



**Department of Energy**  
Office of Civilian Radioactive Waste Management  
Yucca Mountain Site Characterization Office  
P.O. Box 98608  
Las Vegas, NV 89193-8608

**MAY 0 1 1995**

Michaele C. Brady  
Deputy Technical Project Officer  
for Yucca Mountain  
Site Characterization Project  
Sandia National Laboratories  
Bank of America Center  
101 Convention Center Drive  
Las Vegas, NV 89109

**EVALUATION OF RESPONSES TO CORRECTIVE ACTION REQUESTS (CAR)  
YM-95-015 THROUGH YM-95-017 RESULTING FROM YUCCA MOUNTAIN  
QUALITY ASSURANCE DIVISION'S (YMQAD) AUDIT YM-ARP-95-03 OF  
SANDIA NATIONAL LABORATORIES (SCPB: N/A)**

The YMQAD staff has evaluated the responses to CARs YM-95-015 through YM-95-017. The responses have been determined to be unsatisfactory because of reasons stated in the enclosed CARs.

Amended responses are required to be submitted to this office within ten working days of the date of this letter. Send the original of your responses to Deborah Sult, YMQAD/QATSS, 101 Convention Center Drive, Suite 640, Las Vegas, Nevada 89109. If an extension to the due date is necessary, it must be requested in writing, with appropriate justification, prior to that date.

If you have any questions, please contact either Robert B. Constable at 794-7945 or William R. Sublette at 794-7782.

Richard E. Spence, Director  
Yucca Mountain Quality Assurance Division

YMQAD:RBC-3101

Enclosures:  
CARs YM-95-015 Through  
YM-95-017

cc w/encls:

J. G. Spraul, NRC, Washington, DC  
K. L. Boardman, OGD, AL  
S. W. Zimmerman, NWPO, Carson City, NV  
R. R. Richards, SNL, Albuquerque, NM, M/S 1333

cc w/o encls:

W. L. Belke, NRC, Las Vegas, NV  
D. G. Sult, YMQAD/QATSS, Las Vegas, NV

YMP-5

9505090265 950501  
PDR WASTE  
WM-11 PDR

102.7  
WM-11  
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8 CAR NO.: YM-95-015  
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QA

**CORRECTIVE ACTION REQUEST**

1 Controlling Document QAIP 6-3, Revision 02, QAIP 20-2, Revision 00	2 Related Report No. YM-ARP-95-03
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3 Responsible Organization SNL	4 Discussed With M. Riggins/ D. Kessel
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5 Requirement:

QAIP 6-3, Section 5.2, Step 1 states, (Reviewers) "Shall conduct the review in accordance with specified criteria and shall document comments on the DRC form."

Section 3.1, states in part, "Technical Review:," "Technical reviews are in-depth critical reviews, analyses, and evaluations of documents, material, or data that require technical verification and/or validation for applicability, correctness, adequacy, and completeness."

QAIP 20-2, Section 4.1, third bullet, 4. states, "A description of the work performed and results obtained, names of individuals performing the work, and dated initials or signature, as appropriate, of individuals making the entries."

6 Adverse Condition:  
Contrary to the above requirement, a technical review of SLTR94-0001 did not identify the following deficient conditions:

1. The values for displacement (P), pressure (q), and modulus (E) for Test #1239 on page 5-22 of SLTR94-0001 are not consistent with these same values on page #4267 of the Scientific Notebook. It was determined that the values "P", "q", and "E" in the SLTR document are in error for Test #1239. The correct values on page #4267 of the Scientific Notebook are recalculated checking analysis values, whereas, the erroneous values in the SLTR are from the original calculations which are not provided in the Scientific Notebook.
2. SLTR94-001, Page 5-3, Figure 5.1, and Page 5-4, Section 5.2.1: The Standard Penetration Test (SPT) blow count data presented in Figure 5.1, was not corrected for overburden pressures and there is no documentation of that fact on this figure. The SLTR does state on Page 5-4 that "the SPT values are not corrected for overburden pressure", however, this same statement needs to be made on Figure 5.1 where the SPT blow count data is presented. This

9 Does a Significant Condition Adverse to Quality exist? Yes ___ No <u>X</u> If Yes, Check One: <input type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> E	10 Does a stop work condition exist? Yes ___ No <u>X</u> ; If Yes - Attach copy of SWO If Yes, Check One: <input type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> C	13 Response Due Date: 20 Working Days From Issuance
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11 Required Actions:  Remedial  Extent of Deficiency  Preclude Recurrence  Root Cause Determination

12 Recommended Actions:

1. Correct all deficiencies identified in the SLTR94-0001.
2. Evaluate the adequacy of the review process for SLTR's.
3. Evaluate the impact that these deficient conditions will have on the designs or studies supported by this work.

7 Initiator William Sublette <i>WR Sublette</i> 12/13/94	14 Issuance Approved by <i>[Signature]</i> QADD <i>[Signature]</i> Date <u>12-15-94</u>
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15 Response Accepted QAR _____ Date _____	16 Response Accepted QADD _____ Date _____
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17 Amended Response Accepted QAR _____ Date _____	18 Amended Response Accepted QADD _____ Date _____
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19 Corrective Actions Verified QAR _____ Date _____	20 Closure Approved by: QADD _____ Date _____
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8 CAR NO.: YM-95-015  
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**CORRECTIVE ACTION REQUEST (CONTINUATION PAGE)**

6 Adverse Condition (continued)

requirement is necessary so that a user will not unwittingly use this data without realizing that it has not been corrected for overburden pressure. In many instances end users will not read the entire document to determine if there are any qualifying factors associated with the data they wish to use, instead they will only look at the figure or table that the data is presented on.

The PI stated that the SPT blow count data was not corrected for overburden pressure since this was not used to estimate soil properties, however, it was used to help identify stratigraphic continuity. If this data is used for establishing stratigraphic continuity, then it is important that this data is adjusted to account for variations in overburden pressures. Generally the SPT blow count data is used as a preliminary exploration method for identifying areas that may require further exploration and characterization. With this in mind, the question should be asked why the SPT blow count data shown on Figure 5.1 for Unit 4 from boreholes NRG-2D and NRG-2C is noticeably less than most other units penetrated. The next step is to look at the moisture contents in Table 5-2 for these same boreholes in Unit 4. It becomes apparent that the moisture contents are high and a further calculation will show that some of these areas in Unit 4 will probably be 100% saturated and stand-up time and bearing capacity could be adversely impacted.

This demonstrates the exploration and collaboration capabilities of the SPT and why this type of data should not be taken lightly and every effort made to provide the most representative SPT blow count data. Correcting for overburden pressure will provide more representative SPT blow count data.

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CORRECTIVE ACTION REQUEST (CONTINUATION PAGE)

Corrective Action Response for CAR # YM-95-015

CAR YM-95-015 states that a technical review of SLTR94-0001 did not identify two deficient conditions and therefore the cited requirements for technical review were violated. It is SNL's position that this is incorrect and no violation of the requirements for reviews (as referenced in the CAR or otherwise) exists. We agree that there was an error in the calculation of displacement which was cited as an adverse condition, but this does not demonstrate failure to comply with review requirements. We furthermore do not agree that an adverse condition exists with respect to our reporting of Standard Penetration Test (SPT) data.

This report went through seven revisions, three documented technical reviews, QA review and a management review prior to being issued. Written documentation of the reviews are project records.

The following actions are being taken to correct the error identified in the calculation of displacement:

The error in calculation will be corrected and an errata sheet issued to those on distribution for the SLTR. The impact of this error will be evaluated and reported with the errata sheet. Initial review indicated that the erroneous value would be conservative and not impact design adversely.

Person responsible for actions: David Kessel

Actions to be complete by: 2/28/95

SNL does not agree that a deficient condition exists with respect to the presentation of SPT data in SLTR94-0001. The CAR states that an adverse condition exists because SPT data was not corrected for overburden pressure. These data were reported as uncorrected and sufficient detail is provided both in the text and on the supporting figure 5.1 (identified as deficient in the CAR). There is no requirement to provide additional processing of this data to remove the effects of overburden. Trends in this data were utilized as discussed in the CAR and are correctly reported in SLTR94-0001.

No further corrective actions are deemed necessary.

*Michael C. Brady*  
1-23-95

1/23/95 Sheppard to Spence

**EVALUATION OF RESPONSES TO CORRECTIVE ACTION REQUESTS (CAR)  
YM-95-015, YM-95-016 AND YM-95-017**

Responses to CARs YM-95-015, YM-95-016, and YM-95-017 are rejected. Responses to CARs YM-95-015, YM-95-016, and YM-95-017 shall address the extent of the deficiencies and describe what steps will be taken to preclude recurrence. An amended response shall be submitted to YMQAD.

Responses to CARs should follow a format that addresses each indicated "Required Action" in block 11 of the CAR form. It is unclear from your response which required actions you are addressing and which you feel no action is required. It is recommended that when you submit your amended response, each required action be addressed under separate title.

Specific technical and programmatic justification for rejection are provided below.

**YM-95-015 and YM-95-016**

The adverse condition does not question whether the review process was performed but questions the effectiveness of the review process. Verification of correctness of data and calculations is an important part of the review process. The Quality Assurance Requirements and Descriptions Document (Section 2.2.9) requires that review "criteria shall consider applicability, correctness, technical adequacy, completeness, accuracy, and compliance with established requirements.

The technical specialist evaluating SLTR94-0001 and the Scientific Notebook looked at a sample of the report and Scientific Notebook content and identified the errors described in these CARs. This evaluation was not comprehensive and therefore, a commitment should be made to determine if additional errors exist and if other information has been left out of the Scientific Notebook. Additionally, your response regarding SPT blow count data stated the following: "these data were reported as uncorrected and sufficient detail is provided both in the test and on the supporting Figure 5.1 (identified as deficient in the CAR)." This statement is incorrect, there is no detail on Figure 5.1 which states that the SPT blow count data is uncorrected for depth.

**REMEDIAL ACTION:**

Describe actions to be taken to ensure specific errors are corrected. Provide objective evidence that corrections were made.

**EXTENT OF DEFICIENCY:**

Evaluate the SLTR and Scientific Notebook to ensure that similar errors do not exist.

Determine impact of incorrect data on design analysis.

**PRECLUDE RECURRENCE:**

Provide improvements to the review process that will prevent these types of errors.

YM-95-017

As stated in the response to CARs YM-95-015 and YM-95-016, the adverse condition does not question whether the review process was performed but questions the effectiveness of the review process.

With regards to Sandia National Laboratories' (SNL) response to not using the most appropriate plate load bearing procedure, American Society for Testing and Materials (ASTM) D 1196 "Standard Test Method for Nonrepetitive Static Plate Load Tests of Soils and Flexible Pavement Components, for Use in Evaluation and Design of Airport and Highway Pavements", it is Quality Assurance's position that this procedure was developed for a specific purpose (highways and airports) and if SNL wants to use this procedure for a purpose for which it is not intended (spread footings) then SNL needs to document their justification for using ASTM D 1196 in place of the more applicable ASTM D 1194 "Standard Test Method for Bearing Capacity of Soil for Static Load and Spread Footings". ASTM would not have developed separate procedures for spread footings versus highways and airports unless they felt that there was significant enough difference in these two loading conditions that would require separate plate load bearing capacity procedures.

It should also be noted that the ASTM subcommittee chairman responsible for these ASTM standard procedures was contacted, and he stated ASTM D 1194 was the procedure that should have been used. In addition, the Study Plan that this work was performed under "Studies to Provide Soil and Rock Properties of Potential Locations of Surface and Subsurface Access Facilities", identified ASTM D 1194 as an appropriate procedure to evaluate the bearing capacity of soil for static loading on spread footings (see Section 2.3.2.3 in Study Plan 8.3.1.14.2).

**REMEDIAL ACTION:**

1. Provide technical justification for use of ASTM D 1196 instead of D 1194.
2. If technical justification is provided, determine the impact of improperly conducting the test and its effect on design analysis.
3. If a technical justification cannot be provided, determine the impact of using standard procedure ASTM D 1196 and its effect on design analysis.

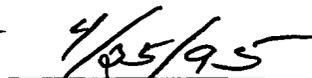
**EXTENT OF DEFICIENCY:**

1. Evaluate other tests to ensure appropriate testing procedures were specified and implemented properly.

**PRECLUDE RECURRENCE:**

1. Provide a description of actions to be taken to ensure that technical reviews of test data assures correct implementation of testing procedures.
2. What actions will be taken to ensure that technical reviews evaluate and assure the appropriateness of procedures used for standard testing activities.

  
William R. Sublette

  
Date

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8 CAR NO.: YM-95-016  
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**CORRECTIVE ACTION REQUEST**

1 Controlling Document QAIP 20-2, Revision 00, QAIP 6-3, Revision 02		2 Related Report No. YM-ARP-95-03	
3 Responsible Organization SNL		4 Discussed With M. Riggins/D. Kessel.	
5 Requirement: QAIP 20-2, Section 4.1, 4. states, "A description of the work performed and results obtained, names of individuals performing the work, and dated initials or signature, as appropriate, of individuals making the entries."  QAIP 6-3, Section 5.2, Step 1, states, (Reviewers) "Shall conduct the review in accordance with specified criteria and shall document comments on the DRC form."  Section 3.1, states in part, "Technical Review:", "Technical reviews are in-depth critical analyses, and evaluation of documents, material, or data that require technical verification and/or validation for applicability, correctness, adequacy, and completeness."			
6 Adverse Condition: Contrary to the above requirement, a technical review of the Scientific Notebook "Characterization of Nonlithified Tuffs, Rainier Mesa and Pre-Rainier Mesa on the West Side of Exile Hill", did not identify the following deficient conditions:  1. Scientific Notebook, Pages 4266-4269: The original calculations for deformation modulus are missing from the Scientific Notebook. However, the results from the original calculations were reported in the SLTR94-0001, Revision 7, Page 5-22, Table 5-8  2. Scientific Notebook, Section 4.4 and the SLTR94-0001, Revision 7, Pages 5-18 and 5-19, Table 5-7: The calculations for cohesion " $C_{y8}$ " as represented in Table 5-7 in the SLTR are not presented in Section 4.4 of the Scientific Notebook.			
9 Does a Significant Condition Adverse to Quality exist? Yes ___ No <u>X</u> If Yes, Check One: <input type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> E		10 Does a stop work condition exist? Yes ___ No <u>X</u> ; If Yes - Attach copy of SWO If Yes, Check One: <input type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> C	
13 Response Due Date: 20 Working Days From Issuance			
11 Required Actions: <input checked="" type="checkbox"/> Remedial <input checked="" type="checkbox"/> Extent of Deficiency <input checked="" type="checkbox"/> Preclude Recurrence <input type="checkbox"/> Root Cause Determination			
12 Recommended Actions: 1. Correct all deficiencies identified and evaluate the extent of documentation problems in the Scientific Notebook. 2. Determine if similar deficiencies exist in other Scientific Notebooks. 3. Evaluate the adequacy of the review process for Scientific Notebooks.			
7 Initiator William Sublette <i>W Sublette</i>		14 Issuance Approved by: <i>William Sublette</i> QADD <i>William Sublette</i> Date <i>12-15-94</i>	
15 Response Accepted QAR _____ Date _____		16 Response Accepted QADD _____ Date _____	
17 Amended Response Accepted QAR _____ Date _____		18 Amended Response Accepted QADD _____ Date _____	
19 Corrective Actions Verified QAR _____ Date _____		20 Closure Approved by: QADD _____ Date _____	

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8 CAR NO.: YM-95-016  
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**CORRECTIVE ACTION REQUEST (CONTINUATION PAGE)**

**13 Recommended Action(s) (continued)**

4. Evaluate the impact that these deficient conditions have on the designs or studies supported by this work.

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8 CAR NO. \_\_\_\_\_  
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CORRECTIVE ACTION REQUEST (CONTINUATION PAGE)

Corrective Action Response for CAR # YM-95-016

CAR YM-95-016 states that a technical review of the Scientific Notebook "Characterization of Nonlithified Tuffs, Rainier Mesa and Pre-Rainier Mesa on the West Side of Exile Hill" did not identify two deficient conditions and therefore the cited requirements for technical review were violated. It is SNL's position that this is incorrect and no violation of the requirements for reviews (as referenced in the CAR or otherwise) exists. Technical and QA reviews of the scientific notebook were performed in accordance with SNL procedures and written documentation of the reviews are recorded in the Scientific Notebook (see pages 4 232, 6 002, and 6 004). Evidence of these reviews was in the Scientific Notebook and available for this audit.

There were two errors of omission associated with providing complete documentation in the Scientific Notebook that were not identified by the technical reviewers and that were identified during the audit. This may have violated the requirement for completeness of documentation in the Scientific Notebook, however this omitted information was documented in SLTR94-0001. The two cited areas requiring clarification will be corrected as follows:

- 1) Dr. Norris' original calculations for deformation modulus will be added to the Scientific Notebook.
- 2) Calculations for cohesion will be added to the Scientific Notebook and will be checked by rewriting the calculations.

Person responsible for action: Mike Riggins  
To be completed by: 2/8/95

No further corrective actions on this CAR are considered necessary because other related YMP CARs (i.e. YM 94-89 and 94-99) concerning Scientific Notebooks will address the issue of completeness of documentation for Scientific Notebooks.

*Michael C. Brady*  
1-23-95

**EVALUATION OF RESPONSES TO CORRECTIVE ACTION REQUESTS (CAR)**  
**YM-95-015, YM-95-016 AND YM-95-017**

Responses to CARs YM-95-015, YM-95-016, and YM-95-017 are rejected. Responses to CARs YM-95-015, YM-95-016, and YM-95-017 shall address the extent of the deficiencies and describe what steps will be taken to preclude recurrence. An amended response shall be submitted to YMQAD.

Responses to CARs should follow a format that addresses each indicated "Required Action" in block 11 of the CAR form. It is unclear from your response which required actions you are addressing and which you feel no action is required. It is recommended that when you submit your amended response, each required action be addressed under separate title.

Specific technical and programmatic justification for rejection are provided below.

**YM-95-015 and YM-95-016**

The adverse condition does not question whether the review process was performed but questions the effectiveness of the review process. Verification of correctness of data and calculations is an important part of the review process. The Quality Assurance Requirements and Descriptions Document (Section 2.2.9) requires that review "criteria shall consider applicability, correctness, technical adequacy, completeness, accuracy, and compliance with established requirements.

The technical specialist evaluating SLTR94-0001 and the Scientific Notebook looked at a sample of the report and Scientific Notebook content and identified the errors described in these CARs. This evaluation was not comprehensive and therefore, a commitment should be made to determine if additional errors exist and if other information has been left out of the Scientific Notebook. Additionally, your response regarding SPT blow count data stated the following: "these data were reported as uncorrected and sufficient detail is provided both in the test and on the supporting Figure 5.1 (identified as deficient in the CAR)." This statement is incorrect, there is no detail on Figure 5.1 which states that the SPT blow count data is uncorrected for depth.

**REMEDIAL ACTION:**

Describe actions to be taken to ensure specific errors are corrected. Provide objective evidence that corrections were made.

**EXTENT OF DEFICIENCY:**

Evaluate the SLTR and Scientific Notebook to ensure that similar errors do not exist.

Determine impact of incorrect data on design analysis.

**PRECLUDE RECURRENCE:**

Provide improvements to the review process that will prevent these types of errors.

YM-95-017

As stated in the response to CARs YM-95-015 and YM-95-016, the adverse condition does not question whether the review process was performed but questions the effectiveness of the review process.

With regards to Sandia National Laboratories' (SNL) response to not using the most appropriate plate load bearing procedure, American Society for Testing and Materials (ASTM) D 1196 "Standard Test Method for Nonrepetitive Static Plate Load Tests of Soils and Flexible Pavement Components, for Use in Evaluation and Design of Airport and Highway Pavements", it is Quality Assurance's position that this procedure was developed for a specific purpose (highways and airports) and if SNL wants to use this procedure for a purpose for which it is not intended (spread footings) then SNL needs to document their justification for using ASTM D 1196 in place of the more applicable ASTM D 1194 "Standard Test Method for Bearing Capacity of Soil for Static Load and Spread Footings". ASTM would not have developed separate procedures for spread footings versus highways and airports unless they felt that there was significant enough difference in these two loading conditions that would require separate plate load bearing capacity procedures.

It should also be noted that the ASTM subcommittee chairman responsible for these ASTM standard procedures was contacted, and he stated ASTM D 1194 was the procedure that should have been used. In addition, the Study Plan that this work was performed under "Studies to Provide Soil and Rock Properties of Potential Locations of Surface and Subsurface Access Facilities", identified ASTM D 1194 as an appropriate procedure to evaluate the bearing capacity of soil for static loading on spread footings (see Section 2.3.2.3 in Study Plan 8.3.1.14.2).

**REMEDIAL ACTION:**

1. Provide technical justification for use of ASTM D 1196 instead of D 1194.
2. If technical justification is provided, determine the impact of improperly conducting the test and its effect on design analysis.
3. If a technical justification cannot be provided, determine the impact of using standard procedure ASTM D 1196 and its effect on design analysis.

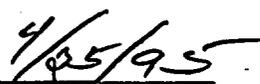
**EXTENT OF DEFICIENCY:**

1. Evaluate other tests to ensure appropriate testing procedures were specified and implemented properly.

**PRECLUDE RECURRENCE:**

1. Provide a description of actions to be taken to ensure that technical reviews of test data assures correct implementation of testing procedures.
2. What actions will be taken to ensure that technical reviews evaluate and assure the appropriateness of procedures used for standard testing activities.

  
\_\_\_\_\_  
William R. Sublette

  
\_\_\_\_\_  
Date

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8 CAR NO.: YM-95-017  
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**CORRECTIVE ACTION REQUEST**

1 Controlling Document QARD, Revision 0, QAIP 1-5, Revision 07, QAIP 6-3, Revision 02		2 Related Report No. YM-ARP-95-03	
3 Responsible Organization SNL		4 Discussed With M. Riggins/D. Kessel	
5 Requirement: QARD, Sections 2.2.9, A., states, "Review criteria shall be established before performing the review. These criteria shall consider applicability, correctness, technical adequacy, completeness, accuracy, and compliance with established requirements."  QAIP 6-3, Section 5.2, Step 1, states, (Reviewers) "Shall conduct the review in accordance with specified criteria and shall document comments on the DRC form."  Section 3.1, states in part, "Technical Review:", "Technical reviews are in-depth critical reviews, analyses, and evaluations of documents, material, or data that require technical verification and/or validation for applicability, correctness, adequacy, and completeness."			
6 Adverse Condition: Contrary to the above requirements, a technical review of the Scientific Notebook utilized for this study did not identify the following deficient conditions:  1) The procedure used to perform the in-situ plate load bearing capacity test was not consistent with the referenced ASTM procedure;  2) The ASTM procedure used for performing the in-situ plate load bearing capacity test was not the most appropriate ASTM procedure for application in this study.  Discussion: Documentation in the Scientific Notebook "Characterization of Nonlithified Tuffs, Rainier Mesa and Pre-Rainier Mesa on the West Side of Exile Hill", Pages 4277-4290, does not show that the testing procedure followed the referenced procedure, "Standard Test Method for Nonrepetitive Static Plate Load Tests of Soils and Flexible Pavement Components, for Use in Evaluation and			
9 Does a Significant Condition Adverse to Quality exist? Yes ___ No <u>X</u> If Yes, Check One: <input type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> E		10 Does a stop work condition exist? Yes ___ No <u>X</u> ; If Yes - Attach copy of SWO If Yes, Check One: <input type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> C	
13 Response Due Date: 20 Working Days From Issuance			
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12 Recommended Actions: 1. Correct all deficiencies identified and evaluate the impacts that this adverse condition will have on the designs or studies that this work supports.  2. Evaluate the adequacy of the review process.			
7 Initiator William Sublette <i>W Sublette</i>		14 Issuance Approved by: <i>W Sublette</i> Date <u>12-15-94</u>	
15 Response Accepted QAR _____ Date _____		16 Response Accepted QADD _____ Date _____	
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**CORRECTIVE ACTION REQUEST (CONTINUATION PAGE)**

5 Requirements (continued)

QAIP 1-5, Section 4.1, Step 1, 2., b., states, "If a Scientific Notebook (SN) is to be used without a governing TP, then the elements listed below shall be addressed, as applicable to the situation, in the WA, and the SN shall be prepared in accordance with Procedure 20-2.

- b. Identification of applicable standards and criteria.

6 Adverse Condition (continued)

Design of Airport and Highway Pavements" (ASTM D-1196-87). This procedure is identified as a nonrepetitive test procedure, however, as noted on pages 4286-4290 the test was performed in a cyclic loading and unloading repetitive process. Contributing further to the problem is that the most appropriate ASTM test procedure, for the loading condition being addressed, was not used. ASTM D 1194-72, "Standard Test Method for Bearing Capacity of Soil for Static Load and Spread Footings", would have been a more appropriate test procedure for use in meeting the objectives of the study. It should also be noted that ASTM D 1194-72 states that if saturated conditions are expected, then it is recommended that prior to testing the soil be saturated to a depth not less than twice the diameter of the largest bearing plate. Another problem noted on pages 4277-4290 was that there is inadequate documentation showing that plates were properly set as per the referenced procedure (Section 4.4 in ASTM D 1196-87).

13 Recommended Action(s) (continued)

3. Use the appropriate procedure in all further testing.

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QA

**CORRECTIVE ACTION REQUEST (CONTINUATION PAGE)**

**Corrective Action Response for CAR # YM-95-017**

CAR YM-95-017 states that a technical review of the Scientific Notebook "Characterization of Nonlithified Tuffs, Rainier Mesa and Pre-Rainier Mesa on the West Side of Dixie Hill" did not identify two deficient conditions and therefore the cited requirements for technical review were violated. It is SNL's position that this is incorrect and no violation of the requirements for reviews (as referenced in the CAR or otherwise) exists. Technical and QA reviews of the scientific notebook were performed in accordance with SNL procedures and written documentation of the reviews are recorded in the Scientific Notebook (see pages 4 232, 6 002, and 6 004). Evidence of these reviews was in the Scientific Notebook and available for this audit.

The plate bearing tests at issue in this CAR were performed by Raytheon Services Nevada (RSN) under RSN's QA program. SNL agrees that RSN did not follow procedure ASTM D 1196 in the performance of the plate load tests. The error identified in block 6, item #1 of this CAR will be corrected by issuing an errata sheet. This errata sheet will identify deviations from the ASTM procedure that were made by RSN. This information will be distributed to those on distribution for SLTR 94-0001 (where these tests were reported). This errata sheet will also be incorporated in the Scientific Notebook. The impact of this error will be evaluated and reported with the errata sheet.

The second adverse condition relates to the use of the appropriate ASTM procedure for plate load tests. There are three ASTM procedures to be considered. Two are for static loading conditions (ASTM D 1194 and ASTM D 1196) and one of these two will be used for all future tests where static loading conditions are anticipated. The third ASTM procedure (D 1195) is most appropriate for designing for cyclic loading conditions and will not be used for developing data for static loading conditions. The impacts from RSN's failure to follow ASTM D 1196 will be evaluated and documented on the above mentioned errata sheet.

Person responsible for action: Mike Riggins  
To be completed by: 2/8/95

No further corrective actions on this CAR are considered necessary.

*Michael C. Buehly*  
1-23-95

**EVALUATION OF RESPONSES TO CORRECTIVE ACTION REQUESTS (CAR)**  
**YM-95-015, YM-95-016 AND YM-95-017**

Responses to CARs YM-95-015, YM-95-016, and YM-95-017 are rejected. Responses to CARs YM-95-015, YM-95-016, and YM-95-017 shall address the extent of the deficiencies and describe what steps will be taken to preclude recurrence. An amended response shall be submitted to YMQAD.

Responses to CARs should follow a format that addresses each indicated "Required Action" in block 11 of the CAR form. It is unclear from your response which required actions you are addressing and which you feel no action is required. It is recommended that when you submit your amended response, each required action be addressed under separate title.

Specific technical and programmatic justification for rejection are provided below.

**YM-95-015 and YM-95-016**

The adverse condition does not question whether the review process was performed but questions the effectiveness of the review process. Verification of correctness of data and calculations is an important part of the review process. The Quality Assurance Requirements and Descriptions Document (Section 2.2.9) requires that review "criteria shall consider applicability, correctness, technical adequacy, completeness, accuracy, and compliance with established requirements.

The technical specialist evaluating SLTR94-0001 and the Scientific Notebook looked at a sample of the report and Scientific Notebook content and identified the errors described in these CARs. This evaluation was not comprehensive and therefore, a commitment should be made to determine if additional errors exist and if other information has been left out of the Scientific Notebook. Additionally, your response regarding SPT blow count data stated the following: "these data were reported as uncorrected and sufficient detail is provided both in the test and on the supporting Figure 5.1 (identified as deficient in the CAR)." This statement is incorrect, there is no detail on Figure 5.1 which states that the SPT blow count data is uncorrected for depth.

**REMEDIAL ACTION:**

Describe actions to be taken to ensure specific errors are corrected. Provide objective evidence that corrections were made.

**EXTENT OF DEFICIENCY:**

Evaluate the SLTR and Scientific Notebook to ensure that similar errors do not exist.

Determine impact of incorrect data on design analysis.

**PRECLUDE RECURRENCE:**

Provide improvements to the review process that will prevent these types of errors.

YM-95-017

As stated in the response to CARs YM-95-015 and YM-95-016, the adverse condition does not question whether the review process was performed but questions the effectiveness of the review process.

With regards to Sandia National Laboratories' (SNL) response to not using the most appropriate plate load bearing procedure, American Society for Testing and Materials (ASTM) D 1196 "Standard Test Method for Nonrepetitive Static Plate Load Tests of Soils and Flexible Pavement Components, for Use in Evaluation and Design of Airport and Highway Pavements", it is Quality Assurance's position that this procedure was developed for a specific purpose (highways and airports) and if SNL wants to use this procedure for a purpose for which it is not intended (spread footings) then SNL needs to document their justification for using ASTM D 1196 in place of the more applicable ASTM D 1194 "Standard Test Method for Bearing Capacity of Soil for Static Load and Spread Footings". ASTM would not have developed separate procedures for spread footings versus highways and airports unless they felt that there was significant enough difference in these two loading conditions that would require separate plate load bearing capacity procedures.

It should also be noted that the ASTM subcommittee chairman responsible for these ASTM standard procedures was contacted, and he stated ASTM D 1194 was the procedure that should have been used. In addition, the Study Plan that this work was performed under "Studies to Provide Soil and Rock Properties of Potential Locations of Surface and Subsurface Access Facilities", identified ASTM D 1194 as an appropriate procedure to evaluate the bearing capacity of soil for static loading on spread footings (see Section 2.3.2.3 in Study Plan 8.3.1.14.2).

**REMEDIAL ACTION:**

1. Provide technical justification for use of ASTM D 1196 instead of D 1194.
2. If technical justification is provided, determine the impact of improperly conducting the test and its effect on design analysis.
3. If a technical justification cannot be provided, determine the impact of using standard procedure ASTM D 1196 and its effect on design analysis.

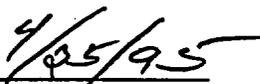
**EXTENT OF DEFICIENCY:**

1. Evaluate other tests to ensure appropriate testing procedures were specified and implemented properly.

**PRECLUDE RECURRENCE:**

1. Provide a description of actions to be taken to ensure that technical reviews of test data assures correct implementation of testing procedures.
2. What actions will be taken to ensure that technical reviews evaluate and assure the appropriateness of procedures used for standard testing activities.

  
William R. Sublette

  
Date