



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

JAN 24 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

EVALUATION OF AMENDED RESPONSE TO CORRECTIVE ACTION REQUEST  
(CAR) YM-94-075 RESULTING FROM YUCCA MOUNTAIN QUALITY ASSURANCE  
DIVISION (YMQAD) AUDIT YMP-94-01 OF CIVILIAN RADIOACTIVE WASTE  
MANAGEMENT SYSTEM MANAGEMENT AND OPERATING CONTRACTOR  
SCPB: N/A)

The YMQAD staff has evaluated the amended response to CAR  
YM-94-075. The amended response has been determined to be  
satisfactory. Verification of completion of the corrective  
action will be performed after the effective date provided.  
Any extension to this date must be requested in writing, with  
appropriate justification, prior to the date. Please send a  
copy of extension requests to Deborah Sult, YMQAD/QATSS,  
101 Convention Center Drive, Suite 640, Las Vegas, Nevada 89109.

If you have any questions, please contact either Robert B.  
Constable at 794-7945 or John F. Pelletier at 794-7538.

*Robert B. Constable* for

Richard E. Spence, Director  
Yucca Mountain Quality Assurance Division

YMQAD:RBC-1837

Enclosure:  
CAR-YM-94-075

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/TRW, Vienna, VA  
Richard Jiu, M&O/TRW, Las Vegas, NV  
R. P. Ruth, M&O/TRW, Las Vegas, NV

cc w/o encl:  
W. L. Belke, NRC, Las Vegas, NV  
D. G. Sult, YMQAD/QATSS, Las Vegas, NV  
D. G. Horton, OQA (RW-3) NV  
W. E. Barnes, YMSCO, NV

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WM-11 PDR

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

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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 P. Hastings/R. Saunders	
5 Requirement: QARD DOE/RW-0333P, Section 3, "Design Control" states that design documents shall be adequate to support design, fabrication, construction, and operation; and also, that appropriate standards shall be identified and documented. (Continued on next page)			
6 Adverse Condition: Determination of Importance Evaluation for Package 2C, DI#BAB000000-01717-2200-00005, Revision 00, approved 6/28/94, states that the following requirements have been identified as a result of this evaluation: standard TBM mining practices used for excavation of the TS North Ramp shall be controlled, to conduct these operations "...in such a manner as to limit adverse effects on the long-term performance of the geologic repository to the extent practical" (10CFR60.15(c)(1)). Such controls include qualification of those performing TBM operations, performance to required tunnel line and grade tolerances, and A/E acceptance of TBM tunnel line and grade excavation procedures. The term "standard mining practices" is referenced throughout the DTE and general specification DI#BAB000000-01717-6300-01501, Revision 00, without an adequate identification or definition of mining standards or quantifying acceptance and testing criteria to confirm that criteria of "standard mining practices" has been met.			
9 Does a Significant Condition Adverse to Quality exist? Yes <u>X</u> No ___ If Yes, Check One: <input type="checkbox"/> A <input checked="" type="checkbox"/> B <input type="checkbox"/> C <input checked="" type="checkbox"/> D <input type="checkbox"/> E		10 Does a stop work condition exist? Yes ___ No <u>X</u> ; If Yes - Attach copy of SWO If Yes, Check One: <input type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> C	
3 Response Due Date: 20 Working Days From Issuance			
11 Required Actions: <input checked="" type="checkbox"/> Remedial <input checked="" type="checkbox"/> Extent of Deficiency <input checked="" type="checkbox"/> Preclude Recurrence <input checked="" type="checkbox"/> Root Cause Determination			
12 Recommended Actions:			
7 Initiator John F. Pelletier <i>John F. Pelletier</i> 8/4/94		14 Issuance Approved by: QADD <i>[Signature]</i> Date 8/5/94	
15 Response Accepted QAR Date 1/19/95		16 Response Accepted QADD Date 10/18/94	
17 Amended Response Accepted QAR <i>[Signature]</i> Date 10/12/94		18 Amended Response Accepted QADD <i>[Signature]</i> Date 10/18/94	
19 Corrective Actions Verified QAR Date		20 Closure Approved by: QADD Date	

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**CORRECTIVE ACTION REQUEST (CONTINUATION PAGE)**

5 Requirements (continued)

Further, that drawings, specifications, and other output documents shall contain appropriate inspection and testing criteria.

## Partial Response to YM-94-075

### Summary of CAR

The use of "standard mining practices" has not been appropriately interpreted into verifiable requirements in design specifications; "standard practices" have not been adequately defined.

### Recommended Actions

None

### Discussion

The intention of the Package 2C Determination of Importance Evaluation (DIE) is to apply some level of QA control to standard practices in order to clarify that "special processes" are not required in order to adequately limit potential adverse impacts. That is, conventional practices are adequate to limit potential impacts, based on the DIE analyst's understanding of the practices nominally applied in the course of the A/E's definition of excavation methods. Since "standard practices" are adequate, an appropriate level of QA control is needed to ensure that substandard practices are not used. To this end, specific minimum criteria associated with the conduct of these "standard practices" are specified in the DIE requirement (i.e., training of personnel, conformance to required line-and-grade tolerances, etc.).

The current DIE defines "standard practices" in terms of the A/E's specifications (i.e., codes and standards in the specification section). In the absence of explicit codes and standards or specific review criteria for assessing the adequacy of contractor's procedures, however, and since the specification simply parrots the DIE control (including that work shall be done in accordance with "standard practice"), the definition is never clearly made. This apparent inconsistency leads to confusion. Instead of defining specific codes and standards, the A/E will evaluate contractor's procedures against compliance with the requirements of the overall specification and the Q and non-Q requirements described therein. This semantic difference will still result in an acceptable practice, since the ultimate confidence in the process/practice is provided by "taking credit" for the skill and experience of the A/E in evaluating the adequacy of the contractor's procedures and methods.

The DIE requirement will be reworded to clarify this point. Any discussion of "standard practice" will be general in nature, and will be described in terms of the discussion above. The specification should then describe the specific QA criteria, and non-Q criteria associated with ensuring "standard practices" are employed. Any reference to "standard practice" in the DIE requirement(s) should not be parroted in the QA controls documented in the specification.

8/17/94 LV.SED.PSH.8/94-111

1. **Corrective Action for CAR YM-94-075**  
(partial response limited to 2C Phase I "early release")

A. Remedial Action:

1. Revise 2C DIE and specification section 1501 appropriately to clarify requirements 1, 11, 13, and 23 based on discussion above in a manner acceptable to DIE and A/E representatives.

This revision will include:

for req't 1: revision of the discussion in section 10.6 of the DIE to clarify that standard mining practices are those involving the use of commercial-grade items and conventional practice as specified by the requirements of the A/E's specification;

revision of requirement 1 in the DIE to indicate that standard mining practices, as defined by the use of commercial-grade items and conventional practice as specified by the requirements of the A/E's specification, are acceptable subject to minimum QA requirements, which will be listed

for req't 11: clarification of requirement 11 to indicate that water use shall be minimized *as follows*, followed by the specific minimum criteria to be applied to water use

for req't 13: similar clarification as discussed in requirement ~~13~~ 11 <sup>11</sup> 8/24/94

(Note: it is not believed, in the cases of requirements 11 and 13, that use of "to the extent practical" can be entirely avoided, in reference to clean-up of spills, or the requirements will be interpreted to apply to clean up of every spill in its entirety as a QA requirement, which is clearly not the intent of the impact evaluations (WIEs and TIEs) or of 10CFR60.15(c)(1). Specificity

for req't 23: the use of the term "standard mining practices" will be clarified consistent with the discussion under requirement 1.

In each case discussed above, specification section 1501 will be revised and reviewed to ensure these controls are applied appropriately, without simply "parroting" the DIE requirements.

(Note: the remedial actions associated with the balance of the 2C release, as well as other non-2C documents, will be provided in an amended response.)

**B. Investigative Action/Extent of Deficiency:**

Several DIE controls have been identified which could be potentially interpreted as ambiguous:

Req't 1: "Standard mining practices...[for TBM operation]"

Req't 4: "Standard mining practices...[for drill-and-blast excavation]"

Req't 6: "Standard mining practices...[for ground support emplacement]"

Req't 11: "Water use...shall be minimized...to the extent practical..."

Req't 13: "The use of...organics...shall be avoided when practical alternative materials and methods exist..."

Req't 14: "Use of diesel...shall be minimized to the extent practical..."

Req't 18: "Water shall be removed from Swellex rockbolts...to the extent practical within limits of the hydraulic water recovery system."

Req't 20: "The use of chloride shall be limited. Only non-chloride-based ground enhancing material shall be used, and use of chloride-based concrete and grout accelerators shall be limited to the extent practical..."

Req't 21: "Cementitious grouting pressures and quantities shall be limited to the extent practical..."

Req't 23: "Maintenance of the conveyor shall be performed...in accordance with standard mining practices."

Only requirements 1, 11, 13, and 23 will require resolution prior to release of Package 2C for Phase I TBM operation. These requirements all flow down to specification section 1501 (no drawings for 2C Phase I release), which may require revision as a result of any DIE control clarification. Revisions will be based on review of the DIE and 1501 by DIE staff and the A/E; the criteria for this evaluation and possible revisions will be the clarity of the control, the A/E's understanding of the control requirements, and the clarity of the resulting specification requirements/criteria.

2. Responsible Parties/Schedule of Corrective Actions:

<u>Action</u>	<u>Responsible</u>	<u>Date</u>
Revise 2C DIE and specification section 1501 appropriately to clarify requirements 1, 11, 13, and 23 based on discussion above in a manner acceptable to DIE and A/E representatives.	Hastings Segrest	prior to Phase I release (no later than 30 Aug 94)

3. Response Approved:

M. A. Rudolph for TCGER  
MGDS Systems Engineering Manager

8/17/94  
Date

[Signature]  
MGDS Development Manager

8/17/94  
Date

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CORRECTIVE ACTION REQUEST (CONTINUATION PAGE)

Verification of Partial Remedial Action for CAR YM-94-075

The following Remedial Action commitments associated with the 2C "Early Release" package were verified:

- a) Revise 2C DIE and specification section 1501 appropriately to clarify DIE requirements 1, 11, 13 and 23 based on discussion above in a manner acceptable to DIE and A/E representatives.

The YMQAD staff has reviewed the Determination of Importance Evaluation for ESF Package 2C, DI#BAB000000-01717-2200-00005, which was revised to Rev 2, and determined that the requirements were appropriately clarified. Also, a check was performed to see that the requirements taken from the DIE were appropriately interpreted and incorporated into the Subsurface General Construction specification 1501. The specification was revised and it was determined that some ambiguity of the requirements still existed in Specification 1501 section 3.01P and section 301S.2.e & d these concerns were noted on the OCRWM QAP 6.2 Document Review Record comments #20 and #21 dated 9/14/94. The comments were adequately addressed and shall be incorporated into the next revision of the 1501 specification prior to the release of the 2C package.

Note: As part of the next verification the actions associated with the QAP 6.2 comment incorporation shall be verified.

  
John F. Pelletier, QAR

9/20/94  
Date



## Amended Corrective Action Response for CAR YM-94-075

### A. Remedial Action

Requirements 1, 11, 13, and 23 (DIE revision 00 numbering) were addressed in the early release portion in DIE revision 01. General Specification Section 01501 was reviewed to ensure these four requirements were successfully translated. To address the rest of the 2C design package, we (DIE/Hastings) will:

- 1) review all 2C DIE requirements for potential interpretation problems,
- 2) clarify the requirements where appropriate,
- 3) and review the design output documents to verify the requirements have been properly incorporated.

Revision 01 of the 2C DIE included a review of all 2C requirements and further clarification of the requirements. The clarifications included: definition of "standard mining practices," inclusion of examples of "extent practical," and combination of controls. Some controls were further enhanced in Revision 02 of the DIE as a result of the DIE group's participation in the interdiscipline review of General Specification Section 01501. Items 1 and 2 described above were completed on 9/7/94. Item 3 is an ongoing activity paralleling the design release of the design output documents. As a result of this CAR, all "Q" specifications and drawings will be reviewed to verify DIE requirements have been clarified sufficiently. The following design documents have been reviewed to support the phased releases of the 2C package to date:

BAB000000-01717-6300-01400 Revision 02	Construction Quality Control/Quality Assurance
BAB000000-01717-6300-01501 Revision 02	Subsurface General Construction
BABEAB000-01717-6300-02165 Revision 04	Rockbolts & Accessories
BABEAD000-01717-2100-40110 Revision 01	TS North Ramp Excavation Layout Profile - Sheet 1 of 7
BABEAD000-01717-2100-40111 Revision 01	TS North Ramp, Excavation Layout, Profile - Sheet 2 of 7
BABEAD000-01717-2100-40112 Revision 01	TS North Ramp, Excavation Layout, Profile - Sheet 3 of 7

0/11/94 LV.SED.DWG. 10/94-129

<b>BABEAD000-01717-2100-40113</b> Revision 01	<b>TS North Ramp, Excavation Layout, Profile -</b> Sheet 4 of 7
<b>BABEAD000-01717-2100-40114</b> Revision 01	<b>TS North Ramp, Excavation Layout, Profile -</b> Sheet 5 of 7
<b>BABEAD000-01717-2100-40115</b> Revision 01	<b>TS North Ramp, Excavation Layout, Profile -</b> Sheet 6 of 7
<b>BABEAD000-01717-2100-40116</b> Revision 01	<b>TS North Ramp, Excavation Layout, Profile -</b> Sheet 7 of 7
<b>BABEAD000-01717-2100-40120</b> Revision 01	<b>TS North Ramp Excavation Layout, Plan -</b> Sheet 1 of 10
<b>BABEAD000-01717-2100-40121</b> Revision 01	<b>TS North Ramp, Excavation Layout, Plan -</b> Sheet 2 of 10
<b>BABEAD000-01717-2100-40122</b> Revision 01	<b>TS North Ramp, Excavation Layout, Plan -</b> Sheet 3 of 10
<b>BABEAD000-01717-2100-40123</b> Revision 01	<b>TS North Ramp, Excavation Layout, Plan -</b> Sheet 4 of 10
<b>BABEAD000-01717-2100-40124</b> Revision 01	<b>TS North Ramp, Excavation Layout, Plan -</b> Sheet 5 of 10
<b>BABEAD000-01717-2100-40125</b> Revision 01	<b>TS North Ramp, Excavation Layout, Plan -</b> Sheet 6 of 10
<b>BABEAD000-01717-2100-40126</b> Revision 01	<b>TS North Ramp, Excavation Layout, Plan -</b> Sheet 7 of 10
<b>BABEAD000-01717-2100-40127</b> Revision 01	<b>TS North Ramp, Excavation Layout, Plan -</b> Sheet 8 of 10
<b>BABEAD000-01717-2100-40128</b> Revision 01	<b>TS North Ramp, Excavation Layout, Plan -</b> Sheet 9 of 10
<b>BABEAD000-01717-2100-40129</b> Revision 01	<b>TS North Ramp, Excavation Layout, Plan -</b> Sheet 10 of 10
<b>BABEAB000-01717-2100-40151</b> Revision 01	<b>TS North Ramp Ground Support Master</b> Elevation and Sections

<b>BABEAB000-01717-2100-40152</b> Revision 01	<b>TS North Ramp Ground Support - Category 1</b> <b>Elevation and Section</b>
<b>BABEAB000-01717-2100-40153</b> Revision 01	<b>TS North Ramp Ground Support - Category 2</b> <b>Elevation and Section</b>
<b>BABEAB000-01717-2100-40154</b> Revision 01	<b>TS North Ramp Ground Support - Category 3</b> <b>Elevation and Section</b>
<b>BABEAB000-01717-2100-40155</b> Revision 01	<b>TS North Ramp Ground Support - Category 4</b> <b>Elevation and Sections</b>
<b>BABEAB000-01717-2100-40156</b> Revision 01	<b>TS North Ramp Ground Support - Category 5</b> <b>Elevation and Sections</b>
<b>BABEAB000-01717-2100-40157</b> Revision 01	<b>TS North Ramp Rock Bolts &amp; Accessories</b> <b>Details</b>
<b>BABEAB000-01717-2100-40161</b> Revision 01	<b>TS North Ramp Alcoves Rockbolts &amp;</b> <b>Shotcrete Sections</b>
<b>BABEAB000-01717-2100-40162</b> Revision 01	<b>TS North Ramp Alcoves Rockbolts &amp;</b> <b>Shotcrete Plan &amp; Sections</b>
<b>BABEAB000-01717-2100-40163</b> Revision 01	<b>TS North Ramp Alcove Rockbolts &amp;</b> <b>Shotcrete Plan, Sections and Elev.</b>

The review indicates that the applicable DIE requirements have been correctly incorporated and clarified sufficiently.

The remaining 2C "Q" drawings and specifications will be reviewed prior to their release to verify that the remaining DIE requirements have been properly translated. These "Q" drawings and specifications that will be reviewed include but are not limited to the following:

<b>BABEAB000-01717-6300-02341</b>	<b>Steel Sets &amp; Accessories, Subsurface</b>
<b>BABEAB000-01717-2100-41101</b>	<b>TS North Ramp Steel Sets &amp; Lagging Elevation</b>
<b>BABEAB000-01717-2100-41102</b>	<b>TS North Ramp Steel Sets &amp; Lagging Sections &amp;</b> <b>Details</b>
<b>BABEAB000-01717-2100-41103</b>	<b>TS North Ramp Steel Sets &amp; Lagging Sections &amp;</b> <b>Details</b>
<b>BABFA0000-01717-2100-41111</b>	<b>TS North Ramp Piping Brackets Installation</b>

<b>BABFA0000-01717-2100-41121</b>	<b>TS North Ramp Cable Tray Supports Elev, Details, Sect</b>
<b>BABFA0000-01717-2100-41130</b>	<b>TS North Ramp, Ventilation Brackets, Elevations, Details</b>
<b>BABE00000-01717-6300-03362</b>	<b>Dry Process Shotcrete</b>
<b>BABE00000-01717-6300-03363</b>	<b>Wet Process Shotcrete</b>
<b>BABEAB000-01717-6300-03601</b>	<b>Tunnel Grouting</b>
<b>BABEAF000-01717-2100-40165</b>	<b>TS North Ramp, Contact RBT Test Alcove Blast Layout, Plan, Sections &amp; Details</b>
<b>BABEAF000-01717-2100-40166</b>	<b>TS North Ramp, Bow Ridge Fault Alcove Blast Layout, Plan, Sections &amp; Elevations</b>
<b>BABEAE000-01717-2100-40167</b>	<b>TS North Ramp, Elect Equip Blast Layout, Plan, Section &amp; Elevation</b>
<b>BABEAE000-01717-2100-40168</b>	<b>TS North Ramp, Sump Alcove Blast Layout, Plan, Elevation &amp; Section</b>
<b>BABEAE000-01717-2100-40169</b>	<b>TS North Ramp, Refuge Chamber Alcove Blast Layout, Plan, Section &amp; Elevation</b>
<b>BABEAD000-01717-6300-02313</b>	<b>Subsurface Drilling and Blasting</b>

Based on the findings of the 2C review, it has been decided that the approach applied to 2C will be used for all previously released DIES. The steps to accomplish to complete the remedial action are identified below:

1. Review all previously released DIES 12/31/94
2. Review design output documents for previously released DIES 12/31/94

These items are to be assigned to DIE/Hastings. Based on the results of these reviews, the applicable DIES and design output documents will be revised as appropriate. The schedule for any necessary revisions will be developed once items 1 and 2 are complete.

**B. Investigative Action/Extent of Deficiency**

Several controls that were included in the Revision 00 2C DIE were identified which could be potentially interpreted as ambiguous:

~~Requirement 1: "Standard mining practices..."~~

~~Requirement 4: "Standard mining practices..."~~

Requirement 6: "Standard mining practices..."

Requirement 11: "minimized ... to the extent practical..."

Requirement 13: "practical alternative means..."

Requirement 14: "minimized to the extent practical..."

Requirement 18: "...to the extent practical..."

Requirement 20: "...to the extent practical..."

Requirement 21: "...limited to the extent practical..."

Requirement 23: "...standard mining practices..."

In order to assure that all DIE requirements are unambiguous, all 2C DIE requirements were reviewed. Revisions 01 and 02 are the result of the requirement clarifications. As a result of the revisions, some DIE requirements were combined and renumbered. The verifications that the DIE requirements are properly presented is in the implementing specifications and drawings. The resulting remedial action addresses all previously released DIEs; therefore, no additional investigative action is required.

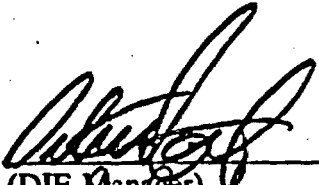
**C. Root Cause Evaluation**


An evaluation based on review of the 2C package and a sample of other (i. e., previous) DIEs indicates that the root cause is due to a lack of communication between the DIE group and the Design group (QAP 16.1 Root Cause Category 3.f). See Section D for further discussion.

**D. Corrective Action**

The corrective action taken to this point is based on the root cause evaluation discussed above that concluded that there was a lack of communication between the DIE group and the design group. The steps taken to preclude recurrence are to require design interdiscipline reviews on all DIES and DIE interdiscipline reviews on the "Q" design output documents. These interdiscipline reviews by both groups will improve the communication between the groups. They will allow design to seek clarification in the DIE for requirements before the DIE is approved. Similarly, it will allow the DIE group to review the allocation of DIE requirements and suggest further clarification as appropriate prior to the release of the design document.

Action	Responsible Individual	Due Date
1. Require Design ID reviews on DIES	DIE/Hastings	10/30/94
2. Require DIE ID reviews on "Q" drawings and specifications	MGDS/Segrest	10/30/94

Response by:  Date: 11 Oct 94  
(DIE Manager)

Response by:  Date: 10-11-94  
(MGDS Development Manager)

## Supplemental Response for CAR YM-94-075

This supplemental response is provided in the form of a complete encapsulation of the events and corrective measures undertaken to date to correct the deficiencies identified in CAR YM-94-075 and to prevent their reoccurrence.

The initial CAR YM-94-075 response (Letter LV.SED.PSH.8/94-111) in August identified a remedial corrective action of revising the 2C DIE and Specification Section 01501 to appropriately clarify DIE requirements 1, 11, 13, and 23. The revisions of the DIE and specification section 01501 were based on the following criteria; the clarity of the control, the A/E's understanding of the control requirements, and the clarity of the resulting specification requirements/criteria. These revisions and additional required corrective actions were documented in the amended corrective action response in October of 1994 (Letter LV.SED.DWG.10/94-129).

### A. Remedial Action

The amended corrective action response to CAR YM-94-075, (Letter LV.SED.DWG.10/94-129) documented revisions 1 and 2 to the Package 2C DIE (BAB000000-10717-2200-00005) which were made to clarify the DIE requirements.

Revision 01 of the 2C DIE included a review of all 2C requirements and further clarification of the requirements. The clarifications included: definition of "standard mining practices," inclusion of examples of "extent practical," and combination of controls. Some controls were further enhanced in Revision 02 of the DIE as a result of the DIE group's participation in the interdisciplinary review of General Specification Section 01501.

The amended response (Letter LV.SED.DWG.10/94-129) also documented the review of the following design documents which were needed to that point to support the phased releases of the 2C package:

BAB000000-01717-6300-01400, Rev. 02	Construction Quality Control/Quality Assurance
BAB000000-01717-6300-01501, Rev. 02	Subsurface General Construction
BABEAB000-01717-6300-02165, Rev. 04	Rockbolts & Accessories
BABEAD000-01717-2100-40110, Rev. 01	TS North Ramp Excavation Layout Profile - Sheet 1 of 7
BABEAD000-01717-2100-40111, Rev. 01	TS North Ramp Excavation Layout Profile - Sheet 2 of 7
BABEAD000-01717-2100-40112, Rev. 01	TS North Ramp Excavation Layout Profile - Sheet 3 of 7

1/3/95 LV.SED. LCM. 12/94-165

BABEAD000-01717-2100-40113, Rev. 01 TS North Ramp Excavation Layout Profile  
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BABEAD000-01717-2100-40114, Rev. 01 TS North Ramp Excavation Layout Profile  
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BABEAD000-01717-2100-40115, Rev. 01 TS North Ramp Excavation Layout Profile  
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BABEAD000-01717-2100-40116, Rev. 01 TS North Ramp Excavation Layout Profile  
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BABEAD000-01717-2100-40120, Rev. 01 TS North Ramp Excavation Layout Plan -  
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BABEAD000-01717-2100-40121, Rev. 01 TS North Ramp Excavation Layout Plan -  
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BABEAD000-01717-2100-40122, Rev. 01 TS North Ramp Excavation Layout Plan -  
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BABEAD000-01717-2100-40123, Rev. 01 TS North Ramp Excavation Layout Plan -  
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BABEAD000-01717-2100-40124, Rev. 01 TS North Ramp Excavation Layout Plan -  
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BABEAD000-01717-2100-40125, Rev. 01 TS North Ramp Excavation Layout Plan -  
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BABEAD000-01717-2100-40128, Rev. 01 TS North Ramp Excavation Layout Plan -  
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BABEAD000-01717-2100-40129, Rev. 01 TS North Ramp Excavation Layout Plan -  
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BABEAB000-01717-2100-40151, Rev. 01 TS North Ramp Ground Support Master  
Elevation and Sections



- BABEAB000-01717-2100-40152, Rev. 01 TS North Ramp Ground Support -  
Category 1 Elevation and Section
- BABEAB000-01717-2100-40153, Rev. 01 TS North Ramp Ground Support -  
Category 2 Elevation and Section
- BABEAB000-01717-2100-40154, Rev. 01 TS North Ramp Ground Support -  
Category 3 Elevation and Section
- BABEAB000-01717-2100-40155, Rev. 01 TS North Ramp Ground Support -  
Category 4 Elevation and Section
- BABEAB000-01717-2100-40156, Rev. 01 TS North Ramp Ground Support -  
Category 5 Elevation and Section
- BABEAB000-01717-2100-40157, Rev. 01 TS North Ramp Rockbolt & Accessories  
Details
- BABEAB000-01717-2100-40161, Rev. 01 TS North Ramp Alcoves Rockbolts &  
Shotcrete Sections
- BABEAB000-01717-2100-40162, Rev. 01 TS North Ramp Alcoves Rockbolts &  
Shotcrete Plan & Sections
- BABEAB000-01717-2100-40163, Rev. 01 TS North Ramp Alcoves Rockbolts &  
Shotcrete Plan Sections and Elevations

The review of these documents concluded that the applicable DIE requirements have been correctly incorporated and clarified sufficiently.

Since the October amended response the following additional design documents have been reviewed to support the phased releases of the 2C package:

- BABEAB000-01717-6300-02341, Rev. 03 Steel Sets & Accessories,  
Subsurface
- BABEAB000-01717-2100-41101, Rev. 03 TS North Ramp Steel Sets &  
Lagging Elevation
- BABEAB000-01717-2100-41102, Rev. 03 TS North Ramp Steel Sets &  
Lagging Sections/Details
- BABEAB000-01717-2100-41103, Rev. 03 TS North Ramp Steel Sets &  
Lagging Sections/Details

BABFA0000-01717-2100-41111, Rev. 01	TS North Ramp Piping Brackets Installation
BABFA0000-01717-2100-41121, Rev. 01	TS North Ramp Cable Tray Supports Elevation, Details, Sect.
BABFA0000-01717-2100-41130, Rev. 01	TS North Ramp Ventilation Brackets Elevations, Details
BABE00000-01717-6300-03362, Rev. 01	Dry Process Shotcrete
BABE00000-01717-6300-03363, Rev. 01	Wet Process Shotcrete
BABEAB000-01717-6300-03601, Rev. 00	Tunnel Grouting

The review of these documents indicates that the applicable DIE requirements have been correctly incorporated and clarified sufficiently.

The amended response (Letter LV.SED.DWG.10/94-129) also identified necessary remedial actions to review all previously released DIEs and to review design documents which depended on those previously released DIEs. These remedial actions have been completed (IOC LV.SED.LCM.12/94-167) and essentially constitute additional investigative action into the extent of the deficiency. The results of these remedial actions are summarized in the following section.

#### B. Investigative Action/Extent of Deficiency

To complete the required remedial actions, additional investigative action was conducted to: 1) Review all previous released DIEs for ambiguous QA controls, and 2) Review design output documents containing requirements from previously released DIEs for correct interpretation of QA controls.

#### Review Methodology

Members of the DIE group, ESF surface and subsurface design groups and the Design Document Coordination Department were interviewed to determine the scope of documentation for review. The following considerations were made:

1. The Package 2C DIE and the design products needed for the phased releases were already fully reviewed per the actions described above. The amended response also identified six drill and blast products which had not been reviewed and whose release has not been required. (These drill and blast products are addressed in the On-going ID Reviews paragraph of this section.)
2. All Previous DIEs required review.

3. Packages 1A, 1C, 1D, 2A, and 2B (specifications and drawings) would require a complete review.
4. Specification sections containing no QA Controls do not require further review.
5. Package 1B contained two (2) drawings with QA Controls, which would require review.
6. Specification sections 01500, 01600, and 01800 were currently being revised by the surface design group to implement clarification to DIE controls to be consistent with the latest revision on the DIES.
7. The Subsurface Design group, per CAR YM-94-055, was reviewing all Package 1A specification sections which were no longer required due to one of the following reasons: (1) they were or will be replaced by a newer specification; (2) the work they specified was completed; or (3) they were not used and are no longer needed. These sections will be revised to be obsolete.

#### **Review of DIES**

All previously released surface and subsurface DIES were reviewed to ensure requirements were accurately stated. The reviewed DIES and the results of this review are as follows:

- |    |                                    |   |
|----|------------------------------------|---|
| 1. | BABB00000-01717-2200-00001, Rev.05 | DIE ESF North Portal Pad                        |
| 2. | B00000000-AA-09-00002, Rev.03      | DIE ESF Stormwater System                       |
| 3. | B00000000-AA-09-00003, Rev.02      | DIE ESF Starter Tunnel Steel Arch Section       |
| 4. | B00000000-AA-09-00004, Rev.01      | DIE ESF Rock Storage Area                       |
| 5. | BAB000000-01717-2200-00003, Rev.07 | DIE ESF Starter Tunnel Drill-and-Blast Section  |
| 6. | BAB000000-01717-2200-00005, Rev.03 | DIE ESF Package 2C                              |
| 7. | B00000000-AA-09-00006, Rev.00      | DIE ESF Switchgear Building                     |
| 8. | BABBA0000-01717-2200-00007, Rev.00 | DIE ESF Change House Facility and Shop Building |

9. BABBD0000-01717-2200-00009, Rev.01 DIE ESF Subsurface Wastewater (Surface Portion) and Sanitary Sewer Collection System
10. BABC00000-01717-2200-00001, Rev.00 DIE ESF Water Supply System
11. BABBDA000-01717-2200-00001, Rev.00 DIE ESF Water Distribution System
12. BAB000000-01717-2200-00010, Rev.01 DIE ESF Muck Storage Area and Conveyor/Muck Storage Area Access Road
13. BABA00000-01717-2200-00017, Rev.00 DIE ESF H-Road Improvements - Widening, Grading, and Paving
14. BABBD0000-01717-2200-00022, Rev.00 DIE ESF Compressed Air System and Standby Power System
15. BAB000000-01717-2200-00098, Rev.00 DIE Procurement of Temporary Items
16. BAAAB0000-01717-2200-00002, Rev.01 DIE USW SD-7 Borehole, Access Road and Drill Pad
17. BAAAA0000-01717-2200-00002, Rev.00 DIE UE-25 UZ-16 Grout Test
18. BAA000000-01717-2200-00097, Rev.00 DIE UZ-7a Access Road and Drill Pad
19. BAAAF0000-01717-2200-00002, Rev.00 DIE UZ Instrumentation in USW NRG-7a and NRG-6B

**Results:**

The requirements identified in DIEs 1, 3, 12, 16, 17, 18, and 19 were found to be acceptable. No further action is required for these DIEs.

DIEs 4 and 15 contain no requirements and are found to be acceptable. No further action is required for these DIEs.

The Requirements identified in DIEs 2, 5, 6, 7, 8, 9, 10, 11, 13, and 14 contained some minor ambiguous requirements. However, these ambiguities do not require correction due to the determination by the review of the specifications and drawings which incorporated these results. The review of the potentially impacted specifications

and drawings is discussed below. Therefore, no further action is required for these DIEs per this CAR Remedial Action. (See Section D for further explanation.)

(Note: The DIE group has scheduled to incorporate/revise all the Surface DIEs into a single ESF Surface DIE and incorporate/revise all Subsurface DIEs into a single ESF Subsurface DIE. The planned ESF Surface DIE will include DIEs 1, 2, 3, 4, 7, 8, 9, 10, 11, 12, 13, and 14 from above. The planned ESF Subsurface DIE will include DIEs 5 and 6 from above. Although not required as part of the remedial actions for this CAR, these planned revisions will provide clarification to remaining ambiguities in the DIE requirements.)

### Review of Specifications

Upon evaluation of the "Review Methodology" considerations discussed above, the following decisions for review criteria for the specification review were made:

- A. Specification sections for Packages 1B, 1C, 1D, 2A, 2B, and 2C (BAB000000-01717-6300-XXXXXX) would be considered for complete review.
- B. Specification Sections for Package 1A (YMP-025-1-SP0X) would be completely reviewed.
- C. Specifications identified as not containing QA controls do not require review.
- D. Further Package 2C review was limited to specifications not already reviewed as part of the amended corrective action response letter LV.SED.DWG.10/94-129 (see section B. Remedial Action).

### Packages 1B, 1C, 1D, 2A, 2B, and 2C Specification Review

From the criteria described above the following Specifications Sections from the Packages 1B, 1C, 1D, 2A, 2B, and 2C (BAB000000-01717-6300-XXXXXX) were found to contain QA Controls which required review (Note - Package 1A specification sections are discussed separately):

01400	Quality Assurance/Quality Control
01500	Temporary Surface Construction
01501	Subsurface General Construction
01600	Material and Equipment
01800	Maintenance & Operation of Surface Facilities
02165	Rockbolts and Accessories

02211	Site Grading/Muck Storage
02225	Water Use
02313	Subsurface Drill & Blast
02341	Steel Sets
02510	Asphalt Concrete Surface
02776	Geomembrane Liners
03362	Dry Process Shotcrete
03601	Tunnel Grouting
16450	Electrical Grounding

**Results:**

Of these 15 Specification Sections the following eight sections (01400, 01501, 02165, 02225, 02313, 02341, 03362 and 03601) were previously reviewed and revised as needed as part of the Package 2C review. No further action is required for these Specification Sections. A revision of specification sections 02341, 03362, 03363, and 03601 from package 2C was reviewed by the DIE group as part of the ID review process. This ID review was performed on the entire specification section having considered the full scope of the design output for compliance and clarity of DIE requirement implementation. These new sections were found to be acceptable with no further action required.

Specification Sections 02211, 02510, 02776 and 16450 were reviewed and found that the QA Controls within are acceptable. No revision is required at this time and no further action is required for these specification sections.

Specification Sections 01500, 01600 and 01800 were identified as requiring revision to clarify QA Controls as delineated by the applicable DIEs. As required by one of the corrective actions to preclude recurrence of this CAR (TRW IOC LV.MG.SDB.10/94-265) these three ESF Specification sections were already in the "Interdiscipline Review" stage during revision by the surface design group to clarify QA Controls. The DIE group has completed its input to the ID review copy designated for markup. The revisions requested by the DIE group provide further clarification where appropriate to the QA Controls within these Specification Sections as delineated by the DIE. This action completes the required revisions needed for these specification sections per this CAR.

## **Package 1A Specification Review**

From the criteria established above for review of Package 1A Specifications (YMP-025-1-SP0X) the following sections were found to contain QA Controls and required review per this CAR Remedial Action (Note - Specification Sections YMP-025-1-SP02 through YMP-025-1-SP08 were reviewed and found to contain No QA Controls):

SP01	02665	Water Distribution System
SP09	01400	QA/QC
SP09	01511	Contractor Performance
SP09	01600	Material & Equipment
SP09	02165	Rockbolts & Accessories
SP09	02225	Water Use
SP09	02310	Welded Steel Lattice
SP09	02312	Drill & Blast
SP09	02313	Drill & Blast
SP09	03361	Shotcrete
SP09	15484	Chemical Tracer

### **Results:**

Specification section SP01- 02665 is designated as QA but contains no QA Controls. Therefore, no remedial action is required for this section per this CAR.

Of the remaining 10 specification sections in SP09 containing QA Controls, nine are being revised as "Obsolete" (Sections 01511, 01600, 02165, 02225, 02310, 02312, 02313, 03361 and 15484) per corrective actions of CARs YM-94-055 and 94-QN-C-042. These specification sections are being obsoleted per these listed CARs because they are no longer required for one of the following reasons: (1) they were or will be replaced by a newer specification; (2) the work they specified was completed; or (3) they were not used and are no longer required. No further action is required per this CAR for these specification sections.

Specification section SP09- 01400 contains one ambiguous requirement stated in Part 3, section 3.02 A, which requires "organic material to be minimized" to the extent practical. This provision of the specification covers work already completed in the Starter Tunnel. This section can not yet be made obsolete because of the need to retain capability to use the tracer injection system. However, this provision of the section 01400 does not impact use of the tracer injector system. No further action is required for this specification section for closure of this CAR Remedial Action.

Based on the above discussion it is judged that since no changes to the specifications are required for clarity, then a revision to the applicable DIES is not required per this CAR.

### **Review of Drawings**

A review was conducted to identify drawings which contain QA Controls. Most affected drawings were reviewed in the Package 2C review. Only two drawings were identified as containing "Q" Controls outside of the scope of Package 2C. To assure that no other drawings with QA Controls outside of the scope of Package 2C exist, a survey of the Surface design and Subsurface design groups was conducted. The results of this survey was that no other drawings except the two listed below required review.

The two drawings identified with QA Controls are:

BABB00000-01717-2100-20022-01

BABB00000-01717-2100-23010-0C

### **Results:**

Drawing 20022 contains a QA Control for a 2% pad grade to prevent water runoff into the tunnel. The control is found to be acceptable and requires no further action.

Drawing 23010 is in review and undergoing ID review by the DIE group as required by one of the actions to preclude recurrence. Therefore, no other action is required per this CAR.

Based on the above discussion it is judged that since no changes to the drawings are required for clarity, then a revision to the applicable DIES is not required per this CAR.

### **On-going ID Reviews**

The remaining 2C "Q" drawings and specifications described in the October amended response which are required for drill and blast are still in the revision process and will



be reviewed prior to their release to verify that the remaining DIE requirements have been properly translated. These "Q" drawings and specifications are:

BABEAF000-01717-2100-40165	TS North Ramp Contact RBT Test Alcove Blast Layout Plan Sections & Details
BABEAF000-01717-2100-40166	TS North Ramp Bow Ridge Fault Alcove Blast Layout Plan Sections & Elevations
BABEAE000-01717-2100-40167	TS North Ramp Electrical Equipment Blast Layout Plan Section & Elevation
BABEAE000-01717-2100-40168	TS North Ramp Sump Alcove Blast Layout Plan Section & Elevation
BABEAE000-01717-2100-40169	TS North Ramp Refuge Chamber Blast Layout Plan Section & Elevation
BABEAD000-01717-6300-02313	Subsurface Drilling and Blasting

Interdisciplinary Review of these drawings and specifications by the DIE group is as required by one of the corrective actions to preclude recurrence (TRW IOC LV.MG.SDB.10/94-265). Therefore, no further remedial action is required on these documents.

#### **C. Root Cause Evaluation**

As stated in the amended response, an evaluation based on review of the 2C package and a sample of other (i.e., previous) DIEs indicates that the root cause is due to a lack of communication between the DIE group and the Design group (QAP 16.1 Root Cause Category 3.f). See Section D. for further discussion.

#### **D. Corrective Action to Preclude Recurrence**

The corrective actions to preclude recurrence identified in the amended response (Letter LV.SED.DWG.10/94-129) were defined to fix the lack of effective communication between the DIE group and the design group. These corrective actions were to require interdisciplinary reviews of all DIEs by the affected design group and interdisciplinary reviews of all Q drawings and specifications by the DIE group. These corrective actions have been implemented (see LV.MG.SDB.10/94-265, LV.SED.PSH.10/94-134, and LV.SER.TCG.12/94-242) and will ensure the necessary interdisciplinary reviews are performed for documents that are in the revision process.

All necessary remedial actions and actions to preclude recurrence have been completed.