



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

APR 07 1995

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

VERIFICATION OF CORRECTIVE ACTION AND CLOSURE OF CORRECTIVE ACTION REQUEST (CAR) YM-94-072 RESULTING FROM YUCCA MOUNTAIN QUALITY ASSURANCE DIVISION'S (YMQAD) AUDIT YMP-94-01 OF THE CIVILIAN RADIOACTIVE WASTE MANAGEMENT SYSTEM MANAGEMENT AND OPERATING CONTRACTOR (SCPB: N/A)

The YMQAD staff has verified the corrective action to CAR YM-94-072 and determined the results to be satisfactory as per the comments stated in the enclosed CAR. As a result, the CAR is considered closed.

If you have any questions, please contact either Robert B. Constable at 794-7945 or Richard E. Powe at 794-7749.

Richard E. Spence, Director  
Yucca Mountain Quality Assurance Division

YMQAD:RBC-2746

Enclosure:  
CAR YM-94-072

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

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

*NH03/11  
102.7/11  
WM-11*

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

8 CAR NO.: YM-94-072  
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**CORRECTIVE ACTION REQUEST**

1 Controlling Document  
OCRWM QARD, DOE/RW-0333P, Revision 01

2 Related Report No.  
YMP-94-01

3 Responsible Organization  
M&O

4 Discussed With  
J. Pye/S. Bonabien

5 Requirement:  
1) QARD, Section 3.2.1.B states: "Design input shall be specified and approved on a timely basis and to the level of detail necessary to permit the design work to be carried out in a correct manner that provides a consistent basis for making design decisions, accomplishing design verification, and evaluating design changes." (Continued on next page)

6 Adverse Condition:  
A lack of documentation exists describing the rationale for making assumptions and selecting data.  
Discussion:  
Examples of the lack of documentation are:  
Structure Steel Sets Analysis, BAREAB000-01717-0200-0002, Revision 00:  
- No rationale for selection of a conservative "rock raveling" value in Attachment I, Page I-1.  
- No rationale for the selection of conservative "Rock Conditions" as presented in Attachment 1, Table 3.  
- No rationale for selecting conservative seismic mean peak horizontal acceleration (0.37) as presented in Attachment II, Table 1.

9 Does a Significant Condition Adverse to Quality exist? Yes \_\_\_ No X  
If Yes, Check One:  A  B  C  D  E

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

3 Response Due Date:  
20 Working Days From Issuance

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

12 Recommended Actions:  
Revise the Structural Steel Sets Analysis to document the rationale for the selection of appropriate conservative data and assumptions. *added 1-3-95 REC.*

7 Initiator  
William R. Sublette *WR Sublette* 8-3-94

14 Issuance Approved by:  
QADD *[Signature]* Date 8-8-94

15 Response Accepted  
QAR *R Stone* Date 9/12/94

16 Response Accepted  
QADD *[Signature]* Date 9-14-94

17 Amended Response Accepted  
QAR *[Signature]* Date 1/31/95

18 Amended Response Accepted  
QADD *[Signature]* Date 2-3-95

19 Corrective Actions Verified  
QAR *R Stone* Date 3/31/95

20 Closure Approved by:  
QADD *[Signature]* Date 4-6-95

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**CORRECTIVE ACTION REQUEST (CONTINUATION PAGE)**

5 Requirements (continued)

- 2) QARD, Section 3.2.2G states: "Design documents shall be sufficiently detailed as to purpose, method, assumptions, design input, references, and units such that a person technically qualified in the subject can understand the documents and verify their adequacy without recourse to the originator." (Also see MEO QAP-3-9, Revision 3, Attachment I, Paragraph 10)

RESPONSE TO CAR NO. YM-94-072

Remedial Action:

Structural Steel Sets Analysis, BABEA0000-01717-0200-00002, Revision 00 will be revised and checked to ensure explanations supporting the engineering judgment used in the preparation of the analysis are present.

No deficiency exists for Item 3. The ESFDR contains the 0.37g as a requirement for ESF Design.

Extent of Deficiency:

The investigative actions performed by J. Pye and S. Bonabian and the conclusions reached regarding Structural Steel Sets Analysis for response to CAR YM-94-072 are as follows:

- Item 1: Engineering judgment was used to reduce the in situ bulk density from 137 lbs/cu ft to 120 lbs/cu ft as a result of the effects of disturbance during tunneling which is a reasonable assumption and consistent with typical published ranges of bulk densities. This was explained in the analysis as a 12% reduction in bulk density.
- Item 2: A load factor was identified from a standard classical reference - "Rock Tunneling with Steel Supports", 1946 by Proctor and White, published by Commercial Shearing Inc., by the Geotechnical LDE as indicated in Attachment 1 of the Structural Steel Sets Analysis BABEAB000-01717-0200-00002.

The load factor of 0.25B with the corresponding description, "Massive moderately jointed" with a propensity for loads to change erratically from point to point were selected on the basis of engineering judgment and field inspection of trench NRT-1, taking into account the geomechanical properties of the Pre-Rainier Mesa material, method of excavation, excavation rate and support installation capabilities of the TBM. Also taken into consideration was the fact that the referenced material is based on 50 year old tunneling technology and practice and as such is not representative of the rapid excavation and support technology employed by the YMP TBM system. The Structural Steel Sets Analysis BABEAB000-01717-0200-00002, Attachment I has been revised to include an explanation based on the above.

- Item 3: The use of 0.37g is consistent with the ESFDR seismic design criteria. No deficiency exists.

8/31/94 LV.ESSB.GH.8/94-753

Review indicates that the deficiency does not extend to the 2C Early Release products.

Corrective Action to Preclude Recurrence:

Assumptions and data used as input to design analyses based on engineering judgment will be explained in sufficient detail to clarify any subjective assessments, to the extent that a person technically qualified in the subject can understand the documents and verify their adequacy without recourse to the originator.

*Done  
10/31*

A documented training session will be conducted for all subsurface designers that are or will be involved in the preparation of analysis stressing the importance of providing the basis for assumptions and selecting data. Refer to QAP-3-9 Attachment I Item 7 requirements.

Responsible Individual: Bob Saunders  
Date of Completion: 9/30/94

  
\_\_\_\_\_  
Alden M. Segrest, Manager  
MGDS Development

*8/31/94*  
\_\_\_\_\_  
Date

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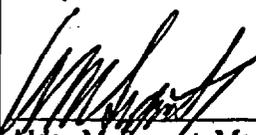
8. CAR NO. YM-94-072  
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CORRECTIVE ACTION REQUEST (CONTINUATION PAGE)

Amended Corrective Action to Preclude Recurrence

A lessons learned program will be instituted to address that "Assumptions and data used as input to design analysis based on engineering judgement will be explained in sufficient detail to clarify any subject assessments, to the extent that a person technically qualified in the subject can understand the documents and verify their adequacy without recourse to the originator."

This action will be completed by March 15, 1995.

  
Alden M. Segrest, Manager      12/20/94      Date  
MGDS Development

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**CORRECTIVE ACTION REQUEST (CONTINUATION PAGE)**

EVALUATION OF AMENDED RESPONSE TO CARS YM-94-065 AND YM-94-072

On December 27, the Office of Quality Assurance received the following letters from the M&O:

1. LV.ESSB.GH.12/94-889 dated December 20, 1994 from L. Dale Foust to Robert M. Nelson, Jr.
2. LV.ESSB.GH.12/94-890 dated December 20, 1994 from L. Dale Foust to Robert M. Nelson, Jr.
3. LV.ESSB.GH.12/94-250 dated December 20, 1994 from L. Dale Foust to Robert M. Nelson, Jr.

Letters LV.ESSB.GH.12/94-889 and LV.ESSB.GH.12/94-890 dated December 20, 1994 from L. Dale Foust to Robert M. Nelson, Jr. state that during the verification and QAP 6.2 review of several design package 2C products, review comments were made that indicate additional extent of deficiency identified in CAR YM-94-065 and YM-94-072. These letters also state that these deficiencies are being tracked via letter LV.ESSB.RMS.12/94-877 and that revisions are necessary to supporting analyses. Letter LV.ESSB.GH.12/94-250 revises the root cause and actions to preclude recurrence indicating that changes are being made to the design control process. Based on this supplemental information, YMQAD needs further clarification to adequately evaluate corrective actions for CARS YM-94-065 and YM-94-072.

1. Letters LV.ESSB.GH.12/94-889 and LV.ESSB.GH.12/94-890 state that the revisions will be completed by February 6, 1995. However, letter LV.ESSB.RMS.12/94-877 indicates that revision of some analyses will not be complete until March 1995. It is unclear what exactly the M&O considers the extent of deficiency for analyses and what the final completion date is for these additional corrective actions.
2. CAR YM-94-065 identifies deficiencies not only related to analyses, but also to drawings and specifications. The M&O committed to rechecking and correcting all Design Package 2C products. Letter LV.ESSB.RMS.12/94-877 identifies several specifications and drawings that need to be revised. Does the M&O consider these items as part of the extent of the deficiency of CAR YM-94-065?

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CORRECTIVE ACTION REQUEST (CONTINUATION PAGE)

3. Letter LV.ESSB.GH.12/94-250 provides an amended response to CAR YM-94-065 but does not provide any due dates for the proposed actions or ask for an extension. The corrective action due dates on the CAR indicate completion by 1/31/95. This appears to be inconsistent with the information provided in M&O letter LV.ESSB.RMS.12/94-877 and M&O letter LV.ESSB.GH.12/94-889.
4. The amended response includes a new completion date of March 15, 1995; does the M&O need an extension for completion of corrective action until this date?

Please provide the additional information within 10 working days. If you have any questions please contact Richard Powe at 794-7749.

Richard E. Powe  
Richard E. Powe

1/10/95  
Date

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CORRECTIVE ACTION REQUEST (CONTINUATION PAGE)

Root Cause requested by letter of February 6, 1995. (Spence to Foust)

Design Personnel were not educated to the fact that all assumptions and inputs used in the analysis required sufficient documentation within the analyses to substantiate the assumptions or inputs. This has been determined to be Cause Code 5C: Inadequate content, under Cause Code 5: Training Deficiency.

  
Alden M. Segrest, Manager  
MGDS Development

  
Date

**Remedial Action Verification**

The Civilian Radioactive Waste Management System Management and Operating contractor (M&O) response indicated that 4 analysis needed to be revised to adequately justify the basis for selection of several values in sufficient details as to purpose, method, assumptions, design input, references, and units such that a person technically qualified in the subject can understand the documents and verify their adequacy without recourse to the originator. These actions were subdivided into 8 specific comment resolutions and the original commitment to provide justification for selection of a conservative "rock raveling" value and conservative "rock conditions" (vertical long term loading).

Also included as part of resolution of this CAR was the proper justification for use of a formula used for documenting the lateral loading on the steel sets (NOTE: This situation is included as part of CAR YM-94-072 by reference only. The actual commitment regarding this issue is part of the remedial action for CAR YM-94-065).

Except for the last commitment discussed (lateral loading on the steel sets) the expected completion date for remedial action was 2/24/95. During March 1995 the 4 draft analysis documents were reviewed by a representative of YMQAD/QATSS to determine adequacy of remedial actions. The following is a discussion of the results of that activity and is keyed to the Comment Number provided in the M&O response.

1. Comment No. 7: "There is no evidence of backup supporting documentation (calculations or analysis) for the materials specified for the components in Sections 2.01 A. 1. - 7., 2.01 B., 2.01 B.1., and 2.01 C." The M&O added further documentation to the "Structural Steel Sets Analysis", Rev. 05 (draft) to address this commit. The revised draft version is adequate.
2. Comment No. 8: "There is no evidence of backup supporting documentation (calculations or analysis) for the materials specified for the bending tolerances and the shop fabrication tolerances specified." This comment addresses Sections 2.02 B. and C of "Steel Sets and Accessories Subsurface Specifications." The M&O added a statement in Attachment VII of the "Structural Steel Sets Analysis", Rev. 05 (draft), tolerances were selected based on constructability and fabrication tolerances. In addition a statement was also added to justify selection of general mill tolerances (identify ASIC or ASTM sources of mill tolerances). The 3/22/94 letter referenced on P. VII-3 was added to the reference section. With regard to Section 2.02 B. 3., a justification was added for "radii of bends are 14 or more times the beam depth" that states that this radii was determined based on fabricators experience with this steel. The M&O also added

the rest of the specification from Attachment VII, p.VII-4, Section 2-(C) to Section 2.02 B. 3. The revised draft version is adequate.

3. **Comment No. 9:** "There is no evidence of backup supporting documentation (calculations or analysis) for the materials specified for the 100mm (4 inches) tolerance specified." This comment addresses Sections 3.03 B.2 of "Steel Sets and Accessories Subsurface Specifications." The M&O added a clarifying statement to the "Structural Steel Sets Analysis", Rev. 05 (draft). The revised draft version is adequate.
4. **Comment No.10:** "Note 7. states, 'Carriage bolts (grade A) shall conform to ASME B18.5-1990 and ASTM A307.' This is no evidence of supporting documentation specifying this material conformance for the carriage bolts." This comment addresses the TS North Ramp Steel Sets & Lagging Drawing. The M&O added reference to ASME B 18.5-1990 in P.III-7 of "Structural Steel Sets Analysis", Rev. 05 (draft), at lagging bolt. The revised draft version is adequate.
5. **Comment No.18:** This comment addressed referencing the QARD Sections 10 and 11 in the Material Dedication Analysis for Commercial Grade Items-Steel Sets. The M&O deleted reference to the QARD in the Material Dedication Analysis for Commercial Grade Items-Steel Sets, Rev. 04 (draft). The revised draft version is adequate.
6. **Comment No.24:** This comment addresses the lack of justification for the W8 x 31 steel set in the "TS North Ramp Ground Support Scoping Analysis." This analysis was revised in the draft of Rev. 02 to delete the size W8 x 31 steel sets and indicate that the specific size would be determined in a separate analysis. The revised draft version is adequate.
7. **Comment No.25:** This comment addresses proper design input call outs within the TS North Ramp Ground Support Scoping Analysis. The "TS North Ramp Ground Support Scoping Analysis", Rev. 02 (draft), was modified to clarify design inputs. The revised draft version is adequate.

8. **Comment No.26:** This comment addresses proper reference to the QARD in the "Materials Dedication Analysis: Rockbolts, Shotcrete and Accessories Procured as Commercial Grade Items", Rev. 01. This document was revised in the Rev. 02A (draft) to clarify the reference. The revised draft version is adequate.
9. **Comments concerning selection of a conservative "rock raveling" value and conservative "rock conditions" (vertical long term loading) within the Structural Steel Sets Analysis.**
- a) The changes made to the "Structural Steel Sets Analysis", Rev. 05 (draft), to resolve the "rock raveling" issue are considered adequate.
- b) The example originally given in CAR YM-94-072 regarding the lack of adequate documentation for the selection of the vertical long term loading (rock conditions) in Attachment IV "Geotech Information on Rock Long Term Loads" of the "Structural Steel Set Analysis" was still not sufficiently documented. This CAR does not question the correctness of the estimate for the long term vertical loading. The problem here is that the justification uses a Terzaghi Table for rock instead of Terzaghi's recommendations for vertical loading on steel supports in soil conditions. The steel sets were being designed for the Bow Ridge Fault area. The material in the Bow Ridge Fault area is a silty sand as described in SLTR "Geoen지니어ing Characterization of Nonlithified Tuffs to be Encountered by the North Ramp West of the Bow Ridge Fault." The designer appears to have selected the  $H_p=0.25B$  for the vertical load and then went into Terzaghi's rock table to find the rock conditions that would produce the 0.25B vertical rock load. It was recommended that the design group use Terzaghi's recommendations for estimating vertical rock loads in a soil or clarify within the analysis why use of rock criteria is still valid in light of the fact that the SAND report classifies the area as a "silty sand" soil. The M&O consulted a knowledgeable individual that was independent of the design responsibility (Dr. M. D. Voegele) and revised the Structural Steel Sets Analysis, Rev. 05 (draft), to address this issue by adding a statement that "The A/E has designed ground support Category 5 and Category 4 by considering the insitu material to behave as a weak but cohesive rock." The author of this CAR does not believe that this statement adequately justifies the calculation since the calculation is based on "massive, moderately jointed rock".
10. The concern regarding the lack of adequate documentation for the lateral loading of the steel sets was satisfied by deleting the original formula and creating a new calculation within the Structural Steel Sets Analysis, Rev. 05 (draft). The revised draft version is adequate.

In summary, except for the situation described in 9b) above, all remedial actions have been completed satisfactorily.

**Verification of Investigative actions and Root Cause Determination**

At the time of the audit (7/94) there were 26 design analysis associated with Design Package 2C of which 10 were considered to support quality affecting work:

BABE00000-01717-0200-00001-00	Material Dedication Analysis for Commercial Grade Items for Concrete and Reinforcement
BABEAB000-01717-0200-00002-00*	Structural Steel Sets Analysis
BABEAB000-01717-0200-00003-00*	Material Dedication Analysis for Commercial Grade Items - Steel Sets
BABEAD000-01717-0200-00003-00	North Ramp Layout Calculation
BABE00000-01717-0200-00004-01	TS North Ramp Blast Design Calculation Package 2C
BABEAB000-01717-0200-00004-00	TS North Ramp Stability Analysis
BABEAB000-01717-0200-00005-00*	TS North Ramp Rock Mass Classification Analysis
BABEAB000-01717-0200-00006-00*	TS North Ramp Alcove Ground Support Analysis
BABEAB000-01717-0200-00007-00	Material Dedication Analysis: Rockbolts, Shotcrete, and Accessories Procured as Commercial Grade
BABEAB000-01717-0200-00008-01*	TS North Ramp Ground Support Scoping Analysis

\* Later revisions of these analysis were reviewed during OCRWM Surveillance YMP-SR-95-005

All analysis associated with design package 2C were re-processed through the design review cycle by the M&O. Five of these 10 analysis were reviewed during OCRWM Surveillance YMP-SR-95-005, which was performed from 10/6/94 through 11/29/94. This surveillance resulted in the expansion on the extent of deficiency from one analysis to 4 analysis and addition of a Root Cause Determination Statement that assigned Cause Code 5C: Inadequate content, under Cause Code 5: Training Deficiency.

**Verification of actions taken to preclude recurrence:**

The M&O indicated that the root cause determination for this CAR was Training; Inadequate content. In other words, the designers did not realize how much detail needed to be documented to justify selection of assumptions and basis. The M&O committed to perform Lessons Learned briefings of appropriate design personnel to assure that they understand the

importance of providing the basis for assumptions and selecting data in sufficient detail. Lessons Learned briefings were given in the September 29 to October 14, 1994 time frame and again in January 1995. The September/October briefing notes contained specific reference to CAR YM-94-072. While the briefing notes for the January 1995 Lessons Learned briefings did not contain specific reference to the CAR YM-94-072 situation, interviews with attendees and instructors, such as Mr. M. Taylor, and Mr. G. Heaney, confirmed that the subject was discussed.

**NOTE:** During the verification activities associated with this CAR a question was raised concerning the Investigative Actions. Was there a need to review previously issued design analysis that were used to support design packages other than Design Package 2C such as analysis used to support Design Package 1A? The answer was that the previous quality related analysis were reviewed and accepted by another design organization (Raytheon Systems of Nevada) and the DOE and no similar deficiencies were noted; therefore, there was no need to re-review those analysis.

#### CONCLUSION

Except for the situation described above in 9b), the M&O satisfactorily completed committed corrective actions. The situation described in 9b) represents a difference of opinion regarding the best way to document justification for selection of vertical loading in possible raveling ground conditions (e.g. the area of the Bow Ridge Fault). The M&O design allows the use of Category 5 steel sets. The Constructor has chosen to only use Category 1, 2, 3 or 4 steel sets to date. The Quality Assurance Representative recommends that this CAR be considered **CLOSED**.

  
\_\_\_\_\_  
Richard E. Powe,  
Quality Assurance Representative

3/31/95  
Date

**TRW Environmental  
Safety Systems Inc.**

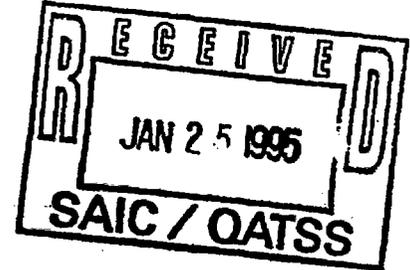
101 Convention Center Drive, Suite 527  
Las Vegas, NV 89109  
702.794.1800

WBS 1.2.6  
QA: N/A

**Contract #:DE-AC01-91RW00134  
LV.ESSB.GH.01/95-516**

**January 17, 1995**

**Mr. Robert M. Nelson, Jr.  
Acting Project Manager  
Yucca Mountain Site Characterization Project  
U. S. Department of Energy  
P.O. Box 98608  
Las Vegas, Nevada 89193-8608**



**Attention: R. E. Spence**

**Dear Mr. Nelson:**

**Subject: Clarification Of Amended Response To CAR YM-94-072  
(SCP#:N/A)**

The M&O is clarifying our previous amended response (Ltr. Foust to Nelson dated 12/20/94) in response to questions from your support staff. The intention of our original response was to demonstrate that the comment responses involved with the resolution of CAR nos. YM-94-065 and YM-94-072 were being tracked within the M&O and would be resolved. Our original intention was not to divide which comments were associated with which CAR. However, for clarification, the comments have been divided. A matrix and the comment sheets associated with CAR YM-94-072 are attached to this letter. The resolution of CAR YM-94-072 involves the revision of the following four design analyses:

**Steel Sets and Accessories BABEAB0000-01717-0200-00002**

**Material Dedication Analysis for Commercial Grade Items - Steel Sets  
BABEAB0000-01717-0200-00003**

**TS North Ramp Ground Support Scoping Analysis BABEA0000-01717-0200-  
00008**

**Material Dedication Analysis: Rockbolts, Shotcrete and Accessories Procured as  
Commercial Grade Items - BABEAB0000-01717-0200-00009**

A similar matrix has been generated for comments associated with CAR YM-94-065. Please note that not all the comment resolutions are indications of deficiencies. However, the M&O has a matrix for those comments and is committed to incorporating those comment resolutions as previously agreed.

The anticipated date of completion for the analysis revisions and the lessons learned session for documenting the basis for assumptions is February 24, 1995.

LV.ESSB.GH.01/95-516  
January 17, 1995  
Page 2

If you have any questions, please contact Jerry Heaney at 794-5156.

Sincerely,

*RM Sandifer*  
*for LDFoust* 1-20-95  
L. Dale Foust  
Assistant General Manager, Nevada Site  
Technical Project Officer

Attachments:

- (1) Matrix Sheet
- (2) Comment Sheet

cc:

- G. S. Abend, M&O, Las Vegas, NV
- G. Heaney, M&O, Las Vegas, NV
- P. G. Jones, M&O, Las Vegas, NV
- CEL* B. R. Justice, M&O, Las Vegas, NV
- J. L. Naaf, M&O, Las Vegas, NV
- R. P. Ruth, M&O, Las Vegas, NV
- RM* R. M. Sandifer, M&O, Las Vegas, NV
- R. S. Saunders, M&O, Las Vegas, NV
- AM* A. M. Segrest, M&O, Las Vegas, NV
- R. E. Spence, YMSCO, NV
- D. Sult, QATSS, Las Vegas *M/S 455*
- Project File No.102.01.1
- LVRPC

LDF:GH:cam

DS  
4/6/95

Review Comments Associated With CAR YM-94-072

Comment No.	Assigned To	Task	Status	Estimated Completion
7	Taylor	Revise steel set analysis CAR YM-94-072 deficiency		2/24/95
8	Taylor	Revise steel set analysis CAR YM-94-072 deficiency		2/24/95
9	Taylor	Revise steel set analysis CAR YM-94-072 deficiency		2/24/95
10	Taylor	Revise steel set analysis CAR YM-94-072 deficiency		2/24/95
18	Taylor	Revise material dedication analysis. A deficiency related to CAR YM-94-065.		2/24/95
24	Pye	Revise North Ramp Scoping analysis to delete callout of size steel sets in this analysis. Not a deficiency.		2/24/95
25	Pye	Revise North Ramp Scoping analysis to clarify relationship to other analyses. Not a deficiency but a clarification.		2/24/95
26	Rogers	Revise material dedication analysis. Confusion as to applicable criteria. A deficiency related to CAR YM-94-072.		2/24/95

1. - lac

7

Design Verification Record  
(Continued)

14. DESIGN PACKAGE TITLE			15. DATE	
Quality Affecting Portion of Package 2C (4th release)			10/14/94	
16. COMMENT NO.	17. DOCUMENT SECTION/ PARAGRAPH	18. COMMENTS	19. RESPONSE	20. ACCEPTED
3	SPEC. 02741 STEEL SETS AND ALL SEAM'S SUBSURFACE SPECIFICATION SECTION: 2.01 PAR.: A, B, C	There is no evidence of backup support- ing documentation (calculations or analysis) for the materials specified for the components in Sections 2.01 A. 1.- 7., 2.01 B., 2.01 B. 1., and 2.01 C.	This will be included in the next revision of the analysis. 10-27-94 (the steel set analysis)	ACCEPT JH 10-27-94
21. REVIEWED BY:		22. RESPONSE BY:		
William Hunt <i>William Hunt</i>		E.M. Sedwick <i>E.M. Sedwick</i>		
10-25-94 Date		10/27/94 Date		

10-27-94

8

Design Verification Record  
(Continued)

14 DESIGN PACKAGE TITLE				15. DATE
Quality Affecting Portion of Package 2C (4th release)				8 10/14/94
16. COMMENT NO	17. DOCUMENT SECTION/ PARAGRAPH	18. COMMENTS	19. RESPONSE	20. ACCEPTED
4	SPEC. ON ST STEEL SETS AND ACCESSORIES SUBSURFACE SPECIFICATION  SECTION: 2.02 PAR.: B & C	There is no evidence of backup support- ing documentation (calculations or analysis) for the bending tolerances and the shop fabrication tolerances specified.	This will be included in the next revision of the analysis, <del>etc</del> (steel set analysis)  EMJ 10-27-94	ACCEPT 2010 10-27-94
21. REVIEWED BY William Hunt _____ Print Name and Sign		10-25-94 _____ Date	22. RESPONSE BY E.M. JEDEN _____ Print Name and Sign	
			10/27/94 _____ Date	

9

CRWMS:M&O

### Design Verification Record (Continued)

WBS: 1.2.6

13. QA: QA

Page: 5 Of: 5

15. DATE: 10/14/94

14. DESIGN PACKAGE TITLE: Quality Affecting Portion of Package 2C (4th release)

16. COMMENT NO	17. DOCUMENT SECTION/ PARAGRAPH	18. COMMENTS	19. RESPONSE	20. ACCEPTED
5	SPEC. 02341 STEEL SETS AND ALL SUBJECT SUBSIDIARY SPECIFICATION SECTION: J.03 PAR: B 2.	There is no evidence of backup support- ing documentation (calculations or analysis) for the 100mm (4 inches) tolerance specified.	This will be included in the next revision of the analysis. (steel set analysis)	ACCEPT 2/28 10-27-94

21. REVIEWED BY: William Hunt  
Signature: *William Hunt*  
Date: 10-25-94

22. RESPONSE BY: *[Signature]*  
Signature: *[Signature]*  
Date: 10/27/94

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Design Verification Record  
(Continued)

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14. DESIGN PACKAGE TITLE			15. DATE	
Quality Affecting Portion of Package 2C (4th release)			10/14/94	
16. COMMENT NO.	17. DOCUMENT SECTION/ PARAGRAPH	18. COMMENTS	19. RESPONSE	20. ACCEPTED
7	IS NORTH RAMP STEEL SETS & LAGGING ELEVATION DRAWING, BY: BAREAB000- 0177-2100- 41101 REV. 03  NOTE 7.	Note 7. states, "Carriage bolts(grade A) shall conform to ASME B18.5-1990 and ASTM A307." This is no evidence of supporting documentation specifying this material conformance for the carriage bolts.	<i>This will be incorporated into the next revision to the analysis, (steel set analysis)</i>	ACCEPT WRA 10-27-94
21. REVIEWED BY:		22. RESPONSE BY:		
William Hunt <i>William Hunt</i> <small>Print Name and Sign</small>		E.M. F. [Signature] <small>Print Name and Sign</small>		
10-26-94		10/27/94		
<small>Date</small>		<small>Date</small>		

18

RWMS/M30

### Design Verification Record (Continued)

WBS: 1.26  
13. QA: QA  
Page: 16 of 33

DESIGN PACKAGE TITLE			18. DATE	
Major Affecting Portion of Package 2C (4th release)			10/14/94	
6. COMMENT NO.	17. DOCUMENT SECTION/PARAGRAPH	18. COMMENTS	19. RESPONSE	20. ACCEPTED
15	BASE AB000-0177-0200-00003	BABEAB00-0177-0200-00003 N-3 MATERIAL DEDICATION ANALYSIS FOR COMMERCIAL GRADE STEEL-STEEL SETS Per 6.1. As identified in the Material Dedication Analysis for Babco, Testing Criteria must meet QARD Section 11 criteria. This analysis specifically addresses meeting QARD Section 10 requirements for satisfying "Inspection and Test Plan" requirements. QARD Section 11 also applies. The analysis and specification specifically identify "testing" requirements. See previous comments.	ACCEPT. CHANGES WERE MADE TO THE MATERIALS DEDICATION ANALYSIS BABEAB00-0177-0200-00003 REV 01. IN REGARDS TO REMOVING QARD SECTION 10 & 11, WERE MADE TO THE BABEAB00-0177-0200-00003 REV 03 TH. ONLY REFERENCE TO QARD SECTION 11 IS A QUOTE FROM THE YMP DESIGN PLAN, WHICH IS THE BASIS FOR INCLUDING INSPECTION AND TEST CRITERIA IN THE SPECIFICATION AND NOT PRODUCING A SEPARATE PLAN	Accepted JP 10/27/94
21. REVIEWED BY:		22. RESPONSE BY:		
John W Peters <i>John W Peters</i> 10/26/94		JOHN H. PUE <i>John H. Pue</i> 10/27/94		

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Design Verification Record (Continued)

14. DESIGN PACKAGE TITLE Quality Affecting Portion of Package 2C (3rd release)		15. DATE 09/29/94	
16. COMMENT NO.	17. DOCUMENT SECTION/ PARAGRAPH	18. COMMENTS	19. RESPONSE
JJC of 4 10-11-94	BABEAB000-01717-2100-40151 10-10-94 11/10-10-94	TS North Ramp Gr... BABEAB000-01717-2100-40151 The Table on this drawing calls out installation of Structural Steel Sets for Category 3 ground support. However, the TS North Ramp Seismic Analysis DI BABEAB000-01717-0100-0001 Rev 2, page 51 of 81, specifically calls out installation of 43 x 11 steel sets. It is not clear where the source of the specific requirement for installation of 43 x 11 steel sets comes from for the analysis and why this requirement is not captured in DWG 40151. (QAP 6.2 Review Criteria 3.7 and 3.11) PLS	The TS North Ramp Seismic Analysis will be revised to delete the callout for the size of the steel sets adding a note to the effect that the size will be determined via separate analysis. Since this change will not impact any of the associated design outputs, the revision will be made after the design package is issued and the appropriate inputs/stress will be updated accordingly.
		NOTE: THIS COMMENT GENERATED BY QRA DURING SURVEILLANCE. 1 CONCERN 10-11-94	ACCEPTED 10-11-94 ACCEPT

21. REVIEWED BY:  
John J. Clark  
10-10-94  
Date

22. RESPONSE BY:  
John H. Pye  
10-11-94  
Date

29

Design Verification Record  
(Continued)

14. DESIGN PACKAGE TITLE  
Quality Affecting Portion of Package 2C (3rd release)

15. DATE  
09/29/94

16. COMMENT NO.	17. DOCUMENT SECTION/ PARAGRAPH	18. COMMENTS	19. RESPONSE	20. ACCEPTED
<p>U.C. 09 10-11-94 JJB 10-11-94 10-11-94</p>	<p>TS NORTH RAMP GROUND SUPPORT SCOPING... BAOEAD000-01917-0100-00.010 SECT...5.0</p>	<p>REGARDING DESIGN INPUTS p.11 of the scoping analysis calls out the following design inputs: TDIF 030273 provided by SNL (Design Input 5.3) TS North Ramp Mass Classification (Design Input 5.3) TS North Ramp Stability Analysis (Design Input 5.4) TS North Ramp Alcove Ground Support Analysis (Design Input 5.5)  These design inputs are not listed in the Section 5.0 of the Analysis. Demonstrate that these inputs were appropriately identified and checked in accordance with CAP-3-9. (ALM)</p> <p>NOTE: THIS COMMENT GENERATED BY 1. OQA DURING SURVEILLANCE. JJB 10-11-94</p>	<p>Page 11 of the scoping analysis will be changed (as a part of the revision to this document as discussed under 5. above) to delete the bulleted wording. The item under the first bullet is presently captured in Design Inputs, Section 5. The remainder of the items were not design input. They are used as references elsewhere in the scoping analysis that confirm the appropriateness of the designs selected in the scoping analysis. The analysis will be clarified to better address the relationship of these analyses to one another when it is revised.</p> <p>THIS CHANGE WILL NOT IMPART ANY OF THE ASSOCIATED DESIGN OUTPUTS, THE REVISION WILL BE MADE AFTER THE DESIGN PACKAGE IS ISSUED AND THE APPROPRIATE INPUTS SHEETS WILL BE UPDATED ACCORDINGLY. JJB/10/94.</p>	<p>JJB 10-11-94 ACCEPT  ACCEPT ADDITION JJB 10-11-94</p>

21. REVIEWED BY:  
John J. Clark  
John J. Clark  
10-10-94  
Date

22. RESPONSE BY:  
John H. Pyle  
John H. Pyle  
10-11-94  
Date

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Design Verification Record  
(Continued)

14. DESIGN PACKAGE TITLE Quality Affecting Portion of Package 2C (3rd release)		15. DATE 09/29/94	
16. COMMENT NO.	17. DOCUMENT SECTION/ PARAGRAPH	18. COMMENTS	19. RESPONSE
JVC 047 8/16 10-11-94 10-10-94	BABEAB000-01717-6300-2X02165 SECT. 6.1 & 6.2 & 6.3	10-10-94 The Specification Inputs list for BABEAB000-01717-6300-2X02165 Rev 6 "Rockbolts ad Accessories" identifies the Material Dedication Analysis ID: BABEAB000-01717-0200-00009 rev. 11 as a design input. This analysis clearly describes both Inspection and Test requirements as addressed in QAD section 7.2.12 for commercial grade items. (The QAD allows for either.) Testing (section 11.0 and Inspection (QAD section 10.0) are different elements of the TNP QA program. Section 6.0 of the analysis refers to QAD Section 7.2.12 D and QAD Section 10 but not to QAD Section 11.0. The analysis specifically calls for Inspection or Testing of commercial grade items in para 10.1.4; inspection and testing in 10.3.1.1 and 10.3.1.3 for rockbolts; testing of shotcrete cores in paragraph 10.3.2.2; rockbolt Test Requirements in 10.4.3.1 and separate inspection requirements in 10.5.3.1 and 10.4.3.3; construction testing requirements in 10.5.3.1 and Section 11.0 (Testing) requirements are not imposed as required by the QAD. (CAP 6.3 Review Criteria 3.9) KOG	1) The Materials Dedication Analysis will be revised to delete the following: the last sentence in Section 6.1 will be deleted, 2) all of Section 6.2 will be deleted, and, 3) all of Section 6.3 will be deleted. Since this change will not impact any of the associated design outputs, the revision will be made after the design package is issued and the appropriate inputs sheets will be updated accordingly.
21. REVIEWED BY: John J. Clark <i>[Signature]</i> 10-10-94		22. RESPONSE BY: DANA J. ROGERS <i>[Signature]</i> 10-11-94	

NOTE: THIS COMMENT GENERATED BY  
OQA DURING SURVEILLANCE.  
1 CORCHER  
10-11-94

ACCEPTED  
10-11-94  
ACCLT

## Reference:

- a) LV.ESSB.GH.12/94-890 dated December 20, 1994 from L. Dale Foust to Robert M. Nelson, Jr.
- b) YMQAD:RBC-1668 dated January 17, 1995 from Richard E. Spence to L. Dale Foust
- c) LV.ESSB.GH.01/95-516 dated January 17, 1995 from L. Dale Foust to Robert M. Nelson, Jr.

Reference a) amended the response to the subject CAR by expanding the extent of the deficiency and changing the Corrective Action to Preclude Recurrence from training by 9/30/94 to conducting Lessons Learned training by 3/15/95, and extended the date for completion of Remedial Action from 10/31/94 to 2/6/95.

- 2. Reference b) informed the CRWMS M&O that additional information was needed to properly evaluate the amended response: the extent of the deficiency was not described in sufficient detail and there was conflicting expected completion dates.
- 3. Reference c) responded to Reference 2 and clarified the extent of the deficiency and provided an expected completion date for Remedial Action and Corrective Action to Preclude recurrence of 2/24/95.
- 4. Based on a review of the above documentation and OCRWM Surveillance Report YMP-SR-95-005, and review of comments generated during that surveillance, it appears that the CRWMS M&O has determined the extent of the deficiency except for addressing one comment:

Structural Steel Sets Analysis (DI #BABEAB000-01717-0200-00002, Revision 4), Attachment IV, Page IV-6:

Adverse Condition: Adequate documentation is not provided describing how the following equations for lateral ground loading on the steel sets were developed:

$e_1$  = soil active pressure (psf)/ft

$e_2$  = soil elastic reaction (psf)/ft

For  $k = 2$       $e_1 = -(0.4803 e_1 - 0.3625 q - 0.719 g)$

For  $k = 3$       $e_2 = -(0.905 e_1 - 0.739 q - 0.973 g)$

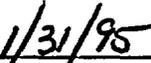
$e = e_1 + e_2 + \text{Total Soil Reaction Pressure}$

This condition is further evidence of lack of documentation describing rational for making assumptions and selecting data. It is also further evidence that the CRWMS M&O checking process is not identifying these types of conditions. The checking process conditions adverse to quality are documented in CAR YM-94-065.

On 1/27/95 a meeting was held between R. Howard/OQA (The assigned QA Representative for CAR YM-94-065), R. Powe/OQA (The assigned QA Representative for CAR YM-94-072, and P. Jones, a representative from the CRWMS M&O to discuss the situation. The above condition is being evaluated by the CRWMS M&O and will be addressed in CAR YM-94-065.

5. **ACTION REQUIRED:** The extent of the deficiency has been expanded from one analysis to 4 analysis and the original corrective action to preclude recurrence was not effective. Based on a review of the situation as described above, OQA accepts the amended response; however, since the deficiency is larger in scope than originally described OQA is requesting that the CRWMS M&O perform a Root Cause Determination for this CAR and report the results to OQA in writing on or before 2/24/95. This report should include a description of the efforts used to investigate the extent of this deficiency and the actions taken to assure that all appropriate personnel receive Lessons Learned training.

 FOR R.E. POWE  
\_\_\_\_\_  
R. E. Powe, QAR

  
\_\_\_\_\_  
Date