



Rio Algom Mining LLC

August 26, 2003

Mr. John Lusher
Fuel Cycle Licensing Branch, NMSS
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Re: **License SUA-1473**
Docket No. 40-8905

Dear Mr. Lusher,

Please find enclosed information associated with re-qualification of the erosion protection rock Rio Algom will use for reclamation activities at the Ambrosia Lake facility. This information was requested by NRC in letters dated February 25, 2002, and November 27, 2002. Laboratory results along with an engineering overdesign of 4% indicates that the Tinaja Pit rock is of sufficient grade to assure protection for the 1000 year design requirement specified in Criterion 6 of 10 CFR Part 40, Appendix A.

Please contact Terry Fletcher at (505) 287-8851, extension 200, if you have any questions.

Regards,

Peter Luthiger
Supervisor, Radiation Safety
and Environmental Affairs

xc: T. Fletcher
P. Goranson
USNRC- MD (J. Caverly)
File



**RIO ALGOM MINING LLC
AMBROSIA LAKE FACILITY**

License SUA-1473 Docket No. 40-8905

**TINAJA PIT
EROSION PROTECTION
QUALIFICATION RESULTS**

August 26, 2003



**Rio Algom Mining LLC - Ambrosia Lake Mill
Erosion Protection Durability Test Results**

In response to US Nuclear Regulatory Commission requests dated February 25, 2002 and November 27, 2002, Rio Algom submits the following information that demonstrates the erosion protection obtained from the Tinaja Pit is of sufficient grade and quality for use on some components of the site reclamation project. Regulatory requirements establish a 1000 year design criteria for erosion protection.

Rio Algom, along with other uranium mill sites in the area, previously acquired all erosion protection materials from a quarry that produced basalt rock. Subsequent closure of this basalt pit precluded its use and alternative rock sources were investigated.

Rio Algom previously conducted qualification tests for the Tinaja Pit rock source in 2001, which indicated acceptable rock (Table 1). Laboratory reports from Western Technologies, Inc., are contained in Appendix 1. Petrographic analysis of the Tinaja Pit rock was performed by American Petrographic Services, Inc., in 2001 with the results indicating that the rock is a massive calcitic dolomite (Appendix 2).

Table 1

**Tinaja Pit Rock - 2001
Erosion Protection Materials Testing Scoring Results**

Lab ID	Date	Computed Score	Rock Quality Rating ¹
01-2	11/15/01	314.8	76.8
1L0465	12/4/01	315.4	76.9
01-1	12/14/01	313.3	76.4

Average Score

76.7

1. - NUREG-1623, "Design of Erosion Protection for Long-Term Stabilization," Table F-2.

Based on these preliminary results for the Tinaja Pit rock, all engineering design work incorporated a 4% overdesign factor to meet the NRC scoring design criteria in NUREG-1623.

With the development of additional erosion protection design elements at Rio's Ambrosia lake facility, NRC requested Rio to requalify the Tinaja Pit rock source to determine whether the rock quality has changed since the preliminary testing that was conducted in 2001.

Updated rock qualification tests were conducted during the 1st half of 2003, which confirmed that the Tinaja Pit rock continues to be acceptable for use. Table 2 provides the summary of the 2003 test results. Appendix 3 contains the laboratory reports. The petrographic analysis of the rock performed in June 2003 resulted in similar observations/findings as the 2001 petrographic tests (Appendix 4).

Table 2

Tinaja Pit Rock - 2003
Erosion Protection Materials Testing Scoring Results

Lab ID	Date	Computed Score	Rock Quality Rating ¹
3L276-A	7/7/03	359.5	87.7
3L276-B	7/7/03	330.3	80.6
3L127	5/23/03	332.2	81.0

Average Score

83.1

1. - NUREG-1623, "Design of Erosion Protection for Long-Term Stabilization," Table F-2.

Based on the two series of tests, the Tinaja Pit rock quality has improved over time. This, combined with the 4% overdesign within the engineering, will ensure that the erosion protection planned for use on the Rio Algom reclamation project meets the 1000 year design criteria for erosion protection.

APPENDIX 1

Tinaja Pit Rock Lab Results
2001



**Western
Technologies
Inc.**
The Quality People
Since 1955

.05 Washington Place, N.E.
Albuquerque, New Mexico 87113
(505) 823-4488 • fax 821-2963

Proc Quality

November 26, 2001

C & E Concrete, Inc.
Post Office Box 2547
Milan, New Mexico 87020

Attn: Mr. Walter Lee Meech

Re: Erosion Protection Material Testing
Rock Quality Scoring

Ref. No: 3241JT019
Invoice No: 32410555

As you requested, we have performed the laboratory testing in accordance with the NUREG-1632 specification. The purpose of the laboratory testing was to determine the overall rock quality as presented in Table D-1, Scoring Criteria for Determining Rock Quality.

If you have any questions regarding our findings, please contact us at (505) 823-4488.

Respectfully yours,
WESTERN TECHNOLOGIES INC.

Andrew L. Cuaderes
Managing Director

Ralph E. Crockett, P.E.
Director of Engineering



*1st
Test
314.8
410
76.8%*

*use 53 SH Test
324.8
410
79.2%*



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**LABORATORY REPORT
ON AGGREGATES**

Client **C & E CONCRETE**
POST OFFICE BOX 2547
MILAN, NEW MEXICO 87021

Date of Report **01/04/02**
Job No. **3241JTC14**
Event / Invoice No. **32410566**
Authorized By **W. MEECH**
Sampled By **CLIENT**
Submitted By **CLIENT**
Lab No. **01-1**
Date **12/14/01**
Date **12/14/01**
Date **12/14/01**

Project **EROSION PROTECTION MATERIAL TESTING**
Contractor **C & E CONCRETE**
Type / Use of Aggregate **COARSE AGGREGATE**
Sample Source / Location **TINAJA PIT**

Location **ALBUQUERQUE LABORATORY**
Arch./Engr. **UNKNOWN**
Supplier / Source **C & E CONCRETE**
Source / Location Desig. By **W.MEECH**
Date **12/14/01**

Reference: SOUNDNESS: ASTM C88 AASHTO T104 SODIUM SULFATE MAGNESIUM SULFATE
ABRASION RESISTANCE: ASTM C131 AASHTO T96 ASTM C535

Special Instructions:

TEST RESULTS

SIEVE SIZE	GRADING OF ORIGINAL SAMPLE	WEIGHT OF TEST FRACTIONS BEFORE TEST GRAMS	PASSING DESIGNATED SIEVE AFTER TEST %	WEIGHTED PERCENTAGE LOSS	ALLOWABLE PERCENTAGE LOSS						
					SODIUM	MAGNESIUM					
SOUNDNESS TEST OF FINE AGGREGATE					NO. OF CYCLES						
SOLUTION CONDITION: <input type="checkbox"/> NEW <input type="checkbox"/> USED											
MINUS NO. 100											
NO. 50 TO NO. 100											
NO. 20 TO NO. 50											
NO. 10 TO NO. 20											
NO. 4 TO NO. 10											
NO. 4 TO NO. 3											
3/8 IN. TO NO. 4											
TOTAL											
SOUNDNESS TEST OF COARSE AGGREGATE					NO. OF CYCLES 5						
SOLUTION CONDITION: <input checked="" type="checkbox"/> NEW <input type="checkbox"/> USED											
2 1/2 IN. TO 1 1/2 IN.											
1 1/2 IN. TO 3/4 IN.	27.7	501.6	1.1	0.3							
3/4 IN. TO 3/8 IN.	55.6	1004.6	0.9	0.5							
3/8 IN. TO NO. 4	16.7	301.6	4.2	0.7							
TOTAL	100			1.5							
DUALITATIVE EXAMINATION OF COARSE SIZE PARTICLES EXHIBITING DISTRESS											
SIEVE SIZE	SPLITTING		CRUMBLING				CRACKING		FLAKING		TOTAL NO. PARTICLES BEFORE TEST
	NO.	%	NO.	%			NO.	%	NO.	%	
2 1/2 IN. TO 1 1/2 IN.											
1 1/2 IN. TO 3/4 IN.											
RESISTANCE TO DEGRADATION BY L.A. MACHINE					% LOSS	SPECIFICATION					
SMALL COARSE AGGREGATE - GRADING B				100 REV. →	6						
				500 REV. →							
LARGE COARSE AGGREGATE - GRADING				200 REV. →							
				1000 REV. →							

Comments:

Copies To: (3) CLIENT

11/26/01

THE SERVICES REFERRED TO HEREIN WERE PERFORMED IN ACCORDANCE WITH THE STANDARD OF CARE PRACTICED LOCALLY FOR THE REFERENCED METHOD(S) AND RELIES ONLY TO THE CONTRIBUTION(S) OR SAMPLE(S) TESTED AS STATED HEREIN. WESTERN TECHNOLOGIES INC. MAKES NO OTHER WARRANTY OR REPRESENTATION, EXPRESSED OR IMPLIED, AND HAS NOT CONFIRMED INFORMATION INCLUDING SOURCE OF MATERIALS SUBMITTED BY OTHERS.

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**FIELD REPORT ON
 PORTLAND CEMENT CONCRETE**

Client **C & E CONCRETE**
 UNIT OFFICE BOX 7547
 MILAN, NEW MEXICO 87021

Date of Report **01/04/02**
 Job No. **3241JT014**
 Event / Invoice No. **32410565**
 Authorized By **W.MEECH**
 Test Calc. By **M.ROYBAL**

Lab No. **01-1**
 Date **12/14/01**
 Date **12/14/01**

Project **EROSION PROTECTION MATERIAL TESTING**
 Contractor **C & E CONCRETE**
 Type / Use of Concrete **LARGE COARSE AGGREGATE**
 Sample Source / Location **TINAJA PIT**
 Reference: **REBOUND NUMBER OF HARDENED CONCRETE** **ASTM C605**
 Special Instructions:

Location **ALBUQUERQUE LABORATORY**
 Arch./Engr. **UNKNOWN**
 Supplier / Source **C & E CONCRETE**
 Source / Location Desig. By **W.MEECH**

Date **12/14/01**

MATERIAL DATA

DESIGN STRENGTH OF CONCRETE, PSI	AGE	HAMMER TYPE	SERIAL NO.		
COMPOSITION OF CONCRETE:					
CURING / UNUSUAL CONDITIONS RELATED TO TEST AREA:					
OBSERVATIONS & TEST RESULTS					
TEST NO.	LOCATION OF TEST AREA IN STRUCTURE	SURFACE DESCRIPTION		AVERAGE REBOUND READING	INDICATED COMPRESSIVE STRENGTH, PSI
		FORM TYPE	FINISH		
1				60.9	
2				61.6	
	AVERAGE:			61.2	
<small>CAUTION: THIS TEST METHOD IS NOT INTENDED AS AN ALTERNATIVE FOR THE STRENGTH DETERMINATION OF CONCRETE. REBOUND NUMBERS SHOULD BE USED ONLY AS A GUIDE IN THE DEVELOPMENT OF CONCRETE COMPRESSIVE STRENGTH ESTIMATES AND MUST NOT BE INFERRED TO BE ABSOLUTE VALUES. OPTIMALLY, REBOUND NUMBERS ARE CORRELATED BY CORE TEST DATA. IN THE ABSENCE OF SUCH DATA, THE INDICATED STRENGTHS PROVIDED SHOULD BE USED CAUTIOUSLY AS THEY ARE BASED ON PREVIOUS RESEARCH AND CORRELATIONS WHICH MIGHT NOT BE REPRESENTATIVE OF THE CONCRETE BEING EXAMINED.</small>					

Comments:

Copies To:

(3) CLIENT

WEST/11/MS/02

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PHYSICAL PROPERTIES OF AGGREGATES

Client **C & E CONCRETE**
POST OFFICE BOX 2547
MILAN, NEW MEXICO 87021

Date of Report **01/04/02**
Job No. **3241JT014**
Front / Invoice No. **32410666**
Authorized By **W.MEECH**
Sampled By **CLIENT**
Submitted By **W.MEECH**

Lab No. **01-1**
Date **12/14/01**
Date **12/14/01**
Date **12/14/01**

Project **EROSION PROTECTION MATERIAL TESTING**
Contractor **C & E CONCRETE**
Type / Use of Aggregate **COARSE AGGREGATE**
Sample Source / Location **TINAJA PIT**
Special Instructions:

Location **ALBUQUERQUE LABORATORY**
Arch./Eng. **UNKNOWN**
Supplier / Source **C & E CONCRETE**
Source / Location Desig. By **W.MEECH**

Date **12/14/01**

TEST RESULTS

SIEVE ANALYSIS <input type="checkbox"/> ASTM C136 <input type="checkbox"/> AASHTO T27			PHYSICAL PROPERTIES				TEST RESULTS	SPECIFICATION
SIEVE SIZE U.S. & MM	ACCUMULATED % PASSING	SPECIFICATION	UNIT WEIGHT & VOIDS		FINE AGGREGATE	UNIT WEIGHT, PCF		
4 IN. - 100.0			<input type="checkbox"/> ASTM C28 <input type="checkbox"/> AASHTO T18			VOIDS, %		
3 - 75.0			<input type="checkbox"/> RODDING <input type="checkbox"/> JIGGING <input type="checkbox"/> LOOSE		COARSE AGGREGATE	UNIT WEIGHT, PCF		
1 1/2 - 37.5						VOIDS, %		
1 1/8 - 25.1			SPECIFIC GRAVITY & ABSORPTION		FINE AGGREGATE	BULK SPECIFIC GRAVITY		
1 - 25.0								
3/4 - 19.0					<input type="checkbox"/> ASTM C128 <input type="checkbox"/> AASHTO T84	BULK SPECIFIC GRAVITY (SSD)		
1/2 - 12.5					AGGREGATE DRIED	APPARENT SPECIFIC GRAVITY		
3/8 - 8.5					<input type="checkbox"/> YES <input type="checkbox"/> NO	ABSORPTION, %		
1/4 - 6.3					COARSE AGGREGATE	BULK SPECIFIC GRAVITY	2.645	
NO. 4 - 4.75					<input checked="" type="checkbox"/> ASTM C127 <input type="checkbox"/> AASHTO T85	BULK SPECIFIC GRAVITY (SSD)	2.658	
3 - 2.35					AGGREGATE DRIED	APPARENT SPECIFIC GRAVITY	2.678	
10 - 2.00					<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	ABSORPTION, %	0.45	
16 - 1.18			SAND EQUIVALENT VALUE <input type="checkbox"/> ASTM D2419 <input type="checkbox"/> AASHTO T176			%		
30 - .850			RESISTANCE TO DEGRADATION		SMALL COARSE AGGREGATE	100 REV. % LOSS		
40 - .425							500 REV. % LOSS	
50 - .300					LARGE COARSE AGGREGATE	500 REV. % LOSS		
100 - .150					<input type="checkbox"/> ASTM C666 GRADING	1000 REV. % LOSS		
FINER THAN NO. 200 <input type="checkbox"/> ASTM C117 <input type="checkbox"/> AASHTO T75			LIGHTWEIGHT PIECES <input type="checkbox"/> ASTM C126 <input type="checkbox"/> AASHTO T113			FINE AGGREGATE, %		
FINENESS MODULUS, ASTM C136						COARSE AGGREGATE, %		
LIGHT & PLASTIC PROPERTIES			CLAY LUMPS & FRIABLE PARTICLES <input type="checkbox"/> ASTM C162 <input type="checkbox"/> AASHTO T112			FINE AGGREGATE, %		
<input type="checkbox"/> ASTM D4318 <input type="checkbox"/> AASHTO T20 & T80						COARSE AGGREGATE, %		
METHOD <input type="checkbox"/> A <input type="checkbox"/> B RESULT SPECIFICATION			FRACTURED FACES COARSE AGGREGATE BY WEIGHT <input type="checkbox"/> AZ 812 <input type="checkbox"/> PLX T807 <input type="checkbox"/> FAA			ONE OR MORE FACES, %		
LIQUID LIMIT						TWO OR MORE FACES, %		
PLASTIC LIMIT								
PLASTICITY INDEX								
SAMPLE AIR CURED <input type="checkbox"/> YES <input type="checkbox"/> NO								
FINENESS MODULUS, ASTM C136			DURABILITY INDEX <input type="checkbox"/> ASTM D4941 <input type="checkbox"/> ASTM T111					
			PROCEDURE: A <input type="checkbox"/> COARSE B <input type="checkbox"/> FINE C <input type="checkbox"/> COARSE & FINE					
ORGANIC IMPURITIES <input type="checkbox"/> ASTM D49 <input type="checkbox"/> AASHTO T21			UNCOMPACTED VOID CONTENT <input type="checkbox"/> AZ 247 <input type="checkbox"/> ASTM C1282 METHOD					
ORGANIC PLATE NO.								
CARBONATES IN AGGREGATE <input type="checkbox"/> AZ 238 <input type="checkbox"/> ASTM D042 %			FLAT & ELONGATED PARTICLES <input type="checkbox"/> ASTM D4781			BY WEIGHT, %		
			DIMENSIONAL RATIO USED <input type="checkbox"/> 1:1 <input type="checkbox"/> 1:2 <input type="checkbox"/> 1:3 <input type="checkbox"/> 1:4			BY NUMBER, %		

Comments:

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LABOR

THE SERVICES REFERRED TO HEREIN WERE PERFORMED IN ACCORDANCE WITH THE STANDARD OF CARE PRACTICES USUALLY PURSUED BY THE REFERENCED METHOD(S) AND RELATE ONLY TO THE CONDITIONS OF SAMPLE(S) TESTED AS STATED HEREON. WESTERN TECHNOLOGIES INC. MAKES NO OTHER WARRANTY OR REPRESENTATION, EXPRESSED OR IMPLIED, AND HAS NOT CONFIRMED INFORMATION INCLUDING SOURCE OF MATERIALS SUBMITTED BY OTHERS.



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PHYSICAL PROPERTIES OF AGGREGATES

Client **C & E CONCRETE**
POST OFFICE BOX 2547
MILAN, NEW MEXICO 87021

Date of Report **01/04/02**
Job No. **3241JT014**
Event / Invoice No. **32410666**
Authorized By **W.MEECH**
Sampled By **CLIENT**
Submitted By **W.MEECH**

Lab No. **01-1**
Date **12/14/01**
Date **12/14/01**
Date **12/14/01**

Project **EROSION PROTECTION MATERIAL TESTING**
Contractor **C & E CONCRETE**
Type / Use of Aggregate **COARSE AGGREGATE**
Sample Source / Location **TINAJA PIT**
Special Instructions:

Location **ALBUQUERQUE LABORATORY**
Arch./Engr. **UNKNOWN**
Supplier / Source **C & E CONCRETE**
Source / Location Desig. By **W.MEECH**

Date **12/14/01**

TEST RESULTS

SIEVE ANALYSIS <input type="checkbox"/> ASTM C136 <input type="checkbox"/> AASHTO T27			PHYSICAL PROPERTIES		TEST RESULTS	SPECIFICATION
SIEVE SIZE U.S. & MM	ACCUMULATIVE % PASSING	SPECIFICATION	UNIT WEIGHT & VOIDS	FINE AGGREGATE	UNIT WEIGHT, PCF →	VOIDS, % →
4 IN. - 100.0			<input type="checkbox"/> ASTM C29 <input type="checkbox"/> AASHTO T19			
3 - 75.0			<input type="checkbox"/> RODDING <input type="checkbox"/> JIGGING <input type="checkbox"/> LOOSE	COARSE AGGREGATE	UNIT WEIGHT, PCF →	VOIDS, % →
1 1/2 - 37.5						
1 1/8 - 29.1						
1 - 25.0						
3/4 - 19.0						
1/2 - 12.5						
3/8 - 9.5						
1/4 - 6.3						
NO. 4 - 4.75						
8 - 2.36						
10 - 2.00						
18 - 1.18						
30 - .850						
40 - .425						
60 - .300						
100 - .150						
FINER THAN NO. 200						
<input type="checkbox"/> ASTM C117						
<input type="checkbox"/> AASHTO T11						
FINENESS MODULUS, ASTM C136 →						
LIQUID & PLASTIC PROPERTIES						
<input type="checkbox"/> ASTM D4318 <input type="checkbox"/> AASHTO T99 & T80						
METHOD <input type="checkbox"/> A <input type="checkbox"/> B RESULT SPECIFICATION						
LIQUID LIMIT						
PLASTIC LIMIT						
PLASTICITY INDEX						
SAMPLE AIR DRIED <input type="checkbox"/> YES <input type="checkbox"/> NO						
CLEANNESS VALUE CA227 →						
ORGANIC IMPURITIES <input type="checkbox"/> ASTM C49 <input type="checkbox"/> AASHTO T21						
ORGANIC PLATE NO. →						
CARBONATES IN AGGREGATE						
<input type="checkbox"/> AZ 238 <input type="checkbox"/> ASTM 3042 % →						
SAND EQUIVALENT VALUE <input type="checkbox"/> ASTM D2418 <input type="checkbox"/> AASHTO T176 % →						
RESISTANCE TO DEGRADATION						
SMALL COARSE AGGREGATE <input type="checkbox"/> ASTM C131 <input type="checkbox"/> AASHTO T96 GRADING					100 REV. % LOSS →	
					500 REV. % LOSS →	
LARGE COARSE AGGREGATE <input type="checkbox"/> ASTM C635 GRADING					200 REV. % LOSS →	
					1800 REV. % LOSS →	
LIGHTWEIGHT PIECES <input type="checkbox"/> ASTM C123 <input type="checkbox"/> AASHTO T113					FINE AGGREGATE, % →	
					COARSE AGGREGATE, % →	
CLAY LUMPS & FRIABLE PARTICLES <input type="checkbox"/> ASTM C143 <input type="checkbox"/> AASHTO T112					FINE AGGREGATE, % →	
					COARSE AGGREGATE, % →	
FRACTURED FACES COARSE AGGREGATE BY WEIGHT <input type="checkbox"/> AZ 312 <input type="checkbox"/> PLM T807 <input type="checkbox"/> PMA					ONE OR MORE FACES, % →	
					TWO OR MORE FACES, % →	
DURABILITY INDEX <input type="checkbox"/> ASTM D3744 <input type="checkbox"/> AASHTO T210					D ₂ →	
PROCEDURE: A <input type="checkbox"/> COARSE B <input type="checkbox"/> FINE C <input type="checkbox"/> COARSE & FINE					D ₁ →	
UNCOMPACTED VOID CONTENT <input type="checkbox"/> AZ 247 <input type="checkbox"/> ASTM C1252 METHOD % →						
FLAT & ELONGATED PARTICLES <input type="checkbox"/> ASTM D4791					BY WEIGHT, % →	
DIMENSIONAL RATIO USED <input type="checkbox"/> 1/2 <input type="checkbox"/> 1/3 <input type="checkbox"/> 1:3					BY NUMBER, % →	

Comments:

Copies To: (3) CLIENT

WESTERN TECHNOLOGIES INC.

THE SERVICES REFERRED TO HEREIN WERE PERFORMED IN ACCORDANCE WITH THE STANDARD OF CARE PRACTICED LOCALLY FOR THE REFERENCED METHOD(S) AND RELATE ONLY TO THE CONDITION(S) OF SAMPLE(S) TESTED AS ORDERED HEREIN. WESTERN TECHNOLOGIES INC. MAKES NO OTHER WARRANTY OR REPRESENTATION, EXPRESSED OR IMPLIED, AND HAS NOT COMPILED INFORMATION INCLUDING SOURCE OF MATERIALS SUBMITTED BY OTHERS.

Pre Qual.

C and E Concrete

EROSION PROTECTION MATERIALS TESTING

December 14, 2001

Lab I.D. - 01-1

Rock Quality Scoring Tabulation

Test	Weighting Factor	Test Value	Score	Computed Score
Specific Gravity	12	2.645	7.9	94.8
Absorption, %	13	0.48	8.1	105.3
Sodium Sulfate, %	4	1.5	9.8	39.2
L/A Abrasion(100 rev), %	1	6	1.4	1.4
Schmidt Hammer	11	61.2	6.8	72.6
Total Score				313.3

410
76.4

Limestone - Tinaja Pit



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Since 1955

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Albuquerque, New Mexico 87113
(505) 823-4488 • fax 821-2963

**FIELD REPORT ON
PORTLAND CEMENT CONCRETE**

Client **C & E CONCRETE**
P O BOX 2547
MILAN, NEW MEXICO 87021

Date of Report **11/26/01**
Job No. **3241JT014**
Event / Invoice No. **32410555**
Authorized By **CLIENT**
Test Calc. By **CLIENT**

Lab No. **01-2**
Date **11/15/01**
Date **11/15/01**

Project **EROSION PROTECTION MATERIAL TESTING**
Contractor **C & E CONCRETE**
Type / Use of Concrete **NON-CONCRETE**
Sample Source / Location **TINAJA PIT**
Reference: **REBOUND NUMBER OF HARDENED CONCRETE** ASTM C805
Special Instructions:

Location **ALBUQUERQUE LABORATORY**
Arch. / Engr. **UNKNOWN**
Supplier / Source **TINAJA PIT**
Source / Location Desig. By **CLIENT**

Date **11/15/01**

MATERIAL DATA

DESIGN STRENGTH OF CONCRETE, PSI	N/A	AGE	N/A	HAMMER TYPE	LR-3	SERIAL NO.	7109
COMPOSITION OF CONCRETE:	N/A						
CURING / UNUSUAL CONDITIONS RELATED TO TEST AREA:	N/A						

OBSERVATIONS & TEST RESULTS

TEST NO.	LOCATION OF TEST AREA IN STRUCTURE	SURFACE DESCRIPTION		AVERAGE REBOUND READING	INDICATED COMPRESSIVE STRENGTH, PSI
		FORM TYPE	FINISH		
1	AGGREGATE EROSION PROTECTION MATERIAL TESTING TOTAL AVERAGE OF 20 TESTS	-	-	43.2	

CAUTION: THIS TEST METHOD IS NOT INTENDED AS AN ALTERNATIVE FOR THE STRENGTH DETERMINATION OF CONCRETE. REBOUND NUMBERS SHOULD BE USED ONLY AS A GUIDE IN THE DEVELOPMENT OF CONCRETE COMPRESSIVE STRENGTH ESTIMATES AND MUST NOT BE INFERRED TO BE ABSOLUTE VALUES. OPTIMALLY, REBOUND NUMBERS ARE CORROBORATED BY CORE TEST DATA. IN THE ABSENCE OF SUCH DATA, THE INDICATED STRENGTHS PROVIDED SHOULD BE USED JUDICIOUSLY AS THEY ARE BASED ON PREVIOUS RESEARCH AND CORRELATIONS WHICH MIGHT NOT BE REPRESENTATIVE OF THE CONCRETE BEING EXAMINED.

Comments: **REBOUND TESTING ON LARGE AGGERGATE.**

Copies To: **(3) CLIENT**

THE SERVICES REFERRED TO HEREIN WERE PERFORMED IN ACCORDANCE WITH THE STANDARD OF CARE PRACTICED LOCALLY FOR THE REFERENCED METHOD(S) AND RELATE ONLY TO THE CONDITION(S) OR SAMPLE(S) TESTED AS STATED HEREIN. WESTERN TECHNOLOGIES INC. MAKES NO OTHER WARRANTY OR REPRESENTATION, EXPRESSED OR IMPLIED, AND HAS NOT CONFIRMED INFORMATION INCLUDING SOURCE OF MATERIALS SUBMITTED BY OTHERS.

REVIEWED BY



Western Technologies Inc.
The Quality People
Since 1955

305 Washington Place, N.E.
Albuquerque, New Mexico 87113
(505) 823-4488 • fax 821-2963

**LABORATORY REPORT
ON AGGREGATES**

Client **C & E CONCRETE**
P O BOX 2547
MILAN, NEW MEXICO 87021

Date of Report **11/26/01**
Job No. **3241JT014**
Event / Invoice No. **32410555** Lab No. **01-2**
Authorized By **CLIENT** Date **11/15/01**
Sampled By **CLIENT** Date **11/15/01**
Submitted By **CLIENT** Date **11/15/01**

Project **EROSION PROTECTION MATERIAL TESTING**

Location **ALBUQUERQUE LABORATORY**

Contractor **C & E CONCRETE**

Arch. / Engr. **UNKNOWN**

Type / Use of Aggregate **TINAJA PIT**

Supplier / Source **C & E CONCRETE**

Sample Source / Location **TINAJA PIT**

Source / Location Desig. By **CLIENT**

Date **11/15/01**

Reference: **SOUNDNESS:** **ASTM C88** **AASHTO T104** **SODIUM SULFATE** **MAGNESIUM SULFATE**
ABRASION RESISTANCE: **ASTM C131** **AASHTO T96** **ASTM C535**

Special Instructions:

TEST RESULTS

SIEVE SIZE	GRADING OF ORIGINAL SAMPLE %	WEIGHT OF TEST FRACTIONS BEFORE TEST GRAMS	PASSING DESIGNATED SIEVE AFTER TEST %	WEIGHTED PERCENTAGE LOSS	ALLOWABLE PERCENTAGE LOSS				
					SODIUM	MAGNESIUM			
SOUNDNESS TEST OF FINE AGGREGATE					SOLUTION CONDITION: <input type="checkbox"/> NEW <input type="checkbox"/> USED				
					NO. OF CYCLES				
MINUS NO. 100									
NO. 50 TO NO. 100									
NO. 30 TO NO. 50									
NO. 16 TO NO. 30									
NO. 8 TO NO. 16									
NO. 4 TO NO. 8									
3/8 IN. TO NO. 4									
TOTAL									
SOUNDNESS TEST OF COARSE AGGREGATE					SOLUTION CONDITION: <input checked="" type="checkbox"/> NEW <input type="checkbox"/> USED				
					NO. OF CYCLES 5				
2 1/2 IN. TO 1 1/2 IN.	66.7	5026.4	.598	.4					
1 1/2 IN. TO 3/4 IN.	20.1	1512.1	2.01	.4					
3/4 IN. TO 3/8 IN.	13.2	998.6	6.06	.8					
3/8 IN. TO NO. 4									
TOTAL	100			1.6					
QUALITATIVE EXAMINATION OF COARSE SIZE PARTICLES EXHIBITING DISTRESS									
SIEVE SIZE	SPLITTING		CRUMBLING		CRACKING		FLAKING		TOTAL NO. PARTICLES BEFORE TEST
	NO.	%	NO.	%	NO.	%	NO.	%	
2 1/2 IN. TO 1 1/2 IN.									
1 1/2 IN. TO 3/4 IN.									
RESISTANCE TO DEGRADATION BY L.A. MACHINE					% LOSS	SPECIFICATION			
SMALL COARSE AGGREGATE - GRADING A				100 REV. →	7				
				500 REV. →					
LARGE COARSE AGGREGATE - GRADING				200 REV. →					
				1000 REV. →					

Comments:

Copies To: (3) CLIENT

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REVIEWED BY

427095WTT
082899



Western Technologies Inc.
The Quality People
Since 1955

505 Washington Place, N.E.
Albuquerque, New Mexico 87113
(505) 823-4488 • fax 821-2963

PHYSICAL PROPERTIES OF AGGREGATES

Client **C & E CONCRETE**
P.O. BOX 2547
MILAN, NM 87021

Date of Report **11/26/01**
Job No. **3241JT014**
Event / Invoice No. **32410555**
Authorized By **CLIENT**
Sampled By **CLIENT**
Submitted By **CLIENT**

Lab No. **01-2**
Date **11/15/01**
Date **11/15/01**
Date **11/15/01**

Project **EROSION PROTECTION MATERIAL TESTING**
Contractor **C & E CONCRETE**
Type / Use of Aggregate **TINAJA PIT**
Sample Source / Location **TINAJA PIT**
Special Instructions:

Location **ALBUQUERQUE LABORATORY**
Arch./Engr. **UNKNOWN**
Supplier / Source **C & E CONCRETE**
Source / Location Desig. By **CLIENT**

Date **11/15/01**

TEST RESULTS

SIEVE ANALYSIS <input type="checkbox"/> ASTM C136 <input type="checkbox"/> AASHTO T27			PHYSICAL PROPERTIES			TEST RESULTS	SPECIFICATION
SIEVE SIZE U.S. - MM	ACCUMULATIVE % PASSING	SPECIFICATION					
4 IN. - 100.0			UNIT WEIGHT & VOIDS				
3 - 75.0			FINE AGGREGATE				
1 1/2 - 37.5			UNIT WEIGHT, PCF →				
1 1/8 - 28.1			VOIDS, % →				
1 - 25.0			COARSE AGGREGATE				
3/4 - 19.0			UNIT WEIGHT, PCF →				
1/2 - 12.5			VOIDS, % →				
3/8 - 9.5			SPECIFIC GRAVITY & ABSORPTION				
1/4 - 6.3			FINE AGGREGATE				
NO. 4 - 4.75			<input type="checkbox"/> ASTM C128 <input type="checkbox"/> AASHTO T84				
8 - 2.36			AGGREGATE DRIED				
10 - 2.00			<input type="checkbox"/> YES <input type="checkbox"/> NO				
16 - 1.18			BULK SPECIFIC GRAVITY →				
30 - .800			BULK SPECIFIC GRAVITY (SSD) →				
40 - .425			APPARENT SPECIFIC GRAVITY →				
50 - .300			ABSORPTION, % →				
100 - .150			COARSE AGGREGATE				
			<input checked="" type="checkbox"/> ASTM C127 <input type="checkbox"/> AASHTO T85				
			AGGREGATE DRIED				
			<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO				
			BULK SPECIFIC GRAVITY →			2.669	
			BULK SPECIFIC GRAVITY (SSD) →			2.684	
			APPARENT SPECIFIC GRAVITY →			2.711	
			ABSORPTION, % →			0.58	
			SAND EQUIVALENT VALUE <input type="checkbox"/> ASTM D2419 <input type="checkbox"/> AASHTO T176				
			RESISTANCE TO DEGRADATION				
			SMALL COARSE AGGREGATE				
			<input checked="" type="checkbox"/> ASTM C131 <input type="checkbox"/> AASHTO T96 GRADING A				
			100 REV., % LOSS →			7	
			500 REV., % LOSS →				
			LARGE COARSE AGGREGATE				
			<input type="checkbox"/> ASTM C535 GRADING				
			200 REV., % LOSS →				
			1000 REV., % LOSS →				
			FINENESS MODULUS, ASTM C125 →				
			LIQUID & PLASTIC PROPERTIES				
			<input type="checkbox"/> ASTM D4318 <input type="checkbox"/> AASHTO T89 & T90				
			METHOD <input type="checkbox"/> A <input type="checkbox"/> B RESULT SPECIFICATION				
			LIQUID LIMIT				
			PLASTIC LIMIT				
			PLASTICITY INDEX				
			SAMPLE AIR DRIED <input type="checkbox"/> YES <input type="checkbox"/> NO				
			CLEANNESS VALUE CA227 →				
			DURABILITY INDEX <input type="checkbox"/> ASTM D3744 <input type="checkbox"/> AASHTO T210				
			PROCEDURE: A <input type="checkbox"/> COARSE B <input type="checkbox"/> FINE C <input type="checkbox"/> COARSE & FINE			D _c →	
						D _f →	
			ORGANIC IMPURITIES <input type="checkbox"/> ASTM C40 <input type="checkbox"/> AASHTO T21				
			ORGANIC PLATE NO. →				
			UNCOMPACTED VOID CONTENT <input type="checkbox"/> AZ 247 <input type="checkbox"/> ASTM C1252 METHOD				
			CARBONATES IN AGGREGATE				
			<input type="checkbox"/> AZ 238 <input type="checkbox"/> ASTM 3042 % →				
			FLAT & ELONGATED PARTICLES <input type="checkbox"/> ASTM D4791 <input type="checkbox"/>				
			DIMENSIONAL RATIO USED <input type="checkbox"/> 1:2 <input type="checkbox"/> 1:3 <input type="checkbox"/> 1:5 <input type="checkbox"/>			BY WEIGHT, % →	
						BY NUMBER, % →	

Comments:

Copies To:

426095WTI
092899

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REVIEWED BY

Lab I.D - 01-2

Rock Quality Scoring Tabulation

Test	Weighting Factor	Test Value	Score	Computed Score
✓ Specific Gravity	12	2.669	8.9	106.8
✓ Absorption, %	13	0.58	7.8	101.4
✓ Sodium Sulfate, %	4	1.6	9.8	39.2
✓ L/A Abrasion(100 rev), %	1	7	6.9	6.9
Schmidt Hammer	11	43.2	5.5	60.5
			<u>Total Score</u>	314.8

Limestone - Tinaja Pit



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Albuquerque, New Mexico 87113
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**LABORATORY REPORT
ON AGGREGATES**

Client C & E CONCRETE
POST OFFICE BOX 2647
MILAN, NEW MEXICO 87021

Date of Report 01/04/02
Job No. 3241JTD14
Event / Invoice No. 32410585
Authorized By W. MEECH
Sampled By CLIENT
Submitted By CLIENT

Lab No. 110485
Date 12/04/01
Date 12/04/01
Date 12/04/01

Project EROSION PROTECTION MATERIAL TESTING
Contractor C & E CONCRETE
Type / Use of Aggregate COARSE AGGREGATE
Sample Source / Location TINAJA PIT

Location ALBUQUERQUE LABORATORY
Arch. / Engr. UNKNOWN
Supplier / Source C & E CONCRETE
Source / Location Orig. By W. MEECH
Date 12/04/01

Reference: SOUNDNESS: ASTM C69 AASHTO T104 SODIUM SULFATE MAGNESIUM SULFATE
ABRASION RESISTANCE: ASTM C131 AASHTO T96 ASTM C535

Special Instructions:

TEST RESULTS

SIEVE SIZE	GRADING OF ORIGINAL SAMPLE %	WEIGHT OF TEST FRACTIONS BEFORE TEST GRAMS	PASSING DESIGNATED SIEVE AFTER TEST %	WEIGHTED PERCENTAGE LOSS	ALLOWABLE PERCENTAGE LOSS						
					SODIUM	MAGNESIUM					
SOUNDNESS TEST OF FINE AGGREGATE					NO. OF CYCLES						
SOLUTION CONDITION: <input type="checkbox"/> NEW <input type="checkbox"/> USED											
MINUS NO. 100											
NO. 50 TO NO. 100											
NO. 30 TO NO. 50											
NO. 16 TO NO. 30											
NO. 8 TO NO. 16											
NO. 4 TO NO. 8											
3/8 IN. TO NO. 4											
TOTAL											
SOUNDNESS TEST OF COARSE AGGREGATE					NO. OF CYCLES 5						
SOLUTION CONDITION: <input checked="" type="checkbox"/> NEW <input type="checkbox"/> USED											
2 1/2 IN. TO 1 1/2 IN.											
1 1/2 IN. TO 3/4 IN.	27.7	488.6	1.1	0.3							
3/4 IN. TO 3/8 IN.	55.6	1000.1	0.5	0.3							
3/8 IN. TO NO. 4	16.7	299.6	3.0	0.5							
TOTAL	100			1.1							
QUALITATIVE EXAMINATION OF COARSE SIZE PARTICLES EXHIBITING DISTRESS											
SIEVE SIZE	SPLITTING		CRUMBLING				CRACKING		FLAKING		TOTAL NO. PARTICLES BEFORE TEST
	NO.	%	NO.	%			NO.	%	NO.	%	
2 1/2 IN. TO 1 1/2 IN.											
1 1/2 IN. TO 3/4 IN.											
RESISTANCE TO DEGRADATION BY L.A. MACHINE					% LOSS	SPECIFICATION					
SMALL COARSE AGGREGATE - GRADING B					100 REV. →	7					
					500 REV. →						
LARGE COARSE AGGREGATE - GRADING					200 REV. →						
					1000 REV. →						

Comments:

Copies To: (3) CLIENT

11/25/01

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Albuquerque, New Mexico 87113
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PHYSICAL PROPERTIES OF AGGREGATES

Client **C & E CONCRETE**
POST OFFICE BOX 2547
MILAN, NEW MEXICO 87021

Date of Report **01/04/02**
Job No. **3241JT014**
Event / Invoice No. **32410566**
Authorized By **W.MEECH**
Sampled By **CLIENT**
Submitted By **W.MEECH**

Lab No. **1L0465**
Date **12/04/01**
Date **12/04/01**
Date **12/04/01**

Project **EROSION PROTECTION MATERIAL TESTING**
Contractor **C & E CONCRETE**
Type / Use of Aggregate **COARSE AGGREGATE**
Sample Source / Location **TINAJA PIT**
Special Instructions:

Location **ALBUQUERQUE LABORATORY**
Arch. / Engr. **UNKNOWN**
Supplier / Source **C & E CONCRETE**
Source / Location Desig. By **W.MEECH**

Date **12/04/01**

TEST RESULTS

SIEVE ANALYSIS <input type="checkbox"/> ASTM C128 <input type="checkbox"/> AASHTO T27		PHYSICAL PROPERTIES		TEST RESULTS	SPECIFICATION
SEIVE SIZE U.S. - MM	ACCUMULATIVE % PASSING	SPECIFICATION			
4 IN. - 100.0				UNIT WEIGHT & VOIDS	
3 - 75.0				<input type="checkbox"/> ASTM C29 <input type="checkbox"/> AASHTO T19	FINE AGGREGATE UNIT WEIGHT, PCF →
1 1/2 - 37.5				<input type="checkbox"/> RODDING <input type="checkbox"/> JIGGING <input type="checkbox"/> LOOSE	VOIDS, % →
1 1/8 - 28.1					COARSE AGGREGATE UNIT WEIGHT, PCF →
1 - 25.0					VOIDS, % →
3/4 - 19.0					
1/2 - 12.5					
3/8 - 9.5					
1/4 - 6.3					
NO. 4 - 4.75					
8 - 2.35					
10 - 2.00					
15 - 1.18					
20 - .850					
40 - .425					
60 - .300					
100 - .150					
FINER THAN NO. 200					
<input type="checkbox"/> ASTM C117					
<input type="checkbox"/> AASHTO T11					
FINENESS MODULUS, ASTM C128 →					
LIQUID & PLASTIC PROPERTIES					
<input type="checkbox"/> ASTM D4318 <input type="checkbox"/> AASHTO T88 & T90					
METHOD <input type="checkbox"/> A <input type="checkbox"/> B RESULT SPECIFICATION					
LIQUID LIMIT					
PLASTIC LIMIT					
PLASTICITY INDEX					
SAMPLE AIR DRIED <input type="checkbox"/> YES <input type="checkbox"/> NO					
CLEANNESS VALUE CA227 →					
ORGANIC IMPURITIES <input type="checkbox"/> ASTM C40 <input type="checkbox"/> AASHTO T21					
ORGANIC PLATE NO. →					
CARBORATES IN AGGREGATE					
<input type="checkbox"/> AZ 238 <input type="checkbox"/> ASTM 2062 % →					
		SAND EQUIVALENT VALUE <input type="checkbox"/> ASTM D2418 <input type="checkbox"/> AASHTO T175		% →	
		RESISTANCE TO DEGRADATION			
		SMALL COARSE AGGREGATE		100 REV., % LOSS →	
		<input type="checkbox"/> ASTM C131 <input type="checkbox"/> AASHTO T82 GRADING		500 REV., % LOSS →	
		LARGE COARSE AGGREGATE		200 REV., % LOSS →	
		<input type="checkbox"/> ASTM C538 GRADING		1000 REV., % LOSS →	
		LIGHTWEIGHT PORES			
		<input type="checkbox"/> ASTM C123 <input type="checkbox"/> AASHTO T118		FINE AGGREGATE, % →	
				COARSE AGGREGATE, % →	
		CLAY LUMPS & FRIBLE PARTICLES			
		<input type="checkbox"/> ASTM C142 <input type="checkbox"/> AASHTO T112		FINE AGGREGATE, % →	
				COARSE AGGREGATE, % →	
		FRACTURED FACES COARSE AGGREGATE BY WEIGHT			
		<input type="checkbox"/> AZ 212 <input type="checkbox"/> PLM T807 <input type="checkbox"/> FAA		ONE OR MORE FACES, % →	
				TWO OR MORE FACES, % →	
		DURABILITY INDEX <input type="checkbox"/> ASTM D3744 <input type="checkbox"/> AASHTO T210		D ₂ →	
		PROCEDURE: A <input type="checkbox"/> COARSE B <input type="checkbox"/> FINE C <input type="checkbox"/> COARSE & FINE		D ₁ →	
		UNCOMPACTED VOID CONTENT <input type="checkbox"/> AZ 247 <input type="checkbox"/> ASTM C1252 METHOD		% →	
		FLAT & ELONGATED PARTICLES <input type="checkbox"/> ASTM D4781		BY WEIGHT, % →	
		DIMENSIONAL RATIO USED <input type="checkbox"/> 1:2 <input type="checkbox"/> 1:3 <input type="checkbox"/> 1:5		BY NUMBER, % →	

Comments:

Copies To: 13) CLIENT

DOHWIT
106

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W. Meech



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Albuquerque, New Mexico 87113
(505) 823-4488 • fax 821-2963

**FIELD REPORT ON
PORTLAND CEMENT CONCRETE**

Client: **C & E CONCRETE**
POST OFFICE BOX 2647
MLAN, NEW MEXICO 87021

Date of Report: **01/04/02**
Job No. **3241JT014**
Event / Invoice No. **32410565**
Authorized By **W.MEECH**
Test Calc. By **M.ROYBAL**

Lab No. **120465**
Date **12/04/01**
Date **12/04/01**

Project **EROSION PROTECTION MATERIAL TESTING**
Contractor **C & E CONCRETE**
Type / Use of Concrete **LARGE COARSE AGGREGATE**
Sample Source / Location **TINAJA PIT**
Reference: **REBOUND NUMBER OF HARDENED CONCRETE** **ASTM C805**
Special Instructions:

Location **ALBUQUERQUE LABORATORY**
Arch. / Engr. **UNKNOWN**
Supplier / Source **C & E CONCRETE**
Source / Location Desig. By **W.MEECH**

Date **12/04/01**

MATERIAL DATA

DESIGN STRENGTH OF CONCRETE, PSI	AGE	HAMMER TYPE	SERIAL NO.	COMPOSITION OF CONCRETE:		
CURING / UNUSUAL CONDITIONS RELATED TO TEST AREA:						
OBSERVATIONS & TEST RESULTS						
TEST NO.	LOCATION OF TEST AREA IN STRUCTURE	SURFACE DESCRIPTION		AVERAGE REBOUND READING	INDICATED COMPRESSIVE STRENGTH, PSI	
		FORM TYPE	FINISH			
1				49.8		
2				48.9		
	AVERAGE:			49.3		

CAUTION: THIS TEST METHOD IS NOT INTENDED AS AN ALTERNATIVE FOR THE STRENGTH DETERMINATION OF CONCRETE. REBOUND NUMBERS SHOULD BE USED ONLY AS A GUIDE IN THE DEVELOPMENT OF CONCRETE COMPRESSIVE STRENGTH ESTIMATES AND MUST NOT BE INTERPRETED TO BE ABSOLUTE VALUES. OPTIMALLY REBOUND NUMBERS ARE CORRELATED BY CORE TEST DATA. IN THE ABSENCE OF SUCH DATA, THE INDICATED STRENGTHS PROVIDED SHOULD BE USED JUDICIOUSLY AS THEY ARE BASED ON PREVIOUS RESEARCH AND CORRELATIONS WHICH MIGHT NOT BE REPRESENTATIVE OF THE CONCRETE BEING EXAMINED

Comments:

Copies To:

(3) CLIENT

RECEIVED

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LAB ID - 120465

Rock Quality Scoring Tabulation

Test	Weighting Factor	Test Value	Score	Computed Score
Specific Gravity	12	2.664	6.3	98.6
Absorption, %	13	0.54	7.7	100.1
Sodium Sulfate, %	4	1.1	9.9	39.6
L/A Abrasion(100 rev), %	1	7	6.8	6.8
Schmidt Hammer	11	49.3	6.3	69.3
Total Score				318.4

Limestone - Thaja PH

76.9

Use S3 SH Test

319.1

 410
 77.8%

PREQUALIFYING TEST FOR TINAJA PIT ROCK

January 07, 2001	76.9%	retest 77.8%
November 26, 2001	76.8%	
December 14, 2001	76.4%	

Design based upon 4% oversize

APPENDIX 2

**Tinaja Pit Rock Petrographic Results
2001**



AMERICAN
PETROGRAPHIC
SERVICES, INC.

December 26, 2001

Mr. Matthew Roybal
Western Technologies, Inc.
8305 Washington Place, NE
Albuquerque, NM 87113-1670

Re: Western Technologies Job No. 3241JT014
APS Job No. 10-01883

Mr. Roybal :

This report presents the results of our review of a core of carbonate rock. The sample were submitted to our laboratory by yourself on November 21, 2001. The scope of our work was limited to performing petrographic testing on the sample to determine its composition.

Conclusions

Based on the work performed and previous experience, our observations and opinions are as follows:

1. The 74mm diameter by 118mm long core is of a massive, pink, fossiliferous, calcitic dolomite. The pink coloration is produced by corrosion of pyrite grains, finely disseminated in the rock
2. The carbonate is well indurated. However, dolomitization has produced some fine porosity. Also, a single planar, pressure solution structure (stylolites) follows the length of the core. A few other discontinuous stylolites were present.

Procedures

Our work was performed on December 12, 2001 and subsequent dates. The analysis was completed through the use of hand sample and thin section work. Observations were made in thin section under an Olympus polarizing-light microscope with magnification up to 1000x and in hand sample under an Olympus stereozoom microscope with magnification up to 130x. The analysis included reviewing the thin sections of the material under plane and cross polarized light conditions. Testing was performed in accordance with APS Standard Operating Procedure 00 LAB 004, "Petrographic Examination of Aggregates for Concrete, ASTM:C295".

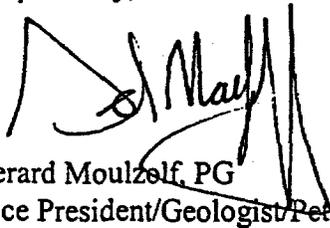
Mr. Roybal
December 26, 2001
Page 2

Remarks

The test sample will be retained for at least 30 days from the date of our report. If no further instructions are received by that time, the samples may be discarded. The petrographic services for this project have been conducted in a manner consistent with that level of care and skill exercised by members of the profession currently practicing in this area under similar budget and time constraints. No warranty, express or implied, is made.

It has been a pleasure to serve you on this project. Should you have any questions on this report, please do not hesitate to call.

Respectfully,

A handwritten signature in black ink, appearing to read "G. Moulzolf", written over a horizontal line.

Gerard Moulzolf, PG
Vice President/Geologist/Petrographer
MN License #30023

PETROGRAPHIC EXAMINATION OF AGGREGATES FOR CONCRETE, ASTM:C295

APS JOB NO: 10-01883 DATE: December 26, 2001
 SAMPLE NO: 1 PETROGRAPHER: Gerard Moulzolf

HAND SPECIMEN DESCRIPTION:

A massive, pink, fossiliferous, calcitic dolomite. Euhedral to subhedral dolomite grains, generally $<25\mu\text{m}$ in size, mostly replace a coarser, anhedral, calcite matrix. The dolomitization has produced small pore spaces. Calcite fossil fragments, made up of mostly brachiopods with some rugose corals, are mostly retained. Very fine sand-sized ($<0.125\text{mm}$), detrital quartz grains are scattered throughout. Bedding was not discernable. Concentrations of 0.125mm sized, corroded, isometric, pyrite grains occur near or within coarser calcite mosaics and drusy, sparry calcite vug fillings. Many others are finely disseminated in the matrix, giving the rock its pink coloration. "Books" of white clay infill several vugs or pores scattered in the sample. The quartz sand grains, corroded pyrites, and clays, i.e. insoluble residue, concentrate within a few discontinuous, and a single continuous, sutured stylolite occurring in the core sample.

MINERALOGY:

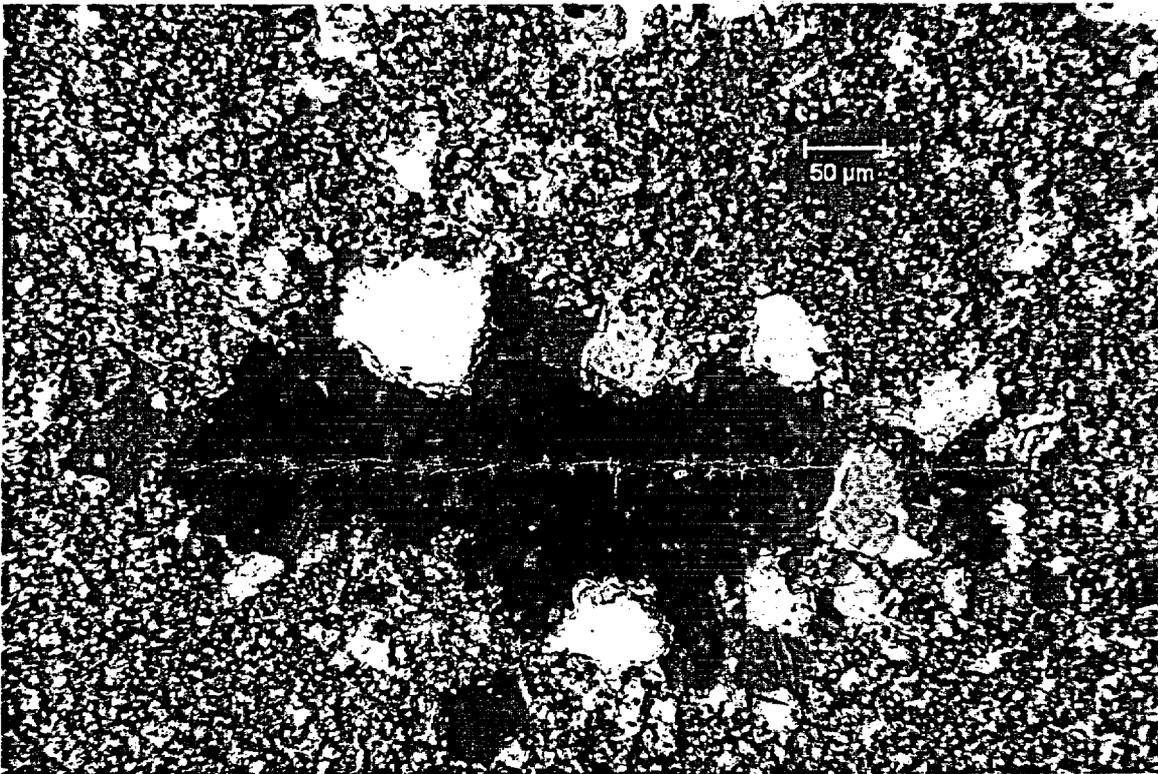
OPTICAL PROPERTIES:

<u>MINERALS</u>	<u>VOL</u>	<u>COLOR</u>	<u>BIREFRINGENCE</u>	<u>RELIEF</u>	<u>HABIT, OTHER</u>
dolomite	55	colorless	high 3 rd to 4 th order	varies	relief changes w/rotation, euhedral to subhedral, generally less than $25\mu\text{m}$
calcite	40	colorless	high 3 rd to 4 th order	varies	relief changes w/ rotation, anhedral
quartz	3	colorless	low 1 st order grays	low	detrital grains, very fine sand-sized
iron oxide	1	rust	-	moderate	corroded, isometric relics of pyrites
clay	<1	colorless	low 1 st order grays	low	white in reflected light, "books", vug and pore fillings

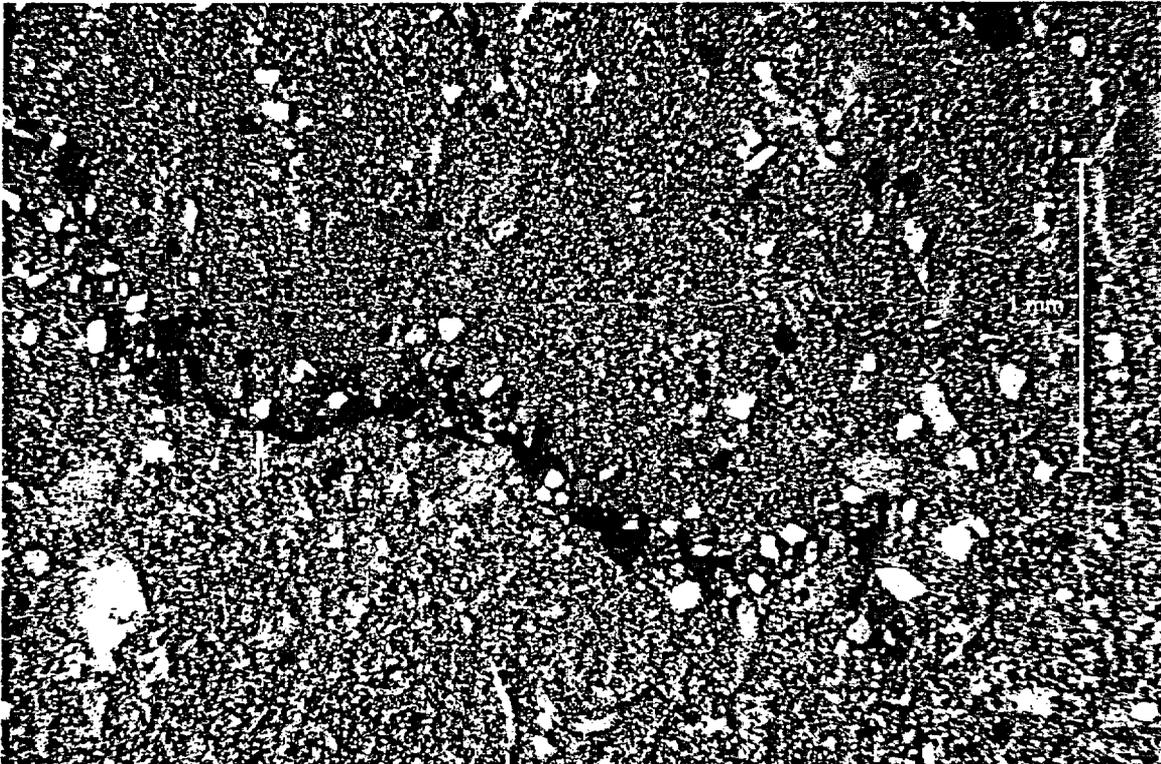
APS#
PROJECT:

10-01883
Western Technologies Job No. 3241JT014

DATE: DECEMBER 26, 2001



SAMPLE ID: 1 DESCRIPTION: Low 1st order grays exhibited by "books" of clay in vug; in thin section under cross polarized light.
MAG: 200x

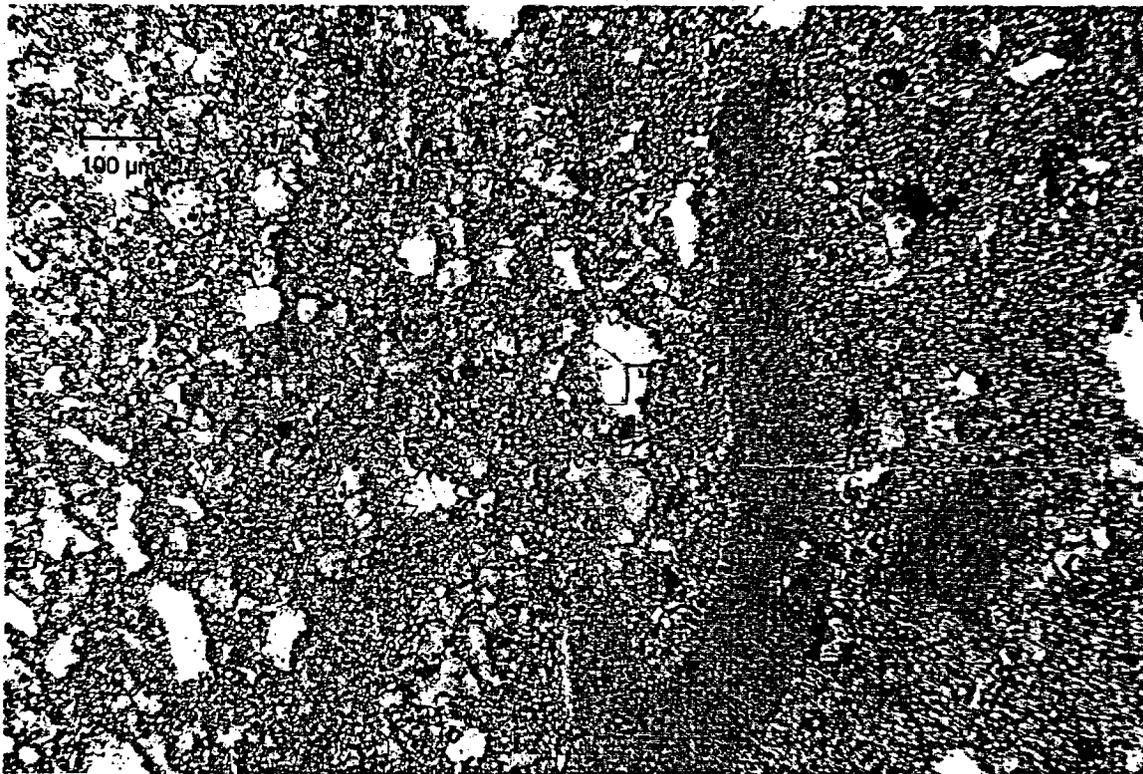


SAMPLE ID: 1 DESCRIPTION: Insoluble residue (quartz grains, corroded pyrites, and clay) concentrates within sutured stylolite, in thin section under cross polarized light.
MAG: 40x

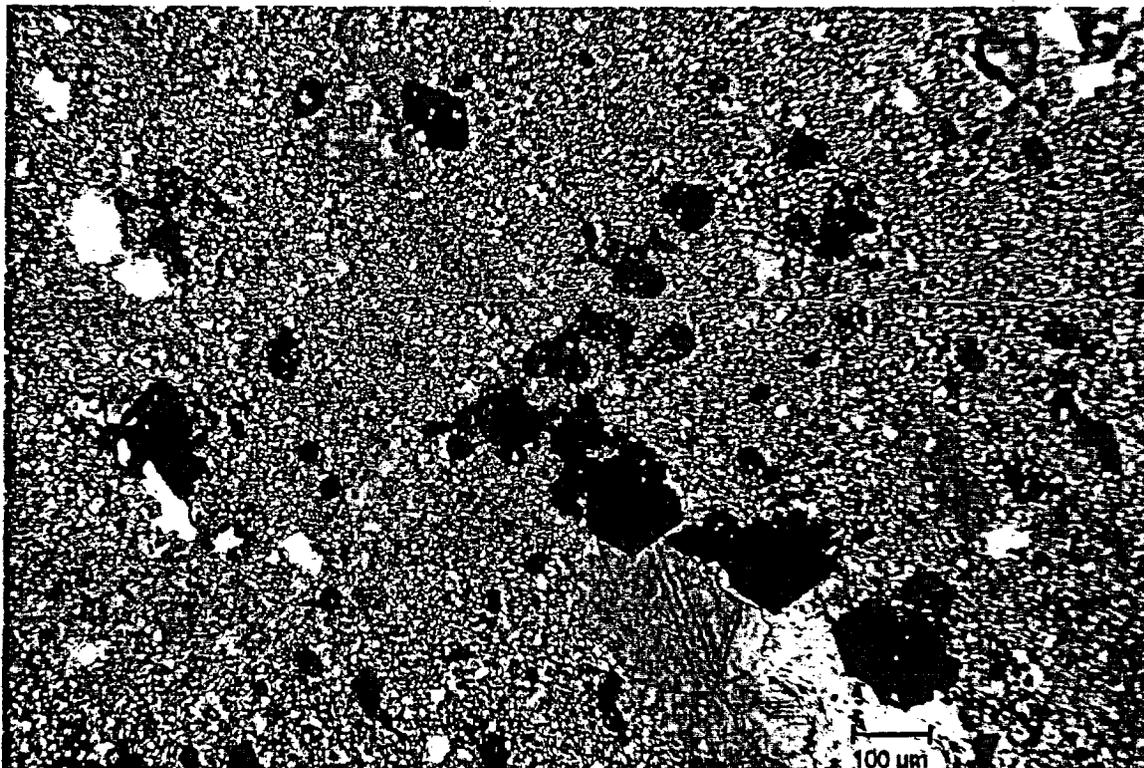
APS#
PROJECT:

10-01883
Western Technologies Job No. 3241JT014

DATE: DECEMBER 26, 2001



SAMPLE ID: 1 DESCRIPTION: Calcite fossil fragments and matrix are stained red; calcitic dolomite in thin section under plane polarized light.
MAG: 100x



SAMPLE ID: 1 DESCRIPTION: Dark, rust colored, corroded pyrite grains, in thin section under plane polarized light.
MAG: 100x

APPENDIX 3

**Tinaja Pit Rock Lab Results
2003**



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The Quality People
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Albuquerque, New Mexico 87113
(505) 823-4488 • fax 821-2963

**LABORATORY REPORT
ON AGGREGATES**

Client **C&E CONCRETE**
PO BOX 2547
MILAN, NEW MEXICO 87021

Date of Report **06-12-03**
Job No. **3243JA112**
Event / Invoice No. **32430194** Lab No. **3L127**
Authorized By **WALTER MEECH** Date **05-23-03**
Sampled By **WALTER MEECH** Date **05-23-03**
Submitted By **WALTER MEECH** Date **05-23-03**

Project **RIO ALGOM MINING COMPANY - EROSION PROTECTION**
Contractor **C&E CONCRETE**
Type / Use of Aggregate **EROSION PROTECTION**
Sample Source / Location **TINAJA PIT**

Location **ALBUQUERQUE LABORATORY**
Arch. / Engr. **UNKNOWN**
Supplier / Source **TINAJA PIT**
Source / Location Desig. By **WALTER MEECH** Date **05-23-03**

Reference: SOUNDNESS: ASTM C88 AASHTO T104 SODIUM SULFATE MAGNESIUM SULFATE
ABRASION RESISTANCE: ASTM C131 AASHTO T96 ASTM C535

Special Instructions:

TEST RESULTS

SIEVE SIZE	GRADING OF ORIGINAL SAMPLE %	WEIGHT OF TEST FRACTIONS BEFORE TEST GRAMS	PASSING DESIGNATED SIEVE AFTER TEST %	WEIGHTED PERCENTAGE LOSS	ALLOWABLE PERCENTAGE LOSS					
					SODIUM	MAGNESIUM				
SOUNDNESS TEST OF FINE AGGREGATE					SOLUTION CONDITION: <input type="checkbox"/> NEW <input type="checkbox"/> USED					
					NO. OF CYCLES					
MINUS NO. 100										
NO. 50 TO NO. 100										
NO. 30 TO NO. 50										
NO. 16 TO NO. 30										
NO. 8 TO NO. 16										
NO. 4 TO NO. 8										
3/8 IN. TO NO. 4										
TOTAL										
SOUNDNESS TEST OF COARSE AGGREGATE					SOLUTION CONDITION: <input checked="" type="checkbox"/> NEW <input type="checkbox"/> USED					
					NO. OF CYCLES 5					
2 1/2 IN. TO 1 1/2 IN.	45	1917.6	0.1	0.1						
1 1/2 IN. TO 3/4 IN.	25	1501.2	0.2	0.1						
3/4 IN. TO 3/8 IN.	15	1001.0	1.0	0.2						
3/8 IN. TO NO. 4	15	300.1	5.7	0.9						
TOTAL				1.3						
QUALITATIVE EXAMINATION OF COARSE SIZE PARTICLES EXHIBITING DISTRESS										
SIEVE SIZE	SPLITTING		CRUMBLING		CRACKING		FLAKING		TOTAL NO. PARTICLES BEFORE TEST	
	NO.	%	NO.	%	NO.	%	NO.	%		
2 1/2 IN. TO 1 1/2 IN.										
1 1/2 IN. TO 3/4 IN.										
RESISTANCE TO DEGRADATION BY L.A. MACHINE					% LOSS	SPECIFICATION				
SMALL COARSE AGGREGATE - GRADING A					100 REV. →	7				
					500 REV. →					
LARGE COARSE AGGREGATE - GRADING					200 REV. →					
					1000 REV. →					

Comments:

Copies To: (3) CLIENT

THE SERVICES REFERRED TO HEREIN WERE PERFORMED IN ACCORDANCE WITH THE STANDARD OF CARE PRACTICED LOCALLY FOR THE REFERENCED METHOD(S) AND RELATE ONLY TO THE CONDITION(S) OR SAMPLE(S) TESTED AS STATED HEREIN. WESTERN TECHNOLOGIES INC. MAKES NO OTHER WARRANTY OR REPRESENTATION, EXPRESSED OR IMPLIED, AND HAS NOT CONFIRMED INFORMATION INCLUDING SOURCE OF MATERIALS SUBMITTED BY OTHERS.

REVIEWED BY _____

427096WTI
092899



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PHYSICAL PROPERTIES OF AGGREGATES

Client **C&E CONCRETE**
PO BOX 2547
MILAN, NEW MEXICO 87021

Date of Report **06-12-03**
Job No. **3243JA112**
Event / Invoice No. **32430194** Lab No. **3L127**
Authorized By **WALTER MEECH** Date **05-23-03**
Sampled By **WALTER MEECH** Date **05-23-03**
Submitted By **WALTER MEECH** Date **05-23-03**

Project **RIO ALGOM MINING COMPANY - EROSION PROTECTION**
Contractor **C&E CONCRETE**
Type / Use of Aggregate **EROSION PROTECTION**
Sample Source / Location **TINAJA PIT**
Special Instructions:

Location **ALBUQUERQUE LABORATORY**
Arch. / Engr. **UNKNOWN**
Supplier / Source **TINAJA PIT**
Source / Location Desig. By **WALTER MEECH** Date **05-23-03**

TEST RESULTS

SIEVE ANALYSIS <input type="checkbox"/> ASTM C136 <input type="checkbox"/> AASHTO T27			PHYSICAL PROPERTIES		TEST RESULTS	SPECIFICATION
SIEVE SIZE U.S. - MM	ACCUMULATIVE % PASSING	SPECIFICATION				
4 IN. - 100.0			UNIT WEIGHT & VOIDS			
3 - 75.0			<input type="checkbox"/> ASTM C29 <input type="checkbox"/> AASHTO T19	FINE AGGREGATE	UNIT WEIGHT, PCF →	
2 - 50.0			<input type="checkbox"/> RODDING <input type="checkbox"/> JIGGING <input type="checkbox"/> LOOSE		VOIDS, % →	
1 1/2 - 37.5				COARSE AGGREGATE	UNIT WEIGHT, PCF →	
1 1/4 - 31.5					VOIDS, % →	
1 - 25.0			SPECIFIC GRAVITY & ABSORPTION	FINE AGGREGATE	BULK SPECIFIC GRAVITY →	
3/4 - 19.0				<input type="checkbox"/> ASTM C128 <input type="checkbox"/> AASHTO T84	BULK SPECIFIC GRAVITY (SSD) →	
1/2 - 12.5				AGGREGATE DRIED	APPARENT SPECIFIC GRAVITY →	
3/8 - 9.5				<input type="checkbox"/> YES <input type="checkbox"/> NO	ABSORPTION, % →	
1/4 - 6.3				COARSE AGGREGATE	BULK SPECIFIC GRAVITY →	
NO. 4 - 4.75				<input checked="" type="checkbox"/> ASTM C127 <input type="checkbox"/> AASHTO T85	BULK SPECIFIC GRAVITY (SSD) →	2.621
8 - 2.36				AGGREGATE DRIED	APPARENT SPECIFIC GRAVITY →	2.641
10 - 2.00				<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	ABSORPTION, % →	0.48
16 - 1.18			SAND EQUIVALENT VALUE <input type="checkbox"/> ASTM D2419 <input type="checkbox"/> AASHTO T176		% →	
30 - .600			RESISTANCE TO DEGRADATION	SMALL COARSE AGGREGATE	100 REV., % LOSS →	
40 - .425				<input type="checkbox"/> ASTM C131 <input type="checkbox"/> AASHTO T96	GRADING	500 REV., % LOSS →
50 - .300				LARGE COARSE AGGREGATE	200 REV., % LOSS →	
100 - .150				<input type="checkbox"/> ASTM C535	GRADING	1000 REV., % LOSS →
FINER THAN NO. 200			LIGHTWEIGHT PIECES		FINE AGGREGATE, % →	
<input type="checkbox"/> ASTM C117			<input type="checkbox"/> ASTM C123 <input type="checkbox"/> AASHTO T113		COARSE AGGREGATE, % →	
<input type="checkbox"/> AASHTO T11			CLAY LUMPS & FRIABLE PARTICLES		FINE AGGREGATE, % →	
FINENESS MODULUS, ASTM C125 →			<input type="checkbox"/> ASTM C142 <input type="checkbox"/> AASHTO T112		COARSE AGGREGATE, % →	
LIQUID & PLASTIC PROPERTIES			FRACTURED FACES COARSE AGGREGATE BY WEIGHT		ONE OR MORE FACES, % →	
<input type="checkbox"/> ASTM D4318 <input type="checkbox"/> AASHTO T89 & T90			<input type="checkbox"/> AZ 212 <input type="checkbox"/> FLH T507 <input type="checkbox"/> FAA		TWO OR MORE FACES, % →	
METHOD <input type="checkbox"/> A <input type="checkbox"/> B	RESULT	SPECIFICATION	DURABILITY INDEX <input type="checkbox"/> ASTM D9744 <input type="checkbox"/> AASHTO T210		D _c →	
LIQUID LIMIT				PROCEDURE: A <input type="checkbox"/> COARSE B <input type="checkbox"/> FINE C <input type="checkbox"/> COARSE & FINE	D _f →	
PLASTIC LIMIT			UNCOMPACTED VOID CONTENT <input type="checkbox"/> AZ 247 <input type="checkbox"/> ASTM C1252		METHOD	% →
PLASTICITY INDEX			FLAT & ELONGATED PARTICLES <input type="checkbox"/> ASTM D4791		BY WEIGHT, % →	
SAMPLE AIR DRIED <input type="checkbox"/> YES <input type="checkbox"/> NO			DIMENSIONAL RATIO USED <input type="checkbox"/> 1:2 <input type="checkbox"/> 1:3 <input type="checkbox"/> 1:5		BY NUMBER, % →	
CLEANNES VALUE CA227 →			CARBONATES IN AGGREGATE			
ORGANIC IMPURITIES <input type="checkbox"/> ASTM C40 <input type="checkbox"/> AASHTO T21			<input type="checkbox"/> AZ 238 <input type="checkbox"/> ASTM D3042		% →	
ORGANIC PLATE NO. →						

Comments: ASTM C 805 - SCHMIDT HAMMER AVERAGE = 59.3

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Rock Quality Scoring Tabulation

Test	Weighting Factor	Test Value	Score	Computed Score
Specific Gravity	12	2.621	7.8	93.6
Absorption, %	13	0.48	8.1	105.3
Sodium Sulfate, %	4	1.3	9.9	39.6
L/A Abrasion(100 rev), %	1	7	6.8	6.8
Schmidt Hammer	11	59.3	7.9	86.9
			<u>Total Score</u>	332.2

Limestone - Tinaja Pit



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Albuquerque, New Mexico 87113
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*Orig NM
C Paul G*

PHYSICAL PROPERTIES OF AGGREGATES

Client **C&E CONCRETE**
PO BOX 2547
MILAN, NEW MEXICO 87021

Date of Report **07/29/03**
Job No. **3243JA014**
Event / Invoice No. **32430270**
Authorized By **WALTER MEECH**
Sampled By **WALTER MEECH**
Submitted By **WALTER MEECH**

Lab No. **3L276-A**
Date **07/07/03**
Date **07/07/03**
Date **07/07/03**

Project **RIO ALGOM MINING COMPANY**
Contractor **C&E CONCRETE**
Type / Use of Aggregate **EROSION PROTECTION**
Sample Source / Location **TINAJA PIT**
Special Instructions: *12" Pre pwr*

Location **ALBUQUERQUE LABORATORY**
Arch./Engr. **UNKNOWN**
Supplier / Source **TINAJA PIT**
Source / Location Desig. By **WALTER MEECH** Date **07/07/03**

TEST RESULTS

SIEVE ANALYSIS <input type="checkbox"/> ASTM C136 <input type="checkbox"/> AASHTO T27			PHYSICAL PROPERTIES			TEST RESULTS	SPECIFICATION
SIEVE SIZE U.S. - MM	ACCUMULATIVE % PASSING	SPECIFICATION					
4 IN. - 100.0			UNIT WEIGHT & VOIDS				
3 - 75.0			<input type="checkbox"/> ASTM C29 <input type="checkbox"/> AASHTO T19 <input type="checkbox"/> RODDING <input type="checkbox"/> JIGGING <input type="checkbox"/> LOOSE			FINE AGGREGATE	UNIT WEIGHT, PCF →
2 - 50.0							VOIDS, % →
1 1/2 - 37.5						COARSE AGGREGATE	UNIT WEIGHT, PCF →
1 1/4 - 31.5							VOIDS, % →
1 - 25.0						SPECIFIC GRAVITY & ABSORPTION	
3/4 - 19.0			FINE AGGREGATE <input type="checkbox"/> ASTM C128 <input type="checkbox"/> AASHTO T84 AGGREGATE DRIED <input type="checkbox"/> YES <input type="checkbox"/> NO				
1/2 - 12.5			COARSE AGGREGATE <input checked="" type="checkbox"/> ASTM C127 <input type="checkbox"/> AASHTO T85 AGGREGATE DRIED <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO				
3/8 - 9.5							
1/4 - 6.3							
NO. 4 - 4.75							
8 - 2.36							
10 - 2.00							
16 - 1.18							
30 - .800							
40 - .425							
50 - .300							
100 - .150							
FINER THAN NO. 200			RESISTANCE TO DEGRADATION				
<input type="checkbox"/> ASTM C117			SMALL COARSE AGGREGATE				
<input type="checkbox"/> AASHTO T11			<input type="checkbox"/> ASTM C131 <input type="checkbox"/> AASHTO T96			100 REV., % LOSS →	
			LARGE COARSE AGGREGATE			500 REV., % LOSS →	
			<input type="checkbox"/> ASTM C535 GRADING			200 REV., % LOSS →	
						1000 REV., % LOSS →	
FINENESS MODULUS, ASTM C125 →			LIGHTWEIGHT PIECES				
			<input type="checkbox"/> ASTM C123 <input type="checkbox"/> AASHTO T113			FINE AGGREGATE, % →	
						COARSE AGGREGATE, % →	
LIQUID & PLASTIC PROPERTIES			CLAY LUMPS & FRIABLE PARTICLES				
<input type="checkbox"/> ASTM D4318 <input type="checkbox"/> AASHTO T89 & T90			<input type="checkbox"/> ASTM C142 <input type="checkbox"/> AASHTO T112			FINE AGGREGATE, % →	
METHOD <input type="checkbox"/> A <input type="checkbox"/> B RESULT SPECIFICATION						COARSE AGGREGATE, % →	
LIQUID LIMIT			FRACTURED FACES COARSE AGGREGATE BY WEIGHT			ONE OR MORE FACES, % →	
PLASTIC LIMIT			<input type="checkbox"/> AZ 212 <input type="checkbox"/> FLH T507 <input type="checkbox"/> FAA			TWO OR MORE FACES, % →	
PLASTICITY INDEX							
SAMPLE AIR DRIED <input type="checkbox"/> YES <input type="checkbox"/> NO							
CLEANNESS VALUE CA227 →			DURABILITY INDEX <input type="checkbox"/> ASTM D3744 <input type="checkbox"/> AASHTO T210			D _c →	
			PROCEDURE: A <input type="checkbox"/> COARSE B <input type="checkbox"/> FINE C <input type="checkbox"/> COARSE & FINE			D _f →	
ORGANIC IMPURITIES <input type="checkbox"/> ASTM C40 <input type="checkbox"/> AASHTO T21			UNCOMPACTED VOID CONTENT <input type="checkbox"/> AZ 247 <input type="checkbox"/> ASTM C1252 METHOD			% →	
ORGANIC PLATE NO. →							
CARBONATES IN AGGREGATE			FLAT & ELONGATED PARTICLES <input type="checkbox"/> ASTM D4791 <input type="checkbox"/>			BY WEIGHT, % →	
<input type="checkbox"/> AZ 238 <input type="checkbox"/> ASTM D3042 % →			DIMENSIONAL RATIO USED <input type="checkbox"/> 1:2 <input type="checkbox"/> 1:3 <input type="checkbox"/> 1:5 <input type="checkbox"/>			BY NUMBER, % →	

Comments: **ASTM C 805 - SCHMIDT HAMMER AVERAGE - 61.4**

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**LABORATORY REPORT
ON AGGREGATES**

Client **C&E CONCRETE**
PO BOX 2547
MILAN, NEW MEXICO 87021

Date of Report **07/29/03**
Job No. **3243JA014**
Event / Invoice No. **32430270** Lab No. **3L276-A**
Authorized By **WALTER MEECH** Date **07/07/03**
Sampled By **WALTER MEECH** Date **07/07/03**
Submitted By **WALTER MEECH** Date **07/07/03**

Project **RIO ALGOM MINING COMPANY-EROSION PROTECTION**
Contractor **C&E CONCRETE**
Type / Use of Aggregate **EROSION PROTECTION**
Sample Source / Location **TINAJA PIT**

Location **ALBUQUERQUE LABORATORY**
Arch. / Engr. **UNKNOWN**
Supplier / Source **TINAJA PIT**
Source / Location Desig. By **WALTER MEECH** Date **07/07/03**

Reference: **SOUNDNESS:** ASTM C88 AASHTO T104 SODIUM SULFATE MAGNESIUM SULFATE
ABRASION RESISTANCE: ASTM C131 AASHTO T96 ASTM C535

Special Instructions:

TEST RESULTS

SIEVE SIZE	GRADING OF ORIGINAL SAMPLE %	WEIGHT OF TEST FRACTIONS BEFORE TEST GRAMS	PASSING DESIGNATED SIEVE AFTER TEST %	WEIGHTED PERCENTAGE LOSS	ALLOWABLE PERCENTAGE LOSS						
					SODIUM	MAGNESIUM					
SOUNDNESS TEST OF FINE AGGREGATE					NO. OF CYCLES						
SOLUTION CONDITION: <input type="checkbox"/> NEW <input type="checkbox"/> USED											
MINUS NO. 100											
NO. 50 TO NO. 100											
NO. 30 TO NO. 50											
NO. 16 TO NO. 30											
NO. 8 TO NO. 16											
NO. 4 TO NO. 8											
3/8 IN. TO NO. 4											
TOTAL											
SOUNDNESS TEST OF COARSE AGGREGATE					NO. OF CYCLES 5						
SOLUTION CONDITION: <input checked="" type="checkbox"/> NEW <input type="checkbox"/> USED											
2 1/2 IN. TO 1 1/2 IN.											
1 1/2 IN. TO 3/4 IN.	25	501.8	7.0	1.8							
3/4 IN. TO 3/8 IN.	50	1001.4	3.1	1.6							
3/8 IN. TO NO. 4	25	300.3	2.4	.6							
TOTAL	100			4.0							
QUALITATIVE EXAMINATION OF COARSE SIZE PARTICLES EXHIBITING DISTRESS											
SIEVE SIZE	SPLITTING		CRUMBLING				CRACKING		FLAKING		TOTAL NO. PARTICLES BEFORE TEST
	NO.	%	NO.	%			NO.	%	NO.	%	
2 1/2 IN. TO 1 1/2 IN. 1 1/2 IN. TO 3/4 IN.											
RESISTANCE TO DEGRADATION BY L.A. MACHINE					% LOSS	SPECIFICATION					
SMALL COARSE AGGREGATE - GRADING A				100 REV. → 500 REV. →	6.2						
LARGE COARSE AGGREGATE - GRADING				200 REV. → 1000 REV. →							

Comments:

Copies To: (3) CLIENT

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427095WTI
092899

Rock Quality Scoring Tabulation

Test	Weighting Factor	Test Value	Score	Computed Score
Specific Gravity	12	2.693	8.8	105.6
Absorption, %	13	0.17	9.5	123.5
Sodium Sulfate, %	4	4	8.5	34
L/A Abrasion(100 rev), %	1	6.2	7.3	7.3
Schmidt Hammer	11	61.4	8.1	89.1
			<i>Total Score</i>	359.5

Limestone - Tinaja Pit

Sample 3L276-A
Sample on July 7, 2003

87.7



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Albuquerque, New Mexico 87113
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PHYSICAL PROPERTIES OF AGGREGATES

Client **C&E CONCRETE**
PO BOX 2547
MILAN, NEW MEXICO 87021

Date of Report **07/29/03**
Job No. **3243JA014**
Event / Invoice No. **32430270**
Authorized By **WALTER MEECH**
Sampled By **WALTER MEECH**
Submitted By **WALTER MEECH**
Lab No. **3L276-B**
Date **07/07/03**
Date **07/07/03**
Date **07/07/03**

Project **RIO ALGOM MINING COMPANY**
Contractor **C&E CONCRETE**
Type / Use of Aggregate **EROSION PROTECTION**
Sample Source / Location **TINAJA PIT**
Special Instructions: *7.5" start*

Location **ALBUQUERQUE LABORATORY**
Arch. / Engr. **UNKNOWN**
Supplier / Source **TINAJA PIT**
Source / Location Desig. By **WALTER MEECH**
Date **07/07/03**

TEST RESULTS

SIEVE ANALYSIS <input type="checkbox"/> ASTM C136 <input type="checkbox"/> AASHTO T27			PHYSICAL PROPERTIES			TEST RESULTS	SPECIFICATION
SIEVE SIZE U.S. - MM	ACCUMULATIVE % PASSING	SPECIFICATION					
4 IN. -100.0			UNIT WEIGHT & VOIDS				
3 - 75.0			<input type="checkbox"/> ASTM C29 <input type="checkbox"/> AASHTO T19 <input type="checkbox"/> RODDING <input type="checkbox"/> JIGGING <input type="checkbox"/> LOOSE			FINE AGGREGATE	UNIT WEIGHT, PCF →
2 - 50.0						COARSE AGGREGATE	VOIDS, % →
1 1/2 - 37.5							UNIT WEIGHT, PCF →
1 1/4 - 31.5							VOIDS, % →
1 - 25.0			SPECIFIC GRAVITY & ABSORPTION FINE AGGREGATE <input type="checkbox"/> ASTM C128 <input type="checkbox"/> AASHTO T84 AGGREGATE DRIED <input type="checkbox"/> YES <input type="checkbox"/> NO			BULK SPECIFIC GRAVITY →	
3/4 - 19.0						BULK SPECIFIC GRAVITY (SSD) →	
1/2 - 12.5			COARSE AGGREGATE <input checked="" type="checkbox"/> ASTM C127 <input type="checkbox"/> AASHTO T85 AGGREGATE DRIED <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO			APPARENT SPECIFIC GRAVITY →	
3/8 - 9.5						ABSORPTION, % →	
1/4 - 6.3							
NO. 4 - 4.75							
8 - 2.36							
10 - 2.00							
16 - 1.18							
30 - .600							
40 - .425							
50 - .300							
100 - .150							
FINER THAN NO. 200 <input type="checkbox"/> ASTM C117 <input type="checkbox"/> AASHTO T11			RESISTANCE TO DEGRADATION				
			SMALL COARSE AGGREGATE <input type="checkbox"/> ASTM C131 <input type="checkbox"/> AASHTO T98			100 REV., % LOSS →	
			LARGE COARSE AGGREGATE <input type="checkbox"/> ASTM C535			500 REV., % LOSS →	
						200 REV., % LOSS →	
						1000 REV., % LOSS →	
FINENESS MODULUS, ASTM C125 →			SAND EQUIVALENT VALUE <input type="checkbox"/> ASTM D2419 <input type="checkbox"/> AASHTO T176			% →	
LIQUID & PLASTIC PROPERTIES <input type="checkbox"/> ASTM D4318 <input type="checkbox"/> AASHTO T89 & T90 METHOD <input type="checkbox"/> A <input type="checkbox"/> B RESULT SPECIFICATION			LIGHTWEIGHT PIECES <input type="checkbox"/> ASTM C123 <input type="checkbox"/> AASHTO T113			FINE AGGREGATE, % →	
LIQUID LIMIT						COARSE AGGREGATE, % →	
PLASTIC LIMIT			CLAY LUMPS & FRIABLE PARTICLES <input type="checkbox"/> ASTM C142 <input type="checkbox"/> AASHTO T112			FINE AGGREGATE, % →	
PLASTICITY INDEX						COARSE AGGREGATE, % →	
SAMPLE AIR DRIED <input type="checkbox"/> YES <input type="checkbox"/> NO			FRACTURED FACES COARSE AGGREGATE BY WEIGHT <input type="checkbox"/> AZ 212 <input type="checkbox"/> FLH T507 <input type="checkbox"/> FAA			ONE OR MORE FACES, % →	
						TWO OR MORE FACES, % →	
CLEANNESS VALUE CA227 →			DURABILITY INDEX <input type="checkbox"/> ASTM D3744 <input type="checkbox"/> AASHTO T210			D _c →	
			PROCEDURE: A <input type="checkbox"/> COARSE B <input type="checkbox"/> FINE C <input type="checkbox"/> COARSE & FINE			D _f →	
ORGANIC IMPURITIES <input type="checkbox"/> ASTM C40 <input type="checkbox"/> AASHTO T21			UNCOMPACTED VOID CONTENT <input type="checkbox"/> AZ 247 <input type="checkbox"/> ASTM C1252 METHOD			% →	
ORGANIC PLATE NO. →							
CARBONATES IN AGGREGATE <input type="checkbox"/> AZ 238 <input type="checkbox"/> ASTM D3042 % →			FLAT & ELONGATED PARTICLES <input type="checkbox"/> ASTM D4791 <input type="checkbox"/>			BY WEIGHT, % →	
			DIMENSIONAL RATIO USED <input type="checkbox"/> 1:2 <input type="checkbox"/> 1:3 <input type="checkbox"/> 1:5 <input type="checkbox"/>			BY NUMBER, % →	

Comments: ASTM C 805 - SCHMIDT HAMMER AVERAGE - 65.2

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REVIEWED BY



Western Technologies Inc.
The Quality People
Since 1955

8305 Washington Place, N.E.
Albuquerque, New Mexico 87113
(505) 823-4488 • fax 821-2963

**LABORATORY REPORT
ON AGGREGATES**

Client **C&E CONCRETE**
PO BOX 2547
MILAN, NEW MEXICO 87021

Date of Report **07/29/03**
Job No. **3243JA014**
Event / Invoice No. **32430270** Lab No. **3L276-B**
Authorized By **WALTER MEECH** Date **07/07/03**
Sampled By **WALTER MEECH** Date **07/07/03**
Submitted By **WALTER MEECH** Date **07/07/03**

Project **RIO ALGOM MINING COMPANY-EROSION PROTECTION** Location **ALBUQUERQUE LABORATORY**
Contractor **C&E CONCRETE** Arch./Engr. **UNKNOWN**
Type / Use of Aggregate **EROSION PROTECTION** Supplier / Source **TINAJA PIT**
Sample Source / Location **TINAJA PIT** Source / Location Desig. By **WALTER MEECH** Date **07/07/03**
Reference: **SOUNDNESS: ASTM C88 AASHTO T104 SODIUM SULFATE MAGNESIUM SULFATE**
ABRASION RESISTANCE: ASTM C131 AASHTO T96 ASTM C535

Special Instructions:

TEST RESULTS

SIEVE SIZE	GRADING OF ORIGINAL SAMPLE %	WEIGHT OF TEST FRACTIONS BEFORE TEST GRAMS	PASSING DESIGNATED SIEVE AFTER TEST %	WEIGHTED PERCENTAGE LOSS	ALLOWABLE PERCENTAGE LOSS						
					SODIUM	MAGNESIUM					
SOUNDNESS TEST OF FINE AGGREGATE					SOLUTION CONDITION: <input type="checkbox"/> NEW <input type="checkbox"/> USED						
MINUS NO. 100					NO. OF CYCLES						
NO. 50 TO NO. 100											
NO. 30 TO NO. 50											
NO. 16 TO NO. 30											
NO. 8 TO NO. 16											
NO. 4 TO NO. 8											
3/8 IN. TO NO. 4					NO. OF CYCLES 5						
TOTAL											
SOUNDNESS TEST OF COARSE AGGREGATE							SOLUTION CONDITION: <input checked="" type="checkbox"/> NEW <input type="checkbox"/> USED				
2 1/2 IN. TO 1 1/2 IN.							NO. OF CYCLES 5				
1 1/2 IN. TO 3/4 IN.	25	501.7	6.8	0.2							
3/4 IN. TO 3/8 IN.	50	1000.2	1.3	0.7							
3/8 IN. TO NO. 4	25	300.0	5.4	1.4							
TOTAL	100			2.3							
QUALITATIVE EXAMINATION OF COARSE SIZE PARTICLES EXHIBITING DISTRESS											
SIEVE SIZE	SPLITTING		CRUMBLING		CRACKING		FLAKING		TOTAL NO. PARTICLES BEFORE TEST		
	NO.	%	NO.	%	NO.	%	NO.	%			
2 1/2 IN. TO 1 1/2 IN.									NO. OF CYCLES 5		
1 1/2 IN. TO 3/4 IN.											
RESISTANCE TO DEGRADATION BY L.A. MACHINE					% LOSS	SPECIFICATION					
SMALL COARSE AGGREGATE - GRADING A					100 REV. →	7					
					500 REV. →						
LARGE COARSE AGGREGATE - GRADING					200 REV. →						
					1000 REV. →						

Comments:

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427095WTI
082899

Rock Quality Scoring Tabulation

Test	Weighting Factor	Test Value	Score	Computed Score
Specific Gravity	12	2.625	7.5	90
Absorption, %	13	0.62	7.3	94.9
Sodium Sulfate, %	4	2.3	9.5	38
L/A Abrasion(100 rev), %	1	6.2	7.3	7.3
Schmidt Hammer	11	65.2	9.1	100.1
			Total Score	330.3

Limestone - Tinaja Pit

Sample 3L276-B
Sample on July 7, 2003

80.5

APPENDIX 4

Tinaja Pit Rock Lab Results
2003



**AMERICAN
PETROGRAPHIC
SERVICES, INC.**

JUL 09 2003

PETROGRAPHIC ANALYSIS OF AGGREGATE

PROJECT:

**C & E CONCRETE
RIO ALGOM MINING COMPANY
EROSION PROTECTION ROCK**

REPORTED TO:

**WESTERN TECHNOLOGIES, INC.
8305 WASHINGTON PLACE, N.E.
ALBUQUERQUE, NM 87113-1670**

ATTN: ANDREW CUADERES

APS JOB NO: 10-02627

DATE: JUNE 25, 2003

INTRODUCTION

This report presents the results of laboratory work performed by our firm on one sample of crushed carbonate submitted to us by Ms. Deborah Hammer of Western Technologies, Inc. on May 28, 2003. The scope of our work was limited to performing petrographic analysis testing on the aggregate sample to provide a geological description of the material as well as identify any potentially deleterious properties when it is used for erosion control.

SAMPLE IDENTIFICATION

Sample Identification:	Tineja Pit, #3L127
Sample Type:	Crushed Carbonate
Original Sample size, lbs:	14.8

TEST RESULTS

Our complete petrographic analysis test results appear on the attached data sheets. A summary of our analysis and opinions are as follows:

1. The angular, crushed particles ranged from equidimensional to flat and elongate. The material was relatively clean of rock flour.
2. The material ranged from a pinkish-brown limestone to a pinkish-tan dolomitic limestone. The material contained equal amounts of both lithologies. Fossil fragments observed in both fossiliferous carbonates include echinoderms, brachiopods, and bivalves.

- 4. In general, the rock was judged to be hard, sound, and appeared durable. However, the dolomitic limestone contains significantly more fine pore space, produced by the dolomitization process, than the limestone.
- 5. We believe the carbonate material to be a good candidate for erosion control under moderate exposure conditions.

TEST PROCEDURES

Laboratory testing was performed on June 10, 2003 and subsequent dates. The petrographic analysis was performed on representative hand samples and in thin section. A total of six thin sections were produced from selected lithologies. Observations were made using an Olympus polarizing-light microscope with magnification up to 1000x and an Olympus stereozoom microscope with magnification up to 130x. Testing was performed in accordance with APS Standard Operating Procedure 00 LAB 004, "Petrographic Examination of Aggregates for Concrete, ASTM:C295."

Photographs are included to illustrate our work and conclusions.

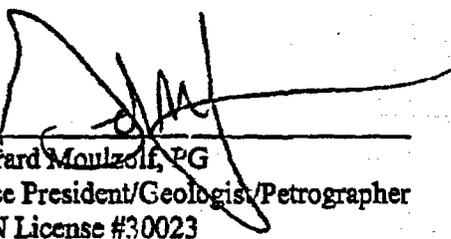
REMARKS

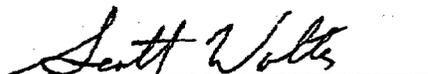
The test sample will be retained for a period of at least thirty days from the date of this report. Unless further instructions are received by that time, the sample may be discarded. Potential reactivity testing can be performed in our laboratories. The geologic services for this project have been conducted in a manner consistent with that level of care and skill exercised by members of the profession currently practicing in this area under similar budget and time constraints. No warranty, express or implied, is made.

If we can be of further assistance to you, please contact Gerard Moulzolf at (651) 659-1346 or Scott Wolter at (651) 659-1345.

Report Prepared by:

Report Reviewed by:


 Gerard Moulzolf, PG
 Vice President/Geologist/Petrographer
 MN License #30023


 Scott F. Wolter, PG
 President
 MN License #30024

00 LAB 004

PETROGRAPHIC EXAMINATION OF AGGREGATES FOR CONCRETE, ASTM:C295

APS JOB NO: 10-02627

DATE: June 25, 2003

SAMPLE NO: Thin Sections 1, 2, and 3

PETROGRAPHER: C. Tillema/G.Moulzolf

DESCRIPTION: Pinkish-tan biosparite; a fossiliferous, dolomitic limestone. The carbonate consists of partially obscured echinoderm, brachiopods, and bivalve fossils with medium to coarse calcite spar in a matrix of dolomite microspar (4µm-10µm, #3), pseudospar (10µm-50µm, #2) and a mixture of both (#1). Very fine grained, well disseminated iron oxide grains were observed throughout the dolomitized matrix. Dolomitization has produced fine porespace throughout the dolomite-rich matrix. A trace of silicification was observed in a few microfossil cores.

A small amount of very fine sand to coarse silt-sized, detrital quartz and feldspar grains were observed in all thin sections. Thin, crosscutting, clear to orange-red stained calcite veinlets were observed in the hand samples 1 and 2. A vein of coarse, white calcite was observed on the outer surface of hand sample 1. Orange-red iron oxide staining was observed within the calcite vein and many veinlets.

MINERALOGY:

OPTICAL PROPERTIES:

<u>MINERALS</u>	<u>VOL*</u>	<u>COLOR</u>	<u>BIREFRINGENCE</u>	<u>RELIEF</u>	<u>HABIT OTHER</u>
calcite	49%	colorless	high 3 rd to 4 th order	varies	relief changes with rotation
dolomite	48%	colorless	high 3 rd to 4 th order	varies	relief changes with rotation
quartz	2%	colorless	1 st order grays	low	detrital sand grains, clean, unit extinction
feldspar	1%	colorless	1 st order grays	low	detrital sand grains, alteration to sericite
chalcedony	trace	colorless	1 st order grays	low	spherulitic growth of fibrous quartz
iron oxide	trace	opaque to red	-	-	red to orange-red in reflected light

*visual estimation of thin section 3 (stained with alizarin red)

00 LAB 004

PETROGRAPHIC EXAMINATION OF AGGREGATES FOR CONCRETE, ASTM:C295

APS JOB NO: 10-02627

DATE: June 25, 2003

SAMPLE NO: Thin Sections 4, 5, and 6

PETROGRAPHER: C. Tillema/G.Moulzolf

DESCRIPTION: Pinkish-brown calcite biosparite; a fossiliferous limestone. The carbonate consists of partially obscured echinoderm, brachiopods, and bivalve microfossils with few ooids in a porphyrotopic matrix of calcite. Fine grained, well disseminated iron oxide grains were observed throughout the matrix.

A small amount of coarse silt-sized, detrital quartz and feldspar grains were observed in all thin sections. Thin, clear sparry calcite veinlets were observed in the thin section 6. A stylolite, a sutured pressure solution structure, was observed in hand sample 6. The pink coloration of the stylolite is most likely due to the concentration of iron oxide.

Chalcedony (chert) nodules, up to a few mm in size, occur in the cores of several microfossil grains.

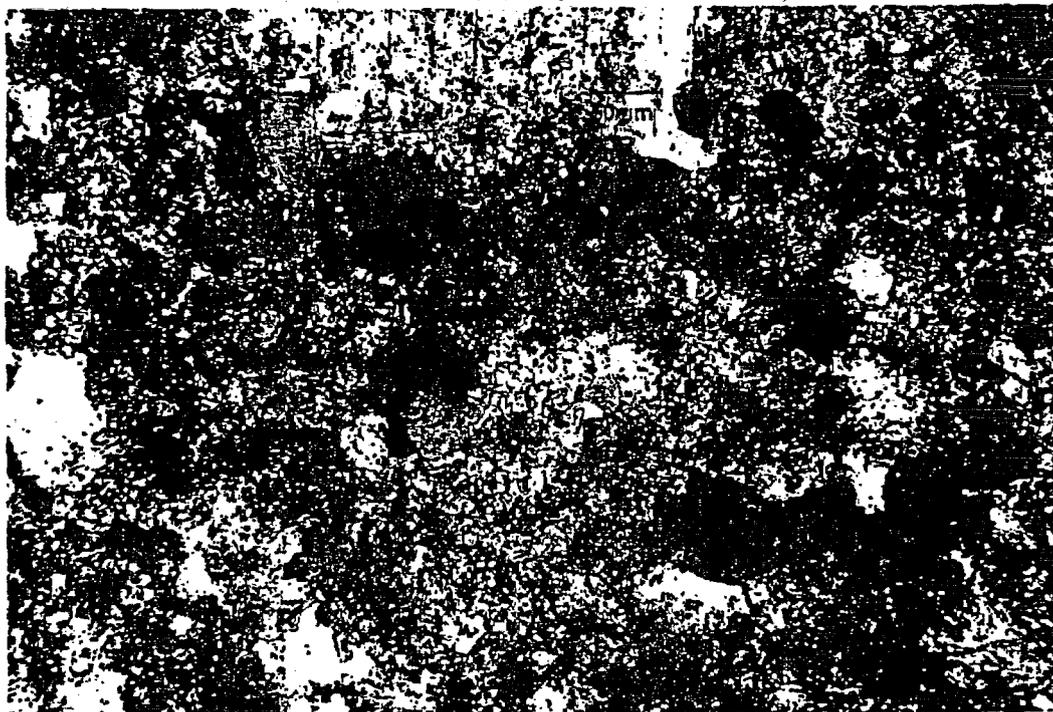
MINERALOGY:

OPTICAL PROPERTIES:

<u>MINERALS</u>	<u>VOL*</u>	<u>COLOR</u>	<u>BIREFRINGENCE</u>	<u>RELIEF</u>	<u>HABIT, OTHER</u>
calcite	97%	colorless	high 3 rd to 4 th order	varies	relief changes with rotation
chalcedony	3%	colorless	1 st order grays	low	spherulitic growth of fibrous quartz, occurring in microfossil cores
quartz	1%	colorless	1 st order grays	low	detrital sand grains, unit extinction,
feldspar	<1%	colorless	1 st order grays	low	detrital sand grains, alteration to sericite
iron oxide	trace	opaque to red	-	-	red to orange-red in reflected light

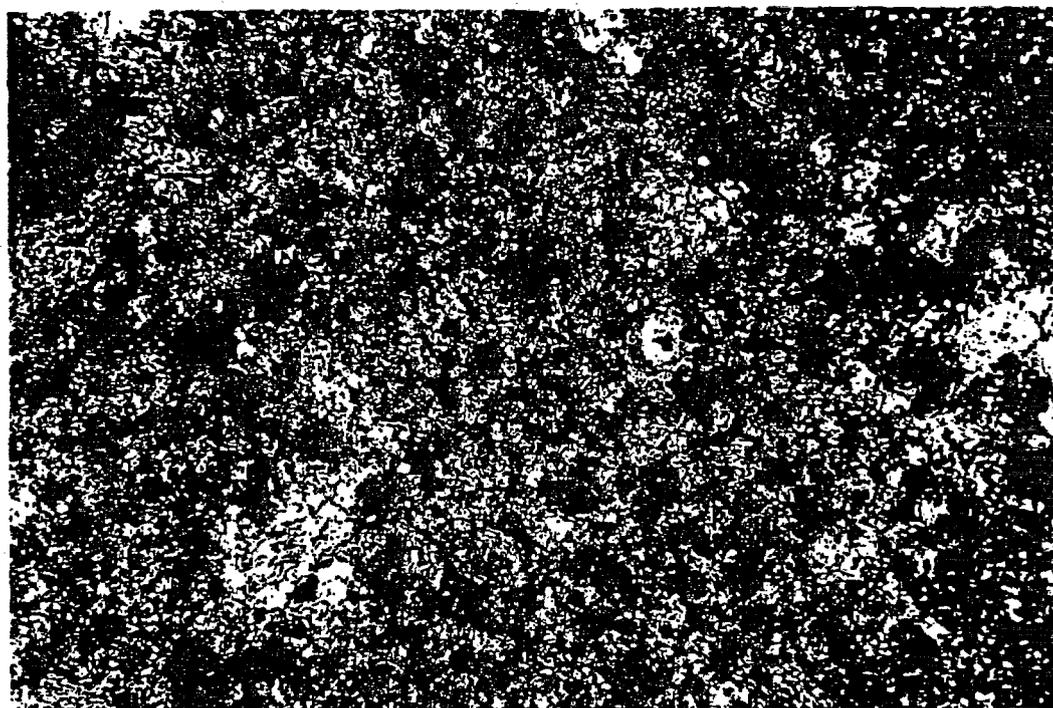
*visual estimation of thin section 6 (stained with alizarin red)

APS# 10-02627
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SAMPLE ID: Thin Section 1 DESCRIPTION: Gray, very fine sand to coarse silt-sized, detrital quartz grains in thin section of fossiliferous, dolomitic limestone under cross polarized light.

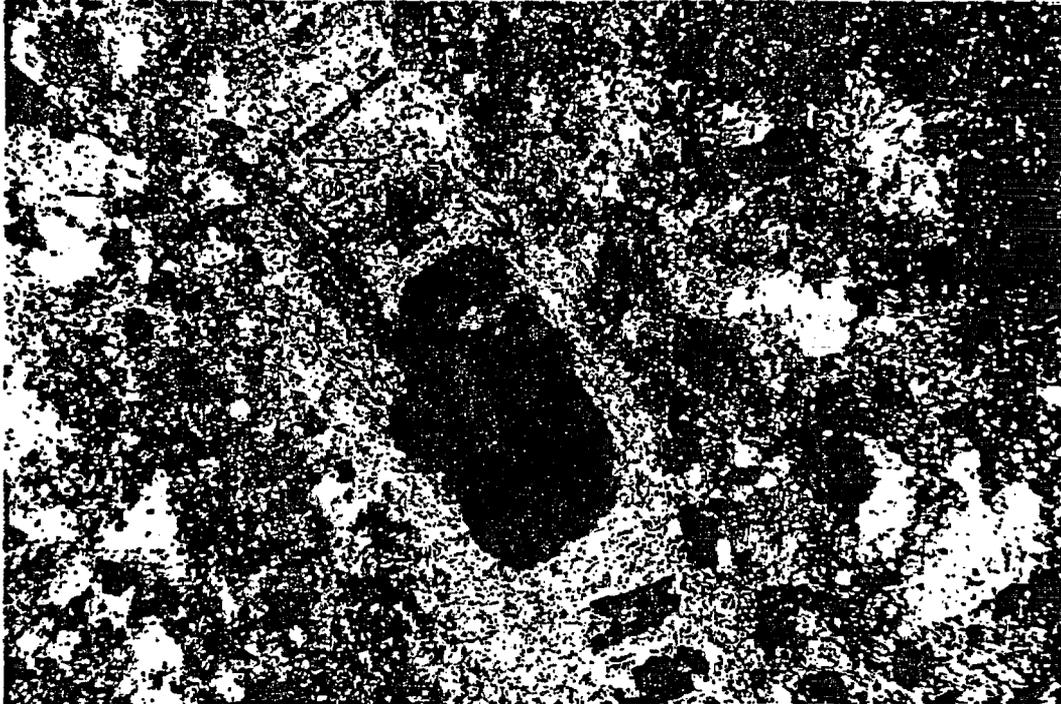
MAG: 200x



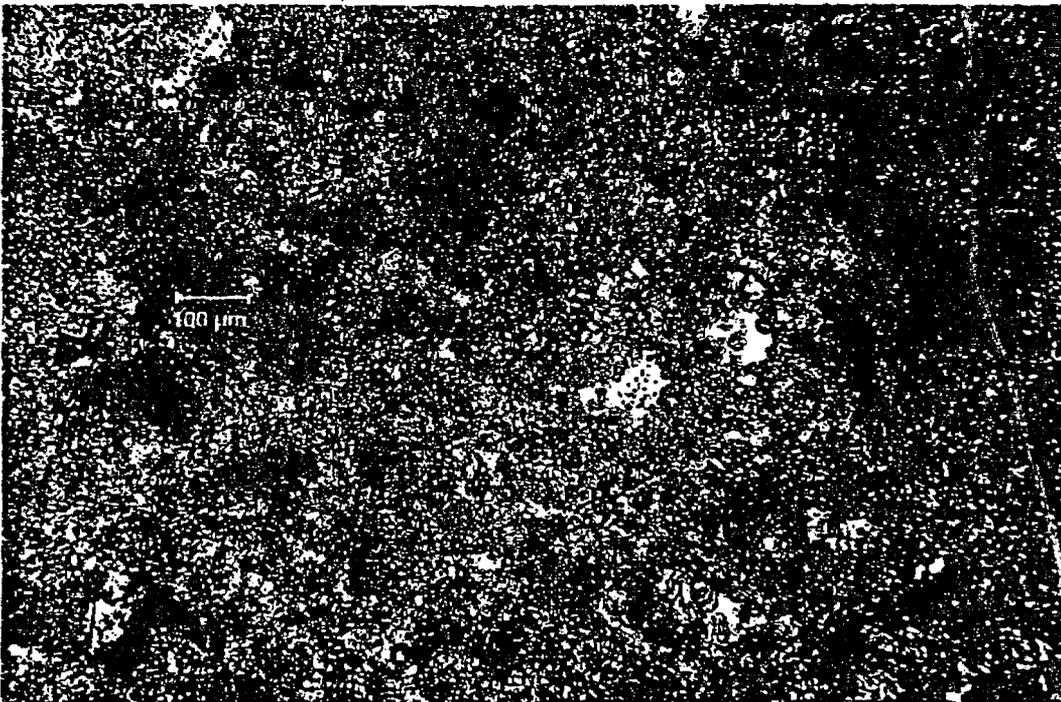
SAMPLE ID: Thin Section 2 DESCRIPTION: Porosity (black) in fine, dolomite-rich matrix; thin section of dolomitic limestone under cross polarized light.

MAG: 200x

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SAMPLE ID: Thin Section 2 DESCRIPTION: White to black chalcedony nodule in core of microfossil grain; in thin section of fossiliferous, dolomitic limestone under cross polarized light.
MAG: 100x

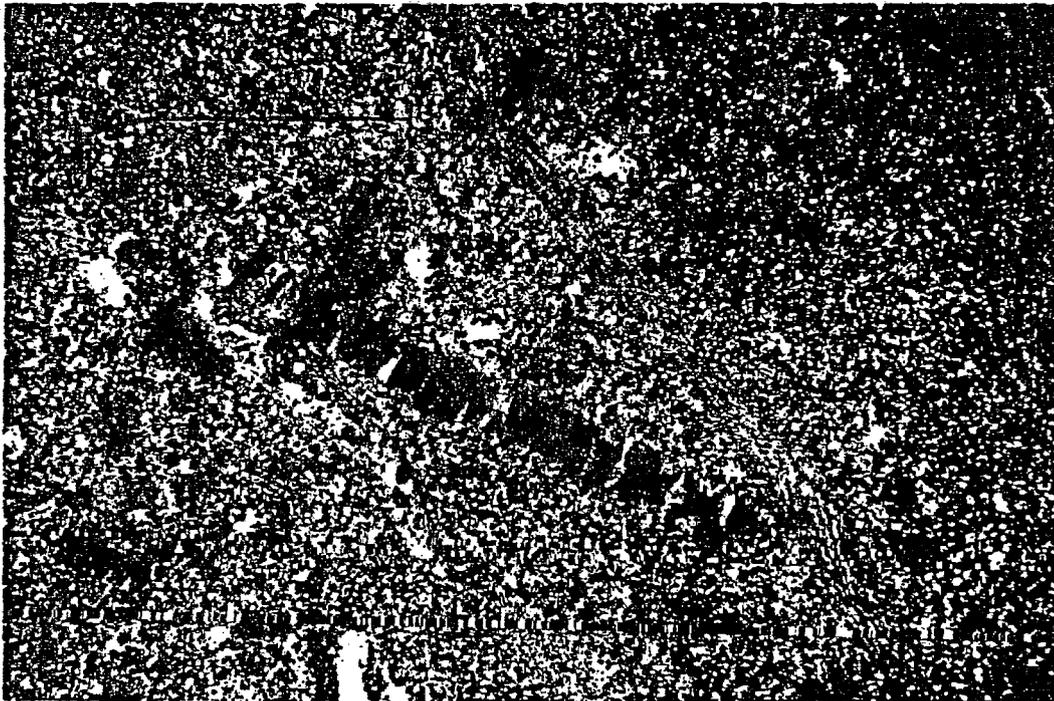


SAMPLE ID: Thin Section 3 DESCRIPTION: Pink stained calcite and unstained dolomite in thin section of dolomitic limestone under plane polarized light.
MAG: 100x

APS# 10-02627
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SAMPLE ID: Thin Section 4 DESCRIPTION: White to black chalcidony nodule mostly replaces core of echinoderm microfossil grain; in thin section of fossiliferous limestone under cross polarized light.
MAG: 40x



SAMPLE ID: Thin Section 5 DESCRIPTION: Microfossil fragments in calcite spar; in thin section of limestone under cross polarized light.
MAG: 40x