted to the Project Office for approval. The work plans were disapproved by the Project Office; however, the letter disapproving the work plans directed SNL to proceed with work to the unapproved work plans.

SDR No. 443 The Project Office has not established procedures for the control of the QA Level II activity associated with the generation of the document, SAND 88-3073, Waste Package Emplacement Orientation Recommendation.

In addition, the activity records and document did not identify and document assumptions used in the analysis, or indicate the quality level of the data used in the analysis.

SDR No. 444 SNL QA functions are performed by the QA Coordinator and other QA personnel; however, the QA personnel are not managed by the QA Coordinator since they report directly to the TPO. Furthermore, there was no QA organizational chart that delineates the reporting relationship between the QA Coordinator and QA personnel.

SDR No. 445 The activity which produced IGIS products CALO342 and CALO343 under WBS element 1.2.1.3.2.S were assigned a QA Level of I, but the sources of the data used to produce these products and the QA levels of the activities which produced that data were not identified, even though these products have not been released for use.

In addition, Reference Information Base (RIB) item 1.2.9, of Version 4 (RIB Control Number DR-22) states that the items were produced under WBS element 1.2.4.2.1.1.S as a QA Level I activity. This is incorrect, because these IGIS products were produced from an activity at the IGIS under WBS element 1.2.1.3.2.S, which was assigned a QA Level of III.

## 6.2 OBSERVATIONS

1. There are a number of minor inconsistencies between SNL's DOP 3-7 and DOP 3-11, and between these procedures and YMP AP-5.2Q, including differences in the Data Authorization Forms.
2. It was determined that in the activity reported in SAND 88-3073, Waste Package Emplacement Orientation Recommendation, that panel participants made comments that were not identifiable as assumptions, judgments, or facts traceable to other documents.
3. It was observed that there was an inadequate amount of documentation providing traceability from the RIB back through the source documents. This was noted in work breakdown activities that provide rock mechanics information for the RIB, specifically, WBS 1.2.4.2.1.3, Laboratory Properties and WBS 1.2.4.2.1.1, Rock Mass Analysis.

Data from the RIB's "Intact Rock Mechanical Properties" which was developed from the Laboratory Properties (WBS 1.2.4.2.1.3) was not adequately traceable through its source documents. Three source documents were checked for the traceability of the mechanical properties: Young's modulus, Poisson's ratio, and unconfined compressive strength. These sources included a data analysis memorandum from Rutherford to Nimick, June 29, 1988 (71/124213/33/Q2), a data report document (SAND83-1646), and a data set from the Data Records Management System (51/L02-02/11/83) Volumes I & II. Various samples were checked, but samples GU3-760.9/2A and G4-749.0/B were checked in detail.

4. During the audit process of checking the traceability of "Intact Rock Mechanical Properties" from the RIB back through their source documents, it was observed that in certain instances there was no reference to the experimental or test procedures that were used. This was noted during the checking of Data Set 51/L02/02/11/83 Volumes I & II, data report document SAND83-1646, and data analysis memorandum (Rutherford to Nimick, 1988). SNL personnel indicated that the only laboratory testing procedures that were in effect at that time were the SNL Safe Operating Procedures (SOPs).

## 6.2 OBSERVATIONS (CONTINUED)

5. It was observed that no standard procedure exists for pre-test and post-test characterization of the core. This type of information is very important when analyzing and compiling the test results. Good pre-test and post-test characterization of the tested samples will improve the documentation process for accepting or rejecting test results from certain samples during the data compilation process.
6. It was noted during the checking of the traceability of the RIB's "Rock Mass Failure" section, that there was a questionable selection of unconfined and confined intact rock strength data used in the development of the rock mass strength criterion for TSw2. The development of the rock mass strength criterion is presented in the following source documents: PDM 75-07, dated 8/31/87, "Empirical Analyses of Rock Mass Strength", and a memorandum from Ehgartner to Distribution, dated 9/24/87, "Empirical Rock Mass Strength Criteria."

The intact rock strength data used in developing the rock mass strength criterion came from a limited source of data with no consideration of the effects of porosity on this data. Another strength relationship in the reference source document (Nimick and Schwartz, 1987) includes the effects of porosity on compressive strength.

7. While auditing Laboratory Properties (WBS 1.2.4.2.1.3), it was noted that heated shrinkage tubes were used to envelop samples during unconfined compression tests. The purpose of using (the heated shrinkage tubes in the unconfined tests was to maintain a saturated condition in the sample during the test. This is not a common practice when performing unconfined compression tests and is not a part of the procedures recommended in American Society Testing and Materials (ASTM) or the International Society of Rock Mechanics Recommended Procedures.
8. SNL should strengthen the provisions for tracking errors, omissions, and changes to data within the Site and Engineering Properties Data Base (SEPDB) and IGIS. Those people who have received data products associated with those errors, omissions, and changes, and the originators of the data (if this is appropriate) should receive notification of such errors, omissions and changes.

### 6.3 CONCERNS CORRECTED DURING THE AUDIT

1. The SNL Program did not incorporate YMP System Engineering Management Plan (SEMP) requirements for the generation of system study reports (refer to the SEMP, Revision 0, para. 5.2.8). During the course of the audit, SNL corrected this situation by revising the following SNL procedures to incorporate the requirements:

- o DOP 3-3, "Analysis Definition Requirements", Revision C, ICN No. 1; and
- o DOP 3-4, "Design Investigation Control", Revision D, ICN No. 2.

In addition, SNL revised the following DIMs related to the generation of system study reports for incorporation of these requirements: DIM Nos. 43, 54, 102, 130, 132, 134, 135, and 205.

2. During a review of DIMs for WBS element 1.2.4.1.2 (Basis for Design) it was determined that explicit traceability to the DIM under which a drawing was produced was not provided. SNL corrected this situation by revising the following procedure:
  - o DOP 3-1, "Preparing, Reviewing, Approving, and Issuing Engineering Drawings", Revision D, ICN No. 1.
3. During a review of DOPs 3-13 and 6-2, the auditor found that the procedures contain two different versions of the same form (Document Review and Comment Form). In addition, the form in DOP 6-2, was missing the "Reviewer" signature line. SNL corrected this situation by revising the following procedures:
  - o DOP 3-13, "Independent Technical and Management Reviews of Documents", Revision B, ICN No. 1; and
  - o DOP 6-2, "Reviewing, Approving, and Issuing Technical Information Documents", Revision B, ICN No. 1.
4. During a review of DOP 6-2, the auditor found that the "Technical Publication Checklist" provided for initialing of the form by the 6310 editor but not the division supervisor. SNL corrected this situation by revising the following procedure:
  - o DOP 6-2, "Reviewing, Approving, and Issuing Technical Information Documents", Revision B, ICN No. 1.

### 6.3 CONCERNS CORRECTED DURING THE AUDIT (CONTINUED)

5. During a review of QAP 10-1, the auditor found that surveillance checklists are not listed as QA records. SNL corrected this situation by revising the following procedure:
  - o QAP 10-1, "Surveillance", Revision B, ICN No. 1. 6.
6. While assessing organizational interface identification, the auditor identified that SNL needed to emphasize that site characterization activities will also require interface interactions. SNL corrected this situation by revising the following procedures:
  - o DOP 3-16, "Interface Interaction", Revision A, ICN No. 2; and
  - o DOP 11-1, "Experiment and Equipment-Test Procedure Requirements", Revision E, ICN No. 2.
7. During a review of DOP 6-1, the auditor found that the procedure did not address Experiment Procedures (EPs) as controlled implementing procedures. SNL corrected this situation by revising the following procedure:
  - o DOP 6-1, "Document Control System", Revision C, ICN No. 1.8.
8. DOP 11-1, Revision D, historical file (document review comment sheets and a copy of the procedure) were found missing. Research by the auditor found that the revision was not issued, and DOP 11-1 went from Revision C to Revision E. SNL documented this situation by issuing Deviation Report (DR) No. 89-40 (dated 9/15/89).
9. Four Task Leaders failed to submit to the LRC a list of records generated or to be generated as a result of project activities. The four Task Leaders submitted the required list on 9/14/89 and the LRC processed the records package for transmittal to the CRF on 9/15/89.

### 7.0 RECOMMENDED ACTION

A written response is required for each SDR delineated in Section 6.0. Responses to each SDR are due within 20 working days from the date of the SDR transmittal letter. Upon response, acceptance, and satisfactory verification of all remedial and corrective actions, the SDRs will be closed and SNL will be notified by letter of closure. A written response is required for the Observations contained in Enclosure 2 of this report. Responses are due within 20 working days from the date of the transmittal letter of this report.

ENCLOSURE 1

SANDIA NATIONAL LABORATORIES  
89-3 AUDIT ROSTER

| <u>NAME</u>          | <u>ORGANIZATION</u> | <u>TITLE</u>         | <u>PRE-<br/>AUDIT</u> | <u>CONTACTED<br/>DURING<br/>AUDIT</u> | <u>POST<br/>AUDIT</u> |
|----------------------|---------------------|----------------------|-----------------------|---------------------------------------|-----------------------|
| Adams, Paula F.      | AMI/SNL             | Support Staff        | X                     | X                                     | X                     |
| Arceo, Amelia I.     | SAIC                | Auditor              | X                     |                                       | X                     |
| Bauer, Stephen J.    | SNL                 | MTS                  | X                     | X                                     | X                     |
| Bingham, Felton      | SNL                 | Supervisor           | X                     | X                                     | X                     |
| Blankenship, Douglas | SNL                 | MTS                  | X                     | X                                     | X                     |
| Blaylock, James      | DOE/YMP             | Audit Manager        | X                     | X                                     | XX                    |
| Blejwas, Thomas E.   | SNL                 | MTS Division Spvr.   | X                     | X                                     | X                     |
| Bosworth, Tom        | OQD/DOE             | Observer             | X                     |                                       | X                     |
| Brockman, Dorothy    | SNL                 | Financial Coord      | X                     |                                       | X                     |
| Caldwell, J. R.      | MACTEC              | Observer             |                       |                                       | X                     |
| Chesnut, Dwayne A.   | SAIC                | Lead Technical Spec. | X                     |                                       | X                     |
| Cloke, Paul L.       | SAIC                | Technical Specialist | X                     |                                       | X                     |
| Conway, J. T.        | NRC                 | Observer             | X                     |                                       |                       |
| Costin, Laurence S.  | SNL                 | TA                   |                       | X                                     | X                     |
| Crawford, Sidney L.  | SAIC                | Auditor              | X                     |                                       |                       |
| Dana, Stephen R.     | SAIC                | ATL                  | X                     |                                       | XX                    |
| Davis, Allison       | SNL                 | TA                   |                       | X                                     | X                     |
| Dial, Barry W.       | SAIC/SF             | Technical Specialist | X                     |                                       |                       |
| Diaz, Mario R.       | DOE/YMP             | Auditor              |                       |                                       | X                     |
| Dyer, J. Russell     | DOE/YMP             | Technical Specialist |                       | X                                     |                       |
| Eley, David          | SNL                 | TA                   | X                     | X                                     |                       |
| Engelhardt, R. E.    | NRC/SWRI            | Observer             | X                     |                                       |                       |
| Faust, Gary          | DOE/HQ/WESTON       | Observer             | X                     |                                       | X                     |
| Fernandez, Joseph A. | SNL                 | MTS                  |                       | X                                     | X                     |
| Finley, Ray E.       | SNL                 | MTS                  |                       | X                                     | X                     |
| Friend, John C.      | SAIC                | Auditor              | X                     |                                       | X                     |
| George, James T.     | SNL                 | TA                   | X                     | X                                     |                       |
| Gibson, Duane        | SNL                 | MTS                  | X                     | X                                     | X                     |
| Gilray, John         | NRC                 | Observer             | X                     |                                       |                       |
| Gruer, Earl R.       | SNL                 | Cost Estimate Engr.  | X                     | X                                     | X                     |
| Hans, Stephen R.     | SAIC                | Auditor              | X                     |                                       | X                     |
| Hansen, Frank        | SNL                 | MTS                  | X                     | X                                     | X                     |
| Heaney, Jerry        | SAIC                | Auditor              | X                     |                                       | X                     |
| Hedges, Dale         | SAIC                | Observer             |                       |                                       | X                     |
| Hill, Roger          | SNL                 | TSA                  | X                     | X                                     | X                     |
| Hinkebein, Thomas E. | SNL                 | MTS                  | X                     | X                                     | X                     |
| Hooks, Ken           | NRC                 | Observer             | X                     |                                       | X                     |
| Hunter, Tom          | SNL                 | Department Manager   | X                     | X                                     | XX                    |
| Hurley, Bill         | SAIC                | Observer             | X                     |                                       |                       |



SANDIA NATIONAL LABORATORIES  
89-3 AUDIT ROSTER

| <u>NAME</u>          | <u>ORGANIZATION</u> | <u>TITLE</u>         | <u>PRE-<br/>AUDIT</u> | <u>CONTACTED<br/>DURING<br/>AUDIT</u> | <u>POST<br/>AUDIT</u> |
|----------------------|---------------------|----------------------|-----------------------|---------------------------------------|-----------------------|
| Kerl, Felicia A.     | LATA                | Staff Engineer       | X                     | X                                     |                       |
| Klamerus, Leo        | SNL                 | MTS                  | X                     | X                                     | X                     |
| Krebs-Jespersion, M. | SNL                 | SEPDA-DBA            | X                     | X                                     |                       |
| LaMonica, Larry      | SAIC                | Technical Specialist | X                     |                                       |                       |
| Langkopf, Brenda     | SNL                 | MTS                  |                       | X                                     | X                     |
| Lizut, Roger         | SNL                 | MTS                  |                       | X                                     | X                     |
| Luke, Barbara        | SNL                 | Mbr. Technical Staff | X                     | X                                     | X                     |
| McConnell, K.        | NRC                 | Observer             | X                     |                                       |                       |
| Miller, Warren       | SNL                 | STA                  |                       |                                       | X                     |
| Mitchel, Martha J.   | SAIC                | Technical Specialist | X                     |                                       | X                     |
| Morales, Arthur R.   | SNL                 | MLS                  | X                     | X                                     | X                     |
| Nilsson, Robert M.   | CER                 | Auditor-in-Training  | X                     |                                       | X                     |
| Nimick, Fran         | SNL                 | MTS                  |                       | X                                     | X                     |
| Peshel, J.           | NRC                 | Observer             | X                     |                                       | X                     |
| Peters, Forrest D.   | SAIC                | Technical Specialist | X                     |                                       | XX                    |
| Peterson, Andrew C.  | SNL                 | MTS/TL               | X                     | X                                     | X                     |
| Price, Ronald H.     | SNL                 | MTS                  | X                     | X                                     | X                     |
| Richards, R. R.      | SNL                 | QA Coordinator       | X                     | X                                     | X                     |
| Robb, R. M.          | LATA                | Mining Engineer      | X                     | X                                     | X                     |
| Rodriguez, Gene      | DOE/YMP             | Observer             | X                     |                                       | X                     |
| Rolbin, Gregory      | DOE/HQ/WESTON       | Observer             | X                     |                                       |                       |
| Sandoval, Robert P.  | SNL                 | Supervisor           | X                     | X                                     | X                     |
| Saunders, Robert     | Westinghouse        | Technical Specialist | X                     |                                       | X                     |
| Sharpton, Sarah      | SNL                 | MLS                  |                       | X                                     | X                     |
| Shephard, L. E.      | SNL                 | Supervisor           | X                     | X                                     | XX                    |
| Smit, Gene           | SNL                 | QA                   | X                     | X                                     | X                     |
| Stevens, Aldred L.   | SNL                 | Supervisor           | X                     | X                                     | XX                    |
| Stinebaugh, Robert   | SNL                 | MTS                  |                       | X                                     |                       |
| Sublette, Bill       | SAIC                | Technical Specialist | X                     |                                       | X                     |
| Tang, Mary A.        | SNL                 | SNL Training Mgr.    | X                     | X                                     | X                     |
| Tillerson, Joe R.    | SNL                 | Supervisor           |                       | X                                     | X                     |
| Tillery, Patricia M. | LATA                | Contractor-Engr      | X                     | X                                     | X                     |
| Voigt, James V.      | MACTEC              | QA Engineer          | X                     | X                                     | X                     |
| Wavrik, R. W.        | SNL                 | Task Leader          | X                     | X                                     | X                     |
| Yarrington, Lane     | SNL                 | MTS                  | X                     | X                                     | X                     |
| Young, Bennett H.    | MSD/DOE             | Hydrologist          | X                     |                                       |                       |
| Zimmerman, Susan     | State of NV         | QA Manager           | X                     |                                       | X                     |

NOTE: XX identifies attendance at Post-Audit meetings on 9/15/89 and 9/20/89.

**ENCLOSURE 2**

**YUCCA MOUNTAIN PROJECT OFFICE**  
**<sup>1</sup>YMPO OBSERVATION NO. 89-3-01**

N-QA-012  
4/89

|  |   |  |   |  |   |                              |   |
|--|---|--|---|--|---|------------------------------|---|
| <b>Completed by Originating Organization</b> | <b><sup>2</sup>Noted During:</b> Audit 89-3 (SNL)   |  | <b><sup>3</sup>Identified By:</b> F.D. Peters                 |  | <b><sup>4</sup>Date:</b><br>9/14/89   |                              |   |
|  | <b><sup>5</sup>Organization:</b> SNL  |  | <b><sup>6</sup>Person(s) Contacted:</b> M. Kreb-Jespersion    |  | <b><sup>7</sup>Response Due Date</b> is 20 Days from Date of Transmittal                      |                              |   |
|  | <b><sup>8</sup>Discussion:</b><br>There are a number of minor inconsistencies between SNL's DOP 3-7 and DOP 3-11, and between these procedures and YMP AP-5.2Q, including differences in the Data Authorization Forms. SNL should review these procedures and make their procedures consistent with each other. If SNL feels that YMP AP-5.2Q should be modified, then they should notify the Yucca Mountain Project Office with thier recommended changes. |  |   |  |   |                              |   |
|  | <b><sup>9</sup>QAE/Lead Auditor</b><br><div style="text-align: center;"><i>S. Dana</i></div>  |  | <b>Date</b><br><div style="text-align: center;">10/5/89</div> |  | <b><sup>10</sup>Branch Manager</b><br><div style="text-align: center;"><i>Pat McGee</i></div> |                              | <b>Date</b><br><div style="text-align: center;">10-5-89</div> |
| <b>Completed by Respondee</b>                | <b><sup>11</sup>Response:</b>   |  |   |  |   |                              |   |
|  |   |  |   |  |   |                              |   |
|  | <b><sup>12</sup>Signature:</b>  |  |   |  |   | <b>Date:</b>                 |   |
| <b>Completed by QA Org.</b>                  | <b><sup>13</sup>Response Receipt Acceptable</b> <input type="checkbox"/>  |  |   |  |   |                              |   |
|  | <b>Initiator</b>  |  | <b>Date</b>   |  | <b>QA/Lead Auditor</b>  |                              | <b>Date</b>   |
|  | <b><sup>14</sup>Remarks:</b>  |  |   |  |   |                              |   |
|  |   |  |   |  |   | Page<br><u>1</u> of <u>1</u> |   |

**YUCCA MOUNTAIN PROJECT OFFICE**  
**1 YMPO OBSERVATION NO. 89-3-02**

N-QA-012  
4/89

|                                       |  |      |                                  |      |   |  |
|---------------------------------------|--|------|----------------------------------|------|---|--|
| Completed by Originating Organization | 2 Noted During: Audit 89-3<br>(SNL)  |      | 3 Identified By: M. Mitchell     |      | 4 Date:<br>9/15/89  |  |
|                                       | 5 Organization: SNL  |      | 6 Person(s) Contacted: R. Wavrik |      | 7 Response Due Date<br>is 20 Days from Date<br>of Transmittal |  |
|                                       | 8 Discussion:<br><br>It was determined in the activity reported in SAND 88-3073 "Waste Package Emplacement Orientation Recommendation" that panel participants made comments that were not identifiable as assumptions, judgements or facts traceable to other documents. Training should be used as a vehicle to establish the need and understanding of the use of assumptions in design activities. |      |                                  |      |   |  |
| Completed by Respondee                | 9 QAE/Lead Auditor<br><i>S. Jara</i>   |      | Date<br>10/5/89                  |      | 10 Branch Manager<br><i>W. Hedges</i>                         |  |
|                                       |  |      |                                  |      | Date<br>10-5-89   |  |
| Completed by Respondee                | 11 Response:   |      |                                  |      |   |  |
|                                       | 12 Signature: _____ Date: _____  |      |                                  |      |   |  |
| Completed by QA Org.                  | 13 Response Receipt Acceptable <input type="checkbox"/>  |      |                                  |      |   |  |
|                                       | Initiator  | Date | QA/Lead Auditor                  | Date |   |  |
| Completed by QA Org.                  | 14 Remarks:  |      |                                  |      |   |  |
|                                       | <div style="float: right; border: 1px solid black; padding: 5px; width: fit-content;">           Page<br/>           1 of 1         </div>   |      |                                  |      |   |  |

**YUCCA MOUNTAIN PROJECT OFFICE**  
**1 YMPO OBSERVATION NO. 89-3-03**

N-QA-012  
4/89

|  |   |      |  |      |   |                              |
|--|---|------|--|------|---|------------------------------|
| <b>Completed by Originating Organization</b> | 2 Noted During: Audit 89-3                              |      | 3 Identified By: W.R. Sublette                                     |      | 4 Date:<br>9/28/89  |                              |
|  | 5 Organization: SNL                                     |      | 6 Person(s) Contacted: F. Nimick,<br>R. Price, S. Bauer, L. Costin |      | 7 Response Due Date<br>is 20 Days from Date<br>of Transmittal |                              |
|  | 8 Discussion:<br><br>(See Attached Sheet)               |      |  |      |   |                              |
|  | 9 QAE/Lead Auditor<br><i>S. Jones</i>                   |      | Date<br>10/5/89  |      | 10 Branch Manager<br><i>W.R. Sublette</i>                     |                              |
| <b>Completed by Respondee</b>                | 11 Response:  |      |  |      |   |                              |
|  | 12 Signature: _____ Date: _____                         |      |  |      |   |                              |
| <b>Completed by QA Org.</b>                  | 13 Response Receipt Acceptable <input type="checkbox"/> |      |  |      |   |                              |
|  | Initiator   | Date | QA/Lead Auditor  | Date |   |                              |
| 14 Remarks:                                  |   |      |  |      |   |                              |
|  |   |      |  |      |   | Page<br><u>1</u> of <u>5</u> |

6. B. Ehgartner, W. Miller

8.

It was observed that there was an inadequate amount of documentation providing traceability from the RIB back through the source documents. This was noted in Work Breakdown Structure Activities that provide rock mechanics information for the RIB, specifically, WBS 1.2.4.2.1.3, Laboratory Properties and WBS 1.2.4.2.1.1, Rock Mass Analysis.

Data from the RIB's "Intact Rock Mechanical Properties" which was developed from the Laboratory Properties WBS (1.2.4.2.1.3), was not adequately traceable through its source documents. Three source documents were checked for the traceability of the mechanical properties: Young's modulus, Poisson's ratio, and unconfined compressive strength. These sources included a data analysis memorandum from Rutherford to Nimick, June 29, 1988 (71/124213/33/Q2), a data report document (SAND83-1646), and a data set from the Data Records Management System (51/L02-02/11/83) Vols. I & II. Various samples were checked but samples GU3-760.9/2A and G4-749.0/B were checked in detail. The data set sheets and data compilation sheets were lacking adequate documentation in the following areas for sample GU3-760.9/2A:

- 1) There was no discussion or description that a least squares fitting method was used to determine Modulus of Elasticity and Poisson's Ratio.
- 2) The least squares fitting calculations that are written on the data set sheets are not clearly and completely presented.
- 3) The data compilation sheets do not clearly identify which samples were invalidated. Stickers were placed on invalid data compilation sheets but there is no discussion describing the purpose of the sticker nor the basis for invalidating the data.
- 4) There are no units on any of the raw data plots or raw data tables.

The data analysis memorandum (Rutherford to Nimick, 1988) does not identify which data is invalid in the data list presented in the Appendix. It also does not indicate how the data was averaged for each depth before incorporation into the statistical analyses. This information is presented in the text of the memorandum but could be easily missed by future users of this data. It is therefore recommended that the invalid data should be clearly identified on the data list in the Appendix and another column be added to the Appendix showing exactly what numbers were used when determining the parameters sample average. This additional column will show the average parameter value for each depth when there are multiple samples for a given depth.

Sample G4-749.0/B was invalidated in the data analysis memorandum (Rutherford to Nimick, 1988) because the sample was fractured, however, in the sample description presented in the data report (SAND83-1646) there was no mention of the sample being fractured.

When checking the documentation and traceability for the Mohr-Coulomb strength parameters (cohesion and angle of internal friction) presented in the RIB, the following inadequacies were noted:

- 1) The source document referenced in the RIB for the Mohr-Coulomb strength parameters (cohesion and angle of internal friction) has not been written. This document is entitled "Results of Statistical Analysis of Mechanical Properties Data from Unconfined Compression Tests on Samples of Tuff from Yucca Mountain, Nevada," SAND88-2822, by Rutherford, B.M., F. B. Nimick, and R. H. Price.
- 2) Data compilation sheets that were compiled from Olsson and Jones (1980), Olsson (1982), Price and Jones (1982), Price, Nimick and Zirzow (1982), and Nimick et al (1985), were found to have inadequate documentation in the following instances:
  - \* There was no title or description of the purpose and content of the data compilation sheets.
  - \* No signature or date on the compilation sheets.
  - \* Compilation sheet column headings were not adequately described. This was especially the case for the three porosity columns. One column was apparently a functional porosity and the other two were different interpolated porosities.
  - \* The compilation sheets are presently in the Principal Investigators personal files and not in any formal data records management system.
- 3) Data calculation sheets were found to have inadequate documentation and traceability in the following instances:
  - \* There was no title or description of the purpose or content of the calculation sheets.
  - \* No signature or date on the calculation sheets.
  - \* Calculation sheets were not numbered. Very hard to follow when they were out of order.
  - \* The calculation sheets were not complete. They did not show all the steps of the calculations or even the final results of the calculations. The purpose of the calculations was to determine the Mohr-Coulomb strength parameters (cohesion and angle of internal friction). These values were not shown on the calculations sheets, however, they were presented in other memorandums or documents that these calculations supported. These memorandums and documents included a Nimick to Blejwas (1985) memorandum summarizing these calculations and also the Nimick and Schwartz, 1987, SAND85-0762 report that is referenced in the RIB.

- \* The calculation sheets are presently in the Principal Investigators personal files and not in any formal data records management system.

Inadequate calculation documentation was noted in the source documents referenced in the "Rock Mass Failure" section of the RIB. The source documents that were referenced in the RIB included a memorandum from Ehgartner to Distribution, dated 9/24/87, and entitled "Empirical Rock Mass Strength Criteria", and PDM 75-07, dated 8/31/87, and entitled "Empirical Analyses of Rock Mass Strength". This work was performed under WBS 1.2.4.2.1.1, Rock Mass Analysis.

The documentation problems identified in the calculations of the two source documents are noted as follows:

- 1) The form of the empirical strength equations presented in PDM 75-07 were changed in the results provided in the Ehgartner (1987) memorandum. It is not obvious what the new form of the equations are in the Ehgartner (1987) memorandum since these equations were not rewritten with the same notation that was used in PDM 75-07. Because the jump in calculation steps and equation transformations is so great it is impossible to check the intermediate steps of the calculations and the development of the constants without going back to the initial input and repeating the entire calculations.
- 2) PDM 75-07 indicates that certain constants in the empirical strength equations will be determined from a linear regression analysis of strength data compiled by Nimick (1987). First of all this reference is cited incorrectly on pages 10 through 12 in the PDM and is also incorrectly referenced in the list of references presented on page 15. The reference should be "Nimick, F. B. and Schwartz, B. M., etc.....". But more importantly there is inadequate documentation and traceability when only a source, such as, Nimick and Schwartz (1987) is referenced. The confined strength data for TSw2 is presented in Table 16 in Nimick and Schwartz (1987), however, the unconfined strength data is presented in Tables 16 and B-6 plus a mean value for TSw2 is presented in the text of Nimick and Schwartz (1987) on page 115. The unconfined strength value (q) for TSw2 is identified as 166 MPa on page 11 of the PDM. This value is inconsistent with the unconfined compressive strength presented in Nimick and Schwartz (1987). An average unconfined compressive strength value of 147.9 MPa is presented on page 115 of Nimick and Schwartz (1987). This value was developed from the data in Table B-6 as described in the text on page 115. If the unconfined compressive strength values from table 16 are averaged, the resulting value is 154 MPa. Both the 147.9 MPa and 154 MPa values are noticeably less than the 166 MPa value used in the PDM. It should also be noted that there is no reference as to whether all of the confined strength data in Table 16 was used or a part of it was used. In both the case of the unconfined compressive strengths and the confined compressive strengths, the input data used in statistical analyses or any other types of analyses should be clearly presented in the document in which the analyses are performed.



Based on what was looked at in WBS's 1.2.4.2.1.3. and 1.2.4.2.1.1 it was noted that the necessary documentation required for adequate traceability has improved over the last two years, however, further improvements should still be forthcoming. Previous to the last two years, documentation for adequate traceability was lacking. The concern is that all work, whether it is QA level I, II, or III, be performed with good scientific and engineering documentation workhabits.

Most of the activities described in this observation were performed as QA Level III, and therefore not controlled by QA program requirements. A few of the activities described in this observation were QA Level II, however, there were no procedural deficiencies noted in these instances.

**YUCCA MOUNTAIN PROJECT OFFICE**  
**1 YMPO OBSERVATION NO. 89-3-04**

N-QA-012  
4/89

|  |   |  |   |
|--|---|--|---|
| <b>Completed by Originating Organization</b> | 2 Noted During: Audit 89-3  | 3 Identified By: W.R. Sublette             | 4 Date:<br>9/28/89                                      |
|  | 5 Organization: SNL   | 6 Person(s) Contacted: R. Price, F. Nimick | 7 Response Due Date is 20 Days from Date of Transmittal |
|  | 8 Discussion:<br>(See Attached Sheet)   |  |   |
|  | 9 QAE/Lead Auditor<br><i>S. Lova</i>  | Date<br>10/5/89                            | 10 Branch Manager,<br><i>Caleb Hedger</i>               |
|  | Date<br>10-5-89   |  |   |
| <b>Completed by Respondee</b>                | 11 Response:  |  |   |
|  |   |  |   |
|  | 12 Signature:   |  | Date:   |
| <b>Completed by QA Org.</b>                  | 13 Response Receipt Acceptable <input type="checkbox"/>   |  |   |
|  | Initiator   | Date                                       | QA/Lead Auditor   |
|  | Date  |  |   |
|  | 14 Remarks:   |  |   |
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|  | <div style="border: 1px solid black; display: inline-block; padding: 5px;"> Page<br/> 1 of 2 </div> |  |   |

8. During the audit process of checking the traceability of "Intact Rock Mechanical Properties" from the RIB back through their source documents, it was observed that in certain instances there was no reference to the experimental or test procedures that were used. This was noted during the checking of Data Set 51/L02/02/11/83 Vols. I & II, data report document SAND83-1646, and data analysis memorandum (Rutherford to Nimick, 1988). SNL personnel indicated that the only laboratory testing procedures that were in effect at that time were the SNL SOP's (Safe Operating Procedures). Even if there were no DOP's, EP's, or TP's in place at that time it is just good practice to reference the procedure that controlled the laboratory testing.

This work was not QA Level I or II and was performed at a time when SNL did not have a Quality Assurance Program Plan in place at that time.

**YUCCA MOUNTAIN PROJECT OFFICE**  
**1 YMPO OBSERVATION NO. 89-3-05**

N-QA-012  
4/89

|  |   |      |  |      |   |  |
|--|---|------|--|------|---|--|
| Completed by Originating Organization  | 2 Noted During: Audit 89-3                              |      | 3 Identified By: W.R. Sublette             |      | 4 Date:<br>9/28/89                                      |  |
|  | 5 Organization: SNL                                     |      | 6 Person(s) Contacted: R. Price, F. Nimick |      | 7 Response Due Date is 20 Days from Date of Transmittal |  |
|  | 8 Discussion:<br>(See Attached Sheet)                   |      |  |      |   |  |
|  | 9 QAE/Lead Auditor<br><i>S. Debra</i>                   |      | Date<br>10/5/89                            |      | 10 Branch Manager<br><i>[Signature]</i>                 |  |
| Completed by Respondee   | 11 Response:  |      |  |      |   |  |
|  | 12 Signature: _____ Date: _____                         |      |  |      |   |  |
| Completed by QA Org.   | 13 Response Receipt Acceptable <input type="checkbox"/> |      |  |      |   |  |
|  | Initiator   | Date | QA/Lead Auditor                            | Date |   |  |
| 14 Remarks:  |   |      |  |      |   |  |
| <div style="float: right; border: 1px solid black; padding: 5px;"> Page<br/> 1 of 2 </div> |   |      |  |      |   |  |

8. It was observed that no standard procedure exists for pre- and post-test characterization of the core. This type of information is very important when analyzing and compiling the test results. Good pre- and post-test characterization of the tested samples will improve the documentation process for accepting or rejecting test results from certain samples during the data compilation process. It may also help to better understand unexpected or unusual results.

A typical pre-test sample characterization would consist of a visual description of the core sample, including a photograph. The visual survey of the sample would determine if the sample is intact or fractured, or containing other outstanding characteristics, such as, vugs, lithophysae, and lithic fragments. A criteria must be established to determine if the vugs, lithophysae, or lithic fragments are large enough to influence the properties of the sample. This criteria may state that any sample containing vugs, lithophysae, or lithic fragments with sizes greater than 1/10 the diameter of the sample, should be identified as such. The sample should also be surveyed to determine if it is fractured and if so are the fractures healed or unhealed. The post-test characterization should also determine if a sample failed along a previous fracture or whether any previously unidentified vugs, lithophysae, or lithic fragments may influence the test results. This is important since it is not always possible to determine if a sample is fractured in the pre-test characterization.

It is also recommended that a notation be developed which will identify whether a sample is intact, fractured, healed, or contains vugs, lithophysae, or lithic fragments that may influence the test results. This notated information should be included as a column in each table that lists or compiles data. This will take very little time and effort and will allow the compiler or user of the data to determine, very quickly, the physical characteristics of the sample.

**YUCCA MOUNTAIN PROJECT OFFICE**  
**1 YMPO OBSERVATION NO. 89-3-06**

N-QA-012  
4/89

|  |   |      |   |      |   |                              |
|--|---|------|---|------|---|------------------------------|
| <b>Completed by Originating Organization</b> | 2 Noted During: Audit 89-3                              |      | 3 Identified By: W.R. Sublette                                      |      | 4 Date:<br>9/28/89                                      |                              |
|  | 5 Organization: SNL                                     |      | 6 Person(s) Contacted: S. Bauer, L. Costin, W. Miller, B. Ehgartner |      | 7 Response Due Date is 20 Days from Date of Transmittal |                              |
|  | 8 Discussion:<br>(See Attached Sheet)                   |      |   |      |   |                              |
|  | 9 QAE/Lead Auditor<br><i>S. Davis</i>                   |      | Date<br><i>10/5/89</i>  |      | 10 Branch Manager<br><i>Kate Hedger</i>                 |                              |
| <b>Completed by Respondee</b>                | 11 Response:  |      |   |      |   |                              |
|  | 12 Signature: _____ Date: _____                         |      |   |      |   |                              |
| <b>Completed by QA Org.</b>                  | 13 Response Receipt Acceptable <input type="checkbox"/> |      |   |      |   |                              |
|  | Initiator   | Date | QA/Lead Auditor   | Date |   |                              |
| 14 Remarks:                                  |   |      |   |      |   |                              |
|  |   |      |   |      |   | Page<br><u>1</u> of <u>2</u> |

8. It was noted during the checking of the traceability of the RIB's "Rock Mass Failure" section, that there was a very questionable selection of unconfined and confined intact rock strength data used in the development of the rock mass strength criterion for TSw2. The development of the rock mass strength criterion is presented in the following source documents: PDM 75-07, dated 8/31/87, and entitled "Empirical Analyses of Rock Mass Strength", and a memorandum from Ehgartner to Distribution, dated 9/24/87, and entitled "Empirical Rock Mass Strength Criteria".

PDM 75-07 identified the Nimick and Schwartz (1987) document as the source for the intact rock strength data relating  $\sigma_1$  to  $\sigma_3$ . The author of PDM 75-07 stated that the intact rock strength data was taken from table 16 in Nimick and Schwartz (1987). This table provides a very limited amount of intact rock strength data which includes 16 unconfined compression test results and 24 confined compression test results. Unfortunately the variability of compressive strength ( $\sigma_1$ ) is very large for each confinement stress ( $\sigma_3$ ). Apparently this is a result of the high variability of porosity for the samples tested, in addition to different testing conditions, such as, strain rate, degrees of saturation, and drained or undrained testing. Nimick and Schwartz (1987) noted that these factors are the probable cause for the high variability of the strength data presented in Table 16. Because of these factors (especially the dependence of strength on porosity), another strength relationship was developed and presented in Appendix E of the Nimick and Schwartz (1987) document that relates compressive strength to confinement stress and porosity (Equation 10 in Appendix E of Nimick and Schwartz (1987) document). This equation should be more representative of the intact rock strength since it was developed on a much larger sample of data and considers both the effects of porosity and confinement stress on rock strength. However, the author of PDM 75-07 did not use the strength relationship in Appendix E and instead used the highly variable and limited data presented in Table 16. It should also be noted that this author did not consult with the principal author of the Nimick and Schwartz (1987) document before using the data in Table 16. In addition, the unconfined compressive strengths referenced in PDM 75-07 are inconsistent with the unconfined compressive strengths in Table 16 or any other section of the Nimick and Schwartz (1987) document. This discrepancy is described in more detail in Observation 3.

Activities described in this observation were performed as QA Level III, and therefore not controlled by QA program requirements.

**YUCCA MOUNTAIN PROJECT OFFICE**  
**1 YMPO OBSERVATION NO. 89-3-07**

N-QA-012  
4/89

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|--|---|------|---------------------------------|------|---|------------------------------|
| <b>Completed by Originating Organization</b> | 2 Noted During: Audit 89-3                              |      | 3 Identified By: W.R. Sublette  |      | 4 Date:<br>9/28/89                                      |                              |
|  | 5 Organization: SNL                                     |      | 6 Person(s) Contacted: R. Price |      | 7 Response Due Date is 20 Days from Date of Transmittal |                              |
|  | 8 Discussion:<br>(See Attached Sheet)                   |      |                                 |      |   |                              |
|  | 9 QAE/Lead Auditor<br><i>S. J. Jones</i>                |      | Date<br>10/5/89                 |      | 10 Branch Manager<br><i>W. R. Sublette</i>              |                              |
| <b>Completed by Respondee</b>                | 11 Response:  |      |                                 |      |   |                              |
|  | 12 Signature: _____ Date: _____                         |      |                                 |      |   |                              |
| <b>Completed by QA Org.</b>                  | 13 Response Receipt Acceptable <input type="checkbox"/> |      |                                 |      |   |                              |
|  | Initiator   | Date | QA/Lead Auditor                 | Date |   |                              |
| 14 Remarks:                                  |   |      |                                 |      |   |                              |
|  |   |      |                                 |      |   | Page<br><u>1</u> of <u>2</u> |



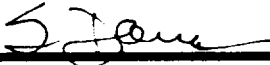
8. While auditing the Laboratory Properties WBS, it was noted that heated shrinkage tubes were used to envelop samples during unconfined compression tests. The purpose of using the heated shrinkage tubes in the unconfined tests was to maintain a saturated condition in the sample during the test. This is not a common practice when performing unconfined compression tests and is not a part of the procedures recommended in ASTM or the International Society of Rock Mechanics Recommended Procedures.

The concern here is that the shrinkage tube may produce enough confinement during deformation that it may influence the unconfined compressive strength of the sample. It is realized that the increased confinement resulting from sample deformation will be very small, however, its influence on a samples unconfined compressive strength may be noticeable. Rock strength is generally more sensitive to confinement stresses at lower confinement stresses than at higher confinement stresses.

It is suggested that a literature review be conducted to determine if any studies have been conducted to evaluate the effect of the shrinkage tube on unconfined compressive strength. If the literature search is unsuccessful, then it is suggested to either perform a study to determine its influence or use a thinner membrane that will stretch easier and produce less confinement when deformation occurs.

**YUCCA MOUNTAIN PROJECT OFFICE**  
**1 YMPO OBSERVATION NO. 89-3-08**

N-QA-012  
4/89

|  |   |  |                                  |  |   |                |
|--|---|--|----------------------------------|--|---|----------------|
| <b>Completed by Originating Organization</b> | 2 Noted During: Audit 89-8  |  | 3 Identified By: F. Peters       |  | 4 Date:<br>9/20/89                                      |                |
|  | 5 Organization: SNL   |  | 6 Person(s) Contacted: T. Hunter |  | 7 Response Due Date is 20 Days from Date of Transmittal |                |
|  | 8 Discussion:<br><br>SNL should strengthen the provisions for tracking errors, omissions, and changes to data within the SEPDB and the IGIS. Those people who have received data products associated with those errors, omissions, and changes; and the originators of the data (if this is appropriate), should receive notification of such errors, omissions, and changes. |  |                                  |  |   |                |
|  | 9 QAE/Lead Auditor<br>   |  | Date<br>10/6/89                  |  | 10 Branch Manager<br><br>Date                           |                |
| <b>Completed by Respondee</b>                | 11 Response:  |  |                                  |  |   |                |
|  | 12 Signature: _____ Date: _____   |  |                                  |  |   |                |
| <b>Completed by QA Org.</b>                  | 13 Response Receipt Acceptable <input type="checkbox"/>   |  |                                  |  |   |                |
|  | Initiator   |  | Date                             |  | QA/Lead Auditor   |                |
| 14 Remarks:                                  |   |  |                                  |  |   | Page<br>1 of 1 |

ENCLOSURE 3

## YM STANDARD DEFICIENCY RE. RT

N-QA-038  
4/89

|  |   |  |  |  |   |
|--|---|--|--|--|---|
| Completed by Originating QA Organization | 1 Date 9/13/89  |  | 2 Severity Level <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input checked="" type="checkbox"/> 3 |  | Page 1 of 2   |
|  | 3 Discovered During<br>AUDIT 89-3<br>(SNL)  |  | 3a Identified By<br>J. FRIEND  |  | 4 SDR No.<br>430 Rev. <u>C</u>  |
|  | 5 Organization<br>SNL   |  | 6 Person(s) Contacted<br>D. BROCKMAN   |  | 7 Response Due Date is<br>20 Working Days from<br>Date of Transmittal   |
|  | 8 Requirement (Audit Checklist Reference, if Applicable)<br>(CL# 4-4) SNL-NWRT-QAPP Rev. E, Sect. 4, para. 4.2, states in part, "SNL will forward to the T&MSS Project QA Department (QA Verification Division Manager) a copy of procurement documents, and changes thereto, as issued, when |  |  |  |   |
| Completed by Organization in Block 5     | 9 Deficiency<br>SNL has not forwarded any copies of 1989 purchase order documents,<br>Example: Geomatrix - P.O. 75-4350, JFT AGAPITO - P.O. 420096  |  |  |  |   |
|  | 10 Recommended Action(s): <input checked="" type="checkbox"/> Remedial <input type="checkbox"/> Investigative <input type="checkbox"/> Corrective<br>1. Transmit P.O.'s and changes to the Project Office when issued and any P.O.s and changes not previously transmitted.                   |  |  |  |   |
|  | 11 QAE/Lead Auditor/Date<br><i>S. Dan</i> 9/22/89   |  | 12 Division Manager/Date<br><i>R. [Signature]</i> 9/22/89  |  | 13 Project Quality Mgr./Date<br><i>James B. [Signature]</i> for 9/24/89 |
|  | 14 Remedial/Investigative Action(s)<br><br>15 Effective Date _____  |  |  |  |   |
| Completed by Org. QA Org.                | 16 Cause of the Condition & Corrective Action to Prevent Recurrence<br><br>17 Effective Date _____  |  |  |  |   |
|  | 18 Signature/Date   |  |  |  |   |
|  | 19 Response Accepted  |  |  |  |   |
| Comp. by Orig. QA Org.                   | 20 Corrective Action Verif. Satisfactory  |  | 21 Remarks   |  |   |
|  | 22 QA CLOSURE   |  | QAE/Lead Auditor/Date  |  | Division Manager/Date PQM/Date  |

ENCLOSURE

YMP<sup>Q</sup> STANDARD DEFICIENCY REPORT  
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N-QA-038  
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8 Requirement ( continued )

purchases involve QA Level I items or services."

## YMPO STANDARD DEFICIENCY REPORT

N-QA-038  
4/89

|   |  |  |  |          |   |                         |
|---|--|--|--|----------|---|-------------------------|
| <b>Completed by Originating QA Organization</b> | 1 Date 9/13/89   |  | 2 Severity Level <input type="checkbox"/> 1 <input checked="" type="checkbox"/> 2 <input type="checkbox"/> 3 |          | Page 1 of 2   |                         |
|   | 3 Discovered During<br>AUDIT 89-3<br>(SNL)   |  | 3a Identified By<br>J.C. FRIEND  |          | 4 SDR No.<br>431 Rev. 0   |                         |
|   | 5 Organization<br>SNL  |  | 6 Person(s) Contacted<br>R. SANDOVAL, M. TANG  |          | 7 Response Due Date is<br>20 Working Days from<br>Date of Transmittal |                         |
|   | 8 Requirement (Audit Checklist Reference, if Applicable)<br>(CL# 2-10) SNL-NWRT-QAPP Rev. E, Sect. 2.0 para. 2.9.2 states, "Minimum education and experience shall be established and documented in position descriptions for each position involved in the performance of activities that |  |  |          |   |                         |
| <b>Completed by Organization in Block 5</b>     | 9 Deficiency<br>SNL Procedure DOP 2-6, Rev. C, does not adequately establish minimum education requirements and does not establish minimum experience. Thus, a determination cannot be made on whether SNL Certification of Personnel Qualifications are                                   |  |  |          |   |                         |
|   | 10 Recommended Action(s): <input checked="" type="checkbox"/> Remedial <input checked="" type="checkbox"/> Investigative <input checked="" type="checkbox"/> Corrective<br>1) Revise the procedure to include minimum requirements.<br>2) Evaluate Qualifications to new requirements.     |  |  |          |   |                         |
|   | 11 QAE/Lead Auditor/Date<br><i>Steve 9/22/89</i>   |  | 12 Division Manager/Date<br><i>1/1/1990 9-22-89</i>  |          | 13 Project Quality Mgr./Date<br><i>James Blaylock 9/22/89</i>         |                         |
| <b>Completed by Organization in Block 5</b>     | 14 Remedial/Investigative Action(s)  |  |  |          |   | 15 Effective Date _____ |
|   | 16 Cause of the Condition & Corrective Action to Prevent Recurrence  |  |  |          |   | 17 Effective Date _____ |
|   | 18 Signature/Date  |  |  |          |   |                         |
| <b>Comp. by Orig. QA Org.</b>                   | 19 Response Accepted   |  | QAE/Lead Auditor/Date  |          | Division Manager/Date   |                         |
|   | 20 Corrective Action Verif. Satisfactory   |  | QAE/Lead Auditor/Date  |          | Division Manager/Date   |                         |
|   | 21 Remarks   |  |  |          |   |                         |
|   | 22 QA CLOSURE  |  | QAE/Lead Auditor/Date  |          | Division Manager/Date   |                         |
|   |  |  |  | PQM/Date |   |                         |

YM ) STANDARD DEFICIENCY RE )RT  
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8 Requirement ( continued )  
affect quality."

9 Deficiency ( continued )  
correct.

## YM STANDARD DEFICIENCY REPORT

N-QA-038  
4/89

|  |  |                       |  |                           |   |                         |
|--|--|-----------------------|--|---------------------------|---|-------------------------|
| Completed by Originating QA Organization | 1 Date 9/13/89   |                       | 2 Severity Level <input type="checkbox"/> 1 <input checked="" type="checkbox"/> 2 <input type="checkbox"/> 3 |                           | Page 1 of 2   |                         |
|  | 3 Discovered During<br>AUDIT 89-3<br>(SNL)   |                       | 3a Identified By<br>S. HANS  |                           | 4 SDR No.<br>432 Rev. 0   |                         |
|  | 5 Organization<br>SNL  |                       | 6 Person(s) Contacted<br>R. BAEHR  |                           | 7 Response Due Date is<br>20 Working Days from<br>Date of Transmittal |                         |
|  | 8 Requirement (Audit Checklist Reference, if Applicable)<br>(CL# 10-1) SNL QAP-10-1 Rev. B para. 3.1.1 states in part, "The QA Coordinator will establish a schedule of surveillances of project activities based on the schedule of performance of those activities..." |                       |  |                           |   |                         |
| Completed by Originating QA Organization | 9 Deficiency<br>Contrary to the above, the QA Coordinator's current basis for scheduling Audits and Surveillances is : (1) procedure requirements, i.e., QAP, DOP, etc., (2) requests from PI, TPO, TL, or QA Coordinators, and (3) followup                             |                       |  |                           |   |                         |
|  | 10 Recommended Action(s): <input checked="" type="checkbox"/> Remedial <input checked="" type="checkbox"/> Investigative <input checked="" type="checkbox"/> Corrective<br>1. Develop appropriate basis for scheduling surveillance.<br>2. Perform training as required. |                       |  |                           |   |                         |
|  | 11 QAE/Lead Auditor/Date<br><i>S. Dana 9/22/89</i>   |                       | 12 Division Manager/Date<br><i>Robert G. 9-22-89</i>   |                           | 13 Project Quality Mgr./Date<br><i>James Blaylock 9/22/89</i>         |                         |
| Completed by Organization in Block 5     | 14 Remedial/Investigative Action(s)  |                       |  |                           |   | 15 Effective Date _____ |
|  | 16 Cause of the Condition & Corrective Action to Prevent Recurrence  |                       |  |                           |   | 17 Effective Date _____ |
|  | 18 Signature/Date  |                       |  |                           |   |                         |
| Comp. by Orig. QA Org.                   | 19 Response Accepted   | QAE/Lead Auditor/Date | Division Manager/Date  | Project Quality Mgr./Date |   |                         |
|  | 20 Corrective Action Verif. Satisfactory   | QAE/Lead Auditor/Date | Division Manager/Date  | Project Quality Mgr./Date |   |                         |
|  | 21 Remarks   |                       |  |                           |   |                         |
|  | 22 QA CLOSURE  | QAE/Lead Auditor/Date | Division Manager/Date  | PQM/Date                  |   |                         |



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9 Deficiency ( continued )

audits. Additionally the QA Coordinator does not have access to schedules of project activities in order to surveill activities in a timely manner.

## YM STANDARD DEFICIENCY REPORT

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4/89

|  |  |  |  |                       |   |
|--|--|--|--|-----------------------|---|
| Completed by Originating QA Organization | 1 Date 9/13/89   |  | 2 Severity Level <input type="checkbox"/> 1 <input checked="" type="checkbox"/> 2 <input type="checkbox"/> 3 |                       | Page 1 of 2   |
|  | 3 Discovered During<br>AUDIT 89-3<br>(SNL)   |  | 3a Identified By<br>J. FRIEND  |                       | 4 SDR No.<br>434 Rev. 0   |
|  | 5 Organization<br>SNL  |  | 6 Person(s) Contacted<br>T. BLEJWAS, JAMES VOIGT   |                       | 7 Response Due Date is<br>20 Working Days from<br>Date of Transmittal |
|  | 8 Requirement (Audit Checklist Reference, if Applicable)<br>(CL# 5-2) SNL-NWRT-QAPP, Rev. E, Sect. 5.0, para. 5.1 states in part, "Each instruction or procedure shall identify QA records which are generated during implementation of the procedure."  |  |  |                       |   |
| Completed by Originating QA Organization | 9 Deficiency<br>A partial review of SNL Procedures disclosed that several procedures did not contain adequate QA Record sections. The following are examples:<br>o DOP 5-1, Rev. C - did not identify ICNs as a record.  |  |  |                       |   |
|  | 10 Recommended Action(s): <input checked="" type="checkbox"/> Remedial <input checked="" type="checkbox"/> Investigative <input checked="" type="checkbox"/> Corrective<br>1. Review procedures and revise records sections as necessary.<br>2. Check to assure any documents not previously identified as records are |  |  |                       |   |
|  | 11 QAE/Lead Auditor/Date<br><i>S. Jones 9/22/89</i>  |  |  |                       |   |
| Completed by Organization in Block 5     | 12 Division Manager/Date<br><i>K. H. H. 9-22-89</i>  |  | 13 Project Quality Mgr./Date<br><i>James Blaylock 9/24/89</i>  |                       |   |
|  | 14 Remedial/Investigative Action(s)  |  |  |                       |   |
|  | 15 Effective Date _____  |  |  |                       |   |
| Completed by Organization in Block 5     | 16 Cause of the Condition & Corrective Action to Prevent Recurrence  |  |  |                       |   |
|  | 17 Effective Date _____  |  |  |                       |   |
|  | 18 Signature/Date  |  |  |                       |   |
| Comp. by Orig. QA Org.                   | 19 Response Accepted   |  | QAE/Lead Auditor/Date  | Division Manager/Date | Project Quality Mgr./Date   |
|  | 20 Corrective Action Verif. Satisfactory   |  | QAE/Lead Auditor/Date  | Division Manager/Date | Project Quality Mgr./Date   |
|  | 21 Remarks   |  |  |                       |   |
|  | 22 QA CLOSURE  |  | QAE/Lead Auditor/Date  | Division Manager/Date | PQM/Date  |

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8 Requirement ( continued )

- B. QAP 16-2, Rev. A, para. 5.3.2 states in part, "QA Coordinators periodically review completed DRs and their disposition to assure proper implementation of this QAP."

9 Deficiency ( continued )

the 15 DRs were not elevated to CARs because of the improper review. The 15 DRs are noted below:

DR 89-01,02,03,04,06,11,12,13,15,24,29,33,34,35,38.

10 Recommended Actions ( continued )

- in DR process.
3. Make changes to procedures as necessary.
  4. Perform training as required.

| YMPQ STANDARD DEFICIENCY REPORT             |  |  |  | N-QA-038<br>4/89 |   |
|---|--|--|--|------------------|---|
| Completed by<br>Originating QA Organization | 1 Date 9/13/89   |  | 2 Severity Level <input type="checkbox"/> 1 <input checked="" type="checkbox"/> 2 <input type="checkbox"/> 3 |                  | Page 1 of 2   |
|   | 3 Discovered During<br>AUDIT 89-3<br>(SNL)   |  | 3a Identified By<br>S. HANS  |                  | 4 SDR No.<br>433 Rev. 0   |
|   | 5 Organization<br>SNL  |  | 6 Person(s) Contacted<br>R. RICHARDS   |                  | 7 Response Due Date is<br>20 Working Days from<br>Date of Transmittal |
|   | 8 Requirement (Audit Checklist Reference, if Applicable)<br>(CL#15-10)<br>A. QAP 16-2, Rev. A, para. 5.1.4 states in part, "Review the DR to ensure that the condition does not warrant a CAR..."  |  |  |                  |   |
| Completed by<br>Originating QA Organization | 9 Deficiency<br>15 of 39 DRs reviewed by the auditor disclosed that the determination as to whether the DR should be elevated to a CAR was made prior to obtaining enough information to make a proper decision. Therefore, it is probable that some of  |  |  |                  |   |
|   | 10 Recommended Action(s): <input checked="" type="checkbox"/> Remedial <input checked="" type="checkbox"/> Investigative <input checked="" type="checkbox"/> Corrective<br>1. Review identified DRs to determine significance.<br>2. Determine if evaluation for significance is performed at appropriate step |  |  |                  |   |
|   | 11 QAE/Lead Auditor/Date<br><i>S. HANS 9/22/89</i>   |  |  |                  |   |
| Completed by<br>Originating QA Organization | 12 Division Manager/Date<br><i>Robert H. Hays 9-22-89</i>  |  | 13 Project Quality Mgr./Date<br><i>James Blaylock 9/22/89</i>  |                  |   |
|   | 14 Remedial/Investigative Action(s)<br><br><br>15 Effective Date _____   |  |  |                  |   |
|   | 16 Cause of the Condition & Corrective Action to Prevent Recurrence<br><br><br>17 Effective Date _____   |  |  |                  |   |
| Completed by<br>Originating QA Organization | 18 Signature/Date<br><br><br>  |  |  |                  |   |
|   | 19 Response Accepted   |  |  |                  |   |
|   | 20 Corrective Action Verif. Satisfactory   |  |  |                  |   |
| Completed by<br>Originating QA Organization | 21 Remarks<br><br><br>   |  |  |                  |   |
|   | 22 QA CLOSURE  |  |  |                  |   |
|   | 23 Signature/Date  |  |  |                  |   |

YM' STANDARD DEFICIENCY REPORT  
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9 Deficiency ( continued )

- o DOP 11-1, Rev. E - did not identify EPs, ETPs and revisions as a record.
- o DOP 5-2, Rev. F - did not identify revisions to TPs as a record.
- o DOP 2-2, Rev. D - did not identify SP revisions as a record.
- o DOP 2-3, Rev. C - did not identify revision documentation as a record.
- o DOP 3-7, Rev. B - did not identify a computer disc as QA records.

10 Recommended Actions ( continued )

available.

3. Check to assure that future procedures contain QAPP requirements.

## YMF-3 STANDARD DEFICIENCY REPORT

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4/89

|  |   |  |  |  |   |  |
|--|---|--|--|--|---|--|
| <b>Completed by Originating QA Organization</b>  | 1 Date 9/14/89  |  | 2 Severity Level <input type="checkbox"/> 1 <input checked="" type="checkbox"/> 2 <input type="checkbox"/> 3 |  | Page 1 of 2   |  |
|  | 3 Discovered During<br>AUDIT 89-3<br>(SNL)  |  | 3a Identified By<br>M. DIAZ  |  | 4 SDR No.<br>435 Rev. 0   |  |
|  | 5 Organization<br>SNL   |  | 6 Person(s) Contacted<br>A. STEVENS/J. PHILLIPS  |  | 7 Response Due Date is<br>20 Working Days from<br>Date of Transmittal |  |
|  | 8 Requirement (Audit Checklist Reference, if Applicable)<br>(CL#12-3) SNL DOP 12-1, Rev.C, para. 4.3.2 states in part, " Calibration<br>certifications shall contain as a minimum:<br>o Identification of the calibration procedure, including revision used.   |  |  |  |   |  |
| <b>Completed by Organization in Block 5</b>  | 9 Deficiency<br>Contrary to the above requirements, calibration certifications of equipment or<br>devices used on work performed by SNL 7111 Division do not contain the cited<br>requirements in Block 8. Additionally, these records are QA records as stated   |  |  |  |   |  |
|  | 10 Recommended Action(s): <input checked="" type="checkbox"/> Remedial <input checked="" type="checkbox"/> Investigative <input checked="" type="checkbox"/> Corrective<br>1. Perform the required review of those calibration certifications in Block 8<br>to ensure that they contain appropriate procedure requirements. |  |  |  |   |  |
|  | 11 QAE/Lead Auditor/Date<br><i>James 9/22/89</i>  |  | 12 Division Manager/Date<br><i>Kabbedge 9-22-89</i>  |  | 13 Project Quality Mgr./Date<br><i>James Blayford 9/22/89</i>         |  |
|  | 14 Remedial/Investigative Action(s)<br><br><div style="text-align: right;">15 Effective Date _____</div>  |  |  |  |   |  |
| <b>Completed by Org. QA Org.</b>   | 16 Cause of the Condition & Corrective Action to Prevent Recurrence<br><div style="text-align: right;">17 Effective Date _____</div>  |  |  |  |   |  |
|  | 18 Signature/Date   |  |  |  |   |  |
|  | 19 Response Accepted<br>20 Corrective Action Verif. Satisfactory<br>21 Remarks  |  |  |  |   |  |
| 22 QA CLOSURE<br><div style="display: flex; justify-content: space-between;"> <div>QAE/Lead Auditor/Date</div> <div>Division Manager/Date</div> <div>PQM/Date</div> </div> |   |  |  |  |   |  |

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8 Requirement ( continued )

- o Calibration data - standards value versus device readings.
- o A quantitative statement of the accuracy of the device.
- o The printed name and signature of the person who performed the calibration."

Para. 6.0 states in part, "Calibration records resulting from this procedure include the calibration certifications. These records are QA records and will be filed in the SNL NWRT Records Management System under the appropriate file codes."

9 Deficiency ( continued )

by SNL personnel. However, they have been neither filed in the SNL NWRT Records Management System nor authenticated as required (Ref. DOP 17-1, Rev. C)

10 Recommended Actions ( continued )

2. Investigate to determine if an adverse impact on quality activities occurred as a result of a QA requirement being omitted from the calibration certifications.
3. After authentication of the records is performed, file those as QA records in the RMS.
4. Reinstruct applicable personnel of 6311, 7110, and 7111 Divisions to the requirements in Block 8.

## YM. STANDARD DEFICIENCY REPORT

N-QA-038  
4/89

|  |   |  |  |                       |   |
|--|---|--|--|-----------------------|---|
| Completed by Originating QA Organization | 1 Date 9/14/89  |  | 2 Severity Level <input type="checkbox"/> 1 <input checked="" type="checkbox"/> 2 <input type="checkbox"/> 3 |                       | Page 1 of 2   |
|  | 3 Discovered During<br>AUDIT 89-3<br>(SNL)  |  | 3a Identified By<br>M. DIAZ  |                       | 4 SDR No.<br>436 Rev. 0   |
|  | 5 Organization<br>SNL   |  | 6 Person(s) Contacted<br>R. RICHARDS   |                       | 7 Response Due Date is<br>20 Working Days from<br>Date of Transmittal |
|  | 8 Requirement (Audit Checklist Reference, if Applicable)<br>(CL# 6-14)<br>SNL-NWRT-QAPP, Rev. E, Sect. 2, para. 2.1.2 states in part, "The Quality Assurance Program of the SNL organization consists of the QAPP plus  |  |  |                       |   |
|  | 9 Deficiency<br>Contrary to the above requirements, SNL could not provide objective evidence to demonstrate that Technical Procedures (TPs) have been reviewed and approved by QA to assure that they implement the requirements stated in the QAPP, Rev.   |  |  |                       |   |
| Completed by Organization in Block 5     | 10 Recommended Action(s): <input checked="" type="checkbox"/> Remedial <input checked="" type="checkbox"/> Investigative <input checked="" type="checkbox"/> Corrective<br>1. Perform a documented review of the procedures to ensure that the procedures contain requirements cited in Blocks 8 and 9 above. |  |  |                       |   |
|  | 11 QAE/Lead Auditor/Date<br><i>S. Davis 9/22/89</i>   |  | 12 Division Manager/Date<br><i>Robert G. 9-22-89</i>   |                       | 13 Project Quality Mgr./Date<br><i>James Blaylock 9/22/89</i>         |
|  | 14 Remedial/Investigative Action(s)<br><br>15 Effective Date _____  |  |  |                       |   |
| Completed by Organization in Block 5     | 16 Cause of the Condition & Corrective Action to Prevent Recurrence<br>17 Effective Date _____  |  |  |                       |   |
|  | 18 Signature/Date   |  |  |                       |   |
| Comp. by Orig. QA Org.                   | 19 Response Accepted  |  | QAE/Lead Auditor/Date  | Division Manager/Date | Project Quality Mgr./Date   |
|  | 20 Corrective Action Verif. Satisfactory  |  | QAE/Lead Auditor/Date  | Division Manager/Date | Project Quality Mgr./Date   |
|  | 21 Remarks  |  |  |                       |   |
|  | 22 QA CLOSURE   |  | QAE/Lead Auditor/Date  | Division Manager/Date | PQM/Date  |



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8 Requirement ( continued )

appropriate implementing procedures required to provide and implement control over activities affecting quality. These procedures will be developed by qualified personnel and be reviewed and approved by the QA organization prior to implementation to assure that they implement the requirements stated in this QAPP."

Section 5, para. 5.1 states in part, "Activities affecting quality on the Yucca Mountain Project will be performed utilizing clear, complete, approved written procedures. Each procedure shall identify, QA records which are generated during implementation of the procedure."

9 Deficiency ( continued )

E and in the Technical Procedure Requirements DOP 5-2, Rev. F. Examples are: format, definitions (consistent with those found in Appendix A of the QAPP), review and approval requirements, content, how to report nonconformances, deviations, and corrective actions, identification of the QA records that are generated during implementation of the TP.

10 Recommended Actions ( continued )

2. Develop a plan to investigate what impact the lack of a QA review has had on the technical procedures. The plan should be provided with response to the SDR.
3. Reinstruct applicable personnel of Department 6310 and associated divisions to the requirements in Block 8.

## YMPO STANDARD DEFICIENCY REPORT

N-QA-038  
4/89

|   |   |  |  |  |   |          |
|---|---|--|--|--|---|----------|
| <b>Completed by Originating QA Organization</b> | 1 Date 9/14/89  |  | 2 Severity Level <input type="checkbox"/> 1 <input checked="" type="checkbox"/> 2 <input type="checkbox"/> 3 |  | Page 1 of 2   |          |
|   | 3 Discovered During<br>AUDIT 89-3<br>(SNL)  |  | 3a Identified By<br>A. ARCEO   |  | 4 SDR No.<br>437 Rev. 0   |          |
|   | 5 Organization<br>SNL   |  | 6 Person(s) Contacted<br>F. NIMICK   |  | 7 Response Due Date is<br>20 Working Days from<br>Date of Transmittal |          |
|   | 8 Requirement (Audit Checklist Reference, if Applicable)<br>(CL# 8-4) NNWSI QAP 88-9, Rev. 2, Sect. 8, para. B states in part,<br>"Procedures shall be developed and implemented to assure that samples are<br>identified and controlled in a manner consistent with their intended use." |  |  |  |   |          |
| <b>Completed by Organization in Block 5</b>     | 9 Deficiency<br>Implementing procedure DOP 8-2, Rev. B, para. 5.3 required a semiannual check<br>of the samples in the Samples Library by the Samples Library Manager or his<br>assistant. Procedure also required inventory of samples during the semiannual                             |  |  |  |   |          |
|   | 10 Recommended Action(s): <input checked="" type="checkbox"/> Remedial <input type="checkbox"/> Investigative <input checked="" type="checkbox"/> Corrective<br>1. Perform the inventory of the Samples Library and generate an<br>inventory list of all samples.                         |  |  |  |   |          |
|   | 11 QAE/Lead Auditor/Date<br><i>S. Dan 9/22/89</i>   |  | 12 Division Manager/Date<br><i>K. L. L. 9-22-89</i>  |  | 13 Project Quality Mgr./Date<br><i>James Blayford 9/24/89</i>         |          |
| <b>Completed by Organization in Block 5</b>     | 14 Remedial/Investigative Action(s)<br><br><div style="text-align: right;">15 Effective Date _____</div>  |  |  |  |   |          |
|   | 16 Cause of the Condition & Corrective Action to Prevent Recurrence<br><br><div style="text-align: right;">17 Effective Date _____</div>  |  |  |  |   |          |
|   | 18 Signature/Date   |  |  |  |   |          |
| <b>Comp. by Orig. QA Org.</b>                   | 19 Response Accepted  |  | QAE/Lead Auditor/Date  |  | Division Manager/Date   |          |
|   | 20 Corrective Action Verif. Satisfactory  |  | QAE/Lead Auditor/Date  |  | Division Manager/Date   |          |
|   | 21 Remarks  |  |  |  |   |          |
|   | 22 QA CLOSURE   |  | QAE/Lead Auditor/Date  |  | Division Manager/Date   |          |
|   |   |  |  |  |   | PQM/Date |

YMP-4 STANDARD DEFICIENCY REPORT  
CONTINUATION SHEET

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9 Deficiency ( continued )

check. The semiannual check of the Samples Library by the Samples Library Manager was not conducted nor was an inventory list of samples generated. There were surveillances of the Samples Library performed; however, these surveillances did not identify all the samples as required by procedure.

10 Recommended Actions ( continued )

2. Conduct the semiannual check as required by procedure or review the implementing procedure against program requirements and revise the procedure, if appropriate, to meet requirement.

## YMFO STANDARD DEFICIENCY REPORT

N-QA-038  
4/89

|  |  |  |  |                       |   |
|--|--|--|--|-----------------------|---|
| Completed by Originating QA Organization | 1 Date 9/15/89   |  | 2 Severity Level <input type="checkbox"/> 1 <input checked="" type="checkbox"/> 2 <input type="checkbox"/> 3 |                       | Page 1 of 2   |
|  | 3 Discovered During<br>AUDIT 89-3<br>(SNL)   |  | 3a Identified By<br>S. L. CRAWFORD   |                       | 4 SDR No.<br>438 Rev. 0   |
|  | 5 Organization<br>SNL  |  | 6 Person(s) Contacted<br>L. YARRINGTON   |                       | 7 Response Due Date is<br>20 Working Days from<br>Date of Transmittal |
|  | 8 Requirement (Audit Checklist Reference, if Applicable)<br>(CL# 3-2) DOP 3-7, Rev. B, para. 4.1.5 provides for Interactive Graphics Information System (IGIS) Logs, including Job Log (JOBxxxx), Reference Log (REFxxxx), and Product Log (CALxxxx). The Product Log and Reference Logs are |  |  |                       |   |
|  | 9 Deficiency<br>The cross references in the Reference and Product Logs are not accurate.<br>Examples include:<br>REF0031 - JOB0112 (actual JOB not known)  |  |  |                       |   |
| Completed by Organization in Block 5     | 10 Recommended Action(s): <input checked="" type="checkbox"/> Remedial <input checked="" type="checkbox"/> Investigative <input checked="" type="checkbox"/> Corrective<br>1. Review JOBxxxx files and confirm or correct application to REFxxxx and CALxxxx runs.                           |  |  |                       |   |
|  | 11 QAE/Lead Auditor/Date<br><i>S. L. Crawford</i> 9/22/89  |  | 12 Division Manager/Date<br><i>L. Yarrington</i> 9-22-89   |                       | 13 Project Quality Mgr./Date<br><i>James Blaylock</i> 9/22/89         |
|  | 14 Remedial/Investigative Action(s)<br><br>15 Effective Date _____   |  |  |                       |   |
| Completed by Organization in Block 5     | 16 Cause of the Condition & Corrective Action to Prevent Recurrence<br><br>17 Effective Date _____   |  |  |                       |   |
|  | 18 Signature/Date  |  |  |                       |   |
| Comp. by Orig. QA Org.                   | 19 Response Accepted   |  | QAE/Lead Auditor/Date  | Division Manager/Date | Project Quality Mgr./Date   |
|  | 20 Corrective Action Verif. Satisfactory   |  | QAE/Lead Auditor/Date  | Division Manager/Date | Project Quality Mgr./Date   |
|  | 21 Remarks   |  |  |                       |   |
|  | 22 QA CLOSURE  |  | QAE/Lead Auditor/Date  | Division Manager/Date | PQM/Date  |

YM-0 STANDARD DEFICIENCY REPORT  
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8 Requirement ( continued )

required to include the work request (Job) number.

9 Deficiency ( continued )

REF0032 - JOB0112 (actual JOB not known)

REF0006 - JOB0097 (JOB actually cancelled)

Many other cross references are questionable based on descriptive titles. The discrepancies are principally in the 1985 - 1987 time frame, but current work (CALxxxx) is accessing REFxxxx files in that time interval. As a result, some Quality Level I products cannot be fully traced to the original source data.

10 Recommended Actions ( continued )

2. Reconstruct remaining REF and CAL cross references by review of IGIS files and date consistency check.

## YMPO STANDARD DEFICIENCY REPORT

N-QA-038  
4/89

|   |  |  |  |          |   |  |
|---|--|--|--|----------|---|--|
| <b>Completed by Originating QA Organization</b> | 1 Date 9/15/89   |  | 2 Severity Level <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input checked="" type="checkbox"/> 3 |          | Page 1 of 1   |  |
|   | 3 Discovered During<br>AUDIT 89-3<br>(SNL)   |  | 3a Identified By<br>S. CRAWFORD  |          | 4 SDR No.<br>439 Rev. 0   |  |
|   | 5 Organization<br>SNL  |  | 6 Person(s) Contacted<br>R. WAVRIK   |          | 7 Response Due Date is<br>20 Working Days from<br>Date of Transmittal |  |
|   | 8 Requirement (Audit Checklist Reference, if Applicable)<br>(CL# 3-4) DOP 3-4, Rev. G (1/31/89) (and subsequent revisions), para. 4.2,<br>requires QA Level I and II Design Investigation Memos (DIM) to be approved by<br>NWRT QA. Para. 5.1 requires approval of changes the same as the original. |  |  |          |   |  |
| <b>Completed by Originating QA Organization</b> | 9 Deficiency<br>DIM 205, Rev. B, 3/15/89, Waste Emplacement Orientation Review (QL II) was not<br>approved by the QA Coordinator. No additional examples of the discrepancy<br>were noted in the review of eleven (11) additional DIMs.  |  |  |          |   |  |
|   | 10 Recommended Action(s): <input checked="" type="checkbox"/> Remedial <input type="checkbox"/> Investigative <input type="checkbox"/> Corrective<br>1. Perform and document QA review of DIM 205, Rev B.  |  |  |          |   |  |
| <b>Completed by Organization in Block 5</b>     | 11 QAE/Lead Auditor/Date<br><i>S. Jones 9/22/89</i>  |  | 12 Division Manager/Date<br><i>Robert Jones 9-22-89</i>  |          | 13 Project Quality Mgr./Date<br><i>James Blumford 9/22/89</i>         |  |
|   | 14 Remedial/Investigative Action(s)  |  |  |          |   |  |
|   | 15 Effective Date _____  |  |  |          |   |  |
| <b>Completed by Organization in Block 5</b>     | 16 Cause of the Condition & Corrective Action to Prevent Recurrence  |  |  |          |   |  |
|   | 17 Effective Date _____  |  |  |          |   |  |
|   | 18 Signature/Date  |  |  |          |   |  |
| <b>Comp. by Orig. QA Org.</b>                   | 19 Response Accepted   |  | QAE/Lead Auditor/Date  |          | Division Manager/Date   |  |
|   | 20 Corrective Action Verif. Satisfactory   |  | QAE/Lead Auditor/Date  |          | Division Manager/Date   |  |
|   | 21 Remarks   |  |  |          |   |  |
|   | 22 QA CLOSURE  |  | QAE/Lead Auditor/Date  |          | Division Manager/Date   |  |
|   |  |  |  | PQM/Date |   |  |

## YMPO STANDARD DEFICIENCY REPORT

N-QA-038  
4/89

|   |   |  |  |                       |   |                         |
|---|---|--|--|-----------------------|---|-------------------------|
| <b>Completed by Originating QA Organization</b> | 1 Date 9/15/89  |  | 2 Severity Level <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input checked="" type="checkbox"/> 3 |                       | Page 1 of 2   |                         |
|   | 3 Discovered During<br>AUDIT 89-3<br>(SNL)  |  | 3a Identified By<br>A. ARCEO   |                       | 4 SDR No.<br>440 Rev. 0   |                         |
|   | 5 Organization<br>SNL   |  | 6 Person(s) Contacted<br>S. SHARPTON   |                       | 7 Response Due Date is<br>20 Working Days from<br>Date of Transmittal |                         |
|   | 8 Requirement (Audit Checklist Reference, if Applicable)<br>(CL#17-16) AP 1.7Q, Rev. 2, para. 5.5.4.1 states in part, "Completed individual records shall be forwarded to the LRC no later than 10 working days after the date of completion or receipt."   |  |  |                       |   |                         |
| <b>Completed by Organization in Block 5</b>     | 9 Deficiency<br>A) The following records were not transmitted to the Local Records Center (LRC) within the 10 working days.   |  |  |                       |   |                         |
|   | 10 Recommended Action(s): <input checked="" type="checkbox"/> Remedial <input type="checkbox"/> Investigative <input type="checkbox"/> Corrective<br>1. Train all record source personnel to submit records to the LRC within the required 10 working days. |  |  |                       |   |                         |
|   | 11 QAE/Lead Auditor/Date<br><i>Signe</i> 9/22/89  |  | 12 Division Manager/Date<br><i>Robert H. ...</i> 9-22-89   |                       | 13 Project Quality Mgr./Date<br><i>James B. ...</i> 9/22/89           |                         |
| <b>Completed by Organization in Block 5</b>     | 14 Remedial/Investigative Action(s)   |  |  |                       |   | 15 Effective Date _____ |
|   | 16 Cause of the Condition & Corrective Action to Prevent Recurrence   |  |  |                       |   | 17 Effective Date _____ |
|   | 18 Signature/Date   |  |  |                       |   |                         |
| <b>Comp. by Orig. QA Org.</b>                   | 19 Response Accepted  |  | QAE/Lead Auditor/Date  | Division Manager/Date | Project Quality Mgr./Date   |                         |
|   | 20 Corrective Action Verif. Satisfactory  |  | QAE/Lead Auditor/Date  | Division Manager/Date | Project Quality Mgr./Date   |                         |
|   | 21 Remarks  |  |  |                       |   |                         |
| <b>Comp. by Orig. QA Org.</b>                   | 22 QA CLOSURE   |  | QAE/Lead Auditor/Date  | Division Manager/Date | PQM/Date  |                         |

# YMPO STANDARD DEFICIENCY REPORT CONTINUATION SHEET

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## 8 Requirement ( continued )

AP 1.7Q, Rev. 2, para. 5.7.3.7 states in part, "The LRC shall perform the following activities...Package the records and transmittal forms and transmit them to the CRF within 10 working days of receipt."

## 9 Deficiency ( continued )

| RECORD FILE CODE        | NAME & DATE OF<br>AUTHENTICATION | DATE<br>SUBMITTED |
|-------------------------|----------------------------------|-------------------|
| 22/000/57-0878/1.2      | 8/14/89 F. Schelling             | 9/13/89           |
| 41/12131/1.1            | 8/7/89 M.K. Jespersen            | 9/6/89            |
| 80/12525                | 8/4/89 B. Kleet                  | 9/6/89            |
| 71/12461/71-034         | 8/1/89 S. Bauer                  | 8/24/89           |
| 60/12433/DIM-130/1.3/02 | 7/7/89 R. Stinebaugh             | 8/8/89            |

B) The following records were not transmitted to the Central Records Facility (CRF) within 10 working days.

| RECORD<br>FILE CODE  | RMS#  | LRC<br>RECEIPT DATE | TRANSMITTAL<br>DATE TO CRF |
|----------------------|-------|---------------------|----------------------------|
| 71/12461/71-034      | 13399 | 8/24/89             | 9/12/89                    |
| 90/1293/PRG/Q1       | 13044 | 8/15/89             | 9/11/89                    |
| 60/12433/DIM-130/1.3 | 12829 | 8/8/89              | 9/1/89                     |

It should be noted that most of the records identified above should have been processed during the period when the LRC was undergoing remodeling.

## 10 Recommended Actions ( continued )

2. Train all LRC personnel to transmit records to CRF within required time.
3. Request from the Project Office a change to AP 1.7Q to allow for extension of the 10 working day limitation when extenuating circumstances occur which prevent the submittal of records within 10 working days.



## YMPO STANDARD DEFICIENCY REPORT

N-QA-038  
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|   |   |                       |  |                       |   |
|---|---|-----------------------|--|-----------------------|---|
| <b>Completed by Originating QA Organization</b> | 1 Date 9/15/89  |                       | 2 Severity Level <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input checked="" type="checkbox"/> 3 |                       | Page 1 of 2   |
|   | 3 Discovered During<br>AUDIT 89-3<br>(SNL)  |                       | 3a Identified By<br>C. FRIEND  |                       | 4 SDR No.<br>441 Rev. 0   |
|   | 5 Organization<br>SNL   |                       | 6 Person(s) Contacted<br>R. RICHARDS, D. BROCKMAN  |                       | 7 Response Due Date is<br>20 Working Days from<br>Date of Transmittal |
|   | 8 Requirement (Audit Checklist Reference, if Applicable)<br>(CL# 4-1) DOP 4-1, Rev. C, Sect. 4.2.3 & 4.2.1 state in part, "The QA Coordinator reviews PR/CR to assure that topics in para. 4.2.1 are addressed, as applicable - 4.2.1 includes:       |                       |  |                       |   |
| <b>Completed by Organization in Block 5</b>     | 9 Deficiency<br>A review of SNL QA Level I procurement documents disclosed that the Right of Access clause has not been a part of the documentation. SNL uses a Standard Lab Terms and Conditions Attachment for all PR/CRs which addresses audits of |                       |  |                       |   |
|   | 10 Recommended Action(s): <input checked="" type="checkbox"/> Remedial <input type="checkbox"/> Investigative <input type="checkbox"/> Corrective<br>1. Assure future procurement documents meet the DOP and QAPP requirements.                       |                       |  |                       |   |
|   | 11 QAE/Lead Auditor/Date<br><i>S. Dana 9/22/89</i>  |                       | 12 Division Manager/Date<br><i>Robert E. G... 9-22-89</i>  |                       | 13 Project Quality Mgr./Date<br><i>James Blayford 9/22/89</i>         |
|   | 14 Remedial/Investigative Action(s)<br><br>15 Effective Date _____  |                       |  |                       |   |
| <b>Completed by Org. QA Org.</b>                | 16 Cause of the Condition & Corrective Action to Prevent Recurrence<br>17 Effective Date _____  |                       |  |                       |   |
|   | 18 Signature/Date   |                       |  |                       |   |
|   | 19 Response Accepted  |                       |  |                       |   |
| <b>Comp. by Org. QA Org.</b>                    | 20 Corrective Action Verif. Satisfactory  |                       | QAE/Lead Auditor/Date  |                       | Division Manager/Date   |
|   |   |                       |  |                       | Project Quality Mgr./Date   |
|   | 21 Remarks  |                       |  |                       |   |
| 22 QA CLOSURE                                   |   | QAE/Lead Auditor/Date |  | Division Manager/Date | PQM/Date  |

YMP-0 STANDARD DEFICIENCY REPORT  
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8 Requirement ( continued )

RIGHT OF ACCESS - Specify that SNL and the Department of Energy (DOE) representative shall have the right to access contractor facilities and quality records for verification or audit purposes at each tier of procurement.

NONCONFORMANCES - Specify the supplier's responsibilities for recording and reporting nonconformances and SNL's authority for approving disposition of nonconformances.

9 Deficiency ( continued )

financial records. This does not meet the requirement as addressed. Additionally, none of the PR/CRs reviewed contain a nonconformance requirements section. However, supplier audits have been performed and there is no apparent effect on quality involving the POs.

## YMPO STANDARD DEFICIENCY REPORT

N-QA-038  
4/89

|   |   |  |  |          |   |  |
|---|---|--|--|----------|---|--|
| <b>Completed by Originating QA Organization</b> | 1 Date 9/15/89  |  | 2 Severity Level <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input checked="" type="checkbox"/> 3 |          | Page 1 of 2   |  |
|   | 3 Discovered During<br>AUDIT 89-3<br>(SNL)  |  | 3a Identified By<br>S. DANA, J.<br>HEANEY  |          | 4 SDR No.<br>442 Rev. 0   |  |
|   | 5 Organization<br>YMP   |  | 6 Person(s) Contacted<br>T. HUNTER (SNL)   |          | 7 Response Due Date is<br>20 Working Days from<br>Date of Transmittal |  |
|   | 8 Requirement (Audit Checklist Reference, if Applicable)<br>(CL# n/a) YMP QA Plan NNWSI/88-9, Rev. 2, Sect. 3, para. 1.3.2, states in part, "The WMPO Project Quality Manager and the appropriate WMPO Branch Chief shall review and approve the scientific investigation planning document prior |  |  |          |   |  |
| <b>Completed by Organization in Block 5</b>     | 9 Deficiency<br>SNL work plans were submitted to the Project Office for approval (ref. SNL ltr. LES:6315, dtd. 2/7/89, Stiegler to Wilmot, (attached)). The work plans were disapproved by the Project Office (ref. ltr. YMP:ALB-2629, dtd. 4/10/89,  |  |  |          |   |  |
|   | 10 Recommended Action(s): <input checked="" type="checkbox"/> Remedial <input type="checkbox"/> Investigative <input type="checkbox"/> Corrective<br>1. Train appropriate personnel to the Project requirements cited in Block 8.   |  |  |          |   |  |
| <b>Aprvl.</b>                                   | 11 QAE/Lead Auditor/Date<br><i>S. Dana 9/22/89</i>  |  | 12 Division Manager/Date<br><i>Robert S. G... 9-22-89</i>  |          | 13 Project Quality Mgr./Date<br><i>James Blumfeld 9/24/89</i>         |  |
|   | 14 Remedial/Investigative Action(s)   |  |  |          |   |  |
|   | 15 Effective Date _____   |  |  |          |   |  |
| <b>Completed by Organization in Block 5</b>     | 16 Cause of the Condition & Corrective Action to Prevent Recurrence   |  |  |          |   |  |
|   | 17 Effective Date _____   |  |  |          |   |  |
|   | 18 Signature/Date   |  |  |          |   |  |
| <b>Comp. by Orig. QA Org.</b>                   | 19 Response Accepted  |  | QAE/Lead Auditor/Date  |          | Division Manager/Date   |  |
|   | 20 Corrective Action Verif. Satisfactory  |  | QAE/Lead Auditor/Date  |          | Division Manager/Date   |  |
|   | 21 Remarks  |  |  |          |   |  |
|   | 22 QA CLOSURE   |  | QAE/Lead Auditor/Date  |          | Division Manager/Date   |  |
|   |   |  |  | PQM/Date |   |  |

**ENCLOSURE**

**YMPO STANDARD DEFICIENCY REPORT  
CONTINUATION SHEET**

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12/88

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Page 2 of 2

8 Requirement ( continued )  
to implementation."

Para 1.7, states in part, "All changes in scientific investigation planning documents shall go through the same review and approval process as specified in para. 1.3 of this section."

9 Deficiency ( continued )

Gertz to Hunter, (attached)), however, the letter directed SNL to proceed with work to the unapproved work plans.

It should be noted that during YMP audit SNL 89-3, no evidence was found that SNL was proceeding with QAL I/II activities using the unapproved work plans referenced in the Gertz to Hunter letter.

**Sandia National Laboratories**

Albuquerque, New Mexico 87185

**FEB 7 1989**

WBS: 1.2.9.2

QA: NA

Ed Wilmot  
Yucca Mountain Project Office  
U.S. Department of Energy  
Nevada Operations Office  
P.O. Box 98518  
Las Vegas, Nevada 89193-8518

|  |               |
|--|---------------|
| THIS IS A<br>YUCCA MOUNTAIN PROJECT<br>MILESTONE |               |
| No   | <u>R100</u>   |
| Date Completed                                   | <u>2/7/89</u> |
| WBS No   | <u>1292</u>   |

Dear Ed:

Subject: Transmittal of Work Plans for YMP Approval

Enclosed are all of the SNL Work Plans and Quality Assurance Level Assignments (QALAS) that require Project Office approval. As we discussed in Albuquerque on February 1, I have identified several Work Plans (see attachment) required to support the ESF Title II work which you have agreed to expedite through the Project Office review and approval process. We would like your approval on these Work Plans before the start of Title II, if at all possible, and on the remainder as soon as is practicable.

I appreciate your assistance in expediting this process. If you have any questions on the Work Plans or QALAS, please contact R. Richards (FTS 844-1280) or L. Shephard (FTS 844-3604) of my staff.

Submittal of these Work Plans satisfies Milestone R100.

Sincerely,

NNI-1989-1229

ACTION

CC: ROBERT WILMOT

CC: BACA / NORI

CC: EDWARDS / MOLEY

CC: KAUSEN / BLANCHARD

CC: BRIVANER

CC: HANSEL / CRAWLEY

CC: NEUBURY

CC: GABSON

CC: LOWINGER

CC: WILLIAMS

Joseph E. Stiegler, Actg. Manager  
Nuclear Waste Repository Technology  
Department 6310

LES:6315:mjh  
Attachment

REC'D IN WMPO

7-12-89

WTO  
ENCE

E. Wilmot

-2-

FEB 7 1961

Copy to: (w/attach I)

6310 J. E. Stiegler, Actg.

6310 R. R. Richards

6311 A. Stevens

6312 F. W. Bingham

6313 T. E. Blejwas

6314 J. R. Tillerson

6316 R. P. Sandoval

6316 S. E. Sharpton

6315 L. E. Shephard

6310 10/1292/WKP/NQ

6310 30/1291/0.6/NQ

6310 YMP CRF (Attachs. 1&2)

Attachment I

Sandia Work Plans and QALAS Required for  
ESF Title II Work

| <u>WBS<br/>Number</u> | <u>Title</u>  |
|-----------------------|---|
| 12141                 | Flow and Radionuclide Transport                           |
| 12142                 | Radionuclide Source Term                                  |
| 1232122               | Faulting Potential at Site Surface Facilities             |
| 124211                | Rock Mass Analysis  |
| 124112                | Basis for Design  |
| 1242151               | Prototype Geomechanical Testing                           |
| 1242152               | ESF Geomechanical Testing                                 |
| 12437                 | Seismic UNE Design Analysis                               |
| 12461                 | Repository Performance Code Development/<br>Certification |
| 12462                 | Design Analysis   |
| 12463*                | Preclosure Safety Analysis                                |
| 12525                 | Study Plan Coordinating                                   |

\*This work plan will follow shortly under separate cover.



# Department of Energy

Nevada Operations Office  
P. O. Box 98518  
Las Vegas, NV 89193-8518  
APR 10 1989

NBS 01.2.4  
"QA: NA"

APR 14 1989

Date Submitted 4/27/89

Authenticated/Verified *24*

6310 10/12911/COR/ ~~QA~~ QI

6310 90/1293/QAL/QI

6310 YMP CRF

Document As Shown

Other title

Thomas O. Hunter  
Technical Project Officer for Yucca Mountain Project  
Sandia National Laboratories  
P.O. Box 5800  
Organization 6310  
Albuquerque, NM 87185

## APPROVAL OF SANDIA NATIONAL LABORATORIES (SNL) WORK PLANS (NNI-1989-1849)

The Yucca Mountain Project Office (Project Office) has completed a review of the SNL work plans submitted for approval. At this time, we cannot approve the plans for the following reasons:

1. The Quality Assurance Level Assignments (QALAs) for the work plans were not completed in accordance with Administrative Procedure (AP)-5.4Q.
2. The Quality Assurance (QA) grading within the work plans was not completed in accordance with AP-5.17Q.

We recognize that these procedures were issued after the work plans were prepared and were not applicable to the plans. However, recognizing the importance of the QALAs and associated grading, we request that you re-evaluate the QALAs and grading using the appropriate project level procedures. We expect the work described by the plans to proceed in parallel with your re-evaluation. Any differences between the QALAs or grading resulting from your evaluation will be identified and controlled using appropriate elements of your QA program. In parallel with the re-evaluation, we intend to initiate an 06-03 review of the work plans and expect any comments resulting from the review to be resolved and incorporated in the resubmittal of the SNL work plans.

If you have any questions, please contact Anthony L. Baca of my staff at (702) 794-7960 or PTS 544-7960.

*Carl P. Gerts*  
Carl P. Gerts, Project Manager  
Yucca Mountain Project Office

YMP:ALB-2629

cc:  
Al Stevens, SNL, 6311, Las Vegas, NV  
R. R. Richards, SNL, 6311, Las Vegas, NV  
J. D. Waddell, SAIC, Las Vegas, NV



## YI O STANDARD DEFICIENCY R \_ ORT

N-QA-038  
4/89

|  |  |  |  |          |   |  |
|--|--|--|--|----------|---|--|
| Completed by Originating QA Organization | 1 Date 9/15/89   |  | 2 Severity Level <input type="checkbox"/> 1 <input checked="" type="checkbox"/> 2 <input type="checkbox"/> 3 |          | Page 1 of 2   |  |
|  | 3 Discovered During<br>AUDIT 89-3<br>(SNL)   |  | 3a Identified By<br>M. MITCHELL  |          | 4 SDR No.<br>443 Rev. 0   |  |
|  | 5 Organization<br>YMP  |  | 6 Person(s) Contacted<br>E. WILMOT, R. WAVRIK  |          | 7 Response Due Date is<br>20 Working Days from<br>Date of Transmittal |  |
|  | 8 Requirement (Audit Checklist Reference, if Applicable)<br>(CL# T-1, T-2, T-6)<br>1) Project QAP, 88-9, Rev. 2, Sect. VIII, part C, para. 1.1.2 states " Where<br>data are the results of the efforts of more than one organization, procedures             |  |  |          |   |  |
| Completed by Originating QA Organization | 9 Deficiency<br>Contrary to the above requirements:<br><br>1. The YMP (Project Office) has not established procedures for the control  |  |  |          |   |  |
|  | 10 Recommended Action(s): <input checked="" type="checkbox"/> Remedial <input checked="" type="checkbox"/> Investigative <input checked="" type="checkbox"/> Corrective<br>1. Investigate to determine the extent of this deficiency in other<br>activities. |  |  |          |   |  |
|  | 11 QAE/Lead Auditor/Date<br><i>S. Davis 9/22/89</i>  |  | 12 Division Manager/Date<br><i>Kabot Hedger 9-22-89</i>  |          | 13 Project Quality Mgr./Date<br><i>James Blayford 9/22/89</i>         |  |
| Completed by Organization in Block 5     | 14 Remedial/Investigative Action(s)  |  |  |          | 15 Effective Date _____   |  |
|  | 16 Cause of the Condition & Corrective Action to Prevent Recurrence  |  |  |          | 17 Effective Date _____   |  |
|  | 18 Signature/Date  |  |  |          |   |  |
| Comp. by Orig. QA Org.                   | 19 Response Accepted   |  | QAE/Lead Auditor/Date  |          | Division Manager/Date   |  |
|  | 20 Corrective Action Verif. Satisfactory   |  | QAE/Lead Auditor/Date  |          | Division Manager/Date   |  |
|  | 21 Remarks   |  |  |          |   |  |
|  | 22 QA CLOSURE  |  | QAE/Lead Auditor/Date  |          | Division Manager/Date   |  |
|  |  |  |  | PQM/Date |   |  |

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8 Requirement ( continued )

describing the organizational responsibilities for that data shall be developed and implemented, and 2) sect. VIII para. 2.3.2 states "Documentation of design analysis shall include in part a listing of applicable references, results of literature searches or other background data, identification of assumptions and indication of those which require verification as the design proceeds." In sect. III, para. 1.4.2 states in part, "... for scientific investigations that documentation of interpretation analysis shall include identification of assumptions."

9 Deficiency ( continued )

of the Quality Level II activity associated with the generation of the document, SAND 88-3073, "Waste Package Emplacement Orientation Recommendation". This document was prepared at the direction of the Project Office by SNL and project organization staff using data from various sources.

2. The activity records and document (SAND 88-3073) did not identify and document assumptions used in the analysis, or indicate the quality level of the data used in the analysis.

10 Recommended Actions ( continued )

2. Determine the impact of this condition on this and other activities that might include interpretation of analysis functions.
3. Determine the need for the Orientation Recommendation document (SAND 88-3073) and determine a strategy for replacing the analysis completed if a document is needed at this time.
4. Provide required procedural controls to ensure that reoccurrence does not take place and that assumptions are documented in design and scientific investigation activities.

# YMF J STANDARD DEFICIENCY REPORT

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|   |  |  |  |  |   |
|---|--|--|--|--|---|
| <b>Completed by Originating QA Organization</b> | 1 Date 9/22/89   |  | 2 Severity Level <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input checked="" type="checkbox"/> 3 |  | Page 1 of 2   |
|   | 3 Discovered During<br>AUDIT 89-3<br>(SNL)   |  | 3a Identified By<br>A. ARCEO   |  | 4 SDR No.<br>444      Rev. 0  |
|   | 5 Organization<br>SNL  |  | 6 Person(s) Contacted<br>T. O. HUNTER, E. WILMOT   |  | 7 Response Due Date is<br>20 Working Days from<br>Date of Transmittal |
|   | 8 Requirement (Audit Checklist Reference, if Applicable)<br>(CL# 1-1 & 1-3)<br>NNWSI 88-9, Rev. 2, para. 1.0 states in part, "The organizational structure, lines of communication, authority and duties of persons and organizations"   |  |  |  |   |
|   | 9 Deficiency<br>It was verified during the audit that the QA functions are performed by the QA Coordinator, and other QA personnel; however, the QA personnel are not managed by the QA Coordinator, since they report directly to the Technical Project   |  |  |  |   |
| <b>Completed by Originating QA Organization</b> | 10 Recommended Action(s): <input checked="" type="checkbox"/> Remedial <input type="checkbox"/> Investigative <input type="checkbox"/> Corrective<br>Provide a Quality Organizational Chart delineating the reporting relationship of all QA personnel and revise procedures and QA program documents if |  |  |  |   |
|   | 11 QAE/Lead Auditor/Date<br><i>S. Dan 9/22/89</i>  |  |  |  |   |
| <b>Completed by Organization in Block 5</b>     | 12 Division Manager/Date<br><i>W. Caldwell 9-23-89</i>   |  | 13 Project Quality Mgr./Date<br><i>James Bluff 9/24/89</i>   |  |   |
|   | 14 Remedial/Investigative Action(s)  |  |  |  |   |
|   | 15 Effective Date _____  |  |  |  |   |
|   | 16 Cause of the Condition & Corrective Action to Prevent Recurrence  |  |  |  |   |
|   | 17 Effective Date _____  |  |  |  |   |
| <b>Completed by Organization in Block 5</b>     | 18 Signature/Date  |  |  |  |   |
|   | 19 Response Accepted   |  | QAE/Lead Auditor/Date  |  | Division Manager/Date   |
|   | 20 Corrective Action Verif. Satisfactory   |  | QAE/Lead Auditor/Date  |  | Division Manager/Date   |
|   | 21 Remarks   |  |  |  |   |
|   | 22 QA CLOSURE  |  |  |  |   |
| <b>Comp. by Orig. QA Org.</b>                   | QAE/Lead Auditor/Date  |  | Division Manager/Date  |  | PQM/Date  |
|   | QAE/Lead Auditor/Date  |  | Division Manager/Date  |  | PQM/Date  |

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8 Requirement ( continued )

performing activities affecting quality shall be clearly established and delineated in writing."

Paragraph 2.1 of the same revision states in part, "The person responsible for directing and managing the overall NNWSI Project Participant QA program shall be identified and have appropriate organizational position, responsibilities, and authority to exercise proper control over the QA program."

Note: As interpreted by the Project Quality Assurance office the QA program includes the individuals directly performing functions of verifying adequacy and effectiveness of the SNL QA program requirements.

9 Deficiency ( continued )

Officer. Furthermore, there was no QA Organizational Chart that delineates the reporting relationship between the QA Coordinator and QA personnel. It should be noted that during the audit there was no objective evidence found which would indicate that the above reporting relationship has had an adverse impact on the SNL QA program.

10 Recommended Actions ( continued )

necessary.

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|  |   |                       |  |                           |   |
|--|---|-----------------------|--|---------------------------|---|
| Completed by Originating QA Organization | 1 Date 9/22/89  |                       | 2 Severity Level <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input checked="" type="checkbox"/> 3 |                           | Page 1 of 2   |
|  | 3 Discovered During<br>AUDIT 89-3<br>(SNL)  |                       | 3a Identified By<br>F.D. PETERS  |                           | 4 SDR No.<br>445 Rev. 0   |
|  | 5 Organization<br>SNL   |                       | 6 Person(s) Contacted<br>L. YARRINGTON   |                           | 7 Response Due Date is<br>20 Working Days from<br>Date of Transmittal |
|  | 8 Requirement (Audit Checklist Reference, if Applicable)<br>SNL-NWRT-QAPP, Rev. E. Sect. 8.0, Identification and Control of Items,<br>Samples, and Data:  |                       |  |                           |   |
| Completed by Originating QA Organization | 9 Deficiency<br>1. The activity which produced IGIS products CALO342 and CALO343 under WBS<br>Element 1.2.1.3.2.S, were assigned a QA Level of I, but the sources of<br>the data used to produce these products, and the QA Levels of the   |                       |  |                           |   |
|  | 10 Recommended Action(s): <input checked="" type="checkbox"/> Remedial <input type="checkbox"/> Investigative <input type="checkbox"/> Corrective<br>1. Modify DOP 3-7 and document the sources of the data for IGIS products<br>CALO342 and CALO343 plus the QA Levels associated with them. |                       |  |                           |   |
|  | 11 QAE/Lead Auditor/Date<br><i>S. Davis 9/22/89</i>   |                       |  |                           |   |
| Completed by Organization in Block 5     | 12 Division Manager/Date<br><i>Edith Heeger 9-22-89</i>   |                       | 13 Project Quality Mgr./Date<br><i>James Blaylock 9/22/89</i>  |                           |   |
|  | 14 Remedial/Investigative Action(s)   |                       |  |                           |   |
|  | 15 Effective Date _____   |                       |  |                           |   |
| Completed by Organization in Block 5     | 16 Cause of the Condition & Corrective Action to Prevent Recurrence   |                       |  |                           |   |
|  | 17 Effective Date _____   |                       |  |                           |   |
|  | 18 Signature/Date   |                       |  |                           |   |
| Comp. by Org. QA Org.                    | 19 Response Accepted  | QAE/Lead Auditor/Date | Division Manager/Date  | Project Quality Mgr./Date |   |
|  | 20 Corrective Action Verif. Satisfactory  | QAE/Lead Auditor/Date | Division Manager/Date  | Project Quality Mgr./Date |   |
|  | 21 Remarks  |                       |  |                           |   |
|  | 22 QA CLOSURE   | QAE/Lead Auditor/Date | Division Manager/Date  | PQM/Date                  |   |

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8 Requirement ( continued )

"8.4.2: General - The identification of Yucca Mountain Project data shall include a reference to the origin of the data (test, experiment, report, publication, etc.) and an indication of the QA Level assigned to the activity which produced the data."

"8.4.2.1 Control measures shall be established and implemented to assure that Yucca Mountain Project data are properly identified. These measures shall include verification of the identification of such data prior to release for use for data resulting from QA Level I or II activities."

9 Deficiency ( continued )

activities which produced that data, were not identified, even though these products have been released for use.

2. The Reference Informance Base item 1.2.9, of Version 4 of the RIB (RIB Control Number DR-22) states that the item (which consists of IGIS products CALO249, CALO250, CALO251), were produced under WBS Element 1.2.4.2.1.1.S as a QA Level I activity. This is incorrect, because these IGIS products were produced from an activity at the IGIS under WBS Element 1.2.1.3.2.S, which was assigned a QA Level of III.

10 Recommended Actions ( continued )

2. Correct the RIB.