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

SEP 09 1996

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ISSUANCE OF SURVEILLANCE RECORD YMP-SR-96-019 RESULTING FROM YUCCA MOUNTAIN QUALITY ASSURANCE DIVISION'S (YMQAD) SURVEILLANCE OF THE CIVILIAN RADIOACTIVE WASTE MANAGEMENT SYSTEM MANAGEMENT AND OPERATING CONTRACTOR (CRWMS M&O) AND KIEWIT/PARSONS BRINCKERHOFF (KIEWIT/PB)

Enclosed is the record of Surveillance YMP-SR-96-019 conducted by the YMQAD at the CRWMS M&O and Kiewit/PB facilities at the Yucca Mountain Site, Nevada, and offices in the Bank of America and Summerlin Buildings, Las Vegas, Nevada, from June 10, 1996 through July 26, 1996.

The purpose of the surveillance was to determine and verify that the processes for controlling drilling and blasting and construction monitoring meet applicable procedures and the Quality Assurance Requirements and Description document.

One Corrective Action Request (CAR) and three Deficiency Reports (DR) were issued as a result of this surveillance. Responses to the CAR and DRs, which were transmitted via separate letter, are due by the date indicated on Block 12 of the CAR and DRs.

This surveillance is considered completed and closed as of the date of this letter. A response to this surveillance record and any documented recommendations is not required; however, the open CAR and DRs will continue to be tracked until they are closed to the satisfaction of the quality assurance representative and the Director, Office of Quality Assurance.

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recip: NMSS/HLUR

If you have any questions, please contact either Mario R. Diaz at (702) 794-1489 or Patout H. Cotter at (702) 794-1332.

R.E. Spence

Richard E. Spence, Director
Yucca Mountain Quality Assurance Division

YMQAD:MRD-2514

Enclosure:
Surveillance Record YMP-SR-96-019

cc w/encl:
D. A. Dreyfus, DOE/HQ (RW-1) FORS
R. W. Clark, DOE/HQ (RW-3.1) FORS
T. A. Wood, DOE/HQ (RW-14) FORS
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D. A. Bechtel, Clark County Comprehensive, Las Vegas, NV
Susan Dudley, Esmeralda County, Goldfield, NV
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Wayne Cameron, White Pine County, Ely, NV
B. R. Mettam, County of Inyo, Independence, CA
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OFFICE OF
RADIOACTIVE WASTE MANAGEMENT
U.S. DEPARTMENT OF ENERGY
WASHINGTON, D.C.

QUALITY ASSURANCE SURVEILLANCE RECORD

SURVEILLANCE DATA

[1]ORGANIZATION/LOCATION:	[2]SUBJECT:	3DATE:
Civilian Radioactive Waste Management System Management and Operating Contractor (CRWMS M&O) and Kiewit/Parsons Brinckerhoff (K/PB), Yucca Mountain Site, Nevada, and Las Vegas, Nevada	Controlled Drilling and Blasting, and Blast Monitoring	6/10/96-07/26/96

[4]SURVEILLANCE OBJECTIVE: To determine and verify that the processes for controlling drilling and blasting and construction monitoring meet applicable procedures and Quality Assurance Requirements and Description (QARD) document requirements.

[5]SURVEILLANCE SCOPE:	[6]SURVEILLANCE TEAM:
To review documentation including implementing documents of controlled drilling and blasting and construction monitoring associated with excavation of the Thermal Test Alcove to verify that implementation of the QARD, applicable procedures, and implementing documents are adequate and effective.	Team Leader: Patout H. Cotter Additional Team Members: Kristi A. Hodges

[7]PREPARED BY:	[8]CONCURRENCE:
Patout H. Cotter P.H. Cotter 6/10/96	N/A
Surveillance Team Leader Date	QA Division Director Date

SURVEILLANCE RESULTS

[9]BASIS OF EVALUATION/DESCRIPTION OF OBSERVATIONS:

See Page(s) 2-9

[10]SURVEILLANCE CONCLUSIONS:

See Page(s) 10

[11]COMPLETED BY:	[12]APPROVED BY:
P.H. Cotter 6/28/96	9/6/96
Surveillance Team Leader Date	QA Division Director Date

Block 9 (continued) BASIS OF EVALUATION/DESCRIPTION OF OBSERVATIONS:

From June 10 through July 26, 1996, a surveillance of drilling and blasting, and blast monitoring was performed (not continuous but on a part-time basis) of the following organizations:

Sandia National Laboratories (SNL)
CRWMS M&O Exploratory Studies Facility (ESF) Design
CRWMS M&O Determination of Importance (DIE)
CRWMS M&O ESF Test Coordination
K/PB

The surveillance took place at the Yucca Mountain Site, Nevada, and in the Bank of America and Summerlin Buildings, Las Vegas, Nevada. The objective of this surveillance was to verify that the activities associated with the drilling and blasting, and blast monitoring were in compliance with the requirements of the QARD, Revision 5, listed below:

SNL

1) **Requirement - Blast monitoring activities are to be performed in accordance with the requirements of Paragraph III.2.2.A, "Scientific investigations shall be performed using scientific notebooks, implementing documents, or a combination of both."**

Review of implementing documents (refer to Objective Evidence) revealed that the blast monitoring was performed in accordance with applicable procedures except some lack of specificity in the implementing documents was noted [See Block 10, Deficiency Report (DR) Yucca Mountain (YM)-96-D-074] (Also see recommendation #1).

2) **Requirement - Measuring and Test Equipment (M&TE) are to be calibrated in accordance with the requirements of Paragraph 12.2.1, "Calibration."**

Documentation of the evaluation and selection of the supplier who performed the calibration of the Seismograph used for Far Field measurements was not available (See Block 10, DR YM-96-D-074).

CRWMS M&O ESF Design

3) **Requirement - Field design/architect-engineer (A/E) activities associated with drilling and blasting are to be performed in accordance with the requirements of Section 5.0, "Implementing Documents."**

Review of implementing documents (refer to Objective Evidence) revealed that A/E field activities were performed in accordance with the QARD requirements and applicable

implementing documents except for the following cases:

- Although the specification "Subsurface Drilling and Blasting," BABEA0000-01717-6300-02313, Revision 01, did not identify acceptance limits for blasting performance, it did specify design goals: 300mm average over break is identified and action is taken if exceeded for two rounds to mitigate excessive over break (See Block 10, DR YM-96-D-074).

- Specification "Subsurface Drilling and Blasting," Paragraph 3.05E, states that the design goal for over break will be determined by visual inspection or spot measurement, as directed by the A/E. K/PB Quality Control Procedure (QCP)-011, Revision 2, Paragraph 3.3, "Inspection of Subsurface Drill and Blast Operations," indicated that visual examination will be performed if requested by the A/E. Revision 3, effective July 29, 1996, added spot monitoring; however, the specification requirements were still not met, since the specification wording indicates that either spot measurement or visual inspection is to be performed for each blast, and which one will be determined by the A/E. Based upon discussion, the over break evaluation is intended to be performed by the A/E Title III rather than the constructor. However, the responsibility is not clearly delineated in the specification, which is written to the constructor (See Block 10, DR YM-96-D-074) (Also see recommendation #1).

<u>CRWMS M&O DIE</u>

4) **Requirement - DIE activities associated with drilling and blasting are to be performed in accordance with the requirements of Section 5.0, "Implementing Documents."**

Review of implementing documents (refer to Objective Evidence) revealed that DIE activities were performed in accordance with QARD requirements and applicable implementing documents except that limits/acceptance criteria (which if exceeded would adversely impact or bias required site characterization tests) were not specified nor were Quality Assurance (QA) controls identified for Peak Particle Velocity (See Block 10, DR YM-96-D-072) (Also see recommendation #1).

<u>ESF Test Coordination</u>

5) **Requirement - Planning of controlled blasting and blast monitoring is to be performed in accordance with the requirements of Paragraph III.2.1A. "Scientific investigations shall be planned in accordance with Section 2.0, Quality Assurance Program."**

The planning documentation (refer to Objective Evidence) reviewed associated with the controlled drilling and blasting and blast monitoring was not in compliance with requirements of

the QARD and applicable implementing documents. Job Package (JP) 92-20D, "Construction Monitoring in the Ramps, MTL Drifts, and Alcoves," dated July 1994, and Test Planning Package (TPP) T-93-2, "Construction Monitoring in the Exploratory Studies Facility," Revision 4, dated October 1995, were not revised to address the "Strategy for Controlled Blasting and Blast Monitoring in the Thermal Alcove," delineated in a letter, W. E. Barnes to L. Dale Foust, dated January 16, 1996, AMSP:KJS-892; and a memorandum, N. Elkins to Distribution, dated February 21, 1996. Technical direction in support of drill and blast activities was contained in memoranda and/or non-QA plans rather than incorporated in JP, TPP, or currently, the Field Work Package. This deficiency is considered a recurring problem and is documented on Corrective Action Request (CAR) YM-96-C-007 (See recommendation #1).

K/PB

6) **Requirement - Construction/Quality Control (QC) activities associated with drilling and blasting are to be performed in accordance with the requirements of Section 5.0, "Implementing Documents."**

Review of implementing documents (refer to Objective Evidence) revealed that construction and QC activities were performed in accordance with QARD requirements and applicable implementing documents except for the following case:

K/PB prepared as a submittal for A/E approval Plan-005, "Subsurface Controlled Drilling and Blasting Plan for TS Main Drift Thermal Test Alcove," Revision 0, effective January 26, 1996. Plan-005 contains the approved drill and blasting patterns designed for the Thermal Test Alcove. Changes to the patterns were made; however, the process for how these changes were to be made was not clearly stated in the specification, K/PB procedures, or the drill and blast plan. During the surveillance, a revision to Plan-005 was generated and processed as a submittal to clearly describe how adjustments to blast patterns are to be documented and approved.

7) **Requirement - Training of Construction and QC personnel associated with drilling and blasting are to be performed in accordance with the requirements of Section 2.0, Paragraph 2.2.12, "Personnel Selection, Indoctrination, Training, and Qualification."**

The Subsurface Drilling and Blasting Specification requires as a QA control, "Documentation addressing training and qualifications of drilling and blasting first line supervision, including identification of an experienced and trained 'Blasting Supervisor' as the individual responsible on each shift for the blasting operations." Technical Control Procedure (TCP)-2.17, Revision 7, "Subsurface Drill and Blast Operation," requires the Blast Supervisor's qualifications to meet 29 CFR, 1926.900-1926.914, "Blasting and the Use of Explosives." Based upon a review of training and qualifications (including experience) of K/PB drilling and blasting supervision, the requirements have been met.

Based upon review of K/PB training records, the Shift Engineer for Plan-005, Blast 5-03, 5-04, and 5-05 was not appropriately qualified to perform that function before performing QA work activities; nor was he trained to the K/PB Job Safety Analyses (JSA) or TCP- 2.17, Revision 7, that were required for that position. DR LVMO-96-D-045, issued on June 13, 1996, documented a breakdown in the training/ qualification process for this particular individual; however, it did not address training deficiencies relative to drill and blast operations. During this surveillance, the existing DR was amended to include the procedure omission and the JSAs for the subject Shift Engineer. This is considered a deficiency identified during this surveillance; however, it has been added to an existing deficiency document.

8) **Requirement - Inspection and verification activities of drilling and blasting were performed in accordance with the requirements of Section 10.0, "Inspection."**

K/PB QC has implemented a monitoring program (not to be confused with construction monitoring). Rather than performing 100 percent QC overview, QC monitors activities on a selected basis. Prior to this surveillance, K/PB QC identified several documentation errors in construction records produced for drill and blast activities in the Thermal Test Alcove. Based upon later QC monitoring reports, record discrepancies have been significantly reduced. It appears that the QC monitoring has alerted construction to the importance of preparing its documentation completely and accurately.

In addition, K/PB has implemented a method for tracking incomplete records; i.e., a Document Deficiency List, into QCP-009, "Tracking and Acceptance of Incomplete Construction Items," Revision 4. It is not the intent of K/PB to add document deficiencies to its Construction Completion List, but to build an additional tracking mechanism for record errors. Although this appears acceptable, there is a concern that records that might have been corrected immediately will be deferred to a later date, likely upon submittal of the final Work Package (See recommendation #2).

OBJECTIVE EVIDENCE

The following letters and memorandums were reviewed during the course of the surveillance:

U.S. Department of Energy letter, "Controlled Blasting and Blast Monitoring in the Thermal Test Alcove," Wesley E. Barnes to L. Dale Foust, dated January 16, 1996.

Los Alamos Memorandums

LA-EES-13-LV-08-94-015, "Exploratory Studies Facility Test Coordination Office Field Work Plan for Construction Monitoring in the Ramps, MTL Drifts, and Alcoves," Revision August 10, 1994

LA-EES-13-LV-02-96-013, "Transmittal of Design and Test-Related Information for Design and Construction of Exploratory Studies Facility Northern Ghost Dance Fault Alcove Access Drift," dated February 14, 1996

LA-EES-13-LV-02-96-005, "Strategy for Controlled Blasting and Blast Monitoring in the Thermal Test Alcove, dated February 21, 1996

LA-EES-13-LV-06-96-005, "Transmittal of Design and Test-Related Information for Design and Construction of the Exploratory Studies Facility Thermal Testing Facility Connecting Drift and Heated Drift," dated June 5, 1996

LA-EES-13-LV-06-96-016, "Blast Monitoring at the Exploratory Facility-Exploratory Studies Facility Construction Monitoring," SCP Activity 8.3.1.15.1, dated June 18, 1996

SNL Letters

"Blasting Monitoring During Thermal Test Alcove Construction, M.G. Brady to Ned Elkins, dated January 8, 1996

"Preliminary Results of Blast Monitoring at the Thermal Test Facility," Moo Y. Lee to Charles R. Garrett, dated June 16, 1996

"Preliminary Results of Blast Monitoring (Rounds 2) at the Thermal Test Facility," Moo Y. Lee to Charles R. Garrett, dated May 15, 1996

"Preliminary Results of Far-Field Blast Monitoring at the Thermal Test Facility," Moo Y. Lee to Charles R. Garrett, dated June 17, 1996

CRWMS M&O Letter

LV.CM.EFF.06/96-094, "Procedure for Blast Pattern Changes"

CRWMS M&O Inter-Office Correspondence

LV.CM.RIL.06/96-100, "Extension of Access/Observation Drift"
LV.ESSB.RAS.5/96-026, "Alcove No. 5 Shot Results Round 5-05"
LV.ESSB.CRG.5/96-023, "Alcove No. 5 Shot Results Round 5-03"
LV.ESSB.RAS.5/96-026, "Alcove No. 5 Shot Results Round 5-05"

The following procedures and implementing documents were reviewed during the course of the surveillance:

CRWMS M&O Design

Specification BABEA0000-01717-6300-02313, Revision 01, "Subsurface Drilling and Blasting," ECR E95-0004, ECR96-0038

Documentation Instructions BABEA0000-01717-5000-00002, Revision 00, "Documentation of Controlled Drilling and Blasting Operations"

BABEA0000-01717-0200-00010, Revision 01, "Submittal Evaluation Calculation: Controlled Drilling and Blasting Plan-005"

BABE00000-01717-0200-00004, Revision 04, "ESF Blast Design Analysis"

CRWMS M&O Technical Coordination Office

Test Planning Package, T-93-2, Revision 4, dated October 1995
Job Package, 92-20D, dated July 1994, includes Field Change Request 94/344, dated August 16, 1994
Field Work Package, FWP-ESF-96-002, July draft

K/PB

Plan-005, Revision 0, "Subsurface Controlled Drilling and Blasting Plan for TS Main Drift Thermal Test Alcove"

Drill and Blast Monitor Reports: Monitoring of Records of Blasts 5-01, 02, 03 and 5-04

QCP-011,R2 & 3, "Inspection of Subsurface Drill and Blast Operations"

TCP-2.17, R7, "Subsurface ESF Drill and Blast Operations"

Blaster Certification, Training Attendance Sheets, April 18 and 29, 1995

Drill and Shoot Operation, JSA #26, Class Attendance Sheets:

May 8, 1996, instructor Young
May 10, 1996, instructors Dennison, Benoit, and Ward
May 11, 1996, instructors Kelso and Beesley

Foreman's Tool Box Meeting Attendance Sheet, Drill and Blast Operation, JSA no. 26, May 8, 1996

Controlled Drilling and Blasting Record Forms:

Blast Identification Numbers 5-01, 02, 03, 04, 05, 05A, 06, 07, 16, 17, 18, 19,& 20

Surveillance Report No. 96-33, "Subsurface Drilling and Blasting"

SNL

Work Agreement, WA-0065, Revision 04, "Exploratory Studies Verification Activities"

QA Implementing Procedure (QAIP) 2-4, Revision 02, "Conducting and Documenting Analyses/Calculations"

QAIP 1-5, Revision 10, "Establishing Work Agreements"

Technical Procedure, TP-237, Revision 00, "Installation and Verification of Instrumentation Wiring"

Technical Procedure, TP-249, Revision 00, "Maintenance, Verification, and Rejection Criteria of Instrumentation"

Seismograph, SN 3861, "Vibra-Tech Calibration Report," dated January 3, 1996

"Wiring Verification for Blast Monitoring System," dated May 13, 1996

Study Plan 8.3.1.15.1.8, "In Situ Design Verification," dated February 4, 1993

CRWMS M&O DIE

Nevada Line Procedure (NLP)-2-0, Revisions 01 & 02, "Determination of Importance Evaluations"

BABEAF000-01717-2200-00002, Revisions 00 & 01, "Determination of Importance Evaluation for the Design and Construction of the TS Main Drift Thermal Test Area"

BAB000000-01717-2200-00004, Revision 00, "Waste Isolation Evaluation Comparing Drill and Blast With Mechanical Excavation Techniques"

B00000000-01717-2200-00031, Revision 00, "Test Interference Evaluation for Fran Ridge Test Planning Support For The Engineered Barrier - Large Block Experiment - Test Planning Package T-93-3"

BAB000000-01717-2200-00005, Revision 05, "Determination of Importance Evaluation for Subsurface Exploratory Studies Facility"

The following CRWMS M&O individuals were interviewed or contacted during the course of this surveillance:

A. Segrest, CRWMS M&O, ESF Design
J. Clark, CRWMS M&O, ESF Design
E. Fitch, CRWMS M&O, ESF Design
Wemheuer, CRWMS M&O DIE
C.Garrett, CRWMS M&O, ESF Design

M. Brady, CRWMS M&O/SNL
J. Schelling, CRWMS M&O/SNL
R. Richards, CRWMS M&O/SNL
M. Lee, CRWMS M&O/SNL

J Hayes, CRWMS M&O/SPO
N. Elkins, CRWMS M&O/SPO
J. Agnew, CRWMS M&O/SPO
R. Data, CRWMS M&O/SPO
A. Burningham, CRWMS M&O/SPO

T Geer, CRWMS M&O SE
P Hastings, CRWMS M&O DIE
D. Gwyn, CRWMS M&O DIE
J. Skov, CRWMS M&O DIE

H. Cox, K/PB, QC
R, Noel, K/PB, QC
D. Osborne,K/PB, QA

R. Ruth, CRWMS M&O/QA
O. J. Gilstrap, CRWMS M&O/QA

S. Jones, YMSCO
W. Boyle, YMSCO
K Skipper, YMSCO

LEGEND:

SNL.....Sandia National Laboratories
SPO.....Scientific Program Operations
ESF TCO...Test Coordination Office
DIE.....Determination of Importance
SE.....Systems Engineering

Block 10 (continued) SURVEILLANCE CONCLUSIONS:

Based on review of records, implementing documents and correspondence, interviews with project personnel, and the issuance of three DRs and one CAR, it has been determined the overall adequacy and effectiveness of the quality program for controlled blasting and blast monitoring is marginal. It appears that implementation of formal controls is in need of improvement.

A summary of the adverse conditons documented as a result of this surveillance is as follows:

CAR YM-96-C-007
Contrary to the requirements of QARD, Revision 5, Supplement III, Paragraph III.2.1; and Section 2.0, Paragraph 2.2.5, planning documents were not kept current, and planning was documented by memorandum and/or non-QA planning documents. In addition, it was disclosed that similar conditions to this had been reported three times in the last year.

DR YM-96-D-072
Contrary to the requirements of QARD, Revision 5, Section 2.0, Paragraph 2.2.5; Section 5, Paragraph 5.2.2; Supplement III, Paragraph III.2.1.C; and NLP-2-0, Revision 02, "Determination of Importance Evaluation," Paragraphs 1 and 10, no limits/acceptance criteria (which if exceeded would adversely impact or bias a required site characterization test) were specified for blasting, nor were QA controls identified for Peak Particle Velocity.

DR YM-96-D-074
Contrary to the requirements of the QARD, Revision 5, Section 2.0, Paragraph 2.2.1, implementing documents which described blast monitoring during thermal test alcove construction lacked required specificity, and Section 7.0, Paragraph 7.2.2.A., the far field seismograph was calibrated by a supplier whose evaluation was not documented.

DR YM-96-D-075
Contrary to the requirements of QARD, Revision 5, Section 5.0, Paragraph 5.2.2; and Section 3.0, Paragraph 3.2.2.1, Subsurface Drilling and Blasting specification BABEA0000-01717-6300-02313, Revision 01, did not provide appropriate inspection criteria (upper limit not to exceed) for determining that a blast was satisfactorily accomplished, and indicated that inspections would be performed by K/PB which wasn't the intent.

Recommendations:

1. Conduct a training needs analysis to determine what training is required of project personnel to prevent the recurrence of deficiencies in need and use of formal implementing documents and identifying acceptance criteria.

2. Review the practice of identifying and tracking incomplete work to be done in the future instead of doing it as it is identified.