



Department of Energy  
Yucca Mountain Site Characterization  
Project Office  
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WBS 1.2.9.3

SEP 29 1992

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for Yucca Mountain  
Site Characterization Project  
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Las Vegas, NV 89109

EVALUATION OF RESPONSE TO CORRECTIVE ACTION REQUEST (CAR) YM-92-050 RESULTING FROM YUCCA MOUNTAIN QUALITY ASSURANCE DIVISION (YMQAD) AUDIT YMP-92-18 OF RAYTHEON SERVICES NEVADA (RSN)

The YMQAD staff has evaluated the response to CAR YM-92-050. The response has been determined to be unsatisfactory based on the inaccurate or misleading statement in the second sentence of the second paragraph. The sentence reads as follows: "The examples given are misleading in that not all values stated are assumptions, rather, some are calculated results from using an assumption." This is a misleading statement in itself. The joint friction angle is equal to the inverse tangent of the coefficient of friction. RSN assumed a coefficient of friction of 0.6 and then calculated the inverse tangent of 0.6 to arrive at a joint friction angle of 30.96 degrees, which they claim is not an assumed value since they calculated the joint friction angle. The fallacy of this logic is that the coefficient of friction was initially assumed, and by taking the inverse tangent of this value will not make it anything other than an assumed value even though it is in a different form.

It is recommended that the sentence, "The examples given are misleading in that not all values stated are assumptions, rather, some are calculated results from using an assumption," be deleted from RSN amended response dated September 1, 1992.

An amended response is required to be submitted to this office within ten working days of the date of this letter. Send the original of your response to Nita J. Brogan, Science Applications International Corporation, Las Vegas, Nevada. If an extension to the due date is necessary, it must be requested in writing with appropriate justification prior to that date.

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PDR WASTE  
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PDR

YMP-5

ADD: Ken Hooks  
L.R. Enc.

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SEP 29 1992

If you have any questions, please contact either Robert B. Constable at 794-7945 or Donald J. Harris at 794-7356.



Richard E. Spence, Director  
Yucca Mountain Quality Assurance Division

YMQAD:RBC-5774

Enclosure:  
CAR YM-92-050

cc w/encl:

K. R. Hooks, NRC, Washington, DC  
S. W. Zimmerman, NWPO, Carson City, NV  
M. J. Regenda, RSN, Las Vegas, NV  
J. H. Rusk, MACTEC, Las Vegas, NV  
N. J. Brogan, SAIC, Las Vegas, NV, 517/T-12

cc w/o encl:

J. W. Gilray, NRC, Las Vegas, NV

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

8 CAR NO.: YM-92-050  
DATE: 6/26/92  
SHEET: 1 OF 2  
QA

**CORRECTIVE ACTION REQUEST**

1 Controlling Document QAPD-002, Rev 0, Change Notice B; PP-03-03, Rev 0 PIC 1, 2, & 3		2 Related Report No. Audit YMP-92-18	
3 Responsible Organization RSN		4 Discussed With E. Stanley, A. Ali	
5 Requirement: <ol style="list-style-type: none"> <li>1. QAPD Section 3, Paragraph 3.2.3-b, states in part; "Includes the following features; b- Sufficient detail as to purpose, method, assumptions, design input, references and units to enable an individual technically qualified in the subject to review and understand the analysis and verify adequacy of the results without recourse to the Originator."</li>   <li>PP-03-3, Rev. 0, PIC 1, 2 &amp; 3 Analysis and Studies</li>   <li>2. PP-03-03, Para. 6.5.5. states: "Assumptions - In order to complete the analysis, the Originator may have to make assumptions which are not clearly identified or controlled by the design inputs or other sources of information. These assumptions, along with the basis for the assumptions, must be clearly stated within the analysis. Those assumptions which require verification as the design proceeds must be identified. The assumptions used must be listed in</li> </ol>			
6 Adverse Condition: <p>Contrary to the stated requirements, inadequate justification was provided for how some design input rock mechanics properties were assumed. The Originator of Design Analysis ST-MN-209 (Highwall Stability Analysis) justified the selection of certain rock mechanics properties by stating their selection was based on "engineering experience."</p> <p>Example of inadequately justified assumptions are as follows:</p> <p>Design Analysis ST-MN-209, Rev. A, p. 8          Rock Mass Tensile Strength = 10 MPa.          Joint Cohesion = 1 MPa          Joint Friction Angle = 30.96          Joint Tensile Strength = 0.5 MPa          Joint Angle = 80</p>			
9 Does a significant condition adverse to quality exist? Yes ___ No <u>X</u> If Yes, Circle One: A B C		10 Does a stop work condition exist? Yes ___ No <u>X</u> ; If Yes - Attach copy of SWO If Yes, Circle One: A B C D	
11 Response Due Date: 20 days from issuance.			
12 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			
13 Recommended Actions:			
7 Initiator D. Harris <i>D. Harris</i> Date <u>7-1-92</u>		14 Issuance Approved by: QADD <i>[Signature]</i> Date <u>7/6/92</u>	
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-92-050  
DATE: 6/26/92  
SHEET: 2 OF 2  
QA

**CORRECTIVE ACTION REQUEST (Continuation Page)**

5 Requirements (continued)

this section and the pages or paragraphs where the assumptions are located shall be annotated in this section."

6 Adverse Condition (continued)

Design Analysis ST-MN-217, Rev A, p. 2  
Tensile Strength of the rock mass = 10 MPa

By simply stating that "engineering experience" was used to make design input assumptions does not provide a clear description of the basis for the assumption selection as described in PP-03-03, Section 6.5.5.

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DATE: 08-04-92  
PAGE: 1 OF 1  
QA

**CORRECTIVE ACTION REQUEST (Continuation Page)**

A. Remedial

For the analyses already performed and in place, RSN will not change the wording of "engineering judgement" as the basis for assumptions. Assumptions made in these analyses have been identified as needing to be verified prior to use for their intended purpose. Parameters used in stability analyses will be correlated with field data from final soils and rock investigative reports, and changed of necessary.

B. Extent of Deficiency

The RSN design department does not concur with the CAR finding as described in YM-92-050. The examples given are misleading in that not all values stated are assumptions, rather, some are calculated results from using an assumption. The issue remains whether the reason for choosing an assumed value given as "engineering experience" is an adequate basis for selection. The source for rock mechanics properties as shown in the CAR is the Reference Information Base (RIB) which gives a range of values for a given geologic unit. The design process should have values that are more location specific, such as for opening stability analysis of the ramp portal. These parameters are scheduled to be determined through a rock and soil program that derives the values from actual site specific pits and drill holes. The results from these investigations have not yet been supplied for use in the analyses. Until then, assumed values must be used and tagged for subsequent verification.

The term "engineering judgement" at this stage of investigation is deemed to be a valid and clearly stated basis for assumption. As noted in the referenced CAR, no significant adverse condition to quality exists. This is because the assumed values must be verified prior to use of a designed item for its intended purpose.

C. Preclude Recurrence

Since RSN believes that "engineering judgement" is an adequate statement for the basis of assumed values, no corrective action will be taken. RSN design process will continue to flag all assumptions according to internal procedure, and verify that the assumed values are reasonable and adequate.

Response Approved: Bruce T. Stanley  
Responsible Manager

Date: 8-4-92

AMENDED RESPONSE TO CORRECTIVE ACTION REQUEST YM-92-050, AUDIT YMP-92-18

A. REMEDIAL

For the analyses already performed and in place, RSN will supplement the wording of "engineering judgement" as the basis for assumptions. Additional backup will be given as to the nature of the "judgement", the source of supporting evidence, and/or further explanation as to whether the assumption is reasonable in the applied instance.

The above action will be completed by October 2, 1992.

B. EXTENT OF DEFICIENCY

The examples given are misleading in that not all values stated are assumptions, rather, some are calculated results from using an assumption. The source for rock mechanics properties as shown in the CAR is the Reference Information Base (RIB) which gives a range of values for a given geologic unit. The design process should have values that are more location specific, such as for opening stability analysis of the ramp portal. These parameters are scheduled to be determined through a rock and soil program that derives the values from actual site specific pits and drill holes. The results from these investigations have not been supplied for use in the analyses. Until then, assumed values must be used and tagged for subsequent verification.

C. PRECLUDE RECURRENCE

The RSN design process will continue to flag all assumptions according to internal procedures, and verify that the assumed values are reasonable and adequate.

Amended Response Approved: Bruce T. Stanley Date: 9-1-92  
Responsible Manager

*Ltr dtd 9/8/92 - RSN - YMP - 622*