

CRWMS/M&O

Calculation Cover Sheet

Complete only applicable items.

1. QA: L

Page: 1 Of: 9

2. Calculation Title
 Alternate Acceptance of Wulfenstein Pit Aggregate

3. Document Identifier (including Revision Number)
 BABEE0000-01717-0210-00003 REV 00

4. Total Pages
 9

5. Total Attachments
 Three

6. Attachment Numbers - Number of pages in each
 Attachment I - 9 pages, Attachment II- 7 pages, Attachment III - 9 pages.

	Print Name	Signature	Date
7. Originator	Jerald W. Keifer	<i>Jerald W. Keifer</i>	6/24/99
8. Checker	Kenneth J. Herold	<i>Kenneth J. Herold</i>	6/24/99
9. Lead /	Jerald W. Keifer	<i>Jerald W. Keifer</i>	6/24/99

10. Remarks

Revision History

11. Revision No.	12. Description of Revision
00	Initial Issue

1. PURPOSE

The purpose of this calculation is to evaluate Wulfenstein fine aggregate for acceptability under ASTM C 33 standard specification.

2. METHOD

The method is to apply the criteria in ASTM C 33, which includes conditional allowances and alternative acceptance criteria, to the Wulfenstein aggregate.

3. ASSUMPTIONS

Not used.

4. USE OF COMPUTER SOFTWARE

Not used.

5. CALCULATION

5.1 Background

Wulfenstein supplies the coarse and fine aggregate for general use in all batch plant operations, which include both shotcrete and concrete. All applicable specification sections, Ref. 7.2 – 7.6, require the aggregate to be procured in accordance with ASTM C 33. (Ref. 7.1) The year-edition specified for ASTM C 33 varies between the different specifications. Impact Reviews were performed, and determined that the latest year-edition, ASTM C 33-97, had no impact on the material specified in the different editions of ASTM C 33. (Ref. 7.7 & 7.8). A deviation to procure all aggregates to ASTM C 33-97 was requested by the constructor and approved by the A/E (Ref. 7.9), which establishes ASTM C 33-97 as the applicable standard. The shotcrete specifications (Ref. 7.2 & 7.3) are Q specifications, which makes all aggregates subject to QA receipt inspection to eliminate separate stockpiles for Q and non-Q aggregates.

Wulfenstein manufactured fine aggregate has been considered to be a non-conforming item to the *Standard Specification for Concrete Aggregates, ASTM C 33-97*. Two conditions are documented in Nonconformance Report (NCR) YMSCO-98-0017 (Attachment I) as the causes of the non-conformance. The first condition is the #100 sieve fraction (150- μ m) exceeded the standard gradation limit by 2%. The second condition is the possibility of exceeding the deleterious substance limits for the #200 sieve (minus 75- μ m material) in the fine aggregate.

5.2 Gradation Issue

ASTM C 33 requires the fine aggregate to be graded within the following limits:

Sieve	Percent Passing
9.5 mm (3/8 – in.)	100
4.75 mm (No. 4)	95 to 100
2.36 mm (No. 8)	80 to 100
1.18 mm (No. 16)	50 to 85
600 µm (No. 30)	25 to 60
300 µm (No. 50)	10 to 30
150 µm (No. 100)	02 to 10

However, as described in section 6.1 of ASTM C 33 (Ref. 7.1) exceptions are allowed when alternative criteria are met in accordance with other sections of the standard. In section 6.3 of ASTM C 33-97 (Ref. 7.1) aggregates are acceptable if :

- 1) not more than 45 percent passing any sieve and retained on the next consecutive sieve of the above listed sieves sizes and
- 2) the fineness modulus is between 2.3 and 3.1.

In section 6.4, aggregates are acceptable if the concrete produced from the aggregates have relevant properties at least equal to the those of concrete produced from a reference aggregate.

Sieve analyses of aggregates in accordance with ASTM C136 were taken at receipt inspection of fine aggregate from the Wulfenstein Pits (Attachment II). A review of the analysis results show that the fine aggregate often failed to meet the standard gradations specified on the #100 and #200 sieves. Calculation of the analysis as shown in Figures 1 through 6, was made to determine the size fraction passing any sieve and retained on the next consecutive sieve. Fineness modulus was also calculated. The results demonstrate that the aggregate meets the requirements for retained fraction percentages being less than 45% and the fineness modulus falling between 2.3 and 3.1. Therefore, the fine aggregates meets the requirements of ASTM C 33 –97 under section 6.3.

The fine aggregate identified in the NCR (Attachment I) was a component of the shotcrete that was placed at the ECRB starter tunnel. The shotcrete applied there is representative of that used in the two Field Work Packages and the Job package identified in the NCR. The shotcrete was prepared in accordance with the A/E approved Shotcrete mix design #505 (Ref. 7.11). Shotcrete Mix Design #505 demonstration test panels were made, during the approval process, from a fine aggregate that met the gradation limits of section 6.1 of ASTM C33. These test panels qualify as the reference concrete in accordance with section 6.4 of ASTM C33. The compressive strength results from the production test panels (Attachment III) met the specified strength requirements of the Wet Process Shotcrete specification. (Ref. 7.2) In accordance with section 6.4 of ASTM C 33 the aggregate is acceptable based upon the comparison of compressive strength results with the reference shotcrete cores.

ASTM C136 Sieve Analysis

	05/19/1998	Cumulative Weight Retained (g)	Retained @ Fraction Weight (g)	Percentage @ Fraction Retained	Cumulative Percent Retained
9.5 mm (3/8 - in.)		0.0			
4.75 mm (No. 4)		0.0	0.0	0.0%	0.0%
2.36 mm (No. 8)		32.2	32.2	6.2%	6.2%
1.18 mm (No. 16)		208.9	176.7	34.2%	40.5%
600 microns (No. 30)		336.4	127.5	24.7%	65.1%
300 microns (No. 50)		413.9	77.5	15.0%	80.2%
150 microns (No. 100)		463.9	50.0	9.7%	89.8%
Total Dry Weight		516.4			
			Total % Retained		281.8%
			Fineness Modulus		2.82

Figure 1. Calculation of Fineness Modulus and Retained Sieve Fractions.

ASTM C136 Sieve Analysis

	05/20/1998	Cumulative Weight Retained (g)	Retained @ Fraction Weight (g)	Percentage @ Fraction Retained	Cumulative Percent Retained
9.5 mm (3/8 - in.)		0.0			
4.75 mm (No. 4)		0.8	0.8	0.1%	0.1%
2.36 mm (No. 8)		38.2	37.4	7.0%	7.2%
1.18 mm (No. 16)		220.5	182.3	34.2%	41.3%
600 microns (No. 30)		346.6	126.1	23.6%	65.0%
300 microns (No. 50)		423.1	76.5	14.3%	79.3%
150 microns (No. 100)		475.0	51.9	9.7%	89.0%
Total Dry Weight		533.6			
			Total % Retained		281.9%
			Fineness Modulus		2.82

Figure 2. Calculation of Fineness Modulus and Retained Sieve Fractions.

ASTM C136 Sieve Analysis					
	05/20/1998	Cumulative Weight Retained (g)	Retained @ Fraction Weight (g)	Percentage @ Fraction Retained	Cumulative Percent Retained
9.5 mm (3/8 - in.)		0.0			0%
4.75 mm (No. 4)		0.6	0.6	0.1%	0.1%
2.36 mm (No. 8)		38.8	38.2	6.7%	6.8%
1.18 mm (No. 16)		237.2	198.4	34.6%	41.3%
600 microns (No. 30)		374.9	137.7	24.0%	65.3%
300 microns (No. 50)		458.1	83.2	14.5%	79.8%
150 microns (No. 100)		513.1	55.0	9.6%	89.4%
Total Dry Weight		574.2			
				Total % Retained	282.7%
				Fineness Modulus	2.83

Figure 3. Calculation of Fineness Modulus and Retained Sieve Fractions.

ASTM C136 Sieve Analysis					
	05/21/1998	Cumulative Weight Retained (g)	Tester: William H. Johnson Retained @ Fraction Weight (g)	Percentage @ Fraction Retained	Cumulative Percent Retained
9.5 mm (3/8 - in.)		0.0			0%
4.75 mm (No. 4)		0.4	0.4	0.1%	0.1%
2.36 mm (No. 8)		41.1	40.7	7.5%	7.5%
1.18 mm (No. 16)		234.6	193.5	35.5%	43.1%
600 microns (No. 30)		365.2	130.6	24.0%	67.0%
300 microns (No. 50)		441.4	76.2	14.0%	81.0%
150 microns (No. 100)		490.4	49.0	9.0%	90.0%
Total Dry Weight		544.9			
				Total % Retained	288.7%
				Fineness Modulus	2.89

Figure 4. Calculation of Fineness Modulus and Retained Sieve Fractions.

ASTM C136 Sieve Analysis

	05/22/1998	Cumulative Weight Retained (g)	Retained @ Fraction Weight (g)	Percentage @ Fraction Retained	Cumulative Percent Retained
9.5 mm (3/8 - in.)		0.0			0%
4.75 mm (No. 4)		0.0	0.0	0.0%	0.0%
2.36 mm (No. 8)		41.0	41.0	7.5%	7.5%
1.18 mm (No. 16)		228.0	187.0	34.1%	41.6%
600 microns (No. 30)		359.5	131.5	24.0%	65.5%
300 microns (No. 50)		438.0	78.5	14.3%	79.9%
150 microns (No. 100)		475.0	37.0	6.7%	86.6%
Total Dry Weight		548.5			
				Total % Retained	281.1%
				Fineness Modulus	2.81

Figure 5. Calculation of Fineness Modulus and Retained Sieve Fractions.

ASTM C136 Sieve Analysis

	06/30/1998	Cumulative Weight Retained (g)	Retained @ Fraction Weight (g)	Percentage @ Fraction Retained	Cumulative Percent Retained
9.5 mm (3/8 - in.)		0.0			0%
4.75 mm (No. 4)		1.0	1.0	0.2%	0.2%
2.36 mm (No. 8)		39.4	38.4	7.3%	7.5%
1.18 mm (No. 16)		224.2	184.8	35.0%	42.5%
600 microns (No. 30)		350.2	126.0	23.9%	66.4%
300 microns (No. 50)		424.9	74.7	14.2%	80.5%
150 microns (No. 100)		472.8	47.9	9.1%	89.6%
Total Dry Weight		527.6			
				Total % Retained	286.7%
				Fineness Modulus	2.87

Figure 6. Calculation of Fineness Modulus and Retained Sieve Fractions.

5.3 Deleterious Substance Limit Issue

The NCR has identified that the fine aggregate exceeds the maximum limit of 5% passing the 75- μm (No. 200) sieve.

ASTM C 33-97 limits the material finer than 75 μm (No. 200 sieve) to 3.0% for concrete subject to abrasion and 5.0% for all other concrete. A conditional exception increases the limits for manufactured sand to 5 and 7 %, respectively, the condition being that the fines be the dust of fracture and must be essentially free of clay or shale. (Ref. 7.1)

The fine aggregate that is produced by Wulfenstein is prepared by crushing oversize material from the pit screening plant. The minus 200 mesh material meets the definition of "fines are the dust of fracture." The petrographic examination of Wulfenstein pit materials reveals that clays and shale were absent for the list of constituents. (Ref. 7.10). A directive was issued to OQA-QC to test the Wulfenstein fine aggregate to ASTM C 142-90 (Attachment I) to confirm the absence of clay and friable material in the aggregates. The directive contained the following comment:

"Minus No. 200 material for the manufactured sand meets the definition "fines are the dust of fracture" if it is prepared from crushing oversize material off screening plant. Since the different size fractions of the manufactured sand are from the same feed stock, the petrology make up of the coarse fractions will be indicative of the Minus No. 200 material. Since shale is defined as a mixture of clay and silt, the ASTM C 142 Test method for Clay and Friable Material is a suitable method. A result of 0% (<0.5% rounded to nearest percent) clay and friable material is sufficient to indicate that the minus No. 200 material is essentially free of clay or shale."

ASTM C 142 test results show a loss of .0357 percent. (Documentation in Attachment I). This confirms that there is an absence of any significant amount of clay or shale in the minus 200 sieve fraction.

6. RESULTS

The Wulfenstein manufactured fine aggregate satisfactory conforms to the requirements of ASTM C 33 -97 under sections 6.3 and 6.4(Ref. 7.1). The allowable percentage limits for Wulfenstein manufactured fine aggregate for material passing 75 μm sieve is 7%, except when abrasive resistance is specified the limit is 5%.

The above results conform to the acceptance criteria set forth by ASTM C 33-97, and therefore the use of Wulfenstein fine aggregate is within the bounds of the specifications.

7. REFERENCES

- 7.1 American Society For Testing Materials 1997. *Standard Specification for Concrete Aggregates*. ASTM C 33-97. West Conshohocken, PA: ASTM.
- 7.2 CRWMS M&O 1996. *Wet Process Shotcrete*. BABEE0000-01717-6300-03363 REV 00. Las Vegas, Nevada: CRWMS-M&O. ACC: MOL.19961213.0123
- 7.3 CRWMS M&O 1996. *Dry Process Shotcrete*. BABEE0000-01717-6300-03362 REV 00. Las Vegas, Nevada: CRWMS-M&O. ACC: MOL.19961213.0122
- 7.4 CRWMS M&O 1994. *Precast Concrete*. BABFCC000-01717-6300-03480 REV 00. Las Vegas, Nevada: CRWMS-M&O ACC: MOL.19950613.0164
- 7.5 CRWMS M&O 1995. *Cast-In-Place Concrete – Surface*. BAB000000-01717-6300-03300 REV 02. Las Vegas, Nevada: CRWMS-M&O. ACC: MOL.19960514.0331
- 7.6 CRWMS M&O 1994. *Cast-In-Place Concrete – Subsurface*. BAB000000-01717-6300-03301 REV 00. Las Vegas, Nevada: CRWMS-M&O. ACC: MOL.19960425.0374
- 7.7 CRWMS M&O 1998. *Impact Review Action Notice for American Society For Testing And Material - Standard Specification For Concrete Aggregates, ASTM C33-93 (C)*. Las Vegas, Nevada: CRWMS-M&O. ACC: MOL.19980223.0326
- 7.8 CRWMS M&O 1998. *Impact Review Action Notice for American Society For Testing And Material - Standard Specification For Concrete Aggregates, ASTM C 33-97 (C)*. Las Vegas, Nevada: CRWMS-M&O. ACC: MOL.19990311.0456
- 7.9 CRWMS M&O 1998. *Transmittal Of Shop Drawings, Equipment Data, Material Samples, Or Manufacturers Certificates Of Compliance (Sdt) For Exploratory Study Facility, Area 25 With Submittal Evaluation Record For Request For Deviation and Impact Review Action Notice With Continuation Page (C)*. Las Vegas, Nevada: CRWMS-M&O. ACC: DRC.19981007.0021
- 7.10 David B. Vollmer 1997. *Petrographic Examination Of Coarse And Fine Aggregate Samples From The Pahrump Pit #1 (Old) And Pahrump Pit #2 (New), Yucca Mountain Project*. Skokie, Illinois: Construction Technology Laboratories, Inc. TIC: 240985

- 7.11 Kiewit/PB 1997. *Kiewit/PB #505 Shotcrete Mix Design With Sieve Analysis Of Aggregates ASTM C 136, Concrete Batch Plant Mix Adjustment Sheet, Total Moisture Of Aggregates ASTM C 566, Daily Inspection Checklist, Batching & Placement Form, Shotcrete Placement Log, Compression Test Report and A Certificate Of Compliance Dated January 03, 1997, and Letter Dated October 16, 1996 (C)*. Las Vegas, Nevada: CRWMS-M&O. ACC: DRC.19970407.0019

8. ATTACHMENTS.

- Attachment I. Yucca Mountain Site Characterization Project Nonconformance Report. NCR No. YMSCO-98-0017. Nine pages
- Attachment II. Yucca Mountain Site Characterization Project Sieve Analyses of Aggregates ASTM C136. Seven pages.
- Attachment III. Selected ECRB And ESF Loop Intersection *Shotcrete Placement Logs* Correlated, By Test Panel Number, With *Compression Test Reports (Cores)*. Eight pages.

Attachment I

Yucca Mountain Site Characterization Project
Nonconformance Report.
NCR No. YMSCO-98-0017.

YMP-006-R6
06/02/97
NCR. No. YMSCO-98-0017

YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT
NONCONFORMANCE REPORT

Page 1 of 2

1. Initiator Name: C. D. Osborne Organization: OQA QC Date: 02/26/98

2. Description of Non-Conformance: Work Package 1.18 Line Item # 5

SEE CONTINUATION ON PAGE 2

ORIGINAL
THIS IS A RED STAMP

Field Work Package/CM/97-01 and 98-01
Job Package/96-02

Hold Tag Applied No. of Hold Tags Applied 1 Test Planning Package No. N/A

3. OQA: Validation Invalidation Q Non-Q

Name: [Signature] Date: 2/26/98

4. Disposition Evaluation

Rework Repair Use-As-Is Conditional Release
 Reject/Scrap Limited Use Discard Potentially Reportable Yes
 No

Justification/Comments:

5. Recommended Disposition by:

Name: [Signature] Organization: Subsurface Date: 3/4/98
Recommended Disposition

Name: [Signature] Organization: Title III Date: 3/4/98
Approval of Disposition

6. OQA Concurrence with Disposition: Corrective Action: No Yes No. _____

Name: [Signature] Date: 8/3/98

7. Completion of Disposition: Hold Tag Removed No. of Hold Tags Removed _____

Name: _____ Organization: _____ Date: _____

OQA Concurrence:

Name: _____ Date: _____

8. OQA Final Review:

Name: _____ Date: _____

YMP-006-R6

YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT

06/02/97

NONCONFORMANCE REPORT

NCR. No. YMSCO-98-0017 Δ

CONTINUATION PAGE

Page 2 of

ORIGINAL
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BLOCK 2 CONTINUED FROM PAGE 1:

It was discovered during the Cement and Concrete Reference Laboratory inspection of the OQA-QC Test Laboratory, located @ the batch plant, that OQA had not established a time of sieving for their mechanical sieve shakers as required by ASTM C 136 - 96a.

A/E Specification BABEE000-01717-6300-03363 R/00 paragraph 2.01C (and 3.12C1 QA Control for testing), BABOOOOOO-01717-6300-03300 R/02 paragraph 2.01B, and BABOOOOOO-01717-6300-03301 R/00 paragraph 2.01A all require aggregate to conform to ASTM C 33.

ASTM C 136 - 96a paragraph 8.4 states: Continue sieving for a sufficient period and in such a manner that, after completion, not more than one mass percent of the residue on any individual sieve will pass that sieve during one minute of continuous hand sieving performed as follows: Hold the individual sieve..... (Item (1) below)

ASTM C 33 - 97 Table 1 states in part: Material finer than the # 200 sieve for concrete not subject to abrasion has a maximum limit of 5 %. Note A goes on to state in part: In the case of manufactured sand, if the material finer than the # 200 sieve consists of the dust of fracture, essentially free of clay or shale, the limit may be increased to 7 % for concrete not subject to abrasion. (Item (2) below)

Upon completion of setting the sieving time for the mechanical shakers it was found that there was a one to two percent difference in material passing an individual sieve when compared to the time that had been being used prior to the shake time established as required by the ASTM C 136 Standard.

An evaluation of previous test results resulted in the following non-conformances:

(1) For sand QC had been running for 6 minutes with no wash. QC was unable to get a passing shake time on unwashed sand even when sand was shaken for an hour. QC was able to get acceptable time results on the sand when a Sub-200 wash was performed. QC determined that when washed and the material shaken for 30 minutes on the 8 inch round Gilson shaker the results were in tolerance. When previous methods were compared, the # 100 sieve was out by 2%. This results in the # 100 sieve failing specification requirements. To date this material has not been used to place Specification concrete however several Non-Specification placements have been made.

(2) It was noted that material finer than No. 200 sieve in the sand was 5.4 % when washed and sieved in accordance with the new shake time. It is indeterminate if the 5.0 % limit can be increased to 7 % as QC is unable to determine if the material finer than the # 200 sieve consists of the dust of fracture and is essentially free of clay or shale.

There is no way to compare other material used prior to the present procurement as we do not have any material to test. Therefore it is indeterminate if this would have resulted in material used for specification concrete being out of Specification requirements.

Note: To date all compressive strength tests performed on all mixes exceed the minimum requirements as established by their individual specification sections.

3/02/98

3/19/98

PAGE 3 of _____

NCR YMSCO-98-001⁷₆ Δ

Conditional Release

Justification:

The present batch of fine aggregate from Wulfenstein has not met the extremely fine end of the sieve analysis requirements of ASTM C 136 paragraph 8.4 and ASTM C 33 Table 1.

As per ASTM C 136 paragraph 8.4, the No. 100 sieve was out of tolerance by 2% resulting in failing the specification requirements.


As per ASTM C 33 Table 1, it was noted that material finer than No. 200 sieve was 5.4% when washed and sieved. It is indeterminate if this material is essentially free of clay or shale in which case the limit of % passing would be 7% and the material would be passing.

CRH 3/3/98 Pending further testing which will be identified,
~~Until further testing is completed,~~ the fine aggregate may be used for concrete applications but traceability of the location of the concrete is required. The Hold Tag will reflect the condition of this requirement.

The fine aggregate is satisfactory for all shotcrete applications.

On going tests will determine the suitability of this material for both concrete and shotcrete. To date all compressive tests performed on all mixes exceed the minimum requirements as stated in the respective specification sections.

Name: Charles R. Gaudin Organization: A/E Title III Date: 3/3/98

NAME: John S. Martin Org. OQA Date 3/3/98


Alternate Acceptance of Wulfenstein Pit Aggregate Attachment I

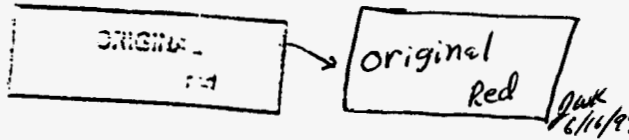
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pI-5 of I-9

4/09/98

NCR YMSCO-98-0017

Conditional Release 



Justification:

Continued purchasing of Wulfenstein sand for shotcrete and non-Q concrete may continue under the continuous use purchasing order. Testing and evaluation is ongoing as required in the original Conditional Release dated 3/02/98. Traceability of the location of the batch non-Q concrete shall continue as stated in the original Conditional Release.

Name: Robert A. [Signature] Organization: Subsurface Title II Date: 4/9/98

Name: Charles R. [Signature] Title: Title III Sup Date: 4/9/98

Approval of Disposition

OQA Concurrence with Disposition: Corrective Action: No Yes No.
 Reportable Nonreportable

Name: [Signature] Organization: OQA Date: 4/9/98

Determination, Decision, or Directive Documentation

3) Tracking Number:

DF: 98-01F

4) A/E:

Jerald W. Keifer

5) Date:

05/18/98

6) Appropriate Driving Document(s)
NCR # YMSCO 98-0017
ASTM C 33 - 97

7) Decision, Determination, or Directive

OQA-QC is directed to test the manufactured sand (fine aggregate) from the Wulfenstein Pit to ASTM C 142 - 78 (reapproved 1990). Document the results to the nearest percent and attach to the NCR.

8) Criteria or Basis for Decision, Determination, or Directive:

The directive is made to determine the "Weight Percentage of Material" limit for material finer than No. 200 sieve from Table 1 of ASTM C 33 (see NCR). ASTM C 33 limits the material finer than No. 200 (75 m) sieve to 3.0% for concrete subject to abrasion and 5.0% for all other concrete, with an conditional exception which allows the limits to be increase for manufactured sand to 5 and 7 %, respectively. These conditions are; fines be the dust of fracture and material composition be essentially free of clay or shale.

9) Comments:

Minus No. 200 material from manufactured sand meets the definition "fines are the dust of fracture" if it is prepared from crushing oversize material off screening plant. Since the different size fractions of the manufactured sand are from the same feed stock, the petrology make up the course fractions will be indicative of the Minus No. 200 material. Since shale is defined as a mixture of clay and silt, the ASTM C 142 Test method for Clay and Friable Material is a suitable method. A result of 0% (< 0.5% rounded to nearest percent) clay and friable material is sufficient to indicate that the minus No. 200 material is essentially free of clay or shale.

Alternate Acceptance of Wulfenstein Pit Aggregate Attachment 1
 BABEE 0000-01717-0210-00003 REV 00

PI-7 of I-9

Test: Clay Lumps and Friable Particles in Aggregates, (ASTM C-142) 7S

Material Description: FINE AGGREGATE Date Sampled: 06/30/98

Material Sources: WULFENSTEIN CONSTRUCTION Date Tested: 07/01/98

Quantities Represented by Report: 384.2 TONS

Control No.	Sieve Size	Original Sample %	Before Test	After Test	Loss %	Loss %
<u>Y11287</u>	<u>#16</u>	<u>100%</u>	<u>224.2</u>	<u>223.4</u>	<u>0.357</u>	<u>0.357</u>
TOTALS		<u>100%</u>	<u>224.2</u>	<u>223.4</u>		<u>0.357</u>

N/A with 07/01/98

Project Specification (Maximum) = 3.0%

Results comply/do not comply with project requirements.

Balance No. Y10619 CAL. DATE: 06/15/98 O.A.E: 12/15/98

Oven No. Y11707 CAL. DATE: 06/16/98 O.A.E: 12/16/98

#16 SIEVE: Y11287 CAL. DATE: 12/03/98 O.A.E: 12/03/98

#20 SIEVE: Q-12217 CAL. DATE: 06/17/98 O.A.E: 06/17/98

#20 SIEVE USED TO WASH DECANATED material from #16 SIEVE
 @ 7-2-98

WHY 07/01/98
 Tested By: William A. Williams
 Reviewed By: Paul B. D.

REFERENCE: DF: 98-017
 NOR: YMS00-98-0017

YMP-291-R1 YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT
 4/7/98 SIEVE ANALYSIS OF AGGREGATES
 ASTM C136 - 96a Page 1 of 1

COMPLETE ONLY APPLICABLE ITEMS

Material Size: Fine Aggregate Sample Location: Area 25 Stockpile

Sampled By (Signature): *William H. Johnson* Printed Name: William H. Johnson Date: 06/30/98

US Standard Sieve No.	Cumulative Weight Retained (g)	Total Percent Retained	Percent Passing	Specification Requirement	Pass	Fail
3/8"	0.0	0	100	100	X	
# 4	1.0	0	100	95 100	X	
# 8	39.4	7	93	80 100	X	
# 16	224.2	42	58	50 85	X	
# 30	350.2	66	34	25 60	X	
# 50	424.9	81	19	10 30	X	
# 100	472.8	89.6	10	2 10	X	
# 200	499.1	94.6	5.4	0 5		-X

Sample Weight (g): Wet: 540.5 Dry: 527.6 200 Wash Dry: 501.2 FM: 2.87

M&TE	PTL No.	Calibration Date	Calibration Due
Scale: Triple Beam	Y10669	06/15/97	12/15/98
Sieve: 3/8"	Y11282	12/03/97	12/03/98
Sieve: # 4	Y11283	12/02/97	12/02/98
Sieve: # 8	Y11284	12/02/97	12/02/98
Sieve: # 16	Y11287	12/03/97	12/03/98
Sieve: # 30	Y11288	12/03/97	12/03/98
Sieve: # 50	Y11289	12/03/97	12/03/98
Sieve: # 100	Y11290	12/03/97	12/03/98
Sieve: # 200	Y11291	12/03/97	12/03/98
Thermometer: Oven	Y11707	06/10/98	12/10/98

Comments: Gradation for clay lumps and friable particales test

Tested By: (Signature) *William H. Johnson* Printed Name: William H. Johnson Date: 06/30/98

Alternate Acceptance of Wulfenstein Pit Aggregate

BABEE0000-01717-0210-00003 REV 00

Attachment I
p. I-9 of I-9

8/03/98

NCR YMSCO-98-0017

Disposition: Use-As-Is

Justification:

Sampling and testing was completed per the Conditional Release granted on 4/09/98. Results show .357% (0% rounded) of clay lumps and friable particles. Results of the Sieve Analysis of Aggregate Report for #200 US Standard Sieve have 5.4 % passing which is higher than the specification requirement of 5.0%. These two tests included in NCR background information.

ASTM C 33 limits the material finer than #200 sieve to 3.0% for concrete subject to abrasion and 5.0% for other concrete, with a conditional exception which allows the limits to be increase for manufactured sand to 5.0 and 7.0% respectively. Conditions are that the dust of fracture and material composition be essentially free of clay or shale. See Attachment I, Determination, Decision, or Directive Documentation, #DF 98-01F by Jerald W. Keifer.

With the conditions satisfied for dust of fracture and material composition, the appropriate Specification Series 033XX will be revised for the Wulfenstein Pit #1 and Pit #2 manufactured sand to allow 7% passing #200 sieve.

The NCR will be closed upon revision of the Specification Sections.

Name: Robert A. Johnson Title: A/E Title III Date: 8/3/98
Recommended Disposition

Name: Charles R. Gandy Title: A/E Title III Date: 8/3/98
Approval of Disposition

Attachment II

Yucca Mountain Site Characterization Project
Sieve Analysis of Aggregates ASTM C 136.

YMP-291-R1 4/7/98		YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT SIEVE ANALYSIS OF AGGREGATES ASTM C136					Page <u>1</u> of <u>1</u>
COMPLETE ONLY APPLICABLE ITEMS							
Material Size: Fine Aggregate		Sample Location: New Shipment					
Sampled By (Signature): <i>William H. Johnson</i>		Printed Name: William H. Johnson		Date: 05/19/98			
US Standard Sieve No.	Cumulative Weight Retained (g)	Total Percent Retained	Percent Passing	Specification Requirement	Pass	Fail	
3/8"	0.0	0	100	100	X		
# 4	0.0	0	100	95 100	X		
# 8	32.2	6	94	80 100	X		
# 16	208.9	40	60	50 85	X		
# 30	336.4	65	35	25 60	X		
# 50	413.9	80	20	10 30	X		
# 100	463.9	89.8	10	2 10	X	-	
# 200	491.1	95.1	4.9	0 5	X	-	
Sample Weight (g): Wet: 555.4 Dry: 516.4 200Wash Dry: 495.3 FM: 2.82							
M&TE		PTL No.		Calibration Date		Calibration Due	
Scale: Triple Beam		Y10797		12/30/97		06/30/98	
Sieve: 3/8"		Y11282		12/03/97		12/03/98	
Sieve: # 4		Y11283		12/02/97		12/02/98	
Sieve: # 8		Y11284		12/02/97		12/02/98	
Sieve: # 16		Y11287		12/03/97		12/03/98	
Sieve: # 30		Y11288		12/03/97		12/03/98	
Sieve: # 50		Y11289		12/03/97		12/03/98	
Sieve: # 100		Y11290		12/03/97		12/03/98	
Sieve: # 200		Y11291		12/03/97		12/03/98	
Thermometer: Oven		Y11709		12/18/97		06/18/98	
Comments: New Shipment from Wulfenstein							
Reference: YLP-10.3Q-OQA-R/1-ICN/0							
Tested By: (Signature) <i>William H. Johnson</i>		Printed Name: William H. Johnson		Date: 05/19/98			

YMP-291-R1 YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT
 4/7/98 SIEVE ANALYSIS OF AGGREGATES
 ASTM C136 Page 1 of 1

COMPLETE ONLY APPLICABLE ITEMS

Material Size: Fine Aggregate Sample Location: New Shipment

Sampled By (Signature): *William H. Johnson* Printed Name: William H. Johnson Date: 05/20/98

US Standard Sieve No.	Cumulative Weight Retained (g)	Total Percent Retained	Percent Passing	Specification Requirement	Pass	Fail
3/8"	0.0	0	100	100	X	
# 4	0.8	0	100	95 100	X	
# 8	38.2	7	93	80 100	X	
# 16	220.5	41	59	50 85	X	
# 30	346.6	65	35	25 60	X	
# 50	423.1	79	21	10 30	X	
# 100	475.0	89.0	11	2 10		X
# 200	504.4	94.5	5.5	0 5		X

Sample Weight (g): Wet: 575.1 Dry: 533.6 200WashDry: 507.2 FM: 2.82

M&TE	PTL No.	Calibration Date	Calibration Due
Scale: Triple Beam	Y10797	12/30/97	06/30/98
Sieve: 3/8"	Y11282	12/03/97	12/03/98
Sieve: # 4	Y11283	12/02/97	12/02/98
Sieve: # 8	Y11284	12/02/97	12/02/98
Sieve: # 16	Y11287	12/03/97	12/03/98
Sieve: # 30	Y11288	12/03/97	12/03/98
Sieve: # 50	Y11289	12/03/97	12/03/98
Sieve: # 100	Y11290	12/03/97	12/03/98
Sieve: # 200	Y11291	12/03/97	12/03/98
Thermometer: Oven	Y11709	12/18/97	06/18/98

Comments: Sampled from load # 3 before it was stacked
 YLP-10.3q-OQA-r/1-ICN/0

Tested By: (Signature) *William H. Johnson* Printed Name: William H. Johnson Date: 05/20/98

YMP-291-R1 4/7/98	YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT SIEVE ANALYSIS OF AGGREGATES ASTM C136	Page <u>1</u> of <u>1</u>
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COMPLETE ONLY APPLICABLE ITEMS

Material Size: Fine Aggregate	Sample Location: New Shipment
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Sampled By (Signature): <i>William H. Johnson</i>	Printed Name: William H. Johnson	Date: 05/20/98
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US Standard Sieve No.	Cumulative Weight Retained (g)	Total Percent Retained	Percent Passing	Specification Requirement	Pass	Fail
3/8"	0.0	0	100	100	X	
# 4	0.6	0	100	95 100	X	
# 8	38.8	7	93	80 100	X	
# 16	237.2	41	59	50 85	X	
# 30	374.9	65	35	25 60	X	
# 50	458.1	80	20	10 30	X	
# 100	513.1	89.4	11	2 10		X
# 200	542.8	94.5	5.5	0 5		X

Sample Weight (g):	Wet: 606.8	Dry: 574.2	200WashDry: 546.4	FM: 2.83
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M&TE	PTL No.	Calibration Date	Calibration Due
Scale: Triple Beam	Y10797	12/30/97	06/30/98
Sieve: 3/8"	Y11282	12/03/97	12/03/98
Sieve: # 4	Y11283	12/02/97	12/02/98
Sieve: # 8	Y11284	12/02/97	12/02/98
Sieve: # 16	Y11287	12/03/97	12/03/98
Sieve: # 30	Y11288	12/03/97	12/03/98
Sieve: # 50	Y11289	12/03/97	12/03/98
Sieve: # 100	Y11290	12/03/97	12/03/98
Sieve: # 200	Y11291	12/03/97	12/03/98
Thermometer: Oven	Y11709	12/18/97	06/18/98

Comments: Sampled from pile after loads # 1 & # 2 were stacked
 YLP-10.3Q-OQA-R/1-ICN/0

Tested By (Signature): <i>William H. Johnson</i>	Printed Name: William H. Johnson	Date: 05/20/98
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YMP-291-R1 YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT
 4/7/98 SIEVE ANALYSIS OF AGGREGATES
 ASTM C136 Page 1 of 1

COMPLETE ONLY APPLICABLE ITEMS

Material Size: Fine Aggregate Sample Location: New Shipment

Sampled By (Signature): *William H. Johnson* Printed Name: William H. Johnson Date: 05/21/98

US Standard Sieve No.	Cumulative Weight Retained (g)	Total Percent Retained	Percent Passing	Specification Requirement	Pass	Fail
3/8"	0.0	0	100	100	X	
# 4	0.4	0	100	95 100	X	
# 8	41.1	8	92	80 100	X	
# 16	234.6	43	57	50 85	X	
# 30	365.2	67	33	25 60	X	
# 50	441.4	81	19	10 30	X	
# 100	490.4	90.0	10	2 10	X	
# 200	516.5	94.8	5.2	0 5		X

Sample Weight (g): Wet: 581.6 Dry: 544.9 200WashDry: 518.9 FM: 2.89

M&TE	PTL No.	Calibration Date	Calibration Due
Scale: Triple Beam	Y10797	12/30/97	06/30/98
Sieve: 3/8"	Y11282	12/03/97	12/03/98
Sieve: # 4	Y11283	12/02/97	12/02/98
Sieve: # 8	Y11284	12/02/97	12/02/98
Sieve: # 16	Y11287	12/03/97	12/03/98
Sieve: # 30	Y11288	12/03/97	12/03/98
Sieve: # 50	Y11289	12/03/97	12/03/98
Sieve: # 100	Y11290	12/03/97	12/03/98
Sieve: # 200	Y11291	12/03/97	12/03/98
Thermometer: Oven	Y11709	12/18/97	06/18/98

INFORMATION COPY

Comments: Sampled load # 5 before it was stacked
 Reference: YLP-10.3Q-OQA-R/1-ICN/0

Tested By (Signature): *William H. Johnson* Printed Name: William H. Johnson Date: 05/21/98

YMP-291-R1
 4/7/98

YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT
 SIEVE ANALYSIS OF AGGREGATES
 ASTM C136

Page 1 of 1

COMPLETE ONLY APPLICABLE ITEMS

Material Size: Fine Aggregate Sample Location: New Shipment

Sampled By (Signature): John K. Devers Printed Name: John K. Devers Date: 05/22/98

US Standard Sieve No.	Cumulative Weight Retained (g)	Total Percent Retained	Percent Passing	Specification Requirement	Pass	Fail
3/8"	0.0	0	100	100	X	
# 4	0.0	0	100	95 100	X	
# 8	41.0	7	93	80 100	X	
# 16	228.0	42	58	50 85	X	
# 30	359.5	66	34	25 60	X	
# 50	438.0	79	21	10 30	X	
# 100	475.0	88.2	12	2 10		X
# 200	504.4	93.0	7.0	0 5		X

INFORMATION COPY

Sample Weight (g): Wet: 578.0 Dry: 548.5 200Wash Dry: 530.5 FM: 2.81

M&TE	PTL No.	Calibration Date	Calibration Due
Scale: Triple Beam	Y10797	12/30/97	06/30/98
Sieve: 3/8"	Y11282	12/03/97	12/03/98
Sieve: # 4	Y11283	12/02/97	12/02/98
Sieve: # 8	Y11284	12/02/97	12/02/98
Sieve: # 16	Y11287	12/03/97	12/03/98
Sieve: # 30	Y11288	12/03/97	12/03/98
Sieve: # 50	Y11289	12/03/97	12/03/98
Sieve: # 100	Y11290	12/03/97	12/03/98
Sieve: # 200	Y11291	12/03/97	12/03/98
Thermometer: Oven	Y11709	12/18/97	06/18/98

Comments: Sampled Load #8 before it was stacked
 Reference: YLP-10.3Q-OQA-R/1-ICN/0 #7 910 05/22/98

Tested By: (Signature) John K. Devers Printed Name: John K. Devers Date: 05/22/98

YMP-291-R1 4/7/98		YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT SIEVE ANALYSIS OF AGGREGATES ASTM C136 - 96a					Page <u>1</u> of <u>1</u>
COMPLETE ONLY APPLICABLE ITEMS							
Material Size: Fine Aggregate		Sample Location: Area 25 Stockpile					
Sampled By (Signature): <i>William H. Johnson</i>			Printed Name: William H. Johnson		Date: 06/30/98		
US Standard Sieve No.	Cumulative Weight Retained (g)	Total Percent Retained	Percent Passing	Specification Requirement	Pass	Fail	
3/8"	0.0	0	100	100	X		
# 4	1.0	0	100	95 100	X		
# 8	39.4	7	93	80 100	X		
# 16	224.2	42	58	50 85	X		
# 30	350.2	66	34	25 60	X		
# 50	424.9	81	19	10 30	X		
# 100	472.8	89.6	10	2 10	X		
# 200	499.1	94.6	5.4	0 5		X	
Sample Weight (g): Wet: 540.5 Dry: 527.6 200 Wash Dry: 501.2 FM: 2.87							
M&TE		PTL No.		Calibration Date		Calibration Due	
Scale: Triple Beam		Y10669		06/15/97		12/15/98	
Sieve: 3/8"		Y11282		12/03/97		12/03/98	
Sieve: # 4		Y11283		12/02/97		12/02/98	
Sieve: # 8		Y11284		12/02/97		12/02/98	
Sieve: # 16		Y11287		12/03/97		12/03/98	
Sieve: # 30		Y11288		12/03/97		12/03/98	
Sieve: # 50		Y11289		12/03/97		12/03/98	
Sieve: # 100		Y11290		12/03/97		12/03/98	
Sieve: # 200		Y11291		12/03/97		12/03/98	
Thermometer: Oven		Y11707		06/10/98		12/10/98	
Comments: Gradation for clay lumps and friable particales test							
Tested By: (Signature) <i>William H. Johnson</i>			Printed Name: William H. Johnson		Date: 06/30/98		

Attachment III

*Selected ECRB And ESF Loop Intersection Shotcrete
Placement Logs Correlated, By Test Panel Number, With
Compression Test Reports (Cores).*

**KIEWIT/PB
YUCCA MOUNTAIN PROJECT
SHOTCRETE PLACEMENT LOG**

Page 1 of 2

Date: 2/18/98 Shift: Day Recorder: Cynthia Sundberg

Certified Nozzle Operator: Michael Hawkins Test Panel No.: 021898-D1

Location: ECRB 0+14²⁰ to 0+26 ESF 19+20 to 23 ^{Light 2.5} Ambient Air Temp.: 59° Shotcrete Temp.: 50° ^{2/19}

Hot/Cold Weather Requirements Applicable: [] Yes [X] No If Yes, Identify Special Precautions Taken: ^{SEE NOTES}

A/E Approval: *[Signature]* Date: 2/10/98

TCO Concurrence: *[Signature]* Date: 2-18-98

Dry Mix Predampened: [] Yes [] No [X] N/A

Mix No.: 505 Admixture Type(s) (if used): Shotset 250 Admixture Quantity: 40 oz

Batch No.	Mix Time	Delivery Time	Discharge Time
0336	0821	0847	0900
337	0923	0943	0955
0338	1003	1021	
0339	1051	1126	1133
0340	1149	1212	1220
0341	1246	1305	1312

Total Quantity Shotcrete Placed: 22 cy

Incomplete Items List: ALL GROUND SUPPORT ROCK BOLTS AND WWT ARE INSTALLED FOR ECRB STARTER TUNNEL DK TO BEGIN SHOTCRETE PLACEMENT Thomas E. Wilson Thomas E. Wilson
No Incomplete Items. ^{02/17/98 R. LEWITT}

Note: Batch 0338 was rejected for too high slump, none placed. Approximately 2 cy of Batch 0341 placed. First 2 Batches placed at Starter ^{Chamber} Mix Temp ^{02/19/98} to 52°, Remainder 60°

Shift Engineer: *[Signature]* Cynthia Sundberg ^{2/19/98}
Signature Printed Name Date

KIEWIT/PB
YUCCA MOUNTAIN PROJECT
SHOTCRETE PLACEMENT LOG

Page 2 of 2

Date: 2/18/98 Shift: Day Recorder: Cynthia Sundberg

Certified Nozzle Operator: Michael Hawkins Test Panel No.: See Page 1

Location: See Page 1 Ambient Air Temp.: 57° Shotcrete Temp.: 57°
see note

Hot/Cold Weather Requirements Applicable: [] Yes [X] No If Yes, Identify Special Precautions Taken:

A/E Approval: See Page 1 Date: N/A

TCO Concurrence: See Page 1 Date: N/A

Dry Mix Predampened: [] Yes [] No [X] N/A

Mix No.: 505 Admixture Type(s) (if used): Shotset 250 Admixture Quantity: 0

Batch No.	Mix Time	Delivery Time	Discharge Time
0342	1326	1350	1400
N/A			

Total Quantity Shotcrete Placed: See Page 1

Incomplete Items List: N/A

Shift Engineer: *Cynthia Sundberg* Cynthia Sundberg 2/19/98
Signature Printed Name Date

YMP-286-RO
10/01/97

YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT COMPRESSION TEST REPORT (CORES)

Page 1 of 1
Work Package No. 2.28.1
Traveler Line #: 31-18
QA: Yes No

Cores Set No.:	Material:	Time Placed:	Date Cored:
<u>021998D1</u>	<u>605 SMOCCRETE</u>	<u>1135</u>	<u>02/20/98</u>
Placement No.:	Quantity Represented:	Strength Requirements:	Applicable A/E Specification:
<u>755</u>	<u>21 YD³</u>	<u>5880 PSI @ 28 DAY</u>	<u>RABEE OCCC-01117-4300-03363</u> <u>R. 02/18/97-0014 8097-0029</u>
			Tested To ASTM C42: <u>94</u>

Equipment Used	MBTE ID No.	Calibration Date	Calibration Due
<u>CALIPER</u>	<u>411953</u>	<u>10/15/97</u>	<u>04/15/98</u>
<u>* TORNY</u>	<u>411802</u>	<u>03/06/97</u>	<u>03/06/98</u>
<u>THERMOMETER</u>	<u>411709</u>	<u>12/18/97</u>	<u>06/18/98</u>
<u>** TEMPERATURE RECORDER</u>	<u>415000</u>	<u>09/16/97</u>	<u>03/16/98</u>

Test Sample No.	Test Age	Date Tested (m/d/yy)	Time Tested (h:mm)	Tested by: (Initials)	Moisture Condition at Time of Testing	Sample Diameter (In.)			Uncapped	Capped	X-Sect Area (Sq. In.)	Max Load	Type of Fracture (C39, Fig 2)	Comp. Strength (psi)	Core Grading Index No.
						1	2	Avg							
<u>1</u>	<u>3</u>	<u>02/21/98</u>	<u>12:05</u>	<u>TEW</u>	<u>MOIST</u>	<u>3.29</u>	<u>3.29</u>	<u>3.290</u>	<u>6.44</u>	<u>6.63</u>	<u>8.50</u>	<u>30000</u>	<u>SHEAR</u>	<u>3529</u>	<u>2</u>
<u>2</u>	<u>3</u>	<u>02/21/98</u>	<u>12:09</u>	<u>TEW</u>	<u>MOIST</u>	<u>3.29</u>	<u>3.29</u>	<u>3.290</u>	<u>6.46</u>	<u>6.60</u>	<u>8.50</u>	<u>35500</u>	<u>SHEAR</u>	<u>41760</u>	<u>2</u>
<u>3</u>	<u>7</u>	<u>02/25/98</u>	<u>12:02</u>	<u>WHJ</u>	<u>MOIST</u>	<u>3.29</u>	<u>3.29</u>	<u>3.290</u>	<u>6.44</u>	<u>6.58</u>	<u>8.50</u>	<u>54000</u>	<u>SHEAR</u>	<u>6410</u>	<u>1</u>
<u>4</u>	<u>7</u>	<u>02/25/98</u>	<u>12:05</u>	<u>WHJ</u>	<u>MOIST</u>	<u>3.29</u>	<u>3.29</u>	<u>3.290</u>	<u>6.50</u>	<u>6.63</u>	<u>8.50</u>	<u>56000</u>	<u>CONE</u>	<u>6590</u>	<u>1</u>
<u>5</u>	<u>28</u>	<u>03/18/98</u>	<u>08:50</u>	<u>WHJ</u>	<u>MOIST</u>	<u>3.29</u>	<u>3.29</u>	<u>3.290</u>	<u>6.45</u>	<u>6.58</u>	<u>8.50</u>	<u>80500</u>	<u>CONE</u>	<u>9470</u>	<u>1</u>
<u>6</u>	<u>28</u>	<u>03/18/98</u>	<u>08:55</u>	<u>WHJ</u>	<u>MOIST</u>	<u>3.29</u>	<u>3.29</u>	<u>3.290</u>	<u>6.45</u>	<u>6.59</u>	<u>8.50</u>	<u>79500</u>	<u>SHEAR</u>	<u>9350</u>	<u>1</u>
<u>N/A</u>															
<u>N/A</u>															
<u>N/A</u>															

Defects in specimens or caps yes no Type of defect: N/A

ORIGINAL

Direction of load with respect to the horizontal plan of the material as placed: PERPENDICULAR

Average Day Strength: <u>3860 PSI</u> <u>@ 30 DAY</u> PSI @ Day	Average Day Strength: <u>650 PSI</u> <u>@ 7 DAY</u> PSI @ Day	Average Day Strength: <u>9410 PSI</u> <u>@ 28 DAY</u> PSI @ Day	Average Day Strength: <u>N/A</u> <u>N/A</u> PSI @ Day
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Comments: USED IN PERD DRIFT * RECALIBRATED 03/02/98 DUE: 03/02/98
** RECORDED TO Y15001 ON 3-4-98; CAL DATE: 01/07/98 DUE: 07/07/98
REFER TO YLP-10.60-OQA-REV. 2-17-98
DWG. BARBEE0000-01717-2100-40311-RAV.001/EAR-94-00 W/ 3-18-98 RESPONSIBLE PE: STEPHEN R. DANA

Inspector Signature: William H. Johnson Printed Name: William H. Johnson Date: 03/18/98

Note: If N/A is in Specimen column, the rest of the line may be left blank.

Alternate Acceptance of Wulfenstein Pit Aggregate Attachment III
 RABEE 0000-01717-0210-00003 REV 00
 Classification: Effective 02/19/98
 PIII-4 of PIII-8

Clarification:
 2 CS 1/30/98

KIEWIT/PB
 YUCCA MOUNTAIN PROJECT
 SHOTCRETE PLACEMENT LOG

Date: 2/2/98 Shift: Day/Swing Recorder: Cynthia Sundberg/Rafael Cruz/Dave Bays

Certified Nozzle Operator: Michael Hawkins Test Panel No.: 020298-D1/020298-51

Location: ECRB 0+11 to 0+14²⁰ and ESF ^{10:30 to 23:00} Ambient Air Temp.: 61° Shotcrete Temp.: 58°

Hot/Cold Weather Requirements Applicable: [] Yes [X] No IF Yes, Identify Special Precautions Taken:
 Clarification: CB 2/2/98

A/E Approval: *[Signature]* Date: 2/2/98

TCO Concurrence: *[Signature]* Date: 1/30/98

Dry Mix Predampened: [] Yes [] No [X] N/A

Mix No.: 505 Admixture Type(s) (if used): Shotset 250 Admixture Quantity: 1078 ^{oz}

Batch No.	Mix Time	Delivery Time	Discharge Time
292	0806	908	10:04
293	1033	1104	1112
294	1132	1200	1216
295	1228	1258	1302
296	1312	1341	1345
297	1408	1440	1450

Total Quantity Shotcrete Placed: 44 cu

Incomplete Items List: N/A Q.C. APPROVES PLACEMENT # 753. *[Signature]*
 SEE PAGE 1 of 2. T.E.W. 02/02/98 Thomas E. Wilson
 02/02/98
 R.T.N. 02/06/98

Shift Engineer: *[Signature]* Cynthia Sundberg *[Signature]* Cynthia Sundberg 2/3/98
 Signature Printed Name Date

Page 2 of 2

KIEWIT/PB
YUCCA MOUNTAIN PROJECT
SHOTCRETE PLACEMENT LOG

Date: 2/2/98 Shift: Day/Swing Recorder: Rufino Cruz, Cynthia Sundberg, Dave Bus.

Certified Nozzle Operator: Michael Hawkins Test Panel No.: See Page 1

Location: See Page 1 Ambient Air Temp.: 61° Shotcrete Temp.: 58°

Hot/Cold Weather Requirements Applicable: [] Yes [X] No If Yes, Identify Special Precautions Taken:

A/E Approval: See Page 1

Date:

TCO Concurrence: See Page 1

Date:

Dry Mix Predampened: [] Yes [] No [X] N/A

Mix No.: 505 Admixture Type(s) (if used): Shotset 250 Admixture Quantity: See Page 1

Batch No.	Mix Time	Delivery Time	Discharge Time
298	1459	1530	1550
299	1610	1650	1707
300	1726	1750	1758
301	1812	1835	1845
302	1856	1942	1953

Total Quantity Shotcrete Placed: See Page 1

Incomplete Items List: SEE P. 1 of 2

Shift Engineer: See Page 1

Signature

Printed Name

Date

YMP-286-RO
10/01/97

**YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT
COMPRESSION TEST REPORT (CORES)**

Page 1 of 1
Work Package No. 2.28.1
Traveler Line From 3.1-18
QA: Yes No

Cores Set No.: <u>020298D1</u>	Material: <u>505 SMOCRTE</u>	Time Placed: <u>1217</u>	Date Cored: <u>02/05/98</u>
Placement No.: <u>753</u>	Quantity Represented: <u>28 YD3</u>	Strength Requirements: <u>5000 PSI @ 28 DAY</u>	Applicable A/E Specification: <u>BA356000-01717-2100-03363</u> <u>REV. 02/19/97 BY E.97-0039</u>
Tested To ASTM C42: <u>94</u>		<u>02/05/98</u> 3-2-98	

Equipment Used	M&T ID No.	Calibration Date	Calibration Due
<u>CALIPER</u>	<u>411953</u>	<u>10/15/97</u>	<u>04/15/98</u>
<u>FORNEY</u>	<u>411803</u>	<u>03/06/97</u>	<u>03/06/98</u>
<u>THERMOMETER</u>	<u>411709</u>	<u>12/18/97</u>	<u>06/18/98</u>
<u>TEMPERATURE RECORDER</u>	<u>415000</u>	<u>09/16/97</u>	<u>03/16/98</u>

Test Sample No.	Test Age	Date Tested (mmddyy)	Time Tested (hhmm)	Tested by: (Initials)	Moisture Condition at Time of Testing	Sample Diameter (in.)			Uncapped	Capped	X-Sect Area (Sq. In.)	Max Load	Type of Fracture (C39, Fig 2)	Comp. Strength (psi)	Core Grading Index No.
						1	2	Avg							
<u>1</u>	<u>3</u>	<u>02/05/98</u>	<u>1358</u>	<u>WHJ</u>	<u>MOIST</u>	<u>3.30</u>	<u>3.30</u>	<u>3.300</u>	<u>6.47</u>	<u>6.60</u>	<u>8.66</u>	<u>37500</u>	<u>CONE</u>	<u>4390</u>	<u>1</u>
<u>2</u>	<u>3</u>	<u>02/05/98</u>	<u>1401</u>	<u>WHJ</u>	<u>MOIST</u>	<u>3.30</u>	<u>3.30</u>	<u>3.300</u>	<u>6.46</u>	<u>6.60</u>	<u>8.65</u>	<u>37800</u>	<u>CONE</u>	<u>4330</u>	<u>1</u>
<u>3</u>	<u>7</u>	<u>02/09/98</u>	<u>1345</u>	<u>WHJ</u>	<u>MOIST</u>	<u>3.28</u>	<u>3.28</u>	<u>3.280</u>	<u>6.46</u>	<u>6.60</u>	<u>8.46</u>	<u>67000</u>	<u>CONE</u>	<u>6750</u>	<u>1</u>
<u>4</u>	<u>7</u>	<u>02/09/98</u>	<u>1350</u>	<u>WHJ</u>	<u>MOIST</u>	<u>3.28</u>	<u>3.28</u>	<u>3.280</u>	<u>6.49</u>	<u>6.65</u>	<u>8.45</u>	<u>55000</u>	<u>CONE</u>	<u>6510</u>	<u>1</u>
<u>5</u>	<u>28</u>	<u>03/02/98</u>	<u>0850</u>	<u>WHJ</u>	<u>MOIST</u>	<u>3.28</u>	<u>3.28</u>	<u>3.280</u>	<u>6.43</u>	<u>6.58</u>	<u>8.45</u>	<u>90600</u>	<u>SHE/CONE</u>	<u>10710</u>	<u>1</u>
<u>6</u>	<u>28</u>	<u>03/02/98</u>	<u>0855</u>	<u>WHJ</u>	<u>MOIST</u>	<u>3.28</u>	<u>3.28</u>	<u>3.280</u>	<u>6.47</u>	<u>6.59</u>	<u>8.45</u>	<u>89800</u>	<u>CONE</u>	<u>10530</u>	<u>1</u>
<u>N/A</u>															
<u>N/A</u>															
<u>N/A</u>															<u>N/A</u>

Defects in specimens or caps yes no Type of defect: N/A

ORIGINAL
red

Direction of load with respect to the horizontal plan of the material as placed: PERPENDICULAR

Average Day Strength: <u>4360 PSI.</u> <u>@ 3 DAY</u> PSI @ Day	Average Day Strength: <u>6630 PSI.</u> <u>@ 7 DAY</u> PSI @ Day	Average Day Strength: <u>10620 PSI.</u> <u>@ 28 DAY</u> PSI @ Day	Average Day Strength: <u>N/A</u> <u>N/A</u> PSI @ Day
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Comments: USED IN ECRA DRIFT
REFERENCE: YLP-10.60-OQA-REV.00-1CN.00 DWG. BA356000-01717-2100-48311-REV.01/ECR-98-0A
WHT 03/02/98
E98-0010 ERECTIOS 2-17-98

RESPONSIBLE PE: STEPHEN R. DANA

Inspector Signature: William H. Johnson Printed Name: William H. Johnson Date: 03/02/98

Alternate Acceptance of Calfenstein Pit Aggregate Attachment III
 BA356000-01717-2100-00003 REV 00
 P III-7 of III-8

YMP-286-RO
10/01/97

**YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT
COMPRESSION TEST REPORT (CORES)**

Page 1 of 1
Work Package No. 2.28.1
Traveler Line Item 3.1-18
QA: Yes No

Cores Set No.: <u>02029851</u>	Material: <u>505 SHOTCRETE</u>	Time Placed: <u>1626</u>	Date Cored: <u>02/05/98</u>
Placement No.: <u>753</u>	Quantity Represented: <u>16 YD³</u>	Strength Requirements: <u>5000 PSI @ 28 DAY</u>	Applicable A/E Specification: <u>BAAE 0000-0117-2300-03363- R34.001297-00048197-0039</u>
		Tested To ASTM C42: <u>94</u>	

Equipment Used	M&E ID No.	Calibration Date	Calibration Due
<u>CALIPER</u>	<u>Y11953</u>	<u>10/15/97</u>	<u>04/15/98</u>
<u>FORNEY</u>	<u>Y11803</u>	<u>03/06/97</u>	<u>03/06/98</u>
<u>THERMOMETER</u>	<u>Y11709</u>	<u>12/18/97</u>	<u>06/18/98</u>
<u>TEMPERATURE RECORDER</u>	<u>Y15000</u>	<u>09/16/97</u>	<u>03/16/98</u>

Test Sample No.	Test Age	Date Tested (mmddyy)	Time Tested (hhmm)	Tested by: (initials)	Moisture Condition at Time of Testing	Sample Diameter (In.)			Uncapped	Capped	X-Sept Area (Sq. In.)	Max Load	Type of Fracture (C39, Fig 2)	Comp. Strength (psi)	Core Grading Index No.
						1	2	Avg							
<u>1</u>	<u>3</u>	<u>02/05/98</u>	<u>1515</u>	<u>WHJ</u>	<u>MOIST</u>	<u>3.29</u>	<u>3.29</u>	<u>3.290</u>	<u>6.41</u>	<u>6.56</u>	<u>8.50</u>	<u>30500</u>	<u>CONE</u>	<u>3590</u>	<u>1</u>
<u>2</u>	<u>3</u>	<u>02/05/98</u>	<u>1519</u>	<u>WHJ</u>	<u>MOIST</u>	<u>3.29</u>	<u>3.29</u>	<u>3.290</u>	<u>6.43</u>	<u>6.59</u>	<u>8.50</u>	<u>32500</u>	<u>CONE</u>	<u>3820</u>	<u>1</u>
<u>3</u>	<u>7</u>	<u>02/09/98</u>	<u>1304</u>	<u>WHJ</u>	<u>MOIST</u>	<u>3.29</u>	<u>3.29</u>	<u>3.290</u>	<u>6.44</u>	<u>6.57</u>	<u>8.50</u>	<u>53500</u>	<u>SHEAR</u>	<u>6330</u>	<u>1</u>
<u>4</u>	<u>7</u>	<u>02/09/98</u>	<u>1357</u>	<u>WHJ</u>	<u>MOIST</u>	<u>3.29</u>	<u>3.29</u>	<u>3.290</u>	<u>6.45</u>	<u>6.59</u>	<u>8.50</u>	<u>49500</u>	<u>SHEAR</u>	<u>5920</u>	<u>1</u>
<u>5</u>	<u>28</u>	<u>03/02/98</u>	<u>0902</u>	<u>WHJ</u>	<u>MOIST</u>	<u>3.29</u>	<u>3.29</u>	<u>3.290</u>	<u>6.31</u>	<u>6.49</u>	<u>8.50</u>	<u>70000</u>	<u>CONE</u>	<u>8240</u>	<u>1</u>
<u>6</u>	<u>28</u>	<u>03/02/98</u>	<u>0908</u>	<u>WHJ</u>	<u>MOIST</u>	<u>3.29</u>	<u>3.29</u>	<u>3.290</u>	<u>6.42</u>	<u>6.55</u>	<u>8.50</u>	<u>82000</u>	<u>SHE/CONE</u>	<u>9650</u>	<u>1</u>
<u>N/A</u>															
<u>N/A</u>															
<u>N/A</u>															<u>N/A</u>

Defects in specimens or caps yes no Type of defect: N/A

ORIGINAL
void

Direction of load with respect to the horizontal plan of the material as placed: PERPENDICULAR

Average Day Strength: <u>3765 PSI</u> <u>@ 3 DAY</u> PSI @ Day	Average Day Strength: <u>6075 PSI</u> <u>@ 7 DAY</u> PSI @ Day	Average Day Strength: <u>8945 PSI</u> <u>@ 28 DAY</u> PSI @ Day	Average Day Strength: <u>N/A</u> <u>N/A</u> PSI @ Day
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Comments: USA 9 ISF EC RD DRIFT
REFERENCE: YLP-10.6A-00A-REV00-10N00 DWG. BAAE0000-0117-2100-40311-REV.00/0298-09
E98-0010 EFFECTIVE 2-17-98

RESPONSIBLE PE: STEPHEN R. DANA

Inspector Signature: William H. Johnson Printed Name: William H. Johnson Date: 03/02/98

Note: If N/A is in Specimen column, the rest of the line may be left blank. Exhibit YLP 10.60 OGA 2

Alternate Acceptance of Wulfsberg Aggregate Attachment III
 BAAE 0000-0117-0210-00003 REV 00
 P III-8 of III-8