



DEPARTMENT OF ENERGY
Office of Civilian Radioactive Waste Management
Office of Geologic Disposal
Yucca Mountain Site Characterization Project Office
P.O. Box 98608
Las Vegas, NV 89193-8608

WBS 1.2.11
QA: N/A

MAR 15 1994

Robert F. Pritchett
Technical Project Officer
for Yucca Mountain
Site Characterization Project
Reynolds Electrical & Engineering Co., Inc.
P.O. Box 98521
Las Vegas, NV 89193-8521

VERIFICATION OF CORRECTIVE ACTION AND CLOSURE OF CORRECTIVE ACTION REQUEST
(CAR) YM-93-061 RESULTING FROM YUCCA MOUNTAIN QUALITY ASSURANCE DIVISION
(YMQAD) AUDIT YMP-93-12 OF REYNOLDS ELECTRICAL & ENGINEERING CO., INC.
(SCP: N/A)

The YMQAD staff has verified the corrective action to CAR YM-93-061 and determined the results to be satisfactory. As a result, the CAR is considered closed.

If you have any questions, please contact either Robert B. Constable at 794-7945 or Raul A. Hinojosa at 794-7991.

Richard E. Spence, Director
Yucca Mountain Quality Assurance Division

YMQAD:RBC-2430

Enclosure:
CAR YM-93-061

cc w/encl:
K. R. Hooks, NRC, Washington, DC
S. W. Zimmerman, NWPO, Carson City, NV
W. J. Glasser, REECO, Las Vegas, NV

cc w/o encl:
J. W. Gilray, NRC, Las Vegas, NV
N. J. Brogan, YMQAD/QATSS, Las Vegas, NV

210001
9403210201 940315
PDR WASTE PDR
WM-11

ADD: Ken Hooks

Ltr. Encl.
1 1

102.7
wm-11
N/A03

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

8 CAR NO.: YM-93-061
DATE: 07/02/93
SHEET: 1 OF 1
QA

CORRECTIVE ACTION REQUEST

1 Controlling Document
Specification YMP-025-1-SP09

2 Related Report No.
YMP-93-12

3 Responsible Organization
REECO QC

4 Discussed With
P. Bryant

5 Requirement:
Specification YMP-025-1-SP09, Section 03361, "Shotcrete," Revision 1, Paragraph 3.10.B.3.d states in part, "When shotcrete does not meet the specified requirements and was taken from a test panel, additional samples shall be taken from the area of work in place represented by the test panel and tested for conformance to the specifications."

6 Adverse Condition:
Contrary to the above, Field Quality Control did not notify construction to take additional samples when two test panel 28-day compressive strength tests failed.

Refer to test results for shotcrete placed on 4/23/93 and on 5/10/93.

9 Does a significant condition adverse to quality exist? Yes ___ No X
If Yes, Circle One: A B C

10 Does a stop work condition exist? Yes ___ No X; if Yes - Attach copy of SWO
If Yes, Circle One: A B C D

11 Response Due Date:
20 Working Days from Issuance

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

13 Recommended Actions:
1) Ensure the two failed test results are appropriately documented.

7 Initiator Gerard Heaney <i>Gerard Heaney</i> Date <u>7-1-93</u>	14 Issuance Approved by: QADD <i>[Signature]</i> Date <u>07-07-93</u>
15 Response Accepted QAR <i>Gerard Heaney</i> Date <u>8-10-93</u>	16 Response Accepted QADD <i>[Signature]</i> Date <u>8/17/93</u>
17 Amended Response Accepted QAR <i>Paul H. Henzler</i> Date <u>11/4/93</u>	18 Amended Response Accepted QADD <i>[Signature]</i> Date <u>11/4/93</u>
19 Corrective Actions Verified QAR <i>Paul H. Henzler</i> Date <u>3-4-94</u>	20 Closure Approved by: QADD <i>[Signature]</i> Date <u>3/14/94</u>

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

CAR NO. YM-93-061
DATE: 08/04/93
PAGE: _____ OF _____
QA

CORRECTIVE ACTION REQUEST (Continuation Page)

CORRECTIVE ACTION RESPONSE for CAR # YM-93-061

A. Remedial Action:

REECO YMP Quality Control (QC) Section has investigated the two noted panel failures and has determined that the failure on April 23, 1993, is included in the area addressed by Project Nonconformance Report (NCR) Number 93-014. Further evaluation indicates that a full review of all shotcrete records with 28 day test results is needed. When this review is completed, all failing panels will be documented on a Project NCR for Architect/Engineer disposition.

Responsible Individual: E. P. Bryant
Estimated completion date: September 15, 1993

C. Root Cause Determination:

Positive controls to ensure appropriate actions for test failures were not in place.

D. Corrective Action to Preclude Recurrence:

As a positive control, a log system has been implemented to ensure timely receipt of test data and to clearly indicate test status. The test results and any action required will be documented on the appropriate Inspection Report.

Responsible Individual: E. P. Bryant
Estimated completion date: September 15, 1993

Response Approved: *R. F. Pritchett* Date: *8/4/93*

Ltr dtd 8/4/93 - 580-01-587

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

CAR NO. YM-93-061
DATE: 10/19/93
PAGE: _____ OF _____
QA

CORRECTIVE ACTION REQUEST (Continuation Page)

CORRECTIVE ACTION RESPONSE FOR CAR # YM-93-061

Supplemental CAR response on Remedial Actions:

During a recent review of documentation for inclusion in the final Design Package 1A records package, REECo identified additional information concerning the status of shotcrete test panels and results. REECo Quality Control Section had originally determined that the panel identified as occurring on April 23, 1993, was included in the area addressed by Project Nonconformance Report (NCR) 93-014. Further evaluation showed that, although the failure apparently occurred in the first 33 feet of the tunnel, the date of failure was after the time frame covered by the NCR.

Based upon this new information, it has been determined that additional evaluation is necessary to ensure that required test panels have been taken, test reports have been received, and test results (including test results for placed shotcrete on April 23, 1993, and May 10, 1993) have been adequately reviewed for inclusion on Project NCR(s), as necessary.

We, therefore, request an extension until November 19, 1993, to complete the additional evaluation and initiate the necessary NCR(s).

Responsible Individual: E. P. Bryant
Estimated completion date: November 19, 1993

Response Approved:

R. J. Pritchard

Date: 10-20-93

Str dtd 10/19/93 - 580-01-038



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

WBS 1.2.11
QA: N/A

NOV 04 1993

Robert F. Pritchett
Technical Project Officer
for Yucca Mountain
Site Characterization Project
Reynolds Electrical & Engineering Co., Inc.
P.O. Box 98521
Las Vegas, NV 89193-8521

VERIFICATION OF CORRECTIVE ACTION REQUEST (CAR) YM-93-061 RESULTING FROM YUCCA MOUNTAIN QUALITY ASSURANCE DIVISION (YMQAD) AUDIT YMP-93-12 OF REYNOLDS ELECTRICAL & ENGINEERING CO., INC. (REECO) AND EVALUATION OF AMENDED RESPONSE AND REQUEST FOR EXTENSION DATED OCTOBER 19, 1993, FROM REECO (REECO LETTER 580-01-38) (SCP: N/A)

The YMQAD staff has verified the corrective action to CAR YM-93-061 and determined the verification results to be unsatisfactory.

The response stated that the failure of the shotcrete test panels tested on April 23, 1993 and May 10, 1993 is addressed by Project Nonconformance Report (NCR) 93-014. Furthermore, a full review of all shotcrete records with 28-day results would be conducted and completed by September 15, 1993. Contrary to this response, the cited nonconformance report does not address test panels which failed, and the review of all shotcrete records with 28-day results had not been completed as of October 12, 1993.

All other corrective action described in the accepted response was found to be satisfactory. In addition, REECO amended response and request for extension of corrective action completion date (REECO letter 580-01-038 dated October 19, 1993) has been received and approved.

Based on the above verification results and evaluation of the amended response received, an extension of corrective action completion to November 19, 1993, is granted. Verification of completion of corrective actions will be performed after the effective dates provided.

If you have any questions, please contact Robert B. Constable at (702) 794-7945.

A handwritten signature in cursive script that reads "R.E. Spence".

Richard E. Spence, Director
Yucca Mountain Quality Assurance Division

YMQAD:RBC-447

Enclosure:
CAR YM-93-061

Robert F. Pritchett

-2-

cc w/encl:

K. R. Hooks, NRC, Washington, DC
S. W. Zimmerman, NWPO, Carson City, NV
W. J. Glasser, REECO, Las Vegas, NV

cc w/o encl:

J. W. Gilray, NRC, Las Vegas, NV
M. J. Brogan, YMOAD/QATSS, Las Vegas, NV



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WBS 1.2.11
QA: N/A

DEC 14 1993

Robert F. Pritchett
Technical Project Officer
for Yucca Mountain
Site Characterization Project
Reynolds Electrical & Engineering Co., Inc.
P.O. Box 98521
Las Vegas, NV 89193-8521

VERIFICATION OF CORRECTIVE ACTION OF CORRECTIVE ACTION REQUEST (CAR) YM-93-061
RESULTING FROM YUCCA MOUNTAIN QUALITY ASSURANCE DIVISION (YMQAD) AUDIT
YMP-93-12 OF REYNOLDS ELECTRICAL & ENGINEERING CO., INC. (SCP: N/A)

The YMQAD staff has verified the corrective action to CAR YM-93-061 and determined the results to be unsatisfactory because of the following:

The amended response stated that additional evaluation of all shotcrete test panels including the panels tested April 23, 1993 and May 10, 1993, would be completed, and necessary nonconformance reports (NCRs) would be issued by November 19, 1993.

A verification of completion of the above-committed corrective actions revealed that the evaluation is not complete, and the necessary NCRs have not been issued.

Your response is requested within ten working days of the date of this letter stating the revised corrective action and expected completion date. The response should address the following:

1. A complete listing of all shotcrete test panels since initiation of shotcrete application by date.
2. An annotation on the Materials Test Laboratory (MTL) log of the acceptance or rejection of the test panels based on all available test results. Nonconformance reports must be issued for test results that do not meet minimum requirements.
3. Inspection records that were signed off as acceptable where the 7-day test results and/or the 28-day test results were below required minimums must be corrected to reflect that the results were unacceptable and the appropriate NCR number annotated thereon.
4. Nonconformance reports must be issued for lost test panels or test panels not tested because of delayed delivery to the MTL.

Verification of completion of the required corrective action will be performed after the date provided.

Robert F. Pritchett

-2-

DEC 14 1993

If you have any questions, please contact either Robert B. Constable at 794-7945 or Raul A. Hinojosa at 794-7991.



Richard E. Spence, Director
Yucca Mountain Quality Assurance Division

YMQAD:RBC-1193

Enclosure:
CAR YM-93-061

cc w/encl:
K. R. Hooks, NRC, Washington, DC
S. W. Zimmerman, NWPO, Carson City, NV
W. J. Glasser, REECO, Las Vegas, NV

cc w/o encl:
J. W. Gilray, NRC, Las Vegas, NV
N. J. Brogan, YMQAD/QATSS, Las Vegas, NV

93-005605

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

CAR NO.: YM-93-061
DATE: 12-29-93
SHEET: _____ OF _____

CORRECTIVE ACTION REQUEST
(continuation sheet)

REVISED CORRECTIVE ACTION RESPONSE FOR CAR YM-93-061

1. A complete listing of all shotcrete panels is in the process of being compiled and validated. The final listing will be submitted by January 28, 1994.
2. The Material Test Request Log was implemented to ensure timely receipt of test data and to indicate test status. The log was implemented as corrective action to preclude recurrence of the identified deficiency and not as remedial action which might require backfitting of information prior to its inception in August 1993. Although accept or reject is indicated for test results received after inception of the log, our planned corrective action dated August 4, 1993 to the CAR clearly states: "The test results and any action required will be documented on the appropriate Inspection Report." Further, it should be noted the Materials Test Laboratory (MTL) is a tracking tool only to ensure results are received as expected. Once the results are received, the log serves no useful purpose since results are on the Inspection Report. It is for this reason that the MTL procedure is not a QA procedure and produces no records.
3. Evaluation of existing test results had been completed at the time of the verification and a subsequent NCR has since been issued. Based on this review, REECo considers all actions to be complete. However, discussion with the DOE QA representative indicates a potential disagreement in the proper use of specification for evaluation of shotcrete test results. REECo will seek an interpretation concerning the applicable specification, and if necessary, issue additional NCR's if it is determined that the REECo methodology is not as required. A status regarding this action will be provided by January 28, 1994.
4. The need for any additional NCR's for lost test panels or test panels not tested because of delayed delivery to the MTL, if required, will be determined as a result of compiling the information requested by item No. 1, above.

Responsible individual: W. J. Glasser/T. M. Leonard
Estimated Completion Date: January 28, 1994

Response Approved: *RJ Pritchett* Date: 12/29/93

Sti dtd 12/29/93 - 580-01-176

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

CAR NO. YM-93-061
DATE: 01/28/94
PAGE: OF
QA

CORRECTIVE ACTION REQUEST (Continuation Page)

AMENDED CORRECTIVE ACTION RESPONSE AND EXTENSION REQUEST for CAR YM-93-061

D. Remedial Actions:

1. The listing of shotcrete panels has been compiled and is being validated. The final listing will be submitted by February 28, 1994.
2. As a result of a written request to the Subsurface A/E, the A/E has responded and agrees with REECo that 28 day break test results evaluated in accordance with ACI 506.2-90, paragraph 1.6.3.3 (i.e., $f'_c = 5000$ psi), is a correct application of Project specifications. REECo is seeking A/E concurrence that 7 day break tests are for information and that acceptance is based upon product achieving design strength at 28 days. A copy of the REECo and A/E correspondence is attached for your information.
3. The need for any additional NCR's for lost test panels or test panels not tested because of delayed delivery to the Material Test Laboratory, if required, will be determined as a result of compiling the information requested by item no. 1, above.

Responsible Individuals: T. M. Leonard/E. P. Bryant
Estimated completion date: February 28, 1994

Response Approved: _____

TC Pritchett

Date: _____

1/28/94

See att 1/28/94-580-01-228



Reynolds Electrical & Engineering Co., Inc.

Post Office Box 98521 • Las Vegas, NV 89193-8521

IN REPLY REFER TO:

580-01-182

WBS 1.2.11.4
QA

January 5, 1994

M. L. Renegar
Construction Manager
Morrison Knudsen
Management & Operating Contractor
101 Convention Center Drive
Mail Stop 423
Las Vegas, NV 89109

EVALUATION OF COMPRESSIVE STRENGTH TEST RESULTS (SCP: N/A)

As a result of Reynolds Electrical & Engineering Co., Inc. (REECO's) efforts to resolve a U.S. Department of Energy (DOE) Corrective Action Request (CAR) (YM-93-061) concerning the reporting of shotcrete test core compressive strengths below specified requirements, a question has been raised by DOE Quality Assurance concerning the utilization of specified criteria which requires Architect/Engineer (A/E) resolution. Based on DOE QA's discussion with A/E personnel, DOE QA has indicated that REECO may have misinterpreted the requirements. However, REECO's discussions with the A/E in the field have an interpretation consistent with REECO's practice. The purpose of this request is to resolve any differences. Requirements which require either agreements with REECO's actions or clarifying direction are noted below.

Disposition of shotcrete compressive test results of test panel cores are given in Project Specification YMP-025-1-SP09, Revision 3, Section 03361. Applicable requirements are as follows:

- Paragraph 3.10.B.3.b, "One core shall be tested at 7 days and 2 cores tested at 28 days in accordance with Section 2.02B."
- Paragraph 2.02B (third paragraph), "The mixes (dry or wet) shall be designed to provide an unconfined compressive strength of 5000 pounds per square inch at 28 days when tested in accordance with ACI 506.2-90."
- Attachment A requires in paragraph 2.1.b, "Construction samples shall be taken and tested as outlined in ACI 506.2 Section 1.6.3."
- ACI 506.2-90 states in paragraph 1.6.3.3 (second paragraph), "The average compressive strength of 3 cores taken from the structure or test panel, representing a shift or 50 cubic yards (38 mm³) of shotcrete, must equal or exceed $0.85 f_c'$ with no individual core less than $0.75 f_c'$."

REECO

AN  EBCG COMPANY



M. L. Renegar
580-01-182
Page 2
January 5, 1994

- ACI 506.2 § 2.5 states " Specified strength of the shotcrete, f_c' , for each portion of the structure."
- ACI 318 identifies in Chapter 5, Section 5.0, that f_c' = specified compressive strength of concrete, psi.

Based on the above information, REECO has evaluated shotcrete cores using the provisions of ACI 506.2-90, paragraph 1.6.3.3 in that REECO has considered the project specified compressive strength of 5000 psi to be the f_c' value. This evaluation criteria has allowed REECO to accept test results with an average compressive strength as low as 4250 psi which is $0.85 f_c'$.

REECO requests concurrence with the above described application of Project specifications or clarification as to how cores are to be evaluated.

A formal response is requested by January 14, 1994, so that your decision may be included as part of REECO's required response to DOE CAR YM-93-061. Should you have any questions, please contact William J. Glasser at (702) 794-7562.

E. P. Bryant, Section Chief
YMP Quality Assurance Department

EPB:as

cy: Information Services Center, M/S 408
T. I. Fortner, DOE/YMP, M/S 523
W. J. Glasser, REECO, M/S 408
D. L. Koss, REECO, M/S 408
T. M. Leonard, REECO, M/S 408
R. F. Pritchett, REECO, M/S 408



INFORMATION COPY

TRW Environmental
Safety Systems Inc.

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

WBS: 1.2.6
QA: N/A

JAN 13 1994

Contract #: DE-AC01-91RW00134
LV.YM.MLR.1/94-003

January 11, 1994

E. P. Bryant, Section Chief
YMP Quality Assurance Department
Reynolds Electrical & Engineering Co, Inc.
PO Box 98521
Las Vegas, NV 89193-8521

Reference: Your letter, 580-01-182, Evaluation of Compressive Strength
Test Results (SCP: N/A), dated January 5, 1994

Dear Mr. Bryant:

Pursuant to the above referenced letter, the Subsurface A/E has determined that we are in agreement with your described application of the project specification as stated. It is the A/E's intention to further clarify the shotcrete specification for the next phase and declare f'_c as 34.4738 MPa (5000psi).

Should you require further information on this subject, please contact
A. Watkins at 702/295-4068.

M. L. Renegar
Construction Manager
Management and Operating Contractor

cc: T. I. Fortner, DOE/YMP
W. J. Glasser, REECo
D. L. Koss, REECo
T. M. Leonard, REECo
J. L. Naaf, M&O
J. H. Pye, M&O
R. M. Sandifer, M&O

MLR:lg

JAN 13 1994

REF-90-YMP
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OFFICE OF CIVILIAN
RADIOACTIVE WASTE MANAGEMENT
U.S. DEPARTMENT OF ENERGY
WASHINGTON, D.C.

CAR NO. YM-93-061
DATE: 02/24/94
PAGE: OF
 QA

CORRECTIVE ACTION REQUEST (Continuation Page)

FINAL CORRECTIVE ACTION RESPONSE for CAR YM-93-061

D. Remedial Actions:

1. A validated listing of shotcrete panels, produced during Starter Tunnel shotcrete application, is attached. Panel numbers are separated into upper and lower drift applications.
2. As a result of a written request to the Subsurface A/E, the A/E has responded and agrees with REECO that 7 day break test results are for information and that acceptance is based on product achieving design strength at 28 days. A copy of the REECO and A/E correspondence is attached for your information.
3. During review of the shotcrete placement and inspection/test documentation (refer to Item 1, above), the need for one additional Nonconformance Report (NCR) was identified. According to construction records, shotcrete was placed in the Starter Tunnel on May 5, 1993, at location 0.66 to 0.71. A review of inspection/test records indicates that inspection and test results for that placement are not available. This is identified as NCR YMPO-94-010.

The information provided herein completes REECO's committed actions.

Response Approved: *RF Pritchard* Date: 2/24/94

Ltd dtd 2/24/94 - 580-01-286

SUMMARY OF TEST PANELS FOR VERIFICATION
OF SHOTCRETE PLACED IN ESF STARTER TUNNEL

STARTER TUNNEL - UPPER DRIFT

Panel #1	930611-1	930719-1
FT-1	930614-1	930719-2
Panel #2	930615-1	930720-2&3
93-04-27	930616-1	930720-3
930428-1	930617-1	930720-1
930503-1	930622-1	930721-1&2
930505-1	930623-2	930721-3
93-5-10-1	930623-3	930721-2H
930511-1	930623-1	930722-1
930518-1	930624-3	930722-2
93-21-5-1	930624-1	930722-3
930601-1	930625-1	930723-2
930601-3	930625-3	930723-1
930601-2	930628-3	930726-1
930602-1	930628-2	930726-2
930607-1	930629-1	930726-3
930608-1	930702-1	930727-2
930609-1	931607-1	930727-3
930610-1	930716-3	
930610-2	930719-3	

STARTER TUNNEL - LOWER DRIFT

930806-1	930820-001
920806-2	930910-1
930807-1	930910-2
930807-2	930913-1
930807-3	930913-2
930809-1	930913-3
930809-2	930914-1
930809-3	930914-2
930810-1	930914-3
930810-2	930915-1
930817-1	930915-2
930818-1	930915-3
930818-002	930916-1
930819-3	930916-2
930819-1	930916-3
930819-2	930917-1
	930917-2

TRW Environmental
Safety Systems Inc.

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

INFORMATION COPY

94-001172
TRW
WBS: 1.2.6
QA: N/A

Contract #: DE-AC01-91RW00134
LV.YM.MLR.1/94-017

February 09, 1994

E. P. Bryant, Section Chief
YMP Quality Assurance Department
Reynolds Electrical & Engineering Co, Inc.
PO Box 98521
Las Vegas, NV 89193-8521

Reference: Your letter, 580-01-221, Disposition of Seven Day Breaks of
Shotcrete (SCP: N/A), dated January 26, 1994

Dear Mr. Bryant:

Pursuant to the above referenced letter, the Subsurface A/E has determined that we are in agreement with your described application of the project specification as stated.

Should you require further information on this subject, please contact A. Watkins at 702/295-4068 or D. Jenkins at 702/295-6623.



M. L. Renegar
Construction Manager
Management and Operating Contractor

cc: T. I. Fortner, DOE/YMP
W. J. Glasser, REECo
D. L. Koss, REECo
T. M. Leonard, REECo
J. L. Naaf, M&O
J. H. Pye, M&O
R. M. Sandifer, M&O

MLR:lg



INFORMATION COPY

94-000717

Reynolds Electrical & Engineering Co., Inc.

Post Office Box 98521 • Las Vegas, NV 89193-8521

IN REPLY REFER TO:

580-01-221

January 26, 1994

WBS 1.2.11.4
QA

M. L. Renegar
Construction Manager
Morrison Knudsen
Management & Operating Contractor
101 Convention Center Drive
Mail Stop 423
Las Vegas, NV 89109

DISPOSITION OF SEVEN DAY BREAKS OF SHOTCRETE (SCP: N/A)

The above subject is concerned with Project Specifications YMP-025-1-SP09, Revision 2, Section 03361, Revision 3, paragraph 1.05 C.4, paragraph 3.10 B.3.b, paragraph 2.02 B; and YMP-025-1-SP01, Revision 5, Section 03362, Revision 1, paragraph 1.04 D.4, paragraph 3.09 B.3.b, paragraph 3.09 B.3.c, and paragraph 3.09 B.3.d.

As a result of the evaluation of response comments to Corrective Action Request YM-93-061, U.S. Department of Energy auditing personnel have raised a question regarding why Nonconformance Reports are not issued against failing seven day breaks of shotcrete.

Reynolds Electrical & Engineering Co., Inc. (REECo) Quality Assurance Department/Quality Control Section has taken the position that seven day breaks of concrete materials, by standard practice and as defined in American Concrete Institute (ACI) 301, Section 16.3.4.3, are for information and that acceptance is based upon the product achieving design strength at 28 days.

If there is in fact a requirement for further evaluation of seven day test specimens, REECo Quality Assurance Department/Quality Control Section suggests that such an evaluation be in accordance with ACI 506.2, Section 16.3, that is, no single core to be less than 75 percent of specified seven day strength.

We request that the Architect/Engineer agree with REECo's position as noted above or provide specific direction for disposition of seven day breaks.

E. P. Bryant, Section Chief
YMP Quality Assurance Department

EPB:as

Enclosure - See page 2

REECO

AN  EBC COMPANY

Jan 27 1994
RECEIVED

M. L. Renegar
580-01-221
Page 2
January 26, 1994

Enclosure
Excerpts dated 01-24-94 (1 page)

cy w/encl.

Information Services Center, M/S 408

T. I. Fortner, DOE/YMP, M/S 523

W. J. Glasser, REECo, M/S 408

D. L. Koss, REECo, M/S 408

T. M. Leonard, REECo, M/S 750

R. F. Pritchett, REECo, M/S 408

Excerpts

January 24, 1994

YMP-025-1-SP09 REVISION 2, SECTION 03361, REVISION 3

¶ 1.05 C.4 Compressive Strength

The mix design for production with the steel fiber reinforcement shall be such as to develop strength as placed on the job or in the test panels progressively as follows:

in 7 days: 3,000 psi minimum
in 28 days: 5,000 psi minimum

¶ 3.10 B.3.b states in part:

One core shall be tested at seven days and two cores tested at 28 days in accordance with Section 2.02 B of this specification.

¶ 2.02 B states in part:

The mixes (dry or wet) shall be designed to provide an unconfined compressive strength of 5,000 pounds per square inch at 28 days when tested in accordance with ACI 506.2-90.

YMP-025-1-SP01 REVISION 5, SECTION 03362, REVISION 1

¶ 1.04 D.4 Compressive Strength

The mix design and finished shotcrete product shall be such as to develop strength as placed on the job and in the test panels progressively as follows:

in 7 days: 2,500 psi minimum
in 28 days: 4,000 psi minimum

¶ 3.09 B.3.b states in part:

One core shall be tested at seven days and two cores tested at 28 days in accordance with ACI 506.2-90.

¶ 3.09 B.3.c states in part:

The shotcrete shall meet the specified strength and durability requirements.

¶ 3.09 B.3.d states in part:

When shotcrete does not meet the specified requirements and was taken from a test panel, additional samples shall be taken from the area of work in place represented by the test panel and tested for conformance to the specifications.

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

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CORRECTIVE ACTION REQUEST (Continuation Page)

**VERIFICATION OF CORRECTIVE ACTION REQUEST
(CAR) YM-93-061**

Verification of corrective action was completed on 03-04-94 by Raul A. Hinojosa. The following objective evidence was verified.

1. The listing of shotcrete panels submitted was verified by comparison with the original Shotcrete Placement Logs.
2. This listing was further compared to the listing of the Shotcrete Placement Logs on REECO Deficiency Notice no. DN-94-016. This DN was issued to document errors in numbering of the Shotcrete Placement Logs by Construction.
3. The Sample Log of Shotcrete Test Panels was reviewed to verify that nonconformance reports were initiated to document the various nonconforming conditions related to Shotcrete placement and testing.
4. REECO DN no. DN-94-018 was issued to document some the fact that REECO QC erroneously changed the Shotcrete Test record results obtained by the RSN Materials Test Laboratory and the actions that are to be taken to correct the records.

All actions committed to by REECO to close this CAR have been completed and this CAR is closed based on the results of this verification. Any further followup to this activity by this department will be by the on-going surveillance or audit activities.

Signature

Raul A. Hinojosa

Date

03-04-94