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

FEB 21 1996

L. Dale Foust
Technical Project Officer
for Yucca Mountain Site
Characterization Project
TRW Environmental Safety Systems, Inc.
Bank of America Center, Suite P-110
101 Convention Center Drive
Las Vegas, NV 89109

EVALUATION OF AMENDED RESPONSES TO DEFICIENCY REPORTS (DR) YMQAD-96-D001 AND YMQAD-96-D002 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 amended responses to DRs YMQAD-96-D001 and YMQAD-96-D002 and they have been determined to be unsatisfactory and rejected for the following reasons:

> AP-16.1Q, Revision 0, Paragraph 5.4.1, b) requires that a justification for delay in meeting previously established completion date be provided. The responses received for these deficiency documents extended the time for completion of Remedial Action from 7/1/95 to 4/1/96 and 7/15/95 to 4/1/96, respectively, without providing justification.
>
> Additionally, it is not clear as to what you plan to do with regard to Extent of Deficiency and Action to Preclude Recurrence.

The intent to revise SLTR 94-0001 rather than making corrections and superseding it with a SAND report is, however, acceptable.

Please resubmit an amended response providing justification for the delay and clarification as to the status of commitments made regarding Extent of Deficiency and Action to Preclude Recurrence. 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.

NH03 1/1
102.7
WM-11

YMP-5
9602270041 960221
PDR WASTE
WM-11 PDR

FEB 21 1996

If you have any questions, please contact either Robert B. Constable at (702) 794-7945 or Richard L. Weeks at (702) 794-7853.

R. E. Spence

Richard E. Spence, Director
Yucca Mountain Quality Assurance Division

YMQAD:RBC-1192

Enclosures:
1. DR YMQAD-96-D001
2. DR YMQAD-96-D002

cc w/encls:
T. A. Wood, HQ (RW-14) FORS
R. L. Strickler, M&O, Vienna, VA
R. P. Ruth, M&O, Las Vegas, NV
J. G. Spraul, NRC, Washington, DC
S. W. Zimmerman, NWPO, Carson City, NV

cc w/o encls:
W. L. Belke, NRC, Las Vegas, NV
D. G. Sult, YMQAD/QATSS, Las Vegas, NV
R. L. Weeks, YMQAD/QATSS, Las Vegas, NV

260146

ORIGINAL
THIS IS A RED STAMP

OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT U.S. DEPARTMENT OF ENERGY WASHINGTON, D.C.	8 ☐ Performance Report ☑ Deficiency Report NO. YMQAD-96-D001 PAGE 1 OF 3 QA: L

PERFORMANCE/DEFICIENCY REPORT

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

5 Requirement/Measurement Criteria:
This DR replaces CAR YM-95-015

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

1. The value for displacement (P), pressure (q), and modulus (E) for Test #1239 on page 5-22 of SLTR94-0001 are not consistent with these same valuates 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. SLTR94-0001, 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 requirement is necessary so that a user will not

7 Initiator: William Sublette	Date 11/6/95	9 QA Review: QAR William Sublette	Date 11/7/95
10 Response Due Date: N/A		11 QA Issuance Approval: QAR (PR)/AOQAM (DR)	Date 11/7/95

12 Remedial Actions:

See response to CAR YM-95-015

13 Remedial Action Response By: N/A	Date	14 Remedial Action Due Date: N/A	Date
15 Remedial Action Response Acceptance: QAR N/A	Date	16 PR Verification/Closure: QAR N/A	Date

OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT
U.S. DEPARTMENT OF ENERGY
WASHINGTON, D.C.

DEFICIENCY REPORT

17 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.

18 Investigative Actions:

See response to CAR YM-95-015

19 Root Cause Determination:

N/A

20 Action to Preclude Recurrence:

See response to CAR YM-95-015

21 Response by: N/A Date	22 Corrective Action Completion Due Date: 01/30/96
23 Response Accepted QAR N/A Date	24 Response Accepted AOQAM N/A Date
25 Amended Response Accepted QAR N/A Date	26 Amended Response Accepted AOQAM N/A Date
27 Corrective Actions Verified QAR Date	28 Closure Approved by: AOQAM Date

PR/DR CONTINUATION PAGE

5 Requirement/Measurement Criteria:

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 Description of Condition:

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 overdurden pressure since this was not used to establish 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 is 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.

NOTE: This DR is issued to supercede CAR YM-95-015 in order to implement the revised OCRWM Corrective Action Program.

OFFICE OF CIVILIAN
RADIOACTIVE WASTE MANAGEMENT
U.S. DEPARTMENT OF ENERGY
WASHINGTON, D.C.

CAR NO.: YM-95-015
PAGE: ____ OF ____
QA

CORRECTIVE ACTION REQUEST (CONTINUATION PAGE)

Conditions adverse to quality identified in this CAR are transferred to DR YMQAD-96-D001 in order to implement the revised OCRWM Corrective Action Program. This CAR is considered closed.

W R Sublett
QAR

11/9/95
Date

ORIGINAL
THIS IS A RED STAMP

OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT
U.S. DEPARTMENT OF ENERGY
WASHINGTON, D.C.

8 CAR NO.: YM-95-015
PAGE: 1 OF 2
QA

CORRECTIVE ACTION REQUEST

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

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?	10 Does a stop work condition exist?	13 Response Due Date:
Yes___ No X If Yes, Check One: ☐A ☐B ☐C ☐D ☐E	Yes___ No X ; If Yes - Attach copy of SWO If Yes, Check One: ☐A ☐B ☐C	20 Working Days From Issuance

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 WR Sublette 12/13/94	14 Issuance Approved by: QADD for Date 12-15-94
15 Response Accepted QAR Date	16 Response Accepted QADD Date
17 Amended Response Accepted QAR WR Sublette Date 6/6/95	18 Amended Response Accepted QADD for Date 6/6/95
19 Corrective Actions Verified QAR N/A Date 11/3/95	20 Closure Approved by: QADD Date 11/7/95

Exhibit QAR 16.1.1

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.

OFFICE OF CIVILIAN
RADIOACTIVE WASTE MANAGEMENT
U.S. DEPARTMENT OF ENERGY
WASHINGTON, D.C.

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

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.

W R Sublette 4/25/95

William R. Sublette Date

OFFICE OF CIVILIAN
RADIOACTIVE WASTE MANAGEMENT
U.S. DEPARTMENT OF ENERGY
WASHINGTON, D.C.

8 CAR NO. _____
PAGE ____ OF ____
QA

CORRECTIVE ACTION REQUEST (CONTINUATION PAGE)

CAR YM-95-015

REMEDIAL ACTIONS

The error in the calculation for deformation modulus in the Scientific Notebook were identified and corrected by Mike Riggins during his review of the SN. This error was not corrected in Rev. 6 of the SLTR. The error will be corrected by superseding the SLTR with a SAND Report with corrected data.

The blow count data as reported in figure 5.1 of the SLTR were uncorrected for overburden. This fact was noted in the text supporting this figure. Figure 5.1 will be changed in the SAND Report to indicate that the blow count data are uncorrected.

Responsible Individual: D. S. Kessel
Completion Date: 07/01/95 (submittal for review and publication)

EXTENT OF DEFICIENCY

The error in calculation for deformation modulus was the only such error identified by Mike Riggins in the review of the Scientific Notebook. Failure to correct his error in the SLTR is therefore judged to be an isolated occurrence. The modulus reported in the SLTR was conservative because it was lower than the correct value and therefore would have no adverse impact on design.

A review of the data tables in the SLTR against the corresponding data in the Scientific Notebook will be performed to determine if similar errors in data tables (as for the incorrect modulus value) exist. The reviews will be performed according to QAIP 6-3, Conducting and Documenting Reviews of Documents.

Blow count data were not transmitted to the M&O design group separate from the SLTR. The SLTR explained in text that the blow count data in figure 5.1 were uncorrected for overburden. Furthermore the data were not used in design. The M&O design group will document this in a letter to SNL.

Responsible Individual: D. S. Kessel
Completion Date: 06/15/95

5/24/95 COSTIN TO SPENCE

OFFICE OF CIVILIAN
RADIOACTIVE WASTE MANAGEMENT
U.S. DEPARTMENT OF ENERGY
WASHINGTON, D.C.

8 CAR NO. _____
PAGE ____ OF ____
QA

CORRECTIVE ACTION REQUEST (CONTINUATION PAGE)

PRECLUDE RECURRENCE

QAIP 6-3, Conducting and Documenting Reviews of Documents will be revised. An additional step will be added to the section on "comment resolution" which will require the consideration of the impact on other documents if errors or mandatory changes are noted in the technical review. In addition, QAIP 6-3 will require the use of the Criteria Checklist for technical reviews, and this checklist will be made part of the Document Review and Comment form.

Responsible Individual: J. V. Voigt
Completion Date: 07/01/95

Laurence Costin
SNL YMP Technical Project Officer

Amended Response YMQAD-95-D1 (01/31/96)

Remedial Actions (for old CAR YM-95-015):

The SLTR 94-0001 will be revised and resubmitted to include the results of the review of the data tables against the Scientific Notebooks.

Responsible Person: Dave Kessel
Due Date: 04/01/96

ORIGINAL
THIS IS A RED STAMP

OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT U.S. DEPARTMENT OF ENERGY WASHINGTON, D.C.	8 ☐ Performance Report ☑ Deficiency Report NO. YMQAD-96-D002 PAGE 1 OF 3 QA: L

PERFORMANCE/DEFICIENCY REPORT

1 Controlling Document:	2 Related Report No.
QARD, Revision 0; QAIP 1-5, Revision 07; QAIP 6-3, Revision 02	YM-ARP-95-03

3 Responsible Organization:	4 Discussed With:
SNL	M. Riggins/D. Kessell

5 Requirement/Measurement Criteria:
This DR replaces CAR No. YM-95-017

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

6 Description of 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

7 Initiator	9 QA Review
W R Sublette 11/6/95 William Sublette Date	W R Sublette 11/6/95 QAR William Sublette Date
10 Response Due Date	11 QA Issuance Approval
N/A	QAR (PR)/AOQAM (DR) [signature] Date 11/7/95

12 Remedial Actions:

See response to CAR YM-95-017

13 Remedial Action Response By:	14 Remedial Action Due Date
N/A Date	N/A Date
15 Remedial Action Response Acceptance	16 PR Verification/Closure
QAR N/A Date	QAR N/A Date

Enclosure 2

OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT
U.S. DEPARTMENT OF ENERGY
WASHINGTON, D.C.

DEFICIENCY REPORT

17 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.

3. Use the appropriate procedure in all further testing.

18 Investigative Actions:

See response to CAR YM-95-017

19 Root Cause Determination:

N/A

20 Action to Preclude Recurrence:

See response to CAR YM-95-017

21 Response by: N/A Date	22 Corrective Action Completion Due Date: 01/30/96
23 Response Accepted QAR N/A Date	24 Response Accepted AOQAM N/A Date
25 Amended Response Accepted QAR Date	26 Amended Response Accepted AOQAM Date
27 Corrective Actions Verified QAR Date	28 Closure Approved by: AOQAM Date

PR/DR CONTINUATION PAGE

5 Requirement/Measurement Criteria:

documents, material, or data that require technical verification and/or validation for applicability, correctness, adequacy, and completeness." 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 Description of Condition:

in Evaluation and 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).

NOTE: This DR is issued to supercede CAR YM-95-017 in order to implement the revised OCRWM Corrective Action Program.

OFFICE OF CIVILIAN
RADIOACTIVE WASTE MANAGEMENT
U.S. DEPARTMENT OF ENERGY
WASHINGTON, D.C.

8 CAR NO. YM-95-017
PAGE: ____ OF ____
QA

CORRECTIVE ACTION REQUEST (CONTINUATION PAGE)

Conditions adverse to quality identified in this CAR are transferred to DR YMQAD-96-D002 in order to implement the revised OCRWM Corrective Action Program. This CAR is considered closed.

WR Sublette
QAR

11/2/95
Date

ORIGINAL
THIS IS A RED STAMP

OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT
U.S. DEPARTMENT OF ENERGY
WASHINGTON, D.C.

8 CAR NO.: YM-95-017
PAGE: 1 OF 2
QA

CORRECTIVE ACTION REQUEST

1 Controlling Document	2 Related Report No.
QARD, Revision 0, QAIP 1-5, Revision 07, QAIP 6-3, Revision 02	YM-ARP-95-03

3 Responsible Organization	4 Discussed With
SNL	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?	10 Does a stop work condition exist?	13 Response Due Date:
Yes___ No X If Yes, Check One: ☐A ☐B ☐C ☐D ☐E	Yes___ No X ; If Yes - Attach copy of SWO If Yes, Check One: ☐A ☐B ☐C	20 Working Days From Issuance

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

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. Evalate the adequacy of the review process.

7 Initiator William Sublette 12/13/94	14 Issuance Approved by: QADD Date 12.15.94
15 Response Accepted QAR Date	16 Response Accepted QADD Date 6/6/95
17 Amended Response Accepted QAR 6/6/95 Date	18 Amended Response Accepted QADD Date 6.6.95
19 Corrective Actions Verified N/A 11/15/95 QAR Date	20 Closure Approved by: QADD Date 11/7/95

OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT U.S. DEPARTMENT OF ENERGY WASHINGTON, D.C.

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).

12 ~~13~~ Recommended Action(s) (continued)

3. Use the appropriate procedure in all further testing.

mh 10-10-95

8 CAR NO. _____
PAGE ____ OF ____
QA

OFFICE OF CIVILIAN
RADIOACTIVE WASTE MANAGEMENT
U.S. DEPARTMENT OF ENERGY
WASHINGTON, D.C.

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 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.

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. 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.

W R Sublette 4/25/95

William R. Sublette Date

OFFICE OF CIVILIAN
RADIOACTIVE WASTE MANAGEMENT
U.S. DEPARTMENT OF ENERGY
WASHINGTON, D.C.

6 CAR NO. _____
PAGE ____ OF ____
QA

CORRECTIVE ACTION REQUEST (CONTINUATION PAGE)

CAR YM-95-017

REMEDIAL ACTIONS

The plate load bearing data from SLTR 94-0001 has been submitted as acquired data by TDIF. The RSN Material Test lab performed the plate bearing tests and they were supposed to follow ASTMD 1196. RSN deviated from this procedure as was noted in the CAR. An explanation of the deviations from the ASTM procedure D 1196 and an analysis of the impact of the deviations was included in the TDIF transmitting the test results. A copy of this explanation is attached to this response. The impact of these deviations from ASTM procedure are not considered significant as discussed in the attachment. The SLTR will be issued as a SAND Report and this report will include the attached explanation of deviation from the ASTM procedure and analysis of the impacts.

Responsible Individual: D. S. Kessel
Completion Date: 07/15/95

The second specific issue raised by the CAR regards the appropriateness of the ASTM procedure used for these tests. These tests were performed according to a modified version of ASTM D 1196 using plates as small as 4 inches diameter.

The CAR states that ASTM D 1194 for spread footings would have been more appropriate. We do not agree with this assessment. Neither procedure could be used to generate the required data without modification.

The primary differences between the two procedures are the plate size and the number of test locations. ASTM D 1194 requires 30 inch diameter plates and at least three test locations. ASTM D 1196 was used because it allows the use of plates as small as 6 inches in diameter. D 1196 does not specify the number of tests to be performed although requirement for three test locations in D 1194 was exceeded. Six tests were performed in the Pre-Rainier Mesa Tuff and seven tests were performed in the Rainier Mesa Tuff.

The desired strength parameters were back calculated from the equation for ultimate bearing capacity. In order to determine ultimate bearing capacity the tuff had to be loaded to failure. Plates smaller than 30 inches in diameter were required to produce failure in the tuff material with the largest dead load that could safely be deployed in the bottom of trench NRT-1. In fact, D 1196 had to be modified because a 4 inch diameter plate was required for failure.

The results of these tests were evaluated and determined suitable for the intended use.

5/24/95 [illegible] TO [illegible]

OFFICE OF CIVILIAN
RADIOACTIVE WASTE MANAGEMENT
U.S. DEPARTMENT OF ENERGY
WASHINGTON, D.C.

8 CAR NO. _____
PAGE ____ OF ____
QA

CORRECTIVE ACTION REQUEST (CONTINUATION PAGE)

EXTENT OF DEFICIENCY

A review of the test data for the other tests performed by RSN and reported in SLTR 94001 will be performed. The tests results will be evaluated against the corresponding ASTM procedure to determine if similar undocumented deviations from ASTM procedures exist.

Responsible Individual: D. S. Kessel
Completion Date: 07/15/95

PRECLUDE RECURRENCE

QAIP 6-3, Conducting and Documenting Reviews of Documents will be revised. An additional step will be added to the section on "comment resolution" which will require the consideration of the impact on other documents if errors or mandatory changes are noted in the technical review. In addition, QAIP 6-3 will require the use of the Criteria Checklist for technical reviews, and this checklist will be made part of the Document Review and Comment form.

An exception must be taken to the "recommended action" to preclude recurrence, item 1. There is no action that can be imposed on an individual performing a technical review that will assure testing procedures are implemented correctly, without the technical reviewer being present during the testing. It is believed that the intent of this statement is that the technical reviewer should assess whether the recorded scientific notebook information is consistent with specifics found in the technical procedures.

Responsible Individual: J. V. Voigt
Completion Date: 07/01/95

Laurence S. Costin
SNL YMP Technical Project Officer

Amended Response to YMQAD-95-D2 (01/31/96)

12. **Remedial Actions (for old CAR YM-95-17):**

SLTR 94-0001 will be revised and resubmitted to include an explanation of deviation from ASTM procedure and analysis of the impacts.

Responsible Person: Dave Kessel
Due Date: 04/01/96

1/31/96