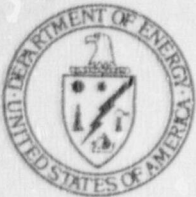


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WM-73



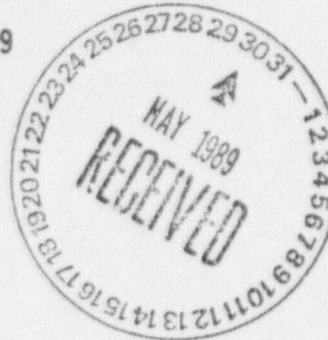
Department of Energy
Albuquerque Operations Office
P. O. Box 5400
Albuquerque, New Mexico 87115

RETURN ORIGINAL TO PDR, HQ.

FEDERAL EXPRESS

MAY 26 1989

Edward F. Hawkins
Chief, Licensing Branch 1
Uranium Recovery Field Office
U.S. Nuclear Regulatory Commission
Region IV
730 Simms Street 100A
Denver, CO 80401



Dear Mr. Hawkins:

Enclosed for review and concurrence are Project Interface Document (PID) No. 16-S-09 and information to support our proposal to allow the blending of material from the Arrow Pit quarry with approved Shadow Mountain bedding material. The support information enclosed are rock quality test results from recent samples of Arrow Pit material and calculations which estimate the characteristics of the blended material.

Specific gravity, soundness, and absorption tests were performed, but because of the nature and function of the bedding, LA abrasion was not considered. The calculated characteristics of this material blended with Shadow Mountain basalt indicates a composite bedding material as follows:

<u>Specific Gravity</u>	<u>Absorption</u>	<u>Soundness</u>
2.77	1.0%	<2.0%

Essentially, this PID does not constitute a criteria change to the subcontract specifications because gradation requirements specified in Section 02278, Item 2.1.D.2 must still be satisfied and the composite blend of these materials exceed the considered rock quality requirements of Section 02278, Item 2.1.C.3. However, since our proposal is based on the characteristics of blended materials, the Department of Energy considers this PID as a potential "Class I" change to the specifications in accordance with Section 8.11 of the Remedial Action Plan.

8907060209 890526
PDR WASTE
WM-73

PDC

DESIGNATED ORIGINAL

Certified By Mary C. HoodDF02
11Add Info
89-0682

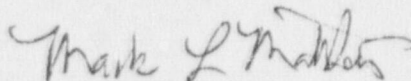
MAY 26 1989

Edward F. Hawkins

-2-

Therefore, pursuant to Class I change requirements, DOE requests an expeditious review and concurrence as necessary to avoid impacting construction. Should you have any questions, please contact Michael Abrams of my staff at (505) 844-3941.

Sincerely,



Mark L. Matthews
Acting Project Manager
Uranium Mill Tailings Project Office

Enclosure

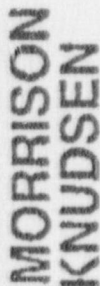
cc w/o enclosure:

J. Oldham, MK-F

R. Richey, UMTRA

E. Banks, JEG

D. Gillen, NRC-HQ



UMTRA PROJECT OFFICE
PROJECT INTERFACE DOCUMENT

801 4U/0200W

Site Tuba City, AZ	Date 5/26/89	PID No. 18-S-09, Rev. 1	Site No. 18	Vic Pro No.
Originator and Location D. Bolton, ST	Phone 415 442-7586	Organization NRES	Answer By:	References: Subcontract: Subcontract No:
Subject Tuba City, Spec. Sect. 02278-Erosion Protection, Item 2.1.D.1 - Bedding Materials				

Description of Problem and Recommended Solution		☐ Clarification ☒ Change	
<u>Problem:</u> The Subcontractor has been unable to crush the Shadow Mountain basalt to meet the specified bedding gradation for No. 4 sieve size and finer. There are insufficient fines retained on No. 4 sieve and finer. <u>Solution:</u> Revise Specification Section 02278 - Erosion Protection, to allow blending of the Shadow Mountain bedding material with fine material from a Contractor approved source of fines to produce a bedding material which meets the specified gradation and quality. Add the following to Spec. Section 02278, Item 2.1.D.1: "At the Subcontractor's option, bedding materials shall be obtained from a blend of crushed and processed dense basalt from Approved Borrow Area B shown on the Subcontract Drawings, and processed fines material from a Contractor approved source. The Subcontractor shall process and blend the materials to meet the gradation requirements specified below. The blended material shall meet the quality requirements for Specific Gravity and Soundness as specified in Item 2.1.C.3 of this section. The Subcontractor shall submit to the Contractor for approval, the blend ratio and gradation of fine material to be added from the Contractor approved source."			

Disposition	☐ Approved ☐ Disapproved ☐ Approved as Noted	RAC Site Manager
Criteria Change? (If Yes, DOE approval required)	☐ Yes ☒ No Class II	RAC Project Control
		RAC Engineering/Design
		RAC Construction Engineer
		Reviewed for Quality Requirements

Distribution	Name	Location	Signature	Date
RAC Site Mgr.				
DOE Proj. Engr.				
TAC Site Mgr.				
RAC Site Qual. Engr.				
RAC HSE Mgr.				

Cost/Time Est.	☐ Attached ☐ Not Required ☐ DOE Approval Req.
----------------	--

16027746496

MAY - 18 - 89 WED 8:39 WESTERN TECH. / FLAGSTAFF P. 87



**WESTERN
TECHNOLOGIES
INC.**

2400 East Huntington Drive
Flagstaff, Arizona 86001
(602) 774-8708

LABORATORY REPORT

PHYSICAL PROPERTIES OF AGGREGATES

Client MK Ferguson Company
P.O. Box 9136
Albuquerque, NM 87119

Job No 2528J029

Lab/Invoice No 25290619

Date of Report 05/09/89

Reviewed By [Signature]

Project Material Testing

Location Tuba City, Arizona

Sampled By Client Date 04/14/89

Type of Aggregate Sand

Submitted By Client Date 04/14/89

Source of Aggregate Sample #1, Arrow Pit

Authorized By Client Date 04/14/89

Sieve Analysis, ASTM C136-

Test Standards are ASTM unless otherwise noted.

Sieve Size	% Passing Accumulative	Specification	Test	Result	Specification	Test STD
			Fineness Modulus			C125-
4"			Dry Rodded Unit Weight, pcf			C29-
3"			Lightweight Pieces, %			C123-
2"			Clay Lumps and Friable Particles			C142-
1 1/2"			Organic Impurities			C40-
1 1/4"			Sand Equivalent Value			C2419-
1"			Resistance to Abrasion	% Wear, rev.		C131-
1/2"				% Wear, 500 rev.		Grading
1/4"				% Wear, rev.		C535-
3/8"				% Wear, 1000 rev.		Grading
1/2"			Scratch Hardness, % by: Weight Count			C235-
No. 4	100		Fractured Faces, % by: Weight Count			
8	92		Liquid Limit Plasticity Index			D4318-
10	90		Cleaness Value			Calif. 227-
16	83		Soundness, % loss*	3.1		C88
30	63		Moisture Density Relations	Max. Dry Density, pcf		☐ D698- ☐ D1537- ☐ AASHTO T99- ☐ AASHTO T180-
40	42			Optimum Moisture, %		
50	26			Method		
100	7		Specific Gravity	Absorption, %	1.8	☐ C127- ☐ C128-
				Bulk (Dry)	2.54	
				Bulk (SSD)	2.59	
				Apparent	2.66	
Finer than 200 ASTM C117.	4.3					

Copies to: Addressee - (2)
MK Ferguson/Attn: T. Swisse - (1)

*Sodium Sulfate



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Flagstaff, Arizona 86001
(602) 774-8708

LABORATORY REPORT

PHYSICAL PROPERTIES OF AGGREGATES

Client MK Ferguson Company
P.O. Box 9136
Albuquerque, NM 87119

Job No. 2528J029

Lab/Invoice No. 25290619

Date of Report 05/09/89

Reviewed By [Signature]

Project Material Testing

Location Tuba City, Arizona

Sampled By Client

Date 04/14/89

Type of Aggregate Sand

Submitted By Client

Date 04/14/89

Source of Aggregate Sample #2, Arrow Pit

Authorized By Client

Date 04/14/89

Sieve Analysis, ASTM C136-

Test Standards are ASTM unless otherwise noted.

Sieve Size	% Passing Accumulative	Specification	Test	Result	Specification	Test STD
			Fineness Modulus			C125-
4"			Dry Rodded Unit Weight, pcf			C29-
3"			Lightweight Pieces, %			C123-
2"			Clay Lumps and Friable Particles			C142-
1 1/2"			Organic Impurities			C40-
1 1/4"			Sand Equivalent Value			C2419-
1"			Resistance to Abrasion	% wear, rev.		C131-
3/4"				% wear, 500 rev.		Grading
1/2"				% wear, rev.		C535-
1/4"				% wear, 1000 rev.		Grading
1/4"			Scratch Hardness, % by: weight Count			C235-
No. 4	100		Fractured Faces, % by: weight Count			
8	89		Liquid Limit Plasticity Index			D4J18-
10	87		Cleanness Value			Calif. 227-
16	80		Soundness, % loss*	2.7		C88
30	62		Moisture Density Relations	Max. Dry Density, pcf		☐ D698- ☐ D1557- ☐ AASHTO T99- ☐ AASHTO T180-
40	46			Optimum Moisture, %		
50	32			Method		
100	13		Specific Gravity	Absorption, %	1.7	☐ C127- ☐ C128-
				Bulk (Dry)	2.55	
				Bulk (SSD)	2.59	
				Apparent	2.66	
Finer than 200 ASTM C117-	8.1					

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MK Ferguson/Attn: T. Swisse - (1)

#Sodium Sulfate

16027746496

MAY-18-89 WED 8:38 WESTERN TECH. / FLAGSTAFF P. 05



**WESTERN
TECHNOLOGIES
INC.**

2400 East Huntington Drive
Flagstaff, Arizona 86001
(602) 774-8708

LABORATORY REPORT

PHYSICAL PROPERTIES OF AGGREGATES

Client MK Ferguson Company
P.O. Box 9136
Albuquerque, NM 87119

Job No. 2528J029
Lab/Invoice No. 25290619
Date of Report 05/09/89
Reviewed By [Signature]

Project Material Testing

Location Tuba City, Arizona Sampled By Client Date 04/14/89

Type of Aggregate Sand Submitted By Client Date 04/14/89

Source of Aggregate Sample #3, Arrow Pit Authorized By Client Date 04/14/89

Sieve Analysis, ASTM C136-

Test Standards are ASTM unless otherwise noted.

Sieve Size	% Passing Cumulative	Specification	Test	Result	Specification	Test STD
			Fineness Modulus			C125-
4"			Dry Rodded Unit Weight, pcf			C29-
3"			Lightweight Pieces, %			C123-
2"			Clay Lumps and Friable Particles			C142-
1 1/2"			Organic Impurities			C40-
1 1/8"			Sand Equivalent Value			C2419-
1"			Resistance to Abrasion	% Wear, rev.		C131-
3/4"				% Wear, 500 rev.		Grading
1/2"				% Wear, rev.		C535-
3/8"				% Wear, 1000 rev.		Grading
1/4"	100		Scratch Hardness, % by: Weight Count			C235-
No. 4	98		Fractured Faces, % by: Weight Count			
8	89		Liquid Limit Plasticity Index			D4118-
10	86		Cleaness Value			Calif. 227-
16	76		Soundness, % loss*	3.7		C88
30	57		Moisture Density Relations	Max. Dry Density, pcf		☐ D698- ☐ D1557- ☐ AASHTO T99- ☐ AASHTO T180-
40	45			Optimum Moisture, %		
50	36			Method		
100	19		Specific Gravity	Absorption, %	1.9	☐ C127- ☐ C128-
				Bulk (Dry)	2.54	
				Bulk (SSD)	2.59	
				Apparent	2.67	
Finer than 200 ASTM C117-	11.8					

*Sodium Sulfate

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MK Ferguson/Attn: T. Swisse - (1)

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MAY-19-89 WED 8:37 WESTERN TECH. / FLAGSTAFF P. 04



**WESTERN
TECHNOLOGIES
INC.**

2400 East Huntington Drive
Flagstaff, Arizona 86001
(602) 774-8708

LABORATORY REPORT

PHYSICAL PROPERTIES OF AGGREGATES

Client MK Ferguson Company
P.O. Box 9136
Albuquerque, NM 87119

Job No. 252SJ029

Lab/Invoice No. 25290619

Date of Report 05/09/89

Reviewed By [Signature]

Project Material Testing

Location Tuba City, Arizona

Sampled By Client

Date 04/14/89

Type of Aggregate Sand

Submitted By Client

Date 04/14/89

Source of Aggregate Sample #4, Arrow Pit

Authorized By Client

Date 04/14/89

Sieve Analysis, ASTM C136

Test Standards are ASTM unless otherwise noted.

Sieve Size	% Passing Accumulative	Specification	Test	Result	Specification	Test STD
			Fineness Modulus			C125-
4"			Dry Rodded Unit Weight, pcf			C29-
3"			Lightweight Pieces, %			C123-
2"			Clay Lumps and Friable Particles			C142-
1 1/2"			Organic Impurities			C40-
1 1/4"			Sand Equivalent Value			C2419-
1"			Resistance to Abrasion	% Wear, rev.		C131-
3/4"				% Wear, 500 rev.		Grading
1/2"				% Wear, rev.		C535-
3/8"				% Wear, 1000 rev.		Grading
1/4"	100		Scratch Hardness, % by: Weight Count			C235-
No. 4	98		Fractured Faces, % by: Weight Count			
8	85		Liquid Limit Plasticity Index			D4318-
10	82		Cleanliness Value			Calif 227-
16	72		Soundness, % loss*	3.4		C88
30	54		Moisture Density Relations	Max. Dry Density, pcf		☐ D698-
40	41			Optimum Moisture, %		☐ D1557-
50	31			Method		☐ AASHTO T99-
100	16		Specific Gravity	Absorption, %	1.9	☐ AASHTO T180-
				Bulk (Dry)	2.55	☐ C127-
				Bulk (SSD)	2.60	☐ C128-
				Apparent	2.68	
Finer than 200 ASTM C117	10.5					

*Sodium Sulfate

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MK Ferguson/Attn: T. Swisse - (1)



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INC.**

2400 East Huntington Drive
Flagstaff, Arizona 86001
(602) 774-8708

LABORATORY REPORT

PHYSICAL PROPERTIES OF AGGREGATES

Client MK Ferguson Company
P.O. Box 9136
Albuquerque, NM 87119

Job No 252SJ029

Lab/Invoice No 25290619

Date of Report 05/09/89

Reviewed By [Signature]

Project Material Testing
Location Tuba City, Arizona Sampled By Client Date 04/14/89
Type of Aggregate Sand Submitted By Client Date 04/14/89
Source of Aggregate Sample #5, Arrow Pit Authorized By Client Date 04/14/89

Sieve Analysis, ASTM C136-

Test Standards are ASTM unless otherwise noted.

Sieve Size	% Passing Accumulative	Specification	Test	Result	Specification	Test STD
			Fineness Modulus			C125-
4"			Dry Rodded Unit Weight, pcf			C29-
3"			Lightweight Pieces, %			C123-
2"			Clay Lumps and Friable Particles			C142-
1 1/2"			Organic Impurities			C40-
1 1/8"			Sand Equivalent Value			C2419-
1"			Resistance to Abrasion	% Wear, rev.		C131-
3/4"				% Wear, 500 rev.		Grading
1/2"				% Wear, rev.		C335-
1/8"	100			% Wear, 1000 rev.		Grading
1/4"	100		Scratch Hardness, % by: Weight Count			C235-
No. 4	96		Fractured Faces, % by: Weight Count			
8	71		Liquid Limit Plasticity Index			D4318-
10	67		Cleanliness Value			Calif. 227-
16	56		Soundness, % loss*	6.0		C88
30	45		Moisture Density Relations	Max. Dry Density, pcf		☐ D698- ☐ D1557- ☐ AASHTO T99- ☐ AASHTO T180-
40	30			Optimum Moisture, %		
50	20			Method		
100	10		Specific Gravity	Absorption, %	1.8	☐ C127- ☐ C128-
				Bulk (Dry)	2.55	
				Bulk (SSD)	2.59	
				Apparent	2.67	
Finer than 200 ASTM C117-	8.0					

*sodium sulfate

Copies to: Addressee - (2)
MK Ferguson/Attn: T. Swisse - (1)



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TECHNOLOGIES
INC.**

2400 East Huntington Drive
Flagstaff, Arizona 86001
(602) 774-8708

LABORATORY REPORT

PHYSICAL PROPERTIES OF AGGREGATES

Client MK Ferguson Company
P.O. Box 9136
Albuquerque, NM 87119

Job No 252BJ029

Lab/Invoice No. 25290619

Date of Report 05/09/89

Reviewed By JPH

Project Material Testing

Location Tuba City, Arizona

Sampled By Client

Date 04/14/89

Type of Aggregate Sand

Submitted By Client

Date 04/14/89

Source of Aggregate Sample #6, Arrow Pit

Authorized By Client

Date 04/14/89

Sieve Analysis, ASTM C136

Test Standards are ASTM unless otherwise noted.

Sieve Size	% Passing Accumulative	Specification	Test	Result	Specification	Test STD
			Fineness Modulus			C125-
4"			Dry Rodded Unit Weight, pcf			C29-
3"			Lightweight Pieces, %			C123-
2"			Clay Lumps and Friable Particles			C142-
1 1/2"			Organic Impurities			C40-
1 1/8"			Sand Equivalent Value			C2419-
1"			Resistance to Abrasion	% Wear, rev.		C131-
3/4"				% Wear, 500 rev.		Grading
1/2"				% Wear, rev.		C535-
3/8"	100			% Wear, 1000 rev.		Grading
1/4"	98		Scratch Hardness, % by: Weight Count			C235-
No. 4	90		Fractured Faces, % by: Weight Count			
8	68		Liquid Limit Plasticity Index			D4318-
10	63		Cleanliness Value			Calif 227-
16	49		Soundness, % loss*	5.2		C88
30	30		Moisture Density Relations	Max. Dry Density, pcf		☐ D698-
40	21			Optimum Moisture, %		☐ D1557-
50	15			Method		☐ AASHTO T99-
100	6		Specific Gravity	Absorption, %	1.9	☐ AASHTO T180-
				Bulk (Dry)	2.55	☐ C127-
				Bulk (SSD)	2.59	☐ C128-
Finer than 200 ASTM C117	3.6		Apparent	2.67		

*Sodium Sulfate

Copies to: Addressee - (2)
MK Ferguson/Attn: T. Swisse - (1)

Project UMTRA-TUBA CITY
Feature BEDDING
Item BLEND OF BASALT & ARROW PIT MATH.

Contract No. 4005-18 File No. 5-19-89
Designed REZAR Date 5-19-89
Checked D BOLTON Date 5-19-89

	SPECIFIC GRAVITY	Absorption	SOUNDNESS
SHADOW MT. DENSE BASALT MATERIAL (FROM SH. 3)	2.89	0.50 %	0.064 %
ARROW PIT MATERIAL	2.59	1.83 %	4.0 %
WEIGHTED AVERAGE BASED ON 60% SHADOW MT. AND 40% ARROW PIT BLENDED BEDDING	2.77	1.03 %	1.64 %
TUBA CITY SPEC. SECTION 0227B, ITEM 2.1.6.3	2.65 MIN	NONE GIVEN	5% MAX.

The blended bedding meets the Tuba City spec. requirements for SG and Soundness. Absorption value of 1.03% is acceptable.



REF. 3

UMTRA PROJECT TELEPHONE CONVERSATION RECORD

DATE 6/17/88 TIME 3:30 ☐ AM ☒ PM DOC. NO. 4005-TUB-T-01-01752

☒ TO ☐ FROM Phil Cate RECORDED BY R Heneks

AFFILIATION MKF PHONE NO. _____

LOCATION Albuquerque

SUBJECT Shadow Mountain Rock Tests

Following are results of rock tests made in April.

Sample	Sp. Grav.	Na ₂ SO ₄	Absorp.	L.A. Abras
Type A	2.90	0.016%	0.72%	4.9%
Type C	2.92	0.06%	0.59	4.0%
Type F	2.86	0.115%	0.19	5.1%
AVG.	2.89	0.064%	0.50%	4.7%

DISTRIBUTION

UMTRA PROJECT

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DEP ENG MINOR

PROJ QA MINOR

CHIEF ENCI

☒ SITE DE HET

PROJ SECTY

CHRON ☒

RWH ☒

MK-F

PROJ DIRECTOR

QUALITY MINOR

(COVER) →

Project MIRA-TUBA CITY Contract No. 4005-18 Sheet 1
Feature BEDDING MATERIAL Designed REZA B. File No.
Item BLEND OF BASALT AND ARROW PIT MATL Checked D. BOLTON Date 5-19-89

PURPOSE

PURPOSE OF THIS CALCULATION IS TO CALCULATE THE WEIGHTED AVERAGE SPECIFIC GRAVITY, ABSORPTION AND SOUNDNESS OF MIXTURE OF MATERIALS FROM ARROW PIT AND SHADOW MOUNTAIN GUARRIES. (LA ABRASION IS NOT APPLICABLE FOR ARROW PIT FINES)

ASSUMPTION

THE MIXTURE IS COMPRISED OF 60% SHADOW MOUNTAIN AND 40% ARROW PIT MATERIAL (REF. 1).

RESULTS (FOR ARROW PIT FINES) (FROM REF. 2)

	SPECIFIC GRAVITY	ABSORPTION	SOUNDNESS
ARROW PIT			
SAMPLE #1	2.59	1.8	3.1
#2	2.59	1.7	2.7
#3	2.59	1.9	3.7
#4	2.60	1.9	3.4
#5	2.59	1.8	6.0
#6	2.59	1.9	5.2
AVG.	2.59	1.83	4.0

Micro-Chem Laboratories

1550 Dell Avenue, Suite E • Campbell, CA 95008 • (408) 374-3360

February 8, 1989

Western Technologies, Inc.
400 South Lorena Avenue
Farmington, New Mexico 87401

Job No. C-1608-89

Attn: Mr. Don Manchester

Re: Petrographic Examination of Aggregates
Project: Tuba City, UMTRA
Source: Arrow Pit

In accordance with your request, a fine aggregate sample was received for petrographic examination. The sample was reportedly obtained from current stockpiles located at the above referenced project. The objectives of the analysis were to identify the constituents, evaluate the physical and chemical properties, and ascertain the suitability of the materials for use as a filler in aggregate base course materials.

Test Methods

The sample was tested according to ASTM C-295, "Petrographic Examination of Aggregates for Concrete," with certain modifications. Approximately 200 particles from six sieve fractions were examined, identified and tallied with a stereomicroscope. Thin sections were prepared and studied with a petrographic microscope to determine the mineralogy of the samples.

Sieve analysis results were provided by Western Technologies, Inc.

Test Results

The results of the petrographic examination are presented in Table I.

RECEIVED

FEB 15 1989

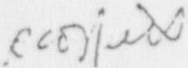
WESTERN TECHNOLOGIES, INC.
FARMINGTON, NEW MEXICO

Discussion and Conclusions

1. The submitted fine aggregate sample consisted mainly of siliceous minerals and rocks (quartz, felsites, feldspars, and chert), limestone, and sandstone.
2. The sand contained only 0.7% poor (weak and friable) aggregates which was considered to be negligible. This sample also contained 13.6% fair (moderate strength) and 78.6% good (firm, dense) aggregates based on subjective visual evaluation. The clay (0.7%) present in the sand was confined to the finer fractions and probably would not adversely affect the properties of the sand.
3. The submitted sand sample contained fewer poor and fair particles than in comparison to the prior sample (see Job No. C-1571-88 dated 11 November 1988). It is believed the overall durability of this Arrow Pit sample was higher than the prior sample from Shadow Mountain Quarry, based on the findings of the petrographic examination.

Should any questions arise concerning the findings of this report, please contact the undersigned.

Respectfully Submitted,
MICRO-CHEM LABORATORIES



Robert C. O'Neill
Petrographer

RCON/jw

PETROGRAPHIC EXAMINATION OF FINE AGGREGATE
FOR CONCRETE ASTM C-295

TABLE I

JOB NO. C-1608-89

CONSTITUENT	WEIGHTED AVERAGE OF SIEVE FRACTIONS						TOTAL	PHYSICAL QUALITY
	No. 4-8	No. 8-16	No. 16-30	No. 30-50	No. 50-100	No. 100-200		
QUARTZ	0.5	2.8	14.3	17.6	11.4	2.8	49.4	G
FELDSPARS	0.2	0.3	2.2	3.4	2.5	1.2	9.8	G
FELSITES	0.3	1.2	3.8	1.3	0.6	0.2	7.4	G
LIMESTONE	3.5	2.2	2.3	0.6	0.6	0.7	9.9	F
SANDSTONE	1.4	0.7	0.3	0.4			2.8	F
PYROXENE			0.3		0.2	0.2	0.7	G
CLAY				0.3	0.1	0.3	0.7	P
HEMATITE	0.4	0.1	0.1	0.1	0.2		0.9	F
BASALT	0.4	0.3	0.6	0.9			2.2	G
CHALCEDONY	0.1	0.2	0.4				0.7	G
CHERT	2.2	1.4	2.7	1.3	0.6	0.2	8.4	G
TOTAL	9.0	9.2	27.0	25.9	16.2	5.6	92.9	

G = Good F = Fair P = Poor

Calculation Cover Sheet



Contract No. 4005-18 Discipline UMTRA-ESC1 Calc. No. 18-895-22-00
 No. of Sheets 3

Project UMTRA-TUBA CITY

Feature BEDDING MATERIAL

Item PHYSICAL PROPERTIES OF BLEND OF
DENSE BASALT AND ARROW PIT FINES

Sources of Data

Sources of Formulae & References

- 1- MKE IOC TO J.G. OLDHAM
 MKE DOC. NO 4005-TUB-N-01-02146-00
 DATED MARCH 29, 1989
- 2- ARROW PIT MATERIAL TEST RESULTS
 MKE DOC. NO 4005-TUB-R-09-02176-00, APRIL 1989.
- 3- UMTRA-TELEPHONE CONVERSATION RECORD
 MKE DOC. NO. 4005-TUB-T-01-01752-00
 DATED 6-17-88

Preliminary Calc. ☐

Final Calc. ☒

Supersedes Calc. No.

		REZA B.	5-19-89	D Bolton	5-19-89	D Bolton	5-19-89
Rev. No.	Revision	Calculation By	Date	Checked By	Date	Approved By	Date



**WESTERN
TECHNOLOGIES
INC.**

4000 South Lorena Avenue
Farmington, New Mexico 87401
(505) 127-4966

LABORATORY REPORT

PHYSICAL PROPERTIES OF AGGREGATES

Client

Mountain Gravel Construction
Post Office Box 788
Dolores, Colorado 81323

30046

Job No.

Lab. Invoice No. 31490155

Date of Report 03/22/89

Reviewed By *L. Winkler*

6

Project Tuba City UNITRA
Location Tuba City, Arizona Sampled By Client Date 03/19/89
Type of Aggregate Composite blend-coarse/fine Submitted By Client Date 03/19/89
Source of Aggregate 35% 1 1/2" Shadow Mtn. Authorized By Client Date 03/19/89
75% 1/4" Shadow Mtn.
40% Fines - Arrow Pit Test Standards are ASTM unless otherwise noted.

Sieve Size	% Passing Accumulative	Specification	Test	Result	Specification	Test STD
			Fineness Modulus			C125-
			Dry Rodded Unit Weight, pcf			C29-
4"			Lightweight Pieces, %			C123-
3"			Clay Lumps and Friable Particles			C142-
2"			Organic Impurities			C40-
1 1/2"			Sand Equivalent Value			C2419-
1 1/4"			Resistance to Abrasion	% Wear, rev.		C131-
1"				% Wear, 500 rev.		Grading
3/4"				% Wear, rev.		C535-
1/2"				% Wear, 1000 rev.		Grading
3/8"			Scratch Hardness, % by: Weight Count			C235-
5/16"			Fractured Faces, % by: Weight Count			
No. 4			Liquid Limit Plasticity Index			D4318-
8			Cleanliness Value			Calif. 227-
10			Composite Bulk Specific Gravity, %	2.72		
16			Moisture Density Relations	Max. Dry Density, pcf	☐ D698- ☐ D1557- ☐ AASHTO T99- ☐ AASHTO T180-	
30				Optimum Moisture, %		
40				Method		
50			Specific Gravity	Absorption, %	☐ C127- ☒ C128-	
100				Bulk (Dry)		
				Bulk (SSD)		
				Apparent		
Finer than 200 ASTM C117						

Spec ID.

Client (3)
/km



**WESTERN
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Farmington, New Mexico 87401
(505) 327-4966

LABORATORY REPORT

PHYSICAL PROPERTIES OF AGGREGATES

Client

Mountain Gravel Construction
Post Office Box 788
Dolores, Colorado 81323

30046

Job No.

Lab Invoice No. 31490155

Date of Report 03/22/89

Reviewed By *L. Winslow*

6

Project Tuba City UMTRA
Location Tuba City, Arizona Sampled By Client Date 03/19/89
Type of Aggregate Composite blend-coarse/fine Submitted By Client Date 03/19/89
Source of Aggregate 35% 1 1/2" Shadow Mtn. Authorized By Client Date 03/19/89
25% 1 1/2" Shadow Mtn.
40% Fines - Arrow Pit Test Standards are ASTM unless otherwise noted.

Source of Aggregate			Test Standards are ASTM unless otherwise noted.				
20% Fines - Arrow Pit							
Sieve Size	% Passing Accumulative	Specification	Test		Result	Specification	Test STD
			Fineness Modulus				C125-
			Dry Rodded Unit Weight, pcf				C29-
4"			Lightweight Pieces, %				C123-
3"			Clay Lumps and Friable Particles				C142-
2"			Organic Impurities				C40-
1 1/2"			Sand Equivalent Value				C249-
1 1/4"			Resistance to Abrasion	% Wear, rev.			C131-
1"				% Wear, 500 rev.			Grading
3/4"				% Wear, rev.			C535-
1/2"				% Wear, 1000 rev.			Grading
1/4"			Scratch Hardness, % by: Weight Count				C235-
3/8"			Fractured Faces, % by: Weight Count				
No. 4			Liquid Limit Plasticity Index				D4318-
8			Cleanliness Value				Calif. 227-
10			Composite Bulk Specific Gravity, %		2.72		
16			Moisture Density Relations	Max. Dry Density, pcf		☐ D698- ☐ D1557- ☐ AASHTO T99- ☐ AASHTO T180-	
30				Optimum Moisture, %			
40				Method			
50			Specific Gravity	Absorption, %	1.0	☒ C127- ☐ C128-	
100				Bulk (Dry)	2.89		
				Bulk (SSD)	2.92		
				Apparent	2.97		
Finer than 200 μ ASTM C117							

105 10

Client (3)
/km