



Department of Energy

Washington, DC 20585

APR 03 1997

QA: L

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for Yucca Mountain
Site Characterization Project
TRW Environmental Safety Systems, Inc.
1180 Town Center Drive, M/S 423
Las Vegas, NV 89134

VERIFICATION OF CORRECTIVE ACTION AND CLOSURE OF DEFICIENCY REPORT (DR) YM-96-D-075 RESULTING FROM OFFICE OF QUALITY ASSURANCE (OQA) SURVEILLANCE M&O-SR-96-019

The OQA staff has verified the corrective action to DR YM-96-D-075 and determined the results to be satisfactory. As a result, the DR is considered closed.

If you have any questions, please contact either James Blaylock at (702) 794-1420 or Patout H. Cotter at (702) 794-1332.


Donald G. Horton, Director
Office of Quality Assurance

OQA:JB-1285

Enclosure:
DR YM-96-D-075

cc w/encl:

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8 ☐ Performance Report
☒ Deficiency Report
NO. YM-96-D-075
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PERFORMANCE/DEFICIENCY REPORT

1 Controlling Document: Quality Assurance Requirements and Description document (QARD), Revision 5		2 Related Report No. YMP-SR-96-019
3 Responsible Organization: CRWMS M&O/Design	4 Discussed With: A. Segrest	

5 Requirement/Measurement Criteria:
1. QARD, Section 5.0, Paragraph 5.2.2, states in part, "Implementing documents shall include the following information as appropriate to the work to be performed:
B. Technical and regulatory requirements.
D. Quantitative or qualitative acceptance criteria sufficient for determining that activities were satisfactorily accomplished."
Specification "Subsurface Drilling and Blasting," BABEA0000-01717-6300-02313, Revision 1, Paragraph 3.05, "Field Quality Control," states in part:
"E. QA Control: Blasting shall conform to a design goal of not exceeding 300 mm average overbreak outside the "C" line. This shall be determined by visual inspection or spot measurement, as directed by the A/E."

6 Description of Condition:
1. Contrary to requirement #1 above, neither the Kiewit/Parsons Brinckerhoff (Kiewit/PB) drill and blast plan, "Subsurface Controlled Drilling and Blasting Plan for TS Main Drift Thermal Test Alcove," Revision 0 (BABEA0000-01717-6300-02313-CD-04-0) or the Kiewit/PB Technical Control Procedure (TCP)-2.17, "Subsurface ESF Drill and Blast Operation," Revision 7 include technical requirements or quantitative or qualitative acceptance criteria to determine that the blast was satisfactorily accomplished. An example of this is that the specification requires the design criteria for 300 mm average overbreak outside the "C" line.

The Kiewit/PB Quality Control Procedure (QCP)-011, Revision 2, "Inspection of Subsurface Drill and Blast Operations," includes this requirement; however, this examination is only performed if requested by the Architect/Engineer.

This examination is required to be performed and documented by Kiewit/PB to meet specification requirements.

7 Initiator Patout H. Cotter <i>P.H. Cotter</i> Date 7/17/96	9 Is condition an isolated occurrence? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown; Must be Yes if PR
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10 Recommended Actions: (Not required for PR)

Evaluate the deficiency, perform remedial action, investigate the extent of deficiency, and perform root cause analysis to determine how the condition came about.

11 QA Review QAR <i>P.H. Cotter</i> Date 7/17/96	12 Response Due Date 20 working days from issuance
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13 Affected Organization QA Manager Issuance Approval: (QAR for PR) Printed Name Richard E. Spence Signature <i>R.E. Spence</i> Date 7/19/96	
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22 Corrective Actions Verified QAR <i>P.H. Cotter</i> Date 3/12/97	23 Closure Approved by: (N/A for PR) <i>[Signature]</i> Date 4/1/97
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PERFORMANCE/DEFICIENCY REPORT RESPONSE

14 Remedial Actions:

See Block 15

15 Extent of Condition: (Not required for PR)
See continuation sheet Page 4 of 4.

16 Root Cause Determination: (Not required for PR)
See Block 15

Required ☐ Yes ☒ No

17 Action to Preclude Recurrence: (Not required for PR)

Required ☐ Yes ☒ No

See Block 15

18 Corrective Action Completion Due Date:

09/30/96 01-31-97 11-9-96

19 Response by:

☒ Initial

☐ Amended

Date 9/30/96

Phone 7941924

20 Response Accepted

QAR

Date

21 Response Accepted (N/A for PR):

AOQAM

Date

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Block 5, Requirements: (continued)

2. QARD, Section 3.0, Paragraph 3.2.2.1, states, "Drawings, specifications, and other design output documents shall contain appropriate inspection and testing acceptance criteria."

Block 6, Description of Condition: (continued)

2. Contrary to requirement #2 above, specification "Subsurface Drilling and Blasting," BABEA0000-01717-6300-02313, Revision 1, Paragraph 3.0.5.E does not provide appropriate inspection and testing acceptance criteria for drill and blast excavation. It does provide a design goal of 300 mm over break for two consecutive rounds. The specification does not provide upper limits or true accept/reject criteria.

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Block 15, Extent of Condition

The requirement is to have a controlled drilling and blasting program in effect, a program meeting these requirements is in place. There are a number of parameters which influence the performance quality of a controlled drill and blast round, none of these is a definitive quantitative measure of the overall effectiveness of the program, particularly if based on a single blast round. Nor is it possible to fully predetermine the performance of an individual blast. For this reason the information gathered can only be used as input to revise the drilling and blasting of subsequent rounds. The current practice is to evaluate each round blasted for the following conditions; overbreak with relation to "C line", and near and far field seismic data (when available) as required by the specification. In addition other information such as presence of half-casts, and muck pile characteristics are evaluated and documented.

These evaluations are being routinely performed and documented for each round blasted, generally by the Title III A/E representative, with the provision as stated in the specification for the A/E to direct the constructor to do it. The information is being used by experienced and qualified personnel, in a qualitative assessment of the performance. Thus, the information is, in fact, used as definitive qualitative criteria for assessing the quality of the blast, not as a design goal. The assessment is to determine if modification of the blast hole patterns, charging, and timing of the rounds as defined in the Constructors approved Controlled Drilling and Blasting Plan is warranted. This determination is made based on performance of two consecutive rounds. If modifications are deemed necessary the data is again used as qualitative input to determine what changes are needed.

The process as currently administered, therefore, meets the specification and the cited QARD requirements. For these reasons the M&O A/E believes that no deficiency exists.

It is agreed that the M&O will modify specification BABEA000-01717-6300-02313 Rev. 01, *Subsurface Drilling and Blasting*, and DI BABEA0000-01717-5000-00002 Rev. 00, *Documentation of Controlled Drilling and Blasting Operations*, to clarify the process. These changes will include changing the emphasis of the Q Controls from specific evaluated parameters to a requirement to modify the drilling and blasting when the evaluated parameters are exceeded in two consecutive rounds, and removal of the words "design goal" from paragraph 3.05E. Similarly, additional clarification will be included in DIE BAB00000-01717-2200-00005 Rev. 05, *Determination of Importance Evaluation (DIE) for Subsurface Exploratory Studies Facility*, to minimize potential confusion in the future. (Note: a revision to the DIE is currently in progress)

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PERFORMANCE/DEFICIENCY REPORT RESPONSE

14 Remedial Actions:

See Block 15

15 Extent of Condition: (Not required for PR)

See continuation sheet Page 4 of 4

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Aug 74 Bpk
12/19/96

16 Root Cause Determination: (Not required for PR)

Required ☐ Yes ☒ No

See Block 15 See continuation sheet page 5 of 12-18-96
Bpk, 12/19/96

17 Action to Preclude Recurrence: (Not required for PR)

Required ☐ Yes ☒ No

See Block 15 See continuation sheet page 5 of 12-18-96
Bpk, 12/19/96

18 Corrective Action Completion Due Date:

01-28-97
09/30/96 01-31-97 12-31-96

19 Response by:

☒ Initial

☐ Amended

Date 9/30/96

Phone 7941924

20 Response Accepted

QAR

P.H. Cb

Date 12/17/96

21 Response Accepted (N/A for PR):

AOQAM

James B. Langford Jr

Date

12/20/96

Exhibit AP-16.10.2

Rev. 07/15/96

12/15/96 LV. 776. JTC. 12/96-288

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Block 5, Requirements: (continued)

2. QARD, Section 3.0, Paragraph 3.2.2.1, states, "Drawings, specifications, and other design output documents shall contain appropriate inspection and testing acceptance criteria."

Block 6, Description of Condition: (continued)

2. Contrary to requirement #2 above, specification "Subsurface Drilling and Blasting," BABEA0000-01717-6300-02313, Revision 1, Paragraph 3.0.5.E does not provide appropriate inspection and testing acceptance criteria for drill and blast excavation. It does provide a design goal of 300 mm over break for two consecutive rounds. The specification does not provide upper limits or true accept/reject criteria.

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REVISED RESPONSE DECEMBER 18, 1996

EVALUATION OF DEFICIENCY per BLOCK 10 Recommended Actions

It is well known in the mining and construction industries that the drill/blast process does not lend itself to strictly quantitative prescribed criteria of performance acceptance. However, recognizing that QARD Section 2.2.4A. and I. are applicable regarding QA controls. The Specification, Subsurface Drilling and Blasting (BABEA000-01717-6300-02313 Rev 01) and Title III Documentation Instruction, Documentation of Controlled Drilling and Blasting Operations (BABEA0000-01717-5000-00002 Rev 00) (D.I.) are used together to meet the QA Controls set forth in the D.I.E.. Clarification of the inter-play between these documents will provide a clear path of objective evidence demonstrating a process to determine the adequacy of blast round performance, specifically post-blast tolerances. This will greatly alleviate the perception that blast round performance acceptance criteria are nonexistent or inadequate. The M&O will take action to provide more overt evidence of having a process to determine adequacy of blast round performance by focusing more appropriately on qualitative criteria in determining acceptability of a blast round. In accordance with QARD Section 5.0, Paragraph 5.2.2.D requirements, we will modify the Controlled Drilling and Blasting Round Results Documentation form to include a box that requires a reasoning of any blast round design change(s) from the preceding blast round resulting from analysis of the numerous blast round performance factors such as bootleg, over break, field seismic data as available, fragment size, and bore hole characteristics, all of which comprise recognized industry practice for evaluating underground drifting or tunneling. (NOTE: This addresses Condition 1 in BLOCK 6 Description of Condition. Condition 2 will be addressed by revising the specification, see below)

BLOCK 14 Remedial Actions

Specific Remedial Actions per Block 10 Recommended Actions

Considering that the condition cited in the Deficiency Report is an isolated case the MGDS Development Group believes that the following Remedial Actions are sufficient to resolve the condition cited. The DR is an isolated case because it only addresses issues relating to the drilling and blasting specification and not to other specifications related to ESF Design.

1. Revision of Title III Documentation Instruction, Documentation of Controlled Drilling and Blasting Operations (BABEA0000-01717-5000-00002 Rev 00), Controlled Drilling and Blasting Round Results Documentation form.

The following blocks will be added to the form.

1. Over all Blast Round Performance This will require a descriptive narrative documenting over all blast round performance, i.e. depth of round pulled, fragmentation, presence of explosives in the muck pile, etc.
 2. A sign off block for the A/E shift engineer accepting the blast performance results.
 3. Description of changes to the blast round required by Specification requirements and results achieved by those changes.
2. Revision of Specification, Subsurface Drilling and Blasting (BABEA000-01717-6300-02313 Rev 01) will be as follows:

Addition of Paragraph 1.01B:

Construction Monitoring Activities by the A/E:

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BLOCK 14 Remedial Actions Continued

QA Control: Measurement of blast performance to required tolerances (post-blast) will be documented by the A/E in accordance with Documentation Instruction, Documentation of Controlled Drilling and Blasting Operations (BABEA0000-01717-5000-00002), "Controlled Drilling and Blasting Round Results Documentation" form. Acceptance of blast round performance shall be by the A/E.

Revision of Paragraph 3.05E

This paragraph will be modified to:

The QA control requiring an A/E signature for changing the blast plan will continue to be a hold point.

BLOCK 15 Extent of Condition

The extent of condition was evaluated, as Suggested by BLOCK 10 Recommended Actions, the condition is an isolated case.

BLOCK 16 Root Cause Determination

A Root Cause Determination is not required because BLOCK 15 Extent of Condition determined that the cited condition was an isolated case. Because the cited condition was an isolated case, the BLOCK 10 Recommended Actions do not apply to this action.

BLOCK 17 Action to Preclude Recurrence

No further action is required because the cited condition is an isolated case.

THE ESTIMATED COMPLETION DATE FOR ALL ACTIONS ABOVE IS February 28, 1997

jjc 12/17/96 dry075k.wpd
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VERIFICATION STATEMENT FOR DEFICIENCY REPORT (DR) YM-96-D-075

The following documents were reviewed to verify completion of all remedial actions identified in the revised response dated December 18, 1996:

BABEA0000-01717-5000-00002, Rev. 01, Effective Date 2/24/97, "Documentation of Controlled Drilling and Blasting Operations".

ECR: E97-0024, dated 3/4/97. This ECR revised Specification BABEA0000-01717-6300-02313, Rev 01, "Subsurface Drilling and Blasting".

The results of this review were satisfactory. This DR is now considered closed based on this review.



3/12/97

P. H. Cotter, QAR

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VERIFICATION STATEMENT FOR DEFICIENCY REPORT (DR) YM-96-D-075

The following documents were reviewed to verify that the revised specification and Documentation Instruction clarified that 1) acceptance of blasting results is to be performed by the M&O and not Kiewit/PB and 2) qualitative criteria for blast acceptance was as specified in the revised response dated December 18, 1996:

- Documentation Instruction, BABEA0000-01717-5000-00002, Rev. 01, Effective Date 2/24/97, "Documentation of Controlled Drilling and Blasting Operations".
- ECR: E97-0024, dated 3/4/97. This ECR revised Specification BABEA0000-01717-6300-02313, Rev. 01, "Subsurface Drilling and Blasting".

The results of this review were satisfactory. This DR is now considered closed based on this review.



P. H. Cotter, QAR

3/12/97
Date